

Appendix D
BABE Wildlife

1.0 INTRODUCTION

1.1 Purpose

This Biological Assessment and Evaluation (BA/BE) evaluates the effects of the Lake Forest Erosion Control Project (ECP) Area B, Environmental Improvement Program (EIP) Project, on species listed as threatened, endangered, or proposed for listing by the U.S. Department of Fish and Wildlife Service (USFWS) and species designated as sensitive by the Regional Forester of the United States Forest Service (USFS).

This BA/BE is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act of 1973, as amended, [19 U.S.C. 1536(c), 50 CFR 402.12 (f), and 402.14 (c)], and follows standards established in the U.S. Department of Agriculture (USDA) Forest Service Manual (FSM 2672.42). The BA/BE provides a process through which federally proposed, threatened, and endangered species receive full consideration in the decision making process. For sensitive species, this document will evaluate whether the proposed action will result in a trend toward federal listing as threatened or endangered by the USFWS.

1.2 Brief Description of Existing Environment

Two ephemeral creeks, Lake Forest and Polaris, traverse portions of the project area. Upstream of State Route (SR) 28, Lake Forest Creek is incised with manmade structures and placed fill that encroach on the channels and stream environment zone (SEZ). The reach just upstream of the SR 28 crossing has been relocated and channelized. Just downstream of the highway crossing, Lake Forest Creek is completely buried in a storm drain until approximately 1,000 feet upstream of Lake Forest's outlet to Lake Tahoe. Downstream of the outlet of the storm drain, the riparian area of Lake Forest Creek has been degraded through channelization and urbanization. Most of the channel has been straightened or otherwise altered. The wetlands at the mouth of the creek at Lake Tahoe are also degraded and mostly non-functional.

The Polaris Creek watershed is relatively undeveloped. The section of Polaris Creek upstream of SR 28 has been channelized and disconnected from its surrounding meadow. In addition, fill has been placed within the meadows, destroying critical habitat. Downstream of SR 28, construction of Pomin Park disrupted the natural flow of water and environment at the mouth of Polaris Creek and the wetland complex just upstream of the mouth within and adjacent to Pomin Park. Existing wetlands have been degraded by overgrowth of vegetation and placement of fill. The creek reaches that drain the wetland have been channelized and disconnected from their floodplain meadows. During construction of Pomin Park, fill was placed in the Polaris Creek SEZ.

1.3 Summary of Proposed Action

Placer County is the lead agency for the proposed project, which is part of the EIP in the Lake Tahoe basin. The Lake Forest ECP Area B EIP Project has three facets: SEZ restoration and associated wildlife habitat restoration, erosion control/water quality improvements in developed areas, and recreational opportunity enhancements. Specifically:

- The project provides for restoration of Lake Forest and Polaris Creeks to near pre-1960s conditions through re-establishment of functional SEZ in the Lake Forest Glen Meadow, onto publicly owned lands, and south to an existing discharge point to Lake Tahoe.
- The project includes drainage improvements within the Highlands subdivision, Panorama Drive/Meadowbrook Drive area subdivisions, and Lake Forest area condominium complexes, light industrial area, and subdivisions.
- To complement and expand upon the SEZ restoration and water quality improvements, recreation and wildlife habitat enhancement features are included in the project.

1.4 Species Addressed

One federally listed threatened species and 13 Region 5 USFS sensitive species are addressed in this document (see Table 1). One USFS sensitive species is also a USFWS candidate for federal listing. Species that are known to have no potential habitat in the project area, based on the reasons given in Table 1, are not further analyzed until section

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6. The following sources were consulted to determine whether species could occur in the project area: USFS Lake Tahoe Basin Management Unit (LTBMU) and Tahoe Regional Planning Agency (TRPA) wildlife occurrence records, available Geographic Information System (GIS) coverages, wildlife surveys conducted in the project area, and current management documents (e.g., USDA 2001, 2004, 2006).

Table 1. Species Addressed in the BA/BE for the Lake Forest ECP Area B EIP Project

Species	Status*	Known to occur in project area	Potential habitat in or adjacent to project area	No habitat	Habitat characteristics not found in project area
Mountain yellow-legged frog (<i>Rana muscosa</i>)	S, C				
Northern leopard frog (<i>Rana pipiens</i>)	S				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	D		X		
American peregrine falcon (<i>Falco peregrinus anatum</i>)	S, D			X	No suitable cliff-nesting habitat is present. The nearest known cliff sites are located more than three miles southwest of the project area in the Truckee River canyon and at least seven miles south of the project area in Blackwood Canyon. There is no preferred foraging habitat (i.e., high avian prey population such as those found in wetland areas with large breeding populations of birds) for peregrine falcons in the project area. Peregrines forage near and occasionally within forested habitat however, forests are not considered an essential habitat type for any stage of their life history. There are no agency records of peregrine falcons in or near the project area.
California spotted owl (<i>Strix occidentalis occidentalis</i>)	S		X		
Great gray owl (<i>Strix nebulosa</i>)	S		X		
Northern goshawk (<i>Accipiter gentiles</i>)	S		X		
Willow flycatcher (<i>Empidonax traillii adastus</i>)	S		X		
Lahontan cutthroat trout (<i>Oncorhynchus clarkii henshawi</i>)	T		X		
Lahontan Lake tui chub (<i>Gila bicolor pectinifer</i>)	S		X		
Sierra Nevada red fox (<i>Vulpes</i>)	S				

Species	Status*	Known to occur in project area	Potential habitat in or adjacent to project area	No habitat	Habitat characteristics not found in project area
<i>vulpes necator</i>)			X		
American marten (<i>Martes americana</i>)	S		X		
California wolverine (<i>Gulo gulo luteus</i>)	S			X	The project area and adjacent habitat do not provide suitable wolverine habitat due to the high level of human disturbance and lack of large mammal carrion. No historic or current sightings of wolverines have been documented in the Lake Tahoe basin or in the project area (USDA 2007). Multiple survey efforts conducted throughout the basin and much of the Sierra Nevada Mountains since 1993 have not detected wolverines. The absence of detections is not proof of absence. However, due to the lack of either incidental or verified sightings, it is highly unlikely that wolverines currently occur in the basin.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	S			X	No Townsend's big-eared bats were detected during the project area 2005 acoustic surveys. There are no records of this species in the basin and it has not been detected during other surveys conducted since 1996. This species is strongly associated with the presence of caves, or cave analogs for roosting. The project area does not contain any caves, abandoned buildings, or mines that would provide suitable hibernation, nursery sites, or roosts for Townsend's big-eared bats.
Great Basin rams-horn (<i>Helisoma newberryi</i>) (<i>Carnifex</i>)	S		X		

*Status

T = Listed as threatened under the Endangered Species Act (ESA)

C = Candidate for federal listing as threatened or endangered under the ESA

D = USFWS de-listed, species will be monitored for 5 years

S = USFS LTBMU Sensitive Species, Regional Forester's Sensitive Species List, Amended 2006

1.5 Project Duration

The design of the channel restoration from SR 28 to Lake Tahoe will be completed in 2008. The period of analysis for this project includes the project design in 2008 and the construction window, spring 2009 through fall 2012. The project would take approximately 4 years to complete with one phase of construction per year. The duration of this BA/BE is for the project's five years. A proposed implementation schedule is: 2009 – lower reach of Lake Forest Creek; 2010 – remaining SEZ/habitat restoration in Lake Forest Creek and Polaris Creek; 2011 - lower portion of erosion control project (south of SR 28); 2012 – upper portion of erosion control project (north of SR 28). It is possible that work in 2011 and 2012 may be reversed.

1.6 Project Area Surveys

A pre-field literature search was conducted to obtain information on the special status animal species potentially occurring within the vicinity of the project area. The USFWS, the USFS LTBMU, and TRPA were queried regarding special status species that could potentially occur in and near the project area. The habitat requirements for the special status animal and plant species identified by the USFWS, the LTBMU, and TRPA were reviewed prior to field surveys.

Surveys were conducted in the project area for threatened, endangered, sensitive, and candidate (TESC) wildlife species in the summers of 2004 and 2005. The surveys also assessed whether any potential habitat was present for special status species. All wildlife species observed or detected by sign (e.g., tracks, scat, burrows, carcass, feather, etc.) were recorded and compiled into a species list. Private property was not surveyed on foot but was scanned from the adjacent roads.

2.0 CONSULTATION TO DATE

2.1 Informal Consultation

The most recent list of threatened, endangered, proposed, and candidate wildlife species that may be present in the USFS LTBMU was obtained from the USFWS, Sacramento Fish and Wildlife Office website (<http://sacramento.fws.gov/es/spplists>) on October 19, 2007. The list was updated on August 16, 2007. This list fulfills the requirements of the USFWS to provide a current species list pursuant to section 7 of the ESA.

2.2 USFWS Species List

The USFWS lists the Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), delta smelt (*Hypomesus transpacificus*), and Central Valley steelhead (*Oncorhynchus mykiss*) as federally listed threatened species that may occur within the LTBMU and the project area. The Lake Tahoe basin is outside the range of the latter two species and they are not considered further. The Yosemite toad (*Bufo canorus*), fisher (*Martes pennanti*), and mountain yellow-legged frog (*Rana muscosa*) are federally listed candidate species that may occur within the LTBMU. This document does not address species that are only classified as candidate species. The bald eagle was removed from the list of threatened and endangered species effective August 8, 2007. Although its status has changed, as directed by the LTBMU, (Sanchez, pers. com.) the bald eagle is still addressed in this document. No critical habitat for threatened or endangered species is designated in the Lake Tahoe basin. No wildlife species that are currently proposed for listing by the USFWS occur in the Lake Tahoe basin.

3.0 CURRENT MANAGEMENT DIRECTION

The current management direction on desired future conditions for Threatened, Endangered, Sensitive and Management Indicator Species of the LTBMU is discussed in the following documents, which are filed at the LTBMUs Supervisor's Office:

- ◆ Forest Service Manual and Handbook (FSM/H 2670);
- ◆ National Forest Management Act (NFMA);
- ◆ Endangered Species Act (ESA);
- ◆ National Environmental Policy Act (NEPA);
- ◆ Lake Tahoe Basin Management Land and Resource Management Plan (LRMP);
- ◆ Species-specific Recovery Plans that establish population goals for recovery of those species; sensitive species list, accounts, and life history (located in the Wildlife Department files);

- ◆ Species management plans; species management guides or conservation strategies;
- ◆ Regional Forestry policy and management direction;
- ◆ Sierra Nevada Forest Plan Amendment (2001); and
- ◆ TRPA Code of Ordinances.

3.1 Threatened, Endangered, and Proposed Species

According to the USFWS website, two federally listed threatened species, the bald eagle (*Haliaeetus leucocephalus*) and Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), and one federally listed wildlife candidate species, mountain yellow-legged frog (*Rana muscosa*), may occur in the Lake Tahoe basin. No critical habitat for threatened or endangered species is designated in the Lake Tahoe basin. No animal species that are currently proposed for listing by the USFWS occur in the Lake Tahoe basin.

As defined by the Endangered Species Act of 1973, a threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. An endangered species is any species that is in danger of extinction throughout all or a significant portion of its range. Proposed species are those that are proposed in the Federal Register by the USFWS to be listed as threatened or endangered.

Species of Concern are taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking. Section 7 of the ESA directs federal departments and agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat.

General USFS direction for threatened and endangered species is summarized below:

FSM 2670.12

- 1) Manage National Forest lands so that all existing native and desired nonnative wildlife, fish, and plants can maintain at least viable populations.
- 2) Conduct forest activities to avoid actions that may cause a species to become threatened or endangered.

FSM 2670.21

- 1) Manage National Forest system habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the ESA are no longer necessary.

FSM 2670.31

- 1) Place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, State, and private forestry, and research activities and programs.
- 2) Establish objectives through the Forest planning process for habitat management and/or recovery of populations, in cooperation with States, the USFWS, and other Federal agencies.
- 3) Through the biological evaluation process, review actions and programs authorized, funded, or carried out by the USFS to determine their potential for effect on threatened and endangered species, and species proposed for listing.
- 4) Avoid all adverse impacts on threatened and endangered species and their habitat except when it is possible to compensate adverse effects totally through alternatives identified in a biological opinion rendered by the USFWS, when an exemption has been granted under the act, or when the USFWS biological opinion recognizes an incidental taking. Avoid taking adverse impacts on species proposed for listing during the conference period and while their Federal status is being determined.
- 5) Initiate consultation or conference with the USFWS when the USFS determines that proposed activities may have an adverse effect on threatened, endangered, or proposed species or when USFS projects are for the specific benefit of a threatened or endangered species.

- 6) Identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species. Protect organisms or populations from harm or harassment as appropriate.

3.2 USFS Sensitive Species

Forest Service sensitive species are those plants and animals identified by the Regional Forester for which population viability is a concern. Concern is warranted by a downward trend in population numbers, density, or habitat conditions, which would reduce a species' existing distribution (FSM 2670.5). Sensitive species are managed so that USFS actions ensure that these species do not become threatened or endangered (FSM 2670.22). The 3 March 2005 Regional Forester's sensitive species list for the LTBMU includes many species of plants and animals (see Table 1).

General Forest Service direction for sensitive species is summarized below:

FSM 2670.32 SENSITIVE SPECIES

- 1) Assist States in achieving their goals for conservation of endemic species.
- 2) As part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.
- 3) Avoid or minimize impacts to species whose viability has been identified as a concern.
- 4) If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.
- 5) Establish management objectives in cooperation with the States when a project on National Forest System lands may have a significant effect on sensitive population numbers or distribution. Establish objectives for Federal candidate species, in cooperation with the USFWS and the State(s).

4.0 Description of Action Area and Proposed Action

4.1 Action Area

The project area encompasses approximately 625 acres and occupies the Skylandia Drainage watershed, and the lower developed portions of the Lake Forest Creek and Polaris Creek watersheds (see Figure 1). The Action Area includes the project area and a 0.5 mile radius around the project area boundary. The 0.5 mile radius was used because the TRPA enforces a Limited Operating Period (LOP) of a 0.5 mile radius around an active goshawk nest.

Project Area Habitat

The project area has a predominant south-southeast aspect. Slopes within the project area are characterized by low to medium-high gradients, on the order of 1%-20%. The upper watershed areas are much steeper, with slopes in excess of 20%. The areas north and south of SR 28 have approximate centroid elevations of 6,498 and 6,294 above MSL, respectively.

Watershed soils are of mixed granitic and volcanic origin from the underlying bedrock. The project area is roughly bisected by SR 28 in an east/west trend. SR 28 also defines an approximate change in land use development in the Lake Forest and Polaris watersheds within the project area. South of SR 28, the existing land use is dominated by multi-family residential developments with some disturbed open space, while the project area north of SR 28 is predominantly single family residential with some undeveloped open space. The majority of the project area's land use is residential housing.

Property ownership in the project area, or lower portion of the watershed, is a mixture of public and private. Improvements will occur on public lands, within County right-of-way, and within drainage easements on privately owned lands. There are a total of 36 proposed easements/agreements on publicly owned lands and twenty proposed drainage/restoration easements proposed on privately owned parcels. Public lands being used for improvements include

Placer County right-of-way and parcels owned by California Tahoe Conservancy (CTC), Department of Parks and Recreation (DPR), Wildlife Conservation Board (WCB), and Caltrans.

The project area includes portions of developed watersheds. Hydrology of the project area outside of the stream channels and undeveloped areas is characterized by localized urban storm runoff. Urban storm runoff is conveyed through roadside ditches and limited storm drainage facilities. Runoff from the project area drains into storm drains, culverts, or channels before discharging into Lake Tahoe.

The majority of the undeveloped habitat in the project area is comprised of a mixed-conifer vegetation community with a montane understory. In addition, wet meadow and montane riparian vegetation communities occur within the project area. The mixed-conifer community is dominated by Jeffrey pine (*Pinus jeffreyi*) and white fir (*Abies concolor*). The forest is second growth, with patches of even- and uneven-aged stands. The even-aged stands mainly contain a single-layer canopy, while the uneven-aged stands are multi-layered. The canopy closure ranges from 10 to 60%. Trees are generally up to and over 24" dbh. Standing snags and down logs, both in various stages of decomposition, are scattered throughout the forested portions of the project area. The montane understory is comprised of greenleaf manzanita (*Arctostaphylos patula*), creeping snowberry (*Symphoricarpos mollis*), snowberry (*S. rotundifolius*) serviceberry (*Amelanchier alnifolia*) and antelope bitterbrush (*Purshia tridentata*). The montane riparian vegetation community is dominated by quaking aspen (*Populus tremuloides*), mountain alder (*Alnus incana*), black cottonwood (*Populus balsamifera*), willow (*salix scoulerian* and other *salix sp.*), wood rose (*Rosa woodsii*), and currant (*Ribes sp.*).

Both dry and mesic meadow habitats are present in the project area. Generally, mesic meadow is present adjacent to the riparian corridors (e.g., Lake Forest Creek), except where the creek is channelized, such as along roads. The meadow areas are dominated by herbaceous plants including sedges (*Carex sp.*), rushes (*Juncus spp.*), spikerushes (*Eleocharis spp.*) and numerous forb species. The riparian habitat consists primarily of willows. Most of the willow clumps are mature and little regeneration was observed. White fir has invaded the aspen stands near the mouth of Lake Forest Creek. Approximately 28% of the project area is comprised of urban and commercial development. The number of acres of California Wildlife Habitat Relationship types in the project area is listed in Table 2, while the number of WHR types in the action area are listed in Table 3. The WHR types within the project area are depicted on Figure 3 and within the action area on Figure 4.

Table 2. The number of acres of each Wildlife Habitat Relationship (WHR) Type in the project area

WHR Type	WHR Size	WHR Density	WHR Area (acres)
Annual grass			25.3
Barren			33.5
Jeffrey pine	Small tree, 11-24" dbh	40-59%	100.0
Jeffrey pine	Small tree, 11-24" dbh	25-39%	109.6
Jeffrey pine	Small tree, 11-24" dbh	10-24%	11.1
Montane chaparral			76.2
Sierran mixed conifer	Small tree, 11-24" dbh	40-59%	18.8
Sierran mixed conifer	Small tree, 11-24" dbh	25-39%	22.6
Urban			179.5
White fir	Small tree, 11-24" dbh	25-39%	28.9
Wet meadow			37.4
Total Acres			642.9

Table 3. The number of acres of each Wildlife Habitat Relationship (WHR) Type outside the project area but within a 0.5 mile radius of the project area (i.e., Action Area)

WHR Type	WHR Size	WHR Density	WHR Area (acres)
Annual grass			2.2
Barren			27.9
Jeffrey pine	Small tree, 11-24" dbh	40-59%	328.9
Jeffrey pine	Small tree, 11-24" dbh	25-39%	73
Jeffrey pine	Small tree, 11-24" dbh	10-24%	1.0
Jeffrey pine	Medium/large tree, < 24" dbh	40-59%	18.8
Jeffrey pine	Medium/large tree, < 24" dbh	25-39%	6.5
Jeffrey pine	Medium/large tree, < 24" dbh	10-24%	3.6
Montane chaparral			98.3
Sierran mixed conifer	Small tree, 11-24" dbh	40-59%	350.5
Sierran mixed conifer	Small tree, 11-24" dbh	25-39%	157.8
Sierran mixed conifer	Small tree, 11-24" dbh	10-24%	9.2
Urban			186.5
White fir	Small tree, 11-24" dbh	25-39%	28.7
Wet meadow			0.8
Total Acres			1293.7

Desired future condition:

The desired future condition for the project area is increased acreage of wet meadow and montane riparian habitat.

Aquatic Habitat

Lake Forest Creek

Lake Forest Creek is approximately two miles in length, and drains a narrow (less than 1/2 mile wide), south-facing drainage. The upper half of the watershed above Polaris Road is undeveloped and has some scattered dirt roads. For a distance of 1,000 feet downstream of Polaris Road, Lake Forest Creek flows through a narrow valley. This upper section is stable and also generally undisturbed. From this point downstream to Lake Tahoe, however, adjacent development has a marked impact on the stream. These impacts include homes located along the stream, a sanitary sewer line with a manhole within the channel, a concrete-lined reach, channelized segments along roads, and an approximately 2,000 foot-long section through the Lake Forest Glen subdivision entirely conveyed in buried pipe. This piped reach of Lake Forest Creek has significantly altered the drainage pattern of Lake Forest Creek.

Surface Water/Groundwater Interaction

Flow in Lake Forest Creek is largely driven by late spring/early summer snowmelt and fall thunderstorms. There is a large annual variation in flow during these periods, as the majority of runoff is determined by the amount of snowpack and the weather conditions that occur during snow melt. Thus, runoff may occur gradually with a low magnitude and long duration under cooler conditions, or it may occur more rapidly, with a higher peak and a much shorter duration under hotter conditions. Flow in the fall depends on the magnitude and frequency of storm events. During the remainder of the year the majority of Lake Forest Creek is dry.

The exception to this ephemeral character is the reach of Lake Forest Creek between the Lake Forest Glen subdivision outfall at Sierra View Avenue and Lake Tahoe. This reach of channel carries a small amount of flow on

an annual basis. The source of this water appears to be groundwater that is collected via subsurface drains and the existing drainage system. The amount of this groundwater flow has not been quantified, but was observed during a midsummer field assessment as a few tens of gallons per minute. No rainfall had occurred during the week prior to this observation.

Overall Geomorphic Character Existing Conditions

The character of Lake Forest Creek has been severely altered, given that almost a third of the length located within the project area is piped underground within culverts. Were this ephemeral stream undisturbed, it would more than likely consist of headwaters that produce sediment from mostly vertical incision, an alluvial fan or aggraded reach as the stream opens to the valley, and then an alternating series of wet meadows with dispersed flow through non-distinct channels and segments of defined channels with complex riparian plant communities. The meadows and riparian areas would largely filter the sediments from the upper drainage, acting as a “sink” such that very little sediment would actually pass to the lake.

The long piped section of Lake Forest Creek entirely precludes the occurrence of such wet meadows. But this drainage is largely ephemeral, and the annual total sediment yield does not appear to be substantial. As expected, the headwaters show signs of vertical incision, and there is an aggraded reach just downstream. Only a portion of the headwaters shows evidence of human disturbance, while the aggraded reach has been encroached upon by residential development. Although wet meadows are non-existent, the downstream-most reach of Lake Forest Creek is a defined channel with a narrow floodplain and riparian fringe. Portions of the channel have been contained in roadside ditches and rock-lined channels, however, minimizing many functional floodplain benefits.

Pre-Development Conditions

As stated previously, the Lake Forest Glen subdivision has had a major influence on Lake Forest Creek. Due to the magnitude of ground alteration associated with that development, it is difficult if not impossible to determine previously existing conditions. Aerial photos from 1952 show that the Lake Forest Glen subdivision is generally located in what were open meadows. This meadow system extended both south and southwest of the current SR 28 crossing. Other investigators have reasonably suggested that Lake Forest Creek may have at various times flowed directly south in its present course as well as southwest through an extended meadow toward Polaris Creek. Close inspection of the geologic, topographic, soils and geomorphic conditions suggests that in recent geologic time Lake Forest Creek flowed to the southwest to join Polaris Creek before it entered the lake. In this geologically recent timeframe, the stream may not have flowed due south at all. The following supports this assertion.

The geologic mapping shows that Lake Forest Creek north of SR 28 follows a northwest- to north-northwest striking fault, suggesting a structural control. Just south of SR 28 a northeast-striking fault intersects this controlling fault. This feature is considered a post-glacial fault downthrown to the northeast side, capable of offsetting the valley alluvium. Thus, Lake Forest Creek would have encountered a scarp caused by the fault, and with lower ground situated to the northeast, would have flowed along this escarpment toward Polaris Creek.

The ground topography immediately south of SR 28 along the current orientation of Lake Forest Creek consists of a broad area without a distinct drainage. The two-foot contour interval survey conducted for this project confirms that the relief in this area is indeed negligible. However, the topography reflects that the probable course toward Polaris Creek is much more pronounced and developed. The apparent floodplain width of this course is greater than the current course, and the slope is more constant. For example, a profile of ground topography along the present course in the area of the pipe south of the Lake Forest Glen apartment complex is steeper than the probable historic course through the meadow. This information suggests that flowing water of annual frequency formed the probable historic course, and that there appears to be an abrupt transition from the lower to upper portions of the current creek orientation.

Surficial soil types also support a southwestern orientation to Lake Forest Creek. The gravelly alluvial and marsh soil types along the probable historic channel orientation reflect a continuous sequence of soils that characterize local stream courses. In contrast, the current orientation of Lake Forest Creek crosses through Jabu stony sandy loam, which is not a common soil through which alluvial valley streams flow. The soil types suggest that the current stream course was not connected, but instead may reflect two distinct drainages.

The concept of two distinct drainages is further strengthened when one considers the second northeast-striking fault along which flows the lower reach of present-day Lake Forest Creek. This fault aligns with the “tributary” to present-day Lake Forest Creek, which extends into the northwest corner of Skylandia Park. From there the fault is evident at depth, but at the surface it is obscured, meaning that it did not disturb surface alluvium. The current “tributary” to Lake Forest Creek exactly follows this fault line, from the lake to the headwaters, even terminating at the point the fault becomes obscured. It seems reasonable to suggest that this “tributary” was in fact an isolated drainage, and was not connected to Lake Forest Creek prior to the installation of the Lake Forest Glen subdrain system. The outlet from the subdrain actually enters at a distinct right angle to the “tributary”, which is contrary to what might be expected if this were the major contribution to this drainage.

In combination, the evidence provided by the faults, soils, topography and geomorphology provide rather strong evidence that in recent geologic time (and likely during recorded history) Lake Forest Creek flowed southwest from SR 28 toward Polaris Creek. Furthermore, it likely never flowed in its current alignment prior to the construction of Lake Forest Glen.

Polaris Creek and Springs

Although the Polaris Creek watershed (about 1,000 acres) is almost twice the size of the Lake Forest Creek watershed, the streams are of comparable length because of the significant portion of the Polaris Creek drainage that is steep terrain at higher elevations. Much of the watershed lies within Burton Creek State Park, and is generally undisturbed. However, within the project area Polaris Creek has been almost entirely relocated and modified. Between the point where it enters the valley and crosses SR 28, its location has been shifted westward. After crossing the highway, it flows through a short stable section in timber with a narrow riparian margin. Downstream of Lake Forest Blvd, it flows for a short distance within a poorly defined channel within dense, decadent shrubs and trees before it enters a two-acre wetland complex. Flow leaves the wetland in two channels, on the east and west sides of a recreational area, before it enters the Star Harbor marina.

Surface/Groundwater Interaction

The Polaris Creek watershed is influenced by a number of significant springs. These springs provide annual base flow to the lower drainage, which would otherwise be ephemeral. A complex of springs rises near the Placer County roads maintenance facility (County facility) and flows west toward Polaris Creek. Two major springs (referred to as the East Spring and West Spring) arise north of SR 28 and west of Polaris Creek in another spring complex. These springs flow south and eventually enter the wetland.

The springs that arise north of the County facility cover an area of more than two acres, and produce base flow estimated to be tens of gallons per minute. While additional springs located further downstream contribute to base flow, much of the flow in Polaris Creek (from the County facility to the wetland complex) is a result of this important complex of springs. Some of this flow is diverted for irrigation into a pasture located on private property to the south, which then crosses SR 28 and does not rejoin the stream. The remainder of the flow is diverted into the relocated reach of Polaris Creek.

Two major and distinct springs, the East Spring and West Spring, also contribute flow to Polaris Creek, converging with the stream at the wetland. Both of these springs originate above SR 28 and were at one time diverted as a water source for the former fish hatchery. This historic hatchery, located between SR 28 and the wetland complex, is associated with the field research facility for the Tahoe Research Group.

The source of the East Spring is enclosed within a concrete foundation and a wood and metal roof shelter. This water flows in a ditch for a short distance, then under SR 28 to the wetland complex. The West Spring, which originates further upslope from SR 28, is also contained in a similar concrete, wood and metal structure. It flows in a defined channel with evidence of manipulation and diversion. Indeed, old ditch lines suggest that some of this flow was used to irrigate a portion of the adjacent meadow. The existence of abandoned pipes, a control box, and remnants of a weir near the East Spring suggest that seasonal springs from this meadow may have been diverted to join the East Spring. Conversely, or maybe additionally, a system of abandoned pipes along the West Spring suggests that the East Spring was at one time diverted to the West Spring to allow flow management for the hatchery. It is likely that the hatchery was able to divert either spring either direction according to its needs. Currently, the West Spring flows under SR 28 into abandoned control works at the hatchery and thereafter into the wetland complex.

Overall Geomorphic Character

Existing Conditions

At first glance, Polaris Creek upstream from Pomin Park appears to be fairly healthy. In contrast to nearby streams (Burton, Lake Forest, and Dollar Creeks), the spring-fed flow in Polaris Creek provides conditions that maintain a comparatively vigorous riparian plant community. Generally speaking, there are no apparent grade imbalances, no knick points or headcuts, no incision and no aggradation. High flows are either contained in a channel stabilized by vegetation, or they overtop the banks north of SR 28 and flow down-valley through meadows that filter sediment and absorb water. The amount of sediment supplied from the upper watershed appears to be minimal, accounting for the lack of aggradation in the channel.

In contrast, the condition of Polaris Creek through the wetland complex and Pomin Park area is poor. The former fish hatchery, campground, ball field, playground, restroom facilities, and parking area have all encroached on an area that, prior to disturbance, was likely a wet meadow. The wetland complex has inundated reaches of the channel, with backwater effects caused by the placement of fill, the relocation of a bifurcated channel, the accumulation of decadent woody material, and active beaver. The channel has been split at the wetland complex, following in two separate courses before it reaches opposing ends of the Star Harbor marina. The man-made channels between the wetland complex and the lake are stable. The wetland complex likely traps what little sediment enters the system from upstream sources, and as such, there are negligible releases of sediment to Lake Tahoe. Water quality impacts to the lake are likely more associated with the release of nutrients and elevated water temperatures.

Prior Conditions

Prior to settlement in the basin, Polaris Creek and the associated springs were likely in an entirely different location than they are today. Settlement in the area began with the Burton Islands Farm, established in 1859, which started dairy operations in the 1870s and 1880s utilizing Antone Meadows in the upper Burton Creek watershed. Local dairy operations, which continued into at least the 1930s, used meadows in the Lake Forest area. Polaris Creek base flow may well have been diverted for stock water and irrigation associated with dairy farming. A fish hatchery was established, likely after the turn of the century, using water from the major springs that arise in the area. John Steinbeck apparently worked part-time feeding fish at this hatchery while he wrote his first novelette, *A Cup of Gold*, in 1929.

Whatever the impetus, it appears that Polaris Creek was diverted westward from its location at the mouth of the valley. Flow was directed along the contour, rather than down the fall line. In doing so, flow was largely diverted from the half-mile long meadow system that extends from the current location of SR 28 all the way to Lake Tahoe. It appears that flow was directed into another channel, crossing the corridor that is now SR 28 about 400 feet west of its original location, then flowing west toward the current hatchery.

The obvious question to pose is why this “other channel” existed and how was it formed. The relocated Polaris Creek channel passes within 100 feet or less of the source of the East Spring. Prior to construction of SR 28 (in its earliest form), the East Spring likely flowed down valley (rather than its current orientation parallel to the roadway). If the East Spring formed a drainage similar in magnitude to that of the west spring, then it was likely responsible for creating this “other channel”.

The topography and soils information provide some support to the hypothesis that the East Spring created this reach of channel. Polaris Creek currently flows through marsh soils for most of its length, except for a short reach where it cuts through Jabu stony sandy loam. It is this reach into which it appears Polaris Creek was diverted and that the East Spring likely formed. This soil type is evident as high, dry ground that supports stands of pine, as opposed to the surrounding lower marsh soils that support sedge communities. It is unlikely that Polaris Creek would have naturally cut a course through this higher ground, given the adjacent land configuration. Indeed, the probable original course of Polaris Creek has a wide floodplain, as opposed to the narrow one through the area of the Jabu soils.

The U.S. Geological Survey Kings Beach, CA quadrangle (1992) shows Polaris Creek located in its former meadow channel through the lower valley. It is curious that this recent map shows this orientation, when it appears that the channel has been relocated for decades.

The area geology provides further support to the assumption that Polaris Creek once flowed in an entirely different location. Polaris Creek follows a fault line just above the project area. This fault line makes a broad curve to the south as it approaches the lake, perfectly describing the orientation of the extended meadow system from the highway to the lake. It is most likely that Polaris Creek once followed this fault out of the drainage, through the meadow and down the valley in a broad curve all the way to Lake Tahoe. Burke Creek (near Stateline, Nevada, downstream of Highway 50) might be a good example of what an undisturbed Polaris Creek resembled as it flowed through sedge-dominated meadows.

It is likely that the East and West Springs eventually came together in the area that is now Pomin Park to feed a meadow or wetland complex. This complex may have consisted of a narrow channel bounded primarily by sedges. Conversely, it may have consisted of a series of channels through sedges and willows and influenced largely by beaver. Regardless, at some point (likely through the 1960s) fill was placed in the area. A site survey performed in the early 1970s prior to construction of the ball field showed that fill covered much of the future site of the field. Some of this fill may have been dredge or spoil materials, as on one 1/4-acre location it was piled as high as fourteen feet. There is no indication whether this fill contained any contaminants.

At the time of this survey, Polaris Creek had already been channelized into the east and west channels that presently exist. An east-west ditch, draining into the east channel, was located just south of the present ball field location. The ball field was constructed in 1987, reportedly without permits and in a very brief timeframe. It appears that the existing fill was re-graded and additional fill brought in to form the ball field. There is no indication when the standing water wetland (as currently exists) was formed.

The adjacent Star Harbor marina was constructed in 1971. It was dredged in 1977 and again in 1990 (the Homeowners Association is currently again considering dredging the marina). As-built surveys from the 1990 dredging indicated that 3,600 cubic yards of material were removed from the main (presumably the west arm owned by the Star Harbor Homeowners Association) marina, 1,300 cubic yards from the TCPUD lagoon (presumably the east arm owned by DPR) and 1,200 cubic yards from the entrance to the marina (within Lake Tahoe). Given that Burton Creek flows into the west arm, it is difficult to determine how much of this accumulated sediment was derived from Polaris Creek.

The campground located at Pomin Park has also had an impact on the wetland complex and SEZ. The boat ramp parcel is owned by the WCB and is operated by the Tahoe City Public Utility District (TCPUD). The ball field and campground parcels are owned by DPR and are operated by TCPUD. Fill has been placed for the access road and some of the campsites. The date of construction of this campground was not located for this report.

U.S. Coast Guard facilities located due east of Pomin Park might occupy land that previously would have been considered SEZ. No information was located for this report that identified the date of construction, nor the conditions prior to the installation of this facility.

4.2 Proposed Action

Scope and Scale

The project is located on the north shore of Lake Tahoe approximately three miles east of Tahoe City in Placer County, California (see Figure 1). The project is generally bounded by Cedarwood Drive to the north, Lake Tahoe to the south, Lakewood Lane to the east, and Pomin Park to the west (see Figure 2). The project appears on the Kings Beach, California/Nevada (1992) U.S. Geological Survey 7.5-minute quadrangle. It is located in Sections 29, 30, 31, and 32 of Township 16 North, Range 17 East, of the Mt. Diablo Meridian (see Figure 1).

The project area encompasses approximately 625 acres and occupies the Skylandia Drainage watershed, and the lower developed portions of the Lake Forest Creek and Polaris Creek watersheds. These watersheds drain directly into Lake Tahoe. The lower portion of this watershed within the project area is occupied by the Highlands subdivision, the Lake Forest Residential/Industrial area, and the Skylandia area. The majority of the project area's land use is residential housing. The watershed that contributes to the project area covers approximately 1,295 acres. The Polaris Creek and Lake Forest Creek watersheds are not included in the project area in their entirety.

Time Frame

The design of the channel restoration from State Route 28 to Lake Tahoe will be completed in 2008. The period of analysis for this project includes the project design in 2008 and the construction window, spring 2009 through fall 2012. The project would take approximately 4 years to complete with one phase of construction per year.

Description of Project

The purpose of the project is to address high priority soil erosion control and water quality improvement needs within the defined project area. The project is part of an ongoing effort to retrofit existing public rights-of-way within the Tahoe basin with Best Management Practice (BMP) improvements to reduce sediment and nutrient loading to Lake Tahoe in accordance with the TRPA's EIP. A major portion of the project includes restoration of the historic flow paths of the lower portions of Lake Forest and Polaris Creeks.

The focus of water quality improvements, in order of priority, is on preventing mobilization of fine sediment and nutrients by erosion (source control through revegetation and channel improvements), reducing surface water volumes (flow reduction through enhanced infiltration opportunities), and removing fine sediment and nutrients from storm water (treatment via structural additions and improvements). Improvements will reduce erosion and increase opportunities for infiltration/treatment of the storm water prior to leaving the project area.

The proposed project provides for restoration of Lake Forest and Polaris Creeks to near pre-1960s conditions through re-establishment of functional SEZ in the Lake Forest Glen Meadow, onto publicly owned lands, and south to an existing discharge point to Lake Tahoe (Figure 2). Four existing streams or systems which are tributary to Lake Tahoe comprise the preferred restoration alternative, as follows:

- ◆ Lake Forest Creek from Star Harbor upstream to north of SR 28 (Reaches 1W through 7W). Lake Forest Creek would be daylighted from its current piped configuration, and Polaris Creek's irrigation diversions to former dairy operations would be redirected. A low (four foot vertical rise) earthen berm would be constructed in the Lake Forest Glen Meadow, between existing infrastructure and the proposed regulated floodplain;
- ◆ Polaris Creek from its confluence with Lake Forest Creek upstream to a point approximately 500 feet north of SR28 (Reaches 1Y through 3Y);
- ◆ Aspen Area Drainage from the current mouth of Lake Forest Creek at Lake Tahoe upstream to near the northwest corner of Skylandia Park (Reaches 1X through 4X, which are not continuous with each other); and
- ◆ East Spring drainage from Lake Forest Road upstream to a point approximately 100 feet north of SR28 (Reaches 1Z through 4Z, which are not continuous with each other).

The stream restoration aspect of the proposed project would restore approximately 44 acres of SEZ to provide wildlife habitat and recreational opportunities and linkages. The SEZ restoration would involve the construction of several reaches of functional SEZ in Lake Forest Creek, Polaris Creek, and the East Spring. Except where precluded by adjacent infrastructure and buildings, restored SEZ would consist of non-rigid margins. Stream banks would be constructed using biodegradable erosion control materials, with long-term stability provided by riparian vegetation. Such stream banks are considered deformable, to slowly adjust to equilibrium over time.

Restored stream channels would flow through existing and created wet meadow complexes. Streams flowing through meadows often exhibit multiple threads (as opposed to single thread channels). Multiple threads are considered a natural condition in dynamic equilibrium.

A full growing season or more would be required to establish adequate streamside herbaceous vegetation prior to the redirection of flow into newly constructed channels. Salvage of existing vegetation, where deemed appropriate, would be incorporated into restoration design. Irrigation would be required to adequately establish vegetation during the first growing season, especially along reaches that carry only ephemeral flow. Revegetation would not

only provide stability against flowing water (both in-stream and overland flow), it would also improve water quality (filtering nutrients and sediment), provide a mosaic of wildlife forage and structural diversity, expand and connect wildlife migration corridors, and improve aesthetic values.

Erosion Control/Water Quality Improvements

The proposed project includes drainage improvements within the Highlands subdivision, Panorama Drive/Meadowbrook Drive area subdivisions, and Lake Forest area condominium complexes, light industrial area, and subdivisions. Currently, impervious surface runoff enters roadside ditches and conveys storm runoff to Lake Tahoe without storm water pretreatment. The overall goal of this aspect of the project is to prevent erosion at the source, then treat storm water before being discharged to Lake Tahoe. The proposed project would enhance water quality features within the Placer County right-of-way. The erosion control aspect of the preferred alternative generally consists of:

- ◆ source control at erosive locations (slopes, shoulders, channels);
- ◆ volume reduction through infiltration (drop inlets, sediment cans, lined channels, infiltration basins, restoration areas);
- ◆ flow redirection into restoration areas and infiltration basins; and
- ◆ load reduction by removal of pollutants from surface water through infiltration (lined channels, infiltration basins, and restoration areas) and pre-treatment and treatment vaults.

Recreational Enhancement and Wildlife Habitat Restoration

To complement and expand upon the proposed SEZ restoration and water quality improvements, recreation and wildlife habitat enhancement features are included in the proposed project. An informal footpath with educational signage and pet cleanup bag stations would be added on both ends of the proposed berm in the Lake Forest Glen Meadow. This trail would enhance viewing opportunities where elevated, while minimizing disturbance of wildlife by directing human access. The berm would be sloped to drain and would be vegetated with native grasses to prevent erosion. The visual impact of the berm would be low, due to its relatively low height relative to riparian vegetation that would be reintroduced into the wet meadow. Existing wet meadow in the lower portion of the Lake Forest Glen Meadow has willows and other dense riparian vegetation that exceed twelve feet in height. The proposed berm would add a defined pedestrian path to the Meadow that would discourage local foot traffic impact on the reestablished riparian area and associated wildlife habitat. Pet refuse bag stations, garbage cans, and educational signage would be added at berm entry points.

Specific recreation and wildlife habitat elements include:

- ◆ Existing trails through the SEZ portion of the Lake Forest Glen Meadow would be eliminated and restored. A boardwalk would be constructed to replace the eliminated trails and maintain access to the existing Caltrans bicycle path along SR28. Lake Forest Road and SR28 would continue to serve as the existing access routes from the south/east and west/north portions of the Meadow, respectively.
- ◆ A Class I bicycle path/Class II bicycle lane would be added to Lake Forest Road. The campground roads would serve bicycle traffic to the west end of Lake Forest Road to its intersection with SR28. A pedestrian crossing on Lake Forest Road from the eastern Lake Forest Road bicycle lane would be added to safely connect the trail system in the meadow to the northern end of the Skylandia Park trail system. This crossing would connect the two recreational nodes with minimum travel on roads.
- ◆ Passive recreation opportunities within the Lake Forest restoration areas would be formalized through directional and interpretive signage to provide clarity for appropriate travel around the areas, provide educational opportunities, and minimize disturbance to wildlife through on-the-spot education. Litter/trash and dog waste bag facilities would be added in coordination with Tahoe City Public Utility District (TCPUD) maintenance agreements.

In the Skylandia Park area recreation improvements are as follows:

- ◆ Increased connections within the proposed project area would be provided to offer loops for fitness walking or low intensity hiking through the addition of trails in other areas. Incremental mile markers would be painted on the paved surface of the path. Existing trails to parking areas through SEZ or areas proposed to be wetted with pretreated storm water runoff would remain, but would be elevated by a boardwalk.
- ◆ Explanatory signage at interfaces would be provided where the trail surface changes from unpaved to paved as the trail climbs out of the SEZ, and where an elevated boardwalk trail would be provided through the wet meadow area from the west parking lot to the restrooms and picnic area. Each interface would serve an educational function, as would signage identifying potential wildlife sightings along the path.
- ◆ Picnic sites in the Lake Forest Beach area would receive weed abatement treatments, and the pad areas would be regraded and covered with inert material, e.g., geotextile, to inhibit future weed growth.
- ◆ The picnic area near the east arm of Star Harbor would be modified to relocate existing tables to nearby flatter areas more conducive to proposed recreational facilities, and pad areas for picnic tables would be prepared with inert materials to inhibit weed growth.

Project Design Criteria/Mitigation

- 1) Any sighting of listed species, sensitive species, or location of nest or dens of these species will be reported to a Forest Service biologist. These nests, dens, or plant locations will be protected in accordance with the Sierra Nevada Forest Plan Amendment (2000) and the Environmental Threshold Carrying Capacities for the Lake Tahoe Region guidelines (TRPA 1982).
- 2) Mitigation measures to avoid impacts to Tahoe yellow cress shall include the following: In 2007, a Tahoe yellow cress field survey will be conducted between June 30 and September 30 by a qualified biologist. The results will be mapped on the working engineering plan set for proposed project improvements. In 2007 and all additional years during which construction will take place along the lake shore, prior to commencement of construction, Tahoe yellow cress populations within 200 feet of the proposed disturbance areas will be identified. The Tahoe yellow cress populations will be delineated with orange construction fence to ensure that Tahoe yellow cress is not impacted by equipment. Equipment access routes will be identified and any Tahoe yellow cress populations along the access route will be delineated. The contractor will be instructed regarding current policy regarding Tahoe yellow cress. If any project activities are conducted during a low lake level period when plants may be present, all work activities will remain above 6,228 feet AMSL to avoid the low lying populations.
- 3) The project proponent will consult with agency biologists (e.g., TRPA, LTBMU) to determine whether information on bald eagle and osprey nesting is available. If no agency surveys have been performed, pre-project surveys will be conducted to determine the location of any active nests.
- 4) Prior to project activities in undeveloped habitat, a survey for special status plants will be conducted. If these species are found during the pre-project survey, mitigation or avoidance measures will be implemented.
- 5) If special status wildlife species with agency-mandated protected activity centers and limited operating periods are found breeding in the project area, a protected activity center will be delineated by the LTBMU wildlife biologist and a limited operating period will be implemented.
- 6) Any management activities that require removal of trees and shrubs should be conducted outside the avian nesting season unless a qualified biologist determines that no nesting is occurring. The chronology of each year's nesting could vary due to snow loads. The project proponent should consult with the TRPA wildlife biologist to determine the most appropriate time of year for performing any vegetation removal. If vegetation removal and ground disturbance occurs during the avian nesting season, a qualified biologist should conduct a nesting bird survey to ensure that breeding birds are not adversely affected. To comply with the Migratory Bird Treaty Act, any location containing an active nest will not be disturbed until the young have fledged or it is determined that the nest is inactive. The survey should be conducted no sooner than 30 days prior to construction activity.
- 7) All trash created during construction will be properly contained (wildlife-proof containers) and removed at the end of each day.
- 8) Construction equipment used in construction must be free of invasive weed seed. The project area will be monitored for any weed colonization after construction is complete, and any infestations will be removed.

4.3 Adjacent Projects

The following list of projects was developed through contacts with all relevant agencies to determine what their current and future plans are for habitat restoration, bikeways, pathways, multi-use trails, and related uses.

*Biological Assessment and Evaluation
Lake Forest Erosion Control Project, Area B
October 2007*

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California Department of Parks and Recreation

DPR has adopted the Tahoe State Recreation Area General Plan. Where conflicts exist between this plan and the TCPUD Parks and Recreation Master Plan, the State Plan controls.

No projects are planned by DPR on their property within or near the project area other than those proposed by this project. An Environmental Impact Report (EIR) comment period and associated documentation for the Burton Creek State Park (BCSP) Plan was identified in a link to the DPR website http://www.parks.ca.gov/?page_id=23847. The BCSP Plan has been accepted (<http://www.parks.ca.gov/pages/843/files/Minutes11-18-05.pdf>). Many activities proposed for the area would have an impact on recreation, transportation, and wildlife/habitat in the North Lake Tahoe area. BCSP Plan's proposed action includes construction of a new campground north of SR 28, pending results of a traffic study, and construction of new trails/access roads throughout the upper watersheds of Polaris, Lake Forest, and Dollar Creeks.

Caltrans

In keeping with TRPA's Master Plan described below, Caltrans is preparing design plans for SR 28, which currently include additional turn lanes within the project area, and some shoulder widening and paving. No signaling or striping additions are planned for SR 28 other than those associated with these improvements. Water quality improvements within Caltrans ROW and nearby properties include bioswales and infiltration basins. Significant traffic issues exist along the stretch of SR 28, particularly west of the project area. Impacts may be studied by DPR in conjunction with the improvements described in this section.

TRPA

The *Lake Tahoe Regional Bicycle and Pedestrian Master Plan* (Fehr and Peers 2003) identifies one plan area improvement within the Lake Forest project area. It is a Class I bicycle trail planned from SR 28 to the Lake Tahoe Recreation Area (listed in the report as EIP #10041, 0.75 miles), and it is a medium priority project.

CTC

The Lake Forest Erosion Control Project in its totality and its supplements constitute the planned projects for the CTC-owned land in and near the Area B project area.

Placer County

The Department of Parks and Recreation does not have any projects planned within the Area B project area.

Private Entities

Several BMP retrofit projects are ongoing in the area. A new housing/commercial development is planned near the intersection of SR 28 and Fabian Way, within the Area B project area.

University of California – Davis, Tahoe Research Group (TRG)

TRG is currently renovating the historic fish hatchery building immediately west of the Area B project area, in the vicinity of the West Spring flowpath. Grant funds are being pursued to restore disturbed SEZ on the property and create an interactive educational fish hatchery display.

5.0 Description of Affected Species, Critical Habitat and Effects of the Proposed Action

5.1 Federally Listed Species

Bald Eagle

The bald eagle is a permanent resident and winter migrant in California (Detrich 1986). Breeding bald eagles in California are restricted primarily to northern California counties, are typically found at lower elevation and rarely occur in the high Sierra Nevada.

Habitat consists of mature coniferous forests with the presence of dominant and co-dominant trees (defined as trees taller and with a greater circumference of the upper canopy relative to the surrounding stand) in close proximity to large bodies of water (Golightly 1991). Bald eagle nests are usually located in uneven-aged (multi-storied) stands with old growth components. Trees selected for nesting are characteristically one of the largest in the stand or at least co-dominant with the overstory (Lehman et al. 1979). Nests are typically constructed in large, dominant live trees with open branch work. The massive stick platform nests are added to annually.

Snags, trees with exposed lateral limbs, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest. Most tree perches selected by eagles provide a good view of the surrounding area (USDI 1986). Bald eagles typically perch in large, robustly limbed trees, on snags, on broken topped trees, or on rocks near water (Peterson 1986; Laves and Romsos 1998).

Nest sites are perhaps the most important habitat element for promoting the reproductive success of bald eagles. Nests are typically established in large, dominant live trees with open branch work. Nest trees and branches of nest trees must be sturdy in order to support the massive stick platform nests that are commonly constructed and added to annually. Nests are usually situated at or just below the tree canopy in forested areas. Call (1978) reported that nests were most frequently found in stands with less than 40% tree canopy cover. In Maine, eagles selected nest sites away from human disturbance and near lakes with abundant warm-water fishes (Livingston et al. 1990). Known nest sites (n = 2) in the Lake Tahoe basin are situated in dominant live coniferous trees in close proximity to open water (< 200m) and at a considerable distance from developed shoreline (> 4.5 km). In treeless areas, eagles will establish nests on cliff faces or pinnacles.

Breeding is initiated as early as January 1 via courtship, pair bonding, and territory establishment, and normally ends approximately August 31, when the fledglings leave the immediate nest site. Incubation may begin in late February to mid-March, with the nestling period extending to the end of June.

Bald eagles historically nested in the Lake Tahoe basin (Orr and Moffit 1971). However, between 1971 and 1995, no confirmed nesting pairs were sighted. Since 1996, bald eagles have nested with varying degrees of success in the Lake Tahoe basin. At least two nest sites currently exist. The Pacific Bald Eagle Recovery Plan identifies four nesting territories in the Lake Tahoe basin, three of which are targeted for the California side of Lake Tahoe (USDI 1986).

The Tahoe basin contains wintering habitat for bald eagles, consisting of mid to late successional stages of montane riparian and mixed conifer forest (USDA 1988). Sighting records indicate that the Lake Tahoe basin is used year-round by bald eagles. However, use occurs primarily during fall and winter months when kokanee salmon (*Oncorhynchus nerka*) spawn.

Occurrence in Project Area

No bald eagle nests are documented in or near the project area. Because the shoreline in and near the project area is developed, it is considered highly unlikely that bald eagles would nest in or near the project area. The closest nesting activity is more than twenty miles south near Emerald Bay. Bald eagles could forage in Lake Tahoe, which forms the Area B project area's southern boundary.

Direct and Indirect Effects

The quality, quantity, and distribution of suitable bald eagle habitat will not be altered by any of the activities. Individual bald eagles could experience temporary auditory and/or visual disturbance if they fly over or near the project area during construction activities. However, because the project activities are primarily in residential areas, it is considered unlikely that individuals would experience additional disturbance from the conditions that currently exist. Bald eagles foraging for fish at Lake Tahoe are unlikely to be affected by the project.

No direct effects to potential nesting bald eagles or their habitat are expected as there are no historic or recent records of bald eagles nesting in or near the project area. If bald eagles are nesting within ½ mile of the project area during implementation, construction activities could disturb them and cause nest failure. No disturbance to bald eagle breeding activities and habitat would occur because a ½ mile no-disturbance radius would be delineated around the nest. No direct effects to potential nest or roost trees would occur as no tree removal is scheduled in potentially suitable habitat, such as the conifer habitat in the east and north portions of the project area. The trees' proximity to existing recreational

and residential developments probably reduces their utility for bald eagles. Coordination with agency wildlife biologists or pre-project surveys would be conducted to determine the location of any active nests.

If bald eagles nest in or near the project area during project implementation, construction activities could disturb them and cause nest failure. However, no disturbance to bald eagle breeding activities and habitat will occur because a LOP from March 1 to August 31 will be applied within 0.5 miles of any active nest. Agency biologists (e.g., TRPA, LTBMU) will be consulted to determine whether information on bald eagle nesting is available. If no agency surveys have been performed, pre-project surveys will be conducted to determine the location of any active nests.

Cumulative Effects

Because no direct or indirect effects are anticipated, no cumulative effects will occur.

Lahontan Cutthroat Trout

The Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) is endemic to the Lahontan basin of central Nevada and mid-eastern California (Sigler and Sigler 1987). They have been extirpated from most of the western portion of their range in the Truckee, Carson, and Walker River basins, and from much of their historic range in the Humboldt basin (Gerstung 1988; Coffin 1988). Lahontan cutthroat trout evolved in the absence of other trout species and are not effective competitors for food and habitat. In stream environments within the western portion of the Lahontan drainage, Lahontan cutthroat trout have seldom been able to co-exist with non-native trout for longer than a decade. Lahontan cutthroat trout, particularly those within the western portion of the Lahontan basin, also hybridize with rainbow trout (Behnke 1979).

Lahontan cutthroat trout historically occurred in the Lake Tahoe basin including in Lake Tahoe, Cascade Lake, and Fallen Leaf Lake (Moyle 1976; Gerstung 1988). There are currently two reintroduced populations of Lahontan cutthroat trout in the basin: Fallen Leaf Lake and Upper Truckee River/Shower's Lake. These populations are not considered recovery populations by the USFWS and are not protected under the Endangered Species Act. A population of Lahontan cutthroat trout has been documented in Cascade Creek, which enters Fallen Leaf Lake.

Occurrence in Project Area

Lahontan cutthroat trout are not known to occur in Lake Tahoe. The closest known population of Lahontan cutthroat trout could occur in the Truckee River, where they were introduced below Lake Tahoe for recreational angling.

Direct and Indirect Effects

None of the project activities will affect the Truckee River. Project components that improve erosion control could ultimately improve habitat conditions in Lake Tahoe, but are unlikely to extend beyond the lake.

Cumulative Effects

Because no direct or indirect effects are anticipated, no cumulative effects will occur.

Mountain Yellow-legged Frog

Preferred habitat for mountain yellow-legged frog is well-illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the water's edge (Zeiner et al. 1988; Martin 1992). Suitable breeding habitat is considered to be low gradient (up to 4%), perennial streams and lakes. These stream types generally have the potential for deep pools and undercut banks, which provide habitat for this frog. In the Sierra Nevada, this frog occurs from 4,500 to 12,000 feet in elevation (Jennings and Hayes 1994). Aquatic and terrestrial invertebrates are the primary foods for adults. These frogs are seldom observed far from water, although they will move overland to disperse to other pond habitats (USDA 1999).

Breeding occurs between May and August in high elevations, after meadows and lakes are free of snow and ice. In lower elevations, breeding occurs between March and June once high water in streams subsides. Eggs are deposited underwater in clusters along stream banks or on emergent vegetation. Tadpoles require at least one year before metamorphosis, but at high elevations may take up to three years before transformation (Knapp 1994). Tadpoles and adults overwinter underwater in deep pools with undercut banks that provide cover (Martin 1992). At high elevations, this frog requires relatively deep lakes (over 5 feet) that do not freeze solid in winter (USDA 1999).

Garter snakes and introduced trout prey on mountain yellow-legged tadpoles (Zeiner et al. 1988). The decline of mountain yellow-legged frogs in the Sierra Nevada has been attributed to the introduction of trout during the last century (Bradford et al. 1993; Knapp 1994). Because the adults overwinter underwater and the tadpoles take more than one season to metamorphosis, they are vulnerable to predation by introduced fish (Knapp 1994).

Occurrence in Project Area

Suitable aquatic habitat for mountain yellow-legged frogs is not present in the project area. Both Polaris and Lake Forest Creeks are ephemeral. Historic accounts of the mountain yellow-legged frog in the Lake Tahoe basin include observations at Grouse Lake 8/1/1974, Tamarack Lake 9/14/1975, Secret Harbor Creek 4/20/1994, and 5.5 miles north of Incline Village 7/10/1932 (USDA 2003). None of these historic occurrences is within or near the proposed project area. The only currently known population of mountain yellow-legged frogs exists at Hell Hole, which is located more than 20 miles southeast of the project area in the southern portion of the Lake Tahoe basin.

Direct and Indirect Effects

Because suitable habitat and this species do not occur in or near the project area, no direct or indirect effects will occur.

Cumulative Effects

No cumulative effects will occur.

5.2 USFS Sensitive Species

MAMMALS

Sierra Nevada Red Fox

The Sierra Nevada red fox inhabits forested areas interspersed with riparian habitats, meadows and brush fields. Preferred forest types include red fir, lodgepole pine, and sub-alpine fir in the higher elevations of the Sierra Nevada (USDA 1992). The fox occurs mainly at elevations greater than 7,000 feet and seldom below 5,000 feet. Rock outcrops, talus slopes, and down logs are necessary for den sites. Red foxes make elevational migrations downslope in winter, using ponderosa pine and mixed conifer habitats. They move seasonally from the higher elevations in the winter to mid elevation forests during the summer.

This species is omnivorous and an opportunistic hunter. Primary prey items are chipmunks, squirrels, wood rats, mice, and birds. The Sierra Nevada red fox might be more tolerant of openings than either marten or fisher, as they will hunt in open areas. Predator avoidance in the open may not be a problem for this fox (Duncan Furbearer Interagency Working Group 1989). The Sierra Nevada red fox is sensitive to human disturbances including logging, grazing, and recreational activities (Steinhart 1990).

Occurrence in Project Area

Very little is known about the status of the red fox in the vicinity of Lake Tahoe. This species is nocturnal and seldom seen. Occasional sightings of the fox have been reported in Tahoe National Forest, but none in or near the project area. Multiple survey efforts conducted throughout the Lake Tahoe basin from 1993 through 2007 have not detected Sierra Nevada red fox (USDA 2007). There are no reliable historic records of this species occurring in the Lake Tahoe basin or in the project area. However, the absence of detections is not proof of absence.

Due to the proximity of nearby residential development, busy roads (SR 28, Lake Forest Road), and the existing levels of human disturbance, it seems unlikely the Sierra Nevada red fox would occupy the project area. Nonetheless, potentially suitable habitat is present in the undeveloped portions of the project area and surrounding habitat.

Direct and Indirect Effects

Sierra Nevada red fox are mobile and are able to avoid temporary disturbances. Sierra Nevada red fox that forage in the upper elevations of the project, such as the Lake Forest riparian corridor, might be temporarily displaced when project activities occur in close proximity to such locations. Any disturbance that did occur would be limited to a temporary auditory and/or visual perturbation of individuals of this species that may pass near the project area. Displacement could result in a temporary spatial redistribution of individuals or habitat-use patterns during implementation. Because construction would occur during the day, disturbance to nocturnal individuals would not

occur. Prey species associated with Sierra Nevada red fox may also be subject to individual behavioral changes during implementation. Since prey species are mobile, they are unlikely to experience direct mortality. Any potential effects to prey are unlikely to adversely affect any foraging Sierra Nevada red fox because the affected area is small relative to the available habitat.

Cumulative Effects

Because no direct or indirect effects are anticipated, no cumulative effects will occur.

American Marten

Preferred habitat is characterized by dense (60-100% canopy closure), multi-story, multi-species mature coniferous forests with a complex physical structure near the ground (Buskirk and Ruggiero 1994). Marten do use a variety of other habitat types, but depend on a well-connected expanse of late-successional forest. High numbers of large snags and down logs are an important component of marten habitat, especially in winter when snow covers much of the ground. Snags and down logs provide denning and resting sites for marten, access to subalpine areas, and habitat for marten prey (Corn and Raphael 1992). Subalpine habitat is also important for resting and thermoregulation during winter (Buskirk and Ruggiero 1994). In winter, martens usually require forest with a canopy closure at least 50% (Bissonette 1991).

High quality habitat includes close proximity to forested riparian corridors that are used as travelways and an interspersed of small (<1 acre) openings with good ground cover used for foraging (Spencer et al. 1983; Freel 1991; Raphael and Jones 1991). Travelways between 300 to 600 feet in width are recognized by one expert as the minimum for marten dispersal (Chapel et al. 1992). Riparian corridors or other means for dispersal are necessary to martens to provide safe and frequent movements through poor habitat areas and between habitats. These travelways should be multistoried stands and should have a minimum canopy closure of 50-60% (Freel and Stewart 1991). Martens forage at the edge of openings, especially natural meadows, but they avoid traveling across large openings. Variable sizes for home ranges within the Sierra Nevada are reported in the literature; male home ranges vary from 673 to 3,000 acres and females range from 427 to 1,075 acres (USDA 1999).

Occurrence in Project Area

Potentially suitable habitat is present in the undeveloped, upper elevations in the northern portions of the action area. However, considering the potential habitat is near urban areas, it is considered unlikely that martens consistently occupy the habitat. Martens could potentially forage in the project area. However, considering that it is separated from the action area by SR 28 and is bounded by urban and commercial development, it is unlikely that the project area provides foraging habitat. Sparse and lacking riparian shrubs along Polaris Creek and Lake Forest Creek reduce their value as dispersal corridors. Moreover, martens would be unlikely to disperse into the project area along these corridors due to surrounding development (i.e., there is nowhere to disperse to). Moreover, low quality marten habitat is characterized by 30-40% canopy closure, which comprises much of the project area. The Jeffrey pine habitat that has moderate quality habitat (i.e., 41-70% canopy closure) is a disjunct patch approximately 100 acres in size. Because it is bounded by urban development and Lake Tahoe, it has minimal utility for martens. No protocol surveys for martens using sooted trackplates or remote cameras were conducted in the project area. Martens have been documented approximately one mile north of the project area in Forest Service land and approximately 1.5 miles west in Burton Creek State Park.

Direct and Indirect Effects

Marten are mobile and are able to avoid temporary disturbances. Marten that forage in the upper elevations of the project, such as the Lake Forest riparian corridor, might be temporarily displaced when project activities occur in close proximity to such locations. Any disturbance that did occur would be limited to a temporary auditory and/or visual perturbation of individuals of this species that may pass near the project area. Displacement could result in a temporary spatial redistribution of individuals or habitat-use patterns during implementation. Because construction would occur during the day, disturbance to nocturnal individuals would not occur. Prey species associated with marten may also be subject to individual behavioral changes during implementation. Since prey species are mobile, they are unlikely to experience direct mortality. Any potential effects to prey are unlikely to adversely affect any foraging marten because the affected area is small relative to the available habitat.

The project is not expected to affect habitat quality, quantity, and distribution of suitable marten during or after project implementation. The relatively minor increase in traffic due to construction activities would not be expected to increase the risk of fatality to martens from vehicle collisions since speed limits are reduced in construction areas. No adverse effects to marten reproduction are expected. If a den site is detected in the project area before or during

project activities, an LOP will be implemented from May 1 to July 31 within 100 acres surrounding the den site.

Cumulative Effects

By reducing potential direct and indirect effects through protection measures such as an LOP, cumulative effects are not expected.

BIRDS

California Spotted Owl

Spotted owls occupy mixed conifer, ponderosa pine, red fir and montane hardwood vegetation types. According to the California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment (USDA 1993), nesting and roosting habitat typically includes a forest stand with greater than 70% canopy cover. Optimum habitat consists of dense, mature trees with multiple canopies and abundant snags and down woody material. Nesting habitat is characterized by dense canopy closure (>70%) with medium to large trees and usually at least two canopy layers present. In addition, nest stands usually have some large snags and an accumulation of logs and limbs on the ground (USDA 1993). Foraging habitat can include all medium to large tree stands with 50% or greater canopy closure (Verner et al. 1992). Prey species include woodrat and flying squirrels.

Wasser et al. (1997) measured significantly higher levels of stress hormones in male northern spotted owls whose home range centers were within 0.41 km (0.25 mi.) of major logging roads or recent (10 years to present) timber activity. Forest Service recommendations for reducing direct effects to spotted owls have generally included minimizing disturbances within 0.25 miles of known roosts or nests during the breeding season (March 1 through August 31).

Information on the historic distribution, abundance, and habitat association of California spotted owls in the Sierra Nevada is unavailable (Verner et al. 1992). On National Forest lands within the Sierra Nevada, there are approximately 873 pairs, 185 territorial singles, and 261 singles. "California spotted owls are currently distributed relatively continuously and uniformly throughout their range in the Sierra Nevada (Verner et al. 1992, Noon and McKelvey 1996), although concern exists for fragmentation effects at finer scales due to habitat alteration (Gutierrez and Harrison 1996). Within the Lake Tahoe basin, detections have been uncommon in eastern watersheds (USDA wildlife files 2007). Between 13 and 15 nesting pairs of spotted owls have been documented within the LTBMU.

Occurrence in Project Area

No suitable nesting habitat is present in the project area, although small patches of mature forest are located in the action area (see Figure 4). No spotted owl protected activity centers (PACs) are delineated in or near the project area. The closest detection is located approximately one mile west of the project area and was recorded in 1991.

Direct and Indirect Effects

No California spotted owl protected activity centers (PAC) are delineated within one mile of the project area. Potential project activities in the vicinity of the Polaris Creek springs north of SR 28 will not involve any tree removal. However, if spotted owls are nesting in this area, they could experience disturbance and nest failure.

Project activities north of SR 28 associated with the restoration of Polaris Creek and springs could disturb any nesting spotted owls. If spotted owls are nesting in or near the project area during implementation, construction activities could disturb them and cause nest failure. A spotted owl was detected in 1991 approximately ¼ mile northeast of the proposed project area. No protected activity center is delineated for this detection. No disturbance to spotted owl breeding activities and habitat would occur because a limited operating period from March 1 to August 31 would be applied within ¼ mile of any active nest. Coordination with agency wildlife biologists or pre-project surveys would be conducted to determine the location of any active nests.

Vegetation changes associated with the meadow and stream restoration will not adversely affect prey availability or habitat suitability for spotted owls in the project area. Improvements in wet meadow habitat associated with Lake Forest Glen could improve habitat for small mammals. It is unknown whether improved conditions in the meadow would also improve habitat conditions in the adjacent forest, and thereby potentially improve the prey base of forest-dwelling small mammals for spotted owls.

Cumulative Effects

By reducing potential direct and indirect effects through protection measures such as an LOP, cumulative effects are not expected.

Great Gray Owl

Preferred habitat is mixed coniferous and hardwood forests, usually bordering small openings or meadows (USDA 1991). Optimal habitat is semi-open areas near dense coniferous forests, which the owls use for roosting and nesting. Breeding great gray owls typically occur between 4,000 and 8,000 feet. Courtship and nest site selection occur during late winter. Most nests are in broken-top snags generally greater than 21" dbh and 20 feet tall (USDA 1992). Nests are also found in debris platforms from dwarf mistletoe or in old stick nests of other raptors. Nests are generally located within 1,000 feet from the edges of wet meadows that range in size from 15 to 250 acres. Preferred canopy closure is greater than 70%, although owls use habitat with canopy closure as low as 40% (Zeiner et al. 1990).

The owls prey primarily on voles and pocket gophers throughout the year (Zeiner et al. 1990). High prey density, perch availability, and relatively open forest canopies have been identified as important factors in foraging habitats (Bull et al. 1988). In winter, the owls hunt in early morning and from late afternoon to dusk. During the breeding season, they hunt throughout the day and night. Great gray owls hunt by perching two to 20 feet high at the edges of meadows or grasslands and listening for prey in grass runways or underground burrows. The owls fly low over the ground and drop on their prey (Winter 1981).

Occurrence in Project Area

Potentially suitable habitat exists in the project area at the Lake Forest Glen meadow. However, great gray owls have not been observed in the Lake Tahoe basin, and there are no reliable historic records of this species occurring in the basin.

Direct and Indirect Effects

The quality, quantity, and distribution of suitable great gray owl habitat will not be altered by any project activities. Great gray owls have not been detected in the project area. However, the restoration component of the project will affect potentially suitable great gray owl habitat located in Lake Forest Glen meadow. If great gray owls use this habitat, they could be temporarily displaced during construction activities. Project activities could temporarily reduce prey availability in the area of direct impact through mortality of small mammals. Following project completion, the restored creek and meadow are likely to support greater numbers of small mammals, thus improving the potential prey base for great gray owls.

Cumulative Effects

The proposed project will not contribute to any cumulative effects for gray owls.

Northern Goshawk

Preferred habitat consists of older-age coniferous, mixed, and deciduous forest habitat. The habitat also consists of large trees for nesting, a closed canopy for protection and thermal cover, and open spaces allowing maneuverability below the canopy (USDA et al. 1988). Snags, down logs, and high canopy cover are critical habitat features. The former two are also an important component used by numerous prey species. Many of the species that provide the prey base for goshawks are associated with open stands of trees or natural openings containing an understory of native shrubs and grass (Fowler et al. 1988).

Northern goshawk nesting habitat is characterized by dense canopy closure (50-90%) with mature timber. Nest trees for this species are commonly located on benches or basins surrounded by much steeper slopes (Call 1979). Mature trees serve as nest and perch sites, while plucking posts are frequently located in denser portions of the secondary canopy. The same nest might be used for several seasons, but alternate nests are common within a single territory. The chronology of nesting activity varies annually and elevationally. In general, nesting activities are initiated in February. Nest construction, egg laying, and incubation occur through May and June. Young birds hatch and begin fledging in late June and early July. They are independent by mid-September (USDA 1992).

For goshawks, recommendations for managing forests call not only for maintaining nest stands, but also for developing forest environments that support a variety of their prey species in a 2430 hectare area surrounding each nest (Reynolds et al. 1992). Important components of foraging areas include snags and down logs for prey base populations (Reynolds

1983; USDA 1991). A dependence on one type of prey could conceivably lead to a decline in a predator population if that prey species declined (McGowan 1975; Newton 1979). The diet of the goshawk is typically varied and is not dependent on only one or a few species. Small mammals and birds are the goshawks' primary prey (Verner and Boss 1980; Fowler 1988).

Occurrence in Project Area

Potentially suitable nesting habitat is not present in the project area and no protocol surveys were performed. The undeveloped, upper elevation, forested habitat located north of the project area could provide potentially suitable foraging habitat. The extreme western portion of the project area encompasses a small area of a protected activity center (PAC) for a goshawk nest in Burton Creek State Park. This nest site was active in 1992 but no activity has been recorded in subsequent surveys, the most recent of which was in 2005. The next closest PAC is located more than 1.5 miles north of the project area in the vicinity of Watson Creek. Within the project area, the LTBMU recorded a single adult goshawk in July 1998 near the intersection of SR 28, Old County Road, and Lake Forest Creek.

Direct and Indirect Effects

The quality, quantity, and distribution of suitable goshawk habitat will not be altered by any project activities. The project disturbances could temporarily reduce prey availability in the area of direct impact through mortality of small mammals, but this short-term potential effect is unlikely to adversely affect any foraging goshawks. Direct effects to northern goshawks are unlikely to occur because suitable nesting habitat is not present in or adjacent to the project area. Project activities could potentially disturb any foraging individuals that are present in or near the area of direct impact. The displacement will be short term until construction is finished. If goshawks are nesting in the project area or within 0.25 miles of the project area during project implementation, construction activities could disturb them and cause nest failure. However, no disturbance to goshawk breeding activities and habitat will occur because a limited operating period from February 15 to September 15 will be applied within 0.5 miles of any active nest.

Cumulative Effects

By reducing potential direct and indirect effects through protection measures such as an LOP, cumulative effects are not expected.

Willow Flycatcher

Nesting habitat typically includes moist meadows with perennial streams and smaller spring-fed or boggy areas with willow (*Salix spp.*) or alder (*Alnus spp.*) (Serena 1982; Harris et al. 1988). Willow flycatchers have been found in riparian environments of various shapes and sizes ranging from small willow-surrounded lakes or ponds with a fringe of meadow or grassland to various willow-lined streams, grasslands, or boggy areas. Willow flycatcher nest territories generally contain open water (i.e., running water or standing water), boggy seeps, or saturated soil (Bombay et al. 1999).

Nests constructed of grass and sedges are usually located in willows between 3.3 to 10 feet in height (Serena 1982). In mountain meadows, duff from the previous growth season must be available when the flycatchers construct their nest.

In the Sierra Nevada, willow flycatchers have nested in meadows less than one acre to meadows several hundred acres (Serena 1982; Stafford and Valentine 1985; Flett and Sanders 1987; Bombay et al. 1999). However, most willow flycatchers occur in meadows larger than 20 acres. Riparian meadow sites used by willow flycatchers vary in size and shape and may contain relatively dense, linear stands of shrubs, or irregularly shaped mosaics of dense vegetation with open areas in between. Various researchers describe openings within thickets of riparian deciduous shrubs or tall clumps of shrubs separated by open areas as important components of willow flycatcher nesting habitat (Serena 1982; Harris et al. 1988; Sanders and Flett 1989). Large contiguous willow thickets are avoided (Harris et al. 1988; Sanders and Flett 1989). According to Sanders and Flett (1989), openings within willow patches appear to increase habitat suitability. However, Harris et al. (1988) found it was not possible to predict presence or absence of willow flycatchers by willow clump sizes. Nonetheless, some openness in the shrub stratum seems important. The loss and degradation of riparian habitats is probably the primary cause of historic and recent declines in willow flycatchers.

Occurrence in Project Area

Within the project area, suitable willow flycatcher nesting habitat is present in the riparian habitat along Polaris Creek in Lake Forest Glen Meadow. Suitable habitat is also present along Burton Creek, which is located less than 0.25 miles

west of the project area. Willow flycatchers were not detected in the project area during surveys performed in 2004 and 2005.

Direct and Indirect Effects

Willow flycatchers have not been detected within the project area, although it is possible that willow flycatchers have nested in the project area. Project activities that will occur in neighborhoods will not affect willow flycatchers or their habitat. The restoration components of the project will improve habitat conditions for willow flycatchers and increase the amount of suitable habitat. Riparian vegetation is expected to colonize new areas, thus providing additional potential nest sites. Post-project, the meadow will retain moisture for a longer period of time through the summer season. This would increase levels of prey for the willow flycatcher, and may inhibit predators from reaching willow flycatcher nests due to higher water flow conditions.

The few willows in the vicinity of Lake Forest Creek in the vicinity of the restoration project are unlikely to be used by willow flycatchers. Construction of the channel and floodplain conveyance associated with restoration of Lake Forest Creek from State Route 28 to a point about 1,000 feet downstream will not directly affect potential willow flycatcher habitat as few willow plants are present. Following construction, riparian vegetation would eventually colonize the channel and the dry meadow would be altered to a wet meadow. Both results would produce more suitable habitat for willow flycatchers.

The project will produce short-term effects to willow flycatcher habitat in the vicinity of Polaris Creek and the springs north of SR 28. Project activities will be designed to minimize disturbance to existing riparian vegetation, and when possible, existing willow trees or shrubs within these areas will be salvaged and replanted at project completion. Project actions to restore Polaris Creek that involve relocating the stream channel, creating a riparian corridor, and restoring wetland meadows would improve habitat for willow flycatchers.

No direct effects to nesting willow flycatchers are expected. Willow flycatchers have not been detected foraging or nesting in the project area. Nest upset is considered unlikely because protocol-level willow flycatcher surveys will be performed prior to implementation of any project phases that occur in or near willow habitat. If nesting willow flycatchers are detected, a protected activity center will be delineated by the LTBMU wildlife biologist and a LOP will be implemented from June 1 through August 31.

It is possible that non-nesting, undetected willow flycatchers could use the project area (i.e., birds arrive after protocol surveys are concluded). Any willow flycatchers occupying the project area during construction activities might be displaced from the immediate work area due to mechanical activity, noise, and visual disturbance. The displacement could result in a temporary spatial redistribution of individuals, changes in habitat use patterns, or changes in occupancy of habitat.

Although the project will be constructed in phases over several years, not all portions of the project area will be entered and disturbed at a given time. Nonetheless, the overall effect could be such that the disturbance level prevents occupancy by willow flycatchers throughout the several years of construction. This potential long-term disturbance is not likely to cause any adverse effects to willow flycatchers because they have never been documented in the project area.

Cumulative Effects

By reducing potential direct and indirect effects through protection measures such as an LOP, cumulative effects are not expected. In the long term, the project will increase the quantity, quality, and distribution of suitable willow flycatcher habitat in the LTBMU.

AMPHIBIANS

Northern Leopard Frog

This frog is highly aquatic and is typically found in springs, slow-flowing streams, marshes, bogs, ponds, canals, and reservoirs. Although found in semi-permanent water in many habitat types, they require permanent aquatic habitat to breed, feed, and overwinter. Emergent or submergent vegetation may be necessary both for oviposition and refuge during the breeding season, although the degree to which this species require vegetation in the aquatic habitat where they deposit their eggs has not been quantified or experimentally evaluated. A dense, relatively tall, grass or forb dominated

habitat with must occur in the vicinity of the aquatic habitat used for egg laying and overwintering (Merrell 1977; Jennings and Hayes 1994). To avoid desiccation, leopard frogs need to be near moist substrate in the vicinity of aquatic habitat.

Adults emerge from underwater overwintering sites that consist of small pits the frogs excavate in the bottom mud. Breeding is initiated in spring after the likelihood of a deep freeze is low. Eggs hatch in 8 to 15 days and tadpoles metamorphose two to six months later (Merrell 1977; Morrey 1988). Females reach sexual maturity in three to four years and males become sexually mature at two to three years.

Stebbins (1966, 1985) considered leopard frogs in the vicinity of Lake Tahoe native amphibians. However, historical evidence indicates that at least some populations of leopard frogs around Lake Tahoe might have been introduced (Jennings and Hayes 1994). Historic accounts of the northern leopard frog in the Lake Tahoe basin include observations at Trout Creek, June 1934, Fallen Leaf Lake, July 1919, and Taylor Creek, June 1995 (LTBMU wildlife files 2006).

Occurrence in Project Area

Suitable aquatic habitat for northern leopard frogs does not occur within the project area. Both Polaris and Lake Forest Creeks are ephemeral. No detections of northern leopard frogs have occurred in the Lake Tahoe basin in recent years (Manley and Schlesinger 2001, Muskopf and Reiner 2003), nor has it been detected during the Multispecies Inventory and Monitoring Program performed throughout the basin during the past five years.

Direct and Indirect Effects

Because suitable habitat and this species do not occur in or near the project area, no direct or indirect effects will occur.

Cumulative Effects

No cumulative effects will occur.

FISH

Lahontan Lake Tui Chub

The Lahontan Lake tui chub are a cyprinid subspecies found in Lake Tahoe and Pyramid Lake (Nevada), which are connected to each other by the Truckee River, and occur in nearby Walker Lake (Nevada) (Moyle 1976; Moyle et al. 1995). The Lake Tahoe population is the only confirmed population in the Sierra Nevada. Suspected populations of this species, due to morphological similarities, may also inhabit Stampede, Boca, and Prosser Reservoirs (Moyle et al. 1995).

This schooling fish is a mid-water feeder and feeds primarily on zooplankton. Lahontan Lake tui chub feed primarily on zooplankton, especially cladocerans and copepods, but also eat benthic insects when available (Miller 1951). Tui chub are mostly preyed upon by large trout, and rarely by birds and snakes (Miller 1951).

In Lake Tahoe, nocturnal spawning occurs during May and June, and might extend into July (Miller 1951). Beds of aquatic vegetation in shallow inshore areas are important for spawning, egg hatching, and larval survival. Tui chub may be serial spawners, reproducing several times during the spawning season (Moyle 1976). Reproductive adults spawn near-shore over beds of aquatic vegetation, to which the eggs adhere. Young remain near shore until winter and then migrate into deeper water. The Lahontan Lake tui chub has been adversely affected by Kokanee salmon and opossum shrimp (*Mysis relicta*), both of which were introduced into Lake Tahoe and feed on zooplankton.

Occurrence in Project Area

This species occurs in Lake Tahoe, which forms the project area's southern boundary.

Direct and Indirect Effects

No direct effects to Lahontan Lake tui chub or their habitat in Lake Tahoe will occur. Construction activities adjacent to or in Lake Tahoe's shore zone could indirectly affect this species' habitat if such activities cause an increase in sedimentation or equipment accidents cause fuel spills. However, the management actions and design criteria described in Section IV will prevent any indirect effects.

Lahontan Lake tui chub occupy Lake Tahoe. No project activities will occur in Lake Tahoe. Therefore, no direct or indirect impacts to this species, its spawning, or its habitat are anticipated. BMPs and other mitigation measures will prevent any project components from adversely affecting Lake Tahoe, and therefore the tui chub. The project is designed to improve water quality and could improve habitat for this species.

Cumulative Effects

Because no direct or indirect effects are anticipated, no cumulative effects will occur.

INVERTEBRATES

Great Basin ramshorn snail

The habitat of the Great Basin ramshorn snail includes muddy areas of lakes and streams, especially near springs or upwellings. The snails characteristically burrow in soft mud and may be invisible even when abundant (USDA 1998). This species can occur with several other endemic mollusks. The Great Basin rams-horn snail has been recorded in Lake Tahoe and the adjacent slow segment of its outflow, the Truckee River.

Occurrence in Project Area

Suitable habitat is not present within the project area. No populations are known to exist in the project area. This species was not detected during surveys conducted in the project area in 2004, 2005, and 2006.

Direct and Indirect Effects

Because suitable habitat and this species do not occur in the project area, no direct or indirect effects will occur.

Cumulative Effects

No cumulative effects will occur.

6.0. DETERMINATION OF EFFECTS

6.1 Species Not Affected

Table 1. Threatened, Endangered, and Sensitive Species for the Lake Tahoe Basin Management Unit, and effect determinations for project level analysis for the proposed Lake Forest ECP Area B EIP Project.

Species	Special Status	Known to Occur in the Project Area	Suitable Habitat in the Project Area	*Determination
Birds				
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Federally Threatened		X	NLAA
American Peregrine Falcon (<i>Falco peregrinus anatum</i>)	De-listed, 5-yr monitoring			NE
California Spotted Owl (<i>Strix occidentalis occidentalis</i>)	Forest Sensitive Species			MANL
Northern Goshawk (<i>Accipiter gentiles</i>)	Forest Sensitive Species			MANL
Willow Flycatcher (<i>Empidonax traillii adastus</i>)	Forest Sensitive Species		X	MANL
Great Gray Owl (<i>Strix nebulosa</i>)	Forest Sensitive Species		X	MANL
Mammals				
Sierra Nevada red fox (<i>Vulpes vulpes necator</i>)	Forest Sensitive Species		X	MANL

Species	Special Status	Known to Occur in the Project Area	Suitable Habitat in the Project Area	*Determination
American marten (<i>Martes americana</i>)	Forest Sensitive Species			MANL
California wolverine (<i>Gulo gulo luteus</i>)	Forest Sensitive Species			NE
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Forest Sensitive Species			NE
Amphibians				
Mountain yellow-legged frog (<i>Rana muscosa</i>)	Forest Sensitive Species			NE
Northern leopard frog (<i>Rana pipiens</i>)	Forest Sensitive Species			NE
Fish				
Lahontan cutthroat trout (<i>Oncorhynchus clarkii henshawi</i>)	Federally Threatened			NE
Lahontan Lake tui chub (<i>Gila bicolor pectinifer</i>)	Forest Sensitive Species		X	MANL
Invertebrates				
Great Basin rams-horn (<i>Helisoma newberryi newberryi</i>)	Forest Sensitive Species			NE

*Federally Listed Species

NA - Will not affect the species or its designated critical habitat.

NLAA - May Affect Not Likely to Adversely Affect the species or its designated critical habitat.

LAA - May affect and is likely to adversely affect the [name of species] or its designated critical habitat

Sensitive Species

NE – Will not affect the species.

MANL – May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability.

MALT - May affect individuals, and is likely to result in a trend toward Federal listing or loss of viability.

7.0 LITERATURE CITED, REFERENCES, AND PERSONAL COMMUNICATION

Ahlborn, G., and N. White. 2000. California Habitat Relationship System. California Interagency Wildlife Task Group, California Department of Fish and Game, California, USA.

Allessio, David and Kundert, Antony. 1990. "C.N.P.S. DATA BASE-MUD LAKE" USDA FOREST SERVICE, LTBMU.

Banci, V.A. 1994. Wolverine. Pp 99-127. In Ruggiero, L.F. et al. (Eds). The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in western U.S. Gen. Tech. Rep. RM-254, Rocky Mountain Forest and Range Experiment Station. 184 pp.

Behnke, R. J. 1979. Monograph of the native trouts of the genus *Salmo* of western North America. U.S. Department of Agriculture, Forest Service, Lakewood, Colorado. 2155 pp.

Bissonette, J.A. 1991. Regression in forest successional stages and its implications for core sensitive species: A global look at marten habitat futures. Symposium on the Biology and Management of Martens and Fishers. Laramie WY, 29 May-1 June 1991.

Boal, C.W. and R.W. Mannan. 1994. Northern goshawk diets in ponderosa pine forests on the Kaibab Plateau. Studies in Avian Biology No. 16 Cooper Ornithological Society.

Bombay, H.L., M.L. Morrison, and L.S. Hall. 1999. 1997 Annual report for the challenge cost-share agreement between California State University, Sacramento and USDA Forest Service, Tahoe National Forest regarding willow flycatcher monitoring. February 22, 1999.

Bradford, D.F., F. Tabatuabai, and D.M. Graber. 1993. Isolation of remaining populations of the native frog, *Rana muscosa*, by introduced fishes in Sequoia and Kings Canyon National Parks, Ca. Conservation Biology 7: 882-888.

Bull, Evelyn L. and Mark G. Henjum. 1990. Ecology of the great gray owl. General Technical Report PNW-GTR 265. Pacific Northwest Research Station, USDA Forest Service, Portland OR. 39 p.

Buskirk, S.W. and Ruggiero, L.F. 1994. American marten. in The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the United States. Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski, tech eds. 1994. Gen. Tech. Rep. RM-254. Ft. Collins, Co: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

California Department of Fish and Game. 1987. American peregrine falcon five-year status report. 15 pp.

California State Parks, Department of Parks and Recreation. June 15, 2005. Burton Creek State Park Preliminary General Plan Draft EIR. 109 pp.

Call, M.W. 1979. Habitat management guides for birds of prey. U.S. Dep. Interior, Bureau of Land Management. Tech. Note TN-338. 70 pp.

Chapel, M., A. Carlson, D. Craig, T. Flaherty, C. Marshall, M. Reynolds, D. Pratt, L. Pyshora, S. Tanguay and W. Thompson. 1992. Recommendations for managing late-seral-stage forest and riparian habitats on the Tahoe National Forest. Located at: USDA Forest Service, Tahoe National Forest, Nevada City, CA. 31 pp.

Corn, J.G. and M.G. Raphael. 1992. Habitat characteristics at marten subnivean access sites. Journal of Wildlife Management. 56:442-448.

DeSmet, K.D. and M.P. Conrad. 1991. Status, habitat requirements, and adaptations of ferruginous hawks in Manitoba. Pages 219-221 in Proceedings of the second endangered species and prairie conservation workshop. Provincial Museum of Alberta, Natural History Occasional Paper No. 15.

Duncan Furbearer Interagency Workgroup. 1989. Workgroup assembled to review the proposed Duncan Timber Sale, Tahoe National Forest and formulate proposed Management Guidelines. Members present: Slader Buck, Reg Barrett, Terri Simon-Jackson, Gordon Gould, Ron Schlorff, Jeff Finn, Joelle Buffa, Maeton Freel, Jeff Mattison, Mike Chapel, Mariana Armijo, Julie Lydick and Phil Turner.

Dunne, P., D. Sibley, and C. Sutton. 1988. Hawks in Flight. Houghton Mifflin Co. Boston, MA.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birders handbook: a field guide to the natural history of North American birds. Simon and Schuster Inc., New York, New York.

Fehr and Peers, 2003. Lake Tahoe Regional Bicycle and Pedestrian Master Plan. TRPA.

Flett, M. A. and S. D. Sanders. 1987. Ecology of a Sierra Nevada population of willow flycatchers. *Western Birds* 18:37-42.

Freel, M. 1991. A Literature Review for Management of Fisher and Marten in California. Unpublished Document, United States Department of Agriculture Forest Service, Pacific Southwest Region.

Freel, M. and R. Stewart. 1991. A literature review for management of the marten and fisher on national forests in California. USDA Forest Service PSW Region, San Francisco. July 1991.

Freel, M. and R. Stewart. 1991. A literature review for management of the marten and fisher on national forests in California. USDA Forest Service PSW Region, San Francisco. July 1991. 22 pp.

Fowler, C. 1988. Habitat capability model for the northern goshawk. USFS Tahoe National Forest, Nevada City, Ca. 21 pp.

Geist, V. 1978. Behavior. In Big Game Animals of North America: Ecology and Management, eds., J.L. Schmidt and D.L. Gilbert, 238-296. Harrisburg, Pennsylvania: Stackpole Books. 494 pp.

Gerstung, E.R. 1988. Status, life history, and management of the Lahontan cutthroat trout. *American fisheries Society Symposium* 4:93-106.

Golightly, R.T. 1991. An Evaluation of the Tahoe Basin for the Support of Nesting and Wintering Bald Eagles, Humboldt State University, Arcata, CA.

Grinnel, J., Dixon, J.S. and Linsdale, J.M. 1937. Furbearing mammals of California. Vol. 1. Berkeley, Ca: University of California Press. 375 pp.

Harris, J.H., S.D. Sanders and M.A. Flett. 1988. The status and distribution of the willow flycatcher in the Sierra Nevada: results of the 1986 survey. California Department of Fish and Game. Wildlife Management Division Administrative Report. 88-1. 32 pp.

Hayward, G.D. 1994. Review of technical knowledge: boreal owls. Pp 92-127. In Hayward, G.D. and J. Verner, tech editors. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, Co: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 214 pp.

Herron, G.B., C.A. Mortimore, and M.S. Rawlings. 1985. Northern goshawk. Nevada raptors: their biology and management. Biol. Bull. No. 8, Nevada Dept. Wildlife, Reno, NV.

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

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. California Department of Fish and Game, Final Report.

- Kahre, S. K. 1995. Deer telemetry study Loyalton-Truckee herd. 1995. Final Report, California Department of Fish and Game, California, USA.
- Keane, J. 1995. Northern goshawk final report. Prepared for the California Tahoe Conservancy.
- Knapp, R. 1994. Wilderness Record. Volume 19, Number 2. Davis, California.
- Kunz, T.H. and R.A. Martin. 1990. *Plecotus townsendii*. Mammalian Species. The American Society of Mammalogists.
- Laves, K. S. and J. S. Romsos. 1998. Draft - Wintering bald eagle (*Haliaeetus leucocephalus*) and human recreational use of the south shore of Lake Tahoe. USDA Forest Service – Lake Tahoe Management Unit, South Lake Tahoe, CA. 31 pp.
- Leonard, M.L. and M.B. Fenton. 1983. Habitat use by spotted bats (*Euderma maculatum*, Chiroptera: Vespertilionidae): roosting and foraging behavior. Can. J. Zool. 61:1487-1491.
- Lehman, R. 1979. A Survey of Selected Habitat Features of 95 Bald Eagle Nest Sites in California. California Department of Fish and Game, Administrative Report 79-1. October 1979. 23 pp.
- Manley, P. and M. Schlesinger. 2001. Riparian biological diversity in the Lake Tahoe basin. A final report to the California Tahoe Conservancy. April 2001.
- Martin, D. L. 1992. Sierra Nevada Anuran Guide. Canorus, LTD. Ecological Research Team. San Jose, CA.
- McGowan, J.D. 1975. Distribution, density, and productivity of goshawks in interior Alaska. Fed. Aid Wildl. Rest. Proj. Rep. Job 10.6R. Alaska Fish and Game Depart., Juneau, AK.
- Merrell, D.J. 1977. Life history of the leopard frog, *Rana pipiens* in Minnesota, Occasional Papers of the Bell Museum of Natural History, Univ. of Minnesota (15):1-23.
- Miller, R.G. 1951. The natural history of Lake Tahoe fishes. Unpubl. Ph.D. Diss. Stanford University. 160 pp.
- Monk, J., B.J. Walton, R. Olendorff and D. Carrier. 1988. California peregrine falcon implementation plan. Santa Cruz Predatory Bird Research Group. 44 pp.
- Morrey, S. 1988. Northern leopard frog (*Rana pipiens*). In Zeiner, D.C., W.F. Laudenslayer, and K.E. Mayer (eds). California's Wildlife, Volume I: Amphibians and Reptiles. California Department of Fish and Game, Sacramento, CA. 272 pp.
- Moyle, P. B. 1976. Inland fishes of California. University of California Press, Berkeley, California. 405 pp.
- Moyle, P.B., R.M. Yoshiyama, J.E. Williams, and E.D. Wikramanyake. 1995. Fish species of special concern in California. Dept. Fish and Game, Inland Fisheries Division. Rancho Cordova, CA. Final Report for contract No. 2128IF. 272 pp.
- Newton, I. 1979. Population ecology of raptors. Buteo Books, Vermillion, SD.
- Nicholson, M.C., R.T. Bowyer, and J.G. Kie. 1997. Habitat selection and survival of mule deer: trade-offs associated with migration. Journal of Mammalogy 78: 483-504.
- Orr, R.T. and J. Moffitt. 1971. Birds of the Lake Tahoe Region. California Academy of Sciences. San Francisco, CA. 150 pp.
- Peterson, A. 1986. Habitat suitability index model: bald eagle (breeding season). Biol. Rep. 82(10.126). Washington, DC: U. S. Dept. of Interior, Fish and Wildlife Service. 25 pp.

Pierson, E.D., W.E. Rainey and D.M. Koontz. 1991. Experimental mitigation for Townsend's big-eared bat at the McLaughlin Mine in California. From Proceedings V: Issues and technology in the management of impacted wildlife, April 8-10, 1991. Snowmass, Co., Thorne Ecological Institute, Boulder, CO.

Philpott, W. 1997. Summaries of the life histories of California bat species. USDA Forest Service, Sierra National Forest, Pineridge Ranger Station. 30 pp. Unpublished Document.

Poole, A. P. 1989. Ospreys: a natural and unnatural history. Cambridge, New York. Cambridge University Press. 246 pp.

Raine, R.M. 1987. Winter food habits and foraging behavior of fishers (*Martes pennanti*) and martens (*Martes americana*) in southeastern Manitoba. Canadian Journal of Zoology. 65:745-747.

Raphael, M.G. and L.L.C. Jones. 1991. Distribution and habitat use of martens in fragmented forests of the western Cascades, Washington. Sympos. Biol. & Manage. of Martens and Fishers. Laramie WY. 29 May-1 June 1991. Procs.

Reed, S. 1979. Bald Eagle Management Plan for the Lake Tahoe Basin Management Unit. Lake Tahoe Basin Management Unit.

Reynolds, R.T. 1983. Management of western coniferous forest habitat for nesting Accipiter hawks. USDA Forest Service, Gen. Tec. Rep. RM-102, Ft. Collins, CO.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. USDA Forest Service, Gen. Tech. Rep. RM-217, Ft. Collins, CO.

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. Ft. Collins, Co: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

Sanders, S. and M.A. Flett. 1989. Ecology of a Sierra Nevada Population of Willow Flycatchers (*Empidonax traillii*), 1986-87. State of California, The Resources Agency, Department of Fish and Game, Wildlife Management Division Non-game Bird and Mammal Section.

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

Serena, M. 1982. The status and distribution of the willow flycatcher (*Empidonax traillii*) in selected portions of the Sierra Nevada, 1982. California Department of Fish and Game, Wildlife Management Division Administrative Report NO. 82-5, 28 pp.

Sherwin, R. 1998. Presentation to the Western Bat Working Group Workshop. February 9-13. Reno, NV.

Sigler, W. F., and J. W. Sigler. 1987. Fishes of the Great Basin: A Natural History. University of Nevada Press, Reno, Nevada. 425 pp.

Spencer, W.D., R.H. Barrett, and W.J. Zielinski. 1983. Marten habitat preferences in the northern Sierra Nevada. J. Wildl. Manage. 47(4):1181-1186.

Stafford, M. D. and B. E. Valentine. 1985. A preliminary report on the biology of the willow flycatcher in the central Sierra Nevada. CAL-NEVA Wildlife Transactions 1985:66-77.

Stebbins, R.C. 1966. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, Mass. USA.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. Second Edition, revised. Houghton Mifflin Company, Boston, Mass. USA.

Steinhart, P. 1990. California's Wild Heritage, Threatened and Endangered Animals in the Golden State. California Department of Fish and Game, California Academy of Science, and Sierra Club.

Tahoe City Public Utility District (TCPUD). 1998. Facilities Management Plan. Department of Parks and Recreation.

Tahoe Regional Planning Agency. 1991. Evaluation Environmental Threshold Carrying Capacities and the Regional Plan Package. November 4, 1991.

United States Department of Agriculture (USDA) 1988a. Land and Resources Management Plan. Forest Service, Region Five, Tahoe National Forest. Lake Tahoe Basin Management Unit. South Lake Tahoe, CA.

----1988b. Habitat Capability Model for the Northern Goshawk. Forest Service, Region Five, Tahoe National Forest, Nevada City, CA.

----1991. Threatened, Endangered, and Sensitive Species of the Intermountain Region. Regulation Guide Prepared by Fish and Wildlife Staff. Intermountain Region, Ogden, UT.

----1992. Biological Evaluation for Drought-related Timber Salvage on National Forests of the Sierra Nevada Province, Pacific Southwest Region for Threatened, Endangered, Sensitive, and Proposed Animals. August 17.

----1993. California Spotted Owl Sierran Province Interim Guideline Environmental Assessment. Forest Service, Pacific Southwest Region. San Francisco, CA , January 1993.

----1994. Lake Tahoe Basin Management Unit California Spotted Owl Protected Activity Centers. Lake Tahoe Basin Management Unit. South Lake Tahoe, CA. April 1994.

----2000. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement. Forest Service, Pacific Southwest Region, December 2000.

----2001. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement, Record of Decision. Forest Service, Pacific Southwest Region, January 2001.

----2003. Biological Evaluation/Biological Assessment for birds, mammals, fish, amphibians, and plants for Cookhouse Meadow restoration. Lake Tahoe Basin Management Unit, South Lake Tahoe, CA. December 2003.

----2005. Lake Tahoe Basin Management Unit wildlife files of species sightings. Forest Service, Region Five, South Lake Tahoe, CA.

---- Forest Service Manual 2670. Threatened and Endangered, and Sensitive Plants and Animals. Forest Service, Pacific Southwest Region, January 2001.

United States Department of the Interior. 1973. Endangered Species Act, 16 U.S.C. 1531-1544. Fish and Wildlife Service.

----1986. Recovery Plan for the Pacific Bald Eagle. Portland, OR.

Van Deale, L. J. and H. A. Van Deale. 1982. Factors affecting the productivity of ospreys nesting in west-central Idaho. Condor 84:292-299.

Verner, J. and A.S. Boss, technical coordinators. 1980. California wildlife and their habitats: Western Sierra Nevada. USDA Forest Service, PSW-37, Berkeley, Ca 439 pp.

Verner, J., K.S. McKelvey, B.R. Noon, R.J. Gutierrez, G.I. Gould, Jr. and T.W. Beck, Technical Coordinators. 1992. The California spotted owl: a technical assessment of its current status. Gen. Tech. Rep. PSW-GTR-133. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 285 pp.

Vogel, W.O. 1989. Response of deer to density and distribution of housing in Montana. Wildlife Society Bulletin. 17: 406-413.

Winter, Jon. 1981. Some aspects of the ecology of the great gray owl in the Central Sierra Nevada. USDA, Forest Service. Stanislaus National Forest Contract # 43-2276. Final report. Sonora, CA. 30 pp.

Woodbridge, B. and P.J. Detrich. 1994. Territory occupancy and habitat patch size of northern goshawks in the southern Sierra Cascades of California. Studies in Avian Biology No. 16 Cooper Ornithological Society.

Younk, J.V. and M.J. Bechard. 1994. Breeding ecology of the northern goshawk in high-elevation aspen forests of northern Nevada. Studies in Avian Biology No. 16:119-121.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer and M. White. 1990. California Wildlife: Volume III: Mammals. California Dept. of Fish and Game, Sacramento CA. 407 pp.

Zeveloff, S.I. 1988. Mammals of the Intermountain West. University of Utah Press, Salt Lake City. 365 pp.

PERSONAL COMMUNICATION

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