RECLAMATION

Managing Water in the West

Environmental Assessment

Independence Lake Forest Thinning and Hazardous Fuels Reduction

Mid-Pacific Region
Lahontan Basin Area Office
Carson City, Nevada

U.S. Department of the Interior
Bureau of Reclamation

September 2012

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Glossary

APE: Area of Potential Effects
BA: Biological Assessment
BMP: Best Management Practice
CAL FIRE: California Department of Forestry and Fire Protection
CARB: California Air Resources Board
CEQA: California Environmental Quality Act
CFR: Code of Federal Regulations
CWE: Cumulative Watershed Effect
dbh: diameter breast height
DTL: Desert Terminal Lakes
EA: Environmental Assessment
FPR: [California) Forest Practice Rule
FR: Federal Register
GHG: Greenhouse Gas
GIS: Geographic Information System
ITA: Indian Trust Asset
LCT: Lahontan cutthroat trout
LTO: Licensed Timber Operator
NEPA: National Environmental Policy Act
NHPA: National Historic Preservation Act
NRHP: National Register of Historic Places
RPF: Registered Professional Forester
RWQCB: [California] Regional Water Quality Control Board
SHPO: State Historic Preservation Officer
TESC: Threatened, endangered, and species of concern
THP: Timber Harvest Plan
TMWA: Truckee Meadows Water Authority
TNC: The Nature Conservancy
USDA: United States Department of Agriculture
USFWS: United States Fish and Wildlife Service
USGS United States Geological Survey
WAA: Watershed Assessment Area
WLPZ: Watercourse and Lake Protection Zone

Section 1 Introduction

This document is an Environmental Assessment (EA) for the Independence Lake Forest Thinning and Hazardous Fuels Reduction project and has been prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations for the implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Department of Interior regulations for the implementation of the National Environmental Policy Act of 1969 (43 CFR Part 46).

The Bureau of Reclamation (Reclamation) has been directed by the Congress of the United States through Public Law 110-161, 208(a) (2) and PL 111-85, 208 (a) (2) to provide funds to The Nature Conservancy (TNC) to partially fund the acquisition of land that surrounds Independence Lake, and for protection of the native fishery and water quality of the lake.

Reclamation provided funding to TNC under a grant agreement under the Desert Terminal Lakes Program. The funding was originally anticipated for the land acquisition and administrative costs. Reclamation has worked with TNC on a grant modification to utilize the remaining funds for other projects at Independence Lake that are consistent with legislative intent, including the forest thinning and hazardous fuels reduction project being analyzed in this EA.

If approved by Reclamation, TNC will utilize Desert Terminal Lakes grant funds to implement a forest management project would take place on 542 acres of land owned by TNC adjacent to Independence Lake in Sierra County, California. The purpose of the project is to protect the lake's water quality and native fishery (including the federally listed Lahontan cutthroat trout) by implementing forest health activities to reduce the risk of damage from high severity wildfire that could affect water quality.

1.1 Purpose of and Need for Action

The purpose of the Proposed Action is to allow TNC to utilize Desert Terminal Lake grant funding to conduct forest thinning and hazardous fuels reduction at Independence Lake. The purpose of the project is to protect the lake's water quality and native fishery (including the federally listed Lahontan cutthroat trout [LCT]) by implementing forest health activities to reduce the risk of damage from high severity wildfire that could affect water quality.

1.1.1 Location of Analysis Area

The proposed 542-acre forest thinning and hazardous fuel reduction project would take place on lands owned by TNC adjacent to Independence Lake as shown in Figures 1 and 2.

Figure 1- Location Map – Independence Lake

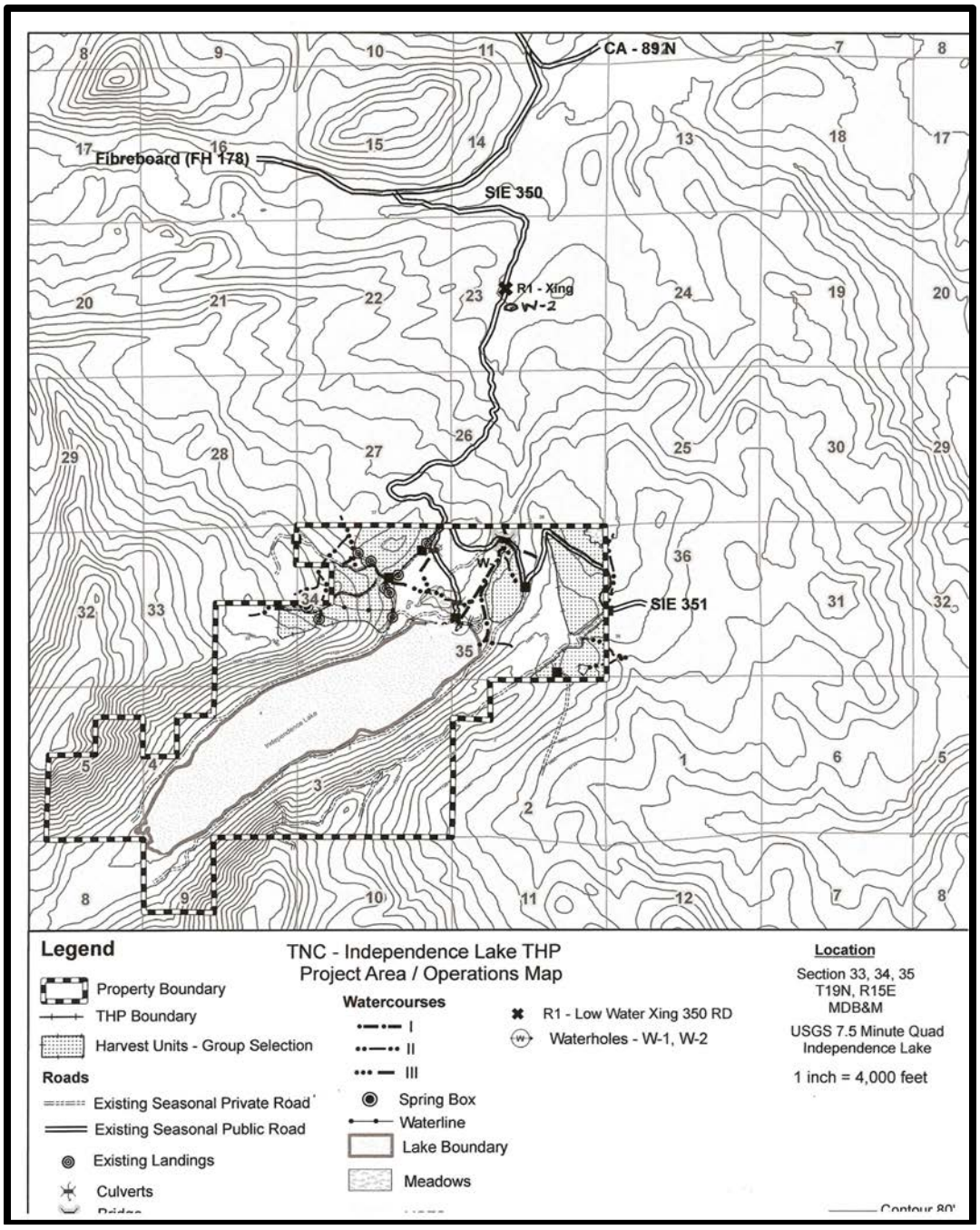

Figure 2: Independence Lake Forest Thinning and Hazardous Fuels Reduction Project Map

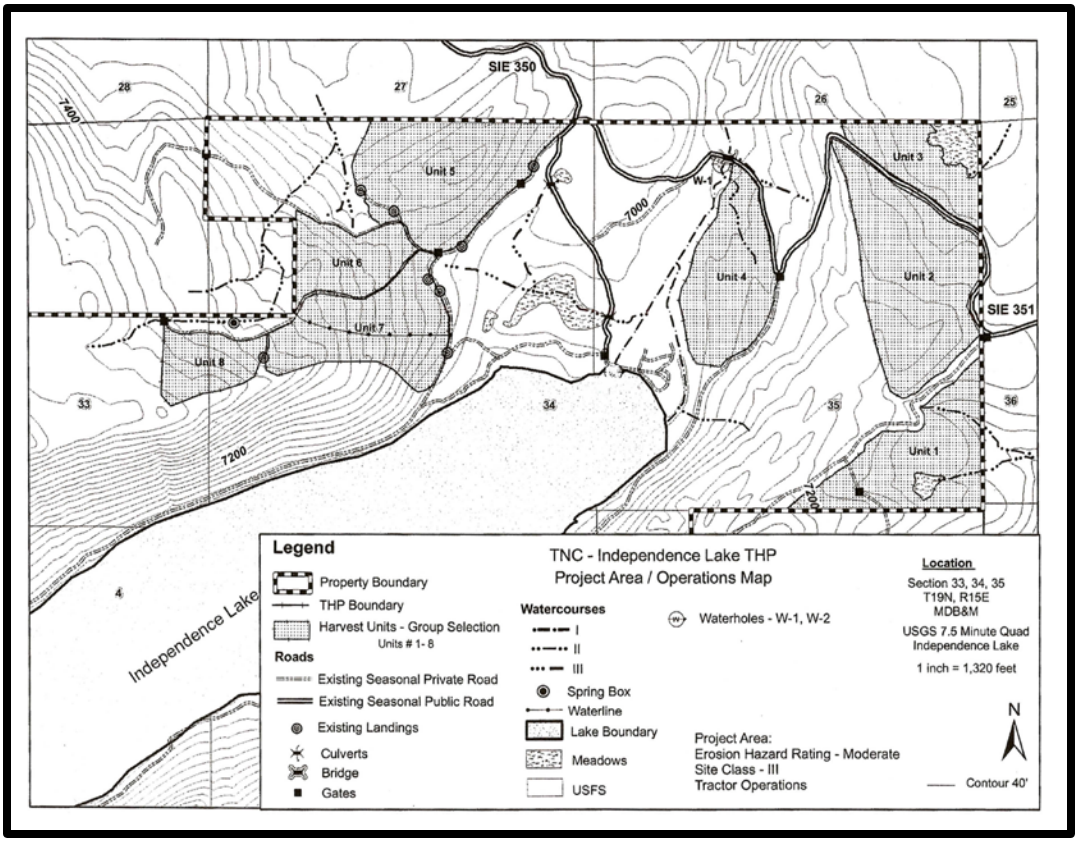

Figure 3: Independence Lake Forest Thinning and Hazardous Fuels Reduction Operations Map

The proposed project area is located in Sierra County, California, approximately 9 air miles northwest of Truckee, California, and 5 miles west of State Route 89. The legal description of the project area is Section 33, 19N, R15E, Section 34, 19N, R15E, Section 35, 19N, R15E, MDB&M, located on the Independence Lake USGS 7.5' topographic map. The site elevation is approximately 7,000 to 7,600 feet above mean sea level. The approximate latitude and longitude of the site is 39° 26' 57" North and -120° 18" 05" West. The proposed project is accessed via SR89 to the Fiberboard Road (or Tahoe National Forest Route 7), and then to Sierra County Road 350.

Independence Lake is fed by the headwaters of Independence Creek, south of Mount Lola and east of the Sierra Nevada crest. Independence Creek flows into the Little Truckee River, which is a part of the Truckee River watershed, a 3,100 square mile basin originating in the Sierra Nevada and draining into Pyramid Lake. Independence Lake is part of the North Lahontan hydrologic basin.

1.1.2 Background

Since 1937, the land around Independence Lake was owned by Sierra Pacific Power Company (now NV Energy). The lake itself is a municipal water storage facility that remains in the ownership of the state of California. The lake has served as a water supply for northern Nevada and as a rustic, remote recreation area.

In 2010, TNC purchased the lands around Independence Lake to protect the lake's unique native fishery resources. Independence Lake is the only location in the entire Walker, Carson, and Truckee River drainages where wild and self-sustaining populations of all native fishes still co-occur. Lahontan cutthroat trout are the premier species of the native fish because Independence Lake and upper Independence Creek support the only self-sustaining indigenous lake population of LCT remaining in California, and is one of only two such lake populations in the world.

Independence Lake is a relatively pristine alpine area in the northern Sierra Nevada. The lake is surrounded by eastside conifer forest, montane chaparral, aspen groves, and meadows. The property is located in area ranked by the California Department of Forestry and Fire Protection (CAL FIRE) as a "Very High Fire Severity Zone". Because most of TNC's property is characterized by dense vegetation, and located at the crest of the Sierra Nevada range where wind is usually present, effects from a wildland fire would likely be severe. Decades of fire suppression have resulted in extensive tracts of dense forest with dead material, fallen trees, understory fuels, and brush, which has created large, continuous areas of hazardous fuel. With these conditions, fire can easily move into the tree crowns ("crown fire"), which usually results in a large amount of tree mortality, and loss of soil cover and organic matter.

Prior to settlement by emigrants in the mid-1800s, eastside pine and mixed conifer stands were characterized by large trees with relatively open canopies, irregular distribution of trees, with interspersed non-forested openings and aspen groves. Frequent fires and competition with grasses for site resources limited widespread establishment of dense young conifers in these areas; thus, stand structure was open relative to today's condition. The proposed action for this project, discussed in detail below, consists of a combination of site-specific treatments designed to reduce the risk of high severity fire and subsequent erosion of sediments into the lake, improve the overall health and resiliency of the forest, and to restore declining aspen stands within TNC ownership at Independence Lake.

1.2 Purpose and Need for Environmental Assessment

1.2.1 Purpose of an Environmental Assessment (EA)

The purpose of this EA is to describe the environmental consequences of allowing TNC to use federal Desert Terminal Lakes funding to perform forest thinning and hazardous fuels reduction at Independence Lake.

1.2.2 Authority

The Bureau of Reclamation (Reclamation) has been directed by the Congress of the United States through Public Law 110-161, 208(a)(2) and PL 111-85, 208 (a)(2) to provide funds to partially fund the acquisition land that surrounds Independence Lake and for protection of the native fishery and water quality of the lake:

"the Secretary of the Interior---- acting through the Commissioner of Reclamation, shall —

(2) allocate $9,000,000 to a nonprofit conservation organization, acting in consultation with the Truckee Meadows Water Authority, for--
(A) the acquisition of land surrounding Independence Lake; and
(B) protection of the native fishery and water quality of Independence Lake as determined by the nonprofit conservation organization;"
and:
(2) allocate—
(A) acting through a nonprofit conservation organization that is acting in consultation with the Truckee Meadows Water Authority, $2,000,000, to remain available until expended, for—
(i) the acquisition of land surrounding Independence Lake; and
(ii) protection of the native fishery and water quality of Independence Lake, as determined by the nonprofit conservation organization;

Under a grant agreement between Reclamation and TNC, these Desert Terminal Lake funds were allocated to fund, in part, the acquisition of the 2,325 acres of land surrounding Independence Lake. The property was acquired in April 2010, using a portion of the above-appropriated funds from Congress along with State and private funds. TNC is currently providing stewardship of the property, continuing fish research and monitoring, and implementing projects to protect the lake's unique conservation values.

Consistent with the legislative authorization, remaining funds may be used by TNC for projects that provide "protection of the native fishery and water quality of Independence Lake" as determined by TNC. The forest thinning and hazardous fuels reduction is one of several agency and partnership projects at Independence Lake and within the Truckee River basin that are intended to eliminate or minimize threats affecting LCT. This project is consistent with the short-term action plan for Lahontan cutthroat trout in the Truckee River basin, developed by the Truckee River Basin Recovery Implementation Team for the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2003a). Reducing the threat of high severity wildfire in the forests surrounding Independence Lake would protect the lake's water quality and habitat for LCT and other native fish in Independence Lake and its tributaries.

Section 2 Alternatives Considered

2.1.1 No Action

Under the No Action Alternative, Reclamation would not allow TNC to utilize Desert Terminal Lakes grant funding for a forest thinning and hazardous fuels reduction project at Independence Lake. The No Action Alternative reflects the existing condition at the Independence Lake preserve and a continuation of the risk of high severity fire that threatens the lake's water quality populations, thereby risking populations of LCT and other native fish in Independence Lake.

2.1.2 Proposed Action

Under the Proposed Action, Reclamation would allow The Nature Conservancy to use Desert Terminal Lakes grant funds to implement a forest thinning and hazardous fuel reduction project comprised of

- 432 acres of mechanical thinning and restoration treatments;
- 150 acres of follow-up prescribed underburning;
- 110 acres of prescribed underburning in areas mechanically treated in 2009 and 2010 (outside the current Timber Harvest Plan boundaries).

The work would take place on land owned by TNC adjacent to Independence Lake in Sierra County, California. 432 acres would be within the boundaries of an approved California Timber Harvest Plan (THP), # 2-11-069 SIE, prepared by Registered Professional Forester, Kevin Whitlock (Whitlock 2011). Compliance with the California Environmental Quality Act (CEQA) was through the approved THP.

The proposed project would use various treatments to restore the health and resiliency of the forest stands to withstand disturbance from high severity wildfire, which would reduce the risk of adverse effects to the water quality of Independence Lake. Maintaining the lake's water quality is essential to protect the unique assemblage of native fish, including the federally listed Lahontan cutthroat trout.

Forest restoration at Independence Lake would promote late-successional forest conditions and enhance forest biodiversity. Properly managed late-successional forests provide quality habitat for many rare wildlife species, while being resilient to disturbance if trees are large, well spaced, and not dominated by shade-tolerant species such as white fir.

Several aspects of the management goals would be accomplished by utilizing an ecological forestry approach. An ecological approach to forestry is based on three principles: retention of biological legacies (e.g., old, large trees, aspen groves); intermediate stand treatments (thinning understory trees and the re-introduction of prescribed fire) that enhance forest stand heterogeneity; and the allowance for the appropriate recovery periods between treatment entries.

The desired post-treatment conditions include:

- healthy forests characterized by more open conditions, dominated by fire-resilient tree species, reduced surface fuel loads and ladder fuels where periodic low-intensity surface fires can be re-introduced and where wildfires can be safely fought;
- forest areas with reduced tree densities that decrease risk of mortality from insects, drought, and disease, and;
- healthy aspen groves, which contribute to landscape biodiversity.

Silvicultural Treatments

Information about the forest stands surrounding Independence Lake can be found in Appendix B. The information is excerpted from the Independence Lake Management Plan (Whitlock 2009). The silvicultural information in the THP is summarized below.

Small groups of trees would receive treatments that would achieve the post-activity desired conditions. A variety of unevenaged silvicultural methods would

be used, customized for a particular group or stand of trees. Minimum stocking standards would be met in all situations per California forest practice rules (FPRs).

Trees shorter and smaller in diameter than the primary forest canopy and brush are called the understory. Following thinning, understory trees less than 12 inches dbh would be spaced 20 to 25 feet apart. Understory thinning (or "thinning from below") would include removal of diseased, damaged, or insect infested tree regardless of size, with the exception of designated wildlife or legacy trees (larger, older remnant trees from earlier forest stands) ; while retaining trees that are healthy, vigorous, and of the best phenotypic quality. Understory trees that are removed would be used for biomass (chips).

Trees designated for removal over 12 inches dbh would be individually marked for cutting. The selection of trees less than 12 inches in diameter would be determined by the Licensed Timber Operator, following the guidelines in the THP. Within the treatment areas, individual snags (dead, standing trees) would be retained to provide wildlife habitat except for snags that pose a safety hazard adjacent to roads, landings, and public use areas. Groups of snags would be evaluated by the RPF and selected for removal if they contribute appreciably to the fire hazard. In aspen groves, aspen would be left and smaller conifers (less than 12 inches in diameter) would be targeted for removal to reduce conifer encroachment and competition with aspen for moisture and light.

Tree species to be retained include Jeffrey pine, mountain hemlock, and western white pine. White fir, lodgepole pine, and small red fir would be targeted for removal, especially in dense stands and where other tree species can be left to meet stocking standards. All trees greater than 12 inches diameter breast height (dbh) would be marked prior to cutting. In general, larger trees would be retained and smaller, more shade-tolerant trees would be a priority for removal.

Unless needed for wildlife habitat, diseased and trees affected by insects would be a priority for removal. Examples of diseases include white pine blister rust, cytospora canker, and dwarf mistletoe, and an example of insect infestation include fir trees affected by fir engraver beetles. Harvest methods would use practices to minimize new infestations. One example is cutting pine limbs in small pieces to prevent breeding by pine engraver beetles, which helps avoid damage to residual trees from beetle attacks.

Harvest (cutting and moving the trees to a central location) would primarily use conventional ground-based machinery such as rubber-tired skidders and forwarders on slopes less than 40%. Some work would be done by hand in sensitive areas such as aspen groves. Larger conifer logs in aspen areas would be removed by "endlining" (pulling with cables from equipment located outside the aspen grove). In some areas, small trees and brush would be chipped (masticated)

on site. No site preparation or artificial regeneration methods would be used. All operations would take place in the summer or early fall.

Unit 1 – 61 ac
Unit 2 – 87 ac
Unit 3 – 28 ac
Unit 4 – 53 ac
Unit 5 – 78 ac
Unit 6 – 32 ac
Unit 7 – 61 ac
Unit 8 – 32 ac.

Watercourse Protection and Erosion Prevention Measures

To the extent possible, trees would be cut (felled) away from sensitive areas such as watercourses so that they can be moved (yarded) with the least ground disturbance and damage to residual trees. Firebreaks and main yarding corridors (skid trails or skid roads) would have constructed water breaks to minimize erosion. The specifications and timing for construction of the water breaks would be according to CA forest practice rules. Waterbreaks would be maintained for at least one year. Waterbreaks (or "waterbars") are a ditch, dike, and/or dip constructed diagonally across logging roads, tractor roads, and firebreaks so that water flow is effectively diverted. Skidding operations would be limited to existing skid roads unless identified and flagged by the RPF or his supervised designee prior to use. In no case, would the construction of skid trail be on slopes over 40%.

For the purposes of determining buffer width and protection measures, California forest practice rules use water class characteristics or key indicator s of beneficial use to define watercourse classes:

- Class I (1) Domestic supplies, including springs, on site and/or within 100 feet downstream of the operations area, and/or (2) Fish always or seasonally present onsite, includes habitat to sustain fish migration and spawning.

- Class II (1) Fish always or seasonally present offsite within 1,000 feet downstream, and/or (2) Aquatic habitat for non-fish aquatic species. (3) Excludes Class III waters that are tributary to Class I waters

- Class III No aquatic life present, watercourse showing evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions after completion of timber operations.

Watercourse widths and protection measures are summarized in Table 1 below.

Watercourse Class	Side Slope Class (%)	Protection Zone Width (ft)	Protection Measures	Notes
Class I	<30	75'	B	No operations within the Class I WLPZ. Unit boundary flagged outside WLPZ.
	30-50	100'	B	
	>50	150'	A	
Class II	<30	50'	BEI	WLPZ
	30-50	75'	BEI	WLPZ
	>50	100'	BEI	WLPZ
Class III	<30	25'	CFH	WLPZ
	>30	50'	CFH	WLPZ
Springs	All	50'	BEI	Remains on surface with downstream connectivity
Seasonally Wet Meadows	All	Transition Zone – Timber edge	BEI	
Waterline	All	N/A	Flagging	Centerline flagging with blue & white WLPZ flagging

Table 1: Watercourse and Lake Protection Zone Widths and Protection Measures

Independence Lake: No ground disturbing activities would occur within 150 feet of the lakeshore.

Class I: *No timber operations will occur within the Class I WLPZ. Unit boundary is flagged outside WLPZ.*

Protection measures A and B.

- A: WLPZ shall be clearly identified on the ground by the RPF who prepared the plan, or supervised designee, with paint, flagging, or other suitable means prior to the pre-harvest inspection on slopes> 50%.

- B: WLPZ shall be clearly identified on the ground by an RPF or supervised designee, with paint, flagging, or other suitable means, prior to start of timber operations.

Class II Watercourses, Springs, and Meadows:

Protection measures B, E, and I.

- B: WLPZ shall be clearly identified on the ground by an RPF or supervised designee, with paint, flagging, or other suitable means, prior to the start of timber operations. Class II WLPZs will be established by the RPF at the widths indicated in the table above and shall be flagged with

blue/white striped flagging printed “LAKE AND WATERCOURSE PROTECTION ZONE” prior to the start of operations in any given areas.

- E: To ensure retention of shade canopy filter strip properties and the maintenance of wildlife values, a base mark shall be placed below the cut line of the harvest trees within the zone and shall be done in advance of timber falling operations by an RPF or supervised designee.

- I: To protect water temperature, filter strip properties, upslope stability, and fish and wildlife values, at least 50% of the total canopy covering the ground shall be left in a well-distributed multi-storied stand configuration composed of a diversity of species similar to that found before the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.

Class III Watercourses:

Class III watercourses shall be given a 25-foot WLPZ for slopes less than 30% and a 50-foot WLPZ for slopes greater than 30%. WLPZ's on Class III watercourses shall be identified by blue and white "Watercourse and Lake Protection Zone" flagging prior to timber operations. Equipment operations within WLPZs will be limited to end-lining trees out and the use of temporary skid crossings. Tree felled by mechanical feller-buncher may place tops of bundles within the WLPZ to facilitate removal and protection of the residual stand.

- C: In site-specific cases, the RPF may provide in the plan that the WLPZ be clearly identified on the ground with flagging or by other suitable means prior to the start of timber operations. Class III watercourses will be centerline flagged with blue and white "Watercourse and Lake Protection Zone" flagging prior to the start of timber operations.

- F: Residual or harvest tree marking within the WLPZ may be stipulated in the THP by the RPF or required by CAL FIRE in site-specific cases to ensure retention of filter strip properties or to maintain soil stability of the zone. The RPF shall state in the THP if marking was used in these zones. Harvest trees within Class III WLPZs will be marked both above and below the cutline with blue paint prior to operations in any given area.

- H: At least 50% of the understory vegetation present before timber operations shall be left living and well distributed within the WLPZ to maintain soil stability.

Accidental depositions of soil or other debris in lakes or watercourses below the watercourse or lake transition line shall be removed immediately after deposition.

If any limbs accidentally enter any of the watercourses, they will be removed from the stream and placed on the bank in a stable manner.

Water Drafting Areas, Road Construction and Maintenance and Landings
All seasonal public roads would remain open and passable during the timber operations. However, for the safety of the public, traffic may be temporarily stopped during falling and/or skidding operations and for the removal of roadside trees.

On County Road 350, the existing low water (Class I) stream crossing/ford would be changed temporarily for log truck hauling on this project and for the Tahoe National Forest's Outback Aspen Restoration Project. To prevent negative water quality effects to this perennial (year-round) tributary to Independence Creek, the U.S. Forest Service in conjunction with the Lahontan Water Quality Control Board (per Timber Waiver # Application 3/19/12, Category 5, ID# 6AT5412067) is requiring three 12-inch squash culverts to be installed and removed for each season of use.

The squash culverts are appropriate to promote fish passage during the season in which they are in place. The crossing will be backfilled with 4 to 6 inch clean cobble, capped with 1.5 inch clean rock. Crossing approaches will be rocked with 3 inch plus, competent angular rock with the minimum binder necessary, for a minimum of 50 feet on each side. During the installation or removal, the area will be dewatered around the construction site. After the season of use, the crossing and all associated material will be removed no later than November 1st of the season of installation.

The expected volume of soil, sand, gravel, or boulders would be less than 35 cubic yards. No displacement of material is anticipated during the installation. The material from the temporary crossing would be spread on the approaches to the low-water crossing. An excavator, backhoe, or grader may be used to remove and spread this material. During the installation or removal, the area would be dewatered around the construction site using gravity flex pipe and or pumping. To install, the pipes would be placed in the channel to grade, either by hand or mechanically using an excavator and backhoe. To remove the pipes prior to the winter period (November 1), the rock would be pulled back down to the pipe. The pipe would be removed, either by hand or mechanically using an excavator, or backhoe. The rock would be spread along the approaches.

Two waterholes (W-1 and W-2 on Figure 2) would be used by water trucks as sources for dust abatement and emergency fire protection. Waterhole use is estimated to be on weekdays between August 31 and November 1 for approximately 10 weeks (i.e., when forest treatment work is active).

At Waterhole W-1, a water truck pad would be installed. The pad would be adjacent to the Class I streamcourse and used for in-channel water drafting.

Minor amounts of surface rocks and boulders would be moved or removed to facilitate truck access, and clean rock, 2 to 4 inches in size, would be placed on the road and pad to prevent sediment from entering the waterhole. Minor amounts of vegetation would be removed or pruned. A brow log or rocks would be placed on the east side of the fill station to prevent water trucks from backing into the waterhole. An excavator, backhoe, dump truck, grader, and/or bulldozer may be used to construct the pad. The affected area would be less than 144 square feet in size, which is the road width for safely backing a water truck. No water impoundment or diversion would occur. No native trees with a dbh in excess of 2 inches will be removed or damaged without prior consultation and approval of a DFG representative. Using hand tools, trees may be trimmed to the extent necessary to gain access to the site. All cleared material will be removed out of the riparian/stream zone.

Waterhole W-2 is located at a bridge over Independence Creek, with an existing concrete pad. No soil, sand, gravel, boulders, or vegetation would be disturbed or removed. No impoundment or diversion would be constructed.

At both water-drafting areas, water would be drafted from the deepest location. Draft hose intakes would be fitted with screens (filters) with less than 2 millimeters mesh designed to avoid drafting aquatic species into the intake. The screens would be maintained in a clean condition and placed to avoid substrate and amphibian disturbance. A bucket would be used at the hose intake to reduce potential water quality and harm to aquatic organisms. A limited operating period of August 31 to November 1 would be followed.

Per Stream Alteration Agreement #1600-2012-0108-R2, water drafting would be conducted in a manner that provides sufficient bypass flows to keep fish and other aquatic species in good condition. The drafting rate would not exceed 50% of surface flow at any time and 10% of the total daily flow. Water drafting would not occur in the Class I watercourse (Independence Creek) when surface flow drops below 10 gallons per minute.

Prior to use, water trucks would be power washed at an off-site location, away from watercourses. Prior to drafting, water trucks would be inspected for oil or fuel leaks and, if necessary, the water truck operator would place an absorbent pad or pan under the water truck while drafting to catch any pollutants that might drip from the vehicle. The pad or pan would be replaced and disposed of properly when it becomes ineffective at collecting fluids. No servicing of vehicles would occur on or adjacent to the drafting platforms. The water truck operator would avoid overfilling the tank to minimize sediment flow back into the waterhole/watercourse.

Per the Stream Alteration Agreement, DFG would be notified within two working days beginning work in the stream zone. Photographs would be submitted to

DFG of the flow diversion structure, finished stream crossing and water drafting sites, and the culvert and rock removal.

The equipment to be used in road construction and maintenance would be an excavator, backhoe, bulldozer, dump truck, skidder, grader, and water truck. Equipment would be inspected for weed seeds and debris.

Rolling dips would be installed on roads used to haul (truck) logs or biomass for provide proper water drainage and to minimize rill erosion. The road surface would be out-sloped and the berm (mound of soil along the road) removed to allow drainage from the road. Road width would not exceed 16 feet. Summer hauling would have dust control to maintain road surface stability and reduce dust (particulate) emissions. Material (soil, rocks) from road maintenance activities would not be pushed into stream protection zones, drainages, swales, or over the slope at the discharge sites at erosion control structures. To the extent possible, the road maintenance material would be stabilized by incorporating it into the road surface; any material not incorporated into the road surface would be stabilized at a location where movement to a drainage or watercourse is unlikely. Landings (places where the logs and biomass are temporarily stored) would also receive erosion control work to stabilize the soil and allow proper drainage.

Hazard Reduction along Roads and Burning

The proposed project is located along a public, seasonal-use, dirt road. In accordance with California forest practice regulations, the following standards would apply to the treatment of slash created operations within the treatment area and on roads used for operations.

> (a) Within 100 feet of the edge of the traveled surface of public roads, and within 50 feet of the edge of the traveled surface of permanent private roads open for public use where permission to pass is not required, slash created and trees knocked down by road construction or timber operations would be treated by piling and burning, chipping, burying or removal from the zone.
>
> (b) Lopping for fire hazard reduction would be accomplished by severing and spreading logging slash so that no part of it generally remains more than 30 inches above the ground.

Within 100 feet of the edge of the traveled surface of public roads and within 50 feet of the edge of the traveled surface of private roads open to the public within the THP area, the logging slash would be lopped and scattered so that no portion generally remains over 30 inches above the ground, or piled and burned, broadcast burned, buried, chipped, or removed from the zone. The specific treatment methods used shall be applied on a site-specific basis at the discretion of the RPF.

Pile and burn slash treatments would be completed no later than June 1 of the year following slash creation or within 30 days following seasonal access. The piled slash would be burned at a safe time following the first wet fall or winter weather or other safe periods and according to laws and regulations. Piles created after October 1 that do not have sufficient time to dry to facilitate burning would be treated within 18 months of their creation. Piles that fail to burn sufficiently to remove the fire hazard would be re-piled and burned or otherwise treated to reduce the fire hazard. All necessary precautions shall be taken to confine the burning to the piled slash.

Mastication and chipping of logging slash is the preferred method of slash disposal. Hand crews, chippers, and masticating equipment would be used to minimize the slash that would need to be burned. In the event piling and burning is used to dispose of slash, the following would be required:

• Slash to be treated by piling and burning would be treated no later than June 1 of the year following its creation, or within 30 days following seasonal access, or as justified in the THP.

• The local CAL FIRE representative would be notified in advance of the time and place of any slash burning.

• Slash burning operations and fire hazard abatement operations would be conducted in a manner that would not damage residual trees and reproduction needed to meet silvicultural stocking requirements.

• Piles and concentrations would be sufficiently free of soil and other noncombustible material for effective burning.

• The piles and concentrations would be burned at a safe time during the first wet fall or winter weather or other safe period following piling and according to laws and regulations. Piles and concentrations that fail to burn sufficiently to remove the fire hazard would be further treated to eliminate that hazard. All necessary precautions shall be taken to confine such burning to the piled slash.

Material that could not be utilized as biomass or saw logs, or masticated onsite, would be burned. Burning would take place the year following harvesting and mastication operations.

Approximately 260 acres would be broadcast burned (underburned). The broadcast burning units are forest stands treated (thinned) in 2009 and 2010 (110 acres), plus 150 acres being mechanically treated under the current THP. All areas would be mechanically pre-treated to reduce the risk of escape or excessive burn intensity. Pre-treatment would reduce surface and canopy fuel load, limit flame length, reduce the rate of spread, intensity, and torching depending on the time of year. The broadcast burning is an important complement to mechanical

thinning by facilitating greater protection of the forest stands and increased safe access for firefighters.

Broadcast burning operations would be designed to maintain key habitat elements, including large snags and down logs, and create a mosaic of burned and unburned organic material. Spring burning would be implemented as snow drifts recede. Each burned area would increase over time, as the perimeter of the burned area would grow due to the receding snowdrifts. Fall burning would utilize existing spring burn areas and fire trail construction for control. All required air quality, smoke management, and burn permits would be acquired. TNC's burn planning processes would be followed (see http://www.tncfiremanual.org/sfmp.htm and http://www.tncfiremanual.org/burnplan.HTM). Local and U. S. Forest Service dispatch would be notified of the time and place of all burning, and all burning would be done in the manner provided by law. No planned burning would occur within the WLPZ of any class watercourse. No active ignition would occur within springs, wet areas, or Class II WLPZs.

The Independence Lake post-harvest fuels management would be guided by the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations. During Independence Lake Project implementation, TNC would coordinate with the Air Quality Coordinator to design the waste fire plan. Burning permits would be acquired from the Northern Sierra Air Quality Management District. The Air Quality District would determine days when burning is allowed. The California Air Resources Board (CARB) provides daily information on "burn" or "no burn" conditions. Burn plans would be designed and all fuel reduction burning would be implemented in a way to minimize particulate emissions. Prescribed fire implementation would be coordinate daily and seasonally.

Project implementation would be carried out and supervised by a RPF, including tree marking and coordination with the licensed timber operator (LTO) before and during operations to ensure use of mitigation measures.

Project Design Features, Environmental Commitments, and Mitigation Measures

The requirements for implementing the Proposed Action alternative are summarized in the Proposed Action alternative above. The specific requirements are listed in Appendix A, by affected resource.

Timeline of the Project

The timber harvest plan has been approved and all required permits for road maintenance and timber harvest implementation are in place. The THP will be amended for minor changes that are analyzed in this EA. Implementation is

expected to take approximately 5 years. Site stabilization work would be performed following each season of work.

Permits

The following permits will have been obtained or will be obtained prior to implementation:

- ✓ THP – CAL FIRE (approved, #2-11-069 SIE)
- ✓ Timber Waiver (Application 3/19/12, Category 5, ID# 6AT5412067)
  Burn Permit – CAL FIRE – planning process will begin in 2013
- ✓ Stream alteration permit - CA Department of Fish and Game (approved, Notification No. 1600-2012-0108-R2)

Section 3 Affected Environment and Environmental Consequences

This section presents the environmental consequences of the No Action and Proposed Action alternatives. The affected environment (or present condition or characteristics of the resource) are discussed first under each environmental factor. This is followed by a description of the estimated effects of the No Action and Proposed Action Alternative. Direct, indirect, and cumulative effects have been considered.

3.1 Vegetation Communities, Endangered, Threatened or Candidate Plant Species

3.1.1 Affected Environment

The vegetation in the project area consists of tree, shrub, and herbaceous plants typical of upper elevation eastside forested sites. The dominant overstory includes white fir (*Pinus monticola*), red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta*), Jeffrey pine (*Pinus jeffreyi*), and quaking aspen (*Populus tremuloides*) trees; mountain alder (*Alnus incana* ssp. *tenuifolia*), willow (*Salix* spp.), and cottonwood (*Populus* spp.) trees also exist in smaller quantities.

Common understory shrubs include greenleaf manzanita (*Arctostaphylos patula*), huckleberry oak (*Quercus vacciniifolia*), bitter cherry (*Prunus emarginata*), bush chinquapin (*Chrysolepis sempervirens*), curly-leaved mountain mahogany (*Cerocarpus ledifolius*), snowberry (*Symphoricarpos rotundifolius*), snowbush (*Ceanothus cordulatus*), and tobacco brush (*Ceanothus velutinus*).

Wildflower species include: American bistort (*Polygonus bistortoides*), corn lily (*Veratrum californicum*), cow parsnip (*Heracleum lanatum*), swamp whiteheads (*Sphenosciadium capitellatum*), arrowleaf butterweed (*Senecio triangularis*), monkeyflower (*Mimulus* spp.), shooting star (*Dodecatheon* spp.), fireweed (*Epilobium angustifolium*), elephant's heads (*Pedicularis groenlandica*), meadow paintbrush (*Castilleja miniata*), spike mallow (*Sidalcea oregana* ssp. *spicata*), swamp onion (*Allium validum*), meadow lupine (*Lupinus polyphyllus*), and monkshood (*Aconitum columbinaum*). (ASM Affiliates 2011)

Timber harvest in the project area began around 1917 with railroad logging. Generally, the largest conifers were harvested by a system of steam donkey skid trails and railroad grades, evidence of which is still visible throughout the area. Sheep grazing began about the same time as timber harvest. The institution of aggressive and effective fire suppression policies in the mid-1900s, combined with the results of livestock grazing and earlier timber practices led to the replacement of shade-intolerant species such as aspen and Jeffrey pine, with shade tolerant species, such as white fir.

In general, six vegetation cover types are found in the project area: grass, shrub, mixed conifer, true fir, conifer plantation, and aspen. The grass cover type includes fen, wet montane meadow, and dry montane meadow. Conifer plantations are areas reforested with ponderosa and Jeffrey pine after fires in the 1960s.

The shrub vegetation type occurs as both a climax type on soils too poor, rocky, or shallow to support conifer forests and as a post-fire or logging successional stage to mixed conifer forests on deeper, more productive soils. It is dominated primarily by tobacco brush (*Ceanothus velutinus*), with greenleaf manzanita (*Arctostaphylos patula*), squaw-carpet (*Ceanothus prostratus*), wax currant (*Ribes cereum*), Bloomer's goldenbush (*Ericameria bloomeri*), dwarf serviceberry (*Amelanchier pumila*), and woolly mule-ears (*Wyethia mollis*).

The mixed conifer vegetation cover type includes lodgepole pine (*Pinus contorta var. murrayana*) forest, eastside pine forest, and mixed conifer. Lodgepole pine forest type is found along Independence Creek and margins of meadows where soil is moist. The eastside pine forest is distributed mainly on south-facing slopes, east of Independence Creek. It is dominated by Jeffrey pine with isolated pockets of aspen.

Mixed conifer stands are a mixture of several co-dominant species including Jeffrey pine, white fir (*Abies concolor*), and red fir (*Abies magnifica)* with isolated pockets of aspen. Mixed conifer stands are found in higher elevations, with small islands of true fir (red and white fir) forest cover type occurring on northeast-and northwest facing, high-elevation slopes. Red fir is the dominant tree species, growing on deep, moist soils. White fir is the major associated species in the lower elevations; mountain hemlock (*Tsuga mertensiana*) is

associated at higher elevations. Other associated species are western white pine (*Pinus monticola*), lodgepole pine, Jeffrey pine, and western juniper. Aspen occurs in small isolated pockets ranging from a few trees to groves of one acre. Most of the groves are in a declining state from competition by encroaching conifers, primarily white fir, and lodgepole pine.

The 2008 TNC's contract RPF conducted a timber inventory comprised of 232 variable plots, stratified over the property. The inventory provided the basis for determining forest stand types, stand conditions, fuel loads, and recommended management actions (Whitlock 2009).

Timber stand types are based on species composition, diameter distribution, and number of trees per acre. Each stand type is similar due to the macro-geographical location, eastside Sierra Nevada forest types, but each maintains subtle differences in species composition due to the micro geographical location within the watershed (i.e. aspect, elevation, and soil type).

One common characteristic that all the timber stand types lack is the natural disturbance from fire, as evidenced by the abundance of shade tolerant species (e.g., white fir) found throughout the property. In addition to invading meadows, riparian areas, and aspen stands, the shade tolerant species are limiting biodiversity of the site due to overstocking, increasing the risk of insect and disease outbreaks, and substantially increasing the hazardous fuels that could lead to high severity wildfire.

According to the vegetation management plan developed for TNC (Whitlock 2009), the forested lands are comprised of the forest types in Table 2. Appendix B contains tables with more detailed information about the characteristics of the forests at Independence Lake.

Table 2 – Summary of Forest Conditions

Forest Type	Acres	Overstory (o/s) Species	Age o/s	Height o/s (Ft)	DBH (in)	Trees Per Acre	Avg Basal Area (ft^2/ac)	Fuel Load (tons/ac)
GF01	552	WF, RF	150	85	11	300	100-320	5-12
GF02	470	RF, WF	200+	92	11	632	401	12-15
GF03	299	WF, JP	200+	85	13	293	268	5-7
OG01	28	RF	360	96	13	313	270	8-12
YG01	39	WF, RF	50	62	8	499	189	3-5
LP01	261	LP, WF	150	86	11	347	226	12-15
LP02	47	LP, WF	150	76	11	548	339	12-15
JP01	261	WF, RF, JP	250	82	10	293	167	3-5

Table 2 notes: white fir (WF); red fir (RF); lodgepole pine (LP); Jeffrey pine (JP).

The stand averages in Table 2 do not reflect the distribution of trees and site conditions. General Forest (GF) 01 and GF02 are highly variable because of past

logging and small natural openings. GF03 is on a harsh site. The dominant overstory of Old Growth (OG) 01 is large red fir with scattered western white pine, with average diameters of 30 to 40 inches, and a dense understory. Similar to most forests with a history of fire suppression, the stand averages are influenced by the large numbers of small trees in the understory. Other than lodgepole pine, these stand types would naturally have far fewer trees per acre and a much larger quadratic mean diameter.

Insects and disease affect the health and vigor of the forests surrounding Independence Lake. Dense conifer forests with a large component of red and white fir commonly have significant damage or mortality from cytospora canker, dwarf mistletoe, and fir engraver beetle. These endemic organisms often work in combination and increase in effects in overstocked stands, especially during droughts. Thinning, especially when conducted mid-late summer when damage to residual trees is lessened and in non-drought years, can greatly reduce tree mortality. When site resources (soil moisture, sunlight) are reallocated to fewer trees, those trees are better able to withstand pressure from insects and disease during drought periods.

Dense stands of pines are susceptible to mortality from mountain pine beetle and pine engraver beetle, especially during droughts. Improper treatment of residual logging material (slash) can result in outbreaks of pine engraver beetle that can persist for years following the initial infestation. Damage and mortality from these endemic insects can be reduced to background levels though proper forest management practices, including thinning understory trees.

An introduced pathogen, white pine blister rust, affects western white pine in the project area. Unlike sugar pine at lower elevations, no rust-resistant western white pine seedlings are available to plant. However, as a cultural practice, all healthy (non-infected) western white pines can be retained, however, since some level of resistance may exist in these uninfected trees.

An important component of restoring eastside forests is improving the health and vigor of aspen groves. Aspen in eastside forests generally occur in small areas with a high water table, interspersed with large upland conifer stands. Conifer encroachment and historic heavy grazing pressure have contributed to aspen loss and decreased stand health throughout much of western montane forests.

Aspen are a disturbance dependant, fire-resilient, shade-intolerant species that rely on vegetative reproduction to maintain stands. Aspen communities provide many important ecological functions. Aspen communities contain greater species diversity and abundance of birds, mammals, insects, and understory plants that provide forage and hiding cover for wildlife, and a cool micro-site during hot summer days. Aspen are declining throughout the west due to changes in fire-regimes and historic grazing. Condition surveys of the aspen communities within

the Independence Lake project area indicate that the aspen component is classified as high- to very high risk for loss.

Although TNC management has eliminated permitted grazing on their land, occasionally cattle drift from adjacent areas and impact aspen groves on TNC land. Conifers have invaded the aspen groves on TNC lands and are competing with aspen for site resources (water, sunlight). The poor condition of the aspen groves within the Independence Lake project area presents an opportunity to enhance aspen by reducing the conifer component within aspen stands. Removing conifers through thinning within aspen groves increases light and moisture availability, providing an improved growth environment for aspen.

Special status plants

Webber's ivesia *(Ivesia webberi)* is listed as a Federal candidate species under the Endangered Species Act. Webber's ivesia is a low, spreading, perennial herb and is restricted to shallow, clayey soils derived from andesitic rock on mid-elevation flats, benches, or terraces above moderately large valleys (Witham 2000). The plant has been found on open summits and ridge-tops and in meadow areas on drier, raised hummocks (ibid). Its habitat is comprised of sparse to moderately dense vegetation usually dominated or co-dominated by Webber's ivesia and low sagebrush or squirrel-tail grass in association with a wide variety of dwarfed or cushion-like perennial herbs (ibid).

Webber's ivesia is known from 15 occurrences clustered in seven general locations in Lassen, Plumas, and Sierra Counties, California, and in Douglas and Washoe Counties, Nevada. All known occurrences of Webber's ivesia are a considerable distance north and east of Independence Lake in different vegetation types than the proposed project site. The closest occurrence is 7 miles to the north in Sierra Valley on private land. Another occurrence is in Dog Valley, approximately 14.5 miles to the east of the proposed project site. A botanical survey of the proposed project area did not detect Webber's ivesia (Schnurrenberger 2011).

The California Department of Fish and Game Natural Diversity Data Base (CNDDB) was reviewed (April 13, 2011) for the Independence Lake Quadrangle and the surrounding nine quad area (on file with the Independence Lake THP reference documents). According to the CNDDB reports, there are no reported occurrences of rare, threatened, endangered, or sensitive plant / animal species within the project area. However, several species were listed by the CDFG as occurring within the Independence Lake 7.5 minute USGS quadrangle.

The proposed project area is within the range and has potential suitable habitat for several listed, special status, and potentially sensitive plant species. These plants, along with their habitat characteristics and potential to occur, are listed in

Appendix C, which contains a summary of the biological resource inventory completed for the THP.

Field surveys have been completed on the proposed units by Catherine Schnurrenberger of C.S. Ecological Surveys and Assessments (Schnurrenberger 2011). The habitat requirements for threatened, endangered and species of concern (TESC) species indicated that 44 plant species have some potential to occur within the Independence Lake property, but only 8 species have potential to occur within the montane coniferous vegetation type.

Of the 44 species, 18 are confined to wetlands and/or meadow openings, which would not be impacted by the forest thinning activities or broadcast burning. The remaining 18 species require specific habitat such as boulder fields, sandy flats, clay pan soils that were not observed in the proposed thinning areas.

The remaining 8 TESC species: Davy's sedge (*Carex davyi*), Geyer's sedge (*C. geyeri*), Quincy lupine (*Lupinus dalesiae*), Jones' muhly (*Muhlenbergia jonesii*), narrow-petaled rein orchid (*Piperia leptopetala*), Sierra starwort (*Pseudostellaria sierrae*), Western campion (*Silene occidentalis ssp. occidentalis*) and felt leaf violet (*Viola tomentosa*) are known to occur within montane coniferous forests in the northern Sierra Nevada mountains within the elevational range of the proposed thinning areas. None of these species is federally listed or a federal candidate species.

Focused surveys for the target species were conducted during the appropriate floristic window (Schnurrenberger 2011). No TESC species were found and no unique habitats were found other than the demarked (off limits) wetland/riparian areas outside of proposed treatment areas. Several upland sedge species, (*Carex rosii*, *C. hoodii*, *C. branerdii*, *C. fracta* and *C. feta*), were identified within the proposed thinning areas however neither Davy's sedge nor Geyer's sedge were observed in the thinning areas. Several lupine species, (*Lupinus latifolius*, *L. latifolius var. columbianus*, and *L. lepidus var. sellulus*) were observed on the project area however, Quincy lupine was not observed in the thinning areas. No Muhlenbergia species were observed outside the wetland areas. No Piperia or Pseudostellaria species were observed in the proposed thinning areas. One species of catchfly (Silene), *Silene lemmonii*, was found within the proposed thinning areas. One species of Violet, (*Viola purpurea*) was found on the forested areas within the proposed thinning areas. All species observed at Independence Lake area during this survey and previous surveys conducted in 2009 and 2010 (Schnurrenberger 2009a) are presented in the final survey report. This list includes wetland and riparian species and species of specific habitats such as clay pan areas.

Noxious and invasive weeds
Catherine Schnurrenberger of C.S. Ecological Surveys and Assessments conducted a botanical survey in 2011. No species listed as noxious or invasive

with the state of California were found on the proposed thinning units (Schnurrenberger 2011).

C.S. Ecological Surveys and Assessments conducted pre-project botanical surveys for areas that received thinning and mastication treatments in 2009 and 2010 . The surveys detected two weeds listed as noxious with the State of California and four weeds listed as invasive with the State of California (Schnurrenberger 2011, Schnurrenberger 2009b). These weed species were found in areas of disturbed ground around, the campground, the edges of the dry meadow and along the banks of the outlet canal. There were no new occurrences of noxious or invasive weeds associated with the 2009-2010 forest thinning project. There were two new locations of invasive weed species recorded in 2010, both along existing roads.

English plantain (*Plantago lanceolata*) and false salsify (*Tragapogon dubius*) were both found at the east end of the lake along the road to the old campground area. False salsify was also found on the road that runs to the north of the lake. These two weeds are ubiquitous in disturbed areas of the Sierra Nevada. These species are not considered very problematic and will most likely not have a large impact on the native flora. Eradication of these species is at the discretion of TNC. English plantain was only found in the campground, along the edge of the road, in compacted soil. It is unlikely that this species will spread. False salsify is located in disturbed soils throughout the project area. It is likely that this species will spread into areas of newly disturbed soil. This plant produces hundreds of seeds per plant that become airborne and easily spread to nearby areas of barren soil. It is not expected that the thinning and mastication methods proposed for this project will produce many areas of bare ground, however, if soil is exposed during this project it may be prudent to pull false salsify plants that border disturbed soil.

Overall, the surveys found few non-native plants within the project area. Considering the history of use, which includes logging, camping, livestock grazing, and installation of roads, the consulting botanist concluded that the vegetation of the project area has very few weed species and none of these species is very problematic.

3.1.2 Environmental Consequences

No Action Alternative

The No Action Alternative would not affect current vegetation conditions at the proposed project site, but risk of high severity wildfire would remain high and increase over time. If a large, high severity wildfire were to occur, the vegetation in the fire area could be greatly altered from existing conditions, including conversion of large areas of mature forest into successional shrub fields. The shrub fields could take 75 years or longer to return to young growth forests, depending on site quality and successional patterns.

Proposed Action Alternative

The proposed project area would affect 432 acres of forest within the TNC ownership (See Figure 2) that would be thinned, 150 acres that would receive subsequent broadcast burning, and 110 acres thinned in 2009 and 2010 that would be broadcast burned as a follow up treatment.

After thinning and hazard reduction treatment, woody vegetation in the project area would be substantially altered from current conditions. As shown in Table 3 in the Fire and Fuels section, the average tree diameter would increase, and the basal area and trees per acre would greatly decrease. The proportion of shade tolerant species such as white fir would decrease and shade-intolerant species such as Jeffrey pine would comprise a larger part of the tree cover compared to existing conditions. Each of these projected trends is consistent with greater fire resilience and progression to late-seral forest conditions.

Some minor damage to residual trees could occur during logging and broadcast burning. A minor amount of post-treatment tree mortality could occur, which is typical when dense conifer stands are opened to increased light and wind, and when trees experience understory fire. The mortality would decrease to normal (non-outbreak) levels within a year or two.

Aspen groves would benefit from increased light and moisture after thinning conifers from within the groves. Aspen canopy cover and vigor would increase, reversing the trend toward aspen decline and loss. The ecological benefits of the aspen stands would increase over current conditions.

Based on the findings of the current partial botanical survey, previous botanical surveys, and the mitigation measure of avoidance, there should no impacts to federally listed plant species, state listed plant species or any species identified as rare and/or sensitive by the CNPS. There should also be no impact to special plant associations, community types, or habitats. Webber's ivesia, a federally listed candidate species, does not occur in the project area. The nearest known occurrence is 7 miles from the proposed project, so no adverse impacts to the plant are expected under this alternative.

The proposed project may temporarily create areas where false salsify may germinate, but this will not have an adverse effect on the flora of the project area if disturbed areas are monitored during the next few years. It is expected that, with the reduction of vehicle traffic and the elimination of trespassing livestock, the number of weeds on the project would decrease. By taking weed prevention measures (see Project Design Features, Environmental Commitments, and Mitigation Measures in Appendix A, Noxious Weeds); the risk of introducing new weed species or spreading existing noxious or invasive weeds would be minimized during the project.

3.2 Fire and Fuels

3.2.1 Affected Environment

Past management practices, including fire exclusion, have led to the current forest conditions in the untreated areas of the project. These areas are characterized by dense stands dominated by shade-tolerant conifers, and high levels of surface, canopy and ladder fuels. Trees must compete for limited water, sunlight, and nutrients and exhibit reduced vigor and susceptibility to insect and disease problems, especially during droughts. Lower tree vigor and a higher component of dead trees lead to an in increase in surface fuel loads, increasing the risk for high severity fire.

Plants and animals in the Sierra Nevada adapted to fire frequency, pattern, and severity for each forest type. Prior to 19th century grazing, logging, and fire suppression, eastside pine and mixed conifer Sierra forests burned at regular intervals, commonly as patchy understory fires. Various studies have found an average fire return interval of about 7 to 12 years. Fires were a result of lightning and cultural practices by Native Americans.

Very high fuel accumulations, combined with new ignition risks (recreation access, equipment use, arson, etc.) have led to notable recent increases in the extent and severity of wildfires in the western United States (Arno 2002). The Sierraville and Truckee Ranger Districts of the Tahoe National Forest, which surround the TNC lands at Independence Lake, have experienced several large, high severity wildfires since the 1960s. The Tahoe National Forest is working cooperatively with private landowners to treat fuels in a strategic manner to reduce the risk of damaging large fires. TNC is engaged in one of these efforts, linking treatments on TNC lands to work at the Forest Service's Sagehen Experimental Forest.

A primary goal of the proposed project is to move the treated stands toward a more fire-resilient condition. To achieve that goal, the existing stand conditions and fuels would be modified to affect future fire behavior and severity (effects). Using data from the 2009 and 2010 projects, the Forest Vegetation Simulator (FVS) and the Fire and Fuels Extension (FFE) to FVS (USFS 2011), several measures, and indices of the current and projected future conditions were evaluated to predict trends for the areas proposed for mechanical treatment in this project (Winford pers comm. 2011). The data are displayed in Tables 3 and 4.

Table 3: 2009 and 2010 Stand Characteristics Pre- and Post-Treatment

Initial Treatment Year	Treatment Stage	Stand Age (years)	Trees per Acre	Basal Area (sq. ft/acre)	Quadratic Mean Diameter (inches)
2009	Pre-treatment	80	720	209	7.3
	Post-Treatment	81	402	177	9.0
2010	Pre-treatment	70	723	292	8.6
	Post-treatment	71	183	182	13.5

Table 4: 2009 and 2010 Canopy Density, Crown and Torch Indices, Pre- and Post Treatment, from FVS/FFE modeling results

Initial Treatment Year	Treatment Stage	Canopy Density	Crown Index	Torch Index
2009	Pre-treatment	0.104	21.5	92.0
	Post-Treatment	0.076	27.2	143.1
2010	Pre-treatment	0.216	12.4	140.7
	Post-treatment	0.143	16.9	146.0

Two crown fire hazard indices were calculated in the FVS/FFE model: torching index and crowning index. Torching index is the 20-foot wind speed (in miles per hour) at which a surface fire is expected to ignite the crown layer, while crowning index is the 20-foot wind speed (in miles per hour) needed to support an active or running crown fire. Torching index depends on surface fuels, surface fuel moisture, canopy base height, slope steepness, and wind reduction by the canopy.

As surface fire intensity increases (with increasing fuel loads, drier fuels, or steeper slopes), or canopy base height decreases, it takes less wind to cause a surface fire to become a crown fire. Crowning index depends on canopy bulk density, slope steepness, and surface fuel moisture content. As a stand becomes denser, active crowning occurs at lower wind speeds, and the stand is more vulnerable to crown fire. For both indices, lower index numbers indicate that

crown fire can be expected to occur at lower wind speeds, so crown fire hazard is greater at lower index values.

Following the thinning and mastication treatment, prescribed fire is used to reduce the slash load and to kill competing vegetation at the same time. Prescribed fire produces optimum native vegetation response and is effective in fully restoring ecological values. Prescribed fire is an important complement to mechanical thinning for restoration of optimal ecological forest conditions in the Sierra Nevada (North et al. 2009). Prescribed fire would be carefully applied to maintain key habitat elements, particularly snags and down wood. While underburning would likely result in some mortality of suppressed and subdominant trees, burning would be done with the goal of ensuring the overall forest structure remains intact.

Spring burning would be implemented as snow drifts recede. Each burned area would increase over time, as the perimeter of the burned area would grow due to the receding snowdrift. Using this method, large areas of surface fuel can be treated efficiently with relatively few resources (equipment, crews).

Due to site conditions, fall burning would require more personnel resources. The number of under burned acres would depend on availability of resources and favorable burn "windows" in 2012 and 2013. All fires would be "backing fires" with respect to slope and/or wind, utilizing drip torches and applying a combination of strip and spot ignition patterns. These burn practices reduce the intensity of the fire and potential for unwanted fire effects to residual trees and soil.

The Independence Lake post-harvest fuels management would be guided by the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations. During Independence Lake Project implementation, TNC would coordinate with the Air Quality Coordinator to design the waste fire plan. Burning permits would be acquired from the Northern Sierra Air Quality Management District. The Air Quality District would determine days when burning is allowed. The California Air Resources Board (CARB) provides daily information on "burn" or "no burn" conditions. Burn plans would be designed, and all fuel reduction burning would be implemented, in a way to minimize particulate emissions. Prescribed fire implementation would be coordinated daily and seasonally.

Due to the inherent risk of implementing prescribed burning on private lands, mastication by heavy equipment is a necessary action to reduce the risk, and ensure control of the fire by pre-treating the fuel. Pre-treatment reduces surface and canopy fuel load, limits flame length, and reduces the rate of spread, intensity, and torching.

3.2.2 Environmental Consequences

No Action Alternative

The no action alternative would continue the high and increasing fuel loads in the project area. FVS modeling results show trends in stand metrics such as trees per acre, basal area, quadratic mean diameter, and canopy density that point to an increase in fuel hazard over time. If a large fire were to occur during unfavorable weather conditions (hot, dry, high winds), a high level of stand mortality could be expected with detrimental effects to the watershed. The fire would likely be difficult to control because of the flame lengths, rate of spread, and tendency to torch, crown, and spot. Rehabilitation costs, such as erosion control, would likely be expensive.

Proposed Action Alternative

The proposed project would make major changes to the existing surface, ladder, and canopy fuels through variable thinning, mastication, and broadcast burn treatments. Because treatment-created fuel ("slash" or forest residuals) would be utilized or disposed of, only small amounts of new fuel would be created from the project. Modeling results show decreases in trees per acre, basal area, canopy density, and representation of shade-tolerant tree species (white fir). A shift to more shade-intolerant tree species (e.g., pines) is desirable because they are more resistant to understory fire and better represent the natural forest composition before fire suppression policies were implemented a century ago.

Post-treatment increases in quadratic mean diameter, and crowning and torching indices are also consistent with an improvement in hazardous fuels conditions and predicted mortality following a wildfire. If a wildfire were to occur, the treated stands would be safer for crews and equipment to use a direct approach for control of the fire. Post-fire effects to residual trees, soil, and watershed resources would be less than an untreated condition, since the potential severity of a wildfire would be reduced.

Future underburning (prescribed fire) could be done more efficiently and effectively because of safer conditions and a wider burning "window" created by the mechanical pre-treatment. Future maintenance by prescribed fire is an important component to continuing restoration of TNC's lands surrounding Independence Lake.

The benefits of the project on TNC's land would be enhanced by coordinated and connected treatments on adjacent National Forest lands, specifically in the Sagehen basin. Larger, strategically placed treated areas are more effective in changing a crown fire to a less-damaging surface wildfire (Finney 2001). The proposed project on TNC's land would reduce the risk of damaging wildfire affecting adjacent National Forest lands.

3.3 Fish, Endangered, Threatened, or Candidate Fish Species

3.3.1 Affected Environment

This section describes the environmental setting related to fish resources, including special-status fish species, and fish habitat.

Native fish in Independence Lake and its tributaries include Lahontan cutthroat trout (LCT), Tahoe sucker, Paiute sculpin, speckled dace, Lahontan redside shiner, Lahontan lake tui chub, and mountain whitefish. Independence Lake is the only location in the Truckee River watershed to support self-sustaining populations of all native fishes that historically occurred in lakes of the upper Truckee River drainage.

Federally Listed and Candidate Species - Fish

Lahontan cutthroat trout

Lahontan cutthroat trout (LCT) was federally listed as an endangered species in 1970 (35 FR 13520). In 1975, this designation was changed to threatened to facilitate management and to allow for regulated angling (40 FR 29864). In 1995, the USFWS released its recovery plan for LCT, encompassing six river basins within the historic range of LCT, including the Truckee River basin. The Lahontan Cutthroat Trout Recovery Plan (U.S. Fish and Wildlife Service 1995) identified the need to develop ecosystem plans for the Truckee and Walker River Basins. The Short-term Action Plan for LCT in the Truckee River Basin was released in 2003. The 5-Year Review for LCT was completed in 2009 (U.S. Fish and Wildlife Service 2009).

Lahontan cutthroat trout is an inland subspecies of cutthroat trout endemic to the Lahontan Basin of northern Nevada, eastern California, and southern Oregon. Lahontan cutthroat trout historically occurred in Tahoe, Cascade, Fallen Leaf, Upper Twin, Lower Twin, Pyramid, Winnemucca, Summit, Donner, Walker, and Independence Lakes (Moyle 1976, Gerstung 1988). At the turn of the 20th century, Lake Tahoe and Pyramid Lake supported commercial and sport fisheries for Lahontan cutthroat trout. Self-sustaining populations of Lahontan cutthroat trout are now extirpated from these lakes with the exception of Independence and Summit lakes, which constitute less than 1 percent of historic lake habitat (U.S. Fish and Wildlife Service 2009). Lahontan cutthroat trout has been extirpated from most of the western portion of its range in the Truckee, Carson, and Walker river basins, and from much of its historic range in the Humboldt basin (U.S. Fish and Wildlife Service 2009). LCT currently occupy approximately 588 miles, or 8.6 percent of streams in 16 different hydrologic units within their historical range (U.S. Fish and Wildlife Service 2009). Within the Truckee River watershed, LCT

occupy approximately 30 miles or 4.2% of historical stream habitat and 40% of historical lake habitat (U.S. Fish and Wildlife Service 2009).

The severe decline of Lahontan cutthroat trout is attributed to a number of factors including hybridization and competition with introduced trout species; alteration of stream channels and morphology; loss of spawning habitat due to pollution and sediment from logging, mining, grazing and urbanization; migration blockage due to dams; reduction of lake levels and concentrated chemical components in natural lakes; loss of habitat due to channelization; de-watering due to irrigation and urban demands; and overfishing (Gerstung 1986, 1988, U.S Fish and Wildlife Service 1995).

Lahontan cutthroat trout evolved in the absence of other trout species and do not compete well for food and habitat. Nonnative fish, especially salmonid species, are currently the greatest threat to LCT range wide, resulting in loss of available habitat and range constrictions primarily through competition and hybridization (U.S. Fish and Wildlife Service 2009).

LCT inhabit both streams and lakes. Like most cutthroat trout species, LCT is an obligatory stream spawner, which means that LCT predominantly use tributary streams as spawning sites. The Truckee River and its tributaries provided spawning and rearing habitat for Lahontan cutthroat trout that exhibited two distinct life history forms, lacustrine (lake) and fluvial (river and stream).

Specific habitat requirements of LCT vary seasonally and with life stage. Historic records indicate that LCT was rather common throughout the entire course of the Truckee River before the river suffered from human-caused effects. Seasonal increases in river flow stimulated mass movement of large trout from lakes - as river flows decreased, large trout were less abundant in various reaches of the river.

The only remaining indigenous lake population of LCT in California resides in Independence Lake and the main inlet tributary Independence Creek (Peacock et al 1999, as cited in U.S. Fish and Wildlife Service 2009). Independence Lake has the only self-sustaining lake LCT population in the Truckee River basin. This population is genetically unique (Peacock and Kirchoff 2007, as cited in U.S. Fish and Wildlife Service 2009) and is vulnerable to extinction (U.S. Fish and Wildlife Service 1995). The lake supports a small catch-and-release fishery, and historically supported spawning runs of 2,000 to 3,000 fish (Welch 1929). By 1960, the population had declined to less than 100 spawners per year (Gerstung 1988), despite many attempts to supplement this population with hatchery-reared native Independence Lake LCT stock. The population decline is thought to be the result of competition with non-native kokanee salmon and brown trout in the lake and brook trout in upper Independence Creek.

LCT research at Independence Lake by several agencies, including the California Department of Fish and Game and the U.S. Geological Survey (USGS) has been ongoing for decades. The USGS summarized their research in a 2006 report (U.S. Geological Service 2006) and through presentations at meetings with the LCT working group. Independence Lake LCT are long-lived (up to 8 or 9 years). Females are mature by 3 or 4 years of age. Males spawn at 4 or 5 years of age. Female spawners return to upper Independence Creek multiple times, but males seldom return more than one year. Fry emigration occurs 46 to 64 days after peak numbers of spawners are in Independence Creek. Fry emigration occurs during daylight hours when fry are most vulnerable to prey by brook trout.

The objective of the LCT Recovery Plan (U.S. Fish and Wildlife Service 1995) is to remove LCT from the List of Threatened and Endangered Wildlife and Plants consistent with the ESA. The 1995 recovery plan specified conditions contributing to decline and affecting the potential for recovery of LCT in the Truckee River basin.

In a basin planning effort, the Truckee River Basin Recovery Implementation Team (TRIT) established recovery objectives for various reaches of the Truckee River and its tributaries. Important recovery areas that the TRIT has initially identified as having immediate potential include upper Independence Creek upstream of Independence Lake and Independence Creek downstream from Independence Lake to the Little Truckee River (US Fish and Wildlife Service 2003a). The reduction of risk to the Independence Lake LCT population depends on implementing new conservation projects, continuing ongoing measures and research, and monitoring results of actions taken.

Land use activities can negatively affect aquatic systems through sedimentation, nutrient enrichment, contaminants, altered hydrology, loss of large woody debris, and loss of riparian and stream habitat (Allan 2004, as cited in U.S. Fish and Wildlife Service 2009). Timber harvest, roads, and recreation use are land use factors on the TNC lands surrounding Independence Lake.

The effects of roads on aquatic systems and fish are well documented. Road crossings can create barriers to fish migration. Roads can affect the hydrology, geomorphology, and disturbance regimes in stream network. Water may be intercepted by roads and rerouted into the stream at road crossings, which can add to the flood peak and increase sediment delivery to streams. Roads allow easier movement of invasive species of plants and animals. Increases in illegal fishing and illegal introductions of nonnative fish and other aquatic organisms are facilitated by public road access to different water bodies.

Effects of suspended sediment on fish are well known. Suspended sediments can affect fish behavior, physiology, and embryo survival, and produce habitat alterations, which may result in physiological stress and reduced growth and survival. The severity of effects of suspended sediment increases as a function of

the sediment concentration and exposure time. Sediment can be delivered by factors such as poor road placement and maintenance, or short-term ground disturbance adjacent to streams. California's forest practice rules regarding watercourse and lake protection measures and erosion management practices are aimed at preventing sediment delivery from timber harvest and associated road maintenance activities. Large events, such as major floods and landslides following high severity wildfire, can deliver very high amounts of sediment in a short time. These sediment pulses can have significant effects on fish populations and fish habitat.

Studies have shown that hydrologic events following high severity wildfire can cause major impacts to local fish populations, including extirpation (Novak and White 1990; Propst et al. 1992; Bozek and Young 1994; Rinne 1996; Rieman et al. 1997, as cited in U.S. Fish and Wildlife Service 2009). Isolated fish populations are at a much higher risk of extinction because they cannot recolonize after a large disturbance (Rinne 1996; Dunham et al. 1997, as cited in U.S. Fish and Wildlife Service 2009). Effects on small headwater streams (such as upper Independence Creek) are more severe because entire drainages are burned at these smaller spatial scales, in contrast to larger stream orders where relatively small proportions of the drainage burn. Numerous LCT streams have been burned in the last decade. No extirpations have been recorded, but mortality, reduction in population size, and poor recruitment has been documented (Humboldt-Toiyabe National Forest 2004, Neville and DeGraaf 2006, as cited in U.S. Fish and Wildlife Service 2009).

Dunham et al. (2007, as cited in U.S. Fish and Wildlife Service 2009) found significantly elevated stream temperature for at least a decade following fire because of a lack of stream shading and suggested that post-fire temperatures may take longer to recover if streams encounter debris flows and flooding which reorganize the stream channel and riparian vegetation. Several authors suggest that habitat degradation favors nonnative fish and that species with narrow habitat requirements are expected to be more sensitive to habitat alteration caused by fire than generalist species such as rainbow trout (Moyle and Light 1996; Dunham et al. 2002; Dunham et al. 2003, as cited in U.S. Fish and Wildlife Service 2009).

Suppression (control) of a large wildfire in the Independence Lake watershed could cause short-term effects to aquatic species and habitat from fire line construction, burn out operations, use of fire retardants and suppressant foams, and water drafting. Preplanning, operational guidelines, use of resource advisors and other preventive measures can reduce the risk of threats to aquatic species, but emergency fire suppression operations can produce unintentional effects. These effects include introduction of sediment and pollutants into watercourses, flow reduction in small fish-bearing streams, disturbance to aquatic species, and transport of weeds and aquatic invasive species into the local ecosystem.

Components of fire retardants and suppressant foams used on wildfires are toxic to aquatic species (Gaikowski et al. 1996; Buhl and Hamilton 2000; Little and Calfee 2002, as cited in U.S. Fish and Wildlife Service 2009). In the 2009 5-year LCT review, the U.S. Fish and Wildlife Service cited an incident of LCT extirpation resulting from a fire retardant air drop in the in the upper Walker River watershed. The LCT population recolonized the affected area two years later, but the genetic effects of the loss are unknown.

Occurrence within the project area
LCT would be present in Independence Lake during the project. The project is at the opposite end of the lake (east) of the spawning area in upper Independence Creek.

3.2.2 Environmental Consequences

No Action Alternative
The No Action Alternative would not change the existing condition of LCT in Independence Lake and upper Independence Creek, including the risk to water quality and LCT habitat from a large, high severity wildfire. An opportunity to lessen that risk would be forgone by not allowing Desert Terminal Lakes funding for a hazardous fuels reduction and forest thinning project consistent with legislative authority for protection of the native fishery at Independence Lake. The risk of loss or damage to native fish would continue and efforts to preserve the fragile LCT population would not receive the benefit from a reduction of hazardous fuels in the watershed.

Proposed Action Alternative
The Proposed Action would allow federal funding for forest thinning and hazardous fuels reduction to move forward. Depending on approval of environmental compliance documents, THP, and permit approval, implementation could begin in August 2012, and continue for an additional three or four years. Hazardous fuels and risk of high severity wildfire would be reduced immediately following logging, mastication, and residual material disposal by burning or chipping. High severity wildfire in the Independence Lake watershed has the potential to affect the lake's water quality and habitat for the native fish. Reducing hazardous forest fuels would reduce the risk of harm to fish.

The U.S. Fish and Wildlife Service (2009) acknowledges that LCT evolved in a fire-prone environment, but increases in wildfire frequency and severity due to increased fuel loads and effects from climate change have increased the threats to LCT due to wildfire. Unlike historical fires, current wildfires pose a larger threat to LCT because of existing habitat loss and the current fragmented and isolated state of occupied habitat. In the 5-year review, the U.S. Fish and Wildlife Service concluded that wildfire is a significant threat to LCT throughout its range.

The logging and fuels treatment activities pose small and manageable risk of fire from equipment use and escaped broadcast burning, which could affect the WLPZs and water quality. This risk would be minimized by prevention measures in the THP, summarized in the Proposed Action alternative (Section 2), and listed in Appendix A.

The designated Watercourse and Lake Protection Zone for Independence Lake is 150 feet from the shoreline, however, thinning operations utilizing heavy equipment would not occur within 500 feet of the lakeshore. Hand crews may be used to reduce brush density adjacent to roads near the lake to ensure safe access. The handwork would maintain ground cover and a filter strip adequate to protect sediment from reaching the lake.

A minor risk exists of watercourse contamination by spills of hazardous materials (e.g., oil, fuel) from equipment. Best management practices and mitigation measures in the THP and required permits, summarized in Section 2 (Proposed Action alternative) and listed in Appendix A (Project Design Features, Environmental Commitments, and Mitigation Measures) minimize this risk.

The impacts and effectiveness of the proposed project, including the road maintenance work, would be monitored during implementation and in post-activity assessments. Additional thinning or prescribed fire and every five to ten years post-treatment would likely be needed to maintain satisfactory fuels and forest health conditions.

3.3 Wildlife, Endangered, Threatened, or Candidate Wildlife Species

3.3.1 Affected Environment

The assemblage of species expected in the area surrounding Independence Lake is typical of Sierra Nevada mid- to upper montane habitats. The combination of alpine lake, upland conifer forest, upper montane chaparral, and a variety of riparian habitats in close proximity and in a relatively undisturbed condition makes the project area particularly rich in species diversity.

Terrestrial species of interest that have or may have potential habitat in or near the project area are summarized in tables in Appendix C.

Federally Listed and Candidate Species

Mountain yellow-legged frog (MYLF)
The mountain yellow-legged frog (*Rana muscosa*) is listed as a U.S. Fish and Wildlife Service Candidate species under the Endangered Species Act, being part

of the Sierra Nevada Distinct Population Segment (DPS) as defined by the U.S. Fish and Wildlife Service.

Mountain yellow-legged frogs occur in upper elevations of the Sierra Nevada, and inhabit ponds, lakes, and streams of sufficient depth for overwintering (Jennings and Hayes 1994) and which do not dry in summer (Knapp and Matthews 2000).

Frogs move overland in late summer to disperse to other nearby aquatic habitats. Some individuals moved overland for distances of at least 466 feet to other nearby aquatic habitats as summer progressed (Pope and Matthews 2001). Matthews and Pope (1999) found that frogs tended to be relatively stationary in August when feeding appeared important and were often found in the open, then moved to overwintering locations in September, and were stationary by the end of October under ledges and in rock crevices and rarely in the open.

During summer, frogs and larvae seek the warmest thermal regimes throughout the day and night (Bradford 1984). Adults are rarely far from water, usually less than 1 meter and usually on a wet substrate while basking, typically from sunrise into late morning (Bradford 1984).

The mountain yellow-legged frog has undergone a range-wide decline in the Sierra Nevada (U.S. Fish and Wildlife Service 2003b). Over 90% of historically occupied sites in the Sierra Nevada are now unoccupied (Vredenburg et al. 2007). The decline of mountain yellow-legged frogs in the Sierra Nevada has largely been attributed to the introduction of salmonid fishes during the last century (U.S. Fish and Wildlife Service 2003b).

Mountain yellow-legged frogs are known to have been present within a number of locations in Tahoe National Forest, which surrounds the proposed project area, but now exist in only a few populations and generally in small numbers (U.S. Fish and Wildlife Service 2003b, Tahoe National Forest GIS database). Jennings and Hayes (1994) indicate that the species was extinct by 1992 in a number of locations based on re-surveys of historic locations.

Occurrence within the project area
Mountain yellow-legged frogs have been sighted in upper Independence Creek (Sean Shea, pers. comm. 2011), as well as lower Independence Creek, and in nearby areas of the Tahoe National Forest (Deborah Urich, pers. comm. 2011). MYLFs in the area are capable of dispersing to the treatment areas, so it is reasonable to assume presence for the purpose of this EA.

Fisher
Under the Endangered Species Act, the West Coast distinct population segment of the fisher was added to the U.S. Fish and Wildlife Service Candidate species list on April 8, 2004 (U.S. Fish and Wildlife Service 2004; 69 FR 18770).

Historically, fishers were distributed across forested regions of California in the Sierra Nevada, Klamath Mountains, and North Coast Ranges. Fishers now have a distributional gap from eastern Shasta County in the southern Cascades to Mariposa County in the central Sierra Nevada (Zielinski et al. 2005). This reported gap includes Tahoe National Forest, which surrounds the project area.

Vegetation used by fisher is structurally complex. They are typically found in late-successional coniferous forests (Freel 1991, Buskirk and Powell 1994) in stands of at least 80 acres (Freel 1991); with certain attributes including multi-layered canopies, large snags, down logs, and a component of decadent live trees. Preferred fisher habitat is often in close proximity to dense riparian corridors and saddles between major drainages.

Important vegetation types for the fisher include montane hardwood conifer, mixed conifer, montane riparian, Jeffrey pine, ponderosa pine, lodgepole pine, subalpine conifer, aspen, eastside pine and red fir, all of which occur near the proposed project area. The historical and contemporary distributions of the fisher in California are clearly associated with areas of low snowfall across a wide range of forest types, and forest types known to be used by fishers in California appear to be used less when located in deep snow areas (Krohn et al. 1997).

There have been widely scattered anecdotal sightings of fisher across the Tahoe National Forest, which surrounds the proposed project area. No recent (past 20 years) sightings of fisher were reported near the proposed project area during several surveys and camera stations from 1998 to the present.

Occurrence within the project area:
Despite numerous surveys by the U.S. Forest Service, no fishers have been detected near the project area or in the entire Tahoe National Forest. If fisher did occupy the proposed project area it is likely they would have been detected at one of the camera stations.

Wolverine
On December 14, 2010, the U.S. Fish and Wildlife Service announced a 12-month finding on a petition to list the North American wolverine (*Gulo gulo luscus*) as an endangered or threatened species under the Endangered Species Act (US Fish and Wildlife Service 2010; 75 FR 78030). The U.S. Fish and Wildlife Service found that wolverine occurring in the contiguous United States is a distinct population segment (DPS) and that listing of this DPS was warranted. The listing is currently precluded by higher priority species, but effective with the Federal Register publication, the contiguous U.S. DPS of the wolverine was added to the candidate species list. The range of the species includes California, along with several other western states. The U.S. Fish and Wildlife Service will make any determination on critical habitat during development of the proposed listing rule. In the interim, the U.S. Fish and Wildlife Service will address the status of the wolverine DPS through its annual Candidate Notice of Review.

The essential condition for wolverines to successfully occupy and reproduce in an area is a cold climate with deep snow that persists into early summer (Copeland et al 2010, as cited in U.S. Fish and Wildlife Service 2010). This requirement is critical to fulfill several reproduction and survival needs. The southern-most occupied habitats in North American are patchy tree-line "sky islands," separated by areas of unsuitable habitat.

Wolverine habitat relationships, particularly in the contiguous United States, are not well-studied (Ruggiero et al. 2007, Aubry et al. 2007, Copeland et al. 2007). In their analysis of broad-scale habitat relations, Aubry et al. (2007) found the only habitat characteristic that fully accounted for the historical distribution was persistent spring snow cover through the denning period (mid-April to mid-May), generally associated with alpine vegetation and alpine climatic conditions.

Knowledge of wolverine use in forested habitats is limited. Schempf and White (1977) extrapolated from locations of anecdotal reports of wolverines in the northern Sierra Nevada that they use mixed conifer habitat (8 of 16 reports), lodgepole (4 of 16 reports), and fir (3 of 16 reports). White and Barrett (1979) believed that wolverines in California are highly dependent upon mature conifer forests for survival in winter, and generally move down slope in winter into heavier timber where food is available. In their preliminary search for study animals previous to capture for their demographic analysis, Squires et al. (2007) considered all forested areas (excluding ponderosa pine forest) and areas above tree line as potential wolverine habitat.

Research about the effects of human disturbance on wolverines is inconclusive. In the December 14, 2010, Federal Register notice, the U.S. Fish and Wildlife Service states "little is known about the behavioral responses of individual wolverines to human presence, or about the species' ability to tolerate and adapt to repeated disturbance." The US Fish and Wildlife Service pointed out that the potentially negative effects of disturbance may be more important at the southern margin of the species' North American range where wolverine productivity is particularly low (Inman et al. 2007, as cited in U.S. Fish and Wildlife Service 2010).

Wolverines have large spatial requirements. Individuals may move great distances on a daily basis. Except for females providing for offspring, or males seeking mates, movement is generally motivated by food (Ruggiero et al. 1994). During summer, long distance movements appear to be restricted to night when temperatures are cooler (Hornocker and Hash 1981). Home ranges of wolverines are generally extremely large and vary greatly depending on gender, availability of food, age, and differences in habitat.

Wolverines are generally described as opportunistic omnivores in summer and primarily scavengers in winter (Fry 1923, Ruggiero et al. 1994). Copeland et al.

(2007) suspected that the minor seasonal variation in habitat use they observed was likely more related to varying food availability than to association with particular vegetation types.

Even in northern areas, the wolverine occurs at low densities and is secretive, difficult to observe even in core areas of its range, and one of the rarest and least known mammals in North America (Aubry et al. 2007). Zielinski et al. (2005), based on the lack of detections of wolverine in contemporary surveys, concluded that the California wolverines may be extirpated or in extremely low densities from the southern Cascades through the Sierra Nevada. Since the last historic specimen was collected in California in 1922 (Fry 1923, and Grinnell et al. 1937 as cited in Aubry et al. 2007), there have been periodic anecdotal sightings (lacking conclusive physical evidence) of the wolverine in California including many in and near the Tahoe National Forest, which surrounds the proposed project area. In its December 2010 Federal Register findings the U.S. Fish and Wildlife Service notes: "Only one Sierra Nevada record exists after 1930, indicating that this population was likely extirpated in the first half of the 1900s concurrent with widespread systematic predator control programs" (US Fish and Wildlife Service 2010).

According to the U.S. Fish and Wildlife Service (2010), large areas of habitat with characteristics suitable for wolverines still occur in the Sierra Nevada, despite the extirpation of wolverines. The U.S. Fish and Wildlife Service support this conclusion, in part, by noting that:

- Wolverine extirpation was coincident with systematic predator eradication efforts in the early 1900s, which have been discontinued for many years; and
- The Sierra Nevada has received at least one (male) migrant from populations in the northern Rocky Mountains (see discussion below) and the possibility that more, yet undetected, individuals inhabit the Sierra Nevada.

The U.S. Fish and Wildlife Service concluded that the Sierra Nevada mountains is an area where wolverines historically existed as reproducing and potentially self-sustaining populations prior to human-induced extirpation, and where reestablishment of those populations is possible given current habitat condition and management and are thereby included in the current range of wolverines (US Fish and Wildlife Service 2010).

The most recent anecdotal sighting in the Tahoe National Forest prior to 2008 was in the summer of 2003 in the Granite Chief Wilderness area, south of Interstate 80. Schempf and White (1977) reported three recorded sightings in the Webber Lake area of Sierra County. Other relatively recent incidental sightings that could potentially be wolverine include a 1991 sighting reported in the Euer Valley on the Truckee Ranger District. A 1992 sighting in the Harding Point area, northeast of the town of Sierraville, was confirmed by track identification. Sightings on the Downieville Ranger District include one in 1989 in the Haskell Peak area, one in 1990 in the Upper Sardine Lake area, one in 1993 along the Gold Lake Road and

Salmon Lake Road area, and one in 1998 near Bassett's Station. All of the Downieville Ranger District sightings have the potential to be within the home range of a single individual. On the Foresthill Ranger District, a wolverine was sighted in the Robinson Flat area in 1980 by a wildlife biologist, and in 1992, a wildlife biologist observed a wolverine in the Granite Chief Wilderness Area (US Forest Service 2009).

Several wildlife management and research entities have participated in local studies to detect the presence of wolverines. In studies using numerous baited camera stations from the early 1990s through 2004, no wolverines were detected.

In February 2008, as part of a research project in the Sagehen basin area (approximately 2.5 miles from the proposed project), photographs and DNA were collected which verified the presence of a single male wolverine (Moriarty et al. 2009, as cited in U.S. Fish and Wildlife Service 2010). Genetic analysis of this individual compared with wolverines across their range, including the seven genetic samples from California wolverine museum specimens (Schwartz et al. 2007, as cited in U.S. Fish and Wildlife Service 2010), supports that the origin of this individual is from the western edge of the Rocky Mountains region, possibly from the Sawtooth Mountain Range in Idaho (Moriarty et al. 2009). How this individual wolverine arrived in the area is unknown. The 2008 sighting is the first verified sighting since 1922 (US Fish and Wildlife Service 2010).

Additional evidence (photographs, tracks, fur samples) of this one male wolverine has been collected since that time on the Tahoe National Forest and on lands owned by Sierra Pacific Industries (SPI) in the “checkerboard” ownership area in the northern portion of the Tahoe National Forest. The wolverine was identified repeatedly in winter 2009/2010 (camera station) and in 2010/2011 tracks were discovered by a research biologist. The most recent detection was in the Fordyce Lake area in the summer of 2011. Sightings of this wolverine have ranged from Yuba Pass to Donner Pass, a distance of more than 20 miles (Craig Wilson pers comm. 2011).

In the December 2010 Federal Register notice, the U.S Fish and Wildlife Service noted that the attempted dispersal events in California (and Colorado) may represent a continuation of the wolverine expansion in the contiguous United States and that other wolverines may have traveled to the Sierra Nevada (and elsewhere) and remain undetected. However, the U.S Fish and Wildlife Service found no evidence that California currently hosts a functional wolverine population or that female wolverines have made or are likely to make similar dispersal movements (US Fish and Wildlife Service 2010).

Occurrence in the Action Area

The original February 2008 wolverine camera station detection was approximately 2.5 miles east of the proposed project area. The 2010/2011 winter

sighting and the 2011 summer detection was within 10 miles of the project area. The wolverine sightings since 2008 have covered a large area between Highway 49 (Yuba Pass) to the north, Interstate 80 (Donner Pass) to the south, and Fordyce Lake to the west. This large geographical area is an indication of considerable movement by this individual through a variety of habitats and apparent tolerance of high levels of disturbance from winter and summer recreation over the past three years.

Bald Eagle

Bald eagles, except for those that occur in the Sonora Desert in central Arizona, were removed from protection under the Endangered Species Act on August 8, 2007 (72 FR 37346). However, they are still protected under the Bald Eagle and Golden Eagle Protection Act and are listed as a protected species under the Migratory Bird Treaty Act. Bald eagles nest in large trees and on cliffs, often near large water bodies. Winter roosts commonly are large trees and other sheltered sites. Bald eagles feed primarily on fish, but will prey on injured waterfowl, various small mammals, and carrion.

Bald eagles are sighted frequently during the summer at Independence Lake. They are known to fish for LCT in upper Independence Creek and for kokanee in the lake. Based on casual observations bald eagle numbers have been apparently increasing over the past few years. They do not appear to be disturbed by recreational or management activities at the lake (Shea pers. comm. 2011). Bald eagles are not known to nest at Independence Lake, although the fishery of Independence Lake may provide important hunting grounds for bald eagles nesting at large reservoirs to the east such as Boca or Prosser.

Migratory Birds

The Migratory Bird Treaty Act (MTBA) (16 U.S. C. 703 et seq.) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes hunting seasons and capture limits for game species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 CFR 21, 50 CFR 10).

The proposed project area is surrounded by the Tahoe National Forest. Appendix D was developed by Tahoe National Forest biologists to address the MBTA. Potential migratory bird species of concern on the Tahoe National Forest were identified using species of concern lists for Bird Conservation Regions (BCRs): 9 for the Great Basin BCR and 15 for the Sierra Nevada BCR (U.S. Fish and Wildlife Service 2008). These two lists totaled 30 species, of which 17 are considered breeding species on the Tahoe National Forest, and eight species were considered transient or migratory; the remaining five species were not expected to occur on the Tahoe N.F. (US Forest Service 2009). Migratory birds are also included in the list in Appendix B, which is a part of the Biological Resource Inventory used in the Timber Harvest Plan submittal (Whitlock 2011).

Great grey owl

The great grey owl (*Strix nebulosa)* was detected on TNC lands in May, 2012, during nighttime calling surveys. The great grey owl (GGO) is listed as endangered under the California Endangered Species Act. GGO require meadows and open grasslands for nesting and foraging habitat, with adjacent mid- to late-successional forest edge.

3.3.2 Environmental Consequences

No Action Alternative
The no action alternative would not affect terrestrial wildlife, including migratory birds, and listed or candidate wildlife species. No activity would occur in the

The hazardous fuels and unnaturally dense forest conditions would not change from existing conditions. If a large, high severity wildfire occurred, it would greatly alter habitat for most animals, creating opportunities for a few species, while eliminating suitable habitat for many others. In the case of species requiring large areas of mature forest, recovery from a high severity wildfire could take 100 years or longer to achieve suitable habitat.

Proposed Action Alternative
Forest thinning and hazardous fuels reduction activities would cause ground disturbance and noise to progressive portions of the 432-acre site for approximately 2 months in late summer and early fall over the next five years. Prescribed burning activities would also cause disturbance to the surrounding area for a few days during late fall, winter and early spring. Disturbance would be primarily from use of heavy equipment, worker activity, vehicle traffic, and smoke from prescribed burning.

Most wildlife species would not expected to be adversely affected by the project because of its timing, duration, and size. Disturbance could cause some animals to avoid the immediate area during project activities and could cause local, short-term interruption of breeding in the immediate area of active burn operations in the early spring. The overall, long-term effect would be positive, because the risk of stand (habitat)-replacing wildfire would be greatly reduced. The more open, mature forest conditions, dominated by shade-intolerant tree species would better reflect the natural conditions of the eastside forest type

There would be a slight risk of harm to animals because of soil or water contamination at the landings, water drafting sites, and road crossings. BMPs and other design and mitigation measures would be implanted to minimize that risk (see Section 2, Proposed Action alternative, and Appendix A – Project Design Features, Conservation and Mitigation Measures, Soil and Watershed Protection). A hazardous material plan would be in place and activated if a spill were to occur.

On-site monitoring by TNC and contract administrators would reduce the risk by anticipating problems and taking prompt action if a spill occurred.

There could be a short-term risk of harm to animals in the project area because of soil disturbance. Erosion control measures and monitoring during and after activities would minimize a risk of sedimentation into the stream courses from site disturbance (see Section 2, Proposed Action alternative, and Appendix A - Project Design Features, Environmental Commitments, and Mitigation Measures, Soil and Watershed Protection).

The thinning and hazardous fuels project would have a very low probability of affecting the wolverine. Similar projects in 2009 and 2010 at Independence Lake took place in the presumed home range, along with projects in Tahoe National Forest, and on private-industrial forestland. No change in the wolverine's movement was detected that could be atributed to habitat changes or disturbance from activities on TNC lands.

There could be risk of harm to amphibians, including mountain yellow-legged frogs (MYLF), if they are present at the project area during planned activities. Amphibians could also be present at nearby wet areas and move through or into the proposed project areas during treatment activity. A scheduled pre-operation amphibian survey would provide information about the potential for amphibians to be in the proximity of the thinning and fuel treatment sites. A late-summer limited operating period would also be observed to minimize impacts to migrating MYLF (see Section 2, Proposed Action alternative, and Appendix A – Project Design Features, Environmental Commitments, and Mitigation Measures, Wildlife and Aquatic Organisms). Amphibians, including MYLF, would be expected to benefit from the project over the long-term because the risk of damage to riparian and aquatic habitats from high severity wildfire would be reduced.

No impacts to fishers are anticipated because they do not occur in or near the project area, including the entire Tahoe National Forest.

Bald eagles are not expected to be negatively affected by the proposed project, since their presence and use of the lake was unchanged during similar projects in 2009 and 2010. Bald eagles, along with several other wildlife species of concern, will be monitored during the project. Adjustments to the project timing and location will be made if disturbance appears to be negatively affecting this species. Similar to other species requiring large trees, reducing the threat of stand-replacing wildfire and restoring forests to late-successional conditions would benefit bald eagles and possibly attract them to nest at Independence Lake in the future.

Populations of migratory birds are unlikely to be affected by the proposed project, although some individuals may be affected. Operations would be limited to two

or three months of one year (2012) and burning would be completed in the following year. Any disturbance would be localized, short-term, and of limited duration. The long-term benefits of greater fire resiliency would be outweighed by any short-term disturbance to individual animals.

TNC is working with DFG on measures to protect great grey owls. In an August, 2012 field meeting with DFG, TNC agreed to erect up to three GGO nest platforms using guidance from DFG. TNC and DFG identified specific trees in the stand near a meadow to be used as nest platforms, and patches of conifers with structural diversity near the edge of the meadow that would be left untreated (older trees would not be cut in the stands to be thinned). TNC will survey around another meadow on the Independence Lake Preserve and DFG will assist with those surveys. TNC will follow Survey Protocol for the Great Gray Owl in the Sierra Nevada of California (2000) Beck & Winter.

3.4 Geology and Soils

3.4.1 Affected Environment

The proposed project is located in the northern Sierra Nevada geologic province and near the western margin of the Basin and Range geologic province. The geology of the area is dominated by volcanic rocks of Miocene to Quaternary age consisting of andesite, dacite, and lahar (mudflow) deposits. Granitic rocks are present near the crest of the Sierra Nevada mountain range.

Independence Lake is located in an alpine glacial valley on the east slope of the Sierra Nevada. Repeated Pleistocene age glaciations occurred in the higher mountains west of the proposed project site. The glacial activity is responsible for transporting large volumes of sediment and boulders from sources west of the site, down the Independence Lake drainage and depositing this material throughout the valley as glacial till and outwash gravel. The till and outwash gravel consists of dense sand and gravel with cobbles and boulders. Boulders can range up to 10 feet in diameter or more. Several times terminal or recessional moraines apparently dammed the Independence Creek drainage, resulting in the deposition of lacustrine (lake) sediments behind the moraines (Holdredge and Kull 2009).

The project area is located in the northern most portion of TNC's property. Aspects vary from north-northeast to southeast. The project elevation is between 6,960 and 7,680 feet with slopes ranging from 0% to 40% as identified on the USGS Independence Lake, 7.5-minute series.

Precipitation falls mainly as snow; the first snows generally occur between mid-September and November, with regular winter storm systems persisting through mid-March. Sierra Nevada summers are generally dry, though summer thunderstorms are common. The annual rainfall ranges from 30 to 40 inches.

Snowfall is often over 200 inches with an average depth of accumulation of 12 feet. The frost-free season ranges from 25 to 125 days. The calculated erosion hazard rating (EHR) for the entire project area is Moderate and timber operations are generally limited to slopes less than 40%.

Soils

Soil is the basic resource of the forest, and is the key to the productivity of the site. A major goal for soil resource management is long-term maintenance of soil productivity and watershed protection. This requires avoiding management actions that would irreversibly impair soil productivity.

Soil and watershed protection is focused on the prevention of erosion and off-site movement of sediments, nutrients, and pesticides, the maintenance of adequate seasonal water levels in wetlands, and the reduction of damage from flood flows. It is necessary to monitor soil productivity to detect significant changes caused by management actions. Maintaining soil productivity also requires restoring or improving soils in areas where they have been degraded. Controlling soil erosion, compaction, and maintaining the nutrient balance during stewardship activities is vital to long-term soil productivity and protection of down-stream water quality. Practices include maintaining ground cover to reduce soil loss and limiting heavy equipment use on wet soils.

According the 1993 "Soil Survey Tahoe National Forest Area" published by the USDA, there are six primary soil series present within the project area. The primary soil series include Waca, Jorge, Aquolls, Tallac, Fugawee, and Trojan. The following is a brief narrative of each soil series (U.S. Department of Agriculture 1994). Figure 4 shows the location of the soil series.

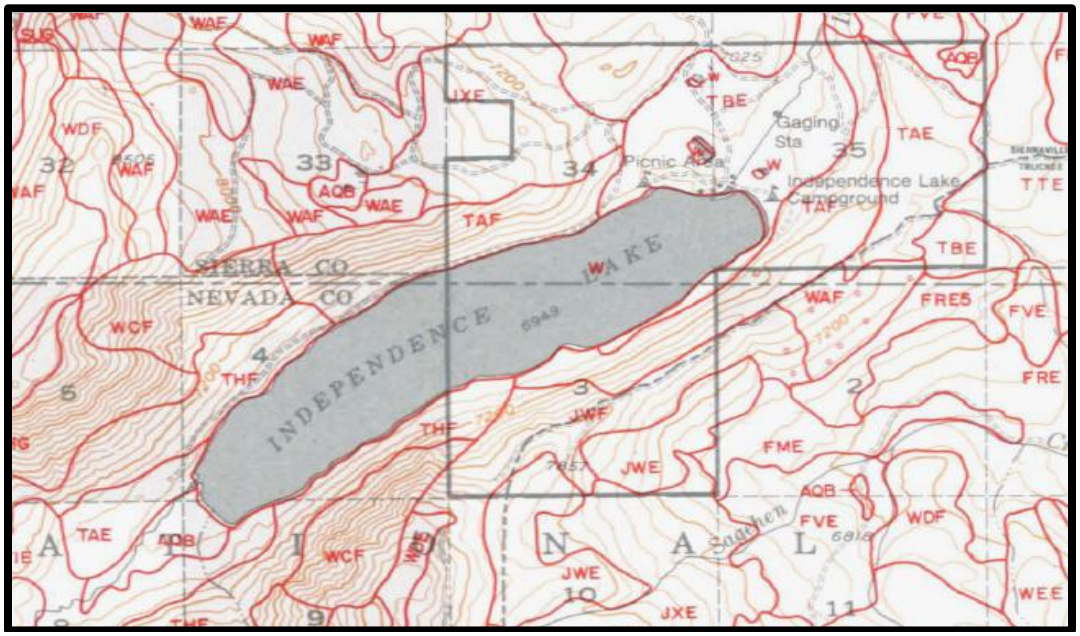

Figure 4: Soil Series in the Independence Lake area, from U.S. Department of Agriculture 1994

Waca (WAE, WAF): The Waca series consists of moderately deep, well-drained soils on mountainsides. Pryoclastic materials influence Waca soils. These soils formed in residuum weathered from andesitic mudflows and rhyolitic tuff. Slope ranges from 2 to 75 percent. Elevation is 6,000 to 9,000 feet. Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

Jorge (JXE): The Jorge series consists of moderately deep, well-drained soils on lake terraces and glacial moraines. These soils formed in lake sediments and material weathered from glacial deposits. Slopes range from 2 to 50 percent. Elevation is 5,500 to 6,400 feet. Permeability is moderate. Available water capacity low, runoff is medium and the erosion potential is high.

Aquolls (AQB): Aquolls consists of shallow and moderately deep, very poorly drained soils in drainage ways and on valley floors. These soils formed in residuum weathered from mixed alluvium. Slopes range from 0 to 15 percent. Elevation is 2,000 to 8,500 feet. Permeability is variable, Available water capacity varies from very low to moderate and runoff is very slow to ponded.

Tallac (TAE, TAF, and TBE): The Tallac series consists of deep, moderately well drained soils on lateral and terminal glacial moraines and outwash. These soils formed in material weathered from glacial deposits. Slope ranges from 2 to 60 percent. Elevation is 5,500 to 9,000 feet. Permeability is moderately rapid. Available water capacity is very low, runoff is slow to rapid, and the erosion potential is high.

Fugawee (FVE): The Fugawee series consist of moderately deep, well-drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rocks, principally latite and andesite flows. Slopes range from 2 to 75 percent. Elevation is 6,000 to 8,000 feet. Permeability is moderate to moderately slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

Trojan (TTE): The Trojan series consists of deep, well-drained soils on mountainsides. These soils formed in residuum weathered from andesitic and basaltic conglomerate and breccia. Slopes range from 2 to 50 percent. Elevation is 4,800 to 6,400 feet. Permeability is moderately slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

Accelerated (management-induced) erosion and sediment production are often the greatest effects of logging, road building, and residential development in forested areas. On-site factors contributing to the accelerated erosion process include soil compaction, most often caused by heavy equipment, and loss of surface organic

matter. Soil compaction results in the decrease movement of water and air into and through the soil. The decreased soil aeration, which can decrease microbial activity and root growth penetration, can diminish plant growth. A decrease in available water capacity results in an increased surface runoff, leading to accelerated erosion. The loss of organic matter from increased surface runoff or logging activities can also affect the short- and long-term nutrient supply to vegetation. Surface organic matter acts as erosion protection and can decrease the compacting effects of ground; based heavy equipment. Organic matter in the soil increases water storage and soil stability.

An increase in erosion from on-site logging activities, beyond natural levels, can result in the decrease of soil depth and an increase of sedimentation and turbidity into watercourses. Loss of soil depth can decrease the available water capacity, nutrient storage, and rooting volume. The result of decreasing soil depth is decreased soil productivity.

Timber harvest and fuel reduction activities result in direct, indirect, and cumulative soil effects. Direct effects on soils include: reduction of soil cover and increase in compaction due to the construction of new or re-opening of existing roads, skid trails and landings; loss of nutrients and organic material through the removal of small material, such as tree tops and limbs and reduction in the number of trees available for recruitment of large woody debris. Indirect effects include acceleration of erosion from overland flow due to increased compaction and reduction in infiltration. Together, these direct and indirect effects may result in the reduction of overall long-term productivity of the soil.

Organic Matter Loss: Displacement or loss of organic matter can result in a long-term loss of soil productivity. Soil surface litter and downed woody debris are the storehouse of long-term soil fertility, provide for soil moisture conservation, and support soil microorganisms that are critical in the nutrient cycling and uptake process. Much of the chemical and microbial activity of the forest nutrient cycle is concentrated in the narrow zone at the soil and litter interface.

Displacement of surface organic matter occurs primarily from skidding, and mechanical site preparation, activities. Actual loss of organic matter can occur because of burning or erosion. The effects of organic matter loss on soil productivity may be expressed in terms of the percentage displacement or loss because of all project activities.

Soil Compaction: Compaction affects site productivity through loss of large soil pores that transmit air and water in the soil and by restricting root penetration. Ground based equipment has by far the greatest effect on soil compaction. The number of passes a machine makes over a soil is a major factor in causing compaction. The greatest increases in soil bulk density occur in the first few

passes. Therefore, dispersed skidding operations can cause more compaction over an area than concentrated skidding operations.

Reduction in tree growth is the most prominent effect related to soil compaction, most often caused by heavy equipment and loss of surface organic matter. Soil compaction results in the decreased movement of water into and through the soil. A decrease in available water capacity results in an increased surface runoff leading to accelerated erosion. Compaction also results in decreased soil aeration, which can decrease microbial activity, and root growth penetration, which decreases plant growth.

The amount of compaction will depend on how efficiently skid trails are planned and used. Since tractor logging can cause significant amounts of compaction, this could result in locally significant effects on soil productivity. Best management practices can alleviate or minimize soil compaction, although some compaction and erosion cannot be avoided, due to the nature of timber harvest methods. Such practices include using existing roads and skid trails and designing skid trails to minimize their total area. Potential loss of timber productivity due to soil effects can be more than offset by management practices that increase growth rates such as control of stocking density and competing vegetation and by planting of improved (faster growing) seedlings.

3.4.2 Environmental Consequences

No Action Alternative

The no action alternative would have no effect on existing geology, soils, or hydrology. No thinning or fuels reduction activity would occur in the proposed project area and the site would be unchanged from its present condition. Hazardous forest fuels would not be reduced, however. If a high severity wildfire were to occur, damage to soil resources would be possible. Subsequent erosion from a large, high severity wildfire could affect water quality in Independence Lake and upper Independence Creek.

Proposed Action Alternative

Organic Matter loss: Organic matter loss because of this proposed project is expected to be low and temporary in nature. Immediately after logging, there would be a minor addition of organic matter onto the site in the form of slash. In the years following logging, there would be a slight decrease in organic matter deposited onto the site. Then, when trees and brush grow to a size where they would produce a yearly leaf drop, organic matter would increase. This initial decrease is not considered significant because there would be sufficient residual vegetation immediately after logging to supply annual leaf and litter fall.

Displacements of surface organic matter because of slash piling activities are expected to have the greatest impacts. Retention of organic matter in these areas can be accomplished by hand piling, or using mastication for the treatment of

slash. This method should leave adequate slash and duff on the site to provide good ground cover and minimize erosion. Approximately 40% of organic matter would be retained using this method.

Although a decrease in organic matter on site could occur, the impacts of the operation would be minimized or completely negated below significant levels with the application of California Forest Practice Rules (FPRs).

Surface Soil Loss: The soil is the storehouse of current and future site fertility, and the majority of nutrients are held in the upper few inches of the soil profile. Topsoil displacement or loss can have an immediate effect on site productivity, although effects may not be obvious because of reduced brush competition or until the new stand begins to fully occupy the available growing space.

There will be some surface soil loss primarily on the existing skid trails, and landings. Soil productivity values will be maintained by limiting the construction of new roads, landings and skid trails, and installing and maintaining erosion control structures as specified in the THP. Some displacement of topsoil is unavoidable; actual accelerated loss of topsoil may be reduced to insignificant by proper installation and maintenance of erosion control structures.

Surface soil loss is expected to be negligible if the application of the FPRs, and BMPs, are implemented. The following FPRs, and BMPs, will be implemented to reduce impacts of surface soil loss within the project area (see also see Section 2, Proposed Action, Conservation and Mitigation Measures, Soil and Watershed Protection).

- Use of skid trails will be limited in number and width to the minimum necessary for removal of logs.
- Existing skid trials will be used instead of constructing new skid trails.
- Ground based equipment will not be operated on unstable areas.
- All water breaks shall be installed no later than the beginning of the winter period of the current year of timber operations. Installation of drainage facilities and structures is required from October 15 to November 15 and from April 1 to May 1 on all constructed skid trails and tractor roads prior to sunset if the National Weather Service forecast is a "chance" (30% or more) of rain within the next 24 hours.
- Water breaks will be constructed immediately upon conclusion of use of tractor roads, roads, and landings, which do not have permanent and adequate drainage facilities, or drainage structures.
- Water breaks or any other erosion controls on skid trails, cable roads from end lining, and firebreaks, shall be maintained during the prescribed maintenance period and during timber operations. The prescribed maintenance period for water breaks and any other erosion control facilities on skid trails, and firebreaks, shall be at least one year

The soil surface would experience some compaction on the skid trails, and landings. However, the increase in soil compaction within the plan area and/or the watershed would be negligible. Most soil compaction occurs when heavy equipment is operated during periods of saturated soil and with concentrated skidding patterns, both of which would not occur in the proposed project. Soil compaction is expected to be negligible with the implementation of the Conservation and Mitigation Measures, including the FPRs, and BMPs.

Growing Space Loss: Forest growing space is lost to roads, landings, permanent skid trails, and other permanent or non-restored areas subjected to severe disturbance and compaction.

Growing space loss is not expected to occur because of the proposed forestry activities. Growing space is lost to roads, landings, permanent skid trails, and other permanent or non-restored areas subjected to severe disturbance and compaction. Forestry activities will result in some reduction of forest growing space due to the construction and opening of landings and skid trails. No new roads or landings are required to manage this property.

The loss of forest growing space will be reduced by the implementation of the Conservation and Mitigation Measures, including the FPRs and BMPs.

3.5 Hydrology and Water Resources

3.5.1 Affected Environment

Independence Lake is situated in a glacially carved valley, naturally impounded by a terminal moraine at the east end of the lake. In 1879, a dam was constructed. The dam was enlarged in 1939, creating a usable storage capacity of about 17,500 acre-feet. Independence Lake serves as the upper most municipal water storage facility for the Truckee Meadows Water Authority (TMWA) in the Truckee River watershed. Reservoir operations and storage are linked to downstream flows in the Truckee River and management of other facilities in the Truckee basin through the Truckee River Operating Agreement (U.S. Bureau of Reclamation 2008).

Independence Lake is approximately 2.5 miles long and 0.5 miles wide, with a surface area of approximately 725 acres (California Department of Water Resources 2011). The shoreline of the lake is approximately 5.8 miles, and the maximum depth is about 145 feet. The boundary between Nevada and Sierra Counties runs through the lake.

The Independence Lake watershed covers approximately 7.5 square miles. The headwater of Independence Creek, upper Independence Creek, is the principle drainage that feeds Independence Lake, with a watershed area of approximately 4

square miles. The upper watershed drains steep granitic and volcanic terrain including the south face of Mount Lola (elevation 9,148 feet), which is the highest peak in the Upper Independence Creek.

Downstream of Independence Lake, Independence Creek flows into the Little Truckee River, which is a part of the Truckee River watershed, a basin that encompasses approximately 3,100 square miles and includes the entire land area draining into Pyramid Lake originating in the Sierra Nevada. Independence Lake is part of the North Lahontan hydrologic basin.

The majority of precipitation in the project area falls as snow from November to April, and the highest volume of runoff is generated by spring snowmelt from April through June (Swanson Hydrology + Geomophology 2009).

A watershed analysis was done for the THP (Whitlock 2011). The following discussion is excerpted from that analysis.

The planning Watershed Assessment Area (WAA) encompasses approximately 20,502 acres:
Calwater v2.2 ID 8636.000203-Independence Lake (4,967 Ac.);
Calwater v2.2 ID 8636.000201-Lower Independence Lake (8,760 Ac.);
Calwater v2.2 ID 8636.000302-Upper Sagehen Creek (6,775 Ac.).

These watersheds can be found on the USGS Independence Lake, Hobart Mills, and Sierraville 7.5-Minute Series Quadrangles.

Ownership within the planning watershed includes; private industrial forestland of approximately 3% or 615 acres, Public ownership including national forestlands of approximately 71% or 14,556 acres, and other private non-industrial forestland of approximately 26% or 5,330 acres.

The watershed includes the portions of the Little Truckee River, Independence Creek, Sagehen Creek and several other Class I, II and III watercourses and springs. These watercourses and their tributaries flow into the Truckee River. The watershed begins atop Mount Lola, heads east –northeast on the ridge past Cold Stream Meadow heading north, crossing Perazzo Meadow and the Little Truckee river, turning east in Section 24, paralleling the Little Truckee river past the Little Truckee Summit Over Snow Vehicle Parking Area, turning southeast in Section 12, crossing the Little Truckee river and the Henness Pass road heading south parallel to Independence Creek, turning southeast past Secret Meadow, crossing the Sierra and Nevada County line into the Sagehen basin, past the University of California Wildlife Experimental Station, continuing south to Sagehen Hills, turning west in Section 17, continuing west along Carpenter Ridge and finally turning north to the point of beginning, Mount Lola.

The rationale for choosing the size and location of the Watershed Assessment Area is based on the proposed project size, on-site and off-site impacts, and surrounding topography as they relate to; water quality, soil productivity, biological, recreation, and visual impacts that could be caused by this project.

According to the Lahontan Regional Water Quality Control Board's (RWQCB) Water Quality Control Plan for the Lahontan Region (Basin Plan), beneficial uses of these watercourses include: Municipal Domestic Supply; Agricultural Supply; Industrial Service Supply; Ground Water Recharge; Freshwater Replenishment; Navigation; Hydropower Generation; Water Contact Recreation; Non-contact Water Recreation; Commercial and Sport Fishing; Cold Freshwater habitat; Wildlife habitat; Preservation of Biological Habitats of Special Significance; Rare, Threatened, or Endangered Species; Migration of Aquatic Organisms; Spawning, Reproduction and Development; Water Quality Enhancement; and Flood Peak Attenuation/Flood Water Storage (California Regional Water Quality Control Board 1995).

The THP was approved by the California Department of Forestry and Fire Protection (CAL FIRE), and met the conditions and criteria of the LRWQCB's Order No. R6T-2009-0029 (the 2009 Timber Waiver). The project is enrolled under the 2009 Timber Waiver: Waste Discharge ID# 6AT5412067.

Currently, the primary activities within the assessment area are associated with recreation, timberland management, research, education, and resource protection. In areas that have not been converted from timber production to urban or rural development, it is likely that timber harvesting will continue due to investment interests, concern for fire safety, protection of the resource and demand for forest products.

Over time, the effect of timber harvesting based on total acreage within the watershed will change as site recovery or more harvesting occurs. Forest Practice Rules, Best Management Practices, and mitigation measures work to reduce these affects to insignificant levels. The following is an evaluation of possible adverse impacts and proposed mitigation to reduce to insignificant levels, those impacts that may occur by the implementation of this project within the assessment area.

Watercourse Condition:
Upper Independence Creek is a small perennial stream that drains the upper Independence Lake basin. Independence Lake holds the only native, self-reproducing lake population of Lahontan cutthroat trout in the Sierra Nevada. Lahontan cutthroat trout are federally listed as Threatened. The trout only spawn in the first one mile of Upper Independence Creek.

Lower Independence Creek is made up of two Class I tributaries, the natural lake outlet, and the constructed channel that converge approximately 1,700 feet from the lake, adjacent to the project area.

In general, the Class II watercourses are low gradient, generally 1st order watercourses starting from springs, and wet meadows with traditional bed, bank, and channel characteristics. Thick riparian vegetation (mountain alder and willow) is usually present. These watercourses are in excellent condition despite years of open grazing. The streams have a meandering form and exhibits erosion within a normal range of variation. Some large woody debris exists within the channel. In general, both the channel migration zones, and watercourse transition lines range from a few feet to several yards. The watercourse has a small amount of small sized cobbles, and moderate amounts of gravel and fine gravel.

The Class III watercourses are similar to the Class II watercourses as they are also low gradient, 1st order watercourse with traditional bed, bank, and channel characteristics. The Class III watercourses are only active during spring runoff. These watercourses appear to be in excellent condition with the exception of the existing road crossings. Some large woody debris exists within these channels.

The effects of forestry activities on water quality have been widely studied. Water quality concerns related to forestry were addressed in the 1972 Federal Water Pollution Control Act Amendments and later, more comprehensively, as non point sources under section 208 of the 1977 Clean Water Act and section 319 of the 1987 Water Quality Act.

Fisheries and domestic water are the designated beneficial uses of greatest concern to the public. Coldwater fisheries are generally regarded to be the most sensitive to forest management.

Without adequate controls, forestry operations may degrade several water quality characteristics in watercourses or lakes receiving drainage from forestlands. Sediment concentrations can increase due to accelerated erosion; water temperatures can increase due to removal of overstory riparian shade; slash and other organic debris can accumulate in watercourses and/or lakes, depleting dissolved oxygen; and organic and inorganic chemical concentrations can increase due to harvesting, fertilizer, and pesticide applications (Brown, 1985). These potential increases in water quality contaminants are usually proportional to the severity of site disturbance (Riekerk 1983, Riekerk et al. 1989). Impacts to these resources depend on site characteristics, climatic conditions, and the forest practices employed.

The way in which an individual THP is determined to comply with California FPRs and other federal and state laws is determined first by compliance with specific standards in the FPRs and then by development of site-specific mitigation measures in response to potential significant impacts identified within the THP. Compliance is attained by a wide variety of detailed mitigation measures tailored to local conditions including, but not limited to, consideration of slope stability, erosion hazard, road and skid trail location, WLPZ width, BMPs on hill slopes

and within WLPZs, and wildlife and fish habitat. Consequently, most adverse significant impacts of individual THPs can be mitigated to levels of insignificance.

Cumulative watershed effects (CWEs) occur within and near bodies of water or significant wet areas, where individual impacts are combined to produce an effect that is greater than any of the individual impacts acting alone. Factors that have been considered in the evaluation of cumulative watershed impacts are listed below.

Watershed impacts have been based on significant on-site and down-stream cumulative effects on beneficial uses of water, as defined and listed in applicable Water Quality Control Plans.

Watershed effects produced by timber harvest and other activities may include one or more of the following: Sediment, Water Temperature, Organic Debris, Chemical Contamination, and Peak Flow. Each of these potential effects is assessed below.

1. Sediment Effects: Sediment-induced CWEs occur when earth materials transported by surface or mass wasting erosion enter a stream or stream system at separate locations, and are then combined at a downstream location to produce a change in water quality or channel condition.

Sediment is often the primary pollutant associated with forestry activities (Pardo, 1980). Under CEQA, the threshold of significance for sediment delivery to streams is based upon the reduction of management-related sediment such that discharge to streams will not degrade or impede the recovery of beneficial uses. Background turbidity would include some continuing effects of past forestry related activities during a particular storm prior to the proposed project, while natural turbidity would be the turbidity that occurs during a particular storm before any timber harvest or other ground-disturbing management activities.

Sediment transported from forestlands into water bodies can be particularly detrimental to aquatic life. When it settles, sediment fills interstitial spaces in lake bottoms or streambeds. This can eliminate essential habitat, covering food sources and spawning sites and smothering bottom-dwelling organisms and periphyton. Sediment deposition also reduces the capacity of stream channels to carry water and of reservoirs to hold water. This decreased flow and storage capacity can lead to increase flooding and decreased water.

Suspended sediments increase water turbidity, thereby limiting the depth to which light can penetrate and adversely affecting aquatic vegetation photosynthesis. Suspended sediments can also damage the gills of some fish species, causing them to suffocate, and can limit the ability of sight-feeding fish to find and obtain food.

Turbid waters tend to have higher temperatures and lower dissolved oxygen concentrations. A decrease in dissolved oxygen levels can kill aquatic vegetation, fish, and benthic invertebrates. Increases (or decreases) in water temperature outside the tolerance limits of aquatic organisms, especially cold-water fish such as trout and salmon, can also be lethal.

2. Water Temperature Effect: Water temperature related CWEs are changes in water chemistry or biological properties caused by the combination of solar warmed water from two or more locations (in contrast to an individual effect that results from impacts along a single stream segment) where natural cover has been removed.

Water temperature is influenced by many factors including latitude, altitude, season, time of day, flow, channel width and depth, groundwater flow, and shading from topography or vegetation. Increased temperatures in streams and water bodies can result from vegetation removal in the riparian zone from timber harvesting or herbicide use. These temperature increases can be dramatic in smaller (lower order) streams, adversely affecting aquatic species and habitat. Increased water temperatures can also decrease the dissolved oxygen holding capacity of a water body, increasing biological oxygen demand levels and accelerating chemical processes (Curtis et al. 1990).

3. Organic Debris Effects: CWEs produced by organic debris can occur when logs, limbs, and other organic material are introduced into a stream or lake at two or more locations. Decomposition of this debris, particularly the smaller sized and less woody material, removes dissolved oxygen from the water and can cause impacts similar to those resulting from increased water temperatures. Introduction of excessive small organic debris can also increase water acidity.

Large organic debris is an important stabilizing agent that should be maintained in small to medium size, steep gradient channels, but the sudden introduction of large, unstable volumes of bigger debris (such as logs, chunks, and larger limbs produced during a logging operation) can obstruct and divert stream flow against erodible banks, block fish migration, and may cause debris torrents during periods of high flow.

Removing streamside vegetation can reduce the natural, annual inputs of litter to the stream (after decomposition of logging-related litter). This can cause both a drop in food supply, and resultant productivity, and a change in types of food available for organisms that normally dominate the lower food chain of streams with an overhanging or adjacent forest canopy.

4. Chemical Contamination Effects: Potential sources of chemical CWEs include run-off from roads treated with oil or other dust-retarding materials, direct application or run-off from pesticide treatments, contamination by equipment

fuels and oils, and the introduction of nutrients released during slash burning or wildfire from two or more locations.

Herbicides, insecticides, and fungicides (collectively termed pesticides) used to control forest pests and undesirable plant species, can be toxic to aquatic organisms. Other toxic materials that may be released during forestry operations include fuel, oil, and coolants used in equipment for harvesting and road-building operations.

5. Peak Flow Effects: CWEs caused by management-induced peak flow increases in streams during storm events and are difficult to anticipate. Peak flow increases may result from management activities that reduce vegetative water use or produce openings where snow can accumulate (such as clear-cutting and site preparation) or that change the timing of flows by producing more efficient runoff routing (such as in sloped roads). These increases, however, are likely to be small relative to natural peak flows from medium and large storms. The effects of management activities on channel conditions indicate that channel changes during storm events are primarily the result of large sediment inputs.

The effects of changes in stream flows are highly site-dependent. The potential for peak flow effects due to timber harvest are related to the amount of timber harvested in relation to the basin size. Increased peak flows have the potential effects to scour channels, erode stream banks, and increase sedimentation to levels higher than pre harvest levels.

Increases in peak flow can also occur because of road building, though these effects are usually only evident in smaller basins (Ziemer et. al. 1991). Roads intercept groundwater in road cuts, surface flow from small drainages, and direct rainfall (Best et al. 1995; Megahan 1975). Roads can gather and transmit rainfall faster than the natural landscape, altering basin hydrology (Jones and Grant 1996). Roads can act as an extension of the drainage network.

3.5.2 Environmental Consequences

No Action Alternative

The no action alternative would have no effect on existing water resources. No treatment activity would occur in the proposed project area and the area would be unchanged from its present condition. Hazardous forest fuels would not be reduced, however. If a high severity wildfire were to occur, damage to water resources, including water quality in Independence Lake and upper Independence Creek, would be likely.

Proposed Action Alternative

The hydraulic and watershed evaluation determined that the proposed project would not negatively affect watercourses and that the project would not have a significant adverse effect to beneficial uses. Post-treatment, the project area and adjacent areas will have a much greater ability to avoid damage from a high

severity wildfire. Water quality and beneficial uses will have greater protection and be at a lower risk of adverse effects from wildfire effects.

The design of the THP was developed to prevent impacts to water resources. Measures to prevent effects to water resources are integrated into the operating plan (THP) and listed in the Environmental Commitments section of this EA (Section 2 – Alternatives, Proposed Action, and Appendix A - Project Design Features, Environmental Commitments, and Mitigation Measures).

Sediment-induced CWEs, water temperature CWEs, and organic debris CWEs, within the project area would be minimized or negated below significant levels with the application of WLPZs on all watercourse and BMPs, FPRs, and mitigation measures described in detail in the Environmental Commitments section (Section 2 and Appendix A).

The potential of chemical contamination of watercourse would be minimized or negated below significant levels with the application of WLPZs. Ground based equipment used in timber operations would not be serviced in locations where grease, oil, or fuel could pass into the watercourse. Pesticides and chemical road treatments are not proposed in this project. Waterholes will have a rocked pad adjacent to the water source for the water-trucks. The rocked pads will allow for quick clean up should oil drip from the vehicle.

The plan does not prescribe for the use of any chemicals to be used for forest management or road stabilization. There will be no significant chemical contamination effects from the proposed action.

Peak flow related CWEs are expected to be unchanged from natural peak flows. The U.S. Geological Survey considers stream-flow measurements within 5 percent of the actual value for 95 percent of the observations to be “excellent” and with the natural annual variability in runoff, any changes are unlikely to be measurable (Huff et al 2000) Although a slight and immeasurable increase in flows could occur due to decreased evapotransporation and the opening of roads, landings, and skid trails, the impacts of these activities will be minimized or completely negated to insignificant levels with the application of the FPRs, BMPs, and mitigation measures incorporated into the proposed action.

On-site implementation monitoring during project activity and longer-term effectiveness monitoring by TNC would ensure that operating plans are adhered to and the protection measures meet the watershed and hydraulic objectives. With these measures in place, there would be no adverse impacts to the hydrology or water resources of the project site or areas that could be affected by the project. The project will benefit water quality over the long-term by reducing the risk of damage to the watershed from high severity wildfire.

3.6 Air Quality and Noise

3.6.1 Affected Environment

Air Quality

The proposed project site is located in Sierra County, California, which is in the Northern Sierra Air Quality Management District. Air quality at Independence Lake is generally excellent. The lake is in an isolated alpine environment. A preserve manager home/office and a few other structures are the primary development at the lake. On average, about 6 to 8 visitor vehicles per weekday are expected, with an estimated 12 to 16 vehicles on weekends. Independence Lake is accessed by low standard dirt roads, which limit vehicle traffic and vehicle speeds, thereby limiting fugitive dust and exhaust emissions. The nearest urban development is the town of Truckee, approximately 10 miles from the lake.

Air quality at Independence Lake can be affected by drifting wood smoke from campfire, wildfires, or prescribed burns during the summer months. Ozone levels can become elevated by emissions from the Sacramento area to the west, although these occurrences are rare.

Noise
Due to its remote location and limited use, Independence Lake has few sources of human-caused noise. The main sources are from occasional vehicle traffic and recreation activities during the summer. Boat use is limited to paddled and 4-stroke engine watercraft, supplied by TNC. Ambient noise is generally dominated by natural sounds.

3.6.2 Environmental Consequences

No Action Alternative
Under the no action alternative there would be no change from current conditions. No forest treatment activity would occur in the proposed project area, therefore project-related noise or air pollution emissions would not be generated.

Proposed Action Alternative

Air Quality
There is a potential for temporary, localized impacts on air quality associated with fugitive dust and engine emissions during logging, road maintenance, and associated activities. Planned mitigation measures such as access road and landing watering would minimize blowing dust.

Haul trucks and worker vehicles would contribute to existing motor vehicle emissions along access roads, but the emissions would be temporary and insubstantial and would not result in violations of national or state ambient air

quality standards. Heavy equipment, including a feller-buncher, excavator, rubber-tired skidder, masticator, and grader, would be brought in by trailer transport. Broadcast burning would be conducted in the early season when recreational use is low. For all burning, state and federal permit requirements would be followed so that smoke from the burning would be well dispersed and the risk of fire escape is very low.

Noise
Recreation use at Independence Lake is light largely because of its remote location, boating restrictions, and current day-use only policy. Few people would be affected by project-generated noise, especially on weekdays. However, Independence Lake is a quiet place, so equipment-generated noise could be noticeable near the equipment as the activity progresses over the entire treatment area. Noise carries over open water and under certain wind conditions, so boaters on Independence Lake could hear logging noise from some units. Topography and the residual vegetation would help buffer the noise.

The Limited Operating Period would be in effect during September and October, therefore late-summer recreationists would not be affected by noise generated from the project. Mechanized activities would be restricted to weekdays from about 7 a.m. to 5 p.m. Access roads to Independence Lake would be posted with notices informing the public about the project and scheduled logging on TNC land at Independence Lake.

Under the Proposed Action, transport of equipment would require the use of commercial trucks. These trucks and other motorized equipment, including use of a feller buncher, a rubber tired skidder, boom mounted masticator, a chipper and possibly a stroke de-limber, would increase the daytime ambient noise levels at each landing as operations proceed through the project.

3.7 Greenhouse Gases and Climate Change

3.7.1 Affected Environment
Climate change implies a significant change having important economic, environmental, and social effects in a climatic condition such as temperature or precipitation. Climate change is generally attributed directly or indirectly to human activity that alters the composition of the global atmosphere, additive to natural climate variability observed over comparable periods.

Greenhouse gases (GHGs) in the atmosphere allow short wavelength solar radiation to pass through the atmosphere to reach the earth's surface, but absorb the longer wavelength heat that is radiated back into the atmosphere from the earth. The concentration of greenhouse gases in the atmosphere has an effect on the average temperature at the surface of the earth. If the atmospheric concentration of greenhouse gases decreases over time, then more heat will escape through the atmosphere, and the average temperature at the earth's surface

will go down. If the greenhouse gas concentration in the atmosphere increases, however, less heat will escape to outer space and the average temperature at the earth's surface will increase.

The greenhouse gas of interest in the proposed project is carbon dioxide (CO_2) because it is a combustion product of vehicle and equipment fuel burning.

For this project, the GHG assessment area is the same as the watershed assessment area. The rationale for choosing the GHG assessment area is based upon the principle that any potential climate effects or impacts associated with the proposed project are linked to the carbon cycle from stump to forest product, product recycling and reuse, product consumption, eventual product decay, and tree regeneration.

The proposed project is part of a complex carbon equation and though methods to quantify potential greenhouse gas emissions have been developed for numerous sources, the connection between potential emissions and their ultimate potential effects on or contributions to climate change and global warming have not been precisely defined. No known quantitative significance threshold exists for potential global warming impacts.

The Independence Lake THP would manage the project area's timber resources on a sustained-yield basis using unevenaged management methods as outlined in the THP. As part of the carbon equation, the proposed project would result in emissions of GHGs during on-site operations, off-site transportation and manufacturing, wood product consumption, and eventual wood product decay. The project would also

- reduce the potential for wildland fire (a major contributor to GHGs)
- create conditions conducive to a forest that will grow more rapidly, and subsequently sequester relatively large volumes of additional carbon from the atmosphere roughly proportional to the forest's growth in biomass
- produce a product that requires up to 280 times less energy to produce than alternative construction materials such as steel, aluminum, plastics or concrete, and encourage the growth and sustainability of a renewable and recyclable resource.

The proposed project would use the "Alternative Prescription – Selection, Sanitation and Salvage" silvicultural methods on approximately 432 acres with periodic entries to conduct forest management operations. The 17 Step - Green House Gas Calculator Spreadsheet provide on the CAL FIRE website (California Department of Forestry and Fire Protection 2012) was used to calculate the total project CO_2 sequestration over a 100 year period and the replacement time for removed carbon stock.

The following are some of the most relevant issues to consider when analyzing the potential effects of the proposed project in regards to GHG concerns and carbon storage:

Sustainability of the long-term forest management plan (carbon growth vs. periodic removal, on- and off-site carbon storage over the long-term);

Carbon storage, which is largely dependent on forest stand health and vigor. In a given stand, the amount of carbon sequestered by young trees varies between 2 to 6 tons of carbon per acre per year depending on species and site quality and total accumulation of carbon (and wood) in fully stocked stands will continue to rise until the stand reaches maturity (Mader 2007). Subsequently, younger managed stands sequester carbon much more rapidly than older stands which have less efficient photosynthesis and higher respiratory losses and therefore may ultimately have zero net $C0_2$ uptake, but store more carbon. Studies have also found that the failure to account for carbon taken from $C0_2$ in the air and stored in forest products and mill residue significantly understates the total amount of carbon sequestered by California's managed forestlands (Cajun et al 2008).

Wildfire Effects – High severity wildfires represent a significant carbon loss and source of GHG emissions throughout the world. Wildfires are one of the primary contributors to GHGs and may emit up to 100 tons of $C0_2$ per acre depending on forest type, density, and fire intensity (Helms 2007). A study conducted for The Forest Foundation estimated that just four California wildfires sent 38 million tons of GHGs into the air, equivalent to 7 million cars on the road for one year in California (Bonnicksen 2008). Wildfires also remove carbon from surface soils and emit significant quantities of aerosols, particulates, and nitrous oxide and methane, which are more potent GHGs than C02 (Mader 2007).

Unmanaged forest stands in the project area create conditions that predispose the forest to unnatural, destructive crown fires. Implementing a long-term management and stewardship plan for the project area that addresses the need for thinning and hazardous fuels treatment greatly reduces the potential for high severity wildfire.

Insects and Disease - Insect and disease infestations create and contribute to similar impacts to the carbon cycle as wildfires, and exacerbate wildfire effects when fire occurs in infested areas. Dense, slow-growing unmanaged forest stands are the most susceptible to the effects of insects and disease and subsequent reduction of stored carbon. Forestry experts predict that more than 21 million additional acres of western forests will suffer significant tree mortality from bark beetle attacks during the next fifteen years (Bonnicksen 2007).

Carbon Leakage - Leakage refers to an unintended, previously unaccounted for, or unknown effect on the carbon accounting process. For example, overly restricted timber harvesting and management practices can create a negative

carbon leakage situation when there is compensation by importing wood from outside the area or region. This effect is a particular concern by the importation of wood from countries and regions where forests are not managed under the same level of comprehensive environmental guidelines and requirements as found in the U.S. and particularly in California. An additional part of the carbon leakage equation is the consumption of non-renewable fossil fuels to import the product into the United States and California.

Currently, the United States imports 36 percent of its wood consumption from other countries, some of which have far lower environmental standards and often may use illegal logging (Helms 2007). California imports 80 percent more wood than it produces (Tuttle 2007).

Emissions - The proposed project would produce carbon emissions during operations from the use of equipment and vehicles. Off-site emissions of GHGs would be produced during off-site transportation and manufacturing, wood product consumption, and eventual wood product decay.

3.7.2 Environmental Consequences

No Action Alternative

Under the no action alternative there would be no change or activity, therefore project-related GHG emissions would not be generated. A large, high severity wildfire has the potential to generate very high particulate, carbon dioxide, and other emissions in the short-term. A high severity wildfire would greatly reduce the stored carbon in the project area.

Proposed Action Alternative

According to the 17 Step - Green House Gas Calculator Spreadsheet provide on the CAL FIRE website (California Department of Forestry and Fire Protection. 2012), the total project CO_2 sequestration over a 100-year period would be approximately 91,053 metric tonnes. The carbon stock removed during any periodic harvest would be replaced within 8 years. The proposed project would not have a significant negative effect on greenhouse gases at either the project level or the assessment area level because there would not be a land use change or an activity that would decrease carbon storage over the normal periods expected for projects consistent with the California Forest Practices Act and its provisions.

Sustained Yield Management - The Independence Lake THP is proposing to use the Selection, Sanitation and Salvage silvicultural methods on 432 acres and periodic forest management operations would occur in the future on the project site. Under sustained yield management, the project's timber stands would be managed such that the amount of carbon removed from the whole stand is balanced by the amount of carbon grown and therefore, carbon storage per acre across the forest remains stable, while harvested carbon flows to product pools.

Carbon Storage - The proposed Independence Lake THP operations would maintain and enhance stand health and vigor, capture mortality, and shift carbon uptake to more-efficient growers, thereby increasing carbon sequestration.

Wildfire Effects –By providing a sound and long-term management and stewardship plan for the project area, the landowner (TNC) is greatly reducing the potential for high severity wildfire in the region.

Insects and Disease - The proposed Independence Lake thinning and hazardous fuels reduction project would enhance the forest's overall health, reduce the effects of insect and disease infestations and potentially negative carbon storage effects by treating and managing adverse stand conditions on the project site.

Carbon Leakage - By proceeding with the proposed Independence Lake thinning and hazardous fuels reduction project THP, which is written, filed, and reviewed under some of the most stringent and comprehensive environmental regulations in the world, the project can potentially reduce carbon leakage. The Independence Lake THP as proposed has the potential to create positive carbon effects by encouraging the local production and use of timber in the market place to reduce imports and the use and consumption of less-efficient and non-renewable wood substitutes.

Emissions – The proposed project would produce minimal carbon emissions during timber operations. Off-site GHG emissions would also occur in the larger carbon equation as discussed in the Affected Environment section. Considering the complete carbon equation, however, the proposed project would have large offsetting positive effects, including

- reduced high severity wildland fire hazard,
- increased vigor and health of the forest, shifting of carbon uptake to more-efficient trees in the stand,
- reduced mortality from insect and disease infestation,
- provide wood as a product substitution to replace other products which are non-renewable and emit higher amounts of $C0_2$ (e.g. displacing more fossil fuel-intensive products in housing construction),
- provide an economic benefit to the community in the form of jobs and commerce
- avoid negative carbon leakage and encourage positive carbon leakage, and
- provide a sustainable, renewable, and recyclable natural resource product.

The proposed project is part of a complex carbon cycle and though methods to quantify potential greenhouse gas emissions have been developed for numerous sources, the connection between potential emissions and their ultimate potential effects on or contributions to climate change and global warming have not been precisely defined. Based on information gathered, the contents of the proposed project, the Forest Practice Rules, information from the review of other plans, the magnitude of impacts identified and mitigation measures identified in previous

projects, the proposed project will not produce significant adverse cumulative effects to greenhouse gas emission at the project or assessment area level.

The assessment area contains over 20,500 acres of timberland. The US Forest Service (Tahoe National Forest) is the largest landowners within the assessment area, comprising over 71% ownership of the assessment area. Management objectives of the USFS include maintaining forested landscapes for wildlife habitat purposes. Review of the present, past, and foreseeable future projects indicates there is no significant anticipated decline or loss of carbon storage anticipated within the assessment area. From this analysis, it can be inferred that current carbon stocks will be maintained over time. It is reasonable to expect that forests within the assessment area will continue to sequester carbon at rates that significantly exceed non-biological emissions. As described above, significant adverse impacts regarding greenhouse gas emissions associated with the proposed timber operations are not expected. Considering the cumulative factors discussed above, this project would not reduce carbon sequestration of the stand, and would not remove the land base from timberland production. The project is expected to 1) increase growth rates throughout the project area, 2) increase carbon stocks over time, and 3) provide for the continued long-term management.

3.8 Cultural Resources

"Cultural Resources" is a broad term that includes prehistoric, historic, architectural, and traditional cultural properties. Those cultural resources that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) are referred to as historic properties. The criteria for NRHP eligibility are outlined at 36 CFR Part 60.4. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. Compliance with Section 106 of the NHPA follows a series of steps outlined at 36 CFR Part 800. These steps are used to identify and consult with interested parties, determine the area of potential effects (APE) for an undertaking, determine if historic properties are present within the APE, assess the effects the undertaking would have on historic properties, and resolve any adverse effects to historic properties before the undertaking is implemented. The Section 106 process also requires consultation with the SHPO, Indian tribes, and other interested parties.

3.8.1 Affected Environment

In the 1860s, Independence Lake was "discovered", and became a recreational fishing destination and ice-harvesting location. Starting in the 1870s, logging and sawmill operations began at the lake, including a network of railroad grades. In the early 1880s, a 3-story hotel and resort was developed at the lake. In the 1890s, more intensive logging took place, including using boats to transport logs to the sawmill. By 1936, Hobart Mills had closed its sawmill and curtailed logging operations in the area. The land surrounding Independence Lake was

acquired by Sierra Pacific Power in 1937. The land stayed under the same ownership until 2010, when TNC acquired it for conservation purposes.

Reclamation's proposed undertaking was determined to be the type of action that could cause effect to historic properties pursuant to 36 CFR Part 800. Reclamation's Section 106 compliance efforts included a cultural resources records search and pedestrian field survey, completed by ASM Affiliates, Inc., and Native American consultation completed pursuant to 36 CFR §§ 800.3(f)(2) and 800.4(a)(4). These efforts concluded that there were four historic-era railroad logging sites in the project Area of Potential Effects (APE).

In a letter dated May 24, 2012, Reclamation initiated consultation with the California State Historic Preservation Officer (SHPO), inviting the SHPO's comments regarding our delineation of the APE and Reclamation's efforts to identify historic properties in accordance with the Section 106 regulations. Reclamation also requested the SHPO's concurrence on Reclamation's determination of National Register of Historic Places ineligibility for the four railroads/logging sites documented in the project APE and that our finding of no historic properties affected was appropriate pursuant to 36 CFR Part 800.4(d)(1). On June 10, 2012, the SHPO requested additional information, which Reclamation provided on June 11, 2012.

3.8.2 Environmental Consequences

No Action Alternative

Under the No Action alternative, Reclamation would not allow grant funds to be used for the proposed project. Conditions related to cultural resources would remain the same as existing conditions. There would be no impacts to cultural resources under the No Action alternative.

Proposed Action Alternative

The SHPO responded to Reclamation's request for consultation in a letter of July 30, 2012, commenting that Reclamation's APE and level of effort to identify historic properties was appropriate, and concurring with Reclamation's NRHP eligibility determinations and finding of no historic properties affected. As the SHPO has concurred with Reclamation's finding of no historic properties affected, Reclamation's Section 106 responsibilities for this undertaking have been fulfilled.

If cultural resources are encountered during the forest management, mitigation measures will be followed as described in Appendix A and the Section 106 process for post-review discoveries, as outlined at 36 CFR Part 800.13, will be followed. In such cases, forest management work would not resume until Reclamation meets all compliance requirements and provides a written notice to proceed.

As outlined in the description of the Proposed Action alternative (Section 2, Proposed Action, and Appendix A – Project Design Features, Environmental Commitments, and Mitigation Measures: Cultural Resources) to comply with the THP, the following measures would be taken if a cultural resource were discovered during project activities:

If any additional archeological sites, features or artifacts are discovered during timber operations work would immediately stop near the find until an assessment of the situation is made. The person who made the discovery shall immediately notify Reclamation and then CAL FIRE, the LTO, the RPF, or TNC. The person first notified in shall immediately notify the remaining parties. No timber operations shall occur within 100 feet of the identified boundaries of the new site until the plan submitter proposes, and CAL FIRE agrees to protection measures.

3.9 Land Uses

3.9.1 Affected Environment

Current land use of the project area is primarily as a private land preserve. The management objectives are to protect the conservation values of Independence Lake. Independence Lake was acquired by TNC to protect and preserve the lake's unique assemblage of native fish, including the Federally listed LCT. Restoring and maintaining a high quality ecosystem is the paramount land use.

Biological research and monitoring is another important activity and is consistent with the restoration goal. Public access and day use is allowed during the summer. Public visitation is generally light, especially on weekdays. Recreational use is boating (boats are provided by TNC), hiking, bird watching, and other non-motorized forms of recreation. The proposed project area is seen from the access road to the headquarter area, and from roads that are closed to public access but open to hikers. The visual appearance from these vantage points is dense natural forest in the untreated areas and open natural forest in the areas that were treated in 2009 and 2010.

3.9.2 Environmental Consequences

No Action Alternative

Under the no action alternative there would be no change in current land use or visual appearance of the forest stands. If a large, high severity wildfire were to occur in the project area, visual quality of the forest stands would be impaired until a new forest was established. Public access in the affected areas might be limited because of safety concerns.

Proposed Action Alternative

Implementation of the proposed project would not affect land uses. Visual quality from road and trail access points could be temporarily impacted immediately following logging and use of prescribed fire, but the change would not be expected to persist beyond one or two seasons. Access in areas with active logging and burning would be limited because of safety reasons, but only temporarily during operations. Land use, including recreation use would positively affected by reducing the risk of loss or damage to the Independence Lake watershed from high severity wildfire.

3.10 Indian Trust Assets

3.10.1 Affected Environment

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States government for federally recognized Indian tribes or individual Indians. ITAs can include, but are not limited to, land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, in stream flows associated with trust land, water quality, fisheries, native plants, wildlife resources, and cultural sites. These resources are important for both cultural and traditional practices.

Beneficiaries of the Indian trust relationship are federally recognized Indian tribes and tribal members with trust land; the United States government is the trustee. By definition, ITAs cannot be sold, leased, or otherwise encumbered without the approval of the United States government. The characterization and application of the United States government trust relationship have been defined by case law that interprets congressional acts, executive orders, and historic treaty provisions.

There is one Tribe potentially affected by the proposed project, the Washoe Tribe of Nevada and California (Washoe Tribe).

The Washoe Tribe is a federally recognized Indian tribe organized pursuant to the Indian Reorganization Act of June 18, 1934, as amended. The Tribal office is located in Gardnerville, Nevada. The Washoe Tribe has four communities, three in Nevada (Stewart, Carson, and Dresslerville), and one in California (Woodfords). There is also a Washoe community located within the Reno-Sparks Indian Colony. The Washoe Tribe has jurisdiction over trust allotments in both Nevada and California, with additional Tribal Trust parcels located in Alpine, Placer, Sierra, Douglas, Carson, and Washoe Counties. The Washoe Tribe has cultural interests at and near Lake Tahoe but does not exercise any water rights in the Lake Tahoe or Truckee River basins. Tribal history extends an estimated 9,000 years in the Lake Tahoe basin and adjacent east and west slopes and valleys of the Sierra Nevada. The present day Washoe Tribe has deep roots in the past, radiating from Lake Tahoe, a spiritual and cultural center, and encompassing an area that stretches from Honey Lake to Mono Lake (Washoe Tribe 2011).

In a September 28, 2011 letter, the Washoe Tribe stated their support of the project, citing protection of water quality and the native fishery from catastrophic wildfire. The Washoe Tribe did not submit comments to the April 2012 version of the EA.

3.10.2 Environmental Consequences

No Action Alternative
Under the no action alternative there would be no change in activities at or near Independence Lake. Indian Trust Assets would not change from current conditions. If a large, high severity wildfire were to occur in the project area, ITAs such as water quality, fisheries, and native plants and animals could be negatively affected, however.

Proposed Action Alternative
Implementation of the proposed project is not expected to have a negative effect on Indian Trust Assets. Land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, in stream flows associated with trust land, water quality, native plants, wildlife resources, and cultural sites would not be affected or could benefit from the project. The populations of native fish, including LCT, would be positively affected by reducing the risk of loss or damage to fishery resources from high severity wildfire in the Independence Lake watershed.

3.11 Environmental Justice

3.11.1 Affected Environment
Executive Order 12898 (1994), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, provides that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Environmental justice programs promote the protection of human health and the environment, empowerment via public participation, and the dissemination of relevant information to inform and educate affected communities.

Independence Lake has no residents other than a few seasonal TNC and TMWA caretakers and workers. The lake receives seasonal recreation use, with most visitors traveling from local areas such as Sierraville or Truckee.

3.11.2 Environmental Consequences
No Action Alternative

Under the no action alternative, there would be no fuels treatment and thinning activity. There would be no change to existing environmental justice conditions or programs, and no effect to minority or low-income populations.

Proposed Action Alternative
Forest thinning and fuels reduction would take place in an uninhabited area that receives seasonal recreation use. The activities would not affect access, environmental quality, or human health. The project could have a slightly positive effect on local employment as the workers, and equipment are expected to be obtained locally. In summary, there would be no adverse human health or environmental effects to minority or low-income populations because of the proposed project.

3.12 Cumulative Effects

3.11.1 Introduction
The cumulative impacts analysis addresses the combined impacts of implementing the proposed project and No Action Alternative with those of other related past, present, and reasonably foreseeable projects that could result in impacts on the same environmental resources.

3.12.2 Legal Requirements

The CEQ regulations implementing NEPA (40 CFR 1508.7) define a cumulative impact for purposes of NEPA as follows:

Cumulative impact is 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 which agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Associated actions (past, present, or future) which, when viewed with the proposed actions, may have cumulative significant impacts. To determine the scope of the cumulative impacts analysis, related projects were identified. These include past, present, and reasonably foreseeable projects that may contribute to cumulative impacts, including, any projects outside of the control of the project proponent or agency.

CEQ regulations also state, “In general, actions can be excluded from analysis of cumulative impacts if the action will not affect resources that are the subject for the cumulative impacts analysis” (Council on Environmental Quality 1997).

3.12.3 Agreements, Plans, and/or Projects with Potential Related Cumulative Impacts

In preparing the Timber Harvest Plan, letters were sent to the Tahoe National Forest, Truckee and Sierraville Ranger Districts requesting information regarding past, present and future projects relevant to cumulative effects analysis of the proposed project. In meetings with Tahoe National Forest representatives, the following information was provided on past, present, and future projects within the Watershed Assessment Area for the THP. These projects are discussed below and shown on the map in Appendix E. The discussion below was largely derived from section IV of the timber harvest plan for Independence Lake (Whitlock 2011). Additional information can be found in Section 3.of this EA (Affected Environment and Environmental Consequences). Mitigation measures are listed in Section 2-Proposed Action Alternative, Environmental Commitments, and Conservation Measures.

1. **Liberty Forest Health Improvement Project** – 2000 the proposed Liberty project area is the northeast portion of the Tahoe National Forest on the Sierraville Ranger District. The purpose is to protect habitat for all Threatened, Endangered, and Sensitive species (spotted owls, furbearers, and mountain yellow-legged frogs) by reducing the probability of stand-destroying wildfire in forested habitat by applying silvicultural prescriptions to treatment areas totaling 1799 acres.

2. **Phoenix Project** - 2007/2008 – Fire hazard reduction and aspen restoration on approximately 4,969 acres. The Phoenix Project area is located in Sierra and Nevada Counties, in the southwest portion of the Sierraville Ranger District, west of Highway 89, south and west of Sierraville. The treatment units are located west and south of Treasure Mountain, in the Dark Canyon area, the area just southwest of the Little Truckee Campground and dispersed throughout the "checkerboard" ownership in the vicinity of Jackson Meadow Reservoir, Milton Reservoir, Meadow Lake, the Bald Ridge Loop Road, the Pass Creek Loop Road, Moscove Meadow, Perazzo Meadow, and other areas both north and south of the Fibreboard Road #07.

3. **Outback Aspen Restoration Project** - 2009 Sierraville Ranger District. The purpose of this project is to promote a proper growth environment that will restore the health and vigor of aspen stands in order to 1) promote aspen regeneration and expansion, and 2) manage for multiple ages and cover classes. The project applies vegetation treatments to approximately 479 acres by remove encroaching and competing conifers within and adjacent to aspen stands to reverse the aspen stand decline trend and improve aspen vigor, improve riparian vegetative and hydrologic conditions.

4. **Perazzo Meadows Watershed Restoration and Grazing Allotment Management Project** - 2009 Sierraville Ranger District. The purpose is to implement watershed restoration activities within the Little Truckee

River watershed in and around Perazzo Meadows. Approximately 5 miles west of Highway 89 and south of Fibreboard Road, Perazzo Meadows consists of a series of wet meadow complexes fed by the Little Truckee River, Perazzo Canyon Creek and Cold Stream located along the east slope of the Sierra Nevada mountain range.

5. **Sagehen Project** – 2010 Pacific Southwest Research Station – Sagehen Experimental Forest, Truckee Ranger District. This project involves an extensive, yearlong collaborative effort to design an integrated, innovative approach for applying the most recent science to enhance marten habitat, restore forest stand ecological conditions, and manage fire and fuels on national forest lands within the Sagehen Experimental Forest on approximately 2,750 acres of treatment utilizing various methods.

Upper Independence Creek Cutbank Restoration Project – 2012 Sierraville Ranger District. Beginning in late-summer 2012, the Tahoe National Forest, TNC, and partners plan to remove an old weir and restore an associated eroding stream bank currently threatening the key spawning stream for LCT at Upper Independence Creek (UIC) located at the northern end of Independence Lake. The stream bank is a site of high erosion on the outside of a meander bend. The eroding bank is causing harm to in-stream cutthroat trout habitat through sedimentation of spawning gravels and depletion of cover and resting habitat. The weir was destroyed by high storm water flows and the remains of the weir are causing disruptions to the natural geomorphic and hydrologic patterns in the creek.

The project has two main goals and objectives:

1. Remove the old, non-functioning fish weir to restore natural hydrology of UIC
2. Restore 80-feet of eroding stream bank to reduce sedimentation in UIC.

When the project is complete, the Tahoe National Forest, TNC, and partners would:

- Remove all traces of the non-functioning weir, including steel, lumber, concrete, rebar, cyclone fencing, and riprap.
- Restore the associated downstream stream bank by regrading and recontouring the stream bank, and constructing a log revetment structure to stop the erosive process.
- Improve spawning habitat for LCT in the affected area of stream channel with the log revetment.
- Improve cover habitat for LCT in the affected area of stream channel.
- Use natural materials so that as the project naturally degrades or the stream channel changes, only native materials would be visible.

In addition to the Tahoe National Forest projects, TNC will be implementing the **Independence Lake Spillway Fish Barrier** project, which was funded by a grant

from the Bureau of Reclamation, Desert Terminal Lakes Program. Under DFG Streambed Alteration Agreement 1600-2011-0139-R2, construction of a fish barrier on the spillway outlet of Independence Lake will be implemented as part of an overall strategy to protect and restore the native LCT population of Independence Lake. This project is scheduled for installation in summer or early fall 2012. The structure is to be installed on the spillway channel during late season flows. It is designed to prevent upstream migration of non-native fish into Independence Lake to protect the native fishery.

Removal of brook trout in Upper Independence Creek
For six years, the U.S. Geological Survey has led an annual effort to remove brook trout from UIC using electroshocking. Other cooperating agencies include the U.S. Forest Service, CA Department of Fish and Game, and the U.S. Fish and Wildlife Service. This project supports the long-term conservation outcome at Independence Lake of increasing the number of spawning adult LCT from the current number of about 175 adults annually to 500 to 1,000 adults annually. The number of spawning LCT increased to 237 in 2010, the highest number in 50 years. Before the project began, the highest number of spawning LCT was 150 and there has been a steady increase each year since 2005, when the program began. LCT egg fry survival has increased three-fold during this same period. Until brook trout are no longer a threat to the Independence Lake LCT population, it is expected this program would continue.

3.12.4 Cumulative Impact Analysis

This section describes the cumulative impacts that could be associated with the forest thinning and hazardous fuels reduction project alternative and No Action Alternative when combined with other related past, present, and reasonably foreseeable actions in the Independence Lake basin. Cumulative impacts would not be considered adverse for one or both of these reasons:

- Cumulative impacts would be beneficial, or
- The impact of the proposed project alternative would not be added to the impact of other projects (i.e., no cumulative impact would occur) or would be too minor or localized to be considered cumulatively.

Biological and Watershed Resources, Fire and Fuels

During the past 10 years, private timber harvesting operations have occurred within the planning watershed. Table 5 is a list of public (U.S. Forest Service) and private (CDF/CAL FIRE) timber harvest plans, which have been filed or have occurred wholly or partially within the assessment area. Records checked include CDF Forest Practice Database, Northern Region Forest Practice GIS (FPGIS), CDF Area Foresters' files and maps, and Tahoe National Forest documents.

Please note, timber harvesting histories generated by the California Department of Forestry and Fire Protection's Northern Region Forest Practice GIS (FPGIS)

show information currently in the files of CAL FIRE, which are documents in the public domain. Because the status of timber harvesting plans change –through operational activity and/or amendments to the original THP, and because geographic features may be reclassified or added into the data-sets over time, CAL FIRE recommends that this GIS data is not redistributed. Rather, obtain the information directly from CAL FIRE to assure the data is current and accurate.

The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of or arising from the use of data or maps.

Public and private timber harvesting in the past 10 years for the Watershed Assessment Area – Calwater v2.2 ID 8636.000203-Independence Lake (4,967 Ac.), Calwater v2.2 ID 8636.000201-Lower Independence Lake (8,760 Ac.), and Calwater v2.2 ID 8636.000302-Upper Sagehen Creek (6,775 Ac.), totaling approximately 20,502 acres, including the future Independence Lake THP (proposed project).

Harvest Document	Section	Township	Range	Silviculture	Acres	% WAA
2-04-156 NEV	13/15/23/27	18N	15E	Shelterwood Removal	15	.07
				Alt. Sanitation/Sal	624	3.0
				Sanitation/Salvage	179	.87
				Selection	740	3.6
2-00-229 SIE	23	19N	15E	Alt. Sanitation Salvage	40	.19
2-09EX-340 SIE	34/35	19N	15E	Fuel break	53	.25
2-10EX-551 SIE	34/35	19N	15E	Fuel break	51	.24
Liberty Project					1799	8.7
Phoenix Project					4,969	24.2
Outback Project					479	2.3
Sagehen Project					2,750	13.4
Total Past/Present					**11,699**	57.0
Independence Lake THP					432	2.1
Total Past, Present, Future					**12,131**	**59.1**

Table 5: Cumulative Timber Harvest Activities in the Watershed Assessment Area

In developing the THP, an evaluation was made on the relative level of activity that may be associated with the watershed. Field evaluations included observations of watercourse conditions at existing public roadway crossings and overview observations as are available from public access points. No ongoing problems related to past harvests were found to be apparent in these observations with the exception of the low water crossing on County Road 350 as identified in the THP.

Over the past 10 years, fuels reduction activities, including timber harvesting, has affected a considerable portion of the Watershed Assessment Area. In general, these impacts are temporary in nature when compared to urbanization and rural growth. Timberland site recovery is estimated using recovery curves. The base disturbance coefficient impact values approximate the watershed's ability to absorb land use activities without causing significant detrimental effects to the beneficial uses of water. For example, full site recovery from timber harvesting activities can occur within 9 to 15 years depending on the type of selected silviculture and harvesting practice. In comparison, urbanization and rural growth areas cannot recover assuming continued site occupancy.

Timber harvest in the project area began around 1917 with railroad logging. Generally, the largest conifer trees were harvested by a system of steam donkey skid trails and railroad grades, evidence of which is still visible in the project area today. Sheep grazing began at the same time as timber harvest. The institution of aggressive fire suppression policies in the mid-1900s has resulted in over-stocked forest stands, with an overabundance of shade-tolerant species such as white fir in the understory. Many current stands have a "fuel-ladder" configuration, and are now very susceptible to the spread of forest fires.

Portions of the WAA have been subject to high-severity fire in the past, such as the 1928 Independence Fire, and most notably the Donner Ridge Fire that occurred in the fall of 1960 and burned approximately 44,000 acres under high fire intensities.

There is substantial risk that a wildfire could start in the more populated areas located to the south of the WAA during a period of low fuel moistures and be driven into the Independence Lake basin by winds from the south or southwest. Under such a scenario, the fire entering the WAA would likely be characterized by extreme fire behavior, with long flame lengths and high rates of spread. Such a fire would be expected to spread in a manner similar to the Donner Ridge Fire or other more recent large fires in the Truckee/Tahoe area. There is also the possibility of a fuel-driven wildfire from the south and southwest in which fire would move through the even-aged plantations in the southeastern portion of the WAA. The high vegetation densities in these plantations, combined with the short distance from the ground to the live crowns of the trees, would cause the fire to spread rapidly. A secondary threat is a wildfire starting along Highway 89, which could be driven into the WAA by winds from the north/northeast.

A rapidly spreading wildfire in the area would adversely affect numerous ecological values; including high quality late-seral habitat for the American marten, California spotted owl, and northern goshawk as well as relatively rare habitats, including aspen stands and fens. Implementation of the forest thinning and hazardous fuels reduction project, in combination with other projects, is not expected to result in discernible or long-term impacts to wildlife. The projects are short-term in duration with expected minor impact on wildlife habitat. Most terrestrial species would be expected to avoid the affected areas while activity is underway. Minor short-term effects could occur to wildlife from cumulative impacts from disturbance (noise, human activity, dust), but habitat would improve over the long-term for most native wildlife species.

A severe wildland fire could have substantial adverse effects on riparian habitats and water quality in WAA, the waters of which enter the Little Truckee and Truckee Rivers. The State of California has listed the Truckee River as being "water quality limited" under Section 303 (d) of the Clean Water Act, and Sagehen Creek has been recommended for designation as a Scenic River under the Wild and Scenic River Act.

Positive environmental impacts, with regard to forest health and forest fuels reductions, have resulted from the recent projects listed within the assessment area. Forest thinning activities result in better forest protection from forest fires, prevention of the build-up of tree-killing insect populations, and protection from the spread of forest diseases. The presence of healthy forest stands in the assessment areas will help protect soil and water resources over time.

The project complies with CEQA (through the THP), NEPA, California Forest Practice Rules, Federal Threatened & Endangered Species Act, Lahontan Regional Water Quality Control Board oversight, and local Sierra and Nevada County rules and regulations. If all appropriate rules and regulations are adhered to on the project, negative environmental impact are minimized or mitigated to a level of no significance.

In summary, the forest thinning and hazardous fuels reduction project would have no long-term cumulative impact on water quality, soils, and vegetation, when combined with other projects. A 432-acre area within the Independence Creek watershed would be disturbed temporarily over the next two to five years. This work is expected to help protect the watershed from the effects of high severity wildfire, such as erosion and high sediment loads in the drainages. The project is complimentary to the other water quality and LCT habitat improvement projects in that a healthy watershed is also necessary to the long-term survival of LCT.

Special Status Plants and Animals

The forest thinning and hazardous fuels reduction project, when considered along with other past, present, and reasonably foreseeable future projects, would have a

beneficial impact on LCT and other native fish species in Independence Lake. Implementation of these combined projects would improve native fish habitat, reduce the risk of non-native fish competition, and reduce the risk of damage to the watershed from high intensity wildfire. Special status plants or animals would not be adversely affected.

Cultural Resources

Implementation of the project would result in limited ground-disturbing activity. The cumulative impacts of past, present, and future actions on cultural resources relate primarily to the potential for damage to cultural resources and their context from ground-disturbing activities. Other federally funded projects occurring in the area would be required to comply with Section 106 of the NHPA if applicable. Pursuant to the definition at 40 CFR Part 1508.27(b) (8), any potential adverse impacts on cultural resources from federal projects would be mitigated to less-than-significant levels using the Section 106 process.

The Proposed Action has the potential to affect cultural resources. Since no historic properties would be affected, no cultural resources would be impacted because of implementing the proposed action. The project, along with other known activities occurring in the Independence Lake area, is not expected to result in adverse cumulative impacts on cultural resources.

Recreation

Access to certain parts of TNC's Independence Lake lands may be temporarily restricted for safety reasons during project work. Access would be restored immediately following work in specific areas. Long-term access would not be affected by the project.

Indian Trust Assets

The cumulative effects of the project, combined with the programs and projects listed in Table 5 and described in Section 3.11.3 would improve the long-term habitat of fish, wildlife, vegetation health, water quality, and watershed ITAs. No adverse cumulative impacts on ITAs from the forest thinning and hazardous fuels reduction project, along with other projects and programs in the area are anticipated.

Environmental Justice

The project would have no effect on minority and low-income groups Other projects within the area including implementing potential federal and private conservation and stewardship activities, fisheries and habitat improvements, and restoration could result in beneficial impacts on environmental justice populations. The overall outcome would not be expected to result in a cumulative adverse impact on environmental justice populations.

Other Resources

The project, along with the other known projects in the area, would have no cumulative impact on land use, water resources, geology, noise, greenhouse gases, or air quality.

Section 4 Coordination and Consultation

4.1 Consultation and Coordination

On April 13, 2012, the EA was sent to the Washoe Tribe of Nevada and California and to the Pyramid Lake Paiute Tribe for comments. No comments were received.

Tribal consultation was initiated by letter on September 9, 2011, to the Washoe Tribe of Nevada and California and to the Pyramid Lake Paiute Tribe. Reclamation received a response letter from the Washoe Tribe expressing support for the project for its efforts to protect the native fishery and water quality of Independence Lake. The Washoe Tribe asked to be contacted if any artifacts were found.

In addition, the following Tribes were contacted by ASM prior to the archaeological survey:

- Washoe Tribe of Nevada and California (Gardnerville, NV);
- United Auburn Indian Community of the Auburn Rancheria (Auburn, CA);
- Greenville Rancheria of Maidu Indians (Greenville, CA);
- T'Si-akim Maidu (Colfax, CA)

Pursuant to Section 7 of the Endangered Species Act of 1973, Reclamation requested a species list from the U.S. Fish and Wildlife Service for the Independence Lake Forest Thinning and Hazardous Fuels Reduction Project and analyzed listed species in a Biological Assessment (BA). Consultation with the U.S. Fish and Wildlife Service was not required because the BA found that project would not affect any federally listed plant or animal species.

The California Department of Fish and Game provided comments on the EA released in April, 2012 (see Appendix F – Public Comment). DFG's comments centered on potential effects of spring burning on special status wildlife, pre-

project wildlife surveys, consultation on great grey owl, and silvicutural treatments in aspen groves, In addition, DFG sent a letter to TNC dated August 14, 2012, specifically concerning coordination and consultation for great grey owl. A field meeting with TNC and DFG followed on August 17. At that meeting specific measures to protect GGO were agreed upon.

Staff from the Lahontan Regional Water Quality Control Board provided comments on the EA released in April, 2012 (see Appendix F – Public Comment). The comments centered on the design of the road crossing at Independence Creek and the Timber Waiver for the project.

4.2 Other Federal Laws, Regulations, and Executive Orders

In undertaking the proposal, Reclamation will comply with the following federal laws, executive orders, and legislative acts: Floodplain Management (Executive Order 11988); Protection of Wetlands (Executive Order 11990); Migratory Bird Treaty Act (16 U.S.C. 703 et seq.); Federal Noxious Weed Control Act, E.O. 13112, and 43 CFR 46.215 (l), Environmental Justice (Executive Order 12898), and the Fish and Wildlife Coordination Act (16 U.S.C. § 661).

4.3 Public Involvement

Public notification on the release of the EA was made on April 13, 2012, when a letter was sent to 54 interested parties and a news release was issued. The EA and appendix material was posted on the Mid-Pacific Region's NEPA webpage. The 30-day comment ended on May 16.

Two comments were received on the EA, one from the one from the Lahontan Regional Water Quality Control Board and one from California Department of Fish and Game. The specific comments and responses are addressed in detail in Appendix F – Public Comment. Conflicting language in the EA pointed out by the LRWQCB, new information from coordination with DFG, and specific language in the Stream Alternation Agreement from DFG prompted the EA to be updated.

Scoping for the EA took place in 2011. A letter was mailed on September 9, 2011, to approximately 60 members of the public, organizations, stakeholders, tribes, and public agencies. The letter requested public comment on the preparation of this EA and invited recipients to a public meeting at the proposed project site on September 28, 2011.

Two agency representatives and four members of the public attended the field meeting, along with Reclamation, and TNC. Information from the meeting was

used to clarify the analysis in the EA. Comments and discussion did not result in creating new alternatives in the EA. No response letters were received from the public.

Section 5 References

Arno, S. 2002. Flames in Our Forest: Disaster or Renewal? Island Press. 227 pp.

Aubry, K.L., K.S. McKelvey, and J.P. Copeland. 2007. Distribution and broadscale habitat associations of the wolverine in the contiguous United States. Journal of Wildlife Management 71:2147–2158.

Beck, T.W. and J. Winter. 2000. Survey protocol for the great gray owl in the Sierra Nevada of California. Vallejo, CA. U. S. Department of Agriculture, Forest Service, Pacific Southwest Region.

Best, D.W. et al., 1995. Role of fluvial hill slope erosion and road construction in the sediment budget of Garrett Creek, Humboldt County, California. Professional Paper 1454, Washington, DC; US Geological Survey.

Bonnicksen, T. 2008. Greenhouse gas emissions from four California wildfires: Opportunities to prevent and reverse environmental and climate impacts. FCEM Report No.2. Prepared for the Forest Foundation, March 12, 2008.

Bonnicksen , T. 2007. Protecting Communities and Saving Forests: solving the Wildfire Crisis through Restoration Forestry. The Forest Foundation, Auburn, CA.

Bradford, D. F. 1984. Temperature modulation in a high-elevation amphibian, Rana muscosa. Copeia 1984(4):966-976.

Brown, G.W. 1985. Controlling Non-point Source Pollution from Silvicultural Operations: What We Know and Don't Know. In Perspectives on Non-point Source Pollution, pp. 332-333. U.S. Environmental Protection Agency.

Buskirk, S. W., and R. A. Powell. 1994. Habitat ecology of American martens and fishers. In S.W. Buskirk, A. S. Harestad, M. G. Raphael, & R. A. Powell (Eds.), Martens, sables and fishers: biology and conservation (pp. 297-315). Ithaca, NY: Cornell University Press.

Cajun, J., B. Krumland, and P. Eckert. 2008. A case study: How California's forests store carbon and improve air quality. Sierra Pacific Industries.

Sierra Pacific Website: www.spi-ind.com. "Our Forests" tab in the Research and Monitoring section.

California Department of Forestry and Fire Protection. 2012 Green House Gas Calculator http://www.fire.ca.gov/resource_mgt/resource_mgt_forestpractice_pubsmemos_memos.php

California Department of Water Resources 2011. http://cdec.water.ca.gov/cgi-progs/profile?s=INL&type=dam Accessed March 2011.

California Regional Water Quality Control Board, Lahontan Region. 1995. Water Quality Control Plan for the Lahontan Region (as amended). http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/ Accessed March 2012.

Copeland, J.P., J.M. Peek, C.R. Groves, W.E. Melquist, K.S. McKelvey, G.W. McDaniel, C.D. Long, and C.E. Harris. 2007. Seasonal habitat association of the wolverine in Central Idaho. Journal of Wildlife Management 71:2201–2212.

Copeland, J.P., K.S. McKelvey, K.B. Aubry, A. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H. Golden, J.R. Squires, A Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola, and R. May. 2010. The bioclimatic envelope of the wolverine (Gulo gulo): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88: 233-246.

Council on Environmental Quality. 1997. Considering Cumulative Effects Under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President, Washington, DC. January.

Curtis, J.G., D.W. Pelren, D.B. George, V.D. Adams, and J.B. Layzer. 1990. Effectiveness of Best Management Practices in Preventing Degradation of Streams Caused by Silvicultural Activities in Pickett State Forest, Tennessee. Tennessee Technological University, Center for the Management, Utilization and Protection of Water Resources

Finney, M. 2001 Design of Regular Landscape Fuel Treatment Patterns for Modifying Fire Growth and Behavior. Forest Science 47(2):219–228.

Freel, M. 1991. A literature review for management of fisher and marten in California. Unpubl. Document, USDA Forest Service, Pacific Southwest Region.

Fry, W. 1923. The wolverine. California Fish and Game 9(4):129-134.

Gerstung, E. R. 1986. Fishery management plan for Lahontan cutthroat trout (Salmo clarki henshawi) in California and western Nevada water. Inland Fisheries Administrative Report No. 86-, Federal Aid Project F33-R-11, The Resources Agency, California Department of Fish and Game. 54 pp.

Gerstung, E.R., 1988. Status, Life History, and Management of the Lahontan Cutthroat Trout. In: American Fisheries Society Symposium, Bethesda, Maryland, Vol. 4, pp. 93-106.

Helms, J.A. 2007. Thoughts on managing forests for carbon sequestration. The Forestry Source.

Holdredge and Koll. 2009. Geotechnical Engineering Report for Independence Lake Fish Barrier Project. Prepared for Blue Line Consulting, Santa Cruz, CA. 37 pp.

Hornocker, M.G. and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Can. J. Zool. 59:1286-1301.

Huff, D.D., Hargrove, B., Tharp, M.L., Graham, R., Managing Forests for Water Yield – The Importance of Scale., Journal of Forestry, Vol., 98, # 12, Dec. 2000.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. CA Dept. of Fish and Game. Rancho Cordova. Pgs 50-53.

Jones, J.A., Grant, G.E. 1996. Peak flow response to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research 32.

Knapp, R. A., and K. R. Matthews. 2000. Non-native fish introductions and the decline of the mountain yellow-legged frog from within protected areas. Conservation Biology 14(2):428-438.

Krohn, W. B., W. J. Zielinski, and R. B. Boone. 1997. Relationships among fishers, snow, and martens in California: results from small-scale spatial comparisons. In G. Proulx, H. N. Bryant, & P. M. Woodard (Eds.), Martes: taxonomy, ecology, techniques, and management (pp. 211-232). Edmonton, Alberta, Canada: Provincial Museum of Alberta.

Mader, S. 2007. CLIMATE PROJECT: Carbon Sequestration and Storage by California Forests and Forest Products. California Forests for the Next Century.

Matthews, K. R., and K. L. Pope. 1999. A telemetric study of the movement patterns and habitat use of Rana muscosa, the mountain yellow-legged frog, in a high-elevation basin in Kings Canyon National Park, California. Journal of Herpetology 33(4):615-624.

Megahan, W.F. 1975. Sedimentation in relation to logging activities in the mountains of central Idaho: Present and prospective technology for predicting sediment yields and sources. ARS-S-40. USDA –ARS.

Moriarty, K.M., W.J. Zielinski, A.G. Gonzales, T.E. Dawson, K.M. Boatner, C.A. Wilson, F.V., Schlexer, K.L. Pilgrim, J.P. Copeland, and M.K. Schwartz. 2009. Wolverine confirmation in California after nearly a century: native or long distance migrant? Northwest Science 83: 154-162.

Moyle, P. B. 1976. Inland fishes of California. University of California Press, Berkeley, California. 405 pages.

North, M.; P. Stine, K. O'Hara, W. Zielinski, S. Stephens. 2009. An ecosystem management strategy for Sierran mixed-conifer forests. Gen. Tech. Rep. PSW-GTR-220. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 49 p.

Pardo, R. 1980. What is Forestry's Contribution to Nonpoint Source Pollution? In U.S. Forestry and Water Quality: What Course in the 80s? Proceedings of the Water Pollution Control Federation Seminar, Richmond, VA, June 19, 1980, pp. 31-41.

Pope, K. L., and K. R. Matthews. 2001. Movement ecology and seasonal distribution of mountain yellow-legged frogs, Rana muscosa, in a high-elevation Sierra Nevada basin. Copeia 2001(3):787-793.

Riekerk, H. 1983. Impacts of Silviculture on Flatwoods Runoff, Water Quality, and Nutrient Budgets. Water Resources Bulletin, 19(1):73-80.

Riekerk, H., D.G. Neary, and W.J. Swank. 1989. The Magnitude of Upland Silviculture Non-point Source Pollution in the South. In Proceedings of the Symposium: Forested Wetlands of the Southern United States, July 12-14, Orlando, FL, pp. 8-18Peter Rissler. 2011. Personal communication. Presentation slides, Interagency LCT meeting, January 19, 2011, Reno, NV.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon and W. J. Zielinski, tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the United States. Gen. Tech. Rep. RM-254. U.S. Department of Agriculture, Forest Service,

Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 184 pp.

Ruggiero, L.F., K.S. McKelvey, K.B. Aubry, J.P. Copeland, D.H. Pletscher, and M.G. Hornocker. 2007. Wolverine conservation and Management. Journal of Wildlife Management 71:2145-2146.

Schempf, P.F. and M. White. 1977. Status of six furbearer populations in the mountains of northern California. USDA Forest Service. 51 pp.

Schnurrenberger, C. 2009a. July 16 letter to C. Fichtel summarizing a special status plants found in a botanical survey at Independence Lake. By Catherine Schnurrenberger, C.S. Ecological Surveys and Assessments, Truckee, CA for TNC. On file with TNC, Reno, NV.

Schnurrenberger, C. 2009b. July 30 letter to C. Fichtel summarizing a noxious and invasive weeds found in a botanical survey at Independence Lake. By Catherine Schnurrenberger, C.S. Ecological Surveys and Assessments, Truckee, CA for TNC. On file with TNC, Reno, NV.

Schnurrenberger, C. 2011. October 3 C. Fichtel summarizing a botanical survey for TESC plants and noxious and invasive weeds for proposed forest thinning and mastication units at Independence Lake. By Catherine Schnurrenberger, C.S. Ecological Surveys and Assessments, for TNC. On file with TNC, Reno, NV.

Shea, Sean. U.S. Geological Survey, Reno NV, phone conversation with Jane LaBoa, TNC contractor. MYLF sightings in upper Independence Creek and bald eagles at Independence Lake, February 14, 2011.

Squires, J. R., J. P. Copeland, T. J. Ulizio, M. K. Schwartz, and L. F. Ruggiero. 2007. Sources and patterns of wolverine mortality in western Montana. Journal of Wildlife Management 71(7):2213-2220.

Swanson Hydrology + Geomophology. 2009. Upper Independence Creek Geomorphic and Hydrologic Study. Prepared for The Nature Conservancyand Truckee River Watershed Council. On file with TNC, Reno, NV.

Tuttle, A. 2007. FAWs on Forest Caron II: The California Forest Protocols after AB 32. University of California, College of Natural Resources, Berkeley, CA. [Visiting faculty member and former Director of the California Department of Forestry and Fire Protection.] Revised March 2007.

U.S. Bureau of Reclamation. 2008. Revised Draft Environmental Impact Statement/Environmental Impact Report for the Truckee River Operating

Agreement, Alpine, El Dorado, Nevada, Placer, and Sierra counties, California, Carson City, Churchill, Douglas, Lyon, Pershing, Storey, and Washoe counties, Nevada: Prepared by the Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Bureau of Indian Affairs, and the California Department of Water Resources.

U.S. Department of Agriculture. 1994. Soil survey of the Tahoe National Forest area, California. National Cooperative Soil Survey. Prepared by Richard O. Hanes, Soil Conservation Service. 377 pp. On file with the Tahoe National Forest, Nevada City, CA.

U.S. Fish and Wildlife Service. 1995. Lahontan Cutthroat Trout, Oncorhynchus clarki henshawi, Recovery Plan. Portland, OR.

———. 2003a. Short-term action plan for Lahontan cutthroat trout (Oncorhynchus clarki henshawi) in the Truckee River Basin. Reno: Developed by the Truckee River Basin Recovery Implementation Team for the U.S. Fish and Wildlife Service.

_____. 2003b. Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition To List the Sierra Nevada Distinct Population Segment of the Mountain Yellow-legged Frog (Rana muscosa). Federal Register 68 (11): 2283-2303.

_____. 2004. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher (Martes pennanti). Portland,OR.

_____.2008. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp.

_____.2009. Lahontan Cutthroat Trout (Oncorhynchus clarkii henshawi) 5-year: Summary and Evaluation. Nevada Fish and Wildlife Office, Reno, NV. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E00Y

_____. 2010. 12-Month Finding on a Petition to List the North American Wolverine as Endangered or Threatened; Proposed Rule. Federal Register 75: 78030-78061.

U.S. Forest Service. 2011. Forest Vegetation Simulator User Guides. http://www.fs.fed.us/fmsc/fvs/documents/userguides.shtml

_____. 2009. Biological Evaluation/Biological Assessment for birds, mammals, reptiles, terrestrial invertebrates, Outback Project, Sierraville Ranger District. Prepared by Craig Wilson, Tahoe National Forest.

U.S. Geological Survey. 2006. Life history, ecology and population viability analysis of the Independence Lake strain Lahontan cutthroat trout, Final Report. On file at the USGS Western Fisheries Research Center, Reno, NV.

Urich, Deborah, Tahoe National Forest. Phone conversation with Jane LaBoa, contractor for TNC. MYLF sightings in Independence Creek drainage, February 14, 2011.

Vredenburg, V. T., R. Bingham, R. Knapp, J. A. T. Morgan, C. Moritz, D. Wake. 2007. Concordant molecular and phenotypic data delineate new taxonomy and conservation priorities for the endangered mountain yellow-legged frog. Journal of Zoology 271: 361-374.

Washoe Tribe. 2011. History and Culture. Available: http://www.washoetribe.us/history-a-culture.html Accessed March, 2011.

Welch, W.R., 1929. Trout fishing in California today and fifty years ago. California Fish and Game 15:20-22.

White, M. and R.H. Barrett. 1979. A review of the wolverine in California with recommendations for management. Unpublished paper. Prepared for the USDA Forest Service, Region 5. By the Dept. of Forestry and Resource Management. College of Natural Resources. University of Calif. Berkley. 71 pp.

Wilson, Craig, Tahoe National Forest, 2011. Phone conversation with Jane LaBoa, contractor for TNC. 2008 wolverine presence in Sagehen Creek drainage, January 31, 2011.

Whitlock, Kevin. 2009. Independence Lake Management Plan. Prepared for TNC by Under the Trees, Kevin Whitlock CA RPF #2436. On file with TNC, Reno, NV. 74 pp.

Whitlock, Kevin. 2011. Timber Harvest Plan for Independence Lake, #2-11-069 SIE. Public copy at ftp://thp.fire.ca.gov/THPLibrary/Cascade_Region/THPs2011/2-11-069SIE/

Winford, Eric. 2011. Personal communication. Email and telephone conversations concerning FVS and FFE modeling results for Independence Lake fuel treatments.

Witham, C., 2000. Current Knowledge and Conservation Status of Ivesia webberi Gray (Rosaceae), the Webber ivesia, in Nevada. Status report prepared for Nevada Natural Heritage Program and U.S. Fish and Wildlife.

Zielinski, W. J., R. L. Truex, F. V. Schlexer, L. A. Campbell, and C. Carroll. 2005. Historical and contemporary distributions of carnivores in forests of the Sierra Nevada, California, USA. Journal of Biogeography 32:1385-1407.

Zeimer, et. al., 1991 Modeling the cumulative watershed effects of forest management strategies. Journal of Environmental Quality.

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