United States Department of the Interior
FISH AND WILDLIFE SERVICE
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In Reply Refer to:
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April 29, 2020

Mr. Jason Kuiken
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U.S. Forest Service
19777 Greenley Road
Sonora, California 95370
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Subject: Formal Consultation on the Proposed Mattley Meadow Restoration Project, Calaveras County, California

Dear Mr. Kuiken:

This letter is in response to the U.S. Forest Service's (Forest Service) October 9, 2018, request for initiation of consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Mattley Meadow Restoration Project (proposed project) in Calaveras County, California. At issue are the proposed project's effects on the federally endangered Sierra Nevada yellow-legged frog (*Rana sierrae*) and the federally threatened Yosemite toad (*Anaxyrus canorus*). No designated critical habitat for either species is present in the action area. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

The federal action on which we are consulting is the restoration of Mattley Meadow and Mattley Creek Meadow, located on the Stanislaus National Forest and a private in-holding, using pond and plug methods, range improvements, and trail rerouting. Pursuant to 50 CFR 402.12(j), you submitted a Biological Assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project (1) *may affect, and is likely to adversely affect* the Sierra Nevada yellow-legged frog, and (2) *may affect, not likely to adversely affect* the Yosemite toad.

In considering your request, we based our evaluation on the following: (1) the letter from the Forest Service to the Service requesting initiation of consultation on the proposed project, dated October 9, 2018; (2) the *Biological Assessment, Mattley Meadow Restoration (47053)* (Biological Assessment), dated October 9, 2018; (3) electronic and telecommunications correspondence between the Forest Service and the Service; (4) July 21, 2017, and October 4, 2017, site visits to the project area by the Service, the California Department of Fish and Wildlife (CDFW), Plumas Corp, the Forest Service, and the private landowner; and (5) other information available to the Service.

The Forest Service determined that the proposed project may affect, but is not likely to adversely affect the Yosemite toad. Our analysis and conclusion on this species is provided below.

Yosemite Toad

The Yosemite toad is a federally threatened amphibian endemic to high elevation (greater than 6,500 feet) habitats in the Sierra Nevada. The species breeds primarily in shallow, still water habitat such as wet meadows, and utilizes meadows, springs, and adjacent terrestrial habitats for foraging, refuge, dispersal, and overwintering. Approximately 7.5 acres of the action area contains suitable breeding habitat for Yosemite toad. The remaining portions of the action area provide 243.5 acres of suitable non-breeding aquatic and upland habitat for the species.

The Forest Service has conducted numerous amphibian visual encounter surveys (VES) of suitable Yosemite toad habitat in the action area within the last ten years; however, no toads have been detected during these efforts. In addition, no historical records of the species exist in the action area. The closest occurrences of Yosemite toad are 6.8 to 8.3 miles from the action area, beyond the expected dispersal distance for the species (0.78 mile). Based in this information, it is unlikely that the species is present in the action area.

The Service concurs with the Forest Service's determination that the proposed project *may affect, but is not likely to adversely affect* the Yosemite toad based on the following reasons: (1) Despite surveys, no Yosemite toads have been detected in the action area and no records exist within expected dispersal distance of the action area; (2) the implementation of conservation measures such as daily pre-work clearance surveys and the presence of a qualified biologist during all work activities will minimize any potential impact to toads should they be encountered. Therefore, the Service concludes that potential effects to Yosemite toad will be discountable. Unless new information reveals the effects of the proposed action that may affect the Yosemite toad in a manner or to an extent not considered, no further action pursuant to the Act is necessary for this species. Therefore, the species is not discussed further in the remainder of this document.

The Forest Service determined that the proposed project may affect, and is likely to adversely affect the Sierra Nevada yellow-legged frog. The remainder of this document provides our biological opinion on the effects of the proposed project on this species.

Consultation History

May 5, 2016 – March 20, 2017:	The Forest Service and the Service discussed the proposed project on multiple occasions.
July 21, 2017:	Representatives from the Service, the Forest Service, the CDFW, Plumas Corp (restoration contractor), and the private landowner attended a site visit to the project area and discussed the proposed action.
September 21, 2017:	The Service, including representatives from the Partners for Fish and Wildlife Program, discussed the proposed project with the Forest Service and the CDFW.
October 4, 2017:	Representatives from the Service, including the Partners for Fish and Wildlife Program, and the Forest Service attended a site visit to the project area and discussed different approaches to meadow restoration.

October 9, 2018:	The Service received a request from the Forest Service for consultation on the proposed project, along with the final Biological Assessment.
November 14, 2019:	Plumas Corp contacted the CDFW regarding a Consistency Determination for the proposed project.
December 8, 2019:	The CDFW notified Plumas Corp and the Service that the proposed project does not warrant a Consistency Determination.
October 30, 2018 – April 2, 2020:	The Service discussed the proposed project with the Forest Service and received additional information about the action, including a revised project description and habitat monitoring plan.

BIOLOGICAL OPINION

Description of the Action

The Stanislaus National Forest, in partnership with a private landowner, is proposing to restore the natural ecosystem function in Mattley and Mattley Creek meadows on the Calaveras Ranger District. Mattley Creek Meadow is located on National Forest System (NFS) lands while Mattley Meadow overlaps both NFS lands and a private in-holding (Figure 1). Pond and plug methods will be used to reconnect the existing gullied channel to the meadows' floodplain. The meadows will continue to be used for livestock grazing by the private landowner; fencing and an off-channel water source will be installed so that animals can be controlled while promoting the stabilization of riparian vegetation. In addition, the proposed project includes rerouting a portion of an existing motorized trail so that it is located outside of the meadow.

While similar restoration activities will occur both in Mattley Meadow and Mattley Creek Meadow, Sierra Nevada yellow-legged frogs and their habitat are present only within Mattley Meadow. Mattley Creek Meadow does not contain suitable habitat for the species (Figure 1). Therefore the following action descriptions focus on activities proposed in the Mattley Meadow portion of the action area.

Pond and Plug

Meadow restoration in Mattley Meadow and Mattley Creek Meadow will be accomplished using a pond and plug technique, which consists of eliminating the existing gullies and replacing them with a series of ponds and earthen plugs. Within Mattley Meadow, this method will only be applied to the incised middle and eastern channels, as the western channel contains a breeding population of Sierra Nevada yellow-legged frogs. No work will be conducted in the western channel.

Approximately 15,918 cubic yards of material will be excavated from the meadow to create nine ponds (totaling 6 acres of pond) and moved short distances to build six gully plugs (totaling 4.5 acres) (Figure 1). All plug and borrow ponds will be sited and designed to accommodate surface and

subsurface through flow, as well as adjacent hillslope-generated surface and groundwater inflows.

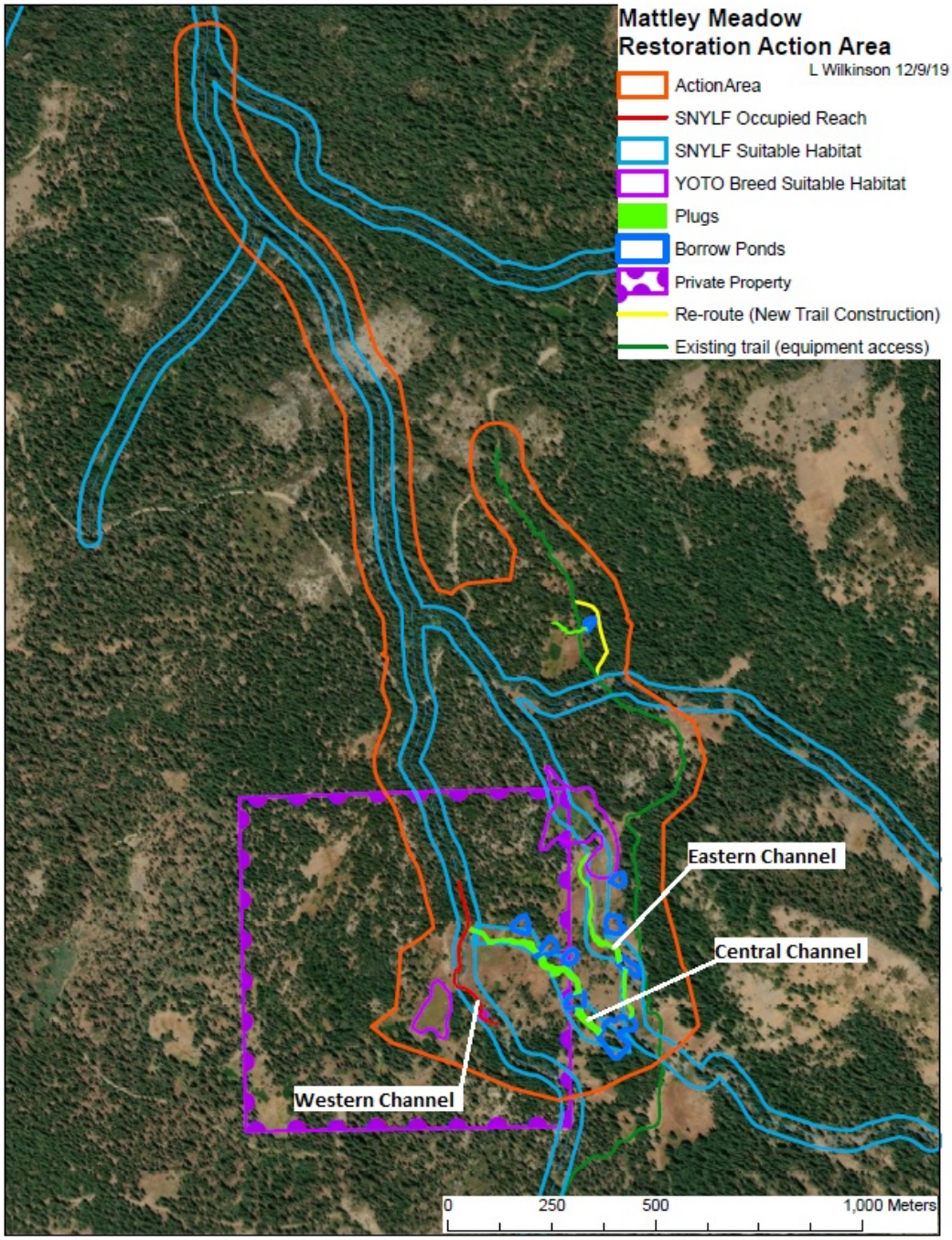

Figure 1. The Mattley Meadow Restoration Project Action Area with western, central, and eastern channels identified. Modified from the December 9, 2019, updated Action Area figure provided by the Forest Service.

The fill material will be excavated from borrow ponds along the margins of the meadow or other elevated features. This design significantly reduces risk associated with frequent overland flow over plugs and into ponds. Excavation will be conducted using a tracked excavator, wheeled loader, and tracker loader. Topsoil and existing vegetation will be removed and stockpiled adjacent to the plug fill zones to top dress the completed plugs. Plugs will be compacted using a wheel loader, with compaction levels intended to match the porosity/transmissivity of the native meadow soils to allow

moisture to move freely within the plug soil profile and support erosion resistant meadow vegetation. This method will also prevent preferential pathways for subsurface flows either in the plug or in the native material. Vegetation that would be buried or continually submersed as a result of the proposed action will be removed and replanted on the plugs, pond sides, and/or along the remnant channel where additional vegetation is needed. Plugs will be seeded with native seed, and pond margins will be planted with available sedge plugs, willow cuttings, and native riparian grasses. Revegetation efforts will focus primarily in areas that need vegetative armoring or where implementation of the project results in bare surfaces. Limited conifer removal may occur incidental to pond and plug construction. Large woody debris will be placed on a steepened slope facet in the meadow to reduce flow velocities and meter channel scour through the reach. Habitat features and diversity will be incorporated into the pond design. To the extent possible, ponds will be constructed to look like a natural part of the landscape. Shallow areas will be constructed within the ponds to provide wildlife habitat. Other features may include islands, peninsulas, and basking logs. Selected ponds will be designated to take into account primary constituent elements of suitable aquatic breeding and rearing habitats for Sierra Nevada yellow-legged frogs. The depth of ponds will be maximized to avoid freezing and hypoxic conditions. Pond margins will be constructed with gradual banks to provide extensive shallow water habitats. Boulders and woody debris will be incorporated into the banks and islands to provide basking areas and refugia. Native planting will stabilize banks and provide additional refuge.

The proposed project will occur during periods of minimal and/or subsurface stream flow and dry weather, beginning no earlier than July 1 and ending no later than October 1. Any existing streamflow will be re-directed from the gullies into existing remnant channels in the meadow. All heavy equipment will be confined to the work areas to minimize the disturbance footprint and material transport generally will not exceed 300 feet. The project area will be accessed using the existing off-highway vehicle (OHV) trail.

Fence and Water Source Installation

Temporary fencing (electric or barbed) will be constructed around the meadows to exclude cattle until the sites have sufficiently revegetated and stabilized, generally a minimum of two to three years after restoration.

Once restoration is complete, livestock grazing is expected to resume in the meadows. To increase cattle dispersal, one off-channel water trough and solar pump may be installed if needed on NFS land near the southern end of the meadow. This infrastructure will be located outside of the meadow and approximately 700 meters from occupied Sierra Nevada yellow-legged frog habitat.

Trail Reroute

The proposed project will construct approximately 805 feet of new trail to reroute sections of the existing 17EV16 OHV trail out of sensitive meadow/riparian areas (Figure 1). Trail construction will be accomplished using a small tractor and/or hand tools. Rock or other armoring may be installed at forded stream crossings and culverts may be installed at other stream crossings. Construction may also include the removal of trees and the placement of barriers along the trail to discourage off-trail travel.

Conservation Measures

To minimize potential environmental impacts from the proposed restoration, the project will implement all applicable Forest Service Standards and Guidelines (S&Gs) and Best Management

Practices (BMPs) from Forest Plan Direction as listed in Appendix B the Biological Assessment. In addition, the Forest Service will ensure implementation of the following measures to avoid and minimize potential effects to Sierra Nevada yellow-legged frog and habitat for the species:

1. All persons involved with project activities will be informed about the presence of Sierra Nevada yellow-legged frogs and potential for Yosemite toads within the work areas, and be provided a training session about life history and habitat elements. This should reduce the potential for unintended injury or mortality during project activities.

2. Mechanical operation will be prohibited on days where greater than 0.5 inches of rain are predicted and within 24 hours of such rain events.

3. During restoration work within Mattley Meadow, a qualified biologist (i.e., Forest Service- or Service-approved biologist) must be on site during all activities. The qualified biologist will survey the immediate work area for listed amphibians before commencement of daily work and following work stoppages exceeding one hour.

4. If Sierra Nevada yellow-legged frogs are detected within the work area, the following procedures will be followed:

   Each frog will be treated on a case-by-case basis but the general procedure will be as follows:

   (1) Leave the non-injured animal alone if it is not in danger; or

   (2) Move the animal to a nearby safe location if it is in danger.

   These two actions are further described below.

   (a) When a Sierra Nevada yellow-legged frog is encountered within the project site, the first priority is to stop all activities in the surrounding areas that may have the potential to result in take of the individual. Then, the situation shall be assessed by a Forest Service- or Service-approved biologist in order to select the course of action that will minimize adverse effects to the individual.

   (b) Sierra Nevada yellow-legged frogs shall be captured and moved by hand only when it is necessary to prevent injury or death. A Forest Service- or Service-approved biologist shall inspect the animal and the area to evaluate the necessity of fencing, signage, or other measures to protect the animal. If suitable habitat is located immediately adjacent to the capture location, then the preferred option is relocation to that site. An individual shall not be moved outside of the radius it would have traveled on its own.

   (c) Only Forest Service- or Service-approved biologists may capture Sierra Nevada yellow-legged frogs. Nets or bare hands may be used to capture the animals. Soaps, oils, creams, lotions, repellents, or solvents of any sort cannot be used on hands within two hours before and during periods when the biologist is capturing and relocating individuals. If the animal is held for any length of time in captivity, they shall be kept in a cool, dark, moist environment with proper airflow, such as a clean and disinfected bucket or plastic container with a damp sponge. Containers used for holding or transporting shall not contain any standing water, or objects (except sponges), or chemicals.

5. The Forest Service will implement a frog and frog habitat monitoring plan described below in order to understand how Sierra Nevada yellow-legged frog habitat within and downstream

of Mattley Meadow is affected by the proposed project and to track frogs abundance habitat post-restoration, the Service and Forest Service have jointly developed the monitoring plan described below. It is anticipated that the most substantial changes to meadow vegetation (e.g., vegetation growth around newly constructed ponds), flow rates, and other Sierra Nevada yellow-legged frog habitat features will occur within a two-to-three year period. The monitoring plan will be implemented over a minimum five-year period in order to document these changes and to account for interannual variability from external factors such as atypical environmental events (e.g., exceptionally deep snowpack resulting in heavy pulses of snowmelt).

As part of the proposed project, the Forest Service and Plumas Corp plan to implement general effectiveness monitoring to evaluate the success of the restoration. As a component of this effectiveness monitoring, a Forest Service Stream Condition Inventory (SCI) will be conducted once prior to project implementation and a second time once implementation is complete. Many of the variables evaluated during SCI monitoring will also be assessed as part of the frog monitoring plan; however, the frog monitoring plan focuses on a sub-set of variables specific to documenting changes to frog habitat and will continue to be implemented for multiple years once restoration activities are complete.

Sierra Nevada Yellow-legged Frog and Habitat Monitoring Plan

(1) Scheduling:

(a) Pre-restoration: No more than one year prior to implementing the proposed project, the Forest Service will collect baseline data on habitat (2) and frogs (3), below. Data will be collected during the season of lowest base flow feasible prior to implementation of the project. This data may be collected during pre-project SCI monitoring.

(b) Post-restoration: After ground-disturbing restoration activities are complete, the Forest Service will collect data on habitat (2) and frogs (3), as follows:

(i) Habitat Monitoring: will occur every other year through the fifth year post-restoration during base flows. However, if an atypical environmental event occur (e.g., a heavy pulsed snowmelt, heavy rain storms), habitat monitoring should occur the summer following the event so as to document any effects to frog habitat.

(ii) Frog Surveys: Frog surveys will be conducted annually every year through the fifth year post-restoration. Surveys will be conducted at during a time of year when all life-stages can be observed.

(c) Once grazing resumes within the restored portion of Mattley Meadow, the Forest Service will conduct three consecutive years of habitat monitoring and frog surveys. Should grazing resume within the 5-year window already identified in (i) and (ii), above, data already being collected to meet requirements (i) and (ii) may be used to satisfy the grazing period monitoring requirement.[1]

[1] For example, if grazing resumes in the third summer after restoration, the monitoring/survey schedule would be as follows: Year 1 – habitat monitoring, frog surveys; Year 2 – frog surveys; Year 3 – habitat monitoring, frog surveys; Year 4 – habitat monitoring for grazing, frog surveys; Year 5 – habitat monitoring (including for grazing), frog surveys; Year 6 – habitat monitoring for grazing.

(2) Habitat Monitoring Variables:

(a) Stream Habitat – Within the occupied breeding habitat within the action area (i.e., within Mattley Meadow and immediately downstream of the meadow), the Forest Service will collect data on the following:

(i) Stream width;

(ii) Stream depth;

(iii) Stream flow rate;

(iv) Pool sedimentation;

(v) Sediment transport;

(vi) Photo-documentation of habitat and vegetation at fixed points.

(b) Pond Habitat – For each of the newly created ponds, the Forest Service will collect the following data:

(i) Maximum depth;

(ii) Maximum width;

(iii) Conductivity (i.e., Estimate of dry-down time);

(iv) Photo-documentation of habitat and vegetation at fixed points; and

(v) Photo-documentation and written description of the status of installed Sierra Nevada yellow-legged frog habitat features such as rocks, boulders, logs, and basking sites.

(c) Invasive Species – The Forest Service will document any opportunistic sightings of non-native and invasive species that prey on and/or compete with Sierra Nevada yellow-legged frogs (e.g., Signal crayfish, American bullfrog).

(3) Frog Surveys:

The Forest Service will implement a monitoring plan to track abundance and habitat use by Sierra Nevada yellow-legged frogs in Mattley Meadow. At minimum, annual VES surveys that document all individuals encountered and their locations in the meadow and downstream of the meadow will be performed along with photo point monitoring of habitats. Other techniques may include capture-mark-recapture (CMR) studies and additional habitat monitoring techniques (as separately authorized by permits with the Service and with the CDFW). The goals will be to monitor trends in relative abundance by life stage, determine if frogs utilize the created ponds for breeding or non-breeding habitat, and determine if avoided existing habitats are negatively modified.

(4) Reporting:

(a) Beginning with the first year of post-implementation monitoring, the Forest Service will provide the Service with an annual report containing information collected on the variables identified in (2). The report will be provided to the Sacramento Fish and Wildlife Office, Sierra-Cascades Division Chief by no later than February 15 the following year.

(b) Once the monitoring program is complete, the Forest Service will provide the Service with a final summary report no later than one year after completion of monitoring efforts. The report will include evaluation of the project's effects on Sierra Nevada yellow-legged frog habitat within the meadow before and after restoration (2); and population trends of the Mattley Meadow frog population (3).

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses 262 acres shared between the Stanislaus National Forest and a private landowner. This acreage includes the project footprints at Mattley Meadow and Mattley Creek Meadow, an additional 200-foot buffer around the footprints where noise or visual disturbance could occur, and 1.2 miles of Mattley Creek downstream of Mattley Meadow where indirect effects such as increased sedimentation and altered hydrology could occur.

Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the action area without the consequences to the listed species caused by the proposed action, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines all consequences to listed species that are caused by the proposed federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the action area on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the proposed action is likely to jeopardize the continued existence of the listed species.

Status of the Sierra Nevada Yellow-legged Frog

Listing Status

The Sierra Nevada yellow-legged frog was listed as an endangered species on April 29, 2014, under the Endangered Species Act of 1973 (Service 2014). Critical habitat was designated for the species on August 26, 2016 (Service 2016).

Description

The Sierra Nevada yellow-legged frog was previously known as the mountain yellow-legged frog (*Rana muscosa*). Based on mitochondrial DNA, morphological information, and acoustic studies, Vredenburg *et al.* (2007) concluded the mountain yellow-legged frog in the Sierra Nevada consists of two distinct species – *R. muscosa* and *R. sierrae*. Due to their similar appearance, habitat requirements, and ecology, these closely related species are often discussed together as the mountain yellow-legged frog complex.

The Sierra Nevada yellow-legged frog is moderate-sized, ranging from 1.5 to 3.25 inches in length (Wright and Wright 1949, Zweifel 1955). Adult coloration is highly variable, with a dorsal pattern of dark spots of various sizes among a background mixture of primarily brown and yellow, but also gray, red, or green-brown. Dorsolateral folds are present, but not prominent. The abdomen and hind legs are yellow, sometimes tinged with orange in larger females. Although lacking vocal sacs, they can still vocalize in or out of water with a flat clicking sound (Zweifel 1955, Stebbins 2003). The adults may also produce a distinctive mink or garlic-like odor when disturbed (Wright and Wright 1949, Stebbins 2003).

Sierra Nevada yellow-legged frogs tend to have smoother skin, with heavier spotting and mottling dorsally, darker toe tips (Zweifel 1955), and more opaque ventral coloration than their conspecific foothill yellow-legged frog (*R. boylii*) (Stebbins 2003). Larvae (tadpoles) exhibit a flattened body shape with a low dorsal fin, can reach up to 2.8 inches in length, and are mottled brown on the dorsal side with a faintly yellow underside (Zweifel 1955, Stebbins 2003, Vredenburg *et al.* 2005).

Current Range and Distribution

The Sierra Nevada yellow-legged frog is endemic to the northern and central Sierra Nevada, ranging from north of the Feather River including the Plumas and southern edge of the Lassen National Forests, south to the Monarch Divide on the west side of the Sierra Nevada crest in the Sierra National Forest, and near Independence Creek on the east side of the Sierra Nevada crest in the Inyo National Forest. The current distribution of the species is primarily restricted to high elevation publicly managed lands within National Forests and National Parks.

Habitat and Life History

Sierra Nevada yellow-legged frogs predominantly inhabit lakes, ponds, tarns, marshes, meadows, and streams at high elevations usually above 4,500 feet (Zweifel 1955, California Department of Fish and Wildlife 2014a, b), but may occur as low as 3,500 feet in northern portions of their range (USFS 2014). Recent genetic testing, however, suggests that frogs below 4,500 ft. in Plumas National Forest are primarily foothill yellow-legged frogs (*R. boylii*) rather than Sierra Nevada yellow-legged frogs (C. Dillingham, USFS, personal communication, 2017). These frogs are highly aquatic (Stebbins 1951, Mullally and Cunningham 1956, Bradford *et al.* 1993), with adults typically found sitting on rocks along shorelines with little or no vegetation (Mullally and Cunningham 1956). Though most abundant in high-elevation lakes and slow-moving portions of meadow streams (Zweifel 1955,

Mullally and Cunningham 1956, Lannoo 2005, Vredenburg *et al.* 2005), habitat use varies with availability. For example, at lower elevations throughout their range, they are associated with rocky streambeds and wet meadows surrounded by coniferous forest (Zweifel 1955, Zeiner *et al.* 1988, Vredenburg *et al.* 2005). These frogs tend to be absent from the smallest creeks, possibly due to insufficient depth for adequate refuge and overwintering habitat (Jennings and Hayes 1994).

Breeding habitat can be diverse, but most often includes permanent, deep lakes (Zweifel 1955, Knapp and Matthews 2000a). In Yosemite National Park, for example, Sierra Nevada yellow-legged frog occupancy tended to be associated with deep water, meadow vegetation on shorelines, and absence of introduced fish (Knapp 2005). When frogs do co-occur with introduced fish, they often use different microclimates, such as shallower waters (Brown *et al.* 2019). Breeding has been observed in both shallow pools and inlet streams (Vredenburg *et al.* 2005). Timing varies with elevation, occurring earlier (April-May) at lower elevations and later (June-July) in higher locations (Zweifel 1955). Females deposit 15-350 eggs underwater in clusters, attached to rocks, gravel, vegetation, or under banks, and hatch after 15-20 days as the temperature warms (Wright and Wright 1949, Stebbins 1951, Zweifel 1955, Pope 1999).

Hatching success tends to be high (Vredenburg 2004), but because tadpoles can require 2 to 4 years to mature, successful recruitment requires water bodies that hold water for this duration, even if only a small amount (Bradford 1983, Bradford *et al.* 1993, Knapp and Matthews 2000b, Vredenburg *et al.* 2005, Lacan *et al.* 2008). Another 3 to 4 years post-metamorphosis is required to reach reproductive maturity; thus it may take 5 to 8 years for an individual to begin reproducing (Zweifel 1955, Vredenburg *et al.* 2005). Adults are long lived, up to 14-16 years (Vredenburg *et al.* 2005, Fellers *et al.* 2013), and under normal circumstances adult survivorship from year to year is very high (Pope 1999). High environmental variation, however, such as severe winters and drought years, can lead to massive mortality (Bradford 1983). Tadpoles are particularly vulnerable in their first winter, with those reared in shallow sites more prone to desiccation (Lacan *et al.* 2008). A study in Yosemite National Park found that population size varied annually, and was positively correlated with precipitation (Fellers *et al.* 2013).

Both adults and juveniles will overwinter in aquatic habitats under ice (Mullally and Cunningham 1956, Pope and Matthews 2001), often at the bottom of lakes >1.7 meters deep (Bradford 1982). However, frogs can also overwinter in bedrock crevices, allowing them to survive in shallower water bodies that freeze to the bottom (Mathews and Pope 1999). Stream-dwelling frogs have also been found overwintering in rock crevices, undercut banks, and seeps within mud holes (MGW Biological 2008). At spring thaw or snowmelt, adults disperse into various sites during the summer months for feeding (Wengert 2008, Pope and Matthews 2001, Matthews and Preisler 2010). In the summer, frogs are found basking in open areas near cover and water (Grinnell and Storer 1924, Storer 1925, Mullally and Cunningham 1956). Individuals display strong site fidelity and may return to the same overwintering and summer habitats from year to year (Pope 1999). Adult frogs also make local movements during the active season – in aquatic habitats of high mountain lakes, adults typically move only a few hundred meters (Pope 1999, Pope and Matthews 2001), though distances over 1 km have been recorded that included overland travel (Vredenburg *et al.* 2005).

Though few diet studies exist, invertebrates are primary prey for this species. Adult frogs have also been observed consuming Yosemite toad and Pacific treefrog larvae (Mullally 1953, Zeiner *et al.* 1988, Pope 1999). As is typical of ranids, tadpoles graze on algae and diatoms along the rocky bottoms (Zeiner *et al.* 1988).

Status and Threats Overall

Once thought to be abundant throughout aquatic habitat in the high Sierra Nevada (Grinnell and Storer 1924), the Sierra Nevada yellow-legged frog and mountain yellow-legged frog have declined since the 1970s (Bradford 1991). Beginning in the 1980s, researchers reported the frogs had disappeared from a significant portion of their range (Hayes and Jennings 1986). Davidson *et al.* (2002) reviewed 255 previously documented locations throughout the historical ranges of mountain yellow-legged frog and Sierra Nevada yellow-legged frog, based on Jennings and Hayes (1994), and they concluded that 83 percent of these sites no longer supported extant populations. Vredenburg *et al.* (2007) further compared recent surveys from 1995 to 2004 with museum records of specimens collected between 1899 and 1994 and found that 93 percent of locations with historic records of the Sierra Nevada yellow-legged frog sites were extirpated. Most recently from 2002-2009, watersheds containing over 2,900 meadows, lakes, ponds or stream reaches were surveyed for both species: breeding was found in 4 percent of watersheds that had frog records from 1990-2001, and only 2 percent of watersheds that had frog records prior to 1990 (Brown *et al.* 2014).

Overall, recent surveys estimate 65-95 percent disappearance from their historical range (Knapp and Matthews 2000a, Vredenburg *et al.* 2007, California Department of Fish and Wildlife 2014 a, b). Furthermore, extant populations are much smaller than historical populations (57 percent of watersheds surveyed had <10 adults/subadults and <10 tadpoles, Foote *et al.* 2013, Brown *et al.* 2014). Populations in the northern range of the Sierra Nevada yellow-legged frog are particularly vulnerable to stochastic environmental events and loss of genetic variation due to their small size and isolation from other populations (Service 2014).

The Sierra Nevada yellow-legged frog is imperiled by a variety of factors, particularly invasive predators and disease (Bradford 1989, Bradford *et al.* 1998, Knapp and Matthews 2000a, Fellers *et al.* 2001). Because the species has a short active season, they must overwinter in aquatic habitats for much of the year, and they require perennial water for reproduction (Zweifel 1955, Bradford 1983, Matthews and Pope 1999, Knapp and Matthews 2000a, Brown *et al.* 2014), it is especially vulnerable to such threats. The introduction of trout to historically fish-free lakes in the Sierra Nevada reduced the distribution and abundance of the Sierra Nevada yellow-legged frog (Bradford 1989, Knapp and Matthews 2000a, Knapp 2005). Prior to the mid-19th century, almost all lakes and associated streams in the Sierra Nevada above 6,000 feet were fishless, but as a result of 150 years of fish stocking throughout the region, all watersheds now contain as many as five non-native trout species (Moyle *et al.* 1996, USFS 2013). Besides direct predation, trout can also further fragment small populations by disrupting dispersal and recolonization routes (Bradford *et al.* 1993). In addition, introduced bullfrogs co-occur with native ranid species at lower elevation sites (generally below 6,000 feet), and may also increase predation and competition, though their exact contribution to the decline remains unknown (Casper and Hendricks 2005).

Diseases also pose a significant threat – especially chytrid fungus (*Batrachochytrium dendrobatidis*, or Bd), documented as a primary factor in widespread declines in Sierra Nevada yellow-legged frogs across the Sierra Nevada over the past several decades (Rachowicz *et al.* 2006, Vredenburg *et al.* 2010). Their highly aquatic life history appears to make these frogs particularly susceptible to this fungus (Fellers *et al.* 2001). Human activities can also facilitate the spread of disease by encouraging further introduction of non-native carriers and even acting as carriers themselves.

Finally, though the Sierra Nevada yellow-legged frog might not be losing much habitat *per se* by human development, additional activities such as water development, mining, and roads are increasingly fragmenting these populations. As the majority of remaining frog populations are small and isolated, they are vulnerable to stochastic events, increased inbreeding, and loss of genetic

diversity (Bradford *et al.* 1993, Knapp *et al.* 2007, Brown *et al.* 2011). Furthermore, climate change will reduce snow pack and increase evapotranspiration that may result in desiccation of some breeding ponds which in turn would reduce breeding success (Lacan *et al.* 2008) and affect survivorship (Blaustein *et al.* 2010; Walls *et al.* 2013).

Environmental Baseline of the Sierra Nevada Yellow-legged Frog

Approximately 63 acres of suitable habitat for the Sierra Nevada yellow-legged frog is present in and downstream of Mattley Meadow (Figure 1). Of this total, six acres is known to be occupied by the species. No suitable Sierra Nevada yellow-legged frog habitat is present in Mattley Creek Meadow.

Mattley Meadow contains high and middle gradient riparian meadow, the confluence of multiple small drainages and hillslope flows. Three tributaries to Mattley Creek (the western, central, and eastern channels) flow through the meadow (Figure 2). These channels are incised in main gullies from 2.5 to 10 feet deep. A large mature aspen stand within the meadow has died off and significant conifer encroachment has resulted from meadow dewatering. Except for immediately following snowmelt, there is little surface water in the meadow outside of the channels.

Amphibian VES surveys have been conducted on multiple occasions in the action area, however, Sierra Nevada yellow-legged frogs have been detected only in the western channel (Table 1, Figure 2) and at one location downstream of the meadow in Mattley Creek (Figure 2). eDNA sampling of all three channels was conducted by the Forest Service in 2017 and sample analysis corroborates previous VES records.

Table 1. Sierra Nevada yellow-legged frogs encountered during Forest Service VES surveys of the western channel, Mattley Meadow.

Year	Observations
2014	212 tadpoles
2015	2 adults, 18 metamorphs, 22 tadpoles
2016	2 adults, 4 tadpoles
2017	2 adults, 1 subadult
2018	2 adults, 7 tadpoles

Mattley Meadow frogs are a stream-dwelling population. No information about the presence of permanent water bodies within the meadow or population's use of the meadow prior to degradation exist; however, based on knowledge of other stream-dwelling populations, it is likely that frogs seasonally dispersed from any permanent waterbodies in the meadow or nearby to utilize adjacent wet meadow habitat during the wet season, moving back to reliable water sources as the meadow dried in late summer/early fall (L. Wilkinson, personal communication, 2020). At present, aquatic habitat for frogs is restricted to the western stream channels within the meadow and reaches immediately downstream. While the western channel is deeply incised, a lowered floodplain has formed at the bottom of the gully, creating suitable frog habitat. Within Mattley Meadow, tadpoles have been found in two general areas: an off-channel, groundwater fed, willow shrouded pool approximately 0.3 meter in depth within the lowered floodplain of the western channel (upper breeding pool) and a slow moving pool around 0.5 meter deep near the outlet of the meadow (middle breeding pool) (Figure 2). Tadpoles have also been detected approximately 100 meters downstream of the meadow (Figure 2). At this downstream location the channel is not incised and has a bedrock, boulder, gravel substrate. The breeding sites at Mattley Meadow are atypical and perhaps lower quality in that they are relatively shallow and may not be permanent in drier years. This is consistent with the irregular observations of tadpoles and young of year in the meadow.

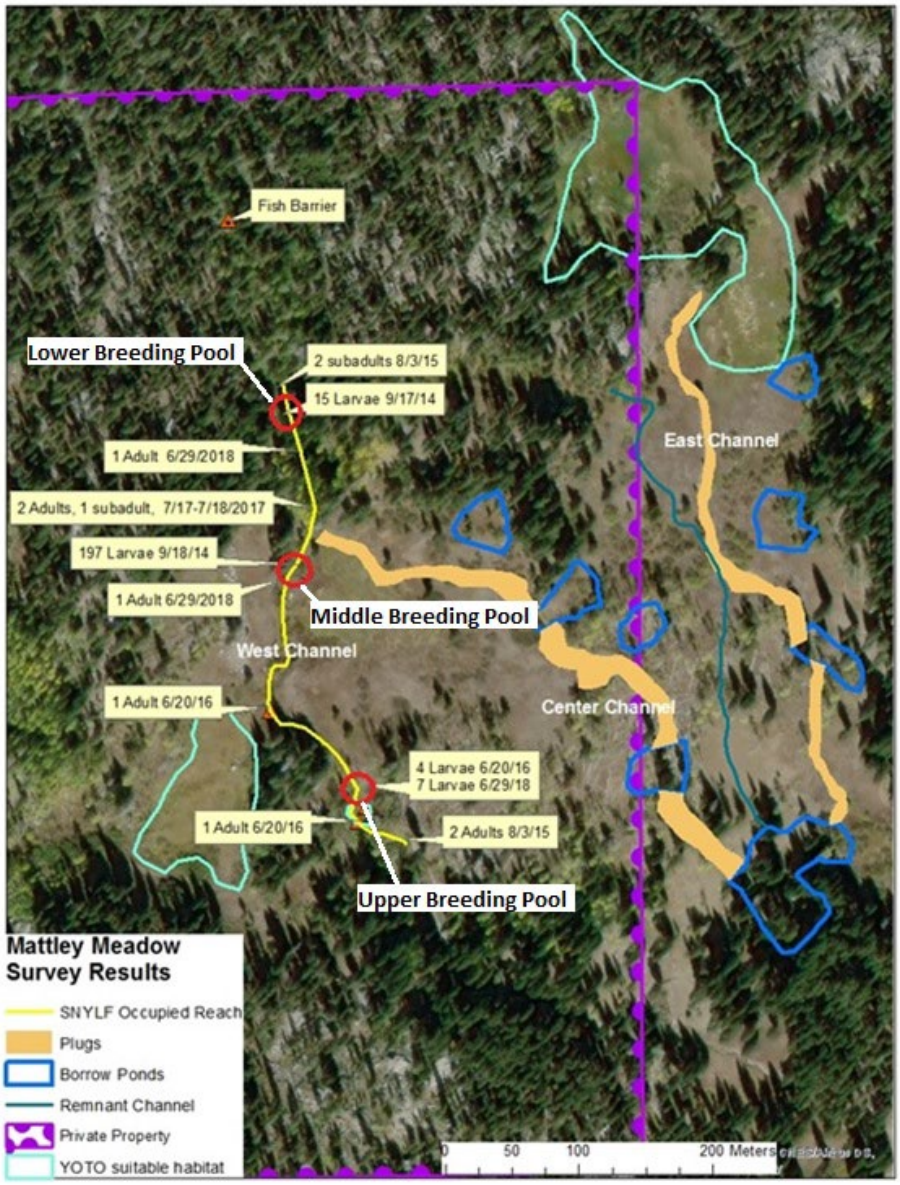

Figure 2. Approximate locations (red circles) of Sierra Nevada yellow-legged frog breeding habitat within and downstream of Mattley Meadow. Modified from Figure 5-2 of the Biological Assessment.

The middle channel in Mattley Meadow is deeply incised (3-10 feet), has deep silty substrate, and extensive emergent vegetation. The eastern channel is also deeply incised (2.5 -9 feet), has minimal sinuosity, and has primarily sand/gravel substrate. Both of these channels have been observed to dry nearly completely in late fall of low water years. Neither channel provides suitable breeding habitat for Sierra Nevada yellow-legged frogs. Suitability for non-breeding use by post-metamorphic individuals is low to moderate but no frogs have been detected in these channels. Because the channels are detached from the floodplain, the majority of the surrounding terrestrial habitat is xeric and not conducive to frog dispersal.

The existing data indicate that the population of Sierra Nevada yellow-legged frogs in Mattley Meadow is small, and inconsistent tadpole detections and sparse detections of subadults suggest that recruitment into this population is irregular. The nearest known Sierra Nevada yellow-legged frog occurrences to the Mattley Meadow population are approximately 1.3 miles west of the action area

at Moore Creek, where all lifestages have been detected, with the most recent detection occurring in 2008; and approximately 2 miles west of the action area at a pond near Moore Creek, where one adult was detected in 2009. The populations at Moore Creek and Mattley Meadow are somewhat disjunct from other known populations in the vicinity. The nearest known extant populations are over 8.5 miles to the northeast at Wheeler Lake.

The primary threats to Sierra Nevada yellow-legged frogs are competition with and predation by non-native trout, and infection with chytrid fungus (see *Status and Threats Overall* section, above). While trout are present in Mattley Creek below Mattley Meadow, a barrier prevents fish from moving upstream into suitable and occupied frog habitat. The Bd status of this population is not currently known; however, swab samples were collected in 2017 and are in the process of being tested for Bd DNA.

Current activities within and in the vicinity of the action area that have the potential to affect Sierra Nevada yellow-legged frogs include recreation such as motorized trail use; vegetation management (e.g., timber, prescribed burning, invasive species control); and livestock grazing. Both private and NFS lands in Mattley Meadow are grazed by livestock, with the private in-holding grazed as part of a larger allotment administrated by the Stanislaus National Forest. The meadow typically is used as a late season gathering pasture, with the majority of use occurring between mid-August and mid-September; however, some use may occur as early as mid-June. While up to 171 cow/calf pairs are authorized under the allotment permit, limited cattle activity or disturbance has been documented in close proximity to the occupied western channel, likely because the incised gully is relatively inaccessible to cattle.

No studies have directly examined effects to Sierra Nevada yellow-legged frogs and the existing literature regarding grazing impacts to other amphibian species is equivocal and incomplete. Nevertheless, the Mattley Meadow population likely experiences some adverse effects from grazing activities, primarily from impacts to riparian and upland vegetation, and increased erosion and sedimentation processes. Implementation of Forest Service S&Gs, BMPs, and project-specific design criteria aim to reduce the potential impacts of the agency's land management on Sierra Nevada yellow-legged frogs and their habitat. The Forest Service's portion of Mattley Meadow is also a monitoring site for forage use and is representative of the entire meadow.

Effects of the Action

There is considerable uncertainty regarding the extent and magnitude of potential adverse effects to Sierra Nevada yellow-legged frog from the proposed project because, while the project has been designed to restore the hydrologic connectivity of Mattley Meadow, a number of variables, including the nature of the hydrologic connection between the central, eastern and western channels, are not known. In addition, the proposed project does not include continued maintenance of the ponds and plugs, which is often necessary to prevent ponds from filling in with vegetation and plugs from naturally eroding away or failing. As a result, the type and spatial and temporal extent of potential effects to Sierra Nevada yellow-legged frogs are difficult to predict. Because of this uncertainty, the Service analyzed effects from the perspective of what we believe to be the worst-case scenario that is reasonably likely to occur.

After review of the proposed action and other information available, the Service has concluded that Sierra Nevada yellow-legged frogs are likely to be affected by the proposed project. The primary anticipated effect is alteration and potential loss of breeding and non-breeding habitat, and, to a lesser extent, disturbance from noise and vibration. We anticipate other effects are not likely to occur or will occur at insignificant or discountable levels. These are addressed briefly below.

Direct Injury or Mortality. Direct injury or mortality of Sierra Nevada yellow-legged frogs from construction is not expected because (1) ground-disturbing work will avoid the occupied western channel; (2) VES and eDNA surveys indicate that the likelihood of frogs occurring in the central and eastern channels is very low; (3) terrestrial habitat within the meadow is xeric and not conducive to frog dispersal; (4) work will be halted for a 24-hour period if a significant rain event (which increases the likelihood of over-land movements by frogs) occurs; and (5) an experienced biologist will be on site for the duration of the project, conducting daily pre-work surveys, monitoring for the presence of frogs, and halting work as needed if a frog is encountered.

Effects from Trail Rerouting. Adverse effects to Sierra Nevada yellow-legged frogs from trail rerouting are not expected because (1) the existing section of trail is located in poor quality terrestrial habitat outside of the anticipated dispersal distance (i.e., 82 feet) of frogs in the occupied western channel and (2) the proposed reroute moves this section of trail out of the meadow into the surrounding forest. (i.e., further from occupied or suitable habitat).

Effects from Capture, Handling, and Relocation. In order to avoid the risk of injury and mortality to Sierra Nevada yellow-legged frogs during restoration activities, frogs, tadpoles, and egg masses may be captured and relocated to nearby suitable habitat that will not be affected by the proposed activities. Injury, mortality or other physical effects (e.g., prolonged increased stress response) are not expected because only a Service-approved biologist, who is experienced with the species and proper handling techniques, will capture and handle frogs, tadpoles, and egg masses.

The remainder of this analysis addresses those effects of the proposed project that the Service believes will adversely affect the Sierra Nevada yellow-legged frog population at Mattley Meadow.

The Mattley Meadow Sierra Nevada yellow-legged frog population is very small and likely limited by the availability of breeding habitat. Therefore, any adverse effects to breeding success or breeding habitat could result in the extirpation of the population. Furthermore, Mattley Meadow is geographically isolated from the nearest known extant Sierra Nevada yellow-legged frog populations, so if the existing population is lost, recolonization is highly unlikely.

Habitat Alteration. The greatest potential impact to Sierra Nevada yellow-legged frogs from the proposed action is the modification of habitat in Mattley Meadow and directly downstream. While the proposed restoration aims to improve meadow habitat and promote wet meadow vegetation, it is likely to affect up to 63 acres of suitable Sierra Nevada yellow-legged frog habitat in the action area (Figure 1). While some effects, such as the expected conversion of xeric terrestrial habitat to wet meadow habitat, will be beneficial to the species, other effects are likely to result in decreased breeding habitat quality and availability, and indirect injury and mortality through habitat alteration. These are addressed in detail below.

The project will remove unoccupied stream habitat by filling portions of the central and eastern channels and will remove marginally suitable upland habitat via the excavation of the series of ponds (Figures 1 and 2). While selected ponds will be designed to incorporate primary constituent elements of Sierra Nevada yellow-legged frog suitable aquatic breeding and rearing habitats, it is not known whether these ponds will be utilized by the stream-adapted Mattley Meadow population. Sierra Nevada yellow-legged frogs typically exhibit breeding site fidelity and no research exists to indicate whether individuals will move to a novel breeding habitat type that is created immediately adjacent to existing utilized breeding habitat. Information about the population's use of the meadow as breeding habitat prior to degradation is lacking. Therefore, whether the project will benefit the population through the creation of functional breeding habitat is unknown. If the frogs utilize the created ponds, water depths are expected to initially be deep enough for breeding and overwintering;

however, as no maintenance is proposed, the ponds may silt in over time, rendering the created habitat unsuitable to fulfill these life history requirements.

Regardless of whether the ponds are utilized by Sierra Nevada yellow-legged frogs, they are expected to hold water year-round and therefore can serve as suitable habitat for bullfrogs, an invasive predator of Sierra Nevada yellow-legged frogs that also competes with the species for resources. While bullfrogs are not currently present in Mattley Meadow, the species' range is increasing in the Sierra Nevada, even in remote locations, and it is reasonable to anticipate that bullfrogs will expand into the vicinity of Mattley Meadow in the future. While bullfrogs may occupy multiple types of waterbodies, they require still, permanent water for reproduction. Plug and pond methods of meadow restoration have been documented to provide habitat for bullfrogs, as they result in the creation of habitat preferred by the species (Fuller et al. 2011; Pope et al. 2015, 2018). The ponds constructed as part of the proposed project provide this same type of bullfrog breeding habitat, thereby further facilitating bullfrog range expansion and it is likely that, when bullfrogs expand into the meadow, they will prey upon and outcompete Sierra Nevada yellow-legged frogs, likely driving this small population to extirpation.

Modification of central and east channels to meet the project goal of raising the meadow water table will have effects on the occupied western channel and on occupied habitat downstream of the meadow; however, the magnitude of those effects is unknown because they are driven by the degree of hydrological connectivity among the channels, which is not known. In discussing hydrological impacts to the western channel, the Biological Assessment presents two impact scenarios, dependent on whether there is little or substantial hydrological connection between the western channel and the central and eastern channels. Effects to Sierra Nevada yellow-legged frogs in the western channel will be most severe if there is extensive groundwater connectivity. The proposed project aims to decrease peak flood flows, increase early season base flows, and reduce late season flows in the eastern and central channels. If the three channels have extensive groundwater connection, the western channel will experience the same flow changes. The Forest Service will implement pre- and post-project habitat monitoring (see *Conservation Measures* section, above) over the period of time during which effects from the restoration are most likely to first be observed, to determine whether project goals have been met and to evaluate and document the effects of the proposed project on Sierra Nevada yellow-legged frogs and their habitat.

Decreased peak flood flow in the western channel is likely to reduce the amount of scouring of occupied breeding and overwintering habitat in the upper and middle pools, and decreased peak flood flows in all three channels will reduce the amount of scouring in the lower breeding pool. Scouring can remove algal communities that tadpoles feed on and the nutrients that support algal growth. Therefore, reduced scouring may result in increased food availability in breeding and overwintering habitat. How the Mattley Meadow population persists in the face of high runoff events is not known; however, it is likely that, at present, spring high runoff events flush tadpoles downstream into unsuitable habitat. It is hypothesized that juveniles and adults move into sheltered side pools and other nearby aquatic habitat to avoid high peak flow events (L. Wilkinson, personal communication, 2020). Lower peak flood flows are expected to reduce the likelihood that tadpoles are flushed downstream as flow rates will not be as forceful.

Increased early season base flows could seasonally increase the amount of aquatic habitat availability to Sierra Nevada yellow-legged frogs as well as increase the amount of nutrients and dissolved oxygen available to tadpoles and egg masses; however, if the increase is too great, flows may dislodge egg masses, causing them to break apart and/or wash downstream. No estimation of the expected increase in early season base flows has been quantified; therefore, it is not possible to determine if this change will have a beneficial or adverse effect to frogs. However, if base flows are

high enough to dislodge or damage egg masses, population-level effects are likely to occur because breeding success will be reduced. If early season base flows are too high for successful egg-rearing, than the restoration will have resulted in the loss of the existing stream-based breeding habitat in the western channel and below the meadow.

Reduced late season flows are likely to result in less aquatic habitat for Sierra Nevada yellow-legged frogs in the western channel and downstream of the meadow, as portions of the aquatic habitat in the action area that are already subject to periodic drying in the late summer and fall will be more likely to go dry. These areas include the middle breeding pool. Reduced late season flows will increase the frequency and duration of periodic drying in frog aquatic habitat. A reduction in late season flows is not expected to affect the upper breeding pool because this location is an off-channel pool that is dependent on groundwater elevation, not stream flow. As discussed previously, a reduction in breeding and tadpole overwintering habitat is expected to have population-level effects to the Mattley Meadow population. In addition, should tadpole overwintering habitat dry out in late summer or early fall, any tadpoles present will be subject to desiccation, resulting the a decrease in recruitment into the population.

There is potential for additional effects to Sierra Nevada yellow-legged frogs once construction is complete if portions of the constructed ponds or plugs fail or fill in with sediment. It is not uncommon for completed pond and plug projects to require maintenance, particularly as severe storms and heavy snowmelt typical of the Sierra Nevada can result in plug degradation and channel instability (Pope et al. 2015, 2018; D. Ciotti, personal communication, 2020). Plug failure can occur partially or in full and can happen suddenly (i.e., an entire section of plug is uprooted during an uncharacteristically high flow event) or over longer time periods (e.g., flowing water eats away at the plug, slowly carving away portions). If one or more of the plugs in the central or eastern channels is compromised, sediment could ultimately be transported into the lower breeding pool downstream of the meadow (Figure 2). A small increase in sediment into this reach is not expected to significantly alter the habitat or affect any tadpoles present, as spring flow rates likely are sufficient to continue the transport of sediment downstream. However, a sudden, large influx of sediment and uprooted vegetation could increase turbidity in the lower breeding pool, cover the existing gravel and bed rock substrate with sediment, and fill in pools. If a sudden, large influx of sediment were to occur, any tadpoles present in the reach would be affected by habitat degradation and loss, and decreases in the availability of their algal food base due to it being buried by sediment. These effects in turn could cause decreased fitness and mortality of tadpoles. Individuals could also suffer direct injury or mortality from being smothered by a large, sudden input of sediment. The likelihood of this type of plug failure event is difficult to predict, as it is heavily influenced by unpredictable external variables such as winter storm severity. Any earth fill erosion or failure is anticipated to be most likely during the first few years after construction, as the meadow system and earth fills will stabilize and adjust to altered water and sediment transport through the meadow over time. Post-project monitoring (as described in the *Conservation Measures* section, above) will coincide with this period, allowing the Forest Service to document incidences of earth fill erosion and/or potential frog habitat degradation.

If successful, the proposed project is expected to have a beneficial effect on Sierra Nevada yellow-legged frog dispersal and upland habitat because the project will convert xeric habitat into wet meadow that is suitable terrestrial habitat for the species. However, the creation of ponds and plugs, and the resulting flow changes in the eastern, central, and potentially western channels are expected to change sediment and nutrient transport within the meadow system. The type and extent of these changes are challenging to predict but may result in cascading effects to the Sierra Nevada yellow-legged frog prey base through alteration of prey diversity and availability.

Ultimately, if one or more of the breeding habitat locations is adversely altered by the proposed project through increased sedimentation or flow changes, population-level effects could occur, up to and including extirpation of Sierra Nevada yellow-legged frogs in Mattley Meadow. The Forest Service will implement pre- and post-project habitat monitoring to evaluate whether the existing habitat has been adversely affected by changes in sedimentation and/or flows (see *Conservation Measures*, above).

Noise and Vibration. There is uncertainty regarding how noise and vibration disturbance may affect amphibians. The Service is not aware of existing scientific literature that documents Sierra Nevada yellow-legged frog response to noise. However, the Service believes that it is reasonable to assume that Sierra Nevada yellow-legged frogs may be disturbed by project noise and vibrations produced by the use of construction equipment adjacent to occupied habitat. Frogs may react to repetitive disturbance by exhibiting stress responses and altering their use of occupied habitat. Exposure to project noise and vibrations will be limited to a one-month period during the summer but could be sufficient to reduce individual physiological fitness if disturbed frogs are temporarily displaced from preferred foraging, sheltering, and basking habitat.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service identified one future non-federal action that is reasonably certain to occur: continued livestock grazing on the privately-owned portion of Mattley Meadow. The effects to Sierra Nevada yellow-legged frog from ongoing grazing in the meadow were previously described in the *Environmental Baseline* section of this Biological Opinion. Future grazing in the restored habitat will only occur once the areas have become sufficiently revegetated – likely two to three years post-restoration (L. Wilkinson, personal communication, 2020). Effects to Sierra Nevada yellow-legged frogs and their habitat from continued grazing will be reduced by implementation of Forest Plan standards to the allotment at large, including on private lands. These measures include limitations on allowable utilization of herbaceous vegetation and shrubs, limits on allowable streambank disturbance, and a defined season of use. Completion of the proposed project is expected to improve forage conditions across the entirety of Mattley Meadow, reducing the tendency for cows to congregate in limited areas of superior forage, and subsequently decreasing the potential for effects to Sierra Nevada yellow-legged frog habitat (such as trampling and chiseling) as grazing impacts will be more dispersed across the meadow. As a result of the meadow restoration and implementation of the Forest Plan standards, effects to the Mattley Meadow frog population from grazing activities are expected to be reduced in comparison with existing grazing practices.

Conclusion

After reviewing the current status of the Sierra Nevada yellow-legged frog, the environmental baseline for the action area, the effects of the proposed Mattley Meadow Restoration Project, and the cumulative effects, it is the Service's biological opinion that the Mattley Meadow Project, as proposed, is not likely to jeopardize the continued existence of the Sierra Nevada yellow-legged frog. The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species based on the following: (1) the proposed project will avoid direct impacts to Sierra Nevada yellow-legged frog occupied habitat; and (2) the proposed conservation measures and monitoring program will

minimize potential injury or mortality of individual Sierra Nevada yellow-legged frog in the action area.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

The Service anticipates that incidental take of Sierra Nevada yellow-legged frogs may occur as the result of the proposed action as a result of capture, harm, injury, or mortality; however, incidents of incidental take may be difficult to detect due to the species' life history and ecology, as well as compounding external variables that affect survival. We cannot measure the total number of individuals taken as a result of the proposed action because Sierra Nevada yellow-legged frogs are difficult to observe due to their size, cryptic coloring, and complexity of their habitat. Injury or mortality of Sierra Nevada yellow-legged frogs, particularly as a result of adverse impacts to habitat hydrology and groundwater, is likely to go undetected because individuals may be hidden in vegetation, scavenged, or swept downstream.

Quantifying the extent of incidental take attributable to the proposed action is complicated by external variables that can affect survival and the availability of breeding habitat, including annual fluctuations in precipitation and snowmelt.

The Sierra Nevada yellow-legged frog population at Mattley Meadow is small (Table 1) and isolated from the nearest substantial adjacent populations. Impacts to just a few individuals or to breeding habitat could have population-level effects and no other substantial populations are known to occur

close enough to Mattley Meadow to serve as a source of recruitment. Therefore, we are authorizing incidental take in multiple forms that capture anticipated take from both direct and indirect effects:

- The detection of one (1) injured or dead sub-adult, or adult Sierra Nevada yellow-legged frog and five (5) injured or dead tadpoles during the construction period.

- The degradation of one (1) of the three known Sierra Nevada yellow-legged frog breeding habitats in the action area as a result of the proposed project, documented during construction or post-restoration monitoring (see *Conservation Measures* section, above). For the purposes of this take authorization, degradation is defined as:

    - A reduction or loss of water in the breeding habitat such that breeding success and/or tadpole survival rates at that location are reduced;

    - Increased sedimentation that partially or completely fills in the breeding habitat such that breeding success and/or tadpole survival rates at that location are reduced;

    - Increased or decreased flow rates in the breeding habitat such that breeding success and/or tadpole survival rates are reduced.

- The capture and subsequent release of all Sierra Nevada yellow-legged frogs of any lifestage in the action area, as required by Conservation Measure 4.

We believe that if any of these take thresholds are exceeded then likely other individuals have also been adversely affected by the project but not detected. Exceeding any of these take thresholds will necessitate that the Forest Service reinitiate with the Service to determine if additional avoidance measures can be used to decrease adverse effects to Sierra Nevada yellow-legged frogs during project implementation. If more than one (1) injured or dead Sierra Nevada yellow-legged frog sub-adult or adult is detected; more than five (5) injured or dead Sierra Nevada yellow-legged frog tadpoles are detected; OR more than one breeding habitat is degraded as a result of the Mattley Meadow Restoration Project, then take is exceeded and, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

Upon implementation of the following reasonable and prudent measures, incidental take of Sierra Nevada yellow-legged frogs associated with the Mattley Meadow Restoration Project will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this opinion.

Effect of the Take

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction. This amount of incidental take will not prevent this population of Sierra Nevada yellow-legged frogs from recovering to pre-take levels because we believe that the project-specific conservation measures (including limited operating periods, and the presence of a qualified biologist) as well as the terms and conditions detailed below will be effective in minimizing the amount and extent of incidental take from the proposed action.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of the Sierra Nevada yellow-legged frog:

1. All Conservation Measures, as described in the Project Description section of this Biological Opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the Terms and Conditions below.

2. The Forest Service will minimize the potential for impacts to Sierra Nevada yellow-legged frogs from any hydrologic and groundwater changes resulting from the meadow restoration. Further, this reasonable and prudent measure shall be supplemented by the Terms and Conditions below.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, the Forest Service shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions implement the Reasonable and Prudent Measures:

1) The Forest Service shall implement the avoidance, minimization, survey, monitoring, and reporting measures described in the *Conservation Measures* section of the Biological Opinion.

2) The Forest Service has proposed to implement a Sierra Nevada yellow-legged frog survey and habitat monitoring plan (as described in the *Conservation Measures* section). The Forest Service will ensure that the finalized plan has been reviewed and approved by the Service and the CDFW prior to initiating any ground-disturbing project activities.

3) As part of the monitoring plan, the Forest Service shall assess potential impacts to Sierra Nevada yellow-legged frogs resulting from changes to hydrology and/or groundwater from the restoration project, with a focus on breeding and tadpole overwintering habitat. If it is determined that the restoration project has resulted in degradation or loss of Sierra Nevada yellow-legged frog aquatic habitat, the Forest Service shall implement further restoration in Mattley Meadow to restore all adversely affected Sierra Nevada yellow-legged frog habitat.

4) The Forest Service will provide the Service with results of the project's frog surveys in a final report (see *Conservation Measures* section) but is not required to provide information on frog survey results in the annual report. However, should the Forest Service obtain atypical survey results (e.g., large fluctuation in the number of frogs observed), the Forest Aquatic Biologist will notify the Sierra-Cascades Division (contacts below) for Service awareness.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. The Forest Service should continue to support and implement projects that aid in the recovery of listed species such as the Sierra Nevada yellow-legged frog, including conservation actions identified in the *Interagency Conservation Strategy for Mountain Yellow-legged Frogs (Rana sierrae and Rana muscosa) in the Sierra Nevada* (MYLF ITT 2018).

In order for the Service to be kept informed of actions that minimize or avoid adverse effects or benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the proposed Mattley Meadow Restoration Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the federal agency or by the Service where discretionary federal agency involvement or control over the action has been retained or is authorized by law, and:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;

(b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

(c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the Biological Opinion; or

(d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this Biological Opinion, please contact Jill Seymour, Senior Biologist (jill-marie_seymour@fws.gov) or Rick Kuyper, Sierra/Cascades Division Chief (richard_kuyper@fws.gov), at the letterhead address or at (916) 414-6621.

Sincerely,

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ec:
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PERSONAL COMMUNICATIONS

Ciotti, D. 2020. Phone conservation between Damion Ciotti, Service, and Jill Seymour, Service, on February 20, 2020.

Wilkinson, L. 2020. Phone conversation between Lucas Wilkinson, USFS, and Jill Seymour, Service on March 30, 2020.