
California Environmental Quality Act (CEQA) Initial Study

for the
Three Meadows Restoration Project

March 20, 2020

Project Title: Three Meadows Restoration Project

Lead Agency Name and Address: Amador Resource Conservation District
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Project location: Eldorado National Forest, Amador Ranger District
El Dorado County, T09N, R16E, Sections 29, 30 and 31

Project Sponsor's name and address: Eldorado National Forest
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General Plan designation: Timberland Agricultural Area

Zoning: FR-160 (Forest Resource, 160-acre minimum)

Description of Project: Three Meadow Restoration Project would restore the natural morphology of three relatively small, high elevation meadows in Amador County, California. The purpose of the project is to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation. By improving the meadow hydrology, the project would also improve and increase habitat potentially available for Sierra Nevada yellow-legged frogs, expand willow habitat for songbirds, including the willow flycatcher, and improve habitat quality for sensitive species associated with wet meadows such as broad-nerved hump-moss (*Meesia uliginosa*), moonworts (*Botrychium* spp.) and Bolander's bruchia (*Burchia bolanderi*), and increase the production of aquatic invertebrates and insects that provide food for amphibians, and songbirds.

Surrounding Land Uses and Setting: The Three Meadows Restoration Project Area (Project Area) is located within three (3) small alpine meadows ranging in elevation from 6,800 to 8,000 feet in elevation. High Onion and Upper Onion Valley are located along Onion River within the Cole Creek Watershed. Tyler meadow drains to Upper Bear River Reservoir. The meadows are surrounded by mixed fir and pine forest dominated by lodgepole pine (*Pinus contorta*, FAC) and red fir (*Abies magnifica*, UPL).

Meadow Name	Location	Project Area	Elevation
Upper Onion Valley	T8N, R16E, Sec 11	26.8 acres	7,480
High Onion Meadow	T8N, R16E, Sec 1	10.2 acres	8,000
Tyler Meadow	T8N, R16E, Sec 3	10.3 acres	6,800

The meadows are accessible via the USDA-Forest Service road network. The meadow was used historically for cattle and sheep grazing; dispersed recreation (e.g., camping, fishing, etc.) is now the primary land use. Surrounding land uses in the vicinity of the meadow include timber harvest, fuels reduction, plantation management, and dispersed summer and winter recreational activities.

Other Public Agencies Whose Approval is Required:

- Central Valley Regional Water Quality Control Board: 401 Water Quality Certification (in process).
- U.S. Army Corp of Engineers: Clean Water Act, Section 404, Nationwide Permit #27 (in process).
- Draft Eldorado National Forest: Decision Memo (under review, Attachment J).

California Native American Tribal Consultation Summary: On July 18, 2019, the Amador Ranger District, Eldorado National Forest notified local Native American tribes, pursuant to Public Resources Code Section 21080.3.1, of the proposed project and of the tribes' opportunity to request consultation. On February 22, 2020, the ARCD as Lead CEQA Agency contacted the Native American Heritage Commission (NAHC) to request a review of the Sacred Lands files and request a list of Native American contacts in the vicinity of the project site. Several tribal groups were notified: Buena Vista Rancheria of Me-wuk Indians, Ione Band of Miwok Indians, Jackson Rancheria, Shing Springs Rancheria, United Auburn Indian Community, Washoe Tribe of Nevada and California, Calaveras Band of Mi-Wuk Indians, and Wilton Rancheria. As of March 2020, there has been no response from any of the Tribal contacts. Tribal consultation will be on-going throughout the duration of the project. Interested Tribes will be kept informed of the project stages and implementation as the project progresses.

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Appendices

- Appendix A Three Meadows Restoration Basis of Design Report – November 24, 2019
- Appendix B Biological Evaluation and Biological Assessment for Threatened, Endangered, and Sensitive Terrestrial Wildlife Species for the Three Meadows Restoration Project – February 5, 2020
- Appendix C Aquatic Biological Assessment for the Three Meadows Restoration Project – February 5, 2020
- Appendix D Aquatic Biological Evaluation for the Three Meadows Restoration Project – February 5, 2020
- Appendix E Biological Evaluation and Assessment for the Threatened, Endangered, and Sensitive Botanical Species – February 5, 2020
- Appendix F Additional Botanical, Terrestrial and Aquatic Wildlife Species Considered for Analysis for the Three Meadows CEQA Initial Study
- Appendix G Silvicultural Assessment of Three Meadows Restoration Project – September 6, 2019
- Appendix H Hydrology Report for the Three Meadows Restoration Project – February 28, 2020
- Appendix I Tribal Consultation Documentation

Project Description

Background

Within the Mokelumne River watershed, a diverse group of stakeholders formed the Amador Calaveras Consensus Group (ACCG) to address the impacts to unique meadow habitats from historic land use practices. Together with the Amador Resource Conservation District (ARCD), ACCG have applied for and received funding to conduct an assessment and develop preliminary restoration plans for three small, high elevation meadows located on the Amador Ranger District Eldorado National Forest in Amador County, California. The project is referred to as the “Three Meadows” Project Area and includes: Upper Onion Valley, High Onion Meadow, and Tyler Meadow.

The Three Meadows Restoration Project area is located approximately 50 miles northeast of Jackson, California, and east of Bear River Reservoir in the Amador Ranger District of the Eldorado Nation Forest. Tyler meadow is located within the Bear River Watershed, and High Onion and Upper Onion are in the Cole Creek Watershed (T9N, R16 E, Sections 01, 03, 11), Mount Diablo Meridian (reference Figure 1).

Table 1. Project Area Location Summary

Meadow Name	Location	Project Area	Elevation
Upper Onion Valley	T8N, R16E, Sec 11	26.8 acres	7,480
High Onion Meadow	T8N, R16E, Sec 1	10.2 acres	8,000
Tyler Meadow	T8N, R16E, Sec 3	10.3 acres	6,800

ARCD in Amador Ranger District (District) is the lead California Environmental Quality Act (CEQA) agency for the Three Meadows Project. The District has obtained Waterways Consulting Inc, to prepare design services for this meadow project. The completed Design Report is provided in Appendix A.

With the assistance of Resource Concepts, Inc (RCI), an environmental consulting firm, the District has completed the required natural and cultural resource surveys necessary to assess potential environmental impact and complete this CEQA Initial Study. Resource surveys and environmental assessments are attached in Appendices B-I.

Proposed Project

The Amador Ranger District, El Dorado National Forest and project stakeholders are seeking to restore the natural morphology of three relatively small, high elevation meadows in Amador County, California. The purpose of the project is to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks.

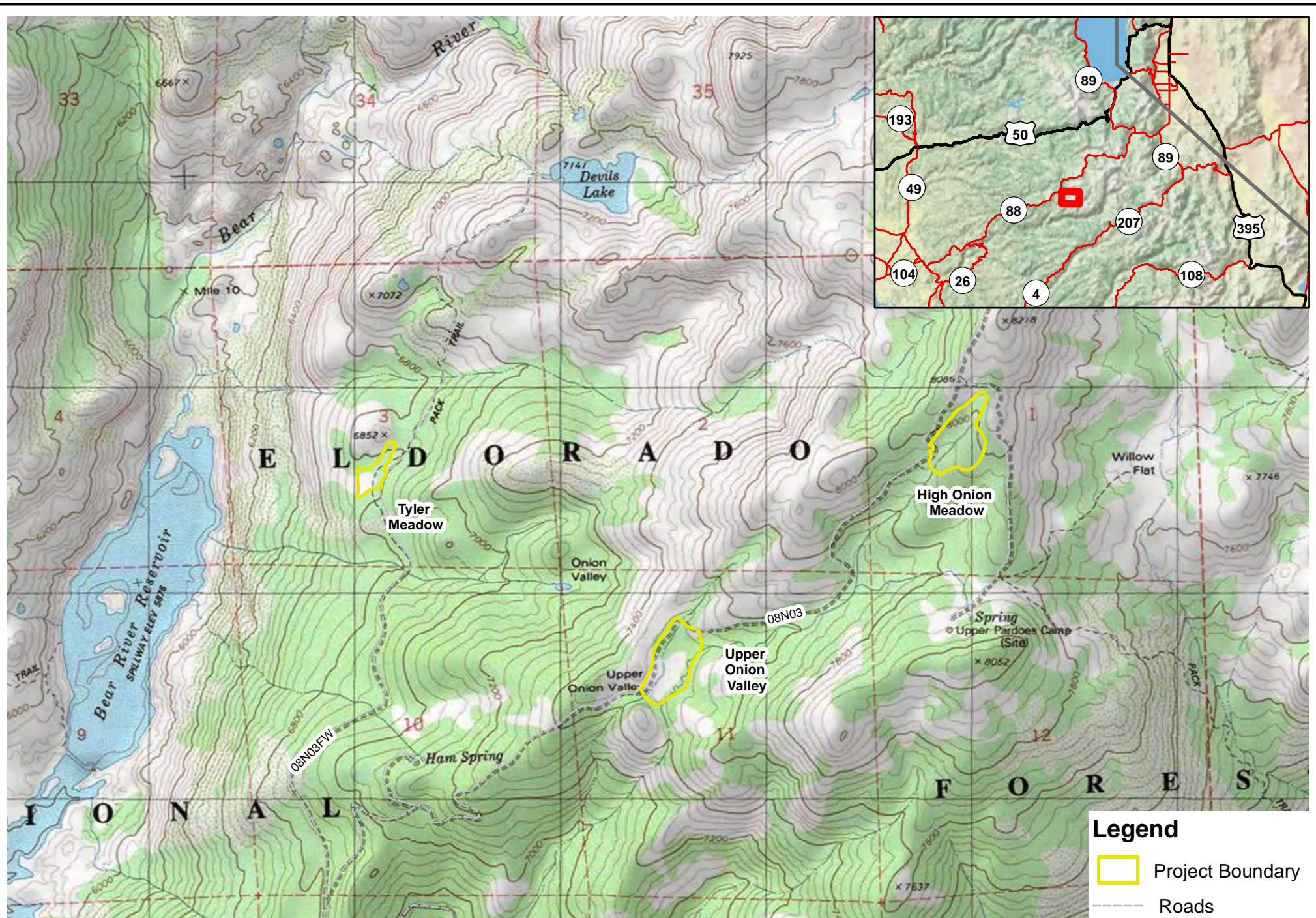


Figure 1: Location Map
Three Meadows Restoration Project

To achieve the above restoration goals, each of the three meadows has its own management action plan to resolve specific resource concerns as described below:

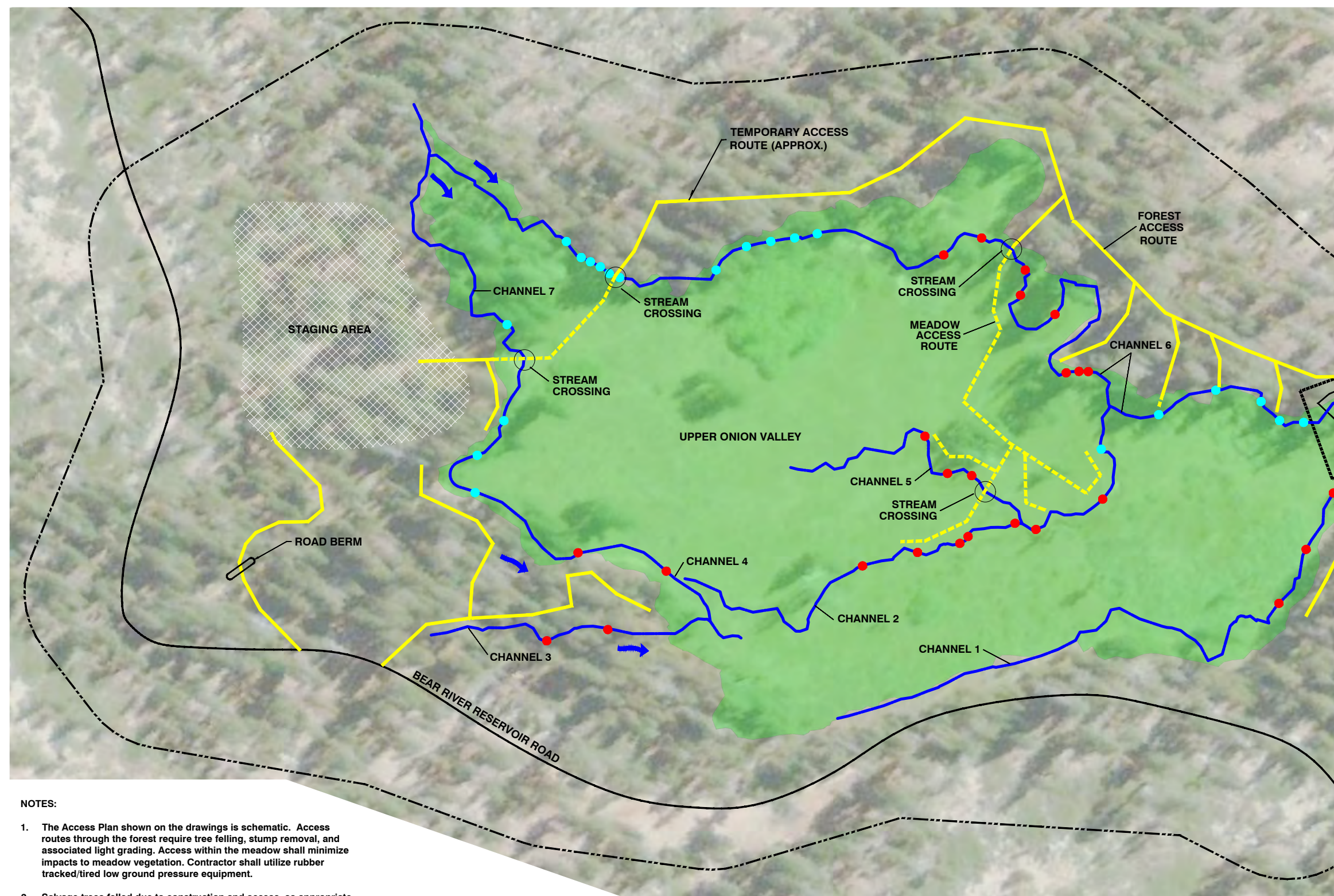
Upper Onion Valley

The proposed restoration actions for Upper Onion Valley include installation of rock riffles and log weirs. The constructed rock riffles and log weirs would be located in existing, incised channels to stabilize the profile grade within the meadow channel, encourage aggradation, restore the hydraulic continuity of flow through the meadow, and raise the groundwater table (reference Figure 2). Rock riffles would be placed in greater than one foot in depth, forming a system of short rock riffle segments interspersed with longer pools. For the constructed riffles a four foot long riffle crest would be established that is keyed into the streambed and banks. Rock ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and at a 1:1 slope at the upstream end. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Approximately twenty-one (21) constructed rock riffles would be placed within Onion Creek, the main channel through the Upper Onion Valley.

Additionally, the project activities at Upper Onion Valley include the installation of twenty-five (25) log weirs as grade control located primarily within lower energy, less incised portions of the channel network. It is estimated that approximately seventy-three (73) logs less than 30" diameter at breast height (dbh) would be needed to construct the weirs and would be harvested from trees within the meadow, along the designated access routes, or near the meadow margins. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

To provide downstream grade control for the meadow, a roughened channel will be constructed at outlet of the meadow. The purpose of the structure is to actively raise water surfaces through the channels and the meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and bury the upstream grade control structures. The roughened channel will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream of the crest and extend upstream of the crest at a 1:1 slope for approximately 10 feet to protect against undermining of the roughened channel. The roughened channel should be a minimum of three feet thick, composed of rock material of various sizes, and would look like a long sloping riffle when completed. Rock would likely be imported to the site from Forest Service rock staging areas in the district.

The proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area (reference the design report in Appendix A and Figure 2). Currently flow within the channel is captured and rerouted within the existing roadbed rather than the natural stream channel. To restore and contain the flows within the original stream channel, the restoration project would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel. The berms on each side of the stream channel would be built up two feet with a 1.5 inch aggregate base material and will contain the streamflow in the original channel and prevent the water from flowing within the existing roadbed. The aggregate base material will be located within the roadbed above the stream channel.



NOTES:

1. The Access Plan shown on the drawings is schematic. Access routes through the forest require tree felling, stump removal, and associated light grading. Access within the meadow shall minimize impacts to meadow vegetation. Contractor shall utilize rubber tracked/tired low ground pressure equipment.
2. Salvage trees felled due to construction and access, as appropriate.
3. Access routes require channel crossings. Contractor shall minimize channel impacts by use of temporary bridge such as marsh mats or corduroy stream crossings.
4. Stage materials within the existing primitive campground. Contain the downslope perimeter of staging or stockpile areas with silt fence.
5. Store, maintain and refuel all equipment and materials in a designated portion of the staging area.
6. Restore access routes prior to final demobilization. Forest access routes require ripping, seeding, and coarse wood cover (e.g. logs and slash). Meadow access routes shall be restored to pre-project conditions.
7. Salvage willows at direction of Engineer or USFS representative.

FIGURE 2
THREE MEADOWS RESTORATION PROJECT
UPPER ONION VALLEY
PLAN VIEW

The Upper Onion Valley site would be accessed by Bear River Reservoir Road (FS Road 08N03), a well-developed road that runs along the entire western and northern sides of the meadow. Staging of equipment and materials would occur at an existing primitive campground located at the northern (up gradient) edge of the meadow. Temporary access routes originating from the staging area and Bear River Reservoir Road would be utilized to access the interior of the site for placement of log weirs on the smaller, interior channels. Access routes would be field fit to minimize impacts caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road, steel plates, or marsh mats would be used. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions and elevation.

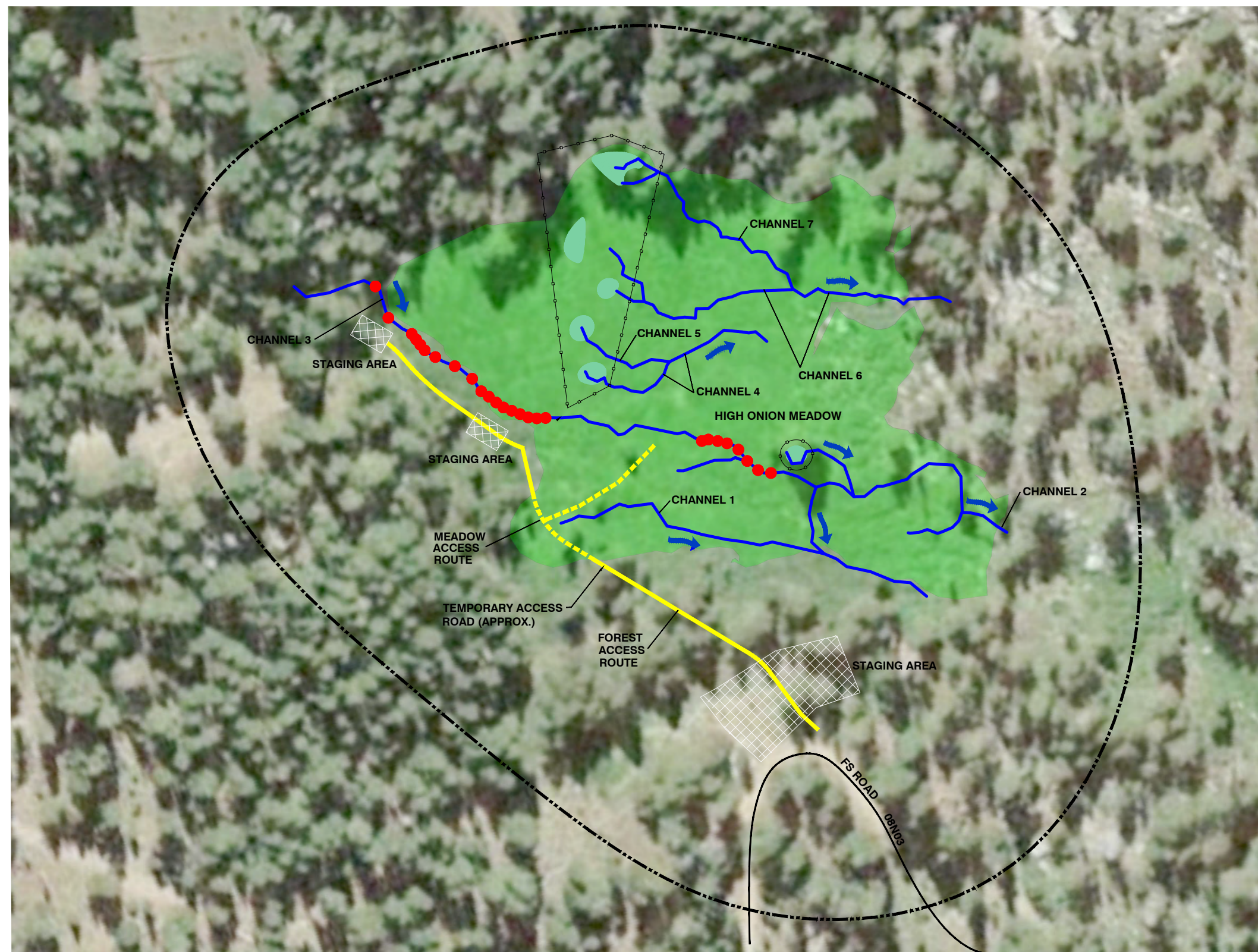
High Onion Meadow

The proposed action for High Onion Meadow includes the installation of low weir grade control structures in the primary meadow channel to limit additional downcutting, manage the timing and duration of grazing, and protect seepage sources from cattle grazing (reference Figure 3). Approximately 26 log grade control weirs spaced at approximately 25-foot intervals are proposed to be installed along the unnamed creek to enhance sedimentation and limit future risk of channel incision. It is anticipated that the structures would be built with hand tools and hand labor given the relatively narrow channel widths.

Approximately 75 conifers not to exceed 12-15 feet in length and with diameters ranging from 8 to 12 inches may be selected for harvest near the meadow margins, along the designated access routes, or in and around the High Onion Meadow. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

To discourage cattle use around sensitive areas and seepage sources, the project proposes to install fencing around the seeps that would prevent cattle access and usage of these areas. Most of the seeps identified in High Onion occur along the downstream margin of the upper fansurface as perched groundwater intersects the lower fan surface, and the entire geomorphic surface will be fenced off. Fencing would consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.

High Onion Meadow is accessible from Forest Service Road 08N03 and staging of materials and equipment would be located within an existing primitive campground adjacent to the road. Temporary access routes originating from the staging area adjacent to the Forest Service Road would skirt the upper edge of the meadow and cross over Onion Creek. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Within High Onion Meadow, access routes are to be constructed along the upper northwestern edge and no stream crossings are required. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.



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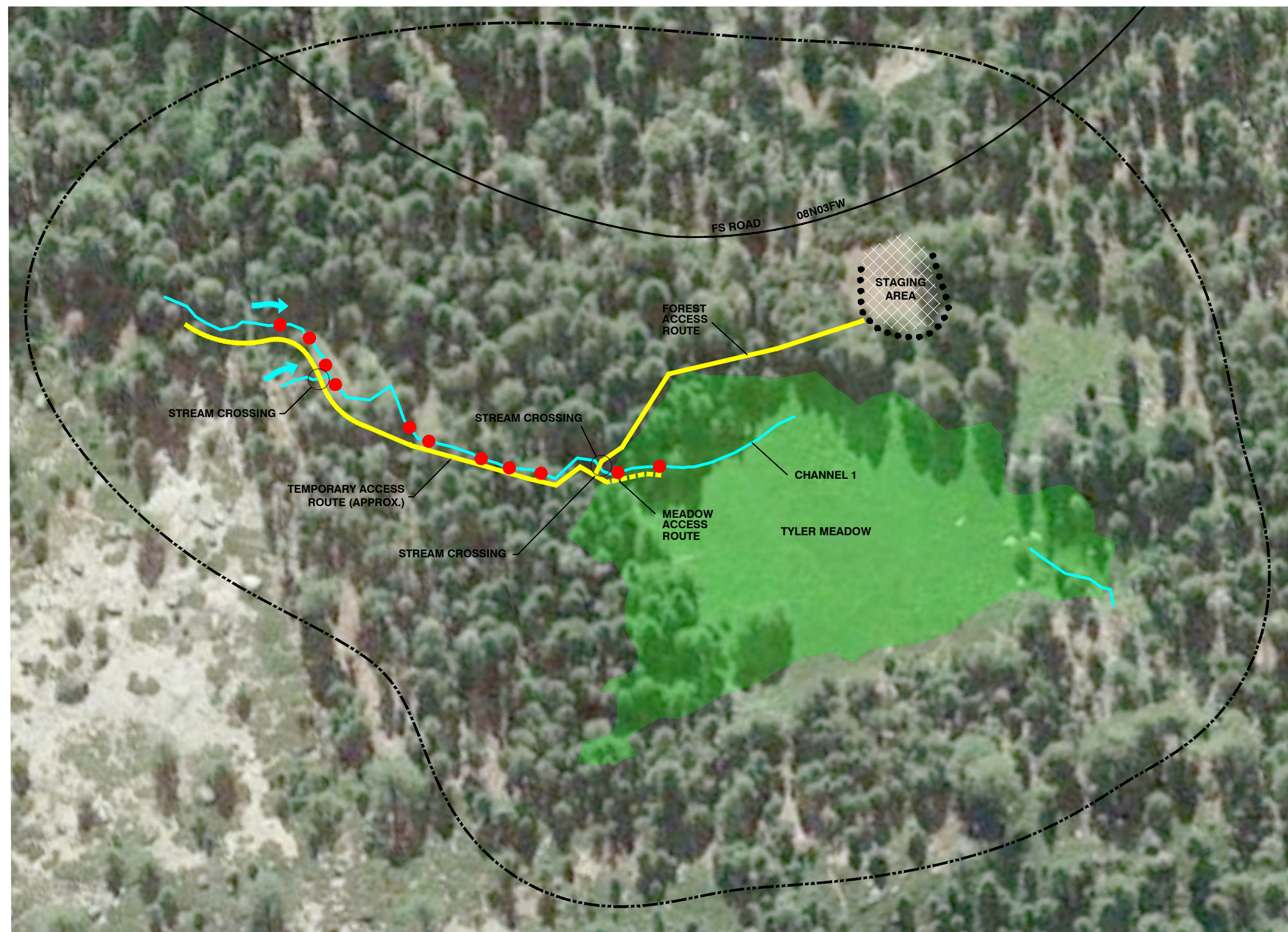
FIGURE 3
THREE MEADOWS RESTORATION PROJECT
HIGH ONION MEADOW
PLAN VIEW

Tyler Meadow

The proposed restoration actions for Tyler Meadow include management of the timing and duration of grazing, limit access by off-highway vehicles (OHVs), and installation of approximately 10-12 log weir grade control structures to limit additional downcutting (reference Figure 4). The log weir grades would be in the primary channel located in the forested area upstream of the meadow. Approximately thirty (30) conifers less than 30" dbh may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Tyler Meadow Project Area. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

One temporary access route will be constructed through upland forest from the FS Road 08N03FW located along the east side of the meadow to the stream channel. The access route will cross through the intermittent stream channel and will be located along the northwestern edge of the stream within an existing disturbance corridor. The access route would be field fit to minimize impacts soil caused by potential tree felling, removal of stumps, and light grading. One crossing of the intermittent stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks as shown on the plan. As the proposed action is limited to the creek channel above Tyler Meadow, there would be no access routes or construction equipment within the meadow.

To limit future access to the meadow by off-road vehicles, either boulders or logs buried by sediment will be placed around the margin of the parking area.



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FIGURE 4
THREE MEADOWS RESTORATION PROJECT
TYLER MEADOW
PLAN VIEW

Table 2 summarizes the action items proposed at each of the three meadows to restore the hydrologic functions utilizing log weirs, constructed rock riffles, and constructed roughened channel to raise the base level within the channels, encourage aggradation, reduce the overall channel capacity and raise the groundwater tables. The project also proposes the installation of fencing and boulder barriers to reduce impacts from grazing and off-highway vehicle (OHV) access to the meadows. Project construction will be completed in late summer and fall of 2020 when the channels are expected to be dry.

Table 2. Action Items of the Three Meadows Restoration Project

Action Item Number	Action
1	<p>Construction of log weirs and constructed rock riffles within existing incised channels to raise base level of channel, encourage aggradation, reduce overall channel capacity and raise the groundwater table (Figures 2 through 4):</p> <ul style="list-style-type: none"> • Construction of log weirs: 11 at Tyler Meadow (intermittent stream), 25 at Upper Onion Valley (intermittent streams), and 26 at High Onion (intermittent streams). Logs will be felled from suitable trees located along the meadow edge, along temporary access routes or from within the meadows. Trees used for log weirs will be hand felled, bucked, and limbed. Transport from the harvest location to the weir construction will utilize various construction equipment. Log weirs will be installed by hand crews. • Construct 21 rock riffles along Onion Creek and two tributaries within Upper Onion Valley. It is expected that rock for the riffles will be imported from the Tragedy Pit. Construction of rock riffles will be completed using motorized equipment in the meadow.
2	<p>Construct Roughened Channel To control overall base level of Upper Onion Valley meadow (Figure 2)</p> <ul style="list-style-type: none"> • Placement of rock within 90 lf / 720 sq. ft. of perennial streams and 0.01 acre of adjacent wet meadow at the outflow from Upper Onion Valley. Rock will likely be imported from Tragedy Pit for this component. Motorized equipment would be used in order to accomplish this action item.
3	<p>Construct Road Berm on FS Road 08N03 (Figure 2)</p> <ul style="list-style-type: none"> • Placement of 5:1 sloped rock berms to direct stream flow to original channel and into meadow.
4	<p>Installation of exclusionary cattle fencing at High Onion (Figure 3)</p> <ul style="list-style-type: none"> • Fencing will be placed around six (6) hillslope seeps to protect existing hydrology and prevent soil compaction
5	<p>Installation of OHV fencing at Tyler Meadow (Figure 4)</p> <ul style="list-style-type: none"> • Log or rock barriers will be placed along upper meadow edge to prevent OHV access from adjacent roadway.
6	<p>Installation Temporary Access Roads (Figures 2 through 4)</p> <ul style="list-style-type: none"> • Access to the meadow restoration areas will be via temporary forest access routes (approx. 3,875 lf / 1.3 acres) and meadow access routes (1,170 lf / 0.40 ac) to be restored upon project completion.

Material Sourcing

The primary materials needed for the construction of the restoration project are logs for the log weirs and the stream bed material for the constructed riffles and roughened channels. All of the logs are anticipated to be sourced from on-site, both adjacent to and within the meadow. The streambed material is expected to be sourced from other Forest Service rock staging areas within the district. Rock transported to the site would be delivered to the proposed staging areas and mixed on site to achieve the desired gradation for either the constructed riffles of the roughened channel.

Revegetation

The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadows are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the Eldorado National Forest (ENF) Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

Post-Project Monitoring

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted.

Environmental Factors Potentially Affected

This Initial Study has determined that in the absence of mitigation the proposed project could have the potential to result in significant impacts associated with the factors checked below. Mitigation measures are identified in this Initial Study that would reduce all potentially significant impacts to less-than-significant levels.

- | | | |
|---|---|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Agriculture/Forestry Resources | <input checked="" type="checkbox"/> Air Quality |
| <input checked="" type="checkbox"/> Biological Resources | <input checked="" type="checkbox"/> Cultural Resources | <input type="checkbox"/> Energy |
| <input checked="" type="checkbox"/> Geology/Soils | <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Hazards & Hazardous Materials |
| <input checked="" type="checkbox"/> Hydrology/Water Quality | <input type="checkbox"/> Land Use/Planning | <input type="checkbox"/> Mineral Resources |
| <input type="checkbox"/> Noise | <input type="checkbox"/> Population/Housing | <input type="checkbox"/> Public Services |
| <input type="checkbox"/> Recreation | <input type="checkbox"/> Transportation | <input type="checkbox"/> Tribal Cultural Resources |
| <input type="checkbox"/> Utilities/Service Systems | <input checked="" type="checkbox"/> Wildfire | <input type="checkbox"/> Mandatory Findings of Significance |

On the basis of this initial evaluation:

- ☐ I find that the project COULD NOT have a significant effect on the environment and a NEGATIVE DECLARATION will be prepared.
- ☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- ☐ I find that the project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- ☐ I find that the project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- ☐ I find that although the project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier BIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier BIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.


Signature


Date

Initial Study and Checklist

Introduction

This checklist is to be completed for all projects that are not exempt from environmental review under the CEQA. The information, analysis and conclusions contained in the checklist are the basis for deciding whether an Environmental Impact Report (EIR) or Negative Declaration is to be prepared. Additionally, if an EIR is prepared, the checklist shall be used to focus the EIR on the effects determined to be potentially significant.

1. Aesthetics

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

Three Meadows Project Area is in a natural setting, surrounded by forest lands administered by the Eldorado National Forest (ENF), Amador Ranger District. The meadows are located approximately 45 miles east of Jackson, California, and five miles south of State Highway 88, in the vicinity of the Upper Bear River Reservoir. State Highway 88 is a State Scenic Highway. The Project Area is not visible from the highway or any designated campgrounds. The Upper Onion Valley and High Onion meadows are visible from South Bear River Road (FS Road 08N03) and Tyler Meadow is visible from FS Road 08N03FW. These roads are rough and not well traveled.

The Land and Resource Management Plan (LRMP) for the ENF (USDA 1988) contains a discussion of Visual Quality Objectives (VQOs) based on management areas and land use types using the USFS Visual Management System. The plan specifically names Highway 88 as scenic corridors. Viewsheds surrounding other well-traveled roads or populated areas must meet visual quality management objectives. The Plan requires retention or partial retention of foreground and middleground areas seen

from roads, trails, rivers, reservoirs and densely developed recreation sites. Unseen areas and background areas have a VQO of modification or maximum modification.

Impact Discussion

The proposed restoration project would not degrade the existing visual character or quality of the site, create any new sources of light or glare, or have an adverse effect on any scenic vistas. The proposed project may result in some temporarily bare areas for the first year following the project, however, the project includes a revegetation component to accelerate establishment of meadow vegetation if determined necessary by the ENF Botanist.

This project seeks to restore the hydrologic function of the meadow ecosystem and will not alter the existing vegetation structure. The forest surrounding Three Meadows, including conifers encroaching on the meadow, has been thinned in accordance with USFS VQOs. The proposed project would remove approximately 140 trees (primarily lodgepole pine) from within the meadows and along temporary access routes surrounding the meadows to construct sixty-two (62) log weirs to be installed within incised channels spread throughout the three meadows. The removal of the trees is negligible relative to the overall forest landscape.

Temporary access routes would be constructed through upland forests and within the wet meadows. Prior to final demobilization, all access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30” following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30”.

Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted. The Forest Service Botanist will monitor for revegetation success and determine if additional revegetation treatments are necessary.

Mitigation Measures: No mitigation measures required.

2. Agriculture/Forest Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state’s inventory of forest land, including the Forest and Range

Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 1 222O(g)) or timberland (as defined by Public Resources Code section 4526)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The proposed project is not located on or near any agricultural lands. The proposed Project Area is located within three montane meadows surrounded by coniferous forest. The project parcels are zoned as Timberland Agricultural Area in the updated 2016 Amador County General Plan. The purpose of this zone is to encourage timber production and associated activities, and to limit noncompatible uses from restricting such activities (Amador County 2009).

Impact Discussion

The Three Meadows Project lies within the boundaries of the Amador Calaveras Consensus Group (ACCG) Collaborative Forest Landscape Restoration Project (ACCG 2006), and therefore the project is consistent with the overall forest management direction for the region. The meadows and surrounding forest have been previously altered from planned timber harvest, fuels treatments, road construction/use, grazing, and hazard tree removal within and adjacent to the Project Area. Past and current grazing, and current and past road use and construction have affected all three meadows and the surrounding area. The proposed project would remove approximately 140 trees (primarily lodgepole pine) from within the meadows and along temporary access routes surrounding the meadows to construction 62 log weirs to be installed within incised channels spread throughout the three meadows. The removal of conifers under the project would not result in a loss of forested land in the overall forest landscape surrounding the meadow. Therefore, there would be no impact to agricultural and forest resources under the proposed project.

Mitigation Measures: No mitigation required.

3. Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in other emissions (such as those leading to odors adversely affecting a substantial number of people)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The project is located on National Forest lands in southeastern Amador County in the Mountain Counties Air Basin. The Amador County Air District is the local air pollution control authority in Amador County. They provide compliance assistance, implement measures to achieve and maintain ambient air quality, protect the public and environment from adverse air quality impacts, and assist with planning and education. The Amador County General Plan presently adopted does not include an element specific to air quality. The Amador air district is designated as unclassified for the State PM10 standards, since no PM10 data are available for this area.

Local sources of impact on air quality in the Project Area are imported constituents from outside the Mountain Counties Air Basin, emissions from vehicular traffic on State Highway 88, and dust from infrequent travel on the nearby Forest Service roads. Other infrequent air quality impacts result from wildfires and intermittent controlled burns implemented by the Forest Service.

Impact Discussion

The proposed project would have no long-term impacts to air quality and would not conflict with or obstruct implementation of the applicable air quality plan. Air quality would be minimally affected by short term construction related emissions such as fugitive dust from roads and soil disturbance and fuel combustion emission from vehicles and other construction equipment. Construction activities have the potential to affect PM10 and ozone concentrations through the production of exhaust emissions and may affect PM10 through the generation of fugitive dust from soil-disturbing activities. Because the Project Area is located within a rural forested area, construction activities are not expected to generate visible dust beyond the project boundaries and impact to PM10 emissions under the proposed project would be less than significant.

The project would have no impact on sensitive receptors.

Mitigation Measures:

The following fugitive dust control measures would be implemented as needed to ensure that PM10 fugitive dust emissions from construction activities are maintained at less-than-significant level. Other precautions not specifically listed in this rule but have been approved in writing by the Amador County Air Pollution Control Officer may be used prior to implementation.

3a. Water and/or approved chemicals would be applied to Forest Service road surfaces and temporary access roads to suppress dust and to maintain a stabilized surface.

3b. Vegetation and other barriers will be used to contain and to reduce fugitive emissions.

3c. Reasonable vehicle speeds will be maintained while driving on unpaved roads in order to minimize fugitive dust emissions.

4. Biological Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The following discussion is summarized from the following sources and are provided as appendices to this document:

- Appendix B: Biological Evaluation and Biological Assessment for Threatened, Endangered, and Sensitive Terrestrial Wildlife Species for the Three Meadows Restoration Project (Loffland, 2020a).
- Appendix C: Aquatic Biological Assessment for the Three Meadows Restoration Project (Loffland, 2020b)
- Appendix D: Aquatic Biological Evaluation for the Three Meadows Restoration Project (Loffland, 2020c)
- Appendix E: Biological Evaluation and Biological Assessment for Threatened, Endangered, and Sensitive Botanical Species for the Three Meadows Restoration Project (Brown, 2020).
- Appendix F: Additional Botanical, Terrestrial and Aquatic Wildlife Species Considered for Analysis for the Three Meadows CEQA Initial Study (Resource Concepts, Inc, 2020).
- Appendix G: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District (Dudek, 2019).

Environmental Setting

The Three Meadows Restoration Project includes three small, high elevation meadows. High Onion Meadow and Upper Onion Valley are located along Onion River within the Cole Creek Watershed. Tyler meadow drains to Upper Bear River Reservoir. The meadows are surrounded by mixed fir and pine forest dominated by lodgepole pine (*Pinus contorta*, FAC) and red fir (*Abies magnifica*, UPL).

Upper Onion Valley Meadow

Upper Onion Valley contains the largest of the three meadows at approximately 8.7 acres in size surrounded by high-elevation fir/pine type forest. Stand density ranges from 100-200 sq. ft. per acre. Large snags are dense with approximately 10-15 snags per acre. Onion Creek is an intermittent stream, which flows along the far eastern edge, often forming the boundary between the wetland and adjacent to the upland forest. The primary emergent wetland meadow is 8.7 acres and is characterized by commonly occurring herbaceous species such as: California false hellebore (*Veratrum californicum*, FAC), American bistort (*Bistorta bistortoides*, FACW), arrow leaf ragwort (*Senecio triangularis*, FACW), Blue-pod lupine (*Lupinus polyphyllus* (FAC), Parish's yampah (*Perideridia parishii*, FAC), and tower larkspur (*Delphinium glaucum*, FACW) as well as various sedges and grasses. There are several small clusters of lodge pole pines scattered throughout. Onion Creek is the largest of the streams through the meadow and has become highly incised, causing a lowering of the water table, and drying of adjacent soils. Lodgepole pine encroachment has been a problem throughout the meadow which has been repeatedly addressed by past projects to cut and pile young lodgepoles under three-inch diameter. The meadow is annually grazed.

High Onion Meadow

High Onion Meadow is located within the upper Cole Creek watershed at approximately 8,000 feet in elevation. The wetland meadow is approximately 2.7 acres in size. Hydrology is driven by snowmelt and subsurface flows. One main drainage (Onion Creek) flows north to south through the meadow, and several small drainages begin within the meadow from seeps or have advanced upslope as head cuts stemming from Onion Creek. The drainages flow to the south and coalesce along the southern wetland boundary near the outflow of Onion Creek, which flows through Upper Onion Valley (described above) and then into Cole Creek and the North Fork Mokelumne River.

The meadow is dominated with healthy riparian vegetation, but has been impacted by past and present management activities including grazing and fire exclusion (Dudek 2020). The upper, moderately wet portion of the meadow is dominated by large stands of California false hellebore. There is a distinct break in topography in mid slope of the meadow, where several small seeps discharge along the topographic break creating small stream channels and drainage swales supporting stands of willows (*Salix* spp., OBL-FAC), arrow leaf ragwort (FACW), blue-pod lupine (FAC), Parish's yampa (FAC), American bistort (FACW), sedges (OBL-FAC), and several species of wetland grasses. The meadows adjacent forested stand consist of high-elevation fir/pine type forest, appears healthy, and is estimated to be approximately 100 years old. Average tree diameter is approximately 10" to 15" d.b.h. Large snags are dense with approximately 10-15 snags per acre. (Dudek 2020).

Tyler Meadow

Tyler Meadow (is approximately 1.5 acres in size and drains into Upper Bear River Reservoir. The relatively flat meadow (approximately 1.2% slope) has a shallow depth to bed rock and shallow groundwater table. The channel slope above the meadow is 1.8%, but the channel bed and bank recede at the start of the meadow and flows infiltrate as they reach the flatter meadow below. There are groundwater seeps located in the northwest corner of the meadow. All surface and subsurface flows coalesce along the southern boundary and discharge from the wetland through an intermittent stream which flows into Upper Bear River Reservoir.

Vegetation within the meadow consists primarily of sedges (OBL – FAC), spikerush (OBL), tufted hairgrass (FACW), America bistort (OBL), alpine aster (*Oreostemma alpigenum*, FACW), water plantain buttercup (*Ranunculus alismifolius*, FACW) and other wetland grasses and forbs. Encroachment of small diameter lodgepole seedlings is occurring along the meadow edges. The meadow is located adjacent to an existing FS Road and evidence of OHV use occurring in the meadow was observed.

The meadow's adjacent forested stand consists of mid-elevation fir/pine type forest growing on a moderate to highly productive site. This stand appears healthy and is estimated to be approximately 100 years old on average. The forest species composition of the meadow margin stand includes multiple age classes of red fir, white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine. A few of the larger diameter red fir and Jeffrey pine are estimated to be over 200 years old. Stand density ranges from 150-200 sq. ft. per acre, and is split evenly between red fir, white fir, and lodgepole pine. The Jeffrey pine occupies a very small portion of the stand. Average tree diameter for the stand is approximately 15-20" d.b.h. Large snag density is moderate with approximately 5-10 snags per acre.

Special Status Species Review

A list of potential state- and federally listed, special-status, and Forest Sensitive species that may be present in the Project Area was compiled using information requested from the US Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDDB), CDFW Biogeographic Information and Observation System (BIOS) and the USDA-Forest Service Region 5 Sensitive Species list (June 2013). The evaluation of botanical impacts also included a review of Forest Watch List species, which includes rare plants on the California Rare Plant list that were identified in CNDDDB query.

Terrestrial Wildlife

Table 3 presents a list of terrestrial species from the CNDDDB, USFWS, and the Regional Forester's Sensitive species list that may occur in the Project Area.

Table 3. Special Status Terrestrial Wildlife Species Potentially Occurring in the Three Meadow Restoration Project Area

Species	Listing Status
Mammals	
California wolverine (<i>Gulo gulo luscus</i>)	FS; ST; Proposed FT
American martin (<i>Pennanti pacifica</i>)	FS
Pacific fisher (<i>Martes pennant pacifica</i>)	FS; SSC; Proposed FT
Sierra Nevada red fox (<i>Vulpes vulpes necator</i>)	ST
Fringed myotis (<i>Myotis thysanodes</i>)	FS
Pallid bat (<i>Antrozous pallidus</i>)	FS; SSC
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	FS; SSC
Birds	
Bald eagle (<i>Haliaeetus leucocephalus</i>)	FS; SE; FP
California spotted owl (<i>Strix occidentalis occidentalis</i>)	FS; SSC
Great gray owl (<i>Strix nebulosa</i>)	FS; SE
Northern goshawk (<i>Accipiter gentilis</i>)	FS; SSC
Willow flycatcher (<i>Empidonax traillii</i>)	FS; SE
Invertebrates	
Western bumble bee (<i>Bombus occidentalis</i>)	FS
Morrison bumble bee (<i>Bombus morrisoni</i>)	SA
*FP= State Fully Protected; FS = Forest Sensitive Species within the ENF; SA = CDFW Special Animal; SE = State Endangered; ST = State Threatened; SCC = State Species of Special Concern	

Aquatic Wildlife

Table 4 presents a list of aquatic wildlife species from the CNDDDB, USFWS, and the Regional Forester's Sensitive species list that may occur in the Project Area.

Table 4. Special Status Aquatic Wildlife Species Potentially Occurring in the Three Meadow Restoration Project Area

Species	Listing Status
Amphibians	
Sierra Nevada yellow-legged frog (<i>Rana sierrae</i>)	FE; ST
Sierra Nevada yellow-legged frog (<i>Rana sierrae</i>)	CH
Yosemite toad (<i>Anaxyrus canorus</i>)	FT; FS; SSC
Southern long-toed salamander (<i>Ambystoma macrodactylum sigillatum</i>)	SSC
Fish	
Delta smelt (<i>Hypomesus transpacificus</i>)	FT; SE
FE = Federal Endangered; ST = State Threatened; FT = Federal Threatened; CH= Critical Habitat; SSC = State Species of Special Concern	

Botanical Species

Currently the only USFWS listed plant species expected to occur on the ENF is *Packera layneae* (Federally Threatened). This species occurs on rocky, gabbroic, or serpentinitic soils in chaparral and cismontane woodland below 3,000 feet. Potential habitat for *Packera layneae* is not found within the proposed Project Area.

The Three Meadows Project area has been previously surveyed for TEPS species as summarized below:

- **High Onion:** This meadow was surveyed in 2015 and 2017, resulting in the identification of two separate suboccurrences of *Botrychium simplex* (Occurrence No. 022-1), an ENF Special Status Species, along the mainstream channel. The occurrences were revisited in August 2019, but no individuals were observed. No TEPS species were located during any of the site surveys.
- **Upper Onion Valley:** This meadow was first surveyed in 2015 for sensitive plants and revisited in 2016 and 2017, resulting in identification of five (5) suboccurrences of *B. simplex* (Occurrence No. 024). All of the suboccurrences were located along the stream channel on the east side of the meadow except one, which was located along a stream channel located near the western meadow edge. The occurrences were revisited in August 2019, but no individuals were observed. No TEPS species were located during any of the site surveys.
- **Tyler Meadow:** Tyler Meadow was surveyed in 2014 as part of the Cole Creek Unit 4 plant surveys completed by ARD survey crews. The site was resurveyed July 2019. No TEPS species were located during any of the site surveys.

Sensitive Natural Communities

Sensitive natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. Natural communities with ranks of S1-S3 are considered Sensitive Natural Communities to be addressed in the CEQA review. The CNDDB was queried to search for S1-S3 ranked Sensitive Natural Communities within Amador County. Nine occurrences of Ione Chapperal were identified, but not located within vicinity of the project area.

Table 5. Habitat potential of the Proposed Three Meadows Restoration Project for TEPS plant taxa known or suspected to occur on the Eldorado National Forest.

Common Name / Scientific Name	Status				Habitat Description	Potential Habitat within Project Area and Rational
	USFWS	Forest Service	State Rank	CNPS		
Three-bracted onion (<i>Allium tribracteatum</i>)	--	S	S2	1B.2	Grows on open ridges with gravelly lahar soils (lava cap communities) in chaparral and lower & upper montane coniferous forests from ~ 3,300 to 10,000 feet in elevation.	No potential habitat.
El Dorado manzanita (<i>Arctostaphylos nissenana</i>)	--	S	S1	1B.2	Grows on highly acidic slate and shale soils and is often associated with closed-cone conifer forest from about 1,400 to 3,600 feet.	No potential habitat; occurs below site elevation range
Big-scale balsamroot (<i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>)	--	S	S2	1B.2	Grows in chaparral, vernal moist meadows & grasslands, grasslands within oak woodland, and ponderosa pine forest below 4,600 feet.	No potential habitat; occurs below site elevation range
Upswept moonwort (<i>Botrychium ascendens</i>)	--	S	S2	2B.3	Grows in lower montane coniferous forest, meadows, and seeps from 4,900 to over 7,500 feet in elevation. Only Tyler Meadow is located within elevation range.	Yes. Project areas contains coniferous forest, meadows, and seeps within the elevation range of the species.
Scalloped moonwort (<i>Botrychium crenulatum</i>)	--	S	S3	2B.2	Grows in fens, lower montane coniferous forest, meadows, seeps, and freshwater marshes from 4,900 feet to 10,500 feet in elevation.	
Common moonwort (<i>Botrychium lunaria</i>)	--	S	S2	2B.2	Grows in meadows, seeps, subalpine and upper montane coniferous forest from 7,450 feet to over 11,000 feet in elevation.	
Mingan moonwort (<i>Botrychium minganense</i>)	--	S	S3	2B.2	Grows in fens, lower and upper montane coniferous forest, meadows, and seeps from 4,900 to 6,750 feet. Only Tyler Meadow is located within known elevation range.	
Mountain moonwort (<i>Botrychium montanum</i>)	--	S	S2	2B.1	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation. Only Tyler Meadow is located within known elevation range.	
Paradox moonwort (<i>Botrychium paradoxum</i>)	--	S	S1	2B.1	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation. Only Tyler Meadow is located within known elevation range.	

Common Name / Scientific Name	Status				Habitat Description	Potential Habitat within Project Area and Rational
	USFWS	Forest Service	State Rank	CNPS		
Stalked moonwort (<i>Botrychium pedunculosum</i>)	--	S	S1	2B.1	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation. Tyler Meadow is located within known elevation range.	Yes. Project areas contains coniferous forest, meadows, and seeps within the elevation range of the species.
Bolander's bruchia (<i>Bruchia bolanderi</i>)	--	S	S3	4.2	Grows in meadows and fens in montane and subalpine communities from about 5,500 to 9,000 feet. Grows in ephemeral habitats such as erosional ditches or small streamlets through wet meadows.	Yes. Project areas contains coniferous forest, meadows, and seeps within the elevation range of the species.
Pleasant Valley mariposa lily (<i>Calochortus clavatus</i> var. <i>avius</i>)	--	S	S2	1B.2	Grows in openings in mixed conifer & ponderosa pine forest, usually on ridgetops and south-facing slopes from 2,500 to 5,600 feet.	No potential habitat; occurs below site elevation range
Porcupine sedge (<i>Carex hystericina</i>)	--	-	S2	2B.1	Grows in wet environments, and specifically along streambanks and in marshes.	Yes. Potential habitat is within Project Area.
Western single-spiked sedge (<i>Carex scirpoidea</i> ssp. <i>pseudoscirpoidea</i>)	--	--	S2	2B.2	Grows in mesic, often carbonate habitats. Prefers rocky alpine areas, meadows and seeps, and / or subalpine coniferous forest.	Yes. Potential habitat is within Project Area.
Alpine dusty maiden (<i>Chaenactis douglasii</i> var. <i>alpina</i>)	--	W	S2	2B.3	Grows in rocky alpine areas, specifically in ridges and rock crevices from 9,000 to 11,000 feet.	No potential habitat.
Fells-fields claytonia (<i>Claytonia megarhiza</i>)	--	W	S2	2B.3	Grows in rocky alpine areas, specifically in ridges and rock crevices from 8,500 to 11,000 feet.	No potential habitat.
Mountain lady's slipper (<i>Cypripedium montanum</i>)	--	S	S4	4.2	Grows in moist areas and upland sites with northerly aspects, loamy soils and shade, from 3,500 to 5,700 feet (generally <5,000 ft).	No potential habitat.
Branched Collybia (<i>Dendrocollybia racemosa</i>)	--	S	--	--	Grows on remains of decayed mushrooms or occasionally in duff/leaf litter, in mid-mature to old-growth stands of mixed hardwood-conifer forests. Evidence of timber harvest at some extant occurrences.	No potential habitat.
Yellow-lip pansy monkeyflower (<i>Diplacus pulchellus</i>)	--	--	S2	1B.2	Grows in mesic environments, particularly in meadows and seeps at 2,000 to 6,500 feet. Occurs frequently in disturbed areas.	No potential habitat; occurs below site elevation range
Tahoe draba (<i>Draba asterophora</i> var. <i>asterophora</i>)	--	S	S2?	1B.2	Restricted to rocky ledges and talus slopes in subalpine and alpine habitats above 8,200 feet.	No potential habitat

Common Name / Scientific Name	Status				Habitat Description	Potential Habitat within Project Area and Rational
	USFWS	Forest Service	State Rank	CNPS		
Cup Lake draba (<i>Draba asterophora</i> var. <i>macrocarpa</i>)	--	S	S1	1B.1	Restricted to sandy slopes, rocky ledges, and talus slopes in subalpine and alpine habitats above 8,200 ft.	No potential habitat
Male fern (<i>Dryopteris filix-mas</i>)	--	W	S2	2B.3	Grows in montane coniferous forests, particularly in granite and rocky soils at 6,000 to 10,000 feet.	Yes. Montane coniferous forests present.
Scribner's wheatgrass (<i>Elymus scribneri</i>)	--	--	S3	2B.3	Grows in rocky alpine areas from 9,500 to 13,000 feet.	No potential habitat.
Tripod buckwheat (<i>Eriogonum tripodum</i>)	--	S	S4	4.2	Grows on serpentine soils in foothill and cismontane woodlands below 5,300 feet.	No potential habitat; occurs below site elevation range
Blandow's bog-moss (<i>Helodium blandowii</i>)	--	S	S2	2B.3	Grows in wet meadows, fens, & seeps in subalpine coniferous forest and alpine lakes from 6,100 to 9,000 feet.	Yes. Wet meadows, fens, & seeps in subalpine coniferous forest.
Parry's horkelia (<i>Horkelia parryi</i>)	--	S	S2	3.2	Grows on stony, disturbed, slightly acidic soils in open chaparral and cismontane woodland below 3,400 feet.	No potential habitat; occurs below site elevation range
Hutchison's lewisia (<i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i>)	--	S	S3	3.2	Grows in openings in upper montane coniferous forest, often on slate soils and on soils that are sandy granitic to erosive volcanic from 4,800 to 7,000 feet.	No potential habitat; occurs below site elevation range
Kellogg's lewisia (<i>Lewisia kelloggii</i> ssp. <i>kelloggii</i>)	--	S	S2/S3	3.2	Grows on granitic and volcanic balds from about 5,000 to 8,000 feet.	No potential habitat
Long-petaled lewisia (<i>Lewisia longipetala</i>)	--	S	S2	1B.3	Restricted to subalpine & alpine slopes or basins with deep snow accumulations, above 8,200 feet.	No potential habitat
Saw-toothed lewisia (<i>Lewisia serrata</i>)	--	S	S2	1B.1	Restricted to steep, nearly vertical cliffs in inner gorges of perennial streams and rarely near seeps and intermittent streams. Grows between 2,800 and 4,800 feet in the American River watershed.	No potential habitat; occurs below site elevation range
Stebbins' lomatium (<i>Lomatium stebbinsii</i>)	--	--	S2	1B.1	Grows in lower montane coniferous forests, particularly from 4,000 to 8,000 feet.	Yes. Montane coniferous forests present.
Broad-nerved hump-moss (<i>Meesia uliginosa</i>)	--	S	S3	2B.2	Grows in permanently wet, primarily spring-fed meadows and fens in montane to subalpine coniferous forest from 4,200 to 9,200 feet.	Yes. Permanently wet, primarily spring-fed meadows present.

Common Name / Scientific Name	Status				Habitat Description	Potential Habitat within Project Area and Rational
	USFWS	Forest Service	State Rank	CNPS		
Elongate Copper Moss (<i>Mielichhoferia elongata</i>)	--	S	S4	4.3	Grows on metamorphic, sedimentary, limestone, and serpentine rock outcrops that often contain copper or other heavy metals and that are seasonally moist or less commonly on moist soil. ponderosa pine. Grows from sea level to 3,550 feet.	No potential habitat; occurs below site elevation range
Yellow bur navarretia (<i>Navarretia prolifera ssp. lutea</i>)	--	S	S3	4.3	Grows in openings in or adjacent to mixed conifer forest or cismontane woodland on rocky ridgelines, saddles, or eroding ephemeral drainages from 2,300 to 5,000 feet.	No potential habitat; occurs below site elevation range
Holzinger's orthotrichum moss (<i>Orthotrichum holzingeri</i>)	--	S	S2	1B.3	Grows on rocks both in and along streambanks, and occasionally on tree limbs. Occurs in montane coniferous forests and in pinyon and juniper woodlands from 2,000 to 6,000 feet.	No potential habitat; occurs below site elevation range
Adder's tongue (<i>Ophioglossum pusillum</i>)	--	S	S1	2B.2	Grows in moist habitat including wet meadows and roadside ditches.	Yes. Wet, meadows present.
Layne's ragwort (<i>Packera layneae</i>)	FT	T, S	S2	1B.2	Grows on rocky, gabbroic or serpentinitic soils in chaparral and cismontane woodland below 3,000 feet.	No potential habitat; occurs below site elevation range
Veined water lichen (<i>Peltigera gowardii</i>)	--	K	S3	4.2	Grows on rocks in cold, unpolluted spring-fed streams without marked seasonal fluctuation. Submerged most of year. Peak flows must not scour the rocks & gravels where this species attaches.	No potential habitat.
Stebbins' phacelia (<i>Phacelia stebbinsii</i>)	--	S	S3	1B.2	Grows on dry, open, rocky sites (bedrock outcrops, rubble or talus) on ledges or moderate to steep slopes and on damp, mossy inner gorges from 2,000 to 6,800 feet.	No potential habitat; occurs below site elevation range
Olive phaeocollybia (<i>Phaeocollybia olivacea</i>)	--	S			Conifer and hardwood forests where it grows in the humus layer. Logging disturbance, when present, is not intense (e.g. clear-cut or patch-cut).	No potential habitat.
Whitebark pine (<i>Pinus albicaulis</i>)	--	C, S		CBR	Whitebark pine typically occurs on cold and windy high elevation sites in western north America (7,000-12,000 feet).	No potential habitat.
Sierra blue grass (<i>Poa sierrae</i>)	--	S	S3	1B.3	Grows in lower montane coniferous forest on steep, shady, moist slopes from 1,200 feet to 3,800 feet.	No potential habitat; occurs below site elevation range
White-stemmed pondweed (<i>Potamogeton praelongus</i>)	--	--	S2	2B.3	Grows in deep water, and particularly lakes and ponds. Requires a wet environment. Occurs in water bodies from 5,800 to 10,000 feet.	No potential habitat.

Impact Discussion

The proposed project will use heavy equipment for placement of rock to construct 21 rock riffles and 95 linear feet (0.01 acres) of a roughened rock lined channel within Upper Onion Valley. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Large boulders will also be brought in to block access to Tyler Meadow from OHV use.

Sixty-two log weirs will be installed within the Project Area: eleven (11) log weirs will be installed at Tyler Meadow, twenty-five (25) log weirs will be installed at Upper Onion Valley, and twenty-six (26) log weirs will be installed at High Onion. Felled trees from cleared forest access routes or from within the meadows will be used for construction of the log weirs. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Construction will take place in late summer/fall, under low-flow conditions.

The project includes a revegetation component. Prior to final demobilization, access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

Terrestrial Wildlife Species Impacts

Based on review of habitat requirements for the above listed Threatened, Endangered, and Sensitive (TES) terrestrial species, several of the listed species would not be affected by the proposed project. The Project Area does not contain habitat for the bald eagle, California wolverine, Pacific fisher, Sierra Nevada red fox, and willow flycatcher, therefore, these species would not be directly, indirectly, or cumulatively impacted by the proposed project (reference Appendix B).

The Three Meadows Restoration Project would not affect the Pacific fisher because the Project Area does not occur within the known or suspected range of this species. The species is not known to be present on the Amador Ranger District.

The Three Meadows Restoration Project would not affect California wolverine, American bald eagle, or willow flycatcher because there is no suitable habitat within the Project Area.

The Three Meadows Restoration Project would not affect the Sierra Nevada red fox. The Sierra Nevada red fox is not known to occur in the Eldorado National Forest Systematic surveys from 1996-2002. The only known population is in Lassen National Park, with an additional detection in 2010 on the Humboldt-

Toiyabe National Forest (Sierra Nevada Red Fox Interagency Working Group 2010). California Wildlife Habitat Relationships (CWHR) range maps were also reviewed for the Project Area for this species. The project is outside of the mapped CWHR range for Sierra Nevada red fox and predicted habitat range by more than two miles.

The proposed project may affect/impact individuals of the following species, but is not likely to result in a trend toward federal listing or loss of viability:

California Spotted Owl, Northern Goshawk, and American Marten

Direct and Indirect Impacts

The proposed action would have minimal effect on suitable habitat for these species. The proposed action is to treat meadow habitat and restore meadow hydrology. Trees encroaching within the meadow and along the meadow edges will be removed for construction of log weirs and access roads, but overall impact to canopy closure or reduction in nesting trees would be minimal in the areas of suitable habitat surrounding the meadow sites. As habitat would not be altered, only disturbance impacts during implementation are likely to occur and will be analyzed further.

Disturbance impacts are similar for all three species. The project could disturb individuals of these species and may temporarily displace individuals, should they be active near project activities, primarily from equipment use and increased human activity. The Project Areas are not located within northern goshawk or spotted owl PACs and would only likely temporarily displace foraging individuals. Project design criteria provides the following protection:

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect TES species.
- Trees and snags will be retained when possible except for meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30" dbh and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Should disturbance to these species occur, disturbance is unlikely to affect more than one or two individuals, due to the small scale of the project, timing of the project, and the design features in place to reduce likelihood of impacts to reproduction. Should disturbance occur, during foraging or travel activities, the result could be temporary displacement of individuals. Impacts on reproduction and population numbers, or species viability would not be expected to occur for California spotted owl, northern goshawk, or marten.

Great Gray Owl

Direct and Indirect Impacts

Direct impacts to suitable foraging habitat may occur from the proposed restoration treatments with the stream channel and adjacent wet meadows (primarily installation of log weirs and rock riffles), but there is no nesting habitat within the Project Area. Approximately 12 acres of suitable foraging open meadow habitat would be directly affected by project activities. Revegetation of this area is expected to be rapid. Prey density is expected to increase post project, as the treated stream channel and surrounding vegetation responds to the increased water table and associated changes to vegetation.

Construction activities in the Project Area would occur under no flow or low flow conditions. This typically occurs between August 1 and October 30. This would result in project activities taking place toward the end, or after the nesting season for great gray owl (GGO). Noise disturbance resulting from the

equipment used in the restoration process would take place primarily in foraging habitat (meadow) away from potential nesting locations. This species foraging behavior would unlikely be affected, as much of the foraging for great GGO is nocturnal when project activities would not be taking place. If disturbance did occur, temporary displacement of individuals could occur, but would not be expected to affect reproduction, due to both time of year, and foraging time of day.

Pallid Bat

Direct and Indirect Impacts

Pallid bat tends to be both a roosting and foraging generalist. Suitable roost sites include a variety of features, such as large snags, oaks and rock crevices; suitable foraging occurs from grasslands to higher elevation coniferous forests. For this reason, all acres within the Project Area which are proposed for treatment are considered to be potentially suitable habitat for this species, although not necessarily high capability due to elevation and relatively wet forest/meadow conditions. Foraging habitat could be improved through implementation of the project, as meadow function improves after implementation; the restored meadow should increase insect diversity and quantities, which would make them available to pallid bats to forage on. If there are any short term impacts to foraging habitat, it is expected to be negligible, as the project would take place late in the season, after most insect populations have peaked, and the project would not impact all of the potential foraging habitat in the immediate area, allowing for foraging elsewhere in close proximity to project activities.

Foraging activity and foraging individuals would not be expected to experience disturbance from project activities, due to timing of foraging (night) not coinciding with the project activities (daytime). Disturbance could occur to day roosting bats where roosting location coincides with project activities. The amount of potential disturbance and effect on individuals is expected to be low, as the forest surrounding the meadow is not being altered, which is where roosting would be expected, and noise from work in the meadow would only be expected to minimally impact snags/tree roosts. This would reduce both the number of potential roosts impacted, and the number of bats that could be impacted. Due to the timing, should disturbance occur, it would be after the reproductive period for this species, and reproduction would not be impacted. Temporary displacement would be possible where roosting sites and project activities coincide. Due to the wide variety of roosting habitats used, this alternative would not be expected to have any long-term population effects on this species, as few individuals would likely be affected.

Future actions on National Forest lands are likely to be favorable to the species. Snags and oaks are retained where they exist under current Forest Plan direction, except where they pose a hazard, such as: recreational sites, administrative sites, and along roadways. Cumulative impacts to the pallid bat from activities on National Forest lands should therefore be quite limited. Due to the location of the project above common elevational range for the species, and the scale of the project (small acreage impacted), effects of the proposed action would not be of sufficient magnitude to greatly change cumulative effects for this species, the project would improve the quality of habitat for this species, but not change the amount of habitat available to this species.

Fringed myotis

Direct and Indirect Impacts

Fringed myotis are considered to be foraging generalists, but do seem to be tied to day-roost habitat associated with old forest conditions, especially large diameter snags. Fringed myotis often forage in meadows and along secondary streams, in fairly cluttered habitats. This project would have a minimal effect on potential roosting sites, large trees and snags in this case. Although trees will be removed at all three meadow sites for construction of log weirs, construction of temporary access roads, and along the

meadow edges, the number is minimal relative to the surrounding forest. Additionally, design criteria have been included within the project to minimize impacts to fringed myotis habitat.

The potential for disturbance to foraging bats would be unlikely from the proposed activities, as project activities would take place during daylight hours, when bat foraging activity is not occurring or is at a minimum (dusk/dawn). Disturbances from project activities are not likely to affect reproduction, and there is a low chance of individuals being affected, due to timing of activities in the year and the low likelihood of species being present in any numbers in the Project Area. Temporary displacement would be possible where roosting sites and project activities coincide. Due to the wide variety of roosting habitats used, this alternative would not be expected to have any long-term population effects on this species, as few individuals would likely be affected.

Townsend's big-eared bat

Direct and Indirect Impacts

Townsend's big-eared bats are associated with a variety of habitats including desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, agricultural lands, and coastal habitats. This species has foraging associations with edge habitats along streams, which the project includes. For this reason, the entire Project Area is believed to provide suitable foraging habitat; however, no roosting habitat is known to occur in the Project Area and would not be affected by this project. Potential for disturbance to foraging bats would be unlikely from the proposed activities, as project activities would take place during daylight hours, when bat foraging activity is not occurring or is at a minimum (dusk/dawn). In the long term, foraging habitat within the Project Area would be enhanced by the proposed project. This project is very unlikely to result in any disturbance to foraging Townsend's big-eared bats and would not affect roosting bats or reproduction.

Western bumblebee and Morrison bumblebee

Direct and Indirect Impacts

Within the Project Area, the meadow habitat provides high quality foraging habitat, and the edge of the meadow and surrounding conifer stands provide nesting and overwintering habitat for this species. Western and Morrison bumblebees, if present in the Project Area, are believed to be in low numbers. Should either species be present, the timing of the project is after the bee population peak, most of the plant flowering has completed, and only queens would be expected to be in the meadow in any number at that time. The short term, likely single season impacts to foraging habitat quality and availability, and temporary displacement to individual bees from disturbance, would not be expected to affect reproduction, or local populations of this species. Longer term, in seasons following implementation, the project would increase both habitat quality and quantity for this species and may prolong the availability of the habitat as the meadow condition improves.

Aquatic Species

The following federally and state listed aquatic species and Critical Habitat were considered for effects from this proposal:

- Yosemite toad (*Anaxyrus canorus*, Threatened)
- Sierra Nevada yellow-legged frog (*Rana sierrae*; Endangered)
- Sierra Nevada yellow-legged frog Designated Critical Habitat,
- Delta smelt (*Hypomesus transpacificus*; Threatened)
- Southern long-toed salamander (*Ambystoma macrodactylum sigillatum*)

The project will have no effect on the following special status aquatic species: Yosemite toad or delta smelt. The Project Area is located within Yosemite Toad habitat distribution but does not contain suitable

habitat. The nearest occurrence to the Project Area is 10.7 miles east of High Onion Valley at Wheeler Lake. Designated critical habitat is located approximately 3.0 miles to the east. No impacts to individuals or Yosemite Toad suitable habitat are expected.

There are no populations of delta smelt known to occur on the Eldorado National Forest land. The Project Area is outside of the species habitat range and there is no suitable habitat within the Project Area.; therefore, there would be no effects to this species from the project. No impacts to individuals or Delta smelt suitable habitat are expected.

Sierra Nevada Yellow Legged (SNYLF)

Direct and Indirect Impacts

The Project Area is located within the elevation range of suitable habitat and designated critical habitat for the Sierra Nevada yellow-legged frog (*Rana sierrae*). Three Meadows Restoration proposed actions contains approximately 27 acres of suitable/Critical Habitat wet meadow habitat with a 25m buffer that includes 6,765 linear feet of intermittent stream habitat. Recent surveys (2019) did not detect any species in the Project Area; however, a previous survey of Upper Onion Valley in 1997 detected one adult SNYLF.

Short-term impacts from construction activities could include localized increases in turbidity and minor scale ground disturbance to designated Critical Habitat. Of the 27 acres of Critical Habitat for SNYLF within the project boundary, including 6,765 linear feet of intermittent stream, approximately 1.95 acres (7.2%) would be directly impacted by project activities resulting in short term adverse effects. However, the project is proposed to be completed under no-flow conditions in late summer and fall and would minimize any increase in local turbidity. Upon completion, the installation of in-channel rock riffles and log weirs is a restorative action, and should result in flow velocity reduction, bank stabilization and subsequently reduce the potential for future erosion, incision and sedimentation. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of SNYLF habitat. Short term direct and indirect impacts to acres of suitable and critical habitat are minimal compared to the positive long-term indirect impacts to 27 acres through improvement of hydrologic functions within the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. For these reasons, it was determined that the Three Meadows Restoration Project may affect but is not likely to adversely affect the designated Critical Habitat of the SNYLF.

Mechanical operations within suitable habitat may cause a risk to SNYLF through disturbance, injury or mortality (e.g., crushing from equipment) in the short-term. There is potential for SNYLF individuals to be crushed or injured by the excavator driving through the meadow. If present, disturbance from work activities may flush any frogs from the in-stream construction site, either downstream or into cover away from activities, reducing the likelihood of mortality. Direct effects to individuals would be short-term, occurring during operations when equipment and personnel are in close proximity and within suitable habitat; however, likelihood of injury or take is relatively low as recent surveys (2019) found no detections of SNYLF within any of the three meadows and construction would occur under dry conditions when SNYLF are not likely to be present. For these reasons, it was determined that project implementation would result in less than significant impacts to this species.

Southern long-toed salamander (SLTS)

Direct and Indirect Impacts

Although no focused surveys were conducted for SLTS, the species is typically detected during surveys for SNYLF. The Project Area was surveyed in 2019, and no adult or larval SLTS were detected within

the Project Area (Chow, 2020a). If individuals of SLTS are present, they are likely in low numbers. There would be no potential for crushing or trampling of breeding adults because construction activities would occur during the fall low flow period. Potential direct effects to SLTS could result from construction disturbance of subterranean adults. There is the potential to dig up subterranean adults while construction instream weirs and riffles; however, due to the low likelihood of occupancy, overall impacts from project implementation to this species would be less than significant.

Botanical Species and Sensitive Communities

Direct and Indirect Impacts

Based on the Three Meadows Botanical BE/BA (Brown, 2020, Appendix E), there are no Threatened, Endangered, or Sensitive (TES) species known from the Project Area, so direct and indirect effects are not expected. The California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants was queried on January 16, 2020 to identify additional rare plants in the Three Meadows Restoration Project Area that may not have been addressed in the Botanical BE/BA. A total of 11 species have documented records in the Bear River Reservoir (Table 2). A review of the Botanical BE/BA indicates that all species have been addressed in the Botanical BE/BA and no further analysis is required (Brown 2020).

The Three Meadows Project Area has been previously surveyed for special status plant species in 2015, 2017 and 2019. Although past surveys of the meadow areas were completed, it is always possible for a special status plants to be overlooked. If this were the case, undetected individuals could be crushed, uprooted, or destroyed during the construction of rock riffles, roughened channel, placement of log weirs, and creation of temporary access routes placed within the wet meadows and across stream channels. Additionally, any undetected special status plant species occurring in the meadow could be impacted following project implementation by altered microsite and hydrologic condition. Project design criteria will minimize the potential impacts to plant species habitat by restoring meadow access routes to preconstruction site conditions, and final location of log weirs and rock riffles will be field fit to avoid special status plant species to the extent practicable. The objective of the in-stream modifications is to restore the natural hydrology of the meadow and is expected to be beneficial to many ENF Sensitive and CA state special status species by increasing suitable habitat.

If any new special status plant species are discovered prior to project implementation, these populations would be protected from project activities. Any new occurrences of special status plant species identified within the Project Area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for Sensitive plants.

Soil disturbances can provide opportunities for the introduction and proliferation of invasive species. These species have the potential to quickly outcompete native plants, including Sensitive plants for sunlight, water, and nutrients. These species can also form dense monocultures which can alter habitat for special status plant species. Seeds of these species can be carried into special status plant species areas on equipment, vehicles, and on workers' boots and clothing. The magnitude of this impact is difficult to predict since it is contingent on the introduction of a noxious weed species into an area, an event which may or may not occur. Currently the Three Meadows Project Area is free of ENF priority listed invasive species and State listed noxious weed species. To minimize the potential for invasive establishment, project design criteria requires all off-road equipment be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the Project Area.

The proposed project will impact wetlands, a sensitive natural community identified within the Amador County General Plan. A formal wetland delineation in accordance with US Army Corps of Engineers (USACE) standards has been completed and will be submitted for verification. The purpose of the

proposed project is to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation. The proposed project is authorized under Nationwide Permit 27 for Aquatic Habitat Restoration, Establishment and Enhancement Activities, and the ENF Service will submit a Preconstruction Notification to the USACE for verification. The ENF will also submit an application for certification from the Regional Water Quality Control Board (RWQCB) pursuant to Section 401 of the CWA.

Mitigation Measures:

Terrestrial Wildlife

- 4a.** The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- 4b.** Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- 4c.** Retain all trees 30" diameter at breast height (dbh) and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

- 4d.** Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.
- 4e.** If the SNYLF are found within the Project Area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- 4f.** Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- 4g.** A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).
- 4h.** The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.
- 4i.** In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.
- 4j.** Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Botanical Resources

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004). Specific design criteria and protection measures for the project include:

4k. Any new occurrences of sensitive plants identified within the Project Area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.

4l. A Forest Service watchlist species, *Botrychium simplex*, occurs within the Project Area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.

4m. All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the Project Area.

4n. Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.

4o. Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.

4p. Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).

4q. All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

5. Cultural Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in 15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

On September 17 and 28, 2019 a Class III reconnaissance of the Three Meadows Restoration' Project Area was completed to comply with Forest Service policies and Section 106 of the National Historic Preservation Act. Inventory coverage methods followed USDA Forest Service guidelines for archaeological inventory, as outlined in the *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer (USDA-SHPO PA 2011)*.

A total of two historical and/or archaeological sites, as well as a historic two-track road, were identified within the Area of Potential Effects (APE). The two identified sites are located at the margins of High Onion and Upper Onion Meadow and will be avoided during project activities. This specific area where the project is located was historically the site of vegetal grinding or milling stations. As such, the artifacts found at these sites have to do with such historical practices. The two-track road (Forest Service Road 08N03) is still in regular use and was used to access all three survey parcels.

No paleontological resources or unique geologic features were recorded within the survey areas.

Impact Discussion

The USFS Archeologist has determined that implementation of the Three Meadows Restoration Project will avoid all documented cultural and archeological resources within the APE. However, this does not fully eliminate the chance of discovering unrecorded sites or subsurface remains within the project boundary. If project ground disturbance should expose a cultural deposit, disturbance activities will be suspended until a qualified archaeologist can examine the area, evaluate the material, and adequate protection measures are incorporated. In the event that human remains are uncovered during project activity, project managers must stop work and contact Eldorado National Forest. Existing law requires that the County coroner be contacted as well. If the remains are determined to be of Native American origin, both the Native American Heritage Commission and any identified descendants shall be notified (Health and Safety Code 7050.5, Public Resources Code Section 5097.94 and 5097.98).

Mitigation Measures:

5a. Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.

5b. Buffer zones may be established to ensure added protection if determined necessary by the Forest Service District Archeologist. The use of buffer zones in avoidance measures may be applicable where heavy equipment is used in proximity to historic properties.

5c. The only access roads to the Project Area will be those shown by the plan set to reduce impacts to previously undiscovered cultural sites.

5d. If articulated or disarticulated human remains are discovered during ground disturbing construction activities or ground disturbing activities, all work shall cease within 100 feet of the find and all ground disturbing activities shall not resume until the requirements of Health and Safety Code section 7050.5 and, if applicable, Public Resources Code 5097.98 are met.

6. Energy

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The Three Meadows Project is located within a natural setting, part of and surrounded by forest lands administered by the Eldorado National Forest, Amador Ranger District. No electrical services are located within the Project Area. Energy consumption in the Project Area is limited to fuel use associated with dispersed recreation (e.g., vehicles traveling to/through Project Area, snowmobiles, etc.)

The Amador County Energy Action Plan was adopted on May 26, 2015. The purpose of the plan is to guide the County in expanding energy-efficiency and renewable energy, as well as the associated cost-saving from these efforts.

Impact Discussion

The Project is a restoration activity that would not create an additional source of energy demand that would result in significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources. Energy consumption would occur temporarily during project construction through the operation of heavy equipment for grading and fill activities. There would be no unusual equipment operation that would result in energy consumption that is wasteful, inefficient, or unnecessary during project construction. All equipment will 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 has a dedicated function during construction—e.g., excavating, placing rock, transplanting vegetation or scarifying completed surfaces for seed planting. All equipment not actively in use will be required to be turned off.

Mitigation Measures: No mitigation required.

7. Geology and Soils

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The Three Meadows Project area is located within the North Fork Mokelumne River Watershed. The Project Area is not located along or near an earthquake fault delineated on the Alquist-Priolo Earthquake Fault Zoning map, nor does it occur on a geologic unit or soil that is unstable or would become unstable as a result of the proposed activities.

The Project Area lies within the Sierra Nevada geomorphic province with outcrops of Mesozoic age granitic rocks (Norris and Webb, 1990). All rock units are of igneous origin and have no potential to contain paleontological resources (SVP 2010).

A Custom Soil Resource Report for Three Meadows and the surrounding area was obtained from the USDA Natural Resource Conservation Service Web Soil Survey application (NRCS 2019). The main

meadow portion of the High Onion meadow is Andic Cryumbrepts-Lithic Cryumbrepts association, 15 to 50 percent slopes sandy loam and Xerumbrepts-Cryumbrepts, wet association, 5 to 50 percent slopes sandy loam. The main portion of the Upper Onion meadow is Aquepts, Umbrepts and 0 to 15 percent slopes soils sandy loam. The Tyler Meadow is Xerumbrepts-Cryumbrepts, wet association, 5 to 50 percent slopes sandy loam. None of these soils are classified as susceptible to erosion.

Impact Discussion

None of the soils in the Project Area are susceptible to erosion and the project would not result in erosion or loss of topsoil. The objective of the project is to restore floodplain function and reduce ongoing soil erosion from the incised channel and expanding gullies.

Restoring floodplain function would have a long-term beneficial effect on soils by reducing erosion, increasing the frequency of floodplain sediment deposition, and retaining moisture. Prior to the establishment of vegetation, there is a short-term potential for negative impacts from soil erosion on newly disturbed areas, in the event of significant storms. The design criteria/mitigation measures described below are designed to ensure that soil resources remain on-site.

Mitigation Measures:

Mitigation measures have been developed under consultation with soil scientists and engineers as an integral component of the meadow restoration project.

7a. Standard best management practices will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.

7b. The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.

7c. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.

7d. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

7e. The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary.

Revegetation will consist of the following measures:

- During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
- All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
- Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

8. Greenhouse Gas Emissions

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The project is located within a natural setting in the Eldorado National Forest. On-going greenhouse gas (GHG) emissions in this area are from normal ecosystem function, emissions from nearby vehicular traffic on State Highway 88, and emissions from vehicles engaged in dispersed recreation. Intermittent sources of GHG emissions occur from forest management activities and wildfire.

The Project Area is a series of meadow ecosystems in a degraded state, with incised (downcut) channels that have resulted in a loss of floodplain connectivity and drying of the meadows. Carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄) are GHGs associated with meadows, and fluxes in the emission of these GHGs can be dependent on soil moisture content (Blankinship and Hart 2014). Functional meadows are considered to be net reservoirs for greenhouse gases; however, there are a number of active research projects across the state that are attempting to quantify the net flux of GHGs in restored and degraded meadows. Currently, there is a statewide effort to restore wetlands and mountain meadows as a climate change adaptation strategy through increased carbon sequestration that includes quantitative research on GHG fluxes (CDFW 2017).

Impact Discussion

The proposed project would restore the hydrologic function of High Onion Meadow, Upper Onion Valley, and Tyler Meadow which is expected to provide a long-term reduction in GHG emissions from the Project Area, although with current data gaps it is not possible to accurately quantify this benefit. Construction of the project would generate temporary and one-time GHG emissions by on-site construction equipment and travel to the work site during the proposed one-month construction period. The GHGs emitted during construction would come from diesel fuel combustion from off-road construction equipment and diesel or gasoline combustion from on-road vehicles. The primary GHG generated from these processes would be carbon dioxide (CO₂), with smaller amounts of emissions of methane (CH₄) and nitrous oxide (N₂O). Construction emissions would permanently cease at the end of the project. Over the long-term, these temporary emissions would be offset by the restoration of meadow hydrology and re-establishment of meadow vegetation. Thus, while the project would have an incremental, short-term, and one-time contribution to GHG emissions within the context of the county and region, the individual impact is considered less than significant.

The proposed project would not conflict with an applicable plan, policy, or regulation adopted to reduce the emissions of greenhouse gases.

Mitigation Measure: No mitigation required.

9. Hazards and Hazardous Materials

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Expose people or structures, either directly or indirectly, to significant risk of loss, injury or death involving wildland fires.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The Project Area is located within a natural setting. There are no known hazards, nor hazardous materials, in the Project Area. Above ground forest ecosystem carbon density is greater than 200 Mg/ha (USFS Forest Inventory and Analysis 2012) and wildland fire potential is high (USFS Fire Modeling Institute 2012) for the meadow and surrounding landscape (Dudek, 2019).

Impact Discussion

There are no hazardous materials that will be transported or disposed of as part of this project. There is no risk of accidental release of hazardous substances associated with this project, other than those normally associated with use of any equipment with an internal combustion engine. The heavy equipment used to construct the project will be fueled with diesel fuel. Re-fueling and equipment maintenance will be conducted outside of the riparian areas, and hazardous material cleanup supplies will be kept onsite during construction in the event of an accidental spill or leak. In addition, contracting specifications will ensure equipment is in good working condition prior to mobilization to the Project Area.

Mitigation Measure:

9a. Equipment will be re-fueled and serviced at the designated staging area located within uplands and outside of the meadow. No fuel will be stored on-site. In the event of an accidental spill, hazmat materials for quick on-site clean-up will be kept at the project sites during all construction activities, and in each piece of equipment.

10. Hydrology and Water Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) result in substantial erosion or siltation on- or off-site;	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(iv) impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Environmental Setting

The discussion provided in this section is summarized from the Hydrology Report for the Three Meadows Restoration Project, provided in Appendix H.

The Three Meadows Project area is described in Table 6.

Table 6. Three Meadows Project Area Hydrology and Watershed Summary

Area	Meadow acreage	Watershed acreage	Elev. (feet)	Meadow Description	Drainage Description	Watershed Description
Upper Onion Valley	7	450	7,480	Meadow hosts one main drainage and several springs which coalesce in channels toward the southeastern end.	One main drainage on the western side of the meadow has several head cuts. Several small drainages begin within the meadow.	The perennial Riparian Conservation Area (RCA) drainage from this meadow flows approximately two miles downstream to Cole Creek which is tributary to the N. F. Mokelumne River.
High Onion Meadow	3	30	8,000	Meadow hosts several springs which coalesce in channels toward the southern end.	One main drainage traverses the southeastern boarder of the meadow. Several drainages begin within the meadow with head cuts.	This meadow is at the drainage headwaters and the perennial RCA drainage feeds into Upper Onion approximately one mile downstream.
Tyler Meadow	2	60	6,800	Wet meadow with low areas. Spring area on the west side of the meadow.	Seasonal channel above meadow. No discernable channel through meadow. Meadow outlet is at bedrock and boulders	Meadow is fed by an ephemeral RCA and is tributary to Bear River Reservoir via an 0.5 mile ephemeral drainage. The reservoir feeds Bear River which is tributary to the N.F. Mokelumne River

Impact Discussion

The project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. The project, once complete should improve water quality by reducing erosion. There may be some short duration increase in sediment immediately following construction, but the Project Design Criteria incorporated would minimize the potential for impacts to water quality.

The project design should retain water on the meadows longer, and thus improve infiltration to groundwater. The rate of runoff would decrease as a result of the project. There will be no reduction in groundwater or groundwater recharge.

The existing drainage patterns of the sites will not be altered. There are no impervious surfaces as a part of the project. No flood flows would be impeded. The Design Criteria incorporated into the project would eliminate any potential for impacts to water quality.

Coverage under two permits will ensure that water quality standards are protected. The project will need to obtain a Clean Water Act Section 404 permit from the US Army Corps of Engineers and a Section 401 Water Quality Certification from the Central Valley Regional Water Quality Control Board.

Although the permit has not yet been obtained, 404 permits for meadow restoration projects typically limit the total area of ground disturbance and contain requirements for erosion control. The project will also be required to obtain. Although this permit has not yet been obtained, 401 permits for meadow restoration projects typically require water quality monitoring and measures to ensure that water quality standards are met. Design Criteria are described below. Additional measures are described in the section entitled Geology and Soils.

Mitigation Measures:

Construction activities within the Project Area would occur during the time of year when flows are at the lowest within the streams and adjacent meadows. This typically occurs between August 1 and October 30th but is dependent on the previous season snowpack. Required permits would be obtained, including the 404 permit from the U.S. Army Corps of Engineers and a 401 Water Quality Certification from the Central Valley Regional Water Board. Watershed mitigation measures also would include the use of Best Management Practices (BMPs) to protect water quality as described in the *National Best Management Practices for Water Quality Management on National Forest System Lands* (USDA Forest Service 2012) and the California Stormwater Quality Association's *Stormwater Best Management Practice Handbook* (CASQA 2015).

10a. Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.

10b. The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.

10c. Where streams and meadows cannot be avoided, corduroy stream crossings consisting of logs placed within the channel and up onto the banks parallel to the flowline of the channel will provide a conformable surface for the constructed equipment to drive across without impacting the channel. Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs as necessary, depending on the number of

times the crossing is used. Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.

10d. Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas. The mats would consist of slash material from the salvaged trees, layered to a depth of 1 to 1.5 feet, and be a minimum of 15 feet wide to accommodate the construction. Marsh mats will be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow. The mats would be removed from the meadow and placed as slash along the temporary forest access roads.

10e. Low impact construction equipment would be used as described in the technical specifications and will provide limits on the size and type of equipment that can be used in the meadow. Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs. Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with only a single, short traverse across the meadow at the northern end of the project site.

11. Land Use and Planning

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The project site is on lands administered by the USDA-Forest Service, Eldorado National Forest and is used primarily for dispersed recreation (e.g., fishing, hunting, camping, and occasional winter use). The Project Area is also grazed and will continue to be in an active grazing allotment for the foreseeable future. Timber harvest, fuel reduction projects, and management have and will continue to take place adjacent to and in the vicinity of the meadows.

Impact Discussion

There are no other known plans for the Project Area. There is no established community in, or close, to the project sites. There would be no permanent, direct impacts to land use and planning under the proposed project.

Temporary impacts to grazing may occur from construction activities if the timing of project implementation conflicts with the permittee's grazing permit period of use. However, the project implementation is anticipated to occur in late summer to fall when cattle would likely be gone from the meadow. Because the proposed project results in minor ground disturbance, grazing is unlikely to be impacted post construction. However, if determined necessary by the ENF Botanist, grazing may be removed from the meadows temporarily post construction in order to allow the newly planted vegetation to become established.

Mitigation Measure: No mitigation required.

12. Mineral Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The Project Area is outside of the important mineral resource areas mapped in the 2009 Amador County General Plan, and there are no other mineral resources in the Project Area.

Impact Discussion

There are no mineral resources in the Project Area, therefore, there would be no impact to mineral resources under the proposed project.

Mitigation Measure: No mitigation required.

13. Noise

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The project is within a natural landscape, with noise coming from natural sources (e.g., bird song) and vehicles passing on nearby USFS roads. The project is over two miles from the nearest campground or paved road. There are no noise-sensitive areas (e.g., residences, schools, hospitals, rest homes, long-term medical or mental care facilities, and other uses deemed noise-sensitive by the local jurisdiction, such as libraries or places of worship) located near the Project Area.

The Amador County General Plan Noise Element sets goals and policies for noise and land use planning. The County has developed land use compatibility standards rating compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. Using these land use compatibility guidelines, the County has established interior and exterior noise standards (Amador County 2016).

Impact Discussion

The restoration project will require construction with heavy equipment, which will create temporary noise for approximately four to five weeks. Construction activities will be conducted in the late summer/early fall during daylight hours of the work week. The project will not create generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

The project will not generate excessive groundborne vibration or groundborne noise levels.

The Project Area is not located within the vicinity of a private airstrip

Mitigation Measure: No mitigation required.

14. Population and Housing

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting and Impact Discussion

The Project Area is located within a natural setting on the Eldorado National Forest. There is no housing near the project site. The Three Meadows Restoration Project is located within a remote location, and would not cause direct or indirect population growth, nor would it displace existing housing or people.

Mitigation Measure: No mitigation required.

15. Public Services

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting and Impact Discussion

No public services are available in the area. The project is a restoration project located within a natural forested setting and would not affect populations or public services.

Mitigation Measure: No mitigation required.

16. Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting and Impact Discussion

The project is located on public land within Eldorado National Forest and is occasionally used for dispersed recreation such as hunting, camping, and OHV touring. The meadows are accessible by foot, with FS 08N03 and 08N03FW as the nearest roads. The project does not include recreational facilities, nor would it lead to a need for recreational facilities. The project is not expected to increase recreational use of the area, because the primary character of the area, open meadow, would not change.

Mitigation Measure: No mitigation required.

17. Transportation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting and Impact Discussion

The surrounding area is occasionally used for dispersed recreation such as hunting, camping, and OHV touring. The meadow is accessible by foot, with FS 08N03 and 08N03FW as the nearest roads, which are not primary routes to any destination. The project would not affect the existing capacity of the transportation system near the Three Meadows. 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.

Mitigation Measure: No mitigation required.

18. Tribal Cultural Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting and Impact Discussion

On September 17 and 28, 2019 a Class III reconnaissance of the Three Meadows Restoration Project Area was completed to comply with Forest Service policies and Section 106 of the National Historic Preservation Act. Inventory coverage methods followed USDA Forest Service guidelines for archaeological inventory, as outlined in the *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer (USDA-SHPO PA 2011)*. Evaluation of tribal cultural resources based on previous historical/archaeological inventories is provided in Section 5 of this checklist (Cultural Resources).

A total of two historical and/or archaeological sites, as well as a historic two-track road, were identified within the APE. The two identified sites are located at the margins of High Onion and Upper Onion Meadow and will be avoided during project activities. The USFS Archeologist has determined that design criteria included in the Three Meadows Restoration Project design will avoid all documented cultural and archeological resources within the APE. See list of mitigation measures listed in Section 5.

On July 18, 2019 the Eldorado National Forest, Amador Ranger District Archeologist sent a letter requesting consultation to a local list of Native American individuals/ organizations that may have knowledge of local cultural resources to solicit tribal input on the project. The list of Native American individuals/organizations contacted includes:

- Wilton Rancheria
- Washoe Tribe of Nevada and California
- United Auburn Indian Community
- Shingle Springs Rancheria
- Jackson Rancheria
- Ione Band of Miwok Indians
- Buena Vista Rancheria of Me-wuk Indians

As of March 2020, there has been no response to the ENF Amador Ranger District Archeologist from any of the Tribal contacts. Tribal consultation with the Forest Service will be on-going throughout the duration of the project. Interested Tribes will be kept informed of the project stages and implementation as the project progresses.

Pursuant to California Assembly Bill 52 (AB 52), on February 22, 2020 the Amador Resource Conservation District, Lead CEQA Agency, contacted the Native American Heritage Commission (NAHC) to request a review of the Sacred Lands file for information on Native American cultural resources in the study area and to request a list of Native American contacts in the vicinity of the project site. In the response letter dated March 03, 2020, the NAHC reported that there were no known Sacred Sites in the Project Area or immediate vicinity and the following tribes had requested to be notified:

- Buena Vista Rancheria of Me-wuk Indians
- United Auburn Indian Community of the Auburn Rancheria
- Calaveras Band of Mi-Wuk Indians
- Washoe Tribe of Nevada and California
- Ione Band of Miwok Indians
- Jackson Rancheria Band of Miwuk Indians

On March 9, 2020 ARCD contacted each of the above listed tribes. Pursuant to AB 52, once notified tribes are allowed up to 30 days to request consultation on the project. As of March 24, 2020, there has been no request for consultation has been received. With the exception of the Ione Band of Miwok Indians, the ENF Amador Ranger District Archeologist had been previously contacted each of these tribes in July 2019.

Mitigation Measures: See Section 5

19. Utilities and Service Systems

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications, the construction or relocation of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting and Impact Discussion

The Project Area is within a natural setting with no utilities or service systems. The project is a restoration project that will not affect utilities and service systems.

Mitigation Measure: No mitigation required.

20. Wildfire

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Substantially impair an adopted energy response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Environmental Setting

The project is located within the Federal Fire Protection Responsibility area (FFRA). The meadow is dominated with healthy riparian vegetation but has been impacted by past and present management activities including grazing and fire exclusion. The meadow's adjacent forested stand consists of high-

elevation fir/pine type forest growing on a low to moderately productive site. Above ground forest ecosystem carbon density is greater than 200 Mg/ha (USFS Forest Inventory and Analysis 2012) and wildland fire potential is high (USFS Fire Modeling Institute 2012) for the meadow and surrounding landscape (Dudek, 2019). The stands complexity and contribution to late successional forest function is ranked 3 out of 5 for having retained significant numbers of large trees and snags but lacking the parklike structure often produced by frequent low-intensity fire (Sierra Nevada Ecosystem Project, Final Report to Congress; Late Successional Old-Growth Forest Conditions, University of California; SNEP Science Team and Special Consultants, 1996).

Impact Discussion

The project is a restoration activity that would not result in land use changes that would affect an emergency response or emergency evacuation plan. 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 purpose of the project is to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. Post construction, the increase in site hydrology and prolonged inundation would likely decrease the site risk of wildfire.

Mitigation Measures:

20a. While the Project Area is located within a meadow and outside of identified very fire hazard severity zones, portions of the meadow are expected to be dry, with a risk for wildfire associated with the use of any internal combustion engine. A trash pump and/or water truck will be on site to assist with vegetation transplants and dust control, as well as to reduce the risk of wildfire.

21. Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) 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?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

☐☐☐☒

Impact Discussion

Overall, implementation of this restoration project is expected to have a long-term, beneficial impact to the environment, improving wildlife habitat, wetland plant communities, and water quality. There would be no cumulative significant impacts caused or created by construction of the restoration project that would degrade existing natural resources, adversely affect human beings, or have an incremental negative effect in connection with past, current or foreseeable future projects. Best management practices, standard operating procedures, and project-specific mitigation measures described in this initial study would ensure that resources are protected and impacts under the proposed project would be less than significant.

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Mitigation Measures and Design Criteria

Monitoring and Reporting Program Summary for the Three Meadows Restoration Project

This sheet summarizes the mitigation measures, design criteria and best management practices discussed under each section of the Initial Study checklist. Some of the measures are redundant because they protect more than one resource.

Mitigation Measures and Design Criteria

Air Quality

- 3a.** Water and/or approved chemicals would be applied to Forest Service road surfaces and temporary access roads to suppress dust and to maintain a stabilized surface.
- 3b.** Vegetation and other barriers will be used to contain and to reduce fugitive emissions.
- 3c.** Reasonable vehicle speeds will be maintained while driving on unpaved roads in order to minimize fugitive dust emissions.

Biological Resources

Terrestrial Wildlife

- 4a.** The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- 4b.** Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- 4c.** Retain all trees 30" diameter at breast height (dbh) and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

- 4d.** Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.
- 4e.** If the Sierra Nevada yellow-legged frog (SNYLF) are found within the Project Area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- 4f.** Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- 4g.** A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).

4h. The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.

4i. In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.

4j. Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Botanical Resources

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004). Specific design criteria and protection measures for the project include:

4k. Any new occurrences of sensitive plants identified within the Project Area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.

4l. A Forest Service watchlist species, *Botrychium simplex*, occurs within the Project Area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.

4m. All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the Project Area.

4n. Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.

4o. Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.

4p. Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).

4q. All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

Cultural Resources

5a. Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.

5b. Buffer zones may be established to ensure added protection if determined necessary by the Forest Service District Archeologist. The use of buffer zones in avoidance measures may be applicable where heavy equipment is used in proximity to historic properties.

5c. The only access roads to the Project Areas will be those shown by the plan set to reduce impacts to previously undiscovered cultural sites.

5d. If articulated or disarticulated human remains are discovered during ground disturbing construction activities or ground disturbing activities, all work shall cease within 100 feet of the find and all ground disturbing activities shall not resume until the requirements of Health and Safety Code section 7050.5 and, if applicable, Public Resources Code 5097.98 are met.

Geology and Soils

7a. Standard best management practices will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.

7b. The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.

7c. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.

7d. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

7e. The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary.

Revegetation will consist of the following measures:

- During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
- All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
- Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

Hazards and Hazardous Materials

9a. Equipment will be re-fueled and serviced at the designated staging area, which is outside of the riparian area and meadow. No fuel will be stored on-site. In the event of an accidental spill, hazmat materials for quick on-site clean-up will be kept at the project sites during all construction activities, and in each piece of equipment.

Hydrology and Water Quality

10a. Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.

10b. The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.

10c. Where streams and meadows cannot be avoided, corduroy stream crossings consisting of logs placed within the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel. Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs as necessary, depending on the number of

times the crossing is used. Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.

10d. Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas. The mats would consist of slash material from the salvaged trees, layered to a depth of 1 to 1.5 feet, and be a minimum of 15 feet wide to accommodate the construction. Marsh mats will be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow. The mats would be removed from the meadow and placed as slash along the temporary forest access roads.

10e. Low impact construction equipment would be used as described in the technical specifications to provide limits on the size and type of equipment that can be used in the meadow. Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs. Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with only a single, short traverse across the meadow at the northern end of the project site.

Tribal Cultural Resources

Repeated from Section 5 Cultural Resources

5a. Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.

5b. Buffer zones may be established to ensure added protection if determined necessary by the Forest Service District Archeologist. The use of buffer zones in avoidance measures may be applicable where heavy equipment is used in proximity to historic properties.

5c. The only access roads to the Project Areas will be those shown by the plan set to reduce impacts to previously undiscovered cultural sites.

5d. If articulated or disarticulated human remains are discovered during ground disturbing construction activities or ground disturbing activities, all work shall cease within 100 feet of the find and all ground disturbing activities shall not resume until the requirements of Health and Safety Code section 7050.5 and, if applicable, Public Resources Code 5097.98 are met.

Wildfire

20a. While the project area is located in a meadow and outside of identified very fire hazard severity zones, portions of the meadow are expected to be dry, with a risk for wildfire associated with the use of any internal combustion engine. A trash pump and/or water truck will be on site to assist with vegetation transplants and dust control, as well as to reduce the risk of wildfire.

Post Construction Monitoring & Reporting

Monitoring is a means to determine if conditions in Three Meadows are meeting or moving toward the desired conditions. All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted. Monitoring would be conducted by Amador Ranger District staff and project partners.

Mitigation Monitoring

During construction, ENF staff would be on-site continuously and responsible for ensuring that Best Management Practices and Design Criteria are followed and mitigations measures are implemented.

Once the project is completed, a report on construction is to be sent to the funding agency, as well to the permitting agencies (Regional Water Quality Control Board and US Army Corps of Engineers). The report will certify compliance with mitigation measures.

Appendix A

Three Meadows Restoration Basis of Design Report
November 24, 2019

THREE MEADOWS RESTORATION

BASIS OF DESIGN REPORT

UPPER ONION MEADOW - 60% DESIGN

HIGH ONION AND TYLER MEADOWS - 30% DESIGN



prepared for

Amanda Watson, Amador Resource Conservation District

prepared by



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Portland, Oregon 97205*

November 24, 2019

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Appendix A 60% Engineering Drawings for Upper Onion Meadow

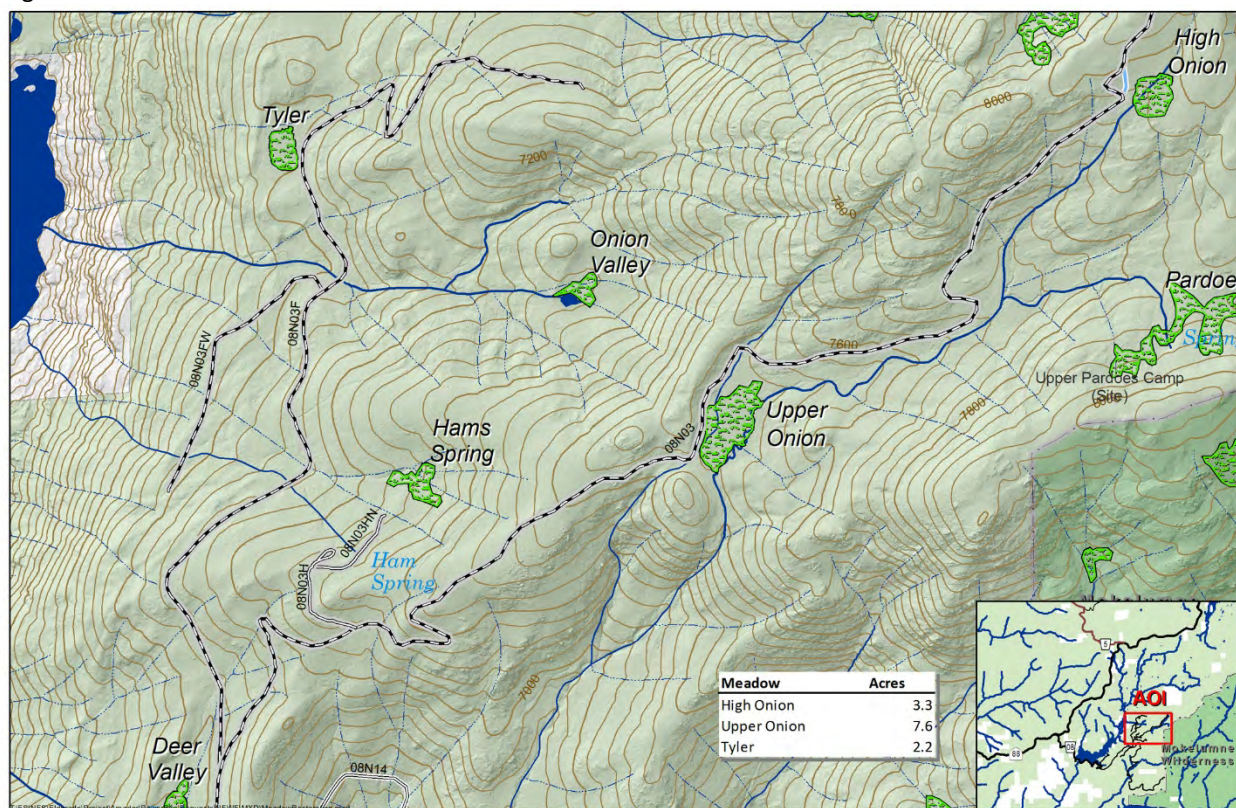
Appendix B 30% Engineering Drawings for High Onion and Tyler Meadows

1.0 INTRODUCTION

1.1 Project Overview

Many meadows throughout the Sierra Nevada have been degraded from historic land use practices, resulting in channel incision that has impacted natural ecological and hydrological functions. Within the Mokelumne River watershed, a diverse group of stakeholders formed the Amador Calaveras Consensus Group (ACCG) to address these impacts and have collaborated to solicit funding in support of efforts to restore these unique meadow habitats. To increase the pace and scale of meadow restoration in the Mokelumne watershed, ACCG members and the Amador Resource Conservation District (ARCD) received funding to conduct an assessment and develop preliminary restoration plans for Upper Onion, High Onion, and Tyler Meadows, referred to as the “Three Meadows” project area (Figure 1). Efforts to restore these meadows is being conducted in parallel with a similar effort at Indian Valley, Foster Meadow, and Little Indian Valley by the U.S. Forest Service’s (USFS) Amador Ranger District. This report has been prepared to summarize the results of the existing conditions assessment and identify the range of potential restoration actions at the site for review and selection by the stakeholder committee.

Figure 1: Overview of the project area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion Meadows.



1.2 Restoration Objectives

Sierran wet meadow complexes provide important ecological benefits but are an increasingly threatened habitat type. Despite the fact that they only represent a small percentage of the overall landscape, they play an outsized role in supporting floral and faunal diversity in the landscape. Although often degraded from altered hydrology, channel incision, and encroachment of the adjacent coniferous forest, wet meadows provide critical habitat for the Sierra Nevada Yellow-legged Frog (SNYLF), *Rana sierra*, and support sensitive plant species such as rare moonworts, *Botrychium sp.* Absent a plan for restoration, these meadows are at risk of losing important ecological and hydrological functions. In addition to their value to threatened and endangered plants and animals, meadows provide other beneficial uses including forage for commercial grazing activities and native ungulates, recreation, and water storage for power generation and domestic water supply downstream.

Given their threatened status and the importance of these habitat types in the larger forest ecosystem, a long-term set of objectives to restore meadow function would include:

- Restore the natural hydrology of the meadow to raise the groundwater elevation and increase natural water storage,
- Restore the natural morphology of the meadow to recover sediment deposition function,
- Arrest channel headcutting,
- Increase and prolong the duration of late-season flows for the benefit of flora and fauna and downstream water users,
- Reduce downstream flood peaks,
- Halt the encroachment of upland plant species, particularly lodgepole pine,
- Increase extent and quality of wet meadow and riparian vegetation, and
- Improve habitat for meadow species, with focus on sensitive plant species and the Sierra Nevada Yellow-legged Frog (SNYLF).

Specific restoration actions designed to achieve these restoration objectives would likely be different at each of the meadows included in the Three Meadows project area. The specific actions are identified based on the assessed conditions and impacts.

2.0 EXISTING CONDITIONS

2.1 Site Setting

The project area encompasses three relatively small, high elevation meadows in Amador County, California. The three meadows include Upper Onion, High Onion, and Tyler and are located approximately 50 miles northeast of Jackson, CA, and east of Bear River Reservoir in the Amador Ranger District of the Eldorado National Forest (Figure 1). Tyler meadow is in the Bear River watershed and High Onion and Upper Onion are in the Cole Creek watershed. High Onion Meadow (~ 3 acres @ 8,000 feet elevation) and Upper Onion Valley Meadow (~7 acres @ 7,480 feet) are located on Onion Creek, which ultimately flows into Cole Creek and the North Fork Mokelumne River, about 1.7 miles downstream from Salt Springs Reservoir. Tyler Meadow (~2 acres @ 6,800 feet) drains into Upper Bear River Reservoir which feeds Bear River and Bear River Reservoir. Upper Onion has a drainage area of approximately 0.7 square miles (450 acres) consisting of two principal tributaries with drainage areas of 0.6 square miles and 0.1 square mile. Both High Onion and Tyler have a drainage area of approximately 0.1 square mile (64 acres).

2.2 Geomorphology

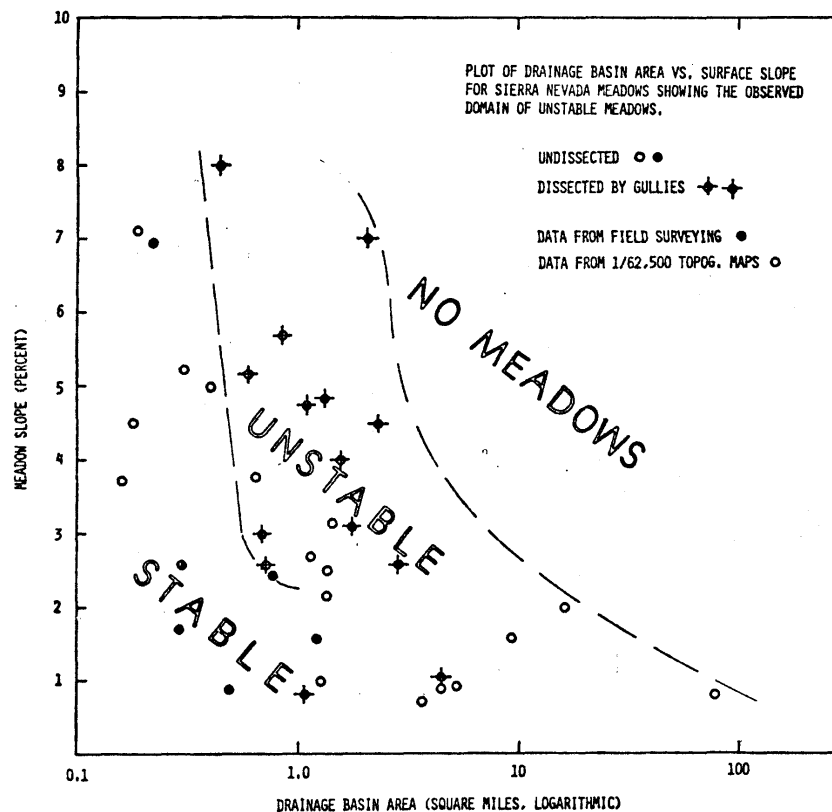
Meadows exist as small pockets of grassland in a landscape largely dominated by forest where downstream controls, such as a bedrock outcrop or terminal moraine, create a flatter longitudinal profile that encourages sediment deposition. According to Wood (1975) meadows are characterized by two fundamental physical conditions: 1) A shallow water table that rarely exceeds two feet in depth at mid-summer, and 2) Surficial material that is fine textured and richly organic. Similarly, according to Wood (1975), whether a meadow occurs at a particular location in the landscape is a function of the size of the drainage basin feeding the meadow and the overall meadow slope. The drainage basin needs to be large enough to provide adequate flow and seepage water from the hillslopes to maintain a high water table during the growing season but not too large where high flows mobilize the fine-grained material. Valley slope has a similar influence on whether or not a meadow will be present. If the slope is too steep, sediment will be mobilized, resulting in channel incision that lowers the groundwater table to the point where the forest encroaches.

Wood (1975) also discusses some general rules of thumb about meadow morphology, expected occurrence of channels in a meadow, and generally how resilient meadows are to disturbance. He reached the following conclusions:

- Meadows typically occur where the ratio between drainage area and meadow area is between 5 and 25. For the Three Meadows, Tyler has a ratio of 32, High Onion has a ratio of 21, and Upper Onion has a ratio of 64.

- A more important metric determining meadow stability is the relationship between drainage area and valley slope. Wood (1975) plotted these relationships for numerous meadows throughout the Sierra Nevada and characterized stable and unstable meadow regimes (Figure 2). Tyler and High Onion both fell solidly in the “stable” regime whereas Upper Onion falls near the break between “stable” and “unstable”.
- Wood developed a general rule of thumb that states that meadows with drainage basins smaller than 0.8 square miles and valley slopes less than 2% do not commonly have a through flowing stream channel. Tyler meadow falls solidly within this description. Upper Onion, with a drainage area of 0.7 square miles and a valley slope of approximately 1.7% is on the upper end of this range. High Onion significantly exceeds the valley slope requirement and is expected to have a flow through channel.

Figure 2: Meadow stability in the Sierra Nevada Mountains as a function of meadow slope and drainage basin area according to Wood (1975).



This last point is highly relevant to this project, especially Upper Onion and Tyler. The topography and specific features of these meadows suggest that these meadows formed in a depositional environment with limited channel formation. Flow entering the meadow at the upstream end spread out into shallow, overland flow and interacted with a rough meadow surface consisting of grasses and shrubs.

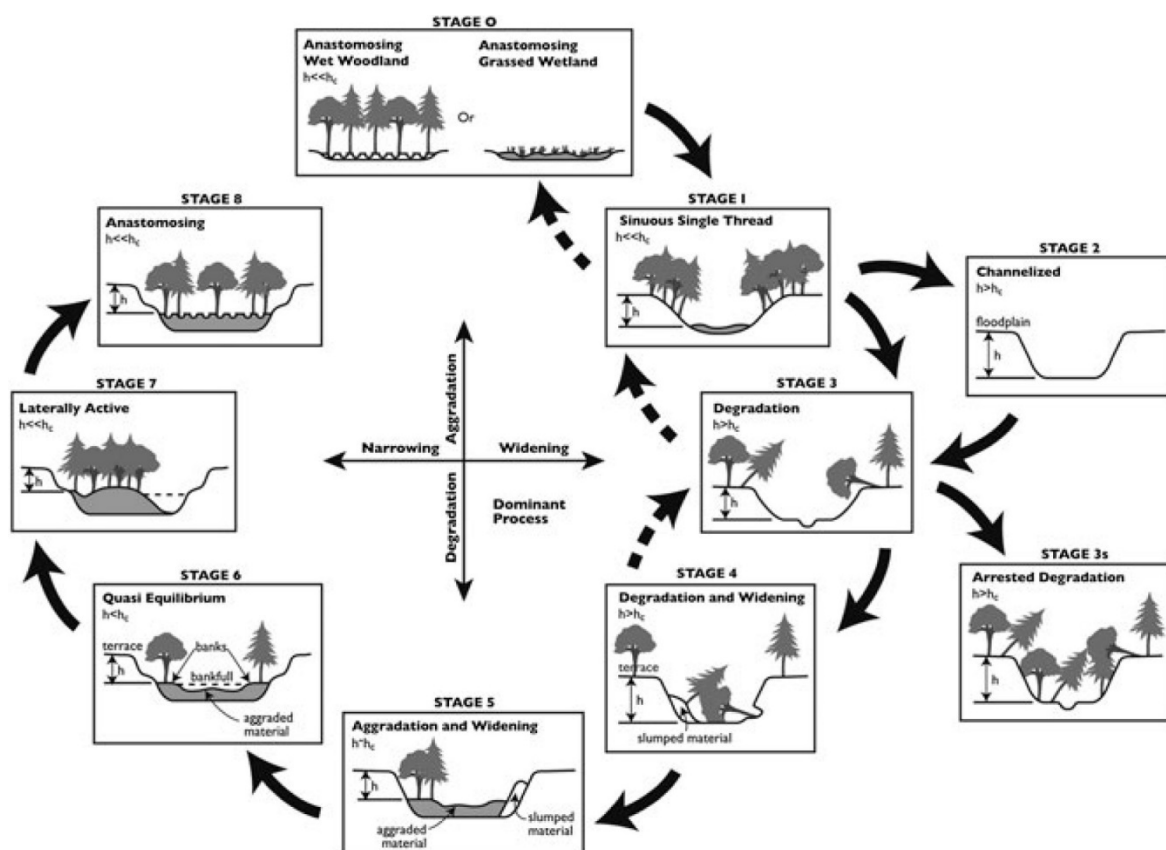
Low areas in the meadow, furthest away from the alluvial fan, would have ponded and the meadow would have aggraded over time from a combination of delivered sediments and organic matter. This would have produced a profile characterized by a flatter slope at the upper end of the meadow on the alluvial fan, a slightly steeper slope in the middle of the meadow representing the base of the fan, and a lower slope at the downstream end of the meadow due to the presence of the bedrock outcrop or terminal moraine. This is the exact scenario observed at Upper Onion.

Various types of disturbances could impact this delicate balance and shift the landform from depositional to erosional. Those disturbances include livestock grazing, which reduces the overall roughness of the meadow surface and increases overland flow velocities, or an increase in flow to the meadow from the watershed that may be a result of more efficient drainage networks (e.g. – roads, channelization, etc.) or logging. Similarly, a variety of disturbances downstream of the meadow could result in headward migration of a knickpoint that could cause incision of a channel through the meadow, independent of land uses within the meadow or upstream watershed. These impacts ultimately lead to formation of a more defined channel, or set of channels, through the meadow which potentially lowers the water table to the point where at least one of the two primary criterion than define a meadow, according to Wood (1975), are no longer being met.

Following an initial disturbance, positive feedback loops are often established that lead to additional channel incision and loss of meadow function. This process is not unique to meadows and has been characterized by a number of researchers (Schumm et al, 1984; Simon and Hupp, 1986) and referred to as the Channel Evolution Model. This model identifies a series of stages that channels typically go through following a disturbance. The initial disturbance results in incision, followed by widening as the incision destabilizes streamside vegetation, followed by aggradation as the channel becomes overwhelmed by the material contributed locally from the banks, followed by a new state of equilibrium as a new inset floodplain is established and the former floodplain surface becomes terrace. Depending on the site opportunities and constraints, restoration efforts on incised channels either seek to turn back the clock and restore the channel by aggrading it to improve interaction with the historic floodplain, or push the process forward to the new equilibrium by excavating terrace material to create an inset floodplain.

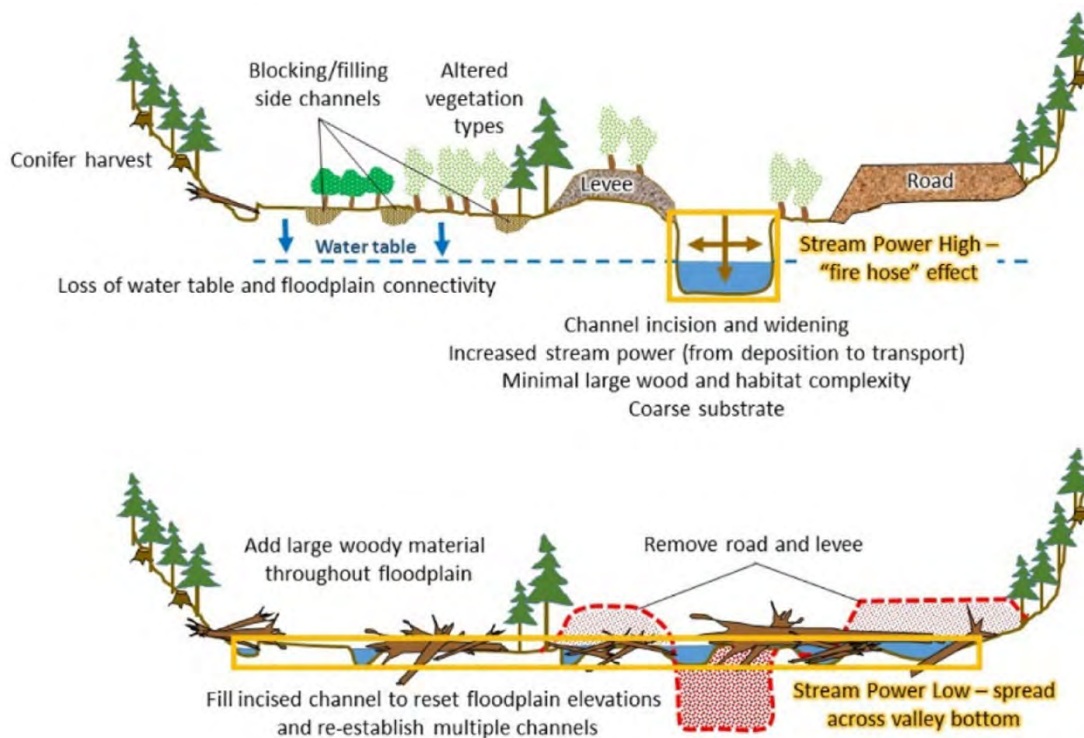
Recent research, culminating in a paper by Cluer and Thorne (2014) sought to address limitations in the Channel Evolution Model in depositional environments where single-thread channels were not likely to be present historically but instead the channel network is either anastomosing or not present at all. They expanded the Channel Evolution Model to include the “Stage 0” morphology and suggested that these landforms require a completely different approach to restoration. Figure 3 presents a graphic from Cluer and Thorne that show how the Stage 0 concept fits in with the Channel Evolution Model and what restoration approaches might look like.

Figure 3: Reimagined Channel Evolution Model that includes depositional environments dominated by anastomosing channels, referred to as Stage 0 (from Cluer and Thorne 2014).



Since the publication of this paper, restoration practitioners have been experimenting with the Stage 0 concept in both meadow and forested settings in the Pacific Northwest. These efforts initially began in smaller meadow systems but have been expanded to larger sites including a recent project that implemented the approach on a large mainstem tributary of the Willamette River (Staley Creek, Middle Fork Willamette River; <https://www.middleforkwillamette.org/restore/rivers-and-streams/staley-creek/>). The U.S. Forest Service (USFS) has been at the forefront of these efforts given the fact that they are a single contiguous landowner and may have a more streamlined regulatory environment to navigate. They have also developed several useful GIS tools to evaluate opportunities for Stage 0 restoration on the landscape. Their conceptual model is illustrated in Figure 4, which was borrowed from a technical newsletter produced by USFS' National Stream and Aquatic Ecology Center. It provides a more detailed look at the geomorphic, hydraulic, ecological, and groundwater benefits of a restoration approach that focuses specifically on historically depositional reaches.

Figure 4: Conceptual cross-section of before and after condition of a Stage 0 restoration project (from a technical newsletter produced by USFS' National Stream and Aquatic Ecology Center).

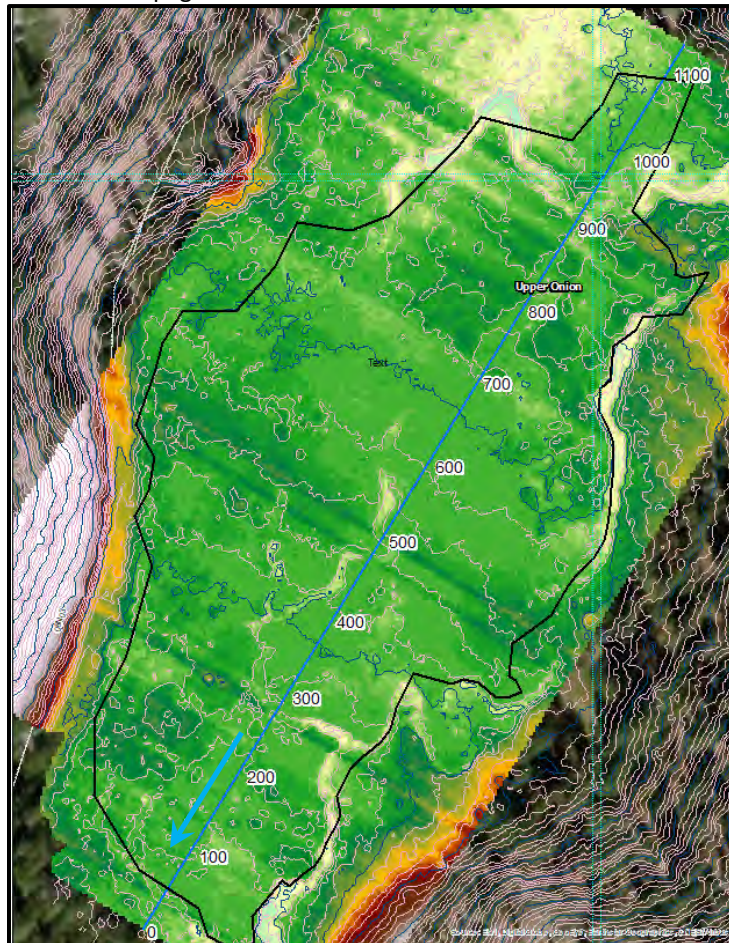


One of those tools uses LiDAR data for a site to generate a Relative Elevation Map (REM) of the project area. This is done by utilizing a user-defined profile of the meadow, which is drawn down the slope of the meadow from the upstream end to the outlet. This profile is then used to compare the elevation of the meadow at the profile to adjacent elevations along a series of perpendicular cross-sections. The result is a map of elevational difference between the historic meadow surface and adjacent ground with negative representing areas of incision and positive values representing areas of deposition. The map produced for Upper Onion provides a clear representation of where incision is most severe (Figure 5). It also provides a tool for evaluating where fill is necessary to return a project site to a Stage 0 condition and where there are opportunities to borrow material to fill the incised areas.

The REM was only generated for Upper Onion Meadow because it was determined to be an historically depositional environment and has experienced cumulative impacts that have caused it to cross a threshold from depositional to erosional. Determining the specific forcers and a timeline of events that led to the initial perturbation and degradation is difficult, if not impossible. It is likely a combination of factors such as heavy, prolonged grazing, followed by modifications to the hydrology. As mentioned previously, slight changes in the independent physical variables can lead to significant changes in meadow condition. For example, there is evidence that the Upper Onion site has not always been a

meadow. During the site visit we observed stumps that had been exhumed due to channel incision. This observation mirrors what was documented by Wood (1975) in incised meadows channels throughout the Sierra Nevada. Wood conducted detailed stratigraphic analysis of these meadows using carbon dating and other methods and came to the conclusion that many of these meadows were forested up until approximately 1,200 year before present (ybp). Climatic variation, initiated by a neoglaciation event from approximately 2800 ybp and 1200 ybp, led to loss of forest cover and a rise in the water table in depositional basins. Continued late season snow pack has maintained these conditions to the present date. This has implications for climate change associated with the rise of atmospheric CO².

Figure 5: Relative elevation map of Upper Onion Valley based on a user-defined geomorphic profile of the meadow (blue line). Light green represents areas where the elevation equals the profile. Dark green represents areas higher than the profile. Yellow and blue represents areas that presumably have incised. The downstream outlet of the meadow is at the bottom of the page.

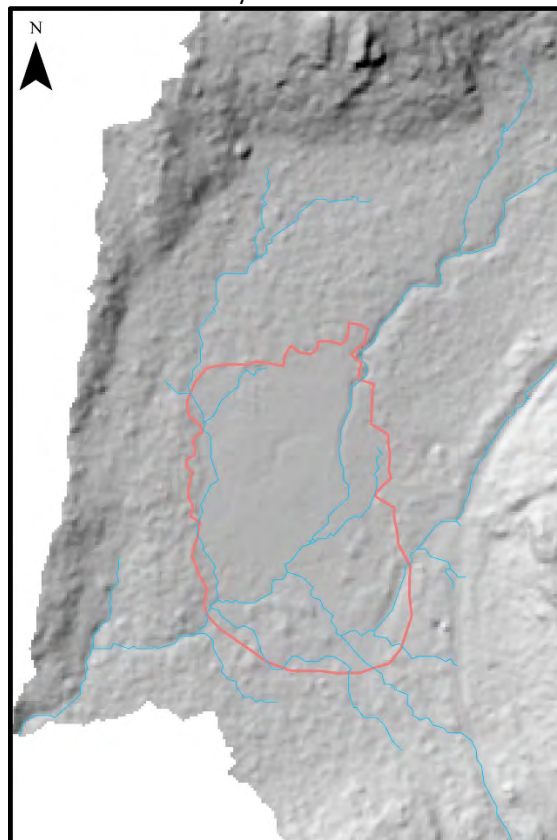


Much of the discussion above has been focused on conditions at Upper Onion Meadow. Although the same physical variables apply, conditions on Tyler and High Onion Meadows are different than what is occurring at Upper Onion for a variety of reasons. At Tyler, impacts to the meadow and surrounding

watershed has not led to incision of the meadow. There are signs that grazing impacts have significantly impacted the ecological value of the meadow and access to the meadow from OHV's have caused localized impacts, but in general it does not appear there have been water table impacts that directly relate to channel incision.

The primary issue at Tyler is the condition of the channel upstream of the meadow, whether or not that area was historically part of the meadow, and what the benefits would be of attempting to aggrade the channel. The apparent age of the trees upstream of Tyler Meadow suggests that it has been forested for quite some time. The drainage area at the outlet of Tyler was calculated to be 0.1 square mile. A closer look at the topography of the watershed that drains to Tyler suggests that the actual drainage contribution to the upper end of the meadow may be less than half of that (Figure 6). Two other drainages enter the meadow downstream of the primary drainage, which may have a significant influence on groundwater depths longitudinally along the meadow and up into the forested portion of the Tyler drainage.

Figure 6: Shaded relief map of Tyler Meadow using LiDAR data. The blue lines represent LiDAR derived stream channels based on a cell-based analysis of flow area and direction.



Depth to bedrock, which controls the outlet of the meadow, is also unknown along the profile. The bedrock surface may be somewhat uniform and flat, whereas the ground surface is sloped, producing a

shallower depth to bedrock at the downstream end of the basin with greater depths in the upstream direction. The survey data shows a meadow slope of approximately 1.2% and a valley slope of 1.8% in the forested reach. The result would be a shallower water table at the downstream end of the basin which may result in meadow conditions in a portion of the basin and forested conditions upstream. The presence of a channel in the forested reach and an absence of channels in the meadow reach could primarily be a function of differences in channel slope, impacts on surface conditions from cattle, and the impact of a more efficient drainage network and higher peak flows due to the presence of the road.

A landscape analysis of High Onion Meadow suggests that it is a much different meadow, morphologically, than Upper Onion and Tyler (Figure 7). The high groundwater table appears to be driven by subsurface flow from colluvial material from adjacent hillslopes and alluvial fans that intersect at this location in the landscape, forcing water to the surface. Upper Onion appears to be one piece of a mosaic of “forest-free” areas in this headwater region of the Onion Creek drainage (Figure 8). It is one of the larger tree free areas and is bisected by the primary channel of Onion Creek, which has incised into the intersecting depositional areas. The overall slope of the meadow exceeds 5% though the stepped nature of the intersecting fans results in some portions of the meadow being flatter than 5% and some portions being much steeper. Slight incision of the primary channel appears to be the result of grazing and increased peak flow associated with the adjacent road network.

Figure 7: Color ramp elevation map of High Onion and adjacent areas from LiDAR. Each color band represents approximately a 3 foot band.

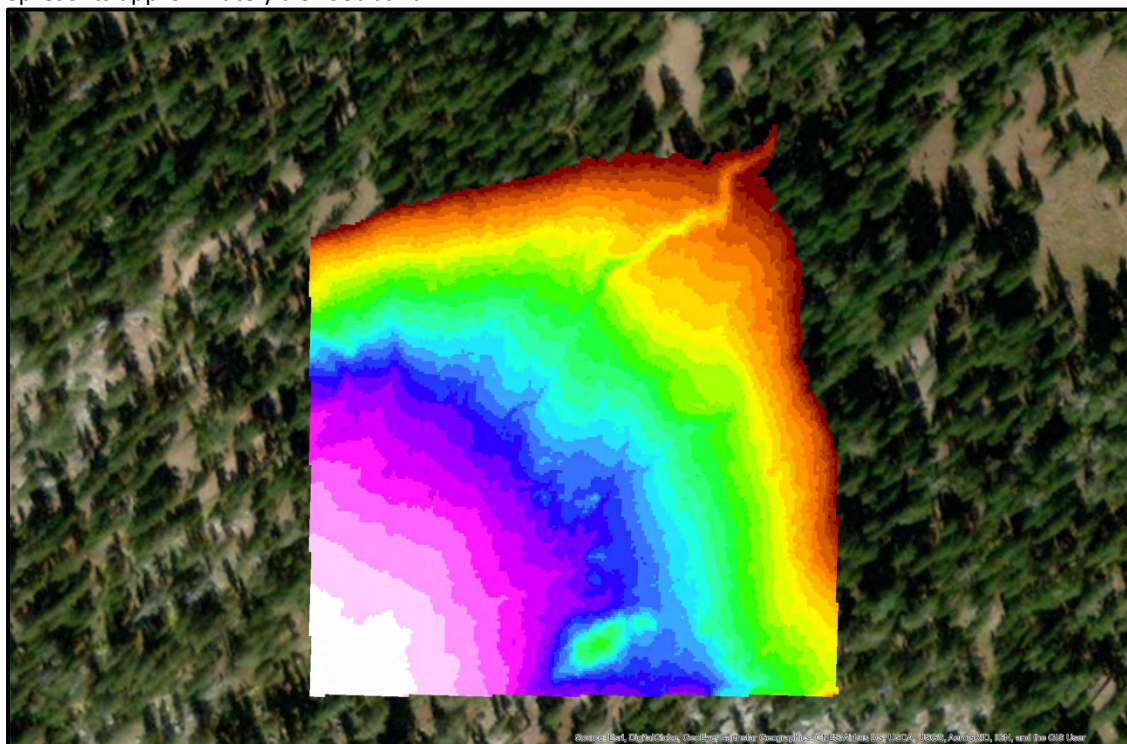


Figure 8: Aerial photo view of High Onion Meadow and surrounding area. The open meadow condition at High Onion is not unusual in this headwater region where seepage water from adjacent hillslopes and convergence of drainage networks result in locally high groundwater.



2.3 Hydrology

Given the elevation of the three meadows, the hydrology is dominated by the melting of winter snowpack. Peak events typically occur in late spring or early summer and often occur when nighttime temperatures stay above freezing for several days in a row. The magnitude of the peak event in any given year is often dictated by the depth of the winter snowpack though extreme high temperatures in conditions of lower snowpack depths can result in large peak flow events. High flows can also occur when significant snowfall and a deep snowpack is followed by a prolonged rain-on-snow event, often referred to as a “Pineapple Express” or atmospheric river because subtropical moisture is entrained into a jet stream that is locked into a particular configuration. These events are rare, on the order of every 10 years, but result in the largest magnitude discharge events on record and typically occur in January or February. Wood (1975) suggests that these events are the primary drivers of both erosional and depositional features in these meadow systems.

Peak flow estimates for a range of return periods were developed for each of the meadows using the StreamStats tool developed by USGS. This tool was used because the drainages themselves are not

gaged by USGS, therefore no streamflow data are available, and similarly-sized drainages in the region are not gaged. There is a gaging site located on Cole Creek near the Salt Springs Reservoir but the drainage area of this gage is 21 square miles, significantly larger than any of the meadows within the Three Meadows project area. The USGS also maintains several gages on smaller tributaries in the Kirkwood region but the smallest drainage area is 7.3 square miles and the gage is located downstream of a regulated reservoir and doesn't represent natural hydrologic conditions. A summary of the Streamstats results for each of the meadows is presented in Table 1. The results for Upper Onion has been divided into two summaries for the primary drainage entering Upper Onion at the fan surface (drainage area of 0.6 square miles) and the drainage that crosses the access road to the camping area (drainage area of 0.1 square miles).

TABLE 1: PEAK DISCHARGE ESTIMATES BASED ON REGIONAL REGRESSION EQUATIONS				
Return Period (years)	Peak Flow Estimates for Upper Onion Main Tributary (cfs)	Peak Flow Estimates for Upper Onion Road Tributary (cfs)	Peak Flow Estimates for High Onion (cfs)	Peak Flow Estimates for Tyler (cfs)
2	18.4	3.5	3.6	3.7
5	43	8.5	8.5	8.7
10	68	14	14	14
25	111	23	23	23
50	154	32	32	32
100	206	43	44	43

3.0 RESTORATION ACTIONS

3.1 Overview

Given the significant differences in the physical characteristics of each of the meadows within the Three Meadows project area, the degree to which land use impacts have degraded their condition, and their overall ecological value, a different set of restoration actions or alternatives needs to be considered for each meadow. Where channel incision has been observed, the objective would be to reverse the process of degradation and encourage sediment deposition, though the approach may vary at each meadow, or in specific areas of each meadow, based on the degree of incision. By implementing measures that will reduce incision and encourage deposition, it is postulated that the water table will rise and restore more natural functions of wet meadow habitat. In the case of Upper Onion, restoration of natural wet meadow conditions is expected to increase the distribution of native plant species such as the rare moonworts (*Botrychium sp.*) and increase the extent and duration of ponded water in depressional areas of the meadow to support native animals such as Sierra Nevada Yellow-legged Frog (SNYLF), *Rana sierra*. Restoring the natural hydrology and historic buffering function of a wet meadow system is also expected to enhance water storage and slow the release of water for a variety of downstream benefits.

Although restoration actions are being proposed for all three of the meadows, more effort is paid to Upper Onion meadow because it is significantly larger than the other two meadows, currently supports the species identified above, and is the most degraded. Opportunities for restoration at Upper Onion Meadow include the following:

- The site is easily accessible by a well-developed road that runs along the entire north side of the meadow,
- A potentially staging area already exists at the site within the seasonal primitive camping area,
- Large conifers within and adjacent to the meadow may be available for use in the project,
- The site is located entirely on public land within USFS property,
- Borrow material, consisting of fine-grained material, is present in areas adjacent to the meadow if needed,
- The meadow currently provides habitat for the two, target species identified above, providing a template on the preferred habitat type that could be replicated through the proposed restoration actions,
- Previous USFS restoration efforts at the meadow resulted in some success at utilizing log weirs to aggrade portions of the incised channels, which could be used as a template for elsewhere in the meadow, and
- Late summer is characterized by little to no flow in the meadow which provides ideal conditions for construction.

Despite these opportunities for restoration, constraints to fully achieve the stated goals for a selected restoration action also need to be considered. The constraints for Upper Onion include the following:

- Despite the recent efforts to address erosion sources and hydrologic impacts of the adjacent road network, the continued use of the access road will provide a long-term source of increased sediment supply and discharge to the meadow,
- The presence of the target species may limit the proposed restoration activities in areas where individuals of those species currently occur or have been identified,
- The meadow is contained within an active grazing allotment and will continue to experience impacts associated with grazing,
- The site is remote so any materials that need to be imported will require long-distance travel, which can increase costs,
- The primitive camping area and associated access road will continue to be an impact to the site, and
- Climate change impacts on snowpack and the timing of snowmelt may continue to have detrimental impacts on the long-term viability of the meadow that will not be addressed through any proposed restoration actions.

Restoration opportunities for High Onion Meadow include the following:

- The site is accessible from a well-developed forest road,
- Trees within and adjacent to the meadow may be available for use in the project,
- The site is located entirely on public land within USFS property,
- Only limited recreational use appears to occur within the meadow, and
- Late summer is characterized by little to no flow in the meadow which provides ideal conditions for construction.

Despite these opportunities for restoration, constraints to fully achieve the stated goals for a selected restoration action also need to be considered. The constraints for High Onion include the following:

- Despite the recent efforts to address erosion sources and hydrologic impacts of the adjacent road network, the continued use of the access road will provide a long-term source of increased sediment supply and discharge to the meadow,
- The meadow is contained within an active grazing allotment and will continue to experience impacts associated with grazing,
- Climate change impacts on snowpack and the timing of snowmelt may continue to have detrimental impacts on the long-term viability of the meadow that will not be addressed through any proposed restoration actions.

Opportunities for restoration at Tyler Meadow include the following:

- The site is easily accessible by a well-developed road that allows access to the site from the east,
- A parking area adjacent to the meadow would act as an ideal staging area,
- Conifer trees within and adjacent to the meadow may be available for use in the project,
- The site is located entirely on public land within USFS property,
- Borrow material, consisting of fine-grained material, is present in areas adjacent to the meadow if needed, and
- Late summer is characterized by little to no flow in the meadow which provides ideal conditions for construction.

Despite these opportunities for restoration, constraints to fully achieve the stated goals for a selected restoration action also need to be considered. The constraints for Tyler include the following:

- Despite the recent efforts to address erosion sources and hydrologic impacts of the adjacent road network, the continued use of the access road will provide a long-term source of increased sediment supply and discharge to the meadow,
- The meadow is contained within an active grazing allotment and will continue to experience impacts associated with grazing,
- The site is remote so any materials that need to be imported will require long-distance travel, which can increase costs, and
- Climate change impacts on snowpack and the timing of snowmelt may continue to have detrimental impacts on the long-term viability of the meadow that will not be addressed through any proposed restoration actions.

3.2 Proposed Restoration Alternatives

The following sections provide an overview of a set of restoration actions/alternatives that have been developed for each of the meadows that seeks to address the observed impacts and achieve the stated project objectives. In addition to the description of each alternative, we have attempted to provide ballpark costs associated with implementing each of the individual alternatives to inform the decision-making process. It is important to note that these cost estimates are preliminary and for planning purposes only. Similarly, the concepts are meant to be conceptual with enough detail to convey the design approach. They are not complete designs and will require additional analysis and field verification following selection of a preferred alternative for each meadow.

3.2.1 Upper Onion Meadow Alternatives

As discussed in this report, Upper Onion Meadow is the most degraded of the three meadows within the project area as evidenced by significant channel incision. Large patches of willow do still exist throughout the meadow along with other native wet meadow patches that appear to be in moderate to

good health. A meadow assessment protocol, developed by American Rivers, was utilized on the meadow by Gwen Starrett and Pat McGreevy in 2017 to characterize the condition of the meadow, resulting in a score of 2, which falls within the moderately impacted classification (Table 2). Of particular concern was the apparent rapid invasion of conifers seedlings and saplings in the meadow which suggested that the incision, and associated water table lowering, was progressing to the point that the meadow was at risk.

Table 2: Meadow Assessment Scorecard results for Upper Onion.

Meadow Name	Bank Height	Gullies outside Main Channel	Bank Stability	Vegetation Condition	Bare Ground	Encroachment
Meadows rated by Starrett and McGreevy 2017						
Upper Onion Valley	2	2	2.5	2	2	2
1- heavily impacted 2 – moderately impacted 3- slightly impacted 4- natural condition						

The geomorphic assessment included in this report suggested that historically, prior to disturbance, the meadow may have lacked defined channels and was primarily depositional with distributed overland flow spreading across the meadow in a low-energy condition. The challenge with restoring the meadow to that historic conditions is the fact that the hydrologic, sediment, and meadow roughness regime that maintained that condition has forever been altered, especially if there is a desire to continue to graze cattle on the meadow and maintain a road for recreation. Given these constraints, the developed alternatives provide a gradation ranging from full restoration to a Stage 0 condition to in-situ aggradation using grade control features. The following alternatives have been proposed:

- Alternative 1:** This alternative consists of building a series of constructed riffles in existing, incised channels to raise the base level of the channel, encourage aggradation, reduce overall channel capacity, and raise the groundwater table. The approach would mimic what was done in the meadow in past restoration efforts but instead of using the wood and weir approach, the structure would consist of a mix of finer material borrowed from the surrounding area and coarser rock that would be imported. The spacing of the constructed riffles would vary by location based on the local slope of the channel and the presence of active headcuts. To the extent feasible, there would be no more than a 6-inch drop between each riffle resulting in a condition where the downstream riffle crest backwaters a significant portion of the tail-out material of the upstream riffle. The result would be a series of short riffles interspersed by long pools. Constructed riffles are only being proposed in existing channels that are greater than one foot depth. To control the overall base level of the meadow a roughened channel would be constructed at the downstream extent of the project area where the moraine extends across the valley and naturally constricts the meadow. The crest of the roughened channel would be constructed one foot below the adjacent moraine surface. Table 3 provides a preliminary evaluation of the number of riffles and their expected spacing. This analysis was based on a

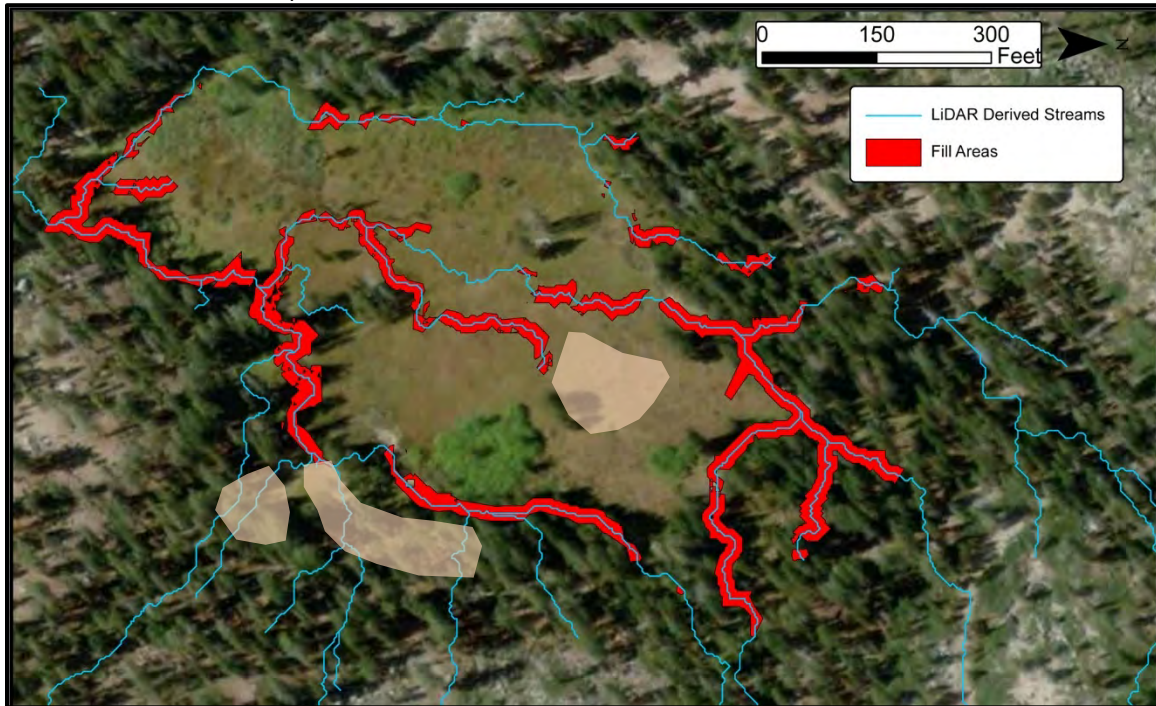
field assessment that was conducted during survey of the specific profiles when topographic data was being collected at Upper Onion. Additional analysis will be required using the survey data to provide a comprehensive assessment of the number of riffles and their specific location during the design phase. Preliminary estimates identified the need for approximately 700 cubic yards of material to construct the riffles. If 30% of the material could be fines derived from on-site borrow sources, a total of 490 cubic yards of material would need to be imported. An additional 115 cubic yards of material would be required for the roughened channel.

Table 3: Preliminary assessment of constructed riffle spacing based on field interpretation of surveyed profiles.

Profile	Station Start (ft)	Station End (ft)	Total Length (ft)	Elevation Start (ft)	Elevation End (ft)	Drop (ft)	Slope	Preliminary # of Riffles	Average Riffle Spacing	Average Drop between Riffles
1	900	600	300	7453.8	7456.3	2.5	0.8%	5	60	0.5
2	750	550	200	7455.8	7458	2.2	1.1%	9	22	0.2
2	550	200	350	7458	7464	6	1.7%	9	39	0.7
3	420	100	320	7464	7467	3	0.9%	5	64	0.6
5	440	100	340	7459	7463	4	1.2%	4	85	1.0
7	750	400	350	7462	7466	4	1.1%	7	50	0.6
Averages							1.2%		53	0.60

- Alternative 2:** Alternative 2 represents the Stage 0 restoration condition, or restoration of a pre-disturbance condition. To restore the meadow to its historic condition all of the significant channels that convey flow off of the meadow would be filled to a depth equal to the adjacent meadow. Periodically, higher berms in the filled channels would be constructed to ensure that the filled channel is not captured and reincised. Figure 9 provides a preliminary representation of where channels will be filled. This graphic is based on the REM map of Upper Onion Meadow that was discussed previously (Figure 5). To ensure that a headcut does not originate from downstream and reincise the meadow, this alternative will also incorporate a roughened channel at the moraine, as was discussed in Alternative 1. Preliminary estimates suggest that a total of 2,200 cubic yards of fill would be required for Alternative 2 in addition to approximately 115 cubic yards of imported material for the roughened channel at the downstream end.
- Alternative 3:** Alternative three consists of a hybrid between Alternative 1 and Alternative 2. The primary channels that are highly incised would receive the constructed riffle treatment discussed in Alternative 1. The remaining, smaller and/or discontinuous channels would be filled using the approach described in Alternative 2. Profiles where constructed riffles would occur are the lower portion of Profile 1, the lower portion of Profile 2, and most of Profiles 7 and 8. A roughened channel would be constructed at the downstream end of the project, as described in both Alternative 1 and 2. This alternative is expected to require 115 yards of imported material for the roughened channel, 700 yards of fill for the Stage 0 channels, and approximately 500 cubic yards of fill for the constructed riffles.

Figure 9: Preliminary depiction of channels in Upper Onion Meadow that would be filled to achieve a Stage 0 condition. The beige polygons represent areas that have the potential to be used to borrow material to fill the channels. Preliminary estimates suggest that these three areas would be adequate to achieve the desired fill requirements.



- Alternative 4:** This alternative was identified during a discussion of the three alternatives presented above. The alternative would replace some of the constructed riffles proposed as part of Alternative 1 with log weirs to achieve the desired grade control. The advantage of using logs for a subset of the grade control features is that there are plenty of trees in and around the site that could be salvaged, thereby reducing the overall project cost. Furthermore, utilizing some of the proposed borrow areas will require removal of existing trees to allow for excavation of material for use in the constructed riffles. Logs weirs would be installed as grade control in lower energy, less incised portions of the channel network where grade control has been identified in Alternative 1. The specific areas where this would occur has not been clearly identified but could include Profile 1 upstream of the roughened channel, Profile 2 from Station 300 to 750, Profile 3, and Profile 5.

Preliminary Cost Estimate for the Upper Onion Alternatives

Preliminary cost estimates have been developed for Alternatives 1 and 2 to assist in selecting a preferred alternative (Table 4). These costs focus only on project implementation and do not include the cost of finalizing the design, obtaining regulatory permits, and providing engineering support during construction. The costs provided include a 30% contingency, given the early phase of the design. As the design progresses, additional detail and resolution will be added to the cost estimate and the ancillary

cost items, discussed above, will be determined. Preliminary cost estimates for Alternatives 3 and 4 have not been developed but will be if those alternatives are selected as a preferred approach. It is expected that Alternative 3 would fall somewhere between the estimated costs for Alternatives 1 and 2. The cost for Alternative 4 is expected to be lower than the cost for Alternative 1 because the material for the log weirs would be available from on site and would not need to be purchased or imported.

TABLE 4A
THREE MEADOW RESTORATION PROJECT
ALTERNATIVES ANALYSIS LEVEL COST ESTIMATE
ALTERNATIVE 1 - UPPER ONION

Job No: 18-016

1/14/2019

ITEM NO.	ITEM	ESTIMATED QUANTITY	UNIT	UNIT COST		TOTAL
1	MOBILIZATION, SITE ACCESS, AND STAGING	1	LS	\$35,000		\$35,000
2	EROSION AND SEDIMENT CONTROL	1	LS	\$20,000		\$20,000
3	RIFFLE CONSTRUCTION					\$70,700
	BORROW SITE EXCAVATION	210	CY	\$20	\$4,200	
	SUPPLY RIFFLE MATERIAL	490	CY	\$50	\$24,500	
	CONSTRUCT RIFFLES	700	CY	\$60	\$42,000	
4	DEWATERING	1	LS	\$8,000	\$8,000	\$8,000
5	SEEDING	1.5	ACRE	\$7,500	\$11,250	\$11,250
6	ROUGHENED CHANNEL	1				\$12,650
	SUPPLY ROCK	115	CY	\$50	\$5,750	
	PLACE ROCK	115	CY	\$60	\$6,900	
SUBTOTAL						\$157,600
CONTINGENCY (30%)						\$47,280
TOTAL PROJECT COST						\$204,880

TABLE 4B
THREE MEADOW RESTORATION PROJECT
ALTERNATIVES ANALYSIS LEVEL COST ESTIMATE
ALTERNATIVE 2 - UPPER ONION

Job No: 18-016

1/14/2019

ITEM NO.	ITEM	ESTIMATED QUANTITY	UNIT	UNIT COST		TOTAL
1	MOBILIZATION, SITE ACCESS, AND STAGING	1	LS	\$35,000		\$35,000
2	EROSION AND SEDIMENT CONTROL	1	LS	\$20,000		\$20,000
3	CHANNEL FILLING					\$99,000
	BORROW SITE EXCAVATION	2,200	CY	\$20	\$44,000	
	FILL CHANNELS	2,200	CY	\$25	\$55,000	
4	DEWATERING	1	LS	\$5,000	\$5,000	\$5,000
5	SEEDING	3.0	ACRE	\$7,500	\$22,500	\$22,500
6	ROUGHENED CHANNEL	1				\$12,650
	SUPPLY ROCK	115	CY	\$50	\$5,750	
	PLACE ROCK	115	CY	\$60	\$6,900	
SUBTOTAL						\$194,150
CONTINGENCY (30%)						\$58,245
TOTAL PROJECT COST						\$252,395

3.2.2 High Onion Meadow Restoration Actions

Results from the meadow assessment protocol utilized on High Onion Meadow by Gwen Starrett and Pat McGreevy in 2017 resulted in a scores ranging from 1 to 3 with 1 being considered heavily impacted and 3 being slightly impacted (Table 5). These scores reflect the fact that the meadow appears to be heavily grazed but in moderately good condition outside of the main channel, which is slightly incised. These results, combined with a more thorough understanding of the geomorphic setting of the meadow relative to its condition contrasts greatly with our assessment of Upper Onion. Consequently, it is our belief that the restoration actions proposed for High Onion could entail a much lighter touch with several of the impacts being addressed through management and protection.

Table 5: Meadow Assessment Scorecard results for High Onion.

Meadow Name	Bank Height	Gullies outside Main Channel	Bank Stability	Vegetation Condition	Bare Ground	Encroachment
Meadows rated by Starrett, McGreevy, Childress and Long 2015						
High Meadow	3	3	2	1	2	3

The proposed restoration actions for High Onion Meadow include the following:

- Protect seepage sources
- Install log weir grade control structures in the primary meadow channel to limit additional downcutting
- Manage the timing and duration of grazing

It is clear from the assessment that grazing impacts should be addressed. Furthermore, we identified specific features of the meadow where exclusion of cattle would go a long way toward restoring these sensitive areas. Six polygons were mapped during the assessment as target areas where groundwater was interacting with the surface, creating seeps, even in late summer. Where the vegetation had clearly been impacted by cattle or other ungulates, knickpoints had formed that had the potential to cause headward incision of these critical wetlands. A typical treatment to protect these seeps would be to install cattle exclusion fencing. Unfortunately, in this environment fencing is often damaged by heavy snow and would need to be taken down and reinstalled every year, which may not be feasible given limited resources to maintain additional infrastructure.

In lieu of fencing, discussions with Rich Farrington and Gwen Starrett identified another potential approach to excluding cattle. This approach would consist of laying down large logs around and across the seep area(s) to discourage access by cattle. Observations of an aspen stand near Tyler Meadow suggests that where tree fall was heavy, browse by cattle decreased. Presumably this is due to the fact that the cattle do not want to step over large logs and risk injury. Adequate stands of moderately sized conifers that have encroached into the margins of High Onion Meadow could be used to accomplish this task. Further assessment will be required to determine the number of trees needed, their general configuration, and where the trees would come from, though the local source of wood appears adequate to achieve the desired objective.

Log grade control weirs would be installed at High Onion to enhance sedimentation and limit future risks of channel incision. These structures would primarily be installed at Channel Profile 3 from Station 100 to Station 600. The spacing of the structures would vary based on local channel slope but would likely be installed with an average spacing of 25 feet to account for the overall slope of 4.2% along Profile 3. This would require that approximately 20 structure be built. We anticipate that the structures could be built with hand tools and hand labor given the relatively narrow channel widths. Logs could be salvaged

locally. The specifics of the spacing and a typical detail of the log weir structure will be provided during the next phase of design if this restoration action is selected.

3.2.3 Tyler Meadow Alternatives

A meadow assessment protocol utilized at Tyler Meadow by Gwen Starrett and Pat McGreevy in 2017 to resulted in scores of 2 and 4, based on the function being assessed (Table 6). The scoring, which was confirmed by our assessment, suggests that the primary impacts at the site relate to heavy grazing impacts on the meadow itself and the instability of the primary channel that discharges to the meadow. This channel, mapped as Profile 3 during the existing conditions survey, is moderately incised and appears to be widening. Locally, downed wood has provided some grade control but in many cases the channel has eroded around the wood, resulting in limited benefits. A score of 2 for the Encroachment category of the assessment was due to the fact that OHV's are accessing the meadow and causing some localized impacts.

Table 6: Meadow Assessment Scorecard results for Tyler Meadow.

Meadow Name	Bank Height	Gullies outside Main Channel	Bank Stability	Vegetation Condition	Bare Ground	Encroachment
Meadows rated by Starrett and McGreevy 2017						
Tyler Meadow (Mdw_1737)	4	2	4	2	4	2

Based on this assessment, the proposed restoration actions for Tyler Meadow include the following:

- Manage the timing and duration of grazing
- Limit access by OHV's
- Install log weir grade control structures in the primary channel in the forested area upstream of the meadow to limit additional downcutting

Attempts have been made at Tyler Meadow to limit OHV access. Unfortunately, evidence of OHV use of the meadow still exists. The frequency of OHV access occurring is unknown but if OHV use occurs when the meadow is wet the impacts of that use can persist indefinitely. Current access restrictions consist of a downed log, a berm, and some boulders. Improving access restrictions will require a more detailed assessment of the site to identify where access is being gained. Long-term, boulders are most likely to be the best way to limit access. Signage to identify the meadow as sensitive habitat may also be useful at the site to educate forest users about the impact of OHV use, especially in spring and early summer when the meadow is wet and susceptible to disturbance.

Log grade control structures at the upper end of Tyler Meadow and extending into the forested area would be similar in design to what is being proposed for High Onion. The difference is the fact that the

channel dimensions and the level of incision at Tyler are significantly larger so it is likely that heavy equipment would be needed to construct the log weirs at Tyler. A total of 10 structures have been proposed with a spacing of approximately 50 feet per structure. It is anticipated that all of the logs could be salvaged from the adjacent forest. Furthermore, a flat, tree-free area follows the entire alignment of the channel within the forested area, providing good access from heavy equipment. To avoid impacts to the meadow, an access path could be created from the road. Trees removed to facilitate the access could be used in the structures.

4.0 BASIS OF DESIGN FOR SELECTED RESTORATION ACTIONS

4.1 Upper Onion Meadow

Following publication of the Existing Conditions and Alternatives Analysis Report and preparation of the conceptual alternatives and preliminary cost estimates for Upper Onion Meadow, the Amador RCD and its partners (Advisory Committee) convened a meeting. The meeting consisted of a presentation by Waterways where the results of the work to date was discussed. Following the meeting, the Amador RCD team discussed the set of four alternatives that were presented for Upper Onion Meadow and prepared a set of questions to be addressed by Waterways prior to identifying a preferred alternative that would be carried forward to a 60% design (permit-level). Based on the responses to the questions, the Advisory Committee provided an outline of the elements to be included in the 60% design. Waterways prepared the 60% design and preliminary engineer's cost estimate, which is included as Appendix A.

4.1.1 Pros and Cons of Proposed Alternatives

To facilitate the discussion of alternatives amongst the Advisory Committee members, Waterways was asked to prepare a summary of the pros and cons of each of the proposed set of alternatives for Upper Onion Meadow (summarized in Table 7).

Table 7. Summary of pros and cons for each proposed restoration alternative at Upper Onion Meadow.

Alternative	Pros	Cons
ALT 1 Constructed riffle grade control	<ul style="list-style-type: none"> • Stabilizes profile grade of channels in the meadow • Raises water table • Restores hydraulic continuity of flow through meadow • May not require fencing of meadow 	<ul style="list-style-type: none"> • Requires imported material for constructed riffles • Could be considered a meadow enhancement as opposed to a meadow restoration given understanding of historic condition • Requires disturbance of meadow and adjacent forest areas to gain access to the meadow
ALT 2 Stage 0; Complete channel fill	<ul style="list-style-type: none"> • Restores natural condition of meadow as depositional environment with distributed overland and sheet flow • Raises water table at meadow surface or above meadow surface in depressional areas • Maximizes hydrologic "buffering" • Most of fill material could be borrowed from within and adjacent to the meadow • May minimize overall disturbance within meadow footprint because equipment can utilize filled channels as access routes 	<ul style="list-style-type: none"> • Robust site protection and revegetation effort would be required following construction • Higher risk given remaining stressors from road runoff, cattle, and recreation • Has a potential to cause periodic, seasonal flooding of camping area • Requires disturbance of adjacent forest areas to borrow material with no use for wood

ALT 3 Hybrid of ALT 1 and ALT 2	<ul style="list-style-type: none"> • Stabilizes profile grade of channels in the meadow and restored a portion of the meadow to historic conditions • Raises water table and potentially maintains surface ponding in low areas of the meadow • Restores hydraulic continuity of flow through meadow and overland flow in some areas of the meadow and enhances buffering, especially along right margin of meadow 	<ul style="list-style-type: none"> • Robust site protection and revegetation effort would be required following construction (not as much as Alt 2) • Requires imported material for constructed riffles • Higher risk given remaining stressors from road runoff, cattle, and recreation (Higher than Alt 2 given transition points between filled and unfilled channels) • Could be considered a meadow enhancement as opposed to a meadow restoration given understanding of historic condition (Less than Alt 1) • Has a potential to cause periodic, seasonal flooding of camping area • Requires disturbance of adjacent forest areas to borrow material with no use for wood
ALT 4 Constructed riffles and log weir grade control (modified ALT 1)	<ul style="list-style-type: none"> • Stabilizes profile grade of channels in the meadow • Raises water table • Restores hydraulic continuity of flow through meadow • May not require fencing of meadow • Some, if not all, of the wood removed in adjacent forest areas for access could be reused for the log weirs 	<ul style="list-style-type: none"> • Requires imported material for constructed riffles (much less than Alt 1) • Could be considered a meadow enhancement as opposed to a meadow restoration given understanding of historic condition • Requires disturbance of meadow and adjacent forest areas to gain access to the meadow

4.1.2 Description of Selected Alternative

The Advisory Committee selected Alternative 4 to address the identified impacts to Upper Onion Meadow. Alternative 4, which is references in Table 7 as a modified Alternative 1, addresses channel incision by installing constructed riffles and log weir grade control structures throughout the meadow. At total of twenty-one constructed riffles and twenty-five log weirs are proposed throughout Upper Onion Meadow. To provide a downstream grade control for the meadow, a roughened channel will be constructed at the outlet of the meadow. In addition, the design includes stabilization and realignment of one of the tributary channels where it crosses the camping area access road at the north end of the meadow.

Determining the location and type of grade control feature to install in any particular location was based on the following design approach:

- A detailed survey of Upper Onion meadow was conducted to enhance the existing LiDAR dataset and provide additional topographic resolution of the channels and banks. A detailed

longitudinal profile was collected along each of the active meadow channels and toe and top of bank locations and elevations were surveyed.

- Based on the initial field evaluation, preliminary locations where grade control structures might be most effective were identified and mapped.
- The longitudinal profile and top of bank data was evaluated, in conjunction with the preliminary mapping of potential grade control locations, to refine and optimize the locations for grade control structures and determine if the structure should be a log weir or constructed riffle. The determining factors on whether a log weir versus a constructed riffle was selected for a particular location was based on the depth of the channel relative to the meadow surface. Where the channel is larger and deeper, a constructed riffle was selected. Most of the constructed riffles are located on the channel that flows along the eastern margin of the meadow.
- A follow-up site visit was conducted to verify both the locations and types of grade control structures proposed and if any additional structures were needed.

4.1.3 *Design Elements*

The design for Upper Onion Meadow incorporates three different types of structures that seek to either hold the current elevation of the streambeds that flow through the meadow or raise the elevation of the streambed. The overall intent of this design is to reduce flow conveyance through the channels and increase the frequency of overbank flow onto the meadow during high flow events. The grade control structures actively raise water surfaces throughout the channels and meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and ideally bury the grade control structures. As the channels aggrade over time the groundwater table throughout the meadow is expected to increase.

The three types of grade control structures consist of log weirs, constructed riffles, and a roughened channel. Functionally, each of the three types of structures are similar but differ in the materials they are constructed out of. The structures have been spaced based on the surveyed longitudinal profile to constrain the capacity of each of the channels while also providing some redundancy in case one or more of the structures fails over time. Each structure was located to ensure a maximum elevation drop of 6 inches from the crest of a particular structure to the crest of the next downstream structure. Where the channel is steeper the structures are located closer together. Where channel gradients are shallower the structures are spaced further apart. The weir crest elevations of a series of structures along each meadow channel was established so that the crest profile is approximately one foot below the adjacent meadow surface. Specific design features associated with each of the structure types are discussed below.

Log Weirs

The log weirs, as the name denotes, consist of check dams constructed from logs. Although site specific conditions at each of the twenty-five proposed log weir structure locations will influence the dimensions of each structure, the approach generally consist of two rows of stacked logs that are keyed into the bed and banks of the channel, secured with rebar pins, and backfilled, as shown on Sheet C6 of the attached 60% Engineering Drawings (Appendix A).

Depending on the overall depth of the channel relative to the meadow surface, the upstream stack of logs will either include three or two logs with the lowest log embedded fully into the streambed, resulting in either 5 or 3 logs total for each weir location. The length of the log also varies by location depending upon the width of the channel. At all sites the logs will be embedded a minimum of three feet into the adjacent banks (a total of 6 feet). The specific log lengths required at each site will be determined at the time of construction. Preliminarily, each site has been estimated as either needing 15 foot or 20 foot logs to span the channel and achieve the minimum bank embedment. The Log Structure Layout table on Sheet C6 of the 60% Engineering Drawings provides estimates of the number and length of logs needed at each of the sites.

The design establishes the weir crest elevation of each of the log structures, as identified in the Log Structure Layout table on Sheet C6 of the 60% Engineering Drawings. The depth to which the structure is keyed into the bed of the channel varies by site and is dictated by the diameter of the logs and how many logs are required to achieve the specified crest elevation, with at least one of the logs fully keyed into the streambed. Once the logs are secured a biodegradable filter blanket will be installed along the upstream face of the structure, extending a minimum of two feet upstream of the structure, and the streambed and bank key trenches will be backfilled. Any excess sediment will be placed upstream of the structure, over the filter blanket, to limit the porosity of the log weir and enhance sediment deposition. Meadow sod removed from the top one foot of the bank key trenches will be reinstalled to match the elevation of the adjacent meadow surface. Holes will then be drilled vertically through the logs and rebar pins will be installed, per the details shown on Sheet C6 of the 60% Engineering Drawings. Once construction of the log weir structure is complete the most upstream log will be notched using a chainsaw to provide a low flow channel with a width of 6 feet and a depth of 4 inches.

Constructed Riffle and Roughened Channel

Although the intent of the constructed riffles and roughened channel are the same as the intent of the log weirs, the constructed riffles are located in portions of the channel where the channel dimensions are too large to utilize stacked logs to safely and effectively hold grade. Instead, grade is held by placing rock in the channel in a manner that mimics a natural riffle.

For the constructed riffles a four foot long riffle crest is established that is keyed into the streambed and banks, as show in the riffle details on Sheet C7 of the 60% Engineering Drawings (Appendix A). Rock

ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and a 1:1 slope at the upstream end.

The overall length of the constructed riffle varies at each site based on the overall depth of the channel relative to the meadow surface and the location of the structure relative to the adjacent constructed riffles or log weirs. In a similar manner to the log weirs, the riffle crest elevation of each constructed riffle is based on the design criteria of the weir crest being 6" higher than the next downstream crest. Consequently, much of the downstream extent of the constructed riffle will be backwatered by the next downstream structure and will be located in a pool when the channel has flowing water. The Constructed Riffle Layout table on Sheet C7 of the 60% Engineering Drawings identifies the riffle crest elevation for each structure, the estimated top width of the channel at the structure and the estimated volume of material needed to construct the riffle.

The geometry of the roughened channel is different from the constructed riffle because the roughened channel is being constructed to hold grade at the downstream end of the meadow and will not be backwatered by any downstream structure. Consequently, the portion of the constructed channel downstream of the riffle crest will experience significant hydraulic forces and therefore needs to be constructed at a lower gradient, which lengthens the roughened channel relative to the constructed riffles and requires that the rock gradation is larger. The roughened channel at Upper Onion will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream. The engineered streambed material (ESM) should be a minimum of three feet thick and the ESM will extend upstream of the crest at 1:1 for approximately 10 feet to protect against undermining of the roughened channel. At the riffle crest the ESM will extend into the adjacent moraine for 12 to 15 feet to protect against flanking of the roughened channel and ensure that all of the flow from the meadow is contained.

To ensure that the constructed riffle and roughened channel resists erosion and the desired riffle crest elevation is maintained, the size and gradation of the ESM used to construct the riffle was engineered using hydraulic model calculations. To simplify the construction process at the constructed riffles, the hydraulic results from the site with the highest energy conditions was used to size the substrate. The hydraulic design for the roughened channel was more site specific. Based on the hydraulic analysis and ESM calculation guidance provided by the California Department of Fish and Wildlife (CDFW) for designing fish passage projects, the following gradation was developed for both the constructed riffles and the roughened channels:

Percent Passing	Particle Diameter (in feet) for Constructed Riffles	Particle Diameter (in feet) for Roughened Channel
100	2.5	3.1
84	1	1.3
50	0.4	0.5
16	0.032	0.04
8	0.007	0.008

Both the constructed riffle and roughened channel are constructed in the same manner. The footprint where the ESM will be placed is overexcavated and the material is stockpiled for later use. Based on our site evaluation, we anticipate that up to 40% of the volume of material at the roughened channel site and up to 20% of the material at the constructed riffle can be derived from material that is excavated from the existing channel. Following overexcavation, the ESM will be installed from downstream to upstream with the larger diameter framework material placed first followed by each subsequent size class. As the smaller material is installed it will be added in lifts. As the material is placed in the lifts a high-pressure hose will be used to “jet” in the fines and ensure that any voids are filled. When water runs over the surface of the lift the next lift will be constructed until the desired riffle elevation is reached. To add localized roughness to the riffle the riffle will be constructed so that some of the larger material protrudes up to 6” above the finished riffle grade.

Tributary Realignment

At the northern end of the meadow a large tributary to Onion Creek crosses the Bear River Reservoir Road and then crosses the existing road to the informal day use/campground area denoted on Sheet C2 of the 60% Engineering Design as the project staging area. A lack of maintenance of the road and the crossing has resulted in the road capturing the tributary creek channel. To address this erosion issue and source of fine sediment to the meadow the design approach proposes building up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel, as shown on Sheet C5 of the 60% Engineering Drawings. The berms would be built up two feet with 1.5 inch aggregate and the resulting crossing approaches would be no steeper than 5:1 to accommodate vehicles.

4.1.4 Material Sourcing

The primary materials needed to construct the restoration project at Upper Onion meadow are the logs for the twenty-five log weirs and the engineered streambed material (ESM) for the twenty-one constructed riffles and roughened channel. All of the logs are anticipated to be sourced from on-site, both adjacent to and within the meadow, and the ESM is expected to be sourced from an inactive quarry called Tragedy Springs located just off of Highway 88 near Silver Lake. The quarry is owned by the U.S. Forest Service but contains previously quarried granite that has been sorted into a mix of grain sizes. Tragedy Springs is approximately 14 miles from the dam at Lower Bear River Reservoir. Rock transported to the site from Tragedy Springs would be delivered to the proposed staging area (see Sheet C2 of the 60% Engineering Drawings) and mixed on site to achieve the desired gradation for the ESM for either the constructed riffles or the roughened channel.

The logs for the log weirs will be salvaged primarily from trees removed along the proposed forest access routes shown on Sheet C2 of the 60% Engineering Drawings. In addition, trees located within or adjacent to the meadow that are denoted on the plans (see Sheet C2 of the Engineering Drawings) are also available for salvage. The trees in the meadow would only be cut, without the stumps removed,

and should be utilized for adjacent log weir structures to minimize additional impacts to the meadow outside of the designated access routes. Salvaged trees will require removal of the branches and should be cut to length, as needed, based on the specific needs at each of the log weir locations. Branches cut off of the salvaged trees should be saved and stockpiled for use in road decommissioning, stream crossings, or meadow mats, as shown on Sheets C2 and C8 of the 60% Engineering Drawings.

4.1.5 Construction Impact Minimization Measures

To minimize impact within sensitive meadow areas during construction several best management practices (BMP) are being employed within the Upper Onion project area. The primary BMP is to avoid the meadow, to the extent feasible, by either utilizing existing roads and staging areas, and temporary equipment and material haul roads delineated along the margin of the meadow in less sensitive forested areas. These haul roads would also provide material for the log weirs, corduroy stream crossings, and marsh mats and generate enough material to provide slash for decommissioning. Where access to the meadow is absolutely necessary, the following BMP's have been identified to reduce the impact and protect the meadow:

- **Corduroy Stream Crossing:** A corduroy stream crossing consists of laying logs in the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel. Four locations within the project site, shown on C2 of the 60% Engineering Drawings, have been identified where stream crossings would occur and corduroy stream crossings would be installed. A cross-sectional detail of the corduroy crossing is shown on Sheet C8 of the 60% Engineering Drawings. Each of the crossings would be monitored to ensure that they are functioning to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies, which would include adding additional logs, as necessary, depending on the number of times the crossing is used. Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access roads.
- **Marsh Mats:** To protect the meadow from excessive disturbance and rutting associated with heavy equipment access the access routes through the meadow, as shown on Sheet C2 of the 60% Engineering Drawings, will be matted with slash material created within the forest access roads or locations where trees are being salvaged. As shown on Sheet C8 of the 60% Engineering Drawings, the slash should be layered to a depth of 1 to 1.5 feet and be a minimum of 15 feet wide to accommodate the construction equipment. In a similar manner to the corduroy stream crossing, the condition of the marsh mats should be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow.
- **Low Impact Construction Equipment:** To further protect the meadow, the technical specifications will provide limits on the size and type of equipment that can be used in the meadow. In all cases, access to the meadow is only required for construction of log weirs.

Given that the logs being used in construction are likely limited to 20 feet long and 12 inches in diameter, it is reasonable to limit the size of equipment as well as dictating that only rubber tracks or wheeled equipment is utilized. Larger equipment may be necessary to construct the roughened channel but that location can be accessed via the temporary forest road with only a single, short traverse across the meadow at the northern end of the project site.

4.2 High Onion

Following publication of the Existing Conditions and Alternatives Analysis Report and preparation of the conceptual alternatives and preliminary cost estimates for High Onion, the Amador RCD and its partners (Advisory Committee) convened a meeting. The meeting consisted of a presentation by Waterways where the results of the work to date was discussed. Following the meeting, the Amador RCD team discussed the restoration actions proposed to address the key issues identified at High Onion. Based on the input provided by the Advisory Committee Waterways prepared the 30% concept design and preliminary engineer's cost estimate for High Onion. The Advisory Committee then reviewed this document and revisions were made to the 30% Engineering Drawings, which are included in Appendix B. Ultimately the design for High Onion will be incorporated into a complete 60% Engineering Drawing set that will include Upper Onion, High Onion, and Tyler Meadows. This effort will be completed in the next phase of design.

4.2.1 Description of Selected Restoration Actions

The selected restoration actions at High Onion Meadow are focused on limiting additional channel incision and protecting the sensitive seep areas identified during the site evaluation and assessment phase as shown on Sheet C2 of the 30% Engineering Drawings provided in Appendix B. The seepage areas will be protected by installing a fencing system around the five main seepage area located along the upper fan terrace. Channel incision will be addressed along the primary stream channel (Onion Creek), that flows along the western margin of the meadow by installing twenty-six log weirs.

4.2.2 Design Elements

As discussed above, the primary design elements consist of log weirs to provide control grade and a perimeter fence around the primary seep areas to limit grazing in these sensitive areas. Given that the design has only been developed to the conceptual level, less detail about the specifics of the design elements are being provided at this phase, mostly with regard to the permitting-related protection measures and best management practices that will be employed to minimize disturbance. That information will be developed further when the designs are brought to the 60% level. Specific information for the two primary design elements are as follows:

- **Seep Protection Fencing:** Most of the seeps identified in the field occur along the downstream margin of the upper fan surface as perched groundwater intersects the lower fan surface.

Rather than protect the discrete areas where seeps were mapped, the Advisory Committee

recommended that the entire geomorphic surface be protected. This approach also simplifies the fencing approach despite the fact that it required more fencing. The area to be protected is shown on Sheet C3 of the 30% Engineering Drawings. The details of the fence, as shown on Sheet C6 of the Engineering Drawings, would be installed with hand crews and consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.

- **Log Weirs:** A total of twenty-six log weirs are proposed for High Onion Meadow. Given that the channel is relatively small at High Onion, the log weirs are anticipated to be fairly small with the largest log lengths anticipated to not exceed 12 to 15 feet and diameters ranging from 8 to 12 inches. The specifics of the log weirs will be detailed at the 60% design phase. Preliminarily, their locations are shown on Sheet C3 of the 30% Engineering Drawings with a typical detail provided on Sheet C7. Most of the log weirs are only anticipated to consist of three logs and be two logs high. All of the wood used in the log structures will be salvaged from on-site. To minimize impact to the meadow and utilize youth crews for the construction of the log weirs a two phased approach to construction is proposed. The first phase would consist of construction crews establishing the access and staging areas identified on Sheet C2 of the 30% Engineering Drawings and salvaging and staging the logs necessary to build each of the structures from each of the proposed staging areas. The second step would consist of installing the log weirs using only hand tools. This approach limits where construction equipment is needed to the margins of the meadow and reduces overall impacts on the meadow.

4.3 Tyler Meadow

Following publication of the Existing Conditions and Alternatives Analysis Report and preparation of the conceptual alternatives and preliminary cost estimates for Tyler Meadow, the Amador RCD and its partners (Advisory Committee) convened a meeting. The meeting consisted of a presentation by Waterways where the results of the work to date was discussed. Following the meeting, the Amador RCD team discussed the restoration actions proposed to address the key issues identified at Tyler meadow. Based on the input provided by the Advisory Committee Waterways prepared the 30% concept design and preliminary engineer's cost estimate for Tyler. The Advisory Committee then reviewed this document and revisions were made to the 30% Engineering Drawings, which are included in Appendix B. Ultimately the design for Tyler will be incorporated into a complete 60% Engineering Drawing set that will include Upper Onion, High Onion, and Tyler Meadows. This effort will be completed in the next phase of design.

4.3.1 Description of Selected Restoration Actions

The selected restoration actions at Tyler Meadow is focused on limiting additional channel incision in the forested area upstream of the existing meadow to limit erosion and potentially raise the overall groundwater level of the meadow and surrounding area. The proposed approach consists of building

log weirs in this area, as shown on Sheet C5 of the 30% Engineering Drawings. An additional design element consists of limiting access to the meadow from vehicles, which has caused localized erosion in discrete areas of the meadow.

4.3.2 Design Elements

As discussed above, the focus of restoration of Tyler Meadow consists of installing log weirs along the channel that flows through the forested area upstream of the meadow and protecting the meadow from vehicle access. Given that the design has only been developed to the conceptual level, less detail about the specifics of the design elements are being provided at this phase, mostly with regard to the permitting-related protection measures and best management practices that will be employed to minimize disturbance. That information will be developed further when the designs are brought to the 60% level. Specific information of the key design elements are as follows:

- **Meadow Protection Elements:** A parking area along the margin of the meadow appears to facilitate access to the meadow by Off-Road Vehicles. Some attempts have been made in the past to limit access by placing boulders or downed logs. Though these attempts have been reasonably successful, some vehicles are still accessing the meadow. To limit future access either boulders or logs buried by sediment will be placed around the margin of the parking area, as shown on Sheet C5 of the 30% Engineering Drawings. The specific approach at Tyler Meadow will be determined at the 60% design phase.
- **Log Weirs:** A total of eleven log weirs are proposed for the forested area upstream of Tyler meadow. The log weirs, as the name denotes, consist of check dams constructed from logs. Although site specific conditions at each of the proposed log weir structure locations will influence the dimensions of each structure, the approach generally consists of two rows of stacked logs that are keyed into the bed and banks of the channel, secured with rebar pins, and backfilled, as shown on Sheet C7 of the attached 30% Engineering Drawings (Appendix B). Depending on the overall depth of the channel the upstream stack of logs will either include three or two logs with the lowest log embedded fully into the streambed, resulting in either 5 or 3 logs total for each weir location. Log lengths will also vary by location depending upon the width of the channel. At all sites the logs will be embedded a minimum of three feet into the adjacent banks (a total of 6 feet). Once the logs are installed a biodegradable filter blanket will be installed along the upstream face of the structure, extending a minimum of two feet upstream of the structure and the streambed and bank key trenches will be backfilled. Any excess sediment will be placed upstream of the structure, over the filter blanket, to limit the porosity of the log weir and enhance sediment deposition. Holes will then be drilled vertically through the logs and rebar pins will be installed, per the details shown on Sheet C7 of the 30% Engineering Drawings. Once construction of the log weir structure is complete the most upstream log will be notched using a chainsaw to provide a low flow channel with a width of 6

feet and a depth of 4 inches. Logs used in the structure will be salvaged from either the temporary access road, shown in Sheet C4 of the 30% Engineering Drawings, or from the forest adjacent to the access road where the log weirs will be constructed. One crossing of the stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks, as shown on Sheet C6 of the 30% Engineering Drawings.

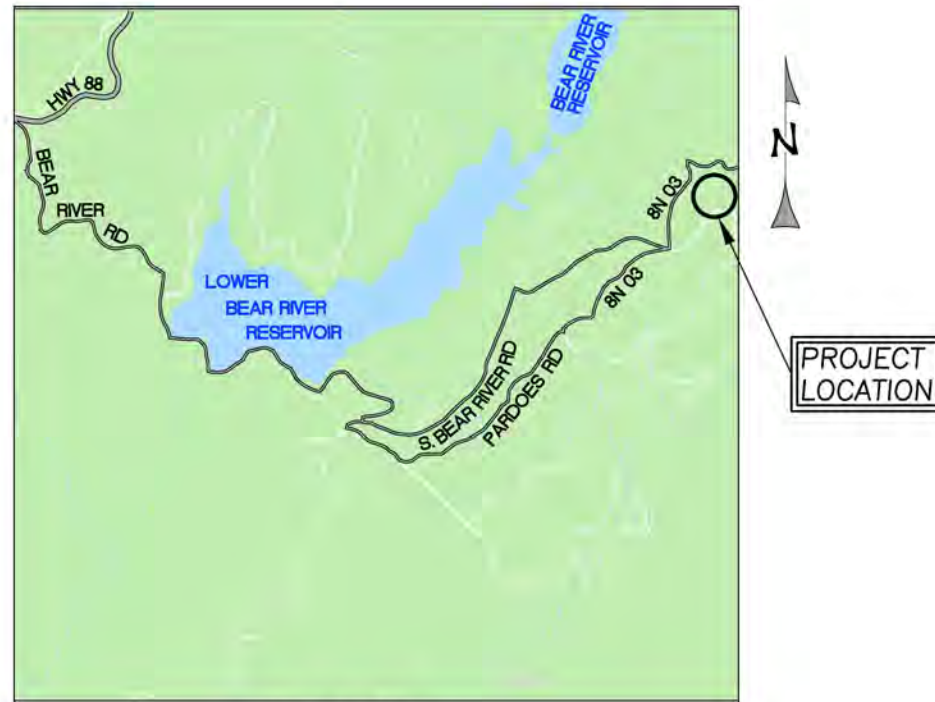
Appendix A

60% Engineering Design Drawings for Upper Onion Meadow

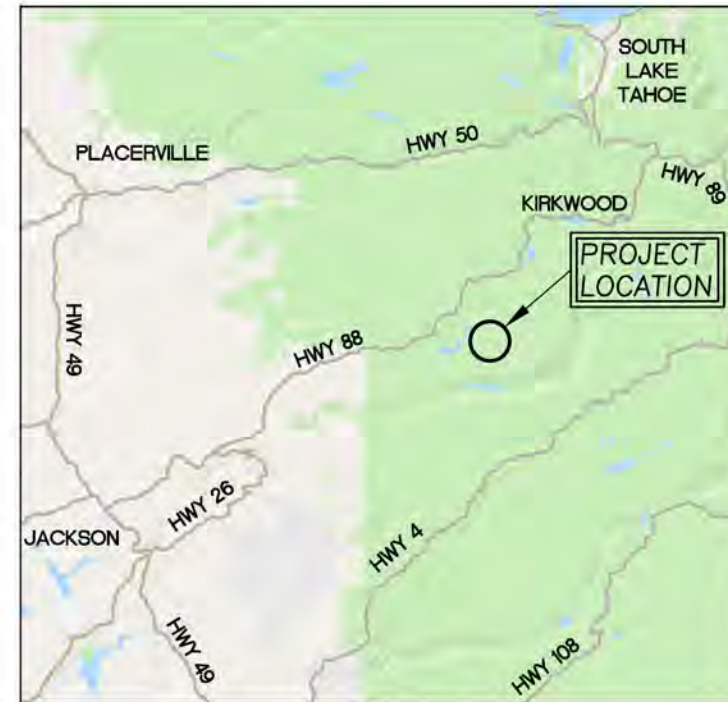
THREE MEADOWS RESTORATION PROJECT

UPPER ONION MEADOW

60% DESIGN SUBMITTAL



VICINITY MAP
N.T.S. (GOOGLE)

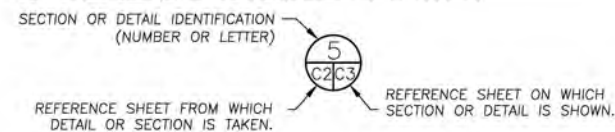


REGIONAL MAP
N.T.S. (GOOGLE)

SHEET INDEX

- C1 COVER SHEET
- C2 EXISTING CONDITIONS, SITE ACCESS, AND STAGING PLAN
- C3 MEADOW IMPROVEMENT PLAN
- C4 ROUGHENED CHANNEL PLAN
- C5 ROAD BERM PLAN
- C6 DETAILS - LOG WEIRS
- C7 DETAILS - CONSTRUCTED RIFFLES
- C8 ACCESS DETAILS
- C9 EROSION CONTROL NOTES AND WILLOW DETAILS
- C10 GENERAL NOTES

SECTION AND DETAIL CONVENTION



ABBREVIATIONS

- DIA. DIAMETER
- (E) EXISTING
- ESM ENGINEERED STREAMBED MATERIAL
- ELEV ELEVATION
- MIN. MINIMUM
- PIP PROTECT IN PLACE
- TYP TYPICAL

- TREE SPECIES
- P LODGEPOLE PINE

PROJECT DESCRIPTION

THESE DRAWINGS PROVIDE 60% DESIGN LEVEL DETAILS FOR THE RESTORATION OF UPPER ONION MEADOW IN AMADOR COUNTY, CALIFORNIA.

WORK SHALL CONSIST OF A ROUGHENED CHANNEL AT THE DOWNSTREAM LIMIT OF THE MEADOW, PLACEMENT OF ROCK AND LOG GRADE CONTROL STRUCTURES, ROADSIDE BERMS, AND REVEGETATION.

GENERAL NOTES

- TOPOGRAPHIC MAPPING WAS PERFORMED BY: WATERWAYS CONSULTING, INC. 509A SWIFT STREET SANTA CRUZ, CA 95060 SURVEY DATE: NOVEMBER 7-9, 2018.
- ELEVATION DATUM: GPS TIES TO NAVD88 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- BASIS OF BEARINGS: GPS TIES TO NAD83 CALIFORNIA STATE PLANE, ZONE 2 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- AERIAL PHOTO SOURCE: AUTOCAD CIVIL 3D 219 GEOLOCATION MAP.
- CONTOUR INTERVAL IS ONE FOOT. ELEVATIONS AND DISTANCES SHOWN ARE IN DECIMAL FEET.
- THIS IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE NOT SHOWN HEREON.
- ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE 2018 EDITION OF THE STATE OF CALIFORNIA STANDARD SPECIFICATIONS, ISSUED BY THE DEPARTMENT OF TRANSPORTATION (HEREAFTER REFERRED TO AS "STANDARD SPECIFICATIONS").
- THESE DESIGNS ARE INCOMPLETE WITHOUT THE FINAL STAMPED TECHNICAL SPECIFICATIONS PREPARED BY WATERWAYS CONSULTING, INC. REFER TO TECHNICAL SPECIFICATIONS FOR DETAILS NOT SHOWN HEREON.

CALL BEFORE YOU DIG

CONTACT UNDERGROUND SERVICE ALERT (USA)
PRIOR TO ANY CONSTRUCTION WORK 1-800-227-2800

PRELIMINARY
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PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

COVER SHEET

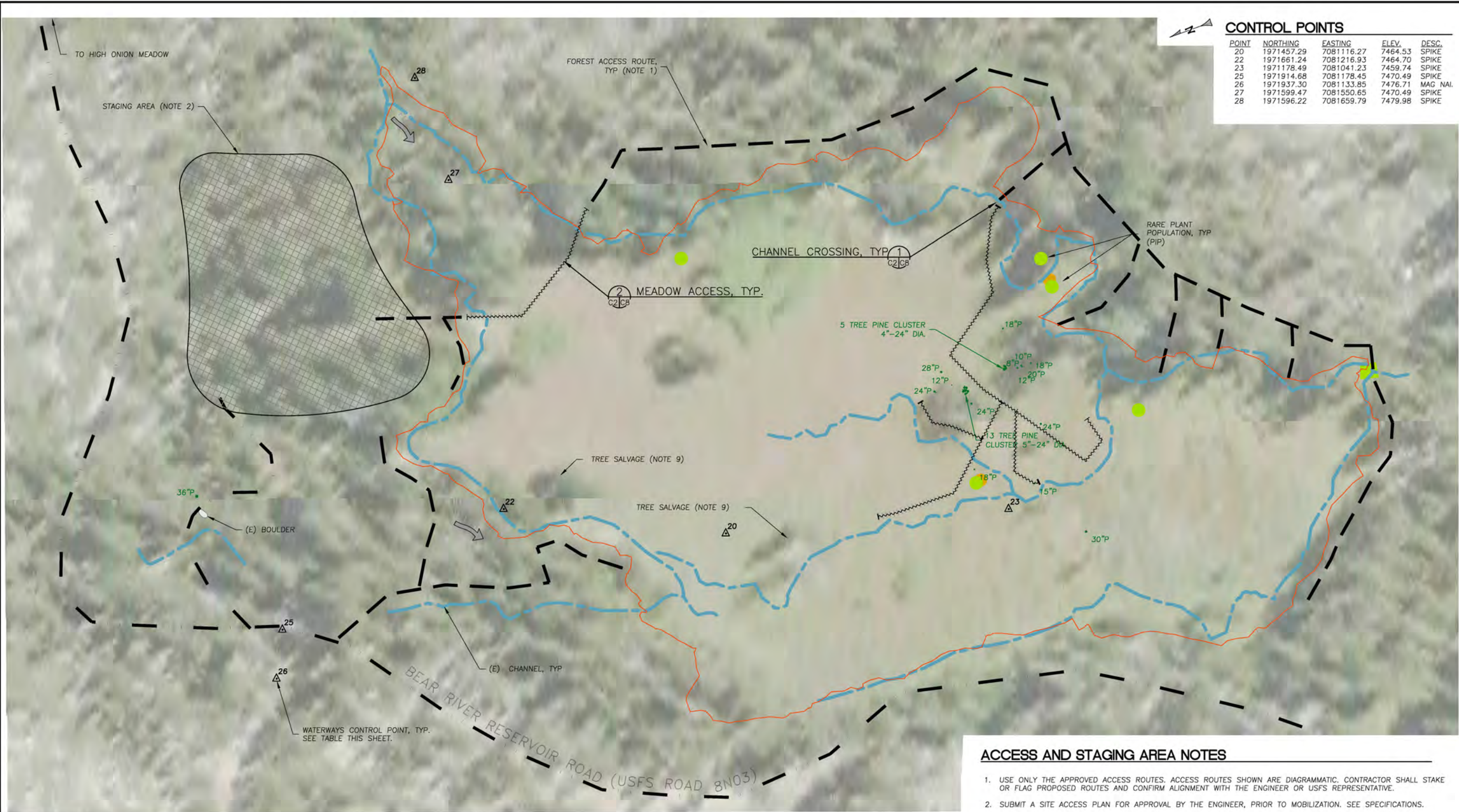
THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS

C1 OF 10

F:\Projects\18-016 Three Meadows\18-016_U03_EV-COMD_ACCESS_CONTROL.dwg - 11/19/2019 12:11 PM



LEGEND

- EXISTING CHANNEL FLOW LINE
- EXISTING FOREST SERVICE ROAD
- MEADOW ACCESS ROUTE
- FOREST ACCESS ROUTE
- WETLAND (NOTE 9)
- STAGING AREA
- RARE PLANT - SENSITIVE SPECIES
- RARE PLANT - WATCH SPECIES
- CONTROL POINT
- EXISTING TREE

EXISTING CONDITIONS, SITE ACCESS, AND STAGING PLAN

SCALE: 1" = 50'

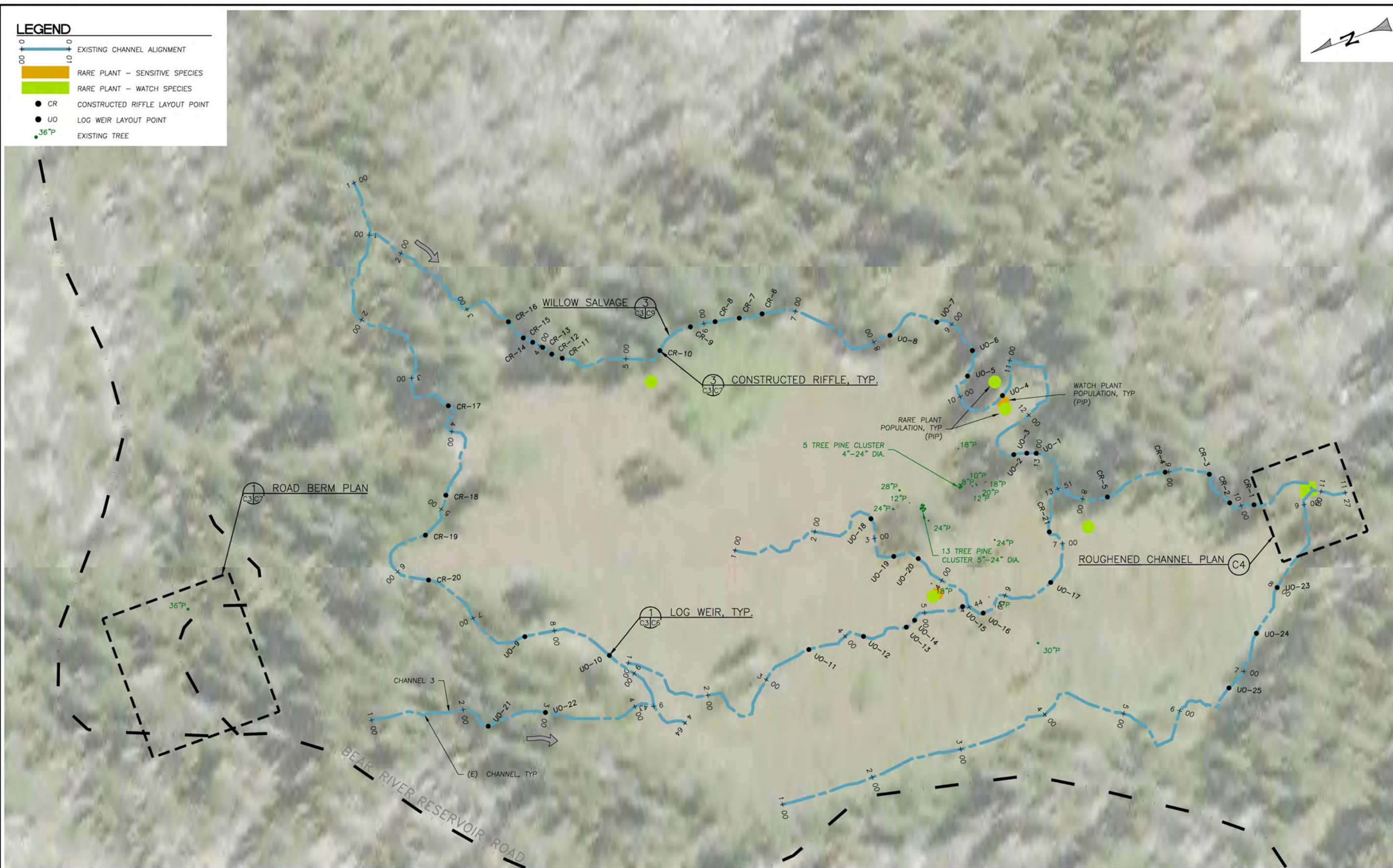
ACCESS AND STAGING AREA NOTES

- USE ONLY THE APPROVED ACCESS ROUTES. ACCESS ROUTES SHOWN ARE DIAGRAMMATIC. CONTRACTOR SHALL STAKE OR FLAG PROPOSED ROUTES AND CONFIRM ALIGNMENT WITH THE ENGINEER OR USFS REPRESENTATIVE.
- SUBMIT A SITE ACCESS PLAN FOR APPROVAL BY THE ENGINEER, PRIOR TO MOBILIZATION. SEE SPECIFICATIONS.
- THE ACCESS PLAN SHOWN ON THE DRAWINGS IS SCHEMATIC. ACCESS ROUTES THROUGH THE FOREST REQUIRE TREE FELLING, STUMP REMOVAL, AND ASSOCIATED LIGHT GRADING. ACCESS WITHIN THE MEADOW SHALL MINIMIZE IMPACTS TO MEADOW VEGETATION; CONTRACTOR SHALL UTILIZE RUBBER TRACKED/TIRED LOW GROUND PRESSURE EQUIPMENT.
- SALVAGE TREES FELLED DUE TO CONSTRUCTION AND ACCESS, AS APPROPRIATE.
- ACCESS ROUTES REQUIRE CHANNEL CROSSINGS. CONTRACTOR SHALL MINIMIZE CHANNEL IMPACTS BY USE OF TEMPORARY BRIDGE SUCH AS CORDUROY ROAD, STEEL PLATES, OR MARSH MAT.
- STAGE MATERIALS WITHIN THE EXISTING PRIMITIVE CAMPGROUND. CONTAIN THE DOWNSLOPE PERIMETER OF STAGING OR STOCKPILE AREAS WITH SILT FENCE
- STORE, MAINTAIN AND REFUEL ALL EQUIPMENT AND MATERIALS IN A DESIGNATED PORTION OF THE STAGING AREA.
- RESTORE ACCESS ROUTES PRIOR TO FINAL DEMOBILIZATION. FOREST ACCESS ROUTES REQUIRE RIPPING, SEEDING, AND COARSE WOODY COVER (E.G., LOGS AND SLASH). MEADOW ACCESS ROUTES SHALL BE RESTORED TO PRE-PROJECT CONDITIONS. SEE SPECIFICATIONS.
- WETLAND DELINEATION PROVIDED BY AMADOR RESOURCE CONSERVATION DISTRICT. DELINEATION PERFORMED BY RESOURCE CONCEPTS INC 2019.

CONTROL POINTS

POINT	NORTHING	EASTING	ELEV.	DESC.
20	1971457.29	7081116.27	7464.53	SPIKE
22	1971661.24	7081216.93	7464.70	SPIKE
23	1971178.49	7081041.23	7459.74	SPIKE
25	1971914.68	7081178.45	7470.49	SPIKE
26	1971937.30	7081133.85	7476.71	MAG NAIL
27	1971599.47	7081550.65	7470.49	SPIKE
28	1971596.22	7081659.79	7479.98	SPIKE

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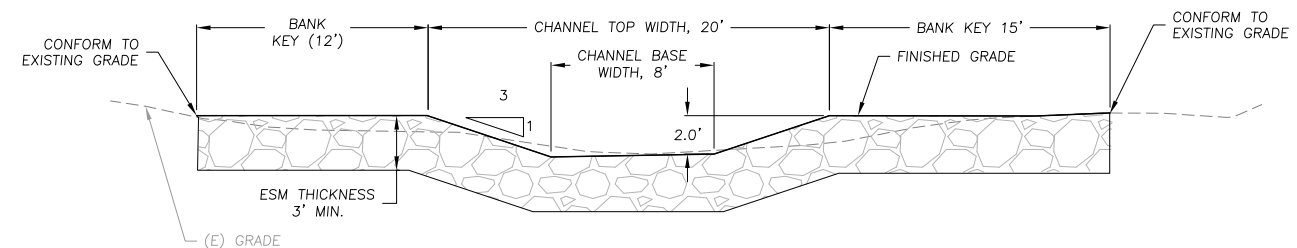
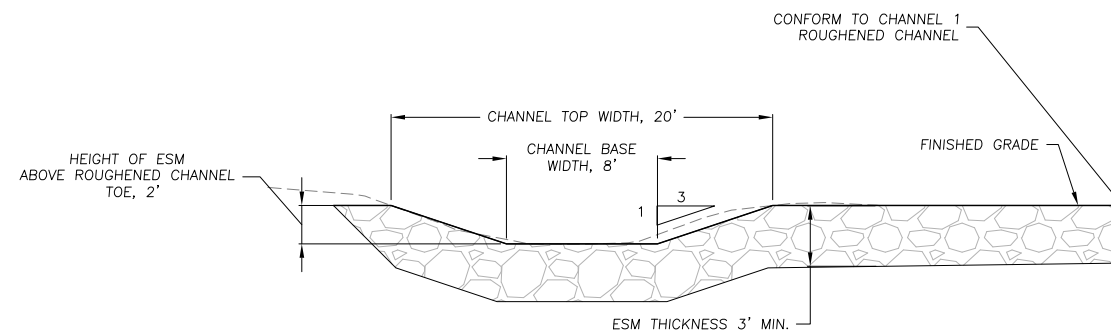
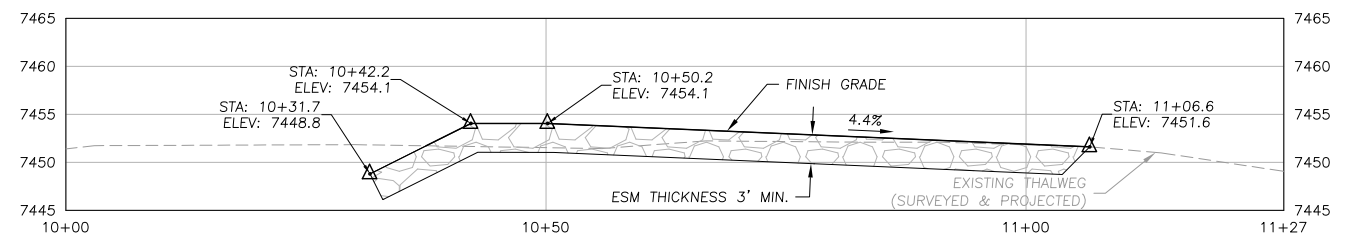
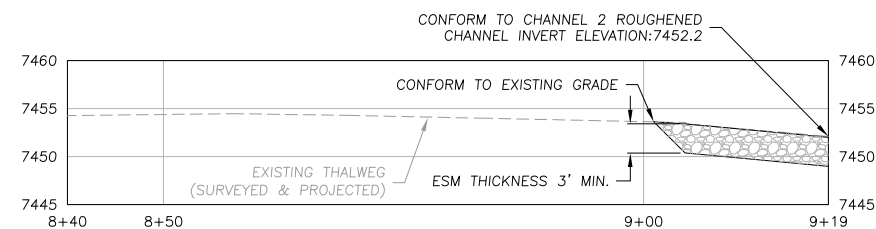
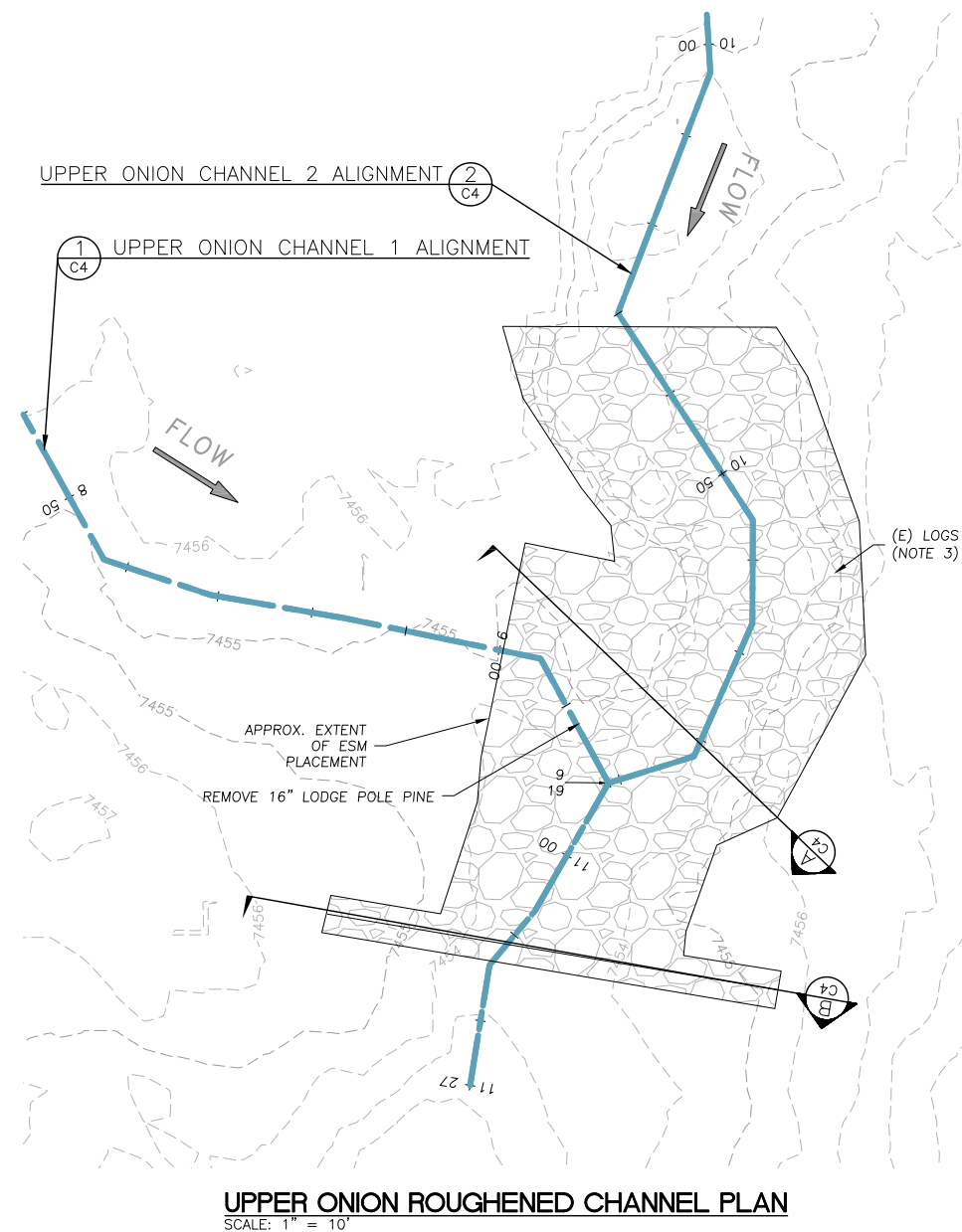
SHEET NOTES

1. SALVAGE WILLOWS AT DIRECTION OF ENGINEER OR USFS REPRESENTATIVE. CONTRACTOR SHALL ANTICIPATE SALVAGE OF UP TO 10 WILLOWS.

MEADOW IMPROVEMENT PLAN

SCALE: 1" = 50'


WATERWAYS CONSULTING INC.	
1020 SW TAYLOR ST SUITE 380 PORTLAND, OR 97205 PH: (503) 222-5979 FAX: (503) 222-6847 WWW.WATERWAYS.COM	
PRELIMINARY NOT FOR CONSTRUCTION	
PREPARED AT THE REQUEST OF: AMADOR RESOURCE CONSERVATION DISTRICT	
MEADOW IMPROVEMENT PLAN	
THREE MEADOWS RESTORATION PROJECT UPPER ONION MEADOW 60% DESIGN SUBMITTAL	
DESIGNED BY: B.D.T. DRAWN BY: B.D.T. CHECKED BY: M.W.W. DATE: 11/22/19 JOB NO.: 18-016	BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS 0 1" 2" 3" 4" 5" 6" 7" 8" 9" 10"
C3	3 OF 10



NOTES AND ESM GRADATION

1. CONTRACTOR SHALL ANTICIPATE ADJUSTMENT OF DIMENSIONS AND ELEVATIONS SHOWN TO ACCOMMODATE FIELD CONDITIONS. CONTRACTOR SHALL STAKE LIMITS AND ELEVATIONS OF PROPOSED ROUGHENED CHANNEL AND ALLOW FIVE (5) WORKING DAYS FOR REVIEW AND ADJUSTMENT BY THE ENGINEER.
2. ESTIMATED VOLUME OF ROUGHENED CHANNEL ESM IS 800 CUBIC YARDS.
3. REMOVE EXISTING LOGS FROM CHANNEL PRIOR TO CONSTRUCTION. REPLACE ON SURFACE OF FINISHED ROUGHENED CHANNEL
4. ESM GRADATION:
 - $D_{100}=3.1\text{FT}$
 - $D_{84}=1.3\text{FT}$
 - $D_{50}=0.5\text{FT}$
 - $D_{16}=0.5\text{IN}$
 - $D_8=0.1\text{IN}$

LEGEND

- EXISTING LIDAR CONTOURS BY OTHERS
 EXISTING THALWEG
 PROPOSED ENGINEERED STREAMBED MATERIAL

PRELIMINARY
NOT FOR CONSTRUCTION


AMADOR RESOURCE
CONSERVATION DISTRICT

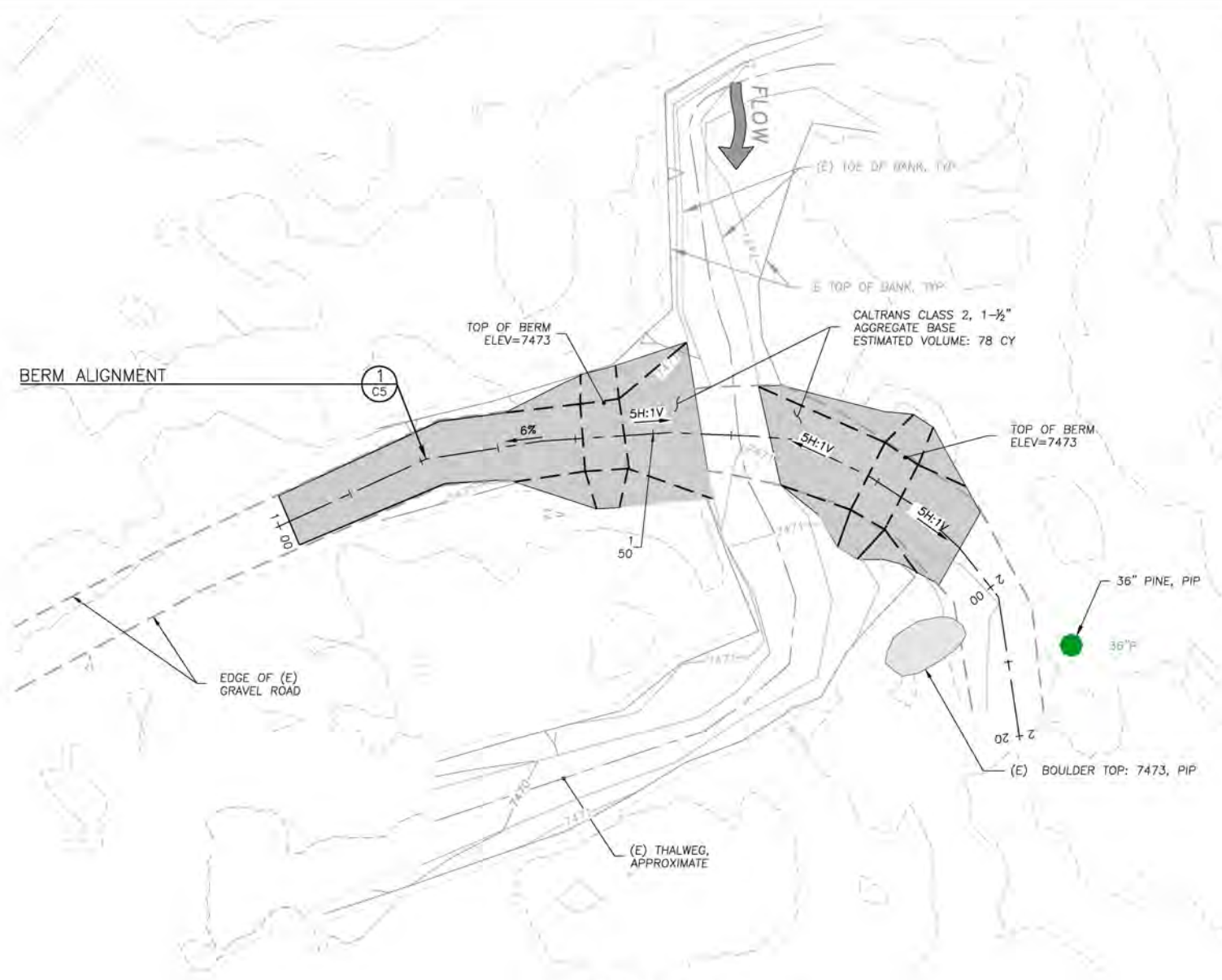
ROUGHENED CHANNEL PLAN

**THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITTAL**

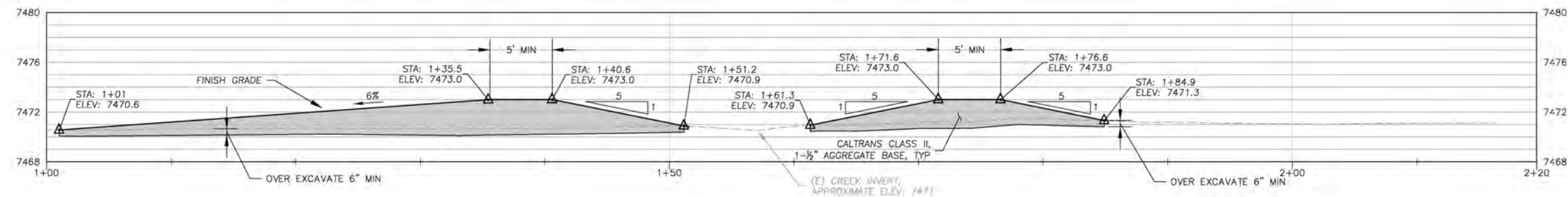
DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING,
ADJUST SCALES FOR
REDUCED PLOTS

0  1"



ROAD BERM PLAN
SCALE: 1" = 10'



BERM PROFILE
SCALE: 1" = 5'

PRELIMINARY
NOT FOR CONSTRUCTION

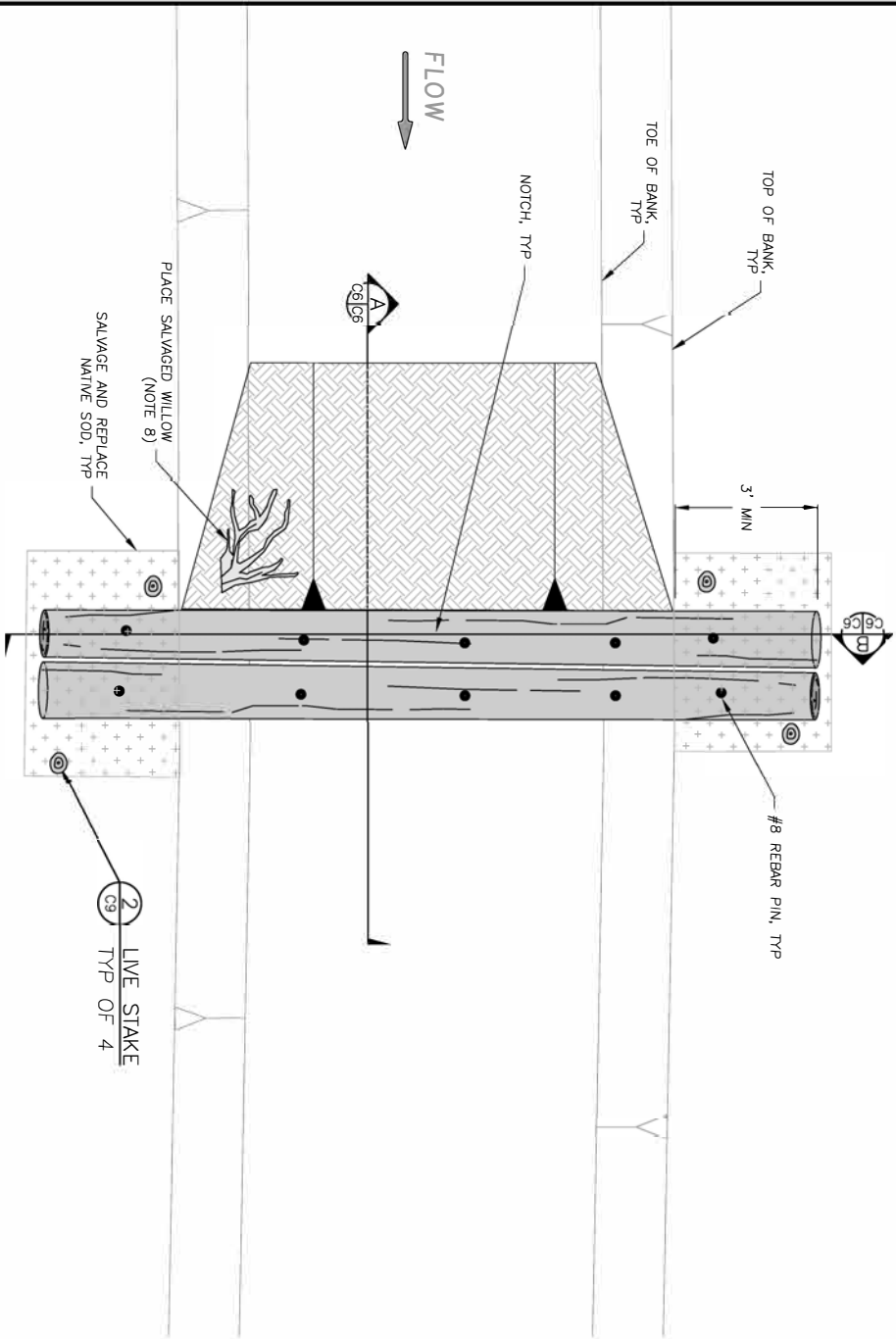
PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

ROAD BERM
PLAN

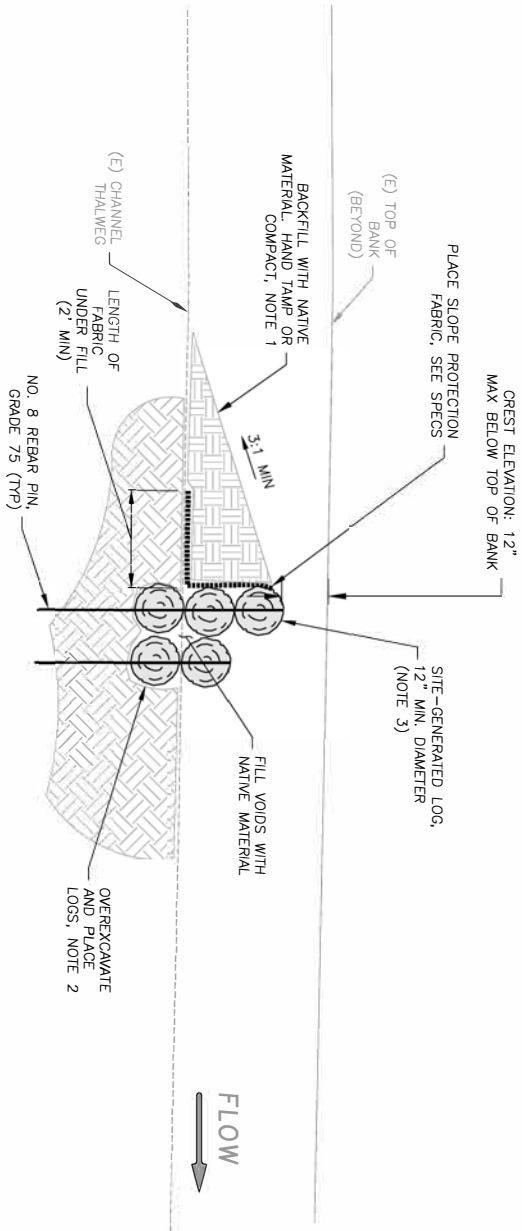
THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.
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CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS



PLAN
 SCALE: 1" = 2'

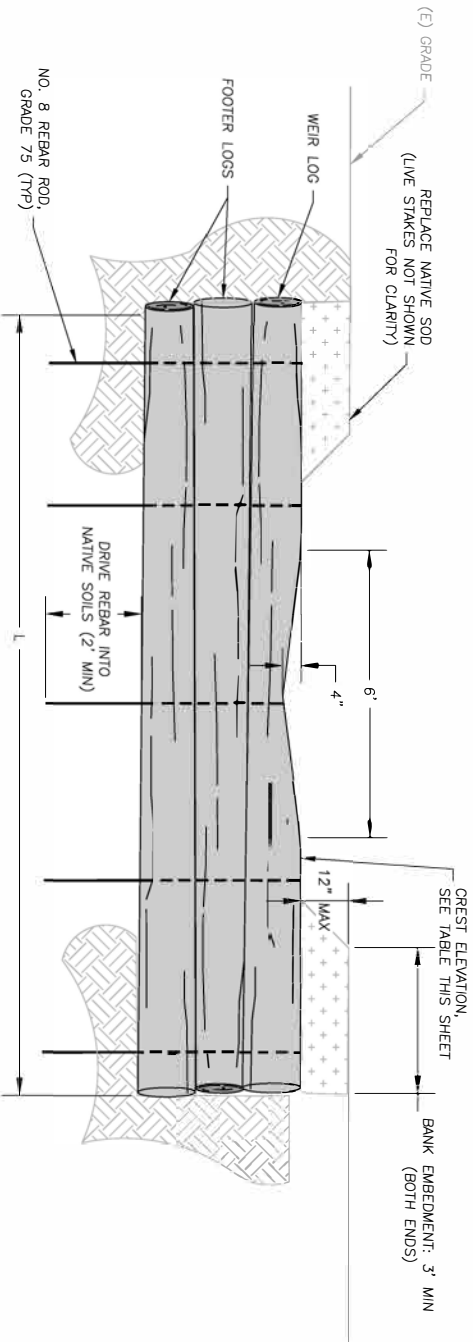


LOG WEIR - TYPICAL PROFILE
 SCALE: 1" = 2'

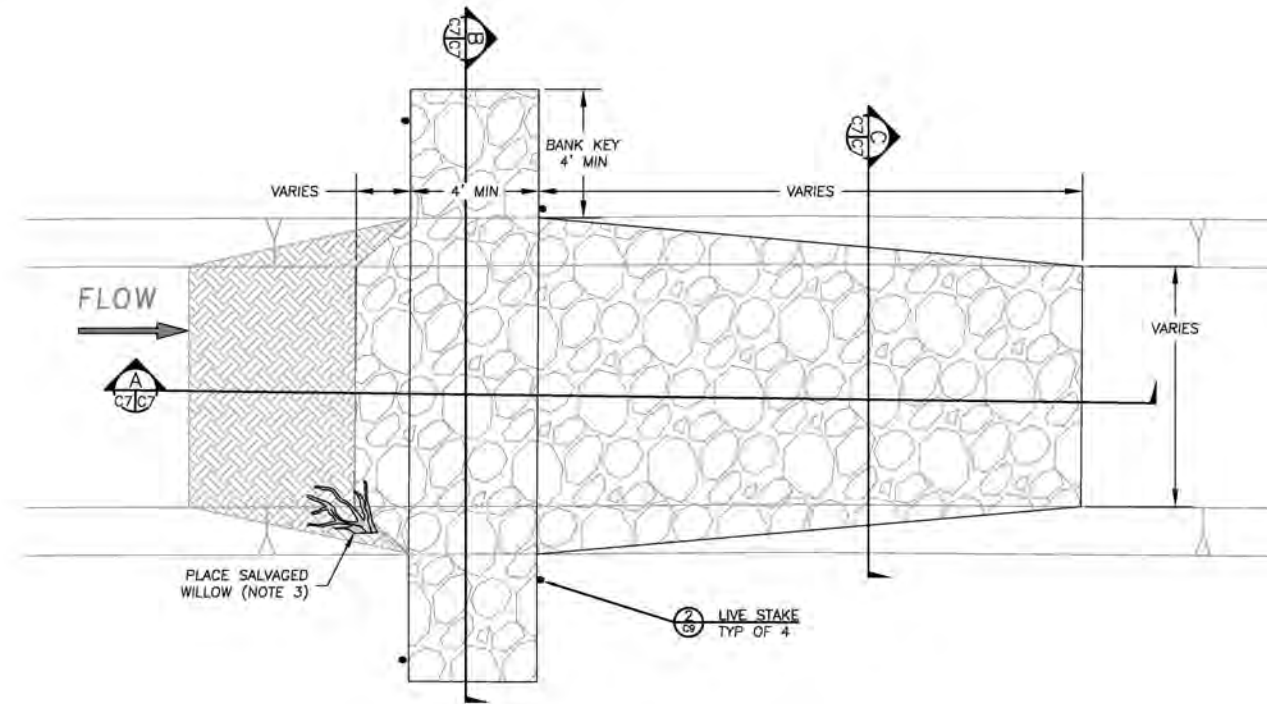
STRUCTURE NUMBER	NORTHING (FT)	EASTING (FT)	CREST ELEVATION (FT, NAVD)	# LOGS	LOG LENGTH (L, FT)
UO-1	1971045.2	7081183.0	7457.10	3	20
UO-2	1971054.6	7081186.6	7457.60	3	20
UO-3	1971068.0	7081189.9	7458.10	3	20
UO-4	1971057.9	7081253.1	7458.60	3	20
UO-5	1971085.7	7081285.3	7459.10	3	15
UO-6	1971071.6	7081309.1	7459.60	5	20
UO-7	1971096.9	7081350.6	7460.10	3	20
UO-8	1971148.6	7081354.3	7462.30	3	20
UO-9	1971623.3	7081186.0	7464.80	3	20
UO-10	1971545.6	7081136.5	7464.30	3	20
UO-11	1971344.0	7081069.7	7461.10	3	20
UO-12	1971284.5	7081062.9	7460.60	3	20
UO-13	1971238.4	7081056.5	7460.10	5	20
UO-14	1971227.5	7081060.4	7459.60	3	20
UO-15	1971174.6	7081056.6	7458.10	5	20
UO-16	1971156.4	7081042.6	7458.10	5	20
UO-17	1971077.7	7081048.7	7457.60	5	20
UO-18	1971234.3	7081177.8	7460.70	3	15
UO-19	1971225.1	7081131.8	7460.20	3	15
UO-20	1971201.5	7081120.7	7459.70	3	20
UO-21	1971692.6	7081109.8	7465.90	3	15
UO-22	1971630.3	7081102.6	7465.40	3	15
UO-23	1970853.0	7080961.1	7455.00	3	20
UO-24	1970890.4	7080923.0	7455.50	3	20
UO-25	1970937.7	7080878.4	7456.00	3	20

SHEET NOTES

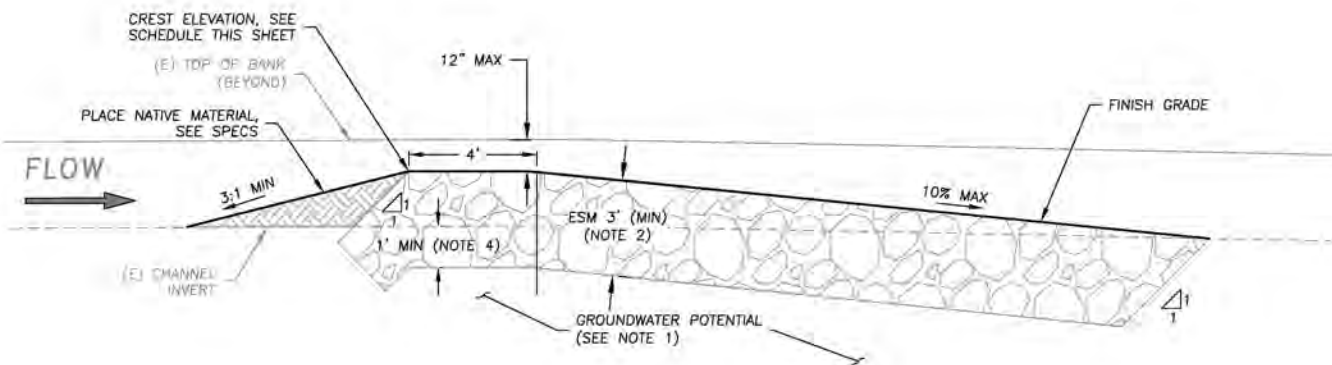
- LIMITED WATER AVAILABLE AT SITE: CONTRACTOR SHALL ANTICIPATE THAT JETTING OF FINES MAY NOT BE POSSIBLE.
- IF GROUNDWATER IS PRESENT, CONTRACTOR SHALL Dewater AS NECESSARY TO INSTALL STRUCTURE. WATER FROM DewaterING ACTIVITIES MAY BE USED FOR JETTING FINES.
- NUMBER OF LOGS REQUIRED PER STRUCTURE VARIES. REFER TO SCHEDULE THIS SHEET. AT A MINIMUM EACH STRUCTURE SHALL HAVE A WEIR LOG AND TWO FOOTER LOGS. ADDITIONAL FOOTER LOGS MAY BE REQUIRED TO ACHIEVE TOP OF BANK TO CREST DISTANCE.
- LOGS SHALL CONSIST OF SITE-GENERATED CONIFERS OR APPROVED EQUIVALENT. QUANTITY OF LOGS REQUIRED: 85. LOG LENGTHS INDICATED IN TABLE ARE ESTIMATED. CONTRACTOR SHALL VERIFY PRIOR TO INSTALLATION.
- LOG LOCATIONS SHOWN ON DRAWINGS ARE APPROXIMATE. EXACT LOCATIONS SHALL BE AS DIRECTED BY THE ENGINEER OR USFS REPRESENTATIVE.
- LOG PINNING SHALL CONSIST OF #8 GRADE 75 REBAR DRIVEN INTO THE LOGS. ALL PINS SHALL BE PLACED TO MINIMIZE VISUAL IMPACT.
- LOG STRUCTURE DESIGNS ARE SHOWN CONCEPTUALLY DUE TO THE INHERENT VARIABILITY OF MATERIAL PROPERTIES. THE DESIGN REQUIRES THAT THE ENGINEER OR USFS REPRESENTATIVE OBSERVE CONSTRUCTION OF THE LOG STRUCTURES TO ENSURE THE INTENT OF THE DESIGN IS MET. OBSERVATION MUST INCLUDE LOG SELECTION, PLACEMENT, AND BACKFILLING. ANY LOG STRUCTURES CONSTRUCTED WITHOUT THE ENGINEER OR USFS REPRESENTATIVE PRESENT ON-SITE MAY RESULT IN REJECTION OF THE WORK BY THE ENGINEER OR USFS REPRESENTATIVE.
- PLACE SALVAGED WILLOWS AT DIRECTION OF ENGINEER OR USFS REPRESENTATIVE.



LOG WEIR - TYPICAL SECTION
 SCALE: 1" = 2'



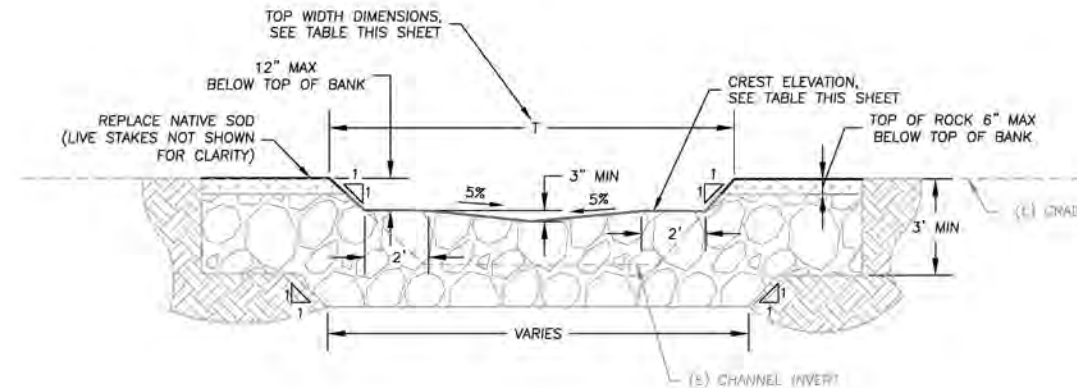
CONSTRUCTED RIFFLE - DETAIL PLAN
1" = 3'



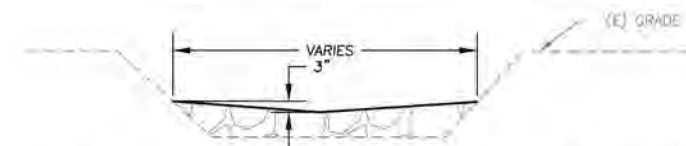
CONSTRUCTED RIFFLE - PROFILE
1" = 3'

CONSTRUCTED RIFFLE LAYOUT

STRUCTURE NUMBER	NORTHING (FT)	EASTING (FT)	CREST ELEVATION (FT, NAVD)	TOP WIDTH (T, FT)	ESTIMATED VOLUME (CY)
CR-1	1970846.1	7081052.3	7454.6	18	64
CR-2	1970869.7	7081063.1	7455.1	18	64
CR-3	1970879.6	7081099.1	7455.6	18	64
CR-4	1970923.1	7081117.3	7456.1	13	31
CR-5	1970989.8	7081113.5	7456.6	15	39
CR-6	1971268.6	7081422.3	7462.8	19	11
CR-7	1971293.0	7081426.4	7463.3	22	34
CR-8	1971318.4	7081431.6	7463.8	20	20
CR-9	1971345.0	7081435.5	7464.3	19	30
CR-10	1971384.3	7081422.8	7464.8	19	37
CR-11	1971484.7	7081450.8	7465.3	16	30
CR-12	1971493.6	7081458.6	7465.8	16	30
CR-13	1971500.2	7081468.7	7466.3	16	30
CR-14	1971508.4	7081477.5	7466.8	15	7
CR-15	1971516.2	7081485.2	7467.3	15	16
CR-16	1971525.2	7081506.8	7468.3	14	14
CR-17	1971615.9	7081444.6	7466.9	10	15
CR-18	1971650.9	7081356.0	7465.1	11	16
CR-19	1971685.8	7081323.5	7465.1	11	16
CR-20	1971699.1	7081277.6	7464.8	11	16
CR-21	1971060.7	7081099.7	7457.1	12	8



CONSTRUCTED RIFFLE - CREST SECTION
1" = 3'



CONSTRUCTED RIFFLE - RAMP SECTION
1" = 3'

SHEET NOTES

- GROUNDWATER MAY BE PRESENT, CONTRACTOR SHALL ANTICIPATE DEWATERING OF CHANNEL DURING INSTALLATION.
- ESM GRADATION:
 - D100 2.5 FT
 - D84 1.0 FT
 - D50 0.4 FT
 - D16 0.4 IN
 - D8 0.08 IN
 ESTIMATED ESM IMPORT VOLUME=475 CY, SEE SPECS.
- PLACE SALVAGED WILLOWS AT DIRECTION OF ENGINEER OR USFS REPRESENTATIVE.
- RIFFLE CREST SHALL BE EMBEDDED MINIMUM OF 1-FOOT INTO CHANNEL BED.

PRELIMINARY
NOT FOR CONSTRUCTION

PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

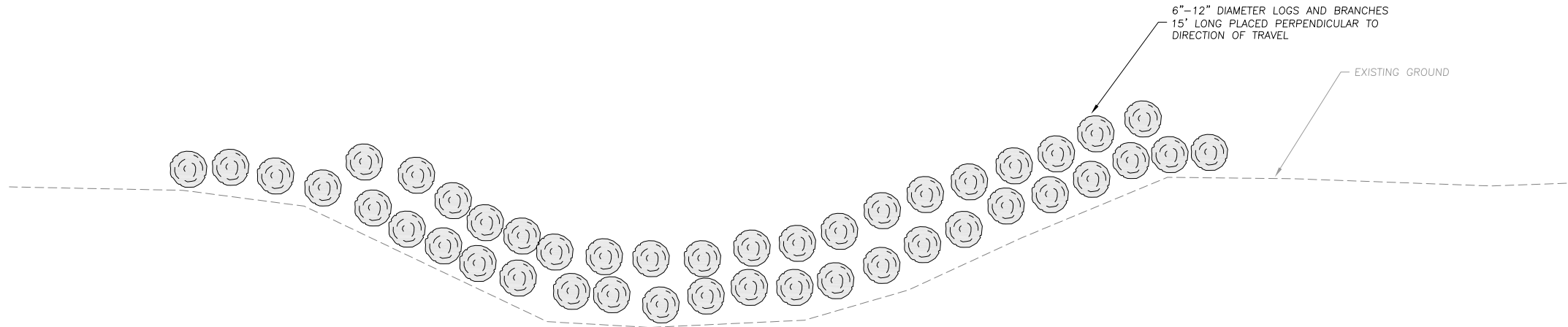
DETAILS -
CONSTRUCTED
RIFFLES

THREE MEADOWS
RESTORATION PROJECT
UPPER OXION MEADOW
60% DESIGN SUBMITTAL

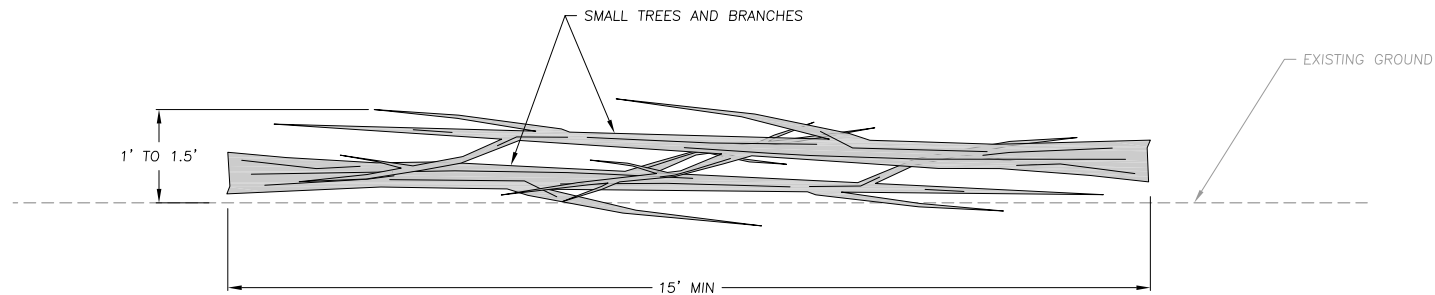
DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS

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STREAM CROSSING - DETAIL SECTION
1" = 2'



MEADOW ACCESS - DETAIL SECTION
1" = 2'

STREAM CROSSING AND MEADOW ACCESS NOTES

1. UTILIZE SMALL TREES AND BRANCHES GENERATED DURING DEVELOPMENT OF FOREST ACCESS ROUTES FOR STREAM CROSSING AND MEADOW ACCESS ROUTES.
2. PLACE LOGS AND LARGE BRANCHES ALONG ACCESS ROUTE AND AT STREAM CROSSING TO PROTECT GROUND SURFACE DURING EQUIPMENT ACCESS ACTIVITIES.
3. MAINTAIN WOODY MATERIALS IN-PLACE FOR DURATION OF CONSTRUCTION ACTIVITIES.
4. REPLACE LOGS AND BRANCHES AS NEEDED TO PROVIDE CONTINUOUS PROTECTION TO STREAM CHANNEL MEADOW VEGETATION. FOR MEADOW ACCESS, MINIMALLY PLACE MATERIAL SUCH THAT GROUND PROTECTION IS ACHIEVED AND MEADOW VEGETATION IS NOT SMOTHERED. ADD OR REMOVE WOODY MATERIAL AS NEEDED AT THE DIRECTION OF THE ENGINEER OR THE USFS REPRESENTATIVE.
5. AT COMPLETION OF THE PROJECT REMOVE WOODY MATERIALS FROM STREAM CHANNELS AND MEADOW ACCESS ROUTES AND PLACE ON DECOMMISSIONED FOREST ACCESS ROUTES AS COARSE MULCH.

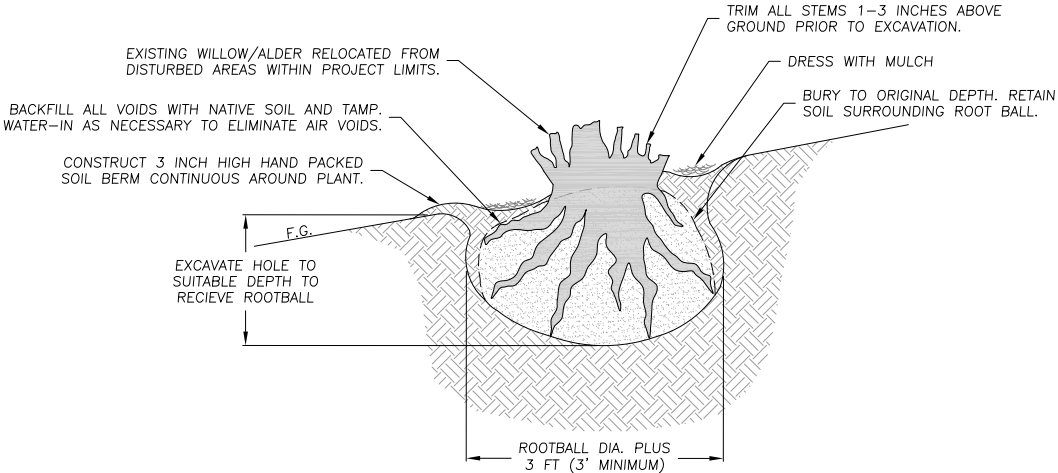
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Erosion Control Notes

1. THE EROSION CONTROL PLAN SHOWN IS INTENDED FOR THE SUMMER CONSTRUCTION SEASON (APRIL 15TH TO OCTOBER 15TH). IF THE DRAINAGE FEATURES SHOWN ON THESE DRAWINGS ARE NOT COMPLETED AND DISTURBED AREAS STABILIZED BY OCTOBER 1ST, CONSULT THE ENGINEER FOR ADDITIONAL RAINY SEASON EROSION CONTROL MEASURES.
2. COMPLY WITH THE APPROVED STORM WATER POLLUTION PREVENTION PLAN, TO BE PREPARED AND IMPLEMENTED BY THE CONTRACTOR IN COMPLIANCE WITH THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD (SWRCB) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES, WATER QUALITY ORDER NO. 2009-0009-DWQ, GENERAL PERMIT NO. CAS000002, ADOPTED SEPTEMBER 2, 2009, (HEREAFTER CONSTRUCTION GENERAL PERMIT (CGP)).
3. DO NOT BEGIN SITE DISTURBING ACTIVITIES UNTIL THE SWPPP HAS BEEN APPROVED BY THE COUNTY, UPLOADED TO SMARTS AND A WASTE DISCHARGE IDENTIFICATION (WDID) NUMBER RECEIVED.
4. IMPLEMENT SWPPP MEASURES AS THE FIRST ORDER OF BUSINESS UPON SITE MOBILIZATION.
5. PRIOR TO COMMENCING WORK, PROTECT AREAS TO REMAIN UNDISTURBED WITH ESA FENCING, AS SHOWN ON THE DRAWINGS. ADDITIONAL FENCING MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER.
6. UTILIZE ONLY THE APPROVED HAUL ROADS AND ACCESS POINTS (AS SHOWN ON THE DRAWINGS) FOR TRANSPORT OF MATERIALS AND EQUIPMENT.
7. BETWEEN OCTOBER 15 AND APRIL 15, PROTECT EXPOSED SOIL FROM EROSION AT ALL TIMES. DURING CONSTRUCTION, SUCH PROTECTION MAY CONSIST OF MULCHING AND/OR PLANTING OF NATIVE VEGETATION OF ADEQUATE DENSITY. BEFORE COMPLETION OF THE PROJECT, STABILIZE ALL EXPOSED SOIL ON DISTURBED SLOPES AGAINST EROSION.
8. MAINTAIN A STANDBY CREW FOR EMERGENCY WORK AT ALL TIMES DURING THE RAINY SEASON (OCTOBER 15 THROUGH APRIL 15). STOCKPILE NECESSARY MATERIALS AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES.
9. CONSTRUCT TEMPORARY EROSION CONTROL MEASURES AS SHOWN ON THIS PLAN AND/OR AS DIRECTED BY THE ENGINEER TO CONTROL DRAINAGE WHICH HAS BEEN AFFECTED BY GRADING AND/OR TRENCHING OPERATIONS.
10. INCORPORATE ADEQUATE DRAINAGE PROCEDURES DURING THE CONSTRUCTION PROCESS TO ELIMINATE EXCESSIVE PONDING AND EROSION.
11. CONSTRUCT AND MAINTAIN EROSION CONTROL MEASURES TO PREVENT THE DISCHARGE OF EARTHEN MATERIALS TO CHANNELS OR MEADOW AREAS FROM DISTURBED AREAS UNDER CONSTRUCTION AND FROM COMPLETED CONSTRUCTION AREAS.
12. INSTALL ALL PROTECTIVE DEVICES AT THE END OF EACH WORK DAY WHEN THE FIVE-DAY RAIN PROBABILITY EQUALS OR EXCEEDS 50 PERCENT AS DETERMINED FROM THE NATIONAL WEATHER SERVICE FORECAST OFFICE: WWW.SRH.NOAA.GOV.
13. AFTER EACH RAINSTORM, REMOVE ALL SILT AND DEBRIS FROM OR SEDIMENTATION DEVICES AND PUMP THE BASIN DRY.
14. THE EROSION CONTROL DEVICES ON THIS PLAN ARE A SCHEMATIC REPRESENTATION OF WHAT MAY BE REQUIRED. EROSION CONTROL DEVICES MAY BE RELOCATED, DELETED, OR ADDITIONAL ITEMS MAY BE REQUIRED DEPENDING ON THE ACTUAL SOIL CONDITIONS ENCOUNTERED, AT THE DISCRETION OF THE ENGINEER.
15. MAINTAIN ALL EROSION CONTROL DEVICES AND MODIFY THEM AS SITE PROGRESS DICTATES.
16. MONITOR THE EROSION CONTROL DEVICES DURING STORMS AND MODIFY THEM IN ORDER TO PREVENT PROGRESS OF ANY ONGOING EROSION.
17. CLEAN DAILY ANY EROSION OR DEBRIS SPILLING ONTO A PUBLIC STREET.
18. CONTACT THE ENGINEER IN THE EVENT THAT THE EROSION CONTROL PLAN AS DESIGNED REQUIRES ANY SUBSTANTIAL REVISIONS.
19. IMPLEMENT ALL REQUIRED BMP'S PRIOR TO COMMENCING SITE DISTURBING ACTIVITIES.

Dust Control Notes

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTINUOUS DUST CONTROL, THROUGHOUT THE CONSTRUCTION, IN ACCORDANCE WITH THE PERMIT CONDITIONS OF APPROVAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REGULAR CLEANING OF ALL MUD, DIRT, DEBRIS, ETC., FROM ANY AND ALL ADJACENT PAVED ROADS, AT LEAST ONCE EVERY 24 HOURS WHEN OPERATIONS ARE OCCURRING.
2. ALL DISTURBED AREAS, INCLUDING UNPAVED ACCESS ROADS OR STORAGE PILES, NOT BEING ACTIVELY UTILIZED FOR CONSTRUCTION PURPOSES, SHALL BE EFFECTIVELY STABILIZED OF DUST EMISSIONS USING WATER.
3. ALL GROUND-DISTURBING ACTIVITIES (E.G., CLEARING, GRUBBING, SCRAPING, AND EXCAVATION) SHALL BE EFFECTIVELY CONTROLLED OF FUGITIVE DUST EMISSIONS UTILIZING APPLICATION OF WATER OR BY PRE-SOAKING.
4. ALL MATERIALS TRANSPORTED OFFSITE SHALL BE COVERED OR EFFECTIVELY WETTED TO LIMIT DUST EMISSIONS.
5. FOLLOWING THE ADDITION OF MATERIALS TO, OR THE REMOVAL OF MATERIALS FROM, THE SURFACES OF OUTDOOR STORAGE PILES, SAID PILES SHALL BE EFFECTIVELY STABILIZED OF FUGITIVE DUST EMISSIONS UTILIZING SUFFICIENT WATER.
6. ONSITE VEHICLE SPEED ON UNPAVED SURFACES SHALL BE LIMITED TO 15 MPH.
7. DISTURBED AREAS SHALL BE SEEDED PRIOR TO OCTOBER 15TH OR EARLIER AS REQUIRED BY THE APPLICABLE PERMIT CONDITIONS.



Willow Salvage Notes:

WILLOW TREES TO BE SALVAGED FOR TRANSPLANTING WILL BE FLAGGED IN THE FIELD BY THE COR OR ENGINEER.

Preparation Notes:

1. PRIOR TO REMOVAL, CUT ALL BRANCHES TO 6-12 INCHES ABOVE THE ROOT CROWN USING SHARP, CLEAN TOOLS.
2. REMOVE THE ROOTWAD AND A MINIMUM 18-INCH LAYER (AT SIDES AND BASE) OF ROOTS AND SOIL FROM THE GROUND AND EITHER TRANSPORT DIRECTLY TO THE PROPOSED PLANTING LOCATION FOR INSTALLATION, OR STORE AS OUTLINED BELOW. PERFORM SALVAGE AND RELOCATION IN A MANNER THAT MINIMIZES HANDLING AND ASSOCIATED DISTURBANCE TO THE PLANT MATERIAL AND SOIL BOUND BY THE ROOTS.

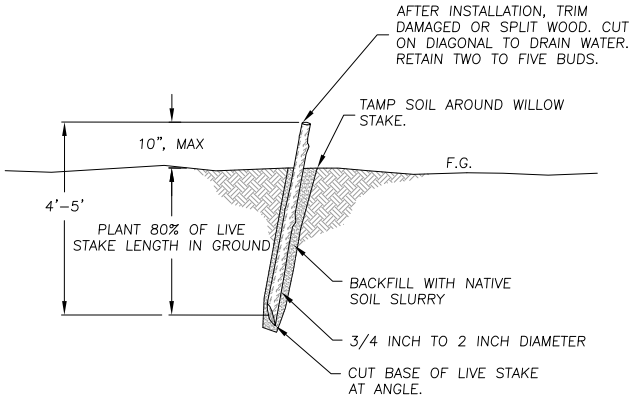
Installation/Storage Notes:

IF THE SALVAGED WILLOW IS NOT PLANTED WITHIN ONE (1) HOUR OF PLANT SALVAGE, THEN STORE AS FOLLOWS:

1. PLACE ROOTBALL IN SHADED LOCATION, COVER ROOTS WITH SOIL, COVER SOIL WITH BURLAP. ALTERNATELY, PLACE ROOTBALL IN "KIDDIE POOL" OR SIMILAR TO MAINTAIN SOIL MOISTURE, COVER PER ABOVE.
2. MAINTAIN MOIST SOIL CONDITIONS UNTIL PLANTING.

Willow Salvage Detail

1" = 1' C6 C7 C9



Live Stake Detail

1" = 2' C6 C7 C9

WATERWAYS

CONSULTING INC.

1020 SW TAYLOR ST SUITE 380

PORTLAND, OR 97205

PH: (503) 222-9379 FAX: (503) 222-6847

WWW.WATERWAYS.COM

PRELIMINARY
NOT FOR CONSTRUCTION

PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

EROSION
CONTROL
NOTES AND
WILLOW
DETAILS

THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITAL

DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING,
ADJUST SCALES FOR
REDUCED PLOTS

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GENERAL NOTES

1. PREPARED AT THE REQUEST OF:
AMADOR RESOURCE CONSERVATION DISTRICT
12200 B AIRPORT ROAD
JACKSON, CA 95642
TELEPHONE: (209) 223-6543

2. TOPOGRAPHIC MAPPING PROVIDED BY:
TRI STATE PHOTOGRAMMETRY
1925 EAST PRATER WAY
SPARKS, NV. 89434
PHONE: (775)358-9491
FAX: (775)358-3664
PROJECT No. 00005.01

3. ELEVATIONS AND DISTANCES SHOWN ARE IN FEET AND DECIMALS THEREOF. CONTOUR INTERVAL IS 1 FOOT.

4. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE DRAWINGS, SPECIFICATIONS, AND THE 2018 EDITION OF THE STATE OF CALIFORNIA STANDARD SPECIFICATIONS, ISSUED BY THE DEPARTMENT OF TRANSPORTATION (HEREAFTER REFERRED TO AS "STANDARD SPECIFICATIONS").

5. THESE DESIGNS ARE NOT COMPLETE WITHOUT THE FINAL STAMPED TECHNICAL SPECIFICATIONS PREPARED BY WATERWAYS CONSULTING, INC. REFER TO SPECIFICATIONS FOR DETAILS NOT SHOWN HEREON.

6. NOTIFY THE ENGINEER AT LEAST 48 HOURS PRIOR TO CONSTRUCTION. THE ENGINEER OR A DESIGNATED REPRESENTATIVE SHALL OBSERVE THE CONSTRUCTION PROCESS, AS NECESSARY TO ENSURE PROPER INSTALLATION PROCEDURES.

7. EXISTING UNDERGROUND UTILITY LOCATIONS:

A. CALL UNDERGROUND SERVICE ALERT (1-800-642-2444) TO LOCATE ALL UNDERGROUND UTILITY LINES PRIOR TO COMMENCING CONSTRUCTION.

B. PRIOR TO BEGINNING WORK, CONTACT ALL UTILITIES COMPANIES WITH REGARD TO WORKING OVER, UNDER, OR AROUND EXISTING FACILITIES AND TO OBTAIN INFORMATION REGARDING RESTRICTIONS THAT ARE REQUIRED TO PREVENT DAMAGE TO THE FACILITIES.

C. EXISTING UTILITY LOCATIONS SHOWN ARE COMPILED FROM INFORMATION SUPPLIED BY THE APPROPRIATE UTILITY AGENCIES AND FROM FIELD MEASUREMENTS TO ABOVE GROUND FEATURES READILY VISIBLE AT THE TIME OF SURVEY. LOCATIONS SHOWN ARE APPROXIMATE. THE CONTRACTOR IS CAUTIONED THAT ONLY ACTUAL EXCAVATION WILL REVEAL THE DIMENSIONS, SIZES, MATERIALS, LOCATIONS, AND DEPTH OF UNDERGROUND UTILITIES.

D. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE LOCATION AND/OR PROTECTION OF ALL EXISTING AND PROPOSED PIPING, UTILITIES, TRAFFIC SIGNAL EQUIPMENT (BOTH ABOVE GROUND AND BELOW GROUND), STRUCTURES, AND ALL OTHER EXISTING IMPROVEMENTS THROUGHOUT CONSTRUCTION.

E. PRIOR TO COMMENCING FABRICATION OR CONSTRUCTION, DISCOVER OR VERIFY THE ACTUAL DIMENSIONS, SIZES, MATERIALS, LOCATIONS, AND ELEVATIONS OF ALL EXISTING UTILITIES AND POTHOLE THOSE AREAS WHERE POTENTIAL CONFLICTS ARE LIKELY OR DATA IS OTHERWISE INCOMPLETE.

F. TAKE APPROPRIATE MEASURES TO PROTECT EXISTING UTILITIES DURING CONSTRUCTION OPERATIONS. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE COST OF REPAIR/REPLACEMENT OF ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION.

G. UPON LEARNING OF THE EXISTENCE AND/OR LOCATIONS OF ANY UNDERGROUND FACILITIES NOT SHOWN OR SHOWN INACCURATELY ON THE PLANS OR NOT PROPERLY MARKED BY THE UTILITY OWNER, IMMEDIATELY NOTIFY THE UTILITY OWNER AND THE CITY BY TELEPHONE AND IN WRITING.

H. UTILITY RELOCATIONS REQUIRED FOR THE CONSTRUCTION OF THE PROJECT FACILITIES WILL BE PERFORMED BY THE UTILITY COMPANY, UNLESS OTHERWISE NOTED.

12. IF DISCREPANCIES ARE DISCOVERED BETWEEN THE CONDITIONS EXISTING IN THE FIELD AND THE INFORMATION SHOWN ON THESE DRAWINGS, NOTIFY THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.

13. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE FULLY INFORMED OF AND TO COMPLY WITH ALL LAWS, ORDINANCES, CODES, REQUIREMENTS AND STANDARDS WHICH IN ANY MANNER AFFECT THE COURSE OF CONSTRUCTION OF THIS PROJECT, THOSE ENGAGED OR EMPLOYED IN THE CONSTRUCTION AND THE MATERIALS USED IN THE CONSTRUCTION.

14. ALL TESTS, INSPECTIONS, SPECIAL OR OTHERWISE, THAT ARE REQUIRED BY THE BUILDING CODES, LOCAL BUILDING DEPARTMENTS, OR THESE PLANS, SHALL BE DONE BY AN INDEPENDENT INSPECTION COMPANY. JOB SITE VISITS BY THE ENGINEER DO NOT CONSTITUTE AN OFFICIAL INSPECTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE REQUIRED TESTS AND INSPECTIONS ARE PERFORMED.

15. PROJECT SCHEDULE: PRIOR TO COMMENCEMENT OF WORK, SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL A DETAILED CONSTRUCTION SCHEDULE. DO NOT BEGIN ANY CONSTRUCTION WORK UNTIL THE PROJECT SCHEDULE AND WORK PLAN IS APPROVED BY THE ENGINEER. ALL CONSTRUCTION SHALL BE CLOSELY COORDINATED WITH THE ENGINEER SO THAT THE QUALITY OF WORK CAN BE CHECKED FOR APPROVAL. PURSUE WORK IN A CONTINUOUS AND DILIGENT MANNER TO ENSURE A TIMELY COMPLETION OF THE PROJECT.

16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGN, PERMITTING, INSTALLATION, AND MAINTENANCE OF ANY AND ALL TRAFFIC CONTROL MEASURES DEEMED NECESSARY.

17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR GENERAL SAFETY DURING CONSTRUCTION. ALL WORK SHALL CONFORM TO PERTINENT SAFETY REGULATIONS AND CODES. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR FURNISHING, INSTALLING, AND MAINTAINING ALL WARNING SIGNS AND DEVICES NECESSARY TO SAFEGUARD THE GENERAL PUBLIC AND THE WORK, AND PROVIDE FOR THE PROPER AND SAFE ROUTING OF VEHICULAR AND PEDESTRIAN TRAFFIC DURING THE PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR COMPLIANCE WITH ALL APPLICABLE PROVISIONS OF OSHA IN THE CONSTRUCTION PRACTICES FOR ALL EMPLOYEES DIRECTLY ENGAGED IN THE CONSTRUCTION OF THIS PROJECT.

18. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTION LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL. NEITHER THE PROFESSIONAL ACTIVITIES OF CONSULTANT NOR THE PRESENCE OF CONSULTANT OR HIS OR HER EMPLOYEES OR SUB-CONSULTANTS AT A CONSTRUCTION SITE SHALL RELIEVE THE CONTRACTOR AND ITS SUBCONTRACTORS OF THEIR RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION MEANS, METHODS, SEQUENCE, TECHNIQUES OR PROCEDURES NECESSARY FOR PERFORMING, SUPERINTENDING OR COORDINATING ALL PORTIONS OF THE WORK OF CONSTRUCTION IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND APPLICABLE HEALTH OR SAFETY REQUIREMENTS OF ANY REGULATORY AGENCY OR OF STATE LAW.

19. MAINTAIN A CURRENT, COMPLETE, AND ACCURATE RECORD OF ALL AS-BUILT DEVIATIONS FROM THE CONSTRUCTION AS SHOWN ON THESE DRAWINGS AND SPECIFICATIONS, FOR THE PURPOSE OF PROVIDING THE ENGINEER OF RECORD WITH A BASIS FOR THE PREPARATION OF RECORD DRAWINGS.

20. MAINTAIN THE SITE IN A NEAT AND ORDERLY MANNER THROUGHOUT THE CONSTRUCTION PROCESS. STORE ALL MATERIALS WITHIN APPROVED STAGING AREAS.

21. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE FULLY INFORMED OF AND TO COMPLY WITH ALL PERMIT CONDITIONS, LAWS, ORDINANCES, CODES, REQUIREMENTS AND STANDARDS, WHICH IN ANY MANNER AFFECT THE COURSE OF CONSTRUCTION OF THIS PROJECT, THOSE ENGAGED OR EMPLOYED IN THE CONSTRUCTION AND THE MATERIALS USED IN THE CONSTRUCTION.
22. PROVIDE, AT CONTRACTOR'S SOLE EXPENSE, ALL MATERIALS, LABOR AND EQUIPMENT REQUIRED TO COMPLY WITH ALL APPLICABLE PERMIT CONDITIONS AND REQUIREMENTS.

23. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION STAKING AND LAYOUT, UNLESS OTHERWISE SPECIFIED.

24. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTED LINES AND GRADES.

25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION AND PRESERVATION OF ALL SURVEY MONUMENTS OR PROPERTY CORNERS. DISTURBED MONUMENTS SHALL BE RESTORED BACK TO THEIR ORIGINAL LOCATION AND SHALL BE CERTIFIED BY A REGISTERED CIVIL ENGINEER OR LAND SURVEYOR AT THE SOLE EXPENSE OF THE CONTRACTOR.

26. ALL STANDARD STREET MONUMENTS, LOT CORNER PIPES, AND OTHER PERMANENT MONUMENTS DISTURBED DURING THE PROCESS OF CONSTRUCTION SHALL BE REPLACED AND A RECORD OF SURVEY OR CORNER RECORD PER SECTION 8771 OF THE PROFESSIONAL LAND SURVEYORS ACT FILED BEFORE ACCEPTANCE OF THE IMPROVEMENTS BY AMADOR COUNTY RESOURCE CONSERVATION DISTRICT (ACRCD). COPIES OF ANY RECORD OF SURVEY OR CORNER RECORDS SHALL BE SUBMITTED TO THE ACRCD.

27. TREE DIMENSIONS: TRUNK DIAMETERS SHOWN REPRESENT DIAMETER AT BREAST HEIGHT (DBH), MEASURED IN INCHES. DBH IS MEASURED 4.5 FT ABOVE GROUND FOR SINGLE TRUNKS AND TRUNKS THAT SPLIT INTO SEVERAL STEMS CLOSE TO THE GROUND. THE DBH FOR TREES THAT SPLIT INTO SEVERAL STEMS CLOSE TO THE GROUND MAY BE CONSOLIDATED INTO A SINGLE DBH BY TAKING THE SQUARE ROOT OF THE SUM OF ALL SQUARED STEM DBH'S, UNLESS OTHERWISE NOTED. WHERE TREES FORK NEAR BREAST HEIGHT, TRUNK DIAMETER IS MEASURED AT THE NARROWEST PART OF THE MAIN STEM BELOW THE FORK. FOR TREES ON A SLOPE, BREAST HEIGHT IS REFERENCED FROM THE UPPER SIDE OF THE SLOPE. FOR LEANING TREES, BREAST HEIGHT IS MEASURED ON THE SIDE THAT THE TREE LEANS TOWARD. TREES WITH DBH LESS THAN 8" ARE TYPICALLY NOT SHOWN.

12"P = 12" DBH PINE

28. TREE SPECIES ARE IDENTIFIED WHEN KNOWN. HOWEVER, FINAL DETERMINATION SHOULD BE MADE BY A QUALIFIED BOTANIST. REFER TO THE LEGEND FOR TREE SPECIES SYMBOLS.

29. TREE TRUNK DIMENSIONS MAY BE SHOWN OUT-OF-SCALE FOR PLOTTING CLARITY. CAUTION SHOULD BE USED IN DESIGNING NEAR TREE TRUNKS. THERE ARE LIMITATIONS ON FIELD ACCURACY, DRAFTING ACCURACY, MEDIUM STRETCH AS WELL AS THE "SPREAD" OR "LEANING" OF TREES. REQUEST ADDITIONAL TOPOGRAPHIC DETAIL WHERE CLOSE TOLERANCES ARE ANTICIPATED. INDIVIDUAL TREES ARE NOT TYPICALLY LOCATED WITHIN DRIPLINE CANOPY AREAS SHOWN.

30. WILLOWS TO BE REMOVED SHALL BE TRIMMED, TRANSPLANTED, AND UTILIZED IN THE REVEGETATION PLAN.

31. CONTRACTOR IS REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

32. THE CONTRACTOR SHALL CONFORM TO THE RULES AND REGULATIONS OF THE CONSTRUCTION SAFETY ORDERS OF THE CALIFORNIA DIVISION OF OCCUPATIONAL SAFETY AND HEALTH PERTAINING TO EXCAVATION AND TRENCHES THE CALIFORNIA CODE OF REGULATIONS TITLE 8, SUBCHAPTER 4 CONSTRUCTION SAFETY ORDERS, ARTICLE 6 EXCAVATION.

33. CULTURAL RESOURCES: IN THE EVENT THAT HUMAN REMAINS AND/OR CULTURAL MATERIALS ARE FOUND, ALL PROJECT-RELATED CONSTRUCTION SHALL CEASE WITHIN A 100-FOOT RADIUS. THE CONTRACTOR SHALL, PURSUANT TO SECTION 7050.5 OF THE HEALTH AND SAFETY CODE, AND SECTION 5097.94 OF THE PUBLIC RESOURCES CODE OF THE STATE OF CALIFORNIA, NOTIFY THE AMADOR COUNTY CORONER IMMEDIATELY.
- DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0"=1"

C10

10
OF
10

THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITTAL

GENERAL
NOTES

PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

PRELIMINARY
NOT FOR CONSTRUCTION

WATERWAYS
CONSULTING INC.

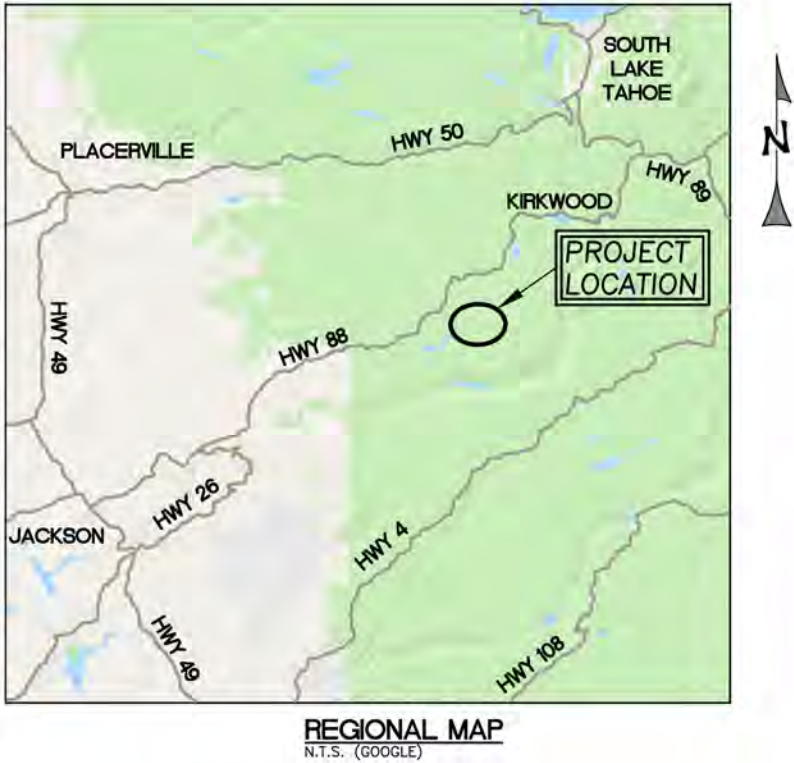
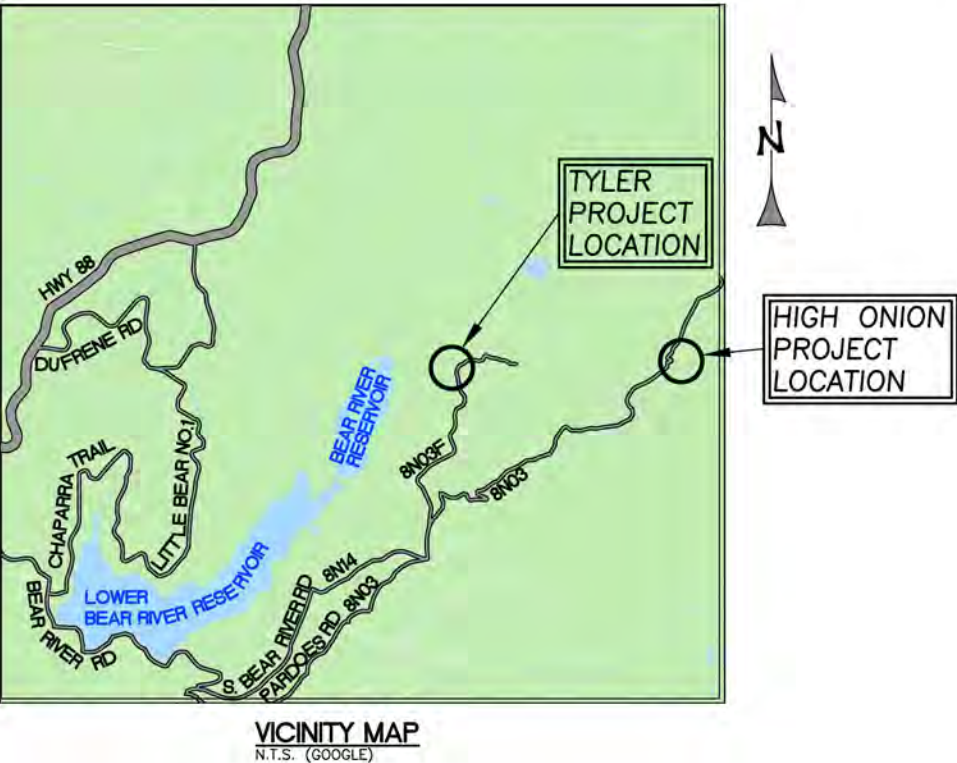
1020 SW TAYLOR ST SUITE 380
PORTLAND, OR 97205
PH: (503) 222-9597 FAX: (503) 222-6847
WWW.WATWAYS.COM

Appendix B

30% Engineering Design Drawings for High Onion and Tyler Meadows

THREE MEADOWS RESTORATION PROJECT HIGH ONION AND TYLER MEADOWS

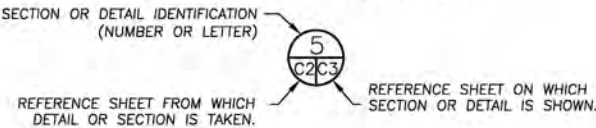
30% DESIGN SUBMITTAL



SHEET INDEX

C1	COVER
C2	HIGH ONION EXISTING CONDITIONS, ACCESS, AND STAGING PLAN
C3	HIGH ONION IMPROVEMENT PLAN
C4	TYLER EXISTING CONDITIONS, ACCESS, AND STAGING PLAN
C5	TYLER IMPROVEMENT PLAN
C6	DETAILS
C7	LOG WEIR DETAIL

SECTION AND DETAIL CONVENTION



ABBREVIATIONS

COR	CONTRACTING OFFICER'S REPRESENTATIVE
DIA	DIAMETER
(E)	EXISTING
FS	FOREST SERVICE
TYP	TYPICAL
N.T.S.	NOT TO SCALE

TREE SPECIES

F	FIR
P	LOGPOLE PINE

*** CALL BEFORE YOU DIG ***

CONTACT UNDERGROUND SERVICE ALERT (USA)
PRIOR TO ANY CONSTRUCTION WORK 1-800-227-2600

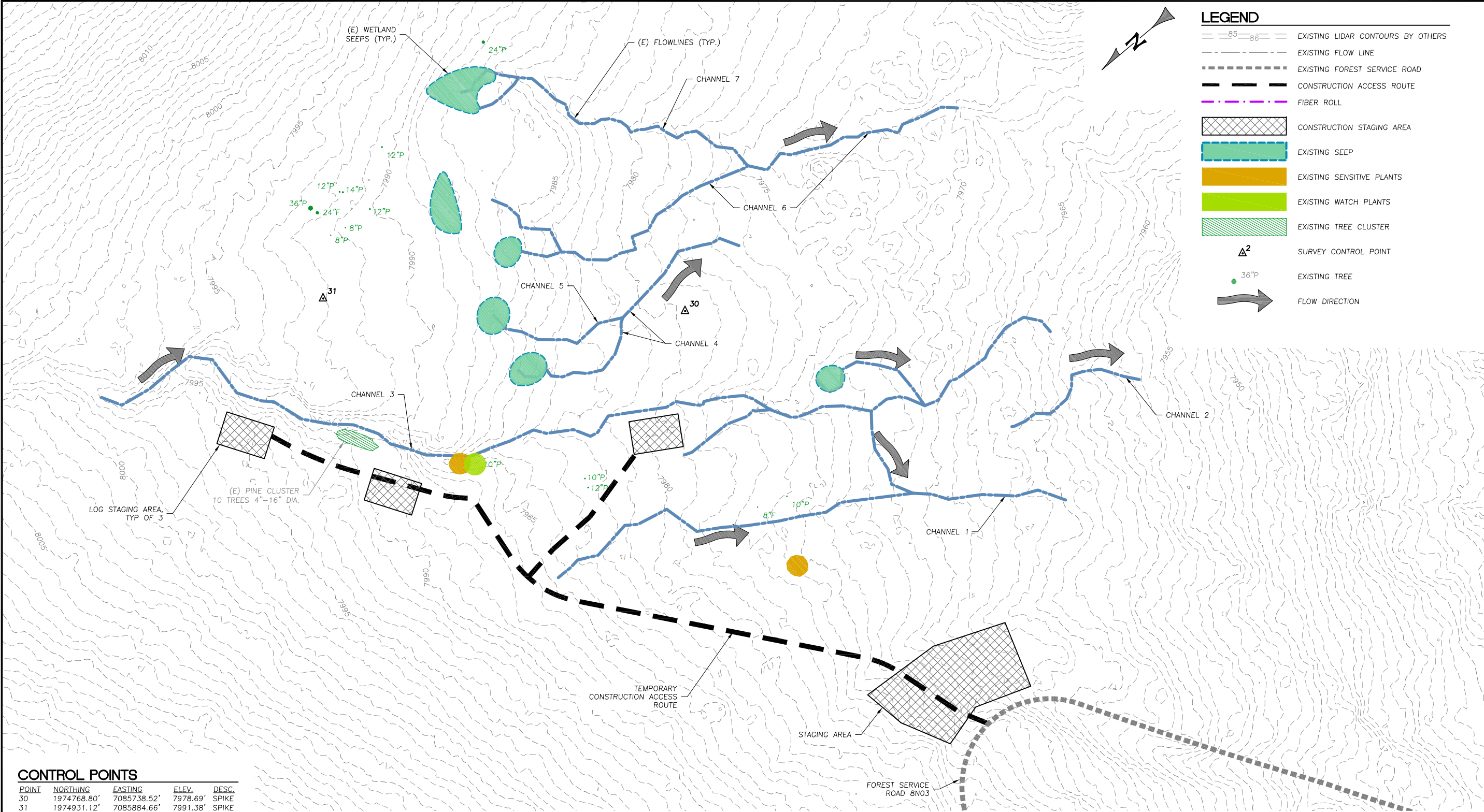
PROJECT DESCRIPTION

THESE DRAWINGS PROVIDE 30% DESIGN LEVEL DETAILS FOR THE RESTORATION OF HIGH ONION MEADOW AND TYLER MEADOW IN AMADOR COUNTY, CALIFORNIA.

WORK IN HIGH ONION MEADOW SHALL CONSIST OF CATTLE EXCLUSION FENCING AROUND EXISTING WETLAND SEEPS AND IN-CHANNEL LOG STRUCTURES. WORK IN TYLER MEADOW SHALL CONSIST OF PLACEMENT OF ROCK ALONG THE EDGE OF THE EXISTING ATV AREA TO DISCOURAGE ATV RECREATION WITHIN THE MEADOW AND IN-CHANNEL LOG STRUCTURES.

GENERAL NOTES

- TOPOGRAPHIC MAPPING WAS PERFORMED BY:
WATERWAYS CONSULTING, INC.
509A SWIFT STREET
SANTA CRUZ, CA 95060
SURVEY DATE: NOVEMBER 7-9, 2018.
- ELEVATION DATUM: GPS TIES TO NAVD88 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- BASIS OF BEARINGS: GPS TIES TO NAD83 CALIFORNIA STATE PLANE, ZONE 2 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- AERIAL PHOTO SOURCE: GOOGLE
- CONTOUR INTERVAL IS ONE FOOT. ELEVATIONS AND DISTANCES SHOWN ARE IN DECIMAL FEET.
- THIS IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE NOT SHOWN HEREON.
- ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE 2018 EDITION OF THE STATE OF CALIFORNIA STANDARD SPECIFICATIONS, ISSUED BY THE DEPARTMENT OF TRANSPORTATION (HEREAFTER REFERRED TO AS "STANDARD SPECIFICATIONS").
- THESE DESIGNS ARE INCOMPLETE WITHOUT THE FINAL STAMPED TECHNICAL SPECIFICATIONS PREPARED BY WATERWAYS CONSULTING, INC. REFER TO TECHNICAL SPECIFICATIONS FOR DETAILS NOT SHOWN HEREON.



CONTROL POINTS

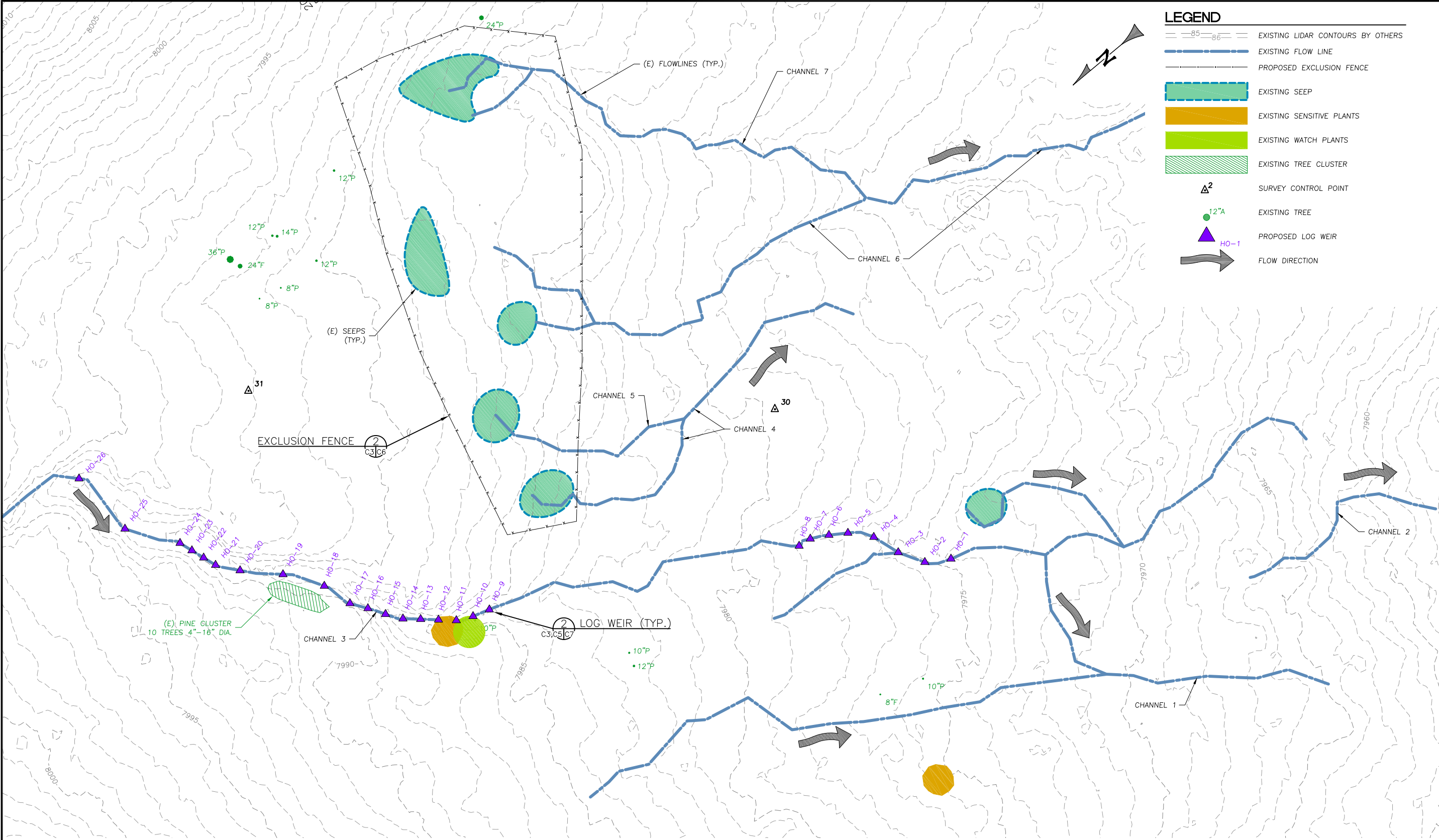
POINT	NORTHING	EASTING	ELEV.	DESC.
30	1974768.80'	7085738.52'	7978.69'	SPIKE
31	1974931.12'	7085884.66'	7991.38'	SPIKE

ACCESS AND STAGING AREA NOTES

1. USE ONLY THE APPROVED ACCESS ROUTES, AS SHOWN ON THE DRAWINGS.
2. SUBMIT A SITE ACCESS PLAN FOR APPROVAL BY THE ENGINEER, PRIOR TO MOBILIZATION. SEE SPECIFICATIONS.
3. THE ACCESS PLAN SHOWN ON THE DRAWINGS IS SCHEMATIC. ACCESS ROUTES THROUGH THE FOREST REQUIRE TREE FELLING, STUMP REMOVAL, AND ASSOCIATED LIGHT GRADING. ACCESS WITHIN THE MEADOW SHALL MINIMIZE IMPACTS TO MEADOW VEGETATION; CONTRACTOR SHALL UTILIZE RUBBER TRACKED/TIRED LOW GROUND PRESSURE EQUIPMENT.
4. SALVAGE TREES FELLED DUE TO CONSTRUCTION AND ACCESS, AS APPROPRIATE.
5. ACCESS ROUTES REQUIRE CHANNEL CROSSINGS. CONTRACTOR SHALL MINIMIZE CHANNEL IMPACTS BY USE OF TEMPORARY BRIDGE SUCH AS MARSH MAT.
6. STAGE MATERIALS WITHIN THE EXISTING PRIMITIVE CAMPGROUND. CONTAIN THE DOWNSLOPE PERIMETER OF STAGING OR STOCKPILE AREAS WITH SILT FENCE
7. STORE, MAINTAIN AND REFUEL ALL EQUIPMENT AND MATERIALS IN A DESIGNATED PORTION OF THE STAGING AREA.
8. RESTORE ACCESS ROUTES PRIOR TO FINAL DEMOBILIZATION. FOREST ACCESS ROUTES REQUIRE RIPPING, SEEDING, AND COARSE WOODY COVER (E.G., LOGS AND SLASH). MEADOW ACCESS ROUTES SHALL BE RESTORED TO PRE-PROJECT CONDITIONS. SEE SPECIFICATIONS.

LEGEND

- EXISTING LIDAR CONTOURS BY OTHERS
- EXISTING FLOW LINE
- EXISTING FOREST SERVICE ROAD
- CONSTRUCTION ACCESS ROUTE
- FIBER ROLL
- CONSTRUCTION STAGING AREA
- EXISTING SEEP
- EXISTING SENSITIVE PLANTS
- EXISTING WATCH PLANTS
- EXISTING TREE CLUSTER
- SURVEY CONTROL POINT
- EXISTING TREE
- FLOW DIRECTION



LEGEND

	EXISTING LIDAR CONTOURS BY OTHERS
	EXISTING FLOW LINE
	PROPOSED EXCLUSION FENCE
	EXISTING SEEP
	EXISTING SENSITIVE PLANTS
	EXISTING WATCH PLANTS
	EXISTING TREE CLUSTER
	SURVEY CONTROL POINT
	EXISTING TREE
	PROPOSED LOG WEIR
	FLOW DIRECTION

HIGH ONION IMPROVEMENT PLAN
SCALE: 1" = 20'

30% DRAFT
NOT FOR CONSTRUCTION

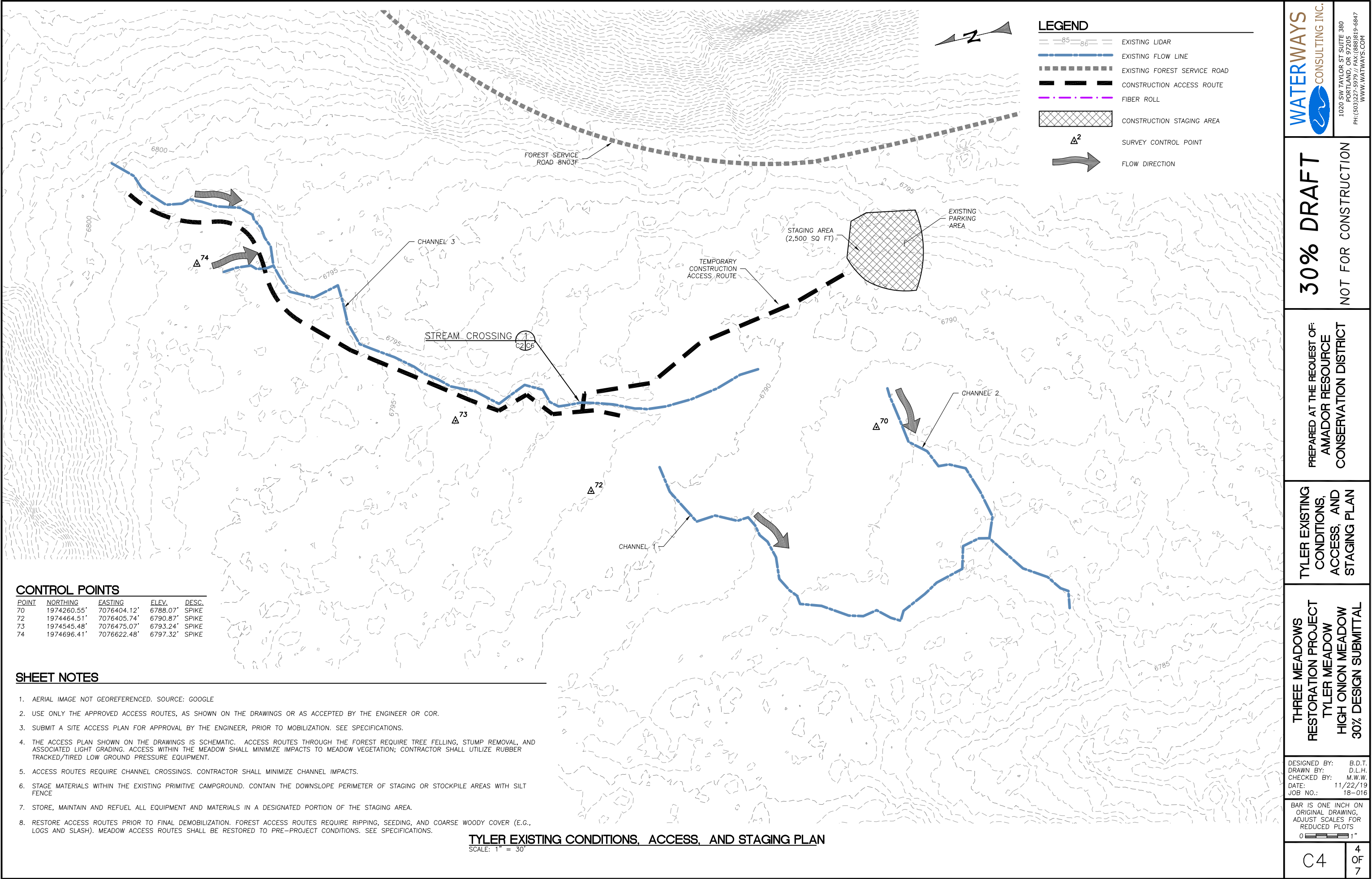
PREPARED AT THE REQUEST OF:
**AMADOR RESOURCE
CONSERVATION DISTRICT**

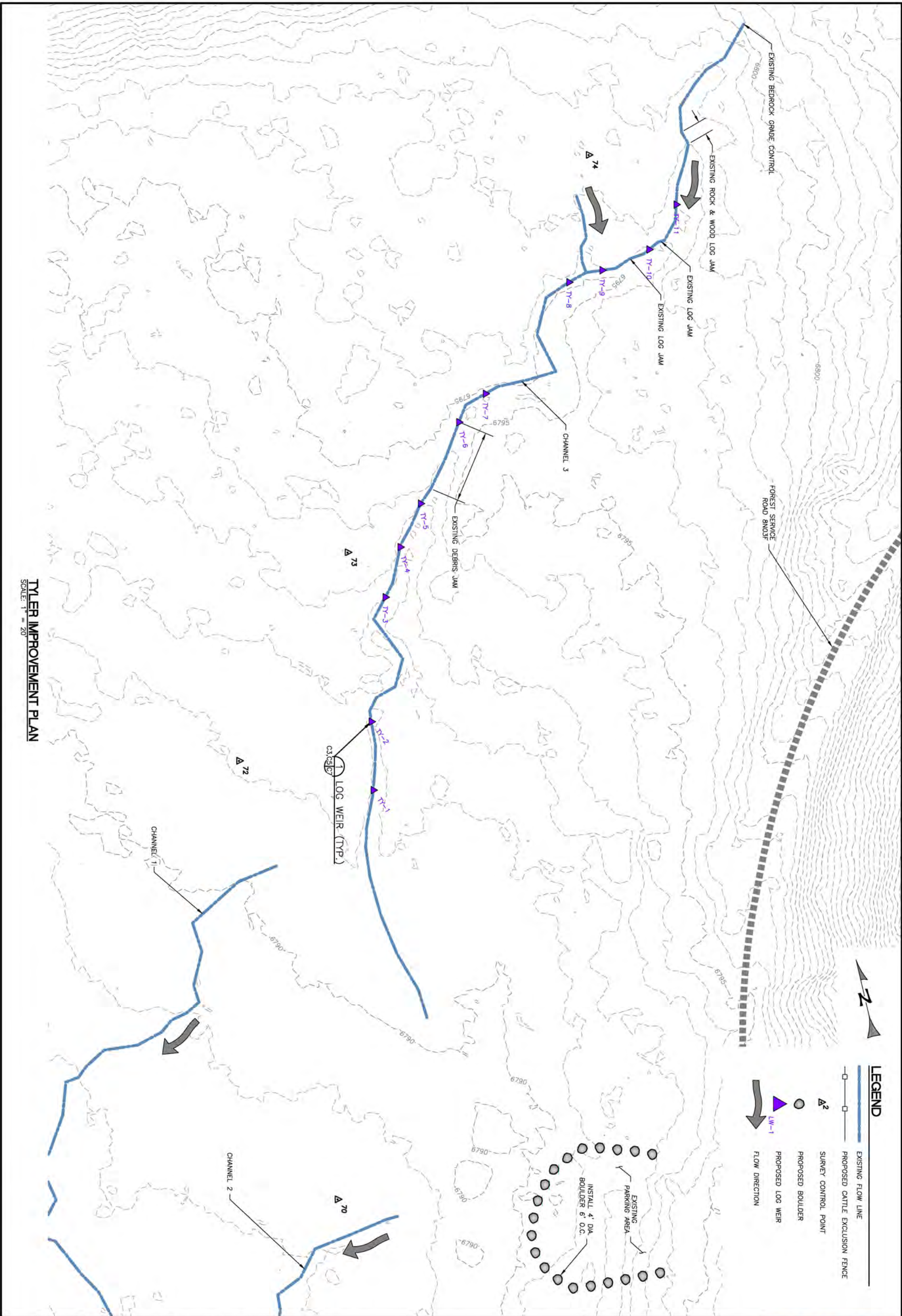
**HIGH ONION
IMPROVEMENT
PLAN**

**THREE MEADOWS
RESTORATION PROJECT
TYLER MEADOW
HIGH ONION MEADOW
30% DESIGN SUBMITTAL**

DESIGNED BY: B.D.T.
DRAWN BY: D.L.H.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

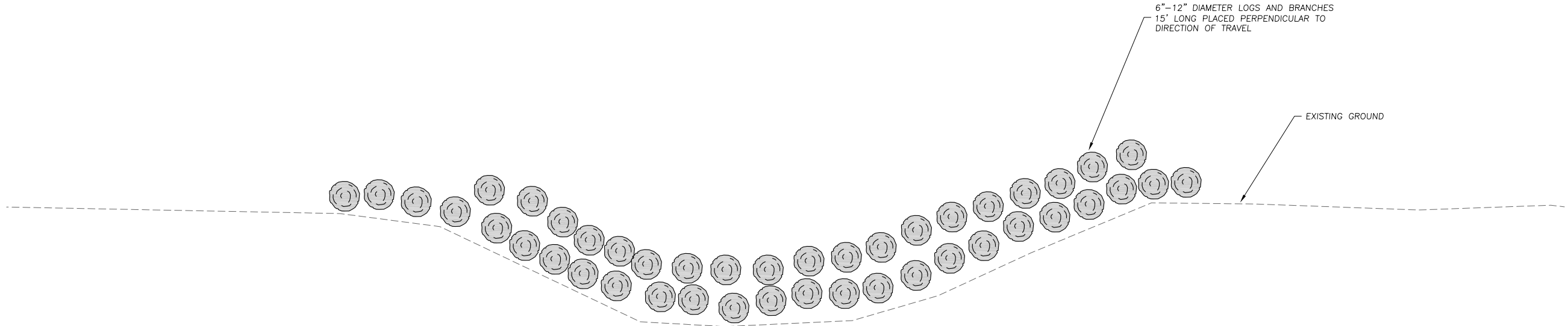
BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS





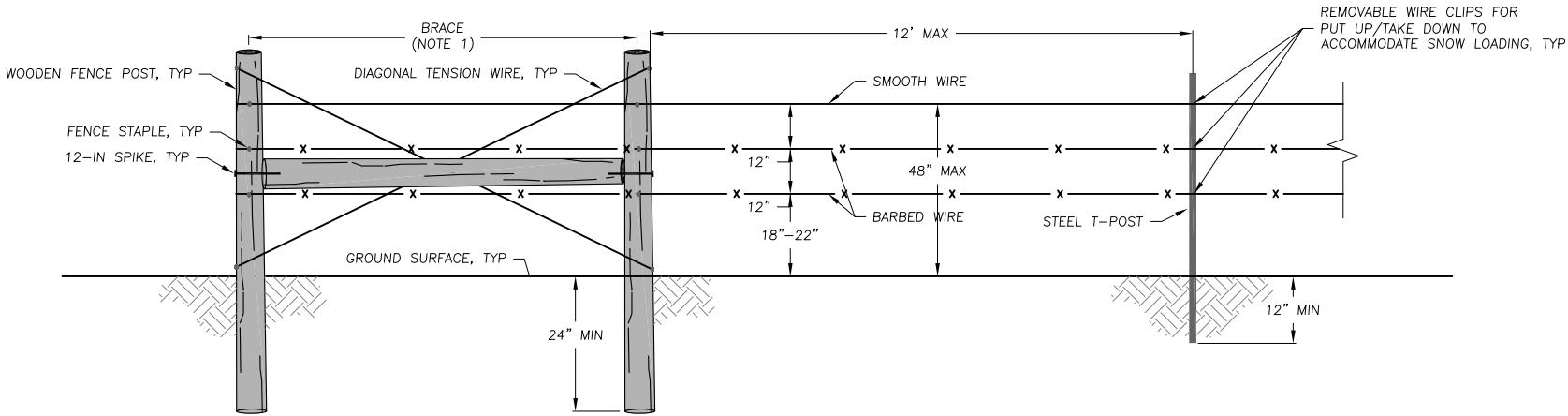
TYLER IMPROVEMENT PLAN

SCALE: 1" = 20'



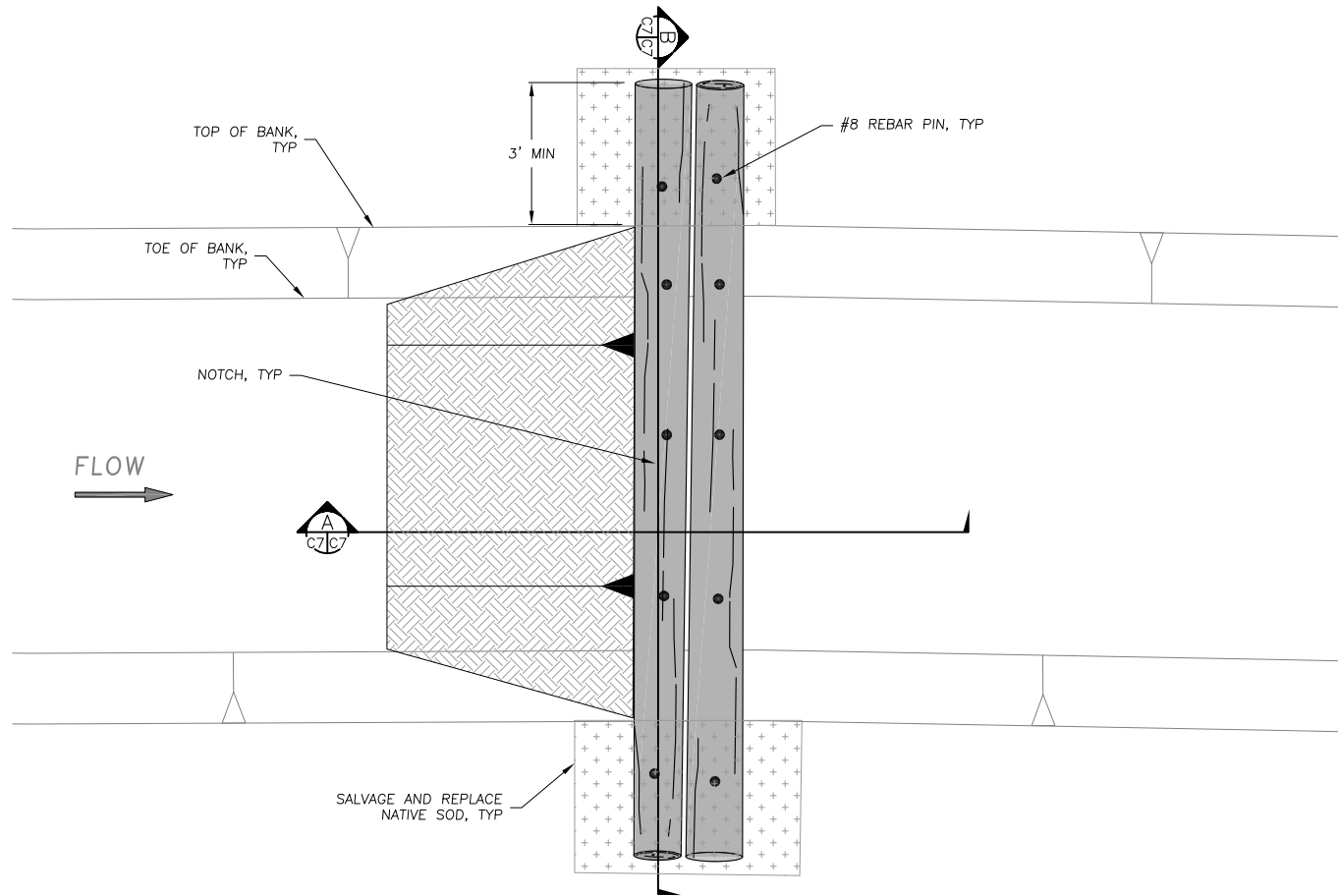
STREAM CROSSING
SCALE: 1" = 2'

- STREAM CROSSING NOTES**
1. PLACE LOGS AND LARGE BRANCHES IN CHANNEL TO PROTECT CHANNEL DURING CROSSING OF EQUIPMENT
 2. REPLACE LOGS AND BRANCHES AS NEEDED TO PROVIDE CONTINUOUS PROTECTION TO THE CHANNEL

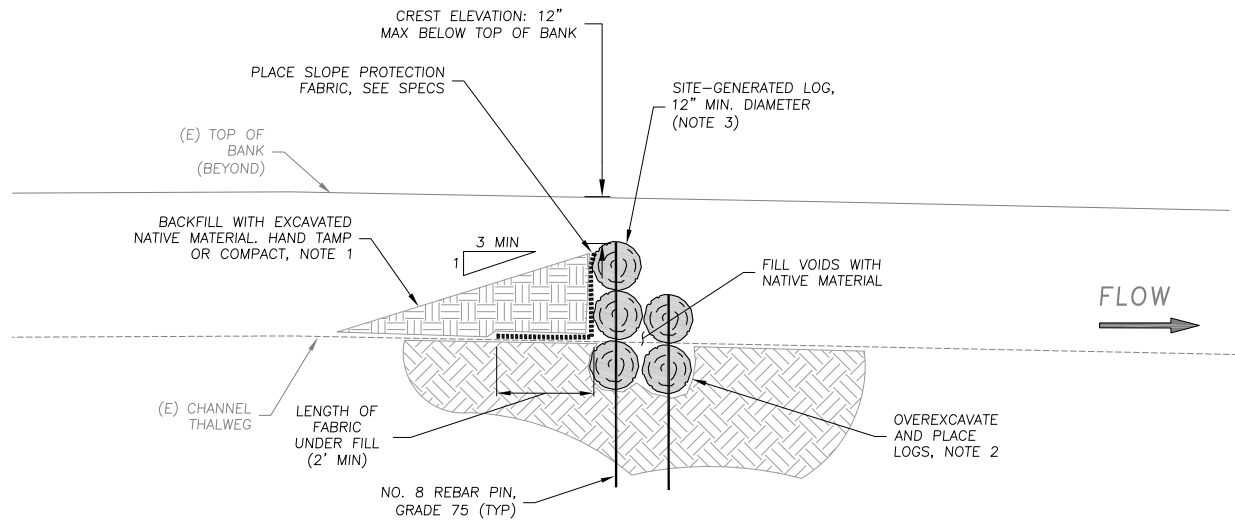


EXCLUSION FENCE
SCALE: 1" = 2'

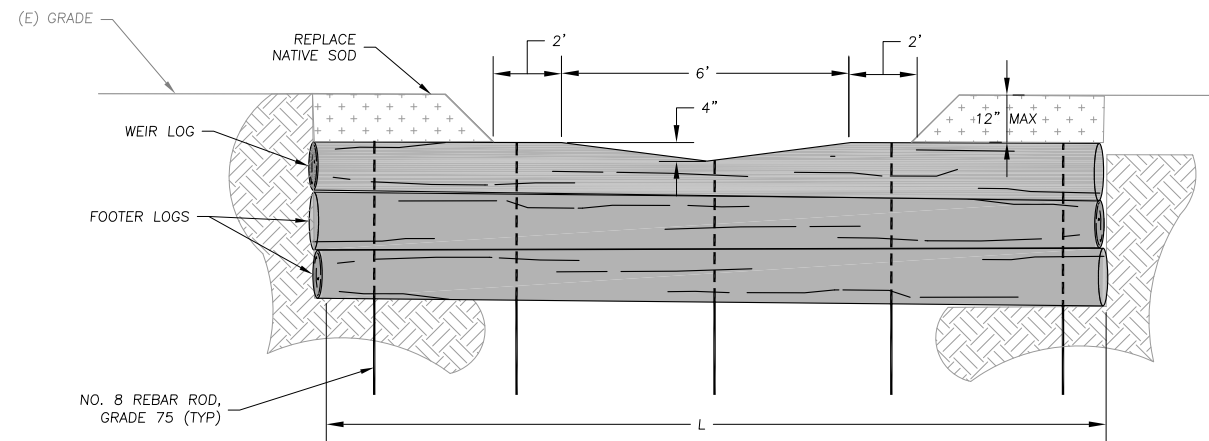
- EXCLUSION FENCE NOTES**
1. BRACES AT FENCELINE ENDS SHALL CONSIST OF TWO POSTS. BRACES AT CORNERS, BENDS, AND CHANGES IN TERRAIN SHALL CONSIST OF THREE POSTS. THIRD POST OF BRACE NOT SHOWN. POSITION THIRD POST TO RESIST FORCES IN FENCELINE.
 2. CONTRACTOR MAY PROPOSE ALTERNATE BRACE CONFIGURATION. ACCEPTANCE OF ALTERNATE BRACE TO BE APPROVED BY USFS.



PLAN
SCALE: 1" = 2'



LOG WEIR - TYPICAL PROFILE
1" = 2'



LOG WEIR - TYPICAL SECTION
1" = 2'

LOG WEIR NOTES

1. LIMITED WATER AVAILABLE AT SITE; CONTRACTOR SHALL ANTICIPATE THAT JETTING OF FINES MAY NOT BE POSSIBLE.
2. IF GROUNDWATER IS PRESENT, CONTRACTOR SHALL DEWATER AS NECESSARY TO INSTALL STRUCTURE. WATER FROM DEWATERING ACTIVITIES MAY BE USED FOR JETTING FINES.
3. NUMBER OF LOGS REQUIRED PER STRUCTURE VARIES. (TO BE DETERMINED). AT A MINIMUM EACH STRUCTURE SHALL HAVE A WEIR LOG AND TWO FOOTER LOGS. ADDITIONAL FOOTER LOGS MAY BE REQUIRED TO ACHIEVE TOP OF BANK TO CREST ELEVATION.
4. LOGS SHALL CONSIST OF SITE-GENERATED CONIFERS OR APPROVED EQUIVALENT. QUANTITY OF LOGS REQUIRED: 64
5. LOG LOCATIONS SHOWN ON DRAWINGS ARE APPROXIMATE. EXACT LOCATIONS SHALL BE AS DIRECTED BY THE ENGINEER.
6. LOG/LOG CONNECTIONS AND PINNING SHALL CONSIST OF #8 GRADE 75 REBAR DRIVEN INTO 1" DIAMETER HOLES BORED INTO THE LOGS. ALL PINS SHALL BE PLACED TO MINIMIZE VISUAL IMPACT.
7. LOG STRUCTURE DESIGNS ARE SHOWN CONCEPTUALLY DUE TO THE INHERENT VARIABILITY OF MATERIAL PROPERTIES. THE DESIGN REQUIRES THAT THE ENGINEER WILL OBSERVE CONSTRUCTION OF THE LOG STRUCTURES TO ENSURE THE INTENT OF THE DESIGN IS MET. OBSERVATION MUST INCLUDE LOG SELECTION, PLACEMENT, AND BACKFILLING. ANY LOG STRUCTURES CONSTRUCTED WITHOUT THE ENGINEER PRESENT ON-SITE MAY RESULT IN REJECTION OF THE WORK BY THE ENGINEER.

30% DRAFT
NOT FOR CONSTRUCTION

PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

LOG WEIR
DETAIL

THREE MEADOWS
RESTORATION PROJECT
TYLER MEADOW
HIGH ONION MEADOW
30% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.
DRAWN BY: D.L.H.
CHECKED BY: M.W.W.
DATE: 11/22/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS

0 1" 1"

C7

7
OF
7

LOG WEIR - TYPICAL DETAIL
SCALE: 1" = 2'

Appendix B

Biological Evaluation and Biological Assessment for Threatened, Endangered, and
Sensitive Terrestrial Wildlife Species for the Three Meadows Restoration Project
February 5, 2020

**Eldorado National Forest
Amador Ranger District**

**Biological Evaluation and Biological Assessment
for
Threatened, Endangered, and Sensitive
Terrestrial Wildlife Species
for the
Three Meadows Restoration Project**

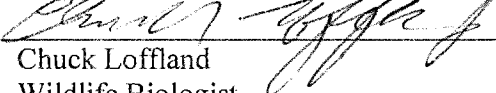
February 5, 2020

**Project Location:
Amador County, California**

T19N, R16E Sections 01, 03, and 11 MDBM.

Prepared By: JoAnne Michael
JoAnne Michael
Senior Environmental Specialist
Resource Concepts, Inc.

Date: 2-12-2020

Reviewed By: 
Chuck Loffland
Wildlife Biologist
Eldorado National Forest

Date: 2-13-2020

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Appendix C	IPaC List

INTRODUCTION

Forest Service Manual (FSM) 2672.42 directs that a biological assessment (BA) be prepared for all proposed projects that may have effects upon U.S. Fish and Wildlife Service (USFWS) listed threatened, endangered, and proposed species. In addition, FSM 2670.32 directs that a biological evaluation (BE) be prepared to determine the effects of proposed projects on Forest Service Region 5 designated sensitive species. The purpose of these documents is to ensure that project decisions do not adversely affect species viability or create significant trends towards federal listing. This document will analyze the potential effects of the proposed project for federally listed threatened, endangered, and proposed terrestrial species, and Region 5 listed sensitive terrestrial species.

Region 5 Designated Terrestrial Sensitive Species

The Regional Forester's Sensitive Species for Region 5 (dated 2013), identifies the following terrestrial sensitive species that may occur on the Eldorado National Forest (ENF):

- bald eagle (*Haliaeetus leucocephalus*),
- California spotted owl (*Strix occidentalis occidentalis*)
- California wolverine (*Gulo gulo luscus*)
- Pacific fisher (*Martes pennant pacifica*)
- fringed myotis (*Myotis thysanodes*)
- great gray owl (*Strix nebulosa*)
- northern goshawk (*Accipiter gentilis*)
- American marten (*Martes americana*)
- pallid bat (*Antrozous pallidus*)
- Townsend's big-eared bat (*Corynorhinus townsendii*)
- western bumble bee (*Bombus occidentalis*)
- willow flycatcher (*Empidonax traillii*)

Federally Listed Endangered (E) and Threatened (T) Terrestrial Species

On January 23, 2020, the USFWS Information for Planning and Consultation website (IPaC) was queried for a list of threatened, endangered, proposed and candidates species and final designated critical habitat under jurisdiction of the USFWS that may occur or be affected by activities within or adjacent to the proposed project boundaries.

The USFWS official species list identified the Pacific fisher (*Martes pennanti pacifica*, Proposed Threatened) as the only federally listed terrestrial species with the possibility to occur in the project area. Upon site visit and literature review of fisher habitat, the project area does not contain suitable habitat and is found at higher elevations than typically occupied by fishers. Fishers are not expected to occur within the project area.

No designated critical habitat for terrestrial species was identified within proximity to the project areas (reference Appendix C).

Federally listed aquatic species are addressed in a separate Aquatic BA (RCI 2019).

Affected Species

Based on lack of correlation between the project area and current literature regarding habitat for the species listed above, several of the Threatened, Endangered, and Sensitive (TES) species would not be affected by the proposed project.

Suitable habitat for the species listed in Table 1 does not occur within the project areas, and/or it is not expected that the project will generate any direct, indirect, or cumulative impacts to the species or its habitats. No further analysis will occur for these species (Appendix B provides further information on the range of these species and their habitat requirements, and references).

Table 1. Species Not Affected by the Proposed Project

Species	Reason for No Effect/Impact Determination
bald eagle California wolverine Pacific fisher willow flycatcher	The project would not affect habitat for these species, either because it does not exist within the areas potentially affected, or it would not be adversely affected if it is within the area of affect.

The following species have potential habitat within or adjacent to the proposed project area and activities and will be analyzed for direct, indirect and cumulative effects in this document:

- California spotted owl
- Great gray owl
- American marten
- pallid bat
- fringed myotis
- Townsend's big-eared bat
- northern goshawk
- western bumblebee

CONSULTATION TO DATE

On January 23, 2020, the website for the Sacramento Field Office of the USFWS was reviewed for a list of threatened, endangered, and proposed species that may occur or be affected by activities within project area. This list indicated that the fisher is the only proposed, endangered, or threatened terrestrial species potentially occurring within the project area.

CURRENT MANAGEMENT DIRECTION

Appendix B describes current management direction that is specific to the individual species addressed in this assessment. General management direction for sensitive species on the ENF can be found in the following documents, available at the ENF Supervisor's Office:

Forest Service Manual and Handbooks (FSM/H 2670)

- As part of the National Environmental Policy Act process, review programs and activities, through a BE, to determine their potential effect on sensitive species.
- Avoid or minimize impacts to species whose viability has been identified as a concern.
- If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.
- Establish management objectives in cooperation with the States when a project on National Forest System lands may have a significant effect on sensitive species population numbers or distribution. Establish objectives for federal candidate species, in cooperation with the USFWS and the States.

National Forest Management Act (NFMA), and implementing regulations (CFR 219.19)

- Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area.

Eldorado National Forest Land and Resource Management Plan (LRMP), as amended in January 2001

- Utilize administrative measures to protect and improve endangered, threatened, rare, and sensitive wildlife species.

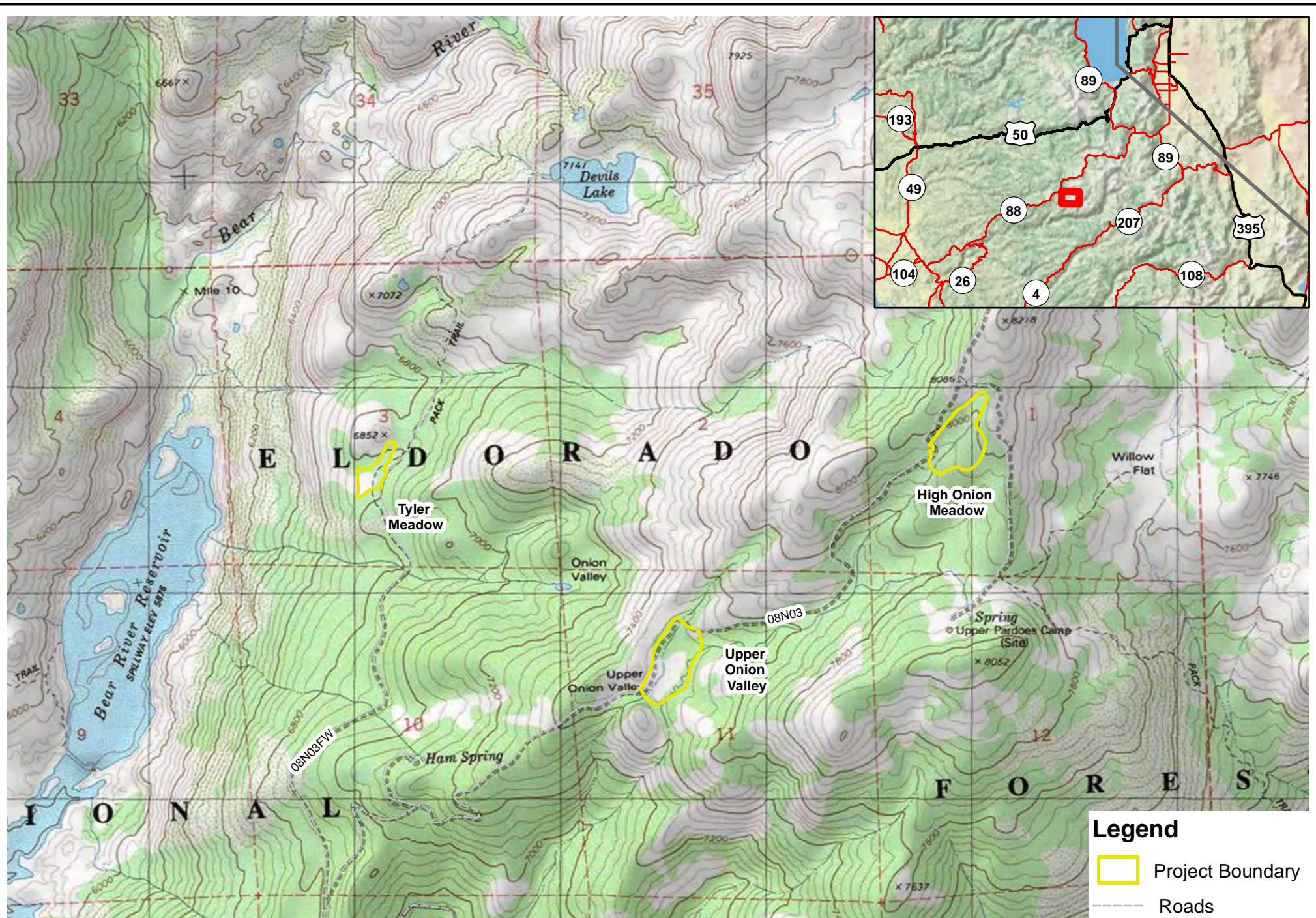
Standards and guidelines from the LRMP and the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) that are pertinent to this project are summarized below.

PROJECT DESCRIPTION

The Amador Ranger District (ARD) on the ENF in Amador County, California in cooperation with the Amador Resource Conservation District (ARCD), and the Amador Calaveras Consensus Group (ACCG), proposes to restore mountain meadow habitat at three small high-elevation meadows: Upper Onion Valley, High Onion Meadow, and Tyler Meadow. This Terrestrial Biological Evaluation/Biological Assessment analyzes actions proposed for restoration of the natural morphology of the three meadows to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna, and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation.

The project area encompasses three relatively small, high elevation meadows in Amador County, California on lands administered by the US Forest Service, ARD on the Eldorado National Forest. The three meadows include Upper Onion Valley, High Onion, and Tyler, which are located approximately 50 miles northeast of Jackson, California, and east of Bear River Reservoir (reference Figure 1).

Meadow Name	Location	Project Area	Elevation
Upper Onion Valley	T8N, R16E, Sec 11	26.8 acres	7,480
High Onion Meadow	T8N, R16E, Sec 1	10.2 acres	8,000
Tyler Meadow	T8N, R16E, Sec 3	10.3 acres	6,800



0 1,000 2,000 Feet
 1 Inch = 2,000 Feet

Figure 1: Location Map
Three Meadows Restoration Project

Legend

- Project Boundary
- Roads

Proposed Action

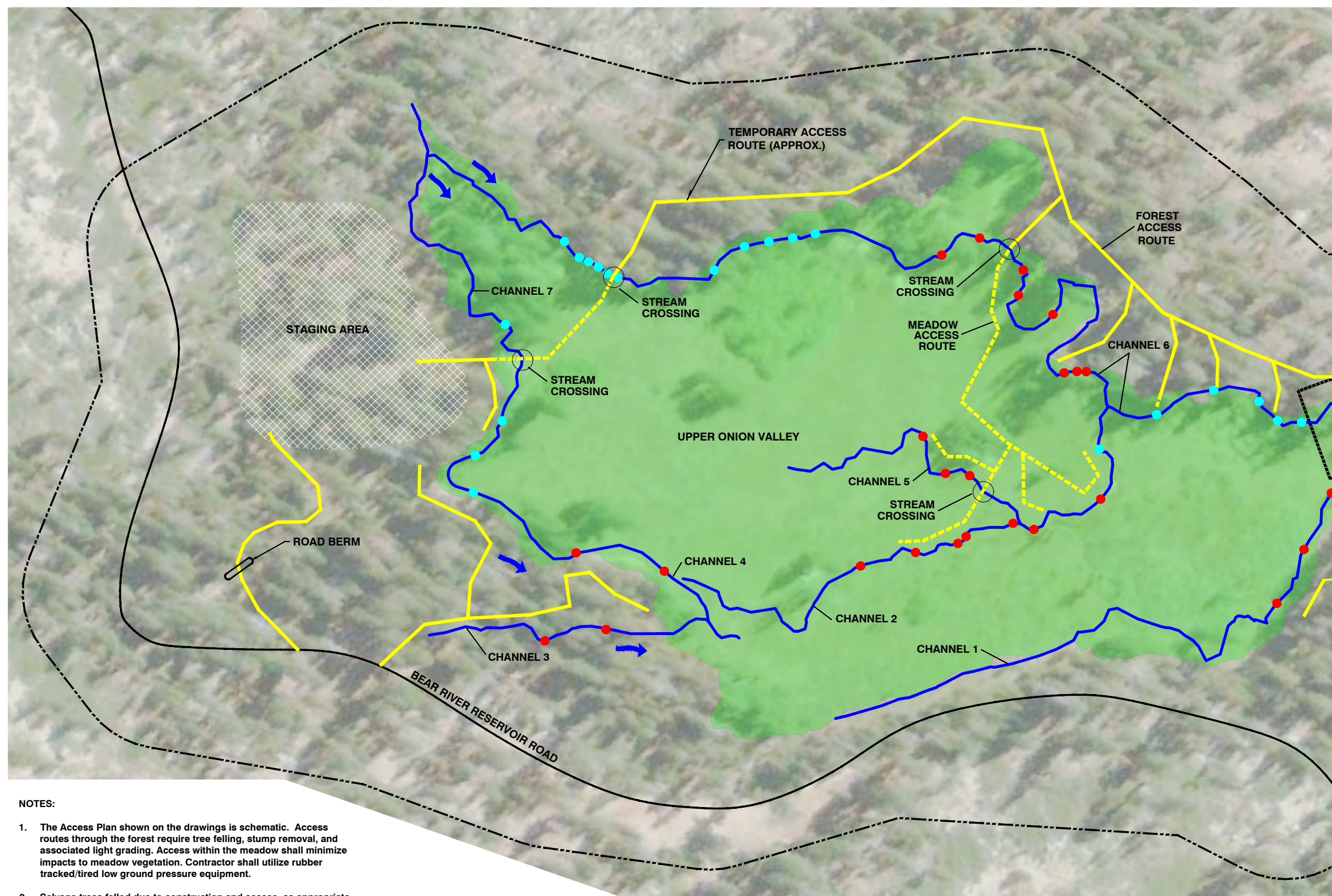
To achieve the above restoration goals, each of the three meadows has its own management action plan to resolve specific resource concerns as described below.

Upper Onion Valley

The proposed restoration actions for Upper Onion Valley include installation of rock riffles and log weirs. The constructed rock riffles and log weirs would be located in existing, incised channels to stabilize the profile grade within the meadow channel, encourage aggradation, restore the hydraulic continuity of flow through the meadow, and raise the groundwater table (reference Figure 2). Rock riffles would be placed in greater than one foot in depth, forming a system of short rock riffle segments interspersed with longer pools. For the constructed riffles a four foot long riffle crest would be established that is keyed into the streambed and banks. Rock ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and at a 1:1 slope at the upstream end. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Approximately twenty-one (21) constructed rock riffles would be placed within Onion Creek, the main channel through the Upper Onion Valley.

Additionally, the project activities at Upper Onion Valley include the installation of twenty-five (25) log weirs as grade control located primarily within lower energy, less incised portions of the channel network. It is estimated that approximately seventy-three (73) logs less than 30" diameter at breast height (dbh) would be needed to construct the weirs and would be harvested from trees within the meadow, along the designated access routes, or near the meadow margins. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

To provide downstream grade control for the meadow, a roughened channel will be constructed at outlet of meadow. The purpose of the structure is to actively raise water surfaces through the channels and meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and bury the upstream grade control structures. The roughened channel will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream of the crest and extend upstream of the crest at a 1:1 slope for approximately 10 feet to protect against undermining of the roughened channel. The roughened channel should be a minimum of three feet thick, composed of rock material of various sizes, and would look like a long sloping riffle when completed. Rock would likely be imported to the site from Forest Service rock staging areas in the district.



NOTES:

1. The Access Plan shown on the drawings is schematic. Access routes through the forest require tree felling, stump removal, and associated light grading. Access within the meadow shall minimize impacts to meadow vegetation. Contractor shall utilize rubber tracked/tired low ground pressure equipment.
2. Salvage trees felled due to construction and access, as appropriate.
3. Access routes require channel crossings. Contractor shall minimize channel impacts by use of temporary bridge such as marsh mats or corduroy stream crossings.
4. Stage materials within the existing primitive campground. Contain the downslope perimeter of staging or stockpile areas with silt fence.
5. Store, maintain and refuel all equipment and materials in a designated portion of the staging area.
6. Restore access routes prior to final demobilization. Forest access routes require ripping, seeding, and coarse wood cover (e.g. logs and slash). Meadow access routes shall be restored to pre-project conditions.
7. Salvage willows at direction of Engineer or USFS representative.

FIGURE 2
THREE MEADOWS RESTORATION PROJECT
UPPER ONION VALLEY
PLAN VIEW

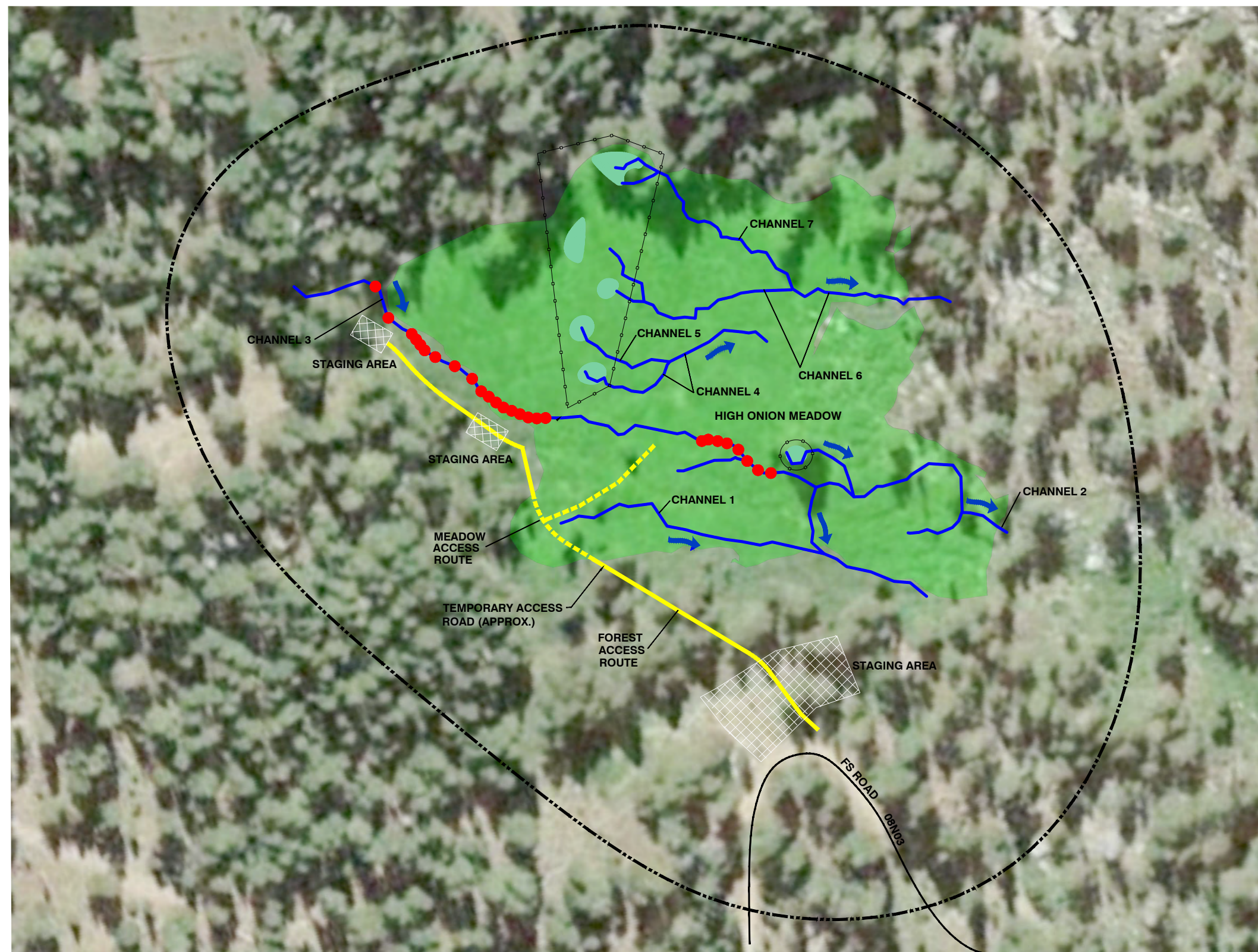
In addition, the proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area at the north end of the meadow (reference Figure 1). Currently flow within the channel is captured and rerouted within the existing roadbed rather than the natural stream channel (reference photo 6 in Appendix A). To restore and contain the flows within the original stream channel, the restoration project would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel. The berms on each side of the stream channel would be built up two feet with a 1.5-inch aggregate base material. The placement of the base material above the stream bank at 5:1 slopes will contain the streamflow in the original channel and prevent the water from flowing within the existing roadbed. The aggregate base material will be located within the roadbed above the stream channel.

The Upper Onion Valley site would be accessed by Bear River Reservoir Road (FS Road 08N03), a well-developed road that runs along the entire western and northern sides of the meadow. Staging of equipment and materials would occur at an existing primitive campground located at the northern (up gradient) edge of the meadow. Temporary access routes originating from the staging area and Bear River Reservoir Road would be utilized to access the interior of the site for placement of log weirs on the smaller, interior channels. Access routes would be field fit to minimize impacts caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road, steel plates, or marsh mats would be used. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions and elevation.

High Onion Meadow

The proposed action for High Onion Meadow includes the installation of low weir grade control structures in the primary meadow channel to limit additional downcutting, manage the timing and duration of grazing, and protect seepage sources from cattle grazing (reference Figure 3). Approximately 26 log grade control weirs spaced at approximately 25-foot intervals are proposed to be installed along the unnamed creek to enhance sedimentation and limit future risk of channel incision. It is anticipated that the structures would be built with hand tools and hand labor given the relatively narrow channel widths.

Approximately 75 conifers not to exceed 12-15 feet in length and with diameters ranging from 8 to 12 inches may be selected for harvest near the meadow margins, along the designated access routes, or in and around the High Onion Meadow. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".



KEY:



NOTES:

1. The sch
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3. Sta
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4. Sto
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5. Res
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6. Sah
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FIGURE 3
THREE MEADOWS RESTORATION PROJECT
HIGH ONION MEADOW
PLAN VIEW

To discourage cattle use around sensitive areas and seepage sources, the project proposes to install fencing around the seeps that would prevent cattle access and usage of these areas. Most of the seeps identified in High Onion occur along the downstream margin of the upper fansurface as perched groundwater intersects the lower fan surface, and the entire geomorphic surface will be fenced off. Fencing would consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.

High Onion Meadow is accessible from Forest Service Road 08N03 and staging of materials and equipment would be located within an existing primitive campground adjacent to the road. Temporary access routes originating from the staging area adjacent to the Forest Service Road would skirt the upper edge of the meadow and cross over Onion Creek. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Within High Onion Meadow access routes are to be constructed along the upper northwestern edge and no stream crossings are required. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

Tyler Meadow

The proposed restoration actions for Tyler Meadow include management of the timing and duration of grazing, limit access by off-highway vehicles (OHVs), and installation of approximately 11 log weir grade control structures to limit additional downcutting (reference Figure 4). The log weir grades would be in the primary channel located in the forested area upstream of the meadow. Approximately thirty (30) conifers less than 30" dbh may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Tyler Meadow project area. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

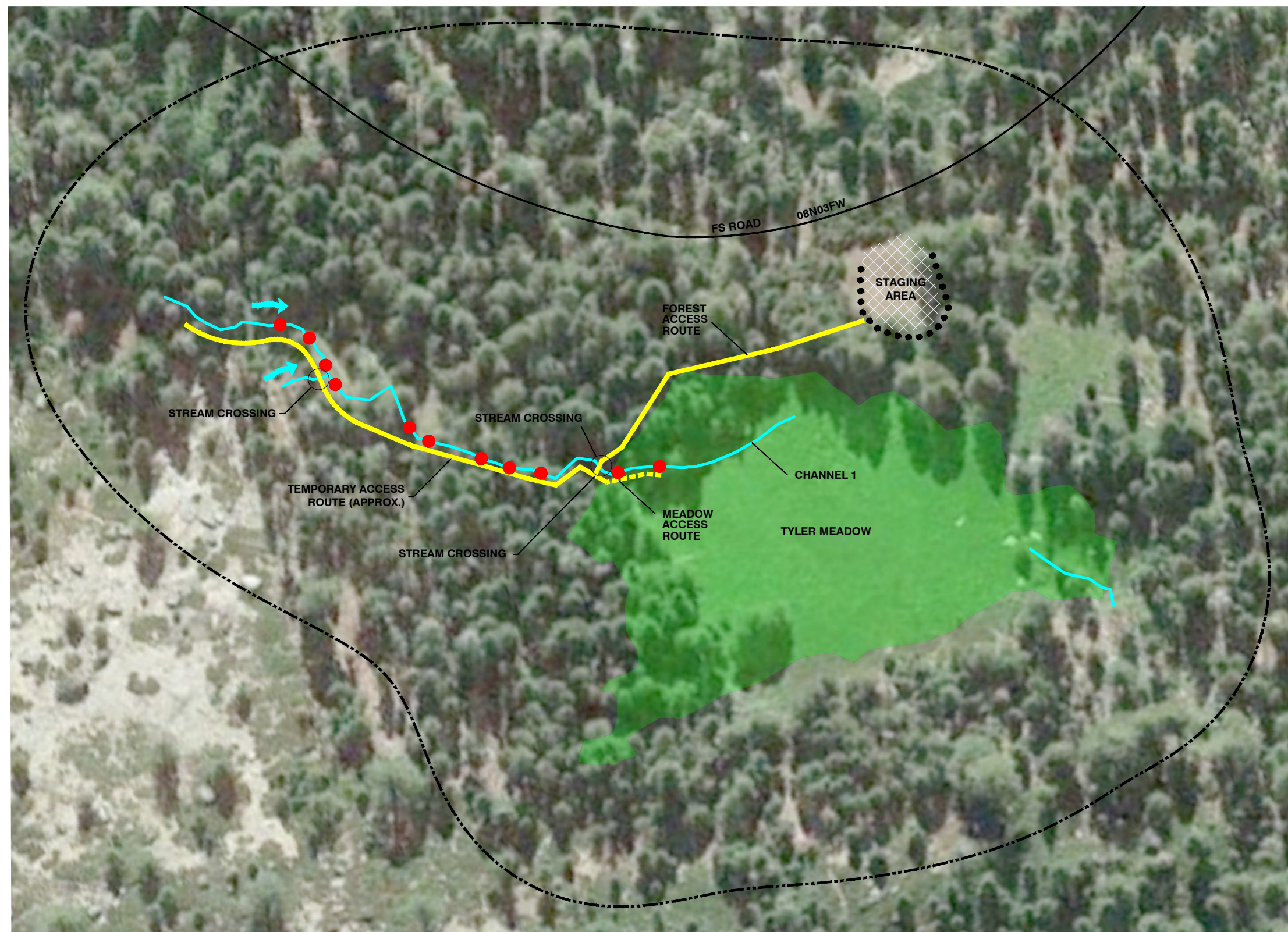
One temporary access route will be constructed through upland forest from the FS Road 08N03FW located along the east side of the meadow to the stream channel. The access route will cross through the intermittent stream channel and will be located along the northwestern edge of the stream within an existing disturbance corridor. The access route would be field fit to minimize impacts soil caused by potential tree felling, removal of stumps, and light grading. One crossing of the intermittent stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks. As the proposed action is limited to the creek channel above Tyler Meadow, there would be no access routes or construction equipment within the meadow.

To limit future access to the Meadow by off-road vehicles, either boulders or logs buried by sediment will be placed around the margin of the parking area (reference Figure 4).

Table 2 summarizes the proposed action items.

Table 2. Action items of the Three Meadows Restoration Project

Action Item Number	Action
1	<p>Construction of log weirs and constructed rock riffles within existing incised channels to raise base level of channel, encourage aggradation, reduce overall channel capacity and raise the groundwater table (Figures 2 through 4)</p> <ul style="list-style-type: none"> • Construction of log weirs: 11 at Tyler Meadow (ephemeral stream), and 25 at Upper Onion Valley (intermittent streams), and 26 at High Onion (intermittent streams). Logs will be felled from suitable trees located along the meadow edge, along temporary access routes or from within the meadows. Trees used for log weirs will be hand felled, bucked, and limbed. Transport from the harvest location to the weir construction will utilize various construction equipment. Log weirs will be installed by hand crews. • Construct 21 rock riffles along Onion Creek and two tributaries within Upper Onion Valley. It is expected that rock for the riffles will be imported from the Tragedy Pit. Construction of rock riffles will be completed using motorized equipment in the meadow.
2	<p>Construct Roughend Channel To control overall base level of Upper Onion Valley meadow (Figure 2)</p> <ul style="list-style-type: none"> • Placement of rock within 90 lf / 720 sq. ft. of perennial streams and 0.01 acre of adjacent wet meadow at the outflow from Upper Onion Valley. Rock will likely be imported from Tragedy Pit for this component. Motorized equipment would be used in order to accomplish this action item.
3	<p>Construct Road Berm on FS Road 08N03 (Figure 2)</p> <ul style="list-style-type: none"> • Placement of 5:1 sloped rock berms to direct stream flow to original channel and into meadow.
4	<p>Installation of exclusionary cattle fencing at High Onion (Figure 3)</p> <ul style="list-style-type: none"> • Fencing will be placed around six (6) hillslope seeps to protect existing hydrology and prevent soil compaction
5	<p>Installation of OHV fencing at Tyler Meadow (Figure 4)</p> <ul style="list-style-type: none"> • Log or rock barriers will be placed long upper meadow edge to prevent OHV access from adjacent roadway.
6	<p>Creation of Temporary Access Routes (Figures 2 through 4)</p> <ul style="list-style-type: none"> • Access to the meadow restoration areas will be via temporary forest access routes (approx. 3,875 lf / 1.3 acres) and meadow access routes (1,170 lf / 0.40 ac) to be restored upon project completion.



KEY:



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FIGURE 4
THREE MEADOWS RESTORATION PROJECT
TYLER MEADOW
PLAN VIEW

Material Sourcing

The primary materials needed for the construction of restoration project are logs for the log weirs and the stream bed material for the constructed riffles and roughened channels. All of the logs are anticipated to be sourced from on site, both adjacent to and within the meadow. The streambed material is expected to be sources from other Forest Service rock staging areas on the district. Rock transported to the site would be delivered to the proposed staging areas and mixed on site to achieve the desired gradation for either the constructed riffles of the roughened channel.

Revegetation

The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30” following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30”.

Post-Project Monitoring

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted.

Design Criteria

The following mitigation measures and coordinating requirements are incorporated into the Proposed Action:

Air Quality

All ground disturbing activities shall be effectively controlled of fugitive dust emissions utilizing good housekeeping methods described by the Amador Air District:

- Application of water and/or approved chemicals to road surfaces.
- Using vegetation and other barriers to contain and to reduce fugitive emissions.
- Maintaining reasonable vehicle speeds while driving on unpaved roads in order to minimize fugitive dust emissions.
- Other precautions not specifically listed in this rule but have been approved in writing by the Amador Pollution Control Officer (APCO) prior to implementation.

Range Resources

- The meadows, or portions of the meadows, may be excluded from grazing use temporarily depending on future coordination between the USFS and the current allotment permittee.

Heritage Resources

- Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.
- This does not fully eliminate the chance of discovering unrecorded sites or subsurface remains within the project boundary. If project ground disturbance should expose a cultural deposit, disturbance activities will be suspended until a qualified archaeologist can examine the area, evaluate the material, and adequate protection measures are incorporated. In the event that human remains are uncovered during project activity, project managers must stop work and contact Eldorado National Forest. If the remains are determined to be of Native American origin, both the Native American Heritage Commission and any identified descendants shall be notified (Health and Safety Code 7050.5, Public Resources Code Section 5097.94 and 5097.98).
- The only access roads to the project areas will be those shown by the plan set to reduce impacts to cultural sites.

Terrestrial Wildlife

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30” diameter at breast height (dbh) and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.

- If the Sierra Nevada yellow-legged frog (SNYLF) are found within the project area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake

into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).

- The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.
- In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.
- Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Hydrology

- Construction activities would occur during the time of year when the flows are at their lowest. This typically occurs between August 1 and October 30.
- Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.
- The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.
- Where streams and meadows cannot be avoided the following would be used to minimize impacts:
 - Corduroy stream crossings consist of laying logs in the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel.
 - Locations of the corduroy stream crossings are shown on Figures 2-4. A cross-sectional detail of the corduroy crossing is shown in the following figures.
 - Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs as necessary, depending on the number of times the crossing is used.
 - Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.
 - Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas.
 - The mats would consist of slash material from the salvaged trees.
 - The slash should be layered to a depth of 1 to 1.5 feet and be a minimum of 15 feet wide to accommodate the construction.
 - Similar to the corduroy stream crossing, the condition of the marsh mats should be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow.

- The mats would be removed from the meadow and placed as slash along the temporary forest access roads.
- Low impact construction equipment would be used as described in the technical specifications will provide limits on the size and type of equipment that can be used in the meadow.
 - Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs.
 - Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with only a single, short traverse across the meadow at the northern end of the project site.

Botanical Resources

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004). Specific design criteria and protection measures for the project include:

- Any new occurrences of sensitive plants identified within the project area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.
- A Forest Service watchlist species, *Botrychium simplex*, occurs within the project area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).
- All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

Soil Resources

- Standard mitigation measures will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.

- The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.
- Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.
- Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.
- The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary. Revegetation will consist of the following measures:
 - During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
 - All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
 - Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

Fire and Fuels Management

- While the project area is located in a meadow and outside of state identified very fire hazard severity zones, portions of the meadow are expected to be dry, with a risk for wildfire associated with the use of any internal combustion engine. A trash pump and/or water truck will be on site to assist with vegetation transplants and dust control, as well as to reduce the risk of wildfire. In addition, equipment would be re-fueled and serviced at the designated staging area, which is outside of the riparian area and meadow. No fuel would be stored on site. In the event of an accidental spill, hazmat materials for quick on-site clean-up would be kept at the project sites during all construction activities, and in each piece of equipment.

EFFECTS OF THE PROPOSED PROJECT

California Spotted Owl, Northern Goshawk, and American Marten

Current Condition-No Action Alternative

The following describes the current condition, also known as the no action alternative. The no action alternative is used as the baseline to measure effects of the action alternatives, and as such is assumed to have no direct, indirect, or cumulative effects associated with it. The California spotted owl, northern

goshawk, and American Marten are Forest Service regionally designated sensitive species. Based on incidental sightings and recent surveys, these species have been detected in close proximity to the project area and the area is believed to be potentially occupied by all three species (reference Figure 5).

Preferred habitat for these species is very similar, and for the purposes of this analysis will be analyzed the same way for both species. Suitable habitat is characterized by dense (50 to 100% canopy), multi storied, multi species late seral coniferous forests with a high number of large (> 24 inch dbh) snags and downed logs. The project area includes this type of habitat along the outer boundaries of the project area.

Proposed Action

Direct Effects and Indirect Effects

Suitable Habitat

The proposed action would have minimal effect on suitable habitat for these species. The proposed action is to treat meadow habitat and restore meadow hydrology. Trees encroaching within the meadow and along the meadow edges will be removed for construction of log weirs and access roads, but overall impact to canopy closure or reduction in nesting trees would be minimal in the areas of suitable habitat surrounding the meadow sites. As habitat would not be altered, only disturbance impacts during implementation are likely to occur and will be analyzed further.

Disturbance Effects

Disturbance impacts are similar for all three species. The project could disturb individuals of these species and may temporarily displace individuals, should they be active near project activities, primarily from equipment use and increased human activity. The project areas are not located within northern goshawk or spotted owl PACs and would only likely temporarily displace foraging individuals. Project design criteria provides the following protection:

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect TES species.
- Trees and snags will be retained when possible except for meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30" dbh and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Should disturbance to these species occur, disturbance is unlikely to affect more than one or two individuals, due the small scale of the project, timing of the project, and the design features in place to reduce likelihood of impacts to reproduction. Should disturbance occur, during foraging or travel activities, the result could be temporary displacement of individuals. Effects on reproduction and population numbers, or species viability would not be expected to occur for California spotted owl, northern goshawk, or marten.

Cumulative Effects

The proposed action would have no impact on suitable habitat for the species, and is expected to have little likelihood of disturbance impacts to individuals of the three species analyzed in this section. The project would have little to no direct or indirect impacts to these species or their habitats, therefore, the project would not contribute to adverse cumulative effects for the California spotted owl, northern goshawk, or marten.

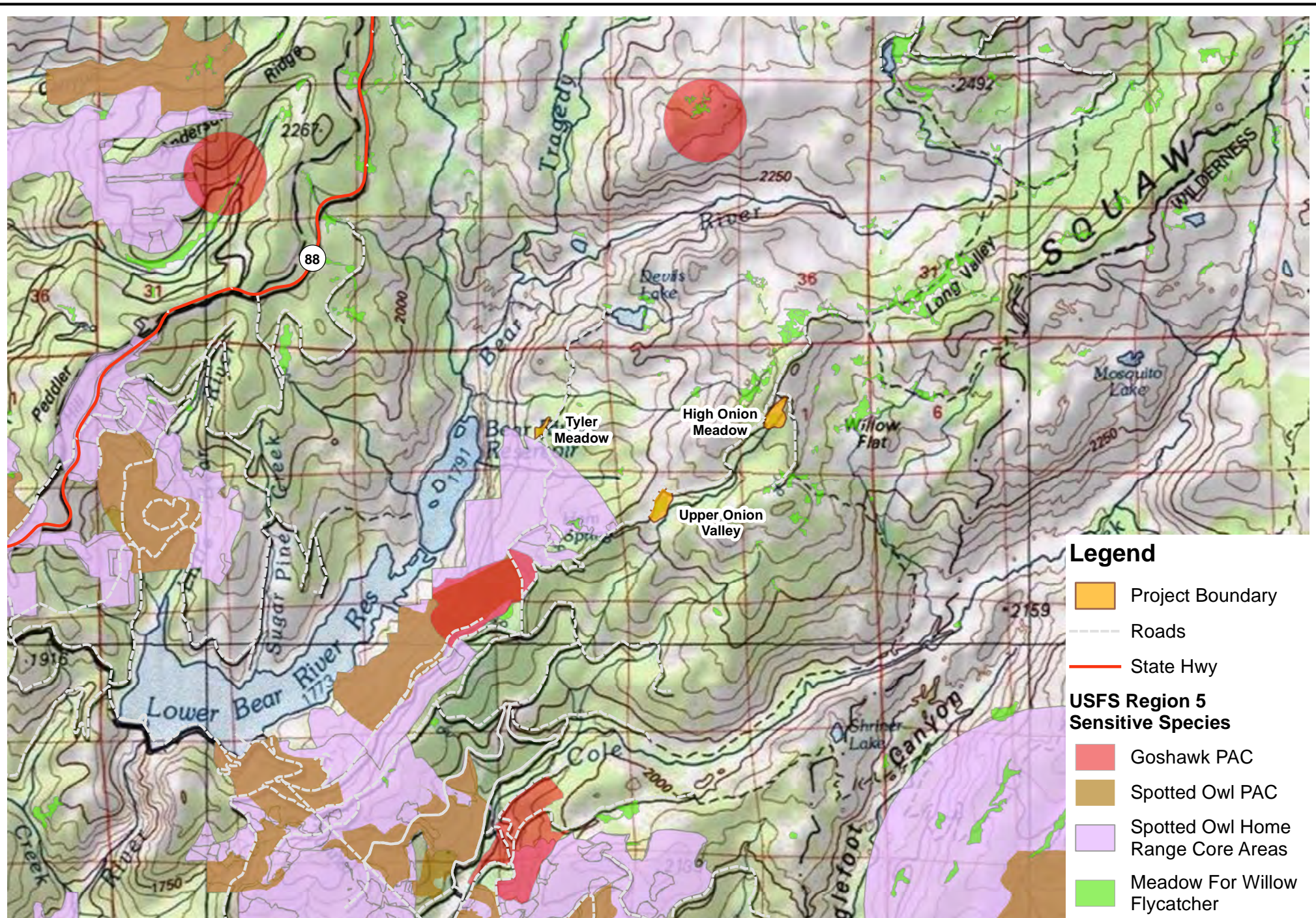


Figure 5: Protected Habitat Areas for Forest Service Terrestrial Sensitive Species

Effects Summary

This alternative would not affect habitat suitability for these species. Project generated disturbance effects are not likely, and should there be any, are expected to affect individuals, and would not be expected to affect reproduction for these species.

Determination

The proposed action may affect individuals, but are not likely to lead to a trend towards federal listing or loss of viability for the California spotted owl, northern goshawk, or marten.

Great Gray Owl

Current Condition-No Action Alternative

The following describes the current condition, also known as the no action alternative. The great gray owl (GGO) is a Forest Service regionally designated sensitive species. Historic sightings are recorded for all counties in the Cascade Range in California and the Sierra Nevada as far south as Tulare Co. The present known population is centered in Yosemite National Park. The current distribution and population of GGO is not well known, in recent years a number of breeding pairs have been found at relatively low elevations, in more of an oak/grass ridgetop and associated drainage systems.

Preferred great gray habitat is characterized mixed conifer habitat, with a combination of meadow and other vegetation opening utilized for foraging. Nests are usually in broken topped medium to large trees or snags which provide a protected platform. Hunting perches are used by the owls, 2-20 feet in height, within 220 feet from open vegetation edge used for hunting.

The habitat surrounding the Three Meadows project area is believed to currently provide the structure necessary for this species to utilize the area. Based on incidental survey responses of GGO within meadows in the area, there is potential for GGO to be present within Three Meadows project area. There is no documentation of reproduction within any of the nearby meadows, and therefore, no protected activity centers have been delineated for GGO.

Proposed Action- Effects

Direct and Indirect Effects

Suitable Habitat

Direct effects are limited to the area that is currently suitable for GGO nesting or foraging. Direct impacts to suitable foraging habitat may occur from the proposed restoration treatments with the stream channel (primarily installation of log weirs and rock riffles), but there is no nesting habitat within the project area. Approximately 12 acres of suitable foraging open meadow habitat would be directly affected by project activities. Revegetation of this area is expected to be rapid. In previous projects on the Tahoe National Forest, treated areas revegetated to similar or higher levels in one runoff season. The effect on GGO prey from this short-term loss of vegetation should be minimal, as there is other meadow vegetation in close proximity to provide prey during this short period. Prey density is expected to increase post project, as the treated stream channel and surrounding vegetation responds to the increased water table and associated changes to vegetation.

Disturbance Effects

Construction activities in Three Meadows project area would occur under no flow or low flow conditions. This typically occurs between August 1 and October 30. This would result in project activities taking

place toward the end, or after the nesting season for GGO. Noise disturbance resulting from the equipment used in the restoration process would take place primarily in foraging habitat (meadow) away from potential nesting locations. This species foraging behavior would unlikely be affected, as much of the foraging for great GGO is nocturnal when project activities would not be taking place. If disturbance did occur, temporary displacement of individuals could occur, but would not be expected to affect reproduction, due to both time of year, and foraging time of day. Presently occupancy of the area is believed to be possible, but is unconfirmed. With this in mind, project timing, and due to the location of project activities outside of nesting habitat, no limited operating period (LOP) is believed to be needed to protect GGO reproduction. Should this species be detected and determined to be reproductive prior to or during implementation of the project, LOP and/or other mitigation would be considered as appropriate at that time.

Cumulative Effects

Analysis of cumulative effects to GGO will consider the impacts of the proposed action when combined with past, present, and foreseeable future actions and events that have affected or may affect the quantity or quality of GGO habitat. The cumulative effects analysis area has been established as the Three Meadows project area, including the meadow and surrounding forested stands. The geographic scope of the cumulative effects analysis was selected considering the area that would likely be utilized if a GGO is present in this area.

The actions contributing to cumulative effects are those past and future actions, which have affected or will affect the quantity or quality of GGO habitat within this analysis area. Within the cumulative effects area past and planned timber harvest, fuels treatments, road construction/use, grazing, and hazard tree removal projects have or will alter the quantity and quality of GGO nesting and foraging habitat, potentially affecting GGO sites within and adjacent to the project area. Past and current grazing, and current and past road use and construction have affected all three meadows and the surrounding area. There have been past logging and thinning projects, as well as current forest thinning projects which have reduced canopy closure, and some nesting structures in the past and foreseeable future. The cumulative effect of these actions has been a lowering of the water table within portions of the meadow, stream down cutting, changes in availability of nest locations, and changes in vegetation.

The proposed action would not be expected to contribute to past reductions/degradation in the amount or quality of suitable GGO habitat. The project is expected to improve habitat quality and quantity of foraging habitat for this species. GGO sites are not currently well distributed across the Amador Ranger District, or the Eldorado National Forest, the extent to whether this is related to population or habitat gaps is not known. The proposed action contributes to beneficial effects to this species' habitat quality and quantity, and would therefore reduce adverse cumulative effects.

Effects Summary

Existing, past and foreseeable future modification of habitat are not expected to reduce the local GGO population. This alternative would have a short term impact on 13 acres or less of existing habitat, and would, post project, improve habitat quality over the project area, approximately 25 acres, by improving the function of the meadow habitat, expected increases in prey species, which would add to the quality of the adjacent nesting habitat. Project generated disturbance effects are not likely, reduced by planned timing of the implementation, late in summer/fall, and design criteria associated with other species, should there be any, are expected to affect individuals, and not affect long-term reproduction.

Determination

The Proposed Action may affect individual GGO but is not likely to result in trend toward Federal listing or loss of species viability.

Pallid Bat

Current Condition-No Action Alternative

Pallid bat is a designated sensitive species for the ENF. Throughout California, the pallid bat is usually found in low to middle elevation habitats below 6,000 feet elevation (ENF 2001); however, the species has been found up to 10,000 feet in the Sierra Nevada (ENF 2001). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a year-long resident in most of their range and hibernate in winter near their summer roost (Zeiner et al. 1990). Day roosts may vary but are commonly found in rock crevices, tree hollows, mines, caves, and a variety of human-made structures. Tree roosting has been documented in large conifer snags, inside basal hollows of redwoods and giant sequoias, and bole cavities in oaks (ENF 2001). Cavities in broken branches of black oak are very important and there is a strong association with black oak for roosting (ENF 2001). Pallid bats are known to feed predominantly on ground-dwelling arthropods, such as scorpions and Jerusalem crickets (USDA 2001b). Foraging occurs over open ground where pallid bats are more often found along edges and open stands, particularly hardwoods (USDA 2001b). There are no known mine or cave sites within the project area that would provide suitable roosting habitat in rock crevices. The project's elevation is above the elevation at which oaks occur, and above 6,000 feet (where this species is usually found). Large conifer trees and snags are present in the project area. There have been no comprehensive surveys for pallid bat on the ENF. What surveys have been done have not detected the species in the project area. Surveys associated with the SNFPA were conducted in 2001 for pallid bats along the Highway 50 corridor north of the project area. There was a capture of a pallid bat during that survey effort (ENF 2002). The Three Meadows project area appears to provide potential foraging habitat, and the surrounding conifer forest may provide some roosting habitat, however, the area does not fit the most common roosting habitat for this species as it is above the elevational range for oaks and is not dry and open, with rocky areas for roosting.

Proposed Action

Direct and Indirect Effects

Pallid bat tends to be both a roosting and foraging generalist. Suitable roost sites include a variety of features, such as large snags, oaks and rock crevices; suitable foraging occurs from grasslands to higher elevation coniferous forests. For this reason, all acres within the project area which are proposed for treatment are considered to be potentially suitable habitat for this species, although not necessarily high capability due to elevation and relatively wet forest/meadow conditions. Foraging habitat could be improved through implementation of the project, as meadow function improves after implementation; the restored meadow should increase insect diversity and quantities, which would make them available to pallid bats to forage on. If there are any short term impacts to foraging habitat, it is expected to be negligible, as the project would take place late in the season, after most insect populations have peaked, and the project would not impact all of the potential foraging habitat in the immediate area, allowing for foraging elsewhere in close proximity to project activities.

Disturbance Effects

Foraging activity and foraging individuals would not be expected to experience disturbance from project activities, due to timing of foraging (night) not coinciding with the project activities (daytime).

Disturbance could occur to day roosting bats where roosting location coincides with project activities.

The amount of potential disturbance and effect on individuals is expected to be low, as the forest surrounding the meadow is not being altered, which is where roosting would be expected, and noise from work in the meadow would only be expected to minimally impact snags/tree roosts, with only 11 trees planned for removal immediately adjacent to the meadow. This would reduce both the number of potential roosts impacted, and the number of bats that could be impacted. Due to the timing, should disturbance occur, it would be after the reproductive period for this species, and reproduction would not be impacted. Temporary displacement would be possible where roosting sites and project activities coincide. Due to the wide variety of roosting habitats used, this alternative would not be expected to have any long-term population effects on this species, as few individuals would likely be affected.

Cumulative Effects

Future actions on National Forest lands are likely to be favorable to the species. Snags and oaks are retained where they exist under current Forest Plan direction, except where they pose a hazard, such as: recreational sites, administrative sites, and along roadways. Cumulative effects to the pallid bat from activities on National Forest lands should therefore be quite limited. Due to the location of project (above common elevational range for the species, and the scale of the project (small acreage impacted), effects of the proposed action would not be of sufficient magnitude to greatly change cumulative effects for this species, the project would improve the quality of habitat for this species, but not change the amount of habitat available to this species.

Effects Summary

Foraging habitat within the project area would be maintained and enhanced by restoring Foster Meadow, which should increase prey species diversity and availability. Roosting habitat would not be greatly impacted, as few large trees and snags would be removed. This project may result in some level of disturbance to a very low number of individuals during implementation. No impacts to reproduction would be anticipated from implementing this project, due to timing of implementation and limited potential impacts. The project would not be expected to affect local population or species viability.

Determination

The proposed action may affect individuals, but is not likely to lead to a trend towards federal listing or loss of viability for the pallid bat.

Fringed Myotis

Current Condition-No Action Alternative

Fringed myotis is a Region 5 Forest Service Sensitive species and is designated as a Species of Special Concern by California Department of Fish and Wildlife. The fringed myotis is usually found in low to middle elevation habitats to 6,400 feet elevation in the Sierra Nevada and in a variety of habitats from low desert scrub to high-elevation conifer forest (Philpott 1997). The fringed myotis is a widely distributed species, but it is considered rare.

Day roosts may vary but are commonly found in rock crevices, tree hollows, mines, caves, and a variety of human-made structures. Tree roosting has been documented in large conifer snags. In northern

California it appears that male and female *Myotis thysanodes* use tree snags exclusively for day roosts (Weller and Zabel 2001). In areas where tree roosting is the norm, vegetative structural complexity of habitat around roost sites is likely more important than plant species composition or general topographic features in determining local distribution. The best habitat model for predicting bat presence in an area contained only these variables (the number of snags ≥ 30 cm dbh combined and percent canopy cover), where increasing numbers of snags and decreasing canopy cover increased the probability of bat occurrence (Weller 2000).

Fringed myotis are considered to be foraging generalists, but do seem to be tied to day-roost habitat associated with old forest conditions, especially large diameter snags. Fringed myotis often forage in meadows and along secondary streams, in fairly cluttered habitats (Pierson et al. 2001).

There are no known mine or cave sites within the project area that would provide suitable roosting habitat in rock crevices. Large conifer snags are present in the project area. There have been no comprehensive surveys for fringed myotis on the ENF, but they have been detected on the ENF in the past. The project meadows are above the 6,400 elevation, which may make the project area less suitable for this species, but for this analysis the project area will be analyzed as suitable habitat.

Proposed Action

Direct and Indirect Effects

Suitable Habitat

Fringed myotis tend to be both a roosting and foraging generalist. Suitable roost sites include a variety of features, such as large snags, oaks and rock crevices; suitable foraging occurs from grasslands to higher elevation coniferous forests, and within meadows and along secondary streams. For this reason, all acres within the Three Meadows project areas which are proposed for treatment are potentially suitable habitat for this species, although not necessarily high probability due to elevation.

This project would have a minimal effect on potential roosting sites, large trees and snags in this case. Although trees will be removed at all three meadow sites for construction of log weirs, construction of temporary access roads, and along the meadow edges, the number is minimal relative to the surrounded forest. Additionally, design criteria have been included within the project to minimize impacts to fringed myotis habitat, including:

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect TES species.
- Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30" dbh and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

As has been previously stated, the project is above the elevation that this species is typically found using, further reducing the likelihood that the tree removal would affect roosting availability for this species.

Disturbance Effects

The potential for disturbance to foraging bats would be unlikely from the proposed activities, as project activities would take place during daylight hours, when bat foraging activity is not occurring or is at a minimum (dusk/dawn). Foraging habitat could be improved through implementation of the project, as meadow function improves after implementation; the restored meadow should increase insect diversity and quantities, which would make them available to pallid bats to forage on. If there are any short-term impacts to foraging habitat, it is expected to be negligible, as the project would take place late in the season, after most insect populations have peaked, and the project would not impact all of the potential foraging habitat in the immediate area, allowing for foraging elsewhere in the immediate area.

Disturbance from project activities are not likely to affect reproduction, and there is a low chance of individuals being affected, due to timing of activities in the year and the low likelihood of species being present in any numbers in the project area. Temporary displacement would be possible where roosting sites and project activities coincide. Due to the wide variety of roosting habitats used, this alternative would not be expected to have any long-term population effects on this species, as few individuals would be likely to be affected.

Cumulative Effects

Effects from the proposed action would not be of sufficient magnitude to contribute to adverse cumulative effects for this species, and future actions on National Forest lands are likely to be favorable to the species. Snags are retained in large numbers under current Forest Plan direction, except where they pose a hazard, such as: recreational sites, administrative sites, and along roadways. Cumulative effects to the fringed myotis from activities on National Forest lands should therefore be quite limited. Where this project opens up the understory, speeds development of roost sites, and improves prey availability, it may result in an improvement in fringed myotis habitat and will not contribute to substantial cumulative impacts.

Effects Summary

Foraging habitat within the project area would be enhanced by increasing prey availability. Roosting habitat would be maintained with implementation of this alternative, as large trees and snags, by and large, would be retained. This project may result in some level of disturbance to individuals during implementation but would not be expected to affect local population or species viability, or distribution.

Determination

The proposed action may affect individuals, but is not likely to lead to a trend towards federal listing or loss of viability for the fringed myotis.

Townsend's Big-eared Bat

Current Condition-No Action Alternative

Townsend's big-eared bats are associated with a variety of habitats including desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, agricultural lands, and coastal habitats. This species has foraging associations with edge habitats along streams, which the project includes. For this reason, the entire project area is believed to provide suitable foraging habitat. Key habitats for Townsend's big-eared bats are roosts sites. This species is highly selective in their choice of roost locations, which include old buildings, mines, or caves that remain undisturbed. No roosting structures have been identified within the project area.

Proposed Action

Direct, Indirect and Cumulative Effects

The pallid bat discussion above describes potential affects to Townsend's big-eared bat foraging habitat (as foraging habitat is essentially the same for both species), improved meadow function should translate into better foraging potential for this species. As no roosting habitat is known to occur in the project area, and would not be affected by this project, roosting habitat would not be impacted by the proposed action, and no disturbance impacts to roosting bats would be expected to occur. Potential for disturbance to foraging bats would be unlikely from the proposed activities, as project activities would take place during daylight hours, when bat foraging activity is not occurring or is at a minimum (dusk/dawn).

The project would not contribute to adverse cumulative effects and would not be expected to impact populations or distribution of this species.

Effects Summary

Foraging habitat within the project area would be enhanced by the proposed action. Roosting habitat would not be affected, and no disturbance to roosting bats would result from implementation. This project is very unlikely to result in any disturbance to foraging Townsend's big-eared bats, and would not affect roosting bats or reproduction.

Determination

The proposed action may affect individuals, but is not likely to lead to a trend towards federal listing or loss of viability for the Townsend's big-eared bats.

Western Bumble Bee

Current Condition-No Action Alternative

Surveys for the species in the project area have not occurred. The species has not been detected at the project area and if the species is present it is likely that population densities are low. Western bumble bees are associated with a variety of habitats; they forage on flowering plants and use rodent boroughs for nesting and overwintering. Early seral habitat with flowering plants may provide habitat for both nest/overwintering and foraging, with later seral, high canopy closure habitat expected to provide some boroughs for nesting/wintering, but little foraging opportunities. Western bumble bee numbers peak in July and into August, and foraging individuals are largely absent by the end of September. The Three Meadow project area provides a high-quality foraging habitat, and the dryer areas and surrounding conifer stands provide nesting and overwintering habitat for the queens.

Proposed Action

Direct and Indirect Effects

Suitable habitat

Within the project area, the meadow habitat provides high quality foraging habitat, and the edge of the meadow and surrounding conifer stands provide nesting and overwintering habitat for this species. With the exception of Tyler Meadow, both High Onion and Upper Onion Valley meadows are too wet to provide good nesting/overwintering habitat, as even the areas that dry out late in the year are flooded early season, as the snow melt soaks into the soil early in the bees lifecycle, and rewet in the fall with first rains and snows, which would deter overwintering even the dryer portions of the meadow.

Nesting/overwintering would be expected to occur in the dryer soils at the edge of the meadow and into

the surrounding conifer stands. For these reasons the proposed project would not be expected to affect nesting and overwintering habitat, to any large extent.

Foraging habitat quality and availability would be impacted by the project activities. In the short term, the season of construction/implementation, there would be a removal of some flowering plants, used for foraging. These impacts are not expected to affect a large number of western bumble bee, as they have not been detected on site, and if present are likely in low numbers. Should the species be present, the timing of the project in late July into October is after the population peaks, most of the flowering has occurred, and only queens would be expected to be in the meadow in any number at that time. For these reasons, during the summer/fall of implementation, only a few individuals would potentially be impacted, and may be displaced to forage outside the area of treatment. Sufficient habitat outside of the area impacted should be available as 10-15 acres of the meadow would not be altered during the season of treatment.

Longer term effects to suitable habitat, the year following treatments and forward from that time, the foraging habitat quality and quantity should both increase for this species. The improved function of the meadow, wetting of areas of the meadow that presently dry out mid to late summer, would increase the vigor and amount of flower plants that the bees forage on. This may also prolong the availability of high-quality foraging habitat as presently dry areas retain moisture and plant vigor later in the year.

Disturbance

In the absence of positive survey results, the area is assumed to be occupied by western bumble bees, but the numbers of bees, if present, is believed to be low, and therefore the number of individuals that would be likely to experience disturbance is also low. Disturbance to this species could occur the year of implementation, during foraging activity where project activities coincide with bee use. As discussed previously the likelihood of disturbance and the number of individuals that might be disturbed is expected to be low, as the time of year, August-October, is after the peak abundance, when most foraging individuals are queens, and few workers and males remain. Were disturbance to occur, the most likely result would be temporary displacement of a limited number of individual bees.

Nest/wintering borough sites are not expected to be impacted, as most of the project activities would take place within areas that are too wet during winter and spring to be used for nesting/wintering by this species. As the nesting and wintering burrows are not expected to be impacted, disturbance would be expected to impact few if any foraging queens, primarily due to timing of the project coinciding with low foraging habitat quality, and taking place after peak abundance for this species, reproduction for the following year is not expected to be greatly altered, as the potential disturbance would not be expected to reduce the number of overwintering queens.

Cumulative Effects

Past activities have had similar effects to bumble bee habitat as described previously. The reduced habitat quality in all three meadow sites from past management and natural causes, have reduced both the quality and quantity of the habitat for this species. The proposed action would reverse and reduce some of these adverse impacts, increasing both quality and quantity of habitat.

Effects Summary

Western bumble bee, if present in the project area, are believed to be in low numbers. Existing past and foreseeable future modifications of habitat are not expected to reduce the local western bumble bee population. The short term, likely single season impacts to foraging habitat quality and availability, and temporary displacement to individual bees from disturbance, would not be expected to affect

reproduction, or local populations of this species. Longer term, in seasons following implementation, the project would increase both habitat quality and quantity for this species, and may prolong the availability of the habitat as the meadow condition improves.

Determination

The proposed action may affect individuals, but is not likely to lead to a trend towards federal listing or loss of viability for the western bumble bee.

SUMMARY OF DETERMINATIONS

The proposed action will have no effect/impact on the following species:

- bald eagle
- California wolverine
- fisher
- willow flycatcher

The proposed action may affect/impact individuals but is not likely to result in a trend toward federal listing or loss of viability for the following species:

- California spotted owl
- American marten
- northern goshawk
- great grey owl
- pallid bat
- fringed myotis
- Townsend's big-eared bat
- western bumble bee

RECOMMENDATIONS

Should any TES species be located prior to, or during implementation, the Amador District Biologist should be notified, and appropriate action taken to minimize effects of project activities on TES species.

APPENDIX A

Three Meadows Photographs

Appendix A – Site Photographs



Photo 1. **Upper Onion Valley:** View to the south of Onion Creek flowing into meadow area at northeast corner of site. July 2019.



Photo 2. **Upper Onion Valley:** View to the south of unnamed creek near eastern edge of meadow. July 2019.

Appendix A – Site Photographs



Photo 3. **Upper Onion Valley:** Overview of meadow. View to the north. July 2019.



Photo 4. **Upper Onion Valley:** Overview north of meadow taken from southern outlet.

Appendix A – Site Photographs



Photo 5. **Upper Onion Valley:** View to the south of Onion Creek at outflow of meadow. Area will be modified through construction of the roughened channel for grade control.



Photo 6. **Upper Onion Valley.** Stream flow currently captured within road. Road berms will be constructed adjacent to stream channel to direct flows into original channel.

Appendix A – Site Photographs



Photo 7. **High Onion Meadow:** Overview of wet meadow along eastern edge.



Photo 8. **High Onion Meadow:** Overview of small drainage discharging from seep. View to the north.

Appendix A – Site Photographs



Photo 9. **Tyler Meadow.** View to the north of creek bed above meadow.



Photo 10. **Tyler Meadow:** Overview to the south of meadow from upper (northern) end.

Appendix A – Site Photographs



Photo 11. **Tyler Meadow:** Outflow of stream from meadow. View to the south.

APPENDIX B

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APPENDIX B

Amador Resource Conservation District Terrestrial Species Accounts

BALD EAGLE

Management Status and Direction

The bald eagle was listed by the U.S. Fish and Wildlife Service (FWS) as a federally endangered species in 1978. On July 12, 1995, this species was reclassified to Threatened status in the lower 48 states. It was proposed for de-listing on July 6, 1999. Following de-listing, the species will be placed on the Region 5 Regional Forester's Sensitive Species List (USDA Forest Service 1999). The species' status as "Sensitive" in Region 5 will be re-evaluated at the end of the five-year monitoring period that is identified in the U.S. Fish and Wildlife Service's Final Rule for de-listing the species, as published in the Federal Register; or if there is a change in the species' status under the ESA during this period (for example, if the FWS initiated re-listing due to information gathered from monitoring).

Bald eagles will continue to be protected under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act.

A Pacific Bald Eagle Recovery Plan has been prepared for the Pacific States (U.S. Fish and Wildlife Service 1986), but critical habitat is not currently mapped or proposed for the bald eagle in the Sierra Nevada. The Eldorado National Forest LRMP that nesting and wintering habitats be managed for meeting target populations of threatened or endangered species as specified in the species recovery plan. A Bald Eagle Habitat Management Plan has been prepared for the Eldorado National Forest, identifying nesting and wintering habitats and actions needed to implement the Pacific Bald Eagle Recovery Plan within these habitats (Eldorado National Forest, 1999). The Plan has been submitted but has not yet received review or concurrence from the FWS.

Population Status

Range-wide Distribution: Bald eagles breed from central Alaska and Canada south to the Great Lakes and Maine, and along the Pacific coast from the Aleutians locally to Baja California, interiorly along the Rocky Mountains south regularly to Wyoming and locally to central Arizona and southern Sonora. Bald eagles are also resident along the Gulf coast from Texas east to Florida and North along the Atlantic coast to New Jersey.

Context of the Eldorado National Forest in the Species' Range: Bald eagles breeding sites are distributed across all National Forests in the Sierra Nevada. California's breeding population of bald eagles is resident yearlong in areas where the climate is relatively mild (Jurek 1988). Between mid-October and

December, migratory individuals from areas north and northeast of the State arrive in California as well (Ibid). Wintering populations remain in the State through March or early April (Ibid).

Population Trend: Within the continental United States, bald eagle populations are increasing, as evidenced by the FWS decision to down-list the species from Endangered to Threatened status in 1995. On the ENF, both wintering and summer nesting surveys have occurred annually since the early 1980s (Eldorado National Forest 1999). The number of nesting bald eagles has also increased on the Eldorado National Forest over the past couple of decades from a single nesting pair in the mid- 1980's to two nesting pairs documented on National Forest and an additional two pairs on private lands within the National Forest boundary in 2004.

Existing Surveys and Sightings on the Eldorado National Forest: Wintering bald eagles use all major reservoirs on the Forest that remain unfrozen, with the number of individuals fluctuating slightly from year to year. Wintering bald eagle surveys occur annually on the Eldorado National Forest and typically detect a small number of eagles at the following Reservoirs: Sly Park, Slab Creek, Union Valley, Ice House, Stumpy Meadows, Hell Hole, and Lower Bear River, Reservoirs. Suitable nesting habitat has been mapped along Bear River Reservoir, Salt Springs Reservoir, Hell Hole Reservoir, Ice House Reservoir, Sly Park Reservoir, Stumpy Meadows Reservoir, Loon Lake, and Union Valley Reservoir, but nest sites are known only at the latter four sites. Although nesting habitat is also mapped at Silver Lake and Caples Lake, it is likely that the late spring thaw dates at these reservoirs limits opportunities for nesting at these sites. Known bald eagle nest sites are monitored annually on the Forest.

Life History and Habitat Requirements

Breeding Habitat: Nesting territories are normally associated with lakes, reservoirs, rivers or large streams (Lehman 1979). Bald eagle nests are usually located in uneven-aged (multi-storied) stands with old growth components (Anthony et al. 1982). Most nests in California are located in predominantly coniferous stands. Factors such as relative tree height, diameter, species, and position on the surrounding topography, distance from water, and distance from disturbance also appear to influence nest site selection (Grubb 1976, Lehman et al. 1980, Anthony and Isaacs 1981).

Trees selected for nesting are characteristically one of the largest in the stand or at least codominant with the overstory. Nest trees usually provide an unobstructed view of the associated water body and are often prominently located on the topography. Live, mature trees with deformed tops are occasionally selected for nesting. Of the nest trees identified in California, about 71 percent were ponderosa pine, 16 percent were sugar pine, and 5 percent were incense cedar. The remaining 8 percent were distributed among five other coniferous species. Nest tree characteristics in California have been defined by Lehman (1980) as being 41 to 46 inches in diameter at breast height and in excess of 100 feet tall. Snags, trees with exposed lateral limbs, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest. Such trees also provide vantage points from which territories can be guarded and defended.

In California, 73 percent of the nest sites were within one-half mile of a body of water, and 89 percent within 1 mile. No nests were known to be over 2 miles from water. Bald eagles often construct several nests within a territory and alternate between them from year to year. Up to five alternative nests may be constructed within a single territory (U. S. Fish and Wildlife Service 1986).

Wintering Habitat: Wintering habitat is associated with open bodies of water, primarily in the Klamath Basin (Detrich 1981, 1982). Smaller concentrations of wintering birds are found at most of the larger

lakes and man-made reservoirs in the mountainous interior of the north half of the state and at scattered reservoirs in central and southwestern California. Some of the state's breeding birds winter near their nesting territories.

Two winter habitat characteristics appear to play a significant role in habitat selection in the cold months: diurnal perches and communal night roost areas. Perches are normally located in close proximity to a food source. Most tree perches selected by eagles provide a good view of the surrounding area (USDI Fish and Wildlife Service 1986), often utilizing the highest perch sites available (Stalmaster 1976).

Habitat requirements for communal night roosting are different from those for diurnal perching. Communal roosts are invariably near a rich food resource. In forest stands that are uneven-aged, communal roosts have at least a remnant of old-growth forest components (Anthony et al. 1982). Most communal winter roosts used by bald eagles throughout the recovery areas offer considerably more protection from the weather than diurnal habitat. Keister and Anthony (1983) found that bald eagles used old-growth forest stands as far as 9.6 miles from the food source in the Klamath Basin.

Diet: The most common food sources for bald eagle in the Pacific region are fish, waterfowl, jackrabbits, and various types of carrion (USDI Fish and Wildlife Service 1986). Diurnal perches are used during foraging; these usually have a good view of the surrounding area and are often the highest perch sites available (Stalmaster 1976).

Breeding Cycle: Breeding is initiated as early as January 1 via courtship, pair bonding, and territory establishment, and normally ends by August 31, as the fledglings are no longer attached to the immediate nest site. This time frame varies with local conditions. Incubation may begin in late February to mid-March, with the nestling period extending to as late as the end of June. From June through August, the fledglings remain restricted to the nest until they are able to move around within their environment.

Habitat on the Eldorado National Forest

Bald eagle nesting, wintering and foraging habitat was last mapped on the Eldorado National Forest in 1999, using aerial photography and local knowledge of habitat use. A GIS data layer of bald eagle habitat has been created and continues to be updated as additional information becomes available.

Risk Factors

Conservation Recommendations

Effective breeding area management should avoid a flight response which is typically induced by disturbance at 200 to 300 m (Grubb et al. 1992). In their study of breeding bald eagle responses to human activities, Grubb et al. (1992) recommend a no activity primary zone of 500 to 600 m from nest sites, followed by a secondary zone of 1000 to 1200 m.

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CALIFORNIA SPOTTED OWL

Management Status and Direction

Management Status: The California spotted owl (*Strix occidentalis occidentalis*) is currently managed as a USDA Forest Service Sensitive species (USDA 2013). Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by USDA 2001, 2004, the R5 Sensitive species evaluation form 2012, and Keane 2014 and are incorporated here by reference. On June 14, 2005, the U.S. Fish and Wildlife Service (FWS) announced its 90-day finding that a status review is warranted to determine whether or not the species should be listed as threatened or endangered. The Service intends to complete its 12-month review by March 14, 2006, then decide whether or not to propose listing the species as threatened or endangered. Management direction for the California spotted owl on the Eldorado National Forest is most recently provided in the Record of Decision for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USDA Forest Service 2004).

Population Status

Range-wide Distribution. The range of the California spotted owl extends from the southern Cascades south of the Pit River in Shasta County in the north, to the southern end of the Sierra Nevada mountain range in the south. It includes all mountainous regions of the Southern California Province, and the central coast ranges at least as far north as Monterey County. Populations are continuous throughout the Sierra Nevada range, permitting dispersal among subpopulations and allowing the species to interact as a

metapopulation throughout the Sierra Nevada. The Sierra population is disjunct from coastal and southern California populations.

Context of the Eldorado National Forest in the Species Range: The Eldorado National Forest occurs in the central portion of the species range and represents about 16 percent of the known population in the Sierra Nevada. There is a relatively uniform distribution of owl sites across the forest and adjoining the Tahoe National Forest to the north and the Stanislaus NF to the south. The elevational range of owl sites on the forest extends from about 3,000 feet to above 8,000 feet, with most owl activity centers occurring below 6,000 feet in elevation.

Population Trend. The most recent population status and trend information can be found in Keane 2014, Conner et al. 2013, Tempel and Gutiérrez 2013, and Tempel et al. 2014. In summary, the most recent estimate of population size for California spotted owls in the Sierra Nevada reported 1865 owl sites, with 1399 sites on National Forest System lands. Ongoing research of recent population trends indicates increasing evidence for population declines on the three demographic study areas on National Forest System lands and a stable or increasing population on the National Park study area, (Conner et al. 2013, Tempel and Gutiérrez 2013, Tempel et al. 2014). The factors driving these population trends are not known (Keane 2014).

Existing Surveys and Sightings on the Eldorado National Forest. One of the four long-term demographic studies of the California spotted owl population in the Sierra Nevada occurs on the ENF. Demographic parameters have been measured within this study area since 1986. Significant declines in this population over the study period have been detected each year since 1998 (Gutiérrez et al. 2000).

Surveys conducted on the Eldorado National Forest since 1987 have covered an estimated 80 to 90 percent of the suitable spotted owl habitat on the forest, resulting in a current estimate of 207 spotted owl territories on the forest. Survey detections since 1987 are recorded in a forestwide GIS coverage which is updated at the end of each field survey season. Best professional judgement is used to designate groups of detections thought to represent an individual owl territory, and to designate the activity center associated with the territory. Systematic and comprehensive surveys have been conducted only within the portion of the forest from the Rubicon drainage north to the Middle Fork of the American River (within the demographic study). Elsewhere on the forest the majority of surveys occurred between 1989 and 1992, in response to extensive timber salvage harvest projects. Known owl sites appear to be fairly evenly distributed across the Forest although estimates of crude density (number of owls/total acreage of the study area) within the demographic study area are lower than the mean crude densities reported from other study areas: 0.259 owls per square mile on the ENF demographic study area versus a mean of 0.495 from three other study areas (Verner et al. 1992: 178). Lower densities are likely the result of large amounts of intermixed private land within the study area.

Verner et al. 1992, identified several geographic areas of concern for the California spotted owl, where future problems might be greatest if the owl's population status were to deteriorate. One such area, identified as area #4, was the large area of intermixed private land and checkerboard ownership within the boundaries of the Eldorado NF, primarily on the Georgetown and Pacific Ranger Districts. This was identified as an area of concern because of habitat fragmentation that decreases the density of owl pairs, makes successful dispersal more difficult, and reduces the likelihood of quick replacement of owls in vacated habitat (Verner et al. 1992: 45). In addition, the 1992 Cleveland Wildfire burned 22,500 acres (about 10,000 acres on National Forest land) within and adjacent to this area of concern, resulting in a

temporary gap in owl distribution. Changes in habitat condition in this area of concern, should, therefore, be closely evaluated.

Life History and Habitat Requirements

Habitat preferences at the stand scale. California spotted owls utilize mixed conifer, ponderosa pine, red fir and montane hardwood vegetation types on the ENF. The vast majority of owl sites on the Forest occur within the mixed conifer vegetation type. Studies on habitat use by the California spotted owl indicate that it is a habitat specialist which selects for stand characteristics associated with mature forests (Verner et al. 1992).

The EIS for the Sierra Nevada Framework Project (USDA Forest Service, January 2001) provides the following information about California spotted owl habitat preferences based upon information contained in Verner et al. 1992; North et al., in press; Laymon, 1988, Call 1990, Bias and Gutiérrez, 1992, Moen and Gutiérrez, 1997).

Stands preferred by owls for nesting and roosting are characterized by:

- two or more canopy layers
- dominant and codominant trees in the canopy averaging at least 24 inches in dbh
- at least 70 percent total canopy cover (including hardwood component)
- higher than average numbers of very large, old, trees with high crown volume
- higher than average levels of snags and downed woody material

Stands preferred by owls for foraging have:

- at least two canopy layers
- dominant and codominant trees in the canopy averaging at least eleven inches in dbh
- at least 50 percent canopy cover
- higher than average levels of snags and downed woody material

Although spotted owls will forage in stands with 40 percent canopy cover (and possibly as low as 30 percent canopy cover in the red fir type), they appear to be only marginally suitable for foraging (Verner pers. comm. 1999). Recent analysis by Hunsaker et al. (2002) indicated that the threshold between canopy cover values that contribute to or detract from occurrence and productivity is a value near 50 percent (USDA Forest Service, January 2001). Research on the northern spotted owl (North et al. 1999) found snag volume, foliage volume, and canopy layering to be stand attributes significantly associated with owl foraging intensity. Vegetation treatments, such as timber harvest and fuels reduction, which alter these habitat attributes may influence habitat quality for the California spotted owl.

Habitat preferences based upon CWHR habitat classifications. Approximately 84% of 292 California spotted owl nest vegetation plots were classified as CWHR classes 6, 5D, 5M, 4D, and 4M (USDA Forest Service, January 2001). These CWHR types are also rated as providing high and moderate suitability foraging habitat for California spotted owls based on the expert opinion habitat relationship models contained in the CWHR database. Timber strata 4G (similar to CWHR classes 5D and 6) have been documented as being preferentially selected by owls for nesting and foraging (Verner et al. 1992) and the majority of spotted owl nest sites have been documented to occur in CWHR classes 6, 5D, and 5M. It would be expected, therefore, that CWHR classes 6, 5D, and 5M would have the highest probability of

providing stand structures associated with preferred nesting, roosting, and foraging (USDA Forest Service, January 2001).

Habitat requirements at the landscape scale: The average breeding season home range size of spotted owl pairs on the Eldorado National Forest, using minimum convex polygon, was about 4,700 acres (Laymon, 1988). Bingham and Noon (1998) found the overused portion of the home range to be about 20 percent (or about 1,000 acres), typically in closest proximity to the nest or primary roost stand.

Studies consistently suggest that some basic amount of suitable habitat is necessary to ensure that a pair of owls can successfully raise a sufficient number of offspring to replace themselves (thus providing for a stable population). Bart (1995) found this amount to be in the range of 30 to 50 percent of an owl home range in a study conducted on the northern spotted owl in the Pacific Northwest. Analysis in the Sierra National Forest demographic study area concluded that canopy cover composition within owl home ranges is significantly correlated with owl occurrence and productivity (Hunsaker et al. 2002). Productivity was positively correlated with the proportion of the analysis area having greater than 50% canopy-cover and negatively correlated with the proportion having less than 50% canopy cover. For those owl sites showing higher productivity, the median value for the portion of a 1,062-acre circular analysis area (surrounding an owl nest location) with greater than 50% canopy cover, was 60 percent (based upon aerial PI).

Information on the desired configuration or patchiness of habitat within a spotted owl's home range is lacking for the California spotted owl. Demographic studies on the northern spotted owl in the Klamath Province have found that birds with access to larger blocks of suitable habitat had slightly lower mortality rates, but those with home ranges that were more patchy had slightly higher fecundity (number of young produced per breeding female). A landscape pattern with some fine-scale fragmentation of old forest (small patches of other habitats with convoluted edges) dispersed within and around a main patch of old forest appeared to provide the optimum balance in promoting both high fecundity and high survival (Franklin et al. 2000).

Diet. Spotted owls occurring above about 4,000 feet in elevation in the Sierra Nevada prey mainly on flying squirrels, while those occurring in the lower mixed conifer and ponderosa pine belt below this elevation rely heavily upon woodrats (Verner et al. 1992). On the Eldorado, greater numbers of spotted owl sites occur in habitat types where flying squirrels dominate, but a substantial number of sites do occur in lower elevation forests. Important ecological linkages for spotted owl prey species include the presence of large, old trees, large snags, denser multi-layered forest canopy, and large decaying logs on the forest floor (Verner et al. 1992).

Habitat Status. Forest ecologists estimate that old forest conditions have declined from 50 to 90 percent compared to the range of historical conditions (USDA Forest Service 2001). The habitat change of greatest concern in the Sierra Nevada has been the rapid disappearance of the large, old and generally decadent trees that are the focus of nesting by spotted owls. Seven additional factors of concern about owl habitat, having resulted from a combination of logging and fire suppression since the turn of the century, were described in Verner et al. 1992: the long recovery period for spotted owl habitat after logging, the ingrowth of shade-tolerant tree species creating unnaturally dense stands with ground-to-crown fuel ladders, excessive build-up of surface fuels, loss of large-diameter logs, disturbance and/or removal of duff and topsoil layers, and change in the composition of tree species (fewer pines and black oaks and more firs and incense cedar).

Spotted owl habitat remains broadly distributed on the Eldorado National Forest, however temporary habitat gaps exist in the areas burned by the Cleveland wildfire on the Pacific Ranger District and the Star Fire on the Georgetown Ranger District. A geographic area of concern, mapped as the large area of intermixed and checkerboard land ownership on the Georgetown and Pacific Ranger Districts, has been identified as an area where suitable habitat appears to be fragmented and in low abundance as the result of past and ongoing timber harvest. Within this area, the lower density of spotted owl pairs increases the uncertainty of successful mate finding and replacement of vacated territories (Verner et al. 1992).

Breeding Cycle. The spotted owl breeding cycle extends from about early March to mid- to late September on the Eldorado National Forest. Egg laying through incubation, when female spotted owl must remain at the nest, extends from early April through mid-to late May. Young owls typically fledge from the nest in mid-to late June and remain near the nest in the weeks following fledging. Adults continue to bring food to the fledglings until mid-to late September. Wasser et al. (1997) measured significantly higher levels of stress hormones in male northern spotted owls whose home range centers were within 0.41 km (0.25 mi.) of major logging roads or recent (10 years to present) timber activity. Forest Service recommendations for reducing direct effects to spotted owls have generally included minimizing disturbances within 0.25 miles of known roosts or nests during the breeding season (March 1 through August 31). Requirements for Limited Operating Periods are described in the ROD for the SNFPA.

Risk Factors

Timber Harvest and Vegetation Treatments. Much of the current concern regarding California spotted owl population trends is focused on the effects of vegetation management on the distribution, abundance and quality of habitat. Logging since the turn of the century has resulted in a reduction in the amount and distribution of mature and older forests and specific habitat elements such as large trees, snags, and downed logs, used for nesting and foraging by California spotted owls (Verner et al. 1992, Laudenslayer 1990, McKelvey and Johnston 1992, Franklin and Fites-Kaufmann 1996, Beardsley et al. 1999, Bouldin 1999).

Climate. Weather (in particular the effects of heavy late spring precipitation on reproductive output) has been identified as one probable cause of declining California spotted owl populations by several researchers. Widespread reproductive failure has been documented in years with late spring storms (Steger et al. 1999, Gutierrez et al. 1999, North et al., 1999, Franklin et al. in press). North et al. (1999) found a correlation between nest sites with higher productivity and high amounts of canopy volume over the nest (associated with very large, old trees). This indicates the importance of maintaining large old trees and high canopy volume at nest sites in order to buffer against the effects of weather on reproduction.

Wildfire. The ingrowth of shade-tolerant species and the excessive buildup of surface fuels are conditions that have resulted from past forest management and fire suppression, and which increase the risk of high-severity fire. Approximately 39 percent of the known owl sites on national forest lands occur in areas designated as “high fire hazard risk” (USDA Forest Service 2001).

Conservation Strategy

Conservation Strategy in the Sierra Nevada Forest Plan Amendment. The Sierra Nevada Forest Plan Amendment (2004), provides a conservation strategy for the California spotted owl. The CASPO conservation strategy does not identify a target number and distribution of spotted owl sites at the Forest,

Sierra Nevada, or range wide scales. Rather, the strategy establishes a set of guidelines for vegetation management projects that are expected to protect habitat components important to the California spotted owl. The strategy includes: 1) identification of protected activity centers (300 acre PACs) and home range core areas (1,000-acre HRCAs) and managing these areas to retain their value as suitable owl habitat; 2) providing direction to retain understory structure within treated areas; and 3) applying diameter limits and canopy closure considerations to a range of tree size classes.

The primary project design elements of the Conservation Strategy can be summarized as follows:

Vegetation Management:

- 1) Stand altering activities are limited to reduction of surface and ladder fuels through prescribed fire treatments and hand treatments within 500-foot radius buffer around spotted owl activity centers within a designated PAC.
- 2) Vegetation treatments are limited to the use of prescribed fire or the removal of material less than 12 inches in dbh in PACs outside the WUI; mechanical treatments may occur in PACs within the WUI, but, outside the defense zone, these treatments must be designed to maintain habitat structure and function of the PAC.
- 3) Mechanical thinning treatments within HRCAs should be designed to retain at least 50 percent canopy cover averaged within the treatment unit. Where 50% canopy cover cannot be met while adequately reducing ladder fuels, retain at least 40% canopy cover.
- 4) General guidelines for snag retention are: 4 of the largest snags per acre are retained in mixed conifer forest; 6 of the largest snags per acre are retained in red fir forest.
- 5) Surveys are conducted in suitable habitat with unknown occupancy, prior to undertaking vegetation treatments.
- 6) Limited operating periods are applied within a quarter mile of spotted owl activity centers if activities may disturb nesting spotted owls (deviation from LOPs may occur for a small number of prescribed burning projects).

Project Design Recommendations for the Eldorado National Forest. The Conservation Strategy provided by the Sierra Nevada Forest Plan Amendment addresses important risk factors for the California spotted owl, both range wide and on the Eldorado National Forest. Additional standard project design features have not been identified for California spotted owls on the Eldorado National Forest but would be based on project-specific conditions and analyses. Changes to habitat quality and abundance within geographic area of concern # 4, occurring on the Georgetown and Pacific Ranger Districts, should receive careful analysis at the project level.

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NORTHERN GOSHAWK

Management Status and Direction

Management Status: The northern goshawk is a Forest Service designated sensitive species and a management indicator species on all Sierra Province National Forests in the Pacific Southwest Region. There is concern that northern goshawk populations and reproduction may be declining in North America and California due to changes in the amount and distribution of habitat or reductions in habitat quality (in USDA Forest Service 2001). In 1998 the U.S. Fish and Wildlife Service (FWS) completed a status review for the northern goshawk and announced its finding that there is no evidence that the goshawk population is declining in the western United States, that habitat is limiting the overall population, that there are any significant areas of extirpation, or that a significant curtailment of the species’ habitat or range is occurring” (Federal Register 1998). Further litigation is pending.

Population Status

Context of the Eldorado National Forest in the Species Range: Northern goshawks are distributed throughout forest and woodlands of the Holarctic, extending across the boreal forests of North America, south through the western mountains to Mexico, and in the east, south through the hardwood forest to approximately New York/New Jersey (in USDA Forest Service 2001). The Sierra Nevada, and Eldorado National Forest, therefore, represent a very small portion of this species range. Approximately 588

northern goshawk sites are known to occur within the Sierra Nevada, with about 12 percent of those sites (69) found on the Eldorado National Forest (USDA Forest Service 2001).

Estimated Population Size and Trend in the Sierra Nevada: Approximately 577 northern goshawk territories are known to occur on National Forest lands in the Sierra Nevada (USDA Forest Service 2001). There does not appear to have been a change in the geographic distribution of northern goshawks in the Sierra Nevada relative to the range reported by Grinnel and Miller (1944). Population trends of northern goshawks in the Sierra Nevada are unknown, although numbers are suspected to be declining due to habitat reductions and loss of territories to timber harvest (Bloom et al. 1986). Currently no rigorous research or monitoring efforts are being conducted to assess population trends, demographic rates, or effects of habitat manipulations.

Existing Surveys and Sightings on the Eldorado National Forest: Goshawk sightings recorded on the Eldorado National Forest have been largely opportunistic; surveys have been limited to specific project areas (documented in Ranger District project files) and have not covered a large proportion of the northern goshawk habitat on the forest. Survey detections have been recorded in a forest-wide GIS coverage which is updated at the end of each field survey season. Best professional judgment is used to designate groups of detections thought to represent an individual goshawk territory, and to designate the activity center associated with the territory. Approximately 69 goshawk sites have been located, primarily over the past 10 years, although the current occupancy status remains unknown for some of these sites. The known goshawk sites appear to be fairly well distributed across the Forest, between 4,000 and 7,000 feet in elevation.

Life History and Habitat Requirements

Habitat preferences at the stand scale: Northern goshawks utilize mixed conifer, ponderosa pine, red fir, subalpine conifer, lodgepole pine, montane riparian and montane hardwood vegetation types on the ENF. Nest site habitat characteristics are the best-known aspect of northern goshawk habitat use patterns. Very little information exists regarding foraging habitat use patterns, particularly during winter. No information is available that addresses habitat quality (as measured by survival and fecundity) at any spatial scale (USDA Forest Service, January 2001).

The EIS for the Sierra Nevada Framework Project (USDA Forest Service, January 2001) provides the following information about northern goshawk habitat preferences based upon three studies in the Sierra Nevada (Hargis et al. 1994, Keane 1999, Maurer 2000) and a number of additional studies from other parts of the western United States.

When compared to random plots, stands preferred by northern goshawks for nesting and roosting (in westside vegetation types), are characterized by:

- Greater basal area
- Greater numbers of large live trees (trees > 24" dbh)
- Greater canopy cover (mean of 65 percent and 70 percent in two studies)
- Higher than average numbers of very large, old, trees (mean of 16 and 17 trees/ac > 40" dbh)
- Significantly lower numbers of trees less than 12" dbh

Foraging habitat preferences of northern goshawks are poorly understood, although limited information from studies in conifer forests indicate northern goshawks prefer to forage in mature forests (summarized in Squires and Reynolds 1997) with greater canopy closure and greater density of large (>40" dbh) trees

relative to random plots (Bright-Smith and Mannan 1994, Beirer and Drennan 1997, Hargis 1994, Austin 1993).

Habitat preferences based upon CWHR habitat classifications: Classification of nest plot data from 35 nest sites from the Lake Tahoe Region (Keane 1999) resulted in 71 percent of the nest vegetation plots being classified as CWHR classes 6, 5D, or 5M and the remaining 14 percent being classified as 4D, 4M, or 4P (USDA Forest Service, January 2001). These CWHR types (with the exception of 4P) are also rated as providing high suitability nesting habitat for northern goshawks based on the expert opinion habitat relationship models contained in the CWHR database. High feeding habitat capability is found in these same types and within 5P and 5S stands.

Habitat requirements at the landscape scale: The mean breeding season home range size of northern goshawks in the Lake Tahoe region was found to be about 6,700 acres for males and about 5,000 acres for females (Keane, 1999). Mean non-breeding period home ranges exceed 10,000 acres. Conservation strategies proposed for the northern goshawk typically recognize three spatial scales for managing northern goshawk home ranges (Reynolds et al. 1992). The first scale addresses the amount and spatial distribution of nesting habitat, the second addresses the post-fledging area, and the third addresses foraging areas within the remainder of the home range. Limited information is available on habitat patterns at larger and multiple scales and how these patterns affect habitat quality for northern goshawks.

Nest stands: Forest stands containing nests are often small (25 to 250 acres) and territories may contain one to five alternate nest stands (Woodbridge and Detrich 1994). Woodbridge and Detrich (1994) reported that near 100 percent territory occupancy rates were observed in territories with nest stand clusters totaling 150 to 200 acres of nesting habitat; occupancy rates declined as the size of the nest stand declined below 150 acres.

Post Fledging Areas: Post-fledging areas (PFA) surround the nest area and are used by both adults and the young as they learn to hunt from the time of fledging through dispersal (Reynolds et al. 1992). PFAs average about 420 acres (Kennedy et al. 1994). Reynolds et al. proposed guidelines regarding the desired amounts of different forest structural classes within PFAs to provide for protective cover and a diversity of prey species. These guidelines call for 60 percent of the PFA to be in mid-aged and mature forest stages with canopy covers ranging from greater than 50 percent to greater than 70 percent depending upon forest type. The remainder of the PFA is managed to provide young forest and grass-forb stages. No data exists to evaluate these guidelines relative to Sierra Nevada Forests.

Foraging Areas: Understanding how prey availability for northern goshawks varies with stand structure and landscape habitat patterns is essential for understanding how to manage northern goshawk populations by providing suitable habitat for prey. Reynolds et al. (1992) has made recommendations that are applied to national forests in the southwest. These recommendations call for a variety of age classes and canopy cover ranging from greater than 40 percent to greater than 60 percent depending on forest vegetation type.

Diet: Prey availability is a primary limiting factor for raptor populations. Northern goshawks prey on a wide variety of species. Primary prey in the Lake Tahoe region was Douglas squirrels, golden-mantled and Belding's ground squirrels, chipmunks, Steller's jay, flicker, and robin. Species that are active year-round, such as Douglas squirrels may be more important prey species during winter (Keane 1999).

Habitat Status across the Sierra Nevada: Forest ecologists estimate that old forest conditions have declined from 50 to 90 percent compared to the range of historical conditions. The habitat change of

greatest concern in the Sierra Nevada has been the rapid disappearance of the large, old and generally decadent trees and increases in the numbers of smaller diameter trees and density of forest understories as a result of fire suppression. These trends suggest there has been a reduction in the amount and distribution of the mature and older forests with large trees and open understories used for nesting by northern goshawks. Greater uncertainty exists regarding changes in foraging habitat although limited knowledge suggests these changes would also have led to a decline in the quantity and quality of foraging habitat.

Habitat Status on the Eldorado NF: Suitable nesting and foraging habitat occurs in patches of varying size and abundance across most of the Eldorado National Forest. Lack of information on the amounts and spatial distribution of vegetation classes associated with high quality territories, limits a meaningful assessment of habitat status on the forest.

Breeding Cycle: The northern goshawk breeding cycle extends from mid- February through mid-September on the Eldorado National Forest. Egg laying through incubation, when female spotted owl must remain at the nest, occurs from mid-April up to mid-June. Young goshawks typically fledge from the nest in early June to mid- July and remain near the nest for a period of 4 to 8 weeks following fledging. Not all pairs of northern goshawks reproduce each year. The proportion of territories with active nests has been documented to range from 14 to 100 percent among years in the Sierra Nevada (Keane 1999). Forest Service recommendations for reducing direct effects to northern goshawks have generally included minimizing disturbances within 0.25 miles of known roosts or nests during the breeding season (March 1 through September 15). Requirements for Limited Operating Periods are included in the Record of Decision for the Sierra Nevada Forest Plan Amendment (January 2004).

Risk Factors

The major threat to northern goshawk at the present time concerns the effects of vegetation management (timber harvest, fuels treatments, etc) and wildfire on the amount and distribution and quality of habitat (Bloom et al. 1986, Keane and Morrison 1994, Kennedy 1997, Squires and Reynolds 1997, Smallwood 1998, DeStefano 1998). Breeding site disturbance from vegetation treatments, human recreation, and falconry harvest is an additional risk factor. Currently legal harvest of northern goshawks is low and does not impact the Sierra Nevada population but the impact of legal and illegal harvest together has the potential to negatively impact individual territories and potentially local populations. This is not known to be a problem on the Eldorado National Forest, however, and is a greater concern on the east side of the Sierra Nevada. Weather patterns, in conjunction with prey dynamics, appear to be a primary factor affecting northern goshawk reproduction and potentially survival (Keane 1999). The effects of climate and chemical pollutants are two potential risk factors that require further investigation (USDA Forest Service, January 2001).

Conservation Strategy

Sierra Nevada Forest Plan Amendment: The Sierra Nevada Forest Plan Amendment (January 2004), does not provide a conservation strategy for the northern goshawk but does provide a number of management guidelines. Specific guidelines are provided for managing goshawk nest stands; foraging habitat needs are expected to be met through the conservation strategy developed for the California spotted owl. The broad distribution and large home range size of the California spotted owl results in a strategy that is likely to provide well-distributed habitat for the northern-goshawk and other old forest-associated species.

The primary project design elements included in the Sierra Nevada Forest Plan Amendment can be summarized as follows:

Stand altering activities are limited to reduction of surface and ladder fuels through prescribed fire treatments and hand treatments within 500-foot radius buffer around goshawk activity centers within a designated PAC.

Vegetation treatments are limited to the use of prescribed fire or the removal of material less than 12 inches dbh in PACs outside the WUI; mechanical treatments may occur in PACs within the WUI, but, outside the defense zone, these treatments must be designed to maintain habitat structure and function of the PAC.

Mechanical thinning treatments within HRCAs should be designed to retain at least 50 percent canopy cover averaged within the treatment unit. Where 50 percent canopy cover cannot be met while adequately reducing ladder fuels, retain at least 40 percent canopy cover.

General guidelines for snag retention are: four of the largest snags per acre are retained in mixed conifer forest; six of the largest snags per acre are retained in red fir forest.

Surveys are conducted in suitable habitat with unknown occupancy, prior to undertaking vegetation treatments.

Limited operating periods are applied within a quarter mile of goshawk activity centers if activities may disturb nesting goshawks (deviation from LOPs may occur for a small number of prescribed burning projects).

Project Design Recommendations for the Eldorado National Forest: The management guidelines provided by the Sierra Nevada Forest Plan Amendment addresses important risk factors for the northern goshawk, both range-wide and on the Eldorado National Forest. Additional standard project design recommendations have not been identified for the Eldorado National Forest but site-specific consideration of habitat distribution and evaluation of post-fledging and/or foraging habitat needs may lead to additional site-specific recommendations. As further information becomes available on how prey availability for northern goshawks varies with stand structure and landscape habitat patterns, project design recommendations will be refined.

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GREAT GRAY OWL

The great gray owl (*Strix nebulosa*) is currently managed as a USDA Forest Service Sensitive species (USDA 2013). Sensitive species are species identified by the Regional Forester where population viability is a concern because of 1) downward population trends and/or 2) diminished habitat capacity that would reduce species distribution. Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by Beck and Winter 2000, USDA 2001, 2004, and the R5 Sensitive species evaluation form of 2012, and are incorporated here by reference.

Great gray owls are regarded as locally rare throughout their range in USFS Region 5 and no more than 100-200 individuals have been estimated in California since 1980, and only 80 were estimated in 2006 (R5 Sensitive species Evaluation Form 2012). Although the great gray owl population in California is small, the Stanislaus National Forest contains more great gray owl sites than any other National Forest in Region 5, or any area outside of Yosemite National Park (Siegel 2001, 2002, NRIS Wildlife database, CNDDDB database).

Historic sightings are recorded for all counties in the Cascade Range in California and the Sierra Nevada as far south as Tulare Co. The present known population is centered in Yosemite National Park. It includes nesting activity on the Stanislaus National Forest at five distinct locations, and several recent sightings on the Sierra National Forest. On the Eldorado National Forest a pair of great gray owls utilized Leoni Meadows early in the breeding season in 2002 but did not remain after mid-June. Coordinated inventories for great gray owls have not been conducted on a large scale. There have been other detections on the Eldorado National Forest, but reproduction has not been confirmed at this site. Recent detections have also been reported on private lands, at low elevations associated with oak/grass systems

and riparian corridors. These owls are somewhat secretive and difficult to detect. There is a possibility that they will be found occupying additional locations where there is suitable habitat. The California population was estimated at 60-70 birds in 1984 (Winter 1985). Recent sightings in Yosemite National Park and on adjacent National Forests in the Sierra Nevada indicate the actual population could measure 100-200 birds (Tom Beck, pers. comm. 1992).

Habitat requirements of great gray owls in the Sierra Nevada were summarized by Beck and Winter (2000), studied specifically by Greene (1995), Sears (2006), Powers et al. (2011), and Kalinowski et al. (2014), and are currently under additional investigations by PSW research (Keane, pers.comm.).

Great gray owls in the Sierra Nevada inhabit coniferous forest surrounding wet meadows (USDA 2001). Great gray owls typically breed in large flat-topped broken snags located in conifer stands with higher than average levels of large snags and woodland cover in the immediate vicinity of montane meadows (Bull and Duncan 1993, Beck and Winter 2000). Great gray owls may also utilize abandoned nests of other birds of prey, and mistletoe or other broom growths (Ibid).

Recent burns, where they exist in the Sierras, provide some structural similarity to a meadow ecosystem for a few years before the trees or brush shade out the grasses and forbs (Beck and Winter 2000). Such sites can provide foraging areas for nearby breeding great gray owls, but only on a short-term basis (Greene 1995, Beck pers. comm.). Meadows or meadow complexes at least 25 acres in size appear to be necessary for persistent occupancy and reproduction but meadows as small as 10 acres will support infrequent breeding (Beck and Winter 2000). Reproductive sites are associated with high vole abundance and high vole abundance is associated with meadow vegetation height (Beck 1985; Greene 1995; Sears 2006, Kalinowski et al. 2014).

Mean home-range size in the Sierra Nevada during a radio-tagging study was estimated at 148 acres in females and 50 acres in males during the breeding season; great gray owls enlarge their home ranges substantially in winter (Van Riper and Van Wagtendonk 2006).

Management oriented survey work is generally opportunistic depending upon planned activities and funding levels. Research oriented survey work is generally more systematic and focused. Together these efforts have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA unpublished data, NRIS Wildlife database).

Great gray owl sites receive special management consideration as protected activity centers (PACs). Protected activity centers (PACs) are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. The PAC encompasses at least 50 acres of the highest quality nesting habitat (CWHR types 6, 5D, and 5M) available in the forested area surrounding the nest. The PAC also includes the meadow or meadow complex that supports the prey base for nesting owls (USDA 2010 p.187).

Management Direction

The Regional Forester for the Pacific Southwest Region has listed the great gray owl (GGOW) as a Sensitive species, which means that management of the species is subject to Forest Service policy found in FSM 2672.1. It states: “Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing.”

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The desired condition for great gray owl PAC described in the Forest Plan Direction focuses on protecting nest sites with a minimum 50 acre buffer and managing meadow habitat for sufficiently large vole populations to provide a food source for great gray owls through the reproductive period (USDA 2010 p187).

Also, there is an emphasis to conduct additional surveys to established protocols to follow up reliable sightings of great gray owls (USDA 2010 p. 43).

The Sierra Nevada Mountains are the southern range of the great gray owl in the western United States. The Eldorado LRMP, as amended in January 2004, provides direction for protection of 50 acres of forested habitat surrounding known nest sites.

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WILLOW FLYCATCHER

The Eldorado LRMP, as amended in January 2001, provides direction intended to protect all known occupied willow flycatcher habitat from the effects of livestock grazing. Surveys took place between 2001 and 2004 of meadows greater than 15 acres in size that occur within 5 miles of occupied habitat. There are historic occupied sites documented within the boundary of the Eldorado National Forest, one near Packsaddle Pass and the other from Forni Meadow. Both detections were from the 1980s.

The willow flycatcher is a small passerine neotropical migrant bird that breeds in riparian deciduous shrub habitat in the United States and Canada, primarily in willows. Wet meadows appear to be the most common habitat, but riparian deciduous shrubs along streams are also used. The willow flycatcher was once a common summer resident throughout California. However, observed declines in breeding populations have been a growing concern for over four decades and it is now limited to scattered meadows of the Sierra Nevada and along the Kern, Santa Margarita, and San Luis Rey Rivers; the statewide population is estimated at about 145 territorial males (Harris et al. 1988).

Most of the remaining breeding populations of willow flycatchers in the Sierra Nevada occur in isolated mountain meadows (up to 8000 feet elevation) and along the Kern River in Kern County (around 2600 feet elevation) (Harris et al. 1988). Small populations have also been detected on the Modoc National Forest and National Wildlife Refuge (Wilson pers. Comm. 1994), Mammoth Lake, Lee Vining Creek and Bridgeport Valley (Gaines 1977), and Lundy Canyon (Gaines 1988). The two largest known populations are the Kern River population and the population in the Perazzo Meadows area of the Tahoe National Forest.

Habitat typically includes moist meadows with perennial streams and smaller spring-fed or boggy areas with willow (*Salix* spp.) or alders (*Alnus* spp.). The presence of water during the breeding season appears to be an important habitat component (Fowler et al. 1991). The minimum size meadow useable for willow flycatchers is assumed to be 0.62 acres (Fowler et al. 1991). Willow flycatchers have also been found in

riparian habitats of various types and sizes ranging from small lakes or ponds surrounded by willows with a fringe of meadow or grassland, to willow lined streams, grasslands, or boggy areas.

Willow flycatchers are territorial during the breeding season. Studies on the TNF have found that territory sizes average 0.84 acre (Sanders and Flett 1989). Females may forage outside or at the fringe of the territories defended by males. In addition, after the young fledge the family groups use areas outside of the territories for feeding and cover (M. Flett, pers. comm.). The breeding season begins in late May to early June (Garratt and Dunn 1981) with adults and fledglings generally staying in the breeding areas through August.

Nests are open cupped, usually 3.7 to 8.3 feet above the ground and mostly near the edge of deciduous, riparian shrub clumps (Sanders and Flett 1989, Valentine et al. 1988, Harris 1991).

Willow flycatchers forage by either aerially gleaning insects from trees, shrubs, and herbaceous vegetation, or they hawk larger insects by waiting on exposed forage perches and capturing them in flight (Ettinger and King 1980, Sanders and Flett 1989). In the Perazzo Meadow, willow flycatchers usually flew less than 3.3 feet from a perch when hawking insects, but occasionally flew as far as 33 feet (Sanders and Flett 1989). The selection of nest sites near water appears to be related to increased densities of aerial insects.

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PACIFIC FISHER

Management Status and Direction

The Pacific fisher is a Forest Service regionally designated sensitive species. On April 8, 2004 the U.S. Fish and Wildlife Service issued a 12-month finding on a petition to list the west coast distinct population segment of the fisher as threatened or endangered. The FWS determined that the listing action is warranted, but precluded by higher priority actions. The Fisher has therefore been added to the list of candidate species.

Population Status

Context of the Eldorado National Forest in Relation to the Species Range: In western North America, fishers once ranged from northern British Columbia into central California in the Pacific Coastal Mountains, and south into Idaho, Montana, and probably Wyoming in the Rocky Mountains. Their present range is reduced, encompassing disjunct pieces of the former range.

Estimated Population Size and Trend in the Sierra Nevada: Fisher populations are presently at low numbers or absent throughout most of their historic range in Montana, Idaho, Washington, Oregon, and California (Heinemeyer and Jones 1994). In recent decades, a scarcity of sightings in Washington, Oregon, and the northern Sierra Nevada may indicate fisher extirpation from much of this area (Zielinski et al. 1996, Aubrey and Raley 1999). The southern Sierra Nevada and northwestern California populations may be the only naturally-occurring, known breeding populations of fishers in the Pacific region from southern British Columbia to California (Powell and Zielinski 1994, Zielinski et al. 1997). Moreover, mortality rates of adult fishers in the southern sierra population appear to be high (Truex et al. 1998).

Existing Surveys and Sightings on the Eldorado National Forest: Several project area surveys have occurred on the Eldorado National Forest in compliance with 1992/1993 Regional survey protocols. All surveys have had negative results. In addition, PSW research station completed surveyed sample points over a 10 km grid spacing aligned with National Forest Inventory vegetation sampling points across the forest (Zielinski et al. May, 1997). The sampling design for this survey effort was designed to provide information about regional distribution and was not intended to meet the sampling design requirements for project-based surveys. Negative results of this survey, nonetheless, provide further indication that fisher, if they occur on the Eldorado National Forest, likely occur at very low densities. Over the past ten years, a number of incidental fisher detections have been reported on the ENF; the following detections have been reported by highly reliable sources (fisher researchers or professional wildlife biologists).

1988 Rubicon River drainage T12N, R13E, Sec. 33

1994 Vicinity of Wrights Lake campground

1995 Vicinity of Stumpy Meadows Reservoir, T12N, R13E, NE1/4, NE1/4, Sec. 9

Life History and Habitat Requirements

Description of Suitable Habitat: In California, Pacific fisher most often occur at elevations between 2000 to 5000 feet in the North Coast region and 4000 to 8000 feet in the southern Sierra Nevada (Freel 1991). In general, Pacific fishers use forest or woodland landscape mosaics that include conifer-dominated stands, and avoid entering open areas that have no overstory or shrub cover. They select forests that have multi-storied, dense (60 to 100 percent) canopy cover. Late-successional coniferous or mixed forests provide the most suitable fisher habitat because they provide abundant potential den sites and preferred prey species. Abundant snags and downed logs appear important for their prey species (Buck et al. 1983, Rugierro et al. 1994, Freel 1991). The presence of large conifers and hardwoods is a highly significant predictor of Pacific fisher occurrence in the southern Sierra Nevada.

Patches of preferred habitat and the location of open areas with respect to these patches may be critical to the distribution of fishers in an area. Habitat patches that are interconnected by other forest types will probably receive use whereas habitat patches separated by large open areas are less likely to be used. Riparian corridors and forested saddles between major drainages may provide important dispersal habitat

or landscape linkages for the species. Abundant evidence exists for selective movement patterns along drainages (Ruggiero et al. 1994, Buck et al. 1983, Freel 1991).

Fisher apparently use greater percentages of middle to early seral stage habitats for foraging in summer months, although they still appear to need and utilize adjacent mature, old forest stands for denning, especially in areas with high snowfall. Freel (1991) correlates suitable habitat with the following timber strata size and density classes: 3, 4, and 5, N and G. Habitat with less than 30 percent canopy cover is considered unsuitable (Freel 1991).

Numerous and heavily traveled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for fisher (Allen 1987) due to decreases in prey populations resulting from road kills and/or behavioral barriers to movement.

Diet: Microtine rodents are important prey species for both fisher and marten in many areas of North America. The abundance of a favored prey species, the southern red-backed vole (*Clethrionomys gapperi*) has been positively correlated with abundance of woody debris on the forest floor (Allen 1987). Maser et al. (1978) attributed the elimination of red-backed voles from clearcuts to xerification (drying out) of the habitat, loss of downed woody material and elimination of the vole's primary food, which is mycorrhizal fungi. Elimination of woody debris and loss of understory vegetation can decrease populations of small prey species of mammals in forested habitats and, therefore, similarly affect fisher populations.

Risk Factors

Trapping, with logging, has had a major impact on fisher populations (Ruggiero et al. 1994). In addition, fisher typically avoid humans; thus, increased road access and human activity within fisher habitat may have affected fisher populations. Ruggiero et al. (1994) cite even-aged timber management practices as one of the likely reasons that fisher populations have not recovered in the Pacific Northwest. The assessment found insufficient information to determine the impact of uneven-aged timber management practices (such as those currently in use on Sierra Nevada National Forests) upon Pacific fisher.

Lamberson et al. (2000) describe a number of factors that currently put the Sierra Nevada fisher population at risk of extinction:

population size: Although no population size estimates have been published, the population is likely to be no less than 100 and probably no more than 500 individuals.

population isolation: Fishers in the southern Sierra Nevada appear to be isolated from those in northern California by >350 linear km (Zielinski et al. 1995 and W.J. Zielinski, unpublished data). This distance exceeds the maximum observed dispersal distance for fishers, ~100 km (Arthur et al. 1993, York 1996).

habitat / landscape specificity: Recent surveys have detected fishers from Yosemite National Park south through the Greenhorn Mountains in a variety of habitats ranging from low elevation mixed chaparral habitats on the fringe of the forest matrix into red fir forests. However, most detections have occurred in mid-elevation habitats including montane hardwood, montane hardwood-conifer, mixed conifer and ponderosa pine forests. Radio-telemetry research conducted on Sequoia National Forest has suggested these mid-elevation forests have large trees and logs needed for denning and resting (Zielinski et al., in prep) as well as a diverse prey base (Zielinski et al. 1998). The combination of timber harvest and fire suppression during the 20th century has resulted in a greater prevalence of small diameter trees throughout the Sierra Nevada (McKelvey and Johnston 1992).

Although higher elevation habitats (i.e., red fir forests) may provide ample structures for denning and resting, deep snow during the winter months likely impedes fisher mobility (Krohn et al. 1995); as a result, these forests are of less value to fisher than mid-elevation habitats where snow cover is sporadic and rarely deep for extended periods. Lower elevation habitats in the southern Sierra Nevada (chaparral and woodlands) lack resting and denning structures, and may not provide thermal regulation during hot summer months.

physiological limitations: The fisher has a relatively low annual reproductive capacity. Fishers are capable of reproducing annually beginning at 2 years old, producing 1-4 young per year ($\bar{x} = 2.5$, Heinemeyer and Jones 1994).

risk of habitat loss/alteration due to fire and land management: In the southern Sierra Nevada habitat loss due to catastrophic fire is of concern. Fire suppression policies have apparently altered the disturbance regime from one of frequent, low intensity fires of small areal extent to rare, high intensity fires of potentially large extent. While the former played a crucial role in maintaining a landscape where forests with large trees and heterogeneous canopies were more common, the latter can result in large-scale crown fires that result in habitat of little or no value to fishers.

stochastic phenomena: As with any small, isolated population, risks of extinction are enhanced by stochastic factors. Demographic stochasticity, the chance events associated with annual survival and reproduction, and environmental stochasticity, temporal fluctuations in environmental conditions, tend to reduce population persistence (Shaffer 1981, see Boyce 1992 and Beissinger and Westphal 1998 for reviews).

interaction of these factors: The interaction of these factors may move the population from a relatively stable, though numerically small condition, into an irreversible extinction vortex. For example, if demographic stochasticity results in lower than average recruitment of female kits into the population in 3 consecutive years, and this is followed by 2 heavy-snow winters and one large fire, the population may quickly become in jeopardy of local extinction.

Conservation Strategy

Conservation Strategy in the Sierra Nevada Forest Plan Amendment. The network of old Forest emphasis areas and guidelines associated with those areas, the Southern Fisher Conservation Area, as well as the umbrella provided by guidelines associated with maintaining California spotted owl habitat, are all expected to maintain management options for the fisher while a comprehensive conservation assessment and strategy is prepared.

Project Design Recommendations for the Eldorado National Forest. The Sierra Nevada Forest Plan Amendment (2001) includes guidelines that should largely address project design recommendations for fisher on the Eldorado National Forest. In 1994, a habitat network was mapped on the Eldorado NF by identifying areas on the Forest that come closest to providing the amounts of mature forest habitat needed within potential fisher home range areas of 6,000 to 11,300 acres in size. This resulted in a total of 11 areas being mapped as potential “fisher use areas” (FUAs). Movement corridors providing connectivity between FUAs were then mapped using orthophotography. Movement corridors typically followed drainages and saddles. The width of the corridors was 600 to 1200 feet based on information in Freel (1991). This assessment may provide useful information for project planning and for design of habitat connectivity during watershed and landscape analysis.

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AMERICAN MARTEN

In California, marten occur in the northern Sierra Nevada at elevations of 3,400 to 10,400 feet, averaging 6,600 feet. In the southern Sierra Nevada, the elevational range is 4,000 to 13,100 feet, averaging 8,300 feet (Freel 1991). On the Eldorado National Forest, marten have not been detected below 5,000 feet in elevation and predominantly occur above 6,000 feet in elevation.

Preferred habitat is characterized by dense (60 to 100 percent canopy), multi storied, multi species late seral coniferous forests with a high number of large (> 24 inch dbh) snags and downed logs (Freel 1991). These areas are often in close proximity to both dense riparian corridors (used as travel ways), and include an interspersed of small (<1 acre) openings with good ground cover (used for foraging). Forest stands dominated by Jeffrey pine did not appear to support marten on the Tahoe National Forest (Martin 1987).

Preferred forest types include mature mesic forests of red fir, red fir/white fir mix, lodgepole pine, and Sierran mixed conifer

Seral Stage	height	dbh	Timber Class	% Crown Closure
3	20-50ft	6-24in		
4 large tree	>50	>24	N	40-69
5 multi-story	>50	>24	G	>69

Marten are known to exist in suitable habitat on all the National Forests in the Sierra Nevada Province. They most often occur at somewhat higher elevations than fisher (Freel 1991).

Numerous and heavily traveled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for marten as well as fisher (Allen 1987) due to prey population decreases resulting from road kills and/or behavioral barriers to movement. Occasional one and two lane forest roads with moderate levels of traffic should not limit marten movements.

Bennett and Samson (1984) identified three major causes for concern regarding the distribution and abundance of marten in the Rocky Mountains. These causes are generally applicable throughout the range of marten in North America. First, the current distribution of marten is a small portion of their historic range. Secondly, extensive habitat destruction and fragmentation along with trapping and fire are major factors contributing to this contraction of historic range. Finally, large home range sizes combined with low reproductive potential and an affinity for habitats that have decreased dramatically over time result in limited ability for populations to recover from natural or human caused disturbances.

In Utah Hargis and Bissonette (1995) found that marten captures declined as openings in the landscape increased. They also noted declines in marten captures as edge increased and where open areas were more closely spaced. In that study, no captures occurred where openings occupied greater than 35 percent of the landscape or where the average distance between openings was less than 100 meters. They recommend that land managers identify forested areas approximately 2-3 square miles in size that contain structural attributes associated with optimum marten habitat (large diameter conifers, canopy cover > 30 percent, and abundant large diameter logs), and to maintain the landscape so that the percentage of non-forested acreage does not exceed 20 percent of the total (including clearcuts, meadows, and natural openings). They further state that the forested areas need not be closed to timber harvests, but selective cutting methods should be considered over clearcutting when possible. Where clearcutting is used, cut blocks should be separated by forested buffers greater than 650 feet wide.

In Maine, Chapin et al. (1997) indicate that marten may neither prefer nor require conifer-dominated forests or forests with a closed overstory canopy throughout all of their geographic range. In their study, marten selected stands with an abundance of snags, high volume of fallen dead trees and root mounds, and regenerating understory of deciduous and coniferous vegetation, despite canopy closures of mature trees less than 50 percent, and typically less than 30 percent. Rather, vertical and horizontal structure may be more important habitat attributes than age or species composition of the forest overstory (Buskirk and

Ruggiero 1994). Chapin et al. (1997) recommend that conservation practices focus on structural attributes that functionally influence the quality of forested habitats for marten, rather than merely age, species composition, and canopy closure of overstory trees, and that these structural requirements could be maintained in a variety of managed and unmanaged stands.

Prey species abundance is a critical component of the habitat and there is some dietary overlap with the Pacific fisher. Both species prey heavily upon squirrels. Marten prey items may vary seasonally however. Simon (1980) found insects dominating the diet in summer and fall, while Douglas squirrels (*Tamiasciurus douglasii*) provided the bulk of winter and spring nourishment. At Sagehen Creek, CA, on the Tahoe National Forest, Zielinski (1983) found microtine rodents the most frequent year-round prey. Chickaree, snowshoe hare, northern flying squirrel, and deer mouse were taken almost exclusively during the winter; and squirrels and chipmunks formed the largest component of the diet from late spring through fall.

Coarse woody debris is an important component of marten habitat, especially in winter, by providing structure that intercepts snowfall and creates subnivean tunnels, interstitial spaces, and access holes. Zielinski et al. (1983) suggested that marten activity varied to allow them to take advantage of subnivean dens utilized by their prey. Sherburne and Bissonette (1994) found marten more likely to utilize subnivean access points that contained more abundant prey. They also found that when coarse woody debris covered a greater percent of the ground, marten use also increased. They state that only older growth forests with accumulated coarse woody debris provide the forest floor structure necessary to enable marten to forage effectively during the winter.

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CALIFORNIA WOLVERINE

Wolverine is a California State Threatened species. The Eldorado LRMP does not provide specific guidelines for this species. However, general guidelines provide for the management of old forest habitat and wilderness guidelines provide for the retention of remote, undisturbed landscapes.

Wolverine are generally considered a solitary species, with adults apparently associating only during the breeding season (Butts 1992). Home ranges of opposite sexes overlap (Powell 1979). However, partial overlap of home ranges of some wolverines of the same sex is common (Ruggiero et al. 1994). Studies indicate that home ranges in North America may vary from less than 38.6 square miles to over 347.5 square miles. Males have larger territories than females. Individuals may move great distances on a daily basis; 15 to 30 miles a day is common for males, and some individuals have moved 60 to 70 miles in a single day. Except for females providing for offspring, or males seeking mates, movement is generally motivated by food (Ruggiero et al. 1994). Although wolverine are primarily nocturnal, diurnal movement is often recorded. During summer, long distance movements appear to be restricted to night when temperatures are cooler (Hornocker and Hash 1976).

Considered a scarce resident in California, the known habitat distribution occurs from Del Norte and Trinity counties east through Siskiyou and Shasta Counties, and south through the Sierra Nevada to Tulare County (Zeiner et al. 1990). Most sightings in the North Coast mountains fall within the 1600 to 4800-foot elevational range. In the northern Sierra Nevada, most sightings fall between 4300 to 7300 feet, and in the southern Sierra Nevada, between 6400 to 10,800 feet. (Zeiner et al. 1990).

In the North Coast region, wolverine have been observed in Douglas-fir and mixed conifer habitats, and probably also use red fir, lodgepole, wet meadow, and montane riparian habitats (Schempf and White 1977, Zeiner et al. 1990). Habitats used in the northern Sierra Nevada include mixed conifer, red fir, and lodgepole pine. The species probably also uses subalpine conifer, alpine dwarf-shrub, wet meadows, and montane riparian (White and Barrett 1979, Zeiner et al. 1990). In the southern Sierra Nevada, habitat preference includes lodgepole pine, red fir, mixed conifer, subalpine conifer, alpine dwarf-shrub, barren, and probably wet meadows, montane chaparral, and Jeffrey pine (Zeiner et al. 1990).

White and Barrett (1979) state that wolverine is highly dependent upon mature conifer forests for survival in winter, and generally moves downslope in winter into heavier timber where food is available.

Wolverine is generally described as an opportunistic omnivore in summer and primarily a scavenger in winter (Ruggiero et al. 1994). In winter, most large prey is carrion, but large snowbound prey such as deer, elk, and moose, may also be killed. Wolverine caches food, and may be able to locate and retrieve prey under deep snow. During the summer, marmots, ground squirrels, gophers, mice, berries, insects, and even porcupines may be taken while foraging in open to sparse tree habitats on the ground, in trees, burrows, among rocks, and sometimes in shallow water (Zeiner et al. 1990, Ruggiero et al. 1994).

At the landscape level, the wolverine's large home ranges need to be considered in forest management planning (Banci 1994). However, what is understood about home range size and use is biased to remote, undeveloped northern habitats (Canada), and generally is not known for the Sierra Nevada.

Little is known regarding wolverine use in forested habitats. Wolverines have a close association with large ungulate mammals, such as deer. However, habitats managed for deer may not necessarily provide for the wolverine's other life needs. The low availability of natal dens may limit reproduction in some areas, and physical structure such as coarse woody debris may be important. According to Banci (1994), management prescriptions that successfully provide for the life needs of species such as the American marten, fisher, lynx and their prey will also provide for the needs of wolverine at the stand level. It is not known whether this will provide for wolverine habitat needs at the landscape or larger scales.

During the winter of 1991/1992, the California Dept. of Fish and Game, University of California Berkeley, and five National Forests conducted a cooperative wolverine study using baited infra-red camera systems at 57 camera stations. Forests involved were the Inyo, Lake Tahoe Basin Management Unit, Shasta-Trinity, Stanislaus, and the Tahoe. No wolverines were detected.

Several incidental sightings of wolverine have been reported on the Eldorado National Forest since 1980, mostly from within the Desolation Wilderness. Sighting confirmed through track or photo identification have not been made, however.

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PALLID BAT

The pallid bat is a California Species of Special Concern. The Eldorado LRMP does not provide specific management direction for this species. However, general guidelines direct the forest to improve habitat capability for hardwood associated species.

Throughout California the pallid bat is usually found in low to middle elevation habitats below 6000 ft. (Philpott 1997), however, the species has been found up to 10,000 ft. in the Sierra Nevada (Sherwin pers. comm. 1998). Populations have declined in California within desert areas, in areas of urban expansion, and where oak woodlands have been lost (Brown 1996).

The status of this species is not well researched, but North American pallid bat populations have declined over the past 50 years (O'Shea and Bogan 2003), and data from California suggest population declines associated with desert and oak woodland habitat loss due to urban expansion (USDA 2001).

A variety of habitats are used, including grasslands, shrublands, woodlands, and coniferous forests (Philpott 1997). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a yearlong resident in most of their range and hibernate in winter near their summer roost (Zeiner et al. 1990). Occasional forays may be made in winter for food and water (Philpott 1997).

Day roosts may vary but are commonly found in rock crevices, tree hollows, mines, caves and a variety of human-made structures. Tree roosting has been documented in large conifer snags, inside basal hollows of redwoods and giant sequoias, and bole cavities in oaks (pers. comm. Sherwin 1998). Cavities in broken branches of black oak are very important, and there is a strong association with black oak for roosting (pers. comm. Pierson 1996). Roosting sites are usually selected near the entrance to the roost in twilight rather than total darkness. The site must protect bats from high temperatures, as this species is

intolerant of roosts in excess of 104 degrees Fahrenheit. Pallid bats are also very sensitive to roost site disturbance (Zeiner et al. 1990, Philpott 1997).

Night roosts are usually more open sites and may include open buildings, porches, mines, caves, and under bridges (Philpott 1997, pers. comm. Sherwin 1998, Pierson 1996).

Pallid bats are a gregarious species, often roosting in colonies of 20 to several hundred individuals. Pregnant females gather in summer maternity colonies of up to several hundred females, but generally fewer than 100 (Brown 1996). Parturition occurs between May and July. Young are weaned in mid to late August with maternity bands disbanding between August and October (Pers. comm. Sherwin 1998).

The pallid bat is very maneuverable on the ground and commonly feeds on large ground-dwelling arthropods. Common prey are Jerusalem crickets, longhorn beetles, and scorpions, but they will also forage at low heights of 0.5 to 2.5 meters above the ground on large moths and grasshoppers (Zeiner et al. 1990, Philpott 1997).

Risk Factors:

- 1) *White Nose Syndrome*- The largest emerging threat to all cave-roosting species is the fungal disease white-nose syndrome (WNS). Massive die-offs result once a colony is infected. Because pallid bats and fringed myotis readily uses caves for roosting, they are considered highly susceptible to contracting WNS. Although not yet documented in California, the disease is moving to the west.
- 2) *Timber Harvest and loss of snags as roosting sites* - The loss of large diameter snags and live trees for roosts due to fire or harvest activities can affect roost availability. Retention of existing large trees and management of forested habitat will provide short and long-term habitat.
- 3) *Fire Suppression*- Pallid bats are at risk from loss of open foraging habitat from fire suppression may reduce foraging habitat in the long-term.
- 4) *Mining*- The resurgence of gold mining in the West potentially threatens mine dwelling bat species such as pallid bats and fringed myotis (Macfarlane and Angerer *draft*). Recreational mining exploration has resulted in an increase in roost disturbance and abandonment. Closure of old mines for hazard abatement or safety can reduce habitat availability if mines aren't closed using bat friendly gates.
- 5) *Rangeland management*- Pallid bats frequently forage in open areas such as oak woodlands. Overgrazing and trampling may alter meadow hydrology or riparian ecosystems, resulting in reduced insect diversity, productivity, and reducing foraging success (Macfarlane and Angerer *draft*, Ferguson and Azerrad 2004).

Literature Cited (see literature cited Fringed Myotis combined)

FRINGED MYOTIS

The fringed myotis is a California Species of Special Concern. The Eldorado LRMP does not provide specific management direction for this species. However, general guidelines direct the forest to improve habitat capability for hardwood associated species.

The fringed myotis (*Myotis thysanodes*) is a Region 5 Forest Service Sensitive species and is designated as a Species of Special Concern by CDFW. The fringed myotis occurs from southern British Columbia south through the western United States and most of Mexico (O'Shea and Bogan 2003). In California, it

occurs from near sea level at the coast to elevations of at least 6,400 feet in the Sierra Nevada and in a variety of habitats from low desert scrub to high-elevation conifer forest (Philpott 1997). The fringed myotis is a widely distributed species, but it is considered rare (Ibid). Although this species occurs in netting and night roost surveys in a number of localities, it is always one of the rarest taxa (Pierson et al. 1996).

In California, the fringed myotis occurs in valley foothill hardwood, hardwood conifer, and coniferous forested habitats. In mist netting surveys, they are found on secondary streams and ponds (Stanislaus National Forest survey records). They roost in caves, buildings, mineshafts, rock crevices and bridges (O'Farrell and Studier 1980). Studies conducted in California, Oregon, and Arizona, have documented that fringed myotis roosts in tree hollows, particularly in large conifer snags (Chung-MacCoubrey 1996, Rabe et al. 1998, Weller and Zabel 2001, Pierson et al. 2006). Most of the tree roosts were located within the tallest or second tallest snags in the stand and were surrounded by reduced canopy closure (Ibid).

They are gregarious and can be found roosting with other bat species, such as the long eared myotis (M. Baumbach pers. obs.). They exhibit high roost site fidelity, sometimes in different trees but within a small area (O'Farrell and Studier 1980, Weller and Zabel 2001). Fringed myotis are highly sensitive to roost site disturbance (Ibid).

Fringed myotis also breed in the fall, with delayed implantation occurring in the spring. Females give birth to one young per year typically from May to July (Philpott 1997). Maternity colonies may contain up to several hundred individuals. In California in recent years smaller colonies of 25-50 are more typical.

Individual fringed myotis emerge from roost sites to forage approximately 1-2 hours after sunset. They forage in and among vegetation along forest edges and in the overstory canopy. They feed on a variety of insect prey, including small beetles, moths, and fly larvae caught in flight or gleaned from vegetation (Ibid). Fringed myotis often forage in meadows and along secondary streams, in fairly cluttered habitat. (Pierson et al. 2001). They are known to fly during colder temperatures and precipitation (Hirshfeld and O'Farrell 1976). Even snow does not appear to affect emergence (O'Farrell and Studier 1975, M. Baumbach pers. obs.). Keinath (2004) found that travel distances from roosting to foraging areas may be up to five miles.

Dispersal patterns are also unknown for fringed myotis. Although known to migrate, little is known regarding the species movement (O'Farrell and Studier 1980). Fringed myotis are year-round residents in California and are known to hibernate but are also capable of periodic winter activity (Philpott 1997).

Risk Factors:

- 1) *White Nose Syndrome*- The largest emerging threat to all cave-roosting species is the fungal disease white-nose syndrome (WNS). Massive die-offs result once a colony is infected. Because pallid bats and fringed myotis readily uses caves for roosting, they are considered highly susceptible to contracting WNS. Although not yet documented in California, the disease is moving to the west.
- 2) *Timber Harvest and loss of snags as roosting sites*- The loss of large diameter snags and live trees for roosts due to fire or harvest activities can affect roost availability. In some forested settings, the fringed myotis appears to rely heavily on tree cavities and crevices as roost sites (Weller and Zable 2001), and may be threatened by certain timber harvest practices that result in the removal

of snags. Retention of existing large trees and management of forested habitat will provide short and long-term habitat.

- 3) *Mining*- The resurgence of gold mining in the West potentially threatens mine dwelling bat species such as pallid bats and fringed myotis (Macfarlane and Angerer *draft*). Recreational mining exploration has resulted in an increase in roost disturbance and abandonment. Closure of old mines for hazard abatement or safety can reduce habitat availability if mines aren't closed using bat friendly gates.
- 4) *Rangeland management*- Fringed myotis frequently forage along riparian corridors or over meadows. Overgrazing and trampling may alter meadow hydrology or riparian ecosystems, resulting in reduced insect diversity, productivity, and reducing foraging success (Macfarlane and Angerer *draft*, Ferguson and Azerrad 2004).

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TOWNSEND'S BIG-EARED BAT

Management Status and Direction

The Townsend's big-eared bat is a FWS Species of Concern and a California Species of Special Concern. The Eldorado LRMP does not provide specific management guidelines for this species. However, general management guidelines address hardwood, riparian, and meadow habitats.

Life History and Habitat Requirement

The Townsend's big-eared bat occurs throughout the west and is distributed from the southern portion of British Columbia south along the Pacific Coast to central Mexico and east into the Great Plains, with isolated populations occurring in the south and southeastern United States (Sherwin 1998).

In California, the species is typically found in low desert to mid-elevation montane habitats, although sightings have been reported up to 10,800 feet (Philpott 1997, Sherwin 1998). Habitat associations include desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, active agricultural areas and coastal habitat types (Kunz and Martin 1982, Brown 1996, Sherwin 1998). The Mother Lode within the Sierra Nevada foothills has been known historically as the "heart of concentrations" (Pierson 1996). Distribution of this species is strongly correlated with the availability of caves and cave-like roosting habitat (Sherwin 1998). Populations have incurred serious declines over the past 40 years in parts of California (Brown 1996).

Townsend's are a year-round California resident. Individuals are very loyal to their natal sites and usually do not move more than 10 kilometers from a roost site (Pierson et al. 1991, Pierson 1996). They roost within caves, abandoned mines, and buildings. Buildings must offer cave-like spaces in order to be suitable. This species is highly sensitive to roost disturbance (Brown 1996). Night roosts may occur in more open settings, including under bridges (Philpott 1997).

Historically, maternal colonies may have contained several hundred individuals. However, maternal colonies at the present usually contain from 35 to 150 individuals (Brown 1996). Maternal colonies select warm parts of the structure, and usually roost in that zone (Kunz and Martin 1982). These colonies form between March and June (may vary by local climate conditions), with a single pup born between May and July (Sherwin 1998). Pups are fully weaned by six weeks (Kunz and Martin 1982). Females usually remain alert and active in maternity roosts. Clusters of females hang on open surfaces, making them readily detectable.

Males remain solitary during the summer. Winter hibernating colonies are composed of mixed-sexed groups and may range from a single individual to several hundred animals (Sherwin 1998). This bat hibernates throughout its range in caves and mines where temperatures are 55 degrees Fahrenheit or less, but generally above freezing. Roost sites are usually in the cooler air near the cave or mine entrance (Barbour and Davis 1969, Kunz and Marten 1982). Individuals may move during winter in response to temperature change (Barbour and Davis 1969).

Foraging usually begins well after dark (Kunz and Marten 1982). Foraging associations include edge habitats along streams and areas adjacent to and within a variety of wooded habitats (Sherwin 1998). In California, the species is shown to forage preferentially in association with native vegetation (Brown 1996). Flight is slow and maneuverable, with the species capable of hovering (Zeiner et al. 1990) and gleaning insects off foliage (Brown 1996). The Townsend's bat is a moth specialist, with over 90% of its diet composed of lepidopterans (Sherwin 1998).

Identification and protection of significant roost sites is still needed in most areas, and significant populations need to be monitored over time (Sherwin 1998).

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*WESTERN BUMBLE BEE**Management Status and Direction*

The western bumble bee (*Bombus occidentalis*) is a Region 5 Forest Service sensitive species. Eldorado LRMP does not provide specific management guidelines for this species.

Life History and Habitat Requirements

Bombus occidentalis currently occurs in all states adjacent to California. Historically, the species was broadly distributed across western North America along the Pacific Coast and westward from Alaska to the Colorado Rocky Mountains (Thorp and Shepard 2005, Koch et al. 2012). Historically, *B. occidentalis* was one of the most broadly distributed bumble bee species in North America (Cameron et al. 2011). Six bumble bee occurrences are known on the Tahoe NF prior to 2000 (www.xerces.org).

Currently, the western bumble bee is experiencing severe declines in distribution and abundance due to a variety of factors, including diseases and loss of genetic diversity (Tommasi et al. 2004, Cameron et al. 2011, Koch et al. 2012).

Bumble bees introduced from Europe for commercial pollination apparently carried a microsporidian parasite, *Nosema bombi*, which has been introduced into native bumble bee populations. Highest incidences of declining *B. occidentalis* populations are associated with highest infection rates with the *Nosema* parasite, and the incidence of *Nosema* infection is significantly higher in the vicinity of greenhouses that use imported bumble bees for pollination of commercial crops (Cameron et al. 2011).

Although the general distribution trend is steeply downward, especially in the west coast states, some isolated populations in Oregon and the Rocky Mountains appear stable (Rao et al. 2011, Koch et al. 2012). The overall status of populations in the west is largely dependent on geographic region: populations west of the Cascade and Sierra Nevada mountains are experiencing dire circumstances with steeply declining numbers, while those to the east of this dividing line are more secure with relatively unchanged population sizes. The reasons for these differences are not known.

Bumble bees are threatened by many kinds of habitat alterations that may fragment or reduce the availability of flowers that produce the nectar and pollen they require, and decrease the number of abandoned rodent burrows that provide nest and hibernation sites for queens. Major threats that alter landscapes and habitat required by bumble bees include agricultural and urban development. Exposure to organophosphate, carbamate, pyrethroid and particularly neonicotinoid insecticides has recently been identified as a major contributor to the decline of many pollinating bees, including honey bees and bumble bees (Henry et al. 2012, Hopwood et al. 2012). In the absence of fire, native conifers encroach upon meadows, which also decreases foraging and nesting habitat available for bumble bees.

According to studies done in England (Goulson et al. 2008), grazing during the autumn and winter months may provide excellent bumble bee habitat and prevent the accumulation of coarse grasses. Heavy grazing and high forage utilization can negatively impact bumble bees since flowering plants providing necessary nectar and pollen may become unavailable, particularly during the spring and summer when queens, workers and males are all present and active.

Queens overwinter in the ground in abandoned rodent (i.e. mouse, chipmunk or vole) nests at depths from 6-18 inches and typically emerge about mid-March. The queen then lays fertilized eggs and nurtures a new generation. She first creates a thimble-sized and shaped wax honey pot, which she provisions with

nectar-moistened pollen for 8-10 individual first-generation workers when they hatch. The larvae will receive all of the proteins, fats, vitamins and minerals necessary for growth and normal development from pollen. Eventually all the larvae will spin a silk cocoon and pupate in the honey pot. The workers that emerge will begin foraging and provisioning new honey pots as they are created to accommodate additional recruits to the colony. Individuals emerging from fertilized eggs will become workers that reach peak abundance during July and August. Foraging individuals are largely absent by the end of September. Those that emerge from unfertilized eggs become males, which do not forage and only serve the function of reproducing with newly emerged queens. During the season, a range of 50 to hundreds of individuals may be produced depending on the quantity and quality of flowers available. When the colony no longer produces workers, the old queen will eventually die and newly emerged queens will mate with males and then disperse to found new colonies. During this extended flight that may last for up to two weeks she may make several stops to examine the ground for a suitable burrow. Mikkola (1984) reported that bumble bees may forage up to a distance of 80 km in Finland (Heinrich 1979).

Unlike all other bees, bumble bees are large enough to be capable of thermoregulation, which allow them to maintain their foraging activities for longer periods of the day, but also to occupy regions with more extreme latitudes and temperatures compared to other bees (Heinrich 1979). Bumble bees may continue to forage when temperatures are below freezing even in inclement weather (Heinrich 1979).

Queens end the year by locating a sheltering burrow, where they may spend the winter months under cover. Where nesting habitat is scarce, bumble bee species having queens that emerge early (mid-March) in the season like *B. vosnesenskii* which co-occurs with the later emerging *B. occidentalis*, may be able to monopolize available nest sites and reduce the chances of success for bumble bee species emerging later.

Western bumble bees have a short proboscis or tongue length relative to other co-occurring bumble bee species, which restricts nectar gathering to flowers with short corolla lengths and limits the variety of flower species it is able to exploit. Western bumble bees have been observed taking nectar from a variety of flowering plants, including *Aster* spp., *Brassica* spp., *Centaurea* spp., *Cimicifuga arizonica*, *Corydalis caseana*, *Chrysothamnus* spp., *Cirsium* spp., *Cosmos* spp., *Dahlia* spp., *Delphinium nuttallianum*, *Erica carnea*, *Erythronium grandiflorum*, *Foeniculum* spp., *Gaultheria shallon*, *Geranium* spp., *Gladiolus* spp., *Grindelia* spp., *Haplopappus* spp., *Hedysarum alpinum*, *Hypochoeris* spp., *Ipomopsis aggregata*, *Lathyrus* spp., *Linaria vulgaris*, *Lotus* spp., *Lupinus monticola*, *Mentha* spp., *Medicago* spp., *Melilotus* spp., *Mertensia ciliata*, *Monardella* spp., *Nama* spp., *Origanum* spp., *Orthocarpus* spp., *Pedicularis capitata*, *P. kanei*, and *P. langsdoeffii*, *P. groenlandica*, *Penstemon procerus*, *Phacelia* spp., *Prunus* spp., *Raphanus* spp., *Rhododendron* spp., *Salix* spp., *Salvia* spp., *Solidago* spp., *Symphoricarpos* spp., *Tanacetum* spp., *Taraxacum* spp., *Trifolium dasyphyllum*, *Trichostema* spp., *Trifolium* spp. and *Zea* spp. (Evans et al. 2008).

Predominantly due to the stand-altering fires experienced during the 2008 Westville Fire and the 2013 American Fire, there is a large amount of western bumble bee habitat which exists or will exist in the project area in the near future. Generally low levels of forest canopy cover in the treatment units and adjoining areas have increased the opportunity for flowering plants to become established within the analysis area and may support western bumble bees. Flowering plants such as asters, lupines, monardellas, penstemons, and phacelias may be present nearby or could colonize the treatment units during the 20-year analysis period.

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APPENDIX C

IPaC List:

Threatened, Endangered, Candidate, and
Proposed Species Critical Habitat
Within the Three Meadows Project Area



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To:

January 23, 2020

Consultation Code: 08ESMF00-2020-SLI-0838

Event Code: 08ESMF00-2020-E-02643

Project Name: Three Meadows Restoration Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office

Federal Building

2800 Cottage Way, Room W-2605

Sacramento, CA 95825-1846

(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2020-SLI-0838

Event Code: 08ESMF00-2020-E-02643

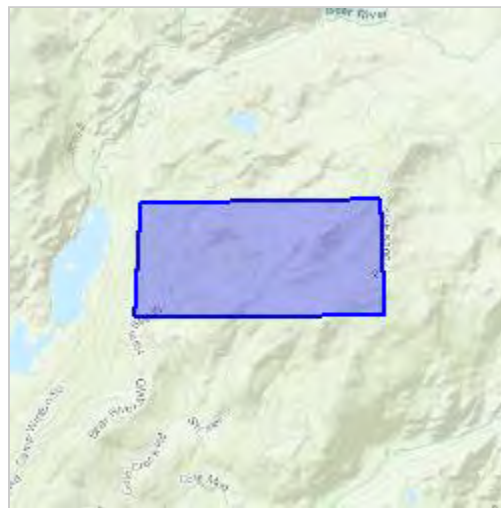
Project Name: Three Meadows Restoration Project

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: Restore hydrology within three small alpine meadows: Upper Onion, High Onion, and Tyler meadows for the benefit of SNYLF habitat and habitat for sensitive plant species.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/38.56578368811218N120.18382020926299W>



Counties: Amador, CA

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Fisher <i>Pekania pennanti</i> Population: West coast DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3651	Proposed Threatened

Amphibians

NAME	STATUS
Sierra Nevada Yellow-legged Frog <i>Rana sierrae</i> There is final critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9529	Endangered
Yosemite Toad <i>Anaxyrus canorus</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7255	Threatened

Fishes

NAME	STATUS
Delta Smelt <i>Hypomesus transpacificus</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Sierra Nevada Yellow-legged Frog <i>Rana sierrae</i> https://ecos.fws.gov/ecp/species/9529#crithab	Final

Appendix C

Aquatic Biological Assessment for the Three Meadows Restoration Project
February 5, 2020

Eldorado National Forest Amador Ranger District

Aquatic Biological Assessment

For the
Three Meadows Restoration Project
February 5, 2020

Project Location:
Amador County, California
T19N, R16E Sections 01, 03, and 11 MDBM.

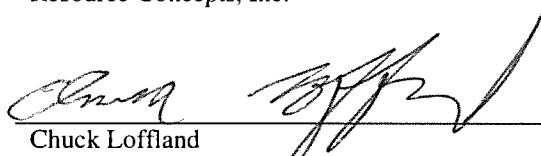
Prepared By:

JoAnne Michael

Date: February 5, 2020

JoAnne Michael
Senior Environmental Specialist
Resource Concepts, Inc.

Reviewed By:


Chuck Loffland
Amador District Wildlife Biologist
Eldorado National Forest

Date:

February 18, 2020

EFFECTS DETERMINATIONS

Species	Status	Determination
Sierra Nevada Yellow-legged Frog (<i>Rana sierrae</i>)	Endangered	May affect and is not likely to adversely affect
Sierra Nevada Yellow-legged Frog Critical Habitat	Designated	May affect and is not likely to adversely affect
Yosemite Toad (<i>Anaxyrus canorus</i>)	Threatened	No Effect
Delta smelt (<i>Hypomesus transpacificus</i>)	Threatened	No Effect

Contact Person: Chuck Loffland Phone Number: (209) 295-5954 email: cloffland@usda.gov

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APPENDICES

Appendix A	Three Meadows Restoration Project Photographs
Appendix B	U.S. Fish and Wildlife Service Letter Listing Threatened, Endangered, Candidate, and Proposed Species Critical Habitat

I. INTRODUCTION

Section 7 of the Endangered Species Act (ESA) of 1973 as amended directs federal departments and agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any federally threatened, endangered, proposed, or candidate (TEPC) species or result in the destruction or adverse modification of their critical habitats. Directive 2672.4 in the Forest Service Manual (FSM), pursuant to legal requirements set forth for implementing Section 7 of the ESA (16 U.S.C. 1536 (c)), requires a biological assessment (BA) be prepared for all proposed projects that may have effects upon TEPC species. The BA is designed to document potential impacts to TEPC species and provide guidance to determine whether formal consultation or conference is required with the United States Department of Interior Fish and Wildlife Service (USFWS).

Species Considered for Analysis

Threatened, Endangered, Proposed, or Candidate Species

Following Section 7(c) of the ESA, the USFWS Information for Planning and Conservation (IPaC) website (<https://ecos.fws.gov/ipac/>) was accessed on August 6, 2019; (1) to obtain a current list of TEPC species that may be present in the vicinity of the project area and (2) to locate any proposed or designated critical habitat that may be present in the vicinity of the project area. The full IPaC report can be found in Appendix B. The scope of this BA is limited to the aquatic species identified in the IPaC report (Table 1).

Table 1 is included in this analysis document to aid in determining which TEPC species are to be considered for analysis. The potential for direct, indirect, and cumulative effects to individuals and critical habitat were considered. Species with potential for effects are indicated with a “Yes” and are analyzed in detail in the BA. Species with no potential for effects were not analyzed in detail following the generic rationale listed here:

1. No effect to downstream water quality or quantity.
2. Project does not occur within or affect suitable habitat.
3. Project does not occur within known or suspected species range.
4. Project does not affect identified management areas.
5. Project does not affect specific habitat features important to the species.
6. Project limited operating periods (LOP) or design avoids seasonal effects.

Table 1. Evaluation of Potential for Project Effects to Federally Listed Species

Federally Listed					
Species	Status	Preferred Habitat	Project Potential for Effects	No	Yes
Sierra Nevada yellow-legged frog (SNYLF) <i>(Rana sierrae)</i>	FE	Above 4,500 ft. High elevation low-gradient streams and small ponds that are either intermittent or perennial	Project area within elevation range and designated critical habitat. Potential to impact species and potential dispersal habitat; however, design criteria will minimize impacts to the species and suitable habitat. Recent surveys (2019) did not detect any species in project area.		✓
Sierra Nevada yellow-legged frog (SNYLF) <i>(Rana sierrae)</i>	CH	Above 4,500 ft. High elevation low-gradient streams and small ponds that are either intermittent or perennial	Project meadows are located within designated critical habitat. Short-term temporary impacts to critical habitat will occur during construction; overall project objective is to improve habitat for SNYLF.		✓
Yosemite toad (YOTO) <i>(Anaxyrus canorus)</i>	FT	Above 6,400 feet. Breeding habitat occurs in lakes, ponds and wetlands, south from the Blue Lakes region of Alpine County.	The project area is located within Yosemite Toad habitat distribution but does not contain suitable habitat. Based on 2019 VES surveys, there are no known occurrences. The nearest occurrence to the project area is 10.7 miles east of High Onion Valley at Wheeler Lake. Designated critical habitat is located approximately 3.0 miles to the east. No impacts to individuals or suitable habitat are expected.	2,3,4	
Delta smelt <i>(Hypomesus transpacificus)</i>	FT	Sacramento-San Joaquin delta	Species is listed on the IPaC list; however, species is outside of habitat range and suitable habitat for the project area. Endemic to the Sacramento-San Joaquin delta and Suisun Bay; spawns in the sloughs and channels of the upper delta or north of Suisun Bay. No populations on Eldorado National Forest land.	2,3,4	
FE = Federal Endangered; FT = Federal Threatened; P = Proposed Federal listing; CH = Critical Habitat					

II. CONSULTATION TO DATE

The Pacific Southwest Region (R5) of the Forest Service and the USFWS completed consultation on activities that R5 Forests implement programmatically. The programmatic “Biological Opinion on Nine Forest Programs on Nine National Forests in the Sierra Nevada of California for the Endangered Sierra Nevada Yellow-legged frog, Endangered Northern Distinct Population Segment of the Mountain Yellow-legged frog, and Threatened Yosemite Toad” (ref # FFO8ESMFOO-2014-F-0557) was signed into effect on December 19, 2014 (USDI 2014). The Three Meadows Restoration has been designed to be consistent with all of the Conservation Measures and Terms and Conditions described in the programmatic Biological Opinion (USDI 2014).

Coordination and formal consultation with the USFWS will be completed by the USFS to discuss biological concerns related to the Three Meadows Restoration Project. A summary of the coordination and consultation to date is provided below. To date, informal consultation has been completed through access and review of the USFW’s Information Planning and Consultation (IPaC) website.

The USFWS’s IPaC web site (<https://ecos.fws.gov/ipac/>) was accessed on January 23, 2020 to request a list of, threatened, endangered, candidate and proposed species and proposed or designated critical habitat that may occur in the vicinity of the project. This list is incorporated in this report as Appendix B.

III. CURRENT MANAGEMENT DIRECTION

Current Forest Service policy (FSM 2670 [USDA 1990]) is to manage National Forest System lands so that the special protection measures provided under the ESA will no longer be necessary, and threatened or endangered species will become de-listed. The Sierra Nevada Forest Plan Amendment Environmental Impact Statement (EIS) (USDA 2004) provides direction for the management of threatened and endangered species. The Aquatic Management Strategy in the EIS directs that Forests utilize administrative measures to protect and restore aquatic, riparian, and meadow ecosystems and provide for the viability of native animal species associated with these ecosystems. The following Riparian Conservation Objectives pertain to aquatic endangered, threatened, and sensitive species in the Three Meadows Restoration Area:

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 instream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.

- Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the Riparian Conservation Areas (RCA).
- 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.
- 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.

- Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.

The Record of Decision for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USDA Forest Service 2004b) directs the Agency to conduct a Riparian Conservation Objectives analysis for projects occurring within RCAs.

The Three Meadows Restoration will implement management direction provided by the Eldorado National Forest Plan, as amended by the Sierra Nevada Forest Plan Amendment (SNFPA 2004).

Forest Service Manual (FSM)

FSM 2672.42 (USDA Forest Service 1990) directs that a (BA) be prepared for all proposed projects that may have effects upon USFWS listed threatened, endangered, and proposed species. In addition, FSM 2670.32 (USDA Forest Service 1990) directs that a BA be prepared to determine the effects of proposed projects on USDA Forest Service Region 5 designated threatened, endangered and sensitive species.

Eldorado National Forest Land and Resource Management Plan (USDA 1989)

IV. Management Direction, B. Goals and Objectives, 1. Goals, Fish and Wildlife:

- Maintain and enhance populations of Threatened and Endangered wildlife and plant species and maintain viable populations of Sensitive Species.
- Provide a diverse habitat for all species, including harvestable game fish and wildlife.

IV. Management Direction, F. Forest Practices, Element C – Fish and Wildlife:

- Maintain and enhance plant and animal communities (including Threatened and Endangered species) in accordance with federal law, regional guidelines, and Forest needs.

IV. Management Direction, G. Standards and Guidelines, 1. Forest-wide Standards and Guidelines, General Direction, Fish and Wildlife:

- Maintain and enhance habitat for fish and wildlife species.
- Provide cover and forage for wildlife species depended on meadows and the adjacent forest edge. Maintain the integrity of the meadow ecosystem.
- Utilize administrative measures to protect and improve Threatened, Endangered, Rare, and Sensitive wildlife species.

Species Specific Direction

The USFWS, in consultation with the Forest Service Region 5, issued a programmatic biological opinion (BO) on December 19, 2014 that provides guidance to avoid or minimize the effects of Forest Service projects on three federally listed species, the Sierra Nevada yellow-legged frog (SNYLF), the Northern Distinct Population Segment of the mountain yellow-legged frog, and the Yosemite toad (USDI 2014). The programmatic BO covers nine National Forests in the Sierra Nevada including the Eldorado and relates to nine broad categories of projects: vegetation management, road and trail maintenance, maintenance of developed recreation sites and administrative infrastructure, special use permits, rangeland management, biological resource management, invasive species management, mining, and lands (real estate). The detailed conservation measures in the programmatic BO are based on Forest Service Standards and Guides documented in the SNFPA Final Supplemental Environmental Impact

Statement Record of Decision (USDA Forest Service, 2004b) and the Region 5 Best Management Practices (USDA Forest Service 2011).

Critical Habitat

The USFWS designated Critical Habitat for the SNYLF on August 26, 2016 (USFWS 2016). This final ruling codifies the proposed Critical Habitat and designated approximately 1,082,147 acres as Critical Habitat for the SNYLF. Subunit 2E (the Crystal Range unit) occupies approximately 71,138 acres and 2F (East Amador Unit) occupies 92,943 acres on the Eldorado National Forest (ENF). All three meadows within the project boundary are located within the East Amador Unit. Impacts to SNYLF designated critical habitat will be described in detail below.

IV. DESCRIPTION OF PROPOSED ACTIONS

The ENF, Amador Ranger District in Amador County, California in cooperation with the Amador Resource Conservation District and the Amador-Calaveras Consensus Group proposes to restore mountain meadow habitat at three small high-elevation meadows: Upper Onion Valley, High Onion Meadow, and Tyler Meadow. This BA analyzes proposed actions for restoration of the natural morphology of the three meadows to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation.

Location: The project area encompasses three relatively small, high elevation meadows in Amador County, California on lands administered by the USDA Forest Service, Amador Ranger District, Eldorado National Forest. The three meadows include Upper Onion Valley, High Onion, and Tyler, which are located 45 miles east of Jackson, California, and five miles south of State Highway 88, in the vicinity of the Upper Bear River Reservoir (reference Figure 1).

Meadow Name	Location	Project Area	Elevation
Upper Onion Valley	T8N, R16E, Sec 11	26.8 acres	7,480
High Onion Meadow	T8N, R16E, Sec 1	10.2 acres	8,000
Tyler Meadow	T8N, R16E, Sec 3	10.3 acres	6,800

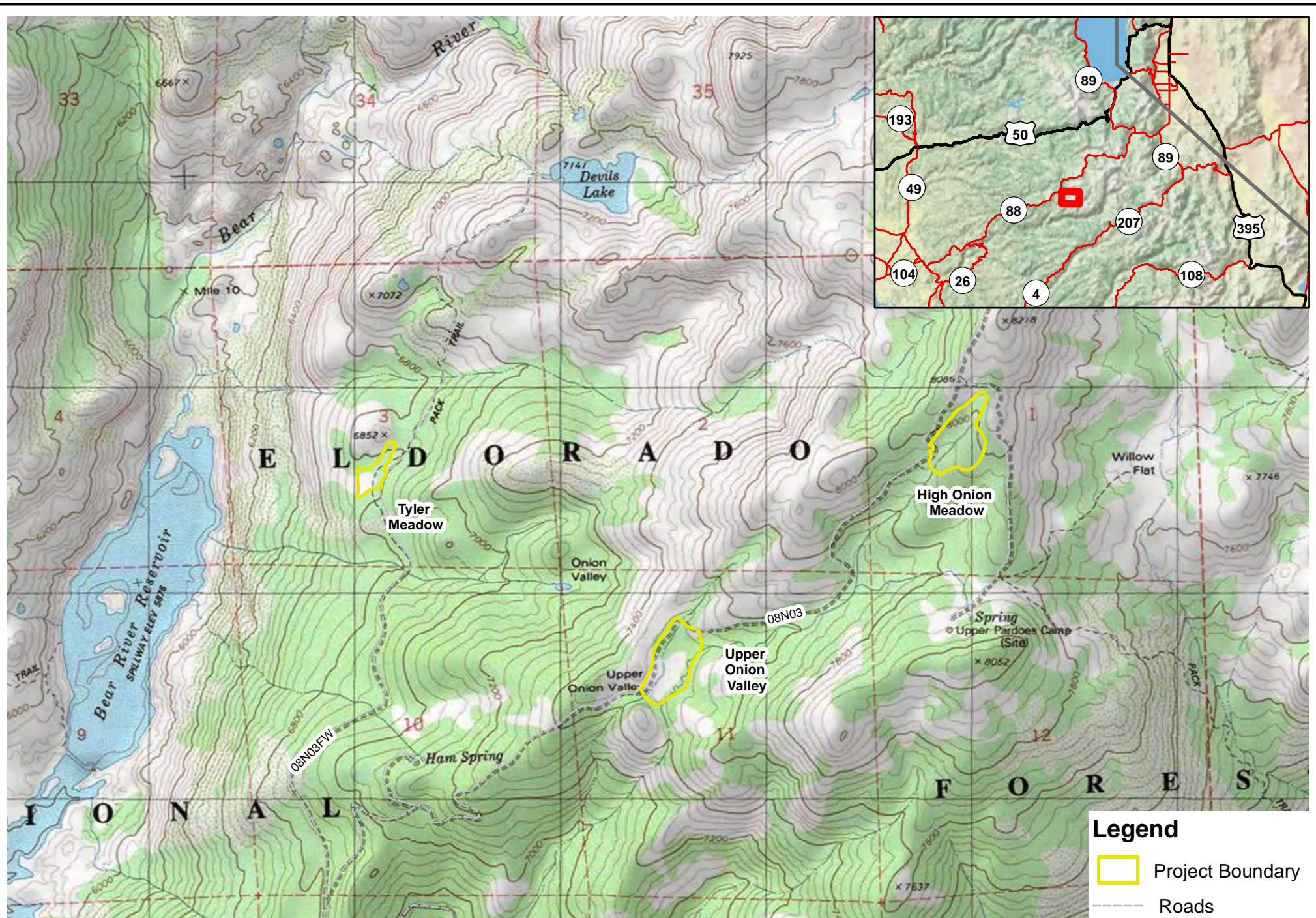


Figure 1: Location Map
Three Meadows Restoration Project

Proposed Action

To achieve the above restoration goals, each of the three meadows has its own management action plan to resolve specific resource concerns as described below.

Upper Onion Valley

The proposed restoration actions for Upper Onion Valley include installation of rock riffles and log weirs. The constructed rock riffles and log weirs would be located in existing, incised channels to stabilize the profile grade within the meadow channel, encourage aggradation, restore the hydraulic continuity of flow through the meadow, and raise the groundwater table (reference Figure 2). Rock riffles would be placed in greater than one foot in depth, forming a system of short rock riffle segments interspersed with longer pools. For the constructed riffles a four foot long riffle crest would be established that is keyed into the streambed and banks. Rock ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and at a 1:1 slope at the upstream end. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Approximately twenty-one (21) constructed rock riffles would be placed within Onion Creek, the main channel through the Upper Onion Valley.

Additionally, the project activities at Upper Onion Valley include the installation of twenty-five (25) log weirs as grade control located primarily within lower energy, less incised portions of the channel network. It is estimated that approximately seventy-three (73) logs less than 30" diameter at breast height (dbh) would be needed to construct the weirs and would be harvested from trees within the meadow, along the designated access routes, or near the meadow margins. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

To provide downstream grade control for the meadow, a roughened channel will be constructed at outlet of meadow. The purpose of the structure is to actively raise water surfaces through the channels and meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and bury the upstream grade control structures. The roughened channel will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream of the crest and extend upstream of the crest at a 1:1 slope for approximately 10 feet to protect against undermining of the roughened channel. The roughened channel should be a minimum of three feet thick, composed of rock material of various sizes, and would look like a long sloping riffle when completed. Rock would likely be imported to the site from Forest Service rock staging areas in the district.

In addition, the proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area at the north end of the meadow (reference Figure 1). Currently flow within the channel is captured and rerouted within the existing roadbed rather than the natural stream channel (reference photo 6 in Appendix A). To restore and contain the flows within the original stream channel, the restoration project

would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel. The berms on each side of the stream channel would be built up two feet with a 1.5 inch aggregate base material. The placement of the base material above the stream bank at 5:1 slopes will contain the streamflow in the original channel and prevent the water from flowing within the existing roadbed. The aggregate base material will be located within the roadbed above the stream channel.

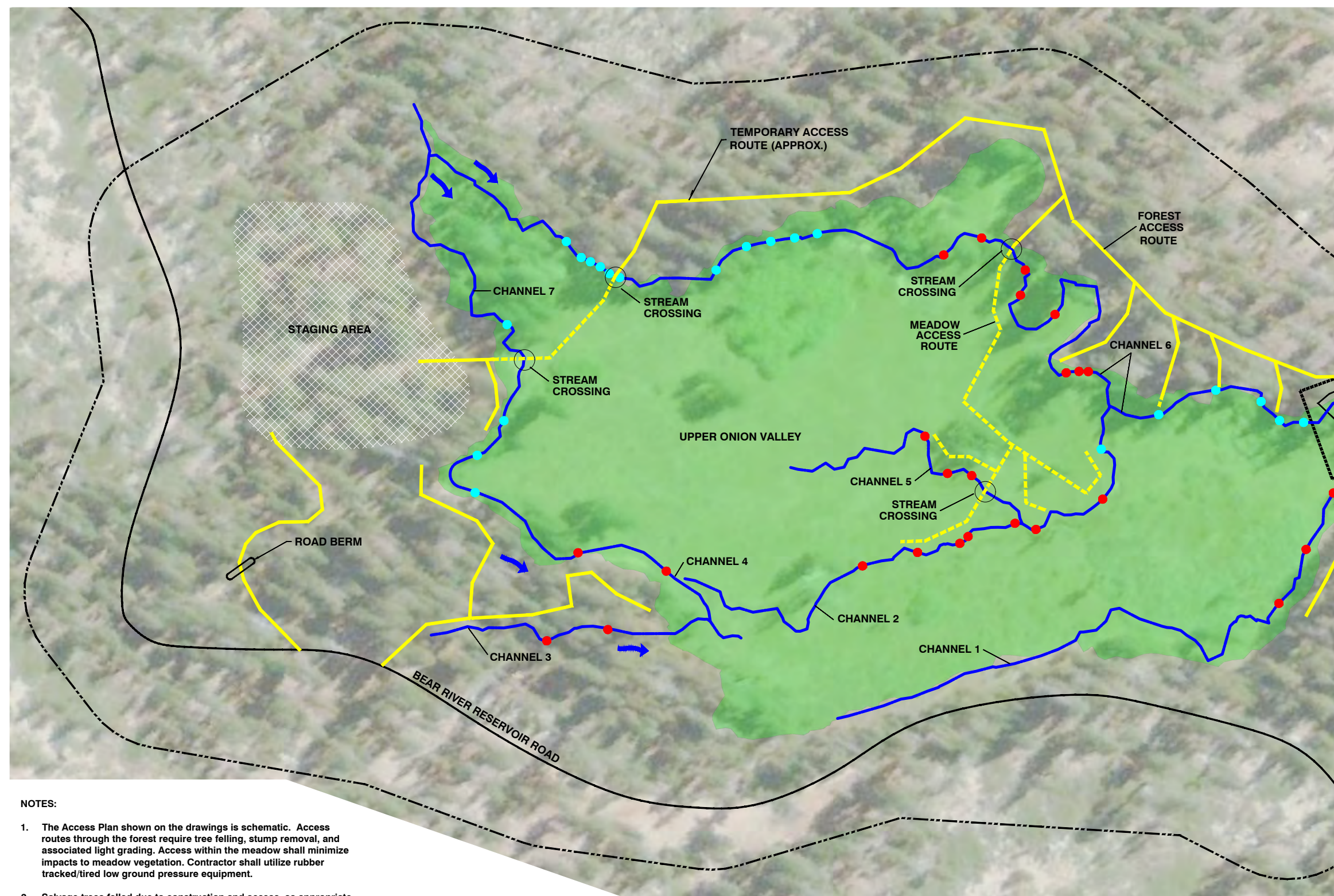
The Upper Onion Valley site would be accessed by Bear River Reservoir Road (FS Road 08N03), a well-developed road that runs along the entire western and northern sides of the meadow. Staging of equipment and materials would occur at an existing primitive campground located at the northern (up gradient) edge of the meadow. Temporary access routes originating from the staging area and Bear River Reservoir Road would be utilized to access the interior of the site for placement of log weirs on the smaller, interior channels. Access routes would be field fit to minimize impacts caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road, steel plates, or marsh mats would be used. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions and elevation.

High Onion Meadow

The proposed action for High Onion Meadow includes the installation of low weir grade control structures in the primary meadow channel to limit additional downcutting, manage the timing and duration of grazing, and protect seepage sources from cattle grazing (reference Figure 3). Approximately 26 log grade control weirs spaced at approximately 25-foot intervals are proposed to be installed along the unnamed creek to enhance sedimentation and limit future risk of channel incision. It is anticipated that the structures would be built with hand tools and hand labor given the relatively narrow channel widths.

Approximately 75 conifers not to exceed 12-15 feet in length and with diameters ranging from 8 to 12 inches may be selected for harvest near the meadow margins, along the designated access routes, or in and around the High Onion Meadow. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

To discourage cattle use around sensitive areas and seepage sources, the project proposes to install fencing around the seeps that would prevent cattle access and usage of these areas. Most of the seeps identified in High Onion occur along the downstream margin of the upper fansurface as perched groundwater intersects the lower fan surface, and the entire geomorphic surface will be fenced off. Fencing would consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.



NOTES:

1. The Access Plan shown on the drawings is schematic. Access routes through the forest require tree felling, stump removal, and associated light grading. Access within the meadow shall minimize impacts to meadow vegetation. Contractor shall utilize rubber tracked/tired low ground pressure equipment.
2. Salvage trees felled due to construction and access, as appropriate.
3. Access routes require channel crossings. Contractor shall minimize channel impacts by use of temporary bridge such as marsh mats or corduroy stream crossings.
4. Stage materials within the existing primitive campground. Contain the downslope perimeter of staging or stockpile areas with silt fence.
5. Store, maintain and refuel all equipment and materials in a designated portion of the staging area.
6. Restore access routes prior to final demobilization. Forest access routes require ripping, seeding, and coarse wood cover (e.g. logs and slash). Meadow access routes shall be restored to pre-project conditions.
7. Salvage willows at direction of Engineer or USFS representative.

FIGURE 2
THREE MEADOWS RESTORATION PROJECT
UPPER ONION VALLEY
PLAN VIEW

High Onion Meadow is accessible from Forest Service Road 08N03 and staging of materials and equipment would be located within an existing primitive campground adjacent to the road. Temporary access routes originating from the staging area adjacent to the Forest Service Road would skirt the upper edge of the meadow and cross over Onion Creek. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Within High Onion Meadow access routes are to be constructed along the upper northwestern edge and no stream crossings are required. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

Tyler Meadow

The proposed restoration actions for Tyler Meadow include management of the timing and duration of grazing, limit access by off-highway vehicles (OHVs), and installation of approximately 11 log weir grade control structures to limit additional downcutting (reference Figure 4). The log weir grades would be in the primary channel located in the forested area upstream of the meadow. Approximately Thirty (30) conifers less than 30" dbh may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Tyler Meadow project area. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

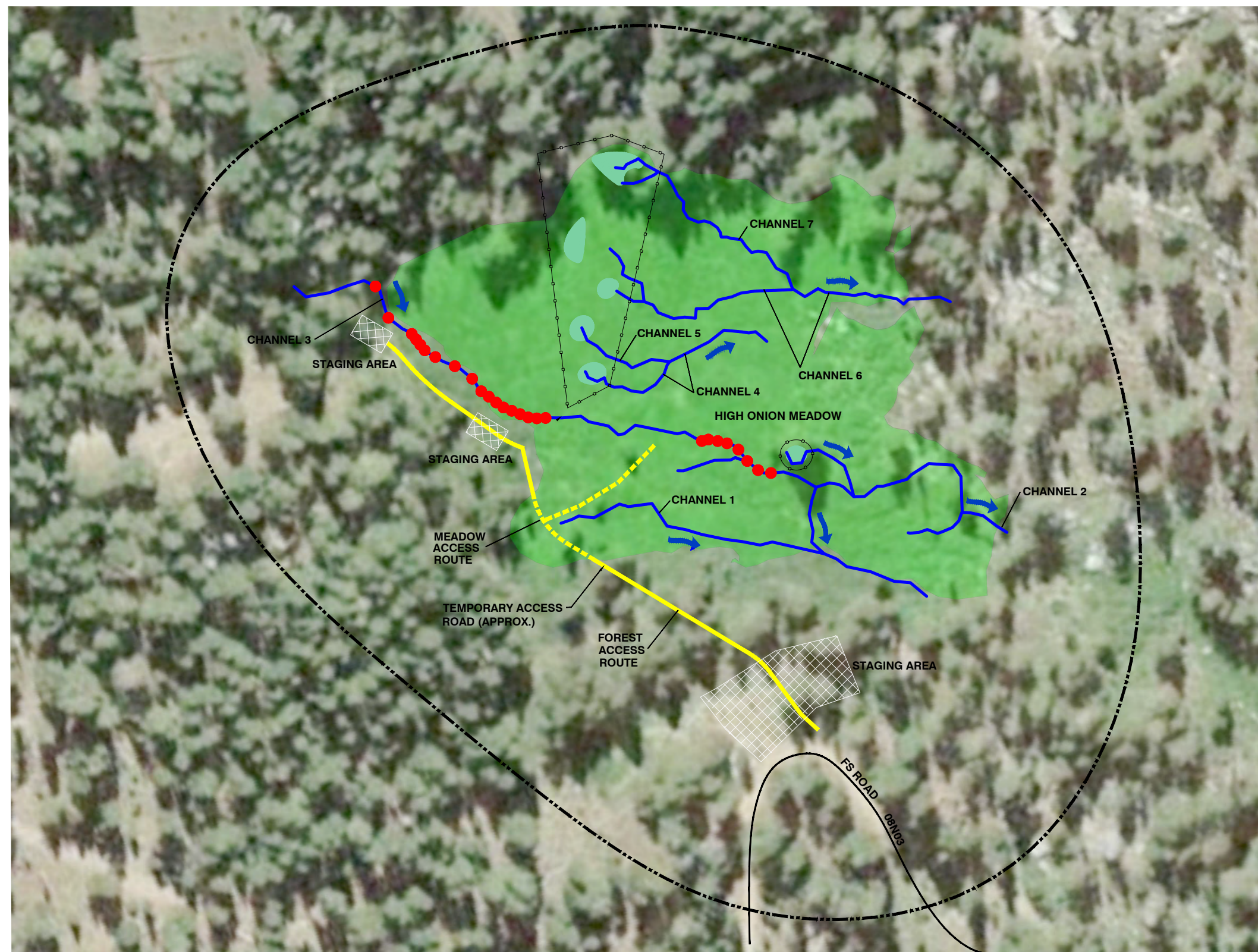
One temporary access route will be constructed through upland forest from the FS Road 08N03FW located along the east side of the meadow to the stream channel. The access route will cross through the intermittent stream channel and will be located along the northwestern edge of the stream within an existing disturbance corridor. The access route would be field fit to minimize impacts soil caused by potential tree felling, removal of stumps, and light grading. One crossing of the intermittent stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks. As the proposed action is limited to the creek channel above Tyler Meadow, there would be no access routes or construction equipment within the meadow.

To limit future access to the Meadow by off-road vehicles, either boulders or logs buried by sediment will be placed around the margin of the parking area (reference Figure 4).

Table 2 summarizes the action items proposed to restore the hydrologic functions at each of the three meadows.

Table 2. Action items of the Three Meadows Restoration Project

Action Item Number	Action
1	<p>Construction of log weirs and constructed rock riffles within existing incised channels to raise base level of channel, encourage aggradation, reduce overall channel capacity and raise the groundwater table (Figures 2 through 4):</p> <ul style="list-style-type: none"> • Construction of log weirs: 11 at Tyler Meadow (ephemeral stream), and 25 at Upper Onion Valley (intermittent streams), and 26 at High Onion (intermittent streams). Logs will be felled from suitable trees located along the meadow edge, along temporary access routes or from within the meadows. Trees used for log weirs will be hand felled, bucked, and limbed. Transport from the harvest location to the weir construction will utilize various construction equipment. Log weirs will be installed by hand crews. • Construct 21 rock riffles along Onion Creek and two tributaries within Upper Onion Valley. It is expected that rock for the riffles will be imported from the Tragedy Pit. Construction of rock riffles will be completed using motorized equipment in the meadow.
2	<p>Construct Roughend Channel To control overall base level of Upper Onion Valley meadow (Figure 2)</p> <ul style="list-style-type: none"> • Placement of rock within 90 lf / 720 sq. ft. of perennial streams and 0.01 acre of adjacent wet meadow at the outflow from Upper Onion Valley. Rock will likely be imported from Tragedy Pit for this component. Motorized equipment would be used in order to accomplish this action item.
3	<p>Construct Road Berm on FS Road 08N03 (Figure 2)</p> <ul style="list-style-type: none"> • Placement of 5:1 sloped rock berms to direct stream flow to original channel and into meadow.
4	<p>Installation of exclusionary cattle fencing at High Onion (Figure 3)</p> <ul style="list-style-type: none"> • Fencing will be placed around six (6) hillslope seeps to protect existing hydrology and prevent soil compaction
5	<p>Installation of OHV fencing at Tyler Meadow (Figure 4)</p> <ul style="list-style-type: none"> • Log or rock barriers will be placed long upper meadow edge to prevent OHV access from adjacent roadway.
6	<p>Installation of OHV fencing at Tyler Meadow (Figures 2 - 4)</p> <ul style="list-style-type: none"> • Access to the meadow restoration areas will be via temporary forest access routes (approx. 3,875 lf / 1.3 acres) and meadow access routes (1,170 lf / 0.40 ac) to be restored upon project completion.



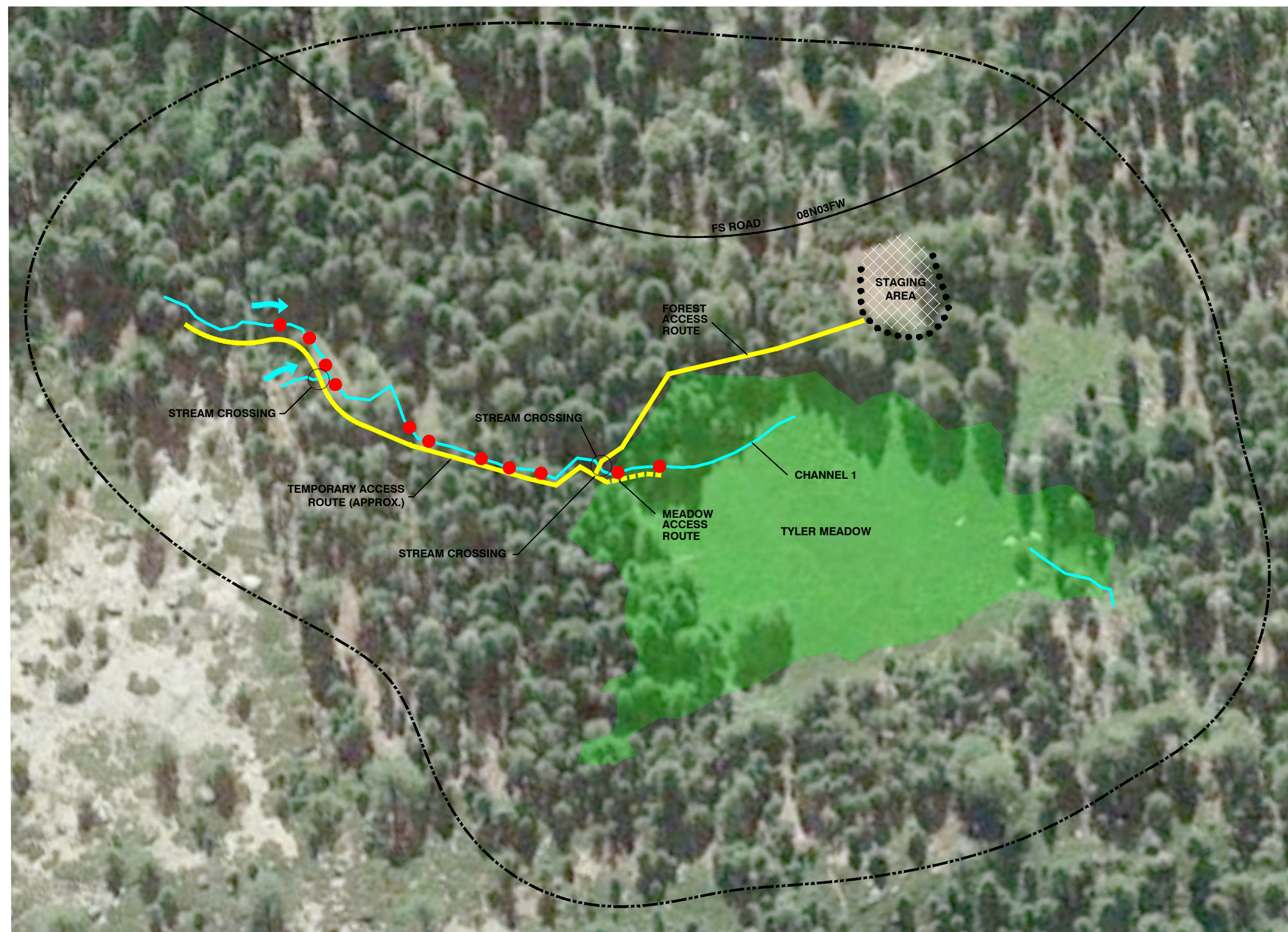
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FIGURE 3
THREE MEADOWS RESTORATION PROJECT
HIGH ONION MEADOW
PLAN VIEW



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FIGURE 4
THREE MEADOWS RESTORATION PROJECT
TYLER MEADOW
PLAN VIEW

Material Sourcing

The primary materials needed for the construction of restoration project are logs for the log weirs and the stream bed material for the constructed riffles and roughened channels. All of the logs are anticipated to be sourced from on site, both adjacent to and within the meadow. The streambed material is expected to be sources from other Forest Service rock staging areas on the district. Rock transported to the site would be delivered to the proposed staging areas and mixed on site to achieve the desired gradation for either the constructed riffles of the roughened channel.

Revegetation

The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

Post-Project Monitoring

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted.

Design Criteria

The following mitigation measures and coordinating requirements are incorporated into the Proposed Action:

Air Quality

- All ground disturbing activities shall be effectively controlled of fugitive dust emissions utilizing good housekeeping methods described by the Amador Air District:
- Application of water and/or approved chemicals to road surfaces.
- Using vegetation and other barriers to contain and to reduce fugitive emissions.
- Maintaining reasonable vehicle speeds while driving on unpaved roads in order to minimize fugitive dust emissions.
- Other precautions not specifically listed in this rule but have been approved in writing by the Air Protection Control Officer (APCO) prior to implementation.

Range Resources

- The meadows, or portions of the meadows, may be excluded from grazing use temporarily depending on future coordination between the USFS and the current allotment permittee.

Heritage Resources

- Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.
- This does not fully eliminate the chance of discovering unrecorded sites or subsurface remains within the project boundary. If project ground disturbance should expose a cultural deposit, disturbance activities will be suspended until a qualified archaeologist can examine the area, evaluate the material, and adequate protection measures are incorporated. In the event that human remains are uncovered during project activity, project managers must stop work and contact ENF. If the remains are determined to be of Native American origin, both the Native American Heritage Commission and any identified descendants shall be notified (Health and Safety Code 7050.5, Public Resources Code Section 5097.94 and 5097.98).
- The only access roads to the project areas will be those shown by the plan set to reduce impacts to cultural sites.

Terrestrial Wildlife

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30" dbh and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

- Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.
- If the Sierra Nevada yellow-legged frog (SNYLF) are found within the project area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).
- The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.

- In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.
- Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Hydrology

- Construction activities would occur during the time of year when the flows are at their lowest. This typically occurs between August 1 and October 30.
- Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.
- The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.
- Where streams and meadows cannot be avoided the following would be used to minimize impacts:
 - Corduroy stream crossings consist of laying logs in the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel.
 - Locations of the corduroy stream crossings are shown on Figures 2-4.
 - Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs, as necessary, depending on the number of times the crossing is used.
 - Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.
 - Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas (see Sheet C2 of the 60% Engineering Drawings for locations).
 - The mats would consist of slash material from the salvaged trees.
 - The slash should be layered to a depth of 1 to 1.5 feet and be a minimum of 15 feet wide to accommodate the construction.
 - Similar to the corduroy stream crossing, the condition of the marsh mats should be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow.
 - The mats would be removed from the meadow and placed as slash along the temporary forest access roads.
- Low impact construction equipment would be used as described in the technical specifications will provide limits on the size and type of equipment that can be used in the meadow.
 - Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs.
 - Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with

only a single, short traverse across the meadow at the northern end of the project site

Botany

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD 2004).

Specific design criteria and protection measures for the project include:

- Any new occurrences of sensitive plants identified within the project area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.
- A Forest Service watchlist species, *Botrychium simplex*, occurs within the project area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).
- All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

Soil Resources

- Standard mitigation measures will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.
- The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.
- Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.
- Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

SNYLF has been found throughout the ENF at elevations between 5,187 feet and 8,986 feet in records dating as far back as 1939. Surveys have recorded detections in streams, streams or potholes in meadows, and lakes. The highest frequencies of SNYLF occurrences on the ENF occur in high elevation lake habitats. The Three Meadows project areas lie within the suitable elevation range (> 4,500 feet and above) of the SNYLF on the ENF and within USFWS designated critical habitat (Reference Figure 5).

The USFWS is charged with the official designation of critical habitat when listing an endangered or threatened species. SNYLF critical habitat was designated on August 26, 2016 and includes 447,341 ha (1,105,400 ac) as critical habitat for the SNYLF, which represents approximately 14 percent of the historic range, and includes lands within Lassen, Butte, Plumas, Sierra, Nevada, Placer, El Dorado, Amador, Calaveras, Alpine, Tuolumne, Mono, Mariposa, Madera, Fresno, and Inyo Counties.

USFWS described the characteristics required to sustain life-history processes of the SNYLF (USDI 2016). These primary constituent elements of critical habitat are:

- 1) Aquatic habitat for breeding and rearing that is permanent, or hydrologically connect with, or close to permanent water bodies.
 - a. Be of sufficient depth as not to freeze solid (to the bottom) during winter.
 - b. Maintain a natural flow pattern, including periodic flooding, and have functional community dynamics in order to provide sufficient productivity and a prey base.
 - c. Be free of introduced predators.
 - d. Maintain water for a minimum 2 years during the entire tadpole phase.
 - e. Contain bank and pool substrates, shallower lake microhabitat with solar exposure, open gravel banks, aquatic refugia, and sufficient food resources for tadpole growth and development.
- 2) Aquatic non-breeding habitat (including overwintering habitat) providing for shelter, foraging, predator avoidance and aquatic dispersal. It may contain the same characteristics as aquatic breeding and rearing habitat that may not hold water long enough for the species to complete its life cycle.
 - a. Aquatic non-breeding habitat contains: bank and pool substrates, open gravel banks and rocks projecting just above or below the surface for sunning, aquatic refugia, sufficient food resources, overwintering refugia, and streams, stream reaches or wet meadow habitats that can function as corridors for movement between aquatic habitats used for breeding or foraging sites.
- 3) Upland areas adjacent to or surrounding breeding and nonbreeding aquatic habitat that provide for feeding or movement.
 - a. For stream habitats, this area extends up to 25 meters (82 feet) from the bank or shoreline.
 - b. For areas containing riparian habitat and upland vegetation, the canopy overstory should be thin and generally not to exceed 85% canopy to allow sunlight to reach the aquatic habitat for basking areas.
 - c. For areas between proximate (within 300 m) water bodies, the upland area extends from the bank or shoreline between such water bodies.

- 4) Upland areas adjacent to and surrounding both breeding and nonbreeding aquatic habitat that provide for the natural hydrologic regime of aquatic habitats. These areas should allow for the maintenance of sufficient water quality to provide for the various life stages of the frog and its prey base.

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

One habitat feature that is documented to have a significant detrimental impact to SNYLF populations is the presence of trout from current and historical stocking for the maintenance of a sport fishery. To further angling success and opportunity, trout stocking programs in the Sierra Nevada started in the late 19th century (Federal Register 2013). This anthropogenic activity has community-level effects and constitutes the primary detrimental impact to SNYLF habitat and species viability. Prior to extensive trout planting programs, almost all streams and lakes in the Sierra Nevada at elevations above 1,800 m (6,000 feet) were fishless. In 2004, Vredenburg et al. (Federal Register 2013) concluded that introduced trout are effective predators on SNYLF tadpoles and suggested that the introduction of trout is the most likely reason for the decline of the SNYLF complex. This threat is a significant, prevalent risk to SNYLF range-wide, and it will persist into the future.

Activities that alter the terrestrial environment, such as road and trail construction may impact amphibian populations in the Sierra Nevada (Federal Register 2013). These impacts are understandably in proportion to the magnitude of the alteration to the environment and are more pronounced in areas with less stringent mitigation measures. Road construction and timber harvest were likely of greater significance historically and may have acted to reduce the species' range prior to the more recent detailed studies and systematic monitoring that have quantified and documented these losses.

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

Existing Habitat Conditions

General Habitat Description

Information about the existing environment was gathered from multiple site visits, botanical, wetland, and silvicultural surveys, and from the hydrology design report (Waterways 2019) for this project. The information gathered for species and their habitat was compiled from available literature and species accounts provided by the Amador Ranger District, Eldorado National Forest. An aquatic wildlife biologist, fluvial geomorphologist, wetland scientist, and the ARD district hydrologist and wildlife biologist visited the project area in order to field verify the condition of the watersheds and aquatic habitat.

The Three Meadows Restoration Project includes three small, high elevation meadows. High Onion Meadow (approx. 2.7 acres wetland) and Upper Onion Valley (approx. 8.7 acres wetland) are located along Onion Creek within the Cole Creek Watershed. The meadows are surrounded by mixed fir and pine forest dominated by lodgepole (*Pinus contorta*) and red fir (*Abies magnifica*). Tyler Meadows (approx. 1.5 acres wetland) flows to Upper Bear River Reservoir. The meadow's adjacent forest stand consists of mid-elevation fir and pine consisting of multiple age classes of red fir, white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine.

Table 3. Description of Aquatic Features within the Three Meadows Project Area

Feature	Characteristics
Upper Onion Valley	<ul style="list-style-type: none"> The meadow complex is located along Onion Creek (channel 6 on Figure 2) and seeps which flow into Cole Creek and then North Fork Mokelumne River, about 1.7 miles downstream. The Upper Onion Valley drainage area is approximately 0.7 square miles (450 acres). The meadow has a valley slope of approximately 1.7% and is characterized by several small internal, intermittent streams. Based on the 2019 aquatic resource delineation, the Upper Onion Valley project area contains approximately 8.7 acres of wetland and 4,645 linear feet (0.70 acres) of intermittent streams. Onion Creek flows along the eastern meadow edge with an average width of 8 to 10 feet. Channel substrate consists of gravel and cobble, with frequent large boulders lining the channel bank. Stream hydrology is intermittent, but flows may continue into late summer. Several small head cuts extend from Onion Creek and unnamed seeps within the meadow. These channels have silty, sandy substrate with little gravel. There is no potential breeding habitat or overwintering within the meadow, but creeks and adjacent meadow provide suitable dispersal and foraging habitat for known populations in Onion Creek (figure 2) located approximately 1 mile downstream and Cole Creek which is 1.7 miles downstream.
High Onion Meadow	<ul style="list-style-type: none"> The meadow complex is located near the headwaters of Onion Creek (channel 3 on Figure 3). There are several small seeps located within the upper half of the meadow forming small intermittent streams and vegetated swales down slope. The High Onion watershed area is approximately 30 acres. Onion Creek is the largest stream channel (average width 8 ft wide) and characterized by moderate to high spring flows. The channel bed consists primarily of gravel and small cobble. Located in the headwater reach, this creek is known to go dry in most years or be reduced to very light flows. Several small internal streams and swales are present within the meadow complex with silty, sandy substrate. The largest channel, channel 3, is incised with several small headcuts. Based on the 2019 aquatic resource delineation, the High Onion Meadow project area contains approximately 2.7 acres of wetland and 1,570 linear feet (0.10 acres) of intermittent streams. There is no potential breeding or overwintering habitat within High Onion meadow, but the intermittent creeks and adjacent meadow may be used as dispersal habitat for known populations in Onion Creek located approximately 1.5 mile downstream and Cole Creek, which is 2.2 miles downstream.
Tyler Meadow	<ul style="list-style-type: none"> Hydrology within Tyler Meadow is supported by shallow groundwater and an ephemeral stream that enters from the northern end. The upstream watershed is approximately 60 acres. The stream is characterized by a low to moderate gradient of 1.8%. Stream flow entering the meadow at the upstream end fans out into the meadow with overland flow (~1.2% slope). A spring on the west side of the meadow wets the low areas along the lower southern meadow edge which may have temporarily ponded water. Based on the 2019 aquatic resource delineation, the Tyler Meadow project area contains approximately 1.5 acres of wetland and 550 linear feet (0.10 acres) of intermittent streams. Headwater sections are ephemeral and are known to go dry in early summer of most years. There is no potential breeding habitat within the meadow or ephemeral creek, but the meadow does contain suitable dispersal habitat.

Habitat Relative to the Sierra Nevada Yellow-legged Frog

Suitable Habitat

A GIS layer of suitable habitat for SNYLF was generated by the USFS Region 5 Regional office (reference Figure 5). For the purposes of analysis, suitable habitat is defined as any perennial or intermittent stream, meadow, or lake habitats occurring 4,500 feet and above. Also included in the definition of suitable habitat is all land within a 25 m (82 ft.) buffer surrounding the aforementioned aquatic habitat. This habitat buffer is assumed to provide suitable terrestrial habitat. Since the SNYLF is highly aquatic, the potential for impacts beyond the 25m (82 ft.) buffer of suitable habitat is very low and would likely result in negligible effects to the species.

Based on the above definition of *suitable* habitat, the Three Meadows Restoration proposed actions contains approximate 27 acres of suitable wet meadow habitat with 25 m buffer that includes 6,765 linear feet of intermittent stream habitat within (reference Table 4).

**Table 4. Potential suitable SNYLF habitat within the project boundary for
Three Meadows Restoration Project.**

Habitat Type	High Onion	Upper Onion Valley	Tyler	Total
Suitable Habitat				
Perennial Stream (linear feet)	0	0	0	0
Intermittent Stream (linear feet)	1,570	4,645	550	6,765
Wet Meadow (acres)	2.7	8.7	1.5	12.9
Adjacent 25 m upland buffer (acres)	3.8	7.3	3.0	14.1
Lake/Pond (acres)	0	0	0	0

Visual Encounter Surveys (VES) were completed within all three meadows on July 18, August 12, and September 12, 2019. Stream reaches were walked and within meadow areas a grid was walked at 20-foot intervals. All areas surrounding the project areas were also surveyed up to 100 feet and include staging areas and access roads. There were no SNYLF detections in any of the three meadows during the 2019 surveys. A previous survey of Upper Onion Valley in 1997 detected 1 adult SNYLF. No additional surveys have been completed in High Onion or Tyler Meadows.

Critical Habitat

The Three Meadows Project area consists of 47.3 acres located entirely within the USFWS designated critical habitat. However, Primary Constituent Elements (PCEs) required to sustain life-history processes are marginal and are not likely to be currently utilized. Specifically:

1. The three meadows do not contain suitable aquatic habitat for breeding and rearing. The three meadows consist of intermittent streams and saturated meadows with seasonally shallow areas of open water. The meadows are only hydrologically connected to permanent water bodies during spring snow melt and are of insufficient depth and flow for insufficient duration to allow for overwintering or brood rearing. These areas do not contain bank and pool substrates or microhabitats that would maintain continuous water for a minimum of 2 years or have water of sufficient depth as to not freeze solid during winter.

2. The three meadows do contain the primary constituent elements to provide aquatic non-breeding stream reaches and wet meadow habitat that could function as corridors for movement between aquatic habitats or used for foraging sites. However, the location of the three meadow sites from the closest documented occurrences of SNYLF within Onion Creek is greater than 1.0 mile, a distance further than SNYLFs are typically known to travel (USDI 2013a). One adult male frog was identified in Upper Onion Valley in 1997 but was not detected during the 2019 surveys.

Additionally, the presence of trout species in the Cole Creek and Bear River Reservoir watersheds decreases the likelihood of SNYLF breeding success and utilization of the lower tributaries that feed into the three meadows. Egg masses and larvae would be unlikely to survive with adult trout sharing the same deep-water habitats.

3. The three meadows do contain upland areas adjacent to the nonbreeding aquatic habitat that would provide for feeding or movement. This includes the 25 meters (82 feet) from the bank of the intermittent streams and wet meadow. As described above, the 25 meters of upland buffer are not likely to be utilized due to the presence of trout species in the Cole Creek and Bear River Reservoir watersheds decreases the likelihood of SNYLF utilization of the lower tributaries that feed into the three meadows.

Of the 47.3 acres of designated critical habitat mapped within the project areas, there are approximately 27 acres containing Critical Habitat PCEs. Areas of PCEs are summarized by meadow within the table below.

Table 5. Potential SNYLF Critical Habitat Primary Constituent Elements within the project boundary for Three Meadows Restoration Project.

Habitat Type	High Onion	Upper Onion Valley	Tyler	Total
Critical Habitat PCEs				
Breeding / Rearing habitat	0	0	0	0
Aquatic non-breeding habitat:				
Intermittent Stream (linear feet)	1,570	4,645	550	6,765 lf
Wet meadow (acres)	2.7	8.7	1.5	12.9 acres
Upl buffer adjacent to nonbreeding aquatic habitat (acres)	3.8	7.3	3.0	14.1 acres

In total, there are 27 acres of PCEs within the 47.3 acres of designated **critical habitat** as described above in Table 5. The 27 acres of PCEs directly corresponds to the same 27 acres mapped as **suitable** habitat in Figure 5 and described above in Table 4. Therefore, impacts to both SNYLF designated critical habitat and suitable habitat are discussed together in the following paragraphs.

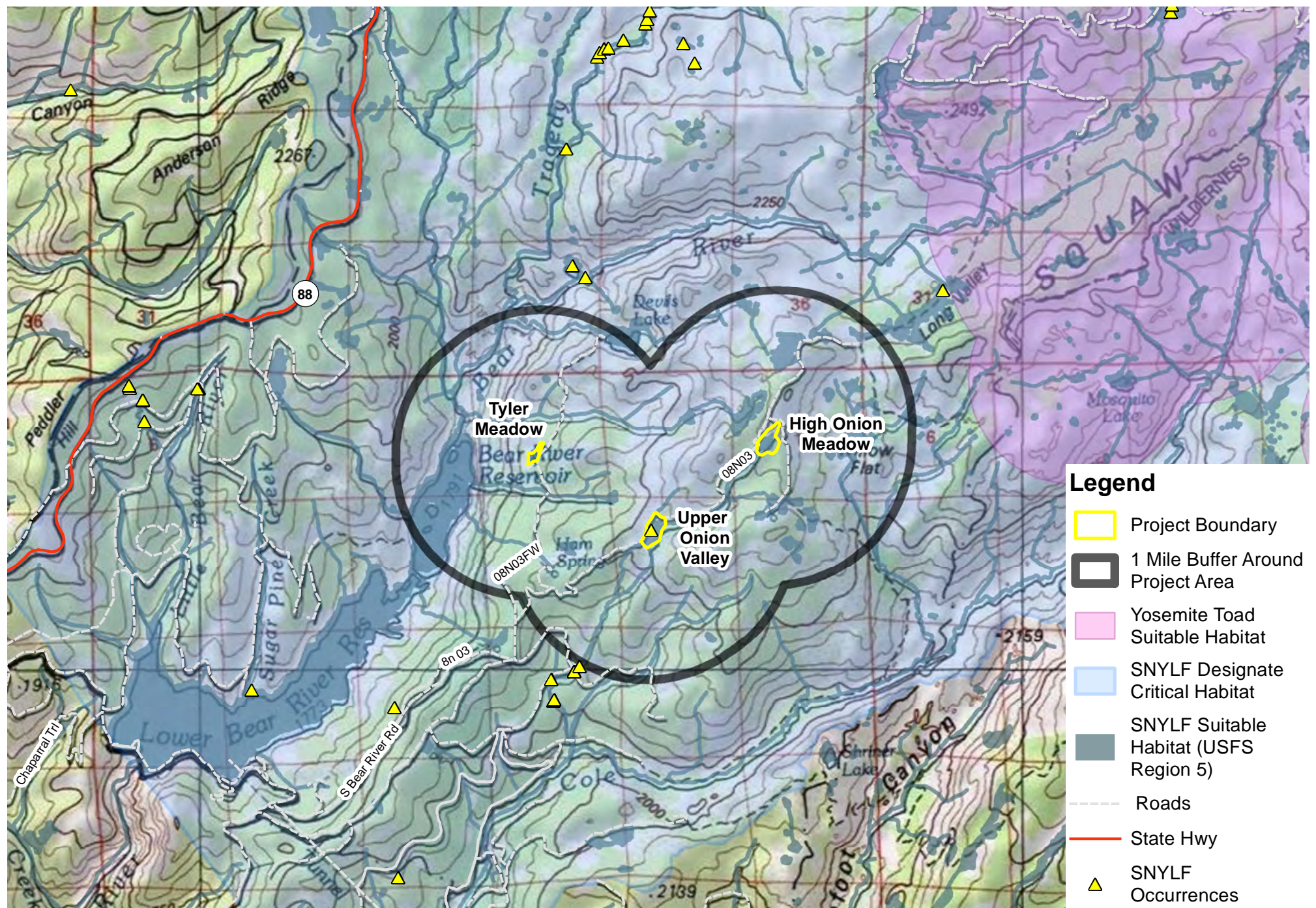


Figure 5: Three Meadows Project Areas with SNYLF Occurrences

Existing Surveys and Sightings

Visual Encounter Surveys (VES) were completed within all three meadows on July 18, August 12, and September 12, 2019. One detection of a Sierran treefrog (*Pseudacris sierra*) was detected in Tyler Meadow on July 18th. Sierran treefrogs were also detected at High Onion Meadow and Upper Onion Valley in both the July and August surveys, but no detections were observed during the September survey in either meadow. There were no SNYLF detections in any of the three meadows during the 2019 surveys. A previous survey of Upper Onion Valley in 1997 detected 1 adult SNYLF. No additional surveys have been completed in High Onion or Tyler Meadows.

Several surveys have been completed within one (1) mile of the Three Meadows project areas (reference Table 6 and Figure 6 below). There were no detections of SNYLF during any of the surveys completed within one (1) mile of the project areas (Figure 6).

Survey and species occurrence records are based on data in the USFS corporate Natural Resource Information System (NRIS 2016) geodatabase in the Aquatic Surveys (AqS) application and Wildlife (WL) application unless otherwise stated.

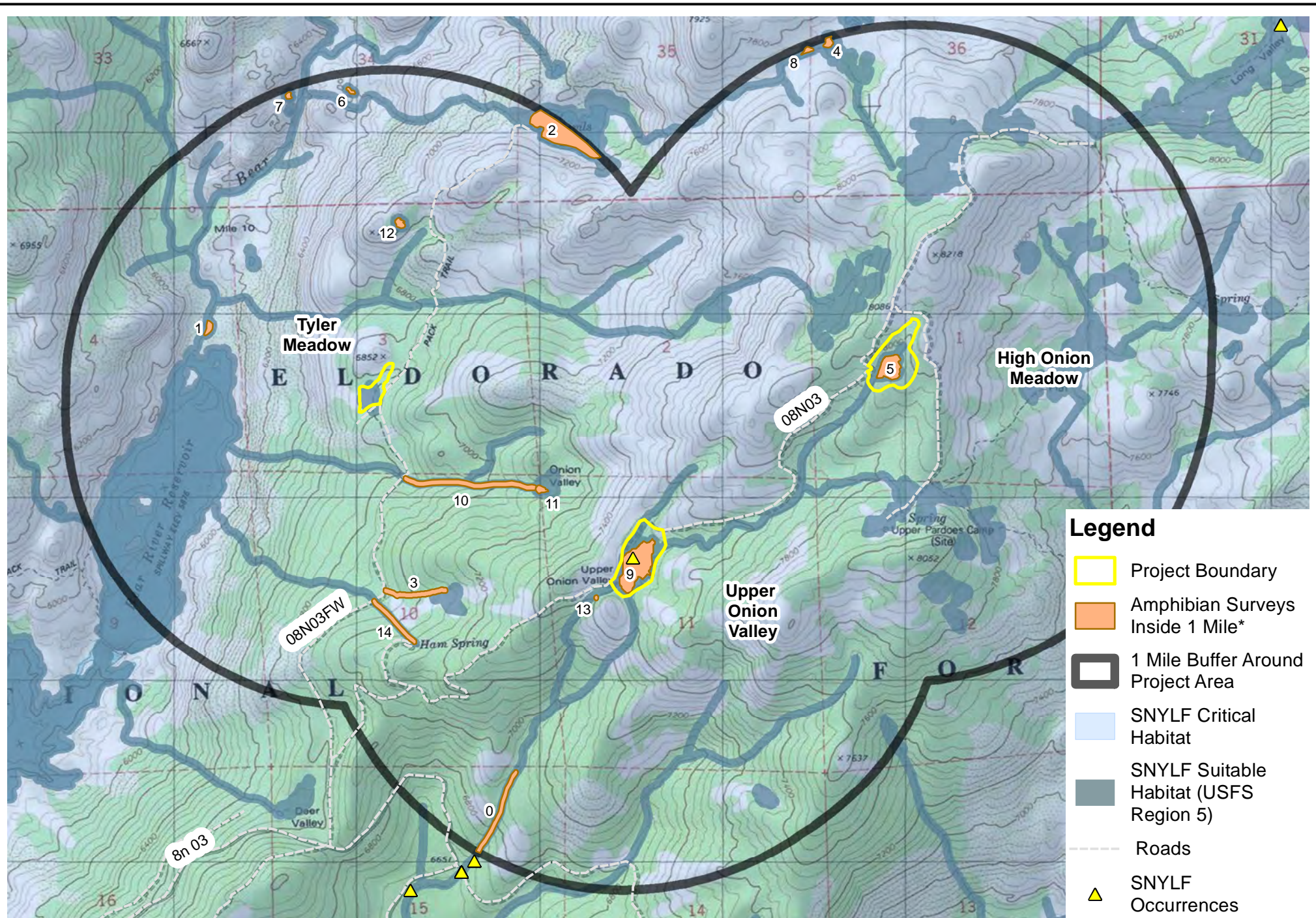
Table 6. Aquatic surveys with the potential to locate Sierra Nevada yellow-legged frogs that have occurred within the project boundary and within one mile.

Survey No.*	Last Updated	Survey Year	Survey Type	Miles from Project	Survey Location	SNYLF** Detections
5	2019-07-22	2019	Amphibian VES	0	High Onion Meadow	None
9	2019-07-22	2019	Amphibian VES	0	Upper Onion Valley Meadow	None
	2017-09-05	1997	Amphibian VES	0	Upper Onion Valley Meadow	1 adult SNYLF
Surveys within 1 mile of the Three Meadows Restoration Project						
Survey No.*	Last Updated	Survey Year	Survey Type	Miles from Project	Description	SNYLF** Detections
14	2018-09-12	2017	Amphibian VES	0.68	Ham Spring Tributary	None
3	2018-09-12	2017	Amphibian VES	0.60	Ham and Onion Spur Tributary	None
0	2018-09-12	2017	Amphibian VES	0.72	Cole Creek, Tributary 4, Reach E	None
11	2018-09-12	2017	Amphibian VES	0.34	Bear River Reservoir Trib and Pond	None
10	2018-09-12	2017	Amphibian VES	0.30	Bear River Reservoir Tributary	None
13	2018-09-18	2002	Amphibian VES	0.13	Cole Creek, Tributary 4, Site 6	None
12	2018-09-18	2002	CDFW High Lakes Inventory & Monitoring	0.47	Bear River Watershed CDFW Lake 14926	None
8	2018-09-18	2002	CDFW High Lakes Inventory & Monitoring	1.02	Bear River Watershed CDFW Lake 14897	None

7	2018-09-18	2002	CDFW High Lakes Inventory & Monitoring	0.98	Bear River Watershed CDFW Lake 14903	None
6	2018-09-18	2002	CDFW High Lakes Inventory & Monitoring	1.02	Bear River Watershed CDFW Lake 14902	None
4	2018-09-18	2002	CDFW High Lakes Inventory & Monitoring	1.02	Bear River Watershed CDFW Lake 14896	None
2	2018-09-15	2002	CDFW High Lakes Inventory & Monitoring	0.94	Devils Lake CDFW Lake 14908	None
1	2018-09-18	2002	CDFW High Lakes Inventory & Monitoring	0.55	Bear River Watershed_ CDFW Lake 14945	None

*Survey ID Numbers shown on Figure 6

**SNYLF = Sierra Nevada Yellow-legged frog



0 1,125 2,250 Feet
1 inch = 2,250 feet

**Figure 6: Three Meadows Project Areas
Previous Amphibian Surveys Within 1 Mile**

*Survey numbers correspond to descriptions in Table 6.

VI. EFFECTS OF PROPOSED ACTIONS**Sierra Nevada Yellow-Legged Frog***Direct Effects to Suitable Habitat*

In order to determine a relative measure of the direct effects to SNYLF *suitable* habitat, the amount of suitable habitat potentially affected by project activities was quantified. The amount of SNYLF suitable habitat that may be directly impacted by the proposed project activities are summarized in Table 7. The acreages of suitable SNYLF habitat that may be affected were calculated based on field mapping and measurements of stream parameters and overlaid by specific project design actions.

Table 7. Summary of Direct Effects to Suitable SNYLF by Project Proposed Actions.

Action	Location	Action #	Suitable Habitat Impacted (Acres)		
			Utilized	Unknown utilized	Unutilized
Construction of 16 in-channel rock riffles in Onion Creek and 5 in-channel rock riffles in smaller tributaries*	Upper Onion Valley	1	0	0.12	0
Construction of 25 in-channel log weirs in unnamed, intermittent tributaries*	Upper Onion Valley	1	0	0.09	0
Construction of 26 log weirs in Onion Creek*	High Onion Meadow	1	0	0.09	0
Construction of 11 in-channel log weirs in unnamed, intermittent tributary*	Tyler Meadow	1	0	0.04	0
Construct Roughened Channel	Upper Onion Valley	2	0	0.14	0
Road Berm Construction	Upper Onion Valley	3	0	0.03	0
Cattle Exclusion Fencing -	High Onion	4	0	negligible	0
OHV Exclusion Fencing**	Tyler Meadow	5	0	0	0
Meadow Access Routes (15 ft. wide)	Upper Onion Valley	6	0	0.32	0
	High Onion Meadow		0	0.07	0
	Tyler Meadow		0	0.02	0
Forest Access Routes (within 25 m of aquatic non-breeding habitat)	Upper Onion Valley	6	0	0.79	0
	High Onion Meadow		0	0.12	0
	Tyler Meadow		0	0.12	0
Total			0	1.95	0

*Based on design plans, log weirs within streams are 8'feet long and 20 feet wide (extending beyond stream bank into adjacent wet meadow or upland buffer habitat).

** OHV exclusion fencing located outside of 25 m buffer habitat.

Restoration actions in the project area include similar types of activities within the three meadows and stream systems. Of the 27 acres of suitable SNYLF habitat within the project boundary, including 6,765 linear feet of intermittent stream (reference table 4), approximately 1.95 acres (7.2%) will be directly impacted by project activities (reference Table 7), resulting in short term adverse effects.

Direct Effects to Critical Habitat

In order to determine a relative measure of the direct and indirect effects to SNYLF designated critical habitat and the primary constituent elements, the amount of critical habitat potentially affected by project activities was quantified and is summarized in Table 8. The acreages of SNYLF critical habitat that may

be affected were calculated based on field mapping and measurements of stream parameters and overlaid by specific project design actions.

Table 8. Summary of Direct Impacts to Primary Constituent Elements of Designated Critical Habitat

Action	Location	Action #	Critical Habitat Primary Constituents (Acres)		
			Breeding/ rearing	Aquatic Non breeding	Upland buffer
Construction of 16 in-channel rock riffles Onion Creek and 5 in-channel rock riffles in smaller tributaries*	Upper Onion Valley	1	0	0.12	0
Construction of 25 in-channel log weirs in unnamed, intermittent tributaries**	Upper Onion Valley	1	0	0.09	0
Construction of 26 log weirs in Onion Cr.	High Onion Meadow	1	0	0.09	0
Construction of 11 in-channel log weirs in unnamed, intermittent tributary	Tyler Meadow	1	0	0.04	0
Construct Roughened Channel	Upper Onion Valley	2	0	0.14	0
Road Berm Construction	Upper Onion Valley	3	0	0	0.03
Cattle Exclusion Fencing -	High Onion	4	0	0	negligible
OHV Exclusion Fencing	Tyler Meadow	5	0	0	0
Meadow Access Routes	High Onion & Upper Onion Valley	6	0	0.32 0.07 0.02	0
Forested Access Routes (within 25 m of aquatic non-breeding habitat)	High Onion & Upper Onion Valley	6	0	0	0.79 0.12 0.12
Total			0	0.92	1.03

*Based on design plans, log weirs within streams are 8 feet long and 20 feet wide (extending beyond stream bank into adjacent wet meadow or upland buffer habitat).

** OHV exclusion fencing located outside of 25 m buffer habitat.

Of the 47.3 acres of SNYLF designated critical habitat within the project boundary, including 6,765 linear feet of intermittent stream (reference table 4), approximately 0.92 acres of direct impacts (3.4%) will occur to non-breeding aquatic habitat (e.g. wet meadows and intermittent streams) from the implementation of restoration activities and creation of temporary access routes. Additionally, 1.03 acres (3.8%) of surrounding upland buffer within 25 meters of the non-breeding aquatic habitat will be directly impacted by the creation of temporary access routes (reference Table 8). Direct impacts from project activities will result in short term adverse effects to a total of 1.95 acres of critical habitat and associated PCEs.

Discussion of Effects to Suitable and Critical Habitat

Because the areas of suitable habitat and the PCEs of designated critical habitat directly overlap and will be affected by the same project activities, impacts to suitable and critical habitat are described together in the following paragraphs.

Installation of in-channel constructed riffles and the roughened channel within Onion Creek and smaller tributaries within Upper Onion Valley will be done through use of heavy construction equipment. Installation of constructed rock riffles and the roughened channel at Upper Onion Valley will require the transportation of rock materials across the meadow and use of heavy equipment within the channels.

Rock will be mechanically picked up and placed in the stream to construct the riffle structures and the roughened channel. The mechanical equipment would need to travel through the meadow, along the creek banks, and cross some stream channels utilizing temporary access routes causing compaction. It is anticipated that there will be approximately 21 constructed riffles within the channels of Upper Onion Valley, impacting 630 linear feet (0.12 acres) of suitable SNYLF habitat containing aquatic non-breeding PCEs. Construction of the roughened channel will impact approximately 90 linear feet of Onion Creek and abutting wetlands (0.14 acres total). However, it is anticipated that the long-term results of this action will be beneficial for erosion control, hydraulic control and reduction of sedimentation from channel incision within Onion Creek, smaller tributaries, and arrest several existing head cuts.

In smaller channels, log weirs are likely to be installed by hand crews at all three meadow sites. Work at these locations would have very small footprints and direct effects would be restricted to work sites and access routes. There are to be 11 log weirs installed at Tyler Meadow, 26 log weirs at Upper Onion Valley, and 25 log weirs at High Onion, impacting 0.04 acres of stream channels and abutting wetlands that are considered suitable SNYLF habitat containing aquatic non-breeding PCEs.

For construction of the log weirs, trees of suitable size will be hand felled, bucked and limbed prior to transport from the harvest site to the weir construction site. Logs will either be fully suspended or suspended by the end during transport to minimize soil disturbance. Areas of disturbance will be restored to pre-construction contours prior to project completion.

Temporary access routes will be utilized to access the interior of the meadow and will be constructed through both forested and wet meadow areas. Access routes may cause soil compaction, impacts to surface and groundwater flows, and increased sedimentation. To minimize the negative effects to SNYLF habitat from creation of access routes, design criteria have been included in the project plans that would minimize the short-term negative direct effects from installation of temporary access roads. All construction activities will be completed in the driest portion of the year, typically August through October. Access routes will be field fit to minimize disturbance to SNYLF habitat to the extent possible and located primarily in uplands. Within the meadow, only low impact construction equipment would be used to minimize soil compaction. Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas. If streams must be crossed, corduroy stream crossings will be installed parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel. Marsh mats and corduroy crossings would be monitored to ensure that they are functioning at all times during construction. Following construction, the corduroy logs crossings would be removed from the crossing and placed as slash along the temporary forest access routes.

Indirect Effects to Suitable Habitat and Critical Habitat

Meadow restoration work would involve ground disturbing activities and, as a consequence, may cause a temporary increase in sediment delivery to downstream reaches of Onion Creek and its tributaries, which can indirectly affect both habitat suitability and individual frogs. Shorter-term impacts from this action could include localized increases in turbidity and minor scale ground disturbance to both suitable and critical habitat. However, the project is proposed to be completed under no-flow conditions in late summer and fall and would minimize any increase in local turbidity. Upon completion, the installation of in-channel rock riffles and log weirs is a restorative action, and should result in flow velocity reduction, bank stabilization and subsequently reduce the potential for future erosion, incision and sedimentation. The long-term benefits of this action outweigh the short-term negative impacts and would result in long-

term indirect positive affects to the entire 27 acres and 6,765 linear feet of streams within suitable and designated critical habitat.

Furthermore, design criteria have been included in the project plans that would minimize the short-term negative indirect effects during construction. Implementation of an erosion control plan, designed to address the potential for sediment production at each work site, would work to limit the sediment-related negative effects of ground disturbance. Revegetation of disturbed areas would limit sediment production after the initial construction phase is completed. The proposed actions are designed to restore hydrologic connectivity and function within meadows which would have long-term beneficial effects to meadow water storage capacity, sediment filtration, water quality, and meadow vegetation. Therefore, once completed this work is expected to reduce future sediment delivery and improve stream water quality which would indirectly produce a net positive benefit for SNYLF habitat.

Direct and Indirect Effects to Species

Mechanical operations within suitable habitat may cause a risk to SNYLF through disturbance, injury or mortality (e.g., crushing from equipment) in the short-term. There is potential for SNYLF individuals to be crushed or injured by the excavator driving through the meadow and adjacent to the river. If present, disturbance from work activities may flush any frogs from the in-stream construction site, either downstream or into cover away from activities, reducing the likelihood of mortality (reference Table 9). Direct effects to individuals would be short-term occurring during operations when equipment and personnel are in close proximity and within suitable habitat; however, likelihood of injury or take is relatively low as recent surveys (2019) found no detections of SNYLF within any of the three meadows and construction would occur under dry conditions when SNYLF are not likely to be present.

Table 9. Summary of Direct and Indirect Effects of proposed action to SNYLF

Treatment	Direct Effects	Indirect Effects
In-channel treatments: constructed riffles, log weirs, roughened channel.	Mortality from crushing, disturbance or injury from hand crews and mechanical equipment in channel and meadow habitat. Tree felling	<ul style="list-style-type: none"> • Raise groundwater elevation and restore natural hydrology of meadow. Provides improved breeding and overwintering habitat for SNYLF in wet meadow complex. • Improvement of incised and eroding banks along channel. • Short-term increase (from disturbance), and long-term decrease (eliminated bank erosion and head-cuts), in downstream sedimentation.
Temporary access routes across meadows	Mortality, injury or disturbance from mechanical equipment within meadow and at creek crossings.	<ul style="list-style-type: none"> • Temporary increased erosion and downstream sedimentation from bare areas until revegetated. • Temporary compaction of meadow until routes are restored to preconstruction conditions
Installation of grazing exclusionary structures	Mortality from crushing, injury, or temporary disturbance from hand crews	<ul style="list-style-type: none"> • Decreased potential for soil compaction and alteration of spring hydrology in High Onion.
Installation of OHV's exclusionary structures.	None – located outside of suitable habitat.	<ul style="list-style-type: none"> • Decreased potential for mortality due to recreational vehicle traffic

Cumulative Effects

Under the ESA, cumulative effects are “those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation”. 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. Land disturbances that have been documented in the past include: road construction, reconstruction, and maintenance of culverts, cattle grazing, dispersed camping, developed hiking trails and over-snow trails.

Future state and private actions (timber, road work or construction) at this point are not expected to occur within the project boundary.

Natural changes that are expected to occur outside of human actions include the effects of future climate conditions. Present and future climate conditions for the Three Meadows project area are taken from the state of California’s Cal-Adapt website (<http://cal-adapt.org/>). Many factors affect local climate conditions and it is difficult to accurately predict future conditions in an area as small as the cumulative effects assessment area for the Three Meadows Restoration Project. Nevertheless, the region of California containing the Three Meadows area is expected to see an average annual temperature increase, relative to a 1961-1990 baseline, of 6.6° Celsius by the end of the century. Average April snow water equivalency values are expected to decrease in the region by 16% depending on emission scenario. Overall the region will likely be warmer and drier during important periods in the SNYLF life cycle.

Proposed actions associated with the Three Meadows Restoration Project are designed to restore hydrologic function and improve aquatic habitat within the three meadows. As a result, the project would be expected to have positive effects of future climate conditions on SNYLFs and their habitat. For example, by restoring natural stream morphology and meadow hydrology would raise the groundwater elevation and increase infiltration and natural water storage within the three meadows. More importantly, the project actions are designed to correct poor conditions within meadows and prevent future degradation from OHV access and modification of grazing patterns. The long-term impact would likely increase and prolong the duration of late season flows for the benefit of SNYLF and other aquatic species. These actions would likely reduce the severity of sediment/ deposition build up at the stream crossing, sediment delivery and erosion into the stream resulting, degradation of stream banks causing stream widening, and loss of meadow habitat and the lowering of the water table resulting in riparian and meadow habitat loss.

An enhancement in meadow habitat and an increase in wetland persistence may potentially influence SNYLF to disperse towards this habitat during times of drought. Based on the expected impacts of the proposed action and the lack of future state or private actions, cumulative effects are expected to be primarily beneficial; improving hydrologic functionality, raising the water table, and increasing wet meadow habitat, all lead to improved habitat quality and quantity for the SNYLF.

VII. DETERMINATION OF EFFECTS

Sierra Nevada Yellow-Legged Frog

Although SNYLF are not known to currently occupy the Three Meadows project area, the area does contain potentially suitable aquatic habitat and the primary constituent elements of designated critical habitat necessary for dispersal and foraging. Increased sedimentation, disturbance, injury/ mortality and

potential short-term loss of refugia/ habitat during construction are the greatest direct and/or indirect effects that may occur to SNYLF or their suitable habitat; however, the negative impacts are short-term and minimal, and are outweighed by positive benefits to suitable and critical habitat in this project area. Overall, the actions of the Three Meadows Restoration Project will ultimately benefit SNYLF through the increase of wetland habitat.

The total suitable and designated critical habitat, including 25 meters of adjacent upland, present within the project boundary area is approximately **27** acres. An estimated 1.95 acres of suitable and designated critical SNYLF habitat may be impacted directly by proposed actions, which is approximately 7.2% of the suitable and critical SNYLF habitat present within the project boundary. Short term indirect impacts to acres to suitable and critical habitat are minimal compared to the positive long-term indirect impacts to 27 acres through improvement of hydrologic functions within the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit SNYLF habitat; therefore, ***it is my determination that the Three Meadows Restoration Project may affect, but is not likely to adversely affect the designated Critical Habitat of the Sierra Nevada yellow-legged frog.***

The response of amphibians to disturbance depends on the type and magnitude of the disturbance, the amount and configuration of remaining habitat, as well as their life-history characteristics, project activities may still have potential to impact this species even when the outcome is positive. Given the known status of SNYLF habitat within the project boundary is potentially suitable (unoccupied) habitat, and that use of mechanical equipment in the meadow habitat will result in impacts of 7.2% of the total suitable and critical habitat within the project area, ***it is my determination that the Three Meadows Restoration Project may affect, but is not likely to adversely affect the Sierra Nevada yellow-legged frog.***

These determinations reflect the degree to which the proposed actions may adversely affect suitable and critical habitat and individuals. The actions proposed for this project 1) have the potential, however unlikely, to result in incidental take of SNYLF, 2) have been implemented in the past under similar conditions, 3) would be an overall benefit in habitat improvement for SNYLF and meadow hydrologic function, and 4) would employ standard practices (S&G's and BMP) and protection measures in design criteria, including applicable conservation measures in the 2014 USFWS Biological Opinion.

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Appendix A

Three Meadows Restoration Photographs

Appendix A – Site Photographs



Photo 1. **Upper Onion Valley:** View to the south of Onion Creek flowing into meadow area at northeast corner of site. July 2019.



Photo 2. **Upper Onion Valley:** View to the south of unnamed creek near eastern edge of meadow. July 2019.



Photo 3. **Upper Onion Valley:** Overview of meadow. View to the north. July 2019.



Photo 4. **Upper Onion Valley:** Overview north of meadow taken from southern outlet.



Photo 5. **Upper Onion Valley:** View to the south of Onion Cr at outflow of meadow. Area will be modified through construction of the roughened channel for grade control.



Photo 6. **Upper Onion Valley.** Stream flow currently captured within road. Road berms will be constructed adjacent to stream channel to direct flows into original channel.



Photo 7. **High Onion Meadow:** Overview of wet meadow along eastern edge.



Photo 8. **High Onion Meadow:** Overview of small drainage discharging from seep. View to the north.



Photo 9. **Tyler Meadow.** View to the north of creek bed above meadow.



Photo 10. **Tyler Meadow:** Overview to the south of meadow from upper (northern) end.



Photo 11. **Tyler Meadow:** Outflow of stream from meadow. View to the south.

Appendix B

US Fish and Wildlife Service List:

Threatened, Endangered, Candidate, and
Proposed Species Critical Habitat
Within the Three Meadows Project Area
January 23, 2020



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To:
Consultation Code: 08ESMF00-2020-SLI-0838
Event Code: 08ESMF00-2020-E-02643
Project Name: Three Meadows Restoration Project

January 23, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office

Federal Building

2800 Cottage Way, Room W-2605

Sacramento, CA 95825-1846

(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2020-SLI-0838

Event Code: 08ESMF00-2020-E-02643

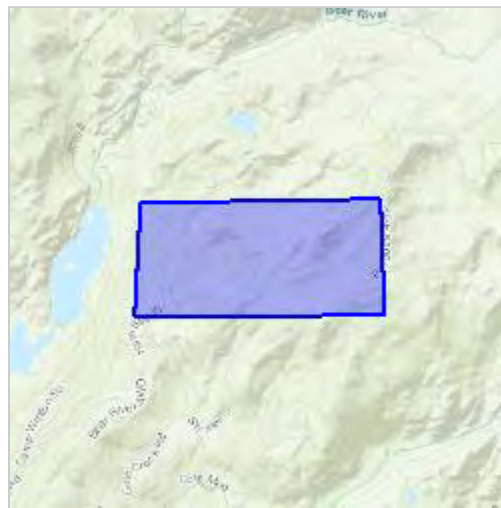
Project Name: Three Meadows Restoration Project

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: Restore hydrology within three small alpine meadows: Upper Onion, High Onion, and Tyler meadows for the benefit of SNYLF habitat and habitat for sensitive plant species.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/38.56578368811218N120.18382020926299W>



Counties: Amador, CA

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Fisher <i>Pekania pennanti</i> Population: West coast DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3651	Proposed Threatened

Amphibians

NAME	STATUS
Sierra Nevada Yellow-legged Frog <i>Rana sierrae</i> There is final critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9529	Endangered
Yosemite Toad <i>Anaxyrus canorus</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7255	Threatened

Fishes

NAME	STATUS
Delta Smelt <i>Hypomesus transpacificus</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Sierra Nevada Yellow-legged Frog <i>Rana sierrae</i> https://ecos.fws.gov/ecp/species/9529#crithab	Final

Appendix D

Aquatic Biological Evaluation for the Three Meadows Restoration Project
February 5, 2020

**Eldorado National Forest
Amador Ranger District**

Aquatic Biological Evaluation
For the
Three Meadows Restoration Project
February 5, 2020

**Project Location:
Amador County, California
T19N, R16E Sections 01, 03, and 11 MDBM.**

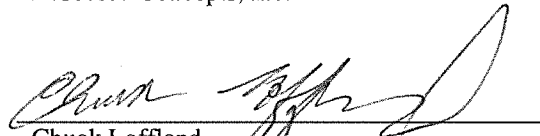
Prepared By:

JoAnne Michael

JoAnne Michael
Senior Environmental Specialist
Resource Concepts, Inc.

Date: February 5, 2020

Reviewed By:


Chuck Loffland
Amador District Wildlife Biologist
Eldorado National Forest

Date:

February 18, 2020

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APPENDICES

Appendix A Three Meadows Photographs

File Doc: 2020-02-05 rpt 3-Meadows_BE_Aquatic 18-631.4Amador jm-jm L2-6.docx

I. INTRODUCTION

The Amador Ranger District (ARD) of the Eldorado National Forest (ENF) in Eldorado County, California in cooperation with the Amador Resource Conservation District and the Amador-Calaveras Consensus Group proposes to restore mountain meadow habitat at three small high-elevation meadows: Upper Onion Valley, High Onion Meadow, and Tyler Meadow. This Biological Evaluation (BE) analyzes proposed actions for restoration of the natural hydrology of the three meadows through the installation of rock riffles, log weirs, a roughened channel for grade control, and grazing management to improve hydrologic functions of the meadow systems. Implementation of these methods would result in improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation.

Forest Service Manual (FSM) 2672.42 (USDA Forest Service 1990) directs that a biological assessment (BA) be prepared for all proposed projects that may have effects upon U.S. Fish and Wildlife Service (USFWS) listed threatened, endangered, and proposed species. In addition, FSM 2670.32 (USDA Forest Service 1990) directs that a biological evaluation (BE) be prepared to determine the effects of proposed projects on USDA Forest Service Region 5 designated sensitive species.

Species Considered for Analysis

Forest Service Sensitive Species

In compliance with FSM direction (FSM 2670.12, .22, .32, .44, .5) the most recent FS-Sensitive species list identified by Randy Moore (Region 5, Regional Forester) was used. Table 1 includes the Forest Service sensitive aquatic species that may be present in Eldorado National Forest, their preferred habitat and elevation range, and their potential to reside in the Three Meadows Project area. Table 1 is included in this analysis document to aid in determining which sensitive species are to be considered for analysis. The potential for direct, indirect, and cumulative effects to individuals and suitable habitat were considered. Species with potential for effects are indicated with a “Yes” and are analyzed in detail in the BE. Species with no potential for effects were not analyzed in detail following the generic rationale listed here:

1. No effect to downstream water quality or quantity.
2. Project does not occur within or affect suitable habitat.
3. Project does not occur within known or suspected species range.
4. Project does not affect identified management areas.
5. Project does not affect specific habitat features important to the species.
6. Project limited operating period (LOP) or design avoids seasonal effects.

Table 1. Forest Service Sensitive Aquatic Species that may be Present in Eldorado National Forest

Federally Listed Species					
Species	Status	Preferred Habitat	Project Potential for Effects	No	Yes
Foothill yellow-legged frog (FYLF) <i>(Rana boylei)</i>	FS	Below 6,000 ft. High elevation low-gradient streams and small ponds that are either intermittent or perennial	Project area not within elevation range. No potential to impacts species or suitable habitat.	2,3,4,5	
Western pond turtle (WPT) <i>(Actinemys marmorata)</i>	FS	Below 5,000 ft. Ponds and slow-moving streams	Project area not within elevation range. No potential to impacts species or suitable habitat.	2,3,4,5	
Hardhead Minnow <i>(Mylopharodon conocephalus)</i>	FS	Sacramento-San Joaquin delta, S. Fork American River – Slab Reservoir	None. Does not occur within project area and are located far enough downstream so that there will be no measurable effects to this species or habitat.	2,3,4,5	
Pacific lamprey <i>(Lampetra tridentata)</i>	FS	Lower North Fork Consumnes River and Camp Creek	None. Does not occur within project area and are located far enough downstream so that there will be no measurable effects to this species or habitat.	2,3,4,5	
FS: Forest Sensitive					

II. CURRENT MANAGEMENT DIRECTION

Direction to maintain the viability of Region 5 sensitive species is provided by the National Forest Management Act, the Code of Federal Regulations (CFR 219.19), the FSM 2672 (USDA 1990), and the Sierra Nevada Forest Plan Amendment Environmental Impact Statement (EIS) (USDA 2004). This Amendment guides the management of the Sierra Nevada national forests until their forest plans are revised. The aquatic, riparian, and meadow conservation strategy in this EIS will provide clean water, functioning aquatic ecosystems, and environmental conditions that contribute to viable populations of associated species (USDA 2004).

Current Forest Service policy (FSM 2670 [USDA 1990]) is to manage National Forest System lands so that the special protection measures provided under the Endangered Species Act will no longer be necessary, and threatened or endangered species will become de-listed. The EIS (USDA 2004) provides direction for the management of threatened and endangered species. The Aquatic Management Strategy in the EIS directs that Forests utilize administrative measures to protect and restore aquatic, riparian, and meadow ecosystems and provide for the viability of native animal species associated with these ecosystems.

Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement

The Record of Decision for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USDA Forest Service 2004b) directs the Agency to conduct a Riparian Conservation Objectives (RCOs) analysis for projects occurring within Riparian Conservation Areas (RCAs). The following RCOs pertain to aquatic endangered, threatened, and sensitive aquatic species in the Three Meadows Restoration Area:

- 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.
- 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.
- 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.
- 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.

Forest Service Manual (FSM)

FSM 2672.42 (USDA Forest Service 1990) directs that a Biological Evaluation be prepared for all proposed projects that may have effects on USDA Forest Service Region 5 designated threatened, endangered and sensitive species.

Eldorado National Forest Land and Resource Management Plan (USDA 1989)

IV. Management Direction, B. Goals and Objectives, 1. Goals, Fish and Wildlife:

- Maintain and enhance populations of Threatened and Endangered wildlife and plant species and maintain viable populations of Sensitive Species.
- Provide a diverse habitat for all species, including harvestable game fish and wildlife.

IV. Management Direction, F. Forest Practices, Element C – Fish and Wildlife:

- Maintain and enhance plant and animal communities (including Threatened and Endangered species) in accordance with federal law, regional guidelines, and Forest needs.

IV. Management Direction, G. Standards and Guidelines, 1. Forest-wide Standards and Guidelines, General Direction, Fish and Wildlife:

- Maintain and enhance habitat for fish and wildlife species.
- Provide cover and forage for wildlife species depended on meadows and the adjacent forest edge. Maintain the integrity of the meadow ecosystem.
- Utilize administrative measures to protect and improve Threatened, Endangered, Rare, and Sensitive wildlife species.

III. DESCRIPTION OF PROPOSED ACTIONS

The ARD on the ENF in Eldorado County, California in cooperation with the Amador Resource Conservation District and the Amador-Calaveras Consensus Group proposes to restore mountain meadow habitat at three small high-elevation meadows: Upper Onion Valley, High Onion Meadow, and Tyler Meadow. This BE analyzes proposed actions for restoration of the natural morphology of the three meadows to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting.

Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation.

Project Location

The project area encompasses three relatively small, high elevation meadows in Amador County, California on lands administered by the USDA Forest Service, Amador Ranger District, Eldorado National Forest. The three meadows include Upper Onion, High Onion, and Tyler, which are located approximately 50 miles northeast of Jackson, California, and east of Bear River Reservoir (reference Figure 1).

The Three Meadows project area is located approximately 45 miles east of Jackson, California, and five miles south of State Highway 88, in the vicinity of the Upper Bear River Reservoir.

Meadow Name	Location	Project Area	Elevation
Upper Onion Valley	T8N, R16E, Sec 11	26.8 acres	7,480
High Onion Meadow	T8N, R16E, Sec 1	10.2 acres	8,000
Tyler Meadow	T8N, R16E, Sec 3	10.3 acres	6,800

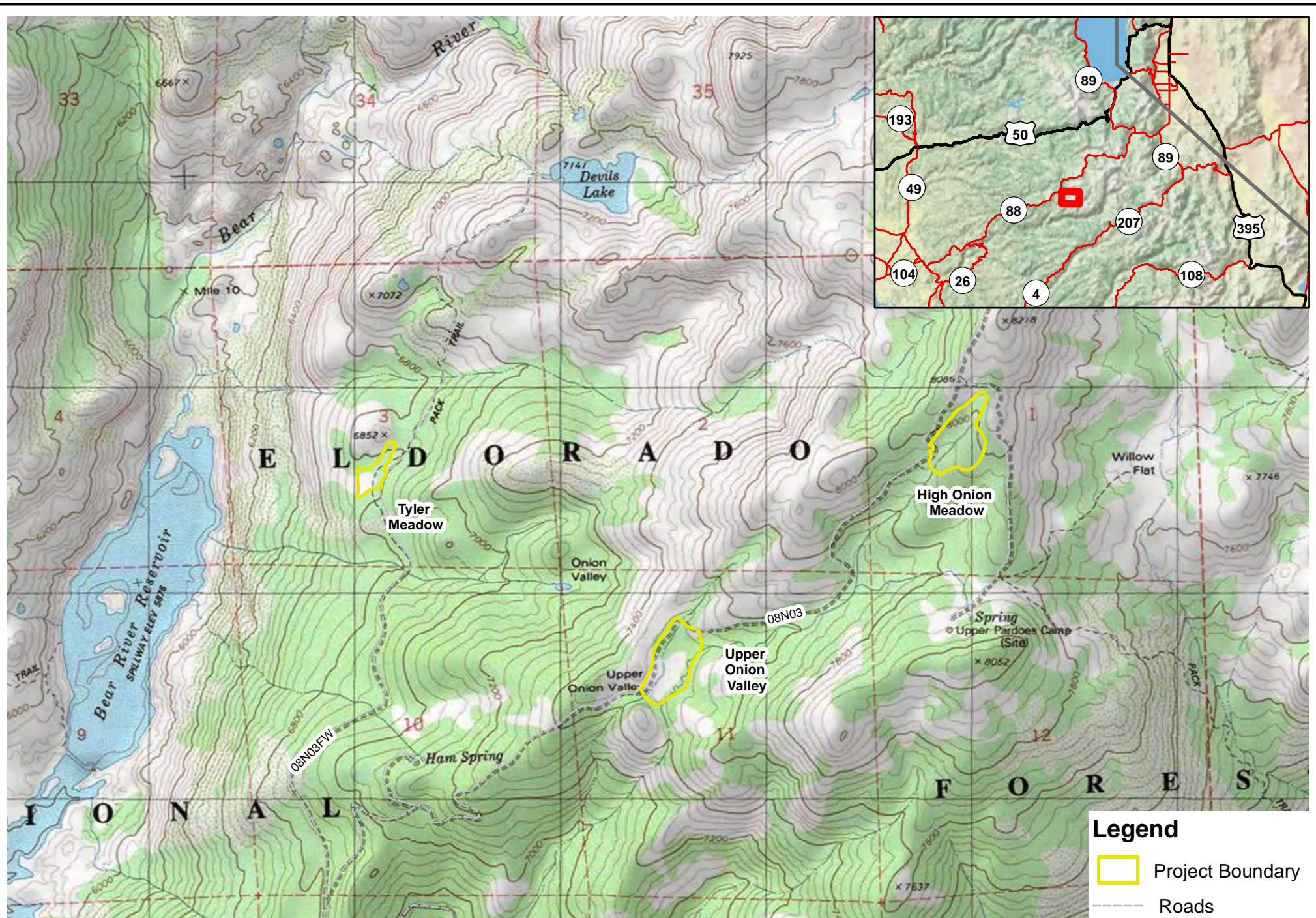


Figure 1: Location Map
Three Meadows Restoration Project

Legend

- Project Boundary
- Roads

Proposed Action

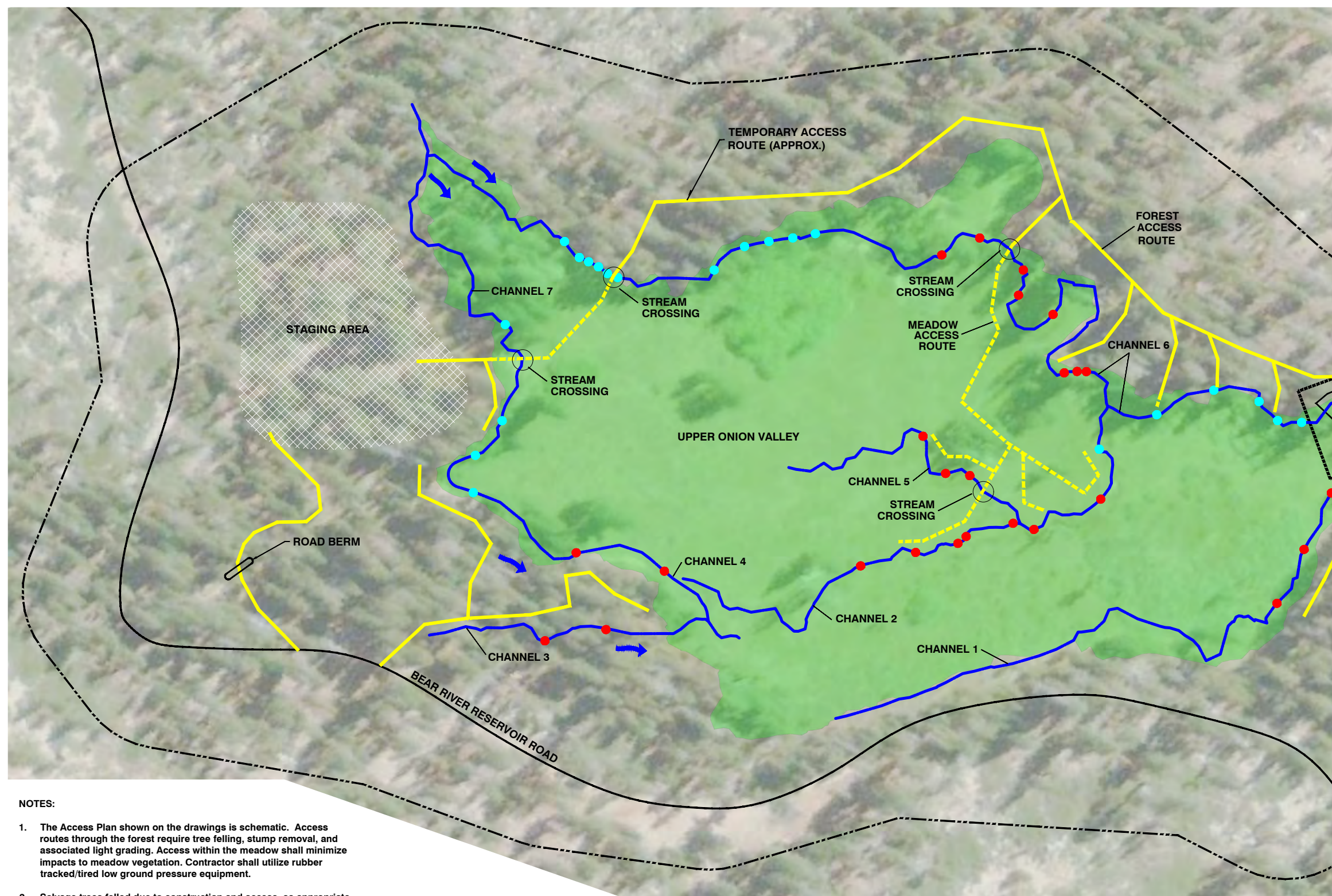
To achieve the above restoration goals, each of the three meadow areas has its own management action plan to resolve specific resource concerns as described below.

Upper Onion Valley

The proposed restoration actions for Upper Onion Valley include installation of rock riffles and log weirs. The constructed rock riffles and log weirs would be located in existing, incised channels to stabilize the profile grade within the meadow channel, encourage aggradation, restore the hydraulic continuity of flow through the meadow, and raise the groundwater table (reference Figure 2). Rock riffles would be placed in greater than one foot in depth, forming a system of short rock riffle segments interspersed with longer pools. For the constructed riffles a four foot long riffle crest would be established that is keyed into the streambed and banks. Rock ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and at a 1:1 slope at the upstream end. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Approximately twenty-one (21) constructed rock riffles would be placed within Onion Creek, the main channel through the Upper Onion Valley.

Additionally, the project activities at Upper Onion Valley include the installation of twenty-five (25) log weirs as grade control located primarily within lower energy, less incised portions of the channel network. It is estimated that approximately seventy-three (73) logs less than 30" diameter at breast height (dbh) would be needed to construct the weirs and would be harvested from trees within the meadow, along the designated access routes, or near the meadow margins. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

To provide downstream grade control for the meadow, a roughened channel will be constructed at outlet of meadow. The purpose of the structure is to actively raise water surfaces through the channels and meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and bury the upstream grade control structures. The roughened channel will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream of the crest and extend upstream of the crest at a 1:1 slope for approximately 10 feet to protect against undermining of the roughened channel. The roughened channel should be a minimum of three feet thick, composed of rock material of various sizes, and would look like a long sloping riffle when completed. Rock would likely be imported to the site from Forest Service rock staging areas in the district.



NOTES:

1. The Access Plan shown on the drawings is schematic. Access routes through the forest require tree felling, stump removal, and associated light grading. Access within the meadow shall minimize impacts to meadow vegetation. Contractor shall utilize rubber tracked/tired low ground pressure equipment.
2. Salvage trees felled due to construction and access, as appropriate.
3. Access routes require channel crossings. Contractor shall minimize channel impacts by use of temporary bridge such as marsh mats or corduroy stream crossings.
4. Stage materials within the existing primitive campground. Contain the downslope perimeter of staging or stockpile areas with silt fence.
5. Store, maintain and refuel all equipment and materials in a designated portion of the staging area.
6. Restore access routes prior to final demobilization. Forest access routes require ripping, seeding, and coarse wood cover (e.g. logs and slash). Meadow access routes shall be restored to pre-project conditions.
7. Salvage willows at direction of Engineer or USFS representative.

FIGURE 2
THREE MEADOWS RESTORATION PROJECT
UPPER ONION VALLEY
PLAN VIEW

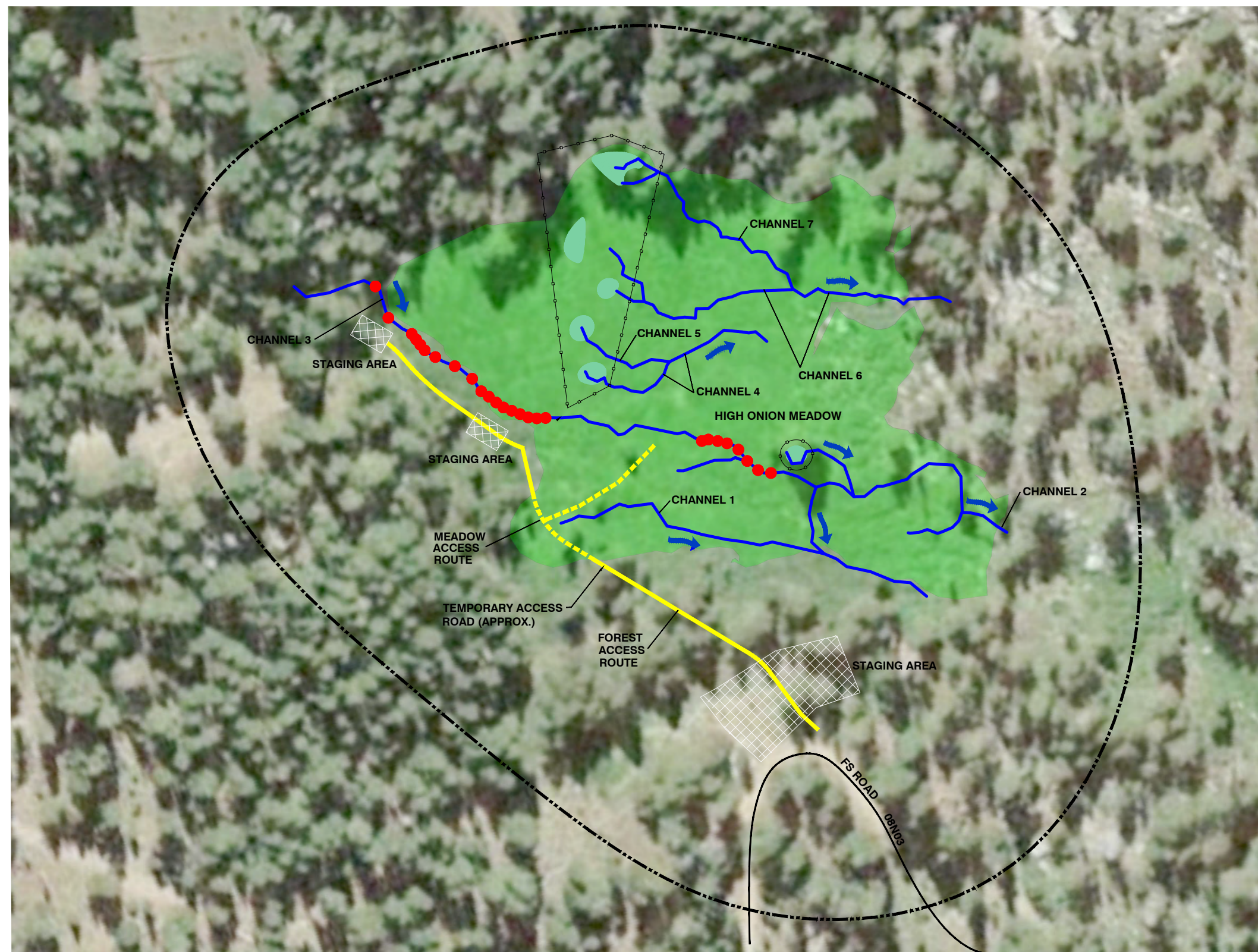
In addition, the proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area at the north end of the meadow (reference Figure 1). Currently flow within the channel is captured and rerouted within the existing roadbed rather than the natural stream channel (reference photo 6 in Appendix A). To restore and contain the flows within the original stream channel, the restoration project would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel. The berms on each side of the stream channel would be built up two feet with a 1.5-inch aggregate base material. The placement of the base material above the stream bank at 5:1 slopes will contain the streamflow in the original channel and prevent the water from flowing within the existing roadbed. The aggregate base material will be located within the roadbed above the stream channel.

The Upper Onion Valley site would be accessed by Bear River Reservoir Road (FS Road 08N03), a well-developed road that runs along the entire western and northern sides of the meadow. Staging of equipment and materials would occur at an existing primitive campground located at the northern (up gradient) edge of the meadow. Temporary access routes originating from the staging area and Bear River Reservoir Road would be utilized to access the interior of the site for placement of log weirs on the smaller, interior channels. Access routes would be field fit to minimize impacts caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road, steel plates, or marsh mats would be used. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions and elevation.

High Onion Meadow

The proposed action for High Onion Meadow includes the installation of low weir grade control structures in the primary meadow channel to limit additional downcutting, manage the timing and duration of grazing, and protect seepage sources from cattle grazing (reference Figure 3). Approximately 26 log grade control weirs spaced at approximately 25-foot intervals are proposed to be installed along the unnamed creek to enhance sedimentation and limit future risk of channel incision. It is anticipated that the structures would be built with hand tools and hand labor given the relatively narrow channel widths.

Approximately 75 conifers not to exceed 12-15 feet in length and with diameters ranging from 8 to 12 inches may be selected for harvest near the meadow margins, along the designated access routes, or in and around the High Onion Meadow. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".



KEY:



NOTES:

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FIGURE 3
THREE MEADOWS RESTORATION PROJECT
HIGH ONION MEADOW
PLAN VIEW

To discourage cattle use around sensitive areas and seepage sources, the project proposes to install fencing around the seeps that would prevent cattle access and usage of these areas. Most of the seeps identified in High Onion occur along the downstream margin of the upper fansurface as perched groundwater intersects the lower fan surface, and the entire geomorphic surface will be fenced off. Fencing would consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.

High Onion Meadow is accessible from Forest Service Road 08N03 and staging of materials and equipment would be located within an existing primitive campground adjacent to the road. Temporary access routes originating from the staging area adjacent to the Forest Service Road would skirt the upper edge of the meadow and cross over Onion Creek. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Within High Onion Meadow access routes are to be constructed along the upper northwestern edge and no stream crossings are required. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

Tyler Meadow

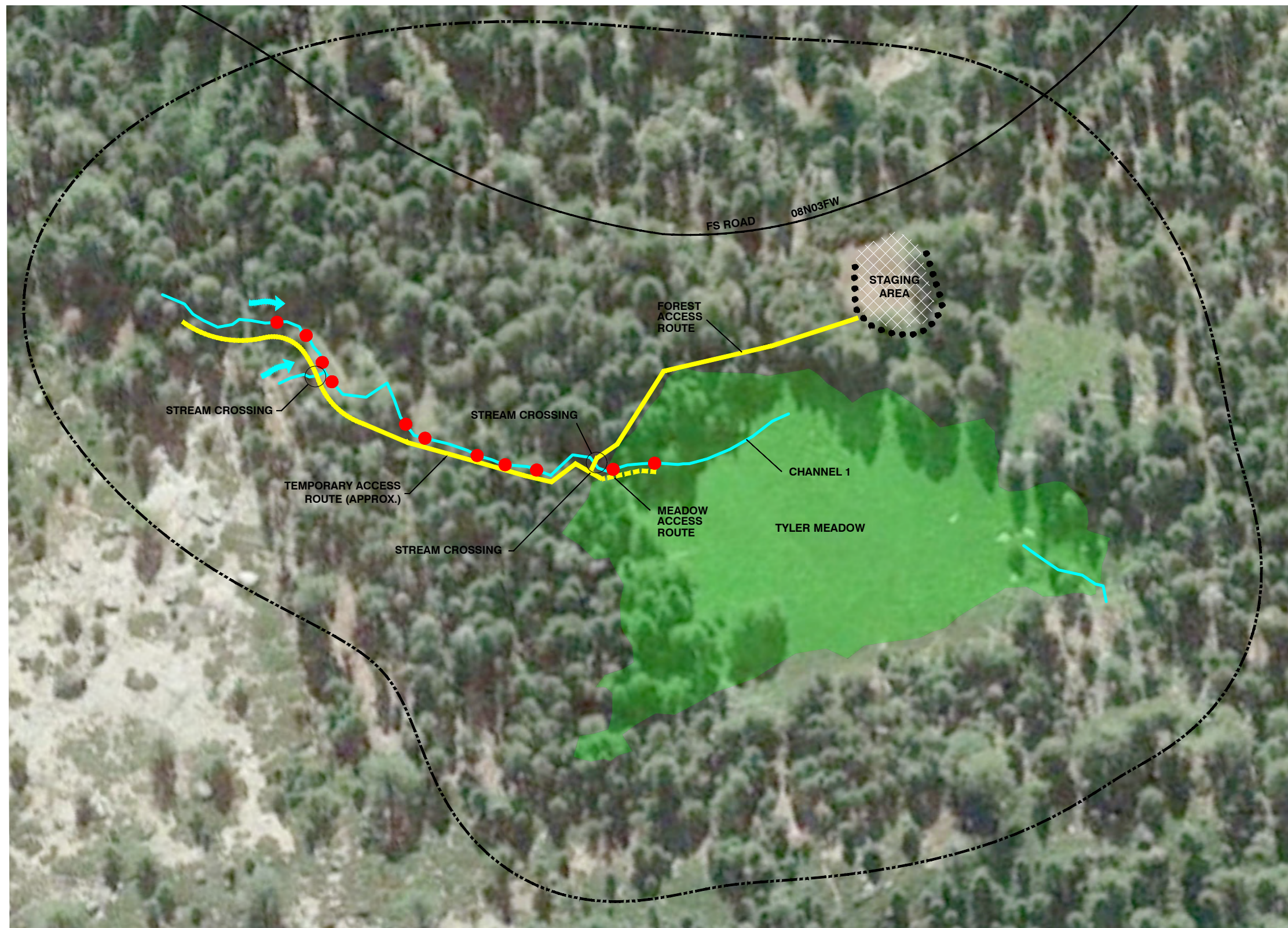
The proposed restoration actions for Tyler Meadow include management of the timing and duration of grazing, limit access by off-highway vehicles (OHVs), and installation of approximately 11 log weir grade control structures to limit additional downcutting (reference Figure 4). The log weir grades would be in the primary channel located in the forested area upstream of the meadow. Approximately thirty (30) conifers less than 30" dbh may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Tyler Meadow project area. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

One temporary access route will be constructed through upland forest from the FS Road 08N03FW located along the east side of the meadow to the stream channel. The access route will cross through the intermittent stream channel and will be located along the northwestern edge of the stream within an existing disturbance corridor. The access route would be field fit to minimize impacts soil caused by potential tree felling, removal of stumps, and light grading. One crossing of the intermittent stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks. As the proposed action is limited to the creek channel above Tyler Meadow, there would be no access routes or construction equipment within the meadow.

To limit future access to the Meadow by off-road vehicles, either boulders or logs buried by sediment will be placed around the margin of the parking area (reference Figure 4).

Table 2. Action items of the Three Meadows Restoration Project

Action Item Number	Action
1	<p>Construction of log weirs and constructed rock riffles within existing incised channels to raise base level of channel, encourage aggradation, reduce overall channel capacity and raise the groundwater table (Figures 2 through 4)</p> <ul style="list-style-type: none"> • Construction of log weirs: 11 at Tyler Meadow (ephemeral stream), and 25 at Upper Onion Valley (intermittent streams), and 26 at High Onion (intermittent streams). Logs will be felled from suitable trees located along the meadow edge, along temporary access routes or from within the meadows. Trees used for log weirs will be hand felled, bucked, and limbed. Transport from the harvest location to the weir construction will utilize various construction equipment. Log weirs will be installed by hand crews. • Construct 21 rock riffles along Onion Creek and two tributaries within Upper Onion Valley. It is expected that rock for the riffles will be imported from the Tragedy Pit. Construction of rock riffles will be completed using motorized equipment in the meadow.
2	<p>Construct Roughend Channel To control overall base level of Upper Onion Valley meadow (Figure 2)</p> <ul style="list-style-type: none"> • Placement of rock within 90 lf / 720 sq. ft. of perennial streams and 0.01 acre of adjacent wet meadow at the outflow from Upper Onion Valley. Rock will likely be imported from Tragedy Pit for this component. Motorized equipment would be used in order to accomplish this action item.
3	<p>Construct Road Berm on FS Road 08N03 (Figure 2)</p> <ul style="list-style-type: none"> • Placement of 5:1 sloped rock berms to direct stream flow to original channel and into meadow.
4	<p>Installation of exclusionary cattle fencing at High Onion (Figure 3)</p> <ul style="list-style-type: none"> • Fencing will be placed around six (6) hillslope seeps to protect existing hydrology and prevent soil compaction
5	<p>Installation of OHV fencing at Tyler Meadow (Figure 4)</p> <ul style="list-style-type: none"> • Log or rock barriers will be placed long upper meadow edge to prevent OHV access from adjacent roadway.
6	<p>Creation of Temporary Access Routes (Figures 2 through 4)</p> <ul style="list-style-type: none"> • Access to the meadow restoration areas will be via temporary forest access routes (approx. 3,875 lf / 1.3 acres) and meadow access routes (1,170 lf / 0.40 ac) to be restored upon project completion.



KEY:



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FIGURE 4
THREE MEADOWS RESTORATION PROJECT
TYLER MEADOW
PLAN VIEW

Material Sourcing

The primary materials needed for the construction of restoration project are logs for the log weirs and the stream bed material for the constructed riffles and roughened channels. All of the logs are anticipated to be sourced from on site, both adjacent to and within the meadow. The streambed material is expected to be sources from other Forest Service rock staging areas on the district. Rock transported to the site would be delivered to the proposed staging areas and mixed on site to achieve the desired gradation for either the constructed riffles of the roughened channel.

Revegetation

The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30” following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30”.

Post-Project Monitoring

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted.

Design Criteria

The following mitigation measures and coordinating requirements are incorporated into the Proposed Action:

Air Quality

All ground disturbing activities shall be effectively controlled of fugitive dust emissions utilizing good housekeeping methods described by the Amador Air District:

- Application of water and/or approved chemicals to road surfaces.
- Using vegetation and other barriers to contain and to reduce fugitive emissions.
- Maintaining reasonable vehicle speeds while driving on unpaved roads in order to minimize fugitive dust emissions.
- Other precautions not specifically listed in this rule but have been approved in writing by the APCO prior to implementation.

Range Resources

- The meadows, or portions of the meadows, may be excluded from grazing use temporarily depending on future coordination between the USFS and the current allotment permittee.

Heritage Resources

- Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.
- This does not fully eliminate the chance of discovering unrecorded sites or subsurface remains within the project boundary. If project ground disturbance should expose a cultural deposit, disturbance activities will be suspended until a qualified archaeologist can examine the area, evaluate the material, and adequate protection measures are incorporated. In the event that human remains are uncovered during project activity, project managers must stop work and contact Eldorado National Forest. If the remains are determined to be of Native American origin, both the Native American Heritage Commission and any identified descendants shall be notified (Health and Safety Code 7050.5, Public Resources Code Section 5097.94 and 5097.98).
- The only access roads to the project areas will be those shown by the plan set to reduce impacts to cultural sites.

Terrestrial Wildlife

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30" diameter at breast (dbh) and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.

- If the Sierra Nevada yellow-legged frog (SNYLF) are found within the project area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).

- The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.
- In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.
- Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Hydrology

- Construction activities would occur during the time of year when the flows are at their lowest. This typically occurs between August 1 and October 30.
- Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.
- The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.
- Where streams and meadows cannot be avoided the following would be used to minimize impacts:
 - Corduroy stream crossings consist of laying logs in the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel.
 - Locations of the corduroy stream crossings are shown on Figures 2-4. A cross-sectional detail of the corduroy crossing is shown in the following figures.
 - Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs as necessary, depending on the number of times the crossing is used.
 - Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.
 - Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas.
 - The mats would consist of slash material from the salvaged trees.
 - The slash should be layered to a depth of 1 to 1.5 feet and be a minimum of 15 feet wide to accommodate the construction.
 - Similar to the corduroy stream crossing, the condition of the marsh mats should be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow.
 - The mats would be removed from the meadow and placed as slash along the temporary forest access roads.
 - Low impact construction equipment would be used as described in the technical specifications will provide limits on the size and type of equipment that can be used in the meadow.
 - Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs.

- Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with only a single, short traverse across the meadow at the northern end of the project site.

Botanical Resources

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004). Specific design criteria and protection measures for the project include:

- Any new occurrences of sensitive plants identified within the project area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.
- A Forest Service watchlist species, *Botrychium simplex*, occurs within the project area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).
- All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

Soil Resources

- Standard mitigation measures will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.
- The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.
- Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.
- Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping,

seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

- The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary. Revegetation will consist of the following measures:
 - During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
 - All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
 - Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

Fire and Fuels Management

- While the project area is located in a meadow and outside of state identified very fire hazard severity zones, portions of the meadow are expected to be dry, with a risk for wildfire associated with the use of any internal combustion engine. A trash pump and/or water truck will be on site to assist with vegetation transplants and dust control, as well as to reduce the risk of wildfire. In addition, equipment would be re-fueled and serviced at the designated staging area, which is outside of the riparian area and meadow. No fuel would be stored on site. In the event of an accidental spill, hazmat materials for quick on-site clean-up would be kept at the project sites during all construction activities, and in each piece of equipment.

IV. EFFECTS OF PROPOSED PROJECT

Potential for Project Effects

This aquatic BE evaluates species that are designated as “sensitive” by the Pacific Southwest Region of the Forest Service, which may occur on the Eldorado National Forest.

Surveys and Assessments

No detections of FS sensitive species have been documented at the proposed action site because it is not within range of all species discussed in Table 1.

Additional surveys required for assessment: Additional surveys are not required.

Habitat Assessment Methodology: Review of Forest Natural Resource Manager (NRM) database of wildlife and aquatic detections and management areas, photos, site reconnaissance and vegetation surveys for the project area.

Direct, Indirect, and Cumulative Effects

The proposed Three Meadows Restoration Project will not have any impacts to FS sensitive species or their suitable habitat due to being outside of elevational ranges. Therefore; no direct, indirect, or cumulative effects would occur for any FS sensitive species.

V. DETERMINATION OF EFFECTS

Foothill Yellow-legged Frog: *It is my determination that the Three Meadows Restoration Project will have no effect on the Foothill yellow-legged frog.*

Western pond turtle: *It is my determination that the Three Meadows Restoration Project will have no effect on the Western Pond Turtle.*

Hardhead: *It is my determination that the Three Meadows Restoration Project will have no effect on the Hardhead.*

Pacific Lamprey: *It is my determination that the Foster Meadow Restoration Project will have no effect on the Pacific Lamprey.*

VI. LITERATURE CITED

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Appendix A

Three Meadows Photographs

Appendix A – Site Photographs



Photo 1. **Upper Onion Valley:** Onion Creek flowing into meadow area at northeast corner of site.



Photo 2. **Upper Onion Valley:** View to the south of unnamed creek near eastern edge of meadow.



Photo 3. **Upper Onion Valley:** Overview of meadow. View to the north. July 2019.



Photo 4. **Upper Onion Valley:** Overview north of meadow taken from southern outlet.



Photo 5. **Upper Onion Valley:** View to the south of Onion Creek at outflow of meadow.



Photo 6. **High Onion Meadow:** Overview of wet meadow along eastern edge.



Photo 7. **High Onion Meadow:** Overview of small drainage discharging from seep. View to the north.



Photo 8. **Tyler Meadow.** View to the north of creek bed above meadow.



Photo 9. **Tyler Meadow:** Overview to the south of meadow from upper (northern) end.



Photo 10. **Tyler Meadow:** Outflow of stream from meadow. View to the south.

Appendix E

Biological Evaluation and Assessment for the Threatened, Endangered,
and Sensitive Botanical Species
February 5, 2020

**Eldorado National Forest
Amador Ranger District**

Biological Evaluation and Assessment
For the
Threatened, Endangered, and Sensitive Botanical Species

Three Meadows Restoration Project

February 5, 2020

**Project Location:
Amador County, California**

T19N, R16E Sections 01, 03, and 11 MDBM.

Botanical BE/BA Prepared by:

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Date: September 17, 2019

Reviewed by:

Matt Brown /s/
ENF Forest Service Botanist
Date: February 13, 2020

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February 5, 2020

BE/BA *for the* –
TES Botanical Species
Three Meadows Restoration Project

APPENDICES

Appendix A Botany Report for Special Interest Plants

Appendix B Noxious Weed Risk Assessment

Appendix C Noxious/Invasive Weeds of Concern

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I. INTRODUCTION

Purpose

Forest Service Manual 2672.42 specifies that a biological evaluation (BE) and a biological assessment (BA) be prepared to determine if a project may affect any USDA Forest Service (FS) sensitive species and US Fish and Wildlife Service (USFWS) threatened, endangered, or proposed species and their designated or proposed critical habitat. This BE/BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)). The purpose of this BE/BA is to review the Three Meadows Restoration Project in sufficient detail to determine to what extent the proposed action may affect any threatened, endangered, proposed, and sensitive (TEPS) plant species for the project area.

The Amador Ranger District (ARD) of the Eldorado National Forest (ENF), in cooperation with the Amador Resource Conservation District and the Amador-Calaveras Consensus Group, proposes to implement the Three Meadows Restoration Project occurring within three meadow locations: High Onion Meadow, Tyler Meadow and Upper Onion Valley.

Location: The Three Meadows project area is located approximately 45 miles east of Jackson, California, and five miles south of State Highway 88, in the vicinity of the Upper Bear River Reservoir (reference Figure 1).

Meadow Name	Location	Project Area	Elevation
Upper Onion Valley	T8N, R16E, Sec 11	26.8 acres	7,480
High Onion Meadow	T8N, R16E, Sec 1	10.2 acres	8,000
Tyler Meadow	T8N, R16E, Sec 3	10.3 acres	6,800

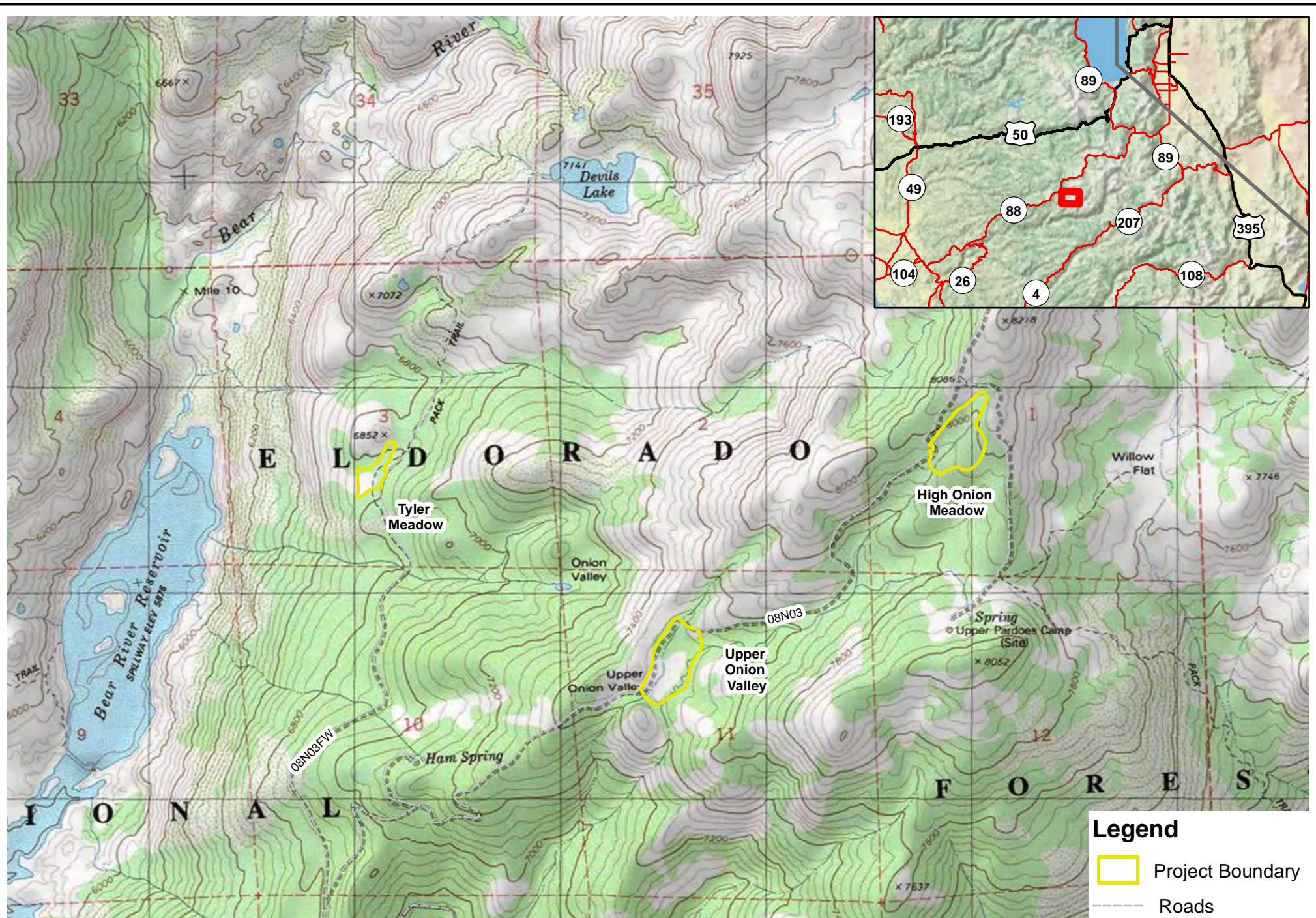
Federally Listed Threatened (T), Endangered (E), and Proposed (P) Plant Species

On January 23, 2020, the USFWS Information for Planning and Consultation website (IPaC) was queried for a list of threatened, endangered, proposed and candidates species and final designated critical habitat under jurisdiction of the USFWS that may occur or be affected by activities within or adjacent to the proposed project boundaries. No federally listed threatened, endangered or proposed (TEP) species were included on the USFWS list.

Currently the only TEP plant species expected to occur on the Eldorado National Forest is *Packera layneae*. Upon site visit and literature review of potential habitat for *Packera layneae*, it was determined that the proposed project area does not contain suitable habitat for the species.

Region 5 Designated Botanical Sensitive Species

Table 1 lists all Sensitive plant species that are known to occur or have potential habitat on the ENF. Species that do not have potential habitat in the project area are not further analyzed in this document. Botanical surveys conducted for the proposed project focused on species with potential habitat. Botanists searched for these habitats (e.g., meadow) as well as for the Sensitive taxa.



0 1,000 2,000 Feet
 1 Inch = 2,000 Feet

Figure 1: Location Map
Three Meadows Restoration Project

Legend

- Project Boundary
- Roads


9/13/2019


Table 1. Habitat potential of the Proposed Three Meadows Restoration Project for TEPS plant taxa known or suspected to occur on the Eldorado National Forest.

Species	Status ¹	On ENF ²	Known in Project Area	Suitable Habitat in Project Area	Rationale for Determination of No Suitable Habitat/No Effect
<i>Three-bracted onion</i> (<i>Allium tribracteatum</i>)	S	P	No	No	Grows on open ridges with gravelly lahar soils (lava cap communities) in chaparral and lower & upper montane coniferous forests from ~ 3,300 to 10,000 feet in elevation.
<i>El Dorado manzanita</i> (<i>Arctostaphylos nissenana</i>)	S	K	No	No	Grows on highly acidic slate and shale soils and is often associated with closed-cone conifer forest from about 1,400 to 3,600 feet.
<i>Big-scale balsamroot</i> (<i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>)	S	P	No	No	Grows in chaparral, vernal moist meadows & grasslands, grasslands within oak woodland, and ponderosa pine forest below 4,600 feet.
<i>Upswept moonwort</i> (<i>Botrychium ascendens</i>)	S	P	No	Yes	Grows in lower montane coniferous forest, meadows, and seeps from 4,900 to over 7,500 feet in elevation. Only Tyler Meadow is located within elevation range.
<i>Scalloped moonwort</i> (<i>Botrychium crenulatum</i>)	S	K	No	Yes	Grows in fens, lower montane coniferous forest, meadows, seeps, and freshwater marshes from 4,900 feet to 10,500 feet in elevation.
<i>Common moonwort</i> (<i>Botrychium lunaria</i>)	S	P	No	Yes	Grows in meadows, seeps, subalpine and upper montane coniferous forest from 7,450 feet to over 11,000 feet in elevation.
<i>Mingan moonwort</i> (<i>Botrychium minganense</i>)	S	K	No	Yes	Grows in fens, lower and upper montane coniferous forest, meadows, and seeps from 4,900 to 6,750 feet. Only Tyler Meadow is located within known elevation range.
<i>Mountain moonwort</i> (<i>Botrychium montanum</i>)	S	K	No	Yes	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation. Only Tyler Meadow is located within known elevation range.
<i>Paradox moonwort</i> (<i>Botrychium paradoxum</i>)	S	K	No	Yes	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation. Only Tyler Meadow is located within known elevation range.
<i>Stalked moonwort</i> (<i>Botrychium pendunculosum</i>)	S	P	No	Yes	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation. Tyler Meadow is located within known elevation range.
<i>Bolander's bruchia</i> (<i>Bruchia bolanderi</i>)	S	K	No	Yes	Grows in meadows and fens in montane and subalpine communities from about 5,500 to 9,000 feet. Grows in ephemeral habitats such as erosional ditches or small streamlets through wet meadows.
<i>Pleasant Valley mariposa lily</i> (<i>Calochortus clavatus</i> var. <i>avius</i>)	S	K	No	No	Grows in openings in mixed conifer & ponderosa pine forest, usually on ridgetops and south-facing slopes from 2,500 to 5,600 feet.
<i>Mountain lady's slipper</i> (<i>Cypripedium montanum</i>)	S	P (K on inholding)	No	No	Grows in moist areas and upland sites with northerly aspects, loamy soils and shade, from 3,500 to 5,700 feet (generally <5,000 ft).

Species	Status ¹	On ENF ²	Known in Project Area	Suitable Habitat in Project Area	Rationale for Determination of No Suitable Habitat/No Effect
<i>Branched Collybia</i> (<i>Dendrocollybia racemosa</i>)	S	K	No	No	Grows on remains of decayed mushrooms or occasionally in duff/leaf litter, in mid-mature to old-growth stands of mixed hardwood-conifer forests. Evidence of timber harvest at some extant occurrences.
<i>Tahoe draba</i> (<i>Draba asterophora</i> var. <i>asterophora</i>)	S	H	No	No	Restricted to rocky ledges and talus slopes in subalpine and alpine habitats above 8,200 feet.
<i>Cup Lake draba</i> (<i>Draba asterophora</i> var. <i>macrocarpa</i>)	S	K	No	No	Restricted to sandy slopes, rocky ledges, and talus slopes in subalpine and alpine habitats above 8,200 ft.
<i>Tripod buckwheat</i> (<i>Eriogonum tripodum</i>)	S	K	No	No	Grows on serpentine soils in foothill and cismontane woodlands below 5,300 feet.
<i>Blandow's bog-moss</i> (<i>Helodium blandowii</i>)	S	P	No	Yes	Grows in wet meadows, fens, & seeps in subalpine coniferous forest and alpine lakes from 6,100 to 9,000 feet.
<i>Parry's horkelia</i> (<i>Horkelia parryi</i>)	S	K	No	No	Grows on stony, disturbed, slightly acidic soils in open chaparral and cismontane woodland below 3,400 feet.
<i>Hutchison's lewisia</i> (<i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i>)	S	K	No	No	Grows in openings in upper montane coniferous forest, often on slate soils and on soils that are sandy granitic to erosive volcanic from 4,800 to 7,000 feet.
<i>Kellogg's lewisia</i> (<i>Lewisia kelloggii</i> ssp. <i>kelloggii</i>)	S	K	No	No	Grows on granitic and volcanic balds from about 5,000 to 8,000 feet.
<i>Long-petaled lewisia</i> (<i>Lewisia longipetala</i>)	S	K	No	No	Restricted to subalpine & alpine slopes or basins with deep snow accumulations, above 8,200 feet.
<i>Saw-toothed lewisia</i> (<i>Lewisia serrata</i>)	S	K	No	No	Restricted to steep, nearly vertical cliffs in inner gorges of perennial streams and rarely near seeps and intermittent streams. Grows between 2,800 and 4,800 feet in the American River watershed.
<i>Broad-nerved hump-moss</i> (<i>Meesia uliginosa</i>)	S	P	No	Yes	Grows in permanently wet, primarily spring-fed meadows and fens in montane to subalpine coniferous forest from 4,200 to 9,200 feet.
<i>Elongate Copper Moss</i> (<i>Mielichhoferia elongata</i>)	S	P	No	No	Grows on metamorphic, sedimentary, limestone, and serpentine rock outcrops that often contain copper or other heavy metals and that are seasonally moist or less commonly on moist soil. ponderosa pine. Grows from sea level to 3,550 feet.
<i>Yellow bur navarretia</i> (<i>Navarretia prolifera</i> ssp. <i>lutea</i>)	S	K	No	No	Grows in openings in or adjacent to mixed conifer forest or cismontane woodland on rocky ridgelines, saddles, or eroding ephemeral drainages from 2,300 to 5,000 feet.
<i>Adder's tongue</i> (<i>Ophioglossum pusillum</i>)	S	P	No	Yes	Grows in moist habitat including wet meadows and roadside ditches.

Species	Status ¹	On ENF ²	Known in Project Area	Suitable Habitat in Project Area	Rationale for Determination of No Suitable Habitat/No Effect
<i>Layne's ragwort</i> (<i>Packera layneae</i>)	T, S	K	No	No	Grows on rocky, gabbroic or serpentinitic soils in chaparral and cismontane woodland below 3,000 feet.
<i>Veined water lichen</i> (<i>Peltigera gowardii</i>)	K	K	No	No	Grows on rocks in cold, unpolluted spring-fed streams without marked seasonal fluctuation. Submerged most of year. Peak flows must not scour the rocks & gravels where this species attaches.
<i>Stebbins' phacelia</i> (<i>Phacelia stebbinsii</i>)	S	K	No	No	Grows on dry, open, rocky sites (bedrock outcrops, rubble or talus) on ledges or moderate to steep slopes and on damp, mossy inner gorges from 2,000 to 6,800 feet.
<i>Olive phaeocollybia</i> (<i>Phaeocollybia olivacea</i>)	S	P (K on inholding)	No	No	Conifer and hardwood forests where it grows in the humus layer. Logging disturbance, when present, is not intense (e.g. clear-cut or patch-cut).
<i>Whitebark pine</i> (<i>Pinus albicaulis</i>)	C, S	K	No	No	Whitebark pine typically occurs on cold and windy high elevation sites in western north America (7,000-12,000 feet).
<i>Sierra blue grass</i> (<i>Poa sierrae</i>)	S	K	No	No	Grows in lower montane coniferous forest on steep, shady, moist slopes from 1,200 feet to 3,800 feet.

¹ S = Forest Service Sensitive; T = Federally Listed as Threatened; C = Candidate Species

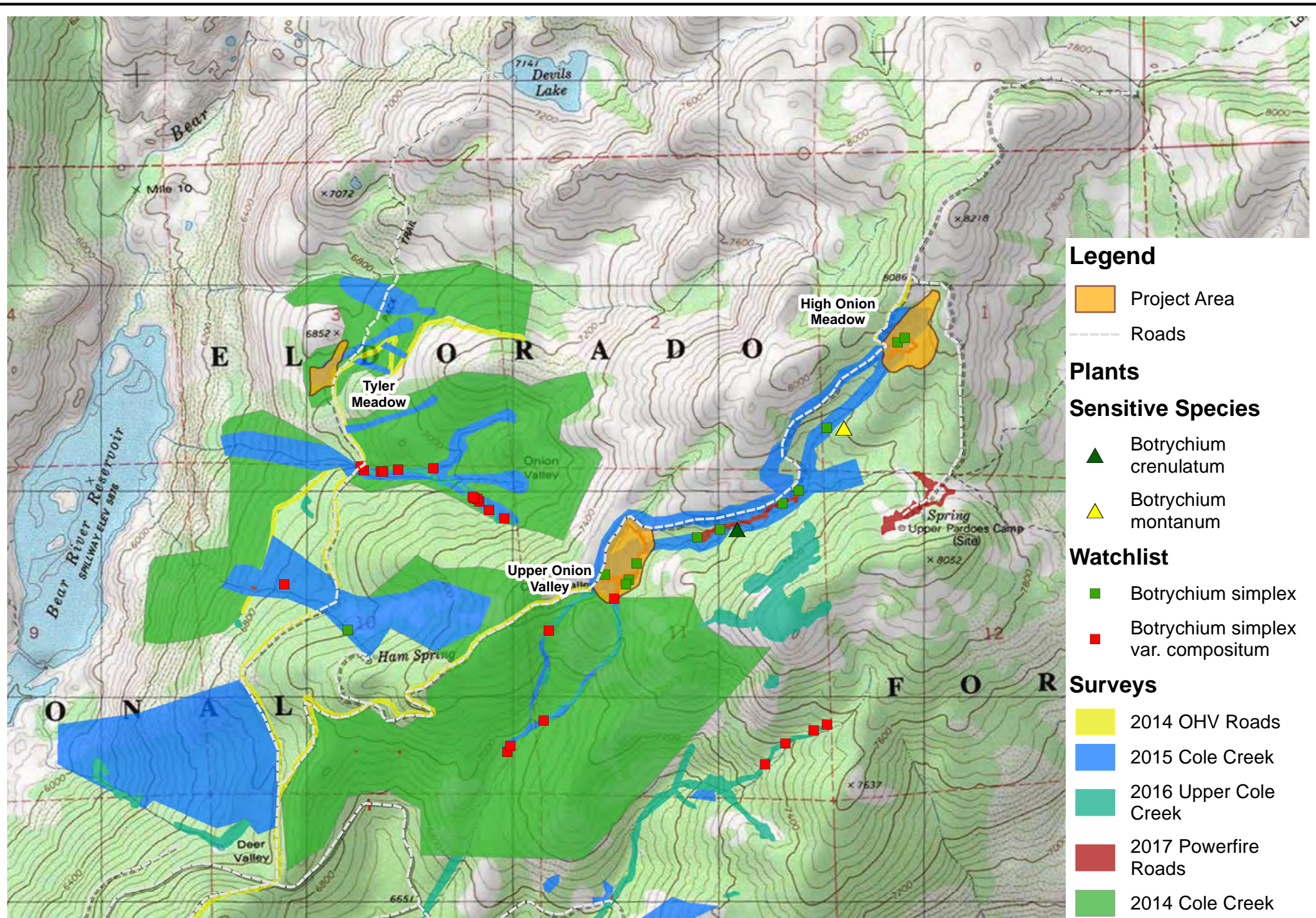
² H = historic record; K = known to occur on ENF; P = suspected to occur on ENF

Field Surveys

The Three Meadows project area have been previously surveyed for TEPS species as summarized below and shown in Figure 2:

- **High Onion:** This meadow was surveyed in 2015 and 2017, resulting in the identification of two separate suboccurrences of *Botrychium simplex* (Occurrence No. 022-1), an ENF Special Status Species, along the mainstream channel. The occurrences were revisited in August 2019, but no individuals were observed. No TEPS species were located during any of the site surveys.
- **Upper Onion Valley:** This meadow was first surveyed in 2015 for sensitive plants and revisited in 2016 and 2017, resulting in identification of five (5) suboccurrences of *B. simplex* (Occurrence No. 024). All of the suboccurrences were located along the stream channel on the east side of the meadow except one, which was located along a stream channel located near the western meadow edge. The occurrences were revisited in August 2019, but no individuals were observed. No TEPS species were located during any of the site surveys.
- **Tyler Meadow:** Tyler Meadow was surveyed in 2014 as part of the Cole Creek Unit 4 plant surveys completed by ARD survey crews. The site was resurveyed July 2019. No TEPS species were located during any of the site surveys.

No formal or informal consultation with the USFWS has been conducted since TEP species or potential habitat does not exist in or near the project area.



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1 Inch = 2,000 Feet

Figure 2: ENF Plant Surveys and Species Occurrences

II. CURRENT MANAGEMENT DIRECTION

Endangered Species Act

The purpose of the Endangered Species Act (ESA) is to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and to provide for the conservation of such endangered species and threatened species. The ESA directs federal agencies to ensure that actions authorized, funded, or carried out by these agencies are not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of their critical habitats (ESA Section 7(a)(2)).

Executive Orders

Executive Order 13112 of February 3, 1999 documents Presidential direction to affected federal agencies to “...identify actions subject to the availability of appropriations... encourage planning and action at local, State, and regional ecosystem-based levels... and prepare and issue Invasive Species Management Plans.... to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive (plant) species cause.”

Forest Service Manual

Forest Service Manual direction (FSM 2672.1 and FSM 2672.43) requires that activities be reviewed for potential effects on rare species and outlines policy, objectives and procedures. The Forest Service Manual (FSM 2670) (USDA Forest Service 2005) also directs national forests to assist states in achieving conservation goals for endemic species; complete biological evaluations of programs and activities; avoid and minimize impacts to species with viability concerns; analyze the significance of adverse effects on populations or habitat; and coordinate with states and USFWS. The Forest Service Manual (2670.15) further defines sensitive species as those plant species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trend in numbers, density or habitat capability that would reduce a species distribution.

FSM 2670.32 states to “avoid or minimize impacts to species whose viability has been identified as a concern.” “A [viable] population...has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area” (FSM 2670.5). If impacts cannot be avoided, then the Forest must analyze the significance of the potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. Impacts may be allowed but the decision must not result in a trend toward federal listing.

FSM 2670.22 directs national forests to “maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.” To comply with this direction, Forests are encouraged to track and evaluate effects to additional species that may be of concern even though they are not currently listed as sensitive. Such plant species are referred to as Special Interest or watch list species.

Forest Service Manual 2900 (USDA Forest Service 2011) contains national direction for noxious weed management. Specific policies included in FSM 2900 include:

- Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.
- Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas. Integrate visitor use strategies with invasive species management activities on aquatic and terrestrial areas of the National Forest System. At no time are invasive species to be promoted or used in

site restoration or re-vegetation work, watershed rehabilitation projects, planted for bio-fuels production, or other management activities on national forests and grasslands.

- Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species. For example, where determined to be appropriate, use agreement clauses to require contractors or permittees to meet Forest Service approved vehicle and equipment cleaning requirements/standards prior to using the vehicle or equipment in the National Forest System.

Land and Resource Management Plan (LRMP), as Amended in 2001 and 2004

TEPS Plants

In the ENF LRMP (USDA FS 1989), under Management Practice 49, the General Direction is to "provide for protection and habitat needs of sensitive plants so that Forest activities would not jeopardize the continued existence of such species". It is reiterated several times in the LRMP that "sensitive plants will be managed to insure that species do not become threatened or endangered because of Forest Service actions". Under the Issue Resolution for Fish and Wildlife on page 2-15, the LRMP states that "sensitive plants are protected as if they are threatened and endangered species".

Special Interest Areas

Management Emphasis: "Manage the areas principally for their recreation use substantially in their natural condition. Preserve the integrity of the special interest features for which the areas were established."

Sierra Nevada Forest Plan Amendment (SNFPA)

The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following direction applicable to motorized travel management and Threatened, Endangered, and Sensitive (TES) plants:

- Bog and Fen Habitat (SNFPA ROD page 65, S&G #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles.
- Sensitive Plant Surveys (Corrected Errata, April 19, 2005): Conduct field surveys for TEPS plant species early enough in project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file. (Management Standard & Guideline 125). The standards and guidelines provide direction for conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities, and adherence to the Regional Native Plant Policy (USDA Forest Service 2004).

Desired Condition

The main goal of the ENF Sensitive Plant Program is to maintain viable populations of sensitive plant species. Conversely, the goal of the ENF Weeds Program is to eradicate or control the spread of noxious and other non-native invasive plants on these federal lands, and thus prevent or minimize impacts to other resources.

The current condition of Sensitive plant species on the ENF reflects the effects of past and present management activities. Presently there is not enough evidence to suggest whether Sensitive plant populations and/or ranges are increasing, decreasing, or stable. Monitoring of occurrences, which detects decreases or increases from year to year, may merely reflect normal variation in individual numbers as a response to annual climatic changes. There is also considerable uncertainty regarding future changes in local climatic patterns. Given the lack of data

needed to take a proactive management approach to these Sensitive plant species, the best available interim management approach is to minimize impacts to known occurrences of Sensitive plant species while allowing expansion into suitable unoccupied habitat. This strategy would also maximize the diversity of habitat and microsite conditions (slope, aspect, elevation, etc) for Sensitive plants on the ENF which may be important in face of future climate change. While much is unknown about the potential long-term effects of a warming and/or drying climate on Sensitive plant species, in the near term, maintaining habitat diversity across the species range may be the best means to manage for species which could require unique microsites to persist under future climatic conditions.

III. PROJECT DESCRIPTION

The Eldorado National Forest Amador Ranger District in Amador County, California in cooperation with the Amador Resource Conservation District proposes to restore mountain meadow habitat at three small high-elevation meadows: Upper Onion Valley, High Onion Meadow, and Tyler Meadow. This BE/BA analyzes proposed actions for restoration of the natural morphology of the three meadows to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation.

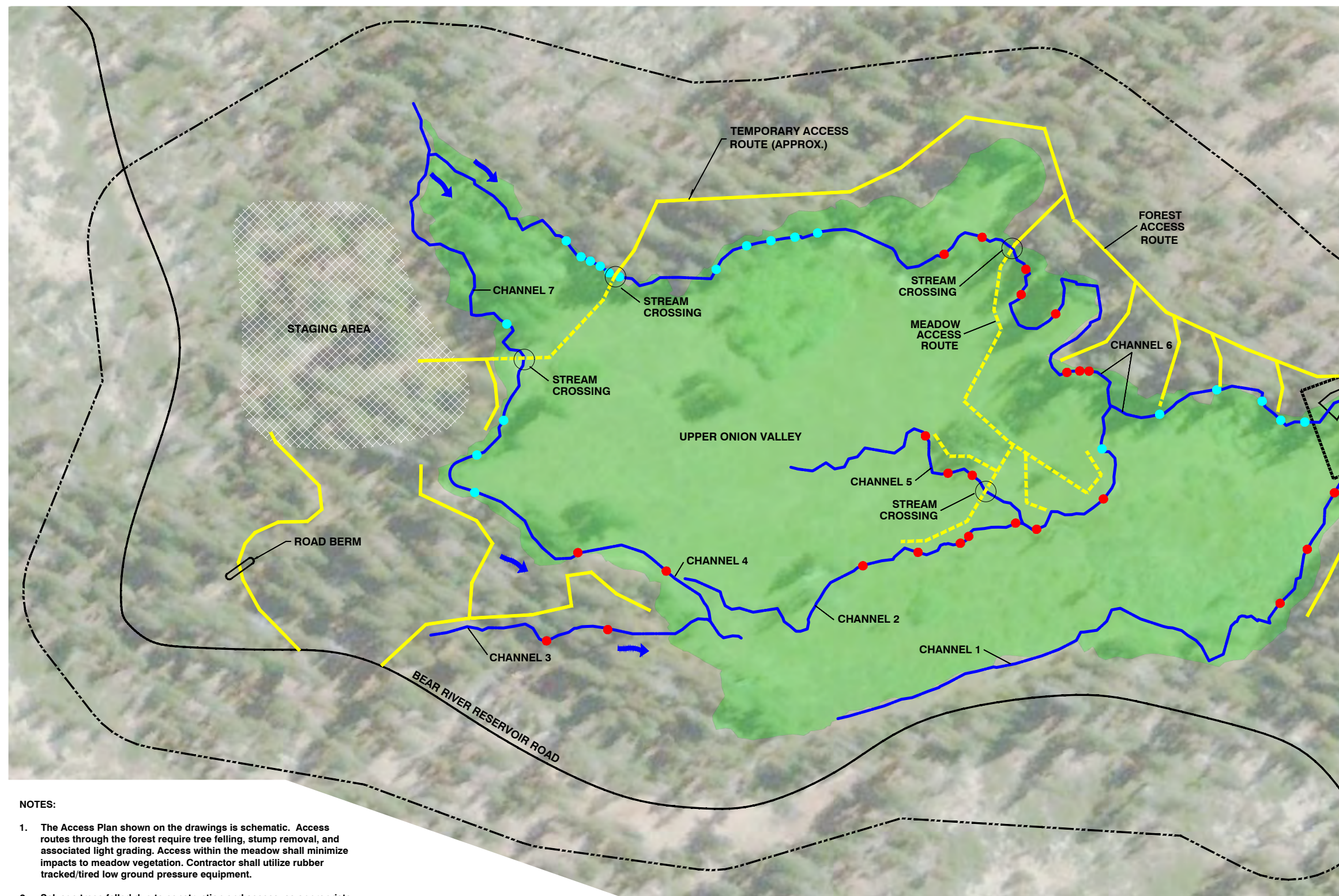
Proposed Action

To achieve the above restoration objectives, each of the three meadows has its own restoration action plan to resolve specific resource concerns as described below.

Upper Onion Valley

The proposed restoration actions for Upper Onion Valley include installation of rock riffles and log weirs. The constructed rock riffles and log weirs would be located in existing, incised channels to stabilize the profile grade within the meadow channel, encourage aggradation, restore the hydraulic continuity of flow through the meadow, and raise the groundwater table (reference Figure 3). Rock riffles would be placed in greater than one foot in depth, forming a system of short rock riffle segments interspersed with longer pools. For the constructed riffles a four foot long riffle crest would be established that is keyed into the streambed and banks. Rock ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and at a 1:1 slope at the upstream end. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Approximately twenty-one (21) constructed rock riffles would be placed within Onion Creek, the main channel through the Upper Onion Valley.

Additionally, the project activities at Upper Onion Valley include the installation of twenty-five (25) log weirs as grade control located primarily within lower energy, less incised portions of the channel network. It is estimated that approximately seventy-three (73) logs less than 30" diameter at breast height (dbh) would be needed to construct the weirs and would be harvested from trees within the meadow, along the designated access routes, or near the meadow margins. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".



NOTES:

1. The Access Plan shown on the drawings is schematic. Access routes through the forest require tree felling, stump removal, and associated light grading. Access within the meadow shall minimize impacts to meadow vegetation. Contractor shall utilize rubber tracked/tired low ground pressure equipment.
2. Salvage trees felled due to construction and access, as appropriate.
3. Access routes require channel crossings. Contractor shall minimize channel impacts by use of temporary bridge such as marsh mats or corduroy stream crossings.
4. Stage materials within the existing primitive campground. Contain the downslope perimeter of staging or stockpile areas with silt fence.
5. Store, maintain and refuel all equipment and materials in a designated portion of the staging area.
6. Restore access routes prior to final demobilization. Forest access routes require ripping, seeding, and coarse wood cover (e.g. logs and slash). Meadow access routes shall be restored to pre-project conditions.
7. Salvage willows at direction of Engineer or USFS representative.

FIGURE 3
THREE MEADOWS RESTORATION PROJECT
UPPER ONION VALLEY
PLAN VIEW

To provide downstream grade control for the meadow, a roughened channel will be constructed at outlet of meadow. The purpose of the structure is to actively raise water surfaces through the channels and meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and bury the upstream grade control structures. The roughened channel will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream of the crest and extend upstream of the crest at a 1:1 slope for approximately 10 feet to protect against undermining of the roughened channel. The roughened channel should be a minimum of three feet thick, composed of rock material of various sizes, and would look like a long sloping riffle when completed. Rock would likely be imported to the site from Forest Service rock staging areas in the district.

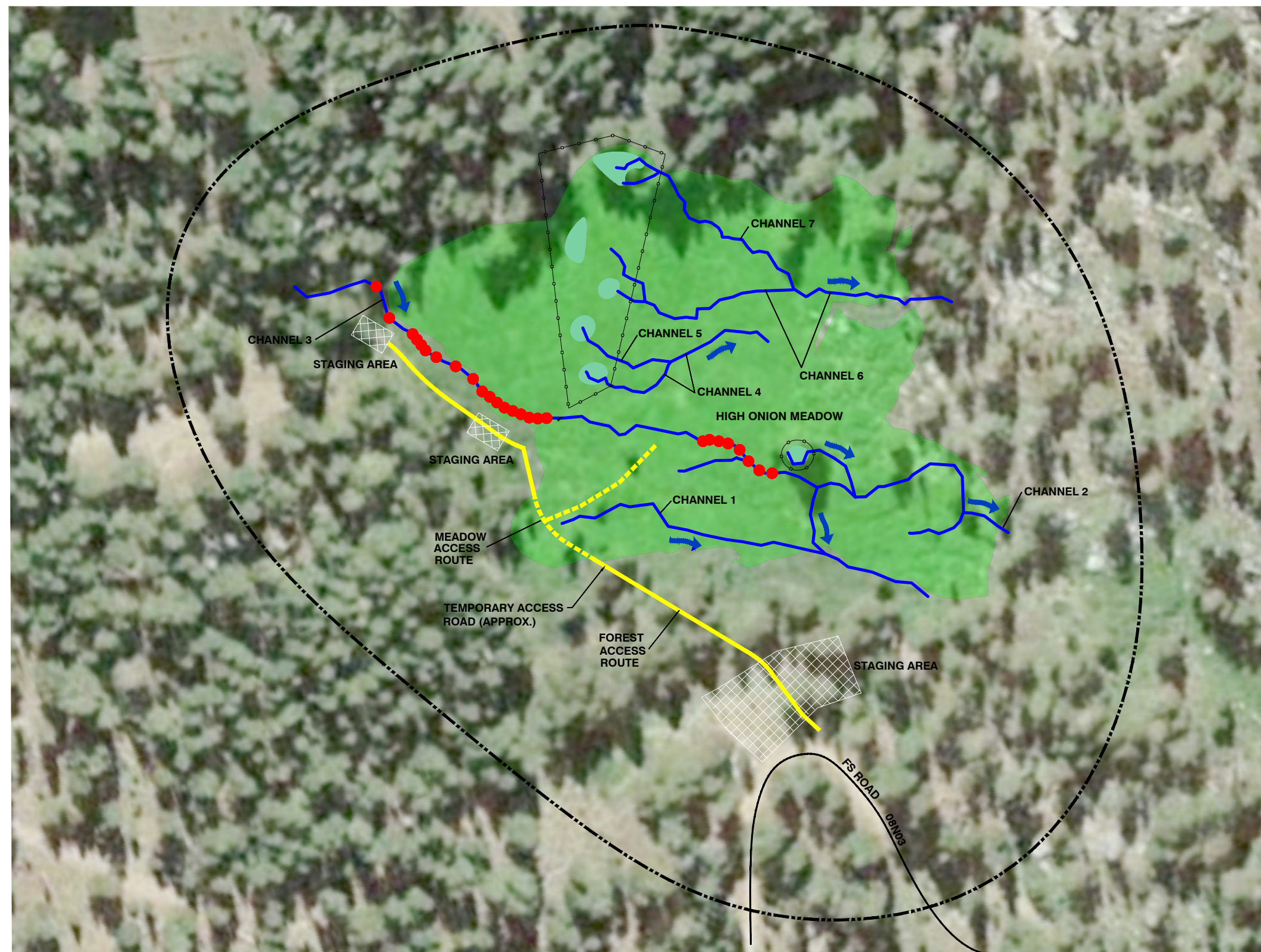
In addition, the proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area at the north end of the meadow (reference Figure 1). Currently flow within the channel is captured and rerouted within the existing roadbed rather than the natural stream channel (reference photo 6 in Appendix A). To restore and contain the flows within the original stream channel, the restoration project would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel. The berms on each side of the stream channel would be built up two feet with a 1.5-inch aggregate base material. The placement of the base material above the stream bank at 5:1 slopes will contain the streamflow in the original channel and prevent the water from flowing within the existing roadbed. The aggregate base material will be located within the roadbed above the stream channel.

The Upper Onion Valley site would be accessed by Bear River Reservoir Road (FS Road 08N03), a well-developed road that runs along the entire western and northern sides of the meadow. Staging of equipment and materials would occur at an existing primitive campground located at the northern (up gradient) edge of the meadow. Temporary access routes originating from the staging area and Bear River Reservoir Road would be utilized to access the interior of the site for placement of log weirs on the smaller, interior channels. Access routes would be field fit to minimize impacts caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road, steel plates, or marsh mats would be used. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions and elevation.

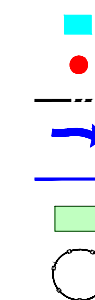
High Onion Meadow

The proposed action for High Onion Meadow includes the installation of low weir grade control structures in the primary meadow channel to limit additional downcutting, manage the timing and duration of grazing, and protect seepage sources from cattle grazing (reference Figure 4). Approximately 26 log grade control weirs spaced at approximately 25-foot intervals are proposed to be installed along the unnamed creek to enhance sedimentation and limit future risk of channel incision. It is anticipated that the structures would be built with hand tools and hand labor given the relatively narrow channel widths.

Approximately 75 conifers not to exceed 12-15 feet in length and with diameters ranging from 8 to 12 inches may be selected for harvest near the meadow margins, along the designated access routes, or in and around the High Onion Meadow. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".



KEY:



NOTES:

1. The sche requ light mini the t grou
2. Salv acce
3. Stag cam stag
4. Ston mate area
5. Rest Fore cour acce conc
6. Salv repri

FIGURE 4
THREE MEADOWS RESTORATION PROJECT
HIGH ONION MEADOW
PLAN VIEW

To discourage cattle use around sensitive areas and seepage sources, the project proposes to install fencing around the seeps that would prevent cattle access and usage of these areas. Most of the seeps identified in High Onion occur along the downstream margin of the upper fansurface as perched groundwater intersects the lower fan surface, and the entire geomorphic surface will be fenced off. Fencing would consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.

High Onion Meadow is accessible from Forest Service Road 08N03 and staging of materials and equipment would be located within an existing primitive campground adjacent to the road. Temporary access routes originating from the staging area adjacent to the Forest Service Road would skirt the upper edge of the meadow and cross over Onion Creek. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Within High Onion Meadow access routes are to be constructed along the upper northwestern edge and no stream crossings are required. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

Tyler Meadow

The proposed restoration actions for Tyler Meadow include management of the timing and duration of grazing, limit access by off-highway vehicles (OHVs), and installation of approximately 11 log weir grade control structures to limit additional downcutting (reference Figure 5). The log weir grades would be in the primary channel located in the forested area upstream of the meadow. Approximately thirty (30) conifers less than 30" dbh may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Tyler Meadow project area. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

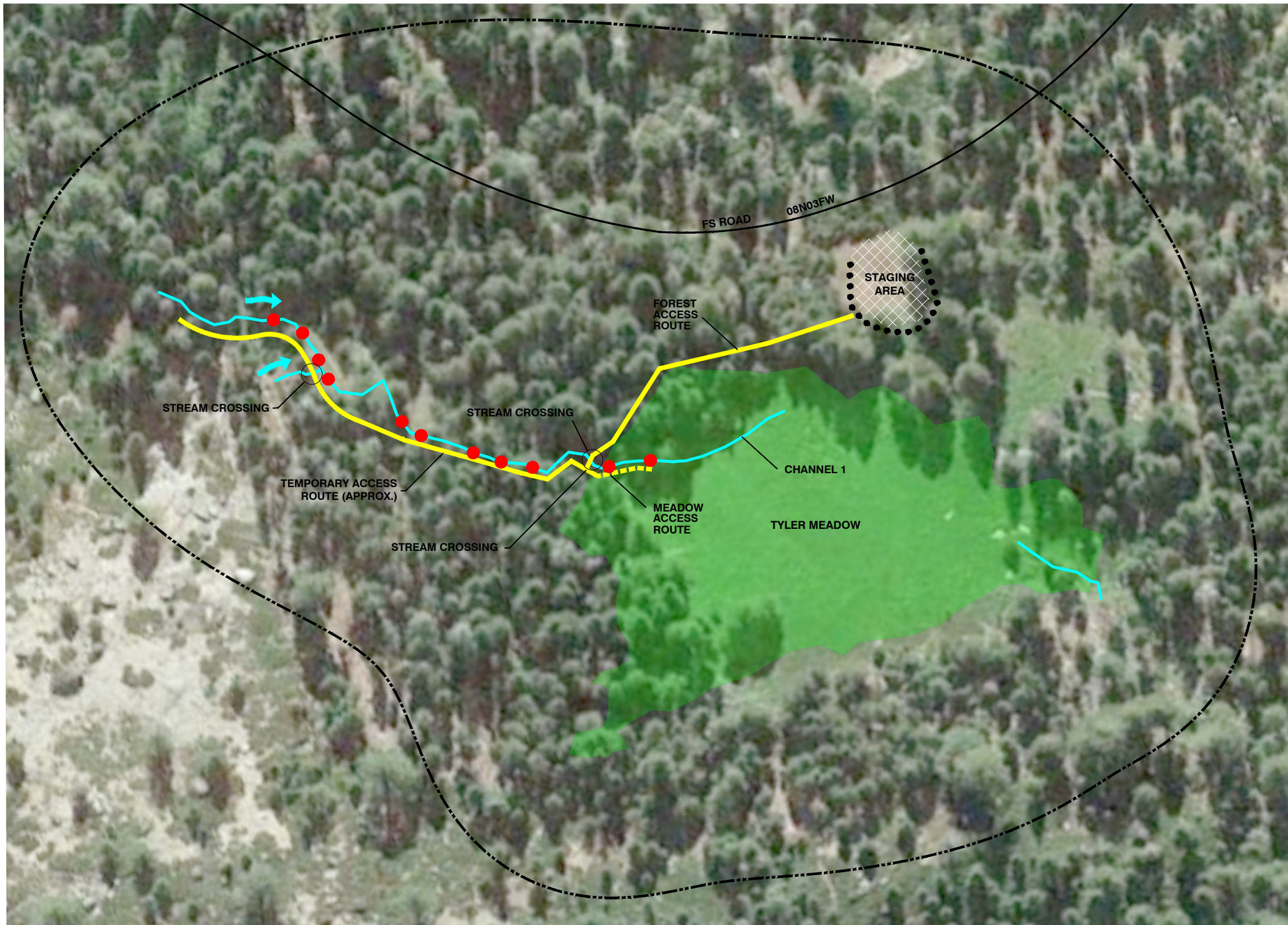
One temporary access route will be constructed through upland forest from the FS Road 08N03FW located along the east side of the meadow to the stream channel. The access route will cross through the intermittent stream channel and will be located along the northwestern edge of the stream within an existing disturbance corridor. The access route would be field fit to minimize impacts soil caused by potential tree felling, removal of stumps, and light grading. One crossing of the intermittent stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks. As the proposed action is limited to the creek channel above Tyler Meadow, there would be no access routes or construction equipment within the meadow.

To limit future access to the Meadow by off-road vehicles, either boulders or logs buried by sediment will be placed around the margin of the parking area (reference Figure 5).

Table 2 summarizes the proposed action items.

Table 2. Action items of the Three Meadows Restoration Project

Action Item Number	Action
1	<p>Construction of log weirs and constructed rock riffles within existing incised channels to raise base level of channel, encourage aggradation, reduce overall channel capacity and raise the groundwater table (Figures 3 through 5)</p> <ul style="list-style-type: none"> • Construction of log weirs: 11 at Tyler Meadow (ephemeral stream), and 25 at Upper Onion Valley (intermittent streams), and 26 at High Onion (intermittent streams). Logs will be felled from suitable trees located along the meadow edge, along temporary access routes or from within the meadows. Trees used for log weirs will be hand felled, bucked, and limbed. Transport from the harvest location to the weir construction will utilize various construction equipment. Log weirs will be installed by hand crews. • Construct 21 rock riffles along Onion Creek and two tributaries within Upper Onion Valley. It is expected that rock for the riffles will be imported from the Tragedy Pit. Construction of rock riffles will be completed using motorized equipment in the meadow.
2	<p>Construct Roughend Channel To control overall base level of Upper Onion Valley meadow (Figure 3)</p> <ul style="list-style-type: none"> • Placement of rock within 90 lf / 720 sq. ft. of perennial streams and 0.01 acre of adjacent wet meadow at the outflow from Upper Onion Valley. Rock will likely be imported from Tragedy Pit for this component. Motorized equipment would be used in order to accomplish this action item.
3	<p>Construct Road Berm on FS Road 08N03 (Figure 3)</p> <ul style="list-style-type: none"> • Placement of 5:1 sloped rock berms to direct stream flow to original channel and into meadow.
4	<p>Installation of exclusionary cattle fencing at High Onion (Figure 4)</p> <ul style="list-style-type: none"> • Fencing will be placed around six (6) hillslope seeps to protect existing hydrology and prevent soil compaction
5	<p>Installation of OHV fencing at Tyler Meadow (Figure 5)</p> <ul style="list-style-type: none"> • Log or rock barriers will be placed long upper meadow edge to prevent OHV access from adjacent roadway.
6	<p>Creation of Temporary Access Routes (Figures 3 through 5)</p> <ul style="list-style-type: none"> • Access to the meadow restoration areas will be via temporary forest access routes (approx. 3,875 lf / 1.3 acres) and meadow access routes (1,170 lf / 0.40 ac) to be restored upon project completion.



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FIGURE 5
THREE MEADOWS RESTORATION PROJECT
 TYLER MEADOW
 PLAN VIEW

Material Sourcing

The primary materials needed for the construction of restoration project are logs for the log weirs and the stream bed material for the constructed riffles and roughened channels. All of the logs are anticipated to be sourced from on site, both adjacent to and within the meadow. The streambed material is expected to be sources from other Forest Service rock staging areas on the district. Rock transported to the site would be delivered to the proposed staging areas and mixed on site to achieve the desired gradation for either the constructed riffles of the roughened channel.

Revegetation

The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30” following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30”.

Post-Project Monitoring

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted.

Design Criteria

The following mitigation measures and coordinating requirements are incorporated into the Proposed Action:

Air Quality

All ground disturbing activities shall be effectively controlled of fugitive dust emissions utilizing good housekeeping methods described by the Amador Air District:

- Application of water and/or approved chemicals to road surfaces.
- Using vegetation and other barriers to contain and to reduce fugitive emissions.
- Maintaining reasonable vehicle speeds while driving on unpaved roads in order to minimize fugitive dust emissions.
- Other precautions not specifically listed in this rule but have been approved in writing by the APCO prior to implementation.

Range Resources

- The meadows, or portions of the meadows, may be excluded from grazing use temporarily depending on future coordination between the USFS and the current allotment permittee.

Heritage Resources

- Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.
- This does not fully eliminate the chance of discovering unrecorded sites or subsurface remains within the project boundary. If project ground disturbance should expose a cultural deposit, disturbance activities will be suspended until a qualified archaeologist can examine the area, evaluate the material, and adequate protection measures are incorporated. In the event that human remains are uncovered during project activity, project managers must stop work and contact Eldorado National Forest. If the remains are determined to be of Native American origin, both the Native American Heritage Commission and any identified descendants shall be notified (Health and Safety Code 7050.5, Public Resources Code Section 5097.94 and 5097.98).
- The only access roads to the project areas will be those shown by the plan set to reduce impacts to cultural sites.

Terrestrial Wildlife

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.
- Retain all trees 30" diameter at breast height (dbh) and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.

- If the Sierra Nevada yellow-legged frog (SNYLF) are found within the project area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).
- The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.
- In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.

- Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Hydrology

- Construction activities would occur during the time of year when the flows are at their lowest. This typically occurs between August 1 and October 30.
- Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.
- The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.
- Where streams and meadows cannot be avoided the following would be used to minimize impacts:
 - Corduroy stream crossings consist of laying logs in the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel.
 - Locations of the corduroy stream crossings are shown on Figures 2-4. A cross-sectional detail of the corduroy crossing is shown in the following figures.
 - Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs as necessary, depending on the number of times the crossing is used.
 - Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.
 - Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas.
 - The mats would consist of slash material from the salvaged trees.
 - The slash should be layered to a depth of 1 to 1.5 feet and be a minimum of 15 feet wide to accommodate the construction.
 - Similar to the corduroy stream crossing, the condition of the marsh mats should be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow.
 - The mats would be removed from the meadow and placed as slash along the temporary forest access roads.
 - Low impact construction equipment would be used as described in the technical specifications will provide limits on the size and type of equipment that can be used in the meadow.
 - Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs.
 - Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with only a single, short traverse across the meadow at the northern end of the project site.

Botanical Resources

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004). Specific design criteria and protection measures for the project include:

- Any new occurrences of sensitive plants identified within the project area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.
- A Forest Service watchlist species, *Botrychium simplex*, occurs within the project area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).
- All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

Soil Resources

- Standard mitigation measures will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.
- The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.
- Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.
- Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.
- The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary. Revegetation will consist of the following measures:

- During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
- All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
- Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

Fire and Fuels Management

- While the project area is located in a meadow and outside of state identified very fire hazard severity zones, portions of the meadow are expected to be dry, with a risk for wildfire associated with the use of any internal combustion engine. A trash pump and/or water truck will be on site to assist with vegetation transplants and dust control, as well as to reduce the risk of wildfire. In addition, equipment would be re-fueled and serviced at the designated staging area, which is outside of the riparian area and meadow. No fuel would be stored on site. In the event of an accidental spill, hazmat materials for quick on-site clean-up would be kept at the project sites during all construction activities, and in each piece of equipment.

IV. EXISTING SPECIES AND HABITAT CONDITION

The Three Meadows Restoration Project includes three small, high elevation meadows. High Onion and Upper Onion Valley are located along Onion River within the Cole Creek Watershed. The meadows are surrounded by mixed fir and pine forest dominated by *Pinus contorta* and *Abies magnifica*.

High Onion is located in the upper portion of the Cole Creek watershed at approximately 8,000 feet in elevation and is approximately three (3) acres in size. Hydrology is driven by snowmelt and subsurface flows. The upper, moderately wet portion of the meadow is dominated by large stands of *Veratrum californicum*. There is a distinct break in topography in mid slope of the meadow, where several small seeps discharge along the topographic break creating small stream channels supporting stands of *Salix* spp., *Senecio triangularis*, *Lupinus polyphyllus*, *Perideridia* sp., *Bistorta bistortoides*, *Carex* spp., and several species of wetland grasses. There are two occurrences of *Botrychium simplex* (a special interest species, reference Appendix A) growing along an intermittent stream through the meadow.

Upper Onion is the largest of the three meadows at approximately seven (7) acres in size. Onion Creek, an intermittent stream, flows along the far eastern edge between the meadow and adjacent to the upland forest. Large patches of *Salix* spp. exist along the multiple small channels within the interior of the meadow. Commonly occurring herbaceous species include: *Veratrum californicum*, *Bistorta bistortoides*, *Senecio triangularis*, *Lupinus polyphyllus*, *Perideridia* sp., and *Delphinium glaucum*, as well as various sedges and grasses. There are five (5) documented occurrence of *Botrychium simplex* (a special interest species; Appendix A) found predominately along the bank of the eastern most channel and one occurrence located on the bank of the western most channel. There are several small clusters of lodge pole pines scattered throughout. Onion Creek is the largest of the streams through the meadow and has become highly incised, causing a lowering of the water table, and drying of adjacent soils. Lodgepole pine encroachment has been a problem throughout the meadow which have been repeatedly addressed by past projects to cut and pile young lodgepoles under three-inch diameter.

Tyler Meadow is approximately two (2) acres in size and drains into Upper Bear River Reservoir. The relatively flat meadow (approximately 1.2% slope) has a shallow depth to bed rock and shallow groundwater table. The channel slope above the meadow is 1.8%, but the channel bed and bank recede at the start of the meadow and flows dissipates as it reaches the flatter meadow below. Vegetation within the meadow consists primarily *Carex*

spp., *Eleocharis* sp, *Deschampsia cespitosa*, *Bistorta bistortoides*, *Oreostemma alpigenum* and other wetland grasses and forbs. Encroachment of small diameter lodgepole seedlings is occurring along the meadow edges. The meadow is located adjacent to an existing FS Road and evidence of OHV use occurring in the meadow has been observed.

Listed Species

Layne's ragwort (*Packera layneae*)

Layne's butterweed is a perennial herb in the sunflower family (CNPS, 2001; USFWS, 2002) found in foothill woodland and chaparral habitats along the west slope of the Sierra Nevada in El Dorado and Tuolumne Counties at elevations between 60 and 3,000 feet. About 36 occurrences of this plant are documented on the Eldorado National Forest. Of the 32 documented occurrences in El Dorado County, two are located wholly on the ENF, one is located partially on the ENF, and one is located on a state-owned ecological preserve, and the remainder are found on private lands primarily in the Cameron Park area. *There is no potential habitat for this listed species within the proposed analysis area.*

Sensitive Species

Moonworts (*Botrychium* spp.)

Botrychium species are widely distributed in North America and elsewhere. In California they occur infrequently in a variety of moist habitats throughout the Sierra Nevada and other portions of the state. Most moonwort species show a marked affinity for neutral substrates with high mineral content, especially soils developed on limestone bedrock or otherwise containing high calcium content. High elevation habitats suitably moist and cool are abundant throughout the Sierra Nevada and northern California mountains, but these mountains are mostly composed of granites, volcanics, and crustal basalts not rich in soluble calcium. However, leaf litter from incense cedar may favorably modify soils for some moonworts.

Documentation of population numbers and distribution patterns are incomplete largely because members of this genus are difficult to distinguish and very uncommon and sporadic in distribution (Wagner and Wagner, 1993). These species appear sensitive to activities such as grazing, trampling, logging, and recreational activities such as OHV use.

Seven species of moonworts are listed as Sensitive species. They were listed as a group because 1) most species in this genus are rare in California; 2) individual species are very difficult to distinguish from each other; and 3) all have similar habitat preferences (wet or moist soils such as in meadows and fens or along the edges of lakes and streams). From the CNPS online inventory (CNPS, 2007):

1. Upswept moonwort (*Botrychium ascendens*): lower montane coniferous forest, meadows, seeps, 4,900 to over 7,500 feet
2. Scalloped moonwort (*Botrychium crenulatum*): Fens, lower montane coniferous forest, meadows, seeps, freshwater marshes, 4,900 to over 10,500 feet
3. Common moonwort (*Botrychium lunaria*): Meadows, seeps, subalpine and upper montane coniferous forest, 7,450 to over 11,000 feet
4. Mingan moonwort (*Botrychium minganense*): Fens, lower and upper montane coniferous forest, 4,900 to 6,750 feet.
5. Mountain moonwort (*Botrychium montanum*): Lower and upper montane coniferous forest, meadows, seeps, 4,900 to 7,000 feet.
6. Paradox moonwort (*Botrychium paradoxum*): Lower and upper montane coniferous forest and meadows.
7. Stalked moonwort (*Botrychium pendunculolum*): Lower and upper montane coniferous forest and meadow.

Threats to moonworts are defined as actions that alter existing site characteristics, including actions that would change the microclimate, canopy coverage, hydrology, or mycorrhizal association on a site from the regime that has supported a given population. Potential actions that could alter site condition include timber harvest, firewood cutting, fire suppression, road widening and maintenance activities, livestock grazing, invasive plant establishment, herbicide use, and recreational activity (camping and off-road vehicle driving).

Bolander's candle moss (*Bruchia bolanderi*)

Bolander's candle moss is found only from California and Oregon (Christy and Wagner 1996) and extends east to Nevada and Utah (Shevock pers. comm.). There are 28 known occurrences in California in El Dorado, Fresno, Tehama, Madera, Mariposa, Modoc, Nevada, Tulare, Tuolumne, Tehama and Plumas counties (CNDDDB 2015), and two additional occurrences on the Eldorado National Forest ENF that are not listed in the CNDDDB records. The California Native Plant Society (CNPS) considers this moss fairly endangered in California and rare outside of California (CNPS 2001). *Bruchia bolanderi* grows on moist soil in lower and upper montane coniferous forest, often along exposed edges of fens, seeps, streams through meadows or in exposed and disturbed soils or under grasses; sometimes partially shaded by coniferous forests. It grows from about 4,000 to above 9,000 feet. The abundant production of spores provides ample dispersal opportunities. The species is opportunistic, taking advantage of disturbed sites and minimal competition from other vegetation (Christy and Wagner 1996). However, sporophytes are infrequently encountered in many California populations. The species is difficult to identify without a sporophyte. Trend is not determined. No population monitoring has occurred.

There are two occurrences known from the Eldorado National Forest. One is in the vicinity of Schneider Cow Camp and another in Desolation Wilderness along the Twin Lakes Trail. The species is opportunistic, taking advantage of disturbed sites and minimal competition from other vegetation. The ephemeral nature of this species and its occurrence in disturbed sites allow some flexibility in management. Potential threats include direct impacts from management activities that directly damage the plants, including cattle grazing and trampling. How this moss responds to being burned is unknown.

Blandow's bogmoss (*Helodium blandowii*)

Blandow's bogmoss is known from Europe, Asia, and across northern United States from New Jersey and Ohio west to California and Nevada, and northwards to Canada (Flowers 2001). In California, it is known from Kings Canyon National Park in Fresno County, from the Inyo National Forest and from the Klamath National Forest. It is also known from the Mt Rose area, along Ophir Creek on the Humboldt-Toiyabe NF, just outside of the Lake Tahoe Basin. On the Toiyabe National Forest, it is known from Mono County north of Bridgeport.

Blandow's bog moss grows on wet meadows, fens and seeps in subalpine coniferous forest and alpine lakes. The two most critical factors affecting the abundance and distribution of fen species such as Blandow's bog moss are hydrology and the nutrient concentration of incoming water. Changes in hydrology may occur either intentional or inadvertent through road or trail construction or cattle trails. Direct trampling by livestock has also been identified as a threat.

Broad-nerved hump-moss (*Meesia uliginosa*)

Meesia uliginosa also has a worldwide distribution. There are 46 known occurrences in California and the majority of the California occurrences are in the Sierra Nevada (CNDDDB, 2015). Its distribution is sporadic throughout the Sierra Nevada and fewer occurrences are known than for *M. triquetra*. It is known to occur from Siskiyou County south to Tulare County with one collection from the San Jacinto Mountains in Riverside County. Populations of *M. uliginosa* are reported to be small and infrequently encountered. There are no known occurrences of *M. uliginosa* on the Eldorado NF but potential habitat does exist (ENF, 2015a; CNPS, 2015).

M. uliginosa grow in bogs and fens in cold, permanently saturated, spring-fed meadows and fens at elevations between 4,200 to 9,200 feet. It often grows in association with *Sphagnum* moss, *Drosera* (sundew), and

Vaccinium (huckleberry). This moss occurs in fens, peaty soil banks, seeps, meadows, and rock fissures (Harpel, 2003) These meadows are generally in the upper levels of mixed conifer to subalpine forests.

The two most critical factors affecting the abundance and distribution of fen species such as *M. uliginosa* are hydrology and the nutrient concentration of incoming water. Changes in hydrology may occur through ditching related to road or trail construction or cattle trails. Direct trampling by livestock has also been identified as a threat.

Adder tongue (*Ophioglossum pusillum*)

CNPS inventory notes only four occurrences in California in El Dorado, Lake, Mendocino, and Siskiyou counties (2015). On the Eldorado the one known occurrences was recorded on SPI lands near Loon Lake (ENF, 2015a). *Ophioglossum pusillum* is known to occur in wet seeps and springs, meadows, and edges of pounds (3,700-6,200 feet) (Jepson, 2015). Like Botrychium species this cryptic fern is likely to be easily overlooked in wet meadows and other potential habitat. These species could be impacted by grazing, trampling, logging, and recreational activities such as OHV use.

Special Interest Plants and plant Communities

Refer to Appendix A, Botany report for Special Interest Species.

Noxious Weeds

See Appendix B for the Noxious Weed Risk Assessment and Appendix C for Noxious Weeds of Concern for the ENF. Implementation of included design criteria should minimize the likelihood of project activities enhancing or spreading invasive species into the proposed project area.

V. EFFECTS

Analysis area defined: This analysis addresses activities and actions associated with the Three Meadows Restoration Project on Eldorado National Forest. The cumulative effects for botany are bound in time by the first botany records on the Eldorado National forest (early 1980's) and covers all proposed activities that are likely to occur in the project area during the next 5 years. The spatial extent of the analysis includes all known and potential occurrences found within the area of the proposed project.

Direct and Indirect Effects for Known Sensitive Plants

There are no TES species known from the project area so direct and indirect effects are not expected. Given the limited area included in the proposed action there is a low likelihood that Sensitive plant populations have gone undetected within the meadow. Survey coverage of the meadow areas were complete, but it is always possible for a Sensitive plant population to be overlooked during past surveys. If this were the case, undetected individuals could be crushed, uprooted, or destroyed during the construction of rock riffles, roughened channel, placement of log weirs, and creation of temporary access routes placed within the wet meadows and across stream channels. Additionally, any undetected Sensitive species occurring in the meadow could be impacted following project implementation by altered microsite and hydrologic condition. Project design criteria will minimize the potential impacts to Sensitive species habitat by restoring meadow access routes to preconstruction site conditions, and final location of log weirs and rock riffles will be field fit to avoid Sensitive species to the extent practicable. The objective of the in-stream modifications is to restore the natural hydrology of the meadow and is expected to be beneficial to many ENF Sensitive species by increasing suitable habitat.

If any new Sensitive species are discovered prior to project implementation these populations would be protected from project activities. Any new occurrences of Sensitive plants identified within the project area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for Sensitive plants.

Soil disturbances can provide opportunities for the introduction and proliferation of invasive species. These species have the potential to quickly outcompete native plants, including Sensitive plants for sunlight, water, and nutrients. These species can also form dense monocultures which can alter habitat for Sensitive plant species. Seeds of these species can be carried into Sensitive plant areas on equipment, vehicles, and on workers boots and clothing. The magnitude of this impact is difficult to predict since it is contingent on the introduction of a noxious weed species into an area, an event which may or may not occur. Currently the Three Meadows project area is free of ENF priority listed invasive species. To minimize the potential for invasive establishment, project design criteria requires all off-road equipment be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.

Cumulative Effects

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects and is consistent with National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008).

Forest Service Activities: Adverse impacts to Sensitive plants from recent (1989-2019) activities have largely been minimized by the use of mitigation measures, mainly the use of avoidance. Ongoing and future management activities in the Three Meadows project area would likely include grazing, hazard tree removal and implementation of ongoing FS projects in the area. It is anticipated that future impacts to Sensitive plants would continue to be minimized through the use of avoidance and minimization measures for the above foreseeable actions. Specific measures may include modification of the timing and duration of grazing when necessary and/or installation of exclusion fencing around springs and other sensitive aquatic resources. Avoidance or other means of mitigating impacts to sensitive plant occurrences is consistent with direction contained in the ENF LMRP, which includes under Standard And Guideline 49 (p. 4-91), "provide for the protection and habitat needs of sensitive plants so that Forest activities would not jeopardize the continued existence of such species."

Dispersed Recreational Activities: The Three Meadows project areas are located adjacent to existing Forest Service roads that are frequented OHVs users, and primitive campground sites are located immediately adjacent to both Upper Onion Valley and High Onion Meadows. OHV use has been observed within Tyler Meadow. Adverse impacts to Sensitive plants may occur from OHV access to the meadow that may crush plants, compact soils, and alter surface hydrology. To decrease OHV use, access restrictions consisting of downed logs, berms, and large boulders may be installed at each of the three meadows as needed.

Climate Change: Anthropogenic caused increases in temperatures and changes in precipitation are likely to impact both ecosystem structure and ecosystem processes (IPCC, 2007). Climate controls many ecosystem processes including species distribution and abundance, regeneration, vegetation productivity and growth, and disturbance all of which could affect FS sensitive species on the Eldorado National Forest. While there is some uncertainty regarding the scale, rate, and direction of future climatic conditions in the western United States and the Sierra Nevada (North et al., 2009) some general observation regarding past changes and expected future changes are generally agreed upon.

Climate change effects on precipitation and mean temperature have been difficult to predict with considerable variation between different models. According to Dettinger (2005), the most common prediction among the most recent models for California is temperature warming by about 9 degrees F by 2100, with precipitation remaining similar or slightly reduced compared to today. Most models agree that summers would be drier than they are currently, regardless of levels of annual precipitation. Current estimates of predicted climate change on vegetation patterns forecast that forest types and other vegetation dominated by woody plants in California would migrate to higher elevations as warmer temperatures make those areas suitable for colonization and

survival (Lenihan et al. 2003). However, rare and uncommon species are expected to experience a number of barriers when adjusting to a rapidly changing climate because of the combination of a small number of occurrences, narrow elevational ranges, and requirements for specific soils types.

VI. OTHER MANAGEMENT ISSUES AND RECOMMENDATIONS:

None.

VII. MITIGATIONS AND MONITORING

Sensitive Plants

Any new occurrences of sensitive plants identified within the project area would be flagged and avoided when necessary.

VIII. DETERMINATION

For Listed Species

The proposed Three Meadows Restoration Project will not affect *Packera layneae* or its habitat. Formal consultation with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act is not required.

For Sensitive Species

There is no potential habitat for *Allium tribracteatum*, *Arctostaphylos nissenana*, *Balsamorhiza macrolepis* var. *macrolepis*, *Calochortus clavatus* var. *avius*, *Cypripedium montanum*, *Dendrocollybia racemose*, *Draba asterophora* var. *asterophora*, *Draba asterophora* var. *macrocarpa*, *Eriogonum tripodum*, *Horkelia parryi*, *Lewisia kelloggii* ssp. *hutchisonii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lewisia longipetala*, *Lewisia serrata*, *Navarretia prolifera* ssp. *lutea*, *Mimulus pulchellus*, *Mielichhoferia elongate*, *Peltigera gowardii*, in the project area. Therefore the proposed action would not affect these species.

Some suitable habitat for *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium manganense*, *Botrychium montanum*, *Botrychium paradoxum*, *Botrychium pendunculatum*, *Bruchia bolanderi*, *Helodium blandowii*, *Meesia uliginosa*, *Ophioglossum pusillum* occurs in the Three Meadows Restoration Project area, but no occurrences were found during past or recent surveys. Because past surveys cannot positively state the absence of a sensitive plant species it is possible that the proposed project could affect undetected individuals in the project area. Therefore, the proposed project may affect undiscovered individuals but is not likely to result in a trend toward Federal listing or loss of viability for the 10 species listed above.

IX. REFERENCES

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APPENDIX A: BOTANY REPORT FOR SPECIAL INTEREST PLANTS**I. INTRODUCTION**

Purpose: The purpose of the Botany Report is to describe effects on Special Interest (or watch list) plant species, special interest plant communities, and other botanical resources.

Special Interest Plant Species and communities:

The Three Meadows project occurs in three (3) small, alpine meadows. Previous surveys have identified two separate suboccurrences of *Botrychium simplex* (Occurrence No. 022-01), an ENF Special Status Species, along the main stream channel in 2015 and 2017. Within Upper Onion Valley five (5) suboccurrences of *B. simplex* have been observed in surveys completed in 2015, which were revisited in 2016, and 2017. All of the suboccurrences were located along the stream channel on the east side of the meadow excepts one, which was located along a stream channel located near the western meadow edge. The occurrences were revisited in August 2019, but no individuals were observed. Tyler meadow was surveyed in 2014 as part of the Cole Creek Unit 4 plant surveys completed by ARD survey crews. No TEPS species were located during any of the site surveys.

II. CURRENT MANAGEMENT DIRECTION

Special Interest species: A number of plant species do not meet all of the criteria to be included on the Regional Forester's Sensitive Plant List but are of sufficient concern that we need to consider them in the planning process. These include species that are locally rare – as opposed to declining throughout their range – are of public concern, occur as disjunct populations, are newly described taxa, or lack sufficient information on population size, threats, trend or distribution.

Such species make an important contribution to forest biodiversity and are addressed as appropriate through the NEPA process. To better identify these species, forests have been encouraged to develop watch lists for these special interest species. These watch lists are dynamic and updated as the need arises to reflect changing conditions and new information.

Bog and Fen Habitat (SNFPA ROD page 65, S&G #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. There are no bog or fen habitat within the Three Meadows Restoration Project Area

Table 1. Watch List Species with Potential Habitat in the Three Meadows Restoration Project Area (updated 2017)

Species	Common Name	CNPS Ranking	Habitat	Potential Habitat in project Area	Lower Elevation (ft)	Upper Elevation (ft)
<i>Allium sanbornii</i> var. <i>congdonii</i>	Congdon's onion	4. No 3	Serpentine outcrops	No	Up to 4,000	
<i>Allium sanbornii</i> var. <i>sanbornii</i>	Sanborn's onion	4.2	Serpentine outcrops	No	Up to 5,020	
<i>Astragalus austini</i>	Austin's milkvetch	1B.3	Alpine boulder & rock field in subalpine coniferous forest.	No	7,600	8,825

Species	Common Name	CNPS Ranking	Habitat	Potential Habitat in project Area	Lower Elevation (ft)	Upper Elevation (ft)
<i>Astragalus whitneyi</i> <i>var. lenophyllus</i>	Whitney's milk-vetch	4.3	Alpine boulder & rock field in subalpine coniferous forest.	No	Above 4,900	
<i>Bolandra californica</i>	Sierra bolandra	4.3	Rock crevices and wet cliffs along streams.	No	3,100	4,200
<i>Botrychium simplex</i>	Yosemite moonwort	--	Moist and wet meadow, seeps, fens and streamside habitats about 6,000 feet in elevation.	Yes	Above 5,000	
<i>Calystegia vanzuukiae</i>	Van Zuuk's morning glory	1B.3	Serpentine outcrops	No	1,640	3,900
<i>Carex cyrtostachya</i>	arching sedge	1B.2	Narrow endemic from the western slope of the northern Sierra Nevada of California	No	2,000	4,460
<i>Carex davyi</i>	Davy's sedge	1B.3	Upper montane coniferous forest to Subalpine coniferous forest; Dry often sparse meadows or rocky areas.	No	Above 4,500	
<i>Clarkia virgata</i>	Sierra clarkia	1B.2	Foothill woodland, cismontane woodland, lower montane coniferous forest, yellow pine forest.	No		
<i>Claytonia megarhiza</i>	Fell-fields claytonia	2B.3	Wet, open to shaded, generally coniferous forest. In California, under firs, in partial shade	No	4,500 – 5,600	
<i>Climacium dendroides</i>	Tree Climacium moss	2B.1	Occurs in occasionally flooded mineral soil, especially on lake and river margins	No	Above ~3,500 (limited information available)	
<i>Ceanothus fresnensis</i>	Fresno ceanothus	4.3	Cismontane woodland (openings), lower montane coniferous forest	No	3,650	6,900

Species	Common Name	CNPS Ranking	Habitat	Potential Habitat in project Area	Lower Elevation (ft)	Upper Elevation (ft)
<i>Chaenactis douglasii</i> var. <i>alpina</i>	alpine dusty maindens	2B.3	Alpine boulder and rock field (granitic), Rocky or gravelly ridges, talus, fell-fields, crevices	No	Above 9,800	
<i>Chlorogalum grandiflorum</i>	red hills soapwort	1B.2	Serpentine outcrops, open shrubby or wooded hills; Chaparral, Foothill Woodland, Yellow Pine Forest	No	Up to 3,150	
<i>Clarkia biloba</i> ssp. <i>brandegeae</i>	Brandegee's clarkia	4.2	Foothill woodland, chaparral, cismontane woodland, lower montane coniferous forest. Often found growing in road cuts	No	Up to 3,000	
<i>Clarkia virgata</i>	Sierra clarkia	4.3	Foothill woodland, cismontane woodland, lower montane coniferous forest, yellow pine forest	No	2,460 to 5,675	
<i>Claytonia megarhiza</i>	fell-fields claytonia	2B.3	Subalpine, alpine gravel, talus, crevices, growing in crevices between rocks in rocky or gravelly soils.	No	Above 8,500	
<i>Corallorhiza trifida</i>	northern coralroot; Early coralroot	2B.1	Wet, open to shaded, generally coniferous forest. In California, under firs, in partial shade	No	4,500	5,600
<i>Drosera anglica</i>	English sundew	2B.3	Fens, meadows and seeps often with Sphagnum	Yes	4,250	6,500
<i>Drosera rotundifolia</i>	round leaf sundew	--	Fens, meadows and seeps often with Sphagnum	Yes	Up to 8,900	
<i>Dryopteris filix-mas</i>	male fern	2B.3	Upper montane coniferous forest (granitic, rocky); Granitic cliffs	No	Above 7,800	
<i>Erythranthe laciniata</i>	Cutleaf monkey flower	4.3	Growing on decomposed granite in moist sandy places.	No	Above 3,100	

Species	Common Name	CNPS Ranking	Habitat	Potential Habitat in project Area	Lower Elevation (ft)	Upper Elevation (ft)
<i>Myrica hartwegii</i>	Sierra sweet bay	4.3	Streambanks and other moist places in foothill and low montane forest	No	Up to 6,000	
<i>Orthotrichum holzingeri</i>	Holzinger's orthotrichum moss	1B.3	Usually on rock in and along streams, rarely on tree limbs.	No	2,345	6,000
<i>Perideridia bacigalupii</i>	Mother Lode Yampah	4.2	Sites in which it occurs include open rocky areas, chaparral openings, slopes, and road cuts. Usually on serpentine	No	Up to 3,500	
<i>Piperia colemanii</i>	Coleman's Rein Orchid	4.3	Open conifer forest, scrub; often in sandy soils.	No	3,900	7,545
<i>Piperia leptopetala</i>	petaled rein orchid	4.3	Generally dry sites, scrub, woodland; Chaparral, Foothill Woodland, Yellow Pine Forest, Red Fir Forest.	No	1,100	7,300
<i>Pseudostellaria sierrae</i>	Sierra Starwort	4.2	Meadows, dry understory of mixed oak or conifer forest	Yes	4,000	7,200
<i>Rhynchospora alba</i>	white beaked-rush	2B.2	Wet meadows, fens, seeps, and marshes	Yes	Up to 6,700	
<i>Rhynchospora capitellata</i>	brownish beakrush	2B.2	Wet meadows, fens, seeps, and marshes	Yes	Up to 6,560	
<i>Sambucus nigra</i> L. ssp. <i>caerulea</i>	Blue Elderberry	--	Riparian areas; of concern below 3,000' as host plant for Threatened Valley Elderberry Longhorn Beetle	No	Up to 3,200	
<i>Sparganium natans</i>	Small bur reed	4.3	Wetland-riparian, lake margins.	Yes	2,800	8,560
<i>Streptanthus longisiliquus</i>	Long-fruit jewel flower	4.3	Occurs in mixed conifer forest	No	2,500 - 5,000	
<i>Taxus brevifolia</i>	Pacific yew	--	Mixed Evergreen Forest, Douglas-Fir Forest, Yellow Pine Forest, Red Fir Forest	No	Up to 4,600	

Species	Common Name	CNPS Ranking	Habitat	Potential Habitat in project Area	Lower Elevation (ft)	Upper Elevation (ft)
<i>Torreya californica</i>	California nutmeg	--	Mixed Evergreen Forest, Douglas-Fir Forest, Yellow Pine Forest	No		Up to 3,000
<i>Viburnum ellipticum</i>	oval-leaved viburnum	2B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest. Chaparral, yellow-pine forest, generally n-facing slopes	No		Up to 4,500
<i>Wyethia reticulata</i>	El Dorado County mule ears	1B.2	Stony red clay and gabbroic soils; often in openings in gabbro chaparral	No		Up to 2,060

III. EXISTING ENVIRONMENT

The Three Meadows Restoration Project includes three small, high elevation meadows. High Onion and Upper Onion Valley are located along Onion River within the Cole Creek Watershed. The meadows are surrounded by mixed fir and pine forest dominated by lodgepole pine (*Pinus contorta*) and red fir (*Abies magnifica*).

High Onion is located in the upper portion of the Cole Creek watershed at approximately 8,000 feet in elevation and is approximately three (3) acres in size. Hydrology is driven by snowmelt and subsurface flows. The upper, moderately wet portion of the meadow is dominated by large stands of *Veratrum californicum*. There is a distinct break in topography in mid slope of the meadow, where several small seeps discharge along the topographic break creating small stream channels which support stands of *Salix* spp., *Senecio triangularis*, *Lupinus polyphyllus*, *Perideridia* sp., *Bistorta bistortoides*, *Carex* spp., and several species of wetland grasses. There are two occurrences of *Botrychium simplex* (a special interest species, reference Appendix A).

Upper Onion is the largest of the three meadows at approximately seven (7) acres in size. Onion Creek, an intermittent stream, flows along the far eastern edge adjacent of the meadow adjacent to the upland forest. Large patches of *Salix* spp. exist along the multiple small channels within the interior of the meadow. Commonly occurring herbaceous species include: *Veratrum californicum*, *Bistorta bistortoides*, *Senecio triangularis*, *Lupinus polyphyllus*, *Perideridia* sp., and *Delphinium glaucum*, as well as various sedges and grasses. There are five (5) documented occurrence of *Botrychium simplex* (a special interest species; Appendix A) found predominately along the bank of the eastern most channel and one occurrence located on the bank of the western most channel. There are several small clusters of lodge pole pines scattered throughout. Onion Creek is the largest of the streams through the meadow and has become highly incised, causing a lowering of the water table, and drying of adjacent soils. Lodgepole pine encroachment has been a problem throughout the meadow which have been repeatedly addressed by past projects to cut and pile young lodgepoles under three-inch diameter.

Tyler Meadow is approximately two (2) acres in size and drains into Upper Bear River Reservoir. The meadow is surrounded by red fir, white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine. The relatively flat meadow (approximately 1.2% slope) has a shallow depth to bed rock and shallow groundwater table. The channel slope above the meadow is 1.8%, but the channel bed and bank recede at the start of the meadow and flows dissipates as it reaches the flatter meadow below. Vegetation within the meadow consists primarily *Carex* spp., *Eleocharis* sp., *Deschampsia cespitosa*, *Bistorta bistortoides*, *Oreostemma alpinum* and other wetland grasses and forbs.

Encroachment of small diameter lodgepole seedlings is occurring along the meadow edges. The meadow is located adjacent to an existing FS Road and evidence of OHV use occurring in the meadow has been observed.

IV. DESIGN CRITERIA

- A Forest Service watchlist species, *Botrychium simplex*, occurs within the project area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. Onsite sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).

V. EFFECTS

Proposed Action:

Watchlist species: There are two occurrences of *Botrychium simplex* at High Onion Meadow and five occurrences within Upper Onion Valley meadow. All sites will be flagged for avoidance during project implementation and avoided to the extent practicable. The final location and placement of log weirs at High Onion and Upper Onion Valley can be modified in the field to avoid impacts to individuals of *B. simplex*. One occurrence of *B. simplex* located at the southern end of Upper Onion Valley is located within the proposed footprint of the roughened channel that will be constructed as a grade control within Onion Creek at the outlet of the meadow. However, the objective of the roughened channel, along with the installation of constructed rock riffles and log weirs within the other incised stream channels, is to increase and restore the natural meadow hydrology. Restoration of the meadow hydrology will raise the water table within the meadow and is expected to improve the habitat where the *Botrychium simplex* occurs as well as reduce the risk of future degradation of the meadows from further channel incision and dewatering of the adjacent meadow.

If any new special interest plant species are discovered in the project area, necessary actions would be considered to limit impacts from project activities. Therefore, the proposed project is not expected to cause cumulative effects for special interest plant species within the proposed project area.

VI. MITIGATION

None required.

APPENDIX B: NOXIOUS WEED RISK ASSESSMENT

Five factors of weed spread were analyzed for the proposed Three Meadows Restoration Project. Determinations of risk (High, Moderate, and Low) are summarized below along with the total risk of weed spread for the proposed project if suggested mitigation measures are implemented.

*If the proposed project includes all listed design criteria to reduce or eliminate the risks of introducing or spreading noxious weeds in the project area then it is my determination that the risk of spreading noxious weeds in the project area is **Low**.*

Introduction:

This Noxious Weed Risk Assessment has been prepared to evaluate the effects of the Three Meadows Restoration Project (Project) on noxious weeds and other invasive non-native plant species as designated by the California Department of Food and Agriculture (2010) or listed by the Eldorado National Forest through the Sierra Nevada Forest Plan Amendment (2004). Appendix A lists the noxious weed species with potential to occur within the project area.

This assessment is in compliance with the Eldorado National Forest Land and Resource Management Plan (USFS ENF LRMP 1988), the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and Record of Decision (ROD), Executive Order on Invasive Species (Executive Order 13112), and the direction in the Forest Service Manual section 2900, Noxious Weed Management (2012), which includes a policy statement calling for a risk assessment for noxious weeds to be completed for every project. The overriding principle stated in these documents is that the costs associated with preventing an infestation are much less than the costs of eliminating a population once it has expanded, and of dealing with the effects of a degraded plant community.

Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, or being nonnative or new to or not common to the United States or parts thereof (FSM 2900). In order to control noxious weeds the US Forest Service has adopted an integrated weed management approach to reduce the spread of noxious weeds on to, and from National Forest System lands. The main objective of this integrated approach to weed management is to prevent the introduction and establishment of noxious weed infestations, and control (contain and suppress) existing noxious weed infestations on National Forest System lands (FSM 2900). In addition when any ground disturbing action or activity is proposed, the federal agency is required to determine the risk of introducing or spreading noxious weeds associated with the proposed action (FSM 2900).

Five factors of weed spread were analyzed for the proposed action and alternatives, and determinations of risk (High, Moderate, and Low) for each factor were made. The five factors evaluated include:

1. Noxious Weeds Present In or Near Project Area
2. Habitat Vulnerability
3. Non-Project Weed Vectors
4. Habitat Alteration Expected as Result of Projects
5. Increased Vectors as a Result of Project Implementation

1. Noxious Weeds Present In or Near Project Area (Low)

Overall, the Three Meadows Restoration project area is relatively free of priority invasive species. There are no high priority invasive plant infestations within the meadow or surrounding area. However, some low priority weeds are found in low levels surrounding the project area along forest service roads, including mullein (*Verbascum thapsus*) and bull thistle (*Cirsium vulgare*), but due to their low levels it is not expected that project work will overly impact these species and spread them much further throughout the project area.

2. Habitat Vulnerability (Low)

The proposed Three Meadows Restoration project area occurs within three high alpine meadows that are in relatively stable condition. In general, a robust cover of native meadow vegetation found throughout the area will limit the susceptibility of the meadow to invasion by non-native species.

3. Non-project Weed Vectors (Moderate)

Weed vectors currently in the project area and vicinity include: off-highway vehicles (OHVs) such as motorcycles and four-wheel drive vehicles; road maintenance equipment; recreationists; private cars and trucks; Forest Service vehicles and workers; logging equipment on private land and FS; and wildlife. Natural dispersal from wind may also spread the seeds of some invasive species into the proposed project area. Wildlife may also disperse certain noxious weeds that can become attached to fur, or when viable seeds pass through digestive systems. Vehicles traveling routes and roads may pick up seeds from existing infestations and spread them to other locations on the forest. For some species, seeds can become affixed to clothing and gear (e.g. non-native annual grasses). Other species do not have dispersal mechanisms for attaching and would most like travel in mud on vehicle and tire tread (e.g. yellow starthistle, scotch broom, and spotted knapweed).

4. Habitat Alteration Expected as Result of Projects (Moderate)

The proposed project would result in relatively major habitat alteration during and immediately following the construction of the project. Temporary access routes will be created to allow heavy equipment access to the interior of the project area. The temporary access routes will require tree felling, removal of stumps, and some minor grading, which will crush and uproot existing native vegetation. Additionally, fine materials will be excavated from adjacent upland areas to use as back fill for creation of log weirs, resulting in areas of bareground immediately following project construction.

Measures will be taken to reduce long-term habitat alteration, including revegetation of all disturbed areas following project completion. These measures include cleaning of all off-road equipment before entering the project area, reporting of new infestations of invasive plants that are discovered during project implementation to the Forest botanist, and all sand, gravel, rock or organic matter would come from documented weed free sources. Post construction, any seed used for restoration or erosion control would be from locally collected sources, in compliance with ENF's Seed, Mulch and Fertilizer Prescription (2000).

The Three Meadows Restoration project is anticipated to result in long-term habitat alterations that would reduce the vulnerability of the meadow to future invasion. To the extent that the proposed action raises the water table in the meadow native species are expected to respond favorably- potentially establishing in areas with limited native vegetation cover due to the down cut channels currently draining portions of the meadow.

5. Increased Vectors as a Result of Project Implementation (Moderate)

The proposed project would *temporarily* increase potential weed vectors due to the increase in project related vehicle use. Potential introduction of invasive species may occur when equipment is first brought into the project area. Another potential vector for invasive species related to project activities is the importation of materials for the construction of riffles in the lower reaches of the meadow.

The Three Meadows Restoration Project has incorporated design criteria into the project to reduce or eliminate the likelihood of most vector opportunities related to the proposed project (see section 6 below).

6. Project Design Criteria

The following design criteria are to be included in the Three Meadows Restoration project. These design features are included to limit the potential introduction of new noxious weeds into the project area and limit the potential spread of existing priority invasive plant infestations.

- All off-road equipment would be cleaned to insure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.

- Infestations of invasive plants that are discovered during and after project implementation would be documented and mapped. New sites would be reported to the Forest botanist and treated using methods analyzed in the Forest's invasive Plant Management Plan (Invasive Plant EA 2011).
- Rock for riffle construction would be weed free. Onsite sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).

7. Anticipated weed response to proposed action (Low Risk)

The proposed Three Meadows Restoration project would: 1) occur in relatively intact upper alpine meadow with a moderate risk for invasion and 2) occur in a portion of the Eldorado with few high priority noxious weed infestations; but does involve activities that could introduce or spread existing noxious weeds and will create substantial soil disturbance within the meadow. Because of the above factors, the anticipated weed response to the proposed action is High/Moderate if the design criteria were not included. By including all of the design criteria listed in section 6, it is anticipated that the risk of spreading and/or introducing noxious weeds would be reduced to a low level of risk.

This weed risk assessment is restricted to the project description in this Biological Assessment / Biological Evaluation. If activities are proposed that extend beyond the activities described in this document, then a new assessment would be required

APPENDIX C: NOXIOUS/INVASIVE WEEDS OF CONCERN**Invasive Plant List for the Eldorado National Forest 2/23/2016**

Group 1 (Eradicate): Highly invasive species known to occur on the Eldorado National Forest. Species are uncommon and are a priority for inventory, control, and eradication.

Acroptilon repens Russian knapweed
Aegilops triuncialis barbed goatgrass
Ailanthus altissima Chinese tree of heaven
Arundo donax Arundo
Centaurea calcitrapa purple starthistle
Centaurea diffusa diffuse (white) knapweed
Centaurea stoebe spotted knapweed

Cirsium arvense Canada thistle
Euphorbia oblongata oblong spurge
Isatis tinctoria dyer's woad
Lepidium latifolium tall whitetop
Lythrum salicaria purple loosestrife
Sorghum halepense Johnson grass

Group 2 (Control): Established or widespread species known to occur on the Eldorado National Forest. Inventory all infestations. Annually treat a portion of known infestations, focusing first on eradicating/containing isolated outlying infestations and, over time, reducing the footprint of larger, less isolated infestations.

Carduus pycnocephalus Italian thistle
Centaurea melitensis tocalote
Centaurea solstitialis yellow starthistle
Chondrilla juncea rush skeleton weed
Cytisus scoparius Scotch broom

Elymus caput-medusae medusahead
Foeniculum vulgare Fennel
Genista monspessulana French broom
Spartium junceum Spanish broom

Group 3 (Control): Established or widespread species known to occur on the Eldorado National Forest. Inventory and treat isolated leading edge infestations or where concurrent with higher priority infestations.

Brassica nigra black mustard
Bromus tectorum cheat grass
Chenopodium botrys Jerusalem-oak goosefoot
Cirsium vulgare bull thistle
Hedera helix English Ivy
Hypericum perforatum Klamath weed
Lathyrus latifolius perennial sweet pea
Leucanthemum vulgare Oxeye daisy
Melilotus alba white sweet clover

Melilotus officinalis yellow sweet clover
Rubus armeniacus Himalayan blackberry
Rubus laciniatus cut leaf blackberry
Salsola tragus Russian thistle/tumbleweed
Silybum marianum milk thistle
Torilis arvensis hedge parsley
Tribulus terrestris puncture vine
Vinca major periwinkle

Group 4 (Manage through education and prevention): Species are well established across forest or have minor economic or ecological impacts. Forest will use appropriate prevention and education measures to limit further spread.

Bromus diandrus ripgut brome
Bromus madritensis var. *rubens* red brome
Conium maculatum poison hemlock
Cynodon dactylon Bermuda grass
Cynosurus echinatus spiny dogtail
Dactylis glomerata Orchard grass

Festuca arundinacea tall fescue
Hirschfeldia incana mustard
Lychnis coronaria rose campion/ mullein pink
Sisymbrium altissimum Jim Hill mustard
Verbascum thapsus mullein

Potential invasives: Species not yet found on the Eldorado National Forest. If found, infestations should be inventoried and targeted for eradication or control.

Aegilops cylindrica Jointed goatgrass
Cardaria chalapensis small whitetop
Cardaria draba hoarycress
Cardaria pubescens whitetop
Carduus nutans musk thistle
Carthamus lanatus Woolly distaff thistle
Centaurea pratensis meadow knapweed
Centaurea sulphurea Sicilian starthistle
Cortaderia selloana pampas grass
Dittrichia graveolens stinkwort
Euphorbia esula leafy spurge
Linaria genistifolia ssp. *dalmatica* dalmatian toadflax

Linaria vulgaris yellow toadflax
Nicotiana glauca Tree tobacco
Onopordum acanthium Scotch thistle
Phragmites australis common reed
Polygonum cuspidatum Japanese knotweed
Polygonum sachalinensis Sakhalin knotweed
Potentilla recta Sulfur cinquefoil
Sesbania punicea Scarlet wisteria
Tamarix chinensis Salt Cedar
Tanacetum vulgare tansy
Ulex europaeus Gorse

Appendix F

Additional Botanical, Terrestrial and Aquatic Wildlife Species
Considered for Analysis for the Three Meadows CEQA Initial Study

Appendix F

Additional Botanical, Terrestrial and Aquatic Wildlife Species Considered for Analysis for the Three Meadows CEQA Initial Study

Summary of Project Activities

The proposed project will use heavy equipment for placement of rock to construct 21 rock riffles and 95 linear feet (0.01 acres) of a roughened rock lined channel within Upper Onion Valley. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Large boulders will also be brought in to block access to Tyler Meadow from OHV use.

Sixty-two log weirs will be installed within the Project Area: eleven (11) log weirs will be installed at Tyler Meadow, twenty-five (25) log weirs will be installed at Upper Onion Valley, and twenty-six (26) log weirs will be installed at High Onion. Felled trees from cleared forest access routes or from within the meadows will be used for construction of the log weirs. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Construction will take place in late summer/fall, under low-flow conditions.

The project includes a revegetation component. Prior to final demobilization, access routes will be restored. Access routes through the meadows are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the Eldorado National Forest (ENF) Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

Terrestrial and Aquatic Wildlife Species

The CNDDDB QuickView Tool in BIOS and the CNDDDB was queried for the nine (9) quads centered on Bear River Reservoir quad on January 16, 2020. Based on these queries, the following species were identified that were not addressed in the Terrestrial Wildlife Biological Evaluation/Biological Assessment (Loffland 2020), Aquatic Wildlife Biological Assessment (Chow 2020a), or Aquatic Wildlife Biological Evaluation (Chow 2020b) that have the potential to occur in the Project Area (Table 1):

Table 1. List of additional special-status species to be addressed under CEQA based on CNDDDB Occurrences.

Scientific Name	Common Name	Federal Status	State Status	Quad Name
<i>Vulpes vulpes necator</i>	Sierra Nevada red fox	Candidate; Forest Service Sensitive	Threatened	Peddler Hill
<i>Bombus morrison</i>	Morrison bumblebee	NONE	Special Animal	Bear River Reservoir
<i>Ambystoma macrodactylum sigillatum</i>	Southern long-toed salamander	None	SSC	Peddler Hill

A California “Species of Special Concern” (SSC) is a species, subspecies, or distinct population of an animal native to California that is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role; is listed as federally but not State threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed, is experiencing, or formerly experienced, serious (nonscyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; and/or has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status (CDFW 2018a)

A “Special Animal” is a broad term used to refer to all the animal taxa tracked by the California Department of Fish and Wildlife’s California Natural Diversity Database (CNDDDB), regardless of their legal or protection status. A Special Animal is also referred to as a “species at risk” or “special status species”. A Special Animal includes species, subspecies, or Evolutionarily Significant Units (ESU) where at least one of the following conditions applies: (CDFW 2018b)

- Officially listed or proposed for listing under the State and/or Federal Endangered Species Acts;
- Taxa considered by the Department to be a Species of Special Concern (SSC);
- Taxa which meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the California Environmental Quality Act Guidelines;
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range but not currently threatened with extirpation;
- Population(s) in California that may be peripheral to the major portion of a taxon’s range but are threatened with extirpation in California;
- Taxa closely associated with a habitat that is declining in California at a significant rate (e.g. wetlands, riparian, vernal pools, old growth forests, desert aquatic systems, native grasslands, valley shrubland habitats, etc.);
- Taxa designated as a special status, sensitive, or declining species by other state or federal agencies, or a non-governmental organization (NGO) and determined by the CNDDDB to be rare, restricted, declining, or threatened across their range in California.

A brief species account and discussion of impacts is provided below for the species listed in Table 1.

Sierra Nevada red fox

The Sierra Nevada red fox (*Vulpes vulpes necator*) is not known to occur in the Eldorado National Forest

Systematic surveys from 1996-2002. The Sierra Nevada red fox has not been detected within Sierra Nevada and southern Cascades (Perrine et al. 2010). The only known population is in Lassen National Park, with an additional detection in 2010 on the Humboldt-Toiyabe National Forest (Sierra Nevada Red Fox Interagency Working Group 2010). California Wildlife Habitat Relationships (CWHR) range maps were also reviewed for the Project Area for this species. The project is outside of the mapped CWHR range for Sierra Nevada red fox and predicted habitat range by more than two miles. Because the Sierra Nevada red fox does not occur in the Project Area, the project would not result in impacts to this species, and no further analysis will be provided.

Southern long-toed salamander

The southern long-toed salamander (*Ambystoma macrodactylum sigillatum*) (SLTS) is listed as a CDFW Species of Special Concern. The species has a broad distribution in western North America (IUCN SSCASG 2015) and is found in ponderosa pine, mixed conifer, and red fir forests associated with mountain meadows (Basey and Morey 1990). Adults spend most of their lives underground in animal burrows or under objects, except during the breeding season (Howard 1997). Breeding varies with snowpack depth and snowmelt, but is typically in late May or June in the Sierra Nevada as soon as ponds begin to thaw (Basey and Morey 1990). At higher elevations, larvae require two years to reach metamorphosis, and require permanent water for overwintering (Howard 1997). SLTS are generally “secretive” and are not expected to be active during the day; most activity occurs during breeding migration and takes place during night (Howard 1997). Preferred foods include terrestrial arthropods for adult salamanders, with larvae consuming aquatic arthropods or terrestrial species that enter the water (Howard 1997).

Predators include garter snakes and shrews (Howard 1997) as well as introduced, predatory trout, which have been shown to exclude salamanders from a portion of their former range (IUCN SSCASG 2015).

No focused surveys were conducted for this species in the Three Meadows Project Area; however, when present, this species is typically detected during surveys for Sierra Nevada yellow-legged frogs or other listed amphibian species. The nearest documented occurrence of SLTS is 2.4 miles east of the project Area, along an intermittent stream that drains into Cole Creek (survey 09/02/2012). The Project Area is beyond the dispersal distance of breeding adults of approximately 3,280 ft (Basey and Morey 1990). Additionally, the Project Area is unlikely to be used for breeding because all streams and small pools dry completely by mid-summer and would not provide overwintering habitat for larvae. Therefore, the Project would likely have *no impact* on the SLTS.

Morrison bumble bee

The Morrison bumble bee (*Bombus morrisoni*) has no formal listing status, but is listed as a CDFW Special Animal, with an International Union for Conservation of Nature (IUCN) status of vulnerable (CDFW 2018b). The Morrison bumble bee is associated primarily with arid environments (Koch et al. 2012) such as open, dry shrub, and nests in abandoned rodent nests, grass hummocks, and dead trees (Hatfield et al. 2014). The Morrison bumble bee is considered a generalist forager, with the genera *Asclepias*, *Astragalus*, *Chrysothamnus*, *Cirsium*, *Cleome*, *Ericameria*, *Helianthus*, *Melilotus*, and *Senecio* cited as important food sources (Hatfield et al. 2017). Although this species is only found sporadically west of the Sierra Nevada crest, the Project Area could provide high quality foraging habitat and the dryer conifer stands could provide nesting and overwintering habitat for queens.

Potential Impacts to Morrison Bumble bee

The meadow is too wet to provide nesting and overwintering habitat for Morrison bumble bee, as even the portions of the meadow in a xeric trend are subject to early season flooding due to snow melt. Therefore, project construction activities would not be expected to result in mortality to nesting and overwintering queens. Potential foraging habitat would be impacted by grading activities within the meadow, which would remove some flowering plants. However, construction activities are planned for the low-flow season (August through September), after flowering plants have peaked, and only queens would be expected to be present in the meadow during this time. If individual queens are present, there will be sufficient foraging habitat available outside of construction activities, and individuals disturbed by construction equipment could disperse to these areas. Therefore, direct impacts to Morrison bumble bee would be less-than-significant. Long-term effects are expected to be positive.

The quantity of foraging habitat would expand as a result of the restored meadow hydrology, which would enhance the vigor of the meadow plant community. The quality of foraging habitat would be enhanced by the revegetation component of the project, which would seed with a diversity of plant species.

Botanical Species

The California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants was queried on January 16, 2020 to identify additional rare plants in the Three Meadows Project Area that may not have been addressed in the Botanical BE/BA (Brown 2020). A total of 11 species have documented records in the Bear River Reservoir (Table 2). A review of the Botanical BE/BA indicates that all species have been addressed and no further analysis is required (Brown 2020).

Table 2. CNPS Inventory of Rare and Endangered Plants query results for the Bear River Reservoir and Peddler Hill

Scientific Name	Common Name	Family	Lifeform	CRPR	GRank	SRank	CESA	FESA
<i>Allium tribracteatum</i>	three-bracted onion	Alliaceae	perennial bulbiferous herb	1B.2	G2	S2	None	None
<i>Botrychium crenulatum</i>	scalloped moonwort	Ophioglossaceae	perennial rhizomatous herb	2B.2	G4	S3	None	None
<i>Botrychium minganense</i>	Mingan moonwort	Ophioglossaceae	perennial rhizomatous herb	2B.2	G4G5	S3	None	None
<i>Botrychium montanum</i>	western goblin	Ophioglossaceae	perennial rhizomatous herb	2B.1	G3	S2	None	None
<i>Calochortus clavatus</i> var. <i>avius</i>	Pleasant Valley mariposa lily	Liliaceae	perennial bulbiferous herb	1B.2	G4T2	S2	None	None
<i>Clarkia virgata</i>	Sierra clarkia	Onagraceae	annual herb	4.3	G3	S3	None	None
<i>Dryopteris filix-mas</i>	male fern	Dryopteridaceae	perennial rhizomatous herb	2B.3	G5	S2	None	None
<i>Lewisia kelloggii</i> <i>ssp. hutchisonii</i>	Hutchison's lewisia	Montiaceae	perennial herb	3.2	G3G4T3Q	S3	None	None
<i>Lewisia kelloggii</i> <i>ssp. kelloggii</i>	Kellogg's lewisia	Montiaceae	perennial herb	3.2	G3G4T2T3Q	S2S3	None	None
<i>Orthotrichum holzingeri</i>	Holzinger's orthotrichum moss	Orthotrichaceae	Moss	1B.3	G3	S2	None	None
<i>Peltigera gowardii</i>	western waterfan lichen	Peltigeraceae	foliose lichen (aquatic)	4.2	G3G4	S3	None	None

CRPR = California Rare Plant Rank; GRank = NatureServe Global Rank (across entire distribution of the species); SRank = NatureServe State Rank (within California distribution of the species); CESA = California Endangered Species Act; FESA = Federal Endangered Species Act; All rankings defined in Attachment A.

Sensitive Natural Communities

Sensitive Natural Communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. Natural Communities with ranks of S1-S3 are considered Sensitive Natural Communities to be addressed in the CEQA review. The CNDDDB was queried to search for S1-S3 ranked Sensitive Natural Communities within Amador County. Nine occurrences of lone Chaparral were identified, but not located within vicinity of the Project Area.

The Amador County General Plan identifies wetlands as a sensitive community and includes policies to avoid and protect. However, the purpose of the proposed project is to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation. Short-term impacts from project implementation will be calculated based on a completion of a formal wetland delineation in accordance with US Army Corps of Engineers (USACE) standards. The proposed project is authorized under Nationwide Permit 27 for Aquatic Habitat Restoration, Establishment and Enhancement Activities, and the ENF Service will submit a Preconstruction Notification to the USACE for verification. The ENF will also submit an application for certification from the Regional Water Quality Control Board (RWQCB) pursuant to Section 401 of the CWA, consistent with Amador County General Plan policies.

Potential impacts to special status plants that may occur in the Project Area could result from removal of vegetation clearing for temporary access roads, excavation of borrow ponds, or burial of vegetation when installing the log weirs, rock riffles, or roughened constructed channel.

Potential Impacts to Sensitive Plant Species and Communities

The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadows are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the Project Area to a depth not to exceed 30".

The following design criteria have been incorporated into the project, which will ensure that potential impacts to Sensitive Natural Communities would be less- than-significant:

- Management of botanical resources, special habitats, and noxious weeds would follow the
- Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004).
- Any new occurrences of sensitive plants identified within the Project Area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.
- A Forest Service watchlist species, *Botrychium simplex*, occurs within the Project Area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the Project Area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).
- All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.
- The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.
- Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.
- Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.
- The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed, as determined necessary. Revegetation will consist of the following measures:

- During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
- All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
- Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

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Attachment A – California Rare Plant and Sensitive Natural Community Ranking Descriptions

Source: California Department of Fish and Wildlife, Natural Diversity Database. August 2018. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly publication. 127 pp. Available at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline> Accessed 9/5/2018.

Element Ranking

Global Ranking

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

Species or natural community level:

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

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

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

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

G5 = Secure— Common; widespread and abundant.

Subspecies/variety level:

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

State Ranking

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

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

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

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

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

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

Notes:

1. Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a bird's eye or aerial view when ranking sensitive elements rather than simply counting element occurrences.
2. Uncertainty about the rank of an element is expressed in two major ways: by giving a range rank (e.g. S2S3 means the rank is somewhere between S2 and S3) or by adding a ? to the rank (e.g. S2? means the rank is more certain than S2S3 but less certain than S2).
3. Other symbols include: GH (all sites are historical), SH (all CA sites are historical), GX (all sites are extirpated, element is extinct in the wild), SX (all CA sites are extirpated), G#Q (the element is very rare but there are taxonomic questions associated with it; the calculated G rank is qualified by adding a Q after the G#).

California Rare Plant Ranks¹

- 1A. Presumed extirpated in California and either rare or extinct elsewhere
- 1B. Rare or Endangered in California and elsewhere
- 2A. Presumed extirpated in California, but more common elsewhere
- 2B. Rare or Endangered in California, but more common elsewhere
3. Plants for which we need more information - Review list
4. Plants of limited distribution - Watch list

1A: Plants Presumed Extirpated in California and either rare or extinct elsewhere

The plants of Rank 1A are presumed extirpated because they have not been seen or collected in the wild in California for many years. This rank includes those plant taxa that are both presumed extinct, as well as those plants which are presumed extirpated in California and rare elsewhere. A plant is extinct if it no longer occurs anywhere. A plant that is extirpated from California has been eliminated from California, but may still occur elsewhere in its range.

1B: Plants Rare, Threatened, or Endangered in California and Elsewhere (Includes Rare Plant Ranks 1B.1, 1B.2, 1B.3)

The plants of Rank 1B are rare throughout their range with the majority of them endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century. California Rare Plant Rank 1B plants constitute the majority of plant taxa tracked by the CNDDb, with more than 1,000 plants assigned to this category of rarity.

2A: Plants Presumed Extirpated in California, but more common elsewhere

The plants of Rank 2A are presumed extirpated because they have not been seen or collected in the wild in California for many years. This rank includes only those plant taxa that are presumed extirpated in California, but that are more common elsewhere in their range. Note: Plants of both Rank 1A and 2A are presumed extirpated in California; the only difference is the status of the plants outside of the state.

2B: Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere (Includes Rare Plant Ranks 2B.1, 2B.2, 2B.3)

The plants of Rank 2B are rare, threatened or endangered in California, but more common elsewhere. Plants common in other states or countries are not eligible for consideration under the provisions of the Federal Endangered Species Act; however, they are eligible for consideration under the California Endangered Species Act. This rank is meant to highlight the importance of protecting the geographic range and genetic diversity of more widespread species by protecting those species whose ranges just extend into California. Note: Plants of both Rank 1B and 2B are rare, threatened or endangered in California; the only difference is the status of the plants outside of the state.

3: Plants About Which We Need More Information - A Review list

In March, 2010, DFG changed the name of “CNPS List” or “CNPS Ranks” to “California Rare Plant Rank” (or CRPR). This was done to reduce confusion over the fact that CNPS and DFG jointly manage the Rare Plant Status Review groups (300+ botanical experts from government, academia, NGOs and the private sector) and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment.

In July 2013, CNPS revised the Rare Plant Ranks in order to better define and categorize rarity in California’s flora. In essence, Rank 2 was split into Rank 2A and Rank 2B to be complementary to the already existing 1A and 1B ranks. This split in Rank 2 plants resulted in five Rank 2 plants moving to Rank 2A (Presumed extirpated in California, but more common elsewhere) and the remaining Rank 2 plants being re-classified as Rank 2B (Rare, Threatened or Endangered in California, but more common elsewhere).

(Includes Rare Plant Ranks 3, 3.1, 3.2, 3.3)

The plants that comprise Rank 3 are united by one common theme--we lack the necessary information to assign them to one of the other lists or to reject them. Nearly all of the plants remaining on Rank 3 are taxonomically problematic.

4: Plants of Limited Distribution - A Watch list (Includes Rare Plant Ranks 4.1, 4.2, 4.3)

The plants in this category are of limited distribution or infrequent throughout a broader area in California, and their vulnerability or susceptibility to threat appears low at this time.

While we cannot call these plants “rare” from a statewide perspective, they are uncommon enough that their status should be monitored regularly. Should the degree of endangerment or rarity of a Rank 4 plant change, we will transfer it to a more appropriate rank or delete it from consideration.

Threat Ranks:

The California Rare Plant Ranks (CRPR) use a decimal-style threat rank. The threat rank is an extension added onto the CRPR and designates the level of threats by a 1 to 3 ranking with 1 being the most threatened and 3 being the least threatened. So, most CRPRs read as 1B.1, 1B.2, 1B.3, etc. Note that some Rank 3 plants do not have a threat code extension due to difficulty in ascertaining threats for these species. Rank 1A and 2A plants also do not have threat code extensions since there are no known extant populations of the plants in California.

Threat Code extensions and their meanings:

- .1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
- .2 Moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat)
- .3 Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Appendix G

Silvicultural Assessment of Three Meadows Restoration Project
September 6, 2019

Silvicultural Assessment of Three Meadows Restoration Project

Amador Ranger District
Eldorado National Forest

September 6, 2019



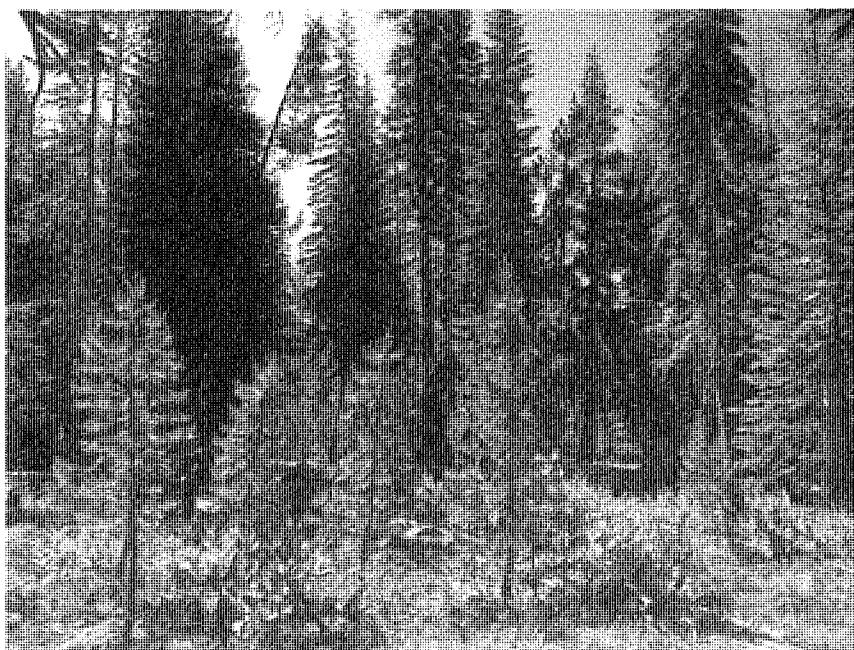
Prepared By: Scott Stephenson Date: 9/6/19
Scott Stephenson
Registered Professional Forester #2949
DUDEK

Reviewed By: /s/ Marc Young Date: 12/2/19
Marc Young
Silviculturist
Eldorado National Forest

**Silvicultural Assessment
of
Three Meadows Restoration Project**

**Amador Ranger District
Eldorado National Forest**

September 6, 2019



Prepared By: Scott Stephenson Date: 9/6/19

Scott Stephenson
Registered Professional Forester #2949
DUDEK

Reviewed By: Marc Young Date: 12-2-19

Marc Young
Silviculturist
Eldorado National Forest

September 6, 2019

12068-02

Mr. Marc Young
Silviculturist
Eldorado National Forest, Amador Ranger District
26820 Silver Drive
Pioneer, CA 95666

Subject: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District

Dear Mr. Young:

The following report summarizes Dudek's silvicultural analysis for the proposed Three Meadows Restoration Project (Project) on Eldorado National Forest – Amador Ranger District's (ENF) Upper Onion Valley Meadow, High Onion Meadow, and Tyler Meadow near the town of Pine Grove, California. This report includes a discussion of the current stand conditions, the desired post-project condition, the proposed action, and the potential effects of the proposed action consistent with the objectives of ENF's Land and Resource Management Plan. The primary objective of a silvicultural prescription for meadow restoration is to halt or reverse the encroachment of upland species and increase the available growing space, sunlight, moisture, and nutrients available for wet meadow and riparian vegetation. Forest stands are typically thinned around the meadow margin and trees are often completely removed from within the meadow footprint. Ongoing volunteer activities include removal of encroaching lodgepole pine less than 3 inches diameter at breast height. The Project's restoration designs do not include a silvicultural component and conifer thinning and removal will not be conducted to meet the objective of halting encroachment of upland species. The project's restoration designs do, however, propose selective tree harvesting of approximately 100-200 trees between 10"-30" diameter breast height (d.b.h.). These trees will be manufactured into logs that will be used to build the in-stream grade control structures.

SITE DESCRIPTION

The three meadows, High Onion, Upper Onion Valley, and Tyler, are approximately 50 miles northeast of Jackson, California, and east of the Bear River Reservoir in the Amador Ranger District of the Eldorado National Forest. Tyler Meadow is in the Bear River watershed and High Onion and Upper Onion Valley are in the Cole Creek watershed. High Onion Meadow (~ 3 acres

Mr. Marc Young

Subject: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District

@ 8,000 feet elevation) and Upper Onion Valley Meadow (~7 acres @ 7,480 feet) are connected by Onion Creek that flows into Cole Creek and the North Fork Mokelumne River, about 1.7 miles downstream from Salt Springs Reservoir. Tyler Meadow (~2 acres @ 6,800 feet) drains into Upper Bear River Reservoir which feeds Bear River and Bear River Reservoir. The location of the three meadows is presented in Attachment A. Detailed maps of the meadows and project designs are presented in Attachment B. Site photographs of each meadow are presented in Attachment C.

USGS Map Information

High Onion Meadow – an unnamed meadow at T8N, R16E, Sec 1 (Bear River Reservoir Quad)

Tyler Meadow - T8N, R16E, Sec 3 (Bear River Reservoir Quad)

Upper Onion Valley - - T8N, R16E, Sec 11 (Bear River Reservoir Quad)

METHODS

Dudek Registered Professional Foresters (RPFs) conducted a site evaluation on July 16 and August 12, 2019 to document forest stand conditions and review the proposed Project. Quantitative visual estimates of stand attributes including general health, species composition, trees per acre, stand density (sq. ft. per acre), average trunk diameter and age, and snag density were visually estimated. Regional forest datasets and model outputs including United States Forest Service (USFS) Forest Inventory and Analysis 2012, USFS Fire Modeling Institute 2012, and the Sierra Nevada Ecosystem Project (SNEP) Final Report to Congress - Late Successional Old-Growth Forest Conditions 1996 were queried for relevant forest data.

ANALYSIS RESULTS

Upper Onion Valley Meadow

Current Condition

The meadow is dominated with healthy riparian vegetation, but has been impacted by past and present management activities including grazing and fire exclusion. These activities have compromised the meadow vegetation and reduced the growing space for wet meadow and riparian vegetation. Encroachment of upland plant species, particularly lodgepole pine, has resulted in a decline of riparian vegetation due to shading and competition. During the field survey, it was noted that past conifer removal treatments had occurred within the meadow footprint. These treatments targeted encroaching lodgepole pine (*Pinus contorta*) less than approximately 4” d.b.h.

The meadow’s adjacent forested stand consists of high-elevation fir/pine type forest growing on a low to moderately productive site. This stand appears healthy and is estimated to be approximately

Mr. Marc Young

Subject: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District

100 years old on average. The forest species composition of the meadow margin stand includes multiple size classes of red fir (*Abies magnifica*) and lodgepole pine. A few of the larger diameter red fir are estimated to be over 200 years old. Approximate trees per acre of trees greater than 4" d.b.h is very high and ranges from 300-400 trees per acre. Approximate trees per acre of trees less than 4" d.b.h is also very high and ranges from 600-1,500 trees per acre throughout the stand. Stand density ranges from 100-200 sq. ft. per acre, more than half of which is represented by lodgepole pine. Average tree diameter for the stand is approximately 10"-15" d.b.h. Large snags are very dense with approximately 10-15 snags per acre. Above ground forest ecosystem carbon density is greater than 200 Mg/ha (USFS Forest Inventory and Analysis 2012) and wildland fire potential is high (USFS Fire Modeling Institute 2012) for the meadow and surrounding landscape. The stands complexity and contribution to late successional forest function is ranked 3 out of 5 for having retained significant numbers of large trees and snags but lacking the parklike structure often produced by frequent low-intensity fire (Sierra Nevada Ecosystem Project, Final Report to Congress; Late Successional Old-Growth Forest Conditions, University of California; SNEP Science Team and Special Consultants, 1996). Slopes are gradual and generally less than 10%.

Desired Condition

The Project is designed to improve meadow conditions through restoring hydrologic functions of the meadow systems, including improved water quality, timing of flows, recovery of sediment deposition, and arrested channel head cutting. Application of meadow restoration silvicultural treatments would halt the encroachment of upland plant species, particularly lodgepole pine, and increase the extent and quality of wet meadow and riparian vegetation.

Proposed Action

This Project does not propose the use of silvicultural treatments, however, it does propose selective tree harvesting of approximately 100-200 trees between 10"-30" diameter breast height (d.b.h.) to be manufactured into logs that will be used to build the in-stream grade control structures (log weirs). The Project includes installation of 15-20 log weirs located in existing, incised channels to raise the base level of the channel, encourage aggradation, reduce overall channel capacity, and raise the groundwater table. It is estimated that 73 logs meeting the Engineer's specified log dimensions and quality will be required. Logs utilized in the weir construction are to be procured by harvesting trees from in and around the Project area.

Approximately 75 conifers less than 30" d.b.h. may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Project area according to the selection criteria provided below. Trees selected for harvest would meet the Engineer's minimum

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Subject: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District

specified log dimensions and quality, and typically contain at least one 20' length log with a 12" small end diameter and only minor structural defects. Trees should be felled away from desirable retention trees. Snags and down logs will be retained and avoided when feasible.

Harvested trees will be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur on gradual slopes less than 30%, when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

Tree selection criteria in order of preference:

- 1) Live lodgepole pine less than 30' d.b.h. encroaching into the meadow
- 2) Live white or red fir less than 30' d.b.h. encroaching into the meadow
- 3) Live lodgepole pine less than 30' d.b.h. within and adjacent to the designated access routes
- 4) Live white or red fir less than 30' d.b.h. within and adjacent to the designated access routes
- 5) Live lodgepole pine less than 30' d.b.h. in the project area
- 6) Live white or red fir less than 30' d.b.h. in the project area

Potential Effects

The selective harvest of approximately 75 conifers from forest stands encompassing the meadow margin, designated access routes, and within the Project area is expected to have negligible impact on the timber resources. Some soil disturbance may occur as a result of harvesting activities, however, woody material generated from tree harvesting and manufacturing weir logs will be spread on disturbed soils to prevent erosion and sediment transport.

High Onion Meadow

Current Condition

The meadow is dominated with healthy riparian vegetation, but has been impacted by past and present management activities including grazing and fire exclusion. These activities have compromised the meadow vegetation and reduced the growing space for wet meadow and riparian vegetation. Encroachment of upland plant species, particularly lodgepole pine, has resulted in a decline of riparian vegetation due to shading and competition.

The meadow's adjacent forested stand consists of high-elevation fir/pine type forest growing on a low to moderately productive site. This stand appears healthy and is estimated to be approximately 100 years old on average. The forest species composition of the meadow margin stand includes multiple age classes of red fir and lodgepole pine. A few of the larger diameter red fir are estimated to be over 200 years old. Approximate trees per acre of trees greater than 4" d.b.h is very high and ranges from 300-400 trees per acre. Approximate trees per acre of trees less than 4" d.b.h. is very high with approximately 600-1,000 trees per acre throughout the stand. Stand density ranges from 100-200 sq. ft. per acre, more than half of which is represented by lodgepole pine. Average tree diameter for the stand is approximately 10"-15" d.b.h. Large snag density is very high with approximately 10-15 snags per acre. Above ground forest ecosystem carbon density is greater than 200 Mg/ha (USFS Forest Inventory and Analysis 2012) and wildland fire potential is high (USFS Fire Modeling Institute 2012) for the meadow and surrounding landscape. The stand's complexity and contribution to late successional forest function is ranked 3 out of 5 for having retained significant numbers of large trees and snags but lacking the parklike structure often produced by frequent low-intensity fire (Sierra Nevada Ecosystem Project, Final Report to Congress; Late Successional Old-Growth Forest Conditions, University of California; SNEP Science Team and Special Consultants, 1996). Slopes are gradual and generally less than 10%.

Desired Condition

The Project is designed to improve meadow conditions through restoring the natural morphology of the meadows to improve hydrologic functions of the meadow systems, including improved water quality, timing of flows, recovery of sediment deposition, and arrested channel head cutting. Application of meadow restoration silvicultural treatments would halt the encroachment of upland plant species, particularly lodgepole pine, and increase the extent and quality of wet meadow and riparian vegetation.

Proposed Action

The Project includes installation of 20-30 log weirs located in existing, incised channels to raise the base level of the channel, encourage aggradation, reduce overall channel capacity, and raise the groundwater table. It is estimated that 100 logs meeting the Engineer's specified log dimensions and quality will be required. Logs utilized in the weir construction are to be procured by harvesting trees from in and around the Project area.

Approximately 75 conifers less than 30" d.b.h. may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Project area according to the selection criteria provided below. Trees selected for harvest would meet the Engineer's minimum specified log dimensions and quality, and typically contain at least one 20' length log with a 12" small end diameter and only minor structural defects. Trees should be felled away from desirable retention trees. Snags and down logs will be retained and avoided when feasible.

Harvested trees will be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

Tree selection criteria in order of preference:

- 1) Live lodgepole pine less than 30' d.b.h. encroaching into the meadow
- 2) Live white or red fir less than 30' d.b.h. encroaching into the meadow
- 3) Live lodgepole pine less than 30' d.b.h. within and adjacent to the designated access routes
- 4) Live white or red fir less than 30' d.b.h. within and adjacent to the designated access routes
- 5) Live lodgepole pine less than 30' d.b.h. in the project area
- 6) Live white or red fir less than 30' d.b.h. in the project area

Potential Effects

The selective harvest of approximately 75 conifers from forest stands encompassing the meadow margin, designated access routes, and within the Project area is expected to have negligible impact on the timber resources. Some soil disturbance may occur as a result of harvesting activities, however, woody material generated from tree harvesting and manufacturing weir logs will be spread on disturbed soils to prevent erosion and sediment transport.

Tyler Meadow

Current Condition

The meadow is dominated with healthy riparian vegetation, but has been impacted by past and present management activities and land uses including grazing, off-highway vehicles, and fire exclusion. These activities have compromised the meadow vegetation and reduced the growing space for wet meadow and riparian vegetation. Encroachment of upland plant species, particularly lodgepole pine, has resulted in a decline of riparian vegetation due to shading and competition.

The meadow's adjacent forested stand consists of mid-elevation fir/pine type forest growing on a moderate to highly productive site. This stand appears healthy and is estimated to be approximately 100 years old on average. The forest species composition of the meadow margin stand includes multiple age classes of red fir, white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine. A few of the larger diameter red fir and Jeffrey pine are estimated to be over 200 years old. Approximate trees per acre of trees greater than 4" d.b.h is very high and ranges from 300-400 trees per acre. Approximate trees per acre of trees less than 4" d.b.h. is very high with approximately 600-1,000 trees per acre throughout the stand. Stand density ranges from 150-200 sq. ft. per acre, and is split evenly between red fir, white fir, and lodgepole pine. The Jeffrey pine occupies a very small portion of the stand. Average tree diameter for the stand is approximately 15-20" d.b.h. Large snag density is moderate with approximately 5-10 snags per acre. Above ground forest ecosystem carbon density is greater than 200 Mg/ha (USFS Forest Inventory and Analysis 2012) and wildland fire potential is high (USFS Fire Modeling Institute 2012) for the meadow and surrounding landscape. The stand's complexity and contribution to late successional forest function is ranked 4 out of 5 likely for the presence of the few isolated old growth Jeffrey pine (Sierra Nevada Ecosystem Project, Final Report to Congress; Late Successional Old-Growth Forest Conditions, University of California; SNEP Science Team and Special Consultants, 1996). The stand and surrounding landscape were assessed for drought related mortality and 5 dead trees per acre were observed on average (USFS 2016 Tree Mortality Survey). Slopes are gradual and generally less than 10%.

Mr. Marc Young

Subject: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District

Desired Condition

The Project is designed to improve meadow conditions through restoring the natural morphology of the meadows to improve hydrologic functions of the meadow systems, including improved water quality, timing of flows, recovery of sediment deposition, and arrested channel head cutting. Application of meadow restoration silvicultural treatments would halt the encroachment of upland plant species, particularly lodgepole pine, and increase the extent and quality of wet meadow and riparian vegetation.

Proposed Action

The Project includes installation of 10-15 log weirs located in existing, incised channels to raise the base level of the channel, encourage aggradation, reduce overall channel capacity, and raise the groundwater table. It is estimated that 40 logs meeting the Engineer's specified log dimensions and quality will be required. Logs utilized in the weir construction are to be procured by harvesting trees from in and around the Project area.

Approximately 30 conifers less than 30" d.b.h. may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Project area according to the selection criteria provided below. Trees selected for harvest would meet the Engineer's minimum specified log dimensions and quality, and typically contain at least one 20' length log with a 12" small end diameter and only minor structural defects. Trees should be felled away from desirable retention trees. Snags and down logs will be retained and avoided when feasible.

Harvested trees will be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

Tree selection criteria in order of preference:

- 1) Live lodgepole pine less than 30' d.b.h. encroaching into the meadow
- 2) Live white or red fir less than 30' d.b.h. encroaching into the meadow

Mr. Marc Young

Subject: Silviculture Report for the Three Meadows Restoration Project – Environmental Compliance, Eldorado National Forest – Amador Ranger District

- 3) Live lodgepole pine less than 30' d.b.h. within and adjacent to the designated access routes
- 4) Live white or red fir less than 30' d.b.h. within and adjacent to the designated access routes
- 5) Live lodgepole pine less than 30' d.b.h. in the project area
- 6) Live white or red fir less than 30' d.b.h. in the project area

Potential Effects

The selective harvest of approximately 30 conifers from forest stands encompassing the meadow margin, designated access routes, and within the Project area is expected to have negligible impact on the timber resources. Some soil disturbance may occur as a result of harvesting activities, however, woody material generated from tree harvesting and manufacturing weir logs will be spread on disturbed soils to prevent erosion and sediment transport.

RPF'S DISCLOSURE

This report provides conclusions and recommendations based only on a visual examination of the meadows and surrounding site by a California Registered Professional Forester and reasonable reliance upon the completeness and accuracy of the information provided to the RPF.

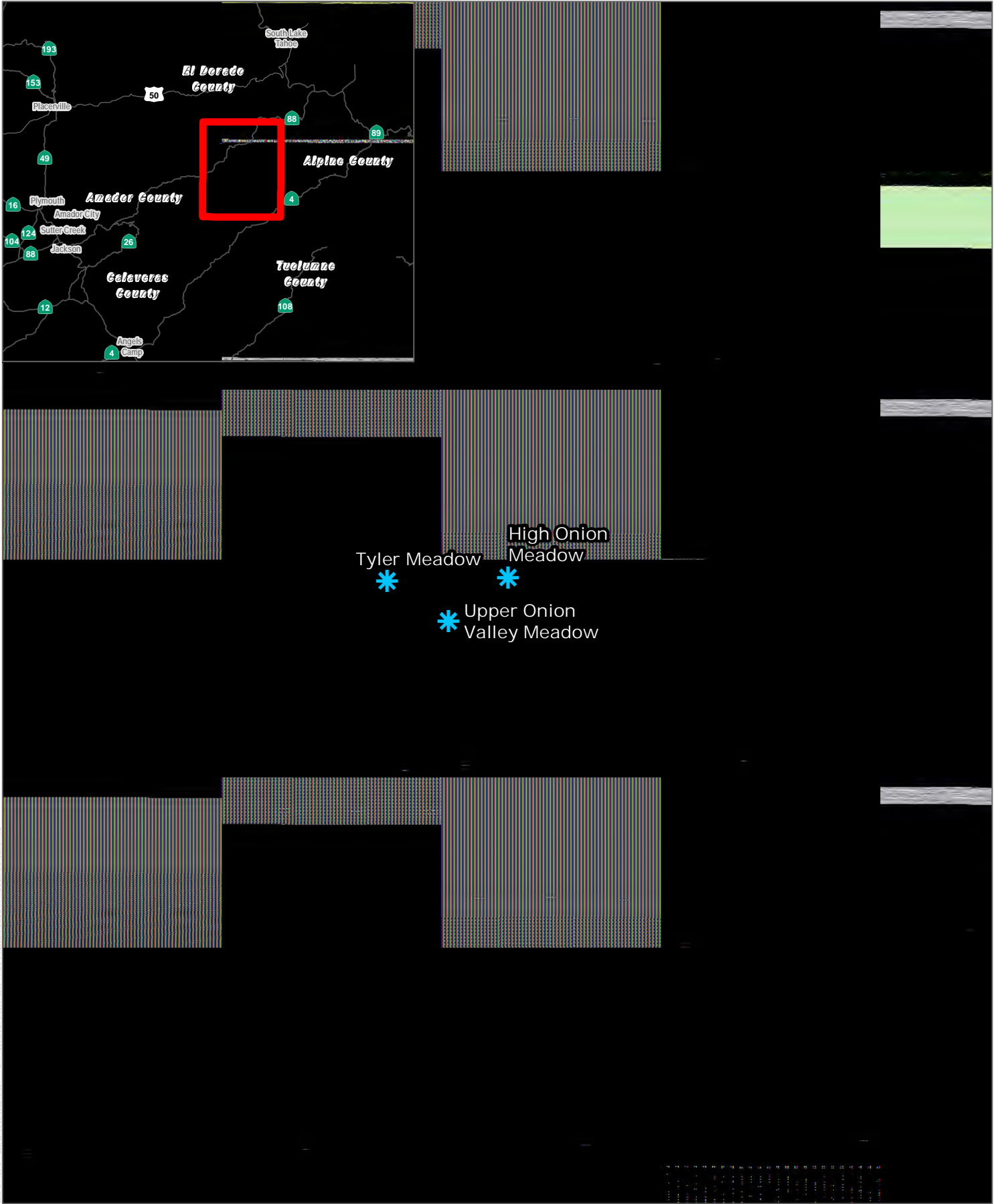
Sincerely,

Scott Stephenson
Scott Stephenson
RPF #2949

*Cc: JoAnne Michael, Senior Environmental Specialist, Resource Concepts, Inc.
Scott Eckardt, RPF, Dudek*

*Att: Attachment A – Project Location Map
Attachment B – Detail Project Designs
Attachment C – Project Area Photos*

ATTACHMENT A
Project Location Map



SOURCE: ESRI 2019

Attachment A



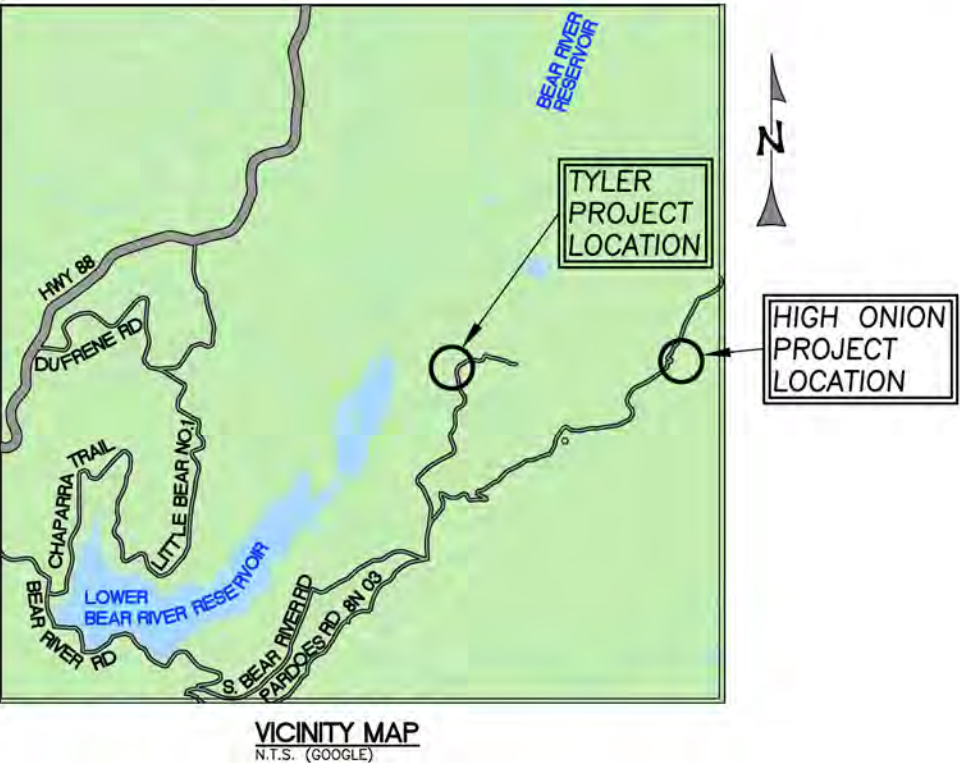
Project Location Map

Silviculture Report for the Three Meadows Restoration Project – Eldorado National Forest – Amador Ranger District

ATTACHMENT B
Detailed Project Designs

THREE MEADOWS RESTORATION PROJECT HIGH ONION AND TYLER MEADOWS

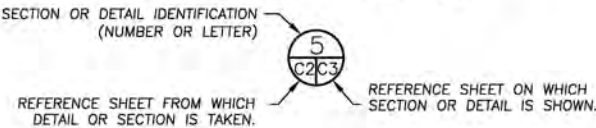
30% DESIGN SUBMITTAL



SHEET INDEX

C1	COVER
C2	HIGH ONION EXISTING CONDITIONS, ACCESS, AND STAGING PLAN
C3	HIGH ONION IMPROVEMENT PLAN
C4	TYLER EXISTING CONDITIONS, ACCESS, AND STAGING PLAN
C5	TYLER IMPROVEMENT PLAN
C6	DETAILS
C7	LOG WEIR DETAIL

SECTION AND DETAIL CONVENTION



ABBREVIATIONS

DIA.	DIAMETER
(E)	EXISTING
FS	FOREST SERVICE
TYP	TYPICAL
N.T.S.	NOT TO SCALE

TREE SPECIES	
F	FIR
P	LODGEPOLE PINE

*** CALL BEFORE YOU DIG ***
CONTACT UNDERGROUND SERVICE ALERT (USA)
PRIOR TO ANY CONSTRUCTION WORK 1-800-227-2600

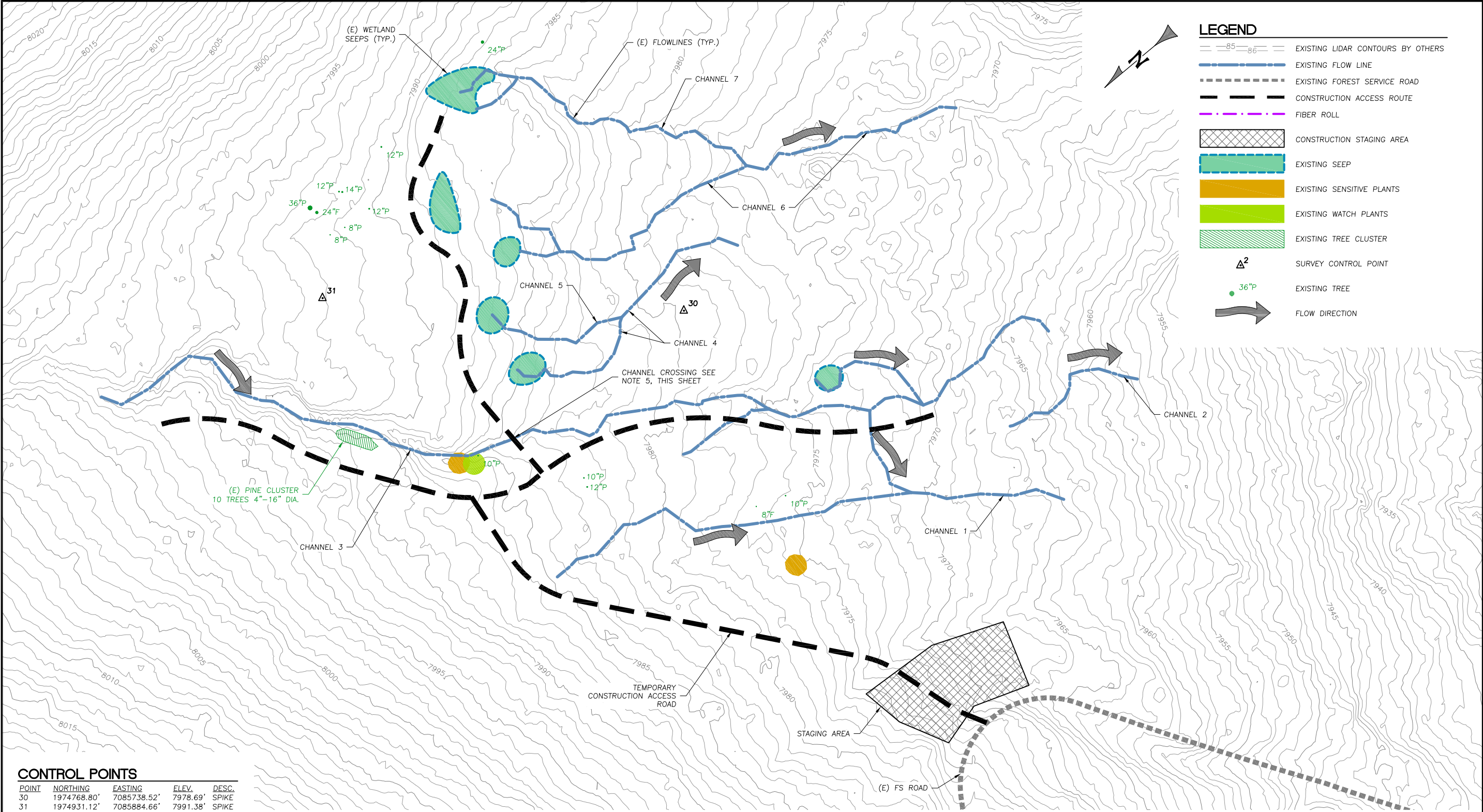
PROJECT DESCRIPTION

THESE DRAWINGS PROVIDE 30% DESIGN LEVEL DETAILS FOR THE RESTORATION OF HIGH ONION MEADOW AND TYLER MEADOW IN AMADOR COUNTY, CALIFORNIA.

WORK IN HIGH ONION MEADOW SHALL CONSIST OF A CATTLE EXCLUSION FENCING AROUND EXISTING WETLAND SEEPS. WORK IN TYLER MEADOW SHALL CONSIST OF PLACEMENT OF ROCK ALONG THE EDGE OF THE EXISTING ATV AREA TO DISCOURAGE ATV RECREATION WITHIN THE MEADOW.

GENERAL NOTES

- TOPOGRAPHIC MAPPING WAS PERFORMED BY:
WATERWAYS CONSULTING, INC.
509A SWIFT STREET
SANTA CRUZ, CA 95060
SURVEY DATE: NOVEMBER 7-9, 2018.
- ELEVATION DATUM: GPS TIES TO NAVD88 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- BASIS OF BEARINGS: GPS TIES TO NAD83 CALIFORNIA STATE PLANE, ZONE 2 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- AERIAL PHOTO SOURCE: GOOGLE
- CONTOUR INTERVAL IS ONE FOOT. ELEVATIONS AND DISTANCES SHOWN ARE IN DECIMAL FEET.
- THIS IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE NOT SHOWN HEREON.
- ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE 2018 EDITION OF THE STATE OF CALIFORNIA STANDARD SPECIFICATIONS, ISSUED BY THE DEPARTMENT OF TRANSPORTATION (HEREAFTER REFERRED TO AS "STANDARD SPECIFICATIONS").
- THESE DESIGNS ARE INCOMPLETE WITHOUT THE FINAL STAMPED TECHNICAL SPECIFICATIONS PREPARED BY WATERWAYS CONSULTING, INC. REFER TO TECHNICAL SPECIFICATIONS FOR DETAILS NOT SHOWN HEREON.



CONTROL POINTS

POINT	NORTHING	EASTING	ELEV.	DESC.
30	1974768.80'	7085738.52'	7978.69'	SPIKE
31	1974931.12'	7085884.66'	7991.38'	SPIKE

ACCESS AND STAGING AREA NOTES

1. USE ONLY THE APPROVED ACCESS ROUTES, AS SHOWN ON THE DRAWINGS.
2. SUBMIT A SITE ACCESS PLAN FOR APPROVAL BY THE ENGINEER, PRIOR TO MOBILIZATION. SEE SPECIFICATIONS.
3. THE ACCESS PLAN SHOWN ON THE DRAWINGS IS SCHEMATIC. ACCESS ROUTES THROUGH THE FOREST REQUIRE TREE FELLING, STUMP REMOVAL, AND ASSOCIATED LIGHT GRADING. ACCESS WITHIN THE MEADOW SHALL MINIMIZE IMPACTS TO MEADOW VEGETATION; CONTRACTOR SHALL UTILIZE RUBBER TRACKED/TIRED LOW GROUND PRESSURE EQUIPMENT.
4. SALVAGE TREES FELLED DUE TO CONSTRUCTION AND ACCESS, AS APPROPRIATE.
5. ACCESS ROUTES REQUIRE CHANNEL CROSSINGS. CONTRACTOR SHALL MINIMIZE CHANNEL IMPACTS BY USE OF TEMPORARY BRIDGE SUCH AS MARSH MAT.
6. STAGE MATERIALS WITHIN THE EXISTING PRIMITIVE CAMPGROUND. CONTAIN THE DOWNSLOPE PERIMETER OF STAGING OR STOCKPILE AREAS WITH SILT FENCE
7. STORE, MAINTAIN AND REFUEL ALL EQUIPMENT AND MATERIALS IN A DESIGNATED PORTION OF THE STAGING AREA.
8. RESTORE ACCESS ROUTES PRIOR TO FINAL DEMOBILIZATION. FOREST ACCESS ROUTES REQUIRE RIPPING, SEEDING, AND COARSE WOODY COVER (E.G., LOGS AND SLASH). MEADOW ACCESS ROUTES SHALL BE RESTORED TO PRE-PROJECT CONDITIONS. SEE SPECIFICATIONS.

LEGEND

- EXISTING LIDAR CONTOURS BY OTHERS
- EXISTING FLOW LINE
- EXISTING FOREST SERVICE ROAD
- CONSTRUCTION ACCESS ROUTE
- FIBER ROLL
- CONSTRUCTION STAGING AREA
- EXISTING SEEP
- EXISTING SENSITIVE PLANTS
- EXISTING WATCH PLANTS
- EXISTING TREE CLUSTER
- SURVEY CONTROL POINT
- EXISTING TREE
- FLOW DIRECTION

HIGH ONION EXISTING CONDITIONS, ACCESS, AND STAGING PLAN

SCALE: 1" = 30'

1020 SW TAYLOR ST SUITE 380
PORTLAND, OR 97205
PH: (503) 227-9979 FAX: (503) 227-6847
WWW.WATERWAYS.COM

30% DRAFT

NOT FOR CONSTRUCTION

PREPARED AT THE REQUEST OF:

AMADOR RESOURCE CONSERVATION DISTRICT

HIGH ONION EXISTING CONDITIONS, ACCESS, AND STAGING PLAN

THREE MEADOWS RESTORATION PROJECT

TYLER MEADOW

HIGH ONION MEADOW

30% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.

DRAWN BY: D.L.H.

CHECKED BY: M.W.W.

DATE: 4/12/19

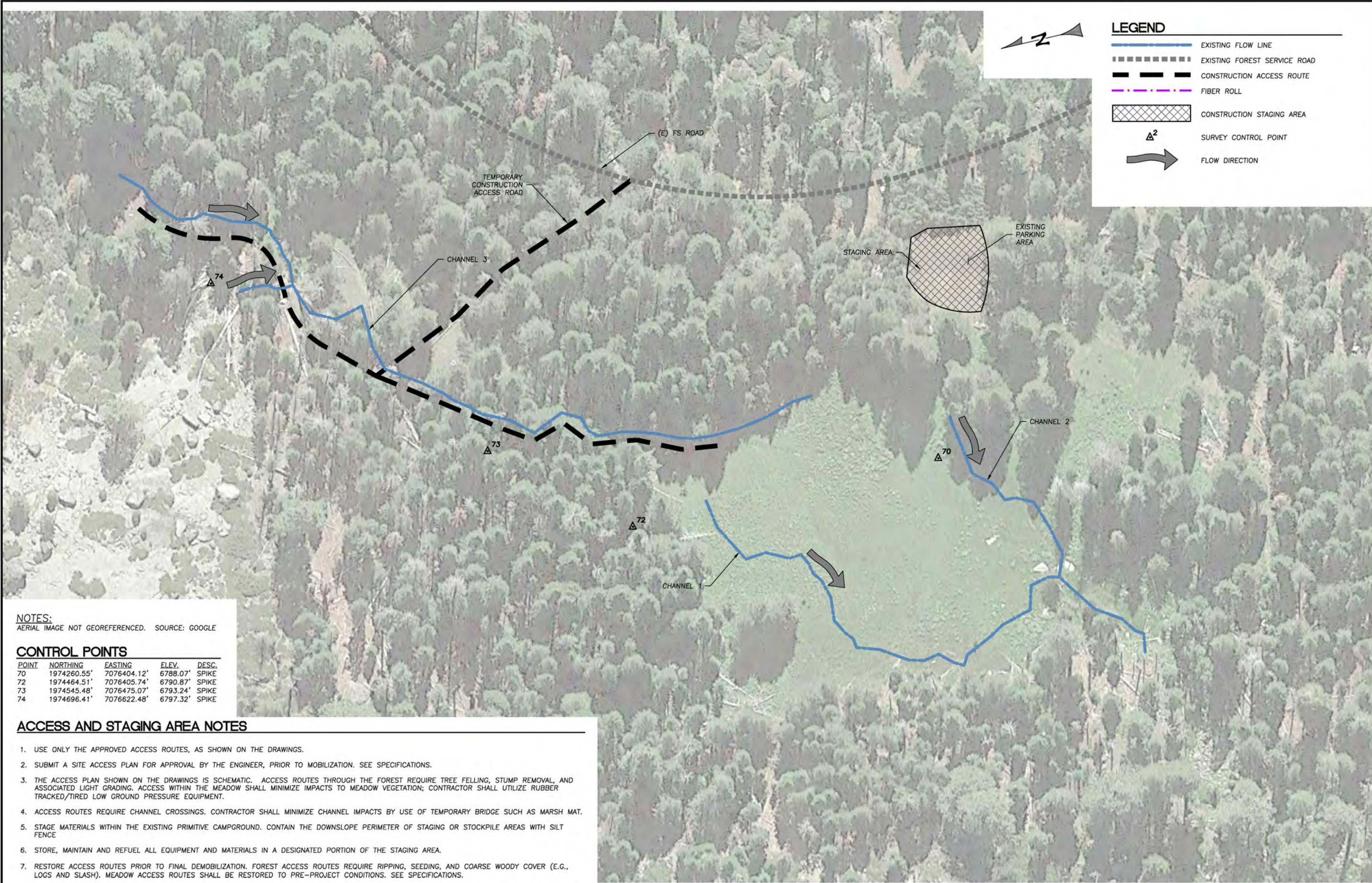
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BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS

0 1"

C2

2 OF 7



NOTES:
AERIAL IMAGE NOT GEOREFERENCED. SOURCE: GOOGLE

CONTROL POINTS

POINT	NORTHING	EASTING	ELEV.	DESC.
70	1974260.55'	7076404.12'	6788.07'	SPIKE
72	1974464.51'	7076405.74'	6790.87'	SPIKE
73	1974545.48'	7076475.07'	6793.24'	SPIKE
74	1974696.41'	7076622.48'	6797.32'	SPIKE

- ACCESS AND STAGING AREA NOTES**
1. USE ONLY THE APPROVED ACCESS ROUTES, AS SHOWN ON THE DRAWINGS.
 2. SUBMIT A SITE ACCESS PLAN FOR APPROVAL BY THE ENGINEER, PRIOR TO MOBILIZATION. SEE SPECIFICATIONS.
 3. THE ACCESS PLAN SHOWN ON THE DRAWINGS IS SCHEMATIC. ACCESS ROUTES THROUGH THE FOREST REQUIRE TREE FELLING, STUMP REMOVAL, AND ASSOCIATED LIGHT GRADING. ACCESS WITHIN THE MEADOW SHALL MINIMIZE IMPACTS TO MEADOW VEGETATION; CONTRACTOR SHALL UTILIZE RUBBER TRACKED/TIRED LOW GROUND PRESSURE EQUIPMENT.
 4. ACCESS ROUTES REQUIRE CHANNEL CROSSINGS. CONTRACTOR SHALL MINIMIZE CHANNEL IMPACTS BY USE OF TEMPORARY BRIDGE SUCH AS MARSH MAT.
 5. STAGE MATERIALS WITHIN THE EXISTING PRIMITIVE CAMPGROUND. CONTAIN THE DOWNSLOPE PERIMETER OF STAGING OR STOCKPILE AREAS WITH SILT FENCE
 6. STORE, MAINTAIN AND REFUEL ALL EQUIPMENT AND MATERIALS IN A DESIGNATED PORTION OF THE STAGING AREA.
 7. RESTORE ACCESS ROUTES PRIOR TO FINAL DEMOBILIZATION. FOREST ACCESS ROUTES REQUIRE RIPPING, SEEDING, AND COARSE WOODY COVER (E.G., LOGS AND SLASH). MEADOW ACCESS ROUTES SHALL BE RESTORED TO PRE-PROJECT CONDITIONS. SEE SPECIFICATIONS.

TYLER EXISTING CONDITIONS, ACCESS, AND STAGING PLAN
SCALE: 1" = 30'

WATERWAYS
CONSULTING INC.

1020 SW TAYLOR ST SUITE 380
PORTLAND, OR 97205
PH: (503) 222-9979 FAX: (503) 222-6847
WWW.WATWAYS.COM

30% DRAFT

NOT FOR CONSTRUCTION

PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

TYLER EXISTING
CONDITIONS,
ACCESS, AND
STAGING PLAN

THREE MEADOWS
RESTORATION PROJECT
TYLER MEADOW
HIGH ONION MEADOW
30% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.
DRAWN BY: D.L.H.
CHECKED BY: M.W.W.
DATE: 4/12/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS
0 1" 1"

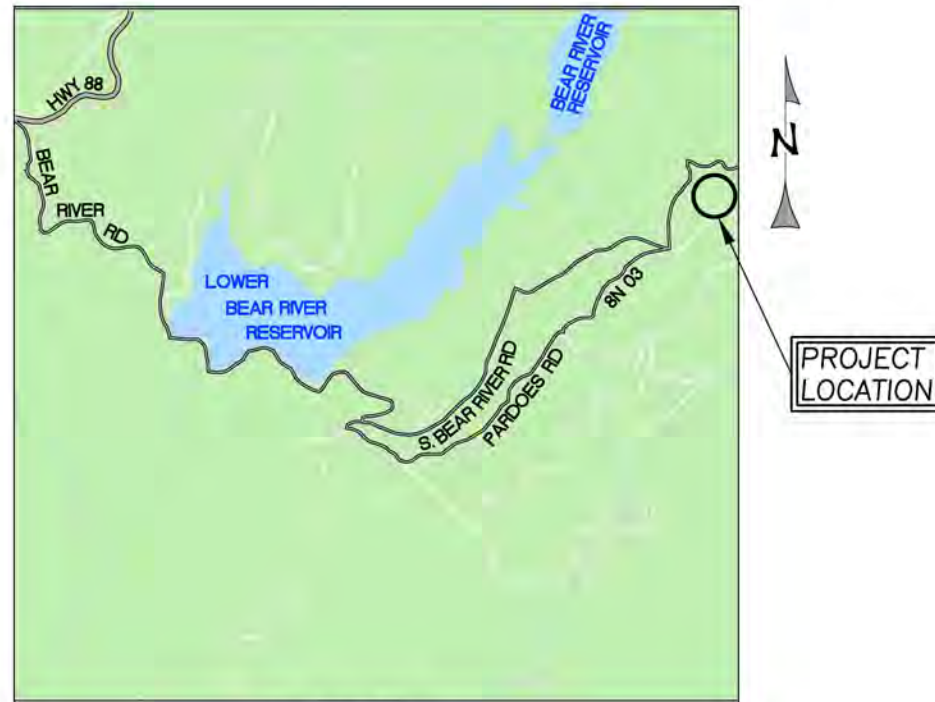
C4

4
OF
7

THREE MEADOWS RESTORATION PROJECT

UPPER ONION MEADOW

60% DESIGN SUBMITTAL



VICINITY MAP
N.T.S. (GOOGLE)

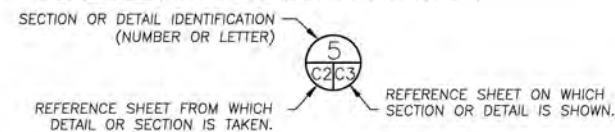


REGIONAL MAP
N.T.S. (GOOGLE)

SHEET INDEX

- C1 COVER SHEET
- C2 EXISTING CONDITIONS, SITE ACCESS, STAGING, AND CONTROL
- C3 MEADOW IMPROVEMENT PLAN
- C4 ROUGHENED CHANNEL PLAN
- C5 ROAD BERM PLAN
- C6 DETAILS - LOG WEIRS
- C7 DETAILS - CONSTRUCTED RIFFLES
- C8* EROSION CONTROL AND REVEGETATION PLAN
- C9* GENERAL NOTES
- * NOT INCLUDED IN THIS SUBMITTAL

SECTION AND DETAIL CONVENTION



ABBREVIATIONS

- DIA. DIAMETER
- (E) EXISTING
- ESM ENGINEERED STREAMBED MATERIAL
- ELEV ELEVATION
- MIN. MINIMUM
- PIP PROTECT IN PLACE
- TYP TYPICAL

- TREE SPECIES
- P LODGEPOLE PINE

PROJECT DESCRIPTION

THESE DRAWINGS PROVIDE 60% DESIGN LEVEL DETAILS FOR THE RESTORATION OF UPPER ONION MEADOW IN AMADOR COUNTY, CALIFORNIA.

WORK SHALL CONSIST OF A ROUGHENED CHANNEL AT THE DOWNSTREAM LIMIT OF THE MEADOW, PLACEMENT OF ROCK AND LOG GRADE CONTROL STRUCTURES, ROADSIDE BERMS, AND REVEGETATION.

GENERAL NOTES

- TOPOGRAPHIC MAPPING WAS PERFORMED BY: WATERWAYS CONSULTING, INC. 509A SWIFT STREET SANTA CRUZ, CA 95060 SURVEY DATE: NOVEMBER 7-9, 2018.
- ELEVATION DATUM: GPS TIES TO NAVD88 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- BASIS OF BEARINGS: GPS TIES TO NAD83 CALIFORNIA STATE PLANE, ZONE 2 USING THE LEICA GEOSYSTEMS SMARTNET GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) NETWORK.
- AERIAL PHOTO SOURCE: AUTOCAD CIVIL 3D 219 GEOLOCATION MAP.
- CONTOUR INTERVAL IS ONE FOOT. ELEVATIONS AND DISTANCES SHOWN ARE IN DECIMAL FEET.
- THIS IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE NOT SHOWN HEREON.
- ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE 2018 EDITION OF THE STATE OF CALIFORNIA STANDARD SPECIFICATIONS, ISSUED BY THE DEPARTMENT OF TRANSPORTATION (HEREAFTER REFERRED TO AS "STANDARD SPECIFICATIONS").
- THESE DESIGNS ARE INCOMPLETE WITHOUT THE FINAL STAMPED TECHNICAL SPECIFICATIONS PREPARED BY WATERWAYS CONSULTING, INC. REFER TO TECHNICAL SPECIFICATIONS FOR DETAILS NOT SHOWN HEREON.

CALL BEFORE YOU DIG

CONTACT UNDERGROUND SERVICE ALERT (USA)
PRIOR TO ANY CONSTRUCTION WORK 1-800-227-2800

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PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

COVER SHEET

THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 4/12/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING.
ADJUST SCALES FOR
REDUCED PLOTS

C1

1
OF
9

CONTROL POINTS

POINT	NORTHING	EASTING	ELEV.	DESC.
20	1971457.29	7081116.27	7464.53	SPIKE
21	1971634.70	7081439.59	7468.52	SPIKE
22	1971661.24	7081216.93	7464.70	SPIKE
23	1971178.99	7071041.23	7459.74	SPIKE
25	1971914.68	708178.45	7470.49	SPIKE
26	1971937.30	7081133.85	7476.71	MAG. NAI.
27	1971599.47	7081550.65	7470.49	SPIKE
28	1971596.22	7081659.79	7479.98	SPIKE

PRELIMINARY
NOT FOR CONSTRUCTION


PREPARED AT THE REQUEST OF:
AMADOR RESOURCE
CONSERVATION DISTRICT

**EXISTING
CONDITIONS,
SITE ACCESS,
STAGING, AND
CONTROL**

THREE MEADOWS
RESTORATION PROJECT
UPPER ONION MEADOW
60% DESIGN SUBMITTAL

DESIGNED BY: B.D.T.
DRAWN BY: B.D.T.
CHECKED BY: M.W.W.
DATE: 4/12/19
JOB NO.: 18-016

BAR IS ONE INCH ON
ORIGINAL DRAWING,
ADJUST SCALES FOR
REDUCED PLOTS



C2	2 OF 9
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LEGEND

-
- | | |
|--|--------------------------------|
| | EXISTING CHANNEL FLOW LINE |
| | EXISTING FOREST SERVICE ROAD |
| | ENVIRONMENTAL PROTECTION FENCE |
| | CONSTRUCTION ACCESS ROUTE |
| | STAGING AREA |
| | RARE PLANT – SENSITIVE SPECIES |
| | RARE PLANT – WATCH SPECIES |
| | CONTROL POINT |
| | EXISTING TREE |



EXISTING CONDITIONS, STAGING, AND ACCESS

SCALE: 1" = 50'

ACCESS AND STAGING AREA NOTES

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4. SALVAGE TREES FELLED DUE TO CONSTRUCTION AND ACCESS, AS APPROPRIATE.
5. ACCESS ROUTES REQUIRE CHANNEL CROSSINGS. CONTRACTOR SHALL MINIMIZE CHANNEL IMPACTS BY USE OF TEMPORARY BRIDGE SUCH AS CORDUROY ROAD, STEEL PLATES, OR MARSH MAT.
6. STAGE MATERIALS WITHIN THE EXISTING PRIMITIVE CAMPGROUND. CONTAIN THE DOWNSLOPE PERIMETER OF STAGING OR STOCKPILE AREAS WITH SILT FENCE
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ATTACHMENT C
Project Area Photos

	
<p>Upper Onion Valley Meadow Dense lodgepole pine and red fir encroachment</p>	<p>Upper Onion Valley Meadow Typical tree to be utilized for weir construction</p>
	
<p>High Onion Meadow Lodgepole pine saplings pioneering in the meadow</p>	<p>High Onion Meadow Dense lodgepole pine and red fir encroachment</p>



Tyler Meadow
Dominant Jeffrey pines with fir and lodgepole
understory



Tyler Meadow
Remnants of aspen at the upper end of the meadow

Appendix H

Hydrology Report for the Three Meadows Restoration Project
February 28, 2020

**Eldorado National Forest
Amador Ranger District**

Hydrology Report
For the
Three Meadows Restoration Project
February 21, 2020

Project Location:
Amador County, California
T19N, R16E Sections 01, 03, and 11 MDBM.

Prepared By: Lynn Zonge

Date: 2/21/2020

Lynn Zonge, PG 8924
Fluvial Geomorphologist
Resource Concepts, Inc.

Reviewed By: _____

Date: _____

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APPENDICES

Appendix A Project Area Photographs
Appendix B Riparian Conservation Objectives (RCO) Consistency Report

INTRODUCTION

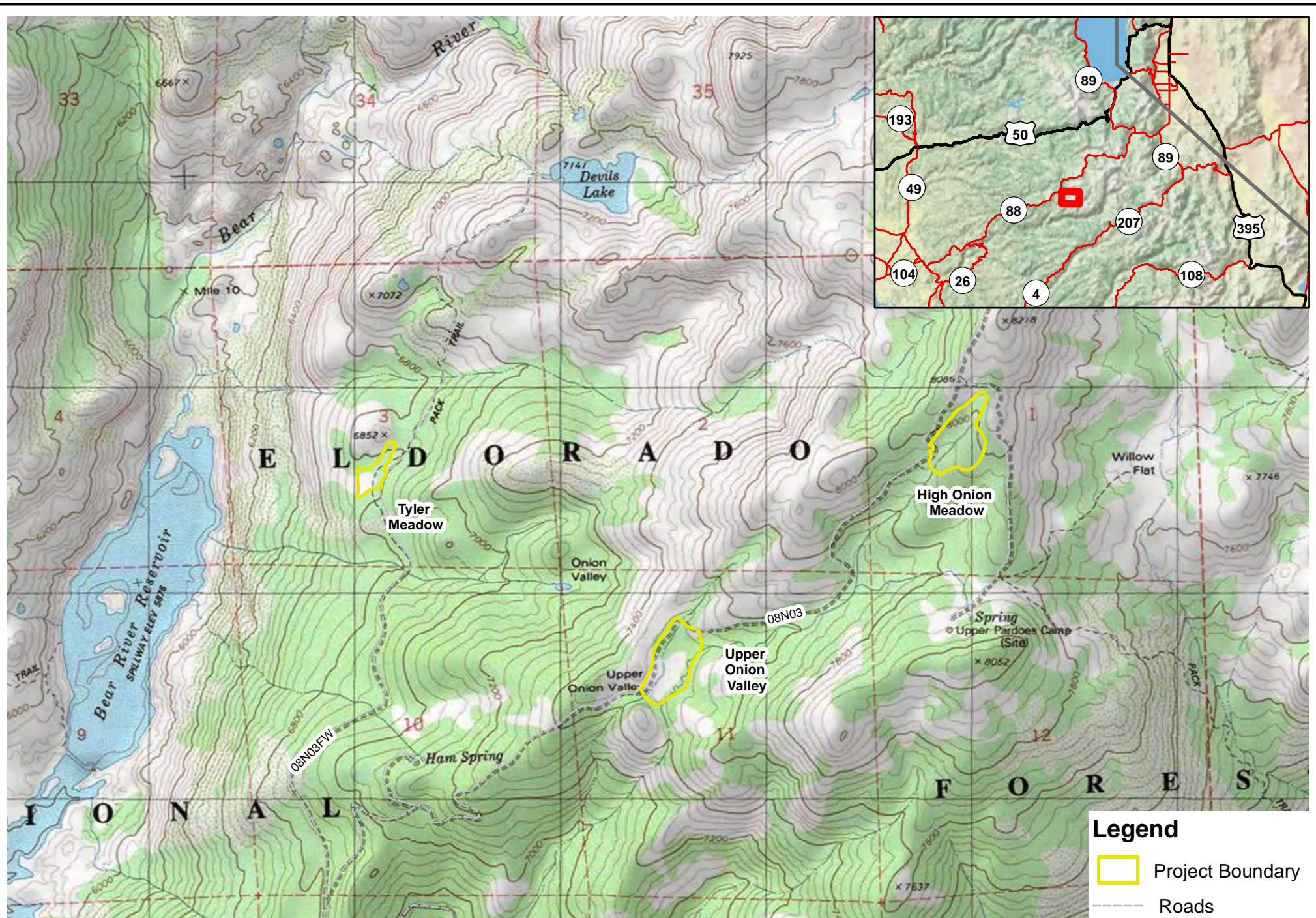
The Amador Ranger District on the Eldorado National Forest (ENF) in Eldorado County, California in cooperation with the Amador Resource Conservation District and the Amador-Calaveras Consensus Group (ACCG) proposes to restore mountain meadow habitat at three small high-elevation meadows. The meadows are within the Mokelumne watershed and include Upper Onion Valley, High Onion Meadow, and Tyler Meadow located approximately 50 miles northeast of Jackson, California, and east of Bear River Reservoir T9N, R16 E, Sections 01, 03, 11, Mount Diablo Meridian (Figure 1 and 2). Table 1 summarizes the meadows.

Each of the meadows have experienced degradation through previous management activities, changes to surface flows (e.g. roads), and downstream disturbances creating incised channels, through the meadows, lowered water tables, and shorter seasonal duration of flows. Drainages within High Onion and Upper Onion meadows each have several head cuts within them.

The proposed project and existing conditions are described by Waterways Consulting Inc. (WCI) 2019 report Three Meadows Restoration Existing Conditions Assessment and Restoration Alternatives. The proposed project actions include installation of rock riffles, log weirs and a roughened channel, as well changes to grazing management to improve hydrologic functions of the meadow systems (see Figures 2, 3, and 4). The intent of these actions is to restore natural meadow hydrology to increase and prolong the duration of late season flows for the benefit of downstream users by reducing downstream flood peaks. Implementation of these actions would also improve water quality, recover sediment deposition, and arrest channel head cutting. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation.

Most of the precipitation occurs in the form of snow between October and April, with thunderstorms locally contributing rain in the summer. In general, the hydrology at each of the meadows is dominated by snowmelt in late spring and early summer. The peak flow of the stream occurs during this time and decreases throughout the summer and early fall.

Past land disturbances surrounding the meadows include timber harvest, grazing, road construction and maintenance, and unauthorized off-highway vehicle (OHV) use. Current recreational uses include dispersed camping, OHV use on existing roads, and hiking.

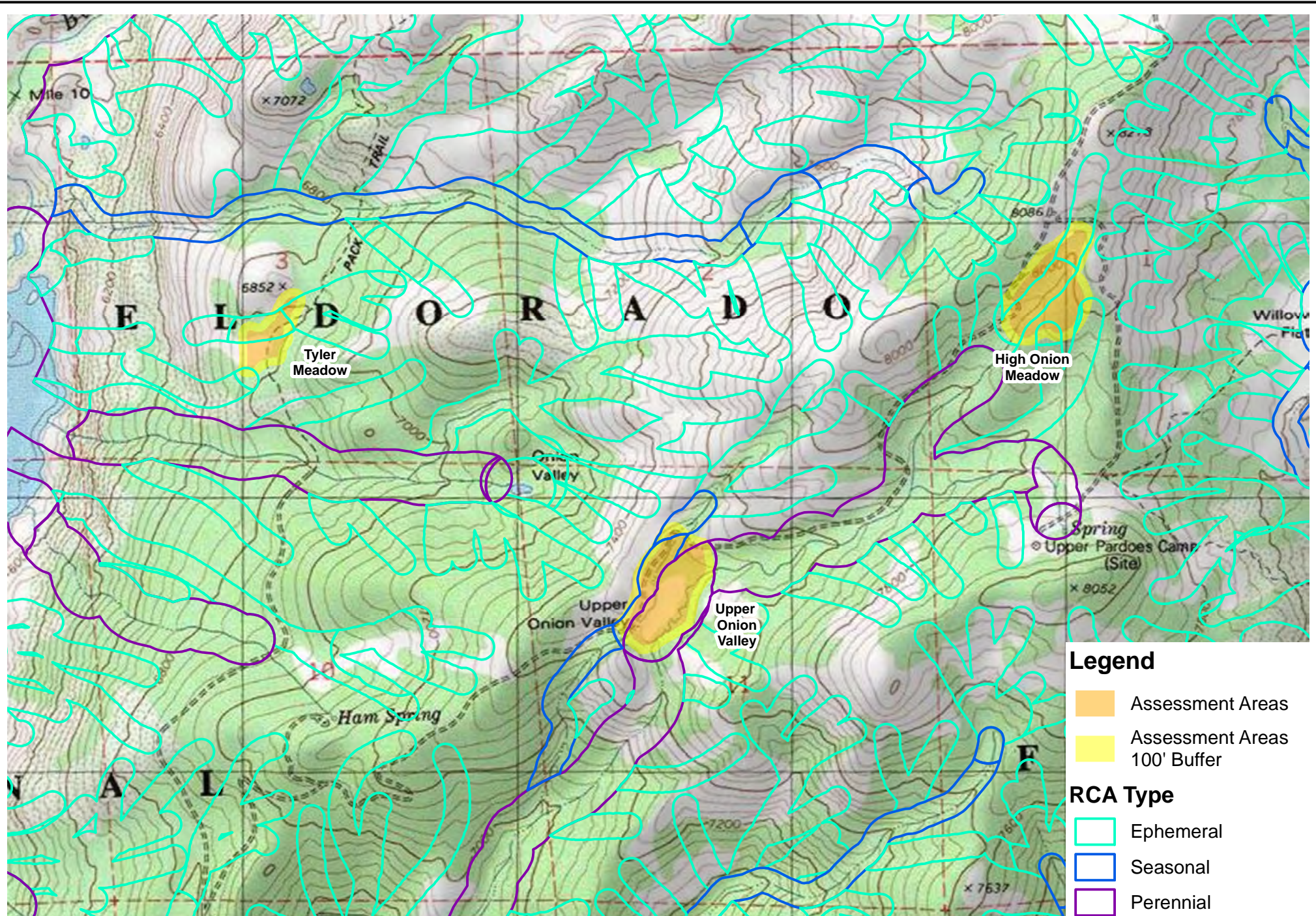


0 1,000 2,000 Feet
 1 Inch = 2,000 Feet

Figure 1: Location Map
Three Meadows Restoration Project

Legend

- Project Boundary
- Roads



0 500 1,000 Feet
 1 inch = 1,500 feet

**Figure 2: Three Meadows
 Riparian Conservation Areas**

Table 1. Three Meadows Summary

Area	Meadow acreage	Watershed acreage	Elev. (feet)	Meadow Description	Drainage Description	Watershed Description
Upper Onion Valley	7	450	7,480	Meadow hosts one main drainage and several springs which coalesce in channels toward the southeastern end.	One main drainage on the western side of the meadow has several head cuts. Several small drainages begin within the meadow.	The perennial Riparian Conservation Area (RCA) drainage from this meadow flows approximately two miles downstream to Cole Creek which is tributary to the N. F. Mokelumne River.
High Onion Meadow	3	30	8,000	Meadow hosts several springs which coalesce in channels toward the southern end.	One main drainage traverses the southeastern boarder of the meadow. Several drainages begin within the meadow with head cuts.	This meadow is at the drainage headwaters and the perennial RCA drainage feeds into Upper Onion approximately one mile downstream.
Tyler Meadow	2	60	6,800	Wet meadow with low areas. Spring area on the west side of the meadow.	Seasonal channel above meadow. No discernable channel through meadow. Meadow outlet is at bedrock and boulders	Meadow is fed by an ephemeral RCA and is tributary to Bear River Reservoir via an 0.5 mile ephemeral drainage. The reservoir feeds Bear River which is tributary to the N.F. Mokelumne River

PROPOSED PROJECT

Each of the three meadows has its own management action plan to resolve specific resource concerns as described below. Details regarding the restoration opportunity analyses and the project objectives are provided in the Three Meadows Restoration Existing Conditions Assessment and Restoration Alternatives (WCI, 2019).

Project Objectives

The project objectives described in WCI, 2019 are:

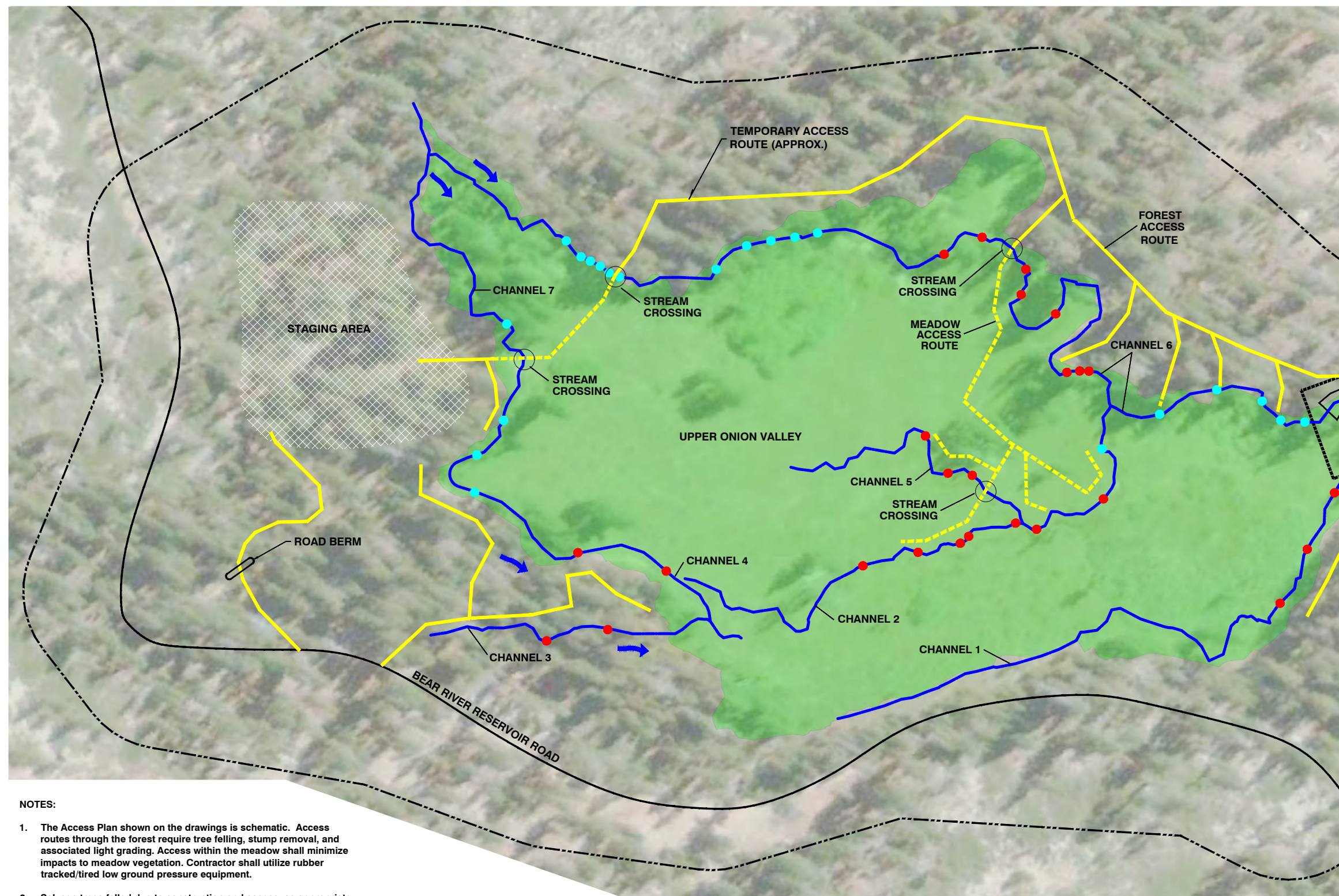
- Restore the natural hydrology of the meadow to raise the groundwater elevation and increase natural water storage,
- Restore the natural morphology of the meadow to recover sediment deposition function,
- Arrest channel head cutting,
- Increase and prolong the duration of late-season flows for the benefit of flora and fauna and downstream water users,
- Reduce downstream flood peaks,
- Halt the encroachment of upland plant species, particularly lodgepole pine,
- Increase extent and quality of wet meadow and riparian vegetation, and
- Improve habitat for meadow species, with focus on sensitive plant species and the Sierra Nevada yellow-legged frog (SNYLF).

Proposed Action

To achieve the above restoration objectives, each of the three meadows has its own restoration action plan to resolve specific resource concerns as described below.

Upper Onion Valley

The proposed restoration actions for Upper Onion Valley include installation of rock riffles and log weirs. The constructed rock riffles and log weirs would be located in existing, incised channels to stabilize the profile grade within the meadow channel, encourage aggradation, restore the hydraulic continuity of flow through the meadow, and raise the groundwater table (reference Figure 3). Rock riffles would be placed in greater than one foot in depth, forming a system of short rock riffle segments interspersed with longer pools. For the constructed riffles a four foot long riffle crest would be established that is keyed into the streambed and banks. Rock ramps are then constructed upstream and downstream of the riffle crest that conform to the existing streambed at a 10% maximum slope downstream of the crest and at a 1:1 slope at the upstream end. Riffles would consist of fine material borrowed from the surrounding upland areas and coarser rock that would be from other Forest Service rock staging areas in the district. Approximately twenty-one (21) constructed rock riffles would be placed within Onion Creek, the main channel through the Upper Onion Valley.



NOTES:

1. The Access Plan shown on the drawings is schematic. Access routes through the forest require tree felling, stump removal, and associated light grading. Access within the meadow shall minimize impacts to meadow vegetation. Contractor shall utilize rubber tracked/tired low ground pressure equipment.
2. Salvage trees felled due to construction and access, as appropriate.
3. Access routes require channel crossings. Contractor shall minimize channel impacts by use of temporary bridge such as marsh mats or corduroy stream crossings.
4. Stage materials within the existing primitive campground. Contain the downslope perimeter of staging or stockpile areas with silt fence.
5. Store, maintain and refuel all equipment and materials in a designated portion of the staging area.
6. Restore access routes prior to final demobilization. Forest access routes require ripping, seeding, and course wood cover (e.g. logs and slash). Meadow access routes shall be restored to pre-project conditions.
7. Salvage willows at direction of Engineer or USFS representative.

FIGURE 3
THREE MEADOWS RESTORATION PROJECT
UPPER ONION VALLEY
PLAN VIEW

Additionally, the project activities at Upper Onion Valley include the installation of twenty-five (25) log weirs as grade control located primarily within lower energy, less incised portions of the channel network. It is estimated that approximately seventy-three (73) logs less than 30" diameter at breast height (dbh) would be needed to construct the weirs and would be harvested from trees within the meadow, along the designated access routes, or near the meadow margins. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

To provide downstream grade control for the meadow, a roughened channel will be constructed at outlet of meadow. The purpose of the structure is to actively raise water surfaces through the channels and meadow but rely on passive delivery of fine and coarse sediment from upstream reaches to ultimately aggrade the meadow channels and bury the upstream grade control structures. The roughened channel will be constructed at a 4.4% gradient and will tie into existing grade approximately 65 feet downstream of the crest and extend upstream of the crest at a 1:1 slope for approximately 10 feet to protect against undermining of the roughened channel. The roughened channel should be a minimum of three feet thick, composed of rock material of various sizes, and would look like a long sloping riffle when completed. Rock would likely be imported to the site from Forest Service rock staging areas in the district.

In addition, the proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area at the north end of the meadow (reference Figure 1). Currently flow within the channel is captured and rerouted within the existing roadbed rather than the natural stream channel (reference photo 6 in Appendix A). To restore and contain the flows within the original stream channel, the restoration project would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel. The berms on each side of the stream channel would be built up two feet with a 1.5-inch aggregate base material. The placement of the base material above the stream bank at 5:1 slopes will contain the streamflow in the original channel and prevent the water from flowing within the existing roadbed. The aggregate base material will be located within the roadbed above the stream channel.

The Upper Onion Valley site would be accessed by Bear River Reservoir Road (FS Road 08N03), a well-developed road that runs along the entire western and northern sides of the meadow. Staging of equipment and materials would occur at an existing primitive campground located at the northern (up gradient) edge of the meadow. Temporary access routes originating from the staging area and Bear River Reservoir Road would be utilized to access the interior of the site for placement of log weirs on the smaller, interior channels. Access routes would be field fit to minimize impacts caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road, steel plates, or marsh mats would be used. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions and elevation.

High Onion Meadow

The proposed action for High Onion Meadow includes the installation of low weir grade control structures in the primary meadow channel to limit additional downcutting, manage the timing and duration of grazing, and protect seepage sources from cattle grazing (reference Figure 4). Approximately 26 log grade control weirs spaced at approximately 25-foot intervals are proposed to be installed along the unnamed creek to enhance sedimentation and limit future risk of channel incision. It is anticipated that the structures would be built with hand tools and hand labor given the relatively narrow channel widths.

Approximately 75 conifers not to exceed 12-15 feet in length and with diameters ranging from 8 to 12 inches may be selected for harvest near the meadow margins, along the designated access routes, or in and around the High Onion Meadow. Harvested trees would be hand felled, bucked, and limbed. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

To discourage cattle use around sensitive areas and seepage sources, the project proposes to install fencing around the seeps that would prevent cattle access and usage of these areas. Most of the seeps identified in High Onion occur along the downstream margin of the upper fan surface as perched groundwater intersects the lower fan surface, and the entire geomorphic surface will be fenced off. Fencing would consist of steel posts, wood corner posts for bracing, and three wires. The fencing has been designed to allow easy removal of the wires prior to the winter and reinstallation following spring snowmelt.

High Onion Meadow is accessible from Forest Service Road 08N03 and staging of materials and equipment would be located within an existing primitive campground adjacent to the road. Temporary access routes originating from the staging area adjacent to the Forest Service Road would skirt the upper edge of the meadow and cross over Onion Creek. Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Within High Onion Meadow access routes are to be constructed along the upper northwestern edge and no stream crossings are required. Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, forest access routes would be restored by ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.

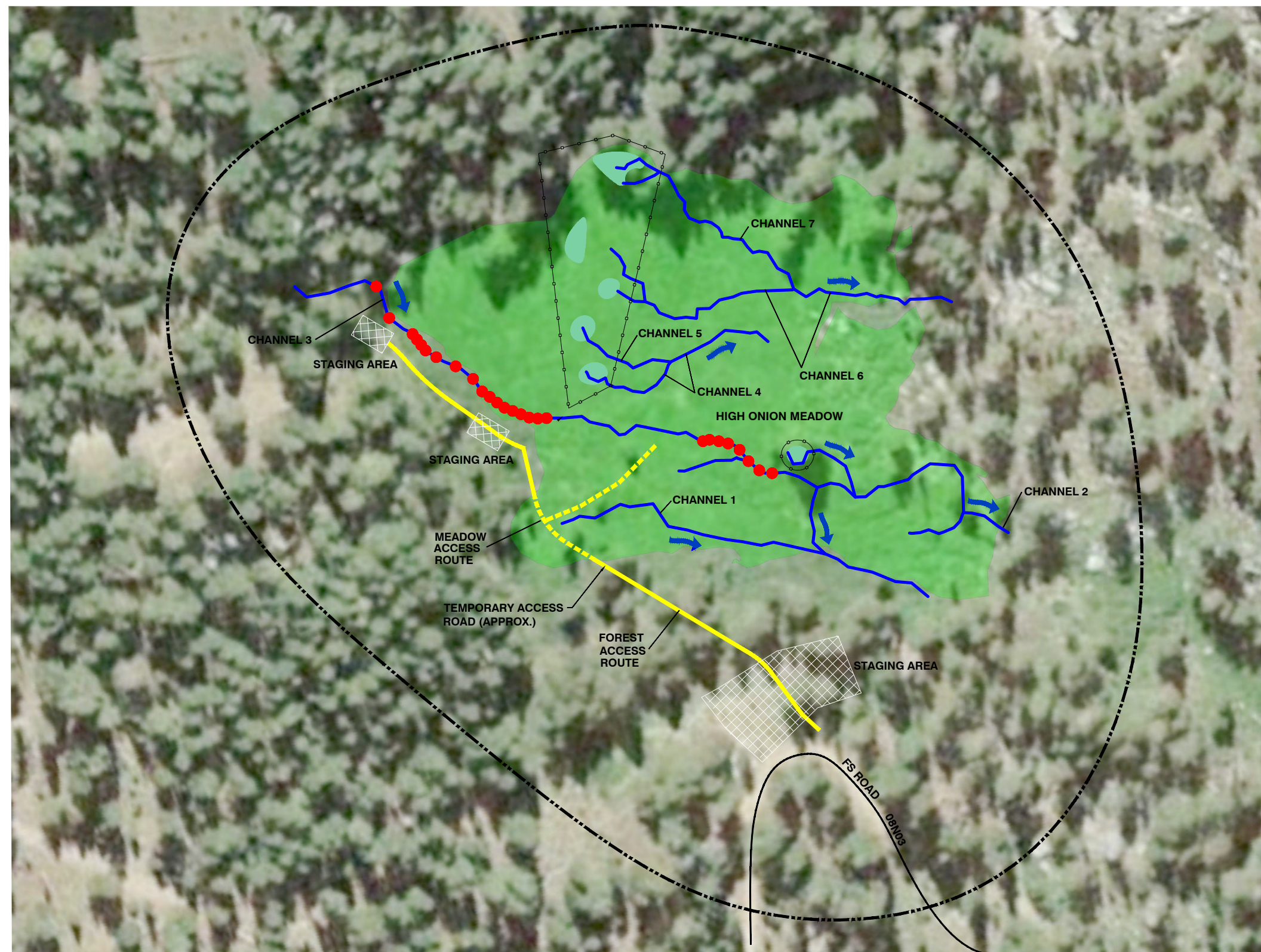


FIGURE 4
THREE MEADOWS RESTORATION PROJECT
HIGH ONION MEADOW
PLAN VIEW

Tyler Meadow

The proposed restoration actions for Tyler Meadow include management of the timing and duration of grazing, limit access by OHVs, and installation of approximately 11 log weir grade control structures to limit additional downcutting (reference Figure 5). The log weir grades would be in the primary channel located in the forested area upstream of the meadow. Approximately thirty (30) conifers less than 30" dbh may be selected for harvest near the meadow margins, along the designated access routes, or in and around the Tyler Meadow project area. Stump heights will be as close to flush cut as is feasible, but not to exceed 6" height. Yarding (transport) from the harvest location to the weir construction site will utilize available construction equipment. Logs will either be fully suspended or be suspended by the lead end during transport to minimize soil disturbance. Yarding will only occur when the ground is stable, and not on saturated soil conditions. Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

One temporary access route will be constructed through upland forest from the FS Road 08N03FW located along the east side of the meadow to the stream channel. The access route will cross through the intermittent stream channel and will be located along the northwestern edge of the stream within an existing disturbance corridor. The access route would be field fit to minimize impacts soil caused by potential tree felling, removal of stumps, and light grading. One crossing of the intermittent stream channel is proposed at the upstream end of the meadow. A corduroy stream crossing will be constructed to protect the channel and streambanks. As the proposed action is limited to the creek channel above Tyler Meadow, there would be no access routes or construction equipment within the meadow.

To limit future access to the Meadow by off-road vehicles, either boulders or logs buried by sediment will be placed around the margin of the parking area (reference Figure 5).

Material Sourcing

The primary materials needed for the construction of restoration project are logs for the log weirs and the stream bed material for the constructed riffles and roughened channels. All of the logs are anticipated to be sourced from on site, both adjacent to and within the meadow. The streambed material is expected to be sources from other Forest Service rock staging areas on the district. Rock transported to the site would be delivered to the proposed staging areas and mixed on site to achieve the desired gradation for either the constructed riffles of the roughened channel.

Revegetation

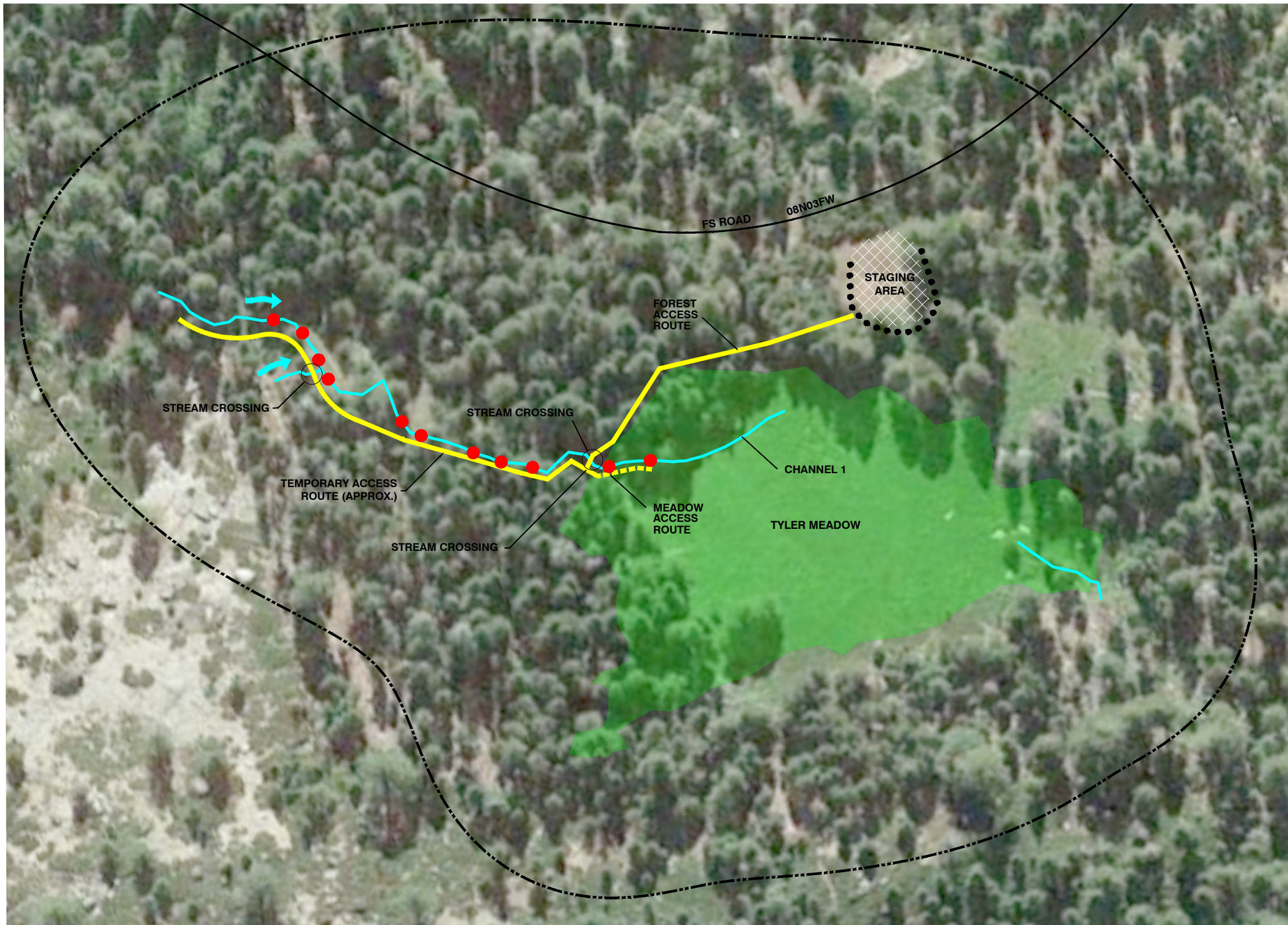
The project will require areas of revegetation. Prior to final demobilization, access routes will be restored. Access routes through the meadow are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary by the ENF Botanist. Willow stakes will be planted next to stream channels and disturbed areas following construction to reduce immediate post project vulnerability to erosion. During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow sites, and other heavily disturbed areas as needed.

Forest access routes are to be ripped, seeded with native species approved by the ENF Botanist, and covered with coarse woody debris (eg. logs and slash). Unutilized limbs, tops, and rounds will be lopped and scattered along the designated access routes to a depth not to exceed 30" following completion of restoration activities to stabilize disturbed soils. Unutilized woody material may also be lopped and scattered within the project area to a depth not to exceed 30".

Table 2 summarizes the proposed action items.

Table 2. Action items of the Three Meadows Restoration Project

Action Item Number	Action
1	<p>Construction of log weirs and constructed rock riffles within existing incised channels to raise base level of channel, encourage aggradation, reduce overall channel capacity and raise the groundwater table (Figures 3 through 5)</p> <ul style="list-style-type: none"> • Construction of log weirs: 11 at Tyler Meadow (ephemeral stream), and 25 at Upper Onion Valley (intermittent streams), and 26 at High Onion (intermittent streams). Logs will be felled from suitable trees located along the meadow edge, along temporary access routes or from within the meadows. Trees used for log weirs will be hand felled, bucked, and limbed. Transport from the harvest location to the weir construction will utilize various construction equipment. Log weirs will be installed by hand crews. • Construct 21 rock riffles along Onion Creek and two tributaries within Upper Onion Valley. It is expected that rock for the riffles will be imported from the Tragedy Pit. Construction of rock riffles will be completed using motorized equipment in the meadow.
2	<p>Construct Roughend Channel To control overall base level of Upper Onion Valley meadow (Figure 3)</p> <ul style="list-style-type: none"> • Placement of rock within 90 lf / 720 sq. ft. of perennial streams and 0.01 acre of adjacent wet meadow at the outflow from Upper Onion Valley. Rock will likely be imported from Tragedy Pit for this component. Motorized equipment would be used in order to accomplish this action item.
3	<p>Construct Road Berm on FS Road 08N03 (Figure 3)</p> <ul style="list-style-type: none"> • Placement of 5:1 sloped rock berms to direct stream flow to original channel and into meadow.
4	<p>Installation of exclusionary cattle fencing at High Onion (Figure 4)</p> <ul style="list-style-type: none"> • Fencing will be placed around six (6) hillslope seeps to protect existing hydrology and prevent soil compaction
5	<p>Installation of OHV fencing at Tyler Meadow (Figure 5)</p> <ul style="list-style-type: none"> • Log or rock barriers will be placed long upper meadow edge to prevent OHV access from adjacent roadway.
6	<p>Creation of Temporary Access Routes (Figures 3 through 5)</p> <ul style="list-style-type: none"> • Access to the meadow restoration areas will be via temporary forest access routes (approx. 3,875 lf / 1.3 acres) and meadow access routes (1,170 lf / 0.40 ac) to be restored upon project completion.



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FIGURE 5
THREE MEADOWS RESTORATION PROJECT
 TYLER MEADOW
 PLAN VIEW

Post-Project Monitoring

All revegetated areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation. Successful revegetation will be achieved with 70% survival of willow cuttings and 50% cover of seeded areas. Any areas that do not meet the survival or cover area would be replanted.

Design Criteria

The following mitigation measures and coordinating requirements are incorporated into the Proposed Action:

Air Quality

All ground disturbing activities shall be effectively controlled of fugitive dust emissions utilizing good housekeeping methods described by the Amador Air District:

- Application of water and/or approved chemicals to road surfaces.
- Using vegetation and other barriers to contain and to reduce fugitive emissions.
- Maintaining reasonable vehicle speeds while driving on unpaved roads in order to minimize fugitive dust emissions.
- Other precautions not specifically listed in this rule but have been approved in writing by the APCO prior to implementation.

Range Resources

- The meadows, or portions of the meadows, may be excluded from grazing use temporarily depending on future coordination between the USFS and the current allotment permittee.

Heritage Resources

- Heritage resources would be avoided. Known historic properties will be flagged with a buffer of at least ten meters for avoidance prior to project implementation. No ground disturbing activities will occur within the flagged area. The flagging will be removed post-project implementation.
- This does not fully eliminate the chance of discovering unrecorded sites or subsurface remains within the project boundary. If project ground disturbance should expose a cultural deposit, disturbance activities will be suspended until a qualified archaeologist can examine the area, evaluate the material, and adequate protection measures are incorporated. In the event that human remains are uncovered during project activity, project managers must stop work and contact Eldorado National Forest. If the remains are determined to be of Native American origin, both the Native American Heritage Commission and any identified descendants shall be notified (Health and Safety Code 7050.5, Public Resources Code Section 5097.94 and 5097.98).
- The only access roads to the project areas will be those shown by the plan set to reduce impacts to cultural sites.

Terrestrial Wildlife

- The USFS District Biologist will be on site during project construction and has the authority to adjust the project to protect Threatened, Endangered and Sensitive species.
- Trees and snags will be retained when possible with the exception of meadow encroaching trees, and those approved for use for livestock and OHV barriers.

- Retain all trees 30" diameter at breast height (dbh) and greater, unless trees pose a safety risk, or are required to construct restoration structures that cannot utilize smaller diameter material.

Aquatic Wildlife

Project activities will conform to conservation measures and terms and conditions requirements as stated by the USFWS 12/19/2014 Programmatic Biological Opinion. Further instruction by the USFWS will be obtained through the consultation process.

- If the Sierra Nevada yellow-legged frog (SNYLF) are found within the project area during project implementation, their safety shall be assessed by qualified personnel and dealt with according to the Terms and Conditions described in the 2014 Programmatic Biological Opinion issued by the USFWS.
- Visual encounter surveys for SNYLF will be conducted by a Forest Service approved wildlife or aquatic biologist within 24 hours of any work proposed.
- A Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, would be used while drafting or dewatering to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. In perennial and intermittent streams, pump intake screens shall have openings not exceeding 3/32-inch (approximately 1/10 inch) and be sized according to the pump intake capacity. Place hose intake into bucket in the deepest part of the pool. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour).
- The development of water drafting sources shall follow all applicable guidelines under BMP 2.5 (USFS 2012). Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat.
- In-channel water drafting locations would include rocking of approaches and barriers of rock or sloping of drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.
- Tightly woven fiber netting, plastic mono-filament netting, or similar material will not be used for erosion control or other purposes in suitable SNYLF habitat.

Hydrology

- Construction activities would occur during the time of year when the flows are at their lowest. This typically occurs between August 1 and October 30.
- Materials and equipment will be staged within designated staging area within existing primitive campgrounds and parking areas. The downslope perimeter of staging areas and material stockpile areas will be contained with silt fence.
- The meadows and streams would be avoided to the extent feasible by using existing roads and staging areas.
- Where streams and meadows cannot be avoided the following would be used to minimize impacts:
 - Corduroy stream crossings consist of laying logs in the channel and up onto the banks parallel to the flowline of the channel to provide a conformable surface for the constructed equipment to drive across without impacting the channel.
 - Locations of the corduroy stream crossings are shown on Figures 2-4. A cross-sectional detail of the corduroy crossing is shown in the following figures.

- Each of the crossings would be monitored to ensure that they are functioning. Remedial actions to address any deficiencies includes adding additional logs as necessary, depending on the number of times the crossing is used.
- Following construction, the logs would be removed from the crossing and placed as slash along the temporary forest access routes.
- Marsh mats will be used to protect the meadow from excessive disturbance and rutting from heavy equipment on the meadow access areas.
 - The mats would consist of slash material from the salvaged trees.
 - The slash should be layered to a depth of 1 to 1.5 feet and be a minimum of 15 feet wide to accommodate the construction.
 - Similar to the corduroy stream crossing, the condition of the marsh mats should be periodically inspected to determine if additional material should be added to provide continuous protection to the meadow.
 - The mats would be removed from the meadow and placed as slash along the temporary forest access roads.
- Low impact construction equipment would be used as described in the technical specifications will provide limits on the size and type of equipment that can be used in the meadow.
 - Only rubber tracked/tired low ground pressure equipment would be used for installation of the log weirs.
 - Larger equipment may be necessary to construct the roughened channel and the location would be accessed via the temporary forest route through uplands with only a single, short traverse across the meadow at the northern end of the project site.

Botanical Resources

Management of botanical resources, special habitats, and noxious weeds would follow the standards and guidelines in the Sierra Nevada Forest Amendment Record of Decision (SNFPA ROD 2004). Specific design criteria and protection measures for the project include:

- Any new occurrences of sensitive plants identified within the project area would be flagged and avoided to the extent practical. The Forest botanist will be consulted on appropriate avoidance and minimization measures for sensitive plants.
- A Forest Service watchlist species, *Botrychium simplex*, occurs within the project area. Under the supervision of the District Botanist all known occurrences will be flagged and avoided to the extent practicable during project implementation. Should any new threatened, endangered, sensitive (TES) or watchlist species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.
- All off-road equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter or other debris that could contain seeds before entering the project area.
- Infestations of invasive plants that are discovered during project implementation would be documented and locations mapped. New sites would be reported to the Forest botanist.
- Rock for riffle construction would be weed free. On site sand, gravel, rock, or organic matter would be used where possible or from documented weed free sources.

- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).
- All temporarily disturbed areas will be revegetated and monitored for three years following project completion for the presence of noxious weeds.

Soil Resources

- Standard mitigation measures will be employed to protect soil resources and have been developed under consultation with soil scientists and engineers as an integral component of meadow floodplain restoration. These mitigation measures have been monitored and refined based on previous projects of this type.
- The installations will be sequenced beginning with the downstream structures and moving in the upstream direction. This will allow the downstream structures to functionally capture the sediment caused by bank and bed disturbance for the upstream structures.
- Access routes would be field fit to minimize impacts to the meadow caused by potential tree felling, removal of stumps, and light grading. Where access routes cross a stream channel, temporary bridge crossings, such as corduroy road or marsh mats would be used. Each crossing would be monitored to ensure they function to limit significant disturbance to the bed and banks of the channel and remedial actions will be taken to address any deficiencies. Following construction, the logs would be removed from the crossing and placed as slash along the temporary access roads.
- Construction equipment located within the meadow will utilize rubber tracked/tired low ground pressure equipment. Prior to final demobilization, access routes would be restored such as ripping, seeding, and placement of coarse wood cover, such as logs and slash. Meadow access routes would be restored to preconstruction conditions.
- The project will require revegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed as determined necessary. Revegetation will consist of the following measures:
 - During the spring and summer following project completion, locally collected seeds would be dispersed along access roads, borrow pits, and other heavily disturbed areas.
 - All revegetation areas would be monitored for three years following project completion. Successful revegetation of seeded area would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded.
 - Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

Fire and Fuels Management

- While the project area is located in a meadow and outside of state identified very fire hazard severity zones, portions of the meadow are expected to be dry, with a risk for wildfire associated with the use of any internal combustion engine. A trash pump and/or water truck will be on site to assist with vegetation transplants and dust control, as well as to reduce the risk of wildfire. In addition, equipment would be re-fueled and serviced at the designated staging area, which is outside of the riparian area and meadow. No fuel would be stored on site. In the event of an accidental spill, hazmat materials for quick on-site clean-up would be kept at the project sites during all construction activities, and in each piece of equipment.

AFFECTED ENVIRONMENT AND EXISTING CONDITION

A meadow assessment protocol, developed by American Rivers, was utilized to grade each meadow. The Meadow Assessment Scorecard results are provided in Table 2.

Table 2. Meadow Assessment Scorecard Results

Meadow	Bank Height	Gullies Outside Main Channel	Bank Stability	Vegetation Condition	Bare Ground	Encroachment
High Onion ¹	3	3	2	1	2	3
Upper Onion ²	2	2	2.5	2	2	2
Tyler ³	4	2	4	2	4	2

1 – heavily impacted 2-moderately impacted 3-slightly impacted 4-natural condition

¹ Rated by Starrett and McGreevy, 2017

² Rated by Starrett, McGreevy, Childress, and Long, 2015

³ Rated by Starrett and McGreevy, 2017

Upper Onion Valley Meadow

Upper Onion Valley sits at 7,480 feet in elevation and is 7 acres in size with a 450-acre watershed. Figure 3 illustrates the meadow and photos are provided in Appendix A.

The meadow assessment protocol, resulted in a score of 2, which falls within the moderately impacted classification.

There is an apparent rapid invasion of conifers seedlings and saplings in the meadow which suggests that the incision, and associated water table lowering, was progressing to the point that the meadow is at risk of dewatering to the point that it no longer functions as a meadow (WCI, 2019).

The meadow complex is located along Onion Creek (channel 6 on Figure 3) and seeps which flow into Cole Creek and then North Fork Mokelumne River, about 1.7 miles downstream. The Upper Onion Valley drainage area is approximately 0.7 square miles (450 acres). The meadow has a valley slope of approximately 1.7% and is characterized by several small internal, intermittent streams.

Onion Creek flows along the eastern meadow edge with an average width of 8 to 10 feet. Channel substrate consists of gravel and cobble, with frequent large boulders lining the channel bank. Stream hydrology is intermittent, but flows may continue into late summer.

Several small head cuts extend from Onion Creek and unnamed seeps within the meadow. These channels have silty, sandy substrate with little gravel.

High Onion Meadow

High Onion Meadow sits at 8,000 feet in elevation and is 3 acres in size with a 30-acre watershed. During the assessment the meadow appeared to be heavily grazed but in moderately good condition outside of the main channel, which is slightly incised. Figure 4 illustrates the meadow and photos are provided in Appendix A

The meadow complex is located near the headwaters of Onion Creek (channel 3 on Figure 4). There are several small seeps located within the upper half of the meadow forming small intermittent streams and vegetated swales down slope. The High Onion watershed area is approximately 30 acres.

Onion Creek is the largest stream channel (average width 8 ft wide) and characterized by moderate to high spring flows. The channel bed consists primarily of gravel and small cobble. Located in the headwater reach, this creek is known to go dry in most years or be reduced to very light flows.

Several small internal streams and swales are present within the meadow complex with silty, sandy substrate. The largest channel, channel 3, is incised with several small head cuts.

There is no lacustrine habitat present in High Onion Meadow.

Tyler Meadow

Tyler Meadow sits at 6,800 feet in elevation and is 2 acres in size with a 60-acre watershed. The primary impacts at the site relate to heavy grazing impacts on the meadow itself and the instability of the primary channel that discharges to the meadow. Figure 5 illustrates the meadow and photos are provided in Appendix A

A score of 2 for the Encroachment category of the assessment was due to the fact that OHV's are accessing the meadow and causing some localized impacts.

Hydrology within Tyler meadow is supported by shallow groundwater and an ephemeral stream that enters from the northern end. The upstream watershed is approximately 60 acres.

The stream is characterized by a low to moderate gradient of 1.8%. Stream flow entering the meadow at the upstream end fans out into the meadow with overland flow (~1.2% slope).

A spring on the west side of the meadow wets the low areas along the lower southern meadow edge which may have temporarily ponded water.

Headwater sections are ephemeral and are known to go dry in early summer of most years.

ENVIRONMENTAL CONSEQUENCES

Direct Effects and Indirect Effects

Alternative 1 (No Action)

All three meadows would likely remain in their current conditions under low to average water years. Under high runoff events the existing drainages with head cuts through High Onion and Upper Onion meadows would continue to migrate upstream which in turn would continue to drain the meadows.

The No Action Alternative would not achieve the project objectives. The head cutting would not be arrested, and stream flows would continue to be confined within the incised drainages. As a result, flood waters would not have access to the meadow floodplain and flood peaks would not be decreased. The incised channels would continue to drain the meadows and upland vegetation would continue to encroach. The extent and quality of the wet meadows would not be increased.

Alternative 2 (Proposed Action)

There may be some of short-term temporary effects to the three meadows and the drainages immediately downstream. There will be ground disturbance during construction of the restoration measures. Construction will take place under no-flow conditions, but subsequent flow events could wash sediment downstream. This sediment would increase turbidity for a short period primarily during the first-year post construction.

In addition to sedimentation, heavy equipment in the meadow could compact the soil resulting in slightly altered macro topography.

Impacts from sediment would be minimized as a result of the following:

- The requirements of the 404 permit from the USACE. Although this permit has not yet been obtained, 404 permits for meadow restoration projects typically limit the total area of ground disturbance and contain requirements for erosion control.
- The requirements of the 401 permit from the Central Valley Regional Water Quality Board. Although this permit has not yet been obtained, 401 permits for meadow restoration projects typically require water quality monitoring and measures to ensure that water quality standards are met.
- Construction activities would occur during the time of year when the flows are at their lowest. This typically occurs between August 1 and October 30.
- Watershed protection measures would include the use of Best Management Practices (BMPs) to protect water quality as described in the Nation Best Management Practices for Water Quality Management on National Forest System Lands (USDA Forest Service 2012) and the California Stormwater Quality Association's Stormwater Best Management Practice Handbook (CASQA 2015).
- The design criteria listed in this document, which are in addition to the items listed above.

In the long term, the condition of the meadows is expected to improve. The following describes the intent and potential effects of the proposed improvements:

- **Log Weirs:** The purpose of log weirs is to arrest channel incision and head cutting, slow the water down, increase lateral water recharge into the meadow, and capture sediment for all three meadows. In smaller channels, log weirs are likely to be installed by hand crews at all three meadow sites. Work at these locations would have very small footprints and direct effects would be restricted to work sites and access routes.
- There are to be twelve (12) log weirs installed at Tyler Meadow, twenty-one (21) log weirs at Upper Onion Valley, and twenty-six (26) log weirs at high Onion, impacting 470 linear feet (0.05 acres) of stream channels.
- For construction of the log weirs, trees of suitable size will be hand felled, bucked and limbed prior to transport from the harvest site to the weir construction site. Logs will either be fully suspended or suspended by the end during transport to minimize soil disturbance. Areas of disturbance will be restored to pre-construction contours prior to project completion.
- **Rock Riffles and Roughened Channel:** The purpose of rock riffles is similar to log weirs and will be used in the main channel in Upper Onion Valley Meadow. Installation of in-channel constructed riffles and the roughened channel within Onion Creek and smaller tributaries within Upper Onion Valley will be done through use of construction equipment.

The purpose of the roughened channel is to control the overall base level of the meadow. This will increase water retention in the Upper Onion Valley Meadow.

The long-term results of this action will be beneficial for erosion control, hydraulic control and reduction of sedimentation from channel incision within Onion Creek, smaller tributaries, and several existing head cuts. It is anticipated that there will be approximately twenty-three (23) constructed riffles within these channels, impacting 690 linear feet (0.12 acres) of stream channel.

- **Road Berm:** The road berm in Upper Onion Valley Meadow will decrease the sediment coming from the road into the meadow and restore the functional natural stream hydrology. This road berm will have no negative effects to the hydrology of the streams or the meadow.
- **Cattle Exclusion Structures:** The cattle exclusion structures should help to protect the spring areas from cattle grazing particularly during drier periods at High Onion Meadow. These structures will be placed by hand and will have no negative effects to the hydrology of the meadow.
- **OHV Exclusion:** The OHV exclusion barrier will relieve Tyler Meadow of the compaction and drainage alteration that comes with indiscriminate driving in wet areas. The barriers will be placed outside of the meadow and will not have any negative effects to the hydrology of the stream or meadow.
- **Temporary Access Routes:** Temporary access routes will be utilized to access the interior of the meadow and will be constructed through both forested and wet meadow areas. Installation of the rocks at Upper Onion Valley will require access by equipment across the meadow and channels. Rock will be mechanically picked up and placed in the stream to construct the riffles structures and roughened channel. Use of the design criteria for access and staging would reduce the effects to negligible.

The Riparian Conservation Objectives (RCO) Consistency Report demonstrates that the Proposed Action of the Three Meadow Restoration Project complies with all of the Riparian Conservation Objectives (RCOs) and associated Standards and Guidelines (S&Gs) of the Sierra Nevada Forest Plan Amendment (SNFPA) of 2004. The report is provided in Appendix A.

CUMULATIVE WATERSHED EFFECTS

The analysis of cumulative watershed effects (CWE) considers all past, present, and likely future land disturbances in a given drainage area. In the ENF, the major potential CWE is the degradation of habitat for aquatic and riparian species. This can result when land disturbances - roads, timber harvest, wildfire, etc. - increase the amount of runoff and sediment delivered to aquatic features.

In the ENF, the risk of the occurrence of CWE for each watershed (7th field scale) is assigned to one of the following four categories: low, moderate, high, or very high. The assignment of the risk of CWE is based on a quantitative evaluation of the land disturbances in the watershed using the method of Equivalent Roaded Acres (ERA).

The Table 3 below summarizes past, present and foreseeable future projects in the vicinity of the proposed activities.

Table 3. Pertinent Past, Present and Reasonably Foreseeable Actions within/adjacent to the Three Meadows Project Area.

Past Actions
<ul style="list-style-type: none"> • Forest Service - timber harvest/stewardship projects and prescribed burning • Cattle grazing • Recreation including hunting, fishing, camping and firewood cutting, OHV use of adjacent roads • Road maintenance and reconstruction • Illegal cross-country OHV use
Present Actions
<ul style="list-style-type: none"> • Cattle grazing • Road reconstruction/maintenance • Recreation including hunting, fishing, camping and firewood cutting, OHV use of adjacent roads • On-going removal of encroaching tree species • Illegal cross-country OHV use
Foreseeable Future Actions
<ul style="list-style-type: none"> • Forest Service - timber harvest/stewardship projects and prescribed burning • Cattle grazing • Recreation including hunting, fishing, camping and firewood cutting, OHV use of adjacent roads • Road maintenance and reconstruction

Conclusions

The Three Meadows Restoration Project does not affect the risk of CWE of the North Fork Mokelumne River watershed:

- The ground disturbance in the project area will be temporary. The disturbed areas are expected to re-vegetate within a few years.
- A number of BMPs and design criteria will be employed during the implementation of the Three Meadows Restoration Project in order to reduce the amount of erosion in the meadow and the amount of sediment delivered to the North Fork Mokelumne River.

Each meadow should be less susceptible to CWE in the future because proposed project is expected to improve the hydrologic function of each meadow. As a result, large precipitation/runoff events are likely to result in less degradation to each meadow.

REFERENCES

- CASQA, 2015. California Stormwater Quality Association's *Stormwater Best Management Practice Handbook*
- USDA Forest Service, 2012. National Water Quality Management Handbook of 2012.
- USDA Forest Service, 2004. Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement
- USDA Forest Service, 2004. Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Record of Decision (ROD).
- Waterways Consulting, Inc., 2019. Three Meadows Restoration Existing Conditions Assessment and Restoration Alternatives

Appendix A

Project Area Photographs

Appendix A – Site Photographs



Photo 1. **Upper Onion Valley:** View to the north of Onion Creek along east edge of meadow. July 2019. Constructed riffles and log weirs will allow better access to the floodplain in this area.



Photo 2. **Upper Onion Valley:** View to the north of an unnamed creek and headcut in the western half of the meadow. July 2019. Log weirs will halt the head cut and allow better access to the floodplain in this area



Photo 3. **Upper Onion Valley:** View to the south of an incised drainage. July 2019. Log weirs will allow better access to the floodplain in this area.



Photo 4. **Upper Onion Valley:** View to the south. Small pines encroaching into the meadow. September 2018. .



Photo 5. **Upper Onion Valley:** View to the east of the road that has captured a drainage. July 2019. The proposed road berm would eliminate this occurrence.



Photo 6. **High Onion Meadow:** View to the north of the incised channel. July 2019. Log weirs will allow better access to the floodplain in this area.



Photo 7. **High Onion Meadow:** View to north of small headcut in the meadow. August 2019. Log weirs will allow better access to the floodplain in this area.



Photo 8. **Tyler Meadow.** View to the north of creek bed above meadow. July 2019 Log weirs will allow better access to the floodplain in this area.



Photo 9. **Tyler Meadow:** Overview to the south of meadow from upper (northern) end. No actions are proposed in this area.

Appendix B

Riparian Conservation Objectives (RCO) Consistency Report

THREE MEADOWS RESTORATION PROJECT

ELDORADO NATIONAL FOREST - AMADOR RANGER DISTRICT

Riparian Conservation Objectives (RCO) Consistency Report

February 28, 2020

The Three Meadows Restoration Project is located in the watershed of North Fork Mokelumne River in the headwaters of the North Fork of the Mokelumne River drainage basin in the Eldorado National Forest.

This report demonstrates that the Proposed Action of the Three Meadow Restoration Project complies with all of the Riparian Conservation Objectives (RCOs) and associated Standards and Guidelines (S&Gs) of the Sierra Nevada Forest Plan Amendment (SNFPA) of 2004.

Additional information on the affected environment/existing condition and the effects of the Three Meadows Restoration Project can be found in the Hydrology Report, Biological Assessment, and the Botany Report.

The SNFPA amends the Eldorado Land and Resource Management Plan of 1988.

Prepared by:

Lynn Zonge, Fluvial Geomorphologist

Riparian Conservation Objective #1

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

The Clean Water Act (1972) gives each state the authority to set water quality standards and designate beneficial uses of water on all lands within that state. The Eldorado National Forest is under the jurisdiction of the Central Valley Regional Quality Control Board (CVRWQCB) of California.

The Three Meadows Restoration Project includes a small portion of the headwaters of the drainage basin of the North Fork of the Mokelumne River. The beneficial uses of the drainage basin are listed in Table 1. The Three Meadows Restoration Project will protect all the designated beneficial uses of water in this drainage basin. The major reasons for this conclusion are described in detail in the *Hydrology Report* and summarized below.

- The Three Meadows Restoration Project is not located near a municipal source of drinking water.
- Increases in the delivery of sediment to the North Fork of the Mokelumne River within and downstream of the project area as a result of the Three Meadows Restoration Project are expected to be short-term and minor. In the long-term, the water quality of the North Fork of the Mokelumne River is expected to improve as a result of the Project. As a result, a) state water quality and standards for turbidity and suspended sediment of streams will be met, and b) aquatic habitat will not be adversely affected.
- In the long-term, the baseflow of North Fork of the Mokelumne River in Three Meadows may increase slightly due to more water retention in the meadows.
- No changes to the temperature of the North Fork of the Mokelumne River are anticipated as a result of the proposed project.

Table 1. Beneficial uses of water in the drainage basin that contains the Three Meadows Restoration Project (CRWQCB 2018).

Surface Water Body	Hydro Unit Number	MUN	AGRIGULTURE		INDUSTRY			RECREATION			FRESHWATER HABITAT (2)		MIGRATION		SPAWNING		WILD	NAV
			AGR		PROC	IND	POW	REC-1		REC-2	Warm	Cold	MIGR		SPWN			
			Irrigation	Stock Watering	Process	Service Supply	Power	Contact	Canoeing and rafting (1)	Other Non-contact	Warm	Cold	Warm (3)	Cold (4)	Warm (3)	Cold (4)		
Mokelumne River - sources to Pardee Reservoir	532.6	E					E	E	E	E	E	E	E		E	E	E	

E = existing beneficial
UsesFootnotes

- 1 Shown for streams and rivers only with the implication that certain flows are required for this beneficial use.
- 2 Resident does not include anadromous. Any segments with both COLD and WARM beneficial use designations will be considered COLD water bodies for the application of water quality objectives.
- 3 Stiped bass, sturgeon, and shad.
- 4 Salmon and steelhead.

	Standards and Guidelines associated with RCO #1		
Num-ber	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
95	For waters designated as Water Quality Limited (Clean Water Act Section 303(d), participate in the development of Total Maximum Daily Loads (TMDLs) and TMDL Implementation Plans. Execute applicable elements of completed TMDL Implementation Plans.	No effect, not applicable	The entire Mokelumne River is NOT on the 303(d) list.
96	Ensure that management activities do not adversely affect water temperatures necessary for local aquatic-and riparian dependent species assemblages.	No effect, not applicable.	No changes to the temperature of the North Fork of the Mokelumne River are anticipated as a result of the proposed project
97	Limit pesticide applications to cases where project level analysis indicates that pesticide applications are consistent with riparian conservation objectives.	No effect, not applicable	Not Applicable. There would be no application of herbicides in the Three Meadows Restoration Project.
98	Within 500 feet of known occupied sites for the California red-legged frog, Cascades frog, Yosemite toad, foothill yellow-legged frog, mountain yellow legged frog, and northern leopard frog, designate pesticide applications to avoid adverse effects to individuals and their habitats.	No effect, not applicable	Not Applicable. There would be no application of herbicides in the Three Meadows Restoration Project.
99	Prohibit storage of fuels and other toxic materials within RCAs and CARS except at designated administrative sites and sites covered by a Special Use Authorization. Prohibit refueling with RCAs and CARS unless there are no other alternatives. Ensure that spill plans are reviewed and up-to-date.	No effect, not applicable	There are no CARs in the project area. No fuel storage would take place within RCAs. Refueling would take place in RCAs only where there is no other alternative. Spill prevention and cleanup of hazardous materials would be implemented in accordance with FS timber sale type B contract clauses and in accordance with the Eldorado Hazardous Spill Notification and Response Plan.

Riparian Conservation Objective #2

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

The Three Meadows Restoration Project is expected to improve the hydrologic function of the Three Meadows. The reasons for this are described in the *Hydrology Report*.

	Standards and Guidelines associated with RCO #2		
Num-ber	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
100	Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface flow paths. Implement corrective actions where necessary to restore connectivity.	No Project. No effect.	The hydrologic connectivity of the Three Meadows will be improved by placement of structures to slow the surface water and encourage infiltration to groundwater. The hydrologic connectivity of the Upper Onion Meadow will be improved by reestablishing a channel that has been captured by an adjacent dirt road.
101	Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.	No Project. No effect	The hydrologic connectivity of the Three Meadows will be improved by placement of structures to slow the surface water and encourage infiltration to groundwater. The hydrologic connectivity of the Upper Onion Meadow will be improved by reestablishing a channel that has been captured by an adjacent dirt road.
102	Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.	No Project. No effect	The Three Meadows area has been altered by past human activities – the major activities were timber harvest, road building, and livestock use. The resulting stream channel conditions exhibit the following: lateral and/or vertical erosion and instability, straightening (lack of meandering), and road capture of flows. The Three Meadows Restoration Project is expected to improve the overall hydrologic function of the Three Meadows. This is described in detail in the <i>Hydrology Report</i> .

	Standards and Guidelines associated with RCO #2		
Num-ber	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
103	Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites, sites authorized under Special Use Permits and designated off-highway routes.	No Project. No effect	The Three Meadows Restoration Project contains Design Criteria that will reduce erosion and disturbance in the watershed. These Design Criteria are described in the <i>Hydrology Report</i> .
104	In stream reaches occupied by or identified as “essential habitat” in the conservation assessment for, the Lahonton and Paiute cutthroat trout and the Little Kern golden trout, limit streambank disturbance from livestock to 10 percent of the occupied or “essential habitat” stream reach. (Conservation assessments are described in the record of decision.) Cooperate with State and Federal agencies to develop streambank disturbance standards for threatened, endangered, and sensitive species. Use the regional streambank assessment protocol. Implement corrective action where disturbance limits have been exceeded.	No Project. No effect.	The Three Meadows do not contain Lahonton and Paiute cutthroat trout. Potential habitat does exist for the Sierra Nevada Yellow Legged Frog (SNYLF), a species that is listed as endangered under the Endangered Species Act (ESA). This is described in detail in the <i>Biological Assessment</i> for the Three Meadows Restoration Project (USDA-Forest Service, 2020a).
105	At either the landscape or project-scale, determine if the age class, structural diversity, composition, and cover of riparian vegetation are within the range of natural variability, and consider implementing mitigation and/or restoration actions that will result in an upward trend.	No Project. No effect	The Three Meadows Restoration Project is expected to improve the overall hydrologic function of the Three Meadows. This is described in detail in the <i>Botany Report</i> .
106	Cooperate with Federal, Tribal, State, and local governments to secure in stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat. Maintain in stream flows and protect aquatic systems to which species are uniquely adapted. Minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species.	No Project. No effect	In the long-term, the baseflow of tributaries to the N.F. Mokelumne River in the Three Meadows may increase slightly. The reasons for this are described in the <i>Hydrology Report</i> .
107	For exempt hydroelectric facilities on national forest lands, ensure that special use permit language provides adequate in stream flow requirements to maintain, restore, or recover favorable ecological conditions for local and riparian-and aquatic-dependent species.	Not applicable. There are no hydroelectric facilities associated with the Three Meadows Restoration Project.	

Riparian Conservation Objective #3

Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA.

	Standards and Guideline associated with RCO #3		
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
108	Determine if the level of coarse woody debris (CWD) is within the range of natural variability in terms of frequency and distribution of sustain stream channel physical complexity and stability. Ensure proposed management activities move conditions toward the range of natural variability.	No Project. No effect	The Three Meadows contain some little coarse woody debris from the adjacent forest. Streams in large meadows typically have few large trees close to the stream. The Three Meadows Restoration Project will have no effect on the amount of CWD in N.F. Mokelumne River because trees will not be planted near the stream.

Riparian Conservation Objective #4

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

	Standards and Guidelines associated with RCO #4		
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
109	With CARS, in occupied habitat or “essential habitat” as identified in conservation assessments for threatened, endangered or sensitive species, evaluate the appropriate role, timing, and extent of prescribed fire. Avoid direct lighting within riparian vegetation; prescribed fire may back into riparian vegetation areas. Develop mitigation measures to avoid impacts to these species whenever ground-disturbing equipment is used.	No Project. No effect.	There are no CARs within, or influenced by, the project area.
110	Use screening devices for water drafting pumps. (Fire suppression activities are exempt during initial attack.) Use pumps with low entry velocity to minimize removal of aquatic species from aquatic habitats.	No Project. No effect	Not applicable. No drafting pumps will be used.

	Standards and Guidelines associated with RCO #4		
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
111	Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs. In burn plans for project areas that include, or are adjacent to RCAs, identify mitigation measures to minimize the spread of fire into riparian vegetation. In determining which mitigation measures to adopt, weigh the potential harm of mitigation measures, for example fire lines, against the risks and benefits of prescribed fire entering riparian vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could be damaging to habitat or long-term function of the riparian community.	No Project. No effect	Not applicable. Prescribed fire is not part of the Proposed Action.
112	Post-wildfire management activities in RCAs and CARs should emphasize enhancing native vegetation cover, stabilizing channels by non-structural means, minimizing adverse effects from the existing road network, and carrying out activities identified in landscape analysis. Post-wildfire operations shall minimize the exposure of bare soil.	No Project. No effect	Not applicable. The Project does not propose post-wildfire management activities.
113	Allow hazard tree removal within RCAs or CARs. Allow mechanical ground disturbing fuels treatments, salvage harvest, or commercial fuelwood cutting within RCAs or CARs when the activity is consistent with RCOs. Utilize low ground pressure equipment, helicopters, over the snow logging, or other non-ground disturbing actions operate off of existing roads when needed to achieve RCOs. Ensure that existing roads, landings, and skid trails or roads for access into RCAs for fuel treatments, salvage harvest, commercial fuelwood cutting, or hazard tree removal.	No Project. No effect.	Not applicable. The Project does not propose hazard tree removal.

	Standards and Guidelines associated with RCO #4		
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
114	As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow legged frogs, and northern leopard frog.	No Project. No effect	<p>The project area does not currently contain suitable California red-legged frog habitat or known populations. If discovered, designated buffers or exclusion zones would apply in accordance with the programmatic biological opinion provided by the U.S. Fish and Wildlife Service.</p> <p>The project area contains potential habitat for the Sierra Nevada yellow-legged frog (SNYLF), listed as an endangered species under the Endangered Species Act (ESA). The Three Meadows Restoration Project contains Design Criteria in order to minimize impacts to the SNYLF and its habitat. The Design Criteria are described in the <i>Aquatic Biological Assessment</i> (USDA-Forest Service, 2020a).</p>
115	During fire suppression activities, consider impacts to aquatic-and riparian-dependent resources. Where possible, locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RCAs or CARs. During pre-suppression planning, determine guidelines for suppression activities, including avoidance of potential adverse effects to aquatic-and riparian-dependent species as a goal.	No Project. No effect	Fire suppression activities are not part of the Three Meadows Restoration Project.
116	Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campground, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions.	No Project. No effect	The Three Meadows Restoration Project does not remove roads and trails. However, the proposed restoration within Upper Onion Valley includes stabilization and realignment of a large tributary to Onion Creek where it crosses an existing road to the informal day use/camping area at the north end of the meadow. To restore and contain the flows within the original stream channel, the restoration project would build up the road approaches to the crossing to reestablish the original thalweg alignment of the tributary channel.

Riparian Conservation Objective #5

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

Standards and Guidelines associated with RCO #5			
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
117	Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) “Process for Assessing PFC” TR 1737-9, “PFC for Lotic Areas” UDSI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” UDSI TR 1737-11 (1994).	No Project. No effect	Not applicable. There will be no range management analysis as part of the Three Meadows Restoration Project.
118	Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic process that maintain water flow, water quality, or water temperatures critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, human, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (<i>Spagnum spp.</i>), (2) mosses belonging to the genus <i>Meessia</i> , and (3) sundew (<i>Drosera spp.</i>) Complete initial plant inventories of bogs and fens within active grazing allotments prior to re-issuing permits.	No Project. No effect	Not applicable. There are no fens in the project area,.
119	Locate new facilities for gathering livestock and pack stock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in riparian conservation areas with riparian conservation objectives.	No Project. No effect.	Grazing management and new livestock gathering facilities are not part of the Three Meadows Restoration Project.
120	Under season-long grazing: <ul style="list-style-type: none"> For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height). For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height). Determine ecological status. on all key areas monitored for gazing utilization . . . Analyze meadow ecological status . . . Under intensive grazing systems . . .		
121	Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.		

Riparian Conservation Objective #6

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

Standards and Guideline associated with RCO #6			
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
122	Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing, and timber harvests that may be contributing to the observed degradation.	No Project. No effect	The Three Meadows Restoration Project is expected to improve the overall hydrologic function of the meadow and improve the quality of soils both in the meadow and in areas surrounding the meadow. This is described detail in the <i>Hydrology Report</i> .

Standards and Guideline for Critical Aquatic Refuges			
Number	Standard and Guideline	Analysis with respect to the No Action Alternative	Analysis with respect to the Proposed Action Alternative
123	Determine which critical aquatic refuges or areas within critical aquatic refuges are suitable for mineral withdrawal. Propose these areas for withdrawal from location and entry under U.S. mining laws, subject to valid existing rights, for a term of 20 years.	No Project. No effect	Not applicable. No known suitable mineral withdrawal sites exist within the project area.
124	Approve mining-related plans of operation if measures are implemented that contribute toward the attainment or maintenance of aquatic management strategy goals.	No Project. No effect	Not applicable. No mining-related plans of operation exist within the project area.

	Additional Standards and Guideline for Riparian Conservation Areas and Critical Aquatic Refuges	
Number	Standard and Guideline	Analysis with respect to the Proposed Action
91	Designate riparian conservation area (RCA) widths as described in Part B of this appendix. The RCA widths displayed in Part B may be adjusted at the project level if a landscape analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths.	RCA widths were designated as described in the Sierra Nevada Forest Plan Amendment of 2004.
92	Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species.	Activities within RCAs were evaluated by an interdisciplinary team on-the-ground. Site specific Design Criteria were developed and are described in the <i>Hydrology Report</i> .
93	Identify existing uses and activities in CARs and RCAs during landscape analysis. At the time of permit reissuance, evaluate and consider actions needed for consistency with RCOs.	The restoration activities within the RCAs were evaluated by an interdisciplinary team on-the-ground. Site specific Design Criteria were developed and are described in the <i>Hydrology Report</i> .
94	As part of project-level analysis, conduct peer reviews for projects that proposed ground-disturbing activities in more than 25 percent of the RCA or more than 15 percent of a CAR.	There will be temporary ground disturbance, as described in detail in the <i>Hydrology Report</i> . Ground disturbing activities will be in much less than 25 percent of the RCAs and there are no CARs in the project area.

REFERENCES CITED

- Resource Concepts, Inc. 2020. Hydrologic Report for the Three Meadows Restoration Project. Amador Ranger District, Eldorado National Forest.
- CRWQCB (California Regional Water Quality Control Board). 2018. The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region, 5th Edition, Rev. May 2018 (with approved amendment). The Sacramento River Basin and the San Joaquin River Basin.
- USDA Forest Service. January 2004. Sierra Nevada Forest Plan Amendment, Final Environmental Impact Statement, Record of Decision.
- USDA Forest Service. December 2011. Water Quality Management for Forest System Lands in California, Best Management Practices. Pacific Southwest Region.
- USDA-Forest Service. 2020a. Aquatic Biological Assessment for the Three Meadows Restoration Project. Eldorado National Forest, Amador Ranger District. February 5, 2020.
- USDA-Forest Service. 2020b. Aquatic Biological Evaluation for the Three Meadows Restoration Project. Eldorado National Forest, Amador Ranger District. February 5, 2020.
- USDA-Forest Service. 2020C. Biological Evaluation and Assessment for Terrestrial Threatened, Endangered, and Sensitive Wildlife Species, Three Meadows Restoration Project. Eldorado National Forest, Amador Ranger District. February 13, 2020.
- USDA-Forest Service. 2020d. Biological Assessment/Evaluation for Botanical Species: Three Meadow Restoration Project. Eldorado National Forest, Amador Ranger District. February 13, 2020.

Appendix I

Tribal Consultation Documentation



NATIVE AMERICAN HERITAGE COMMISSION

March 3, 2020

Amanda Watson
Amador Resources Conservation District

Via Email to: amanda@amadorrcd.org

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
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Pomo

COMMISSIONER
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Stenslie**
Chumash

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Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Three Meadows Restoration Project, Amador County

Dear Ms. Watson:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

- Any report that may contain site forms, site significance, and suggested mitigation measures.

All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was negative.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,



Nancy Gonzalez-Lopez
Cultural Resources Analyst

Attachment

**Native American Heritage Commission
Tribal Consultation List
Amador County
3/3/2020**

Buena Vista Rancheria of Me-Wuk Indians

Rhonda Morningstar Pope,
Chairperson
1418 20th Street, Suite 200 Me-Wuk
Sacramento, CA, 95811
Phone: (916) 491 - 0011
Fax: (916) 491-0012
rhonda@buenavistatribe.com

United Auburn Indian Community of the Auburn Rancheria

Gene Whitehouse, Chairperson
10720 Indian Hill Road Maidu
Auburn, CA, 95603 Miwok
Phone: (530) 883 - 2390
Fax: (530) 883-2380
bguth@auburnrancheria.com

Calaveras Band of Mi-Wuk Indians

Gloria Grimes, Chairperson
P.O. Box 899 Mi-wuk
West Point, CA, 95255
Phone: (209) 419 - 5675
calaverasband.miwukindians@gm
ail.com

Washoe Tribe of Nevada and California

Serrell Smokey, Chairperson
919 Highway 395 North Washoe
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Phone: (775) 265 - 8600
serrell.smokey@washoetribe.us

Calaveras Band of Mi-Wuk Indians

546 Bald Mountain Road Mi-Wuk
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Phone: (209) 293 - 2189

Washoe Tribe of Nevada and California

Darrel Cruz, Cultural Resources
Department
919 Highway 395 North Washoe
Gardnerville, NV, 89410
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darrel.cruz@washoetribe.us

Ione Band of Miwok Indians

Sara Setchwaelo, Chairperson
9252 Bush Street, Suite 2 Miwok
Plymouth, CA, 95669
Phone: (209) 245 - 5800
sara@ionemiwok.net

Jackson Rancheria Band of Miwuk Indians

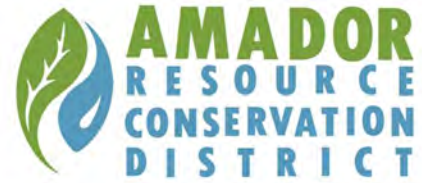
Adam Dalton, Chairperson
P.O. Box 1090 Miwok
Jackson, CA, 95642
Phone: (209) 223 - 8370
Fax: (209) 223-5366
adalton@jacksoncasino.com

Jackson Rancheria

Rolland Fillmore, Cultural
Preservation Representative
P.O. Box 1090 Miwok
Jackson, CA, 95642
Phone: (209) 223 - 8370

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Three Meadows Restoration Project, Amador County.



March 9th 2020

Buena Vista Rancheria of Me-Wuk Indians
Rhonda Morningstar Pope
1418 20th Street Suite 200
Sacramento, CA, 95811

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

Dear Rhonda Morningstar Pope,

The Amador Resource Conservation District has decided to undertake the following project: Three Meadows Restoration. The Amador Resource Conservation District in partnership with the Eldorado National Forest is proposing to restore the morphology and hydrologic function of three meadows as part of the Three Meadows Restoration project. The three meadows are Tyler, Upper Union, and High Onion meadows.

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Project Location: The location for the project area is approximately 50 miles northeast of Jackson, California, east of Bear River Reservoir on the Amador Ranger District, Eldorado National Forest.

Lead Agency Contact:

Amador Resource Conservation District

Amanda Watson, District Manager

Amanda@AmadorRCD.org

(916) 612 5163

The purpose and need, proposed actions, and map of the project area may be found online:

<https://www.fs.usda.gov/project/?project=56357>

Pursuant to PRC § 21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with the Amador Resource Conservation District.

Sincerely,

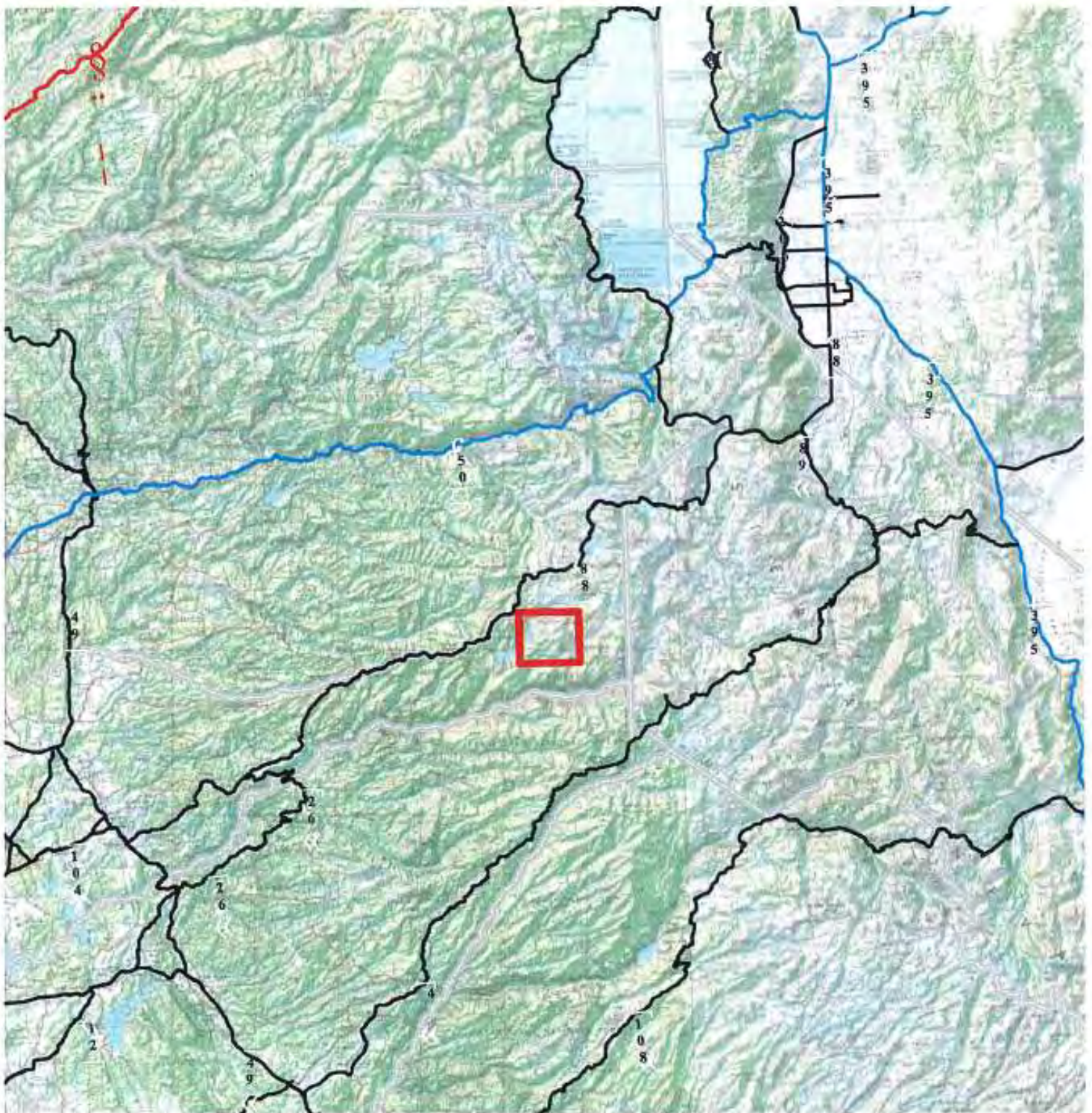
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Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

0 10 20 Miles
1 in = 10 miles

Legend

- 3 Meadows Project Locations
- Interstate
- Highway
- State Route
- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Calaveras Band of Mi-Wuk Indians
Gloria Grimes
PO Box 899
West Point, CA, 95255

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

Dear Gloria Grimes,

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Amador Resource Conservation District

Amanda Watson, District Manager

Amanda@AmadorRCD.org

(916) 612 5163

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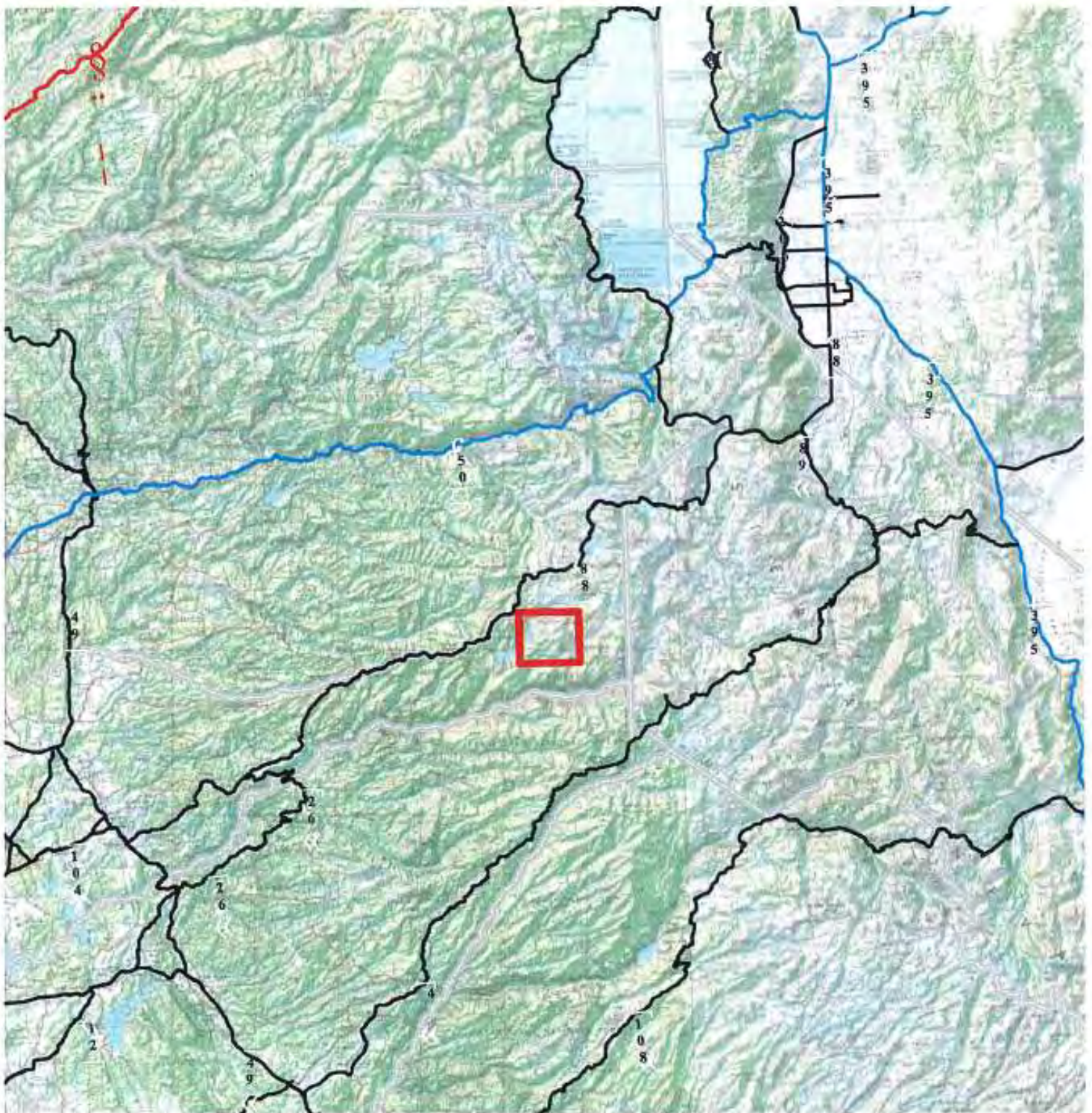
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Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

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Legend

- 3 Meadows Project Locations
- Interstate
- Highway
- State Route
- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Calaveras Band of Mi-Wuk Indians
Calaveras Band of Mi-Wuk Indians
546 Bald Mountain Road
West Point, CA, 95255

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

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Lead Agency Contact:

Amador Resource Conservation District

Amanda Watson, District Manager

Amanda@AmadorRCD.org

(916) 612 5163

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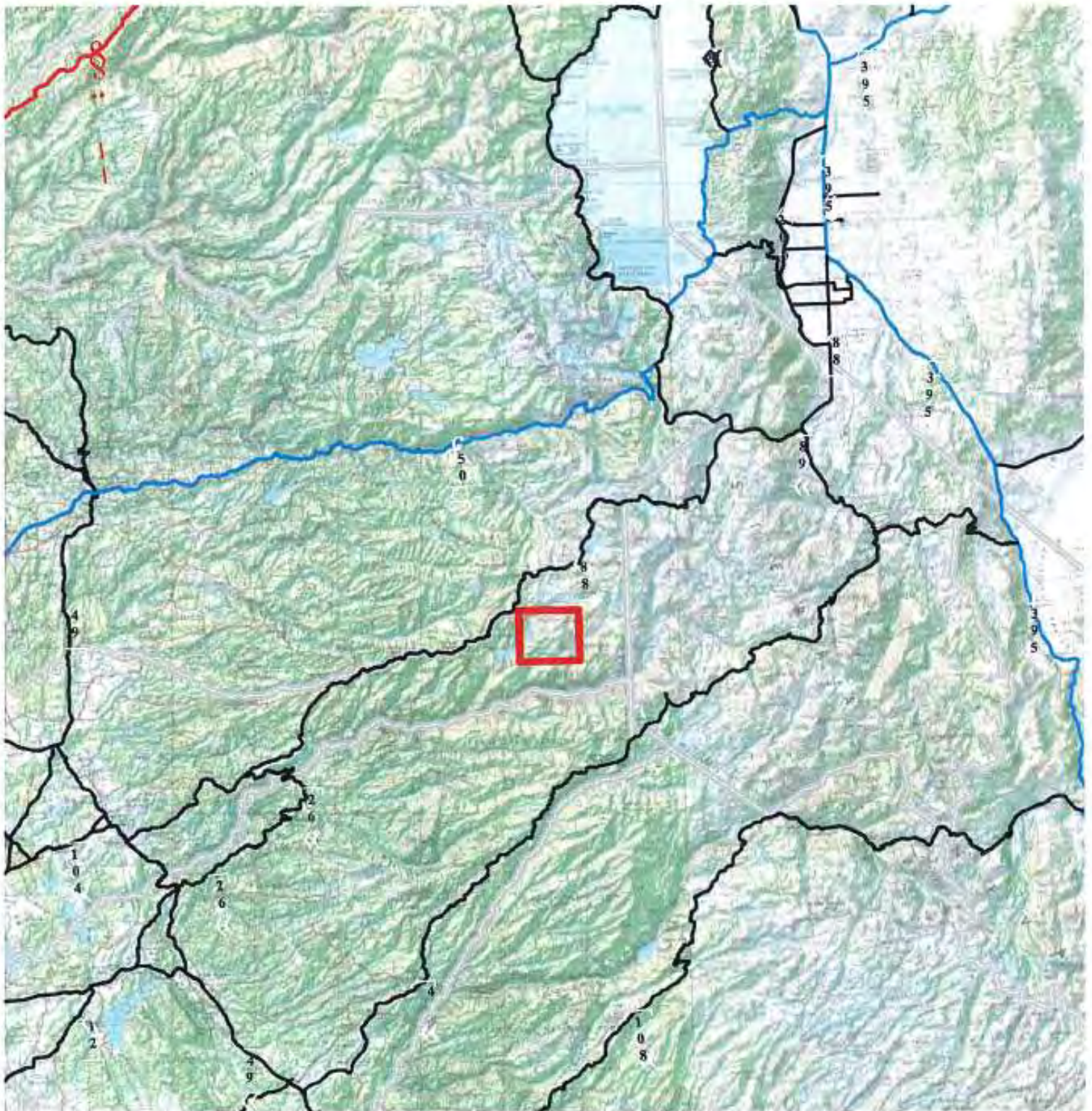
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Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

0 10 20 Miles
1 in = 10 miles

Legend

- 3 Meadows Project Locations
- Interstate
- Highway
- State Route
- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Ione Band of Miwok Indians
Sara Setchwaelo
9252 Bush Street, Suite 2
Plymouth, CA, 95669

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

Dear Sara Setchwaelo,

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Lead Agency Contact:

Amador Resource Conservation District

Amanda Watson, District Manager

Amanda@AmadorRCD.org

(916) 612 5163

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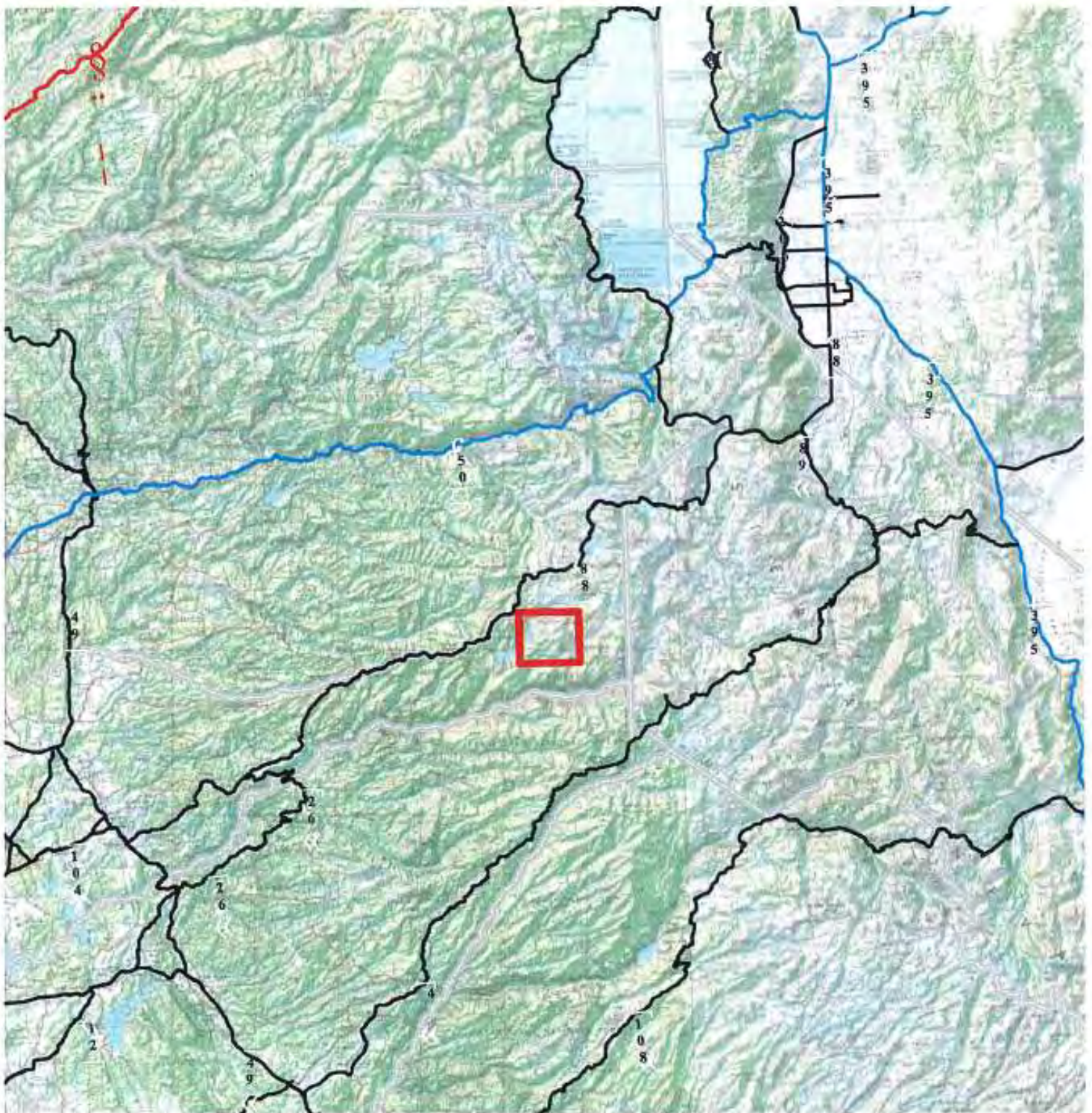
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Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

0 10 20 Miles
1 in = 10 miles

Legend

- 3 Meadows Project Locations
- Interstate
- Highway
- State Route
- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Jackson Rancheria Band of Miwuk Indians
Adam Dalton
PO Box 1090
Jackson, CA, 95642

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

Dear Adam Dalton,

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Amanda Watson, District Manager

Amanda@AmadorRCD.org

(916) 612 5163

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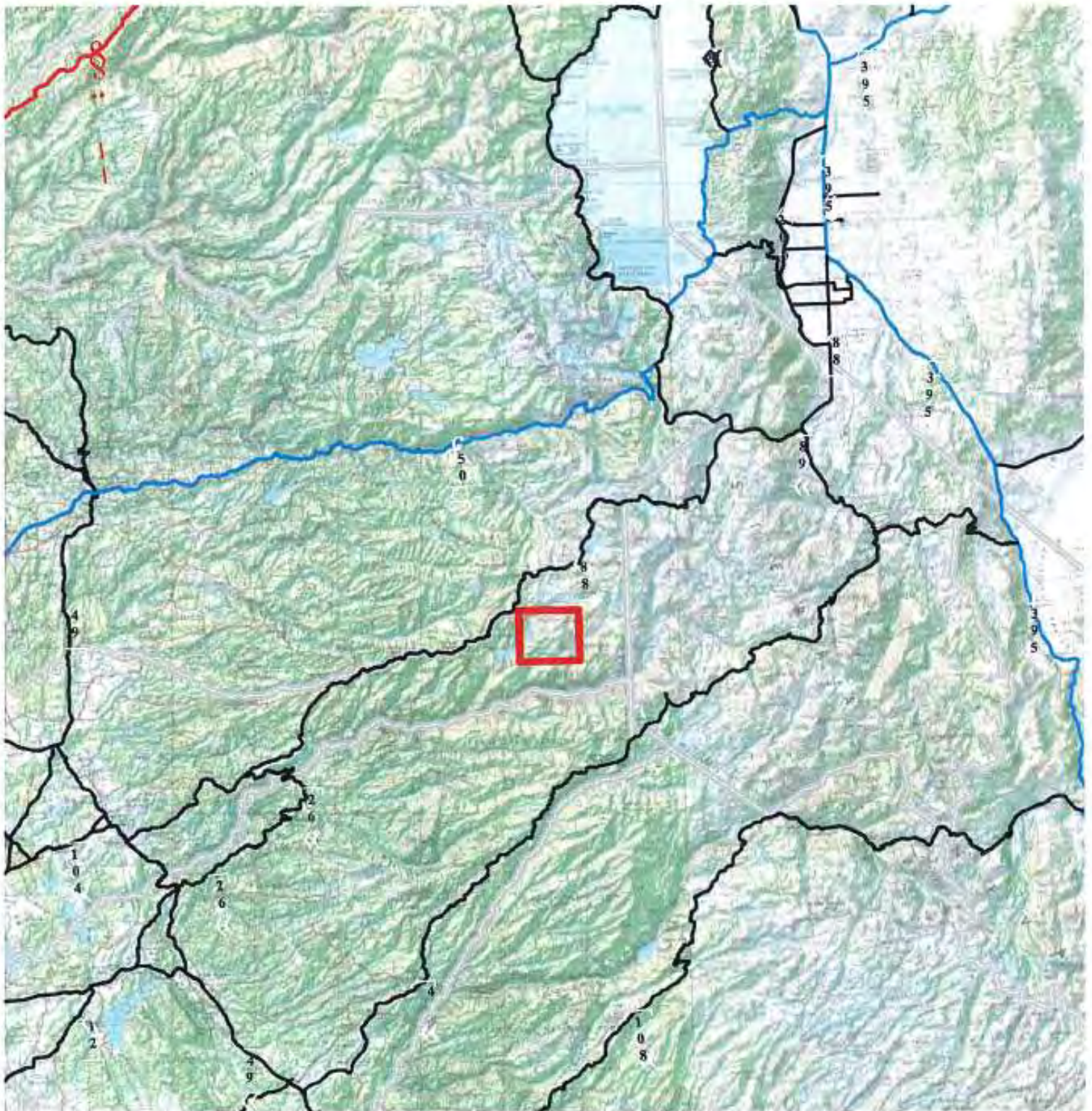
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Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

0 10 20 Miles
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Legend

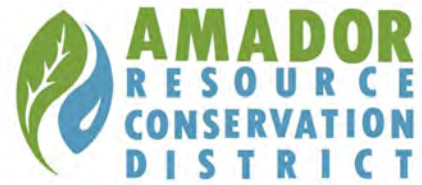
- 3 Meadows Project Locations
- Interstate
- Highway
- State Route
- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Jackson Rancheria
Rolland Fillmore
PO Box 1090
Jackson, CA, 95642

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

Dear Rolland Fillmore,

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Amanda Watson, District Manager

Amanda@AmadorRCD.org

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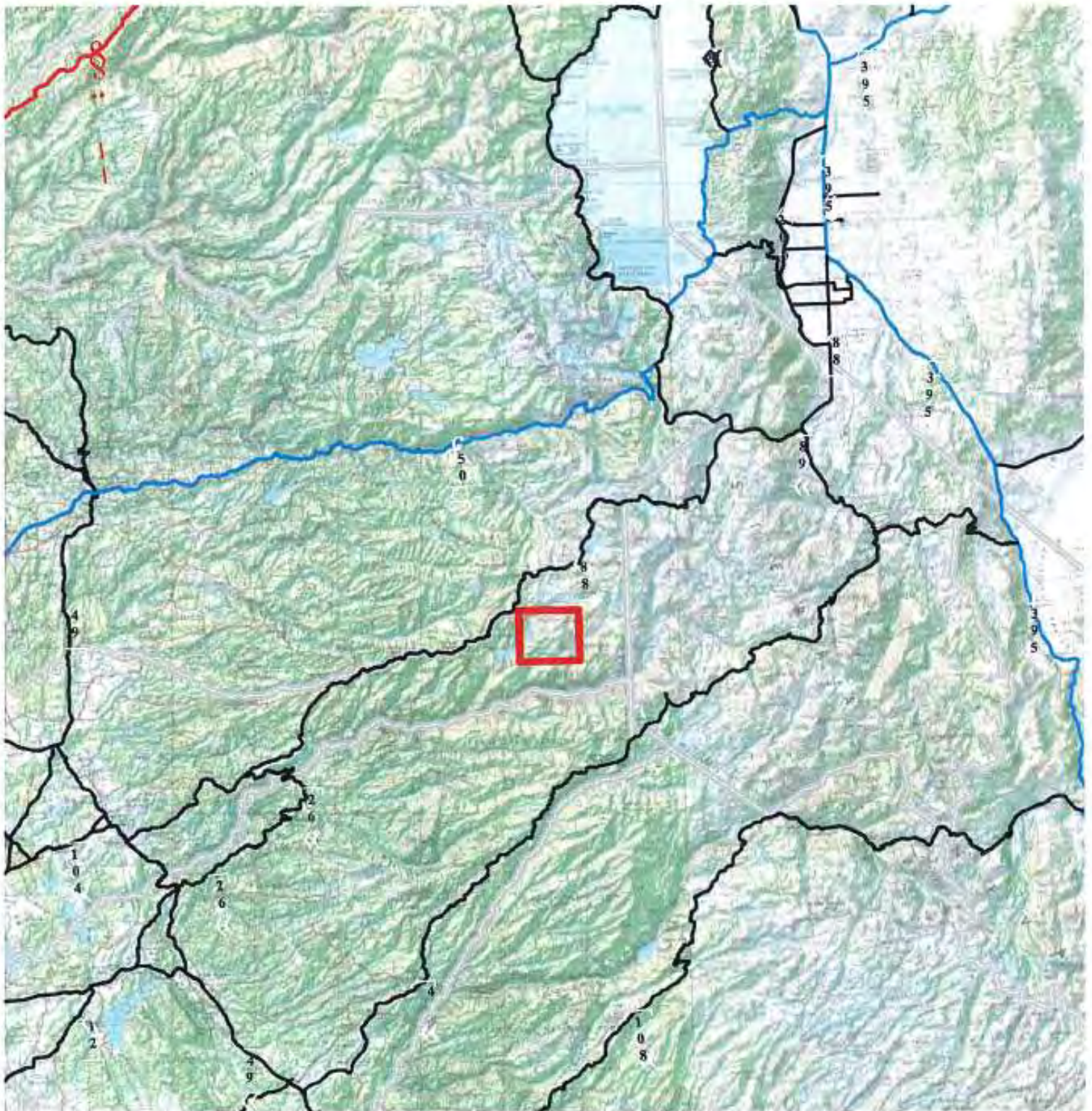
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District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

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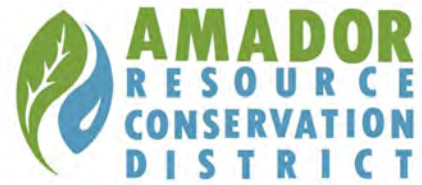
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- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse
10720 Indian Hill Road
Auburn, CA, 95603

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

Dear Gene Whitehouse,

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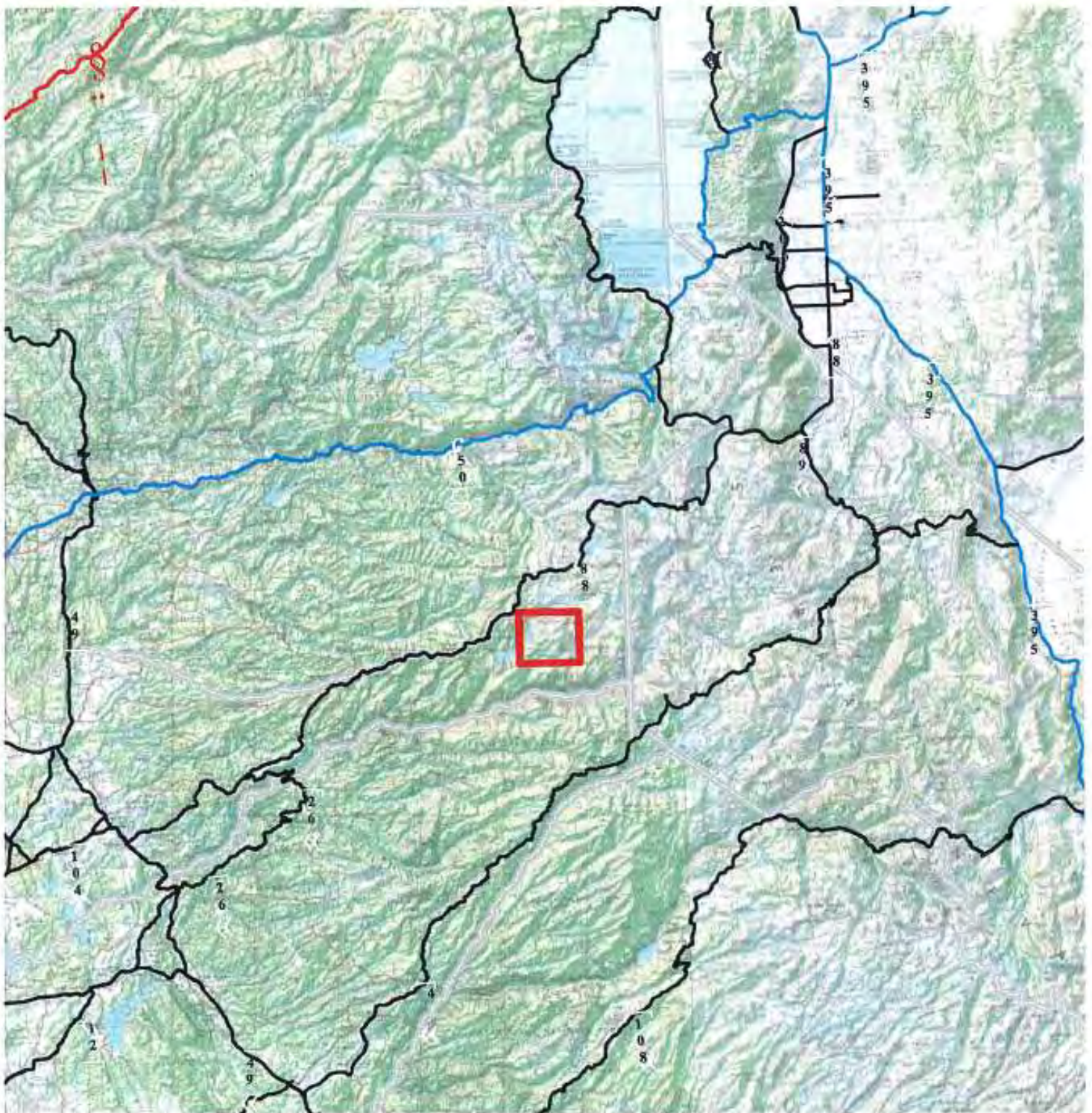
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District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

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Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Washoe Tribe of Nevada and California
Serrell Smokey
919 Highway 395, North
Gardnerville, NV, 89410

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of determination that a Project Application is Complete or Decision to Undertake a Project, and Notification of Consultation Opportunity, pursuant to Public Resources Code § 21080.3.1 (hereafter PRC).

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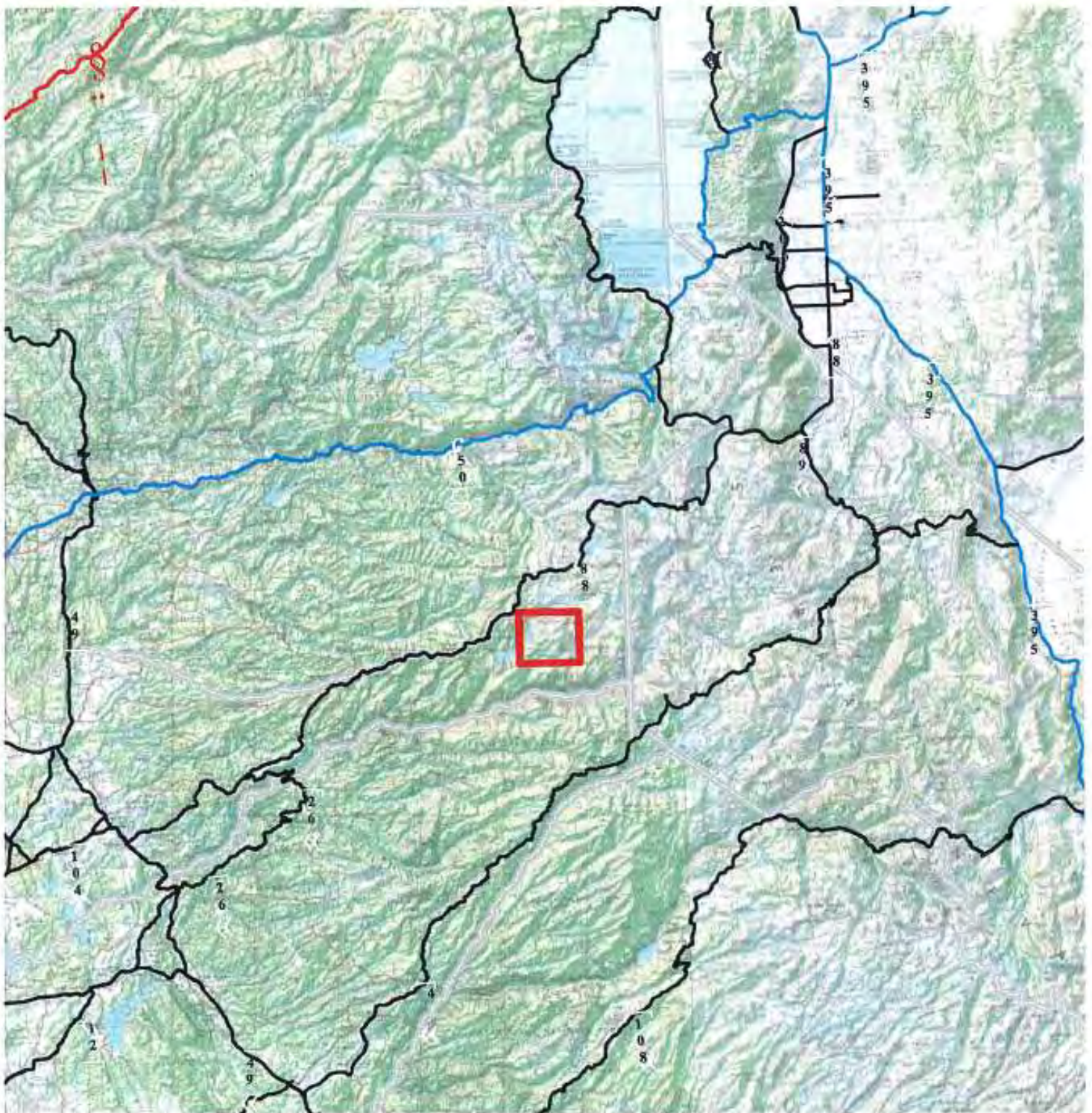
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Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

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Legend

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Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.





March 9th 2020

Washoe Tribe of Nevada and California
Darrel Cruz
920 Highway 395, North
Gardnerville, NV, 89411

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Dear Darrel Cruz,

The Amador Resource Conservation District has decided to undertake the following project: Three Meadows Restoration. The Amador Resource Conservation District in partnership with the Eldorado National Forest is proposing to restore the morphology and hydrologic function of three meadows as part of the Three Meadows Restoration project. The three meadows are Tyler, Upper Union, and High Onion meadows.

Because of the close partnership between the Amador Resource Conservation District and the Forest Service you may have received an earlier letter from the Forest Service in July 2019. If you'd like to contact the Forest Service about this project Miranda Gavalis, Amador Ranger District Archeologist, is available to answer questions; at (209) 295-5908, or email Miranda.Gavalis@usda.gov

Below please find a description of the proposed project, a map showing the project location, and the name of our project point of contact, pursuant to PRC § 21080.3.1 (d).

Description of the Proposed Project: Three Meadow Restoration Project would restore the natural morphology of three relatively small, high elevation meadows in Amador County, California. The purpose of the project is to improve hydrologic functions of the meadow systems by improving water quality, timing of flows, recovery of sediment deposition, and arrest channel head cutting. Implementation of these actions would also increase and prolong the duration of late season flows for the benefit of flora and fauna and downstream users by reducing downstream flood peaks. The proposed project would halt the encroachment of upland plant species, particularly lodgepole pine, while increasing the extent and quality of wet meadow and riparian vegetation. By improving the meadow hydrology, the project would also improve and increase habitat potentially available for Sierra Nevada yellow-legged frogs, expand willow habitat for songbirds, including the willow flycatcher, and improve habitat quality for sensitive species associated with wet meadows such as broad-nerved hump-moss (*Meesia uliginosa*), moonworts (*Botrychium* spp.) and Bolander's bruchia (*Burchia bolanderi*), and increase the production of aquatic invertebrates and insects that provide food for amphibians, and songbirds.

Project Location: The location for the project area is approximately 50 miles northeast of Jackson, California, east of Bear River Reservoir on the Amador Ranger District, Eldorado National Forest.

Lead Agency Contact:

Amador Resource Conservation District

Amanda Watson, District Manager

Amanda@AmadorRCD.org

(916) 612 5163

The purpose and need, proposed actions, and map of the project area may be found online:

<https://www.fs.usda.gov/project/?project=56357>

Pursuant to PRC § 21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with the Amador Resource Conservation District.

Sincerely,

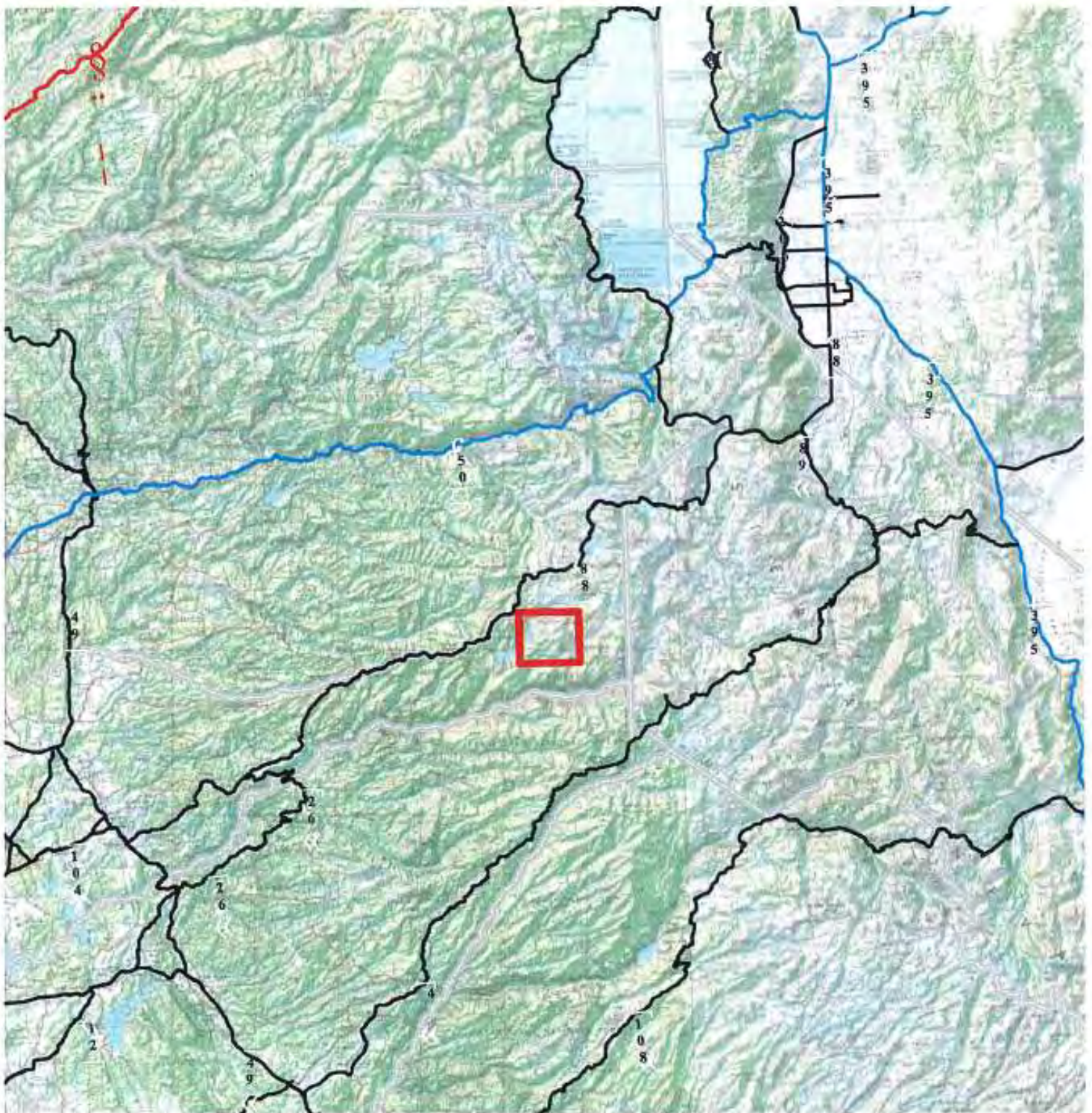
A handwritten signature in cursive script that reads "Amanda Watson".

Amanda Watson

District Manager

Amador Resource Conservation District

Enclosure: Project Maps



Amador Co

3 Meadows Project Vicinity Map

0 10 20 Miles
1 in = 10 miles

Legend

- 3 Meadows Project Locations
- Interstate
- Highway
- State Route
- Roads



Figure 1. Vicinity Map

Figure 2. Overview of Project Area. The Three Meadows Restoration area includes Tyler, Upper Onion, and High Onion meadows.

