
**Eldorado National Forest
Amador Ranger District**

**Aquatic Biological Evaluation
For the
Foster Meadow Restoration Project**
August 21, 2017

**Project Location:
Amador County, California**

T19N, R16E sections 1, 29, 30, 31 and 32; MDBM.

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I. INTRODUCTION

The Amador Ranger District on the Eldorado National Forest in Amador County, California has developed proposed actions for restoring Foster Meadow. The Environmental Assessment analyzes proposed actions for implementation of a meadow restoration project restoring functionality through method of Plug-n-pond. The Foster Meadow Restoration Project encompasses 27 acres of meadow along the Middle Fork Cosumnes River on lands administered by the USDA- Forest Service, Amador Ranger District, Eldorado National Forest. Foster Meadow was identified as a target meadow for restoration in the Amador Calaveras Consensus Group (ACCG) Collaborative Forest Landscape Restoration Project (December, 2006). The ACCG CFLR Project is a multi-stakeholder, including National Forests, process to collaboratively address common natural resource concerns over a large geographic area. The project area is located approximately 40 miles east of Jackson, CA. one mile north of State Highway 88, in the vicinity of the Peddler Hill maintenance station. The project is in El Dorado County. Amador Ranger District staff had expressed interest in having Plumas Corporation, a meadow restoration group in Plumas County, conduct data collection and design services for this meadow project. Plumas Corporation design work has been funded under a grant contract with the National Fish & Wildlife Foundation.

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 US 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. The FS-Sensitive species occurring on the ENF are listed in Table 1. Similar to the process described for the TEPC species, Table 1 was used to determine which FS Sensitive species were to be considered for analysis based on geographic and elevational distribution and presence of suitable habitat within the Project's areas or those that may occur within a reasonable distance as to be affected by the implementation of the Projects.

Table 1. or 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 Foster Meadow Project area.

Tables 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 LOP or design avoids seasonal effects.

Table 1. Evaluation of potential for project effects to federally listed species range, and their potential to reside in the Power Fire Maintenance Fuel Study area.

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.	1,2,3	
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.	1,2,3	
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.	1,2,3	
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.	1,2,3	
FS: Forest Sensitive					

III. 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 Forest Service Manual, 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 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 Foster Meadow 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 in stream 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 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 Riparian Conservation Areas (RCAs).

Forest Service Manual (FSM);

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 US Fish and Wildlife Service (USFWS) listed threatened, endangered, and proposed species. In addition, FSM 2670.32 (USDA Forest Service 1990) directs that a biological assessment (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 Management Plan (USDA 1989);

IV. Management Direction, B. Goals and Objectives, 1. Goals, Wildlife and Fish:

- 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.

IV. DESCRIPTION OF PROPOSED ACTIONS

The Amador Ranger District, El Dorado National Forest and project stakeholders are seeking to restore the natural hydrologic functions of the Foster Meadow system to provide improved water quality, timing of flows and enhanced aquatic and terrestrial habitats onsite and downstream. Attendant with that objective is to remove barriers to aquatic organism passage in this reach of the Middle Fork Cosumnes River. The Foster Meadow Restoration Project proposes to meet these objectives by filling gullies within the meadow using local fill taken from meadow margins and terraces, and installing an aquatic organism passage structure at Foster Meadow road (9N14) crossing. This will require excavation and placement of approximately 22,533 cubic yards in seven (7) total plugs to eliminate the existing gullies as a conduit for flow. The design of the proposed action applies the principles of fluvial geomorphology and the science of landscapes formed by flowing water, to understand the processes that have governed the development of the meadow through the Holocene period (last 10,000 years). This method also helps determine the possible mechanisms that have led to channel degradation and loss of floodplain connection/ecosystem function. This approach combines quantitative data with qualitative observations and historical overviews of land uses, both onsite and watershed-wide.

Table 2 summarizes the action items proposed to restore the hydrologic functions of Foster Meadow utilizing a modified pond-and-plug restoration technique. The design for Foster Meadow is a near-complete gully fill (“plugs”), with the majority of fill material generated from terrace grading and a smaller amount coming from four small borrow ponds along the margins of the meadow. The purpose of the fill material is to raise/restore the base elevation of surface water flow in the meadow. Generally, surface flows will be re-directed to remnant channel(s) elsewhere in the meadow. Surface flows would only cross the “plugs” during floods. Specific features of the project design are discussed in greater detail in the Meadow Component section, below.

Table 2. Action items of the Foster Meadow Restoration Project

Item Number	Action
1	<p>Fill and stabilize the gullied channel of the Middle Fork Cosumnes River in Foster Meadow through (Figures 2 through 4):</p> <ul style="list-style-type: none"> • Excavation of approximately 22,500 yd³ of material from 4 small borrow pits along the margins of the meadow and 4 terrace cuts areas in the meadow. This material will be used to construct the plugs. • Construction of 7 plugs in the meadow to achieve the partial or complete filling or approximately 4,400 feet of channels. The plugs will total approximately 3.1 acres in size. • Construction of 9 in-channel rock riffles in the meadow just down-gradient of the plugs and ponds. It is expected that rock for the riffles will be imported from the Tragedy Pit. <p>Motorized equipment in the meadow would be used in order to accomplish this action item. Approximately 20.72 acres are wet meadow floodplain, 2.20 acres are intermittent and perennial channels, and 4.51 acres are upland.</p>
2	<p>Improve aquatic organism passage at Forest Highway 54 crossing by:</p> <ul style="list-style-type: none"> • Placing rock/soil/vegetation in the channel and floodplain to raise the elevation and eliminate current 'waterfall' at the main culvert. Rock will be imported from Tragedy Pit for this component. • Replacing the existing culvert and adding at least three culverts at floodplain elevation. <p>Motorized equipment would be used in order to accomplish this action item.</p>
3	<p>Plant riparian vegetation throughout portions of the meadow in those areas that are currently deficient in riparian vegetation. Sod and willow transplants would be excavated and placed using heavy equipment. Native seeding, planting of container stock, and willow plantings would be done by hand.</p>

The 27-acre Foster Meadow Project area can be delineated into several reaches of work separated by reaches that are still functional. The functional reaches are at risk from headcuts moving upstream from the degraded reaches. Figure 1 (Vicinity and Project Area Map) shows the relative location of the treatment reaches under the proposed action. At the upstream end of the project, the culvert at the Forest Highway (FH) 54/Foster Meadow Road (9N14) crossing is a fish barrier and a risk for failure. Downstream of the road crossing there are three (3) distinct meadow sections: Pocket 1, Pocket 2, and Main Meadow.

Meadow Restoration Component

Ultimately, the design concept for degraded meadows in the Foster Meadow project areas is to implement near-complete gully fill. The fill material would be excavated from four (4) small borrow ponds along the margins of the meadow and grading four (4) areas of in-meadow terrace down to the design floodplain elevation. This design significantly reduces risk associated with frequent overland flow over plugs and into ponds. Given meadow slopes of 1% -3% and a gully near the center of the meadow, the more traditional pond and plug technique would have some risk.

The principal function of the borrow ponds is to provide native fill material for plug construction. Since the ponds will fill with groundwater and maintain ponded water year-round, habitat features and diversity are incorporated into their construction. These include varying water depths, islands, peninsulas, basking logs, etc., which are determined as fill needs are met.

Topsoil is removed and stockpiled adjacent to the plug fill zone to top dress the completed plug. Meadow vegetation such as sod mats and willow wads would be salvaged by excavating and stockpiling the material to use for revegetation of the completed project.

All plugs and borrow ponds are sited and configured to accommodate surface and subsurface through flow as well as adjacent hillslope-generated surface and groundwater inflows. Plugs are constructed with wheel loader(s) to provide wheel compaction of the fill. The compaction levels are intended to match the porosity/transmissivity of the native meadow soils. This allows moisture to move freely within the plug soil profile and support erosion resistant meadow vegetation for long term durability as well as preventing preferential pathways for subsurface flows either in the plug or the native material.

Design features specific to the Pocket Meadows #1 and #2 are as follows (Figure 2). All gully fill for Pocket Meadow #1 will be generated from the one borrow pond excavated into the timbered terrace to the south. Approximately 11 trees (red fir/lodgepole) will be incorporated into the plug fill surfaces and the remnant channel for velocity reduction. This borrow pond will provide an off-channel, in-forest, perennial surface water habitat feature. The majority of the earth fill for the gully in Pocket Meadow #2 will be generated from cutting terrace features down to floodplain elevation. This will provide more meadow area and floodplain extent, but not open water habitat. One borrow pond will be excavated into the forested terrace to the north. This will be an off-channel, in-forest, perennial surface water habitat feature. Approximately 4 red fir trees would be removed and used for habitat in the pond.

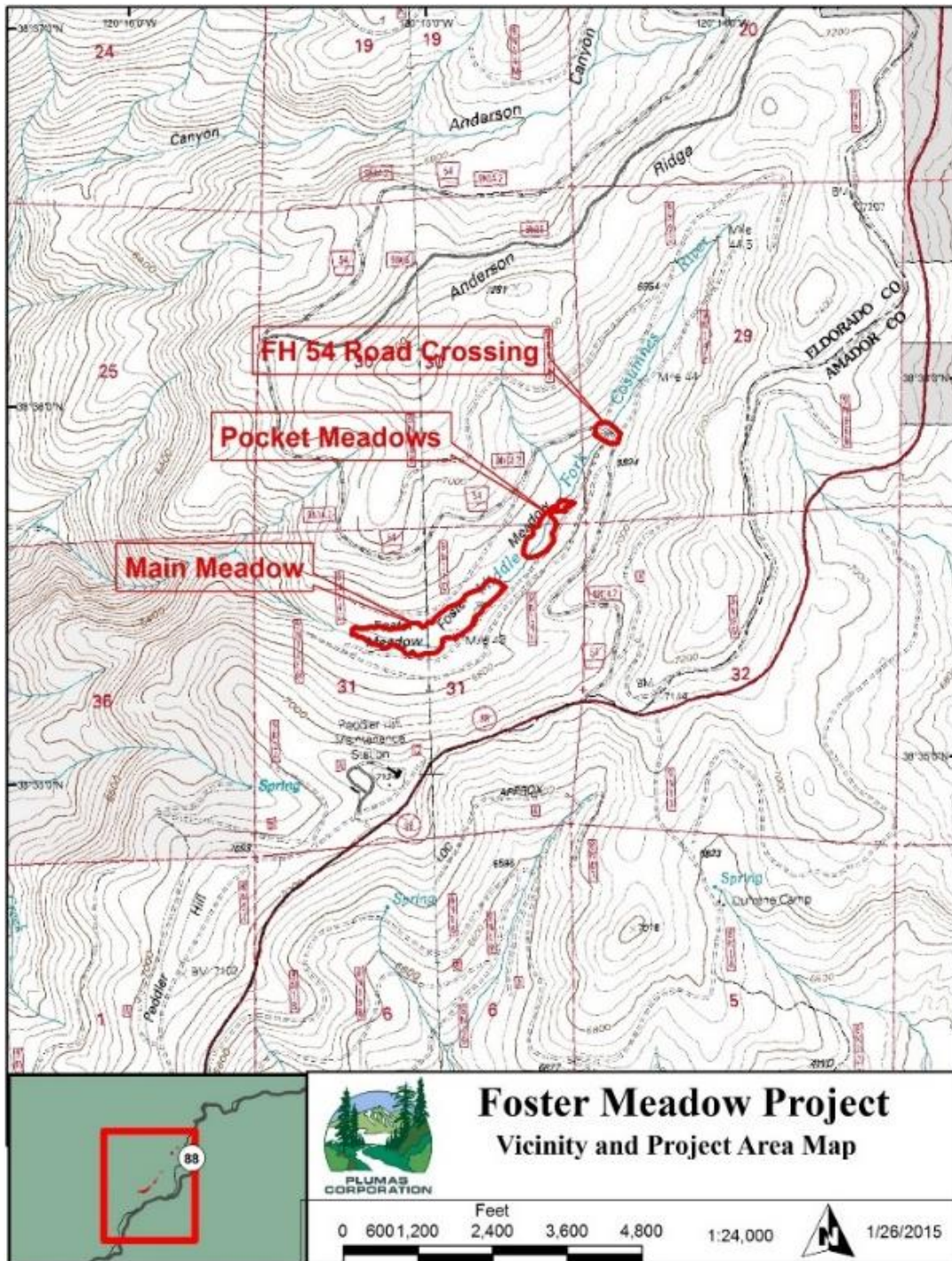


Figure 1. Foster Meadow Restoration Project Treatment Reaches.

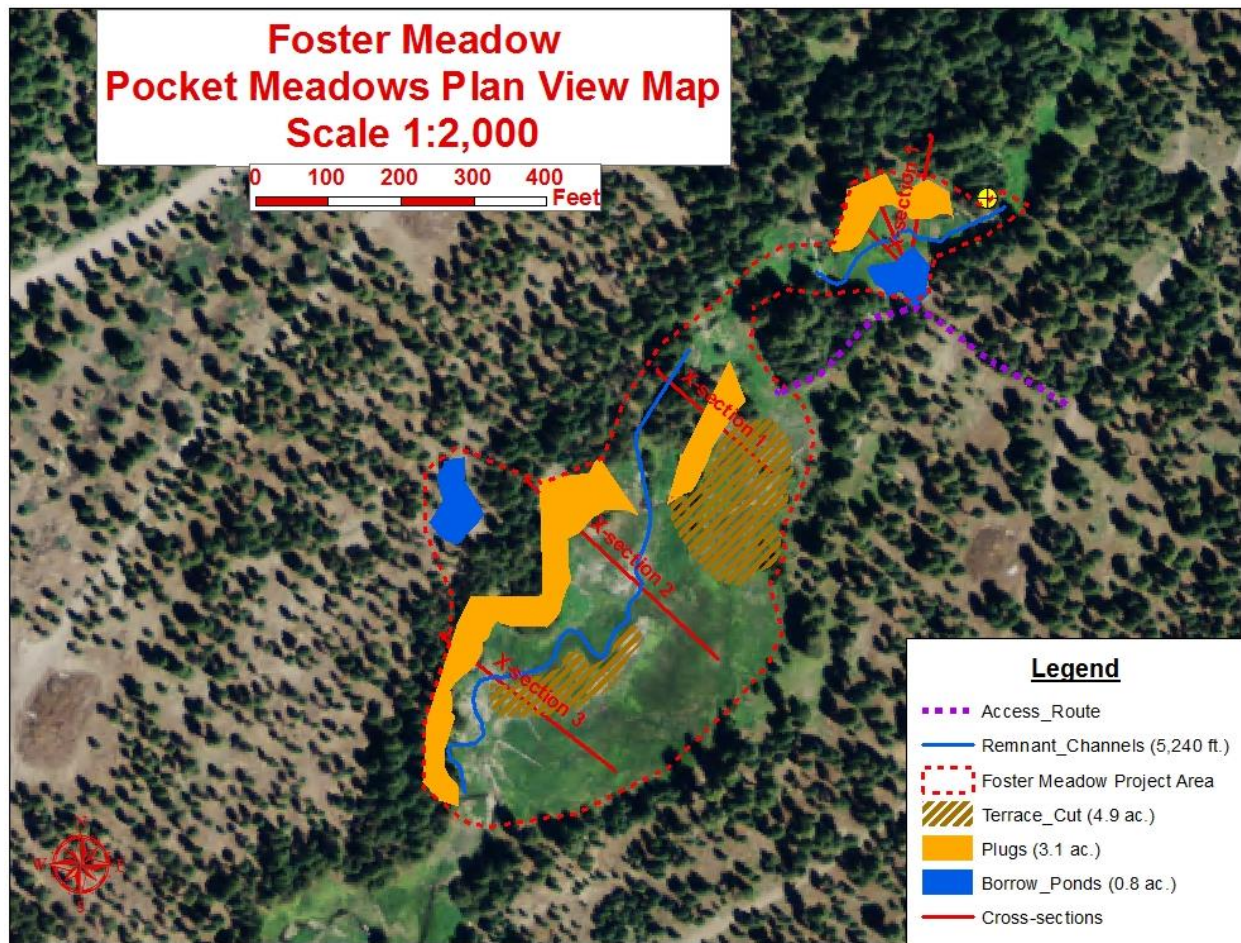


Figure 2. Foster Pocket Meadows Restoration Design Schematic.

Design features specific to the Main Meadow include having the bulk of the gully fill being generated from terrace cut (Figure 3). This will reduce shear stresses on the remnant channel and reverse the xeric trend on approximately 5 acres of wet meadow that are currently transitioning to upland vegetation. The lower end of the project will require using 9 rock riffles to raise the base level of the channel, in lieu of gully fill, in its existing alignment. The installation of riffles in the existing channel will raise the base level at the downstream end of the project, allowing a seamless transition of the new meadow gradient to the existing channel at the downstream end of the project. All access for equipment and materials will be on existing open or closed roads and recent timber harvest skid trails and landings.

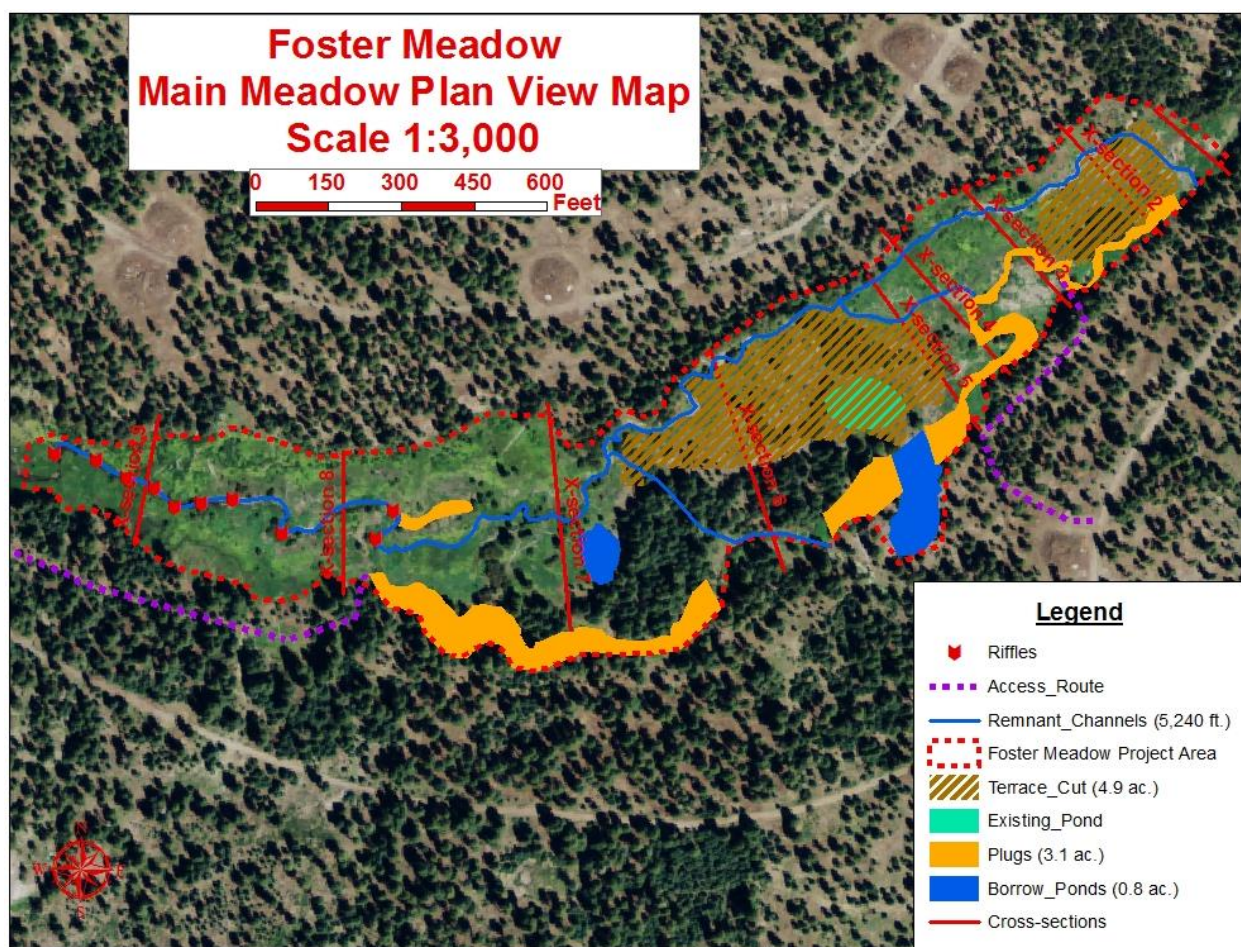


Figure 3. Foster Meadow Main Meadow Restoration Design Schematic.

Aquatic Passage Component

The second phase of the project will be construction of the AOP. The AOP will reduce the backwater effect of high flow from a single culvert with additional culverts set at floodplain elevation. The floodplain culverts would be installed in the road crossing with invert elevations approximately 1 foot above the invert elevation of the channel culvert. Ideally, no less than 3 additional culverts should be installed. These floodplain culverts would be ‘squash’ type, and set at as close an interval practicable across the floodplain. The AOP also includes the construction of a valley grade structure (VGS). The VGS will provide a durable, aquatic organism-passable channel/floodplain transition reach (125 feet long) between the road crossing elevation and downstream channel elevation, which would eliminate the current “waterfall” at the culvert outlet. Because the project is a forest highway road crossing, the AOP and VGS will be engineered. The VGS will require approximately 500 yds³ of 2.0-foot minus rock and soil, sourced from the USFS Tragedy Pit (approximately 8 miles from the Project site). A water truck will be required on-site for dust suppression during rock transport. One excavator (36” bucket)

and four rock trucks will be required to load and transport rock to the Project site, and placement of rock at the VGS will require the use of a second excavator.

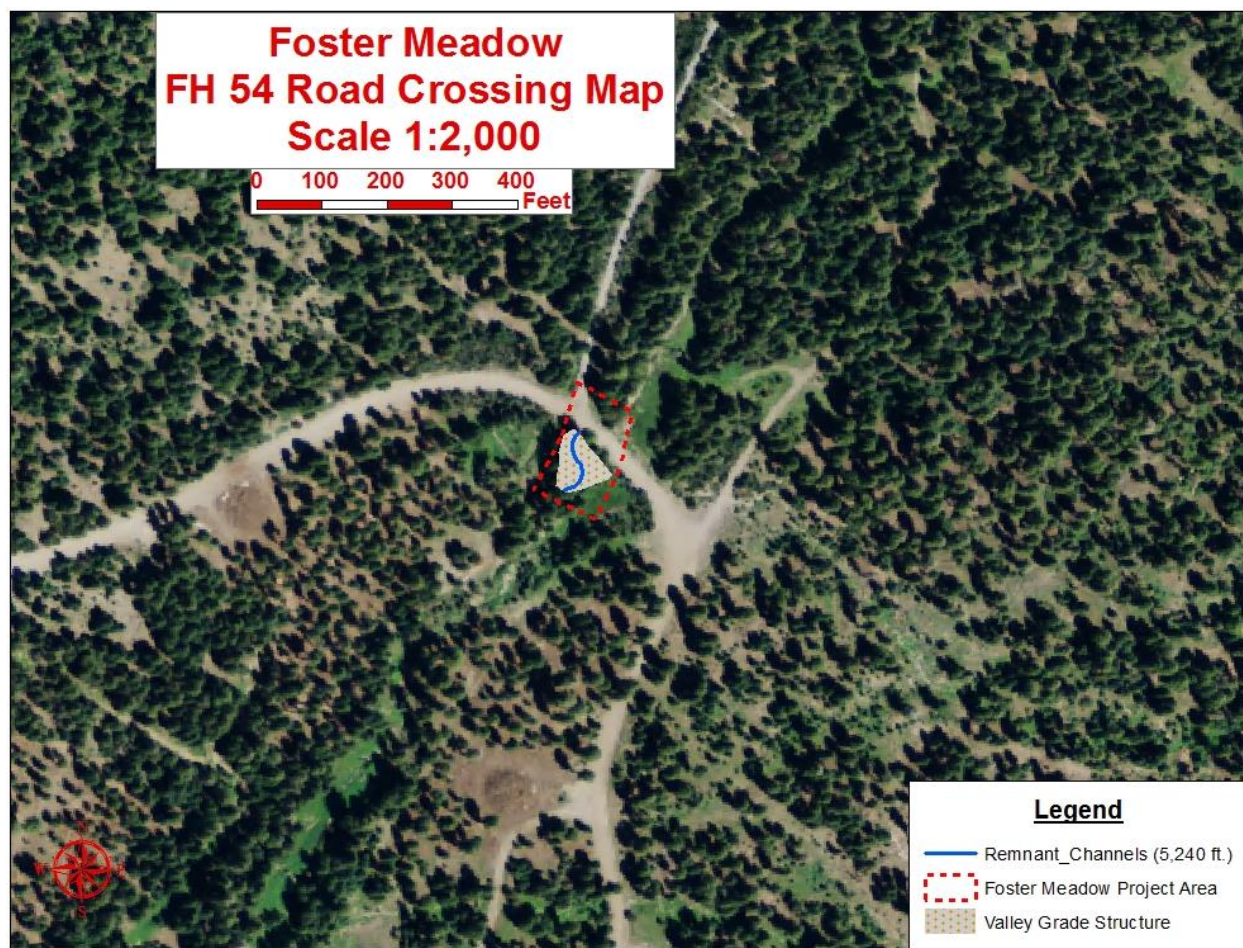


Figure 4. Foster Meadow FH 54/Foster Meadow road (9N14) crossing aquatic passage structure.

Revegetation

Upon completion, all plug surfaces are ripped to a depth of 12" to facilitate rainfall infiltration, dressed with the recovered topsoil, and seeded with native seed. Sod mats, willow wads, and other meadow vegetation from fill and borrow sites will be transplanted to plug edges, terraces and key locations on the remnant channel. Willow stakes will be planted next to stream channels and disturbed areas following construction in the fall to reduce immediate post-project vulnerability to erosion. In the spring following project construction, disturbed areas in the meadow and on graded terraces will be seeded using native seeds collected from Foster Meadow. In key locations during spring seeding, there will also be supplementary willow staking and hand-planting of container stock from locally-sourced material. Container stock will consist of rhizomatous species that can quickly colonize the terrace cuts and plugs. ENF staff will monitor survival of willow cuttings and percent cover of seeded areas for three years following construction. 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.

Project Monitoring

The Foster Meadow Restoration Project is expected to benefit multiple resources by restoring the hydrological and ecological functions of the meadow floodplain system. The purpose of project monitoring is to measure project effectiveness on water quality, timing of flows, and enhancement of wildlife and aquatic habitats. Monitoring parameters and methods that would be utilized are outlined in Table 3.

Table 3. Project Effectiveness Monitoring of the Proposed Action

Monitoring Parameter	Method	Responsible Party
Water Temperature	Water temperature data loggers installed above and below project area May-Sept*	Plumas Corporation**
Aquatic Habitat	California Rapid Assessment Method (CRAM) and Forest Service Stream Condition Inventory (SCI) conducted once pre- and post-project	Plumas Corporation (CRAM); USFS-ENF (SCI)
Groundwater	4 groundwater wells (approximately 6 to 12 ft in depth) made of 3/4" galvanized perforated pipe, measured monthly*	Plumas Corporation**
Stream Flow	Staff gage and pressure transducer installed at the bottom of project area; monthly* manual calibration flow measurements; quarterly* collection of oxygen isotope samples and measurement of electrical conductivity (EC) from inflows, springs, and wells	Plumas Corporation**
Sediment Supply	Channel cross-section surveys; CRAM and SCI	Plumas Corporation (CRAM); USFS-ENF (SCI)
Meadow Vegetation	All revegetation areas would be monitored for three years following project completion. Monitoring will quantify willow survival and percent cover of native meadow vegetation.	USFS-ENF

**As access permits*

***Plumas Corporation has secured funding for monitoring through 2019, and is working with the Cosumnes Coalition so that this group can continue monitoring outside of the existing funding window.*

Design Criteria

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

Air Quality - Soil-disturbing activities that generate fugitive dust PM10 emissions that are visible beyond the project property lines would be controlled through the implementation of the following measures as needed:

- Construction fill and cut areas would be watered as necessary to prevent visible emissions from extending more than 100 feet beyond the active work areas unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
- Disturbed surface areas would be watered in sufficient quantity and frequency to suppress dust and maintain a stabilized surface.

- At least 80 percent of all inactive disturbed surface areas would be watered on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible due to excessive slope or other safety conditions.
- All unpaved roads used for any vehicular traffic would be watered at least once per every two hours of active operations.
- A water truck will be available on site. Water will be drafted from Lower Bear River Reservoir, approximately one-quarter mile from the project area. See the aquatic resources design criteria for aquatic resource protection measures to be implemented during drafting activities.

Range – There are no active range allotments in the project area.

Heritage – Management measures, other than avoidance, are not required to protect heritage resources from project activities (Foster Meadow Restoration Design Cultural Resource Report, R2016-05-03-10015, 9/09/2016). Known historic properties will be flagged for avoidance prior to 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 El Dorado 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).

Terrestrial Wildlife – Should project activities take place during the nesting/reproductive periods for these species (February 15-September 15), surveys of the project adjacent CA spotted owl, and northern goshawk Protected Activity Centers (PACs) would be conducted in an attempt to determine nesting status and species presence. Based on the survey results efforts will be made to minimize potential disturbance impacts based on recommendations of the project biologist.

Aquatic – There are no LOPs proposed for aquatic and riparian species. The proposed activities meet the standards and guidelines for aquatic and riparian dependent species. Additional design criteria for botanical species, hydrology, and soils provide additional protection measures for aquatic resources.

- The project activities will conform to the conservation measures and terms and conditions requirements in the Biological Opinion (USFWS 12/19/2014), and subsequent letter which appends this and other projects to that document (USFWS 02/08/2018).
- Visual Encounter surveys will be conducted for Sierra Nevada yellow-legged frogs by a qualified forest service biologist within 24 hours of construction at the Foster Meadow Road 9N14 stream crossing and within the entire Foster Meadow project area.
- If the Sierra Nevada yellow-legged frog 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 US Fish and Wildlife Service.
- Existing waterholes and other aquatic sites including ponds, lakes and streams used for water drafting would be surveyed for Aquatic TES species and flow levels taken prior to use. In the event TES species are found to occur at drafting sites; sites will not be used

and future surveys would be conducted by an aquatic specialist to determine presence of potential populations. Dufrene Pond, a nearby manmade pond designated for drafting, contains a small breeding population of SNYLF and will **not** be used for drafting water for dust abatement or other construction needs.

- The use of low velocity water pumps and screening devices for pumps (per S&G 110) will be utilized during drafting for project treatments to prevent mortality of eggs, tadpoles, juveniles, and adult SNYLF. A drafting box measuring 2 feet on all sides covered in a maximum of 0.25 inch screening is required.

Hydrology – Construction activities in Foster Meadow would occur during the time of year when the flow of the Middle Fork Cosumnes River is at its lowest. This typically occurs between August 1 and October 30. Required permits would be obtained including, at the least, the 404 permit from the U.S. Army Corps of Engineers and the 401 Permit from the Central Regional Valley Water Board. Additionally, construction would be supervised on-site by at least one person who has worked on at least one previous pond and plug project. Watershed mitigation measures also would include the use of Best Management Practices (BMPs) to protect water quality. The following management requirements from the U.S. Forest Service Region 5 *Water Quality Management Handbook* (USDA 2011) would be applied to prevent impacts to on-site and downstream water quality during implementation:

- **BMP 1.18 Meadow Protection** – The objective of this BMP is to avoid damage to ground cover, soil, and the hydrologic function of meadows.
- **BMP 2.5 Water Source Development and Utilization** - The objective of this BMP applies to dust abatement and other management activities requiring the use of water while protecting and maintaining water quality. Water may be needed to assist in construction of structures. Approved drafting sites designated by the district hydrologist would be utilized.
- **BMP 2.8 Stream Crossings** – This BMP minimizes water, aquatic and riparian resource disturbances and related sediment production when constructing, reconstructing, or maintaining temporary and permanent water crossings.
- **BMP 2.11 Equipment Refueling and Servicing** - This BMP prevents pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels. Servicing and refueling activities would be located a minimum of 100 feet away from the meadow edge. Site specific locations for equipment fueling would be identified prior to or during project implementation. A non-porous mat or equivalent would be used for the refueling at the staging area.
- **BMP 2.13 Erosion Control Plan** - The requirements of this BMP are met through: 1) the Design Features for hydrology and soil resources that are in the proposed action, 2) the erosion control measures and monitoring that will be contained in the 404 permit (U.S. Army Corps of Engineers) and 401 Permit (State Water Quality Control Board, and 3) other applicable BMP's in the 2011 WQMH as listed in this section.
- **BMP 5.3 Tractor Operation Limitation in Wetlands & Meadows** – The objective of this BMP is to limit turbidity and sediment production resulting from compaction, rutting, run-off concentration, and subsequent erosion by excluding the use of mechanical equipment in wetlands and meadows except for the purpose of restoring wetland meadow and meadow function.
- **BMP 7.1 Watershed Restoration** - The objective of this BMP is to repair degraded watershed conditions and improve water quality and soil stability. Restoration measures described herein reflect state-of-the-art techniques and have been chosen to custom fit the

unique hydrologic, physical, biological and climatic characteristics of Foster Meadow. The proposed design for restoration of Foster Meadow restores the meadow condition and hydrologic function to the watershed as described in this document.

- **BMP 7.4 Forest and Hazardous Substance Spill Prevention Control and Countermeasure (SPCC) Plan** - The objective of this BMP is to prevent contamination of waters from accidental spills. BMP 7.4 would be implemented when a total oil product at a site exceeds 1,320 gallons or any single container exceeds 660 gallons. The forest has a SPCC spill plan designed to guide the emergency response to spills during construction.
- **BMP 7.6 Water Quality Monitoring** - The objective of this BMP is to collect representative water data to determine base line conditions for comparison to established water quality standards, which are related to beneficial uses for that particular watershed. This BMP is implemented through establishment of Stream Condition Inventory (SCI) site prior to project implementation to establish a pre-project condition, and through the requirements of the 401 Water Quality Certification that will be obtained for the project..
- **BMP 7.8 Cumulative Off-site Watershed Effect** - This BMP serves to protect the identified beneficial uses of water from the combined effects of multiple management activities. Beneficial uses and effects have been documented in the Hydrology Report. Impacts of past and present activities including impacts of the proposed future management activities were considered in the evaluation of the analysis area, and summarized in the attached hydrology report.

Botany - 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 Foster Meadow project include:

- Any new occurrences of sensitive plants identified within the project area would be flagged and avoided when necessary.
- A watchlist species, *Botrychium simplex*, occurs within Foster meadow. All known occurrences will be flagged for avoidance 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.
- Fens within Foster Meadow would be flagged prior to project implementation for avoidance. Crews conducting repair work at Foster Meadow would be informed of the location of the fen.
- 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 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.
- Any seed used for restoration or erosion control would be from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).

Soil Resources - Standard mitigation measures 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.

- Construction would occur during the low flow period, and coincides with the most favorable moisture conditions to the depth of borrow site excavation. The subsurface soil material excavated is used to plug the adjacent channel incision. This material requires enough moisture to allow for compaction to background condition of the adjacent native soil. The purpose of compaction is to preclude subsidence of the plug material during

saturated conditions. Subsidence can lead to the initiation of erosion on the plugs. Utilization of onsite fill material allows the best match of soil types at the least cost. Material too wet to efficiently transport and work would be avoided. The subsurface (compacted) portions of the plug are constructed using the 'layer lift' method, which entails spreading the material in a thin veneer over the general area of the plug with each delivered bucket load of material. This repeated action, with occasional re-cutting of the working surface allows for efficient wheel compaction without supplemental equipment.

- Topsoil, and any organic material, in the area of excavation would be removed to a depth of approximately one foot and stockpiled adjacent to the plugs. When the plugs have been constructed to the design elevation, the plug surface would be cross-ripped to a depth of 12" to restore a deep infiltration capacity. Stockpiled topsoil with associated organics and native seed bank would be spread across the plug with a low ground-pressure track loader. The final pass with equipment is to dress and roughen the topsoil surface for microclimate roughness and to fully incorporate the topsoil with the surface of the subsoil.
- Equipment travel into the project area would be restricted to existing open or closed roads and recent timber harvest skid trails and landings. During construction, routes from the borrow sites to plug areas with compaction resulting from construction would be scarified perpendicular to expected surface water flow and dressed with scattered organic material.
- Staging areas and temporary haul routes used during the project would be minimized to minimize soil compaction and disturbance to the greatest extent possible. After construction, they would be sub-soiled, perpendicular to surface flow directions, to the full depth of compaction to restore soil porosity. Areas with residual meadow sod would only be lightly scarified to preserve sod integrity. The emphasis is on the least soil disruption while loosening the soil. Extensive mixing or plowing can have a negative effect on soil microorganisms. This technique has been successful in loosening the soil, restoring soil porosity, providing a high infiltration capacity, and thereby reducing cumulative watershed effects.
- The project will require re-vegetation. Access routes are expected to have residual sod, and thus not require seeding, but may receive mulching and possibly seed, depending on the condition of the sod. Revegetation will consist of the following measures:
 - All desirable plant material that would be excavated or buried in plugs, such as sod mats and willow wads, will be removed and transplanted to plugs, terraces and at key locations in the remnant channel. Locations of transplants are prioritized according to need for maximum soil protection in bare areas and areas of potentially high stress.
 - During the spring and summer following project completion, locally collected seeds would be dispersed into terrace cuts, plugs, and other heavily disturbed areas.
 - Container stock from locally-sourced material would be hand planted in the spring and summer in key locations. Container stock will consist of rhizomatous species that can quickly colonize the terrace cuts and plugs.
 - All revegetation areas would be monitored for three years following project completion. Successful revegetation would consist of 70% survival of willow cuttings and transplanted seedlings. Seeded areas would have at least 50% cover of native vegetation. Any areas that do not meet the survival or cover criteria would be reseeded or replanted.
- Erosion control would be accomplished using locally collected materials (wood chips, duff, pine needles, etc.). Straw would not be used.

- Meadow restoration projects include rest from grazing in disturbed areas for up to three years after construction in order to allow the newly planted vegetation to become established. Currently, the project area is not grazed and the allotment will not be re-opened, so this mitigation requires no further action.

Fire/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.

VI. EFFECTS OF PROPOSED PROJECT

Potential for Project Effects

This Biological Evaluation evaluates project effects to animal species that are listed, or proposed to be listed by the U.S Fish and Wildlife Service as threatened or endangered, and to 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

Surveys have been conducted for many of the aquatic species on the Amador Ranger District, in which the data has been reviewed to determine potential overlap. 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 NRM database of wildlife and aquatic detections and management areas, photos, and vegetation data for the project area.

Direct, Indirect, and Cumulative Effects

The proposed Foster Meadow Restoration 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.

VII. DETERMINATION OF EFFECTS

Foothill Yellow-legged Frog: *It is my determination that the Foster Meadow Restoration Project will have no effect on the Foothill yellow-legged frog.*

Western pond turtle: *It is my determination that the Foster Meadow Restoration Project will have no effect on the Western Pond Turtle.*

Hardhead: *It is my determination that the Foster Meadow 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.*

VII. LITERATURE CITED

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- USDI Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants: designation of Critical Habitat for the Sierra Nevada yellow-legged frog, the Northern DPS of the mountain yellow-legged frog, and the Yosemite toad; final rule. FR 81 (166): 59046-59119.

Appendix A

Foster Meadow Photographs



Figure 1: a) Erosion along the creek within the meadow and b) main body of Foster Meadow

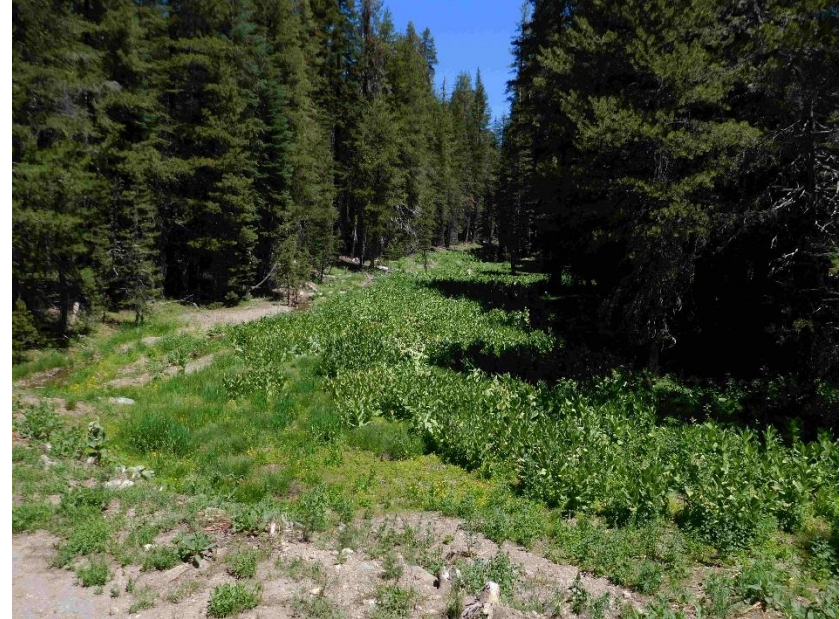


Figure 2: a) Erosion along the creek within the meadow and b) main body of Foster Meadow



Figure 3: a) Middle Fork Cosumnes river gully in foster meadow near cross section #8. Breached rock dam in photo center