United States Department of Agriculture
Forest Service

Incline Lake Dam Project

Environmental Assessment

Lake Tahoe Basin Management Unit
Pacific Southwest Region
Washoe County, Nevada

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Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
BA/BE	Biological Assessment/Biological Evaluation
BMPs	best management practices
BMPEP	Best Management Practice Evaluation Program
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CO	carbon monoxide
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationship System
dbh	diameter at breast height
DOE	Determination of Eligibility
EA	environmental assessment
EIP	Environmental Improvement Program
ERA	equivalent roaded acres
ESA	Endangered Species Act of 1973 as amended
FONSI	Finding of No Significant Impact
Forest Plan	Lake Tahoe Basin Management Unit Land and Resource Management Plan
Forest Service	USDA Forest Service
FSORAG	Forest Service Outdoor Recreation Accessibility Guideline
GHGs	greenhouse gasses
GIS	Geographic Information System
HUC	Hydrologic Unit Code
LOP	limited operating period
LTBMU	Lake Tahoe Basin Management Unit
MIS	Management Indicator Species
MIS Report	Management Indicator Species for the Lake Tahoe Basin Management Unit
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act

Acronym/ Abbreviation	Definition
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NO_x	nitrous oxides
NRHP	National Register of Historic Places
SEZ	stream environment zone
SHPO	State Historic Preservation Officer
SNF MIS	2007 Sierra Nevada Forests Management Indicator Species
TEPCS	Threatened, Endangered, Proposed, Candidate and Sensitive Species
TRPA	Tahoe Regional Planning Agency
SIS	Special Interest Species
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

Summary

The Lake Tahoe Basin Management Unit (LTBMU) proposes to restore the human influenced disturbance footprint of the dams within the Incline Lake Dam project area, such that surface and groundwater hydrologic function are restored to a point where natural processes would restore the groundwater dependent ecosystems that characterized this site prior to when the dam was created. Under this Proposed Action the Incline Lake Dams would be completely removed and the topography around the dams and the historic disturbance footprint would be recontoured to match adjacent contours and grades.

This project is located off of State Route 431 in Washoe County, Nevada near Tahoe Meadows. The reservoir and dams (See Figure 1-2 for location of the major dam and minor dam) are situated on Assessor Parcel Number 048-041-15, at an elevation of approximately 8,300 feet. The total project area is approximately 46 acres and includes the roadway into the dam and the human influenced disturbance footprint of the dam (See Project Analysis Area (Figure 1-1) and Project Area Context maps (Figure 1-2)).

Additional restoration actions may be required outside of the Incline Dam project boundary and/or scope, to fully achieve restoration of hydrologic function supporting groundwater dependent ecosystems in this Incline Dam project area. Actions outside of this project area or project scope will be addressed in the future through a full analysis of proposed management of the entire Incline Lake Acquisition Area.

These actions are needed because the current dams and spillway do not meet current public safety and water quality protection standards, and long term planning for the remainder of the property cannot begin until the fate of the dams is determined.

In addition to the Proposed Action (Alternative 2), the Forest Service also evaluated the following alternatives:

- **Alternative 1 — No Action.** This is not a typical no-action alternative because the existing structures pose a hazard in their current condition. This alternative would leave the dams in their current configuration, but provide for water flow by removing the outflow pipe and breaching the main dam in that location. No work would be done to the secondary dam. This alternative would also include installing log/boulder grade control structures as needed to stabilize channels throughout the footprint of the existing impoundment in order to reduce the possibility of erosion.
- **Alternative 3 —** This alternative is designed to respond to relevant issues identified through scoping. Under this alternative, a new dam would be constructed at Incline Lake. However, the new dam would not be as high as the existing dam due to safety considerations downstream. The project design features and BMPs that are prescribed for the Proposed Action would apply to this alternative as well.

Based upon the effects of the alternatives, the responsible official will decide:

- Whether or not to implement the project activities as described in the Proposed Action or select an alternative to the Proposed Action.

- Whether or not a Finding of No Significant Impact (FONSI) can be supported by the environmental analysis contained in this Environmental Assessment (EA).

Chapter 1
Introduction

1.1 Document Structure

The U.S. Department of Agriculture (USDA) Forest Service (Forest Service) has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This EA discloses the direct, indirect, and cumulative environmental effects that would result from the Proposed Action and Alternative Actions as well as the No Action Alternative. The document is organized as follows:

- **Chapter 1, "Introduction,"** includes information on the structure of the EA, background of the project, overview of the existing condition, the desired conditions, the purpose of and need for action, summary of the Proposed Action, applicable management direction, and the decision framework. This chapter also details how the Forest Service informed the public of the proposal through public involvement, describes the issues identified by the public, and summarizes laws, regulations, and policies that are applicable to the project.
- **Chapter 2, "Alternatives, Including the Proposed Action,"** provides descriptions of alternatives considered but dismissed from detailed analysis, the No Action Alternative, the Forest Service's Proposed Action, and two action alternatives to the Proposed Action. Detailed site maps of the existing project site and alternatives are included. Chapter 2 also summarizes the effects of the No Action Alternative and the action alternatives.
- **Chapter 3, "Affected Environment and Environmental Consequences,"** presents an overview of the analysis, the existing conditions, and the environmental effects of implementing the alternatives. The effects of the No Action Alternative are described first to provide a baseline for evaluation and comparison of the action alternatives.
- **Chapter 4, "Consultation and Coordination,"** provides a list of preparers and agencies consulted during the development of this document.
- The **appendices** include water quality protection best management practices. Additional documentation may be found in the project record located at the Forest Supervisor's office in South Lake Tahoe, CA.

1.2 Background

Incline Lake Dam was purchased by the Forest Service as part of a larger land acquisition (777 acres) on July 29, 2008. All buildings were removed from the property prior to the acquisition. As a part of the larger acquisition, a site investigation and assessment of the

major dam and spillway were commissioned. The results of the site investigation and assessment indicated that the existing major dam and spillway do not meet Federal, State or local standards for a high hazard dam. Before long-term planning can begin for the remainder of the property, the dams need to be addressed.

1.3 Overview of the Existing Condition

This project is located off of State Route 431 in Washoe County, Nevada near Tahoe Meadows (See Figure 1-1). The reservoir and dams (See Figure 2-1 for location of the major dam and minor dam) are situated on Assessor Parcel Number 048-041-15, at an elevation of approximately 8,300 feet. The total project area is approximately 46 acres and includes the roadway into the dam and the human influenced disturbance footprint of the dam (about 18-20 acres).

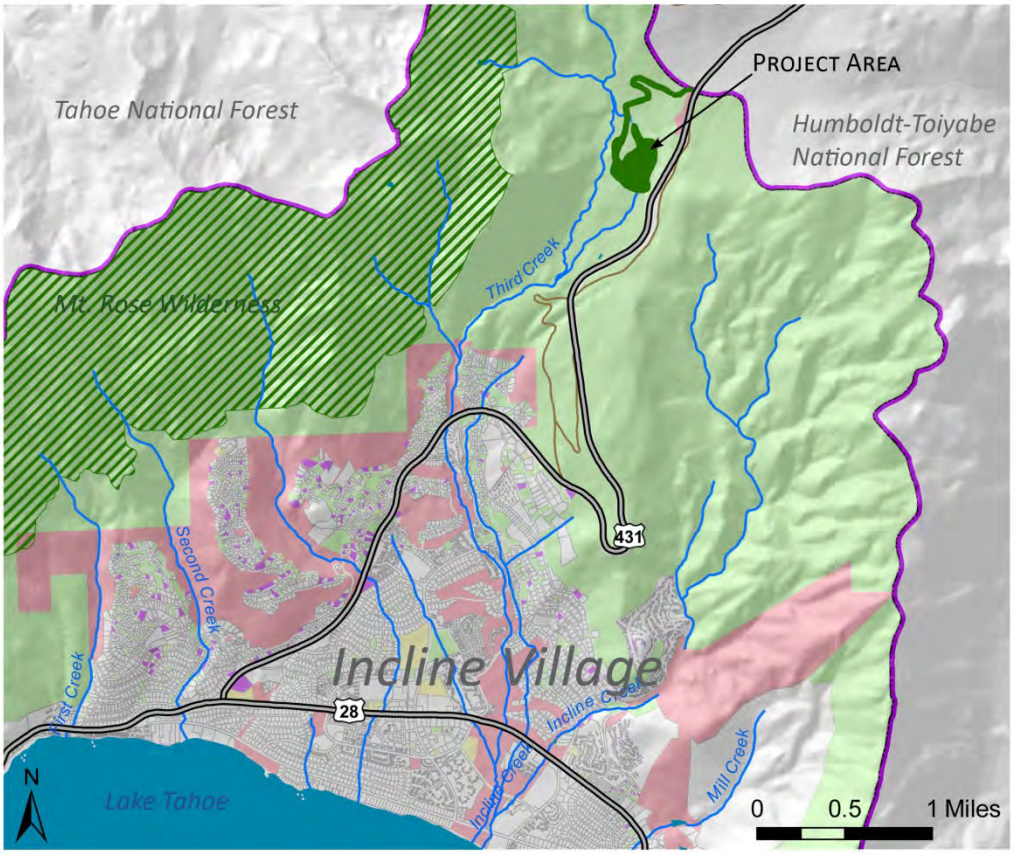
Records show the construction of the dams was completed in 1942 (RCI, 2006). The man-made lake was likely used for recreational purposes (swimming, boating, fishing, etc.) by the private owners. Water was diverted out of Third Creek to supply the man-made lake, but this diversion was shut down prior to the Forest Service acquiring ownership.

The addition of Third Creek water and ditching led to stream erosion. The creek has cut down through surface soils and continues to do so currently. This erosion front is located just beyond the rim of the old lake bed, where water plunges 6 feet over the head cut from the meadow surface to a raw stream bottom. Without intervention, erosion will continue to advance up valley and has already captured one of the headwater spring feeder streams, the bottom of which is eroding down currently.

The results of a site assessment done prior to the acquisition (Black Eagle Consulting, 2008) indicated that the existing dam and spillway (see Former Condition (Figure 1-2) and Existing Condition (Figure 1-3) maps) do not meet Federal, State or local standards for a high hazard dam and would liquefy during a seismic event, with the Incline Village fault about 1,000 feet from the former lake. Subsequently, the lake (which was approximately 18-20 acres) was drained and the outflow pipe was disabled so that it would not refill. Water currently flows freely through the underflow pipe.

Figure 1-1

Project Area Context



Legend

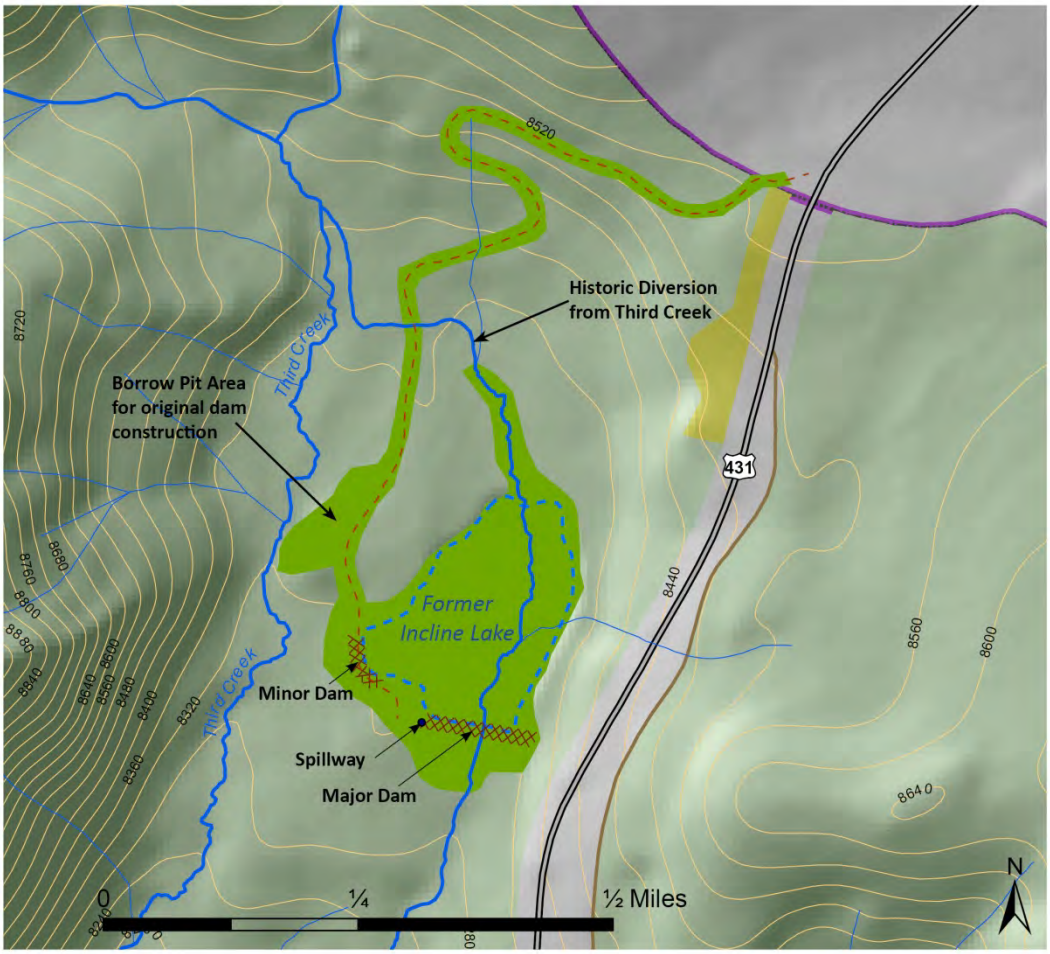
- Highways
- National Forest System Road
- Perennial Stream/River
- Project Area Boundary
- Wilderness
- County
- Incline GID
- Private
- State
- US Forest Service (LTBMU only)
- LTBMUBoundary

Incline Lake Dam Project Proposed Action

Lake Tahoe Basin Management Unit

Figure 1-2

Project Area



Legend

- LTBMUBoundary
- Highways
- National Forest System Road
- Contours 40 foot
- Ephemeral Stream
- Perennial River/Stream
- Incline GID ownership
- US Forest Service (LTBMU only)
- Project Area
- Former Incline Lake Footprint
- Access Road
- Dam Spillway
- Dam

Incline Lake Dam Project Proposed Action

Lake Tahoe Basin Management Unit

1.4 Desired Conditions

The desired condition for the project area is to remedy the existing condition of a high hazard dam that does not meet Federal, State or local standards. Additionally, the desired condition for the project area is to provide a sustainable hydrological system which supports groundwater dependent ecosystems and other riparian ecosystems that characterized the site prior to when the dams were created.

1.5 Purpose and Need for Action

There is a need from a public safety and water quality protection standpoint to remove the existing dams and spillway and to replace them with a system that meets current standards. There is also a need to address the dams before long term planning can begin for the remainder of the property. In addition, there is a need to stabilize and restore the area impacted by the dam and reservoir to protect water quality and riparian/aquatic habitat by maintaining or improving the condition of wetland, fen and other riparian systems in the project area.

1.6 Proposed Action

See Section 2.2 for a complete description of the Proposed Action.

1.7 Decision Framework

The LTBMU Forest Supervisor would decide:

1. Whether or not to implement the project activities as described in the Proposed Action or select an alternative to the Proposed Action.
2. Whether or not a Finding of No Significant Impact (FONSI) can be supported by the environmental analysis contained in this Environmental Assessment (EA).

This decision would only affect NFS lands. Coordination and permitting through the Nevada Department of Environmental Protection (NDEP) would be required to implement changes to the dam and water rights in the area. Implementation could begin as early as May 2015. Depending on construction funding, implementation is anticipated to be completed in 2-3 years.

1.8 Public Involvement and Results of Scoping

During preliminary review of the project with Forest Service personnel and with other interested agencies, several concerns were identified and were addressed in the final Proposed Action that was part of the formal scoping process. A couple of these preliminary concerns included:

- **The presence of invasive plants within the project area.** Design features will be implemented to prevent the spread of these plants during project construction.

- **The dam should be evaluated for eligibility to the federal register for historic places.** The dam itself is over 50 years old and needs to be evaluated for eligibility before the project is decided.

The project was listed on the LTBMU's quarterly "Schedule of Proposed Actions" on January 1, 2012. A scoping letter was mailed to stakeholders and interested parties on June 15, 2013. A press release was submitted to local news outlets (such as the Tahoe Tribune, Tahoe Mountain News, and Sacramento Bee) regarding the scoping of this project and identifying how the public could learn more about and comment on the proposal. The press release was published in multiple newspapers (Project Record Folder C6). A total of 20 written or electronic comment letters were submitted (Project Record Folder C7).

1.9 Issues

The Forest Service separated the issues brought up in the scoping comment letters into two groups: 1) non-relevant issues, and 2) relevant issues leading to an alternative to the Proposed Action. Project Record Document C-8 documents the comments and their categories and includes a list of non-relevant issues and reasons regarding their categorization as non-relevant.

- **Non-relevant issues** (Category 1) do not meet the purpose and need for the project; are outside the scope of the Proposed Action; are already decided by law, regulation, or Forest Plan; are not supported by scientific evidence; are addressed by project design features; or are addressed by additional information or clarification of the Proposed Action. Non-Relevant issues also represent opinions and statements which do not present problems or alternatives and include those comments that meet the Purpose and Need for the project but were considered in alternatives already studied and eliminated, or additional project design features were developed which reduced or eliminated the effects.
- **Relevant issues** (Category 2) meet the purpose and need for the project and are relevant in the extent of the geographic distribution, the duration of effects, or the intensity of interest or resource conflict and therefore merit consideration for the development of an alternative to the Proposed Action. The following relevant issues were identified by the Forest Supervisor:
    1. Restore the Dam - We received multiple comments from individuals and organizations that requested an alternative which would restore the dam in its current configuration. We have responded to this request by analyzing alternative 3, which would re-build a dam in the existing location.

1.10 Analysis Framework

In determining which issues and resources to analyze in detail in this EA, the LTBMU utilized direction contained in Forest Service Manual (FSM) 1909.15 – NEPA Handbook. Issue identification is specifically discussed in FSM 1909.15, Chapter 10, Section 12.4. It was determined that the following resources would not require detailed analysis in the EA:

Air Quality – Impacts to air quality were not deemed necessary for analysis, as they are typically associated with increased vehicular traffic or prescribed burning. This project would not increase traffic in the area and prescribed burning is not included as a project activity. Project Design

Features have been incorporated into the alternatives to reduce short-term, construction related air quality impacts associated with implementation.

Vegetation (Tree) Removal – Impacts to vegetation from the removal of trees was not deemed necessary for analysis because it is incidental to the project and only occurring on a small area (less than 4 acres). Impacts to other resources (mainly wildlife) from removal of trees are discussed in detail in Chapter 3.

1.11 Applicable Laws, Regulations, and Policies

All resource management activities described and proposed in this document would be consistent with applicable federal law and regulations, Forest Service policies, and applicable provisions of state law. The major applicable laws are as follows.

1.11.1 National Forest Management Act

The National Forest Management Act (NFMA) requires the development of long-range land and resource management plans. The LTBMU Forest Plan was approved in 1988 as required by this act. It has been amended several times, including in the Sierra Nevada Forest Plan Amendment (SNFPA) (USDA Forest Service 2004). The Forest Plan provides guidance for all natural resource management activities. The NFMA requires that all projects and activities be consistent with the Forest Plan. The Forest Plan has been reviewed in consideration of this project, and the design of the project is consistent with the Forest Plan. A Forest Plan consistency matrix and review for this project was completed (Project Record Document B-1).

1.11.2 Endangered Species Act

In accordance with Section 7(c) of the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) list of endangered and threatened species that may be affected by projects in the Lake Tahoe Basin Management Area was reviewed (verified January 7, 2014) and effects on those species are analyzed in the Aquatic and Wildlife BA/BE's (Project Record Folders F-1 and F-2).

1.11.3 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effect of a project on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places. Section 106 of the NHPA (Public Law 89.665, as amended) also requires federal agencies to afford the State Historic Preservation Officer a reasonable opportunity to comment. An evaluation of the dam has been prepared and submitted to the Nevada State Historic Preservation Officer. No other cultural sites or archaeological sites would be affected.

1.11.4 Clean Water Act (Public Law 92–500)

All federal agencies must comply with the provisions of the Clean Water Act (CWA), which regulates forest management activities near federal waters and riparian areas. The design features associated

with the Proposed Action ensure that the terms of the CWA are met, primarily prevention of pollution caused by erosion and sedimentation.

1.11.5 Environmental Justice (Executive Order 12898)

Executive Order 12898 requires that all federal actions consider potentially disproportionate effects on minority and low-income communities, especially if adverse effects on environmental or human health conditions are identified. Adverse environmental or human health conditions created by any of the alternatives considered would not affect any minority or low-income neighborhood disproportionately.

The activities proposed in alternatives were based solely on the existing and desired condition of the project area. In no case were the project designs based on the demographic makeup, occupancy, property value, income level, or any other criteria reflecting the status of adjacent non-federal land. Reviewing the location, scope, and nature of the proposed alternatives in relationship to non-federal land, there is no evidence to suggest that any minority or low-income neighborhood would be affected disproportionately. Conversely, there is no evidence that any individual, group, or portion of the community would benefit unequally from any of the actions in the proposed alternatives.

1.11.6 Invasive Species Management, FSM 2900

This EA recognizes both terrestrial and aquatic invasive species. An Invasive Plant Risk Assessment has been prepared (Project Record Folder F3). The project's design features are designed to minimize risk of new invasive species introductions (See section 2.1.4).

1.11.7 Migratory Bird Treaty Act of 1918 as amended (16 USC 703-712)

The original 1918 statute implemented the 1916 Convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the United States and Mexico, Japan, and the Soviet Union (now Russia). Specific provisions in the statute include the establishment of a federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." Because forest lands provide a substantial portion of breeding habitat, land management activities within the LTBMU can have an impact on local populations.

A Migratory Bird Report (Project Record Folder F1) has been prepared for this project which fulfills the requirements of this act and Executive Order 13186.

1.11.8 Special Area Designations

There are no specially designated areas that would be affected by the project (i.e., Research Natural Areas, Inventoried Roadless Areas, Wilderness Areas, and Wild and Scenic Rivers).

1.11.9 Tahoe Regional Planning Agency

This project was submitted for review by TRPA consistent with the terms of the 1989 MOU between TRPA and the Forest Service. Depending on the extent of implementation phases, project permits may be required.

1.11.10 Local Agency Permitting Requirements and Coordination

Any ground-disturbing project activities that occur between October 15 and May 1 will require a grading exemption from TRPA. In addition, any required permits will be obtained from TRPA and/or the NDEP prior to project implementation. Project documents have been shared with both TRPA and NDEP.

Chapter 2
Alternatives, Including the Proposed Action

This chapter describes the No Action Alternative, the Proposed Action, and Action Alternative. It also includes a description of alternatives not considered in detail. It includes detailed descriptions of the specific activities, an overview of project design features, and a summary comparison of the alternatives. Chapter 2 is intended to present the alternatives in comparative form, defining the issues and providing a clear basis for choice among options by the responsible official.

2.1 Alternatives Considered in Detail

The range of alternatives the Forest Service considered for this analysis was bound by the purpose and need underlying the Proposed Action, the project area boundary, as well as by the issues that arose from internal discourse and stakeholder input (Chapter 1 Forest Service Handbook 1909.15 directs the Forest to consider a reasonable range of alternatives). Reasonable alternatives to the proposed action should fulfill the purpose and need and address unresolved conflicts related to the proposed action.

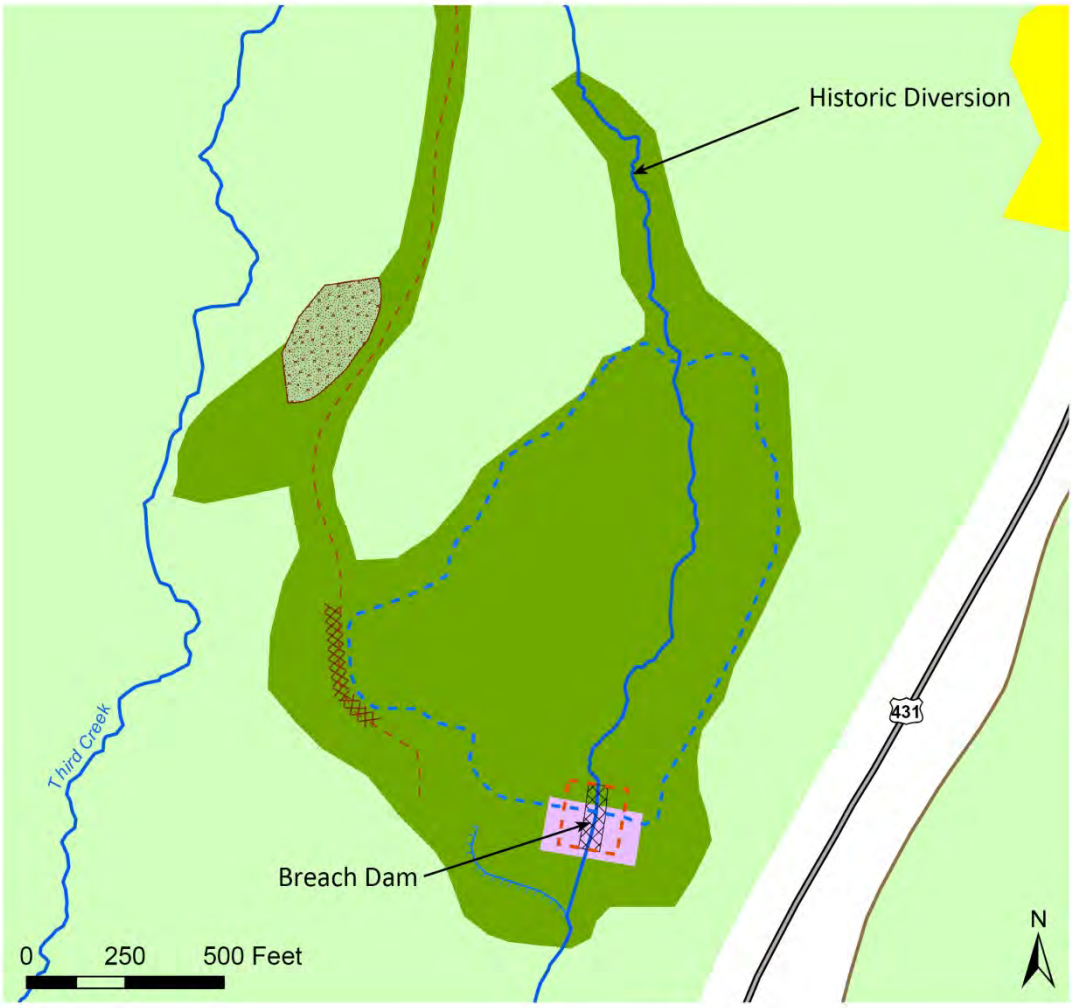
2.1.1 Alternative 1 – No Action

This is not a typical no-action alternative because the existing structures pose a hazard in their current condition. This alternative would undertake the least amount of work necessary to stabilize the breach location and would not go beyond stabilization work; no work would be done to the secondary dam. The dams would be left in their current configuration, but provide for water flow by removing the outflow pipe and breaching the main dam in that location (see Figures 2-1 and 2-2). Trees would be removed (about 0.8 acres) in order to breach the dam (about 0.6 acres). Unused material from the excavation of the breach would be used to infill areas that were excavated when the land was privately owned (approximately 1.1 acres). The area around the breach would be stabilized with coir logs, hydromulch, revegetation or similar erosion control measures. This alternative would include construction of 200 feet of new stream channel, through a V-shaped notch through the dam. The new channel will likely be characterized by large cobble/boulder substrate, large wood, and step/pool channel morphology (Rosgen B channel type). Actions would also include installing log/boulder grade control structures as needed to stabilize channels immediately up and downstream of the breached main dam in order to reduce the possibility of channel destabilization (about 200 feet of channel). Stabilization of the dam side slopes at the location of the breach would also occur to prevent erosion.

It is anticipated that it would take 1-2 seasons to implement these activities. Maintenance would only occur as needed following any major weather events, so costs of maintaining this alternative are expected to be low.

Figure 2-1

Alternative 1 - "No Action" Alternative



Legend

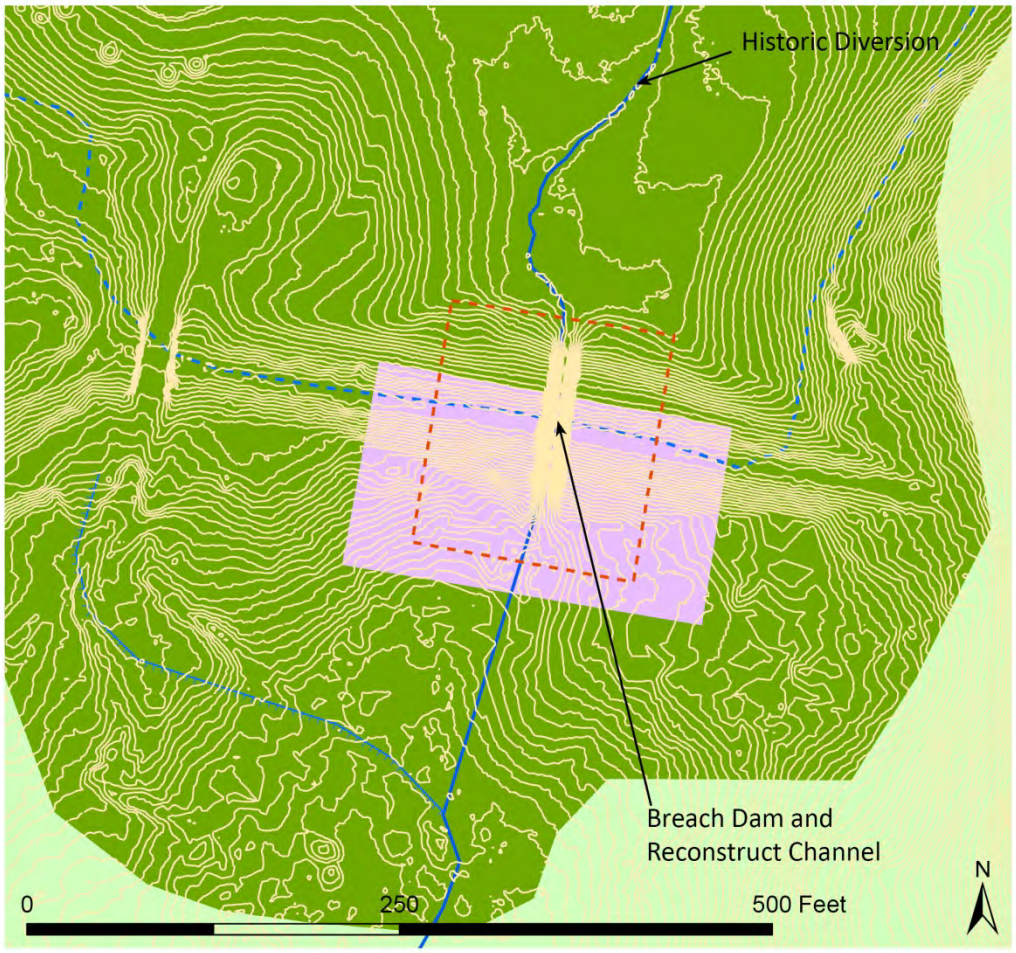
- Access Road
- Highways
- National Forest System Road
- Incline GID ownership
- US Forest Service (LTBMU only)
- Project Area
- Former Incline Lake Footprint
- Spillway Ditch
- Minor Dam (to remain)
- Perennial River/Stream
- Dam Breach Area
- Channel Construction
- Tree Removal
- Infill Area

Incline Lake Dam Project Proposed Action

Lake Tahoe Basin Management Unit

Figure 2-2

Alternative 1: Breach Detail



Legend

US Forest Service (LTBMU only)
Project Area
Former Incline Lake Footprint
Spillway Ditch
Dam Breach Area
Tree Removal
Contour 5ft interval

Alternative 1:

- Breach the Major Dam
- Construct and stabilize the resulting stream channel
- Minimal slope stabilization in the area immediately adjacent to the dam work
- Tree removal along Major Dam crest to facilitate dam breach activities

Incline Lake Dam Project Proposed Action

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2.1.2 Alternative 2 – Proposed Action

Under this Proposed Action the Incline Lake Dams would be completely removed and the topography around the dams and the historic disturbance footprint would be recontoured to match adjacent contours and grades. This would likely involve fill of part of the disturbance footprint. The goal of this Proposed Action would be to restore the human influenced disturbance footprint of the dams within the Incline Lake Dam project area, such that surface and groundwater hydrologic function are restored to a point where natural processes would restore the groundwater dependent ecosystems that characterized this site prior to when the dam was created (See Figures 2-3 and 2-4). Additional restoration actions may be required outside of the Incline Dam project boundary and/or scope, to fully achieve restoration of hydrologic function supporting groundwater dependent ecosystems in this Incline Dam project area. Actions outside of this project area or project scope will be addressed in the future through a full analysis of proposed management of the entire Incline Lake Acquisition Area. It is anticipated that it would take 1-2 seasons to implement these activities. Maintenance costs associated with this alternative are expected to be very low because natural processes would be restored.

The Forest Service expects the restored ground water dependent ecosystem over the long term (approximately 10 years) to be characterized by a variety of SEZ vegetation types and wetland communities (including fens and marshes), connected by undefined surface flow channels of low velocity, and small areas of shallow ponded water. One of the objectives of this Proposed Action would be to maintain or improve the condition of wetland, fen and other riparian systems in the project area. There would be poorly defined surface flow channels within this system, and during dry periods the ecosystem would be hydrologically connected through subsurface and groundwater flows, with little to no surface flow. Figure 2-5 depicts what the Forest Service expects the area to look like in the long term.

In the short term, restoration actions would ensure that the site is stable in terms of soil stability and geomorphic processes, and would establish a trajectory that actively promotes natural processes of ground water dependent ecosystem recovery.

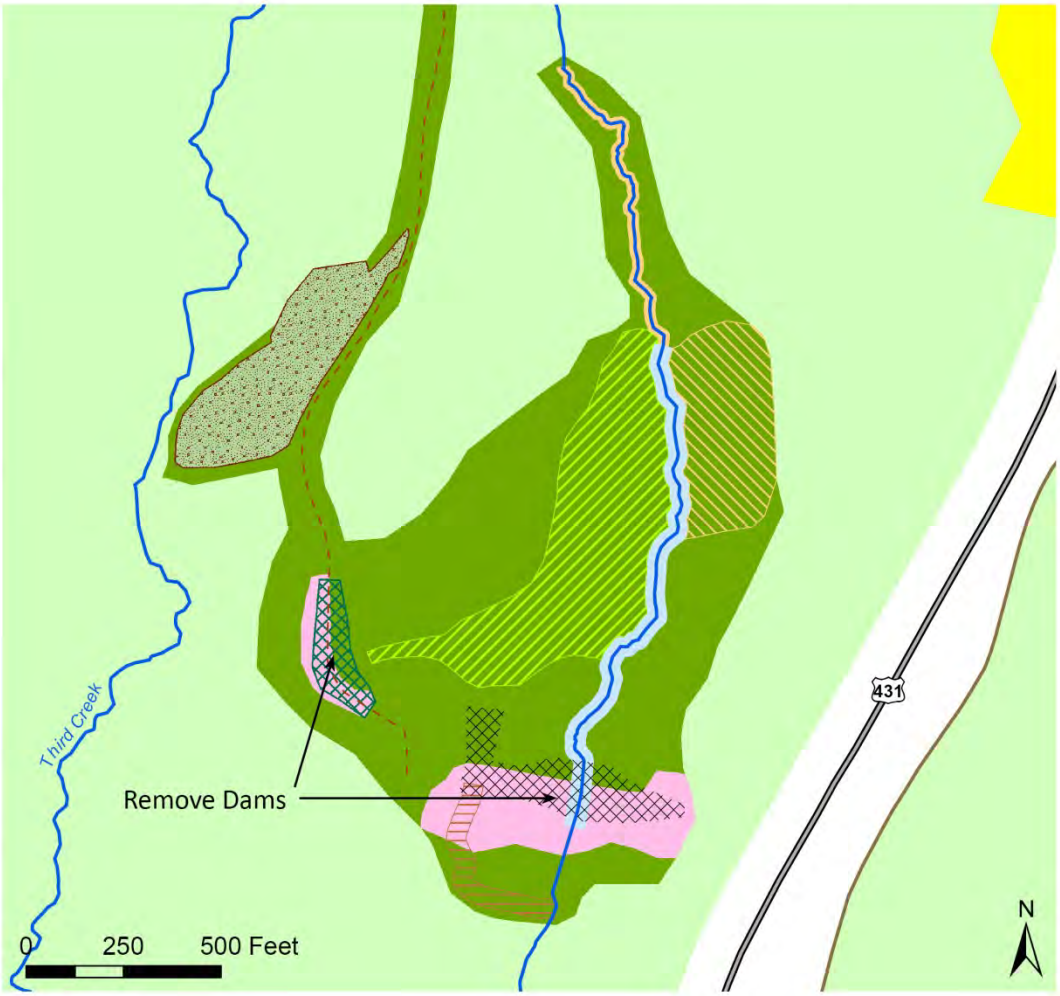
The specific proposed actions would consist of:

- Removal of the major dam structure and spillway (about 1.6 acres) and re-contouring to match adjacent contours and grades. All concrete and metal materials associated with spillway structure would be hauled away to an appropriate solid waste disposal facility. This action would also include removal of trees from these structures (approximately 3.4 acres).
- Decommissioning the existing spillway ditch (about 500 feet/0.6 acres). Decommissioning would consist of filling the spillway ditch and re-contouring it to match adjacent grades. The banks of the existing spillway ditch channel would be laid back and stabilized to minimize future erosion. Large wood and mulch would be placed in the old channel to capture material in the bed as the site stabilizes.

- Use of the existing access road into the dam (approximately 1.2 miles). The access road may need to be widened in order to provide an appropriate turning radius for equipment. Widening may involve a minor amount of tree removal (not included in the 3.4 acres estimated above) and replacement of existing roadway drainage features. This road would be returned to its original use level and stabilized with appropriate BMPs after work is completed on the dam.
- The current minor dam would be converted into a low water crossing (about 0.7 acres) in order to facilitate administrative access. Work on the minor dam would also include re-contouring to match adjacent contours and grades. Tree removal could also occur and is included in the 3.4 acres estimated above.
- Utilizing earthen material from dam decommissioning to fill an approximately 3 acre area (which was excavated when the land was privately owned), to match adjacent topography. Excess spoil material from the dam decommissioning will be hauled off site. (see Figure 2-3 for approximate area that would be reshaped through regrading). Conduct minor regrading of berms and areas "scraped" in an approximately 5.7 acre area within the lake bed footprint.
- Slope stabilization measures (examples: coir logs, large wood, hydromulch, wood chips, tilling organic material into soil) would be installed on regraded areas that have potential for soil erosion and transport until vegetation is established (could include planting and/or seeding).
- Installing log/boulder grade control structures as needed to re-establish connectivity of drainage upstream of the dam into drainage downstream of the dam. Construct approximately 200 feet of channel characterized by large cobble/boulder substrate, large wood, and step/pool channel morphology (Rosgen B channel type; Rosgen, 1996).
- Reconstruction of existing incised and unstable man-made ditch through the reservoir footprint (about 1,300 feet/1.6 acres; this includes the approximately 200 feet of channel construction through the dam footprint) through channel filling and constructed weirs, to create a poorly defined, shallow (6 to 8 inches deep), 3 to 6 foot wide channel, with a sand/small gravel substrate. Stabilization of approximately 15 to 20 headcuts in an additional 2,250 feet of unstable ditches (about 900 feet/0.6 acres) and channels (about 1,350 feet/2.7 acres). Channel restoration results in stable poorly defined channels, dispersed and widely spread throughout the floodplain (Rosgen Da channel type; Rosgen, 1996).
- Installation of willow stakes, seeding, and wetland species sod plugs and plantings sufficient to stabilize and prevent erosion of the area influenced by the dam removal and channel reconstruction and head-cut stabilization, and promote reestablishment of wet meadow and riparian vegetation throughout the lake bed footprint.

Figure 2-3

Alternative 2 - Full Restoration Alternative



Legend

- Access Road
- Highways
- National Forest System Road
- Incline GID ownership
- US Forest Service (LTBMU only)
- Project Area
- Perennial River/Stream
- Stabilize Headcuts in Channels
- Minor Reshape of Soil Surface
- Remove Dam and Spillway
- Reconstruct Shallow Channel
- Infill Area (Shape & Stabilize)
- Replace Dam with Low Water Crossing
- Stabilize Headcuts in Ditch
- Decommission Spillway Ditch
- Tree Removal

Incline Lake Dam Project Proposed Action

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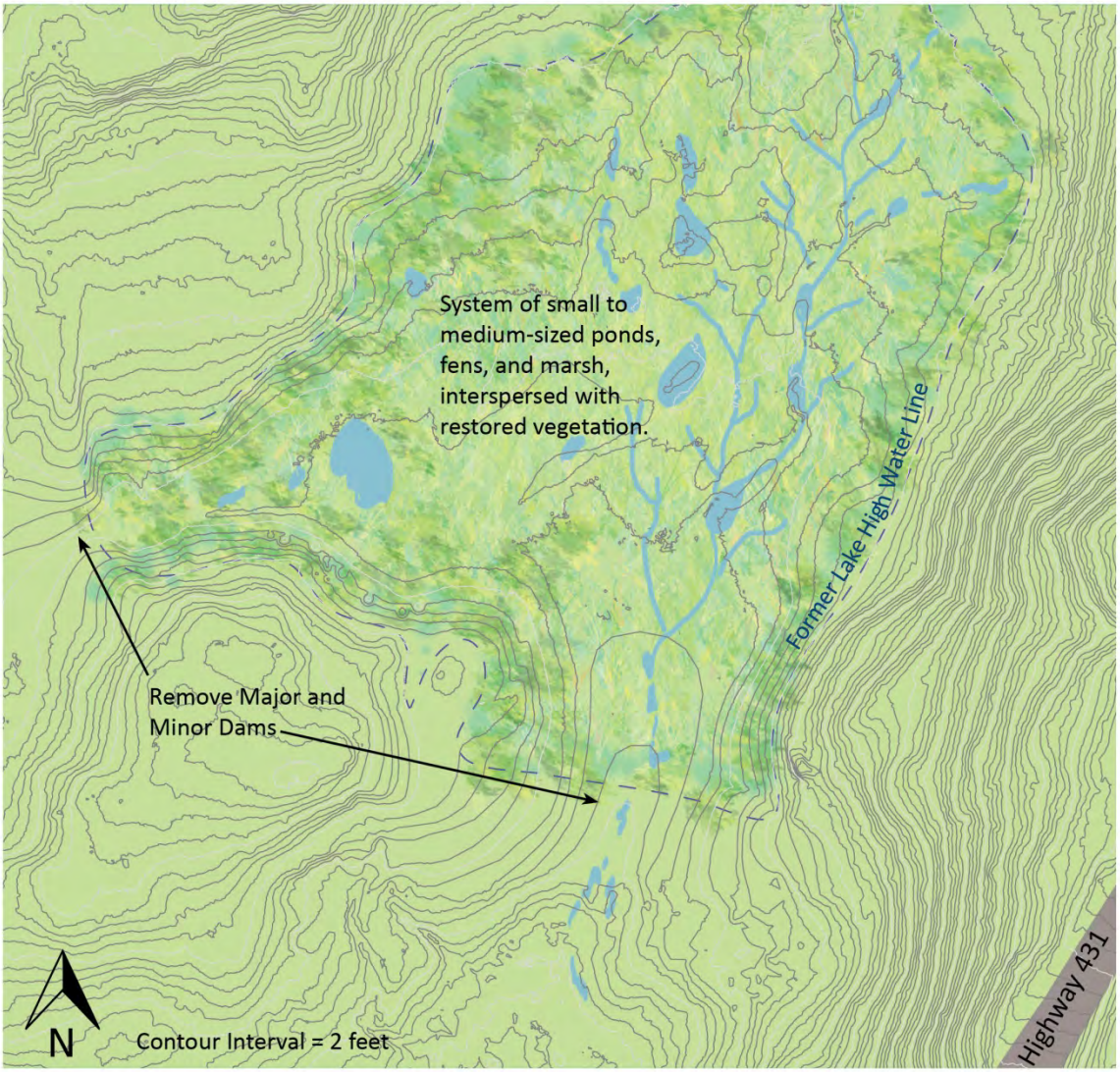
Figure 2-4

Alternative 2 Detail



Desired Condition:

- Removed Major Dam, Minor Dam, and spillway.
- Small to medium sized ponds, fens, and marsh, connected by undefined surface flow channels of low velocity during wet periods.
- During dry periods the ecosystem would be hydrologically connected through subsurface and groundwater flows, with little to no surface flow.
- Maintain or improve the condition of wetland, fen and other riparian systems in the project area.

Note: This map is a conceptual illustration only. Exact final grading and revegetation patterns may change based on further analysis and during final design.

Incline Lake Dam Project Proposed Action Lake Tahoe Basin Management Unit

Figure 2-5
Alternative 2 Rendering

Note: This illustration is for conceptual purposes only and is meant to depict a system of small to medium-sized ponds, fens, and marsh, interspersed with restored vegetation. This is the system that is anticipated to develop 15 - 20 years after restoration of the Incline Lake Dam site.

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Incline Lake Dam Project Proposed Action

Figure 2-5 Alternative 2 Rendering.

2.1.3 Alternative 3

The reader is encouraged to reference Figures 2-6 through 2-9 in conjunction with the following description. This alternative was developed to respond to the following relevant issue: Consider an alternative that would re-build the dam.

This alternative would restore a dam in the existing location. The volume of water impounded would be roughly equal that of the previous dam (about 18-20 acres). It is anticipated that it would take 2-3 seasons to implement these activities. Maintenance costs associated with this alternative are expected to be high because once implemented, the dam would require: (i)development of an emergency action plan, (ii)annual inspection, (iii)periodic maintenance (from removing vegetation to dealing with animal disturbance), (iv)annual exercise of dam control features.

The specific proposed actions would consist of:

- Reconstruction of both of the dam structures (about 2.3 acres). Removal of trees from both of the dam structures (approximately 3.4 acres). All concrete and metal materials associated with the current spillway structure would be hauled away to an appropriate solid waste disposal facility. A temporary coffer dam would need to be constructed upstream of the main dam in order to facilitate work on the main dam (see Figure 2-8).

- Construction of a new spillway and channel. The exact location of the spillway and channel will be determined with the engineering designs, but is expected to be about the same as the previous structures (about 500 feet/0.6 acres).

- At this time it is thought that the dams would be reconstructed with installation of a geomembrane liner on top of the dam structures (see Figure 2-8) (about 2.3 acres). This would alleviate the concern regarding unconsolidated material. The geomembrane liner would be anchored by boulders and rip-rap material. A rock buttress would also be installed on the downstream side of both the major dam and minor dam to further anchor the dam in the event of seismic activity (see Figure 2-8). The exact method of reconstruction would be determined through final engineering design.

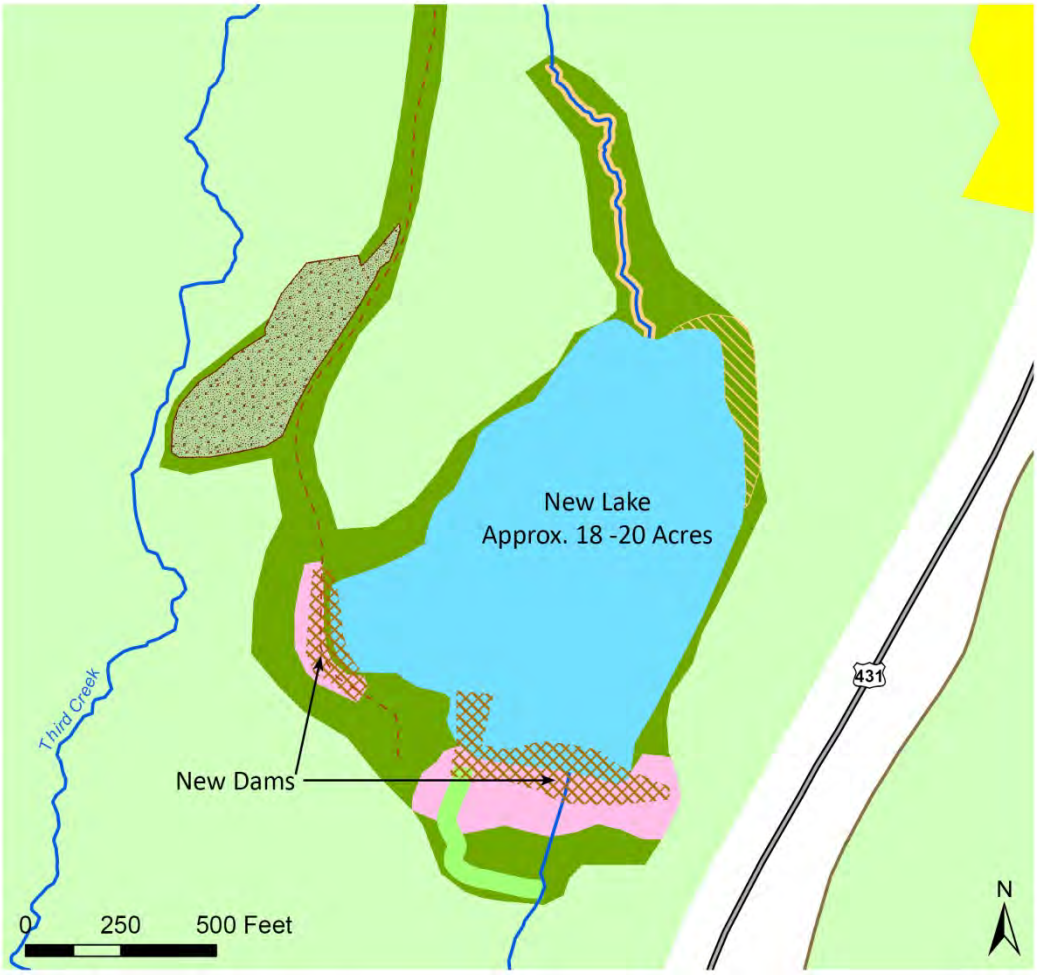
- Use of the existing access road into the dam (approximately 1.2 miles). The access road may need to be widened in order to provide an appropriate turning radius for equipment. Widening may involve a minor amount of tree removal and replacement of existing roadway drainage features. This road would be returned to its original use level and stabilized with appropriate BMPs after work is completed on the dam.

- Installing log/boulder grade control structures to stabilize headcuts in 1,250 feet of unstable ditches (about 900 feet/0.6 acres) and channels (about 350 feet/0.8 acres) draining into the reservoir.

- Installation of willow stakes and wetland species sod plugs and plantings sufficient to stabilize and prevent erosion of the area influenced by the dam re-contouring and headcut stabilization.

Figure 2-6

Alternative 3 - Dam Replacement



Legend

- Access Road
- Highways
- National Forest System Road
- Incline GID ownership
- US Forest Service (LTBMU only)
- Project Area
- Perennial River/Stream
- Reconstruct Dams and Spillway
- Infill Area (Shape & Stabilize)
- Reconstruct Spillway Ditch
- Stabilize Headcuts in Channels
- Stabilize Headcuts in Ditch
- Tree Removal
- New Lake Water Area

Incline Lake Dam Project Proposed Action

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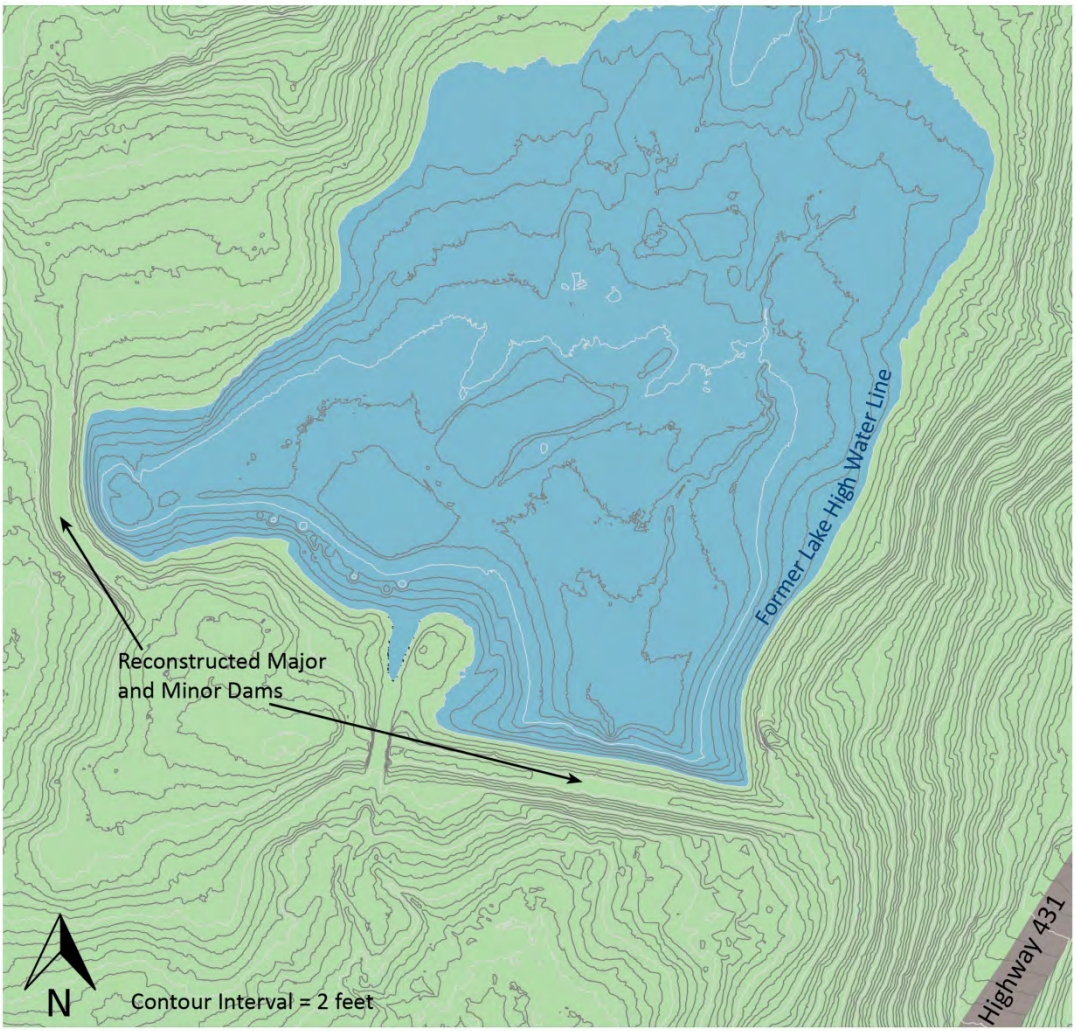
Figure 2-7

Alternative 3: Dam Detail



Desired Condition:

- Reconstructed Major Dam, Minor Dam, and spillway.
- Former Incline Lake water surface returns
- Dam continues to be located along an earthquake fault (remains High Hazard)

Note: This map is a conceptual illustration only. Exact final grading and revegetation patterns may change based on further analysis and during final design.

Incline Lake Dam Project Proposed Action Lake Tahoe Basin Management Unit

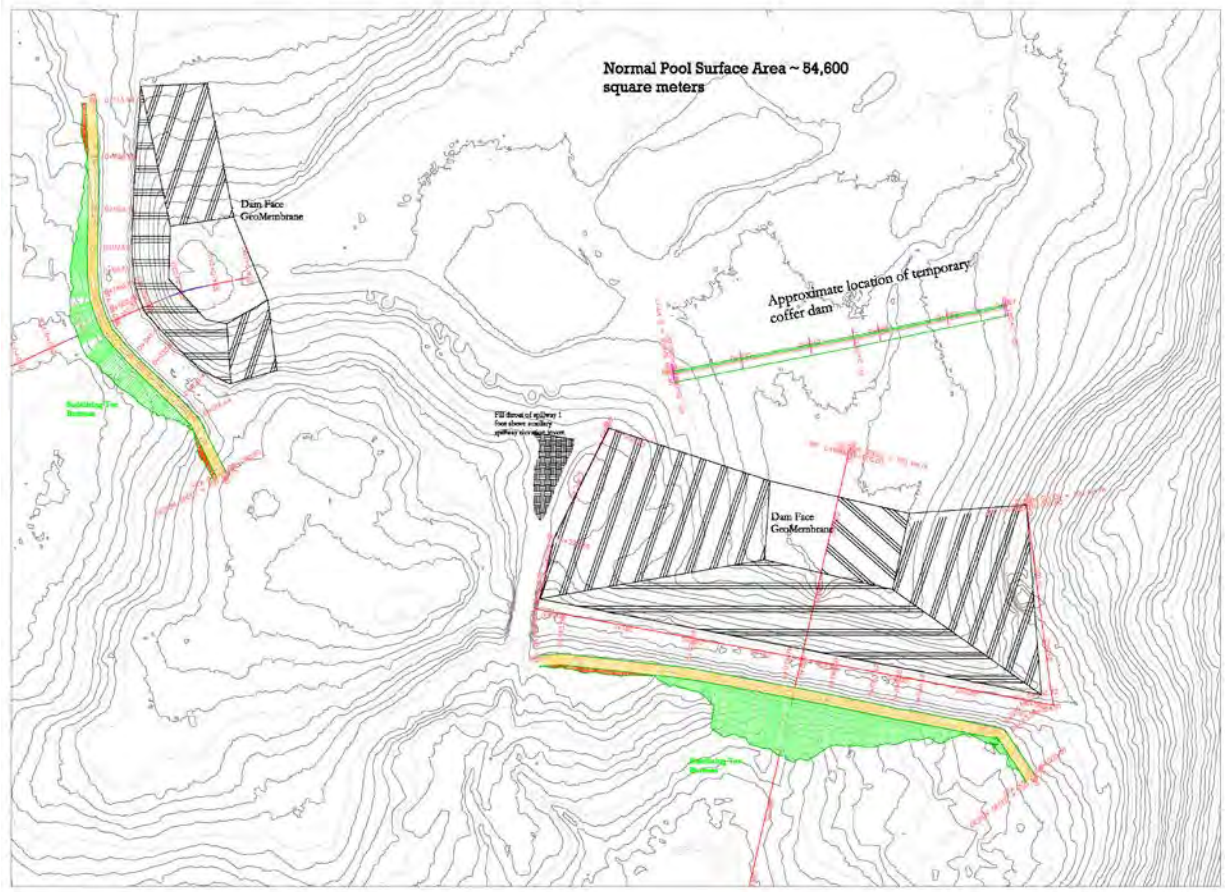


Figure 2-8. Alternative 3 Site Plan. This is a preliminary site plan for NEPA evaluation, not a final engineering design.

Figure 2-9. View of Incline Lake looking Northeast showing the approximate level of water impounded in Alternative 3.

2.1.4 Project Design Features and Best Management Practices

Activities associated with implementation of this project could have localized, short-term effects. The following design features have been incorporated into the Proposed Action and Alternatives and are intended to minimize or avoid effects on soils, water, vegetation, wildlife, fisheries, heritage resources, recreational resources, and air quality. In addition to the following design features, applicable BMPs are identified in *Water Quality Management for Forest System Lands in California* (USDA Forest Service 2000a). Adherence to these BMPs ensures compliance with the Clean Water Act. Detailed specification for these BMPs would be incorporated into the final design plans and any plans required for permitting (for example, a SWPPP (Storm Water Pollution Prevention Plan).

Botany

1. Avoidance of Botanical Resources—Occurrences of Threatened, Endangered, Proposed, Candidate and Sensitive (TEPCS) botanical species (except whitebark pine) and sensitive habitats (e.g. fens) are to be avoided completely during project activities with an appropriate buffer as determined by a staff botanist (in coordination with project leader).
2. Whitebark pine—Individual whitebark pine (Pinus albicaulis) trees will be avoided during construction. Individual trees may be removed if disease or insect infestations are present and after inspection by staff botanist and silviculturist.
3. Maintenance of suitable habitat—
    a. Project design and operations will improve or maintain the hydrologic processes that sustain water flow, water quality, water temperature, and hydrological connectivity that is critical to sustaining fen, wetland and riparian ecosystems within the vicinity of the project area (upstream and downstream of the dam) and plant species that depend on these ecosystems.
    b. In project areas that may impact suitable habitat, native wetland-associated plant species will be revegetated as needed to facilitate channel stabilization, water table maintenance, and erosion prevention

Invasive Plants

4. Equipment Cleaning—
    a. All equipment and vehicles (Forest Service and contracted) used for project implementation must be free of invasive plant material before moving into the project area. Equipment will be considered clean when visual inspection does not reveal soil, seeds, plant material or other such debris. Cleaning shall occur at a vehicle washing station or steam-cleaning facility before the equipment and vehicles enter the project area. Equipment used during emergency work or used exclusively on paved surfaces is exempt from the cleaning requirement.

   b. When working in known invasive plant infestations or designated weed units, equipment shall be cleaned before moving to other National Forest Service system lands. These areas will be identified on project maps.
5. Staging areas—Do not stage equipment, materials, or crews in invasive plant-infested areas.
6. Project-related disturbance—
   a. Minimize the amount of ground and vegetation disturbance in staging and construction areas. Where feasible, reestablish vegetation on disturbed bare ground to reduce invasive species establishment; revegetation is especially important in staging areas.
   b. If staging and construction areas cannot be revegetated (active or passive) or rehabilitated within the same growing season as construction, then they will be covered until such activities can be accomplished, unless revegetation of the area is deemed unnecessary by a staff hydrologist and botanist. Cover options include, but are not limited to, 4+" wood chip mulch, landscape fabric, or erosion control fabric.
7. Early Detection—Any additional infestation discovered prior to or during project implementation should be reported to the Forest Botanist or their designated appointee for prioritization and assessment for treatment.
8. Post Project Monitoring–After the project is completed the Forest Botanist should be notified so that (as funding allows) the project area can be monitored for invasive plants subsequent to project implementation.
9. Gravel, fill, and other materials–All gravel, fill, or other materials are required to be weed-free. Use onsite sand, gravel, rock, or organic matter when possible. Otherwise, obtain weed-free materials from sources that have been certified as weed-free. If an LTBMU inspector is not available to inspect material source, then the project proponent will provide a weed-free certificate for its material source.
10. Mulch and topsoil—Use weed-free mulches and topsoil. Salvage topsoil from project area for use in onsite revegetation, unless contaminated with invasive species. Do not use material (or soil) from areas contaminated by cheatgrass.
11. Revegetation—
    a. Seed and plant mixes must be approved the Forest Botanist or their designated appointee who has knowledge of local flora.
    b. Invasive species will not be intentionally used in revegetation. Seed lots will be tested for weed seed and test results will be provided to Forest Botanist or their designated appointee.
    c. Persistent non-natives, such as such as timothy (Phleum pretense), orchardgrass (Dactylis glomerata), ryegrass (Lolium spp.), or crested wheatgrass (Agropyron cristatum) will not be used in revegetation.
    d. Seed and plant material will be from native, high-elevation sources as much as possible. Plant and seed material should be collected from as close to the project

area as possible, from within the same watershed, and at a similar elevation whenever possible.

Aquatic

12. Retain/add downed wood in the open meadow areas where feasible for native amphibian species. Density should be approximately three logs of > 12 inches (30 cm) diameter at midpoint per acre (0.4 ha).
13. If water drafting is needed for project implementation activities, water levels at drafting locations would be maintained to support the needs of aquatic dependent species and associated habitat. Contract administrator and/or watershed specialist will periodically check to ensure water levels are sufficient and appropriate drafting procedures (i.e. proper screening device, maintaining proper flows, etc.) are being followed. If visual monitoring (such as water level on staff plate) indicates flows are not adequate, contract administrator would consult with a hydrologist and/or aquatic biologist (see FSH 2509.22; 12.21 - Exhibit 05).
14. If drafting water, use screening devices for water drafting pumps (Fire suppression activities are exempt during initial attack). Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats (see FSH 2509.22; 12.21 - Exhibit 05).
15. Mussels are not known to occur in the project area but if they are identified, they will be removed prior to any water diversion from channels where feasible. Feasibility will be determined in the field by Forest Service aquatic biologist and will take into consideration mussel population within and outside of the project area.
16. Salvage/recovery of fish will be conducted within anticipated construction dewatering or diversion zones operations by electro-shocking or other suitable means as developed through consultation with the Nevada Division of Wildlife and LTBMU fisheries staff. Fish will be moved approximately 500 -700 feet upstream or downstream of project activities. Block nets will be installed to ensure fish do not move back into the project area during project activities. Nets will be cleaned one to two times daily to ensure the nets are functioning.
17. When equipment or vehicles are used at sites known or thought to be contaminated with Aquatic Invasive Species (AIS), measures will be employed following formal decontamination procedure. The Contractor shall be solely responsible for ensuring that all equipment, boats, and other aquatic equipment meet the Lake Tahoe Aquatic Invasive Species (AIS) Watercraft Inspection Program. Further information is found at www.tahoeboatinspection.com
18. During regrading of existing reservoir footprint, promote or maintain depressions to hold water through active breeding season of western toad.

Terrestrial Wildlife

19. Retain snags, preferably larger than 15 inches diameter at breast height (dbh), for wildlife unless the snag would be hazardous to operations and/or human safety. Minimize tree removal; retain some mid- and large diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure.

20. Existing logs (coarse woody debris) greater than 20 inches dbh would be retained where they exist, or moved and replaces following project activities. Where snags are felled for safety and/or operations, keep as coarse woody debris; preference would be given to the largest logs available in a variety of decay stages for wildlife habitat.

21. Retain red fir trees containing large witches' brooms caused by red fir broom rust (*Melampsorella caryophyllacearum*).

22. During the nesting season, conduct nest surveys of trees or other vegetation to be removed immediately prior to project activities (e.g., two weeks before any habitat disturbance) to identify nests of sensitive species . Based upon the survey results, the Responsible Official may implement a Limited Operating Period (LOP), adapt construction timelines or facility locations as determined necessary to provide adequate protection.

23. At this time the project area is not located inside or within 0.25 mile of a Protected Activity Center (PAC). If northern goshawk and/or California spotted owl are detected within the project area and determined to be nesting, a PAC will be delineated in accordance with the Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD). If a PAC is delineated within 0.25 mile of a project area prior to construction, an LOP would be implemented which would limit construction activities and vegetation treatments during the breeding season (March 1 through August 31 for California spotted owl; and February 15 through September 15 for northern goshawk). The LOP may be waived if surveys confirm nesting is not occurring or if the activity is of such scale and duration that impacts to breeding California spotted owls or northern goshawks will not occur.

24. Inform implementation crew members of sensitive resources known to occur in the project area, their locations, and resource protection measures prior to implementation.

25. Any sightings of threatened, endangered, candidate, proposed, or sensitive species would be reported to the project biologist and construction would be stopped immediately if the species is found within any disturbance footprint. If construction is stopped, the project biologist will be consulted within 24 hours. Based upon this consultation, the Responsible Official may adapt construction timelines or facility locations as determined necessary to provide adequate protection.

26. No LOPs currently apply to this project. If special status wildlife species are detected in the project vicinity, the Responsible Official may implement an LOP.

Hydrology/Soils

27. Implement temporary and permanent Best Management Practices (BMP) to meet water quality objectives and maintain and improve the quality of surface water on the forest. Insure that temporary erosion control measures will be in place prior to commencing any soil disturbing activities. Methods and techniques for applying the BMPs incorporated into the associated project plan and implementation documents. Erosion control measures may include but will not be limited to: water diversions through pumping, sandbag checkdams, and diversion pipes and hoses, silt fences, straw wattles, coir logs, water filled berms, mulching, gravel/sand bags, construction limit fencing, and revegetation.

28. The US Forest Service has recently developed technical guidance to provide uniform direction for BMP implementation on all USFS lands to protect water quality (FS-990a, 2012). The following National BMPs will be considered during project planning and analysis to develop site-specific BMP prescriptions/practices to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resource: AqEco-2 Operations in Aquatic Ecosystems; Road-5 Temporary Roads; Road-7 Stream Crossings; Road-9 Parking and Staging Areas; Road-10 Equipment Refueling and Servicing; WatUses-6 Dam Removal.

29. Soil disturbing activities will not occur from October 15 to May 1 of each year unless a waiver is applied for and approved from TRPA. Assure that permanent or temporary erosion control measures are in place for the winter season.

30. Temporary roads may be constructed for use during this project and will be designed with the least amount of cut and fill and the fewest stream or water channel crossings. Any temporary roads will be obliterated when the one-time need is fulfilled.

31. All disturbed areas, including staging and storage sites, will be stabilized and revegetated following construction.

Cultural Resources

32. All known cultural resource sites (FS #05-19-1192) within the Project Area will either be avoided, protected in place, or mitigation will be developed. Known sites near access or staging areas will be fenced off and the Contractor and/or LTBMU construction crew staff will be notified to prevent disturbance during construction activities.

33. If unrecorded/new cultural resources (i.e., prehistoric sites, historic sites, and isolated artifacts and features) are discovered during project implementation, then work shall be halted immediately within 50 feet of the discovery and the LTBMU shall be notified, and a professional archaeologist that meets the Secretary of the Interior's Professional Qualifications Standards and Guidelines ([Code of Federal Regulations, 36 CFR Part 61]) in archaeology and/or history shall be retained to determine the significance of the discovery.

Recreation

34. Postings and public notices would be issued in advance of construction and posted at public access points and trails as well as on the LTBMU website.

35. During project implementation, construction fencing would be placed at public access points in order to deter users from continued use of the construction area during implementation.

2.2 Monitoring

The purpose of project monitoring is to track the implementation of the project design features and the prescribed BMPs (Appendix A) and, in some cases, to measure their short-term effectiveness at protecting resources. The monitoring types are defined as follows:

- *Implementation monitoring* consists of inspections of project areas and roads to ensure that all management practices and design features are implemented as prescribed, including those designed to prevent sediment delivery and protect water quality.
- *Effectiveness monitoring* consists of inspections of the project to evaluate the effectiveness of the prescribed design features and management practices at meeting their objectives. It includes evaluating the effectiveness of management practices designed to prevent sediment delivery and protect water quality.

2.2.1 Required Monitoring

For all aspects of the project, the Best Management Practice Evaluation Program (BMPEP) protocols developed by the Forest Service and the California State Water Resources Control Board (USDA Forest Service and California State Water Resources Control Board 2002) will be followed to provide qualitative information about BMP implementation and effectiveness. The Forest Service R-5 BMPEP onsite evaluation form will be used to rate the effectiveness of the BMPs. The monitoring will address the specific activities of the project and the following areas:

- Design implementation inspection and reporting.
- Soil and water BMP monitoring.
- Vegetation (tree removal) monitoring.
- Invasive plants monitoring.
- Heritage resource monitoring.
- Soil moisture monitoring.

2.3 Comparison of Alternatives

Table 2-1 compares the components of each alternative, while Table 2-2 summarizes the environmental consequences of each alternative, by resource. Depending on the resource, impacts are measured either quantitatively or qualitatively.

Table 2-1. Comparison of Project Components by Alternative

Activity	Alternative 1	Alternative 2	Alternative 3
Breach	0.6 acres	--	--
Remove Dam	--	1.6 acres	--
Low Water Crossing	--	0.7 acres	--
Reconstruct Dams	--	--	2.3 acres
Install, Shape and Stabilize Fill	1.1 acres	3.0 acres	--
Tree Removal	2.8 acres	3.4 acres	3.4 acres
Channel Construction	0.2 acres/200 feet	1.6 acres/1,300 ft	--
Stabilize Headcuts on Ditch	--	0.6 acres/900 ft	0.6 acres/900 ft
Stabilize Headcuts on Channels	--	2.7 acres	0.8 acres
Restore Hydrologic Function	--	5.7 acres	--

Table 2-2. Summary of Direct and Indirect Environmental Consequences by Resource and Alternative

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
Aquatic Wildlife	The Alternatives do not differ in terms of potential for direct effects to species. Alternative 1 is expected to have the fewest short-term impacts to potential habitat for species during implementation because this alternative has the fewest acres of ground disturbing activities. Potential effects of not taking further corrective action would include meadow drying due to head cuts or incised channels, loss of streambank vegetation; and potentially increased sediment transport due to lack of floodplain connectivity and loss of spawning habitat (particularly downstream of major dam).	The Alternatives do not differ in terms of potential for direct effects to species. The additional proposed actions will improve aquatic habitat characteristics (e.g. habitat availability and complexity, streambank stabilization, vegetative composition and vigor, water quality) within the project area and downstream. Similar to Alternative 1, removing the existing obstruction to aquatic migration could increase the distribution and abundance of non-native fish as well as native fish. The additional actions to recountour areas influenced by the construction of the previous dam and reservoir will improve potential habitat for aquatic species, specifically amphibians, by restoring wetland and stream habitat. Restoring and stabilizing the 3,350 feet of stream within the project area will increase floodplain function, improve water quality, and increase habitat characteristic (e.g. stream shade, width/depth ratio) that will provide conditions for various life history requirements of aquatic species. Ultimately, Alternative 2 has the greatest benefit to aquatic habitat.	The Alternatives do not differ in terms of potential for direct effects to species. The proposed lake habitat could provide habitat for some special status species, such as SNYLF; however, it could also increase habitat for non-desirable aquatic invasive species, such as American bullfrog or blue gill. Because brook trout have been detected in the project area, it is likely that this species would establish in the lake and restrict the establishment of SNYLF (and LCT). Additionally, due to the lack of spawning habitat, LCT could not become self-sustaining even in the absence of non-native fish. Ground disturbing activities under Alternative 3 would be similar (but slightly less) as Alternative 2 in terms of short term impacts as heavy equipment would be needed to stabilize the existing dam causing similar short-term impacts, specifically to downstream aquatic habitat.
Botany	Alternative 1 is considered the most detrimental and least beneficial to botanical resources because it fails to address the channel incision, active erosion and habitat vulnerability. It puts at risk the greatest amount of fens, which once damaged or	Alternative 2 is considered the least detrimental and most beneficial to botanical resources because it addresses the channel incision, active erosion, and habitat vulnerability that threaten fens, wet habitat, and the TEPCS botanical	Alternative 3 falls between Alternatives 1 and 2—but closer to Alternative 1—due to the permanent loss of potential habitat that would result from the creation of a new lake and potential direct effects to Bolander's candle-moss. It does, however,

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
	destroyed, cannot be easily restored because they require thousands of years to develop. It also provides for the least amount of potential wet meadow habitat creation or enhancement.	species that utilize these habitats. It also has the greatest potential for enhancement or creation of new wet habitat.	address the channel incision, active erosion, and habitat vulnerability that threaten fens, wet habitat, and the TEPCS botanical species that utilize these habitats.
Cultural	No impact to cultural resources because sites would be avoided.	No impact to cultural resources because sites would be avoided.	No impact to cultural resources because sites would be avoided.
Hydrology and Soils	Alternative 1 ranks lowest because although it does leave a substantial area of existing SEZ in place, it does not address the existing instability in the man-made ditch and natural channels within the project area. This leaves the channels and adjacent SEZs vulnerable to future flood events when stream bed and bank erosion will occur. The degree of head-cut erosion that is currently in evidence in the project area, and the rate at which this erosion has expanded in the 6 years since the reservoir has been drained, indicates that channel and SEZs within the project area are at considerable risk from catastrophic erosion and de-stabilization that could occur during a major flood event. Continued downward erosion of these channels would continue to "dewater" riparian areas adjacent to the channels, resulting in conversion of these areas to dryer site vegetation types.	Alternative 2 ranks the highest because it results in restoring hydrologic function to the greatest area of existing and potential wet meadow/riparian SEZ that is resilient to the effects of predicted climate change. Wet meadow (including fens) in particular is a relatively rare SEZ form in the Lake Tahoe Basin that provides for unique biological habitat. Restoration of SEZs is an important EIP threshold for the Tahoe Regional Planning agency, and wet meadows/wetlands are considered to be high value ecosystems both in the State of Nevada as well as nationally.	Alternative 3 ranks lower because 18 to 20 acres of potential wet meadow/riparian SEZ valley bottom is inundated by a reservoir. Please see the discussion in the biological analysis sections regarding an assessment of relative benefits of biological functions/values for these different water body forms. In addition Alternative 3 will require the administrative and technical capacity to manage flows out of the reservoir during extreme floods (to prevent dam failure), as well as drought periods (to provide minimum in-stream flows downstream).
Invasive Plants	Alternative 1 presents the highest invasive plant risk because, despite its smaller scale of construction activities, it fails to address the most vulnerable habitat—the former lake bed that is largely lacking native	Alternative 2 presents the second highest invasive plant risk because it involves the most proposed construction and associated introduction risks, though it does address the former lake bed's habitat vulnerability through	Alternative 3 presents the least risk because, despite an intermediate scale of proposed construction and associated introduction risks, it would impound the majority of the most vulnerable habitat under

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
	vegetation cover and is at risk of hydrologic function degradation.	establishment of wet meadow habitat.	water, returning the area to conditions similar to the former Incline Lake.
Recreation and Scenic	Access: same access as current. Recreational Opportunity: The removal of trees and grading activities at the site will not affect the existing dispersed recreation opportunities at the site. Site closure during construction and tree removal activities would be localized and limited in duration. Scenery: Long and short term impacts to scenery are expected to be negligible under Alternative 1. The incised nature of the existing ditches and channels would continue to remain.	Access: Same as alternative 1. Recreational Opportunity: The quality of the recreation opportunity is expected to increase the most under Alternative 2. The dispersed recreation opportunities afforded under Alternative 2 more closely match the sensitive nature of the site. It should be noted that developed swimming and fishing opportunities occur at multiple other sites within the Lake Tahoe Basin Management Unit and the surrounding areas, while the fen and step pool ecosystem anticipated to reform within the project area is extremely rare and unique to the area. Scenery: The short term impacts to scenery are greatest under Alternative 2, however the long term benefit to the scenery would be greatest under Alternative 2. The restored site would be attractive and unique in nature.	Access: Same as alternative 1. Recreational Opportunity: While Alternative 3 provides the opportunity for some additional recreation activities such as swimming and possibly fishing, the limitations to managing such activities (i.e. lack of restrooms and other facilities, lack of access to utilities, the isolated nature of the site, etc.) make anticipated negative impacts higher under Alternative 3. Additionally, the ability to effectively mitigate the negative effects from developed or dispersed recreation use on the sensitive site under Alternative 3 is extremely limited. Scenery: Impacts to scenery under Alternative 3 are considered to be higher than Alternatives 1 and 2. The new lake would not be a high quality alpine lake, but rather a low quality, low-visibility lake with a highly man-made appearance and devoid of trees along a significant portion of the shoreline.
Terrestrial Wildlife	The alternatives do not differ in terms of potential for direct effects to species. In terms of habitat condition, Alternative 1 is expected to have the fewest impacts to potential habitat for species because this alternative has the fewest acres of ground disturbing activities, including tree removal.	The alternatives do not differ in terms of potential for direct effects to species. Alternative 2 has the greatest potential of all alternatives to set the trajectory for improved habitat conditions in the project area. Although this alternative includes 3.4 acres of tree removal, the long-term benefit from	The alternatives do not differ in terms of potential for direct effects to species. Alternative 3 is expected to have a longer implementation period (1-3 seasons) when compared to Alternatives 1 and 2 (1-2 seasons) and this would mean greater potential time frame for disturbance-type

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
	However, the condition of wet meadow and montane riparian habitat under this alternative would deteriorate as channel incision continues unabated and vegetation dries.	improving hydrologic conditions and planting native, riparian vegetation can serve to improve the condition for a variety of species associated with wet meadow and montane riparian habitat. Ultimately, Alternative 2 has the greatest benefit to TECPS terrestrial wildlife that are associated with wet meadow habitat, which is a relatively rare (rarer than lake habitat) habitat in the LTBMU.	effects such as flushing, fleeing, or causing individuals to change their daily activity patterns. Alternative 3 would replace currently potential habitat for some species with a new kind of potential habitat for a different suite of species. By inundating the former lake footprint to create a lake, Alternative 3 is influencing the suite of species that would use the wet meadow, barren, and perennial grassland formerly found in the lake footprint. There are currently no detections of any TECPS wet meadow-associated species or lake-associated species in the project area. Therefore, the effects of this may be neither beneficial nor detrimental to currently occurring species.

2.4 Alternatives Considered, But Not in Detail

Prior to and during scoping, one suggestion for an alternative to the Proposed Action was considered but dropped from detailed consideration for the reasons presented below.

1) **Re-build the dam in its current location and configuration -** This alternative would be a total reconstruction of the dam in its existing configuration. This alternative was not considered in detail because of the high cost involved (approximately 8.25 million dollars).
2) **No Action** – The typical no-action alternative in this case was not feasible. If no action were to be taken, the outflow pipe would continue to be an issue because of the potential to plug up and inadvertently impound water. If this happened, coupled with the seismic character of the area, there is the potential to flood downstream residential areas.

Chapter 3
Affected Environment and Environmental Consequences

3.0 Introduction

The Council on Environmental Quality (CEQ) regulations direct that agencies succinctly describe the environment that may be affected by the alternatives under consideration (40 CFR 1502.15). This chapter describes the existing physical, biological, social, and economic aspects of the project area that have the potential to be affected by implementing any of the alternatives (i.e., the existing conditions). Each description of the existing conditions is followed by a description of the environmental effects (direct, indirect, and cumulative) that would be expected to result from undertaking the proposed action or other alternatives. Together, these descriptions form the scientific and analytical basis for the comparison of effects table found at the end of Chapter 2, "Alternatives, Including the Proposed Action."

3.0.1 Organization of Chapter 3

Chapter 3 combines information on the existing conditions and environmental effects of the alternatives for the various resources. The information is separated into these resource areas for ease in reading. The discussion of alternatives is organized by resource area, and each resource area is presented as follow:

- *Introduction*. The scope of the analysis (including the methodology and assumptions) briefly describes the geographic area(s) for the individual resource and its indicators potentially affected by implementation of the proposed action or alternative. The scope of the analysis varies according to individual resource area and may also vary for direct, indirect, and cumulative effects.
- *Overview of the Affected Environment.* The overview of the affected environment section provides a description of the existing conditions and the resource environment that is potentially affected based on current resource conditions, uses, and management decisions.
- *Environmental Consequences.* This section provides an analysis of direct, indirect, and cumulative environmental effects on the resource area by implementing each of the alternatives, according to the indicators and issues identified for that resource.
- *Analytical Conclusions.* This section summarizes the effects of the project on the resource and ranks the alternatives.

Direct effects are caused by the actions to implement an alternative, and occur at the same time and place. Indirect effects are caused by the implementation action and are later in time or removed in distance, but are still reasonably foreseeable (i.e., likely to occur within the duration of the project).

Cumulative effects are the result of the incremental direct and indirect effects of any action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor, but collectively significant actions, taking place over a period of time.

3.0.2 Projects Considered for Cumulative Effects

3.0.2.1 Past Projects

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior actions that have affected this project area and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been affected by the construction of the dam which leads to its current state today. Trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions has the risk of ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the CEQ issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

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

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

For these reasons, the analysis of past actions in this section is based on current environmental conditions. Past actions which make up the current conditions include: Grazing, Construction of diversion ditches on Third Creek, Draining Incline Lake, Pile burning along the Hwy 431 corridor, Small fuels treatments and pile burning on USFS urban lots, Tree thinning and prescribed burning

activities on non-USFS lands in the Incline Village area and Stream and SEZ restoration activities on Rosewood and Third Creeks, downstream from this project area.

3.0.2.2 Present Projects

Additional information on these projects and those in the planning stage listed below can be found at www.fs.fed.us/r5/ltbmu, under "Land and Resources Management" and search "Projects."

There is one project and one set of ongoing activities to be considered:

- Incline Hazardous Fuels Reduction and Forest Health Restoration Project: this project was approved on February 15, 2013. There are stands proposed for treatment directly adjacent to the Incline Lake Dam project area (approximately 163 acres of hand treatments and 16 acres of mechanical treatments). These fuels reduction treatments are not currently scheduled to occur until after completion of this project.
- In addition to this project, present actions on both Forest Service Urban Lots and non-NFS lands include maintenance fuels treatments. These treatments include thinning, chipping and prescribed burning (both pile burning and broadcoast burning) of generally small diameter trees. The nearest locations for these treatments are over a mile away and downstream from the project area.

3.0.2.3 Projects in the Planning Stage

Maintenance fuels treatments on both NFS lands and non-NFS lands are expected to continue into the future. These treatments include thinning, chipping and prescribed burning (both pile burning and broadcoast burning) of generally small diameter trees.

There are currently no projects in the planning stage to be considered. Long-term planning for the entire area purchased would occur after this project has been decided. Although the need for this project has been identified in this instance, this potential future project is not included in the cumulative effects analysis because there is no project proposal nor identified direct and indirect effects which could be effectively considered when cumulatively added to the direct and indirect effects of the Incline Lake Dam project.

3.0.3 Assumptions Common to all Alternatives

1. Management of the area remains the same as current. Areas that are currently closed to vehicles remain the same.

2. Long-term planning will occur following this decision. Management of recreation for the area beyond the dam would be considered with long-term planning.

3. No other facilities would be developed as a result of this decision.

4. Unexploded ordinance (UXO) will be searched out and retrieved before implementation of any alternative. If any UXO is found it will be disposed of appropriately.

3.1 Aquatic Wildlife Habitat and Species

3.1.1 Introduction

The purpose of this analysis is to evaluate and disclose the potential effects of the three alternatives for the Incline Lake Dam Restoration Project on USDI Fish and Wildlife Service (FWS) aquatic wildlife species protected under the Endangered Species Act and Forest Service Sensitive (FSS) aquatic wildlife species and habitat. Aquatic Management Indicator Species (MIS) and Tahoe Regional Planning Agencies (TRPA) Special Interest Species (SIS) are addressed in the Terrestrial Wildlife Chapter 3.6 of this EA. The three alternatives under consideration (Alternatives 1, 2, and 3) are described in Chapter 2.

The desired condition for the project area is to remedy the existing condition of a high hazard dam that does not meet Federal, State or local standards. Additionally, the desired condition for the project area is to provide a sustainable hydrological system which supports groundwater dependent ecosystems and other riparian ecosystems that characterized the site prior to when the dams were created. Alternatives described in this chapter discuss the degree to which each alternative moves toward these desired condition; specifically in relation to aquatic habitat and the special status associated with that habitat.

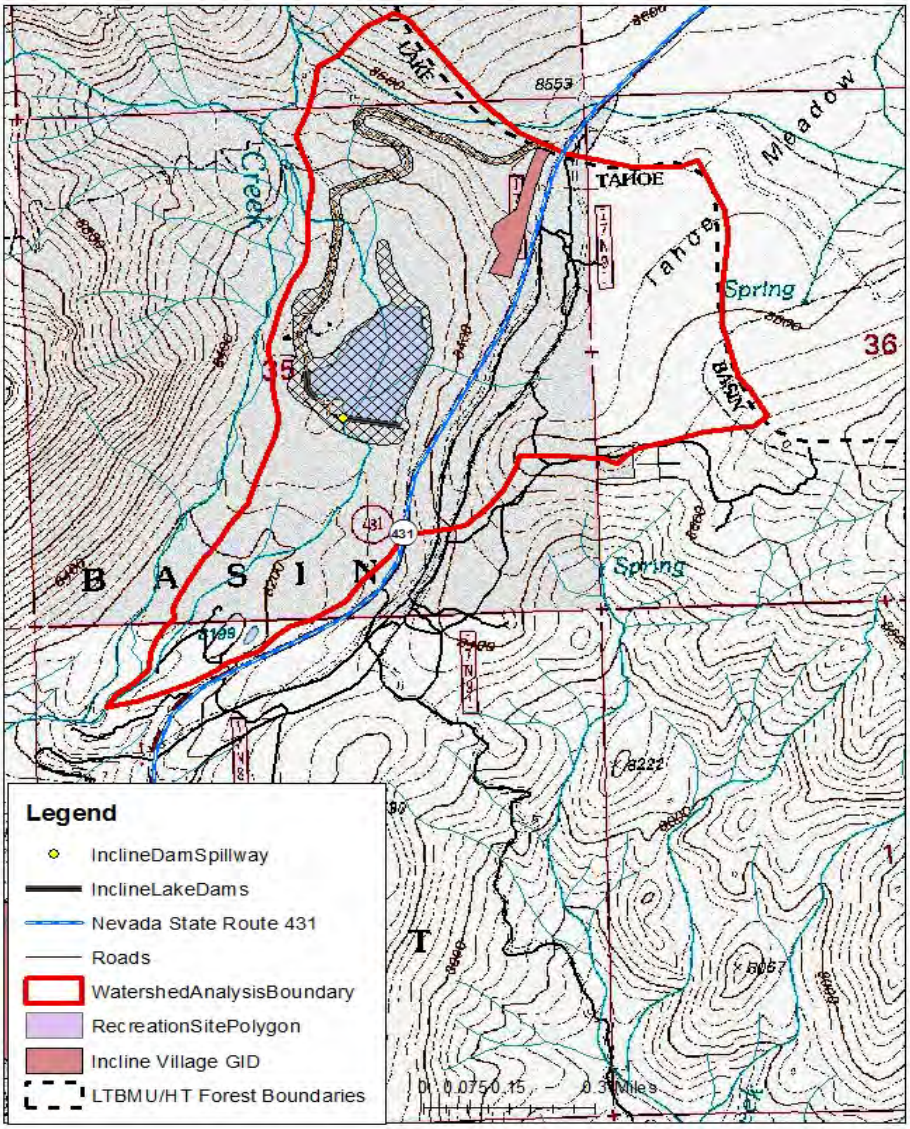
Methodology

The scope of analysis for aquatic resources covers fish, amphibians and invertebrates, and their associated habitats including: streams, lakes, wetlands and meadows. The aquatic resources analysis is driven by both Forest Service and other federal policies, which include various goals to conserve and/or protect species and habitat. The aquatic analysis area lies within a perennial tributary watershed of the Third Creek Watershed (Figure 3.1). The total size of this tributary watershed from the headwaters to the confluence with Third Creek is 448 acres. This sub-watershed comprises 12 % of the Third creek watershed (3,680 acres). Incline dam lies along the southern border of a glacially formed sub-alpine meadow with a surface elevation of 8,300 feet and the top of the watershed at 8,800 feet. Contributing watershed area upstream of the dam is 256 acres. Contributing watershed area below the dam is 192 acres. The perennial tributary channel below the dam joins Third Creek 0.75 miles down from the spillway.

Because the alternatives influence hydrologic conditions within and downstream of the project area as well as alter wet meadow, stream, and lacustrine habitat; all which effect aquatic species, a larger area of analysis was needed to determine effects of each alternative. This analysis area was also used in determining cumulative effects.

Aquatic surveys for fish, amphibians and reptiles were conducted using standardized protocols from 2009 through 2013. Fish assessments utilizing back-pack electro fishers were conducted from 2009 to 2010. Amphibian and reptile surveys were conducted 2009 through 2013. Surveys were conducted within the project area and analysis area.

Figure 3-1: Incline Lake Dam Project Area and Aquatic Analysis Area.



The following aquatic species and their Federal and State listing status' that are specifically addressed in this analysis are:

- **Lahontan Cutthroat Trout** (*Oncorhynchus clarkia henshawi*)
  Endangered Species Act (ESA) Listing Status: *Threatened*
  California State Listing Status: *None*
  Nevada State Listing Status: *Vulnerable to Decline Due to Rarity or Restricted Range*
  US Forest Service, Region 5 Status: *None*
- **Sierra Nevada Yellow-legged Frog** (*Rana sierrae*)
  ESA Listing Status: *Proposed Federally Endangered with Critical Habitat*
  California State Listing Status: *State Candidate Endangered or Threatened*
  Nevada State Listing Status: *None*
  US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*
- **Yosemite Toad** (*Bufo canorus*)
  ESA Listing Status: *Proposed Federally Threatened with Critical Habitat*
  California State Listing Status: *Species of Special Concern*
  Nevada State Listing Status: *None*
  US Forest Service, Region 5 Status: *None*
- **Northern Leopard Frog** (*Rana pipiens*)
  ESA Listing Status: *None*
  California State Listing Status: *None*
  Nevada State Listing Status: *None*
  US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*
- **Lahontan Lake Tui Chub** (*Gila bicolor pectinifer*)
  ESA Listing Status: *None*
  California State Listing Status: *None*
  Nevada State Listing Status: *None*
  US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*
- **Great Basin Great Basin rams-horn** (*Helisoma newberryi)*
  ESA Listing Status: *None*
  California State Listing Status: *None*
  Nevada State Listing Status: *None*
  US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*

Of the aquatic species listed above, none were detected during survey efforts between 2009 and 2013. No surveys were conducted for Great Basin rams-horn. Habitat for some of the species listed above does occur in the project area (Table 3-1).

Table 3-1*:* Aquatic species listed for the Lake Tahoe Basin Management Unit noting if they occur and/or have suitable habitat within the project and/or analysis area.

SPECIES	STATUS	HABITAT CHARACTERISTICS	POTENTIAL HABITAT PRESENT?	RATIONALE
Fish				
Lahontan lake tui chub *(Gila bicolor pectinifer)*	FSS	Large, deep lakes of the Lahontan basin. Algal beds in shallow, inshore areas for spawning, egg incubation, larval rearing.	No	Tui chub may spawn in the near shore areas of Lake Tahoe or mouths of rivers.
Lahontan cutthroat trout *(Oncorhynchus clarki henshawi)*	FT	Lakes and streams of the Lahontan basin.	Yes	Suitable habitat occurs downstream of the project area. No/limited spawning habitat occurs in the project area. Additionally, the biological conditions (specifically non-native trout presence) inhibit LCT from becoming established in the project area and analysis area.
Amphibians				
Sierra Nevada yellow-legged frog (*Rana sierrae)*	FSS, PE, PX, CSC	Inhabits ponds, tarns, lakes, and streams at moderate to high elevations.	Yes	Though there is habitat present, there are no populations in the project area due to the biological conditions (specifically non-native trout).

SPECIES	STATUS	HABITAT CHARACTERISTICS	POTENTIAL HABITAT PRESENT?	RATIONALE
Northern leopard frog *(Rana pipiens)*	FSS, CSC	Quiet permanent or semi-permanent aquatic habitat with emergent and submergent vegetation.	Potential	The Lake Tahoe basin is not in the historic range of northern leopard frog (Jennings et al. 2004).
Yosemite toad *(Bufo canorus)*	PT, CSC	High elevation, open, montane meadows with permanent water sources	Potential	The Lake Tahoe basin is not in the historic range of Yosemite toad. No detections to date.
Invertebrates				
Great Basin rams-horn *(Helisoma newberryi)*	FSS	Larger lakes and slow rivers, including larger spring sources and spring-fed creeks. Snails burrow in soft mud.	Yes	Great Basin rams-horn may be present in in springs inside the project area, but surveys have not been conducted.

Status explanations:
FSS = LTBMU Sensitive Species, Regional Forester's Sensitive Species List, Region 5
California State List: CSC = CA Special Concern; CE = CA Endangered; CT = CA Threatened; CFP = CA Fully Protected
Federal List (USFWS): FC = Candidate for listing; FE = Endangered; FT = Threatened;
P = proposed for listing as endangered (E) or threatened (T); (PX) Proposed Critical Habitat
Sources: CDFW 2008; USFWS 2013; USDA Forest Service 2008

Management Indicator Species

Management indicator species (MIS) for the LTBMU are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS (see the MIS Report, Project Record Folder F1). The aquatic MIS selected for project-level MIS analysis for the Incline Lake Project are: aquatic macroinvertebrates (Riverine & Lacustrine) and Pacific tree frog (Wet Meadow). Aquatic MIS along with Terrestrial MIS selected for project-level analysis are discussed in the Terrestrial Wildlife section (3.6) of this EA.

3.1.2 Overview of the Affected Environment

Aquatic Habitat

Aquatic habitat within the analysis area consists of stream channels, springs, ponds, and wet meadow habitat. These habitats have been modified by past management activities including the construction of ditches to move water, two earthen dams, and the impoundment of water in the previous reservoir, Incline Lake.

Within the analysis area, precipitation falls mostly as snow with annual precipitation approximately 50 inches per year (RCI, 2006). Average spring snowmelt Peak runoff ranges from 4 to 10 cubic feet per second (CFS) (*calculated using USGS Flood Frequency Regresssion Relationship, Thomas et. Al, 1997*). Flows are maintained after snowmelt has ceased by spring flows. Based on visual observations, spring fed base flow levels in late summer (mid-July through September) range between 0.1 to 1 CFS, maintaining a constant source of surface, subsurface, flow through the system, and maintaining relatively high ground water levels. Larger winter storms could generate peak flows ranging from 30 to 70 CFS; rare extreme events that may result in flows carrying sand and gravel off the hill slopes and sheeting out onto the meadow.

Stream channels within the analysis area consist of a mix of natural channels as well as man-made ditches. Stream channel pattern starting in the headwaters consists of several natural somewhat straight, spring feeder channels, that are 2 to 4 feet wide and averaging 0.5 to 1 foot deep. These channels are poorly defined due to the low gradient and robust vegetation structure on the surface. These channels are very stable, characterized by a resilient grass lined channel bed and banks, and flows easily and frequently spread out onto the adjacent meadow floodplain.

Ditches were created as the 1880's during Comstock logging activities. These ditches are still active. A ditch created to divert water from Third Creek to supply water to the previous reservoir (Incline Lake) is currently disconnected from Third Creek; however, it does pick up contributing lateral flows as it extends toward the dam and areas of instability in the project area. The diversion ditch upstream of the earthen has 8, 2 to 3foot head cuts. Downstream of these head cuts, the diversion ditch erodes downward with a 4.5 foot head cut. This head cut is actively eroding and illustrated in the Chapter 3 Hydrology Section.

Head cut formation may have begun prior to draining the lake in 2008, but draining the lake has resulted in rapid growth of head cut development as flows adjust to the drop in flow gradient. Head cut growth and advancement up valley is expected to continue, without intervention.

From the location of this 4.5 foot head cut, the diversion ditch collects 60 to 80 percent of the surface and spring water from the contributing watershed upstream, routing it relatively quickly downstream to the underflow pipe and out of the meadow; cross section hydraulics analysis in the hydrology specialist report suggests that this ditch contains and prevents water from accessing the floodplain in all but the rare extreme floods. Width along the top of bank of this ditch below this head cut is 6 to 10 feet, and bottom width is 2 to 3 feet. Stream bank height is 6 feet below the head cut, reducing down to about 1 foot near the dam. This ditch is characterized by unstable channel surfaces consisting of primarily fine grade sediments.

Within the aquatic analysis area, there is approximately 58 acres of SEZ habitat (as defined by TRPA). Within the SEZ, approximately 29 acres would be classified as wet meadow using USFS CWHR vegetation classification system (see Chapter 3 Botany section for more information on classification system). Historic aerial photos suggest that the historic lake foot print would also have been classified as SEZ; however, since the 18 acre impoundment has been drained, approximately 8 acres are considered barren, 6 are perennial grassland, and 4 have returned to wet meadow. Based on vegetation alone, approximately 13% of this tributary watershed would be classified as SEZ, with a high percentage of SEZs classified as wet meadow, a relatively rare vegetation classification in the Tahoe Basin.

The creation of ditches and the reservoir, confounded by head cut establishment, has impacted the distribution of surface, subsurface, and groundwater flows. The current channel flows are confined, increasing velocity and erosive force. The increased flow energy promotes continued channel erosion with channels beds getting deeper relative to the ground surface. The increased incision has left channels disconnected from the floodplain, lacking streambank vegetation, and contributing to the overall “drying” out of the adjacent riparian areas. The channels within the project area are homogenous, lacking habitat characteristics, such as spawning or rearing habitat, to support fisheries. Under natural conditions, channels within the project area would most likely lack gravel. However, due to the unstable banks and erosive characteristics, streambeds are dominated by silt and sand.

Aquatic Species

Lahontan Cutthroat Trout (Oncorhynchus clarkia henshawi)

Lahontan cutthroat trout (LCT) was listed as an endangered species in 1970 (Federal Register Vol. 35, p.13520). In 1975, under the Endangered Species Act of 1973 as amended (ESA), LCT was reclassified as threatened to facilitate management and to allow for regulated angling (Federal Register Vol. 40, p.29864). In 1995, the U.S. Fish and Wildlife Service (USFWS) released its recovery plan for LCT, encompassing six river basins within LCT historic range, including the Truckee River basin. Endangered Species Act Specific recovery targets related to

down listing (i.e. number of self-sustainable sub-populations) have yet to be determined for the basin.

Historically, LCT occurred throughout the Truckee River drainage from the headwaters in California downstream to Pyramid Lake (Gerstung, 1988). By 1938 LCT had been extirpated from the Tahoe Basin. Historically, LCT utilized both lake and stream habitat. Like other native fish species, they preferred cold water habitat but could utilize a wide variety of habitats as long as oxygen levels were high and cover and food were plentiful. Stream dwelling LCT feed on drift, typically a combination of terrestrial and aquatic insects. In lake habitat, small LCT feed on zooplankton or insects while larger LCT feed on other fish species, historically tui chub (Moyle, 2002)

To date, recovery efforts for LCT have been initiated in the headwaters of the Upper Truckee River and Fallen Leaf Lake. LCT have been stocked throughout the Lake Tahoe basin, including Lake Tahoe, for recreational fishing opportunities by State fish and game agencies. Future recovery activities could also occur over the next 10 years in various sub-watersheds in the Lake Tahoe basin, including Third Creek.

Sierra Nevada Yellow-legged Frog (Rana sierrae)

Sierra Nevada (mountain) yellow-legged frog (SNYLF) is a Proposed Endangered Species with Proposed Critical Habitat under the Endangered Species Act (ESA) and a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). On April 25, 2013, the US Fish and Wildlife Service (FWS) published in the Federal Register (Federal Register Vol.78, No. 80) proposing listing SNYLF as endangered and designating critical habitat. The criterion for the proposed listing is based on the danger of extinction throughout the species entire range and on the immediacy, severity, and scope of the threats to its continued existence. These threats include habitat degradation and fragmentation, predation and disease, climate change, inadequate regulatory protections, and the interaction of these various stressors impacting small remnant populations. There has been a range wide reduction in abundance and geographic extent of surviving populations of frogs following decades of fish stocking, habitat fragmentation, and most recently a disease epidemic. Surviving populations are smaller and more isolated, and recruitment in disease-infested populations is much reduced relative to historic norms. This combination of population stressors makes persistence of the species precarious throughout the currently occupied range in the Sierra Nevada.

SNYLF occupied the majority of lake, pond, marsh, and stream habitats within its historic range, and may have been the most abundant vertebrate in these montane ecosystems (Grinnell and Storer 1924). Non-native trout, however, that have been introduced to over 90% of historic SNYLF habitat have drastically altered these ecosystems (Knapp et al. 2008, Epanchin et al. 2010). The introduction of fishes into naturally fishless mountain lakes often results in the

extirpation of large-bodied zooplankton species (Knapp et al. 2008). Within the historical range of SNYLF, most aquatic habitats were naturally fishless due to the presence of natural barriers that prevented the upstream movement of fish from occupied downstream habitats. Starting in the mid-1800s, several species of trout were widely introduced into fishless lakes and streams throughout the Tahoe Basin. Predation by trout on all SNYLF life stages resulted in marked declines of SNYLF across their range (Knapp and Matthews 2000, Vredenburg et al. 2005). These declines caused by introduced trout are now being partially reversed via removal of trout populations from some sites by the National Park Service (NPS), California Department of Fish and Wildlife (CDFW), and USFS (Knapp et al. 2007). The decline of the SNYLF is being driven primarily by the introduction of non-native fish and the emerging infectious disease, *Batrachochytrium dendrobatidis* (sometimes referred to as Bd or chytrid fungus) (Knapp et al. 2003, Vredenburg 2004, Knapp et al. 2007, Vredenburg et al. 2010).

SNYLF has been nearly extirpated from the Lake Tahoe basin. A small remnant population was discovered in Hell Hole Meadow, located in the headwaters of Trout Creek in the 1990's. Additional recovery efforts were initiated in 2008 to restore historic habitat in Desolation Wilderness. Museum specimens from the Museum of Vertebrate Zoology and the California Academy of Sciences suggest that historically SNYLF occupied Tahoe Meadows, which is within 1 mile of the project area and exhibits similar habitat characteristics.

Yosemite Toad (Bufo canorus)

The Yosemite Toad is currently a Proposed Threatened Species with Proposed Critical Habitat under the Endangered Species Act (ESA) of 1973, as amended. On April 25, 2013, the US Fish and Wildlife Service (FWS) published in the Federal Register (Federal Register Vol.78, No. 80) proposing listing Yosemite toad as Threatened and designating critical habitat. Yosemite Toad is also listed by the State of California as a Species of Special Concern. To date, range-wide conservation activities (including the development of a conservation strategy) for Yosemite toad have been accomplished in a multi-agency format involving the FWS, NPS, USFS, CDFW and academic institutions such as the University of California, Berkeley and Sierra Nevada Aquatic Research Laboratory.

Yosemite toads are endemic to the Sierra Nevada Mountains or Province from Ebetts Pass, Alpine County to the Spanish Springs Mountain area, Fresno County (Karlstrom, 1973; Stebbins 1966) at elevations ranging from 1950 to 3444 m (6398 to 11299 ft.). Jennings and Hayes (1994a) estimate that populations have disappeared from 50 percent of historical habitat. Of historical sites, declines have been concentrated in lower elevation locations with greater persistence in higher elevation locations (Davidson et al, 2002). Their current range borders the boundary of the Tahoe Basin but, to date, no detections have been recorded.

Because the range of this species is currently outside the boundary of the Lake Tahoe Basin, it will not be discussed in more detail as the proposed project activities will have no effect on the species or its habitat.

Northern Leopard Frog (Rana pipiens)

The northern leopard frog is a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). Historically this species occurred from Newfoundland and southern Quebec to West Virginia and west across the Canadian and northern and central portions of the United States including Oregon, Washington, and Northern California (Stebbins, 1985). Reports of extirpation and range contraction are common in the western United States, where the species has disappeared from 95 percent of its historic range in California (Jennings 1995). Northern leopard frogs may be absent where large populations of American bullfrog (*Rana catesbeiana)* occur (Hammerson, 1982b; Jenning and Hayes, 1994b), as is the case in many lower elevation (lake level) habitats in the Lake Tahoe Basin. According to Jennings and Hayes (1994b), northern leopard frogs were introduced to the Lake Tahoe Basin. Although preferred habitat exists within the project area, including streams, wetlands, or ponds as well as upland areas for foraging, to date, there have been no detections of this species.

Because this species has not been detected in the Lake Tahoe basin, it will not be discussed in more detail as the proposed project activities will have no effect on the species or its habitat.

Lahontan Lake Tui Chub (Gila bicolor pectinifer)

Lahontan Lake tui chub is a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). They occur in open water habitats, such as lakes, lagoons or river mouths and feed primarily on zooplankton. Tui chub populations have presumably declined as a result of introductions of non-native species, specifically kokanee salmon (*Oncorhychus nerka*) and opossum shrimp (*Mysis relicta*), which, through predation and competition, have significantly reduced native zooplankton (Moyle, 2002). Compounding these impacts are the illegal introductions of invasive warm-water fishes, specifically largemouth bass but potentially blue gill, crappie and brown bullhead catfish, which prey on juvenile chubs at their inshore rearing habitats (Kamerath et al. 2008).

Great Basin rams-horn (Helisoma newberryi)

Great Basin rams-horn is a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). This aquatic pulmonate snail has hemoglobin in its blood and a secondary gill or pseudobranch, allowing it to occupy poorly oxygenated, but cold waters such as cold spring upwellings. It can be almost invisible to the casual observer even when abundant because it may burrow into muddy substrates. This species may be found in larger lakes and slow rivers, including larger spring sources and spring-fed creeks (Taylor 1981). In Eagle Lake, Lassen

County, this species commonly occurs on top of sandy substrates at depths greater than 10 feet (3 m) (Brim Box et al. 2005). Historically the species occurred in Lake Tahoe and the slow flowing outflow into the Lower Truckee River. The population status of Great Basin rams-horn is currently unknown as no surveys have been conducted. However, habitat within the project area does exist indicating that if populations were detected through survey efforts they would be vulnerable to bed altering activities.

3.1.3 Environmental Consequences

Analysis of direct, indirect, and cumulative effects of the three alternatives on FWS and FSS aquatic species and habitat is presented for Alternative 1 (No Action), Alternative 2 (Proposed Action), and Alternative 3 as summarized above and described in detail in Chapter 2 of this EA.

Direct / Indirect Effects Analysis

Proposed project activities would remove and also create habitat (depending on alternative) and could affect individuals and/or populations of FWS and FSS species. Project activities could disturb individuals and/or populations of aquatic species during implementation. Potential direct and indirect effects on FWS and FSS aquatic species and habitat were determined by evaluating the type and amount of existing habitat for each species, type and amount of habitat alteration/removal/creation for each species, and type and magnitude of disturbance for each species.

Cumulative Effects Analysis

The analysis area, as described above, is spatially defined as the 46 acre project area and the hydrologic area contributing to the project area for a total of about 448 acres. The analysis area includes all land managed by the Forest Service and a small parcel (approximately 6 acres) of public land (Incline Village GID) that is just east of the project area, adjacent to SR431 (Figure 3-1). The analysis area is temporally defined to extend 15 years before and after the present. Although actual implementation may last one to three years (depending on alternative), the results of the implementation activities may not be realized for 15-20 years following implementation. Section 3.0.2 of this EA describes the projects and activities considered for cumulative effects.

Alternative 1 – No Action

Aquatic Habitat

Alternative 1 proposes the minimal actions needed to stabilize the portion of the stream directly upstream and downstream of the earthen dam. Temporary soil disturbance will occur as a result of removing dam fill material to create a “notch” for a newly constructed stream channel (approximately 200 feet), and actions to construct a stable stream channel and stabilize side slopes of the newly constructed channel. Best Management Practices, as directed in USFS guidance documents, will be implemented to eliminate/ reduce the potential of soil from entering

the stream channel. A short-term increase in sediment could impact water quality and spawning habitat.

By creating a "notch" within the existing earthen dam, there will be unimpeded flows upstream of the dam through the dam footprint in a stable channel. This will remove an existing barrier to upstream (and downstream) movement of aquatic species.

Because no other restoration actions are proposed under Alternative 1 to address channel incision, head cuts or ditches, subsurface and groundwater flows may continue to be disrupted in the floodplains adjacent to channels/ditches that are vulnerable to continued erosion and incision (Figure 3.2). Alternative 1 would leave approximately 3,350 feet of unstable channel. The unstable channels would lead to a loss of riparian and wet meadow habitat as groundwater levels continued to decrease. Additionally, as the stream channel becomes more disconnected to the floodplain, riparian vegetation along the streambank that aids in bank stabilization, stream shading, and habitat complexity would decline, further decreasing the quality of aquatic habitat.

The existing groundwater levels are currently below the growing depth needed to sustain wet meadow vegetation. In Alternative 1, both meadow and wetland habitat would decrease in quality and quantity as groundwater elevation decreased and vegetation community shifted to upland dominated species.

Figure 3-2 - Head cut erosion advancing upstream on the main ditch (left path looking upstream) and a lateral spring feeder channel (right path)

Any ponded areas within the former impoundment would occur in existing low depressions that naturally hold water. These ponded areas may or may not connect to the existing stream. It is unclear the length of time throughout a season (depending on the water year) the wetland/meadow will hold water. If groundwater continues to decline due to unstabilized channels, eventually these low depressions would be above the water table and be dry earlier in the season. Any water remaining in ponded habitat will most likely freeze solid during the winter months.

Downstream flows would be maintained through both the notch in the existing earthen dam and through slow seepage through the dam. Downstream flow would continue to flow into Third creek approximately 0.75 mile downstream of the notch.

Aquatic Species

Lahontan Cutthroat Trout (Oncorhynchus clarkia henshawi)

LCT have not been detected in the project area or the analysis area and it is unknown if historically they occurred this high in the watershed. Habitat does exist downstream of the project area in Third Creek. Stream habitat in the project area lacks characteristics that would support a self-sustaining LCT population. Specifically, spawning habitat in the project area is limited to non-existent. The incised channel/ditches lack both gravel and riffle habitat. Additionally, Third Creek and stream habitat in the analysis area host a variety of non-native trout, specifically brook trout that are known to predate and out-compete LCT. Alternative 1 will restore aquatic organism passage potentially increasing brook trout, or other non-native trout, abundance and distribution. Without additional recovery efforts (e.g. non-native trout removal), which is outside the scope of this project, it is unlikely that LCT could become established in this sub-watershed. Because LCT have not been detected in the project area or downstream of the project area, Alternative 1 will have no effect on LCT.

Sierra Nevada Yellow-legged Frog (Rana sierrae)

SNYLF have not been detected in the project area or the aquatic analysis area. Historically, habitat could have existed within the project area and analysis area. Historic evidence concludes their presence in a meadow complex approximately 1 mile (1.6 km) from project area. The ponded areas under Alternative 1 could provide suitable habitat if water depths were such that prevented freezing during winter months. If groundwater levels continued to decline without treatment of the ditch/head cut area, ponded habitat, as well as stream habitat, would continue to decline reducing the quality and quantity of potential habitat. Brook trout have also been detected within the project area and analysis area. These trout are known predators of SNYLF and would prohibit the establishment of this species even if suitable habitat existed. Because SNYLF have not been detected in the project or analysis area and the current biological

condition of the area precludes them from establishing in the area, Alternative 1 will have no effect on this species.

Lahontan Lake Tui Chub (Gila bicolor pectinifer)

Under Alternative 1, no suitable habitat exists for this species. It has not been detected in the project area or analysis area. Therefore, there are no effects to this species or habitat under Alternative 1.

Great Basin Great Basin rams-horn (Helisoma newberryi)

No surveys have been conducted for the Great basin rams-horn; however, habitat does occur in the project area, specifically in spring habitat. This project could have indirect impacts on habitat as continued incision of streams/ditches and head cuts could drain spring habitat, reducing both quality and quantity of available habitat.

Alternative 2 – Proposed Action

Aquatic Habitat

Alternative 2 proposes additional actions when compared to Alternative 1 that would address the stressors in the project area that are affecting SEZ and stream habitat. Proposed actions would promote natural function, such as stream and floodplain connectivity. Because both dams (major and minor) would be removed and recountoured, this alternative also has the greatest amount of soil disturbances. However like Alternative 1, direct effects on soil quality and water quality would be mitigated by the application of USFS best management practices. The period of full stabilization of channel/SEZ surfaces is expected to take 2 years for channel/SEZ revegetation to become established, with full vegetation recovery occurring within 5 to 10 years. A short-term increase in sediment could impact water quality and spawning habitat. Temporary soil surface stabilization would be monitored and maintained throughout this period, as needed.

The restoration actions would result in the restoration of stable channel flows including 200 feet of new channel and 3,350 feet of restored channel. This action would eliminate an existing aquatic organism barrier, similar to Alternative 1, and increase both the quality and quantity of stream habitat available for aquatic species. As the stabilized stream becomes established with the floodplain, both woody and herbaceous vegetation are expected to increase. The final future channel form will likely be a series of interconnected channels with no distinct single main flow path. The channels will likely be shallow and grass lined based on current understanding of the geomorphic conditions that support this type of channel pattern

Restoration actions to channels as well as restoration actions to remove dam fill and recontour topography on the floodplain surface, will result in restoring patterns within the natural range of

variability for this site related to surface flooding, the movement of subsurface flows, and groundwater levels. By increasing groundwater levels and surface flooding, wet meadow habitat will increase by approximately 17 acres in comparison to Alternative 1 for a total of 27 acres restored/maintained. This increase could be greater considering wet meadow habitat will decrease over time in Alternative 1 as stream incision and head cuts continue to decrease groundwater availability. However, wet meadow habitat may be affected where equipment is used to remove trees or stabilize channels. It is estimated that about 1.2 acres of wet meadow habitat may be directly affected during tree removal. Although some potential habitat may be lost, activities under this alternative are predicted to support more wet meadow habitat in the long-term and higher functioning wet meadow habitat by restoration actions that would improve ground water connectivity as well as surface and subsurface flows

There will be no positive or negative effects on channel and SEZ function below the dam as a result of this alternative compared to the existing condition, other than reducing this risk of future debris jams impounding flow. Downstream flows under this alternative are expected to mimic pre-dam conditions as there will be no impediment to water movement. By restoring the upstream and downstream stream segment currently separated by the earthen dam, this alternative will restore aquatic organism passage and could reduce downstream sediment transport by constructing a step pool stream and floodplain in place of a notch (with no floodplain connection) through the existing earthen dam.

Recountouring within the existing reservoir footprint and dam locations will increase both meadow and wetland habitat. Any water remaining in ponded habitat will most likely freeze solid during the winter months as these are low depression areas.

Additional activities to restore the former diversion all the way to Third creek are outside the scope of this project but may be analyzed as part of future projects (i.e., management of the entire Incline Lake Acquisition Area) in order to fully achieve restoration of hydrologic function. However, as described above in the cumulative effects introduction, a proposed action for that project has not been developed.

Aquatic Species

Lahontan Cutthroat Trout (Oncorhynchus clarkia henshawi)

LCT have not been detected in the project area or the analysis area and it is unknown if historically they occurred this high in the watershed. Habitat does exist downstream of the project area in Third Creek; however, Third Creek hosts a variety of non-native trout, specifically brook trout, that are known to predate and out-compete LCT. These non-native trout have also been detected throughout the project area. Alternative 2, like Alternative 1, will restore aquatic organism passage potentially increasing brook trout, or other non-native trout, abundance

and distribution. Without additional recovery efforts (e.g. non-native trout removal), which is out of the scope of this project, it is unlikely that LCT could become established in this sub-watershed. Although stream channel stabilization will restore 3,350 feet of stream channel, the geomorphic conditions suggest that the natural channels in the project area were most likely small, shallow, interconnected channels lacking a single flow path. Although this could be rearing habitat, it could lack habitat conditions that would support spawning. Regardless, because LCT have not been detected in the project area or downstream of the project area and the existing fish assemblage is not conducive for LCT habitat needs, Alternative 2 will have no effect on LCT.

Sierra Nevada Yellow-legged Frog (Rana sierrae)

SNYLF have not been detected in the project area or the aquatic analysis area. Historically, habitat could have existed within the project area and analysis area. Historic evidence concludes their presence in a meadow complex within one mile of the project area. Proposed actions to restore surface and groundwater hydrologic function and set the trajectory to continued improvement would increase potential habitat for SNYLF, specifically where ponded/wetland habitat is connected to stream channels and provided habitat characteristics that supported life history requirements of the species. These characteristics include, continued water source that does not freeze solid during the winter, areas for basking, and areas for egg deposition. Actions proposed under Alternative 2 would increase both the quality and quantity of habitat available for SNYLF if they became established in the area.

However, brook trout have been detected within and downstream of the project area as well as throughout the analysis area. These trout are known predators of SNYLF and would prohibit the establishment of this species even if suitable habitat existed. Distribution and abundance of brook trout, as well as other non-native trout, could increase throughout the project area when aquatic organism passage is restored. Without action to remove non-native trout and the ability of trout to move into the project area, which is outside the scope of this project, it is highly unlikely that SNYLF will become established in the area, regardless of restoration actions. Because SNYLF have not been detected in the project or analysis area and the current biological condition of the area precludes them from establishing, Alternative 2 will have no effect on this species.

Lahontan Lake Tui Chub (Gila bicolor pectinifer)

Under Alternative 2, no suitable habitat exists for this species. It has not been detected in the project area or analysis area. Therefore, there are no effects to this species or habitat under Alternative 2.

Great Basin Great Basin rams-horn (Helisoma newberryi)

No surveys have been conducted for the Great basin rams-horn; however, habitat does occur in the project area, specifically in spring habitat. This project could have short-term impacts on potential habitat during restoration efforts. There could be direct impacts to the species during the use of any heavy equipment needed to stabilize stream channels or restore wetland features. However, there will be long-term benefits to the species and habitat following stabilization efforts when both stream channels and springs are allowed to function. By restoring both groundwater conditions and preventing impacts to springs by restoring head cuts and ditches, which could affect spring habitat long term, the quantity and quality of habitat will increase/improve. These beneficial effects will be greater in Alternative 2, in comparison to Alternative 1.

Alternative 3

Aquatic Habitat

Aquatic habitat under Alternative 3 would shift from a stream, wetland, and meadow dominated system to lake dominated. To implement proposed actions, soil disturbing activities would be needed. Disturbance would be substantially greater when compared to Alternative 1 but less than Alternative 2. However like Alternative 1 and 2, direct effects on soil quality and water quality would be mitigated by the application of USFS best management practices. The period of full stabilization of channel/SEZ surfaces from revegetation post construction would be similar to Alternative 2, and temporary soil surface stabilization would be monitored and maintained throughout this period, as needed. A short-term increase in sediment could impact water quality and spawning habitat.

The volume of water impounded would be equal to the previous dam filled up to the level of the current spillway, resulting in the creation of an 18 to 20 acre reservoir. At this level the maximum depth of the lake would be approximately 18 ft. (5.5m). Upstream flows would feed into the channel downstream of the dam when flows coming into the reservoir exceed the volume maintained by the spillway height, or when flows are provided through spillway management to maintain flows determined necessary to maintain aquatic habitat as required by Federal law and policy (see Chapter 3.4 Hydrology Section). During very dry years, late summer base flow may need to be augmented by managed flow releases from the reservoir. Unlike Alternative 1 and 2, this alternative could affect downstream conditions as minimum flows could be less than existing with the impoundment of water. The impoundment and associated dam will likely reduce the amount and duration of peak flows to the main tributary below the dam. This could be confounded with both climate change predictions and evaporative water losses. Although the evaporative loss potential has not been quantified, it can reasonably be stated that evaporative water losses would be greater then that which occurs in a meadow ecosystem where

most of the water flows under the ground surface as subsurface and groundwater flow and is slowly metered throughout the system.

Because the reservoir would impound large portions of current meadow and stream habitat, 900 feet of channel and ditch and 500 feet of lateral tributaries would be stabilized, compared to 3,350 in Alternative 2. Stabilization of channels above the reservoir would result in the enhancement of floodplain function of 4 acres of SEZ. The total amount of wet meadow/riparian SEZ under Alternative 3 would be approximately 8 acres, compared to 27 acres under Alternative 2.

Impounded water could provide habitat for aquatic invasive species, such as American bullfrog. This species has not been detected at this elevation; however, climate change projections could expand the range of this species into higher elevation habitats. Additionally, shallow lake habitat, where water temperatures range from 2-5°C in the winter up to 40 to 41°C in the summer, is suitable for warm water invasive fish, such as bluegill *(Lepomis macrochirus*) (Moyle 2002).

Aquatic Species

Lahontan Cutthroat Trout (Oncorhynchus clarkia henshawi)

LCT have not been detected in the project area or the analysis area and it is unknown if historically they occurred this high in the watershed. Habitat does exist downstream of the project area in Third Creek; however, Third Creek host a variety of non-native trout, specifically brook trout, that are known to predate and out-compete LCT. These non-native trout have also been detected throughout the project area and analysis area. Alternative 3 has the potential to increase habitat for non-native species, including warm water invasive species such as blue gill and American bullfrog. Without additional recovery efforts (e.g. non-native trout removal), which is out of the scope of this project, it is unlikely that LCT could become established in this sub-watershed. Additionally, the proposed dam would also prevent both upstream and, potentially, downstream migration. Although this could reduce the distribution of non-native fish movement into the project area, it would also impair the likelihood of future LCT recovery. Because LCT have not been detected in the project area or downstream of the project area and the existing fish assemblage is not conducive for LCT habitat needs, Alternative 3 will have no effect on LCT.

Sierra Nevada Yellow-legged Frog (Rana sierrae)

SNYLF have not been detected in the project area or the aquatic analysis area. Historically, habitat could have existed within the project area and analysis area. Historic evidence concludes their presence in a meadow complex within one mile of the project area. Proposed lake habitat could provide habitat for SNYLF, provided the entire lake did not freeze solid during winter months. However, due to the current population of brook trout within the project area and the

potential threat of other non-native aquatic species becoming established in the lake, the biological habitat is not conducive for the establishment of SNYLF. Without recovery actions that address the removal and prevention of these species, which is out of the scope of this project, the proposed lake and stream habitat could not support SNYLF. Because SNYLF have not been detected and actions needed to restore suitable habitat for SNLYF are out of the scope for this project, Alternative 3 will have no effect on this species.

Lahontan Lake Tui Chub (Gila bicolor pectinifer)

Under Alternative 3, no suitable habitat exists for this species. It is unlikely that that would occur in the project area unless manually planted and, if planted, it is unlikely they survive due to inadequate habitat characteristics (e.g. lake size and depth, lack of spawning habitat, presence of non-native species). Because Lahontan lake tui chub has not been detected in the project or analysis area and under Alternative 3 no suitable habitat will occur, there are no effects to this species or habitat under Alternative 3.

Great Basin Great Basin rams-horn (Helisoma newberryi)

No surveys have been conducted for the Great basin rams-horn; however, habitat does occur in the project area, specifically in spring habitat. The extent of suitable habitat under Alternative 3 has the potential to stay in baseline condition, increase, or decrease. Because some suitable habitat could be impounded by lake habitat, suitable habitat located in springs, spring fed streams and low gradient streams would decrease. However, this species has also been known to occur in large lakes with muddy substrate. There is a potential that suitable habitat could increase as water is impounded behind the proposed dam.

This project could have short-term impacts on potential habitat during restoration efforts. There could be direct impacts to the species during the use of any heavy equipment needed to stabilize stream channels or restore wetland features. However, there could be long-term benefits to the species and habitat. These beneficial effects will be less in Alternative 3, in comparison to Alternative 1 and Alternative 2, as quality of potential habitat under Alternative 3 is unknown.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have cumulative effects to any special status species. LCT, SNYLF, and Lahontan lake tui chub are not known to occur in the analysis area. There are no nearby occurrences of any of the species, indicating that dispersal to the project area is probably unlikely. The existing biological community within the analysis area increases the unlikelihood of these special status species becoming established. Although Great Basin rams-horn could occur in the analysis area, no additional effects are expected when any of the alternatives are combined with other past, present or reasonably foreseeable projects because any potential

effects caused from other projects are located in areas, such as upland habitat or areas downstream of potential habitat; therefore, they would not influence potential habitat. Although Incline Fuels Project is near the project area, these treatments are not in potential habitat (springs, lakes and slow moving streams). Additionally, both Resource Protection Measures and BMPs would apply actions to prevent effects to habitat, for example buffers around aquatic habitat. Additionally this effort could have long-term benefits to potential habitat as vegetation removal increases water availability.

3.1.4 Analytical Conclusions

The Alternatives do not differ in terms of potential for direct effects to species. No aquatic special status species have been detected during pre-project surveys. No surveys were conducted for Great basin rams-horn so presence is assumed.

Alternative 1 (No Action) is expected to have the fewest short-term impacts to potential habitat for species during implementation because this alternative has the fewest acres of ground disturbing activities. However, without treating other areas within the project area that have been impacted by previous land management actions, specifically the area impounded by water or unstable channels, ditches and head cuts, the existing habitat would decline in both quality and quantity. Potential effects of not taking corrective action would include meadow drying due to head cuts or incised channels, loss of streambank vegetation; and potentially increased sediment transport due to lack of floodplain connectivity and loss of spawning habitat (particularly downstream of major dam).

In terms of habitat condition, Alternative 2 (Proposed Action) has the greatest potential of all alternatives to set the trajectory for improved habitat conditions in the project area. The additional proposed actions will improve aquatic habitat characteristics (e.g. habitat availability and complexity, streambank stabilization, vegetative composition and vigor, water quality) within the project area and downstream. Similar to Alternative 1, removing the existing obstruction to aquatic migration could increase the distribution and abundance of non-native fish as well as native fish. The additional actions to recountour areas influenced by the construction of the previous dam and reservoir will improve potential habitat for aquatic species, specifically amphibians, by restoring wetland and stream habitat. Restoring and stabilizing the 3,350 feet of stream within the project area will increase floodplain function, improve water quality, and increase habitat characteristic (e.g. stream shade, width/depth ratio) that will provide conditions for various life history requirements of aquatic species.

Although Alternative 2 includes more ground disturbing activities when compared to Alternative 1, the long-term benefit from improving ground water connectivity can serve to improve the condition for a variety of species associated with wet meadow, wetland and stream habitat conditions. Ultimately, Alternative 2 has the greatest benefit to aquatic habitat (Table 3-2).

By inundating the wetland, meadow, and stream habitat to create a lake, Alternative 3 alters the type of available habitat (Table 3-2). The proposed lake habitat could provide habitat for some special status species, such as SNYLF; however, it could also increase habitat for non-desirable aquatic invasive species, such as American bullfrog or blue gill. Because brook trout have been detected in the project area, it is likely that this species would establish in the lake and restrict the establishment of SNYLF and LCT. Additionally, due to the lack of spawning habitat, LCT could not become self-sustaining even in the absence of non-native fish.

Ground disturbing activities under Alternative 3 would be similar (but slightly less) as Alternative 2 in terms of short term impacts as heavy equipment would be needed to stabilize the existing dam causing similar short-term impacts, specifically to downstream aquatic habitat. However, the long-term benefits to aquatic habitat would be less than Alternative 2.

Waterbody/SEZ Form	**Alternative 1**	**Alternative 2**	**Alternative 3**
Lake/Reservoir	0	0	18-20 acres
Wet Meadow/Riparian SEZ	12.5 acres	26.6 acres	8.3acres
Unstable Channels	3,350 ft	0	0
Created/Restored Geomorphically Stable Channels	200 ft	3,350 ft	1,450 ft

Table 3-2: Spatial extent of predicted Waterbody/ SEZ Form within the Project Area under each Alternative

3.2 Botanical Resources

3.2.1 Introduction

This section analyzes the activities proposed as a part of the Incline Lake Dam Project to determine whether they have the potential to affect any federally endangered, threatened, proposed or candidate botanical species, or Forest Service Region 5 Sensitive botanical species (referred to collectively as TEPCS botanical species) as well as other botanical resources, such as TRPA Sensitive Plants, LTBMU Watch List botanical species and uncommon plant communities. Effects to TEPCS botanical species are discussed in detail in the project's Biological Evaluation of Botanical Species and effects to other botanical resources are discussed in detail in the project's Other Botanical Resource Assessment.

Methodology

Geographic Area Evaluated

The area analyzed in this document is referred to as the 'analysis area'; it encompasses approximately 410 ac and follows the watershed boundary delineated by the project's hydrologist. This area was selected because the proposed hydrological restoration activities have the potential to influence hydrological processes beyond the project area (46 ac) but are anticipated to be limited to the watershed boundary. With the exception of the Highway 431 corridor (30 ac), the entire analysis area is NFS lands.

Botanical Resource Indicators

The following indicators were used to analyze the impacts to botanical resources:

- Number (acres) of TEPCS occurrences affected by proposed activities
- Acres of fens at risk
- Acres of TEPCS suitable wet habitat potentially created
- Acres entombed

Table 3-3 summarizes these indicators by alternative. "At risk" is defined as potentially degraded or destroyed as a direct or indirect result of proposed activities or that may result from not undertaking proposed activities. For example, failure to address current meadow dissection would put suitable fen habitat at risk. Acreage was calculated from estimates provided in Chapter 2 of the project's EA and the R5 Eveg geospatial dataset (USDA Forest Service 2010) as well as field measurements of known fens and TEPCS occurrences as recorded in LTBMU's corporate GIS database.

Acres of TEPCS suitable wet habitat potentially created is the most difficult indicator to quantify—especially for Alternative 1—due to the complexity of potential interactions between the project area's hydrology and vegetation during the transition from the reservoir's former condition (entombed for 70+ year) to its future condition. It does not include improvement (or conversely degradation) of current wet habitat, though the qualitative effects of the proposed activities are discussed in the effects analysis.

Table 3-3. Summary of Botanical Resource Indicators by Alternative

Botanical Resource Indicator	Alternative 1 (No action)	Alternative 2 (proposed action)[2]	Alternative 3
Number (acres) of TEPCS occurrences affected by proposed activities	0 (0)	0 (0)	1 (0.3)
Acres of fens at risk	1.7	0	0.2
Acres of TEPCS suitable wet habitat potentially created	Some creation & some loss (extent difficult to quantify)	Gain ~14	Loss ~4
Acres entombed	0	0	15-20

Assumptions

In the analysis of botanical resources, the following assumptions have been made:

- In its current highly disturbed state, the area formerly entombed under Incline Lake is not suitable habitat for TEPCS botanical species (except Bolander's candle-moss) in the short- to long-term (at least 5 years).
- Areas entombed by water are not suitable habitat for terrestrial vegetation in the long-term (20+ years) to permanent timeframe.
- Use of heavy equipment and imported materials present a moderate to high risk of invasive plant introduction.

TEPCS Botanical Species Effects Analysis

Forest Service Manual, Section 2670 requires a review of all activities or programs that are planned, funded, executed, or permitted for possible effects on federally listed and Forest Service sensitive species (USDA Forest Service 2005). LTBMU Land Resource Management Plan (LRMP) directs the LTBMU to manage the viability of sensitive botanical species and to ensure that these species do not become threatened or endangered because of Forest Service activities (USDA Forest Service 1988).

Methodology

The analysis of effects on TEPCS botanical species was a three-step process (FSM 2672.43) (USDA Forest Service 2005). The first step identified species all TEPCS species that were known or were believed to have potential to occur in the analysis area. The second step involved checking for adequate field reconnaissance surveys; the entire Incline Lake Acquisition Area—which encompasses the analysis area—was surveyed for botanical resources in 2010. In the third step (conflict determination), TEPCS botanical information and project activity data were used to analyze proximity to the proposed activities, identify direct and indirect effects, and develop resource protection measures. Conflict determinations are provided for all species known to occur or have suitable habitat impacted by proposed activities.

Species considered

Those TEPCS species present or with suitable habitat within the analysis area are anticipated to have the highest potential to be impacted by the proposed project activities. Conversely, species outside of the analysis area are not anticipated to be impacted by the proposed project either directly, indirectly, or cumulatively; as such, species outside the analysis area were considered, but dismissed from further effects analysis. Table 3-4 lists all Federally TEPC, and Forest Service Region 5 Sensitive botanical species that are known or have suitable habitat on LTBMU. There are no Federally threatened, endangered, or proposed botanical species known to occur or

with known suitable habitat within LTBMU. The 12 species analyzed in detail in this document—those that fall within or have suitable habitat within the analysis area—are indicated in the table.

TABLE 3-4. LIST OF THREATENED, ENDANGERED, PROPOSED AND CANDIDATE SPECIES AND FOREST SERVICE SENSITIVE BOTANICAL SPECIES KNOWN TO OCCUR OR HAVE SUITABLE HABITAT ON LTBMU

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in analysis area	Known in project area	Suitable habitat in project area	Rationale for why habitat is not suitable
Boechera rigidissima var. *demota*	Galena Creek rock cress	FSS	Open, rocky areas along forest edges of conifer and/or aspen stands; usually found on north aspects; 7,500 ft. & above.	X			**X**	
Boechera tiehmii	Tiehm's rock cress	FSS	Open rocky soils in the Mt. Rose Wilderness; 10,000 ft. & above.	Suitable habitat only				Too low; no open rocky slopes
Boechera tularensis	Tulare rockcress	FSS	Shaded, mostly east-facing subalpine rocky areas, including rocky slopes, rock-lined streams and seeps, rocky outcrops, saddles, and canyons; 6,000-11,000 ft.	Known only from herb-arium or text records				No open rocky slopes
Botrychium spp.			*Botrychium* species are found in similar habitat; wet or moist soils such as marshes, meadows, and along the edges of lakes and streams; generally occur with mosses, sedges, rushes, and other riparian vegetation; 2,000-10,000 ft.					
Botrychium ascendens	upswept moonwort	FSS	See *Botrychium* spp.	X			**X**	
Botrychium crenulatum	scalloped moonwort	FSS		X			**X**	
Botrychium lineare	slender moonwort	FSS		Suitable habitat only			**X**	
Botrychium lunaria	common moonwort	FSS		Suitable habitat only			**X**	
Botrychium minganense	Mingan moonwort	FSS		X			**X**	
Botrychium montanum	western goblin	FSS		X			**X**	
Bruchia bolanderi	Bolander's candle moss	FSS	Mainly in montane meadows and stream banks, but also on bare, slightly eroding soil where competition is minimal.	X	**X**	**X**	**X**	

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in analysis area	Known in project area	Suitable habitat in project area	Rationale for why habitat is not suitable
Dendrocollybia racemosa[1]	branched collybia	FSS	On old decayed or blackened mushrooms or occasionally in coniferous duff, usually within old growth stands.	Known only from herb-arium or text records			**X**	
Draba asterophora var. *asterophora*	Tahoe draba	FSS; TRPA	Rock crevices and open granite talus slopes on north-east slopes; 8,000-10,200 ft.	X				No talus slopes
Draba asterophora var. *macrocarpa*	Cup Lake draba	FSS; TRPA	Steep, gravelly or rocky slopes; 8,400-9,300 ft.	X				No talus slopes
Draba cruciata	Mineral King draba	FSS	Subalpine gravelly or rocky slopes, ridges, crevices, cliff ledges, sink holes, boulder and small drainage edges; 7,800-13,000 ft.	Known only from herb-arium or text records				No open rocky slopes
Erigeron miser	starved daisy	FSS	Granitic rock outcrops; 6,000 ft & above	Suitable habitat only				No rock outcrops
Eriogonum luteolum var. *saltuarium*	golden-carpet buckwheat	FSS	Sandy granitic flats and slopes, sagebrush communities, montane conifer woodlands; 5,600-7,400 ft.	Suitable habitat only				No sagebrush-dominated commun-ities
Eriogonum umbellatum var. *torreyanum*	Donner Pass buckwheat	FSS	Dry gravelly or stony sites; often on harsh exposures (e.g. ridge tops, steep slopes)	Suitable habitat only				Far from known range
Helodium blandowii	Blandow's bog-moss	FSS	Bogs, fens, wet meadows, and along streams under willows.	X			**X**	
Hulsea brevifolia	short-leaved hulsea	FSS	Red fir forest, but also in mixed conifer forests; found on gravelly soils; 4,900-8,900 ft.	Suitable habitat only				No gravelly soils
Ivesia sericoleuca	Plumas ivesia	FSS	Vernally wet portions of meadows and alkali flats, vernal pools within sagebrush scrub or lower montane coniferous forest; often on volcanic soils; 4,300-7,200 ft.	Suitable habitat only				No volcanic meadows; too high
Lewisia kelloggii ssp. *hutchisonii*	Kellogg's lewisia	FSS	Ridge tops or flat open spaces with widely spaced trees and sandy granitic to erosive volcanic soil; 5,000-7,000 ft.	Suitable habitat only				No gravelly soils; too high

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in analysis area	Known in project area	Suitable habitat in project area	Rationale for why habitat is not suitable
Lewisia kelloggii ssp. *kelloggii*	Kellogg's lewisia	FSS	See *Lewisia kelloggii* ssp. *hutchisonii*	Suitable habitat only				No gravelly soils; too high
Lewisia longipetala	long-petaled lewisia	FSS; TRPA	North-facing slopes and ridge tops where snow banks persist throughout the summer; often found near snow bank margins in wet soils; 8,000-12,500 ft.	X				Far from known range
Meesia uliginosa	broad-nerved hump-moss	FSS	Bogs and fens, but also very wet meadows.	X			**X**	
Orthotrichum praemorsum	ortho-trichum moss	FSS	Shaded, moist habitats of east side of Sierra Nevada rock outcrops; up to 8,200 ft.	Known only from herb-arium or text records				No rock outcrops; too high
Peltigera gowardii	Goward's water fan	FSS	Cold unpolluted streams in mixed conifer forests.	X				Stream gradient too low; not shaded
Pinus albicaulis	whitebark pine	C; FSS	Subalpine and at timberline on rocky, well-drained granitic or volcanic soils.	X	**X**	**X**	**X**	
Rorippa subumbellata	Tahoe yellow cress	C; FSS; TRPA	Endemic to the shore zone of Lake Tahoe, typically in back beach areas between 6,223 and 6,230 ft.	X				Not on Lake Tahoe shoreline

Botanical species includes vascular and non-vascular plants, lichen, and fungi.
There are no federally threatened, endangered, or proposed botanical species known to occur or with known suitable habitat within LTBMU. This list includes all R5 Sensitive botanical species with known occurrences or known suitable habitat on LTBMU.
Legal status: C—Candidate for federal listing under the Endangered Species Act; FSS—Forest Service Sensitive (Regional Forester's Sensitive Species List, Region 5); TRPA—Tahoe Regional Planning Commission Sensitive Species (TRPA Code of Ordinances 2012)
[1]For branched collybia, surveys are only effective when fruiting bodies are visible. This species typically fruits in late fall -early winter. The extent to which aboveground fruiting bodies are correlated with the abundance of underground structures is unknown. When a survey does not find the fruiting body, the species could still be present at the site. Because of this detection difficulty, it is important to manage habitat in a state that is suitable for fungi.

Aggregating by habitat type

While the botanical species analyzed vary widely in their ecological requirements and life history characteristics, many occur in similar broad habitat types where the effects of proposed management are comparable; habitat requirements for each species are summarized in Table 3-4. As such, to discuss the potential indirect effects to suitable habitat, species are aggregated by habitat type and effects to each habitat are described. The 12 species with suitable habitat in the analysis area can be aggregated into three broad categories based upon habitat type:

- Species restricted to fens: Blandow's bog-moss and broad-nerved hump-moss
- Species associated with wet habitat: Bolander's candle-moss, upswept moonwort, scalloped moonwort, slender moonwort, common moonwort Mingan moonwort, and western goblin

- Species associated with upland habitat: Galena Creek rock cress, branched collybia, whitebark pine

Table 3-5 provides a summary of the acreage of each habitat type within the project and analysis area. In the former lake footprint, vegetation types had to be reclassified using aerial photograph interpretation and project data because the source dataset (EVeg) had not been updated since the lake was drained in 2008 and is still classified as CWHR type "Lacustrine". The project's Botanical Species BE contains an explanation of the reclassification methodology.

TABLE 1-5. SUMMARY OF HABITAT TYPES IN PROJECT AND ANALYSIS AREAS

Habitat Type	CWHR Types[1]	Acres in project area	Acres in analysis area
Wet habitat	ASP, MRI, WTM	12.4	58.0
Lake	LAC	0.7	1.2
Upland	BAR, LPN, MCP, PGS, RFR, SGB, URB	32.0	350.8
Total (Analysis Area)		45.2	410.0
Fens[2]	N/A	0	2.1

[1]Derived from the the R5 Existing Vegetation (EVeg) geospatial dataset (USDA Forest Service 2010). California Wildlife Habitat Relationship (CWHR) Types classifies existing vegetation types important to wildlife and is considered a standard vegetation classification across the region.
[2]Fens are not classified as a separate CWHR type. Due to their ecological importance, fens are included as a separate habitat type for analysis. Acreage is calculated from field measurements of known fens and TEPCS occurrences as recorded in LTBMU's corporate GIS database.

Other Botanical Resources

LTBMU Watch List

The LTBMU maintains a watch list of plant species that are of conservation concern, but have not been designated as Sensitive by the Regional Forester; this list is included in the project's "Other Botanical Resource Assessment". According to the Regional Forester, Watch List plant species should be considered during project planning with corresponding documentation maintained in the planning file (USDA Forest Service 2006).

Uncommon plant communities

LTBMU supports several uncommon plant communities that warrant consideration in the project planning process, of which fens receive the most attention. The LTBMU Land and Resource Management Plan directs the Forest Service to manage uncommon plant communities to preserve their natural characteristics, specifically Osgood Swamp, Grass Lake, and Freel Cushion Plant Community (USDA Forest Service 1988). The SNFPA directs the Forest Service to address Special Aquatic Features (including fens) during project analyses and to maintain, restore, and/or enhance these features on National Forest System (NFS) lands (USDA Forest Service 2004b).

Assessment methodology

Table 3-6 provides an outline of the assessment methodology used to consider other botanical resources in project planning.

TABLE 3-6. ASSESSMENT METHODOLOGY FOR OTHER BOTANICAL RESOURCES

Analysis Component	Yes	No	Not applicable
1. Were surveys conducted for other botanical resources within the project area?	X		
2. Were other botanical resources found within the project area?	X		
3. Is there the potential for negative impacts from project implementation?	X		
4. Were protection measures included in the project documentation?	X		

3.2.2 Overview of the Affected Environment

TEPCS botanical species with known occurrences in the project area

Bolander's candle-moss (Bruchia bolanderi)

This ephemeral bryophyte has a broad range, including Oregon, California, Nevada and Utah (California Native Plant Society 2012). There are seven known occurrences on LTBMU. Species monitoring on LTBMU includes only presence/absence data at five occurrences, making it difficult to determine a trend for Bolander's candle moss on LTBMU (McKnight and Engelhardt 2012). Threats include trampling of stream banks and any other activity that would increase erosion or alter hydrology (Harpel 2009). . There is one known location of Bolander's candle-moss within the project area (BRBO3)—along the west edge of the former Incline Lake footprint. When it was last surveyed in 2010, the occurrence spanned 0.3 ac. Plants occur mostly along the shorelines of small ponds that formed in the former Incline Lake footprint, within 15 ft of water level.

Whitebark pine (Pinus albicaulis)

This 5-needle white pine has broad distribution at high elevation and timberline zones throughout the mountains of western North America (NatureServe 2012). While the species has a broad geographic range, precise data on the abundance and distribution of stands is limited and there is a high level of uncertainty regarding stands on LTBMU. Estimates of the abundance of whitebark pine on LTBMU range from approximately 1,500 acres to over 24,000 acres; the methodology of how estimates were produced, and maps of estimated distribution within the project and analysis area are provided in the project's Biological Evaluation of Botanical Species.

Mortality data collected in multiple studies throughout its range strongly suggest that whitebark pine is in range-wide decline (Keane and others 2012; US Fish and Wildlife Service 2011a). The primary threat to whitebark pine across its range is a synergistic combination of climate change, white pine blister rust (WPBR), periodic mountain pine beetle (MPB) outbreaks and fire exclusion (Keane and others 2012; Millar and others 2004; US Fish and Wildlife Service 2011a). When compared to other parts of the range, such as the Rockies, California has experienced relatively low mortality of whitebark pine, potentially due to the lower incidence of WPBR(Dunlap 2010; Millar and others 2012); The 2010 survey of the Incline Lake Acquisition area states that there are whitebark pine stands, but does not delineate these areas, so their exact extent within the analysis area is not known. A cursory survey was conducted in November 2012 by the Forest Botanist who confirmed the absence of whitebark pine along the major and minor

dams. No whitebark pine stands were classified in the project area for either vegetation dataset (i.e. EVeg, TEUI) (Estimation methods outlined in the project's Botanical Species BE). In the analysis area, there were 24.3 and 0.5 ac of potential habitat classified via the EVeg and TEUI datasets, respectively.

TEPCS botanical species with suitable habitat, but no known occurrences in project area

During surveys of the project area, suitable habitat was identified but no occurrences were found for species listed in Table 3-7. Discussion of effects to these species is aggregated by habitat type.

TABLE 3-7. TEPCS BOTANICAL SPECIES WITH SUITABLE HABITAT, BUT NO KNOWN OCCURRENCES IN PROJECT AREA

Scientific Names	Common Name	Habitat type
Boechera rigidissima var. *demota*	Galena Creek rock cress	Moist microclimates at edges of conifer and aspen stands
Botrychium ascendens	upswept moonwort	Wet meadow, riparian
Botrychium crenulatum	scalloped moonwort	Wet meadow, riparian
Botrychium lineare	slender moonwort	Wet meadow, riparian
Botrychium lunaria	common moonwort	Wet meadow, riparian
Botrychium minganense	Mingan moonwort	Wet meadow, riparian
Botrychium montanum	western goblin	Wet meadow, riparian
Dendrocollybia racemosa[1]	branched collybia	Old growth stands
Helodium blandowii	Blandow's bog-moss	Fen
Meesia uliginosa	broad-nerved hump-moss	Fen

Fens

Fens are among the most sensitive plant communities identified during ecological assessments of the Sierra Nevada (USDA Forest Service 2004b). Fens are ground-water dependent peat-accumulating wetlands typically saturated for the entire growing season (Bartolome and others 1990). Compared to other habitats in the Sierra Nevada, fens support a disproportionately large number of rare vascular and nonvascular plants species (Sikes and others 2010; Weixelman and Cooper 2009). Fen integrity is inherently tied to maintenance of the hydrologic conditions that support peat accumulation, which occurs on the order of 4-16 inches per 1000 years (Cooper 1990, Chimner and Cooper 2002). Because fens require thousands of years to develop, they cannot easily be restored once damaged or destroyed. Four fens have been delineated within the analysis area totaling approximately 2.1 ac: Incline Lake, Below Incline Lake (West), Below Incline Lake (East), and South of Incline Lake (Sikes and others 2011). A more detailed assessment of the project's impacts to fens is included in project's Other Botanical Resource Assessment.

Wet habitat

Wet habitat in the analysis area consists primarily of wet meadow with some montane riparian and aspen (USDA Forest Service 2010). Meadows are groundwater-dependent ecosystems that rely on the persistence of a shallow water table, generally at a depth of less than one meter, throughout the growing season (Lowry and others 2011; Ratliff 1985; Weixelman and others 2011). For wet meadows, this timeframe is typically 1-2 months (Allen-Diaz 1991; Benedict and Major 1982).

Upland habitat
Upland habitat in the analysis area consists primarily of lodgepole pine forests, with minor components of barrens, montane chaparral, red fir, perennial grassland, and urban areas (Highway 431 corridor).

Other Botanical Resources
No LTBMU Watch List species are documented in the project area. Four fens have been delineated within the analysis area and are described above.

3.2.3 Environmental Consequences

General Effects to TEPCS Botanical Species

Many of the project activities have similar indirect and cumulative effects on all TEPCS botanical species so they are discussed generally and pertain to all species analyzed. For botanical species, direct effects occur when individual plants, lichen, or fungi are physically impacted. Examples of proposed activities that have the potential to directly affect botanical species include: construction, entombment, trampling during implementation, tree removal (e.g. whitebark pine). These actions can result in death, altered growth, or reduced seed set through physically breaking, crushing, or uprooting botanical species. Indirect effects are separated from an action in either time or space. These effects, which can be beneficial or detrimental, may include changes in vegetation composition, successional patterns, fire regimes, or the distribution and abundance of invasive plants. Adverse indirect effects are more likely to occur to those species that are intolerant of disturbance, such as those utilizing fen habitat (e.g. Blandow's bog-moss and broad-nerved hump-moss). For this project, the important factors considered in analysis of indirect effects are hydrologic regime changes, habitat alternation resulting from restoration activities and potential introduction of invasive plants. Cumulative effects are defined in the "Affected Environment" section of Chapter 3.0.2.

Direct effects
Botanical Resource Indicator: Number (acres) of TEPCS occurrences affected by proposed activities.

Direct effects are addressed under species-specific effects analysis.

Indirect effects

Alternative 1

Summary by botanical resource indicators
- Acres of fen habitat at risk—1.7
- Acres of TEPCS suitable wet habitat potentially created—Some gain & some loss (extent difficult to quantify)
- Acres entombed—0

Fen habitat
Fen habitat will not be directly affected by project activities; project design features have been incorporated into the project that provide spatial buffers from proposed activities to fens.

However, since fens are groundwater-reliant, any disturbance that significantly impacts water quantity or quality is a threat. The development of channels that act as ditches can lower fen water tables and dry fen areas, resulting in the oxidation of peat and tree invasion (Chimner and Cooper 2003; Fisher and others 1996; Glaser and others 1990). Gullies are a very serious impact to fens because they may dewater them, removing the perennially saturated condition that defines them. Even short periods of drying will allow oxygen to enter soil and greatly increase decomposition rates (Chimner and Cooper 2003), and just slight changes in fen hydrologic regimes can disrupt the formation and maintenance of peat bodies and result in vegetation changes(Cooper and others 1998).

As described in the hydrology section of Chapter 3 (Section 3.4), there is evidence of channel incision as well as active erosion associated with a diversion ditch upstream of the former Incline Lake footprint. Alternative 1 fails to address the channel incision and active erosion. In the short-term, this incision is not an immediate risk to the upstream Incline Lake Fen (1.5 ac fen in a 22 ac meadow complex) due to the distance between the disturbance and the fen (500+ ft). However, without intervention, the incision could propagate up valley. If it propagates far enough, it poses a substantial risk of directly eroding the fen. If it captures additional stream flow, it may alter the hydrological regime such that the requisite ground water level is not maintained for peat accumulation. These factors may result in the long-term degradation or even loss of Incline Lake Fen.

Failure to address the channel incision and active erosion also has potential long-term negative effects for downstream fen habitat—namely, Below Incline Lake (East) Fen (0.2 ac). This fen is downstream of the proposed activities, but connects via the same stream channel. The Below Incline Lake (West) and South of Incline Lake fen is not directly hydrologically connected to the affected stream, are primarily spring-fed, and would not likely be affected. Continued active erosion may result in increased sediment load. Since peat accumulation rates in fens are so slow, sediment inputs have the potential to bury peat bodies and alter the function of the habitat. Excess sediment may also change nutrient cycling and suppress regeneration of plants (Weixelman and Cooper 2009).

The analysis area's overall hydrologic regime appears to be complex, with both springs and subsurface flow as important contributors to the water table, which may buffer the potential negative impacts.

Wet habitat

The channel incision, as well as active erosion associated with a diversion ditch upstream of the former Incline Lake footprint, could also degrade or even eliminate wet meadow habitat. Channel incision lowers groundwater and reduces overland flow frequencies across the meadow surface, decreasing meadow moisture (Loheide and Gorelick 2007; Micheli and Kirchner 2002). Such conditions encourage the conversion to dry meadow vegetation (Micheli and Kirchner 2002). Well-defined channels may support montane riparian rather than wet meadow vegetation. Conversion to dry meadow vegetation may allow for conifer encroachment and resultant degradation of meadow habitat or even eventual conversion to upland habitat, particularly lodgepole pine forest (Helms 1987; Vale 1987). In the long-term, the channel incision and active erosion could reduce or degrade wet habitat within the project area (~10.4 ac) and negatively affect TEPCS botanical species. Without intervention, the documented erosion could propagate

up valley and capture additional stream flow. If the requisite ground water level is not maintained, this would degrade additional wet meadow habitat outside the project area—namely the ~22 ac meadow complex located upstream—through active erosion or conversion to drier vegetation.

Within the former Incline Lake footprint, wet meadow habitat—currently estimated at 4.2 ac—is expected to increase due to passive revegetation. More than 70 years of inundation resulted in a lack of vegetation across the former lake footprint, but some of these areas have sufficient water availability to support wet vegetation, due to subsurface and spring water sources, especially along the east edge of the former lake footprint. However, vegetation recovery is exhibiting a temporal lag behind the establishment of a new hydrologic regime since the lake's draining in 2008. Currently, much of the former lake footprint remains devoid of vegetation and is classified as barren or perennial grass—upland vegetation types (described in Botanical Species BE). Wet meadow vegetation is establishing most rapidly near channels and is expected to expand, though the extent and distribution of the increase is difficult to predict.

Just as with the existing wet habitat, under Alternative 1, in the long-term, any new wet meadow habitat would also be at risk of degradation due to failure to address upstream channel incision that may further result in a lowered water table. There is a high level of uncertainty with the spatial extent of this process.

Upland habitat

Indirect effects to upland habitat are primarily limited to tree removal and minor road widening. Tree removal can have substantial effects on TEPCS habitat, including: degradation of suitable habitat through removal of desirable vegetation or soil compaction; enhancement of suitable habitat for early seral species; enhancement of suitable habitat by removing excessive fuel loads and increasing a stand's resistance to higher intensity fires. Under Alternative 1, the proposed tree removal is relatively small in scale and intensity (~0.8 ac). It is limited to the dam structures—which are considered low quality upland habitat due to their composition of fill material—and does not represent substantial habitat alteration. Similarly, minor road widening is focused in areas of low quality upland habitat and does not represent substantial habitat alteration.

As described in the discussion of wet habitat, barren and perennial grass areas in portions of the former lake footprint are expected to convert to wet habitat. These are considered low quality upland habitat and the type conversion will not negatively affect TEPCS botanical species that utilize upland habitat.

All habitat types

Invasive species are considered the second leading cause of native species decline and extinction in North America, behind habitat loss (Wilcove and others 1998). Proposed activities may facilitate the introduction of invasive plants and put TEPCS botanical species at risk. A detailed assessment of the risks of invasive plant introduction and spread associated with the project as well as the project's invasive plant management requirements can be found in the project's Invasive Plant Risk Assessment (IPRA; Project Record Folder F3). Invasive plants can directly compete with TEPCS botanical species for nutrients, light, and water or indirectly affect these

species through alteration of habitat characteristics, such as nutrient cycling or fire regimes (Bossard et al 2000). Disturbed habitats often have a higher susceptibility to invasions than those with long periods in late successional phases (Radosevich 2002). In the area formerly entombed by Incline Lake (18-20 ac), there is little to no vegetation, little recent soil development and limited inundation during flood events (though there have not been any major flood events since the breaching of the major dam in 2008). This area is highly vulnerable to invasive plant invasion.

Furthermore, construction activities can increase vectors that introduce invasive plants (e.g. use of heavy equipment, increased vehicle use, or use of materials containing weed seed) and result in habitat alteration (e.g. ground disturbance, tree removal, understory removal or degradation). Though there are not likely to be direct effects to TEPCS botanical species from invasive plants as a result of project activities, there is still a risk of an indirect effect of invasion from adjacent disturbed areas. To mitigate this risk, standard invasive plant management requirements—such as reducing the disturbance footprint, using weed free nursery material, and revegetating disturbed areas—are incorporated into the project.

As detailed in the project's IPRA, Alternative 1 presents the highest invasive plant risk because, despite its smaller scale of construction activities, it fails to address the most vulnerable habitat—the former lake bed that is largely lacking native vegetation cover and is at risk of hydrologic function degradation.

Alternative 2

For the proposed stream restoration activities (i.e. dam removal, topographic recontouring, ditch and channel reconstruction and stabilization, installation of log/grade control structures, revegetation), it is particularly difficult to state with certainty the duration and intensity of the effects on fen and wet habitats and the TEPCS botanical species that utilize them. Compared to other management activities, there is a relatively high level of uncertainty in the outcomes of watershed restoration due to the complexity of interactions in hydrological and ecological processes (Matthews and Endress 2008; Rey Benayas and others 2009; Zedler and Callaway 1999). As such, there may be unanticipated changes to hydrological and ecological processes following the proposed activities (e.g. failure to reconnect floodplain; additional incision; ponding; extensive invasive species introduction; the type, extent, and quality of vegetation changes) that may affect fen and wet habitats and the TEPCS botanical species that utilize them.

Summary by botanical resource indicators

- Acres of fen habitat at risk—0
- Acres of TEPCS suitable wet habitat potentially created— ~14
- Acres entombed—0

Fen habitat

Alternative 2 addresses the channel incision and active erosion that pose a threat to both downstream and upstream fen habitat. As such, Alternative 2 would have a beneficial effect on fen habitat. However, as stated above, there are potential negative effects to fen habitat via unanticipated consequences during restoration.

Wet habitat

Alternative 2 addresses the channel incision and active erosion that pose a threat to upstream wet habitat—particularly the 22-ac meadow complex containing Incline Lake Fen. As such, Alternative 2 would have a beneficial effect. However, as stated above, there are potential negative effects to wet habitat via unanticipated consequences during restoration.

Proposed restoration activities would raise the existing ditch elevation approximately 2 ft and remove spoils piles, which would reestablish flow relationship with the floodplain. This would facilitate increased flow across the floodplain surface and longer water residence time. During the growing season, the water table level would be approximately 0 to 8 inches, so as long as there was surface flow in the channel. This meets the water table depth and duration requirements to support wet meadow vegetation, suggesting that wet meadow vegetation should colonize most of the former Incline Lake footprint, resulting in additional suitable habitat (~14 ac gained) for TEPCS botanical species that utilize this habitat.

Upland habitat

Effects from tree removal and road widening are similar to those described for Alternative 1, except that the scale of tree removal is ~3.4 ac plus potential removal associated with widening ~1.2 mi of road, instead of ~0.8 ac.

As described in the discussion of wet habitat, barren and perennial grass areas in most of the former lake footprint are expected to convert to wet habitat. These are considered low quality upland habitat and the type conversion will not negatively affect TEPCS botanical species that utilize upland habitat.

All habitat types

As detailed in the project's Invasive Plant Risk Assessment, Alternative 2 presents the second highest invasive plant risk because it involves the most proposed construction and associated introduction risks, though it does address the former lake bed's habitat vulnerability through restoration of wet meadow habitat.

Alternative 3

The same uncertainties associated with restoration activities detailed above with respect to Alternate 2 are relevant for Alternative 3. However, the scale of impact is reduced in Alternative 3 because restoration activities are limited to the area upstream of the proposed 18-20 ac Incline Lake with limited potential of impacting downstream habitat due to the lake.

Botanical Resource Indicators

- Acres of fen habitat at risk—0.2
- Acres of TEPCS suitable wet habitat potentially created— Loss of ~4 ac
- Acres entombed—18-20

Fen habitat

Under Alternative 3, channel incision and active erosion would be addressed, reducing the risk to upstream fen habitat. However, the impoundment would sequester sediment and could result in the release of nutrient rich water—a product of eutrophication due to lentic conditions. This may degrade downstream fen habitat.

Wet habitat

Alternative 3 would entomb 18-20 ac. This would result in the loss of ~4.2 ac of existing wet habitat and eliminate the entire area as suitable habitat in the long-term to permanent timeframe. Alternative 3 addresses the channel incision and active erosion that pose a threat to upstream wet habitat, thus providing some benefit, though the scale is smaller than Alternative 2. As stated above, there are potential negative effects to wet habitat via unanticipated consequences during restoration.

Upland habitat

Effects are similar to those described for Alternative 1, except that the scale of removal is ~3.4 ac plus potential removal associated with widening ~1.2 mi of road, instead of ~0.8 ac.

All habitat types

As detailed in the project's Invasive Plant Risk Assessment, Alternative 3 presents the least risk of invasive plant introduction because, despite an intermediate scale of proposed construction and associated introduction risks, it would entomb the majority of the most vulnerable habitat under water, returning the area to conditions similar to the former Incline Lake.

Cumulative Effects

The effects of past actions on TEPCS botanical species in the analysis area are largely unknown. Data describing the past distribution and abundance of rare plant species is very limited. While a steady stream of botanists have visited and collected in the Tahoe Basin since 1860, many of the collections were made primarily at personal vacation locations, and were not focused on providing a comprehensive floristic survey (Smith 1984). On LTBMU, systematic survey of projects for rare botanical species did not begin until the early 1980s. In many cases, even when project-level surveys were conducted, there is very little documentation that describes whether past projects avoided or protected rare botanical species during project implementation.

It is likely that past actions have caused some species to become rarer and encouraged others to become more common. Some species have always been rare due to particular ecological requirements or geographic isolation (Ornduff and others 2003; Shevock 1996). However, the Lake Tahoe Basin sustained perhaps the most intensive land use of any watershed in the Sierra Nevada during the height of commercial land uses that occurred throughout much of the range in the late 1800s and early 1900s (Manley and others 2000). Undoubtedly, past actions involving ground disturbance (e.g. gold and gravel mining, timber harvest, road construction, and recreational off-highway vehicle use) and hydrological alternation (e.g. diversions, ground-water pumping) have reduced the abundance and distribution of TEPCS individuals and degraded their suitable habitat. Many of the plants found in early botanical surveys were not found during the field work for Smith's 1983 flora (Smith 1984). For those species that occupy open habitats and are tolerant of some level of disturbance, it is possible that past actions have had a beneficial effect by creating openings and areas of suitable habitat across the landscape. However, these actions have also created a highly disturbed landscape, which has increased the susceptibility to invasive plant invasion and increased the overall risk to native plant communities and rare species.

There is one present project, no projects in planning stage, and one set of ongoing activities to be considered. The Incline Hazardous Fuels Reduction and Forest Health Restoration Project

proposes fuels treatment directly adjacent to the Incline Lake Dam project area (63 ac hand treatments and 16 ac mechanical treatments); these fuels reduction treatments are not currently scheduled to occur until after completion of this project. Maintenance fuels treatments on both NFS lands and non-NFS lands are currently being undertaken and expected to continue into the future. These treatments include thinning, chipping and prescribed burning (both pile burning and broadcast burning) of generally small diameter trees. While some treatment may occur in wet habitats, these treatments are focused in upland habitat.

Undeniably, past, present, and future activities have and will continue to alter TEPCS botanical species populations and their habitats to various degrees; however, the approach taken in this analysis is that, if direct and indirect adverse effects resulting from the project are minimal or would not occur, then they would not contribute substantially to cumulative effects on the species. On NFS lands—which constitute the vast majority of the analysis area (all but 30 ac), current projects incorporate project design features to avoid or mitigated negative effects to known occurrences (e.g. field surveys, protection of known rare species occurrences, SEZ restrictions, and invasive plant management). Therefore, the contribution to cumulative effects of these projects is likely to be minimal or similar to those described in this analysis. Future projects on NFS lands will undergo site-specific analysis and be subject to the LRMP's design criteria which include managing sensitive plants to ensure that species do not become threatened or endangered because of Forest Service activities. Projects on non-NFS lands are subject to the resource protection measures prescribed by TPRA (Tahoe Regional Planning Agency 2012). As such, the effect of future projects would also likely be minimal or similar to those described in this analysis, if existing management guidelines are applied.

Effects to Bolander's Candle-moss

Direct effects

Alternative 1

There will be no direct effects to Bolander's candle-moss. Project design features spatially buffer known occurrences from proposed activities. There are no known occurrences within the area expected to be impacted during the breaching and stabilization of the major dam.

Alternative 2

There will be no direct effects to Bolander's candle-moss. Project design features spatially buffer known occurrences from proposed activities. There are no known occurrences within the area expected to be impacted during the dam removal and restoration activities.

Alternative 3

The proposed activities would entomb 18-20 ac adjacent to the known occurrence of Bolander's candle-moss (BRBO3) (0.3ac). The entombment would kill any Bolander's candle-moss individuals that may have colonized the area since 2010—the time of last survey. Furthermore, the exact footprint of the impoundment is not certain and may entomb a portion of the known extent of BRBO3.

Indirect effects

The indirect effects to wet habitat described in the "General Effects to TEPCS Botanical Species" section apply to Bolander's candle-moss for all alternatives.

Alternative 1

In addition to other indirect effects to wet habitat, Bolander's candle-moss may benefit from ponding and lack of vegetation that currently characterizes the former Incline Lake footprint because it colonizes bare soil in wetter habitats. As such, under Alternative 1—which would leave the footprint largely untouched—Bolander's candle-moss may expand in the short-term.

Alternative 2

In addition to other indirect effects to wet habitat, Bolander's candle-moss may benefit from the proposed ground disturbance associated with proposed restoration activities because it colonizes bare soil in wetter habitats and may expand in the short-term.

Alternative 3

In addition to other indirect effects to wet habitat, Bolander's candle-moss may benefit, in the short-term, from the creation of additional suitable habitat from proposed ground disturbance associated with proposed restoration activities and, in the long-term, from the creation of lakeshore areas similar to the habitat currently utilized by the known occurrence (BRBO3).

Cumulative effects

Cumulative effects common to all TEPCS botanical species are described above. In addition, Bolander's candle-moss has likely lost individuals and a considerable amount of suitable habitat over the past 100 years due to land use activities such as water diversions, habitat type conversion (i.e. meadow to annual grassland), intense grazing by domestic livestock, and construction of roads and trails. However, it remains widely distributed, occurring in Oregon, California, Nevada and Utah (California Native Plant Society 2012). With the exception of some land use activities (e.g. off highway vehicle use, fire suppression, etc.), protection measures for meadows in the Lake Tahoe Basin have generally been in place for nearly 25 years (Tahoe Regional Planning Agency 2012; USDA Forest Service 1988). When considered in the context of the effects of other past, present, and reasonably foreseeable future actions, the project is not expected to contribute significantly to a loss of species viability.

Conflict determination

All of the alternatives (Alternatives 1, 2 and 3) of the Incline Lake Dam Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for Bolander's candle-moss. For the no action alternative (Alternative 1), this determination is based on the following: a) there would be no direct effects; b) without proposed restoration activities, habitat that currently supports this species may be degraded. For alternative 2, this determination is based on the following: a) there would be no direct effects; b) there is a potential beneficial effect via restoration of hydrologic processes that maintain known occurrence and suitable habitat; c) there are potential negative effects to known occurrence and suitable habitat via unanticipated consequences during restoration. For alternative 3, this determination is based on the following: a) there may be direct effects to BRBO3; b) entombment of suitable habitat; c) there is a potential beneficial effect via restoration of hydrologic processes that maintain suitable habitat.

Effects to Whitebark Pine

Direct effects

Alternative 1

Approximately 0.8 ac of tree removal is proposed in association with breaching the major dam structure. Cursory survey of the area did not reveal any whitebark pine trees, but was not comprehensive. While the area around the major dam is not classified as whitebark pine stands, it is within the species elevation range and individual trees may be present. Project design features limit the removal of whitebark pine trees to only those with evidence of disease. So, no healthy trees are expected to be removed as part of the project. Individual diseased trees may be removed, but this would be considered a benefit effect as it would reduce the risk of pathogen spread to healthy stands. Individual trees may also be directly affected by limbing but this impact is unlikely to affect reproduction.

Alternative 2

Effects are similar to those described for Alternative 1, except that the scale of tree removal is 3.4 ac plus potential removal associated with widening 1.2 mi of road, instead of 0.8 ac.

Alternative 3

Effects are similar to those described for Alternative 2.

Indirect effects

The indirect effects to upland habitat described in the "General Effects to TEPCS Botanical Species" section apply to whitebark pine for all alternatives. In addition, removal of diseased trees may reduce the risk of pathogen spread to healthy stands and provide a small beneficial effect.

Cumulative effects

Cumulative effects common to all TEPCS botanical species are described above. Tree removal does not exceed 4 ac under any alternative. There are no stands classified within the project area. The quantity of suitable habitat estimated in the analysis area using EVeg (24.3 ac) totals less than 0.1% of the total estimated habitat on LTBMU; estimates using TEUI are even lower. In the context of the estimated abundance of whitebark pine on LTBMU (between 1,500-24,000 ac), the project's direct and indirect effects are minimal. Although it represents the best available science, this estimate of relative affected area should be considered in the context of the low accuracy of the LTBMU abundance estimates; there remains a high degree of uncertainty about the abundance and distribution of whitebark pine on LTBMU.

There is even greater uncertainty regarding the health of LTBMU's whitebark pine stands. Other than aerial detection surveys (FHP 2012), there has not been a unit-wide assessment of whitebark pine health. Survey plots near Mt. Rose—which are outside the analysis area, but the closest available data geographically—characterize that area with a relatively high incidence of white pine blister rust (Maloney et al. 2012). It is unclear what effect this will have on the stands in the analysis area.

Past projects in the analysis area did not specifically analyze effects to whitebark pine; it only became a candidate for listing under ESA in late 2011 and was only added to the Forest Service Sensitive list in 2013. However, past actions have undoubtedly resulted in removal of individual whitebark pine trees. Currently, there is no LTBMU or R5 conservation strategy for whitebark pine, no unit or regional standard management measures have been developed, and there are no species-specific management requirements outlined in the current LTBMU LRMP (USDA Forest Service 1988). As such, the future management of whitebark pine is difficult to fully assess. Nonetheless, future projects on NFS lands will undergo site-specific analysis and be subject to the LRMP's design criteria which include managing sensitive plants to ensure that species do not become threatened or endangered because of Forest Service activities.

When considered in the context of the effects of other past, present, and reasonably foreseeable future actions, the project is not expected to contribute significantly to a loss of species viability.

Conflict determination

All of the alternatives (Alternatives 1, 2 and 3) of the Incline Lake Dam Project may affect individuals, but is not likely to accelerate Federal listing or result in a loss of viability for whitebark pine. This determination is based on the potential removal of a limited quantity of individual trees during proposed tree removal and restoration activities.

TEPCS Botanical species with suitable habitat, but no known occurrences in project area

Effects to the ten species with suitable habitat, but no known occurrences in the project area are aggregated by habitat type.

Direct effects

There are no direct effects expected for any of these ten species because there are no occurrences documented in the analysis area and therefore no occurrences that could be potentially affected by project activities.

Indirect effects

The principle indirect effects to suitable habitat for these species are described in the 'General Effects to TEPCS Botanical Species" section. There are no additional species-specific or habitat-specific effects that warrant discussion.

Cumulative effects

Cumulative effects common to all TEPCS botanical species are described 'General Effects to TEPCS Botanical Species" section. There are no additional species-specific or habitat-specific effects that warrant discussion. When considered in the context of the effects of other past, present, and reasonably foreseeable future actions, the project is not expected to contribute significantly to a loss of species viability for any of these ten species.

Conflict determinations

Species restricted to fens

All of the alternatives (Alternatives 1, 2, and 3) of the Incline Lake Dam Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for Blandow's bog-moss and broad-nerved hump-moss. For the no action alternative (Alternative 1),

this determination is based on the following: a) there are no known occurrences; b) without proposed restoration activities, fen habitat that could support these species may be degraded or lost. For both action alternatives (Alternative 2 and 3), this determination is based on the following: a) there are no known occurrences; b) there is a potential beneficial effect via restoration of hydrologic processes that maintain their fen habitat; and c) there are potential negative effects to fen habitat via unanticipated consequences during restoration, as there remains a high level of uncertainty of how the proposed restoration activities will impact fen habitat.

Species associated with wet habitat

All of the alternatives (Alternatives 1, 2, and 3) of the Incline Lake Dam Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for upswept moonwort, scalloped moonwort, slender moonwort, common moonwort, Mingan moonwort, or western goblin. For the no action alternative (Alternative 1), this determination is based on the following: a) there are no known occurrences; b) without proposed restoration activities, wet habitat that could support these species may be degraded or lost. For both action alternatives (Alternative 2 and 3), this determination is based on the following: a) there are no known occurrences; and b) there is a potential beneficial effect via restoration of hydrologic processes to increase the quality and quantity of wet habitat.

Species associated with upland habitat

All of the alternatives (Alternatives 1, 2, and 3) of the Incline Lake Dam Project will not affect Galena Creek rock cress or branched collybia. For the no action alternative (Alternative 1), this determination is based on the lack of known occurrences or potential effects to suitable habitat. For both action alternatives (Alternatives 2 and 3), this determination is based on the lack of known occurrences and negligible effects to suitable habitat.

Other botanical resources

Because there are no known occurrences of watch list species documented in the project area, no negative impacts to Watch List species are expected from any of the alternatives of the Incline Lake Dam project. No additional protection measures are included in the project's decision document.

The potential direct and indirect effects to fens are described above in fen habitat discussion in the "General Effects to TEPC Botanical Species" section. As part of the planning process, project design features have been incorporated in the Incline Lake Dam project to protect fens from direct effects and address indirect effects to their hydrologic regime. Full implementation of the project design features is considered adequate to protect fens from significant effects in Alternatives 2 and 3. Alternative 1 fails to address the channel incision and active erosion. Without intervention, the documented erosion poses a substantial risk of directly eroding Incline Lake fen or indirectly affecting it by altering the hydrological regime such that the requisite ground water level is not maintained for peat accumulation. This may result in the long-term degradation or even loss of Incline Lake Fen.

3.2.4 Analytical Conclusions

Table 3-8 provides a summary of effects to botanical resources by alternative and Table 3-9 provides a summary of determinations for TEPCS botanical species. Based upon these effects, Alternative 2 (proposed action) is considered the least detrimental and most beneficial to botanical resources because it addresses the channel incision, active erosion, and habitat vulnerability that threaten fens, wet habitat, and the TEPCS botanical species that utilize these habitats. It also has the greatest potential for enhancement or creation of new wet habitat. Alternative 1 is considered the most detrimental and least beneficial to botanical resources because it fails to address the channel incision, active erosion and habitat vulnerability. It puts at risk the greatest amount of fens, which once damaged or destroyed, cannot be easily restored because they require thousands of years to develop. It also provides for the least amount of potential wet meadow habitat creation or enhancement. Alternative 3 falls between Alternative 1 and 2—but closer to Alternative 1—due to the permanent loss of potential habitat that would result from the creation of a new lake and potential direct effects to Bolander's candle-moss. It does, however, address the channel incision, active erosion, and habitat vulnerability that threaten fens, wet habitat, and the TEPCS botanical species that utilize these habitats.

TABLE 3-8. SUMMARY OF EFFECTS TO BOTANICAL RESOURCES

Botanical Resource Indicator	Rank of Potential Effect Level[1]		
	Alternative 1 (No action)	Alternative 2 (proposed action)	Alternative 3
TEPCS occurrences affected by proposed activities	**1**	**1**	3
Acres of fen at risk	3	**1**	2
Acres of TEPCS suitable wet habitat potentially created	2	**1**	3
Acres entombed	**1**	**1**	3

[1]Rank: 1—least detrimental for botanical resources (most beneficial); 3—most detrimental effect level for botanical resources (least beneficial); quantitative values for indictors are discussed in text.

TABLE 3-9. SUMMARY OF TEPCS BOTANICAL SPECIES DETERMINATIONS

Scientific Names	Common Name	Alternative 1 (no action)	Alternative 2 (proposed action)	Alternative 3
Boechera rigidissima var. *demota*	Galena Creek rock cress	WN	WN	WN
Botrychium ascendens	upswept moonwort	MA(NL)	MA(NL)	MA(NL)
Botrychium crenulatum	scalloped moonwort	MA(NL)	MA(NL)	MA(NL)
Botrychium lineare	slender moonwort	MA(NL)	MA(NL)	MA(NL)
Botrychium lunaria	common moonwort	MA(NL)	MA(NL)	MA(NL)
Botrychium minganense	Mingan moonwort	MA(NL)	MA(NL)	MA(NL)
Botrychium montanum	western goblin	MA(NL)	MA(NL)	MA(NL)
Bruchia bolanderi	Bolander's candle moss	MA(NL)	MA(NL)	MA(NL)
Dendrocollybia racemosa[1]	branched collybia	WN	WN	WN
Helodium blandowii	Blandow's bog-moss	MA(NL)	MA(NL)	MA(NL)
Meesia uliginosa	broad-nerved hump-moss	MA(NL)	MA(NL)	MA(NL)
Pinus albicaulis	whitebark pine	MA(NL)	MA(NL)	MA(NL)

WN—The project will not affect the species; MA(NL)—The project may affect but is not likely to result in a trend toward (or accelerate) Federal listing or a loss of viability for the species

3.3 Cultural Resources

3.3.1 Introduction

All three alternatives in this project will impact the Incline Lake Dam FS #05-19-1193 and could possibly impact prehistoric lithic scatter FS #05-19-1192.

Prior to the Comstock timber boom in Lake Tahoe Basin, this area would have been used by the Washoe during the summer and fall harvesting seasonal edible and medicinal plants that grew in the meadows and riparian areas. The Washoe also would have hunted here, as represented by lithic scatters found in the immediate area such as FS# 05-19-1192.

In 1939, Norman Blitz began construction on the Incline Lake Dam, Blitz acquired water rights and had a ditch built to supply water to the lake for recreation and fish propagation. Initially, Blitz researched the possibility of building a ski resort on the property, but that plan did not come to fruition and Incline Lake prospered as a summer getaway. Blitz entertained many of the rich and famous there; it was visited by politicians, business magnets and movie stars.

The dam is an earthen dam constructed of two sections, main dam and auxiliary and there is a spillway, sluice gate and outflow pipe on the main dam.

Since the Incline Lake Dam is over 70 years old, under Section 106 of the National Historic Preservation Act (NHPA) it needs to be evaluated for eligibility to the National Register of Historic Places (NRHP) if it will be impacted by this project. The prehistoric site could be impacted by any of the alternatives of this project can be avoided by flagging the site during project implementation.

Methodology

To evaluate the eligibility of the dam to NRHP, documentation of the construction of the dam, specifications of the dam's design, water rights acquired to fill the lake and the history of the use of the lake were needed to complete the evaluation.

Documentation for the evaluation was acquired through LTBMU site records and cultural resource inventory reports, University of Nevada – Reno Oral History Program, Incline Village and Crystal Bay Historical Society, State of Nevada Division of Water Resources and LTBMU's LIDAR imagery and GIS database.

An evaluation of the dam has been submitted to the Nevada State Historic Preservation Officer (SHPO) for consultation on the determination of the eligibility of the dam for the NRHP.

Activity: Proposed project activities will either completely remove the dam, breach the dam or totally rebuild the dam, destroying the historic integrity of the dam. The ditch feature will be modified to restore it to a small stream-like watercourse, eliminate head-cuts and raise the water table in the meadow.

Indicator:

- Adverse effects to properties eligible to the NRHP.
- Adverse effects to properties unevaluated to the NRHP.

3.3.2 Overview of the Affected Environment

Currently, the two sections of the earthen dam are fully intact, as is the spillway. The sluice gate has had some loose components pilfered (wooden gate slates and trolley pulley), but the bridge and trolley rails are still in place. The outflow valve/pipe has been opened to drain the lake. There is a stream channel in what was the bottom of the lake that had been dug out (or ditched) to provide greater flow from Third Creek to fill the lake. This ditch is considered to be an additional feature of the dam complex. The lithic scatter appears to be in an area that has not been impacted by modern development.

3.3.3 Environmental Consequences

None of the alternatives will affect properties eligible to the NRHP, the prehistoric lithic scatter is unevaluated for the NRHP and project design features will be in place so the site will be avoided during project implementation (project design features #31). The dam has been determined not eligible for the NRHP by the LTBMU and therefore is not impacted by this project.

3.3.4 Analytical Conclusions

With the anticipated concurrence by the Nevada SHPO of our determination of the Incline Lake Dam being not eligible to NRHP and the avoidance of unevaluated prehistoric site FS# 05-19-1192, this project will have no impact to cultural resources as it is currently planned.

3.4 Hydrology and Soils

3.4.1 Introduction

This section analyzes the effects to hydrology and soils from the three alternatives.

Methodology

The effects to hydrology and soils are ultimately evaluated in terms of changes to waterbody and stream environment zone (SEZ) form and function. In the case of the Incline Dam analysis area, the type of SEZ that is dominant in the analysis area is a largely spring fed, wet/moist meadow complex.

The effects of the proposed actions under each alternative are described both qualitatively and quantitatively in terms of:

Direct Effects:

- Soil disturbance during construction. (*short term)*
- Changes in surface, subsurface, and groundwater flow distribution. (*short and long term)*

Indirect Effects:

- Effects of changes in flow distribution on the location and areal extent of various water body/SEZ forms (i.e., lakes, stream channels, springs, wet meadow) (*short and long term)*
- Effects of changes in flow distribution on water body/ SEZ function and stability, (including resiliency to climate change), in terms of physical ecosystem components important for aquatic and riparian habitat (ex. water quantity [magnitude, timing] and water and soil quality (*long-term)).*

The methodology used to analyze describe these effects include utilizing the results of past surveys and new analysis as described in the Hydro specialist report, and referenced below.

Assumptions

See section 3.0.3 for a list of the universal assumptions.

3.4.2 Overview of the Affected Environment

The project analysis area lies within a perennial tributary watershed of the Third Creek Watershed, as displayed on Figure 3-3. The total size of this tributary watershed from the headwaters to the confluence with Third Creek is 448 acres. This sub-watershed comprises 12

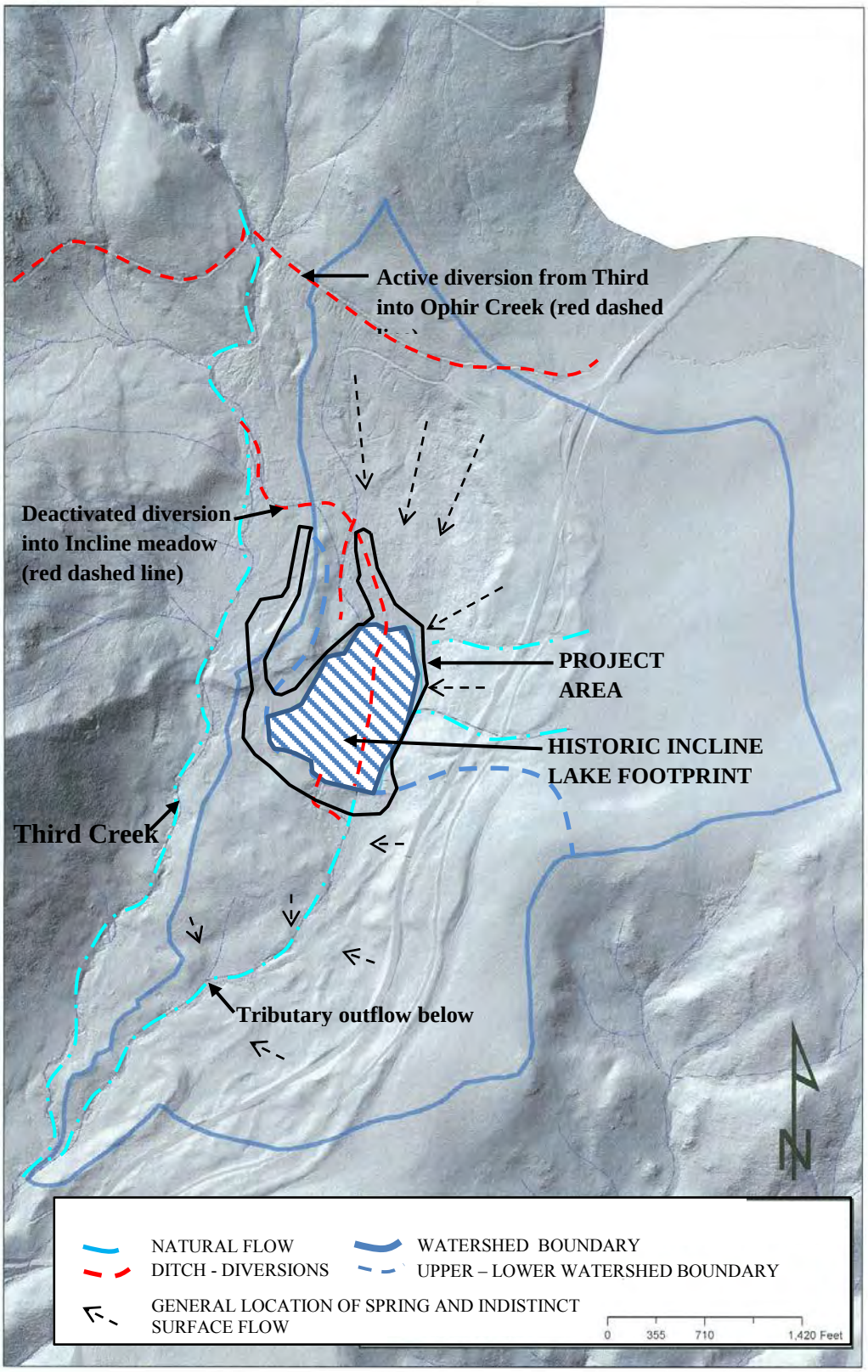


Figure 3-3: Incline Dam Watershed

percent of the Third creek watershed (3,680 acres). Incline dam lies along the southern border of a glacially formed sub-alpine meadow with a surface elevation of 8,300 feet and the top of the watershed at 8,800 feet. Contributing watershed area upstream of the dam is 256 acres. Contributing watershed area below the dam is 192 acres. The perennial tributary channel below the dam joins Third Creek 0.75 miles down from the spillway.

SEZ Condition

Within this entire tributary watershed the existing area that would be currently classified as SEZ based on a GIS analysis of primary vegetation indicators (as defined by TRPA) is 58.1 acres (approximately 13% of the tributary watershed). Within this SEZ, 29.2 acres would be classified as wet meadow using the USFS CWHR vegetation classification system (see Botany section of this EA (3.2) for more detailed description regarding vegetation types within the analysis area). From historic aerial photo analysis, it can be assumed the majority of the lake footprint would also have been classified as SEZ based on primary vegetation indicators prior to inundation. An update of vegetation types within the lake footprint, conducted in March 2014, indicates that already approximately 4.5 acres within the lake footprint is now classified as wet meadow, a change that has occurred since the lake was drained in 2008. Based on vegetation alone, we estimate approximately 13% of this tributary watershed would be classified as SEZ, with a high percentage of SEZs classified as wet meadow, a relatively rare vegetation classification in the Tahoe Basin. (see Appendix A, for map and table of vegetation types)

Soil Condition

The presence of wet meadow SEZ is connected to the two dominant soil types present in the analysis area, (see Hydrology/Soils Specialist Report). Sediment deposits (valley alluvium and hill slope colluvium) are classified by NRCS and information comes from the Web Soil Survey. The modern surface layer in the meadow is classified mostly as Bidart and Bidart wet variant. This 5-foot thick layer begins at the surface with a veneer of decomposed plant materials overtop mucky organic silt and silt loams, followed by fine sand and sandy loam at its base. Of modern relevance are the organic veneer and uppermost silt layers (16” thick) that indicate a low energy depositional environment; rough age of this layer based on an accumulation rate of 1 inch per century (Woods, 1975), suggesting that these conditions have persisted for 1600 years; well before the influence of modern land use activities. Also within this unit are strongly organic, Watah and Hellhole soil types of which the land form can be Fens or Sphagnum Fens that imply saturated soil conditions throughout the year. Also present is a 1-inch thick layer of extremely gravelly coarse sand at depth of 17”; this layer is indicative of surface water flowing at deeper depth with greater transporting capacity and could be from a rare large flood, a situation where hill slope gravels and sands were transported down and sheeted onto the meadow surface. Generally hill slope soils are coarser (gravels and rubble) and their origin is glacial till. Many of the hill slope soil units are classified as being moist, an indicator of shallower ground water than what is typically encountered in soils of this type.

Modern project area (meadow) soils built over many centuries are indicative of a low energy flow environment. Shallow surface flows spread out over the meadow, carrying in with it some silt and fines, and depositing it in and around thick meadow vegetation.

Hydrology Condition

Precipitation falls mostly as snow with annual precipitation approximately 50 inches per year (RCI, 2006). Average spring snowmelt Peak runoff at the confluence of this tributary to Third Creek ranges from 4 to 10 cubic feet per second (CFS) (*calculated using USGS Flood Frequency Regresssion Relationship, Thomas et. Al, 1997*). Spring flows continue throughout the year, and maintain flows into the system long after spring snowmelt has ceased. Based on visual observations, spring fed base flow levels in late summer (mid-July through September) range between 0.1 to 1 CFS, maintaining a constant source of surface, subsurface, flow through the system, and maintaining relatively high ground water levels. Larger winter storms could generate peak flows ranging from 30 to 70 CFS; rare extreme events that may result in flows carrying sand and gravel off the hill slopes and sheeting out onto the meadow.

Channel Condition

Stream channels within the analysis area consist of a mix of natural channels as well as man-made ditches. In 2009, soon after the purchase of this Incline Dam area, the USFS completed a Watershed Improvement Needs Inventory, identifying channel reaches and historic diversion ditches that were currently exhibiting signs of instability, as evidenced by indicators of channel erosion and instability. The locations of these unstable reaches are illustrated on Figure 3-4.

Stream channel pattern starting in the headwaters consists of several natural somewhat straight, spring feeder channels, that are 2 to 4 feet wide and averaging 0.5 to 1 foot deep. These channels are poorly defined due to the low gradient and robust vegetation structure on the surface. These channels are very stable, characterized by a resilient grass lined channel bed and banks, and flows easily and frequently spread out onto the adjacent meadow floodplain.

At one time most of the watershed was in private ownership with water being diverted out of Third Creek during Comstock time via an 1880's side hill ditch into Ophir Creek across the northern edge of the watershed and eventually east down to Washoe Valley (RCI, 2006); the ditch is still active and there is uncertainty as to its hydrologic contribution currently (see Figure 3-3 to see the location of this ditch).

By 1939, aerial photos show the presence of another diversion off Third Creek located about 1,100 feet downstream of the Ophir diversion, which extends all the way to Incline Dam (see Figure 3-3). Records indicate this ditch was created to divert water from Third Creek to supply water to the new man-made Incline lake for recreation and fish propagation (RCI, 2006). Records also show the dam and lake in place by 1942; the exact time when the diversion was constructed is unclear; however, the ditch as seen in the 1939 photo appears to be well-established suggesting that it could have been constructed several years earlier. This ditch is currently disconnected from Third Creek, but it does pick up contributing lateral flows as it extends down to the dam and areas of instability have been observed within the project area.

Areas of instability also exist in this historic diversion outside of the project area, which is further described in the cumulate watershed effects later in this section.

At about 2,000 feet above the dam, 8, 2 to 3 foot high head cuts have developed for approximately 900 feet in this diversion ditch. The diversion ditch erodes downward dramatically at about 1,100 feet upstream of the dam beginning with a 4.5 foot head cut (Figure 3-5). To illustrate the rate at which head cut development is evolving in this system the photo in Figure 3-6 shows this same headcut in 2009. The width and depth of this headcut has doubled in 4 years.

Head cut formation may have begun prior to draining the lake in 2008, but draining the lake has resulted in rapid growth of head cut development as flows adjust to the drop in flow gradient. Head cut growth and advancement up valley is expected to continue, without intervention.

From the location of this 4.5 foot headcut, the diverison ditch collects 60 to 80 percent of the surface and spring water from the contributing watershed upstream, routing it relatively quickly downstream to the underflow pipe and out of the meadow; cross section hydraulics analysis in the specialist report suggests that this ditch contains and prevents water from accessing the floodplain in all but rare, extreme floods. Width along the top bank of this ditch below this head cut is 6 to 10 feet, and bottom width is 2 to 3 feet. Stream bank height is 6 feet below the headcut, reducing down to about 1 foot near the dam. This ditch is characterized by unstable channel surfaces consisting of primarily fine grade sediments.

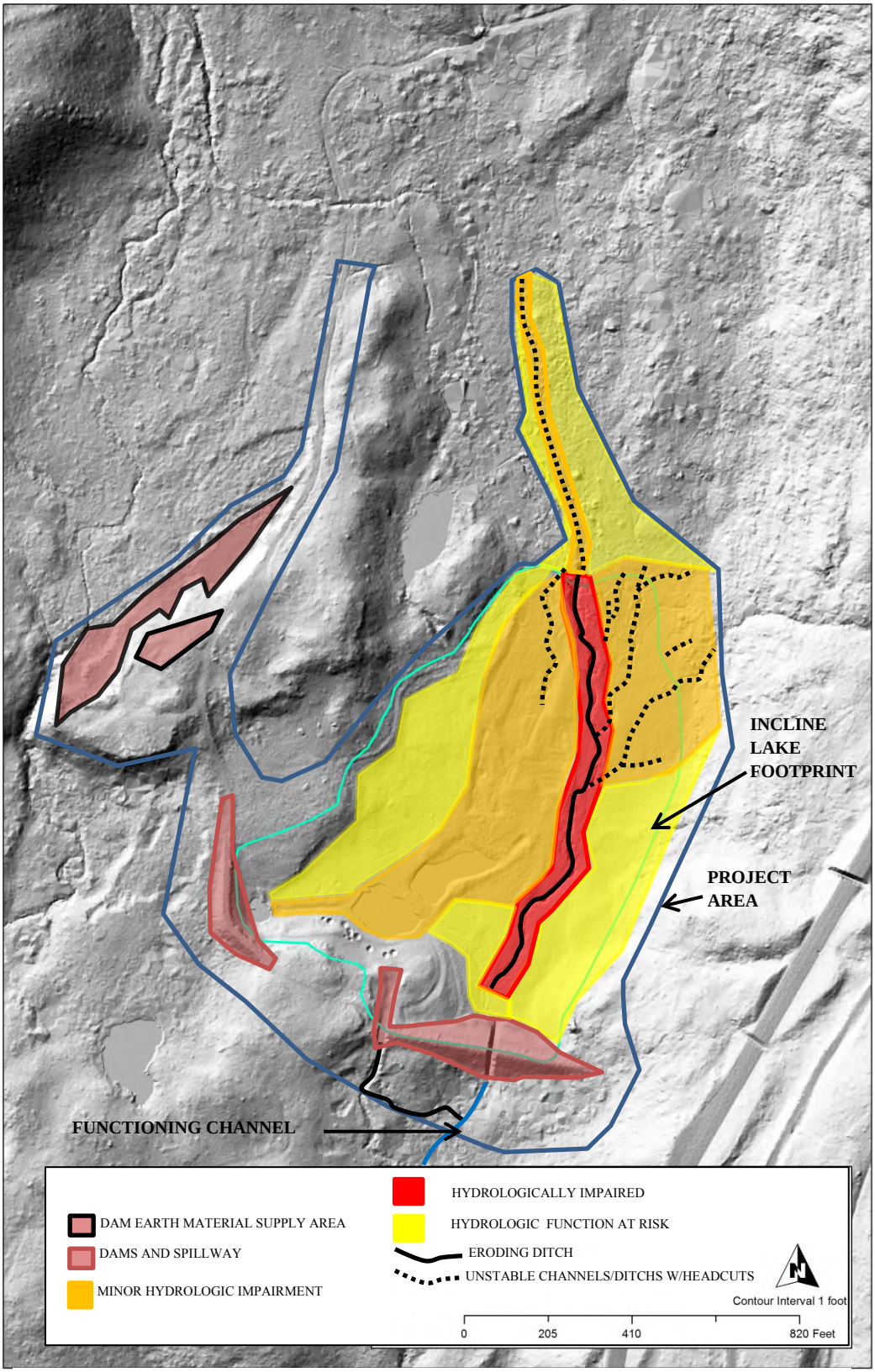


Figure 3-4: Existing Hydrologic Conditions, Incline Dam Project Area

Figure 3-5: Third Creek tributary headcut- 4.5 foot height, immediately above drained Incline lake footprint (2013).

Figure 3-6. Third creek tributary headcut – 2' height, above Incline lake footprint (2009).

There are three additional natural lateral spring feed channels that contribute flows to the ditch between the 4.5 foot headcut and the dam. These lateral channels are relatively stable for most of their length until they get closer to the deeply incised ditch, where they too are eroding down through sediments in a series of head cuts, to match the grade of the man-made channel. There is

a 2-acre area containing roughly 1000 feet of spring fed tributary channels in the meadow located east of the ditch in the northeast corner of the historic lake bed, and a field inspection in 2011 revealed that these channels contain between 5 to 10 small head cuts.

Historically, outflows from the reservoir either went through the spillway in the spring and either the spillway or underflow pipe later in the year. Management continued in this fashion for 60+ years. In 2008 under Forest Service ownership; the lake was drained and water now flows freely through the underflow pipe presently.

Flow continues down valley below the dam in a stable channel fed by stable lateral side springs for 0.75 miles until it joins Third Creek.

To the west of the man-made diversion ditch in the historic lake bed, is a 5-acre area which appears to have old scrape marks (2 to 8 inches in depth) in the surface soil from dam material prospecting. The "shallow ground scraping" signature goes down-valley and ends at two man-made depressions west of the ditch that range between 0.5 to 1 foot deep. Ditch building and dam material prospecting resulted in berms paralleling the ditch as well as next to one of the man-made depressions, further contributing to flow confinement in these features. Figure 2, which was created using LIDAR imagery provides a useful illustration of these features.

There is another channel near the upper end of this 5 acre "scraped" area that is also exhibiting head cut erosion (as illustrated on Figure 3-4).

<u>Surface/subsurface/groundwater flow condition</u>

All the man-caused topographic changes described above negatively affect the distribution of surface, subsurface, and groundwater flows. Channel flows are confined which increases velocity and erosive force. Increased flow energy promotes continued channel erosion with channel beds getting deeper relative to the ground surface. Incised channels dissect the surface and subsurface flowpaths, reducing the amount of water to adjacent riparian area from overbank flooding, and drawing down subsurface and groundwater flows away from the ground surface (described as the "cone of influence"). The resulting impact is an overall "drying" out of the riparian areas adjacent to these channels.

The "cone of influence" created by lowering the surface water elevation in the channel would at a minimum extend to twice the depth to each side of the channel (i.e., a channel surface elevation 10 feet below the level of the adjacent meadow surface would draw down subsurface flows and groundwater in an arc to at least 10 feet to either side of the channel).

The duration, extent and frequency of this impact would depend on the magnitude of lateral surface and subsurface water inflows which we did not attempt to quantify. Based on observed current levels of channel incision, we estimate that the "cone of influence" adjacent to the man-made ditch extending through the Incline Lake bed extends approximately 25 feet on either side of this ditch, and approximately 5 feet to either side of the lateral tributaries (that are currently exhibiting headcut erosion) that feed into this ditch.

Based on monitoring conducted in the Cookhouse Meadow System (located in the Upper Truckee drainage) we can say that over time channel incision will result in a drying out of the soils next to the channel, disrupt the movement of subsurface flows throughout the meadow lowering groundwater levels, resulting in overall decreases in plant available water throughout the meadow during dry years in late summer, with significant adverse impacts to the vegetation community (Cookhouse Reports, 2009 and 2013).

Comstock logging in the late 19th century resulted in clear cutting much of the forest around the meadow, but the forest has grown back and there is no current evidence of legacy hydrology impacts from this activity.

Forest Service roads along the meadow perimeter and drainage paths from the highway coming in from the east could affect timing and magnitude of inflows to the meadow, but are gauged to be minor influences at this time.

3.4.3 Environmental Consequences

Direct and Indirect Effects on Hydrology and Soils

ALTERNATIVE 1

Direct Effects

Soil Disturbance

Temporary soil disturbance will occur as a result of removing dam fill material to create a "notch" for a newly constructed stream channel, and actions to construct a stable stream channel and stabilize side slopes adjacent to the new channel. The potential for transport of disturbed soils will be addressed through the application of best management practices as directed in USFS guidance documents as described in Chapter 2 (Section 2.1.4). Soil disturbance in terms of compaction and soil cover will recover quickly once final stabilization measures are in place.

Changes in Flow Distribution

Restoration actions will result in unimpeded transport of channel flows upstream of the dam through the dam footprint in a stable channel. The gradient of the newly constructed channel will be approximately 2 percent to tie into upstream and downstream channel grades. The result will be substantially reduced risk of debris jams impeding channel flows, as exists with the current outlet structure on the dam. No other changes to hydrologic flow distribution will occur in the short-term. However, over the long-term, subsurface and groundwater flows may continue to be disrupted in the floodplains adjacent to channels/ditches that are vulnerable to continued erosion and incision.

Indirect Effects

Changes in Waterbody/SEZ form

There would be no change to the existing location and areal extent of springs, channels, and meadow and riparian SEZ beyond the footprint of the restoration actions under this alternative in the short term. Within the footprint of restoration actions, 200 feet of perennial stream channel will be created (to replace the outlet pipe through the dam). Long term changes in vegetation within the lake bed footprint will continue to occur as a result of draining the lake. However, disrupted flows due to continued channel/ditch erosion would reduce the amount of water available to support SEZ vegetation. There is a high degree of uncertainty in attempting to predict the amount and type of SEZ vegetation that would persist within the project area under this alternative, because this area is in a current state of active transition. The best guess, at this time, is that hydrologic processes will support approximately the same amount of SEZ within the project area over the long term, as what currently exists (12.5 acres).

Changes in Waterbody/SEZ function

Current impairments to existing waterbody/SEZ function, outside of the small restoration footprint in this alternative, would not be addressed, and are expected to continue to degrade as described in the existing conditions section, resulting in continued “drying” out of riparian areas adjacent to incised channels.

Alternative 2

Direct Effects

The hydrologic effects of this alternative is illustrated in Figure 3-7, and described below.

Soil disturbance

The areas of temporary soil disturbance from restoration actions proposed under this alternative would be substantially increased compared to Alternative 1, as described above. However like alternative 1, direct effects on soil quality and water quality would be mitigated by the application of USFS best management practices. The period of full stabilization of channel/SEZ surfaces is expected to take 2 years for channel/SEZ revegetation to become established, with full vegetation recovery occurring within 5 to 10 years. Temporary soil surface stabilization would be monitored and maintained throughout this period, as needed.

Changes in Flow Distribution

The restoration actions would result in the restoration of stable channel flows to 200 feet of new channel, and 3,350 feet of restored channel.

Restoration actions to channels as well as restoration actions to remove dam fill and recontour topography on the floodplain surface, will result in restoring patterns within the natural range of

variability for this site related to surface flooding, the movement of subsurface flows, and groundwater levels.

Indirect Effects

Changes in Waterbody/SEZ form

The restoration actions would result in the creation of 200 feet of new channel, and the restoration of 3,350 feet of existing channel. These new and restored channels are expected to endure in a state of stable dynamic equilibrium.

Conservative hydraulic modeling of the restored channel form suggest that at capacity the average sheer stress would be about 0.4 Lbs/ft2 which approaches the average sheer stress found in the natural wide-shallow grass lined channels of 0.6 Lbs/ft2 (Hagberg, 1995). After restoration, silt and very fine sand will be entering the new channel, which is expected to be the typical size of material transported in annually. This will settle and help start natural vegetation colonization in the channel, channel banks, and adjacent floodplain surfaces. Once vegetation becomes established, it becomes the dominant factor determining the final channel shape; this may take as long as 2 to 10 years. While vegetation is becoming well established, expect that side channels off the main flow will form dynamically through overbank spreading of flows, depending on local bed and bank vegetation composition and sediment accumulation.

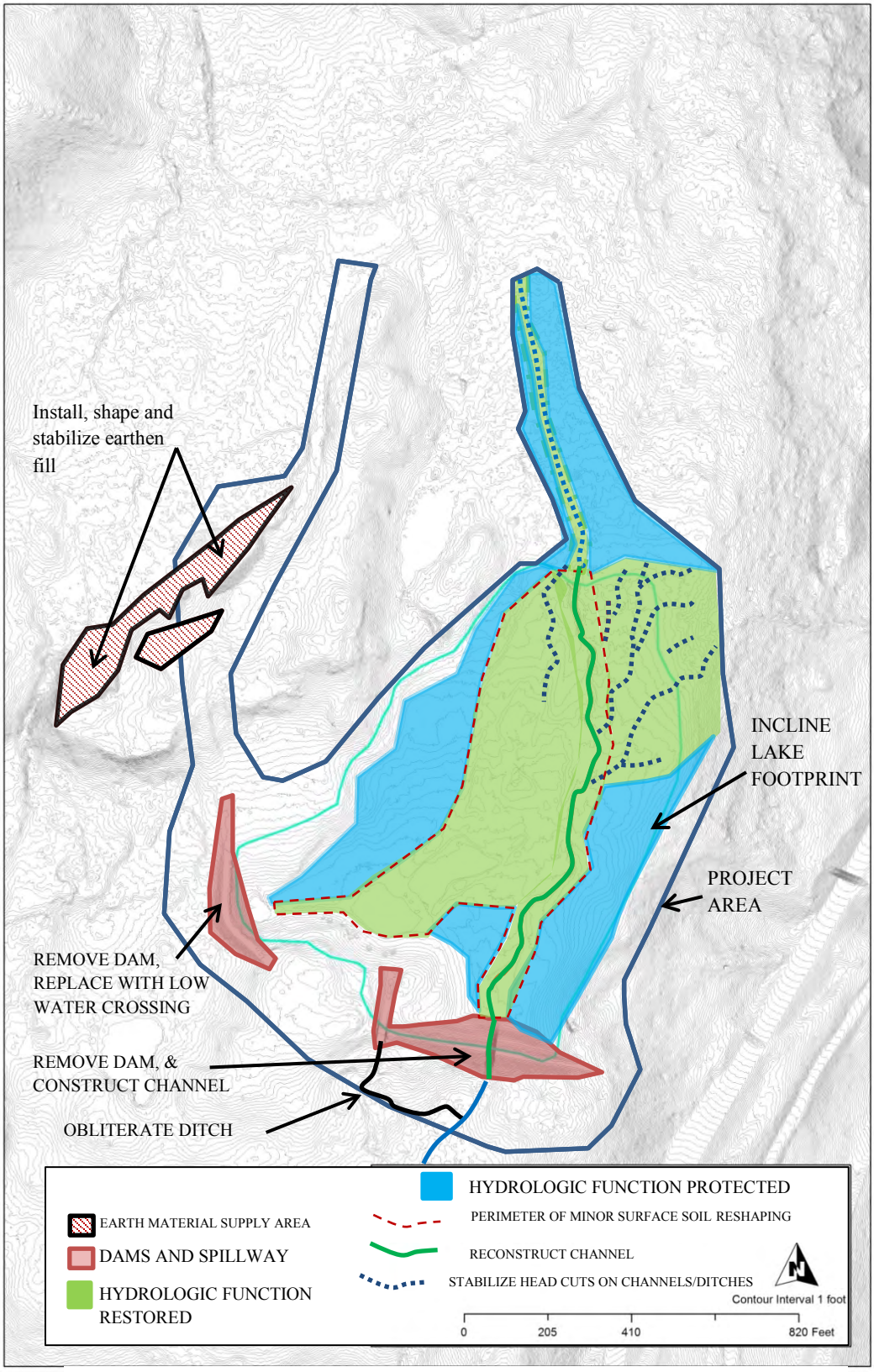


Figure 3-7: Hydrologic effects of Alternative 2.

The final future channel form will likely be a series of interconnected channels with no distinct single main flow path. The channels will likely be shallow and grass lined based on current understanding of the geomorphic conditions that support this type of channel pattern.

There will be no measurable adverse or positive changes on the existing main channel below the dam.

Restoration actions are expected to result in the continued conversion of the dry lake bed footprint to sustainable wet meadow/riparian SEZ, and prevent further degradation to approximately 5 acres of meadow/riparian SEZ outside of the lake bed. With these actions, it is estimated that a total of 26.6 acres of meadow/riparian habitat would be maintained over the long term within the project areas.

It is important to note that a relatively small amount of area directly impacted by restoration actions, will have a much larger area of positive indirect effects in terms of increasing the stability and resiliency of stream channels, and restoring hydrology to support meadow/riparian SEZ within the project area.

Changes in Waterbody/SEZ function

Channel restoration actions are expected to result in restoration of hydrologic function in terms of channel stability and hydrologic connectivity to the floodplain. The low depth design (6 to 8 inches) of the restored main tributary channel for 1,100 feet immediately above the dam, will ensure channel flow capacity is exceeded during all floods; resulting in more frequent flooding of adjacent wet/moist meadow surfaces and reducing the velocity and erosion power of peak flows (See Hydrology and Soils Specialist Report, Project Record Folder F4). The discharge would be about 3 CFS, which is slightly less than the minimum predicted 2-year flood of 4 CFS. Therefore during most years the channel would exceed capacity and water would spread out onto adjacent floodplains.

The approximately 8 head-cut stabilizations along 900 feet of the main channel above the historic reservoir footprint, and approximately 15 head-cut restorations on the 1,050 feet of spring fed channels in the 2 acre portion of meadow in the northeast corner of historic lake bed, as well as 300 feet of channel located to the west of the main channel, will cause flood flows to back up and reduce energy , creating an environment for stabilization through natural processes throughout this 2,250 feet of channel. The resulting poorly defined, shallow channels will again flood frequently onto the adjacent meadow surfaces.

Minor surface regrading of depressions and berms throughout the lake bed footprint (as illustrated on Figure 3-7) would eliminate floodplain flow constrictions further reducing floodplain flow velocity and erosive power, and allowing surface and subsurface flows to disperse more evenly throughout the floodplain.

All the topographic changes described above would positively affect both the distribution and forces of surface and subsurface flow, increasing water availability to support a vegetation community characteristic of wet meadow and riparian SEZ.

Restoration actions would also support restoring and maintaining groundwater to levels sufficient to provide plant available water during late summer, after surface and subsurface water from flood events and snow melt are no longer available. Ground water depth may be quite shallow adjacent to the restored channels, resulting in the "wettest" areas within the meadow SEZ complex

There will be no positive or negative effects on channel and SEZ function below the dam, as result of this alternative compared to the existing condition, other than reducing this risk of future debris jams impounding flow.

Alternative 3

Direct Effects

The hydrologic effects of this alternative is illustrated in Figure 3-8, and described below.

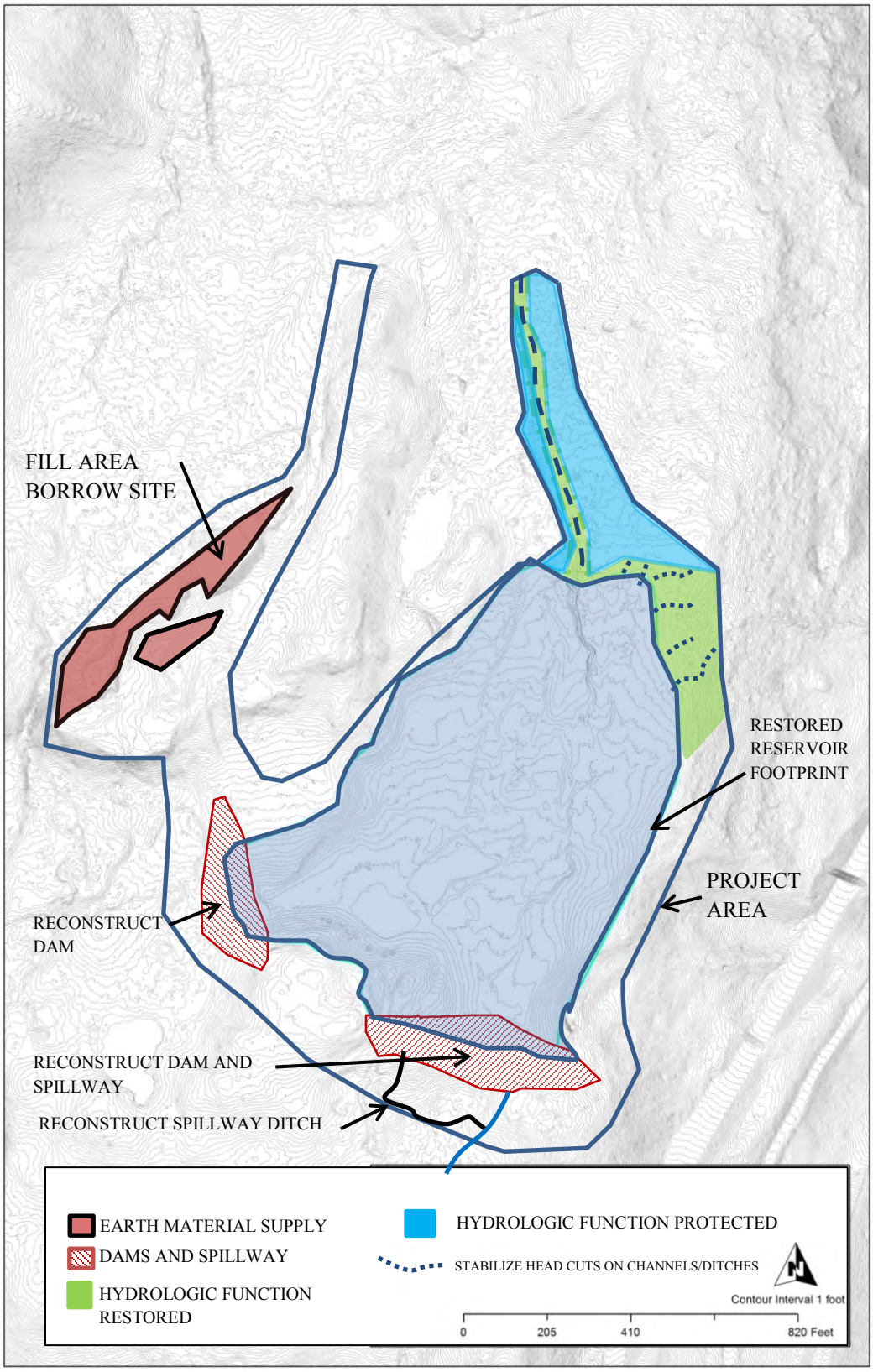


Figure 3-8: Hydrologic effects of Alternative 3.

Soil Disturbance

The areas of temporary soil disturbance from restoration actions proposed under this alternative would be substantially increased compared to Alternative 1, but less then Alternative 2. However like alternative 1 and 2, direct effects on soil quality and water quality would be mitigated by the application of USFS best management practices. The period of full stabilization of channel/SEZ surfaces from revegetation post construction would be similar to alternative 2, and temporary soil surface stabilization would be monitored and maintained throughout this period, as needed.

Changes in Flow Distribution

The area of impoundment would result in the creation of an 18 to 20 acre reservoir, averaging 15 to 18 foot deep. The two dams impounding the reservoir would be constructed with an artificial liner to prevent leakage. Restoring the reservoir will likely reduce the amount and duration of peak flows to the main tributary below the dam compared to alternative 1 and 2. During very dry years, late summer base flow may need to be augmented by managed flow releases from the reservoir. Upstream flows would feed into the channel downstream of the dam when flows coming into the reservoir exceed the volume maintained by the spillway height, or when flows are provided through spillway management to maintain flows determined necessary to maintain aquatic and riparian habitat as required by Federal law and policy (USFS,2004)

Late summer flows are predicted to continue to decline in the Tahoe Basin as a result of climate change which is predicted to result in smaller snow packs, and earlier cessation of spring runoff. Compounding the impacts of impoundment of upper watershed flows by the dam, is the percentage of water that would be lost to evaporation. Although no attempt is made to quantify the evaporative loss potential, it can reasonably be stated that evaporative water losses would be greater, then that which occurs in a meadow ecosystem where most of the water flows under the ground surface as subsurface and groundwater flow, and is slowly metered throughout the system.

The restoration actions would result in the restoration of stable channel flows to 900 feet of the main channel draining into the dam, as well as 500 feet of the lateral tributaries. Restoration actions to channels will result in restoring patterns within the natural range of variability for this site related to surface flooding, the movement of subsurface flows, as well as groundwater levels to 4 acres of the adjacent floodplain.

Indirect Effects

Changes in Waterbody/SEZ form

Restoration actions will result in the creation of 18 to 20 acre reservoir, and resulting in the inundation of many of the existing eroding unstable man-made ditch and channels. Restoration will restore 900 feet of currently eroding channel above the dam, to a stable channel

geomorphology, characterized by ill-defined channels, of shallow depth, rapidly evolving to grass lined channel bottoms.

The channel form below the dam will not change from its current condition.

Restoration actions above the reservoir footprint are expected to result in enhancement of floodplain function to 4 acres of SEZ, above the reservoir resulting in restoring the resiliency to maintain this area as a sustainable wet meadow/riparian SEZ. The total amount of wet meadow/riparian SEZ maintained in the project area under this alternative, would be 8.3 acres

Changes in Waterbody/SEZ Function

The effects of channel restoration, and adjacent floodplains (as illustrated on Figure 2-6) on stream channel/SEZ function is the same as alternative 2, except at a reduced scale because 18 to 20 acres of the currently dry lake bed, would be inundated by the creation of a new reservoir.

Climate Change Effects

Current science indicates that the climate is changing in the Tahoe Basin. Climate change predictions (Coats et al, 2010) indicate there will be similar seasonal precipitation amounts, but more of the precipitation will fall as rain and there will be less snow. This research also predicts

- upward trends in minimum and maximum day time temperatures,
- earlier snowmelt and runoff during the water year, and decreases in the hydrologic flow-duration,
- some increases in drought severity, especially toward the end of the century,
- dramatic increases in flood magnitude in the middle third of the century,

Alternative 1 would not be effective in helping the area become more ecologically resilient to the predicted trends in climate change in the Tahoe Basin. Instead the channels and adjacent floodplain within the project area would be extremely vulnerable with continued degradation in response to climate change effects.

Alternative 2 repairs human caused disturbances, and restores and improves hydrologic function throughout the project area. Within 10 years meadow vegetation should return to an optimal level. Even with the increased temperatures and reduced snowpacks predicted from climate change, water will be much more efficiently stored, and utilized in the restored wet meadow/riparian SEZ complex (Bisson, 2008). The restored system will also be much more resilient in being able to absorb and dissipate the energy of flows from high magnitude flood events, preventing accelerated erosion of channel or floodplain surfaces (Furniss et.al, 2008).

Alternative 3, will be more resilient to climate change than Alternative 1, but less than Alternative 2. Managing flows to respond to either extreme floods or drought will place an ongoing administrative burden on the LTBMU. The volume of water that can be maintained in the reservoir during extended drought periods may be inadequate to support recreational

fisheries, resulting in a "bathtub ring" of bare soil around the reservoir perimeter during drought periods.

Cumulative Watershed Effects

The boundary for evaluating Cumulative Watershed Effects is the same as the analysis area for evaluating the indirect and direct effects described above. The rationale for this determination is that under all three alternatives the effects of proposed actions (or non-actions) is not expected to result in measurable or observed differences on water quality or quantity at the confluence of the tributary to the Third Creek Channel. Therefore the analysis below focuses on the cumulative effects of actions within the tributary watershed, both as proposed under this project as well other past, present, and foreseeably future actions.

Alternative 1

The effects of unstable eroding channels within the project area will still have potentially negative impacts as described in the direct and indirect affects analysis.

In addition, outside of the project area, there is an area of destabilization in the man- made ditch 100 feet downstream from the point of diversion off Third Creek (see Figure 3-3 for the location of this ditch). This part of the historic diversion is currently is in an unstable gully condition, 5 feet deep, by 25 feet wide, for a length of 200 feet. During a high magnitude flow event this area of destabilization could advance upstream far enough to capture Third Creek, significantly changing the magnitude of flow into the system and increasing rates of channel erosion. Riparian areas outside of the project area could be negatively impacted if gullies expand resulting in dewatering of adjacent riparian areas.

Inspection of watershed topographic mapping (no obvious hill slope erosion features) suggests that the effects of runoff from Highway 267 is minor. The scope and scale of the Forest Service Incline Fuels Reduction Project (planned for implementation after 2015) is not likely to have a meaningful impact on soil or water function due to implementation of best management practices, including hand thinning in SEZs (which is the fuels reduction practice proposed for the area proposed for treatment within this tributary watershed).

It is likely that impacts, as reflected in gully erosion and up valley advancement of head-cuts, could occur as a result of an extreme hydrologic event, and the system is currently very vulnerable to this type of event. Continued channel incision, would continue to disrupt and dissect floodplain hydrology, accelerating erosion and reducing plant available water throughout the floodplain.

All areas of watershed instability, and proposed management actions, would be identified during development of the Incline Management plan. Implementation of restoration of the areas of unstable channels outside, as well as within, the project area would be addressed sometime in the future after that process.

Alternative 2

Accelerated erosion in the man-made ditch outside of the project area would still pose a threat from an extreme rain storm if there was capture of Third Creek flows, not only to areas outside of the project area, but to the restored areas within the project area as well. Restoration efforts may reduce these impacts, but capture of these flows may be enough to form a single channel which is not the natural geomorphic form, and there could be dewatering of the SEZ if the channel were to entrench itself in the meadow. This area will continue to be monitoring by hydrology staff, and may require intervention to stabilize this area, ahead of efforts conducted under the Incline Area Management Plan.

As described in Alternative 1 impacts from Highway 267 runoff, and the proposed Incline Fuels Reduction project, will still be inconsequential.

Barring further catastrophic degradation of areas of instability outside of the project area, restored wet meadow/riparian SEZ and channels would be much more resilient to extreme flow events, and areas of watershed instability outside of the project area would eventually be addressed through the development of an Incline Lake Management Plan.

Alternative 3

Cumulative effects are the same as described in alternative 2, for areas outside of the reservoir footprint, and the effects of the reservoir related to management requirements to manage downstream flows during extreme floods and droughts has already been described in the indirect effects analysis above.

Areas of watershed instability outside of the project area would eventually be addressed through the development of an Incline Lake Management Plan.

3.4.4 Analytical Conclusions

The table below (Table 3-10) summarizes the effects of the three alternatives on the spatial extent of Waterbody/SEZ form within the project area.

Table 3-10: Spatial extent of predicted Waterbody/ SEZ Form within the Project Area under each Alternative

Waterbody/SEZ Form	Alternative 1	Alternative 2	Alternative 3
Lake/Reservoir	0	0	18-20 acres
Wet Meadow/Riparian SEZ	12.5 acres	26.6 acres	8.3 acres
Unstable Channels	3,350 feet	0	0
Created/Restored Geomorphically Stable Channels	200 feet	3,350 feet	1,450 feet

Alternative 2 ranks the highest because it results in restoring hydrologic function to the greatest area of existing and potential wet meadow/riparian SEZ that is resilient to the effects of predicted climate change. Wet meadow (including fens) in particular is a relatively rare SEZ form in the Lake Tahoe Basin that provides for unique biological habitat (see biological resources section). Restoration of SEZs is an important EIP threshold for the Tahoe Regional Planning Agency, and wet meadows/wetlands are considered to be high value ecosystems both in the State of Nevada as well as nationally.

Alternative 3 ranks lower because 18 to 20 acres of potential wet meadow/riparian SEZ valley bottom is inundated by a reservoir. See the discussion in the biological analysis sections regarding an assessment of relative benefits of biological functions/values for these different water body forms. In addition Alternative 3 will require the administrative and technical capacity to manage flows out of the reservoir during extreme floods (to prevent dam failure), as well as drought periods (to provide minimum in-stream flows downstream).

Alternative 1 ranks lowest because although it does leave a substantial area of existing SEZ in place, it does not address the existing instability in the man-made ditch and natural channels within the project area. This leaves the channels and adjacent SEZs vulnerable to future flood events when stream bed and bank erosion will occur. The degree of head-cut erosion that is currently in evidence in the project area, and the rate at which this erosion has expanded in the 6 years since the reservoir has been drained, indicates that channel and SEZs within the project area are at considerable risk from catastrophic erosion and de-stabilization that could occur during a major flood event. Continued downward erosion of these channels would continue to “dewater” riparian areas adjacent to the channels, resulting in conversion of these areas to dryer site vegetation types.

3.5 Invasive Plants

3.5.1 Introduction

In 2003, the Chief of the U.S. Forest Service identified invasive species—including terrestrial invasive plants—as one of four critical threats to the National Forest System (NFS) (Bosworth 2003). Invasive plants pose a serious threat to ecosystem function because of their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife, and degrade soil structure (Bossard et al. 2000). Invasive plants can also greatly reduce the recreational and aesthetic values of forestlands.

Many of the activities managed by the Forest Service have the potential to introduce or spread invasive plants. Both National and Regional Forest Service management direction prioritize prevention of invasive plant introduction and spread on NFS lands by considering invasion risks during project planning and—to the extent feasible—incorporating invasive plant prevention measures into all activities (EO 13112, USDA 2000, USDA 2011). In the Sierra Nevada, the Sierra Nevada Forest Plan Amendment directs national forests to conduct invasive plant risk assessments during project planning (USFS 2004).

Methodology

Potential effects from invasive plants is presented in the context of the risk of introduction and spread associated with proposed activities, rather than effects to specific resources; these resource-specific effects are addressed in other resource sections, as appropriate. On LTBMU, an established invasive plant risk assessment process has been used to evaluate projects involving ground-disturbance activities since 2004—when the Sierra Nevada Forest Plan Amendment required National Forests in the Sierra to conduct such assessments(USDA Forest Service 2004b).

On LTBMU, invasive plant risk is assessed by examining both non-project-dependent factors (inventory, known infestations, vectors not-dependent on proposed action; habitat vulnerability) and project-dependent factors (vectors expected to result from proposed action; and habitat alteration expected to result from proposed action). The list of invasive plants of management concern on LTBMU as well as a detailed assessment of invasive plant risks associated with the project can be found in the project's invasive plant risk assessment. To assess potential invasive plant vectors and seed sources, the analysis area includes the project area and a 1-mile buffer.

Assumptions

See the project's universal assumptions (Section 3.0.3).

3.5.2 Overview of the Affected Environment

Survey & Inventory (known infestations)

The entire Incline Lake Acquisition Area—which encompasses the analysis area—was surveyed in 2010. As such, survey and existing inventory are sufficient to complete the risk assessment.

There are no invasive plant infestations known in the project area or in the analysis area. Even by the standards of the Lake Tahoe Basin—a relatively uninvaded area compared to nearby lower elevation watersheds in California and Nevada, the lack of any known invasive plant infestations in this project's analysis area is exceptional and represents the lowest possible risk.

Habitat Vulnerability

Whether they originate from human causes (e.g. road construction, thinning) or natural causes (e.g. wildfire, windfall), disturbed habitats often have a higher susceptibility to invasions than those with long periods in late successional phases (Radosevich 2002). The project area is dominated by conifer, wet habitats (montane riparian, wet meadow, aspen), and the former lake area. In the area formerly entombed by Incline Lake (20 ac), there is little to no vegetation, little recent soil development and limited inundation during flood events (though there have not been any major flood events since the breaching of the main dam in 2008). There is also evidence of active meadow dissection and gully formation resulting from an upstream diversion ditch that channels flow from Third Creek; there is an area near the north edge of the former lake edge where water plunges straight down 6 feet off the meadow surface to a raw stream bottom. These two previously disturbed areas are the most vulnerable to invasive plant invasion. Aside from the former lake area, plant communities in the remaining project area exhibit a relatively low level of disturbance, with little non-native vegetation or anthropogenic devegetation.

The channel stablization and revegetation activities proposed in Alternative 2 would address the habitat vulnerability of the former lake area by restoring it to wet meadow habitat. In Alternative 3, this area would be entombed under Incline Lake, making it no longer vulnerable to invasion by terrestrial invasive plants, though it may become vulnerable to aquatic invasive species (AIS); AIS risks are analyzed in the aquatic wildlife section of Chapter 3 of the project's EA. Alternative 1 would not address any meadow dissection or channel incision and would not actively revegetate the former lake area, leaving this area highly vulnerable to invasion.

Non-project dependent vectors

Invasive plant introduction occurs when plant propagules are moved from one infestation—the "seed source"—to new and often uninvaded habitat. In general, any activity that moves soil or plant parts—especially seeds—from one location to another has the potential as a vector for invasion (Radosevich 2002). Non-project vectors include natural processes (i.e. stream flow, wildlife movement) as well as anthropogenic vectors, including vehicle traffic, utility corridors, recreationists, stock movement, urban development (i.e. escape from horticultural plantings), and use of imported infested materials (e.g. gravel, fill, straw, seed).

Access routes—whether they are major highways, general forest roads, motorized vehicle trails, non-motorized trails, or utility corridors—are often the primary conduit for introduction and establishment. The access route density in the analysis area is characterized as low, though Highway 431 runs within 500 feet of the majority of the east edge of the project area and the road accessing Incline Lake links the backcountry to Highway 431.

There are no adjacent urban areas—the nearest being Incline Village which is over a mile away. There are no facilities (e.g. restrooms, trash service) at the dam or at the parking area. However, the project area does experience a moderate level of dispersed recreation in the form of hiking, skiing, and scenery/wildlife viewing. The project area does not include any major utility corridors. It is not used for grazing or subject to substantial stock movement. Even with the high level of infrastructure development and recreation activities that is common elsewhere in the Lake Tahoe Basin, the project area has a relatively low risk from non-project vectors.

3.5.3 Environmental Consequences

Habitat Alteration Expected As A Result of Proposed Action

There will be ground disturbance, creation of disturbed areas, and change in plant species composition resulting from the proposed activities. Disturbed habitats often have a higher susceptibility to invasions than those with long periods in late successional phases (Radosevich 2002). In particular, the use of mechanical equipment can favor nonnative plant establishment (Brooks 2007; Hobbs and Huenneke 1992; Lonsdale 1999). Ground disturbance is a component of all three alternatives, through to varying degrees; Alterative 1 involves the least amount of ground disturbance, followed closely by Alternative 3, and Alternative 2—with full dam removal and extensive stream channel restoration—involves the most ground disturbance.

In addition to ground disturbance, habitat alteration is expected to result from the channel restoration activities proposed in Alternatives 2 and 3. Removal of dams and repair of channels is expected to increase the extent and duration of meadow inundation and groundwater infiltration throughout the footprint of the old lake area. This, in turn, should result in the restoration of wet meadow habitat over approximately 20 ac in Alternative 2 and 5 ac in Alterative 3.

Alternative 3 proposed creation of a lake on a portion (15ac) of the former Incline Lake footprint (20ac). Currently, this area is not impounded and is unvegetated. This would return the area to a state similar to that which existed from the mid-1940's until 2008 when the dam was breached.

The scale of proposed tree removal varies by alternative, with Alternative 2 involving the most and Alternate 1 the least. However, across all alternatives, the proposed removal is relatively minor and does not represent substantial habitat alteration. As such, it presents a very low risk of invasive plant introduction.

Increased Vectors As A Result of Proposed Action

The project does not increase access routes, recreation facilities, utility corridors, livestock grazing, or movement of water from potentially invaded sources. As detailed under the 'Non-project dependent vectors' section, access routes can contribute to dispersal of invasive plants because they allow for easier movement by wild or human vectors (e.g., on clothes, shoes, hooves, and tires). There will be a short-term (1-3 year) increase in traffic due to construction, but the proposed activities will not result in a long-term increase in access route use. The following vectors represent the highest potential of invasion associated with the proposed activities.

Use of heavy equipment

Both dam re-grading and stream channel restoration necessitate the use of heavy equipment. Soil containing invasive plant propagules can adhere to machinery, be dispersed to uninfested areas, and result in new infestations (Hodkinson and Thompson 1997). The use of infested machinery is considered a substantial vector for incidental introduction (Kowarik and Von der Lippe 2007; USDA Forest Service 2001; van der Meulen and Sindel 2008). On LTBMU, machinery is often imported from lower elevations (e.g. Sacramento Valley, Minden-Gardnerville area). In California, invasive plant species richness is generally greater at lower elevations (Dark 2004; Randall and others 1998). So, use of imported equipment presents a high risk of introduction.

Imported materials

The following materials may be imported as part of the proposed activities: gravel or rock; riprap; geo-membrane liner; erosion control products (e.g. coir logs, large wood, hydromulch, wood chips, straw); revegetation materials (e.g. willow stakes, wetland species sod plugs, seed, nursery stock).

If imported materials originate in infested areas, invasive plant propagules may be attached to these materials and then disperse to uninfested areas when the materials are used (Kowarik and Von der Lippe 2007). The use of imported materials is considered a substantial vector for the introduction and spread of invasive plants (Nevada Department of Agriculture 2013; USDA Forest Service 2001, 2004a, 2011).

Management Measures

Both standard and project-specific invasive plant management measures (known as project design features) have been included to minimize risk of new introductions and minimize the spread of invasive plants to the project. These measures are detailed in Chapter 2 (Section 2.1.4). They are consistent with Forest Service policy and manual direction and the LTBMU LRMP as amended by the SNFPA.

The invasive plant management measures are sufficient to reduce the risk of invasive plant introduction and spread. If the management measures are not implemented—specifically the prevention measures, such as vehicle and equipment washing and monitoring, and use of weed-

free construction materials—then the risk of introduction would be substantially higher due to the expected ground disturbance and increased vectors associated with construction.

3.5.4 Analytical Conclusions

Overall, the anticipated invasive plant response to the project is moderate. While there is a low risk from non-project vectors and known infestations, the habitat vulnerability of the former lake area is high. The proposed activities represent a moderate to high risk of introduction, particular the use of heavy equipment, importation of construction and revegetation materials, and the scale of habitat alteration (or lack thereof in Alternative 1).

Table 3-11. Summary of Risk Factors

	Factor	Risk			Assessment summary
		Alternative 1	Alternative	Alternative 3	
NON-PROJECT DEPENDENT FACTORS	Inventory	N/A	N/A	N/A	Adequate
	Known invasive plants	Low			There are no known infestations present in the analysis area.
	Habitat vulnerability	High	Moderate	Low	Disturbed, unvegetated former lake bed is highly vulnerable to invasion. Vulnerable habitat is not addressed in Alternative 1. It is restored to wet meadow in Alternative 2 and mostly entombed in Alternative 3
	Non-project dependent vectors	Low			Low access route density, no utility corridors, moderate dispersed recreation.
PROJECT-DEPENDENT FACTORS	Habitat alteration expected as a result of project	Low	High	Moderate	Ground disturbance associated with construction.
	Increased vectors as a result of project implementation	Low	High	Moderate	Use of heavy equipment, use of imported construction and revegetation materials, short-term traffic increase
	Management measures	Moderately reduced risk	Greatly reduced risk	Greatly reduced risk	Standard management measures implemented in all alternatives. Habitat vulnerability reduced under Alternative 2 & 3.
ANTICIPATED INVASIVE PLANT RESPONSE		**Moderate**	**Moderate**	Low	Low risk from non-project dependent factors, but moderate to high risk due to potential habitat (non)alteration and construction activities, particular the use of heavy equipment and material importation.
Overall Risk Ranking[1-]		3	2	**1**	

[1]A score of 1 indicates the alternative has the lowest overall risk of invasive plant introduction and spread; a score of3 indicates that the alternative has the highest overall risk.

The main differences between the alternatives are the scale of construction and the degree to which the current habitat vulnerability is addressed—either through restoration or impoundment. Alternative 1 presents the highest invasive plant risk because, despite its smaller scale of construction activities, it fails to address the most vulnerable habitat—the former lake bed that is largely lacking native vegetation cover and is at risk of hydrologic function degradation. Alternative 2 presents the second highest invasive plant risk because it involves the most proposed construction and associated introduction risks, though it does address the former lake bed's habitat vulnerability through establishment of wet meadow habitat. Alternative 3 presents the least risk because, despite an intermediate scale of proposed construction and associated

introduction risks, it would impound the majority of the most vulnerable habitat under water, returning the area to conditions similar to the former Incline Lake.

3.6 Recreation and Scenic Resources

3.6.1 Introduction

Recreation in and around the Incline Dam generally occurs in the form of hiking, viewing scenery, and viewing wildlife. Impacts to recreation are analyzed differently for developed and dispersed recreation sites. Incline Dam is considered a dispersed recreation site because no facilities are available at the site and the area is considered part of the general forest.

Methodology

Impacts to dispersed recreation are analyzed in terms of access, recreation opportunity, and scenery. Access is analyzed in terms of the ease of vehicular and non-vehicular travel. Recreation opportunity is discussed as a spectrum of allowable available activities in which visitors may engage. Scenery is analyzed in terms of changes to the foreground, middle ground, and background.

Assumptions

In the analysis for this resource, the following assumptions have been made:

The Incline Lake Area Management Plan will be completed after the dam project is approved and/or constructed. The plan will include management strategies for the anticipated types of recreation that will occur after the project is complete. Until a decision is made regarding the dam, the level of management and needed infrastructure investment for recreation use is unknown. After a decision regarding the dam is made, it is assumed that no change in management of the site would occur until the Incline Lake Area Management Plan is completed.

3.6.2 Overview of the Affected Environment

Before the Forest Service acquired the property, Incline Lake was used for dispersed recreation by the owners and visitors to the cabins that were located along the lake. Fishing, swimming, and hiking were popular activities. Due to its proximity to the City of Incline Village, the lake attracted many young visitors on weekends and was considered a gathering spot for locals, despite the private property designation.

All of the structures and infrastructure that previously existed on the site were removed before the Forest Service obtained the property. Since then the dam outlet was opened and the lake drained for safety. Currently there are no facilities such as restrooms or trash service at the dam or at the parking area. Recreation occurs now in the form of hiking, viewing of scenery, and viewing of wildlife. Since the dam was drained and vegetation began growing up through the lake bed, the popularity of the site for bird watching has increased.

The dam can be accessed by one main route. This main access from the north is via a native surface/aggregate road off of SR 431 (Mount Rose Highway). A level area located at the highway pullout serves as an informal parking area and trailhead. The parking area is located on NFS lands managed by the Humboldt-Toiyabe National Forest. The access road itself is gated at the highway and visitors must access the site on foot. The road is approximately 1 mile long and drops about 300 feet in elevation over this length. The road also serves as administrative access to the dam. Currently the road is not part of the Forest Service system of roads that are actively managed. The road ends at the major dam crest and continues as a foot trail across the major dam crest. Additional user-created trails exist around the lake and along the access road. The steep topography of the area limits access from the south, although user-created trails do exist in some areas.

The steep topography of the area limits viewsheds into and from the site. Lake Tahoe is not visible from the area around the dam. Views of the lake can be seen from various points along the access road.

3.6.3 Environmental Consequences

Alternative 1/No Action

Direct and Indirect Effects

Access

Tree removal necessary to breach the dam and stabilize the resulting channel would not have an effect on the ability to access the site. Currently it is possible to walk along the minor and major dam crests. After the dam is breached, the eastern-most portion of the major dam crest will be inaccessible without traversing the dam breach area; however there is no trail that currently connects to the far eastern edge of the major dam and no destinations exist to the east of the major dam crest. The road will continue to provide access to the site for dispersed recreation. Therefore any impacts to access at the site from breaching the dam will be minimal and localized to the area immediately adjacent to the major dam.

Recreation Opportunity

The removal of trees and grading activities at the site will not affect the existing dispersed recreation opportunities at the site. Site closure during construction and tree removal activities would be localized and limited in duration.

Scenery

The area immediately surrounding the former lake on the west and southern sides has been substantially altered by human activity (via creation of the dam and the access road). Currently vegetation has grown in and the landscape appears somewhat naturalized.

Breaching the dam would alter the appearance of the major dam crest. The man-made nature of the major dam may be more apparent due to the new V-shaped notch devoid of vegetation. These impacts would be limited to the area immediately surrounding the major dam and are considered minor in nature and limited in duration as vegetation grows back in across the remaining dam topography.

Cumulative Effects

When combined with past, present, and future projects, it is not anticipated that this project will contribute to negative cumulative effects to recreation. Vegetative thinning projects such as the Incline Hazardous Fuels Reduction and Forest Health Restoration Project will contribute to improved scenic attributes through improved tree health and an opening of the understory, which is generally preferred to a dense understory from a scenery standpoint.

Alternative 2/Proposed Action

Direct and Indirect Effects

Access

Full restoration of the area would include removal of the major dam and conversion of the minor dam to a low-water crossing. The existing trail would therefore be removed starting at the location of the minor dam (currently pedestrian access continues across the crest of both dams). Access will be replaced with the construction of the new low-water crossing. Access to the overall site via the roadway will continue, as well. After the major and minor dams are removed, the area is expected to return to its original hydrologic condition of a system of small step pools and ephemeral braided streams. The new vegetation regime will not alter access to the site; however use patterns may change as the site hydrology changes over time.

Recreation Opportunity

The restoration of the area is expected to increase the quality of the dispersed recreation opportunity. Initially the site will appear highly disturbed after grading activities and tree removal are completed. Once vegetation begins to grow and the area returns to its original hydrologic condition, these impacts will be reversed and the scenery will be improved over the existing condition. Wildlife viewing opportunities are expected to increase as species that favor wetland systems move into the area. The unique nature of the original ecosystem may attract additional users to the site, but it is not anticipated that the demand for the site will increase substantially. Use will most likely be less than when Incline Lake was a destination for locals.

Scenery

As indicated above, the scenic attributes of the site are expected to increase under this alternative. The site will appear highly altered until vegetation begins to grow over the disturbed areas. After the previous Incline Lake was drained, vegetation began to grown in the lake bed within a year. It is expected that vegetation will grow at a similar rate after the new construction ends. Views into the site from upland areas are expected to improve, as well.

Cumulative Effects

Cumulative effects are the same as Alternative 1.

Alternative 3

Direct and Indirect Effects

Access

Impacts to access are similar to the no action alternative. Access to the site via the road would remain. It is anticipated that after the new dam is installed that pedestrian access would continue across the crest of the major dam, as well.

Recreation Opportunity

Alternative 3 provides some opportunity for additional recreation activities. It is anticipated that use of the site would be similar to when it was under private ownership and Incline Lake was present. Use of the site is expected to increase above Alternatives 1 and 2.

Swimming, fishing, and other lakeside recreation activities may begin under Alternative 3; however the quality of these opportunities is highly questionable due to the shallow depth of the lake and lack of facilities and managed access. Activities such as non-motorized watercraft use may be possible on the lake, however the proximity of the parking area to the lake makes carrying any such watercraft very difficult. As a result, illegal storage of personal property such as non-motorized watercraft may increase at the site. It is anticipated that only warm water invasive fish species such as bluegill would reproduce in the lake, and yearly freezing may prevent even that type of fish from thriving. Any viable fishing opportunities would only result from stocking the lake on a regular basis due to the winter kill issues, which is an activity that would require coordination with Nevada Department of Wildlife and is outside of the scope of this action. The reasonably foreseeable condition of the lake recreation opportunity is that of a small, low quality, highly disturbed lake/pond with low water visibility (not a clear cold alpine lake as is normally found elsewhere in the Lake Tahoe Basin).

The potential to properly manage the anticipated use of the site is severely limited by multiple factors. The steep topography and isolated location preclude easy access to the site by the general public, making any potential developed recreation use (i.e. fishing outfitter, developed swimming, etc.) extremely limited. The ability of the surrounding environment to sustain such uses is also severely limited due to the sensitive and rare nature of the fen and spring ecosystems in and near the site. The lack of access to utilities at the site also presents an obstacle to more developed uses. It is anticipated that the rare and sensitive nature of the area will make mitigation of the effects, from developed or dispersed use of the lake, severely prohibitive.

The site would continue to function as a local gathering spot. Issues with proper trash disposal, collection of dog waste, and proper disposal of human waste would be present to a greater extent under this alternative due to the increased use of the site and concentrated use along the shoreline. It is anticipated that these negative effects would also be to a greater extent than occurred at the previous Incline Lake due to the fact that many previous users of the lake were visitors of local residents and could use the restroom/trash facilities in the nearby cabins. Impacts from pedestrian use along the lake shore area may impede efforts to restore the shoreline due to compaction and trampling of vegetation. While the number of possible recreation activities afforded under this Alternative 3 is higher than Alternative 1 or 2, the overall effect would be a decrease in the quality of the recreation opportunity at the site.

Scenery

Changes to the existing scenery are the greatest under Alternative 3. The construction of a new dam would cause disturbance to a significant portion of the site. Although limited grass/shrub-type vegetation could grow back in the disturbed areas, the scene will look significantly different than the previous Incline Lake due to the removal of trees along both the old dam crests. The new dam would be managed in a manner that discourages new tree growth because tree roots can undermine the dam. The lake would therefore have a highly constructed appearance devoid of trees along a significant portion of the lake shore. The slope surrounding the lake may not revegetate due to trampling and compaction by visitors. The anticipated low visibility of the lake would also contribute to a decrease in scenic value of the site. Increased use of the site as a gathering spot for locals may also increase the risk of catastrophic wildfire in the area, which would significantly degrade the scenic character of the site.

Cumulative Effects

Cumulative effects are the same as Alternative 2.

Figure 3-9. The image shows a view taken from within the Incline Lake footprint looking south towards the major and minor dam. The red arrows indicate the extent of anticipated tree removal.

3.6.4 Analytical Conclusions

Access

Access to the area will remain and result in no effect under all alternatives.

Recreational Opportunity

The quality of the recreation opportunity is expected to increase the most under Alternative 2. While Alternative 3 provides the opportunity for some additional recreation activities such as swimming and possibly fishing, the limitations to managing such activities (i.e. lack of restrooms and other facilities, lack of access to utilities, the isolated nature of the site, etc.) make anticipated negative impacts higher under Alternative 3. Additionally, the ability to effectively mitigate the negative effects from developed or dispersed recreation use on the sensitive site under Alternative 3 is extremely limited. It should be noted that developed swimming and fishing opportunities occur at multiple other sites within the Lake Tahoe Basin Management Unit and the surrounding areas, while the fen and step pool ecosystem anticipated to reform within the project area is extremely rare and unique to the area. The dispersed recreation opportunities afforded under Alternative 2 more closely match the sensitive nature of the site and would result in the highest quality recreation opportunity when compared to Alternatives 1 and 3.

Scenery

Long and short term impacts to scenery are expected to be negligible under Alternative 1. The incised nature of the existing ditches and channels would continue to remain. The short term impacts to scenery are greatest under Alternative 2, however the long term benefit to the scenery would be greatest under Alternative 2. The restored site would be attractive and unique in nature. Impacts to scenery under Alternative 3 are considered to be higher than Alternatives 1 and 2. The new lake would not be a high quality alpine

lake, but rather a low quality, low-visibility lake with a highly man-made appearance and devoid of trees along a significant portion of the shoreline.

3.6 Terrestrial Wildlife Species and Habitat

3.6.1 Introduction

The purpose of this analysis is to evaluate and disclose the potential effects of the three alternatives for the Incline Lake Dam Restoration Project on FWS terrestrial wildlife species protected under the Endangered Species Act, FSS terrestrial wildlife species and habitat, TRPA SIS and migratory birds. The three alternatives under consideration (1, 2, and 3) are described in Chapter 2 of this EA.

Methodology

The evaluation of effects involved selecting an appropriate wildlife analysis area, using Geographic Information System (GIS) data to describe current habitat conditions within the analysis area and the type and extent of habitat types available for each terrestrial wildlife species, identifying proposed activities (and magnitude of those activities) that could affect terrestrial wildlife species and habitat and selecting appropriate indicators to evaluate effects, and identifying those terrestrial wildlife species (and habitat) that occur (or could occur) within the analysis area and could be effected by the proposed activities.

Analysis Area

The wildlife analysis area includes the project area (46 acres) and a one-mile buffer for a total analysis area of approximately 3250 acres (Figure 3-10). There are no known occurrences of FWS and FSS terrestrial wildlife species in the project area, very few acres (3.4) of conifer habitat would be removed, and the actions are discrete meaning that there would be no lingering actions causing a new type of disturbance once construction is complete. Therefore, the potential for adverse effects is low. However, because the alternatives could influence hydrologic conditions in and downstream of the project area, and potentially alter wet meadow and lacustrine habitat, effects could occur both within and around the project area. The one-mile buffer was selected because it encompasses known species occurrences adjacent to the project area, a portion of the Incline Creek northern goshawk Protected Activity Center (PAC), and all potentially suitable habitat for riparian-associated species (e.g., willow flycatcher) downstream of the project area as well as the transition zone to drier habitat conditions.

GIS Data

Except where otherwise noted, the existing habitat conditions (and available habitat types) in the project and wildlife analysis area for terrestrial wildlife species were quantified using the California Wildlife Habitats Relationships v. 8.1 (CWHR) personal computer program developed by the California Department of Fish and Wildlife (CDFW; formerly Fish and Game) (2005). Geographic information system (GIS) data for CWHR come from the CalVeg GIS layer (USDA 2009; http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/). A portion of

the wildlife analysis area includes the Humboldt-Toiyabe (HT) National Forest. CWHR data used to describe vegetation in the LTBMU and HT come from the same Eveg GIS layer but data for the LTBMU are based on higher resolution (1m) satellite imagery compared to the HT in which the data for vegetation are based on lower resolution (30m) satellite imagery. We do not believe this discrepancy has significantly altered the way the vegetation in the wildlife analysis area is described.

Where CWHR (2005) data were available, habitats were quantified by high and moderate capability for each terrestrial wildlife species analyzed. The CWHR program describes vegetation conditions through metrics such as tree size classes and canopy closure and functions as a predictive model of habitat suitability for wildlife species. CWHR ranks habitat suitability for each vegetation type as 0.0 (not suitable), 0.33 (low), 0.66 (moderate), or 1.0 (highly suitable) for each wildlife species. CWHR canopy closure classification system defines "open" canopy as S (10-24% canopy closure) and P (25-39% canopy closure), and "closed" canopy as M (40-59% canopy closure) and D (>60% canopy closure). Tree size classes are defined as: 1 (Seedling)(<1" diameter-at-breast height [dbh]); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(>24" dbh); 6 (Multi-layered Tree) (Mayer and Laudenslayer 1988). Current and historic survey information for terrestrial wildlife species was used to supplement GIS data to evaluate the potential for species occurrence in the analysis area and the suitability of available habitat for the species.

The CalVeg data covering the LTBMU was last updated in January 2009. However, the area of the former Incline Lake footprint has not been updated since the lake was drained in 2008 and is still classified as CWHR type "Lacustrine" (18.4 acres). The habitat in the former lake footprint is experiencing rapid vegetation change and would not currently be considered lacustrine. Because this area would be affected by project activities under any alternative (especially under alternatives 2 and 3) the habitat type(s) that currently comprise the lake footprint needed to be classified. Therefore, using data from CalVeg North Sierran tile 17B, last modified in January 2009 (USDA Forest Service 2009), the 18.4 acre polygon was extracted from the dataset and split into four new polygons that were hand-digitized to re-classify the habitat to the most closely related CWHR type. Three datasets were utilized to reclassify the CWHR type: a) the latest available aerial imagery of the project area—2010 National Agricultural Imagery Project (NAIP) for the State of Nevada, 1-meter resolution; b) the channel and contour data produced for the project (in project record 'contour 5ft' & 'channels'); and c) CWHR type data from the CalVeg North Sierran tile 17B. The CalVeg data were utilized to verify the CHWR types of adjacent and nearby polygons, which informed which types would be appropriate for classification of the former lake area. Project channel and contour data were utilized to delineate edges of wet meadow (WTM). The NAIP imagery was utilized to delineate edges of lacustrine (LAC), barren (BAC), and perennial grassland (PGS) types.

The habitat re-classified in the former lake footprint (and described below in the *Project Area Condition* section) may not adequately capture or characterize the rapid transitions the habitat is experiencing. Although methods followed the same general principles as the CalVeg dataset, the methodology could not replicate the CalVeg classification process, which relies on detailed analysis for several variables to produce each classification. The NAIP imagery represents a single snapshot in time and may not adequately characterize the extent and distribution of lacustrine habitat, which is likely to change from year to year. Although these caveats exist, the re-classified habitats are the best estimation of CWHR habitat types in the former lake footprint.

Terrestrial Wildlife Species – FWS and FSS

The analysis evaluated effects to threatened, endangered, candidate, and proposed species under the Endangered Species Act of 1973 (as amended) and Region 5 FSS Species. FWS species lists are based on the September 18, 2011 (verified on January 7, 2014) list of federally threatened, endangered, proposed, and candidate species for the Lake Tahoe Basin Management Unit (LTBMU) (http://www.fws.gov/sacramento/). The Pacific Southwest Regional Forester's sensitive species are based on the list that was updated on July 3, 2013 (USDA 2013). Table 3-12 lists the FWS and FSS species for the LTBMU.

The LTBMU is outside the geographic range of the fisher. Therefore, effects to this species would not occur and there is no further analysis of this species.

Table 3-12. FWS and FSS species for the LTBMU and status in the analysis area

WILDLIFE SPECIES	LEGAL STATUS[a]	KNOWN TO OCCUR IN ANALYSIS AREA	SUITABLE HABITAT IN ANALYSIS AREA	SPECIES CONSIDERED IN EFFECTS ANALYSIS – WHY/NOT?
Invertebrates				
Western bumble bee *(Bombus occidentalis)*	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Birds				
Willow flycatcher (*Empidonax traillii*)	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Bald eagle (*Haliaeetus leucocephalus*)	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Northern goshawk (*Accipiter gentiles*)	FSS	Y	Y	Yes, potential habitat may be affected by one or more alternatives.
Great gray owl (*Strix nebulosa*)	FSS	N	Y	Yes, but no effects expected because species not known to occur in LTBMU and analysis area above breeding elevation.
California spotted owl (*Strix occidentalis occidentalis*)	FSS	N	Y	Yes but no effects expected due to lack of known occurrences and lack of potential habitat.
Mammals				
Pacific fisher (*Martes pennanti)*	C	N	Y	No, species not known to occur. The LTBMU is outside geographic range for species.

WILDLIFE SPECIES	LEGAL STATUS[a]	KNOWN TO OCCUR IN ANALYSIS AREA	SUITABLE HABITAT IN ANALYSIS AREA	SPECIES CONSIDERED IN EFFECTS ANALYSIS – WHY/NOT?
North American wolverine (*Gulo gulo luscus*)	PT, FSS	N	Y	Yes, but no effects expected because species not known to occur in LTBMU and analysis area below breeding elevation.
Pacific marten (*Martes caurina*)	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Pallid bat *(Antrozous pallidus)*	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Townsend's big-eared bat (*Corynorhinus townsendii*)	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Fringed myotis (*Myotis thysanodes)*	FSS	N	Y	Yes, potential habitat may be affected by one or more alternatives.
Status C: Candidate, PT: Proposed Threatened, D: Delisted under Endangered Species Act of 1973 (as amended) FSS: Region 5 Forest Service Sensitive Species				

Terrestrial Wildlife Species – Management Indicator Species

Management indicator species (MIS) for the LTBMU are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS (see the MIS Report, Project Record Folder F1). Five MIS habitats—riverine &lacustrine, riparian, wet meadow , mid seral coniferous forest, and snags in green forest—would be affected by the Incline Lake Dam Project and are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the Proposed Action and alternatives on these habitats. The MIS selected for project-level MIS analysis for the Incline Lake Dam are:

Aquatic macroinvertebrates (riverine & lacustrine habitat)

Yellow warbler (*Dendroica petechia)* (riparian habitat)

Pacific tree frog (*Pseudacris regilla)* (wet meadow habitat)

Mountain quail (*Oreortyx pictus*)(mid seral coniferous forest habitat)

Hairy woodpecker (*Picoides villosus)*

Terrestrial Wildlife Species – TRPA and Migratory Birds

In addition to the individual species listed above, effects to TRPA SIS and migratory birds are addressed as a group in this section. The TRPA SIS include northern goshawk, osprey (*Pandion haliaetus*), bald eagle winter habitat (as mapped by TRPA), nesting bald eagles, golden eagle (*Aquila chrysaetos*), Peregrine falcon (*Falco peregrinus anatum*), waterfowl habitat (as mapped by TRPA), and mule deer critical fawning habitat (as mapped by TRPA). For more detailed

information on TRPA SIS and migratory birds, see the Terrestrial Species Impact Analysis Report for the Tahoe Regional Planning Agency and Migratory Landbird Conservation on the Lake Tahoe Basin Management Unit report that were prepared for this project (Project Record Folder F1).

Activities and Indicators

Proposed project activities would remove and also create habitat (depending on alternative) and could affect individuals and/or populations of FWS and FSS species as well as SIS and migratory birds. Project activities could disturb individuals and/or populations of terrestrial wildlife species during implementation. Indicators of effects analyzed include: (1) type and amount of existing habitat for each wildlife species, (2), type and amount of habitat alteration/removal/creation for each wildlife species and the predicted resulting habitat condition in the project area, and (3) type and magnitude of implementation-related disturbance for each wildlife species.

Assumptions

In the analysis for this resource, it is assumed that the gate to the access road would continue to be locked following implementation and access to the site would be pedestrian.

3.6.2 Overview of the Affected Environment

Information for the project and analysis areas, and terrestrial wildlife species accounts and status is summarized from more detailed descriptions that can be found in the Biological Assessment/Biological Evaluation (BA/BE) prepared for the project (Project Record Folder F1).

Project Area Condition

Habitat in the 46-acre project area is primarily comprised of coniferous forest (lodgepole pine), wet meadow, barren, and perennial grassland (Table 3-13). Refer to Figure A-1 in Appendix A for a visual depiction of CWHR habitat types in the project area and watershed boundary. As stated above, the former lake footprint (18.4 acres) is classified by CWHR (2005) as “lacustrine” but through our analyses, we identified that the habitat in this area is more similar to a combination of the following four CWHR types: lacustrine (0.7 acre), wet meadow (4.2 acres), barren (7.5 acres), and perennial grassland (5.9 acres). As noted above, the habitat in the former lake footprint is experiencing rapid vegetation conversion and a good portion of the footprint is classified as barren simply because vegetation has not yet regrown in these areas.

Table 3-13. Current CWHR habitat types in the Incline Lake Dam Project Area

CHWR Type	Acres in Project Area	Percent of Project Area
Lodgepole pine	14.9	33%
Wet meadow	10.4	23%
Barren	8.1	18%
Perennial grassland	6.8	15%

CHWR Type	Acres in Project Area	Percent of Project Area
Montane riparian	1.6	3%
Red fir	1.2	3%
Urban	1.1	2%
Lacustrine	0.7	1%
Sagebrush	0.5	1%
Aspen	0.5	1%
Total	**45.8**	**100%**

A man-made ditch bisects the former lake footprint and there are a series of smaller side channels primarily on the eastern side of the former lake footprint that feed into this main ditch. In general, the water that flows into the project area from the ditch and spring flows maintains a constant source of surface and subsurface flow and a relatively high ground water level. However, the ditch is eroding and the lateral channels are unstable. These incised ditches and channels dissect the surface and subsurface flowpaths, reducing the amount of water available to adjacent riparian vegetation and drawing down the subsurface and groundwater flows away from the ground surface. The resulting impact is believed to be an overall "drying" out of the riparian areas adjacent to these channels. Downstream of the former lake footprint, water flows freely down the valley in a stable channel fed also by lateral springs for 0.75 mile until it joins Third Creek. For a complete description of the hydrologic condition of the project area, refer to the Hydrology and Soils section of this EA (Section 3.4).

Wildlife Analysis Area Condition

The wildlife analysis area includes the project area and a one-mile buffer for a total analysis area of approximately 3250 acres (Figure 3-10). See the *Methodology* section for how the analysis area was selected.

The analysis area includes all land managed by the Forest Service (LTBMU and HT) and a small parcel (approximately 6 acres) of public land (Incline Village GID) that is just east of the project area, adjacent to SR431. Habitat in the public parcel is characterized as lodepole pine (CHWR 2005). The analysis area is bisected southwest to northeast by Nevada State Route 431 and a series of roads in the southern portion of the analysis area.

The elevation of the analysis area ranges from approximately 7800 feet at the very southern tip of the analysis area to 9600 feet. The majority of the analysis area falls between 8400 and 9000 feet. The north and western portions of the analysis area are very steeply sloping compared to the rest of the area, particularly the project area and directly south of the project area. Approximately 85% of the wildlife analysis area is comprised of CWHR types that are individually equal to or greater than 5% of the acreage of the wildlife analysis area and include: lodgepole pine (34%, mainly represented by 4M and 4P size classes), subalpine conifer (12%, mainly represented by 4P and 4S size classes), montane chaparral (10%), alpine dwarf scrub (6%), red fir (6%, mainly represented by 4M and 4P size classes), sage brush (6%), wet meadow

(6%), and montane riparian (5%) (CWHR 2005). The remaining 15% is comprised of habitat types (including non-habitat types such as barren and urban) that individually are less than 5% of the total acreage of the wildlife analysis area.

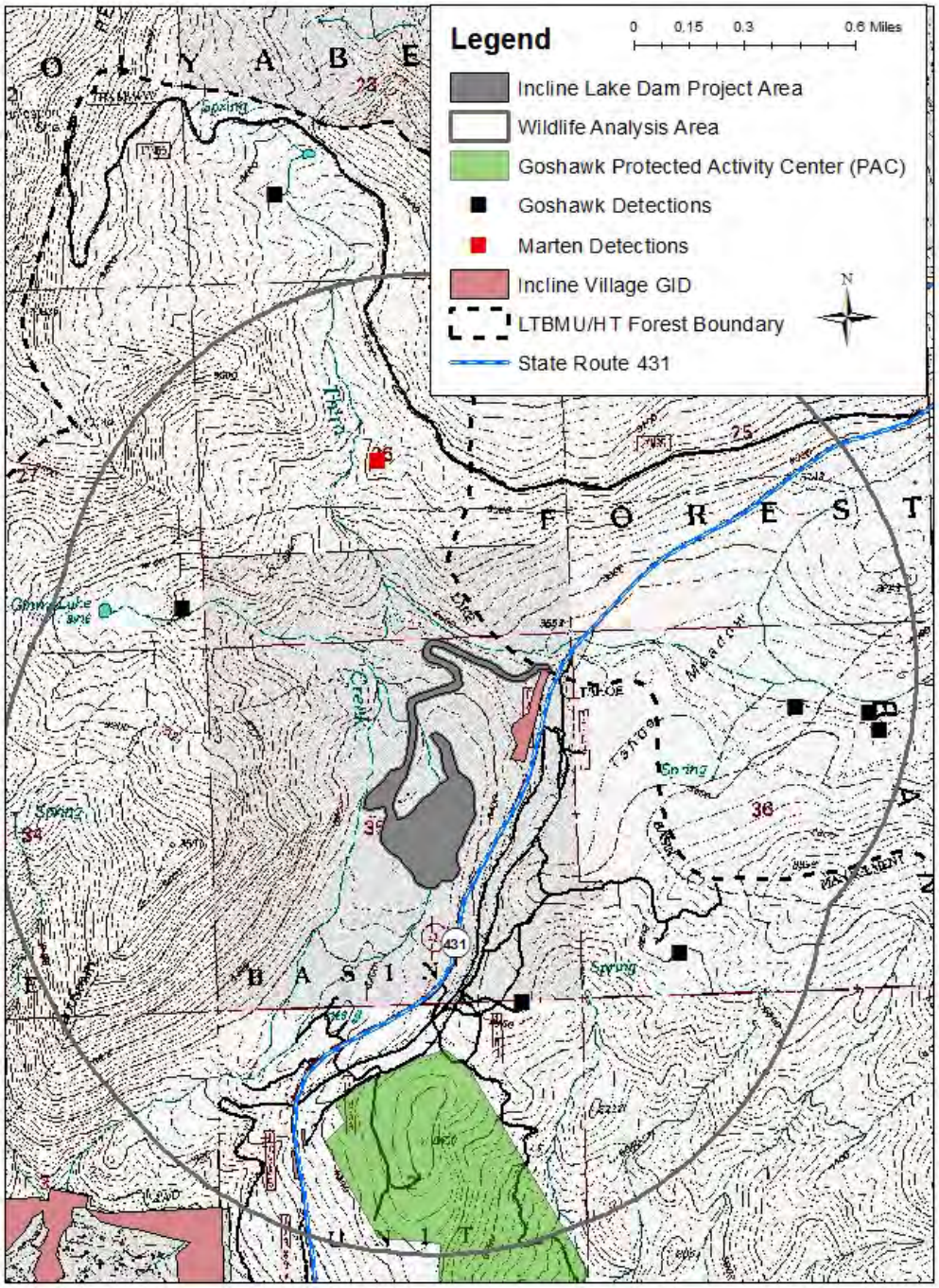


Figure 3-10. Incline Lake Dam Project and Wildlife Analysis Areas

Forest Service Sensitive Species Accounts and Status

Western Bumble bee

The western bumble bee (*Bombus occidentalis)* was recently added to the Region 5 FSS species list. The status of the western bumble bee in the wildlife analysis area is unknown. However, the wildlife analysis area includes wet meadow, fen, perennial grassland, montane riparian, and sagebrush habitat that may have flowering plants pollinated by this species.

Willow Flycatcher

The willow flycatcher (*Empidonax trailii*) is a FSS species on the LTBMU. The analysis area contains approximately 340 acres (11% of the analysis area) of high and moderate capability habitat (montane riparian and wet meadow) for the species. The project area contains 12 acres of high and moderate capability habitat (2 acres of montane riparian and 10 acres of wet meadow habitat). Although suitable habitat is available, surveys in the analysis area have not detected the species. Surveys were conducted for willow flycatcher in 2009, 2010, 2012, and 2013. Surveys in 2009 and 2010 were concentrated in wet meadow habitat within and adjacent to the northern portions of the project area. Surveys in 2012 and 2013 were expanded to include potentially suitable habitat at the southwestern and southeastern portions of the project area and south of the project area approximately 0.75 mile along a narrow drainage.

The lack of detections could be due to the relatively low representation (11%) of high and moderate capability habitat in the analysis area or that most of the analysis area (and all of the project area) are at or above the maximum elevation extent for the species –willow flycatcher sites range in elevation from 1,200 to 9,500 feet, though most (88%, 119 of 135) are located between 4,000 and 8,000 feet (Stefani et al. 2001). Most of the willow flycatchers known to occur or have occurred in the LTBMU are primarily limited to the southern portions of the LTBMU with some occurrences on the west shore. The nearest occurrence of willow flycatcher to the wildlife analysis area is approximately 12 miles (as the crow flies) southwest in Pomin Park and Lake Forest (2 detections, data provided by Will Richardson in 2010, Tahoe Institute of Natural Science). The nearest known willow flycatcher nest was identified 18 miles (as the crow flies) southwest of the wildlife analysis area in Blackwood canyon in 2007.

Bald Eagle

The bald eagle, (*Haliaeetus leucocephalus*), was federally de-listed on August 8, 2007 (Federal Registrar Vol. 72, No. 130, pp. 37346-37372) and then placed on the USFS Region 5 Regional Forester's sensitive species list. The winter and nesting bald eagle population in the LTBMU is also designated as a TRPA SIS.

The analysis area offers very little potential habitat for the bald eagle. There is no high or moderate capability bald eagle nesting and perching habitat in the wildlife analysis area. Less

than 1% of the analysis area (2 acres) contains high capability foraging habitat. There is no moderate capability foraging habitat in the analysis area.

Surveys for bald eagle were not conducted in the analysis area. The analysis area has very little potential foraging habitat for this species and no nesting or perching habitat. The analysis area is also about three miles inland from the shores of Lake Tahoe where most activity has been detected. The nearest nest is about seven miles from the analysis area but this nest has not been active since 2000.

Northern Goshawk

The northern goshawk (*Accipiter gentilis*) is a FSS species and a TRPA SIS on the LTBMU.

Potential habitat for northern goshawk is available in the analysis area. About 22% (700 acres) and 2% (55 acres) of the analysis area contains high and moderate capability nesting habitat, respectively. About 22% (715 acres) and 34% (1095 acres) of the analysis area contains high and moderate capability perching habitat, respectively. About 28% (910 acres) and 36% (1150 acres) of the analysis area contains high and moderate capability foraging habitat, respectively.

Although habitat is available in the analysis area, no goshawks were detected during surveys conducted in large portions of the analysis area in 2009, 2010, 2012, and 2013. Surveys in 2009 and 2010 included the project area, a wide buffer, and most of the southern portion of the analysis area. Surveys in 2012 and 2013 were more focused on the project area and a wide buffer surrounding the project area. Goshawks have been detected in the analysis area in the past, with five detections from the early 1990's and one detection from 2005 (see Figure 3-10).

The Incline Creek goshawk Protected Activity Center (PAC) overlaps with the very southern portion of the analysis area. Northern goshawk PACs are intended to protect goshawk nesting habitat. They are delineated to include the best available 200 acres of nesting habitat, and the most recent nest site and alternate nests within a goshawk breeding territory as described in management direction for the forest (USDA 2001, USDA 2004). The northern boundary of the Incline Creek PAC is 0.5 mile from the southern boundary of the project area. Only one nest has ever been found in the PAC. The nest is 1.3 miles from the project area and 0.3 mile from the wildlife analysis area. The nest was identified in 1995 but there are no data to indicate if the nest was successful. Additional detections of goshawks were made in the PAC in 1994, 1997, and 1998 but there has been no activity associated with the PAC during the last 10 years it was surveyed (2003-2012).

Great Gray Owl

The great gray owl (*Strix nebulosa*) is a FSS species. This species is not known to occur in the LTBMU. Although protocol surveys for great gray owl have not been conducted on the LTBMU, this species has not been detected during other large-scale owl surveys. This species was also not detected during multi-year surveys for California spotted owls in the analysis area

for this project. If the species were to occur in the LTBMU (including the analysis area), it is within reason to assume that it would have been detected during surveys for other owls.

The nearest detection of this species to the Lake Tahoe basin occurred near Carson Pass in 1971 approximately 1.1 miles south of the LTBMU. A second great gray owl detection was reported near Grover Hot Springs State Park, approximately 7.9 miles southeast of the LTBMU, in 1979. Based on the lack of detections on the Forest and the presumption that this species likely would have been detected if it were present, the great gray owl appears to be absent from the Lake Tahoe Basin, or to occur rarely or at extremely low densities.

There is no high capability nesting, roosting, and foraging habitat in the analysis area. There is no moderate capability nesting habitat in the analysis area. Although some potential moderate capability foraging and roosting habitat for the great gray owl may exist in the analysis area, the species has never been detected in the analysis area (or LTBMU) and the analysis area is considered above the suitable breeding elevation for the species. A portion of the analysis area also includes land managed by the Humboldt-Toiyabe (HT) National Forest which does not list the great gray owl as occurring on that Forest.

California Spotted owl

The California spotted owl (*Strix occidentalis occidentalis*) is a FSS species and a Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat.

There is relatively little to no potential habitat for spotted owls in the analysis area. About 5% (158 acres) and 2% (60 acres) of the analysis area contains high and moderate capability nesting habitat, respectively. About 5% (165 acres) and 10% (340 acres) of the analysis area contains high and moderate capability roosting habitat, respectively. About 5% (158 acres) and 11% (350 acres) of the analysis area contains high and moderate capability foraging habitat, respectively. The estimate of high capability nesting habitat and high and moderate capability roosting and foraging habitat may be substantially overestimated because CHWR data for the potential habitat in the analysis area do not differentiate montane riparian habitat (a habitat class used by the owls) by size class or canopy closure; therefore the 156 acres of montane riparian contributing to these estimates of high capability nesting habitat, and high and moderate capability roosting and foraging habitat represents all montane riparian habitat in the analysis area and almost all of the habitat considered high or moderate capability for spotted owls in the analysis area. There is virtually no high and moderate capability habitat for spotted owls in the project area. There are 1.6 acres of montane riparian habitat in the upper edge of the project area which is considered high capability nesting habitat and high and moderate capability foraging and roosting habitat but the size class and canopy cover are unknown and so true capability is uncertain. There is 0.7 acre of lodgepole pine 5M which is considered moderate capability roosting and foraging habitat.

No spotted owls have been detected during surveys conducted in large portions of the wildlife analysis area in 2009, 2010, 2012, and 2013. Furthermore, no spotted owl PACs or Home Range Core Areas (HRCAs) overlap with the analysis area. Similar to goshawks, spotted owls PACs are intended to protect owl nesting habitat. The PAC includes 300 acres of the highest quality nesting habitat available, and the most recent nest site or activity center within a spotted owl breeding territory as described in management direction for the forest (USDA 2004). HRCAs surround a PAC, are 1,000 acres in size, and are comprised of the best available contiguous habitat. The nearest PAC (Griff Creek) is four miles from the edge of the analysis area (five miles from the project area). The PAC has had active nesting as recently as 2009. The nearest HRCA (Griff Creek) is about three miles from the edge of the analysis area (four miles from the project area).

North American Wolverine

The North American wolverine (*Gulo gulo luscus)* is a FSS species and is proposed for listing as a threatened species under the Endangered Species Act of 1973 (as amended). The species is not known to occur in the LTBMU or the adjacent HT National Forest. There is no high or moderate capability denning habitat in the analysis area. Much of the LTBMU, including all of the analysis area, is below the suitable breeding elevation for the species. Although there is high and moderate capability foraging and resting habitat in the analysis area, the wolverine has not been detected during extensive carnivore surveys on the LTBMU (including near the project area) over the past 10 years and is not expected to occur in the LTBMU or in the analysis area.

Historically, there have been sporadic reports of wolverine south, west, and northwest of the LTBMU (CDFW 2008). All reports of wolverine have occurred in areas where conditions are wetter and generally characterized by longer lasting snowpack (important for wolverine denning) than the eastern portion of the LTBMU (where the project area is located) which tends to have drier conditions.

In 2008, a male wolverine was identified about 14-19 miles northwest of the LTBMU; this was the first verified record of a wolverine in California since 1922. The wolverine is most closely related to a population on the western edge of the Rocky Mountains and not a local (California or Washington) lineage (Moriarty et al. 2009). Although this attempted dispersal event may represent a continuation of the wolverine expansion in the contiguous United States, the USFWS (2013) found that there is no evidence that California currently hosts a wolverine population or that female wolverines have made, or are likely to make, similar dispersal movements.

Pacific Marten

The Pacific marten (*Martes caurina*) is a FSS species and an MIS for late seral, closed canopy coniferous forest habitat.

Potential habitat for marten exists in the analysis area. About 22% (730 acres) and 26% (850 acres) of the analysis area contains high and moderate capability denning habitat, respectively.

About 25% (795 acres) and 29% (940 acres) of the analysis area contains high and moderate capability resting habitat, respectively. About 30% (980 acres) and 43% (1400 acres) of the analysis area contains high and moderate capability foraging habitat, respectively. The estimate of potential denning, resting, and foraging habitat may be overestimated because montane riparian, in certain size classes and canopy closures, is considered potential habitat but CHWR data for the analysis area do not differentiate montane riparian habitat by size class or canopy closure; therefore, the estimates include all montane riparian habitat in the analysis area.

Surveys for marten were not conducted in the analysis area but previous meso-carnivore surveys have been conducted near the analysis area in 2005. No marten were detected during these earlier surveys. Sighting of marten tracks and evidence of significant marten activity were reported to the USFS in February 2013 from the area near Relay Peak (along or near the road between Tahoe Meadows and Relay Peak) which traverses the northern portion of the analysis area (see Figure 3-10; Richardson pers. comm. 2013).

Townsend's Big-eared Bat

Townsend's big-eared bat (*Corynorhinus townsendii*) is a FSS species.

The status of the species in the analysis area is unknown. No surveys were conducted in the wildlife analysis area for the species. Townsend's big-eared bat was first detected in Blackwood Creek and Big Meadow Creek watersheds in the LTBMU in 2007. This species has not been positively identified at survey locations in the LTBMU since 2009. The analysis area does not contain any roost sites that are strongly associated with this species elsewhere in its range such as mines, caves, and cave-like habitat. Although this species is limited by availability of roost sites, this species can forage in a wide variety of habitats and is fairly adaptable in its foraging requirements. Foraging habitat for this species does exist in the analysis area.

Pallid bat

The pallid bat (*Antrozous pallidus*) was recently added to the Region 5 Forest Service Sensitive species list for the LTBMU. The status of the species in the analysis area is unknown. No surveys were conducted in the wildlife analysis area for the species. Pallid bats were first detected in the LTBMU in 2004. The species was detected again in 2006 but has not been detected since. The analysis area does contain some rocky outcrops which are the primary roost sites for this species. Foraging habitat for this species does exist in the analysis area.

Fringed myotis

The fringed myotis (*Myotis thysanodes*) is a bat species that was recently added to the Region 5 Forest Service Sensitive species list for the LTBMU. The status of the species in the analysis area is unknown. No surveys were conducted in the wildlife analysis area for the species. Fringed myotis were first detected in the LTBMU in 2001 and have been detected in or near the LTBMU as recently as in 2013. The analysis area does not contain typical roost sites such as caves, crevices, cliffs, mines, large decadent trees and snags, and bridges and buildings. There

are some rocky outcrops in the analysis area and there are some snags in the analysis area. Foraging habitat for this species does exist in the analysis area.

TRPA Special Interest Species and Migratory Birds

TRPA Special Interest Species

The northern goshawk and bald eagle (both SIS) have been described in the previous section entitled Forest Service Sensitive Species Accounts and Status; all other SIS are described here.

Waterfowl SIS include species of ducks, geese, shorebirds, loons, grebes, mergansers, rails, gulls, terns, and herons. Waterfowl management areas are mapped for the Lake Tahoe Basin. The nearest waterfowl management area is 11 miles (as the crow flies) from the analysis area.

Golden eagle (*Aquila chrysaetos)* is associated with early successional forests and shrub communities for foraging and cliffs and large trees for nesting. Golden eagle surveys have been conducted during the past several years in the LTBMU. Golden eagle surveys have not been conducted in the wildlife analysis area. The nearest golden eagle occurrence is 24 miles (as the crow flies) from the analysis area. All golden eagles identified in the LTBMU have been observed in the very southern and also southwestern portions of the LTBMU.

Osprey (*Pandion haliaetus*) is associated with open forests with large snags for nest sites that are typically located near open water. Nest sites include large coniferous and deciduous trees and cliffs located near or over water. Surveys have been conducted in the LTBMU for osprey, along the shoreline of Lake Tahoe. No surveys for osprey have been conducted in the analysis area. The nearest occurrence of the species is about four miles from the analysis area on the Lake Tahoe shoreline.

The peregrine falcon (*Falco peregrinus*) is associated with rivers, wetlands, lakes, or other aquatic features for breeding and cliffs, banks, dunes, mounds, and human-made structures for nesting. Nests are usually situated on open ledges and a preference for southern facing slopes increases with latitude (USFWS 1984). From 2009 through 2013, successful nesting of this species has been confirmed in the Lake Tahoe Basin. However, no surveys for the species have been conducted in the analysis area. The nearest detection of the species is 21 miles (as the crow flies) from the analysis area.

Mule deer are associated with riparian areas, meadows, and early to mid-successional habitats. Threats to mule deer include habitat fragmentation and loss. TRPA has mapped critical fawning areas; the analysis area is not within or adjacent to critical fawning areas. Within the analysis area there are about 50-60 acres of fawn rearing areas; about 50 of these acres are just east of the project area on the other side of SR-431. Wet meadow occurs in the project area and this could be used by foraging mule deer. However, it is not known if deer are crossing SR-431 from fawn rearing habitat to the meadow in the project area; therefore, the extent of deer use of the project or analysis areas are not well understood.

Migratory Birds

Migratory birds have become a focus of conservation concern due to evidence of declining population trends for many species. Under the National Forest Management Act (NFMA), the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 USDA Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF North American Landbird Conservation Plan, references goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a *Memorandum of Understanding between the USDA Forest Service and the USDI Fish and Wildlife Service to Promote the Conservation of Migratory Birds* was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other federal, state, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

To facilitate a regional approach to bird conservation, regional geographic units called bird conservation regions (BCRs) were developed under the North America Bird Conservation Initiative (http://www.nabci-us.org/bcrs.html). BCRs encompass landscapes with similar bird communities, habitats, and resource issues. In *Birds of Conservation Concern 2008*, the U.S. Fish and Wildlife Service (FWS) identified the species in each BCR in greatest need of conservation action and proactive management to prevent the need for listing them as endangered or threatened. These species are termed Birds of Conservation Concern (BCC), and a list is given for each BCR. A BCC may be present in a BCR but not included in that BCR's list because its population numbers are not a concern in that region.

In addition, Audubon California has designated 145 important bird areas in the state. See http://www.ca.audubon.org/iba for additional information about these areas.

3.6.3 Environmental Consequences

Direct / Indirect Effects Analysis

Proposed project activities would remove and also create habitat (depending on alternative) and could affect individuals and/or populations of FWS and FSS species, TRPA SIS and migratory birds. Project activities could disturb individuals and/or populations of terrestrial wildlife species during implementation. Potential direct and indirect effects on FWS and FSS terrestrial wildlife species and habitat were determined by evaluating the type and amount of existing habitat for

each wildlife species, type and amount of habitat alteration/removal/creation for each wildlife species, and type and magnitude of disturbance for each wildlife species.

The type and amount of existing habitat for each terrestrial wildlife species is described above for each species and also in detail in the BA/BE for terrestrial wildlife species (Project Record Folder F1). The type and amount of habitat altered, removed, or created is described in Chapter 2 of this EA. A summary of the broad anticipated habitat changes that would be influential for terrestrial wildlife species is provided in the bullet list below. The effects of these changes as well as disturbance effects from implementation are described below for each species.

Although some of the potential habitat changes are described quantitatively in the bullet list below, it is important to note that there is a great deal of uncertainty when trying to predict the amount and type of habitat that would persist in the former lake footprint and surrounding this area because this habitat is currently in an active state of transition and strongly influenced by the hydrology of the area. Therefore, our best guesses are presented below based on what we believe hydrologic processes can support given activities that are part of the alternatives. Please interpret the quantitative predictions cautiously, focusing more on whether the actions are predicted to result in more or less "wet" habitat (primarily wet meadow). The broad anticipated changes in habitat that would be influential to terrestrial wildlife are as follows:

Alternative 1

- Tree removal would incur a loss of habitat on approximately 0.8 acre of land that is currently classified as 0.02 acre of lodgepole pine (4M), 0.03 acre of red fir (4P), 0.1 acre of barren, and 0.6 acre of wet meadow.
- Channel creation through the breached area (200 feet of perennial channel) would result in unimpeded flows in a stable channel through the dam to habitat downstream, maintaining water available for downstream wet meadow habitat.
- The majority of the habitat in the former lake footprint (perennial grassland) is trending towards wet meadow and this trajectory is expected to continue, at least in the short-term. However, unabated ditch and channel incision and erosion will continue to degrade and contribute to drying of wet meadow and montane riparian habitat in and around the project area. This habitat is considered low functioning and condition would not improve under this alternative.
- Barren habitat in former lake footprint may convert to perennial grassland and possibly to lodgepole pine in the long-term.

Alternative 2

- Tree removal would incur a loss of habitat on approximately 3.4 acre of land that is currently classified as 0.001 acre of perennial grassland, 0.03 acre of sagebrush, 0.2 acre of barren, 0.3 acre of lodgepole pine (4P), 0.5 acre of red fir (4P), 1.2 acre of lodgepole pine (4M), and 1.2 acre of wet meadow.
- Channel creation through the dam removal area (200 feet of perennial channel) would result in unimpeded flows in a stable channel through the dam to habitat downstream, maintaining water available for downstream wet meadow habitat.

- Restoration actions in the ditch and channels would restore hydrologic patterns within the natural range of variability for the site related to surface flooding, movement of subsurface flows, and groundwater levels. All of these changes would positively affect the water available to support wet habitat. Improved hydrologic processes (and connectivity of these processes) are expected to support approximately 14 more acres of wet meadow habitat for a total of approximately 26 acres. These additional acres would come from a conversion of barren, lacustrine, and perennial grassland to wet meadow habitat in the former lake footprint.
- Lacustrine habitat in the project area (0.7 acre) is expected to decrease as a result of restoration activities that smooth the surface of the former lake footprint.

Alternative 3

- Tree removal would incur the same loss of habitat in the same habitat types as described for Alternative 2.
- About 18 to 20 acres of lacustrine habitat would be created due to lake inundation.
- Habitat currently in transition in the former lake footprint (18.4 acres comprised of lacustrine, wet meadow, barren, and perennial grassland) would be lost due to lake inundation. If the maximum of 20 acres is inundated, approximately 1.6 acres of either one or a combination of surrounding wet meadow, lodgepole pine, and red fir habitat could also be lost.
- The total amount of wet meadow and montane riparian habitat maintained in the project area would be about 8 acres, less than under current condition, because all of the wet meadow in the former lake footprint would be inundated.
- Downstream flow regime from the dam would be altered given that a new dam with an impermeable liner would be installed. However, the flow regime would maintain habitat that currently exists either by manual releases or through spillover. Habitat downstream is not expected to be adversely affected expect in prolonged drought years when less water may come from both the dam and lateral springs.

Cumulative Effects Analysis

Cumulative effects represent (40 CFR 1508.7) the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions."

The analysis area is spatially defined as the project area (46 acres) and a 1-mile buffer for a total of about 3,250 acres. The analysis area includes all land managed by the Forest Service (LTBMU [75%] and HT [25%]) and a small parcel (approximately 6 acres) of public land (Incline Village GID) that is just east of the project area, adjacent to SR431. The analysis area is temporally defined to extend 15 years before and after the present. Although actual implementation may last only one to three years (depending on alternative), the results of the implementation activities particularly under alternative 2, may not be realized for 15-20 years

following implementation. Section 3.0.2 of this EA describes the projects and activities considered for cumulative effects.

Forest Service Sensitive Species

Western Bumble bee

Direct/Indirect Effects

Alternative 1 (No Action) Western bumble bee, if they were to occur in the project area, could be temporarily disturbed by equipment and human activity. Underground hives in small mammal burrows could be lost or temporarily disturbed by the use of heavy equipment in the project area. Bumble bees, if they were to be hibernating in the project area, are not expected to be lost because work would be conducted outside the hibernation season.

About 0.6 acre of wet meadow habitat (potential foraging habitat) could be lost under this alternative during tree removal activities to breach the main dam. This loss constitutes about 6% of wet meadow in the project area (0.6 of 10.4 total acres) and 0.3% of wet meadow habitat in the analysis area (0.6 of 190 acres) (CWHR 2005). This loss is considered relatively small compared to wet meadow habitat that would remain available in the project and analysis areas. Therefore, the loss of 0.6 acre of wet meadow habitat is not considered a major, long-term adverse effect for bees.

Wet meadow condition may deteriorate over time under this alternative and this change in condition could influence foraging opportunities for bees. Currently, it is believed that the habitat in the former lake footprint is transitioning towards wet meadow habitat. However, this habitat is considered low functioning and may continue to trend in this direction without restoration of hydrologic conditions. The hydrology of the project area is compromised by the incision and erosion occurring in the main ditch and side channels that are effectively drawing down available water and leading to a drying out of wet habitat condition (see section 3.4 of this EA, Hydrology and Soils).

Alternative 2 (Proposed Action)

The type of direct disturbances to foraging, hibernating, and bees using hives are the same as described under effects analysis for alternative 1. The potential spatial extent of the disturbance is larger under this alternative because work would be conducted on both the main and secondary dams, and additional restoration work would occur in the former lake footprint, and upstream of the former lake footprint. The duration of work activities are the same as alternative 1 (1-2 construction seasons).

Under this alternative, tree removal could incur a loss of 1.2 acres of wet meadow habitat, 0.001 acre of perennial grassland, and 0.03 acre of sagebrush habitat. This potential loss of wet meadow habitat constitutes about 12% of wet meadow in the project area (1.2 of 10.4 total acres) and 0.6% of wet meadow habitat in the analysis area (1 of 190 acres) (CWHR 2005). The

potential loss of sagebrush is 8% percent of the sagebrush available in the project area (0.03 of 0.4 total acres) and 0.02% available in the analysis area (0.3 acre of 187 total acres). The potential loss of perennial grassland is even smaller than that of sagebrush. This loss is considered relatively small compared to available foraging habitat available in the project and analysis areas. Therefore, the effect of tree removal on habitat is not considered a major, long-term adverse effect for bees.

Unlike alternative 1, restoration under this alternative would eliminate the ground water loss effect of the existing incised ditch and channels by restoring ground water residence time as well as surface and subsurface flows. All of these changes would positively affect the water available to support wet meadow habitat. Improved hydrologic processes (and connectivity of these processes) are expected to support better functioning and more acres of wet meadow habitat in the project area which could improve flowering habitat for bees, depending on the species of vegetation. These additional acres are anticipated to come from a conversion of barren, lacustrine, and perennial grassland to wet meadow habitat in the former lake footprint. Bees could be influenced by the transition of perennial grassland to wet meadow but there is a high level of uncertainty of which of these two habitat types in the project area are better valued habitat to bees. Perennial grassland would remain elsewhere in the project area.

Alternative 3

The type of direct disturbances to foraging, hibernating, and bees using hives are the same as described under effects analysis for alternative 1. Like alternative 2, the potential spatial extent of the disturbance is larger under this alternative because work would be conducted on both the main and secondary dams. This alternative also has the longest expected implementation period under which disturbance could occur.

In terms of direct disturbances, the most significant difference between this alternative and alternatives 1 and 2 is that lost hive and hibernation sites in the lake footprint would not be able to be re-established once implementation is complete because the area would be inundated.

Potential habitat for hives and for foraging would be negatively affected under this alternative. Tree removal would remove the same habitat as described for alternative 2. The number of potential hive/hibernation sites may be decreased during tree removal, re-contouring and filling, and by membrane installation on the main dam face. Inundation of wet meadow and perennial grassland habitat to create the lake would mean a permanent loss of foraging habitat for the bees. Total inundation could equal 18-20 acres. Not all of the habitat in the former lake footprint is currently suitable for foraging but the habitat is trending in the direction of wet meadow habitat. With the inundation, bees would experience a loss in flowering species and also small mammal burrows to use as hives or hibernation sites.

Cumulative Effects

Draining Incline Lake inadvertently led to the creation of about 18 acres of what could be considered currently suitable and trending towards suitable foraging habitat for western bumble bee. The analysis and project areas already contained fens, sagebrush habitat, perennial grasslands, meadows, and riparian areas that could also be considered foraging habitat, depending on extent of flowering plants. Draining the lake likely also created habitat for hive and hibernation sites. Therefore, draining the lake would be considered a positive past action for bumble bee habitat.

Past actions involving fuel reduction and pile burning treatments may also have improved habitat condition by opening understories to sunlight and using fire to stimulate understory growth (and potential flowering). Present and future maintenance fuels treatments may also indirectly improve long-term habitat condition although these actions are outside the analysis area. The Incline Forest Health and Hazardous Fuel Reduction Project also involves fuel reduction treatments in forested stands (including some that contain or are adjacent to meadows or other openings) that would open up the understory to increased sunlight that could provide greater opportunities for photosynthesis of flowering plants. The burning of piles could have an immediate adverse effect in the burn scar itself but these areas are expected to experience revegetation. Unlike the other maintenance fuel treatments, the Incline Forest Health and Hazardous Fuel Reduction Project is large-scale and therefore could negatively impact bumble bee hive sites and foraging opportunities during implementation. Slash piles could also hinder vegetation growth until they are burned. Therefore, the bee may experience immediate adverse effects mainly related to implementation and residence time of burn piles. However, the long term benefit of providing greater sunlight to the forest floor, removing conifers adjacent to meadow or other openings, and using fire could also stimulate the growth of flowering plants in the long-term.

When considered collectively with this Incline Lake Dam project, there could be a cumulative negative temporary effect if implementation of both this project and the Incline Fuels project occurs concurrently. Equipment for both of these projects could temporarily degrade hive locations and foraging habitat where used. However, this project is only 46 acres (not all of which is ground-altering) and is very small compared to Incline Fuels project. Therefore, this project would contribute minimally to the potential cumulative adverse effect.

In terms of habitat availability, there would be no cumulative adverse effect under alternatives 1 and 2 because habitat would continue to be available to the western bumble bee. Habitat condition under alternative 1 would deteriorate but this represents a relatively small portion of the entire analysis area. Similar to the other actions in the analysis area, habitat condition would be expected to improve during the 15 years after project implementation under alternative 2.

Under alternative 3, the loss of potential hive and hibernation sites would be permanent once the lake is inundated but this impact would not be incremental with the other past, present, or future actions as described above because no other actions would remove habitat in the analysis area.

Willow Flycatcher

Direct/Indirect Effects

Alternative 1 (No Action)

Willow flycatcher is not expected to be affected under this alternative. The project area may be above the maximum elevation that supports this species on the LTBMU. There are also no nearby occurrences of the species, indicating that dispersal to the project area is probably unlikely. An LOP would be in place if nesting individuals are identified before or during project implementation.

About 0.6 acre of wet meadow habitat (potential foraging habitat) could be lost under this alternative during tree removal activities to breach the main dam. This loss constitutes about 6% of wet meadow in the project area (0.6 of 10.4 total acres) and 0.3% of wet meadow habitat in the analysis area (0.6 of 190 acres). This loss is considered relatively small compared to wet meadow habitat that would remain available in the project and analysis areas. Therefore, the loss of 0.6 acre of wet meadow habitat in an area that is not known to be inhabited by willow flycatcher and is probably above the maximum elevation limit for the species is not considered a major, long-term adverse effect.

Wet meadow and montane riparian condition may deteriorate over time under this alternative and this change in condition could influence nesting opportunities. Currently, it is believed that the habitat in the former lake footprint is transitioning towards wet meadow habitat. There is also wet meadow and montane riparian habitat surrounding the former lake footprint and along the ditch upstream of the lake footprint. However, this habitat is considered low functioning and may continue to trend in this direction without restoration of hydrologic conditions. The hydrology of the project area is compromised by the incision and erosion occurring in the main ditch and side channels that are effectively drawing down available water and leading to a drying out of wet habitat condition (see section 3.4 Hydrology and Soils). This drying out can be particularly problematic for willow flycatcher nesting since the species nesting habitat is characterized by standing water (at least until June 1st) and large willow complexes. With the continued incision and erosion of the main ditch and side channels, the area may not be able to support standing water into the drier parts of the season.

Alternative 2 (Proposed Action)

Similar to the effects analysis for alternative 1, willow flycatcher is not expected to be affected under this alternative. The project area may be above the maximum elevation that supports this species on the LTBMU. There are also no nearby occurrences of the species, indicating that

dispersal to the project area is probably unlikely. An LOP would be in place if nesting individuals are identified before or during project implementation.

Under this alternative, tree removal could incur a loss of 1.2 acres of wet meadow habitat. This potential loss constitutes about 12% of wet meadow in the project area (1.2 of 10.4 total acres) and 0.6% of wet meadow habitat in the analysis area (1 of 190 acres) (CWHR 2005). This loss is considered relatively small compared to wet meadow habitat available in the project and analysis areas. Furthermore, the potential effects of this loss would be compensated for by the predicted increase in the amount and condition of wet meadow and montane riparian habitat that the project area (and upstream of the former lake footprint) could support in the long-term as a result of the improvement in hydrologic conditions through restoration actions.

Alternative 3

Similar to the effects analysis for alternatives 1 and 2, willow flycatcher is not expected to be affected under this alternative. The project area may be above the maximum elevation that supports this species on the LTBMU. There are also no nearby occurrences of the species, indicating that dispersal to the project area is probably unlikely. An LOP would be in place if nesting individuals are identified before or during project implementation.

Wet meadow habitat would be lost due to tree removal and inundation to create a lake. Tree removal could cause the loss of the same amount of wet habitat are described for alternative 2. Inundation to create a lake could incur the loss of about 4.2 acres of wet meadow habitat that is currently in the former lake footprint. Wet meadow habitat would remain elsewhere in the project area and upstream of the former lake footprint where restoration actions would improve the condition of existing wet meadow and montane riparian habitat.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to the willow flycatcher because the species is not known to occur in the analysis area despite multi-year surveys. The project area may be at or above the maximum elevation that supports this species on the LTBMU. There are also no nearby occurrences of the species, indicating that dispersal to the project area is probably unlikely.

In terms of habitat availability, draining Incline Lake inadvertently led to the creation of wet meadow and habitat that is transitioning towards wet meadow conditions. The habitat in the immediate lake footprint currently does not support a large willow community and so it would not be considered suitable nesting habitat. Still, the trajectory was created. And the analysis and project areas contain wet meadow and riparian areas that could be considered potential nesting habitat, depending on the presence of standing water. Therefore, although draining the lake may not have created nesting habitat, it would be considered a positive past action for willow flycatcher habitat.

Past actions involving fuel reduction and pile burning treatments may have improved meadow habitat condition where conifers were removed from meadows and meadow perimeters and where water tables were enhanced. However, it is not known to what extent treatments would focus on meadows since these areas tend not to present a fire hazard risk to communities. Therefore, these actions likely had no effect or maybe an indirect beneficial effect where meadows were included in treatments. Present and future maintenance fuels treatments would also be characterized similarly to these past actions but these proposed actions are outside the analysis area. The Incline Forest Health and Hazardous Fuel Reduction Project also involves fuel reduction treatments in forested stands (including some that contain or are adjacent to meadows or other openings) and removal of encroaching conifers from otherwise suitable meadow habitats may lead to the recruitment of deciduous, riparian shrubs during the 15 years after implementation that may improve the quality and suitability of these habitats. However, this project is not expected to increase or decrease the number of acres of suitable willow flycatcher habitat.

When considered collectively with this Incline Lake Dam project, there is not expected to be a cumulative negative effect on willow flycatcher habitat because other past, present, and future actions in the analysis area are not expected to increase or decrease willow flycatcher habitat. In terms of habitat condition, removal of conifers from meadows and meadow perimeters could improve condition over the long term although meadows are not the focus of Incline Fuels project. Under this project, habitat condition under alternative 1 may be challenged where the incised ditches contribute to desiccation but this represents a relatively small portion of the entire project and analysis area. Similar to the other actions in the analysis area, habitat condition would be expected to improve during the 15 years after project implementation under alternative 2. Under alternative 3, the loss of potential habitat would be permanent once the lake was inundated but this impact would not be incremental with the other past, present, or future actions as described above because no other actions would remove habitat.

Bald Eagle

Direct/Indirect Effects

Alternative 1 (No Action)

Bald eagles are not expected to be affected under this alternative. The species is not known to occur in the project area and is not expected to occur under this alternative because there would be no change in habitat for the species. There is approximately 0.7 acre of lacustrine habitat in the former lake footprint (and in the entire project area) which consists of not much more than a series of small pools and ponds. The lake would not be refilled under this alternative and the amount and condition of lacustrine habitat would not change under this alternative. Potential habitat is not expected to be affected by tree removal because trees removed as part of dam breaching would be smaller diameter (and not a preferred species) than those used by bald eagle for nesting and perching.

Alternative 2 (Proposed Action)

Effects are the same as those described under alternative 1. There may be a decrease in lacustrine habitat because restoration actions would smooth the surface of the former lake footprint where the pools and ponds are currently found but bald eagles are not expected to occur and be affected because there are currently very few acres of high and moderate capability foraging habitat and no perching or nesting habitat.

Alternative 3

Under this alternative there would be an increase in lacustrine habitat following the completion of project activities. Lacustrine habitat is considered a high capability foraging habitat type for bald eagles. It is expected that about 18-20 acres of lacustrine habitat would be created. If bald eagles begin using the project area following completion of the project, the species could experience effects from recreational use that may accompany the creation of the lake. Bald eagles are sensitive to human/recreation disturbance; in Washington, bald eagles were adversely affected by both pedestrian and boat recreation (Stalmaster and Kaiser 1998). However, Knight and Knight (1984) found that bald eagles became habituated to canoes in areas where they were common. It is assumed that the gate will remain closed so any recreation access would be pedestrian. Ultimately, the potential for effects from recreation depend on the type and extent of recreation use which can't be predicted from this project since the scope of this project does not involve recreation use of the project area.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to bald eagle because this project is not expected to adversely affect the species or potential habitat. Under alternative 3, following implementation, there would be more potential foraging habitat for bald eagles in the project area. However, this effect is not adverse and is not considered cumulative in nature because it would not be incremental with other past, present, or future projects.

Northern Goshawk

Direct/Indirect Effects

Alternative 1 (No Action)

Goshawk are not expected to be directly affected under this alternative because the species is not known to occur in the project area and implementation would occur outside of the maximum buffer from the known nest in Incline Creek PAC. Goshawks that temporarily use the area for perching or foraging could be disturbed by human presence and noise during implementation.

Habitat available to goshawk would be affected by the loss of 0.05 acre of potential habitat during tree removal under this alternative. Tree removal during dam breaching would remove 0.02 acre of lodgepole pine 4M habitat (high capability nesting, foraging, and perching) and 0.03

acre of red fir 4P habitat (moderate capability foraging habitat). This 0.05 acre area represents a fraction of a percent of the high and moderate capability habitat available to goshawk in the wildlife analysis and project areas. Specifically, a loss of 0.02 acre of lodgepole pine is 0.22% of the total available high capability nesting habitat in the project area and 0.21% of total high capability foraging and perching habitat available in the 46-acre project area. Loss of 0.03 acre of red fir is 0.32% of all available moderate capability foraging habitat in the project area. Because such a small amount of habitat would be lost in the project area that has no known nesting, perching, or foraging activity by goshawk (despite multi-year surveys), it is not expected that this loss would constitute a major adverse effect to goshawk.

Over the long-term, with continued drying of the habitat from ditch and channel incision and erosion, montane riparian habitat functioning is predicted to deteriorate. This habitat (depending on size class and canopy cover) is considered high capability nesting habitat and high and moderate capability foraging and perching habitat for goshawk.

In contrast, lodgepole pine on the edges of the project area may begin to penetrate into the project area where barren and perennial grassland habitat exists and may create habitat for goshawk. However, this process and the length of time this transition would take are highly uncertain.

Alternative 2 (Proposed Action)

Goshawks are not expected to be directly affected by project activities under this alternative for the same reasons provided in the effects analysis for alternative 1.

Habitat available to goshawk would be affected by the loss of two acres of potential habitat during tree removal under this alternative. Tree removal would incur a loss of 1.2 acre of lodgepole pine 4M (high capability nesting, foraging, perching habitat), and 0.5 acre of red fir 4P and 0.3 acre of lodgepole pine 4P (moderate capability foraging and perching habitat). The loss of these two acres represents a fraction of a percent of the high and moderate capability habitat available to goshawk in the wildlife analysis area. Within the project area, the loss of 1.2 acre of lodgepole pine 4M represents 13% of all high capability nesting habitat and 10% of all high capability foraging and perching habitat. The loss of 0.8 acre of red fir and lodgepole pine 4P represents 8% of all moderate capability foraging and perching habitat available in the project area. Although more habitat would be lost under this alternative than under alternative 1, the loss is still considered relatively small given the amount of habitat available in the project and analysis areas and the fact that this area has no known nesting, perching, or foraging activity by goshawk (despite multi-year surveys). Therefore, like alternative 1, actions under this alternative to remove trees are not expected to constitute a major, long-term adverse effect to goshawk.

Potential habitat could be improved if the measures taken to enhance the hydrologic stability of the project area improve wet meadow and montane riparian habitat condition and vegetative cover and these improvements attract a greater amount of potential prey. Wet meadow is not

considered a high or moderate capability habitat for goshawk but montane riparian habitat is and the condition of montane riparian habitat is predicted to improve over the long-term under this alternative.

Alternative 3

Goshawks are not expected to be directly affected by project activities under this alternative for the same reasons provided in the effects analysis for alternative 1. This alternative is expected to take longer to implement than alternatives 1 and 2 and this prolonged implementation schedule could mean longer potential disturbance to individuals foraging or perching in the area.

Effects to goshawk habitat from tree removal would be the same as those described under alternative 2 since the same acres of trees in the same locations would be removed. Goshawks are not expected to be adversely affected by inundation to create a lake because the habitat that would be lost in the former lake footprint is not considered high or moderate capability habitat for goshawk (perennial grassland, wet meadow, barren, lacustrine). However, lake creation could potentially affect adjacent lodgepole pine and/or red fir habitat if the inundation perimeter expands beyond the former lake footprint as mapped in CalVeg but the potential for this to occur is highly uncertain.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to goshawk habitat. No goshawk territories or PACs would receive treatment under any alternative. This project is not focused on fuel reduction or forest treatments. Potential goshawk habitat manipulated as part of this project is very small (1-2 acres) relative to the availability of potential habitat in the analysis area.

Past actions related to draining Incline Lake have little to no influence on the habitat condition for goshawk today. Past actions related to fuels treatments may have had a temporary adverse effect on goshawk and potential habitat but these actions likely set a trajectory for improved forest stand growth conditions or were concentrated in areas not considered suitable for goshawk. Fuel reduction treatments were likely concentrated in the wildland urban interface (WUI) where goshawk are less likely to nest. Goshawks tend to be sensitive to disturbance and generally avoid urban areas and portions of the WUI that are most impacted by ongoing anthropogenic disturbance. Exceptions exist but most goshawk activity centers in the Lake Tahoe basin have been detected in relatively less-disturbed suitable habitats following an ideal despotic distribution.

Present and future maintenance fuel treatments that would occur on NFS urban lots and non-NFS land would occur outside of the analysis area and the effects from this project are not expected to cumulatively add to any effect from these activities because: 1) treatments as part of the Incline Dam project are relatively very small (1-2 acres), 2) maintenance treatments are assumed to also treat relatively few acres because these are considered predominantly follow up actions to

maintain safe conditions, and 3) maintenance treatments are expected to primarily occur in the WUI where goshawk are less likely to nest.

Unlike the maintenance projects, the Incline Forest Health and Fuel Reduction Project area includes the Incline Dam Project area that would treat forested stands throughout the analysis area. It is expected that the growth of treated stands in the Incline Forest Health and Fuel Reductions Project would follow along a trajectory that is more beneficial than the current trajectory and that implementation would directly and indirectly benefit goshawks and their habitat in the long term. This Incline Dam Project would treat an incredibly small amount of potential habitat (1-2 acres) compared to the Incline Forest Health and Fuel Reduction project and would not be expected to incrementally add to any effect on goshawk habitat.

When considered collectively with this Incline Lake Dam project, there could be a cumulative negative temporary effect if implementation of both this project and the Incline Fuels project occurs concurrently. Equipment for both of these projects could temporarily cause goshawk to flee and avoid the project area. However, this project is only 46 acres (not all of which is ground-altering) and is very small compared to Incline Fuels project. Therefore, this project would contribute minimally to a potential cumulative adverse effect.

Great Gray Owl

Direct/Indirect Effects

Alternative 1 (No Action)

The great gray owl would not be affected by actions under this alternative because the species is not expected to occur in the analysis area; the species is not known to occur in the LTBMU and the analysis area is above the suitable breeding elevation for the species.

Alternative 2 (Proposed Action)

The great gray owl would not be affected by actions under this alternative because the species is not expected to occur in the analysis area; the species is not known to occur in the LTBMU and the analysis area is above the suitable breeding elevation for the species.

Alternative 3

The great gray owl would not be affected by actions under this alternative because the species is not expected to occur in the analysis area; the species is not known to occur in the LTBMU and the analysis area is above the suitable breeding elevation for the species.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to the great gray owl because this species would not experience direct or indirect effects from any alternative.

California Spotted Owl

Direct/Indirect Effects

Alternative 1 (No Action)

The California spotted owl would not be affected under this alternative and spotted owl habitat would not be affected. Within the project area, there is a maximum of 2.3 acres of potential spotted owl habitat (1.6 acres of montane riparian habitat (strata unknown) and 0.7 acre of lodgepole pine 5M habitat) and this habitat is excluded from any proposed manipulation (e.g., tree removal). The conifer habitat affected by tree removal includes lodgepole pine 4M, 4P, and red fir 4P; none of these habitat types are considered high and moderate capability habitat for spotted owl nesting, foraging, or roosting. Therefore, given the lack of spotted owl detections despite four years of surveys, relatively small amount of spotted owl habitat within the project area (including none in areas designated for manipulation/tree removal), relatively little amount of spotted owl habitat in the analysis area surrounding the project area, and relatively small amount of tree removal in habitat that is not considered high and moderate capability habitat for spotted owls, it is determined that this alternative would not affect the spotted owl.

Alternative 2 (Proposed Action)

The effects are expected to be the same as those described under alternative 1.

Alternative 3

The California spotted owl and potential habitat would not be directly affected under this alternative for the same reasons described under the effects analysis for alternatives 1 and 2. Spotted owls are not expected to be affected by lake creation because the habitats that would be inundated (barren, perennial grassland, lacustrine, and wet meadow) are not considered a high or moderate capability habitat for this species. Inundation could potentially influence adjacent lodgepole pine or red fir habitat but none of the size and density classes are considered high or moderate capability habitat for spotted owls. Therefore, no effects are expected to this species.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to spotted owl or potential habitat because the project is not expected to have any direct or indirect effects to spotted owls.

North American Wolverine

Direct/Indirect Effects

Alternative 1 (No Action)

The wolverine would not be affected by actions under this alternative because the species is not expected to occur in the analysis area; the species is not known to occur in the LTBMU and the analysis area is below the suitable breeding elevation for the species.

Alternative 2 (Proposed Action)

The wolverine would not be affected by actions under this alternative because the species is not expected to occur in the analysis area; the species is not known to occur in the LTBMU and the analysis area is below the suitable breeding elevation for the species.

Alternative 3

The wolverine would not be affected by actions under this alternative because the species is not expected to occur in the analysis area; the species is not known to occur in the LTBMU and the analysis area is below the suitable breeding elevation for the species.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to the wolverine because this species would not experience direct or indirect effects from any alternative.

Pacific Marten

Direct/Indirect Effects

Alternative 1 (No Action)

Marten could be disturbed by human presence and noise during implementation. Effects could include displacement of individuals (e.g. equipment causing an individual to flee the area) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities). These disturbance-type effects would be temporary and may affect foraging and resting behaviors. Adverse effects on reproduction are not expected. No marten den sites are known, though den sites may exist. If marten den sites are identified prior to or during implementation, an LOP would be applied to minimize potential direct effects to marten reproduction. Direct mortality (e.g. killing of an individual by equipment) is unlikely to occur to this highly mobile and wary species. Marten are not expected to experience effects to behavior patterns in the winter because no alternative proposes to conduct activities during the winter.

Marten could be indirectly affected by the loss of about 0.8 acre of habitat during tree removal under this alternative. This loss of potential habitat represents a fraction of a percent of the suitable habitat available to marten in the wildlife analysis area. Within the project area, the loss includes 0.02 acre of high capability denning habitat (0.21% of high capability denning habitat available in project area), 0.05 acre (0.44%) of moderate capability denning habitat, 0.62 acre (3%) of high capability foraging habitat, 0.13 acre (0.6%) of moderate capability foraging habitat, 0.02 acre (0.2%) of high capability resting habitat, and 0.13 acre (0.87%) of moderate capability resting habitat. Because such a small amount of habitat would be lost compared to the relative availability in the analysis and project areas, it is not expected that this loss would constitute a major long-term adverse effect to marten.

The location where trees would be removed under this alternative is also not expected to adversely affect marten foraging ability. Marten will often forage at the interface of

meadows/perennial grasslands and forests. Under this alternative, the 0.8-acre patch of trees would be removed adjacent to what has been reclassified as barren land in the former lake footprint. Barren habitat is considered moderate capability foraging habitat for marten and so this area may be used for foraging and could be temporarily affected by tree removal. However, this location is relatively small compared to the larger perimeter of the former lake footprint, and there would be other locations where marten can forage at the interface of meadow, barren, and perennial grassland habitat and forest.

Marten habitat condition could be compromised over the long-term due to continued ditch and channel incision and erosion, leading to dryer hydrologic conditions. Wet meadow is considered a high capability foraging habitat and montane riparian is considered a high and moderate capability denning, foraging, and resting habitat. Wet meadow could initially increase in the former lake footprint because habitat in this area is already in transition to this habitat type. However, not only is this habitat and montane riparian habitat considered low functioning due to hydrologic instability of the area but over time, the increasingly poor hydrologic stability of the area is expected to cause a decrease in both the amount and function of wet meadow and montane riparian habitat that can be supported.

Marten habitat may also transition over the long-term in the project area because of expected drying of the area. Lodgepole pine on the edges of the project area may begin to penetrate into the project area, particularly the former lake footprint, where barren and perennial grassland habitat exists and may transition this habitat. Perennial grassland is considered moderate capability foraging habitat for marten and barren habitat is considered moderate capability foraging and resting habitat for marten. Lodgepole pine habitat, depending on the size and density, could be considered high and moderate denning, foraging, and resting habitat. However, this process and the length of time this transition would take are highly uncertain.

Alternative 2 (Proposed Action)

Potential disturbance effects on marten from project implementation are the same as those described under alternative 1. However, more of the project area would be the subject of ground disturbance (e.g., main and secondary dams, former lake footprint, upstream of former lake footprint) under this alternative and so marten may avoid or be excluded from foraging or seeking resting locations in a larger footprint under this alternative. Both alternatives would be implemented in 1-2 seasons and so the length of time marten may be disturbed would not differ by alternative.

Marten could be indirectly affected by the loss of potential habitat during tree removal under this alternative. About 3.4 acres of trees would be removed for dam removal. This acreage is a fraction of a percent of the high and moderate capability habitat available for marten in the analysis area. For the project area, 1.2 acres is considered high capability denning habitat (13% of total high capability denning habitat available in the project area), 0.8 acre is considered moderate capability denning habitat (12% of total moderate capability denning habitat available

in project area), 2.4 acres is considered high capability foraging habitat (12% of total high capability foraging habitat available in project area, 1 acre is considered moderate capability foraging habitat (4% of total available moderate capability foraging habitat in project area), 1.2 acres is considered high capability resting habitat (12% of total available high capability resting habitat in the project area), and 0.9 acre is considered moderate capability resting habitat (6% of total available moderate capability resting habitat). Overall, the loss of habitat would be very small compared to the relative availability of these habitats in the analysis and project areas. Therefore, tree removal is not expected to constitute a major long-term adverse effect to marten.

Because trees would be removed in two locations adjacent to the meadow under this alternative, marten could experience a loss of protective foraging cover in two locations rather than one as proposed under alternative 1. Loss of this cover could make marten more susceptible to predation and compromise foraging opportunities.

Potential habitat could be improved if the measures taken to enhance the hydrologic stability of the project area improve wet meadow and montane riparian habitat condition and vegetative cover and these improvements attract a greater amount of potential prey. Wet meadow and montane riparian are both considered habitat for marten and the condition of both of these habitat types is predicted to improve over the long-term under this alternative.

Alternative 3

Potential disturbance effects on marten from project implementation are the same as those described under alternative 1. Like alternative 2, more of the project area would be the subject of ground disturbance (e.g., main and secondary dams, former lake footprint, upstream of former lake footprint) as compared to alternative 1 and so marten may avoid or be excluded from foraging or seeking resting locations in a larger footprint under this alternative. Implementation under this alternative is anticipated to take potentially 2-3 seasons, which would be longer than implementation under alternatives 1 and 2, so this temporary effect could be comparatively prolonged under this alternative.

Marten could be affected by the loss of 18-20 acres of foraging habitat under this alternative for lake creation and 3.4 acres of tree removal for dam removal and rebuilding. The same habitat types affected by tree removal under alternative 2 would be affected under this alternative. Lake inundation would incur a loss of all habitat in the former lake footprint (barren, perennial grassland, wet meadow, and lacustrine). Wet meadow (4.2 acres) is considered high capability foraging habitat. Perennial grassland (5.9 acres) and barren (7.5 acres) are considered moderate capability foraging habitat and barren is also considered moderate capability resting habitat. This loss of 17.6 acres of foraging habitat could adversely affect marten foraging in the project area. However, this acreage is 0.7% of the total high and moderate capability foraging habitat that is available for marten in the analysis area. It is assumed that areas of wet meadow would remain around the periphery of the lake, and foraging habitat would remain in other locations in the project area where wet meadow and perennial grassland would not be affected by project

activities. Although foraging habitat affected is a relatively small proportion of available habitat in the analysis area and foraging habitat would still remain elsewhere in the project area, permanently losing 17.6 acres of foraging habitat as part of lake creation and losing an additional 2.4 acres of high capability foraging habitat and 1 acre of moderate capability foraging habitat for dam removal and rebuilding would constitute a long-term adverse effect on marten foraging opportunities.

Cumulative Effects

When considered collectively, there could be a cumulative negative temporary effect if implementation of both this project and the Incline Forest Health and Fuel Reduction project occurs concurrently. Equipment for both of these projects could temporarily cause marten to avoid the project area and seek foraging and resting opportunities elsewhere. However, this project is only 46 acres (not all of which is ground-altering) and is very small compared to Incline Forest Health and Fuel Reduction project. Therefore, this project would contribute minimally to a potential cumulative adverse effect.

In terms of potential habitat, the past actions related to draining Incline Lake have probably created potential foraging habitat for marten as this species is known to forage at the interface of open habitat (meadows, perennial grassland) and forest. Past actions related to fuels treatments likely reduced the forest understory complexity (which is valuable to marten denning, resting, and foraging). Fuel reduction treatments can be beneficial if they set the trajectory for improving forest stand growth but also retain some of the important features to marten. It is possible that these fuel reduction treatments were concentrated in the wildland urban interface (WUI) and therefore focused primarily on the protection of communities and not on understory retention.

Present and future maintenance fuel treatments that would occur on NFS urban lots and non-NFS land would occur outside of the analysis area and the effects from this project are not expected to cumulatively add to any effect from these activities because: 1) treatments as part of the Incline Dam project are relatively small (2.5-18 acres), 2) maintenance treatments are assumed to also treat relatively few acres because these are considered predominantly follow up actions to maintain safe conditions, and 3) maintenance treatments are expected to primarily occur in the WUI which is already considered less suitable habitat for marten due to the high level of human disturbance.

Unlike the maintenance projects, the Incline Forest Health and Fuel Reduction Project area includes the Incline Dam Project area and would treat forested stands throughout the analysis area. However, it was assessed in the BE for that project that only a small proportion of available marten habitats would be affected and large tracts of high and moderate capability habitats and habitat connectivity would be retained. The distribution of marten habitat would not change substantially under the Incline Forest Health and Fuel Reduction Project. This Incline

Dam project would not treat a large amount of acreage of marten habitat but 20 acres of high and moderate capability foraging habitat would be completely lost under alternative 3. The Incline Forest Health and Fuel Reduction project may treat the perimeters of meadows but any of these actions would ultimately improve meadow condition by removing encroaching conifers. Therefore although this project could remove high and moderate capability foraging habitat, especially under alternative 3, this effect would not contribute incrementally to or other past, present, or future actions) to create a cumulative effect.

Townsend's big-eared bat

Direct/Indirect Effects

Alternative 1 (No Action)

Townsend's big-eared bat is not expected to be effected by this alternative because there are no known mines, caves, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, if this species is roosting in tree hollows as documented in coastal habitats, then affects to roost sites may occur. Tree hollows, like those reported by Gellman and Zielinski (1996) and Fellers and Pierson (2002), are most likely to occur in larger, more decadent trees, especially those with structural defects. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Potentially suitable foraging habitat for the species may be affected where equipment is used to remove about 0.6 acre of wet meadow habitat and 0.1 acre of barren land during tree removal

and dam breaching. This loss of about one acre is relatively small compared to the available foraging habitat in the project and analysis areas and is not expected to constitute a long-term adverse impact. However, the habitat condition may be less suitable for insects, and therefore bat foraging, over time due to continued drying of wet habitat in the project area from continued incision and erosion of the ditch and channels.

Alternative 2 (Proposed Action)

Townsend's big-eared bat is not expected to be effected by this alternative because there are no known mines, caves, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, if this species is roosting in tree hollows as documented in coastal habitats, then effects to roost sites may occur and this alternative has a larger tree removal footprint (3.4 acres) than alternative 1 (0.8 acres). Tree hollows, like those reported by Gellman and Zielinski (1996) and Fellers and Pierson (2002), are most likely to occur in larger, more decadent trees, especially those with structural defects. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

It is estimated that about 1.2 acres of wet meadow habitat, 0.03 acres of sagebrush habitat, and 0.2 acres of barren land may be directly affected during tree removal. These habitats are considered moderate capability habitat for this species (CWHR 2005). This potential loss of wet meadow habitat constitutes about 12% of wet meadow in the project area (1.2 of 10.4 total acres) and 0.6% of wet meadow habitat in the analysis area (1 of 190 acres) (CWHR 2005). The potential loss of sagebrush is 8% percent of the sagebrush available in the project area (0.03 of

0.4 total acres) and 0.02% available in the analysis area (0.3 acre of 187 total acres). The loss of barren land is about 2% (0.2 of 8.1 acres) of barren land available in the project area and 0.2% (0.2 of 96 acres) of barren land available in the analysis area. This potential loss is considered relatively small compared to the availability of these habitats in the project and analysis areas. Furthermore, any loss of these habitats during dam removal would be compensated for by the increase in condition and amount of wet meadow habitat that the project area would be predicted to support in the long-term as a result of improved hydrologic conditions from restoration actions. Therefore, activities under this alternative would assist in the improvement of foraging habitat condition for Townsend's big-eared bat by improving ground water connectivity and facilitating the habitat to trend towards healthier wet meadow and montane riaprian habitat that could support an improved prey base.

Alternative 3

Townsend's big-eared bat is not expected to be effected by this alternative because there are no known mines, caves, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, if this species is roosting in tree hollows as documented in coastal habitats, then effects to roost sites may occur. This alternative would have the same tree removal footprint as alternative 2 (about 3.4 acres). Tree hollows, like those reported by Gellman and Zielinski (1996) and Fellers and Pierson (2002), are most likely to occur in larger, more decadent trees, especially those with structural defects. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

In addition to the loss of potential foraging habitat to remove trees for dam removal and rebuilding, lake creation under this alternative could incur the loss of about 18-20 acres of potential habitat. Lake inundation would cause the permanent loss of wet meadow habitat in the former lake footprint and all of the habitat in the footprint that was considered trending towards wet meadow. However, it may be, depending on the size and volume of the lake as well as adjacent vegetation and the ability to attract insects, that the lake also offers foraging habitat for Townsend's big-eared bats.

Cumulative Effects

When considered cumulatively there could be a cumulative negative temporary effect if implementation of both this project and the Incline Forest Health and Fuel Reduction project occurs concurrently. Equipment for both of these projects could temporarily cause Townsend's big-eared bats to avoid roosting in the analysis area where these two projects overlap. However, this project is only 46 acres (not all of which is ground-altering) and is very small compared to Incline Forest Health and Fuel Reduction project, and there are no preferred roost types in the analysis area. Therefore, this project would contribute minimally to a potential cumulative adverse effect.

In terms of habitat alterations and loss, the proposed action, when combined with past, present, and reasonably foreseeable future actions is not expected to have a cumulative effect to Townsend's big-eared bat because mines, caves and cave analogues most likely to provide roosting habitat for this species would not be effected by this project. The alternatives also do not include actions that would contribute to alteration of the following types of potential roost sites: caves, mines, buildings, cliffs, or talus fields. If this species uses tree hollows for roosts, some roosts may be removed by project implementation, but a cumulative effect is not expected because the trees removed as part of the alternatives are smaller in diameter than tree roost typically associated with this species, and the total acreage of loss is relatively small compared to the availability in the project area. Similarly, foraging habitat lost or altered under each alternative is small compared to the amount of foraging habitat available to the species in the analysis area. In addition, foraging habitat would improve over the long term under alternative 2.

Pallid bat

Direct/Indirect Effects

Alternative 1 (No Action)

Pallid bats are not expected to be effected by this alternative because there are no known mines, caves, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not

only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, if this species is roosting in tree hollows then effects to roost sites may occur. Roosts of this species have been found in incense cedar trees, and this species has been associated with large trees for roosting. Incense cedar is not a species targeted for removal under any alternative but this species could be removed if it is preventing the removal/remediation of the main dam. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Overall, there is very little potential habitat in the wildlife analysis area for the species since there is little white fir and sierra mixed conifer. Neither of these habitat types exists in the project area. Perennial grassland and sagebrush exist in the project area and are associated with this species (CWHR 2005) but are not affected under this alternative. Barren land is also associated with pallid bats and about 0.1 acre would be removed as part of dam breaching. This fraction of an acre is incredibly small and not expected to constitute a long-term adverse effect.

Alternative 2 (Proposed Action)

Pallid bats are not expected to be effected by this alternative because there are no known mines, caves, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, if this species is roosting in tree hollows then effects to roost sites may occur and this alternative has a larger tree removal footprint (3.4 acres) than alternative 1 (0.8 acres). Roosts of this species have been found in incense cedar trees, and this species has been associated with large trees for roosting. Incense cedar is not a species targeted for removal under any alternative but this species could be removed if it is preventing the removal/remediation of the main dam. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Overall, there is very little potential habitat in the wildlife analysis area for the species since there is little white fir and sierra mixed conifer. However, potential habitat for the species may be affected where equipment is used to remove about 0.001 acre of perennial grassland, 0.03 acre of sagebrush, and 0.2 acre of barren habitat. The loss of this acreage is incredibly small compared to the amount of habitat available in the analysis area.

Alternative 3

Pallid bats are not expected to be effected by this alternative because there are no known mines, caves, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, if this species is roosting in tree hollows then effects to roost sites may occur and this alternative has a larger tree removal footprint (3.4 acres) than alternative 1 (0.8 acres). Roosts of this species have been found in incense cedar trees, and this species has been associated with large trees for roosting. Incense cedar is not a species targeted for removal under any alternative but this species could be removed if it is preventing the removal/remediation of the main dam.

Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Overall, there is very little potential habitat in the wildlife analysis area for the species. However, potential habitat for the species may be affected where equipment is used to remove about 0.001 acre of perennial grassland, 0.03 acre of sagebrush, and 0.2 acre of barren habitat to rebuild the dam. Potential habitat for the species would be permanently lost due to lake creation which would inundate about 5.9 acres of perennial grassland and 7.5 acres of barren land. This constitutes a loss of about 14 acres of potential habitat due to lake creation and dam rebuilding. It may be, depending on the size and volume of the lake as well as adjacent vegetation and the ability to attract insects, that the lake offers foraging habitat for Pallid bats.

Cumulative Effects

When considered cumulatively there could be a cumulative negative temporary effect if implementation of both this project and the Incline Forest Health and Fuel Reduction project occurs concurrently. Equipment for both of these projects could temporarily cause Townsend's big-eared bats to avoid roosting in the analysis area where these two projects overlap. However, this project is only 46 acres (not all of which is ground-altering) and is very small compared to Incline Forest Health and Fuel Reduction project, and there are no preferred roost types in the analysis area. Therefore, this project would contribute minimally to a potential cumulative adverse effect.

In terms of habitat alterations and loss, the proposed action, the proposed action, when combined with past, present, and reasonably foreseeable future actions is not expected to have a cumulative effect to Pallid bat because mines, caves and cave analogues most likely to provide roosting habitat for this species would not be effected by this project. The alternatives also do not include actions that would contribute to alteration of the following types of potential roost sites: caves, mines, buildings, cliffs, or talus fields. If this species uses tree hollows for roosts, some roosts may be removed by project implementation, but a cumulative effect is not expected because the

trees removed as part of the alternatives are smaller in diameter than tree roost typically associated with this species, and the total acreage of loss is relatively small compared to the availability in the project area. Similarly, habitat lost or altered under each alternative is small compared to the amount of habitat available to the species in the analysis area.

Fringed Myotis

Direct/Indirect Effects

Alternative 1 (No Action)

Fringed myotis are not expected to be effected by this alternative because there are no known caves, mines, bridges, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, this species is known to day and night roost under bark and in tree hollows. Because tree removal would occur as part of this alternative, effects to roost sites may occur. Typically, snags and trees associated with roosts of this species are characteristic of older and mature forest conditions, which is not like the analysis or project areas which tend to have younger and smaller diameter trees. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur; it has been found that the likelihood of occurrence of the species increases as snags greater than 30 cm (12 inches) in diameter increase. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops (with crevices) in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Overall, there is not a lot of mature forest and very little sources of open water in the analysis area. There is however, a large amount of montane riparian habitat, sagebrush habitat, and barren land in the analysis area and all of these habitats are associated with fringed myotis

(CWHR 2005). Only 0.1 acre of barren land may be affected by tree removal during dam breaching. This fraction of an acre is an incredibly small percent of the total amount of barren land (96 acres) available in the analysis area and would not constitute a major long-term adverse effect on the species.

Alternative 2 (Proposed Action)

Fringed myotis are not expected to be effected by this alternative because there are no known caves, mines, bridges, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, this species is known to day and night roost under bark and in tree hollows. Because tree removal would occur as part of this alternative, effects to roost sites may occur and this alternative could remove more acres of conifer trees than alternative 1. Typically, snags and trees associated with roosts of this species are characteristic of older and mature forest conditions, which is not like the analysis or project areas which tend to have younger and smaller diameter trees. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur; it has been found that the likelihood of occurrence of the species increases as snags greater than 30 cm (12 inches) in diameter increase. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops (with crevices) in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Overall, there is not a lot of mature forest and very little sources of open water in the analysis area. There is however, a large amount of montane riparian habitat, sagebrush habitat, and barren land in the analysis area and all of these habitats are associated with fringed myotis (CWHR 2005). Only 0.2 acre of barren land and 0.03 acre of sagebrush habitat may be affected by tree removal during dam breaching. These fractions of an acre are an incredibly small percent

of the total amount of barren land (96 acres) and sagebrush (187 acres) available in the analysis area and would not constitute a major long-term adverse effect on the species. About 0.7 acre of lacustrine habitat would decrease under this alternative as the surface of the former lake footprint is re-contoured.

Alternative 3

Fringed myotis are not expected to be effected by this alternative because there are no known caves, mines, bridges, or buildings in the analysis area and this alternative does not include actions that would directly alter these types of structures. Other disturbance-type effects such as displacement of individuals (e.g. equipment flushing an individual) and changes in patterns of habitat use (e.g. avoidance of areas with ongoing project activities) are also not expected to occur because not only are there no known roost structure but this species forages nocturnally when work would not be occurring. Therefore, mortality of individual bats or effects to reproduction would not be expected as roost structures would not be affected.

However, this species is known to day and night roost under bark and in tree hollows. Because tree removal would occur as part of this alternative, effects to roost sites may occur and this alternative could remove more acres of conifer trees than alternative 1. Typically, snags and trees associated with roosts of this species are characteristic of older and mature forest conditions, which is not like the analysis or project areas which tend to have younger and smaller diameter trees. Based on the CWHR data for habitat in the project area with potential to be effected, the largest trees that would be removed are considered small (size class 4) with dbh of 11-23.9 inches. These trees are generally smaller than what would be considered a roost tree but potential roosting in these trees could occur; it has been found that the likelihood of occurrence of the species increases as snags greater than 30 cm (12 inches) in diameter increase. Removal of a roost tree or trees would be expected to cause affected bats to relocate to a new roost. As the availability of suitable roost trees is unknown, the effect of expulsion of individual bats is unknown, but could reasonably range from a temporary disturbance to mortality. Recruitment of new roosts would be likely to occur during the 15 years after treatment as retained large trees mature and may become decadent or experience structural defects.

The analysis area contains some rocky outcrops (with crevices) in the northwestern section and if the species is roosting in these rocky outcrops then effects may occur if noise travels from the implementation site to the roost. However, it is assumed that if bats are roosting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may show some level of tolerance.

Overall, there is very little potential habitat in the wildlife analysis area for the species since there is not a lot of mature forest and very little sources of open water. There is however, a large amount of montane riparian habitat, sagebrush habitat, and barren land in the analysis area and all of these habitats are associated with fringed myotis (CWHR 2005). The same amount of habitat affected by tree removal under alternative 2 would be affected under this alternative.

Lake creation under this alternative would also cause the permanent loss of 7.5 acres of barren land. Although barren land is associated with fringed myotis (CWHR 2005), this species is also associated with sources of open water. Therefore, it may be, depending on the size and volume of the lake as well as adjacent vegetation and the ability to attract insects, that the lake offers foraging habitat for fringed myotis.

Cumulative Effects

When considered cumulatively there could be a cumulative negative temporary effect if implementation of both this project and the Incline Forest Health and Fuel Reduction project occurs concurrently. Equipment for both of these projects could temporarily cause Townsend's big-eared bats to avoid roosting in the analysis area where these two projects overlap. However, this project is only 46 acres (not all of which is ground-altering) and is very small compared to Incline Forest Health and Fuel Reduction project, and there are no preferred roost types in the analysis area. Therefore, this project would contribute minimally to a potential cumulative adverse effect.

In terms of habitat alterations and loss, the proposed action, the proposed action, when combined with past, present, and reasonably foreseeable future actions is not expected to have a cumulative effect to fringed myotis because mines, caves and cave analogues most likely to provide roosting habitat for this species would not be effected by this project. The alternatives also do not include actions that would contribute to alteration of the following types of potential roost sites: caves, mines, buildings, cliffs, or talus fields. If this species uses tree hollows for roosts, some roosts may be removed by project implementation, but a cumulative effect is not expected because the trees removed as part of the alternatives are smaller in diameter than tree roost typically associated with this species, and the total acreage of loss is relatively small compared to the availability in the project area. Similarly, habitat lost or altered under each alternative is small compared to the amount of habitat available to the species in the analysis area.

Management Indicator Species

Riverine & lacustrine habitat (Aquatic macroinvertebrates)

Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Karr et al. 1986; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are: flow, sedimentation, and water surface shade.

Alternative 1 (No Action)

Direct and Indirect Effects

Under Alternative A, no lacustrine habitat would occur in the analysis area. The quality of riverine habitat would continue to decline as the stream continued to incise becoming

disconnected from the floodplain. Because no stream stabilization is proposed under Alternative A, the stream and ditches within the footprint of the previous impoundment and upstream of the impoundment, approximately 3,350 feet, would continue to degrade. With the reduction of floodplain function, existing streambank vegetation would decline with groundwater levels. This would reduce stream shading and potentially lead to increase water temperatures. The existing ditch and gully system would continue to erode increasing downstream sediment transport and reducing groundwater levels for riparian vegetation.

(1) Flow: Negative effects from increased water velocity in the old lake bed because flows are confined to the gully and are unable to spread into meadow deposition zones. This effect may be partially mitigated by sediment trapping in the project area floodplain as well as in the meadow downstream of the dam area. Gullying negatively effects timing of water inputs by concentrating and increasing the velocity of flow; this may be partially mitigated by increasing hydraulic roughness through project area restoration as well as roughness encountered in the meadow downstream.
(2) Sedimentation: Untreated gullying upstream channelizes flow, increases water velocity and shear stress, which increases soil erosion beyond natural levels. This will continue to occur if the disturbance is not treated. Water quality impacts due to gullying will occur because of increased water velocity that has more capacity to dislodge and carry nutrients and sediments. Impacts will be somewhat mitigated by increasing surface roughness and promoting fine sediment trapping and nutrient use within the project channel and floodplain as well as sediment trapping and nutrient use in the meadow downstream
(3) Water surface shade: The restoring of a natural flow path will improve sediment trapping capacity, but remaining dam slopes will likely remain sparsely vegetated due to its topographic and hydrologic isolation from surrounding soils; the positive and negative aspects cancel each other. Recent observations suggest that vegetation may establish itself along gully walls downstream of active erosion over time; however, raw stream banks near areas of fresh erosion will continue to be present, and these areas have no vegetation for sediment trapping.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would not have a cumulative effect on this habitat because it is not expected that riverine habitat would be lost under this alternative. Although the condition of this habitat may be influenced by changes to hydrology under this alternative, it is not believed that this habitat would be lost.

Alternative 2 (Proposed Action)

Direct and Indirect Effects

Under Alternative B, no lacustrine habitat would occur in the analysis area. The quality and quantity (+3,350 feet) of riverine habitat would improve with proposed action to stabilize stream segments impacted by past land management, including the diversion of water and creation of the previous reservoir.

(1) Flow: Meadow surface and flow path restoration will cause water to move through soil and along the surface closer to a natural rate. Full recovery will not be achieved until channel form and surface vegetation settle into their functional states. Exhumed hill slope soils may start to deliver water at a natural rate once vegetation and surface soil structure recovers. Restoration would have positive effect on timing of subsurface water inputs downstream by delaying water release from the meadow later in the growing season. There would be a minor effect by delaying surface water flood peak downstream during a large flood; effect level would similar for hill slope contribution. Restoration will reduce flood velocity and store more water during floods, which will reduce flood wave speed (time to concentration); however the overall contribution from the surrounding watershed even during extreme events is small and so the effect on the water input magnitude is minor. Restoration will reduce flood peak speed to downstream areas; however, floods are typically small (small contributing drainage area) and flows are probably less concentrated downstream towards Third Creek, all which dampen the restorations' effect on water input magnitude. Restoration will increase water residence time in areas downstream by slowing down the release of water later in the growing season to those areas. There may be little or no effect to water in the meadow soil downstream due to a naturally shallow ground water in that area already. Exhumed hill slope water residence time will not change much.

(2) Sedimentation: Restoration of meadow vegetation and flow path form will increase soil particle retention and nutrient uptake. There will be one to ten year recovery period for surface vegetation to fully establish retention and nutrient uptake processes. Water quality going through the meadow will improve before it hits the meadow areas downstream. Little or no sediment transported out of the meadow will be uptaking nutrients before they travel downstream. The restoration would also improve the capacity to absorb an extreme flood (sand and gravel transport) and probably a reduction of nutrient transport to functional areas downstream.

(3) Water surface shade: Restoring the meadow surface / ground water relationship will promote surface vegetation with strong soil trapping capacity. The same is true for hill slope soils but they will recover at a slower rate. Increased sediment trapping capability and ground water levels combined with proposed native vegetation planting will increase riparian vegetation along streambank; thus increasing stream

shade. The restoration will have little or no effect on meadow vegetation downstream because it is already functioning.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would not have a cumulative effect on this habitat because it is not expected that riverine habitat would be lost under this alternative. Although the condition of this habitat may be influenced by changes to hydrology under this alternative, it is not believed that this habitat would be lost.

Alternative 3

Direct and Indirect Effects to Habitat.

Under Alternative C, lacustrine habitat would increase by 18 to 20 acres, decreasing the amount of stream habitat by 1,900 feet (when comparing to Alternative 2).

(1) Flow: Ditch and gully restoration upstream of the lake would slow down the release of water locally. No direct effect on magnitude of inputs in the impoundment. The impoundment will disrupt the timing of water inputs downstream, particularly during extended dry periods when a higher percentage of spring flow is retained and evaporated out of the lake; this effect is partially dependent on how outflows are managed.

Ditch and gully restoration upstream of the lake would result in more flow spreading out damping peak flow locally; however, the affected area is relatively small and the change in water input magnitude is minor at best. No direct effect on magnitude of inputs in the impoundment. The impoundment could potentially sequester flood waters dampening water input magnitude downstream; this would typically be a minor effect due to small contributing drainage area and current storm types. Impoundment would force an artificial increase in surface and soil water residence times. The impoundment could affect water residence time during multi-year dry periods when sequestered water is subject to evaporation, which reduces the volume of water available for surface flow and soil water replenishment downstream.

Ditch and gully restoration upstream of the lake would restore natural rates of sediment and nutrient movement locally. Impoundment would sequester sediment and nutrients and could result in eutrophication depending on water temperature as well as temperature of spring inflows; eutrophication potential has not been assessed.

(2) Sedimentation: Ditch and gully restoration would spread flow out, reduce velocity, cause sediment deposition, and build soils in those areas at a natural rate. No direct

effect on soils in the lake bed footprint. The impoundment disconnects meadow areas downstream from sediment particles traveling down from upstream sources. Effect is partially mitigated by sediment particles transported in from lateral sources. Ditch and gully restoration would reduce waters soil dislodging capability back to a natural level. There would be negative effects from wave cut erosion dislodging lake edge soil; however, that dislodged soil would for the most part remain in the lake. Impounding water has minor effect on the stream environment just downstream of the underflow pipe where some increase in velocity and shear stress has been witnessed based on concentrated flow pattern downstream of the underflow pipe currently; riparian vegetation does mitigate concentration about 100 feet downstream.

(3) Water surface shade: Covering about 15 acres of meadow soils with water would disrupt natural soil building processes by preventing air and vegetation needed to build and maintain that surface. Riparian vegetation around lake may be sparse. Water temperatures within the lake, due to depth limitation are expected to be high, specifically in the summer months. Increased sediment trapping capability and ground water levels above the lake combined with proposed native vegetation planting will increase riparian vegetation along streambank; thus increasing stream shade. The restoration will have little or no effect on meadow vegetation downstream because it is already functioning.

Cumulative Effects Conclusion:

It is not expected that the actions of the Incline Dam Project, when combined with past, present, and reasonably foreseeable future actions, will contribute to a cumulative effect on this habitat type. Although some of the existing riverine habitat within the analysis will be affected by Alternative 3 (impounded by lake), there is not a cumulative effect expected when considering other past, present or foreseeable future projects because there is not expected to be any other projects affecting this habitat in the analysis area.

Riparian Habitat (Yellow Warbler)

This species is usually found in riparian deciduous habitats (cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland) in summer (CDFG 2008). Yellow warbler is dependent on both meadow and non-meadow riparian habitat in the Sierra Nevada (Siegel and DeSante 1999).

Alternative 1 – No Action

Direct and Indirect Effects

(1) Acres of riparian habitat (CWHR montane riparian (MRI) and valley foothill riparian (VRI)). There are a total of 156 acres of montane riparian habitat (MRI) in the terrestrial MIS habitat analysis area. There are about 1.6 acres of this habitat type in the project area. NRI in the analysis and project areas includes all strata. There are no acres of valley foothill riparian (VRI).

(2) Acres with changes in montane riparian habitat: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat under this alternative. Habitat condition may deteriorate over time due to vegetation drying from ditch and channel incision and erosion but it is not believed that this habitat would be lost under this alternative.

(3) Acres with changes in total canopy cover: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat, including canopy cover, under this alternative. Habitat condition may deteriorate over time due to vegetation drying from ditch and channel incision and erosion but it is not believed that this habitat would be lost under this alternative.

(4) Acres with changes in CWHR size classes: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat, regardless of CWHR size class, under this alternative. Habitat condition may deteriorate over time due to vegetation drying from ditch and channel incision and erosion but it is not believed that this habitat would be lost under this alternative.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the habitat is not expected to be lost. Although the condition of this habitat may deteriorate over time as a result of unstable hydrologic conditions, it is not believed that this habitat would be lost. Also, this habitat is an extraordinarily small percent (<1%) of the total amount of montane riparian habitat in the analysis area.

Alternative 2 (Proposed Action).

Direct and Indirect Effects

(1) Acres of riparian habitat (CWHR montane riparian (MRI) and valley foothill riparian (VRI)). There are a total of 156 acres of montane riparian habitat (MRI) in the terrestrial MIS habitat analysis area. There are about 1.6 acres of this habitat type in the project area. NRI in the analysis and project areas includes all strata. There are no acres of valley foothill riparian (VRI).

(2) Acres with changes in montane riparian habitat: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat under this alternative. The condition of this habitat type may improve due to restoration of hydrologic function in the project area and upstream of the project area. It is anticipated that more “wet” habitat would be supported under this alternative but the majority of this increase in habitat is believed to be wet meadow.

(3) Acres with changes in total canopy cover: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane

riparian habitat, including canopy cover, under this alternative The condition of this habitat type may improve due to restoration of hydrologic function in the project area and upstream of the project area. It is anticipated that more "wet" habitat would be supported under this alternative but the majority of this increase in habitat is believed to be wet meadow.

(4) Acres with changes in CWHR size classes: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat, regardless of CWHR size class, under this alternative. The condition of this habitat type may improve due to restoration of hydrologic function in the project area and upstream of the project area. It is anticipated that more "wet" habitat would be supported under this alternative but the majority of this increase in habitat is believed to be wet meadow.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because montane riparian habitat would not be lost under this alternative. The condition of this habitat is expected to improve over the long-term as the result of restoration of hydrologic function.

Alternative 3

Direct and Indirect Effects

(1) Acres of riparian habitat (CWHR montane riparian (MRI) and valley foothill riparian (VRI)). There are a total of 156 acres of montane riparian habitat (MRI) in the terrestrial MIS habitat analysis area. There are about 1.6 acres of this habitat type in the project area. NRI in the analysis and project areas includes all strata. There are no acres of valley foothill riparian (VRI).

(2) Acres with changes in montane riparian habitat: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat under this alternative. Restoration under this alternative upstream from the lake would improve hydrologic condition for montane riparian habitat.

(3) Acres with changes in total canopy cover: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat, including canopy cover, under this alternative. Restoration under this alternative upstream from the lake would improve hydrologic condition for montane riparian habitat.

(4) Acres with changes in CWHR size classes: Project activities are not expected to occur in this habitat type; therefore, there are no expected changes in the acres of montane riparian habitat, regardless of CWHR size, under this alternative. Restoration under

this alternative upstream from the lake would improve hydrologic condition for montane riparian habitat.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because montane riparian habitat would not be lost under this alternative. Restoration under this alternative upstream from the lake would improve hydrologic condition for montane riparian habitat.

Wet Meadow Habitat (Pacific Tree Frog)

The Pacific tree frog (now known as the Pacific chorus frog) was selected as an MIS for wet meadow habitat in the Sierra Nevada. This broadly distributed species requires standing water for breeding; tadpoles require standing water for periods long enough to complete aquatic development, which can be as long as 3 or more months at high elevations in the Sierra Nevada (CDFG 2005). During the day during the breeding season, adults take cover under clumps of vegetation and surface objects near water; during the remainder of the year, they leave their breeding sites and seek cover in moist niches in buildings, wells, rotting logs or burrows (ibid).

Alternative 1 (No Action)

Direct and Indirect Effects

It is estimated that about 0.6 acre of wet meadow habitat may be directly affected during tree removal under Alternative 1. Although wet meadow exists in the former lake footprint and much of the other habitat in the footprint is trending towards wet meadow, this habitat condition is considered low functioning and is expected to deteriorate over time due to the continued incision and erosion of the ditch and channels in the project area (and upstream of the project area).

Because no other restoration actions are proposed under Alternative 1 to address channel incision, head cuts or ditches, subsurface and groundwater flows may continue to be disrupted in the floodplains adjacent to channels/ditches that are vulnerable to continues erosion and incision. Alternative 1 would leave approximately 3,350 feet of unstable channel. The unstable channels would lead to a loss of riparian and wet meadow habitat as groundwater levels continued to decrease.

The existing groundwater levels are currently below the growing depth needed to sustain wet meadow vegetation. In Alternative 1, both meadow and wetland habitat would decrease in quality and, potentially, quantity as groundwater elevation decreased and vegetation community shifted to upland dominated species.

Cumulative Effects

Cumulative effects to wet meadow habitat in the project area would be insignificant and would not alter the existing trend in meadow habitat.

Alternative 2 (Proposed Action)

Direct and Indirect Effects

Alternative 2 proposes to actively restore groundwater ecosystem function within the project area by stabilizing channels/ditches, restoring head cuts and recountouring the areas influence by the creation of the former reservoir. These proposed actions will maintain, enhance and restore wet meadow habitat. Actions proposed under Alternative 2 could increase wet meadow habitat by 14 acres. Restoration actions would eliminate the ground water loss effect of the existing ditch and restore ground water residence time a short time after treatments are complete. Surface water residence time will recover back to a natural level once vegetation has recovered. Recountouring within the existing reservoir footprint and dam locations will increase both meadow and wetland habitat. Any water remaining in ponded habitat will most likely freeze solid during the winter months as these are low depression areas.

Wet meadow habitat may be affected where equipment is used to remove trees or stabilize channels. It is estimated that about 1.2 acres of wet meadow habitat may be directly affected during tree removal. Although some potential habitat may be lost, activities under this alternative are predicted to support more wet meadow habitat in the long-term and higher functioning wet meadow habitat by restoration actions that would improve ground water connectivity as well as surface and subsurface flows

Cumulative Effects

Cumulative effects to wet meadow habitat in the project area would be insignificant and would not alter the trend in meadow habitat beyond the (beneficial) direct and indirect effects expected under Alternative 2.

Alternative 3

Direct and Indirect Effects

Under Alternative 3, the predominate aquatic habitat would shift from stream and meadow habitat to lake habitat. The volume of water impounded would be equal to the previous dam filled up to the level of the current spillway. At this level the maximum depth of the lake would be approximately 18 ft. (5.5m). The lake would impound between 18 to 20 acres of SEZ.

Wet meadow habitat would be lost due to inundation to create a lake and tree removal to rebuild the dams. Dam rebuilding would remove about 1.2 acres of wet meadow habitat (same as alternative 2). It is expected that about 4.2 acres of wet meadow habitat would be inundated to create the lake. In addition, all of the habitat currently trending towards wet meadow in the former lake footprint would be permanently lost due to inundation. Wet meadow/riparian SEZ would total approximately 8 acres in Alterative 3 compared to 27 in Alternative 2.

Cumulative Effects

Effects to wet meadow habitat under Alternative 3 are direct and indirect effects from proposed activities that convert 4.2 acres of existing wet meadow habitat to lake habitat. Other past, present or foreseeable future projects have insignificant effects on this habitat and do not affect the trend of habitat conditions now or in the future.

Mid Seral Coniferous Forest Habitat (Mountain Quail)

The mountain quail was selected as the MIS for mid seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. Mid seral coniferous forest habitat is comprised primarily of small-sized trees (11”-23.9” dbh). The mountain quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more that 0.8 km (0.5 mi) from water (CDFG 2005).

Alternative 1 (No Action)

Direct and Indirect Effects

(1) Acres of mid seral (CWHR tree size 4) coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures]: There are currently 250 acres of mid seral coniferous forest habitat (as defined in this report) in the analysis area and only 1.2 acres in the project area. About 0.03 acres of mid seral coniferous forest (as defined in the MIS report, Project Record folder F1) would be removed from the project area.

(2) Acres with changes in each CWHR tree size class: About 0.03 acres of mid seral coniferous forest (all size class 4, as defined in the MIS report, Project Record Folder F1) would be removed from the project area.

(3) Acres with changes in tree canopy closure: About 0.03 acres of mid seral coniferous forest (size class 4, as defined in the MIS report, Project Record Folder F1) and open canopy cover (P, 25-39%) would be removed from the project area.

(4) Acres with changes in understory shrub canopy closure: About 0.03 acres of mid seral coniferous forest would be removed to breach the dam. It is assumed that any understory shrub layer would also be removed during implementation.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the loss of this habitat from this project is extraordinarily small compared to its representation in the rest of the analysis area. About 0.03 acre would be lost which is <1% of the total mid seral coniferous forest (as defined in the MIS report, Project Record Folder F1) in the analysis area.

Alternative 2 (Proposed Action)

Direct and Indirect Effects

(1) Acres of mid seral (CWHR tree size 4) coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures]: There are currently 250 acres of mid seral coniferous forest habitat (as defined in this report) in the analysis area and only 1.2 acres in the project area. About 0.5 acres of mid seral coniferous forest (as defined in the MIS report, Project Record Folder F1) would be removed from the project area.

(2) Acres with changes in each CWHR tree size class: About 0.5 acres of mid seral coniferous forest (all size class 4, as defined in the MIS report, Project Record Folder F1) would be removed from the project area.

(3) Acres with changes in tree canopy closure: About 0.5 acres of mid seral coniferous forest (size class 4, as defined in the MIS report, Project Record Folder F1) and open canopy cover (P, 25-39%) would be removed from the project area.

(4) Acres with changes in understory shrub canopy closure: About 0.5 acres of mid seral coniferous forest would be removed to remove the main and secondary dams. It is assumed that any understory shrub layer would also be removed during implementation.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the loss of this habitat from this project is extraordinarily small compared to its representation in the rest of the analysis area. About 0.5 acre would be lost which is <1% of the total mid seral coniferous forest (as defined in the MIS Report, Project Record Folder F1) in the analysis area.

Alternative 3

Direct and Indirect Effects

(1) Acres of mid seral (CWHR tree size 4) coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures]: There are currently 250 acres of mid seral coniferous forest habitat (as defined in this report) in the analysis area and only 1.2 acres in the project area. About 0.5 acres of mid seral coniferous forest (as defined in the MIS report, Project Record Folder F1) would be removed from the project area.

(2) Acres with changes in each CWHR tree size class: About 0.5 acres of mid seral coniferous forest (all size class 4, as defined in the MIS report, Project Record Folder F1) would be removed from the project area.

(3) Acres with changes in tree canopy closure: About 0.5 acres of mid seral coniferous forest (size class 4, as defined in the MIS report, Project Record Folder F1) and open canopy cover (P, 25-39%) would be removed from the project area.
(4) Acres with changes in understory shrub canopy closure: About 0.5 acres of mid seral coniferous forest would be removed to remove and replace the dams. It is assumed that any understory shrub layer would also be removed during implementation.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the loss of this habitat from this project is extraordinarily small compared to its representation in the rest of the analysis area. About 0.5 acre would be lost which is <1% of the total mid seral coniferous forest (as defined in the MIS report, Project Record Folder F1) in the analysis area.

Snags in Green Forest Ecosystem Component (Hairy woodpecker)

The mountain quail was selected as the MIS for mid seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. Mid seral coniferous forest habitat is comprised primarily of small-sized trees (11”-23.9” dbh). The mountain quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more that 0.8 km (0.5 mi) from water (CDFG 2005).

Alternative 1 (No Action)

Direct and Indirect Effects

(1&2) Medium (15-30 inches dbh) and large (greater than 30 inches dbh) snags per acre:

There are a total of 1624 acres of green forest habitat on forest service land in the analysis area that are size class 4 (11-23.9” dbh) or 5 (≥24” dbh). There are 14 acres of green forest habitat in the project area that are size class 4 or 5. Less than one acre of the project area is in size class 5.

Green forest habitat in size class 4 would be removed from about 0.05 acre of a 0.8 acre footprint to breach the dam. No size class 5 green forest habitat (≥24” dbh) would be affected. Given that there is an average of 7.4 snags/acre and 2.6 snags ≥20 inches dbh snags/acre in the Incline Fuels Project units that overlap this analysis area, it could be expected that one snag that is ≥20 inches dbh could be lost by tree removal in the 0.8 acre footprint. No snags ≥24 inches dbh would be lost since there are none in the footprint for dam breaching.

Given that there are 1,624 acres of green forest habitat in the analysis area and estimated to be an average of 7.4 snags/acre and 2.6 snags ≥20” dbh in the analysis area, there are estimated to be 12,018 snags and 3,286 snags ≥20” dbh in the analysis area. Therefore, the potential loss of snags is equivalent to the loss of <1% of snags ≥20” dbh in the analysis area. No snags ≥24 inches dbh would be lost since there are none in the footprint for dam breaching.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the loss of this habitat from this project is extraordinarily small compared to its representation in the rest of the analysis area.

Alternative 2 (Proposed Action)

Direct and Indirect Effects

(1&2) Medium (15-30 inches dbh) and large (greater than 30 inches dbh) snags per acre:

There are a total of 1624 acres of green forest habitat on forest service land in the analysis area that are size class 4 (11-23.9" dbh) or 5 (≥24" dbh). There are 14 acres of green forest habitat in the project area that are size class 4 or 5. Less than one acre of the project area is in size class 5.

Green forest habitat in size class 4 would be removed from about 2 acres of a 3.4 acre footprint to remove the main and secondary dams. No size class 5 green forest habitat (≥24" dbh) would be affected. Given that there is an average of 7.4 snags/acre and 2.6 snags ≥20 inches dbh snags/acre in the Incline Fuels Project units that overlap this analysis area, it could be expected that about 15 snags and 5 snags that are ≥20 inches dbh could be lost by tree removal.

Given that there are 1,624 acres of green forest habitat in the analysis area and estimated to be an average of 7.4 snags/acre and 2.6 snags ≥20" dbh in the analysis area, there are estimated to be 12,018 snags and 3,286 snags ≥20" dbh in the analysis area. Therefore, the potential loss of snags is equivalent to the loss of 0.1% of snags and 0.2% of snags ≥20" dbh in the analysis area. No snags ≥24 inches dbh would be lost since there are none in the footprint for dam breaching.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the loss of this habitat from this project is extraordinarily small compared to its representation in the rest of the analysis area.

Alternative 3

Direct and Indirect Effects

(1&2) Medium (15-30 inches dbh) and large (greater than 30 inches dbh) snags per acre:

There are a total of 1624 acres of green forest habitat on forest service land in the analysis area that are size class 4 (11-23.9" dbh) or 5 (≥24" dbh). There are 14 acres of green forest habitat in the project area that are size class 4 or 5. Less than one acre of the project area is in size class 5.

Green forest habitat in size class 4 would be removed from about 2 acres of a 3.4 acre footprint to remove the main and secondary dams. No size class 5 green forest habitat (≥24" dbh) would be affected. It is assumed that no medium and large snags in green forest would be affected by the inundation of the meadow to create a lake. Given that there is an average of 7.4 snags/acre and 2.6 snags ≥20 inches dbh snags/acre in the Incline Fuels Project units that overlap this analysis area, it could be expected that about 15 snags and 5 snags that are ≥20 inches dbh could be lost by tree removal.

Given that there are 1,624 acres of green forest habitat in the analysis area and estimated to be an average of 7.4 snags/acre and 2.6 snags ≥20" dbh in the analysis area, there are estimated to be 12,018 snags and 3,286 snags ≥20" dbh in the analysis area. Therefore, the potential loss of snags is equivalent to the loss of 0.1% of snags and 0.2% of snags ≥20" dbh in the analysis area. No snags ≥24 inches dbh would be lost since there are none in the footprint for dam breaching.

Cumulative Effects

It is not expected that the actions of the Incline Dam Project when combined with past, present, and reasonably foreseeable future actions would have a cumulative effect on this habitat because the loss of this habitat from this project is extraordinarily small compared to its representation in the rest of the analysis area. The potential loss of snags from this project represents about 0.1% of snags and 0.2% of snags ≥20" dbh in the analysis area. These are relatively small proportions of the total amount of snags in green forest available. And no snags ≥24 inches dbh would be lost since there are none in the footprint for dam breaching. Incline Fuels project will also remove snags from the analysis area but both of these projects have protection measures in place that ensure the retention of a minimum number of snags per acre for wildlife.

Tahoe Regional Planning Agency Species and Habitat Analysis

The TRPA Regional Plan created and adopted environmental threshold carrying capacities to help maintain and protect natural resources in the Lake Tahoe Basin. The LTBMU LRMP directs that projects be guided by both the LRMP and the TRPA Regional Plan to support attainment of environmental thresholds. TRPA thresholds refer to both habitats and species of interest. This section responds to LRMP direction by summarizing the consistency of the project's effects with relevant thresholds and the nature of potential effects on TRPA species of interest. An impact analysis report was prepared for the project (Project Record Folder F1).

TRPA Special Interest Species

None of the alternatives are anticipated to result in direct, indirect, or cumulative effects to the golden eagle and peregrine falcon at known locations, or waterfowl in mapped areas. Effects to golden eagle and peregrine falcon are not expected because these species have never been detected in the analysis area and the nearest detections are over 20 miles away. Effects to bald eagle and goshawk have been previously described. Although the project is not located near a known osprey nest or in mapped mule deer critical fawning habitat, there may be effects to potential habitat for these species and so the potential effects are summarized below.

Osprey

Direct/Indirect Effects

Alternative 1 (No Action)

Osprey is not expected to be affected under this alternative. The species is not known to occur in the project area and is not expected to occur under this alternative because there would be no change in habitat for the species. There is approximately 0.7 acre of lacustrine habitat in the former lake footprint (and in the entire project area) which consists of not much more than a series of small pools and ponds. The lake would not be refilled under this alternative. Potential habitat is not expected to be affected by tree removal because trees removed as part of dam breaching would be smaller diameter than those typically used by osprey.

However, if osprey is nesting in the rocky outcrops then effects may occur if noise travels from the implementation site to the nest. However, if the species were detected nesting, an LOP would be implemented to avoid disturbance from project activities. It can also be assumed that if ospreys are currently nesting in the rock outcrop they are accustomed to the noise associated with the busy state route adjacent to the project area and therefore, may exhibit some level of tolerance.

Alternative 2 (Proposed Action)

Effects under this alternative are the same as those described under alternative 1. Although this alternative has potential to remove more acres of trees than alternative 1, all areas affected by tree removal would contain smaller diameter trees than those typically used by osprey. There may be a decrease in lacustrine habitat under this alternative because restoration actions would smooth the surface of the former lake footprint where the pools and ponds are currently found but osprey are not expected to occur and be affected because there are currently very few acres of potential habitat available for the species.

Alternative 3

Under this alternative there would be an increase in 18-20 acres of lacustrine habitat following the completion of project activities. Lacustrine (open water) habitat is strongly associated with osprey. If ospreys begin using the project area following completion of the project, the species could experience effects from recreational use that may accompany the creation of the lake. However, it is assumed that the gate will remain closed so any recreation access would be pedestrian. Ultimately, the potential for effects from recreation depend on the type and extent of recreation use which can't be predicted since the scope of this project does not involve recreation use of the project area.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to osprey because this project is not expected to adversely affect the species or potential habitat. Under alternative 3, following implementation,

there would be more potential foraging habitat for osprey in the project area. However, this effect is not adverse and is not considered cumulative in nature because it would not be incremental with other past, present, or future projects.

Mule deer

Direct/Indirect Effects

Alternative 1 (No Action)

If mule deer were to cross SR-431 and use the project area, the species could be affected during project implementation under any alternative. Implementation activities could cause the deer to avoid or flee the project area.

Wet meadow habitat may be affected where equipment is used to remove trees or stabilize channels. It is estimated that about 0.6 acre of wet meadow habitat may be directly affected during tree removal. Although wet meadow exists in the former lake footprint and much of the other habitat in the footprint is trending towards wet meadow, this habitat condition is considered low functioning and is expected to deteriorate over time due to the continued incision and erosion of the ditch and channels in the project area (and upstream of the project area).

Alternative 2 (Proposed Action)

If mule deer were to cross SR-431 and use the project area, the species could be affected during project implementation under any alternative. Implementation activities could cause the deer to avoid or flee the project area.

Wet meadow habitat may be affected where equipment is used to remove trees or stabilize channels. It is estimated that about 1.2 acres of wet meadow habitat may be directly affected during tree removal. Although some potential habitat may be lost, activities under this alternative are predicted to support more wet meadow habitat in the long-term and higher functioning wet meadow habitat by restoration actions that would improve ground water connectivity as well as surface and subsurface flows.

Alternative 3

If mule deer were to cross SR-431 and use the project area, the species could be affected during project implementation. Implementation activities could cause the deer to avoid or flee the project area. This alternative has the potential for the longest implementation schedule and so impacts could last longer under this alternative than alternatives 1 and 2.

Wet meadow habitat would be lost due to inundation to create a lake and tree removal to rebuild the dams. Dam rebuilding would remove about 1.2 acres of wet meadow habitat (same as alternative 2). It is expected that about 4.2 acres of wet meadow habitat would be inundated to create the lake. In addition, all of the habitat currently trending towards wet meadow in the former lake footprint would be permanently lost due to inundation.

Cumulative Effects

All alternatives, when combined with past, present, and reasonably foreseeable future actions are not expected to have a cumulative effect to mule deer habitat because under alternative 2 habitat quality is expected to improve during the 15 years after project implementation if the stabilization and restoration actions encourage the recruitment of deciduous riparian shrubs and increases the water table, improving ground water connectivity. Habitat could be challenged under alternative 1 over the long term due to the potential for drying vegetation conditions. And under alternative 3, the loss of potential habitat would be permanent once the lake is inundated in the current and trending meadow vegetation. However, these impacts would not be incremental with other past, present, or future projects since there are no other projects or actions that are specifically targeting meadow habitat in the analysis area. Incline Fuels Reduction and Healthy Forest Restoration project may treat conifers on the periphery of meadows or in open areas among forested stands but these treatments would ultimately improve meadow conditions by reducing conifer encroachment.

When considered collectively, concurrent implementation of this project and Incline Fuels and Forest Restoration project could have a cumulative adverse effect on mule deer during actual implementation activities. Although the Incline Fuels and Forest Restoration project wouldn't be directly treating meadows; this project will treat meadow perimeters and overlaps spatially with the Incline Dam project. Deer could be forced to avoid specific locations or alter foraging and fawn rearing behaviors if both projects are implemented concurrently and in similar spatial locations.

Impact Analysis for Fisheries Threshold Standards and Indicators

Lake Habitat

Standard: Achieve the equivalent of 5,948 total acres of excellent lake fish habitat.

Indicator: Physical disturbance of rocky (spawning and feed/cover habitats) substrate (acres).

Does the proposed project have the potential to degrade fish habitat, substrate conditions (Y/N):_____N_____

The project area does not contain any lake acres. Alternative 3 proposes to create approximately 18 to 20 acres of lake habitat through construction of a dam. This proposed impoundment will not provide optimal life history habitat requirements due to the water depth(15 to 18 feet),

projected water temperatures, water chemistry (low dissolved oxygen and high nutrients), and substrate (silt/sand).

Stream Habitat

Standard: Maintain 75 miles of excellent, 105 miles of good, and 38 miles of marginal stream habitat as indicated by the Stream Habitat Quality Overlay map (1997).

Indicator: Miles of stream habitat in the various categories based on field investigations of habitat. A qualified fisheries biologist using empirical data should make determinations of stream quality.

Will proposed project impact stream habitat quality (Y/N)__Y___if yes, how and can it be mitigated or state short-term affect(s) versus long-term benefit(s), or BMPs implementation?_____Y_____

The purpose of the project is to remedy the high hazard dam situation. The three alternatives vary in actions and associated effects to stream habitat with Alternative 2 having the greatest benefits. Actions under Alternative 2 would improve or maintain approximately 3,350 feet of stream and reconnect the upstream and downstream portion of the stream (200 feet) currently obstructed by earthen dam, stabilizing the channels, re-contouring previously affected areas, and restoring the habitat to improve ground water connectivity. Alternative 1 creates a "notch" at the existing dam creating approximately 200 feet of stream channel, improving aquatic organism passage and maintaining downstream flows. However, Alternative 1 but does not address head cuts, ditches, or propose any additional stream stabilization within the project area. This alternative would leave 3,350 of un-stabilized channels to continue to incise, transport sediment and reduce ground water levels. Under Alternative 3, approximately 900 feet of stream would be stabilized. The remaining stream habitat would be impounded in the 18 to 20 acre reservoir. Best Management Practices would be incorporated into the project design under all alternatives.

Instream Flow

Standard: Until instream flow standards are established in the Regional Plan to protect fisheries values, a non-degradation standard shall apply to instream flows.

Indicator: Instream flows evaluated by the use of an instream beneficial use assessment, such as the type established by Title 23, Section 670.6 of the California Administrative Code.

Does the proposed project include new construction or maintenance of a water diversion (Y/N)? _____N_____Potential to affect instream flows (Y/N)? _____Y_____There is a potential for minor differences in instream flows between alternatives, specifically due to the impoundment proposed under Alternative 3. Alternative 3 could also affect downstream flows. Upstream flows would feed into the channel downstream of the dam when flows coming into the reservoir exceed the volume maintained by the spillway height, or when flows are provided through spillway management to maintain flows determined necessary to maintain aquatic habitat as required by Federal law and policy (see Chapter 3.4 Hydrology Section). During very dry years, late summer base flow may need to be augmented by managed flow releases from the reservoir. Unlike Alternative 1 and 2, this alternative could affect downstream conditions as

minimum flows could be less than existing with the impoundment of water. The impoundment and associated dam will likely reduce the amount and duration of peak flows to the main tributary below the dam. This could be confounded with both climate change predictions and evaporative water losses. Although the evaporative loss potential has not been quantified, it can reasonably be stated that evaporative water losses would be greater, then that which occurs in a meadow ecosystem where most of the water flows under the ground surface as subsurface and groundwater flow, and is slowly metered throughout the system.

Lahontan Cutthroat Trout

Standard: It shall be the policy of the TRPA Governing Board to support, in response to justifiable evidence, state and federal efforts to reintroduce Lahontan cutthroat trout.

Indicator: (TRPA 1982a): Threshold would be achieved with the successful establishment of a Lahontan cutthroat trout population.

Are fish species present/suspected? _____Y_____ The streams and lakes in the project area contain non-native trout and native non-game fish.

Is there an adjacent Lahontan cutthroat trout population which could be affected by the project? _____N_____

Migratory Birds

The project could have potential adverse short-term impacts related to human disturbance and noise. However, LOPs would be put in place to protect sensitive landbird species during the nesting season if the species were confirmed to be nesting.

Trees on the main and secondary dams will be removed as part of the project activities. Potential impacts to migratory species would be minimized through the adherence of LRMP Standards and Guidelines for snags/down woody debris and limited ground disturbance. Specific resource protection measures include snag retention for wildlife unless the snag would be hazardous to operations and/or human safety; existing log (coarse woody debris) retention, especially for those greater than 20 inches dbh; pre-implementation surveys for nesting birds in trees to be removed; protection of Protected Activity Center (PAC) if one were to be delineated in the project area; and education trainings of implementation crews and reporting mechanisms for crews to report incidental sightings.

Approximately 1.2 acres of wet meadow habitat could be lost under alternative 2 due to dam removal (tree removal). Although some potential habitat may be lost initially, the proposed action (alternative 2) is expected to improve wet meadow habitat conditions over the long-term and support more acres of wet meadow habitat within the entire 46-acre project area.

Approximately 0.6 acre of wet meadow habitat would be lost under alternative 1 due to dam breaching (tree removal). Wet meadow habitat in the project area may increase because the

habitat in the former lake footprint is on a trajectory towards wet meadow condition but this trajectory may be short-lived. Alternative 1 may lead to a deterioration of habitat condition over the long term because of the lack of stabilization of the main ditch and lateral channels that feed the main ditch. The continued incision of the ditch and channels could lead to drier soil conditions and hence drier vegetation.

Alternative 3 is expected to reduce wet meadow habitat but increase lacustrine habitat in the project area. Overall, under alternative 3, wet meadow habitat could decrease by about 4 acres where this habitat is inundated to create an 18-20 acre lake. Although some wet meadow habitat may be lost in the immediate project area, wet meadow habitat would persist adjacent to the project area and the creation of a lake would create habitat for numerous additional landbird species.

3.6.4 Analytical Conclusions

The alternatives do not differ in terms of potential for direct effects to species. All species, if determined to be nesting, denning, or roosting (bats) in the project area would be protected to avoid impacts to these species. However, Alternative 3 is expected to have a longer implementation period (1-3 seasons) when compared to Alternatives 1 and 2 (1-2 seasons) and this would mean greater potential time frame for disturbance-type effects such as flushing, fleeing, or causing individuals to change their daily activity patterns. Alternatives 2 and 3 affect a greater area of the project given the proposed restoration actions which could mean a greater potential spatial extent for disturbance-type effects.

In terms of habitat condition, Alternative 1 (No Action) is expected to have the fewest impacts to potential habitat for species because this alternative has the fewest acres of ground disturbing activities, including tree removal. However, the condition of wet meadow and montane riparian habitat under this alternative would deteriorate as channel incision continues unabated and vegetation dries.

Alternative 2 (Proposed Action) has the greatest potential of all alternatives to set the trajectory for improved habitat conditions in the project area. Although this alternative includes 3.4 acres of tree removal, the long-term benefit from improving hydrologic conditions and planting native, riparian vegetation can serve to improve the condition for a variety of species associated with wet meadow and montane riparian habitat.

Alternative 3 would replace currently potential habitat for some species with a new kind of potential habitat for a different suite of species. By inundating the former lake footprint to create a lake, Alternative 3 is influencing the suite of species that would use the wet meadow, barren, and perennial grassland formerly found in the lake footprint. There are currently no detections of any TECPS wet meadow-associated species or lacustrine-associated species in the project area.

Therefore, the effects of this may be neither beneficial nor detrimental to currently occurring species.

Ultimately, Alternative 2 has the greatest benefit to TECPS terrestrial wildlife that are associated with wet meadow and montane riparian habitat, which is a relatively rare (rarer than lacustrine) habitat in the LTBMU.

Chapter 4
Team Members

4.1 Interdisciplinary Team Members

The following people participated in the initial scoping, were members of the Interdisciplinary Team, and/or provided direction and assistance during the preparation of this EA.

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Sarah Muskopf	Aquatic Biologist
Courtney Rowe	Forest Botanist/Invasive Plants
Tom Fuller	Archaeologist
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Appendix A

RECLASSIFICATION OF THE CWHR TYPES IN FORMER INCLINE LAKE FOOTPRINT
For the Incline Lake Dam Project
Conducted by the Incline Lake Dam Interdisciplinary Team
17 March 2014

Background: CalVeg tiles produced by the USFS R5 Remote Sensing Lab are considered the standard for vegetation classification in the Pacific Southwest Region (R5) (USDA Forest Service 2009). Its vegetation classifications are produced from aerial photograph interpretation; methodology is outlined on the Remote Sensing Lab's website: http://www.fs.usda.gov/main/r5/landmanagement/gis. Each polygon within the dataset contains the vegetation classification attribute "WHRType"—which crosswalks to the California Wildlife Habitat Relationship (CWHR). CWHR was developed by the California Department of Fish and Game to classify vegetation for wildlife (California Department of Fish and Game 1988, 2005). CWHR was utilized to develop wildlife design criteria in the Sierra Nevada Forest Plan Amendment and is utilized across the region for classifying federally Threatened, Endangered, Proposed, Candidate and Forest Service Sensitive (TEPCS) species suitable habitat(USDA Forest Service 2004).

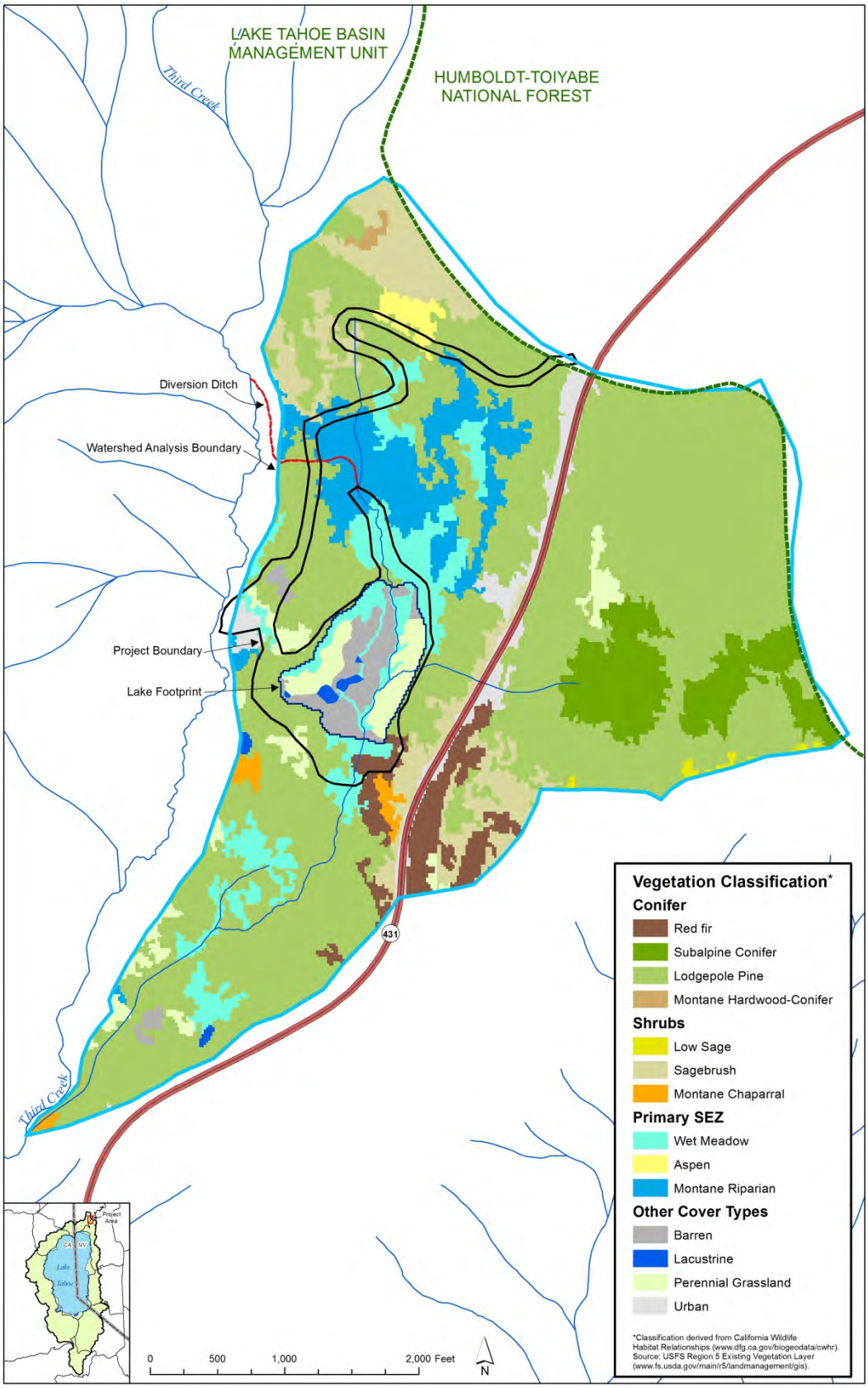
Need: The tile covering the LTBMU (17B) was last updated in January 2009. The area of former Incline Lake footprint has not been updated since the lake was drained in 2008 and is still classified as CWHR type "Lacustrine". This presents issues for the analysis of the Incline Lake Dam Project because the former lake footprint is expected to be substantially impacted by project activities. Therefore, the Incline Lake Dam Project interdisciplinary team (IDT) undertook reclassification of the former lake footprint using aerial photograph interpretation and project data. This will allow for quantitative comparison of the existing conditions to the project's alternatives.

Methodology: The source dataset was the CalVeg North Sierran tile 17B, last modified in January 2009 (USDA Forest Service 2009). The 18.4 acre polygon (ObjectID—200) was extracted from the dataset. . The former lake polygon was split into four new polygons that were hand-digitized. Three datasets were utilized to reclassify the CWHR type: a) the lasted available aerial imagery of the project area—2010 National Agricultural Imagery Project (NAIP) for the State of Nevada, 1-meter resolution; b) the channel and contour data produced for the project (in project record 'contour 5ft' & 'channels'); c) CWHR type data from the CalVeg North Sierran tile 17B. The CalVeg data was utilized to verify the CHWR types of adjacent and nearby polygons, which informed which types would be appropriate for classification of the former lake area. Project data was utilized to delineate edges of wet meadow (WTM). The NAIP imagery was utilized to delineate edges of lacustrine (LAC), barren (BAC), and perennial grassland (PGS) types

Summary of Reclassified Types:

WHRTYPE	Acres
LAC	0.7
WTM	4.2
BAR	7.5
PGS	5.9
Total	18.4

Disclosures: Due to the draining of Incline Lake, the former lake footprint is experiencing rapid vegetation conversion. The classifications provided may not adequately capture or characterize these transitions. Though it follows the same general principles as the CalVeg dataset, the methodology could not replicate the CalVeg classification process, which relies on detailed analysis for several variables to produce each classification. The NAIP imagery represents a single snapshot in time and may not adequately characterize the extent and distribution of lacustrine habitat, which is likely to move from year to year.


LAKE TAHOE BASIN
MANAGEMENT UNIT
HUMBOLDT-TOIYABE
NATIONAL FOREST
Third Creek
Diversion Ditch
Watershed Analysis Boundary
Project Boundary
Lake Footprint
431
Third Creek
Project Area
CA
NV
Lake Tahoe
0
500
1,000
2,000 Feet
N
Vegetation Classification*
Conifer
Red fir
Subalpine Conifer
Lodgepole Pine
Montane Hardwood-Conifer
Shrubs
Low Sage
Sagebrush
Montane Chaparral
Primary SEZ
Wet Meadow
Aspen
Montane Riparian
Other Cover Types
Barren
Lacustrine
Perennial Grassland
Urban
*Classification derived from California Wildlife Habitat Relationships (www.dfg.ca.gov/biogeodata/cwhr). Source: USFS Region 5 Existing Vegetation Layer (www.fs.usda.gov/main/r5/landmanagement/gis).

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