# 3.4 GEOMORPHOLOGY AND WATER QUALITY

This section presents the regulatory setting for geomorphology and water quality, describes the existing conditions in the study area related to geomorphology and water quality, and evaluates potentially adverse environmental impacts related to erosion, sedimentation, and deposition associated with project implementation.

The examination of geomorphology and water quality is based on information obtained through review of academic research and available information published by Federal, State, and local agencies, primarily the Final Report: Upper Truckee River Upper Reach Environmental Assessment (SH&G 2004a), the Amendment Report: Upper Truckee River Upper Reach Reclamation Project (SH&G 2004b), and the Riparian Ecosystem Restoration Feasibility Report associated with the Upper Truckee River Restoration Project (River Run Consulting 2006). The examination of geomorphology is also based on the preliminary engineering schematic designs prepared for the alternatives.

For a discussion of other water resource issues, refer to Section 3.3, "Hydrology and Flooding." Consistency with TRPA goals and policies is presented in Section 3.2, "Land Use," Table 3.2-1. Cumulative geomorphology and water quality impacts are addressed in Section 3.16, "Cumulative Impacts." The project's effects on thresholds are described in Section 4.6, "Consequences for Environmental Threshold Carrying Capacities."

## 3.4.1 AFFECTED ENVIRONMENT

### REGULATORY SETTING

### Federal

#### *Clean Water Act*

The Clean Water Act (CWA) (33 United States Code [USC] 1251 et seq.) provides the primary basis for Federal regulations affecting geomorphology and water quality. CWA Section 402 establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate discharges of pollutants into waters of the United States. A NPDES permit sets specific discharge limits for point sources discharging pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. Discharges of stormwater to surface waters associated with construction activity including clearing, grading, and excavation activities mush also obtain an NPDES permit and implement measures to reduce or eliminate stormwater pollution. The Federal government delegates water pollution control authority under Section 402 of the CWA to the states and the states oversee compliance.

Under Section 303(d) of the CWA, water quality limited segments are identified, and Total Maximum Daily Loads (TMDLs) of pollutants to a water body listed as impaired pursuant to that section is required. Lake Tahoe is listed as impaired and the TMDL is being developed by California and Nevada to address pollutant loadings from all sources to achieve existing water quality objectives for deep water clarity and transparency (namely loadings of nitrogen, phosphorous, and fine sediment) (California Water Boards and NDEP 2009).

Section 404 of the CWA requires projects to receive authorization from the Secretary of the Army, acting through the U.S. Army Corps of Engineers (USACE), to discharge dredged or fill material into waters of the United States, including wetlands, whether the discharge is temporary or permanent. USACE Regional General Permit 16 authorizes activities with minimal individual and cumulative impacts on waters of the United States, including wetlands, in the Tahoe Basin (USACE 2005). This regional General Permit will expire September 30, 2010, but it is expected that the USACE will either extend the expiration date and/or issue a replacement permit effective as of that date. In conjunction with USACE's CWA Section 404 permits, CWA Section 401 requires that water quality certifications or waivers be issued by the U.S. Environmental Protection Agency (EPA), the states, or both (see below).

### *Safe Drinking Water Act*

The Safe Drinking Water Act (SDWA) (42 USC 300f et seq.) was established to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designated for drinking use, whether from aboveground or underground sources. The SDWA authorized EPA to establish water quality standards and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary (nuisance-related) standards. Contaminants of concern in a domestic water supply are those that either pose a health threat or in some way alter the aesthetic acceptability of the water. These types of contaminants are regulated by EPA as primary and secondary maximum contaminant levels (MCLs). As directed by the SDWA amendments of 1986, EPA has been expanding its list of primary MCLs. MCLs have been proposed or established for approximately 100 contaminants.

## State

The Porter-Cologne Water Quality Control Act (California Water Code Section 13000 et seq.) requires establishment of water quality objectives and standards to protect water quality for beneficial uses. This act is implemented by the State Water Resources Control Board (SWRCB) and nine regional water quality control boards (RWQCBs), which are responsible for preserving California's water quality. The SWRCB protects water quality by setting Statewide policy, coordinating and supporting RWQCB efforts, and reviewing petitions that contest RWQCB actions. The RWQCBs issue waste discharge permits, take enforcement action against violators, and monitor water quality for the protection of waters in their specified regions. The SWRCB and the RWQCBs jointly administer Federal and State laws related to water quality in coordination with EPA and USACE.

The study area is under the jurisdiction of the Lahontan RWQCB. The Lahontan RWQCB administers CWA Section 401 water quality certifications in conjunction with USACE's CWA Section 404 permit. In addition, the Lahontan RWQCB regulates discharge of stormwater from construction projects (as well as municipal and industrial stormwater) under the CWA Section 402 NPDES permit program. Because the project would disturb more than 1 acre of land, State Parks would need to obtain and comply with the Lahontan RWQCB's NPDES General Permit Number CAG616002 for discharge of stormwater runoff associated with construction activity. The SWRCB adopted a new statewide NPDES Construction General Permit Order 2009-0009-DWQ on September 2, 2009 that becomes effective July 1, 2010 (SWRCB 2010). This General Permit imposes more minimum BMPs and establishes three levels of risk-based requirements based on both sediment risk and receiving water risk. All dischargers are subject to narrative effluent limitations. Risk level 2 dischargers are subjet to technology-based numeric action levels (NALs) for pH and turbidity. Risk level 3 dischargers are subject to NALs and numeric effluent limitations (NELs). Certain sites must develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and Rain Event Action Plan (REAP) and all projects must perform effluent monitoring and reporting, along with receiving water monitoring and reporting for some Risk level 3 sites Key personnel (e.g., SWPPP preparers, inspectors, etc.) must have certifications to ensure their qualifications to design and evaluate project specifications that will meet the requirements. For projects commencing on or after July 1, 2010, the applicant must electronically submit Permit Registration Documents (PRDs) prior to commencement of construction activities including the Notice of Intent, Risk Assessment, Post-Construction Calculations, a Site Map, the SWPPP, a signed certification statement by the Legally Responsible Person (LRP), and the first annual fee. The Lahontan RWQCB is responsible for enforcing the new statewide General Permit in its region and is updating its regional General Permit for construction stormwater discharges within the Lake Tahoe hydrologic unit to be as least as stringent as the statewide permit (Amorfini, pers. comm., 2010).

The Water Quality Control Plan for the Lahontan Region (Basin Plan), adopted March 31, 1995, and as amended, identifies the beneficial uses, water quality objectives, numerical standards, and waste discharge prohibitions for surface water and groundwater in the California portion of the Tahoe Basin (Lahontan RWQCB 1995:1-1). Table 3.4-1 summarizes the applicable environmental issues related to this project that are covered under the Basin Plan. Best management practices (BMPs) are defined as "[m]ethods, measures or practices selected by an

**Table 3.4-1**
**Summary of Basin Plan Water Quality Control Measures Relevant to the Project**

| Water Quality Control Measure | Description |
|---|---|
| Water quality standards | State standards, including designated beneficial uses and water quality objectives, implemented by the SWRCB and RWQCBs. Regional "environmental threshold" standards implemented by TRPA. |
| Waste discharge prohibitions | State prohibitions against discharge of sewage, industrial waste, solid wastes, earthen materials, and so on, including prohibitions related to new subdivisions, land capability, SEZs, development not offset by remedial measures, and new piers in significant fish spawning habitat, implemented by the Lahontan RWQCB. TRPA implements similar land-use restrictions. |
| Best management practices | Use of BMPs mandatory for all new development. Implementation through State and TRPA permits and enforcement programs. Retrofit of BMPs required by the Lahontan RWQCB for existing development. BMPs also required for resource management uses, such as timber harvest and livestock grazing. The Basin Plan endorses the TRPA *BMP Handbook*. |
| Controls for SEZs and similar resources | Development and disturbance strictly limited in SEZs and setback areas, 100-year floodplains, and shorezone areas. Limited implementation through Lahontan RWQCB discharge prohibitions, TRPA land-use restrictions, and CWA Section 401 and 404 programs. Some exceptions for public projects and coverage relocation; specific exemption findings required. Restoration requirement of 1.5:1 for permitted SEZ disturbance, unless meets specific criteria, such as if the relocation is from one portion of a SEZ to another portion, there is a net environmental benefit to the SEZ. Shorezone projects must meet TRPA development standards. TRPA 208 Plan includes SEZ restoration program, which is expected to restore 25% of disturbed/developed SEZs. Control measures for other problems also serve to protect groundwater. |
| Water rights and water use | Limits on diversions for consumptive use from all sources in Tahoe Basin by act of Congress. Waste discharge requirements for sewer districts include conditions to prevent use beyond limits. TRPA plans include minimum fireflow requirements, as well as requirements for use of native/adapted plants in landscaping. Recommendations or SWRCB action on water rights policy update and water meter use. |
| Outdoor recreation | Controls for water quality impacts of outdoor recreation (dispersed recreation, campgrounds and day-use areas, ski areas, golf courses, and boating and shorezone recreation) through Lahontan RWQCB and TRPA permits and USFS programs on national forest lands. Impacts related to erosion, SEZ disturbance, fertilizer use, dredging and underwater construction, wastewater disposal, fuel spills, and so on. |
| Miscellaneous water quality problems | Control measures for problems related to fertilizer use, pesticide use, and wet and dry atmospheric deposition. Fertilizer and pesticide controls through Lahontan RWQCB and TRPA permits; atmospheric deposition control through TRPA traffic/air pollution controls and other 208 Plan commitments. |

Notes:
208 Plan = regional water quality control plan required under Section 208 of the Clean Water Act
Basin Plan = *Water Quality Control Plan for the Lahontan Region*
BMP = best management practice
CWA = Clean Water Act
Lahontan RWQCB = Lahontan Regional Water Quality Control Board
SEZ = Stream Environment Zone
SWRCB = State Water Resources Control Board
TRPA = Tahoe Regional Planning Agency
USFS = U.S. Forest Service
Source: Lahontan RWQCB 1995:5-11 to 5-13

agency to meet its non-point source control needs. BMPs include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters" (Lahontan RWQCB 1995:5.3-1). Stream Environment Zones (SEZ) are wetland and riparian areas designated by the Tahoe Regional Planning Agency (TRPA) and the Lahontan RWQCB through specific criteria using designated water, soil, and vegetation indicators (Lahontan RWQCB 1995:5.7-2). The Basin Plan incorporates water quality thresholds, programs, and regulations as developed and implemented by TRPA along with Federal and State regulations. The project would be required to meet the provisions of the Basin Plan for the protection and enhancement of Lake Tahoe.

The Basin Plan lists water quality objectives for all surface waters of the region, including the Lake Tahoe Hydrologic Unit (HU), in addition to specific water quality objectives for certain water bodies in the Lake Tahoe HU (i.e., the entire watershed tributary to and containing Lake Tahoe), including the Upper Truckee River. The region-wide and water body-specific objectives pertaining to the Upper Truckee River, groundwater, and stormwater are summarized in Table 3.4-2). To achieve those objectives, the Basin Plan prohibits discharges and threatened discharges in 100-year floodplains. These prohibitions are described in Chapter 5 of the Basin Plan and those relevant to project implementation are summarized below in Table 3.4-3.

## Tahoe Regional Planning Agency

### *1987 Regional Plan*

TRPA implements its authority to regulate growth and development in the Lake Tahoe region through the Regional Plan for the Lake Tahoe Basin (Regional Plan). TRPA's Regional Plan, adopted in 1987, consists of several documents: Goals and Policies, Code of Ordinances, Water Quality Management Plan, Plan Area Statements (PAS), and Scenic Quality Improvement Plan.

The 1987 Regional Plan, which had a 20-year scope, is being reviewed and updated through a collaborative effort, called Pathway, among TRPA, USFS, the Lahontan RWQCB, and Nevada Department of Environmental Protection (NDEP) (TRPA 2007a). These agencies are working together to update several important environmental documents for the Tahoe Basin. These Regional Plan updates will guide land management, resource management, and environmental regulations in the Tahoe Basin over the next 20 years. The updated Regional Plan is expected to be adopted in 2010.

#### Regional Plan Goals and Policies

The Regional Plan's Goals and Policies document presents specific goals and policies for achieving and maintaining adopted environmental thresholds. These goals and policies are implemented through the TRPA Code of Ordinances (TRPA Code) (TRPA 1986:I-1), described below. A key component of the Goals and Policies document is the Land Use Element, which identifies the fundamental philosophies directing land use and development in the Tahoe Basin. The Land Use Element consists of seven sub elements, including the Water Quality Sub Element. This sub element identifies two goals and 18 policies designed to support attainment of the water quality thresholds:

**GOAL 1:** Reduce loads of sediment and algal nutrients to Lake Tahoe; meet sediment and nutrient objectives for tributary streams, surface runoff, and subsurface runoff, and restore 80 percent of the disturbed lands.

- **Policy 1:** Discharge of municipal or industrial wastewater to Lake Tahoe, its tributaries, or the groundwaters of the Tahoe Region is prohibited, except for existing development operating under approved alternative plans for wastewater disposal, and catastrophic wildfire protection to prevent the imminent destruction of the STPUD [South Tahoe Public Utility District] Luther Pass Pump Station.

**Table 3.4-2**
**Water Quality Objectives for the Upper Truckee River**

| Water Quality Constituent | Lahontan Region Water Quality Objective | |
|---|---|---|
| | Numeric Standard (mg/L unless noted) [1] | Narrative Limits or Explanation of Numeric Tests |
| **Upper Truckee River** | | |
| Ammonia | calculation | pH and temperature dependent values |
| Bacteria, Coliform | 20/100 ml<br>40/100 ml | Log mean during any 30-day period<br>Limited to no more than 10% of samples in any 30-day period. |
| Biostimulatory Substances | - | Concentrations must not promote aquatic growth to the extent of nuisance or adversely affect beneficial uses |
| Chemical Constituents | - | All MCLs and SMCLs of the CCR, for each designated beneficial use. |
| Chloride | 4 | |
| Chlorine (Total Residual) | 0.003/0.002 | Max/Median based on daily measurements in any 6 month period. |
| Color | | Water shall be free of coloration that causes nuisance or adversely affects beneficial uses. |
| Dissolved Oxygen (DO) | 80% of saturation | Not to be depressed by more than 10%, nor shall the minimum DO saturation concentration be less than 80%; Specific limits apply to aquatic resource beneficial uses. |
| Floating Materials | | Shall not cause nuisance or adversely affect beneficial uses. |
| Iron, Total | 0.03 | |
| Nitrogen, Total | 0.19 | |
| Nondegradation of Aquatic Communities and Populations | | Wetlands shall be free of substances attributable to wastewater or other discharges that produce adverse response in organisms. |
| Oil and Grease | | Shall not result in a visible film or coating on the surface of the water or on objects in the water that cause nuisance, or adversely affect beneficial uses. |
| Pesticides | | Not to exceed lowest detectable levels. |
| pH | 6.5-8.5 | Not to be outside the stated limits:<br>Waters designated as COLD beneficial use shall have less than 0.5 pH unit change. |
| Radioactivity | | Shall not be present at concentrations deleterious to organisms, or result in accumulation of radionuclides. |
| Phosphorus, Total | 0.015 | |
| Settleable Materials | | Shall not result in deposition of material that causes nuisance or adversely affects beneficial uses. |
| Sulfate | 1 | |
| Suspended Materials | | Shall not cause nuisance or adversely affect beneficial uses. |
| Suspended Sediment | 60 | 90th percentile value |
| Taste and Odor | | Shall not impart undesirable tastes or odors to fish or other edible products, cause nuisance, or adversely affect beneficial uses. |

**Table 3.4-2**
**Water Quality Objectives for the Upper Truckee River**

| Water Quality Constituent | Lahontan Region Water Quality Objective | |
|---|---|---|
| | Numeric Standard (mg/L unless noted) [1] | Narrative Limits or Explanation of Numeric Tests |
| Temperature | | Natural receiving water temperatures shall not be altered |
| Total Dissolved Solids | 55 | |
| Toxicity | | Remain free of substances in concentrations that are toxic or detrimental to organisms (based on indicator organisms). |
| Turbidity | <10% over natural NTU | Shall not cause nuisance or adversely affect beneficial uses. |
| **Groundwater** | | |
| Fecal Coliform | 1.1/100 MPN | mL/ 7-day period median in groundwater designated as MUN |
| Chemical Constituents | | Incorporates MCLs and SMCLs of the CCR for beneficial uses. |
| Radioactivity | | For municipal groundwater, incorporates standards of the CCR. |
| Taste and Odor | | Shall not contain in concentrations that interfere with beneficial use. For municipal groundwater, incorporates standards of the CCR. |
| **Stormwater Runoff** | | |
| Total Nitrogen as N | 0.5;<br>5.0 | For discharges to collection systems, Lake Tahoe or any of its tributaries;<br>For discharges to land treatment systems. |
| Total Phosphorus as P | 0.1;<br>1.0 | For discharges to collection systems, Lake Tahoe or any of its tributaries;<br>For discharges to land treatment systems. |
| Total Iron | 0.5;<br>4.0 | For discharges to collection systems, Lake Tahoe or any of its tributaries;<br>For discharges to land treatment systems. |
| Turbidity | 20 NTU;<br>200 NTU | For discharges to collection systems, Lake Tahoe or any of its tributaries;<br>For discharges to land treatment systems. |
| Grease and Oil | 2;<br>40 | For discharges to collection systems, Lake Tahoe or any of its tributaries;<br>For discharges to land treatment systems. |

Notes:

MCL = Maximum Contaminant Level, SMCL = Secondary Maximum Contaminant Level; CCR=California Code of Regulations

* Where there is a direct and immediate connection between ground and surface waters, discharges to groundwater shall meet the guidelines for surface discharges.

Sources:

1 California Water Quality Control Board Lahontan Region (LRWQCB). 1995. Water Quality Control Plan for the Lahontan Region: North and South Basins. State of California. Chapter 5, Lake Tahoe Basin

| Table 3.4-3<br>Discharge Prohibitions, Lake Tahoe Hydrologic Unit |
|---|
| **General Prohibitions** |
| Against discharges that violate water quality objectives or impair beneficial uses<br>Against discharges that cause further degradation of water where objectives are already being violated<br>Against discharges to surface waters of the Lake Tahoe Hydrologic Unit |
| **Prohibitions Related to Development** |
| Against discharges or threatened discharges below the high-water rim of Lake Tahoe or in the 100-year floodplains of tributaries<br>Against discharges attributable to new development in Stream Environment Zones<br>Against discharges attributable to new development not in accordance with offset requirements |
| Source: Lahontan RWQCB 1995:5.8-12 |

- **Policy 2:** All persons who own land and all public agencies which manage public lands in the Lake Tahoe Region shall put best management practices (BMPs) in place; maintain their BMPs; protect vegetation on their land from unnecessary damage; and restore the disturbed soils on their land.

- **Policy 3:** Application of BMPs to projects shall be required as a condition of approval for all projects.

- **Policy 4:** Restore at least 80 percent of the disturbed lands within the region.

- **Policy 5:** Units of local government, state transportation departments, and other implementing agencies shall restore 25 percent of the SEZ lands that have been disturbed, developed, or subdivided in accordance with the Capital Improvements Program (Part II).

- **Policy 6:** The use of fertilizer within the Tahoe region shall be restricted to uses, areas, and practices identified in *The Handbook of Best Management Practices*. Fertilizers not be used in or near stream and drainage channels, or in stream environment zones, including setbacks, and in shorezone areas. Fertilizer use for maintenance of preexisting landscaping shall be minimized in stream environment zones and adjusted or prohibited if found, through evaluation of continuing monitoring results, to be in violation of applicable water quality discharge and receiving water standards.

- **Policy 7:** Off road vehicle use is prohibited in the Lake Tahoe region except on specified roads, trails, or designated area where the impacts can be mitigated.

- **Policy 8:** Transportation and air quality measures aimed at reducing airborne emissions of oxides of nitrogen in the Tahoe basin shall be carried out.

**GOAL 2:** Reduce or eliminate the addition of other pollutants which affect, or potentially affect, water quality in the Tahoe Basin.

- **Policy 1:** All persons engaging in public snow disposal operations in the Tahoe region shall dispose of snow in accordance with site criteria and management standards in *The Handbook of Best Management Practices*.

- **Policy 2:** Discharges of sewage to Lake Tahoe, its tributaries, or the groundwaters of the Lake Tahoe region are prohibited. Sewage collection, conveyance and treatment districts shall have approved spill contingency, prevention, and detection plans.

- **Policy 3:** All institutional users of road salt in the Lake Tahoe region shall keep records showing the time, rate, and location of salt application. Storage of road salt shall be in accordance with *The Handbook of Best Management Practices*.

- **Policy 4:** Underground storage tanks for sewage, fuel, or other potentially harmful substances shall meet standards set forth in TRPA ordinances, and shall be installed, maintained, and monitored in accordance with *The Handbook of Best Management Practices*.

- **Policy 5:** No person shall discharge solid wastes in the Lake Tahoe region by depositing them on or in the land, except as provided by TRPA ordinance.

- **Policy 6:** TRPA shall cooperate with other agencies with jurisdiction in the Lake Tahoe region in the preparation, evaluation, and implementation of toxic and hazardous spill control plans.

- **Policy 7:** The BMPs will be amended to include special construction techniques, discharge standards, and development criteria applicable to projects in the shorezone.

- **Policy 8:** Liquid or solid wastes from recreational vehicles and boats shall be discharged at approved pump-out facilities. Pump-out facilities will be provided by public utility districts, marinas, campgrounds, and other relevant facilities in accordance with standards set forth in *The Handbook of Best Management Practices*.

- **Policy 9:** Evaluate the feasibility and effectiveness of ponding facilities along stream corridors as a strategy for removing instream loads of sediment and nutrients.

- **Policy 10:** Reduce the impacts of motorized watercraft on water quality.

Before the TRPA Code was established, TRPA prepared Volume 1 of the regional water quality management plan required under Section 208 of the CWA (208 Plan), along with other environmental values and standards, to identify important issues relating to water quality in the Tahoe Region (TRPA 1981:1-4). Subsequently, the Lahontan RWQCB incorporated appropriate provisions of the 208 Plan into the Basin Plan. The 208 Plan has the same two major water quality goals as the Regional Plan. The first goal, with eight policies to support its implementation, is to reduce loading of sediment and nutrients to Lake Tahoe and meet sediment and nutrient objectives for tributary streams, surface runoff, and subsurface runoff. The second goal, with 10 policies to support its implementation, is to reduce or eliminate the addition of other pollutants that affect water quality in the Tahoe Basin.

### *Code of Ordinances*

The TRPA Code is a compilation of all the ordinances needed to implement the Goals and Policies. The following portions of the TRPA Code are most relevant to the geomorphology and water quality aspects of the project:

- Basic standards and prohibitions for all discharges to surface waters and groundwater are specified in TRPA Code Chapter 81, "Water Quality Control." Table 3.4-4 describes the discharge limits to surface runoff and to groundwater discharges in the Tahoe Basin.

- Measures to avoid or reduce potential short-term and long-term erosion and sedimentation effects on the quality of surface water, groundwater, or both are required by TRPA Code Chapter 64, "Grading Standards"; Chapter 65, "Vegetation Protection during Construction"; and Chapter 77, "Revegetation."

**Table 3.4-4**
**TRPA Limits on Discharges for Water Quality Control**

| Constituent | Maximum Concentration |
|---|---|
| **Surface runoff: Pollutant concentration in surface runoff shall not exceed the following reading at the 90th percentile:** | |
| Dissolved inorganic nitrogen as N | 0.5 mg/L |
| Dissolved phosphorus as P | 0.1 mg/L |
| Dissolved iron as Fe | 0.5 mg/L |
| Grease and oil | 2.0 mg/L |
| Suspended sediment | 250 mg/L |
| **Discharge to groundwaters: Waters infiltrated into soils shall not exceed the following maximum constituent levels:** | |
| Total nitrogen as N | 5 mg/L |
| Total phosphate as P | 1 mg/L |
| Iron as Fe | 4 mg/L |
| Turbidity | 200 NTU |
| Grease and oil | 40 mg/L |

Notes: mg/L= milligrams per liter; NTU = nephelometric turbidity unit
Source: TRPA 1980:81-1, 81-2

- Measures to prevent contamination of sources of drinking water and protect the public health relating to drinking water are required by TRPA Code Chapter 83, "Source Water Protection." This measure may apply to the project since a few domestic wells are located immediately north of the study area and the confluence of the Upper Truckee River and Angora Creek. The public well south of the study area close to U.S. Highway 50 (U.S. 50) in Meyers is believed to be located far enough from the study area to avoid any potential impact.

- A section of the TRPA Code in Chapter 20 Land Coverage Standards that indirectly relates to water quality, given the ability of SEZs to buffer waterways and provide infiltration and uptake opportunities, also relates to the project. Land coverage standards, limitations, and prohibitions of additional land coverage in TRPA Code Chapter 20 would apply.

### *Plan Area Statements*

Each PAS outlines land use classifications, special policies, planning considerations, permissible uses, and maximum allowances for a portion of the Tahoe Basin. The study area is located in PAS 119 (Country Club Meadow), which is designated as an outdoor recreation and natural resource area with opportunities for SEZ restoration (TRPA 2005:1). PAS 119 planning considerations include a statement that the riverbanks are locally unstable and that log jams are contributing to streambank erosion. The following special policies are relevant to water quality and geomorphology for this particular PAS (TRPA 2005:2):

- Whenever possible, opportunities for restoration of disturbed SEZs and land coverage removal should be encouraged, including strategies to mitigate the impacts of the golf course.

- A stream channel maintenance program should be implemented to protect the value of the river as a fishery and to minimize the risks of bank erosion.

- Erosion control, runoff control, and SEZ restoration are all permissible uses under resource management of PAS 119.

### *Environmental Threshold Carrying Capacities*

Environmental thresholds for the Tahoe Basin have been established for water quality, air quality, scenic resources, soil conservation, fish habitat, vegetation, wildlife habitat, noise, and recreation. These thresholds indicate the capacity of the region to accommodate additional land development. Every 5 years, TRPA conducts a comprehensive evaluation that identifies whether each threshold is being achieved or maintained, provides specific recommendations to address problem areas, and directs general planning efforts for the next 5-year period. The most recent threshold evaluation was completed and adopted by the TRPA Governing Board in 2007 (TRPA 2007b). Recommended changes to thresholds are being evaluated for future implementation. Attainment status results from the 2006 evaluation are used in this document to describe the affected environment; however, thresholds adopted in 1987 remain in effect.

The following narrative and numeric standards for the adopted TRPA water quality thresholds directly relate to the project:

- WQ-4. Tributaries threshold to attain state standards for nitrogen, phosphorus, iron, and a 90th percentile value for suspended sediment of 60 milligrams per liter (mg/L).
- WQ-5. Stormwater runoff, surface water threshold to attain TRPA surface water discharge standards for nitrogen, phosphorus, iron, grease and oil and suspended sediment.
- WQ-6. Stormwater runoff, groundwater threshold to attain TRPA discharge standards for infiltration to groundwater for nitrogen, phosphorus, and iron; along with turbidity, grease and oil.

The three directly related water quality thresholds all have a “non attainment” status.

In addition, the adopted TRPA Soil Conservation SC-2 SEZ threshold applies indirectly to the geomorphology and water quality aspects of the project. The narrative and numeric standards of SC-2 are as follows:

- SC-2. Naturally Functioning SEZ Threshold. It has a “non attainment” status.
- Preservation of existing naturally functioning SEZ lands;
- Restoration of disturbed SEZ in undeveloped, unsubdivided lands; and,
- Restoration of 25 percent of the SEZ lands that have been identified as disturbed, developed, or subdivided to attain a 5 percent increase in the area of naturally functioning SEZ lands.

### El Dorado County

The study area is located entirely in El Dorado County; therefore, the El Dorado County Grading Ordinance (Chapter 15.14) and the Tahoe Basin Special Conditions Section of the El Dorado County Grading Design Manual (El Dorado County 2007) are applicable, although State-owned land is not subject to local government ordinances. The project’s required compliance with USACE, Lahontan RWCQB, and TRPA requirements related to water quality protection also would address the goals and objectives of the El Dorado County General Plan (El Dorado County 2004:44) and Grading Ordinance previously mentioned.

## ENVIRONMENTAL SETTING

This section describes both the water quality and the geomorphologic characteristics in the study area. The geomorphologic characteristics and related processes, including erosion and sedimentation, are described because they influence physical and biological aspects of the water quality conditions. Additionally, some aspects of water

quality in the study area and in surrounding surface water and groundwater bodies are independent of geomorphic characteristics of the study area.

## Geomorphology

### *River and Streams*

The geomorphology of the study area has been influenced by both natural geologic, climatic, hydrologic and geomorphic processes as well as by human disturbance. The Upper Truckee River, Angora Creek, and the unnamed creek in the study area were altered by watershed-scale changes in land use, hydrology, and sediment loads, as well as on-site uses (e.g., Comstock-era log transport, early 1900s irrigation and grazing) over the last 100 years as well as changes during modern urban development. Channel response to those watershed and on-site effects, within the context of the underlying geologic controls, have resulted in a channel with degraded geomorphic conditions, higher erosion rates, less floodplain connectivity and decreased ecosystem function.

#### Upper Truckee River Alignment

The study area is located between the U.S. 50 crossings at Meyers and Elks Club Drive. Although the valley floor is wide in the project vicinity, the channel alignment is somewhat confined by glacial outwash terrace and delta deposits in the upstream portion of the study area and by the alluvial fan from the unnamed creek in the downstream portion of the study area (see Section 3.6, "Earth Resources: Geology, Soils, and Land Capabilities and Coverage," and Exhibit 3.6-1).

Both moraines and outwash occur in the study area as a result of different climatic conditions. Multiple glacial episodes formed the glacial moraines and outwash terraces composed of large boulders and cobbles, sand and gravel deposits, and periods of higher lake elevations produced delta deposits upstream of and along the west side of the site, (SH&G 2004a:II-2) while inundating the downstream half of the study area. The modern river has reworked and selectively transported smaller sized materials in the outwash deposits, but it is not effective at eroding or transporting the larger boulders or cobbles. In the study area, the Upper Truckee River channel and active floodplain is approximately 60–200 feet wide and bounded by low floodplain terraces and high glacial outwash terraces and delta deposits (Walck pers. comm. 2009; SH&G 2004a: II-2).

The channel pattern in the project vicinity likely changed dramatically over glacial and interglacial cycles due to the combined effects of large variations in sediment supply and streamflows, along with differences attributable to rising and falling lake levels. The presence of exposed, unvegetated side slopes and valley floor deposits left during glacial retreats would have increased sediment loads and supported a braided channel pattern (i.e., multiple low-flow channels) (River Run Consulting 2006: 12). During periods of high lake stands, fine-grained deposits were laid down on the valley floor in the lower half of the study area and downstream (under the lake) while coarse outwash deltas were created along the lake margin, especially the upper half of the study area. Sediment supply decreased over the Holocene (approximately the last 10,000 years) as vegetation colonized the upper watershed hillslopes and outwash deposits following the glacial retreat. The channel began reworking and eroding down through the outwash. The meadow reaches underlain by fine-texture lake bed and stream deposits generally produced single-thread, meandering stream channel patterns. However, reaches underlain by coarse outwash deposits were steeper where confined by moraines and outwash and continued to have a braided channel form (River Run Consulting 2006:12). Braiding occurred in the locations of downstream transition from narrow and confined to wider valley flats.

The Comstock mining boom between 1860 and 1890 brought about substantial changes in the watershed. Loss of trees and compaction of soils from clear-cut logging and primitive log transport methods increased runoff, soil erosion, and sediment supply to the river. Intensive logging, including clear-cutting and hauling, took place in the area surrounding the Upper Truckee River below the U.S. 50 crossing at Meyers. Straightening the channel to help move the logs downriver and constructing splash dams likely also affected the Upper Truckee River. Splash

dams were temporary structures to impound the flow and create a pond where logs could be stored. Once full, the dam would be breached, sending the logs downstream to Lake Tahoe (SH&G 2004a: II-21).

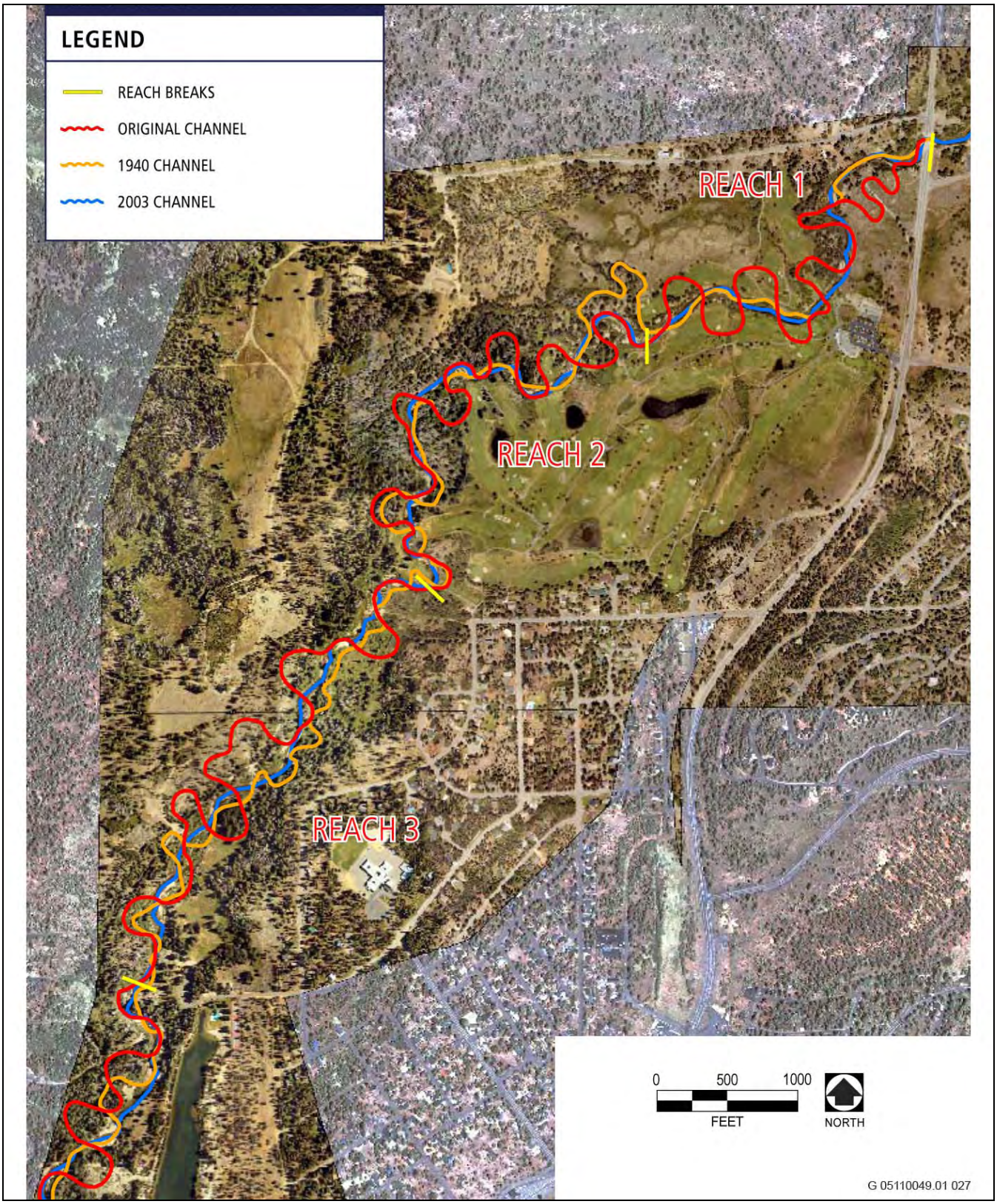
Road and railroad development through the Upper Truckee River watershed was initiated during the Comstock mining boom, and road additions, bridge replacements, and alignment changes continued through the late 1990s. Construction of bridge and road crossings often involved placing fill across floodplains and limiting the capacity for flow to pass under the bridges in the main channel. Such localized constrictions caused higher velocities and often resulted in channel incision for considerable distances upstream and downstream of the crossing (SH&G 2004a: II-19).

Upper watershed grazing during the post-logging era probably continued trends of relatively high sediment supply to the Upper Truckee River and Angora Creek (River Run Consulting 2006:18). Using floodplain meadows as pastureland in the early 1900s also had direct impacts on the stream channels, streamflows, and floodplain soil and vegetation. For example, as shown in the 1940 and 1952 aerial photographs of the area, a dairy stood in the current location of the Lake Tahoe Golf Course and Washoe Meadows State Park; the Angora Creek channel had been straightened and/or deepened to minimize flooding and allow for earlier seasonal grading, and a diversion works was present to provide late-season irrigation across the meadows (SH&G 2004a:II-19, II-21).

Historic channel patterns are often best seen on older aerial photographs. The earliest aerial photographs available for the study area were taken in 1940, well after initial human impacts, so the channel patterns do not fully represent natural function. The earliest available aerial photographs of the study area were taken in 1940, around 80 years after the beginning of the Comstock logging era, so the channel patterns in these photographs do not directly portray undisturbed conditions. Rather, they include the impacts of logging, grazing, roads, and bridges that had occurred before the photographs were taken. However, characteristics of meander cutoffs and other floodplain features visible on early historic photos provide clues to prior patterns and channel dynamics. Floodplain meander scars and other evidence along the Upper Truckee River in the study area suggest that channel patterns have changed over the past 150 years because of human disturbance of the watershed and the channel. Swanson Hydrology + Geomorphology (SH&G) developed an estimated pre-1940 channel pattern by tracing and connecting visible meander scars from the 1940 aerial image and 2003 LIDAR image and topographic map (SH&G 2004a:II-14). The estimated original channel should be considered an indication of the possible maximum channel length and sinuosity (i.e., ratio of channel length to valley length; the higher the sinuosity, the more river bends are present a given reach) that may have existed in the last couple of centuries (Exhibit 3.4-1). It is uncertain and somewhat unlikely that all of the relict meanders were active concurrently, but a trend of decreasing channel length and straightening over the historic era is evident, even if SH&G's estimated original channel is a maximum sinuosity version. The meander scars in the upstream portion of the study area have low amplitude and tend not to exhibit scrolling, which suggest episodic channel migration in the past. In the downstream end of the study area, high-amplitude meander scars east of the present channel suggest a highly sinuous channel pattern in the past (River Run Consulting 2006:17).

The modern phase of channel straightening and deepening began in the 1930s and 40s likely to protect dairy operations from flooding and continued in the mid-1950s to accommodate roadway construction (SH&G 2004a:III-151). This channel straightening reduced the channel length by 28 percent and lowered sinuosity from 1.54 in 1940 to 1.14 by 1994 (River Run Consulting 2006:20). The golf course was constructed on the former floodplain in the lower half of study area between 1958 and 1962. Rapid development from the early 1960s to the 1970s increased the supply of sediment in the watershed due to increased runoff and erosion, but aerial photo analysis of the channel pattern it did show any further dramatic changes.

The results of analysis of sediment cores under Lake Tahoe show major changes in sediment delivery to the lake during the historical series of watershed disturbances discussed above (Table 3.4-5). The sediment core analyses do indicate that rates of sediment delivery returned to background levels reasonably quickly following disturbances (River Run Consulting 2006:21). Although the sediment delivery to the lake changed dramatically, there is little evidence to suggest that the increase in sediment supply resulted in a large-scale aggradation (i.e., sediment deposition that raises the streambed) in the Upper Truckee River. (River Run Consulting 2006:21).




"Original Channel" as mapped is considered a maximum channel length estimate based on connected remnant channel segments, including those that might not have been part of a particular single channel.
Source: SH&G 2004a

**Present (2003), Historical (1940), and Estimated Original Upper Truckee River Channel Alignments** **Exhibit 3.4-1**

| Table 3.4-5<br>Historical Watershed Condition and Lake Sedimentation Rates | | |
|---|---|---|
| Time Period | Watershed Condition Land Use | Lake Core Mass Sedimentation Rate ($g/cm^2$/year) |
| Predisturbance (pre-1850) | Predisturbance | 0.006 (± 0.003) |
| Comstock era (1860–1890) | Extensive logging and construction of logging roads; log runs down Upper Truckee River | 0.043 (± 0.011) |
| 1900–1970 | Forest second growth; rapid urbanization in 1960s | 0.009 (± 0.004) |
| Modern (1970–1990) | Continued forest regrowth and urbanization | 0.027 (± 0.006) |

Note: $g/cm^2$/year = grams per square centimeter per year.
Source: Heyvaert 1998

### Angora Creek Alignment

Angora Creek originates at Angora Lakes along the western side of the watershed. It flows through residential neighborhoods and large meadows before entering the Upper Truckee River at the downstream end of the golf course near River Station (RS) 1800. Only the most downstream 2,500 feet of Angora Creek is in the study area, sharing a floodplain with the river on its north side.

Angora Creek was altered by humans to enhance grazing and pasture use, particularly in the area just upstream of its confluence with the Upper Truckee River. Originally, Angora Creek entered the river just upstream of the U.S. 50 crossing at Elks Club Drive; however, sometime before 1940, it was relocated to enter the Upper Truckee River roughly 2,000 feet farther upstream to drain the meadow for improved pasture (River Run Consulting 2006:19). In addition, irrigation facilities visible in the 1940 aerial photograph were constructed, including a diversion headgate and small pond in the Angora Creek meadow and several ditches to facilitate grazing. In the 1960s, an upstream reach of Angora Creek moved to occupy an unvegetated scar along the recently installed sewer pipe, subsequently incising.

Between 1998 and 2002, State Parks implemented two projects that restored 8,000 linear feet of Angora Creek channel and floodplain, of which 2,500 feet were in the study area. The projects restored the channel to a sinuous planform reconnected to the meadow floodplain. Activities included: reconstructing the channel; reoccupying remnant channels where appropriate; and, moving the channel mouth slightly downstream of its original location to compensate for historic incision of the Upper Truckee River (SH&G 2004a:II-23).

### Unnamed Tributary Alignment

A small unnamed creek enters the Upper Truckee River in the study area (see Exhibit 3.3-2). The unnamed creek's headwaters are in the Tahoe Paradise Golf Course in Meyers, and the creek flows northward along and under U.S. 50 and through the Meyers residential area via a channelized ditch (SH&G 2004a:II-2). The unnamed creek receives the bulk of its runoff from commercial and residential areas, including runoff directly from U.S. 50. This small tributary was also channelized before 1940 (River Run Consulting 2006:18). The upstream section in the Tahoe Paradise Golf Course was channelized, and much of the riparian vegetation has been removed (SH&G 2004a:III-56).

Downstream of U.S. 50, the unnamed creek was channelized to move it away from a historical wet meadow and allow for development of the commercial area along the highway. A later attempt to divert flow out of this channelized section and back into the meadow via a berm across the channel resulted in overtopping and formation of a large scour hole downstream that may have added to downcutting and channel widening in that reach (SH&G 2004a:III-56). The portion of the unnamed creek in the study area is a shallow swale likely straightened for grazing operations prior to golf course construction that now drains runoff from the managed turf grasses.

## Upper Truckee River Profile

Historical channel incision has occurred throughout the Upper Truckee River, from the study area downstream to Lake Tahoe, and has altered the profile of the streambed. Evidence that the river channel has incised includes the enlarged channel relative to the streamflows; eroding knickpoints (i.e., headcuts) in the streambed; reduced overbank flow frequency; lack of bedforms, such as gravel bars and pools; and high streambanks with accelerated streambank erosion (River Run Consulting 2006:22).

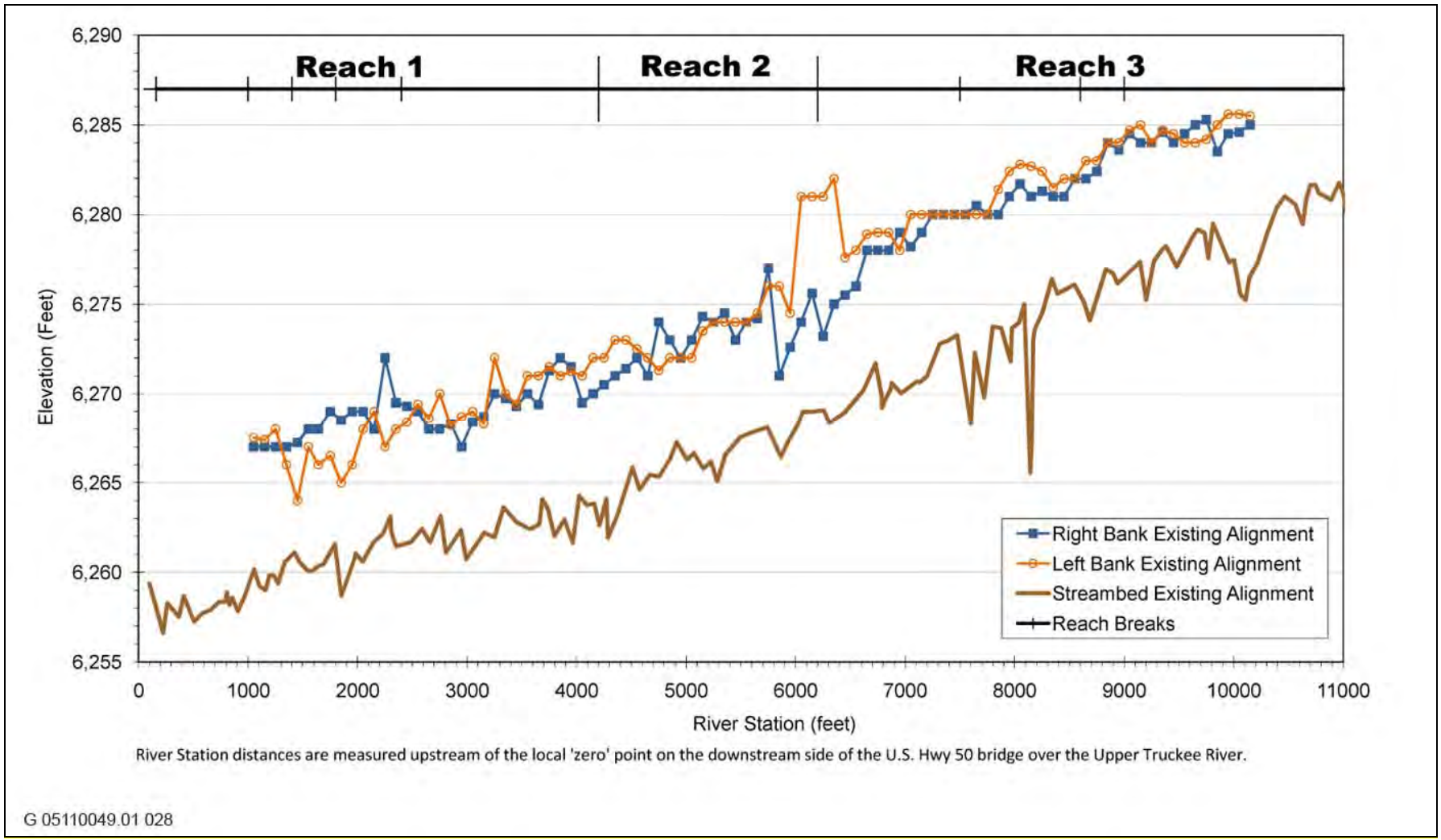
Incision by streambed erosion is a channel's response to various forces, and it modifies the channel's profile and slope. Straightening (channelization) reduces channel sinuosity and channel length, resulting in a steepened channel slope, increased streamflow velocity, and greater erosive forces (SH&G 2004a:II-19). Several experts have concluded that channel incision in the lower reaches of the Upper Truckee River has occurred in response to channelization (River Run Consulting 2006:22). Other local practices that likely contributed to channel incision include removal of woody debris to "clear" the channel, which reduced sediment storage and increased erosive power; splash damming and log transport operations, which increased channel depth and width; and logging and grazing, which decreased infiltration and increased runoff, floods, and erosive power. Grazing of meadows on the floodplains also would have reduced riparian vegetation cover and modified soils along the channel, making the channel banks more susceptible to erosion (River Run Consulting 2006:22). The results of analysis of the historical aerial photographs from 1940 and 1952 indicates the presence of meander cutoffs and straightening that would likely have prompted incision that propagated upstream and could have been accelerated by rain-on-snow floods in 1955, 1963, and 1964.

The longitudinal profile of the Upper Truckee River in the study area has been surveyed four times in the last 15years: by State Parks in 1993, 1994, and 2002 and by SH&G in May 2003. The profiles display changes in streambed elevation over time, including results of recent changes after the 1997 rain-on-snow flood (SH&G 2004a:III-20). The series of longitudinal profiles imply the movement of knickpoints through the study area, which lowers the streambed elevation. An episodic streambed profile modification process occurs because erosion rates are initially slow as the stream attempts to erode through the resistant deposits and then speed up after the river penetrates to less resistant materials (River Run Consulting 2006:35).

Although the overall slopes of the channel and valley in this vicinity are less than 1 percent overall, there is variability. The existing (2003) profile displays several key features, including a flatter section in the downstream half with steeper sections upstream, and the detail of the profile includes local pools, bars, and the effect of resistant knickpoints (Exhibit 3.4-2). An existing grade control structure comprised of small to medium boulders has been in place since the 1960s at RS 2100 to protect the water intake for the golf course (SH&G 2004a:III-20).

The protection has likely supported the local channel bed elevation (River Run Consulting 2006:35), as shown by the nearly level streambed slope for several hundred feet upstream (Exhibit 3.4-2).

The streambed and adjacent surface downvalley slope varies by major river reach in the study area (Table 3.4-6), reaches whose underlying characteristics are inherited from the glacial history (see Table 2.1-1 for reach descriptions). The downstream meadow reach (Reach 1) has a broader valley, would have been inundated by high lake stands in the geological past, and contains finer grained deposits. It has the lowest average bed slope, and historically would have been connected to a meadow floodplain that flooded nearly every year. The transition reach (Reach 2) near the middle of the study area adjusts from the narrower valley upstream to a broader valley downstream and the bank and bed sediments transition from coarser glacial outwash to somewhat finer material. Here the vegetation converts from forest to meadow and this reach has the highest streambed slope (Table 3.4-6), which may reflect the locally steeper valley slope across outwash delta deposits (River Run Consulting 2006:35). The upstream reach (Reach 3) has a relatively steep slope and narrow valley confined by glacial moraine and outwash deposits. It is naturally slightly incised in glacial moraine and outwash material, but disturbance has increased this incision.




Source: Valley & Mountain Consulting unpublished, data provided by California Department of Parks and Recreation in 2008

**Streambed and Streambank Profiles on the Existing Upper Truckee River Alignment** **Exhibit 3.4-2**

**Table 3.4-6**
**Existing Streambed and Streambank Downvalley Slopes**

| Study Area Reach | Average Streambed Slope (%) | Left Bank Average Slope (%)* | Right Bank Average Slope (%)* |
|---|---|---|---|
| 1 | 0.151 | 0.145 | 0.097 |
| 2 | 0.316 | 0.450 | 0.135 |
| 3 | 0.224 | 0.135 | 0.252 |

Notes:
* Left and right banks are referenced from the perspective of viewing the river facing downstream
Source: Valley & Mountain Consulting unpublished, survey data provided by California Department of Parks and Recreation and SH&G

### Upper Truckee River Channel Capacity

Historical alterations of the watershed and channels, along with subsequent channel responses have enlarged the cross-sectional area of the Upper Truckee River channel through incision and widening. Channel enlargement has increased channel capacity throughout the study area, and reduced the frequency of overbank flows and areas inundated by small to moderate peak streamflows (for additional details, see the overbanking and active floodplain discussion within Section 3.3, "Hydrology and Flooding"). The degraded overbanking frequency and inundation areas for peak flows at the geomorphic bankfull magnitude (1.5-year) and up through the 5-year and 10-year events impairs floodplain processes normally protective of water quality, such as physical settling of sediment and nutrient trapping and uptake. Additionally, the adverse hydraulics associated with the enlarged channel increases stress on the streambed and streambank toe, fostering erosion that contributes sediment and nutrient pollutants directly to the stream.

### Upper Truckee River Channel Erosion

The channel along the Upper Truckee River in the study area has experienced substantial erosion historically as the stream adjusted to direct and indirect disturbances, including both streambed erosion (incision) and streambank erosion (widening) phases. Channel instability is continuing as the stream adjusts to past channel modifications, and maintenance of golf course infrastructure often requires bank stabilization treatments and repairs (River Run Consulting 2006:7). The dominant erosion process in the study area at present is widening, causing accelerated bank erosion that affects Lake Tahoe water quality since many of the streambanks in the study area have large proportions of fine sediment (River Run Consulting 2006:16).

Several rock riprap revetments were installed around 1970 along the streambanks in the golf course area to stabilize banks and protect bridge abutments, sewer line crossings, and other golf course infrastructure (see Exhibit 2-3 and Appendix B, Table 4). Some of these treatments were successful at eliminating local erosion for a period of years, but many have partially or completely failed and they often caused erosion upstream and downstream of the installation (SH&G 2004a:II-21). In the early 1990s, bioengineered structures (e.g., logs and root wads with cobble revetments) were placed to stabilize other banks and/or replace prior failed treatments. Long-term or reach-scale success has been limited, and some have been completely eroded away due to the lack of grade stabilization or scour protection at the toe of bank (SH&G 2004a:II-21), coupled with the small percentage of channel length treated. Overall, these past attempts to control bank erosion have created localized areas of more erosion resistance, but only about one-third of the treated areas continue to function to prevent erosion at present (Appendix B, Table 4), and these are only a small portion of the overall eroding banks.

Simon et al. (2003) measured historical channel erosion or "channel activity" in terms of the mean rate of lateral migration for the Upper Truckee River by using aerial photographs from 1940 to 1994. In the study area, channel activity was high for 1940–1952 (1.08 to 1.65 square meters per kilometer per year [m2/km/year]) and decreased to moderately high for 1952–1971 (0.73 to 0.94 m2/km/year) and moderate for 1971–1994 (0.66 to 0.73

m2/km/year) (Simon et al. 2003). Overall, channel activity generally decreased from 1940 to 1994, which correlates to a gradual reduction in sediment yield over the same period of record (River Run Consulting 2006:34). However, the channel remains unstable and there is active erosion, with this reach rated as moderate to high bank erosion hazard using field survey methods that were applied consistently throughout the Tahoe Basin (Simon et al. 2003:4-15). The study did not include data from the 1997 flood event in which the reach again experienced high rates of erosion or accelerated "channel activity".

Cross sections monitored by State Parks since 1992 show continuing bank erosion and bed incision in recent years (since the 1994 historical aerial analysis) (SH&G 2004a:III-28). Substantial erosion occurred at several sites after the 1997 flood event, with the most change in the upstream transects (River Run Consulting 2006:35). Aside from the major flood events, recent channel dynamics have been limited to small-scale changes, such as minor meander migration, local bank failure, and continuation of minor incision.

In 2003, SH&G conducted a field survey and streambank erosion hazard potential inventory for the banks along the entire upper reach of the Upper Truckee River that included the study area (the existing study area overlaps with SH&G Reaches 1 and 2) (Exhibit 3.4-3). The results show numerous areas of unstable banks undercutting bank vegetation. Many of the banks have high erosion hazard and are sources of fine sediment (SH&G 2004a:III-41) that can be mobilized and transported to the lake.

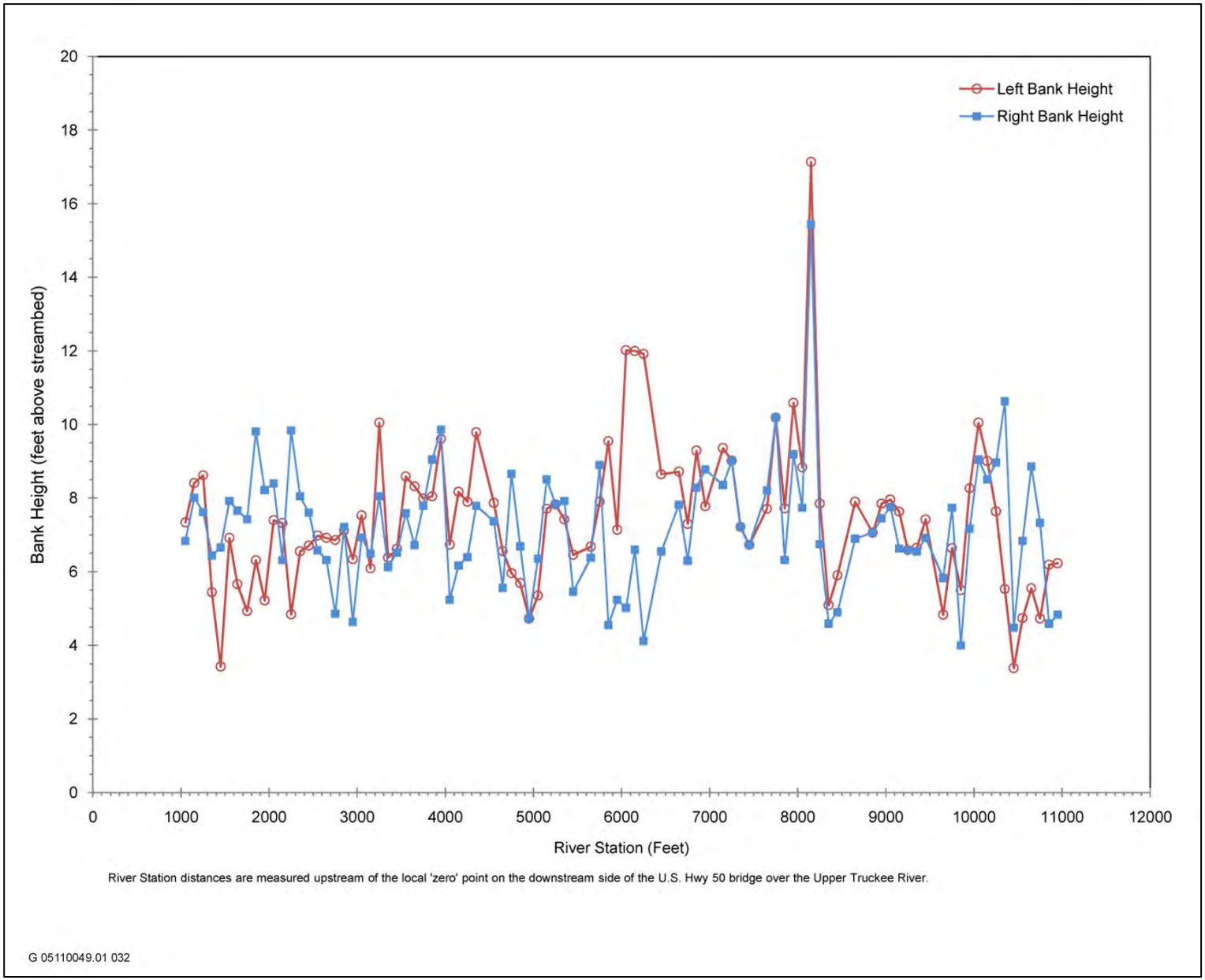
Streambank erosion is controlled by numerous factors, but one of the key driving forces is related to bank height above the streambed. In the study reaches, the history of channel bed incision has resulted in bank heights that are more than 7 feet tall on average (Exhibit 3.4-4). Streambanks are consistently high throughout the project reaches, and only a few areas have banks less than 5 feet high (e.g., left bank at RS 1200 and RS 10200 or right bank at RS 6200 and RS 8400). Thus the water table is low throughout much of the growing season and the banks cannot support riparian vegetation that can improve bank material cohesion. Instead of over-banking and spreading energy onto the floodplain, the erosive force is contained in the channel exacerbating erosion of the banks.

Studies for the Lake Tahoe total maximum daily load (TMDL) identified the Upper Truckee River as the largest source of fine sediment from streambank erosion to the lake (Simon et al. 2003:ES-1, Simon 2006:618). For the entire Upper Truckee River, the average annual streambank erosion rate for fine sediment (i.e., sediment that is smaller than 0.063 millimeter in diameter) is 639 tons per year which is approximately 63 percent of the total fine sediment from its entire watershed (Simon 2006:635). The large percentage of watershed total fine sediment loads emanating from streambanks along the Upper Truckee River indicates the importance of bank instability for water quality.

The TMDL analysis of load reduction opportunities (California Water Boards and NDEP 2007:211–215) produced quantitative estimates of erosion of fine sediment from streambanks of the Upper Truckee River, including estimates covering the study area reaches (Table 3.4-7). The study area reaches span 16.3 percent of the total length of the Upper Truckee River studied in the analysis but generates 19.5 to 22.7 percent of the fine sediment eroded from streambanks, which indicates that the study area reaches have proportionally more streambank erosion than other reaches of the river. This is not unexpected, because the study area has some steeper slopes, a moderately high percentage of banks actively failing, and a larger proportion of fines in the banks than other reaches. The results of the TMDL study (Table 3.4-7) indicate that locations in Subreach 3C/3D have the highest fine sediment from bank erosion in the study area. These data are consistent with the relative pattern of bank failure observed by SH&G (2004a) in the study area. Although the absolute values of estimates from the TMDL analysis of load reduction opportunities should not be considered precise, these estimates provide useful data for comparisons among various alternatives.


Source: SH&G 2004a

**Existing Streambank Erosion Inventory (2003)** **Exhibit 3.4-3**




Source: Valley & Mountain Consulting unpublished, data provided by California Department of Parks and Recreation in 2008

**Existing Streambank Heights** **Exhibit 3.4-4**

**Table 3.4-7**
**Estimated Stream Channel Bank Erosion on the Upper Truckee River in the Study Area for Above-Average Streamflow Year and Event**

| River Station (feet above mouth of river) | Associated Study Area Reach(es) | Length (feet) | Percent Bank Failing (% of length) | Estimated Existing Bank Erosion of Fine Sediment (cubic yards) | |
|---|---|---|---|---|---|
| | | | | Assuming Upper Truckee River Average % Fines[1] Bank Composition | Assuming Reach-Specific % Fines[1] Bank Composition |
| **Upper Truckee River Entire Watershed** | | | | | |
| Upper Truckee River Total | | 81,693 | 20.2 | 4,174 | 4,320 |
| **Upper Truckee River in Study Area** | | | | | |
| 35,564 to 36,778 | 1A to 1D | 2,625 | 12.6 | 115.2 | 149.2 |
| 36,778 to 39,600 | 1E | 1,214 | 16.8 | 153.0 | 197.2 |
| 39,600 to 43,143 | 2 to 3A | 2,822 | 21.1 | 19.2 | 24.8 |
| 43,143 to 44,357 | 3A to 3C | 3,543 | 14.9 | 136.3 | 173.7 |
| 44,357 to 46,260 | 3C/3D | 1,214 | 14.9 | 372.0 | 413.3 |
| 46,260 to 48,458 | 3D | 1,903 | 17.3 | 15.8 | 23.2 |
| Study Area Subtotal | 11,840 | 13,320 | – | 811.7 | 981.4 |
| Study Area as Percent of Upper Truckee River | | 16.3 | – | 19.5 | 22.7 |

Note: [1] Fine sediment is less than 0.063 millimeter in diameter.
Source: Lahontan RWQCB and NDEP 2007

## Water Quality

"Water quality" refers to a combination of characteristics (parameters) that can be quantitatively or qualitatively described for a given water body. The parameters include pollutants, such as nutrients, suspended sediment, bacteria, and toxic elements or chemicals, as well as attributes important to biological resources, such as pH, dissolved oxygen, and temperature. The pollutants of concern for the Upper Truckee River are sediment; nutrients, nitrogen and phosphorus; iron; and, to a lesser degree, heavy metals, pesticides, and hydrocarbons (SH&G 2004a:III-2). The Upper Truckee River is included in the 2006 CWA 303(d) listing of impaired water bodies for phosphorus and iron above and below and for pathogens above Christmas Valley. Since the 1960s, Lake Tahoe has been losing its clarity at a rate of nearly 9 inches per year and has failed to meet transparency and clarity standards (Lahontan RWQCB and NDEP 2007). Lake Tahoe is included in the 2006 CWA 303(d) listing of impaired water bodies for nitrogen, phosphorus, and sedimentation/siltation. Development of the TMDL is under way to identify the pollutant sources, quantify the amount of pollutants that the lake can accept, determine options for reducing pollutants, and provide an implementation plan and monitoring plan (Lahontan RWQCB and NDEP 2007). TMDL research has established that Lake Tahoe is impaired by excess inputs of nutrients (nitrogen and phosphorus) and fine sediment. Nitrogen and phosphorus stimulate algae growth, which in turn absorbs light and reduces light penetration through the water (Reuter and Miller 2000). Fine sediments decrease clarity by scattering light as the particles slowly settle through the water (Lahontan RWQCB and NDEP 2007). Fine mineral particles (i.e., particles less than 20 microns in diameter) have been shown to strongly affect clarity and may be responsible for 60 percent or more of the transparency loss (because of their effect on light scattering) (TRPA 2007b).

There are several potential pathways for nutrients, fine sediment, and other pollutants to enter waters of the study area and be released downstream to the lake. Several potential sources, sinks, and transformations of these constituents may occur in the study area. Sources include streamflow (from and upstream of the study area, Angora Creek, and the unnamed creek), golf course and urban stormwater runoff (from turf, ponds, ditches, and roadways), groundwater, and direct atmospheric deposition. Watershed and site-scale monitoring of water quality has been performed at varied times for various purposes, but site-specific data are limited. Some site-specific assessments of water quality issues have been performed by staff members of the Lahontan RWQCB as part of periodic inspections related to the waste discharge permit (Lahontan RWQCB 2000a) under which the existing golf course operates. The information below is focused on topics that describe the existing water quality in the study area or water quality parameters that may be altered by the action alternatives.

### *Stream Water Quality*

Stream water quality sampling at the gauge station on the Upper Truckee River downstream of the study area near U.S. 50 in the City of South Lake Tahoe has been ongoing since 1980. Sampling data from the gauge station presented in this paragraph are drawn from analysis for the Upper Truckee River and Marsh Restoration Project Draft EIR/EIS/EIS (EDAW in prep.). Nutrient concentrations in the Upper Truckee River often exceed Basin Plan objectives and TRPA threshold criteria. Average annual concentrations of total phosphorus in the Upper Truckee River exceeded the Basin Plan objective of 0.015 mg/L in all years and exceeded the TRPA threshold criteria of 0.03 mg/L in approximately two-thirds of the years. Average annual total nitrogen concentrations exceeded the Basin Plan objective of 0.19 mg/L in 76 percent of the years on the Upper Truckee River. The TRPA total nitrogen standard of 0.22 mg/L was exceeded in 41 percent of the years on the Upper Truckee River. The total iron concentrations in the Upper Truckee River has been sampled only since water year 1989, but they have consistently exceeded the Basin Plan objective and TRPA standard of 0.03 mg/L, perhaps because of high natural background levels. The average annual total suspended sediment concentrations on the Upper Truckee River exceeded the TRPA standard of 60 mg/L in only one year.

An evaluation of median suspended-sediment concentrations of the 10 largest tributaries to Lake Tahoe from 1993 to 1998 indicated that the Upper Truckee River at U.S. 50 in the city of South Lake Tahoe ranked sixth (Rowe et al. 2002). During this period, the minimum concentration of suspended sediment in the Upper Truckee River was 1 mg/L, the maximum was 458 mg/L, and the median was 16 mg/L.

Monthly suspended sediment loads on the Upper Truckee River demonstrate, as expected, year-to-year variations that generally track precipitation and overall streamflow volume variations (Rowe et al. 2002). Annual suspended sediment loads on the Upper Truckee River for all years of record since 1960 (using the sediment rating curves from Simon et al. 2003 and Simon 2006) also display a wide range of values, from less than 1,000 tons per year (during drought years) to approximately 8,000 tons per year or more (during the 1983 water year and during 1997) (EDAW in prep.). Various estimates of average suspended sediment loads for the Upper Truckee River have been calculated by different studies for different data periods (Table 3.4-8), all within the same order of magnitude.

The calculated annual load of fine sediment (less than 0.063 millimeter in diameter) for the Upper Truckee River is 1,010 tonnes per year (or metric tons per year) using mean-daily flow data and the sediment-rating relations developed by Simon et al. (2003) (Simon 2006). This value is approximately 19.40 percent of the total suspended load of the Upper Truckee River. In terms of both fine sediment load and fine particle flux, the Upper Truckee River is the greatest throughout the Lake Tahoe Basin (Simon 2006). Although the suspended sediment yields (per unit watershed area) estimated for the Upper Truckee River (6 tons per year per square mile) are moderate relative to other watersheds at Lake Tahoe, the sheer size of this watershed enlarges its load to Lake Tahoe (Simon et al. 2003).

**Table 3.4-8**
**Published Annual Suspended Sediment Loads (Tons/yr) for the Upper Truckee River from Measured Data**

| Water Years | Suspended Sediment Loads for Upper Truckee River (tons per year) |
|---|---|
| 1989–1996 | 3,310 ([mean or median?])[1] |
| 1972–1974 | 3,900 ([mean or median?])[2] |
| 1972–2002 | 2,850 (mean)[3] |
| 1972–2002 | 2,200 (median)[3] |

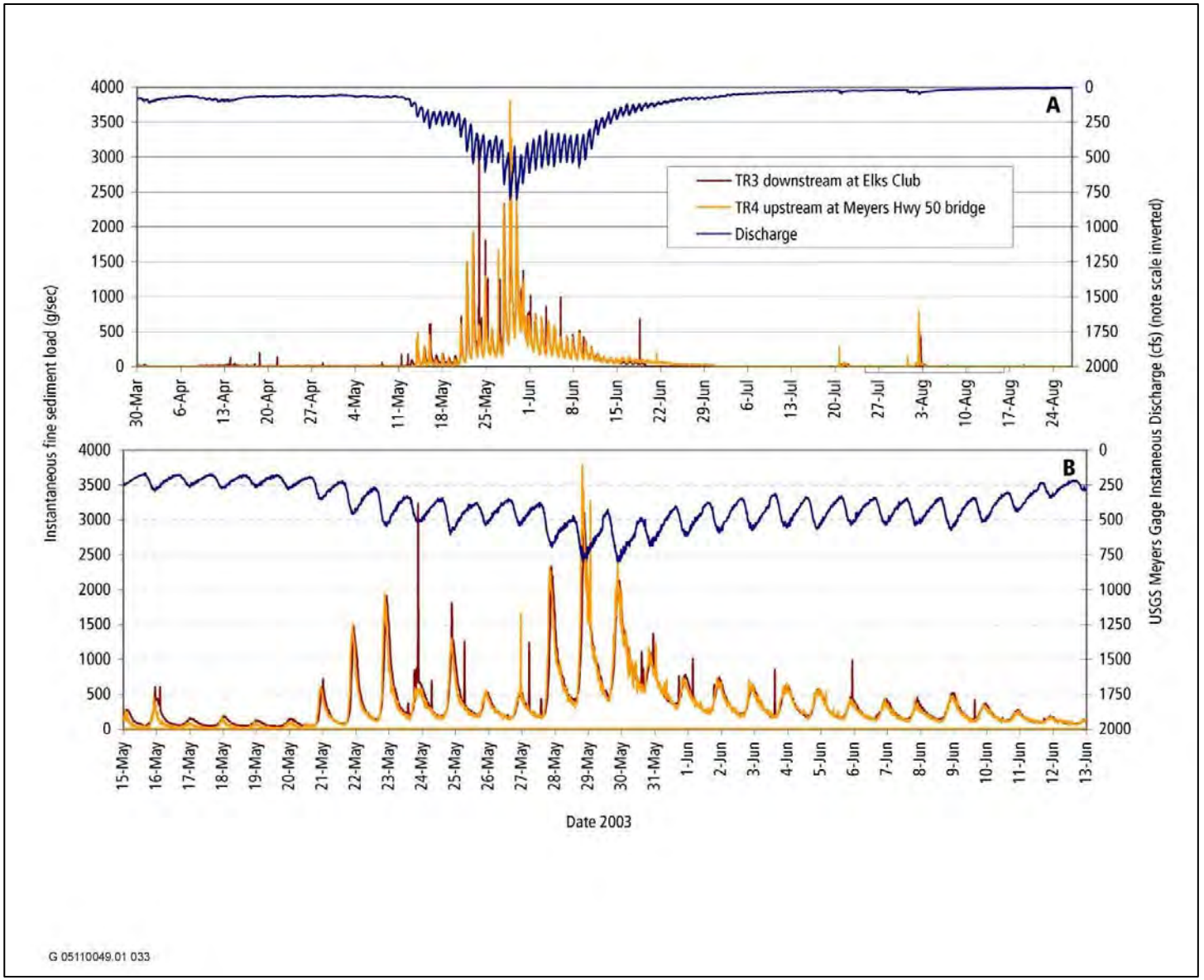
[1] Source: Reuter and Miller 2000
[2] Source: Kroll 1976
[3] Source: Simon et al. 2003

Rowe et al. (2002) found that the seasonal pattern of sediment loadings generally follows runoff, with the highest seasonal median loads of suspended sediment for the Upper Truckee River occurring during the snowmelt months of April, May, and June. The largest median monthly loads for all measured constituents occurred in May. The lowest seasonal loads occurred in summer (July, August, and September), with the lowest monthly loads usually in August, September, or October (Rowe et al. 2002).

Statistical analysis has been conducted to look at trends over time in suspended sediment and other constituents (Rowe et al. 2002, Simon et al. 2003). Simon et al. 2003 identified a possible decreasing trend in annual loads on the Upper Truckee River and concluded that the Upper Truckee River had decreasing mean daily concentrations. These data may indicate long-term watershed recovery from past disturbances, and the patterns are similar for concentrations of total and fine-grained sediment (Simon et al. 2003).

Shifts in the rating curves for suspended sediment also highlight changes over the period of record, with loads on the Upper Truckee River first increasing during 1983–1992, then decreasing from 1993 through 2002, to values lower than those during 1972–1982 (Simon et al. 2003). Short-term analysis of suspended sediment data from before and after the 1997 flood event showed a statistically significant decrease in the rating curve after the flood event (Simon et al. 2003). The decrease resulted from flushing of readily available sediment from the channel system by the major flood event.

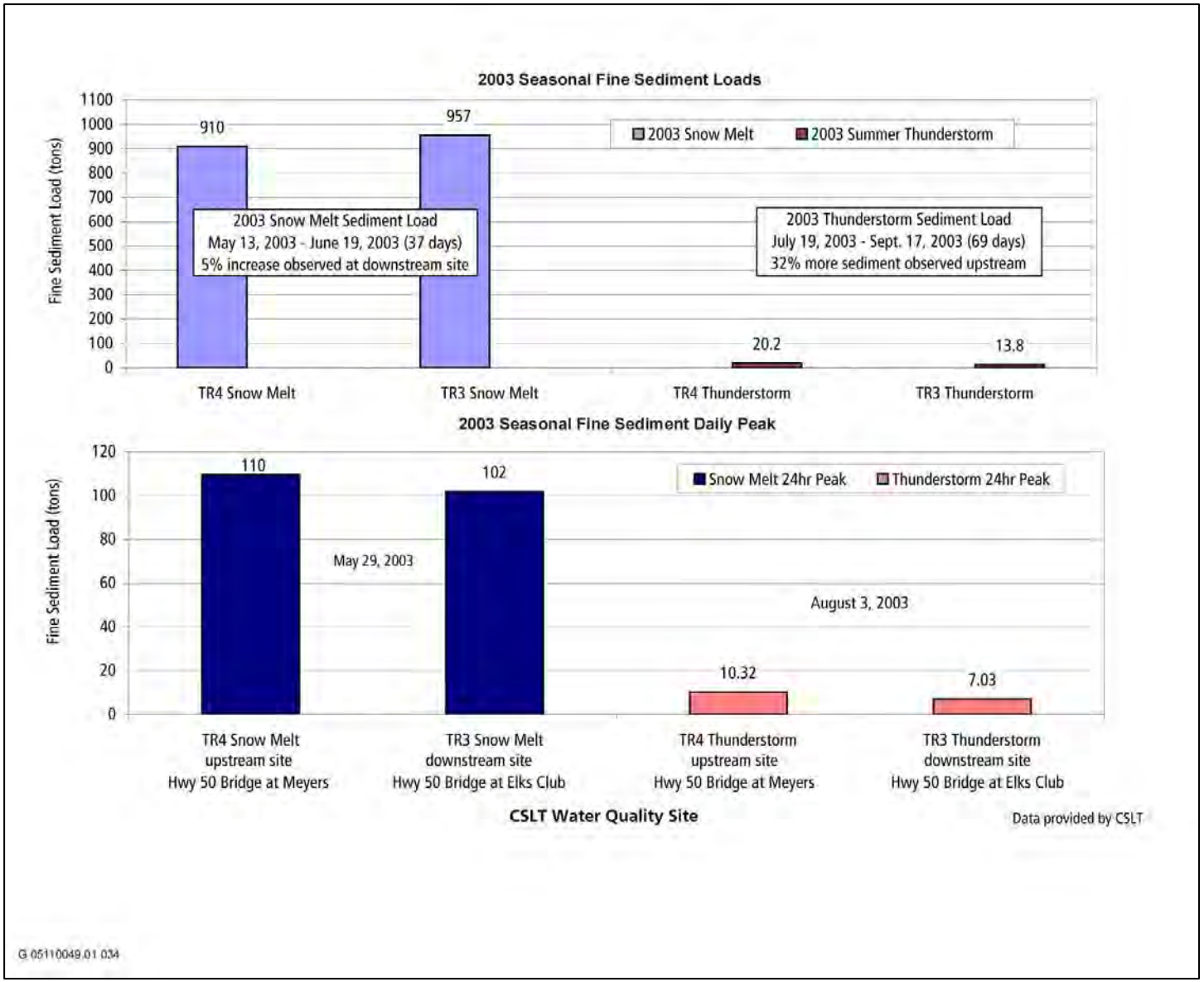
The City of South Lake Tahoe collected turbidity measurements and periodic samples of nitrogen and phosphorus during high flows in the Upper Truckee River upstream and downstream of the study area during 2002 and 2003 (SH&G 2004a:I-14, I-15). SH&G calibrated the turbidity readings (nephelometric turbidity units) to total suspended sediment (TSS) concentrations using grab-sample TSS data and rating curves and reported on TSS loads at the upstream and downstream ends of the study area. Spring snowmelt conveys a consistent fine sediment load, whereas flashy summer thunderstorms often convey high amounts of sediment in a short period of time (Exhibit 3.4-5). The results showed the sustained elevated flows during a spring snowmelt produced a total fine sediment load of more than 900 tons during the 37-day period in 2003, an order of magnitude higher than the summer thunderstorm series of 69 days (Exhibit 3.4-6). It was also reported that, based on field observations and the data, the fine sediment loads likely increase downstream through the study area as a result of local bank erosion (SH&G 2004a:III-8). For the same sampling period in 2003, the grab-sample concentrations of total Kjeldahl nitrogen (TKN) remain relatively consistent over the sampling selection, but values of total phosphorus were much higher during the summer thunderstorm in August 2003, likely because of the high loads of fine sediment observed during the flashy event (SH&G 2004a:III-13). No distinct downstream trend was noted (Exhibits 3.4-7 and 3.4-8).




(SH&G 3.7A & B)

**Continuous Fine Sediment Loads and Streamflow Upstream and Downstream of the Study Area, 2003**

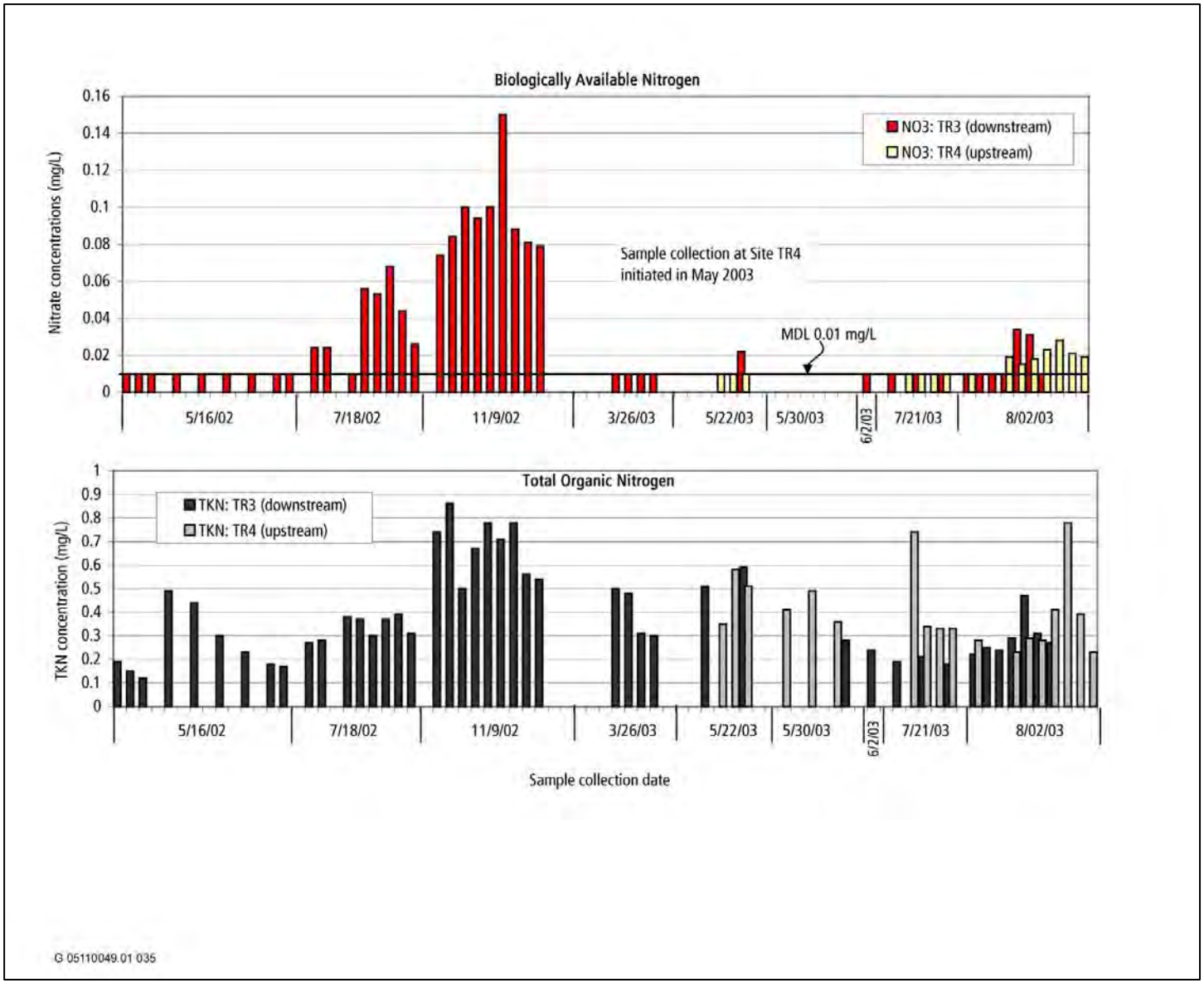
**Exhibit 3.4-5**




(SH&G 3.8)

**Seasonal and Peak Loads of Fine Sediment Upstream and Downstream of the Study Area, 2003**

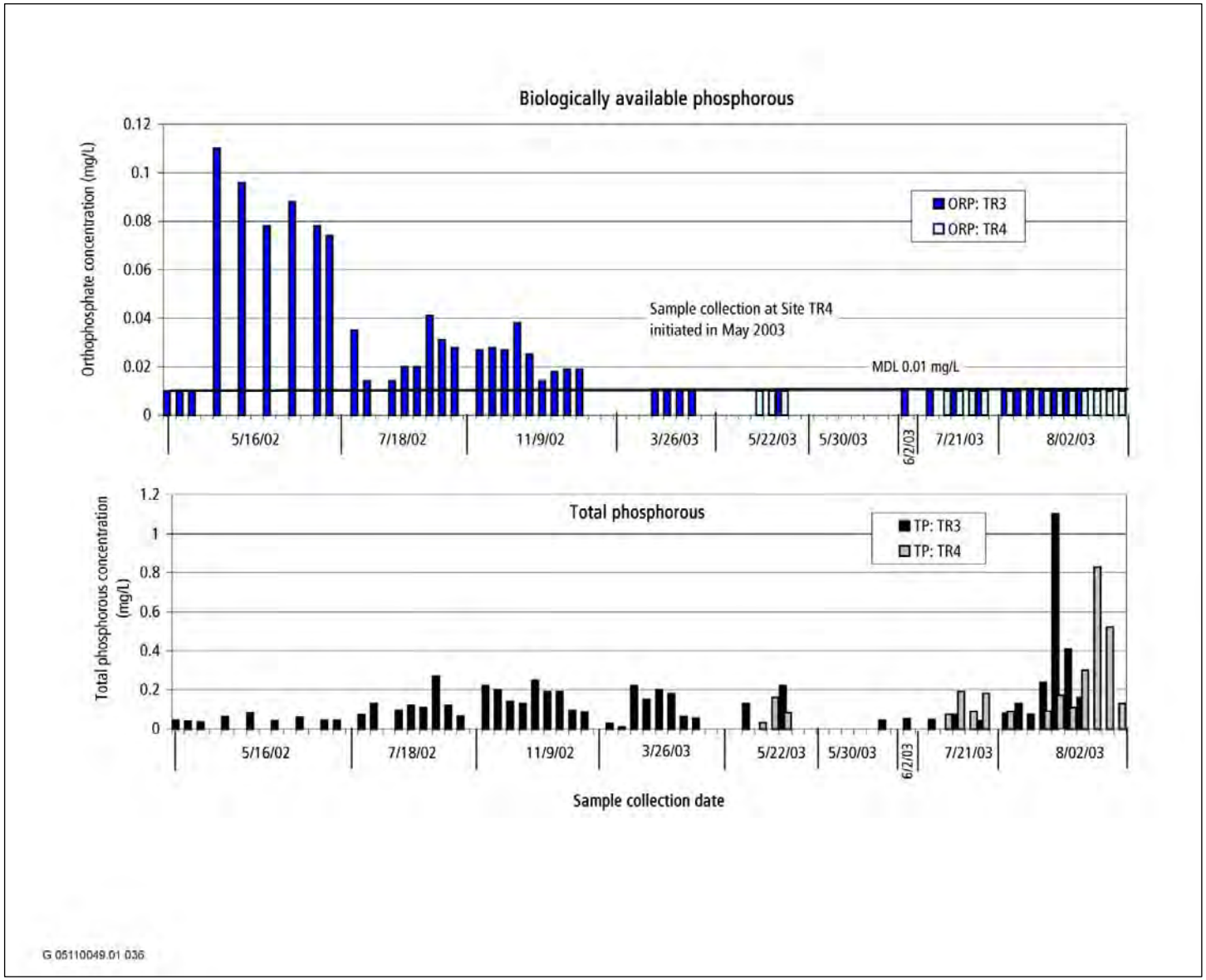
**Exhibit 3.4-6**




(SH&G 3.9 )

**Concentrations of Nitrogen (as Nitrate and TKN)
Upstream and Downstream of the Study Area, 2003**

**Exhibit 3.4-7**




(SH&G 3.10 )

**Concentrations of Phosphorus (as Orthophosphate and Total Phosphorus) Upstream and Downstream of the Study Area, 2003**

**Exhibit 3.4-8**

### *Floodplain Processes*

Stream channel and floodplain connections, active floodplain areas, and overbanking processes that prompt fine sediment deposition and nutrient retention are degraded in the study area and along the other reaches of the Upper Truckee River relative to natural conditions as a result of past watershed-wide and site-specific direct actions and the stream's geomorphic response to those actions. The river channel is enlarged, banks are high, and fill has been placed in some floodplain areas. These have reduced overbank flow frequency and the extent of active floodplain (See Exhibit 3.3-14). This, in turn, has decreased the opportunity for, and effectiveness of floodplain deposition of suspended sediment and/or the trapping and transformation of attached or dissolved nutrients. Studies for the Lake Tahoe TMDL have documented the existing degraded condition along the Upper Truckee River; reported the magnitude of total and fine sediment loads, and calculated nutrient loads delivered to Lake Tahoe based on USGS records (Simon et al. 2003; Simon 2006; California Water Boards and NDEP 2007). The loads reaching the lake reflect the net effect of numerous sources and sinks (or storage) throughout the watershed and along the stream corridor, not just the floodplain processes. The TMDL studies included estimates of several of the watershed pollutant sources and opportunities to reduce loads from those sources (California Water Boards and NDEP 2007). However, little quantitative information is available about the degree of impairment of floodplains as a sink for sediment and nutrients along the Upper Truckee River relative to a natural or undisturbed condition.

Conceptual models linking channel and floodplain characteristics to sediment and nutrient sources and sinks and some limited field data have been the basis of discussions of the existing versus restored conditions to-date (EDAW and ENTRIX 2003:Chapter 12; California Water Boards and NDEP 2008:Stream Cannel Erosion Load Reduction Analysis, Appendix F). While no field data regarding overbank flows and floodplain sedimentation has been reported for the study area, a few studies have collected information downstream within the Upper Truckee Marsh. Analysis of soil cores documented modern net sedimentation in the Upper Truckee Marsh even under the degraded channel conditions, but at rates that only capture a small portion of the suspended sediment in the streamflow entering the area (Winter 2003:90). Observations at seven sampling sites in the marsh during the 2003 snowmelt season identified patterns and amounts of suspended sediment (SS) and total phosphorus (TP) retention on the Upper Truckee River versus Trout Creek portions (Stubblefield et al. 2006). These field data indicate that the more functional floodplain along Trout Creek retained 68 to 90 percent of the SS, and 61to 85 percent of the TP, while areas along the degraded Upper Truckee River retained only 26 percent of the SS and 24 percent of the TP (Stubblefield et al. 2006). Conceptual models of floodplain processes and the limited local data both suggest that impaired floodplain connectivity and floodplain conditions, limit net sedimentation and nutrient retention as water quality treatment along the Upper Truckee River.

Three on-going research projects funded in late 2007 have just completed two years of data collection on various portions of the Upper Truckee River and Trout Creek to study existing overbank flows and floodplain sedimentation, streambank processes, and to test and improve computer simulations of channel dynamics and floodplain processes:

- "Methodology to Predict Total and Fine Sediment Load Reductions as a Result of Channel Restoration in Lake Tahoe Streams" 2ndNature, Santa Cruz, CA. Nicole Beck, Principal Investigator.

- "Numerical modeling of the effects of floodplain morphology and vegetation on sediment retention: Implications for river restorations in the Lake Tahoe Basin, California-Nevada, USA" University of California, Davis, CA. Geoffrey Schladow, Principal Investigator and Stephen Andrews, researcher.

- "Application of Enhanced Stream-Corridor Modeling Tools for Adaptive Management of Tahoe Basin Streams" USDA-ARS National Sedimentation Laboratory, Oxford, MS. Eddy Langendoen and Andrew Simon, Principal Investigators.

At this time, none of the on-going research projects have results available to quantify the net effects on water quality associated with existing or proposed channel capacity, bank heights, floodplain elevation and slope, and vegetation type and density.

In the absence of empirical data or calibrated models to estimate potential quantities of fine sediment and nutrient trapping by floodplain processes, the area inundated by frequent small streamflow events (i.e. the 2-year recurrence) serves as a proxy (Table 3.4-9). As the frequency of overbanking opportunities and the area inundated by a particular magnitude streamflow increases, the duration of time that floodwaters would be spread out on the active floodplain also increase. The specific changes in duration are difficult to quantify, since they depend on floodplain topography, flow paths, and vegetation resistance, but increased duration of floodwater on the floodplain would improve the trapping of fine sediment and nutrients.

**Table 3.4-9**
**Estimated Active Floodplain[1] Area along the Upper Truckee River Project Reaches**

| River Reach* | Area of Active Floodplain[2] Existing (acres) |
|---|---|
| Upper Truckee Marsh (downstream of U.S. 50) | 65.0 |
| Middle Upper Truckee River, Reaches 1 and 2 [3] | na |
| Middle Upper Truckee River, Reaches 3 and 4 | 0 |
| Middle Upper Truckee Rver Reaches 5 and 6 (Sunset Stables) | 58.0 |
| Washoe Meadows State Park/Lake Valley State Recreation Area | 35.7 |
| **Total** | **158.7** |

Notes:

* River Reaches herein are those identified for the enture Upper Trucke River, not just the Study Area. Middle Upper Truckee River extends between the U.S. Hwy 50/Lake Tahoe Blvd. crossing to the U.S. Hwy 50 crossing by Elks Club.

[1] Active floodplain" is defined as the area inundated from a 2-year recurrence peak streamflow event.

[2] The range of active floodplain areas for the alternatives under consideration is listed for projects that have not yet selected a preferred alternative or final design.

[3] No quantitative estimate of floodplain area has yet been calculated or modeled for these reaches (Rudd, pers. comm., 2008).

Sources: EDAW and ENTRIX 2005; ENTRIX 2006; ENTRIX 2008; California Department of Parks and Recreation 2008

### *Golf Course Runoff*

At this time, no definitive conclusions regarding water quality impacts of the existing Lake Tahoe Golf Course have been drawn from surface-water nutrient data collected by the City of South Lake Tahoe and the U.S. Geological Survey (SH&G 2004a:III-13). Efforts by TRPA and the Lahontan RWQCB to reduce the concentration of phosphorus (P) applied to turf and manicured lawns produced strict requirements for fertilizer management at golf courses and recreational facilities in the last 10–15 years (SH&G 2004a:III-13). Existing golf course operations are conducted under an updated waste discharge permit and associated monitoring and reporting program from Lahontan RWQCB (Lahontan RWQCB 2000a, 2000b). For the purposes of Board Order No. 6-00-48, State Parks (as land manager) and American Golf (as lease holder) are considered as "the discharger," and the golf course and its routine operation and maintenance are referred to as "the facility." Before the 2000 update, the facility operated under Board Order No. 6-89-9, which was adopted on January 12, 1989. The waste discharge requirements for the facility include compliance with discharge limitations and receiving water limitations consistent with the Basin Plan. In compliance with the updated permit, the golf course prepared a maintenance plan that included a " chemical plan, an irrigation plan, an agronomic plan, an erosion control plan, and reporting requirements (Lake Tahoe Golf Course and Restaurant 2000).

Potential discharge of pollutants from the facility consists of nutrients from fertilizers and toxic compounds from the use of pesticides, products of erosion, construction waste materials, and small amounts of oil and grease contained in stormwater runoff from impervious surfaces, diesel fuel, and gasoline fuel from the two aboveground fuel tanks and the former underground tanks (Lahontan RWQCB 2000a). The potential for discharge of applied chemical compounds via surface runoff or shallow groundwater to the surface water of the Upper Truckee River is increased by the narrow and, in some sub reaches, non-existent buffer between intensively managed turf and the river channel. For example, no buffer between the golf course landscaping and the river is present at: RS 1800 to 2400 (on both sides of the river); RS 4700 (left bank); RS 5100 (both banks); RS 7500 to 7700 (left bank); and, RS 7700 to 8600 (both sides).

However, both the 2002 and 2004 Lahontan RWQCB field inspections concluded that the primary sources of water quality problems at the site are related to streambank erosion rather than to golf course management (Lake Tahoe Golf Course and Restaurant 2000:85, 87).

The monitoring and reporting program that began under the original (1989) permit established two surface-water monitoring and three roughly 15-feet deep groundwater monitoring wells (Lahontan RWQCB 2000a:1). Monitoring site SW-I is along the unnamed creek at the upstream (south) boundary of the golf course, and SW-II is downstream of SW-1 on the same unnamed creek. Monitoring results show little or no increase in constituents monitored in surface waters (nitrate plus nitrite, dissolved ammonia, orthophosphorus, turbidity, oil and grease, pesticides, and fungicides). Groundwater monitoring site GW-2 is located in a monitoring well at the upstream end of the study area, GW-3 is near the midpoint of the study area, and GW-1 is at the downstream end of the study area. A residential area adjacent to GW-2 may provide input to a relatively high concentration of background nutrients to the upgradient monitoring well. The upgradient well (GW-2) and the downgradient well (GW-1) seemed hydrologically connected in that the downgradient well tracks slugs of nitrate and orthophosphate, with a characteristic time lag of several months (indicating a relatively rapid rate of groundwater movement). Golf course fertilizer management practices seemed to be relatively well reflected by nutrient concentrations in GW-3.

Fertilizer use at the Lake Tahoe Golf Course is minimal, typically occurs twice per year in May and November. Most fertilizers used are slow release but some are not. Use of slow release fertilizer minimizes the amounts of fertilizer free in the soil solution which could be leached. Fertilizers used on site that are not considered slow release are applied either in as spoon fed on greens only (on approximately 2 acres,) or are applied in a manner which approximates a slow release feeding in that they are applied in such small quantities (per acre) that they do not overwhelm the soil's ability to hold and then release to the plant to match growth rates. No nitrates are applied, nitrates are negatively charged, as is the soil, have no holding ability in the soil therefore whatever the plant doesn't uptake or attach to its roots would be lost to the groundwater below. Fertilizer use is focused on fairways, tees, and greens, and not within the rough or 'minimally managed' areas. Buffer zones are located along some fairways adjacent to creeks and ponds. However, some fairways located adjacent to the river currently have no buffer. Herbicides are used only in spot treatments and pesticide use is also very minimal.

## 3.4.2 ENVIRONMENTAL CONSEQUENCES

### SIGNIFICANCE CRITERIA

For this analysis, significance criteria are based on the checklist presented in Appendix G of the State CEQA Guidelines; the TRPA Initial Environmental Checklist; factual information; scientific data; and regulatory standards of Federal, State, and local agencies. In development of mitigation measures for significant impacts of the project, the environmental thresholds of the Tahoe Regional Planning Compact were also considered. The project's effects on thresholds are further described in Chapter 4, Section 4.6,"Consequences for Environmental Threshold Carrying Capacities."

### CEQA Criteria

Based on Appendix G of the State CEQA Guidelines, a geomorphology and water quality impact is considered significant if implementation of the project would do any of the following:

- violate any water quality standards,
- create or contribute to runoff water that would include substantial additional sources of polluted water, or
- otherwise substantially degrade surface water or groundwater quality.

### NEPA Criteria

An environmental document prepared to comply with NEPA must consider the context and intensity of the environmental effects that would be caused by or result from the proposed action. Under NEPA, the significance of an effect is used solely to determine whether an EIS must be prepared. The factors that are taken into account under NEPA to determine the significance of an action in terms of the context and the intensity of its effects are encompassed by the CEQA criteria used for this analysis.

### TRPA Criteria

Based on TRPA's Initial Environmental Checklist, an alternative would result in a significant impact on geomorphology and water quality if it would:

- result in continuation of or increase in wind or water erosion of soils;
- create changes in deposition or erosion of beach sand, or changes in siltation, deposition, or erosion, including natural littoral processes, that may modify the channel of a river or stream or the bed of a lake;
- result in discharge into surface waters or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen, or turbidity; or
- result in the potential discharge of contaminants to the groundwater or any alteration of groundwater quality.
- result in an effect on drinking water sources located within 600 feet of the project.

## METHODS AND ASSUMPTIONS

The impact analysis has been completed using a combination of quantitative and qualitative methods performed by a hydrologist/geomorphologist and civil engineer experienced in river restoration in general and the Lake Tahoe Basin environment specifically. Information for the project site and vicinity and professional experience on similar projects have been referenced and incorporated into the analysis of the river system history, existing condition, likely future conditions, and conditions expected under each action alternative.

Climate change effects on future geomorphology and water quality are incorporated in the No Project/No Action Alternatives evaluation. However, even the most geographically and temporally focused available forecasts of climate change effects on hydrologic parameters (Tetra Tech 2007) have relatively large variability and substantial uncertainty. Due this variability and uncertainty, a range of climate change scenarios, not just end members or a midline scenario, are considered. Depending on the scenario, the statements are expressed in only qualitative terms.

The impact analysis examines the effects of each alternative over the short term and long term for each of the criteria listed above. Short-term effects are defined as those that would be temporary. The short-term, temporary effects include those that could occur over hours, days, or weeks during the active construction phase. In addition, the river system is expected to undergo changes following construction as vegetation matures and the river reoccupies and

adjusts to the restoration project, so the short-term, temporary analysis also looks at interim effects that might occur during the first few years following construction, assuming streamflows are at least average, and also considers conditions if a large flood event (approximately 25-year peak flow) occurs within 5 years after construction.

Wherever Federal, State, or local water quality standards applicable for the region must be attained and maintained pursuant to Article V(d) of the TRPA Compact (TRPA 2004) , the strictest standards are used as the significance criteria for this project therefore, the project effects must meet or exceed such water quality standards to earn a less-than-significant conclusion, recognizing that any violation of a water quality standard is considered a water quality impact without taking in account the extent and duration of that impact. Based on informal agency consultations during alternatives development and analysis, the Lahontan RWQCB numeric and narrative water quality standards are the most stringent factors for significance determinations. Violation of any of the numeric water quality limits or narrative standards in the objectives of the Basin Plan (see Table 3.4-2 for examples), or actions inconsistent with the "Non-degradation" objective, would comprise a significant impact for this analysis. While it is possible that other water quality parameters could be affected by a project alternative, the "turbidity standard" (i.e., <10 percent above natural background) appears to be the most sensitive measure that is likely to be affected by potential construction in and along the river channel. The applicable limit is related to the Lahontan RWQCB's narrative turbidity standard for receiving waters in the Basin Plan, which states that: "Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent" (Lahontan RWQCB 1995:5.1-9).

Natural turbidity levels range widely by season with flow magnitudes and availability of sediment to be entrained. Over the past several years, most turbidity sampling on the Upper Truckee River has been conducted via grab samples as part of volunteer monitoring or research programs, along with some sampling during construction activities. For example, a citizen's volunteer water quality monitoring event, called Snapshot Day, held in May each year typically includes sites on the Upper Truckee River: in Christmas Valley; one in the downstream end of the middle reach (Mosher property); and a couple sites near the river's mouth. May 2002 samples had turbidity readings ranging from 0.12 NTU to 1.61 NTU (in the Mosher Reach). May 2003 samples had turbidity readings ranging from 0.3 NTU to 0.98 NTU (near the mouth). May 2005 samples had turbidity readings ranging from 2.43 NTU (near the mouth, but above Trout Creek) to 3.47 NTU (Christmas Valley) (TRPA data for 2002-2005). Additional grab samples were collected at two sites on the Upper Truckee River and two sites on Angora Creek on four dates in 2008 (January, March, the May 10th snapshot day, and in July), but none were over 4.5 NTU (Sierra Nevada Alliance 2008). During summer of 2008, Upper Truckee River and Angora Creek were sampled at multiple stations on the same dates as part of a Tahoe-Baikal Institute program. The Upper Truckee River samples ranged from less than 1 NTU at Meyers and by the Elks Club to less than 1.5 NTU at U.S. 50/Lake Tahoe Boulevard. The Angora Creek samples ranged from less than 0.5 NTU at the headwaters (by Angora Lakes) to just over 1 NTU at View Circle and nearly 3 NTU near the confluence with the Upper Truckee River (Tahoe-Baikal Institute 2008). Restoration project-specific water quality compliance monitoring for the Upper Truckee River Reaches 3 and 4 during construction included numerous grab samples between July 21 and September 4, 2008 along with continuous monitoring from September 5 to October 7, 2008 (Taylor, pers. comm. 2010), none of the grab samples were over 4 NTU. Median values during continuous monitoring remained between 1 and 3 NTU both upstream and downstream of the construction site for the restoration project, although a few brief spikes exceeded 10 and even 100 NTU for 10 to 20 minute periods. The brief turbidity spikes were associated with miscellaneous background disturbance (by recreation users and animals) upstream of the construction, as well as potential construction-related effects at least on one date (Taylor, pers. comm., 2010; ENTRIX, 2008).

The only continuous turbidity monitoring that spans multiple seasons and locations on the Upper Truckee River was conducted by the City of South Lake Tahoe (2nd Nature 2006). This monitoring included three sites along the Upper Truckee River beginning in April 2002 (for a partial Water Year [WY]) and throughout WY 2003, 2004, and 2005. The background turbidity levels (between storm events) were generally under 15 NTU and often less than 10 NTU. Short duration peaks exceeded 100 NTU (and a few exceeded 500 NTU) in all years, but the season when peak values occurred was not consistent, ranging from the onset of fall rains to snowmelt season and brief summer storms.

Because background turbidity levels on the Upper Truckee River is typically extremely low (i.e., less than 10 NTU), especially during summer construction season, very small changes from the natural state (an increase of <1 NTU) could result in a violation of the Basin Plan standard. Water with turbidity less than 10 NTU, and especially less than 5 NTU, generally appears clear to the naked eye, so detection of a potential violation in this range can only be determined with sensitive instrumentation that is appropriately deployed, calibrated, and maintained (USGS 2005: TBY-47). Additionally, the Basin Plan provides no narrative or numeric distinction regarding the season or duration of a turbidity increase to be considered detrimental, so an increase more than 10 percent over natural, of any duration could be considered a violation of the standard as written in the Basin Plan. Regardless of flow or season, a turbidity violation that lasts after an initial disturbance ends and/or impacts that produce a recurring or chronic source of turbidity exceeding this standard would be considered a significant adverse impact for purposes of this document.

Potential violations of the narrative turbidity standard at the low end of the NTU range, while considered a significant impact for CEQA/NEPA/TRPA analysis (as stated above), would not necessarily correspond to an adverse effect on beneficial uses. For example, an effect on aesthetic values under Non-Contact Recreation Use designation in the Basin Plan (Lahontan RWQCB 1995:2-2) is considered by Lahontan RWQCB to be the first indicator (i.e., most sensitive indicator) of an effect on beneficial uses (Kemper, pers. comm., 2010). If persistent visible turbidity from the project site occurred, particularly during the summer recreation period when flows are low, recreation use is high, and background conditions would exhibit low turbidity (i.e., good background clarity), it would potentially impair non-contact recreation beneficial uses. However, the turbidity values that would correlate with this impairment of aesthetics-related beneficial use might not occur unless turbidity was increased beyond natural seasonal background by several orders of magnitude (i.e., well beyond the <10 percent increase limit in the turbidity standard of the Basin Plan). Summer turbidity levels would also likely need to exceed the minimum aesthetic criterion to have adverse effects on other beneficial uses, including those supporting aquatic organisms. While impairment of beneficial uses would likely require the proposed project to elevate turbidity levels considerably further than 10 percent above background for a larger magnitude and longer duration beyond the more stringent limited area and brief period used as a significance threshold for this EIR/EIS/EIS, because of the CEQA checklist question regarding violation of "any water quality standard."

## IMPACT ANALYSIS AND MITIGATION MEASURES

### Alternative 1: No Project/No Action: Existing River and 18-Hole Regulation Golf Course

IMPACT 3.4-1 (Alt.1) Stream Channel Erosion within the Study Area. *Implementing Alternative 1 would not make direct changes to the channel of the Upper Truckee River, Angora Creek, or the unnamed creek and other drainages. However, natural geomorphic response to historic disturbances and the continuing effects of undersized bridges would cause channel instability that erodes the streambanks and streambed within the study area, releasing sediment and nutrients that degrade the river and lake water quality relative to undisturbed natural conditions. While implementing Alternative 1 would allow the adverse conditions to persist, it would not be a change from existing conditions. Therefore, this impact would be less than* ***less than significant****.*

Alternative 1 does not involve modifying the existing impervious surfaces or making changes to the channel that would result in a substantial increase in runoff volumes or peak flows. (See Impacts 3.3-1 [Alt. 1] and 3.3-2 [Alt. 1.] in Section 3.3, "Hydrology and Flooding.") Therefore, implementing Alternative 1 would not directly increase driving forces causing stream channel erosion.

Implementing Alternative 1 would not directly modify the existing streambank stabilization treatments, but bank repairs would be implemented in response to flood events on an as-needed basis to protect infrastructure, natural resources, or private property. There would likely be continued streambank erosion along unprotected banks and streambed incision as active knickpoints continue migrating upstream for several decades as the stream makes natural geomorphic adjustments toward an equilibrium state.

Alternative 1 would not involve replacing or relocating the existing golf course bridges, except in the event they are damaged by a flood or are expected to fail. These undersized bridges, including the bridges by holes 6 and 7 (approximate RS 8200 and RS 7575), would continue to constrict flow during high flows, resulting in local streambed and streambank erosion.

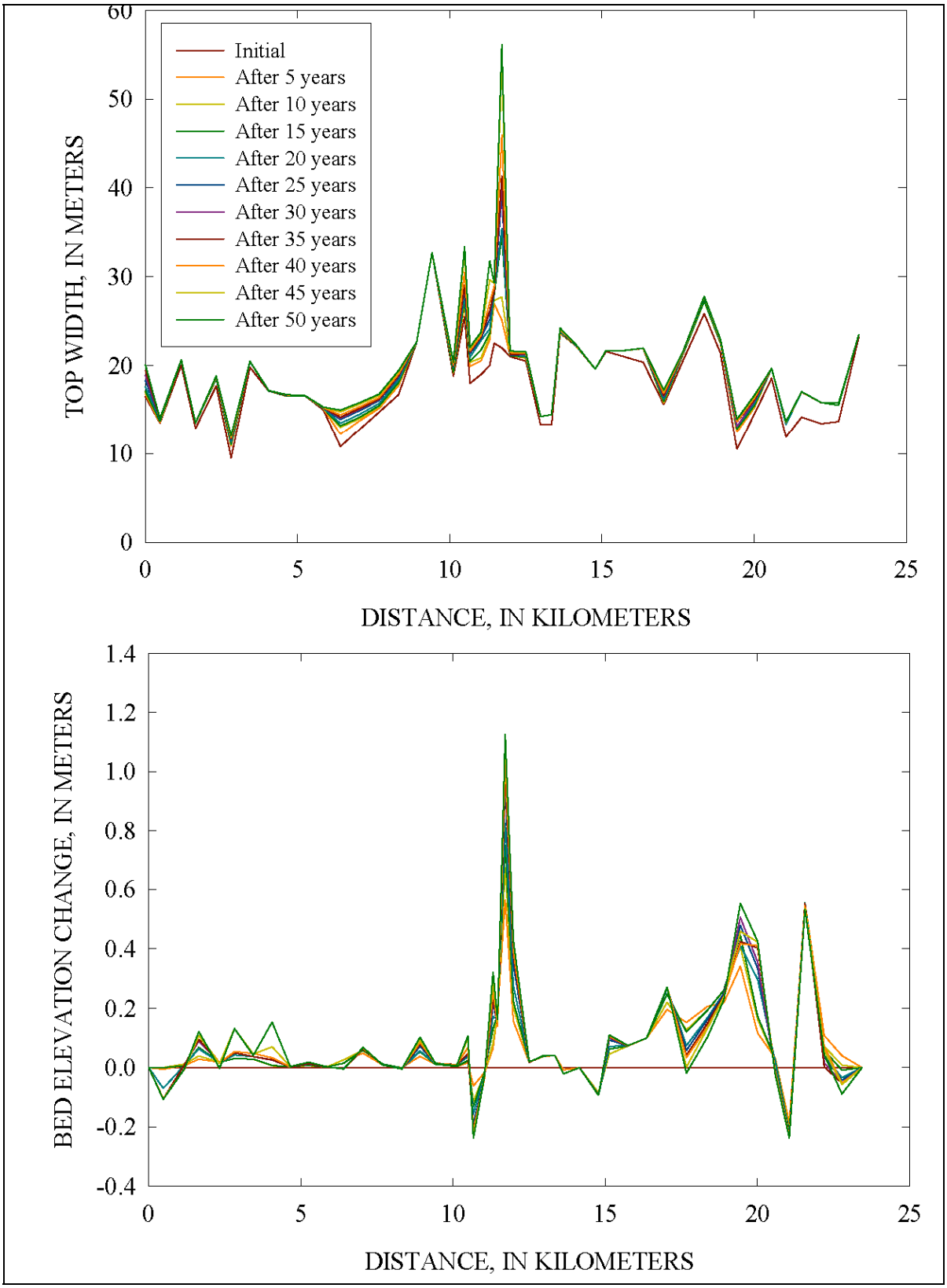
Alternative 1 would not involve making direct modifications to the channel of the Upper Truckee River, Angora Creek, or the unnamed creek(s) within the study area. However, the channels within the study area would continue their natural responses to past disturbances, the influence of ongoing land uses that affect hydrology and drainage, and the adverse hydraulic effects of existing undersized golf course bridges (SH&G 2004c). Therefore, implementing Alternative 1 would not decrease the channel erosion rates along the Upper Truckee River within the study area. Streambed and streambank erosion would continue at an accelerated rate in response to historic disturbances until the channel reaches equilibrium many years in the future. Implementing Alternative 1 would also perpetuate potential channel instability and future erosion within the lower reaches of Angora Creek and the unnamed creek.

The Upper Truckee River channel has undergone accelerated erosion in response to watershed-wide and site-specific past land use actions. The direct actions and the geomorphic response to those actions have created increased rates of streambed and streambank erosion. Some localized and watershed scale past actions, such as logging and log transport using stream channels and ditches or water supply diversions and ditches, had direct effects on channels within the study area. These actions typically decreased stream length and increased slope, channel depths, and/or bank heights. As a result, erosion occurred at the time of or subsequent to each disturbance, generating total sediment and fine sediment loads at rates that exceed natural conditions.

Within the study area, various types of streambank protection measures were installed in several locations over the past 40 years to limit erosion, but the measures addressed only local issues and did not include streambed protection, so their effectiveness and life spans were limited. Studies for the Lake Tahoe TMDL have documented the existing degraded condition of the river from field observations (Simon et al. 2003), and performed calculations that demonstrated it is largest contributor of fine sediment from streambanks to Lake Tahoe (Simon 2006, California Water Boards and NDEP 2007). A coupled watershed (AnnAGNPS) and channel (CONCEPTS) 50-year model simulation using flows based on historic conditions (Simon et al. 2003) predicted channel adjustments, over half of which would occur in the first 23 years. The channel change would be dominated by widening throughout the system, including the downstream half of the study area (10.8 to 14.8 km) (Exhibit 3.4-9a). Bed elevation changes would be more varied, with minor bed lowering, as well as net aggradation in the study reaches (Exhibit 3.4-9b).

Compilation of the TMDL streambank erosion results (California Water Boards and NDEP 2007:211–215) for specific subreaches of the Upper Truckee River allows a quantitative estimate of stream channel erosion in the study area and in other reaches. Using the existing conditions analyzed for the TMDL, the estimated fine sediment loads from streambank erosion in the study area under Alternative 1 would be 1,228 cubic yards (Table 3.4-10). The study area channel erosion rate per unit stream length of 145.16 cubic yards per 1,000 feet is higher than that for upstream or downstream reaches and nearly three times the rate for the river overall (54.4 cubic yards per 1,000 feet). These data indicate that the degraded existing conditions would persist under the No Project/No Action Alternative.

No quantitative estimate of streambank erosion loads or load reduction potential along Angora Creek or the unnamed creek within the study area was made in studies for the TMDL (California Water Boards and NDEP 2007). Alternative 1 would not involve making any direct changes to either stream, but natural adjustment to past disturbance and response of the tributaries to changes within the main stem of the Upper Truckee River at the tributary mouths would occur. Based on geomorphic principles and qualitative analysis, both tributaries may undergo streambed erosion near their mouths, and they may be destabilized by widening of the Upper Truckee River that would effectively “shorten” and steepen the tributaries.




The study area is located between 10.8 and 14.8 km distance (upstream of the mouth at Lake Tahoe).
Source: Simon et al. 2003

**Simulated Changes in Bank Top-Width and Bed Elevation of the Upper Truckee River Over a 50-Year Period** **Exhibit 3.4-9a and b**

**Table 3.4-10**
**Estimated Stream Channel Bank Erosion of Fine Sediment on the Upper Truckee River under the No Project/No Action Alternative**

| River Reach | Distance Upstream of Lake (feet) | Bank Erosion of Fine Sediment[1] Alternative 1 (No Project/No Action) | |
|---|---|---|---|
| | | (cubic yards) | (cubic yards per 1,000 feet) |
| Downstream reaches | 0–40,000 | 2,451 | 61 |
| Study area reaches | 40,000–48,458 | 1,228 | 145.2 |
| Upstream reaches | 48,458–79,364 | 641 | 20.7 |
| **Total** | **79,364** | **4,320** | **54.4** |

Note:
[1] Fine sediment is less than 0.063 millimeter in diameter.
Source: California Water Boards and NDEP 2007

Future channel erosion under the No Project/No Action Alternative, although generally expected to follow a predictable trend based on geomorphic channel evolution models as described above, could be altered by climate change. Climate change may modify future hydrology and sediment loads from the watershed but was not specifically represented in the TMDL modeling, which assumed future hydrology to be similar to the historic record. Increased rainfall as a proportion of total precipitation, increased runoff during winter, decreased snow water equivalent, and decreased spring/summer runoff are conditions that could result from climate change and limit the rate of natural recovery within the incised channel system. There could also be offsetting effects of climate change on stream channel erosion. For example, vegetation encroachment within channels related to lower average annual flows may help stabilize some of the existing streambanks. However, the potential for severe rain or rain-on-snow floods may remain the same or even increase.

Under Alternative 1, no change to the adverse existing conditions would be made, and channel erosion rates would continue to exceed natural background. While this is an adverse condition that would continue, because it is not a change from existing conditions, this impact would be less than significant.

No mitigation is required.

IMPACT 3.4-2 (Alt.1) Risk of Channel Erosion Damage to Sewer Pipelines. *Implementing Alternative 1 would not improve or enhance existing protective cover of sewer pipelines crossing the Upper Truckee River or within 25 feet of the existing banks, and it would not involve taking measures to stabilize the channel to reduce future streambed or streambank erosion. Natural geomorphic adjustments to past disturbances and continuing hydraulic constrictions at bridges will increase the risk of damage to pipelines that could potentially release untreated wastewater to the river and eventually reach Lake Tahoe. Implementing Alternative 1 would allow this adverse condition to persist. This impact would be* ***less than significant****.*

The existing sewer pipeline crosses Angora Creek within the study area. This crossing depth is unknown however, is currently not exposed in the stream channel. The pipeline crossing under the Upper Truckee River at RS 1400 is an inverted siphon that has approximately 1 foot of cover, and the upstream crossing at RS 8800 is an exposed concrete encasement. These crossings are inspected by STPUD twice per year (Adams, pers. comm., 2009). Continued normal channel dynamics, particularly any additional channel bed erosion in the future, may further diminish the remaining protective cover at RS 1400 or potentially undercut the concrete casing at RS 8800, increasing the risk of damaging effects during a major flood flow. If the sewer pipeline is damaged during a major flood, untreated wastewater could be released into the river and potentially reach Lake Tahoe.

Additionally, a few hundred feet of sewer pipeline is located parallel to and within 25 feet of the eroding streambank on the Upper Truckee River between RS 6500 and RS 5900. Continued normal channel dynamics, particularly any additional channel widening in the future, may undermine and/or expose this section of the sewer pipeline and increase the risk of damaging effects during a major flood flow. If the sewer pipeline is damaged during a major flood, untreated wastewater could be released into the river and potentially reach Lake Tahoe.

Under Alternative 1, no change to the adverse existing conditions would be made; therefore, the risk of damage to the sewer pipelines would continue and would not be a direct effect of State Parks' implementation of Alternative 1. As occurs under existing conditions, STPUD would continue to monitor the sewer crossings and, if deemed necessary, would make an assessment of risk of damage and implement grade control measures to protect the sewer line. These protection measures are under the authority of STPUD. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-3 (Alt.1) **Long-Term Increased Surface/Soil Erosion within the Study Area.** *Alternative 1 would not involve modifying the topography, soils, vegetation, or drainage in the areas of existing surface erosion caused by prior surface disturbances within Washoe Meadows SP. Implementing Alternative 1 would allow existing areas of active erosion to persist. This impact would be* ***less than significant****.*

Alternative 1 would not directly modify the existing disturbed former quarry, unpaved access roads, informal trails, or other disturbed surfaces that have accelerated soil erosion within the Washoe Meadows SP portion of the study area (see Impact 3.6-1 (Alt. 1) in Section 3.6, "Earth Resources"). No changes to the drainage or vegetation that might affect soil erosion rates would be expected. Alternative 1 would not involve changes to the adverse existing conditions. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-4 (Alt.1) **Fine Sediment and Nutrient Retention within the Study Area.** *Alternative 1 would not involve directly modifying the channel capacity, elevation, frequency of overbanking, or area of functional active floodplain, although future natural geomorphic adjustments to historic disturbances would be expected to eventually form a small inset floodplain below the terrace banks. Implementing Alternative 1 would allow the impaired fine sediment and nutrient retention conditions to persist. This impact would be* ***less than significant****.*

Under the No Project/No Action Alternative, the Upper Truckee River, Angora Creek, the unnamed creek, and the existing 36-acre active floodplain in the study area would not be directly modified. The channel capacity would remain oversized, the streambed elevation would remain low, and streambanks would remain high, all of which limit normal frequent flows (i.e., the 2-year peak flow) from overbanking onto the surrounding former floodplain (now a terrace). The estimated location and area of the active floodplain would remain similar to existing conditions (see Exhibit 3.3-14).

Natural geomorphic adjustments along the Upper Truckee River would continue and would further enlarge the channel and worsen the existing degraded floodplain connectivity to surrounding terrace surfaces over time. The active floodplain area and potential for frequent overbanking in the study area would be either similar to existing conditions or potentially worse if climate change reduces available streamflow. These factors would reduce the frequency, area, and duration of floodplain inundation. Some reaches could have small increases in active floodplain area where channel widening has progressed to the point of creating an inset floodplain between the high-terrace banks where additional bank treatments were not implemented to protect golf course infrastructure. However, net sediment and nutrient retention would not necessarily be improved substantially because these inset floodplain surfaces would be more vulnerable to disturbance during high flows than would active floodplains on the broader surrounding terrace. Therefore, the opportunity for floodplain processes to provide water quality treatment would be further degraded in the study area under the No Project/No Action Alternative.

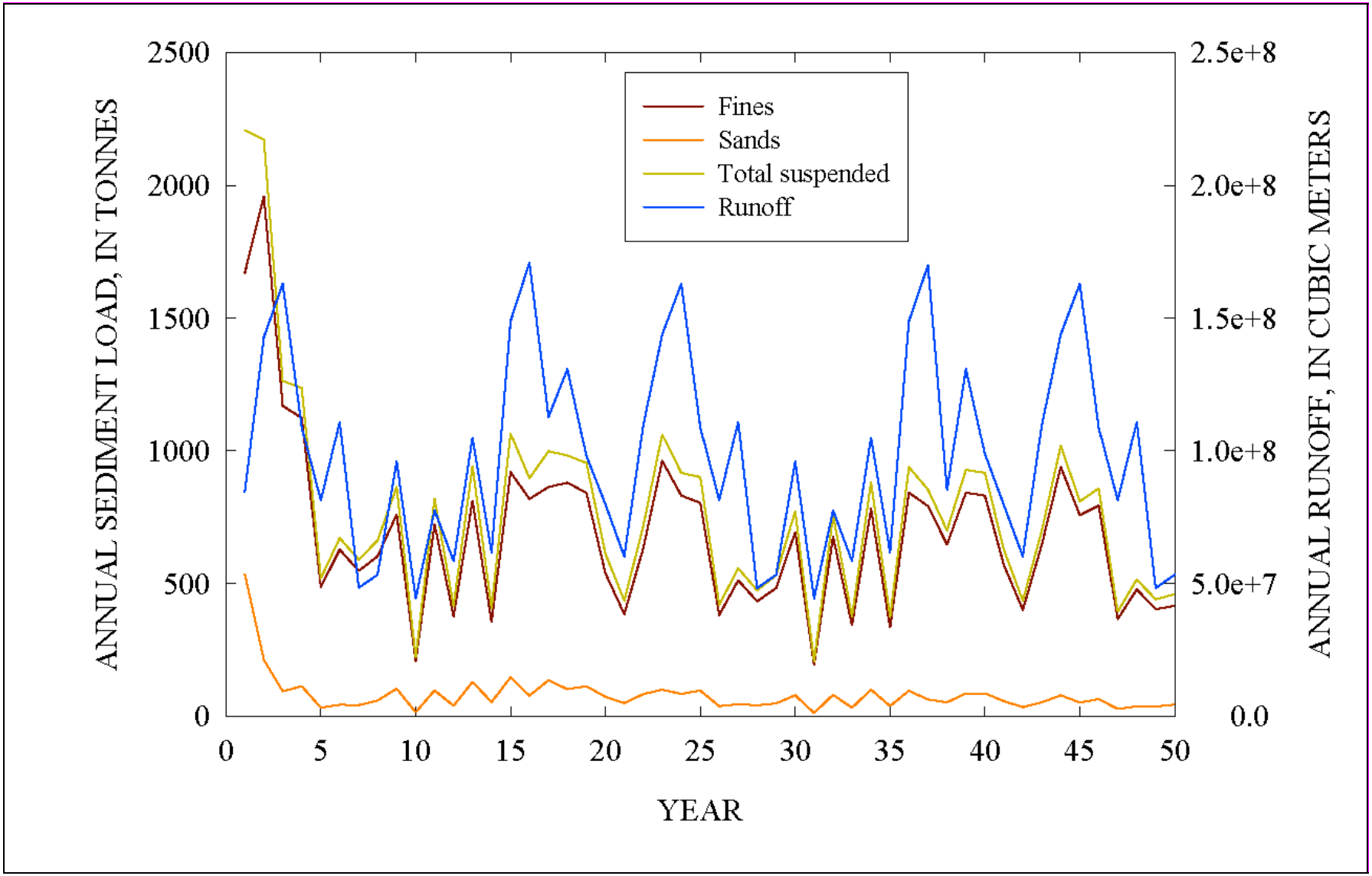
Under Alternative 1, no change would be made to the adverse existing conditions. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-5 (Alt.1) **Modifications in Upper Truckee River Coarse Sediment Transport and Delivery Downstream.** *Alternative 1 would not involve directly modifying the channel bed profile, bank and bed materials, or hydraulic conditions controlling bedload (i.e., sands and gravel) transport within the study area and into the downstream reaches of the Upper Truckee River. Naturally declining post-watershed disturbance coarse sediment yield would continue, along with adverse effects on downstream channel erosion and beach erosion adjacent to the river mouth (e.g., Cove East and Barton Beach). In the long term, climate change effects could either exacerbate or counteract present trends. Because conditions could range from worse than the existing degraded condition to a possible improvement, any determination regarding climate change effects on coarse sediment transport and delivery downstream remains too speculative for a meaningful significance conclusion.*

Historic disturbances in the watershed would have caused temporary episodes of increased erosion and sediment production, affecting coarse sediment transport through the river and delivery to Lake Tahoe. The magnitude and timing of such historic sedimentation episodes has not been reconstructed in detail. Although past direct actions throughout the watershed caused increased sedimentation episodes the overall trend since the end of Comstock Era logging has been a decrease in coarse sediment loads. Additionally, human management of the lake level and effects of dredging and development at the river mouth have also contributed to increased beach erosion of the Cove East and Barton Beaches. At the watershed scale, past actions, such as late 1800s logging, channel straightening, and mid-1900s urban development, temporarily increased total sediment transport in the river, prompting various possible stream adjustments (incision, widening, aggradation, braiding, avulsion) and increasing the amount of coarse sediment that reaches the lake and supplies local beaches. Over the last few decades, coarse sediment carried by the Upper Truckee River and Trout Creek has been insufficient to maintain the historic beach deposit length, width, or thickness. In addition, wave energy effects on all Lake Tahoe beaches have increased since the late 1800s through management of the lake to hold water in storage and keep the lake at a high elevation when possible. Since the 1950s, beach sediment supply has also been decreased by initial and maintenance dredging of the Tahoe Keys navigation channels west of the Upper Truckee River. These past actions have resulted in considerable and continued shoreline retreat at the Upper Truckee Marsh. Historic beach erosion has primarily affected active, largely unvegetated sand deposits but also has disturbed locations with dense herbaceous vegetation and mature conifers rooted in soils along the beach ridge.

Under the No Project/No Action Alternative, the amount of coarse sediment delivered from the study area to downstream reaches and the local beaches would change as the watershed and stream channels continue to respond to past disturbances, ongoing management, and the influences of climate change. No quantitative projections of the net effects of all these factors on future coarse sediment delivery have been made. The results of analysis of suspended sediment data over the periods of record for USGS gage sites throughout the Lake Tahoe Basin indicated that the Upper Truckee River at the project site (Gage 10336610) is one of the sites with a statistically significant decreasing trend in mean daily sediment transport rate (Simon et al. 2003). Recent historic relatively low coarse sediment yields from the watersheds are estimated to continue and even have declining sand or coarser loads as channels widen and the streambed stabilizes (with net deposition in certain reaches) (Exhibit 3.4-10). It is possible that rainfall runoff flood processes could result in periodic increases in coarse sediment loads, even if most years have reduced coarse sediment transport compared to present.




Source: Simon et al. 2003

**Simulated Annual Runoff and Loads of Fines, Sands, and Total Suspended Sediments Delivered to the Lake for the 50-Year Period**

**Exhibit 3.4-10**

The effect of reduced coarse sediment transport within the Upper Truckee River could include changes in channel erosion, and reduced coarse sediment delivery to the beaches would worsen historic trends of shoreline retreat. However, the net long-term effect of the above factors on future channel and beach erosion is highly uncertain and difficult to predict, especially giving the distance from the study area to the beaches. There could be a continuing adverse trend of net coarse sediment deficit and increasing risk of channel or beach erosion, which would be similar to and worse than the existing degraded condition. However, it is also possible that climate change could result in vegetation encroachment within the incised river channel system that stabilizes the bed or banks, and lowered lake levels could reduce potential wave energy along the existing beach ridge. The net effect of these factors has not been quantified and has high uncertainty, and could range from worse than the existing degraded condition to a possible improvement.

Implementing Alternative 1 would not make any change to existing conditions, and after thorough investigation, the outcome on coarse sediment transport and delivery downstream remains too speculative for a significance conclusion, because depending on which predictions for climate change influences occur, they could either exacerbate or improve conditions.

No mitigation is required.

IMPACT 3.4-6 (Alt.1) Short-Term Risk of Surface Water or Groundwater Degradation during Construction. *Alternative 1 would not involve implementing any planned major or prolonged construction activities along or in the channel of the Upper Truckee River, Angora Creek, or the unnamed creek, although repairs to bridges, existing streambank protections for the golf course, or infrastructure could be required if damage or threats of failure occurred, which is the same as with current practices. Although temporary BMPs would be implemented, short-term risks of water quality degradation during construction could occur, particularly if emergency repairs must be conducted during high-flow events. However, the extent of repairs would be local, the background turbidity would be elevated during a flood event, and the seasonal timing would lesson potential impairment of noncontact recreation beneficial uses (aesthetics) or other uses. While adverse, temporary turbidity conditions could occur with emergency repairs, the potential need for repairs and risk of turbidity are the same as existing conditions, so there is no change resulting from Alternative 1; therefore, this impact would be* ***less than significant****.*

Alternative 1 would not include any planned construction, although it is possible that emergency repairs during or following damaging high flows could be required to reinforce or replace bridges, repair streambank stabilization, or protect infrastructure (i.e., irrigation pipelines on bridges or buried under or along the river), as under existing conditions. The exact nature and extent of potential construction under Alternative 1 are unknown and could range from minor activities conducted quickly and without the need to divert or bypass active streamflow to major bridge repairs or replacement activities. The probability of such construction is uncertain but reasonably foreseeable over the life of the project. Emergency response during high-flow events could be required because the existing bridges are undersized and are vulnerable to high flows and/or debris that could be entrained in high flows.

If a bridge or infrastructure failure occurs during high flows, emergency response activities could be needed without extensive planning but would be expected to incorporate temporary BMPs. BMPs implemented during high-flow events would be less effective than BMPs planned and implemented to address potential water quality risks during a normal low-flow construction season. Possible construction activities under Alternative 1 could include planned summer season construction follow-up to damaging high flows or emergency response during high-flow events. Temporary BMPs for planned summer season follow-up repairs would be designed, sized, and implemented with planning and regulatory oversight and would be expected to be effective at preventing temporary water quality degradation, particularly because the efforts would be localized sites by bridges or infrastructure. It is possible that temporary BMPs for emergency response during high-flow events would not be effective at preventing short-term turbidity violations. In a flood flow situation, the background turbidity would be elevated, but the ability to isolate even a small work area for the repair work could be limited by high flows.

Therefore, disturbance from construction could elevate turbidity in the active flow of the channel more than 10 percent above background, at least briefly.

This risk of an adverse condition would be the same as under existing conditions, where current practice is to repair or protect infrastructure as needed, so the risk of a violation of the turbidity standard or other water quality standard is the same currently as it would be with implementation of Alternative 1. Historic data documenting whether short-term violations of water quality standards resulted during past emergency response efforts to stabilize the streambed or streambanks is not available. However, State Parks uses current BMP practices to protect water quality during any construction implementation within the study area. Given the strictness of the standards and the conditions present during such response/repair efforts, it is likely that short-term violations of water quality standards have occurred under the existing baseline conditions howver, likely to a limited magnitude a duration that would not affect beneficial uses. The potential effects under Alternative 1 would be similar to and no worse than the historic adverse condition. To be deemed a significant environmental impact, a "substantial or potentially substantial adverse change" must result from the alternative (see State CEQA Guidelines Section 15382, definition of a significant effect on the environment). Because no change from existing conditions would occur, the continuation of the existing risk of an adverse condition would not be considered a significant impact for this analysis. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.4-7 (Alt.1) Short-Term Risk of Surface Water or Groundwater Degradation Following Construction. *Implementing Alternative 1 would not require major or prolonged construction activities, it would not require a period of channel adjustments following construction to meet final design, and any construction would be stable at the time of installation. Therefore, implementing Alternative 1 would not make any changes to the existing condition that could increase short-term risk of water quality degradation following construction. This impact would be* ***less than significant****.*

Implementing Alternative 1 would not require any planned construction, although it is possible that flood damage to existing undersized bridges, public infrastructure, or stream stabilization features that protect infrastructure may need emergency or follow-up repairs, as under existing conditions (see Impact 3.4-6). If such activities are required to protect infrastructure and/or repair or replace bridges, their areal extent would be localized, and it is likely that the repair measures would feature hard engineering features designed to meet final dimensions and resistance at the time of installation and to remain stable (in order to protect infrastructure). A possible risk of short-term water quality degradation within the first few years after construction could arise from two potential mechanisms:

- expected natural channel adjustments in accordance with repair design and/or
- a large flood event (e.g., 25-year recurrence or greater) in the first few years (approximately 5) after construction.

A natural channel adjustment effect or large flood effect would not be expected under Alternative 1 because methods that achieve immediate stability likely would be used at the time of construction. It is unlikely that post construction geomorphic adjustments would be required to meet final design, and the treatments would cover the entire potential erosion source area. Implementing Alternative 1 would not create a mechanism to increase short-term risk of water quality following construction. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-8 (Alt.1) Risks of Surface Water and Groundwater Contamination from Golf Course Operations. *Alternative 1 would not involve modifying the footprint area, configuration, or landscaping management of the existing golf course. Risks of surface water and groundwater contamination would remain similar to those under existing conditions, and operations would continue to be subject to water quality protection regulations, with monitoring, reporting, and response requirements under direct oversight of the Lahontan RWQCB. This impact would be* ***less than significant****.*

Alternative 1 would not involve modifying the physical layout or management practices of the existing landscaped golf course. The managed golf course landscaping would still occupy 123 acres of SEZ and be adjacent to the Upper Truckee River, Angora Creek, and the unnamed creek without any substantial buffer (i.e., minimally managed or natural landscape) for much of the study area. Paved golf course paths and poor drainage in several portions of the course (e.g., holes 1, 3, 5, 8, 9, 10, 11, and 13) would continue to provide routes for potential contaminants to accumulate and enter the surface water and groundwater system. Potential discharges from operations, including use of chemicals and activities posing erosion risk, would continue to be regulated by the Lahontan RWQCB (presently under Board Order No. 6-00-48). Although risks from accidental spills or normal operations would still occur, they would be of similar magnitude and potential frequency as under existing conditions. Past monitoring and reporting indicate that substantial, long-duration, or repeated water quality violations have not occurred during historic golf course operations. Alternative 1 would not involve modifying the existing adverse risk posed by the golf course layout and operations. This impact would be less than significant.

No mitigation is required.

### Alternative 2: River Ecosystem Restoration with Reconfigured 18-Hole Regulation Golf Course

IMPACT 3.4-1 (Alt.2) Stream Channel Erosion within the Study Area. *Alternative 2 would involve making direct changes to the channel of the Upper Truckee River and the mouths of Angora Creek and the unnamed creek. The changes would offset past geomorphic response to historic disturbances and the undersized bridges within the study area by lengthening the channel, reactivating and constructing more appropriately sized channel sections, improving floodplain connectivity, and removing bridges. These modifications would prompt improved stream function and reduce overall erosion of the streambed and banks. This would be a substantial long-term benefit overall, but localized erosion could increase at the bridge removal sites, downstream of the treated reaches, and/or in the two tributary creeks. This localized risk of increased erosion would be* ***potentially significant****.*

Alternative 2 would involve modifying the existing impervious surfaces by changing the location and total area of impervious surfaces but would include drainage improvements, wider buffers distances to the river, and mitigation measures to limit potential increases in runoff volumes or peak flows. (See Impacts 3.3-1 [Alt. 2] and 3.3-2 [Alt. 2] in Section 3.3, "Hydrology and Flooding.") Therefore, implementing Alternative 2 would not directly increase driving forces causing stream channel erosion.

Alternative 2 would involve replacing and/or repairing existing streambank stabilization treatments in locations of the existing channel that will remain part of the active main channel. Existing streambed knickpoints would be addressed by lengthening the channel (reducing slope), placing hard grade controls (anchored high-gradient riffles) at the upstream and downstream project boundaries, and installing armored riffles at intervals within the reach to maintain the proposed streambed elevation.

Compilation of the TMDL streambank erosion results (California Water Boards and NDEP 2007:211–215) for specific subreaches of the Upper Truckee River allows a quantitative estimate of the effect of the proposed alternatives on stream channel erosion. Although the specific measures proposed under Alternative 2 were not modeled for the TMDL, they can be represented by using the "restoration" and "mixed treatment" tiers results for the treatment subreaches within the study area. The estimated fine sediment loads from streambank erosion in the study area would be793 cubic yards, which represents a 35.4-percent reduction for the study area and a 10.8-

percent reduction for the entire river relative to the No Project/No Action Alternative (Table 3.4-11). This estimate would represent the long-term fully functional condition after geomorphic adjustments to the construction activities, which would be a substantial beneficial effect relative to existing conditions and Alternative 1, the No Project/No Action Alternative.

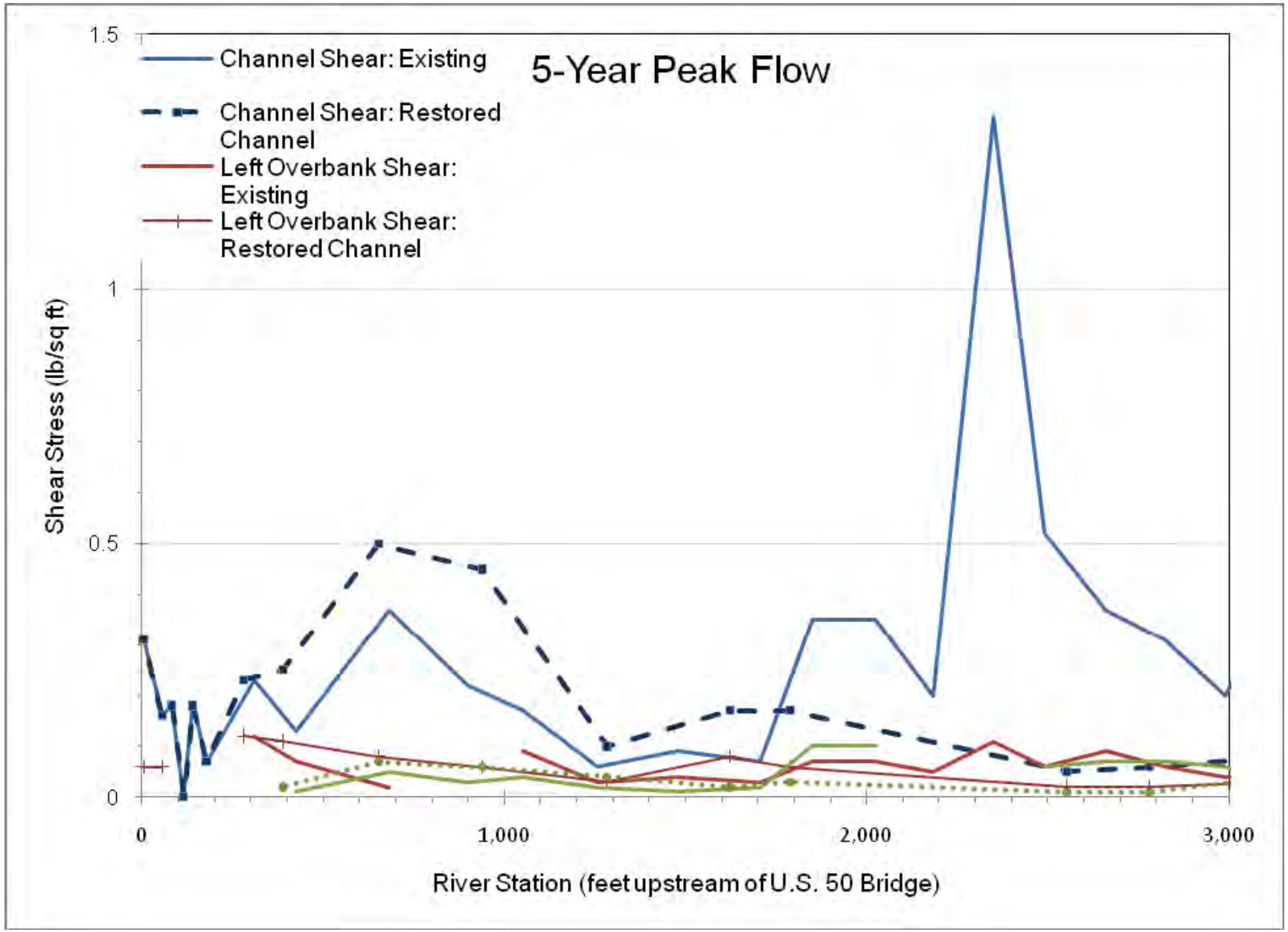
**Table 3.4-11**
**Estimated Stream Channel Bank Erosion of Fine Sediment on the Upper Truckee River under Alternatives 2, 3, and 5**

| River Reach | Distance Upstream of Lake (feet) | Bank Erosion of Fine Sediment[1] | |
|---|---|---|---|
| | | Alternative 1 (No Project/No Action) (cubic yards) | Alternatives 2, 3, 5 (cubic yards) |
| Downstream reaches | 0–40,000 | 2,451 | 2,451 |
| Study area reach | 40,000–48,458 | 1,228 | 793 |
| Upstream reaches | 48,458–79,364 | 641 | 2,451 |
| **Total** | **79,364** | **4,320** | **3,885** |

Note:
[1] Fine sediment is less than 0.063 millimeter in diameter.
Source: California Water Boards and NDEP 2007 (compiled for these subreaches in Appendix F)

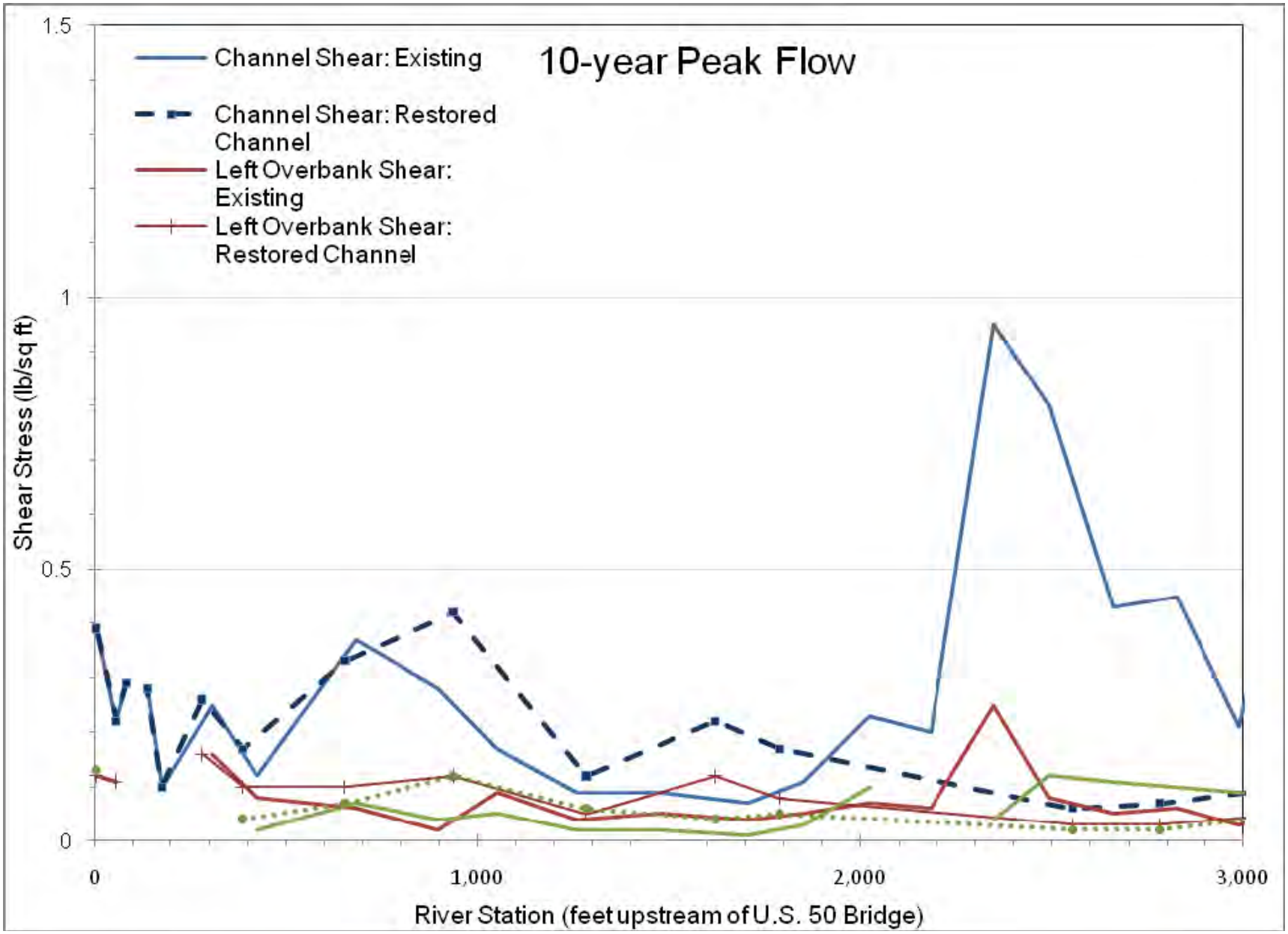
Under Alternative 2, the streambed elevation and water surface elevations would be raised over the full range of streamflow events (e.g., 5-year, 10-year) (see Exhibit 3.3-13 in the Section 3.3, "Hydrology and Flooding") within the treated reaches (RS 1400 to RS 8800), creating improved overbank connections with the surrounding land surface throughout the treated reaches. However, downstream of the proposed treatments, the water surface would have a steepened transition back to the existing untreated areas downstream of RS 1400. The hydraulic modeling results confirm qualitative assumptions that the U.S. 50 bridge effectively controls the water surfaces and velocities at the downstream study area boundary because the existing and proposed shear stress would not change at the bridge itself. However, hydraulic modeling results (SH&G 2004b) suggest that shear stress within the channel and on the left and right overbank areas could increase relative to existing conditions in the reach downstream of RS 2000 (Exhibits 3.4-11A, 3.4-11B, and 3.4-11C). The relative change and absolute magnitude of the average shear stress increases are not large but may have a geomorphic effect. Mobilization of larger gravels in the streambed could be increased for the 5- and 10-year flows, particularly between RS 700 and RS 1200. A minor increase in the risk of erosion to poorly vegetated or bare soils in the overbank area could result in a few areas.

Because the hydraulic modeling was performed for the conceptual design, the potential effect of the eventual design could be less than the estimates presented here, but the possible impact mechanism of a raised upstream water surface would exist and would need to be considered. An additional related impact mechanism would be an increase in return flow depths and/or velocities as floodplain runoff reenters the reincorporated incised existing channel across high streambanks, potentially causing a localized increased risk of erosion. The potential area of these erosion risks are small relative to the thousands of feet of project-related benefits of reduced erosion throughout the treated subreaches under Alternative 2 (as revealed by the reduced fine sediment load estimates for the entire study area presented in Table 3.4-11, above); however, a locally adverse effect may occur within the study area. Therefore, it is possible that localized erosion could be worsened relative to existing conditions and the No Project/No Action Alternative.



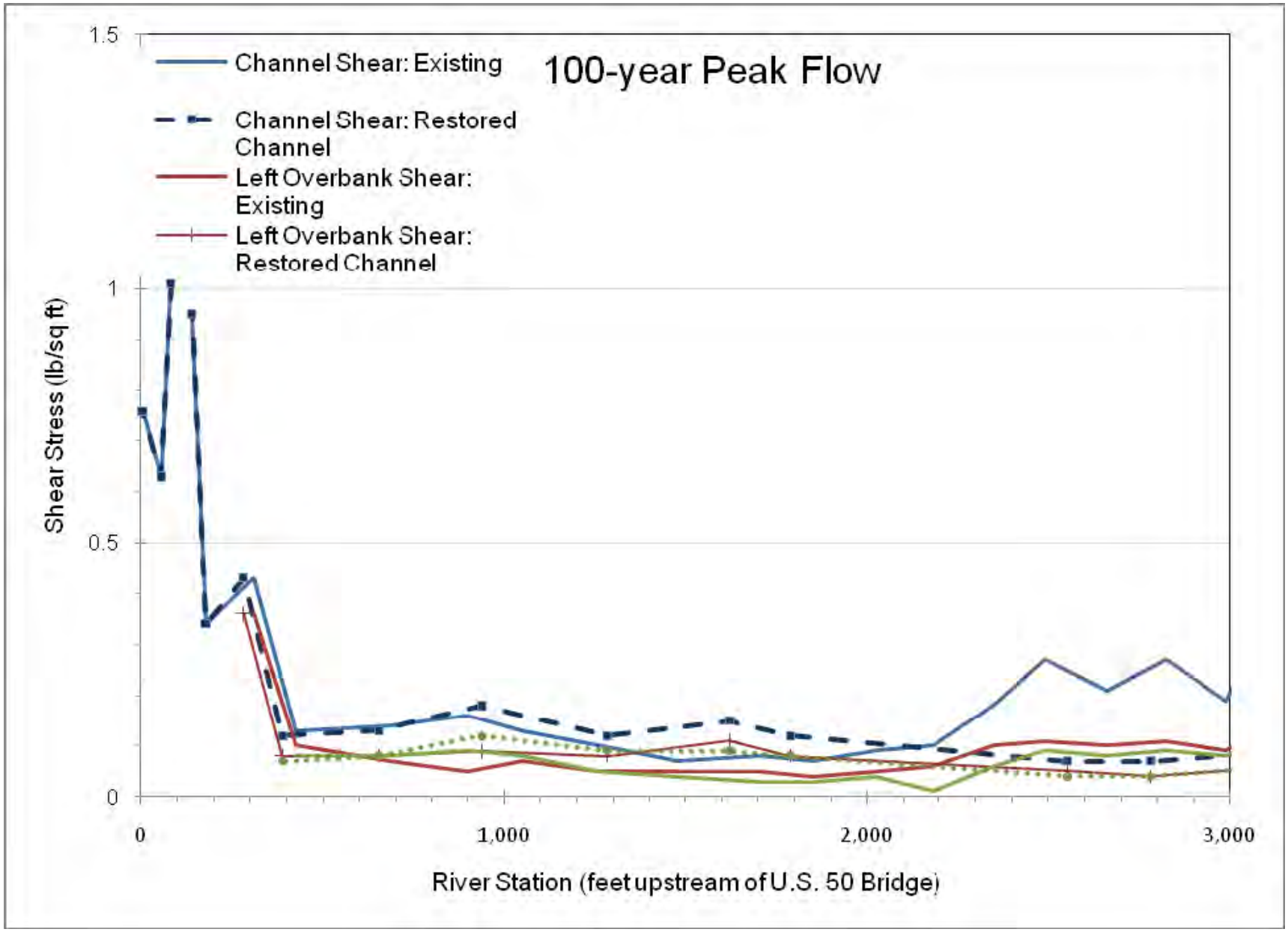

Source: HEC-RAS model output by SH&G, October 2004

**Estimated Shear Stress at Downstream End of Study Area: 5-Year Peak Flow** **Exhibit 3.4-11A**




Source: HEC-RAS model output by SH&G, October 2004

**Estimated Shear Stress at Downstream End of Study Area: 10-Year Peak Flow** **Exhibit 3.4-11B**




Source: HEC-RAS model output by SH&G, October 2004

**Estimated Shear Stress at Downstream End of Study Area: 100-Year Peak Flow** **Exhibit 3.4-11C**

Under Alternative 2, the mouths of Angora Creek and the unnamed creek would be relocated to meet the modified alignment of the Upper Truckee River, and the bed elevation of the confluence would be raised to match the proposed streambed elevation of the river. These changes could shorten the creeks and may result in steepening of their lower reaches, depending on the final bed elevation at their mouths. If steepening results, shear stress within the two creeks could increase and result in channel erosion and/or initiate headcutting that might propagate upstream. Erosion within the lower reach of Angora Creek could destabilize or damage the existing sewer pipelines and potentially risk release of contaminated water into the creek and the Upper Truckee River. Alternative 2 includes streambed and streambank protection measures in the modified lower reaches of each creek, although specific design and performance standards have not been determined as part of conceptual design. Therefore, it is possible that localized erosion could be worsened relative to existing conditions and Alternative 1, the No Project/No Action Alternative.

Alternative 2 would involve replacing all the existing golf course bridges with a single, longer span bridge between RS 6600 and RS 6900 (Subreach 3A). The new bridge would span the channel and active floodplain and would not require placing piers in the channel bed; therefore, it is not expected to constrict flows or increase flow velocity in the vicinity. In addition, local streambed and streambank protection measures would be installed at the new bridge. The existing streambed scour and streambank erosion at each of the existing undersized bridges, especially the bridges upstream of holes 6 and 7 (approximately RS 8200 and RS 7575), would be eliminated. Removal of the five undersized bridges would eliminate the existing high-flow constrictions and modify local hydraulics. Removal of bridges would slow the velocity at and just downstream of each bridge crossing and speed up velocities just upstream of each crossing relative to existing conditions. This change in local hydraulics could, if not addressed by sufficient bed and bank stabilization measures, result in increased shear forces sufficient to increase bed and bank erosion upstream of each former bridge location. Alternative 2 includes implementation of streambed and streambank protection measures in the vicinity of each removed bridge, but the performance standards for those measures have not been specified. Therefore, it is possible that localized erosion could be worsened relative to existing conditions and the No Project/No Action Alternative.

Although the overall long-term channel erosion effects for the treated reaches of the Upper Truckee River under Alternative 2 would be beneficial compared to existing conditions and the No Project/No Action Alternative, some portions of the study area could experience increased channel erosion. This localized impact would be potentially significant.

Mitigation Measure 3.4-1A (Alt. 2): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

Final design will include specific streambed stabilization and streambank protection measures at each proposed bridge removal site (and the upstream and downstream directions) that will minimize future erosion under the modified hydraulic conditions, as verified by quantitative modeling that demonstrates stability up to the 20-year peak event. The measures may include grading to modify the channel dimensions (e.g., eliminate existing large scour pool) and the shape of the channel bed and banks, along with installation of rock and/or biologic materials.

Mitigation Measure 3.4-1B (Alt. 2): Ensure Bed and Bank Stability Downstream of the Treated Reaches.

Final plans will include design features or specific streambed stabilization and streambank protection measures in the transition zone downstream of the treated reaches (approximately RS 150 to RS 1400), if detailed hydraulic modeling of the 5-year, 10-year, and 100-year peak flows indicates that shear stress changes would increase streambed mobility/erosion, streambank erosion, or overbank erosion in the floodplain.

Mitigation Measure 3.4-1C (Alt. 2): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

Final design will include specific streambed stabilization and streambank protection measures in the lower reaches of Angora Creek and the unnamed creek, based on detailed hydraulic modeling of the proposed

reconfiguration of their alignments and slopes, to protect against increased erosion up to the 20-year peak event or to a higher design standard as needed to protect the sewer pipeline crossings.

Implementation of these mitigation measures would reduce impacts associated with potential increases in localized channel erosion to a less-than-significant level because bed and bank stabilization measures would be installed immediately upstream and downstream of the bridge removal sites, downstream of the treated reaches, and in the lower reaches of the two tributary creeks.

IMPACT 3.4-2 (Alt.2) Risk of Channel Erosion Damage to Sewer Pipelines. *Implementing Alternative 2 would improve existing protective cover over sewer pipelines crossing the Upper Truckee River, but the new alignment would place the channel within 25 feet of the buried pipeline in two locations. Natural geomorphic adjustments following construction may pose a risk of damage to these portions of the sewer pipelines, as well as the two Angora Creek crossings, potentially releasing untreated wastewater to the river and creek that would eventually reach Lake Tahoe. This impact would be* ***potentially significant****.*

The existing sewer pipeline crossing under the Upper Truckee River at RS 1400 is an inverted siphon that has approximately 1 foot of cover, the upstream crossing at RS 8800 is an exposed concrete encasement, and the depth of the crossing along Angora Creek is currently not known, however is not exposed and is protected by sheetpile. All of these crossings are inspected by STPUD twice per year (Adams, pers. comm., 2009). Alternative 2 would involve installing hard grade control (anchored high-gradient riffle) that increases the thickness and resistance of the channel bed over these crossings and for some distances upstream and downstream, diminishing the risk of damaging effects during a major flood flow. This would be a beneficial effect relative to existing conditions and the No Project/No Action Alternative.

Under the proposed new channel alignment, the active channel would be located further away from a vulnerable section of pipeline near the existing bank between RS 6500 and RS 5900 but would be located near different sections of buried pipeline in two other locations. A couple hundred feet of the existing sewer pipeline would be parallel to and within 25 feet of the new streambank in each of two proposed reconnected meanders, upstream of existing RS 4100 and downstream of existing RS 7900. Normal channel dynamics following construction, particularly any channel widening in the future, may undermine and/or expose these sections of the sewer pipeline and increase the risk of damaging effects during a major flood flow. Under Alternative 2, bank stabilization measures, including potentially using buried sheetpile or launchable rip-rap between the pipeline and the river, relocating pipeline sections, adjusting other proposed streambank stabilization methods, and/or adjusting the location of the reconnected channel to increase the distance from the existing pipeline, would be implemented where needed, as long as the measures would be effective at preventing lateral channel migration (bank erosion) from reaching and/or undermining the existing buried pipeline. However, flood event design standards have not been established. If the sewer pipeline is damaged during a major flood, untreated wastewater could be released into the river and potentially reach Lake Tahoe.

Changes at the mouth of Angora Creek could potentially modify the channel slope and erosive forces in the vicinity of two existing sewer crossings, particularly if streambed and streambank treatments within lower Angora Creek are not designed specifically to prevent potential headcutting that could erode the bed upstream and destabilize or threaten the existing pipelines.

Proposed construction activities related to golf course and floodplain modifications, including grading and excavation, could potentially damage the sewer lines that run through several areas within the project site. In addition, to effectively reach final grade, some of these lines could require relocation for project implementation. If the sewer pipeline were damaged or a spill were to occur during grading or relocation, untreated wastewater could be released into the river and potentially reach Lake Tahoe.

Under Alternative 2, the risk of damage to the sewer pipelines would be reduced along the river relative to the existing conditions and No Project/No Action Alternative for some locations, but increased in other portions of

the study area. Furthermore, grading activities could potentially cause damage to pipelines, or a spill could occur. This impact would be potentially significant.

Mitigation Measure 3.4-2A (Alt. 2): Protect Vulnerable Portions of the Sewer Pipeline up to the 100-Year Flood Event.

In coordination with STPUD, State Parks will design and install protection measures for the buried sewer pipeline north and west of the proposed reconnected meanders on the Upper Truckee River upstream of existing RS 4100 and downstream of RS 7900 or work with STPUD to relocate the vulnerable section of pipeline. Final design will prevent channel adjustments up to the 100-year peak event in areas potentially at risk of exposing/undermining sewer pipelines. Final design schematics will be reviewed and approved by the Engineering Department of STPUD.

Mitigation Measure 3.4-2B (Alt. 2): Verify Utility Locations, Coordinate with Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

This mitigation measure is similar to Mitigation Measure 3.13-2A. Before final design schematics are prepared, State Parks or its primary representative will consult with STPUD to determine the exact location of underground facilities in the project area, including the public right-of-way, and design the final grading plans to avoid existing utilities where possible. If these utilities cannot be avoided, State Parks will coordinate with STPUD to determine the best possible course of action to minimize potential disturbance.

Before the start of construction, utility locations will be verified through field surveys and the use of the Underground Service Alert services. Any buried utility lines will be clearly marked in the area of construction on the construction specifications in advance of any earthmoving activities. Before construction begins, State Parks will provide advance notification of any needed disturbance to area businesses and residents. STPUD consultation should continue during construction to ensure that facilities are avoided and protected and that service disruptions are minimized as construction proceeds.

Before the start of construction, a response plan will be prepared to address potential accidental damage to a utility line. The plan will identify chain-of-command rules for notifying authorities and appropriate actions and responsibilities to ensure the safety of the public and workers. Worker education training in response to such situations will be conducted by the contractor. The response plan will be implemented by State Parks and its contractors during construction activities.

Mitigation Measure 3.4-2C: Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.4-1C.

With implementation of Mitigation Measures 3.4-2A (Alt. 2) through 3.4-2C (Alt. 2) as described above, Impact 3.4-2 (Alt. 2), the potential increased risk of sewer pipeline damage and water quality degradation, would be less than significant because vulnerable portions of the sewer pipeline would be protected up to the 100-year flood event; utility locations would be verified, utility providers would be consulted, a response plan would be prepared and implemented, and worker training with respect to accidental utility damage would be conducted; and bed and bank stability in the lower reaches of the two tributary creeks would be ensured.

IMPACT 3.4-3 (Alt.2) Long-Term Surface/Soil Erosion within the Study Area. *Alternative 2 would involve modifying the topography, soils, vegetation, and drainage to offset the existing erosion caused by prior surface disturbances within Washoe Meadows SP to restore natural conditions and would involve incorporating other areas of existing erosion into the reconfigured golf course, along with appropriate landscaping and/or permanent BMPs. This treatment of prior disturbed sites would be beneficial relative to existing conditions and the No Project/No Action Alternative. This effect would be* **beneficial***.*

Alternative 2 would modify the existing disturbed former quarry and some of the unpaved access roads, informal trails, or other disturbed surfaces that have accelerated soil erosion within Washoe Meadows SP portion of the study area. As part of its normal administrative responsibilities (separate from this project), State Parks would prepare interim management guidelines for Washoe Meadows SP, with the revised boundaries, which would provide additional guidance for protection of resources and management of permissible uses for that unit. The management plan would likely include small parking areas, signage, and some trail improvements on higher capability land; however, additional development in the remaining park area would not occur because most of the park is within sensitive, low-capability lands. State Parks may choose to prepare a general plan for Washoe Meadows SP in the future, if development of new facilities were contemplated; however, this would be a separate action subject to its own environmental review under CEQA.

Under Alternative 2, the natural drainages would be considered and incorporated within planned stormwater drainage improvements for the reconfigured golf course, and areas of prior disturbance and soil erosion that would be within the proposed golf course footprint would be revegetated. Therefore, implementing Alternative 2 would have a beneficial effect by restoring some areas that are actively eroding under the existing conditions (See Impact 3.6-1 (Alt. 2) in Section 3.6, "Earth Resources". This effect would be beneficial.

For a discussion of potentially significant short-term risks of surface/soil erosion within the study area and proposed mitigation measures, see Impact 3.6-1 (Alt. 2) in Section 3.6, "Earth Resources").

No mitigation is required.

IMPACT 3.4-4 (Alt.2) Fine Sediment and Nutrient Retention within the Study Area. *Implementing Alternative 2 would directly reduce the channel capacity and raise the streambed elevation in several subreaches to increase the frequency and duration of overbanking, enlarge the area of functional active floodplain, and offset past natural geomorphic adjustments to historic disturbances. Implementing Alternative 2 would result in a substantial beneficial improvement in fine sediment and nutrient retention in the study area relative to the existing degraded condition. This effect would be* ***beneficial****.*

Under Alternative 2, the channel length would be increased by 1,590 feet by reconnecting historic meanders and constructing new channel sections. The channel bed profile would be raised 2–4 feet, and the streambank heights would be lowered to reduce channel capacity closer to 500 - 550 cfs along 4,190 feet. The channel dimensions (width, depth, cross-section area) in reconnected and constructed sections would be reduced through both constructed modifications and process-based changes over time to arrive at a channel capacity closer to 550 cfs. These changes would increase the frequency and duration of overbank flows and enlarge the area inundated by small to moderate flood events (i.e., 2-year to 5-year events). The active floodplain in the study area would be increased from 36 acres to 57 acres, an increase of 21 acres, by reactivating portions of the surrounding former floodplain (now a terrace). The enlarged active floodplain (see Exhibit 3.3-15) would increase opportunities for shallow inundation that slows water, deposits sediment, and recharges soil moisture across the floodplain to support dense vegetation that physically traps sediment and biologically takes up nutrients. Sections of the 5,000 feet of modified existing channel would have a raised bed elevation at grade control locations and would be expected to undergo sediment deposition that raises the bed elevation between the grade control sections over time, with backwater and raised water surfaces between riffles. Therefore, overbanking frequency could also eventually improve in these areas. The 4,240 feet of unmodified existing channel (upstream and downstream of all proposed actions) would remain inset between high banks and would not experience increased overbanking to the surrounding terrace.

Under Alternative 2, fine sediment and nutrient retention in the study area would be substantially improved relative to the existing degraded condition and would result in a beneficial reduction of these pollutants released downstream to the Upper Truckee River or transported to Lake Tahoe. This effect would be beneficial.

No mitigation is required.

IMPACT 3.4-5 (Alt.2) Modifications in Upper Truckee River Coarse Sediment Transport and Delivery Downstream. *Alternative 2 would involve making major modifications to the channel bed profile, bank and bed materials, and hydraulic conditions controlling bedload (i.e., sands and gravel) transport within the study area and into the downstream reaches of the Upper Truckee River. Naturally declining, post-disturbance watershed coarse sediment yield would continue and, potentially, would be worsened, particularly during the initial channel adjustment phase, with possible adverse effects on downstream channel erosion and beach erosion adjacent to the river mouth (e.g., Cove East and Barton Beach). In the long term, climate change effects could either exacerbate or counteract present trends. Over the long term, the potential effects could range from worse than the existing degraded condition to a possible improvement, depending on climate influences. Any determination regarding climate change effects on coarse sediment transport and delivery downstream would be too speculative for a meaningful conclusion. Over the short term, implementing Alternative 2 would modify coarse sediment transport and deposition within various portions of the study area and likely decrease coarse sediment delivery to downstream reaches. This short-term impact would be potentially significant.*

Alternative 2 would involve making major changes to the streambed profile throughout the treatment reach (RS 1400 to RS 8800). The streambed profile would be modified by activating reconnected and newly constructed meander segments at higher bed elevations, installing a series of armored riffles in the existing channel segments that would remain part of the proposed alignment, and constructing anchored high-gradient riffles at the upstream and downstream ends of the project. These features would raise several segments of the existing streambed profile by up to 1 to 3 feet near the boulder steps and anchored high gradient riffles and by as much as 3 to 5 feet in other areas, and they would leave the unmodified sections of streambed at existing elevations in other locations (see Exhibit 2-6).

The pattern of proposed streambed treatments would create several relatively abrupt changes in bed elevation at the time of construction. The design approach constructs a series of on-grade armored riffles to define the long profile between reconnected sections and anticipates and expects that natural geomorphic processes would make adjustments within the treatment reaches to redistribute bed materials and refine channel dimensions and shape over time. The proposed upstream and downstream anchored high-gradient riffles would be designed to provide key long-term controls on the eventual stream profile for the entire 9,190-foot proposed channel, supported by a series of armored riffles.

Based on the conceptual design, there would be approximately five transitions from existing channel sections downstream to reconnected or newly constructed channel sections at higher bed elevation. These transitions would experience hydraulic constriction as flows move from the enlarged existing channel into the smaller, higher, geomorphically sized channel. Each of these hydraulic constrictions could experience a range of local erosion and sedimentation effects that have not been quantified at the conceptual design level, depending on the resistance of the bed and banks, the size and volume of bed material, and the water surface elevations and slopes. Net sedimentation, particularly of coarse sediment, may occur upstream of these constrictions, but local flow acceleration and/or scour within the smaller reconnected or constructed channels would also be possible.

There would be five separate sections of existing channel between reconnected and constructed meander sections, and it is possible that hydraulic conditions, sediment transport capacity, and sediment supply to each of these sections would vary, at least for several years until the channel profile adjustments have been completed and bedload is more readily conveyed downstream through each channel section over a range of streamflows. Until such time, net coarse sediment deposition would occur within portions of the study area and reduce coarse sediment discharged downstream.

Implementing Alternative 2 would reduce but not halt long-term streambank sources of coarse sediment in the treated reaches because bank heights would be lowered and biotechnical streambank protection would be emphasized in the reconnected and constructed channel segments. Long-term coarse sediment supply generated by channel erosion may be reduced relative to existing conditions and the No Project/No Action Alternative.

The channel bed elevation irregularities may prompt hydraulic conditions and geomorphic responses that substantially impair transport of coarse sediment from upstream sources through the project reach for an undetermined period of years until the river makes natural adjustments via erosion and sedimentation to smooth out the bed profile within the treatment reaches. It is possible that such interim reductions of bedload transport within portions of the study area or bedload discharge to downstream reaches could increase stream channel erosion downstream if sufficient coarse sediment supply is not locally available in those reaches. Channel erosion prompted by the reduced coarse sediment supply could result in water quality degradation within and/or downstream of the study area. This short-term impact would be potentially significant.

Over the long-term, delivery of coarse sediment to downstream reaches and eventually to the beaches by the river mouth could be diminished proportional to the reduction of coarse sediment sources from eroding streambanks in the study area. However, as under the No Project/No Action Alternative, there are potentially offsetting factors that may result over the long-term from climate change. The net effect on downstream river dynamics and beach erosion is highly uncertain and could be either worse or better than current conditions, depending on climate influences. Even after thorough investigation, any determination regarding climate change effects on coarse sediment transport and delivery downstream would be speculative. This long-term impact would be less than significant.

### Mitigation Measure 3.4-5 (Alt. 2): Monitor and Supplement Coarse Sediment Delivery Downstream

During the period of channel adjustments following construction and until the streambed profile attains a relatively continuous slope, where bedload deposition within the study area has adjusted and coarse sediment supply net input approximately equals net output from the study area, State Parks will monitor coarse sediment supply entering the study area, deposition within the treated reaches, and discharge to downstream reaches (i.e., at the U.S. 50 crossing) at least once a year (make observations of net deposition or scour during low water conditions). If substantial areas and volume of coarse sediment deposition is occurring within the study area and/or coarse sediment discharge to downstream reaches is substantially less than sediment input from upstream sources, State Parks will conclude that a project-related effect on coarse sediment delivery may be occurring. Coordinated adaptive management, administered by the Upper Truckee Watershed Advisory Group (UTRWAG) will review and evaluate monitoring data and project conditions and recommend next steps, including continuation or revision of monitoring, corrective actions or interventions, or documentation. If the UTRWAG determines there is a significant worsening coarse sediment impact, State Parks, in coordination with land managers of the downstream river reaches (i.e., Conservancy, USFS, City of South Lake Tahoe), will assess whether any adverse channel erosion and water quality effects might result and will recommend a plan to monitor or take corrective action, which may include introduction of supplemental coarse sediment (e.g., gravel,) using washed, sorted materials and methods that minimize temporary risks to water quality, biologic resources, and recreation uses. The quantity and size classes of any required supplemental coarse sediment introduced downstream would be determined annually in coordination with the land managers downstream along the river.

With implementation of Mitigation Measure 3.4-5 (Alt. 2), Impact 3.4-5 (Alt. 2), the potential downstream adverse geomorphic effects and water quality consequences of short-term interruption of coarse sediment delivery, would be less than significant, because the gravel would be supplemented, as necessary.

IMPACT 3.4-6 (Alt.2) **Short-Term Risk of Surface Water or Groundwater Degradation during Construction.** *Implementing Alternative 2 would require construction activities along or in the channel of the Upper Truckee River and sections of Angora Creek and the unnamed creek. Although temporary BMPs would be implemented, short-term risks of water quality degradation during construction could occur during each summer construction season or the intervening winters. Implementing Alternative 2 could result in short-term violations to the Basin Plan water quality standards, including turbidity due to construction implementation. This short-term impact would be* ***potentially significant****.*

Implementing Alternative 2 would require 3–4 years of seasonal construction (between May 1 and October 15), with winter closedowns, except for BMP maintenance and monitoring. Construction would disturb areas in

uplands (west of the river), as well as in the active floodplain and the main channels of the Upper Truckee River, Angora Creek, and the unnamed creek. The extent of "in-channel" (i.e., channel that normally carries flows year-round) work varies by year (see Alternative 2 construction schedule section in Table 2-4). Bridge removals, the new bridge installation, grade controls, bank protection measures, and transition connections between channel segments would require work in the active channel. The reconnected meanders and new constructed meanders, as well as portions of the floodplain reconstruction, existing golf course reconfiguration, and new golf course construction, would be completed "off-channel" (outside of the active channel). Nearly all of the disturbance areas, access routes, and staging areas (except the driving range) proposed north and/or east of the Upper Truckee River would be within the 100-year floodplain. Most of the disturbance areas, access routes, and staging locations proposed west of the Upper Truckee River would be outside the 100-year floodplain (see Exhibit 2-7).

Permits and approvals from several entities (e.g., El Dorado County, TRPA, Lahontan RWQCB, USACE, and California Department of Fish and Game) that would impose conditions and requirements to minimize construction phase risks of water quality degradation by sediment or other pollutants will be required for the project. Although the general types of permit documents and their components are known (e.g., SWPPP, Dewatering Plan/BMP Plan), the specific measures, performance standards, and enforcement elements would not be established until the time of acquisition. Several general construction management measures would be implemented to minimize environmental impacts, along with specific measures to protect water quality (see Chapter 2, "Project Alternatives"). Exact erosion control measures (BMPs) and their performance standards are not specified at this time, but general BMPs would include use of construction fencing, silt fences, hay bales, temporary settling basins, vegetation protection, hydroseeding, and straw mulch. Construction activities that would occur within the existing streambed or streambanks would require temporary dewatering of surface water in the river channel, and where subsurface access is needed, temporary dewatering/pumping of groundwater that seeps into the work area may also be required. Conceptual approaches to dewatering have been identified for various elements of Alternative 2 in-channel work, but specific measures have not yet been determined. Efforts would be made to work as quickly as possible to move from initial disturbance through final revegetation throughout the study area, but it is expected that disturbed areas would be exposed to winter conditions between summer construction seasons. Winterization protection could be needed throughout the construction zone, and possible overwinter use of staging, storage, or access is likely.

All temporary stormwater controls and/or overwinter flood flow protections would likely be designed and sized to meet typical regulatory requirements (e.g., 20-year rainstorm for stormwater, 50-year peak streamflow) but could be overwhelmed by a larger event if it occurred during the construction period. However, the probability of an event of greater magnitude occurring during either the summer low-flow seasons or the intervening winters is low and would not be reasonably foreseeable.

Based on the conceptual information regarding proposed construction management for Alternative 2, it remains possible that violations of water quality standard could occur, at least for short periods during each summer's activities and/or over each intervening winter and snowmelt season. The effects could produce a violation of Section 5.2 of the Basin Plan, despite efforts to minimize risks. State Parks would request an exemption for the potential construction-related violation(s) of water quality standards from the Lahontan RWQCB as part of CWA compliance. However, for purposes of this analysis, any violation of any duration and magnitude would be potentially significant. The surface water and/or groundwater degradation caused could potentially be of a magnitude and duration that would impair beneficial uses of the Upper Truckee River, including visible turbidity that impairs aesthetic values or other potential effects on other beneficial uses. Impairment of beneficial uses would be expected to require considerably higher turbidity levels, orders of magnitude above the very low background for the river. Regardless, the significance conclusion for this environmental document is based on the potential to violate the turbidity standard; therefore, the impact is considered potentially significant.

Mitigation Measure 3.4-6 (Alt. 2): Prepare and Implement Effective Site Management Plans.

State Parks will be required to develop and implement several construction phase site management plans as part of various permit and approval requirements, including but not limited to, grading and erosion control plan, Storm

Water Pollution Prevention Plan (SWPPP), spill prevention plan, dewatering and channel seasoning plan, winterization plan, and monitoring and oversight plan. The following measures will be implemented by State Parks within each of these plans to be developed for specific permits or as independent mitigation measures:

- Restrict the area and duration of construction disturbance to the absolute minimum necessary to accomplish the work.
- Design, install, and maintain temporary BMPs to protect disturbed areas and minimize soil erosion, prevent surface runoff interaction with disturbed surfaces, and limit the potential for release of sediment, nutrients, or otherwise contaminated water into surface water bodies or groundwater recharge areas for storm events up to the 20-year precipitation event.
- Design, install, and maintain internally draining construction area(s) on both sides of the Upper Truckee River, Angora Creek, and the unnamed creek within the study area to prevent discharge of untreated stormwater to these surface water bodies. Anticipate runon from upslope groundwater seeps west of the Upper Truckee River, and reroute it around the construction zone.
- Establish specific locations for construction vehicle/equipment refueling, maintenance, and storage that are lined and/or bermed to prevent release of any potential spills into surface water or groundwater.
- Provide winterization that isolates and protects disturbed areas from high streamflow on the Upper Truckee River and Angora Creek (up to the 50-year event).
- Protect stockpiled and transported materials or debris from wind or water erosion.
- Avoid overwinter storage of materials, vehicles, equipment, or debris within the 100-year floodplain.
- Provide site-specific and reachwide dewatering/bypassing plans that indicate the scheduling approach and or maximum diverted flows to minimize risks from summer thunderstorms, specific diversion/bypass/ dewatering methods and equipment, defined work areas and diversion locations, the types and locations of temporary BMPs for the diversions and reintroduction points, measures and options for treating turbid water before release back to the channel, and stated water quality performance standards.
- Provide wetting flows before activation of new and reconnected river channel sections based on a “channel seasoning” plan that indicates the water source(s), volumes and duration required, phased placement of clean, washed gravels; and the measures and options for treating potentially turbid water.
- Monitor the status and effectiveness of temporary erosion control, stormwater facilities, and flood flow protection measures throughout the construction area, including each of the internally draining zones that could separately discharge to various surface water bodies. Monitor turbidity in the Upper Truckee River upstream and downstream of the construction zone and, if needed to further describe background, upstream in Angora Creek. Monitoring will be conducted by the engineer or its qualified representative regularly during summer construction and on an event basis when runoff equals or exceeds the BMP design standards. Failures and/or threats of BMP failures will be documented and remedial measures identified for implementation. BMP failures will be repaired within 24 hours of documentation.

With implementation of Mitigation Measure 3.4-6 (Alt. 2) as described above, Impact 3.4-6 (Alt. 2), the likelihood and potential magnitude of short-term water quality degradation that could persist and impair beneficial uses, would be minimized because effective site management plans would be prepared and implemented. However, the potential for violations of narrative or numerical water quality objectives in the Basin Plan at least for short periods of time cannot feasibly be eliminated. The residual impact would remain significant and unavoidable.

IMPACT 3.4-7 (Alt.2) **Short-Term Risk of Surface Water or Groundwater Degradation Following Construction.** *Implementing Alternative 2 would require in-channel construction activities, and the biotechnical streambank treatments and other revegetated areas could be vulnerable during a flood flow within the first few years following construction. Furthermore, the proposed treatments would require a period of channel adjustment following construction to meet final design. Therefore, implementing Alternative 2 could result in potential short-term turbidity that violates the turbidity water quality standard in the Basin Plan (i.e., within 10 percent above background). This short-term impact would be* ***potentially significant****.*

A possible risk of short-term water quality degradation within the first few years after construction could arise from two potential mechanisms:

- expected natural channel adjustments in accordance with project design and/or
- a large flood event (e.g., 25-year recurrence or greater) occurring in the first few years (approximately 5 years) after construction.

A natural channel adjustment effect could occur where engineered designs are implemented. In particular, such adjustments would be expected as normal post-construction channel dynamics for sites where the selected restoration design does not impose the final channel size, shape, or bed and bank materials directly during construction. Expected channel adjustments would likely require at least a few years (approximately 3–5) where flows approach or exceed the geomorphic design flow to reach equilibrium. Alternative 2 includes expected natural channel adjustments as part of the design approach for the reconnected and constructed meanders, as well as the segments of existing channel between them. Alternative 2 incorporates grade control and bank protection elements at the upstream and downstream extents of the treated reaches (RS 1400 and RS 8800) to define the area of intended channel treatment and response. As described for Impact 3.4-5 (Alt. 2), changes in coarse sediment transport and deposition within the treatment reaches would be expected, particularly during the initial channel adjustment phase. The potential magnitude and duration of water quality degradation would vary by the type and degree of channel adjustment, but the effects could violate water quality standards. Channel adjustments in the form of streambed material sorting and/or net streambed or streambank erosion could produce turbidity effects. The effects would be greatest at each site of adjustment within the study area and would dissipate after each erosion event ends, but it is possible that turbidity might be detectable and extend downstream of the study area, at least for short periods.

Normal channel adjustments would most likely occur during and just following peak seasonal streamflow, at flows around or higher than the intended design capacity of 550 cfs. Under existing conditions and the No Project/No Action Alternative, such flows may cause local streambed erosion (because there are knickpoints within the study reach), and may result in streambank erosion because the bank heights are high. These flows and expected channel adjustments would occur at times of the year when background turbidity would be elevated and aesthetic beneficial uses are lower than some periods of the recreation season. These channel adjustments would be restricted to the treatment reaches, and they may pose a level of water quality risk worse than existing conditions or that under the No Project/No Action Alternative (i.e., for the risk of temporary increases in turbidity beyond the stringent turbidity standard of <10 percent above natural background conditions). Although it would be difficult to estimate an appropriate "natural" background condition due to natural variability (e.g., normal storm effects, recreation and wildlife user effects), it is possible that violations of narrative or numeric water quality standards could result. This would be potentially significant. However, the seasonal timing of likely channel adjustments would minimize the potential for impairment of beneficial uses, because background turbidity may be elevated in high flow events and, in relation to the most sensitive potential beneficial use impairment – aesthetic value, the likely timing of high flow events may be when recreation use is low. Nonetheless, because the turbidity standard could be violated by short-term turbidity increases, this impact is considered potentially significant.

The Upper Truckee River is an unregulated river; therefore, it would not be possible to avoid or control streamflow if a large flood occurs while the project area was still adjusting to construction. Although the

probability of a large flood flow (i.e., 25-year recurrence peak flow) in any given year would be relatively low (4 percent), the project area could be vulnerable for a few consecutive years, so the overall probability increases and such an event could be reasonably foreseeable during a 5-year post-construction period (i.e., 20-percent chance).

Revegetation on restored floodplains that might be adequate to protect surfaces against typical shallow overbank flows shortly after construction might not yet be mature enough to withstand a large flood. Mixed in-channel treatments of rock, wood, and living materials might not have reached maximum hydraulic resistance within the construction period. Also, it is not possible to predict whether all of the reactivated floodplain surfaces would remain stable, particularly on existing terrace surfaces that have accumulated organic material and fine sediment for decades (i.e., in old oxbows or other channel remnants).

A large flood occurring within the first few years following construction could violate water quality standards within the study area and potentially downstream. Pollutant sources from surface erosion of the reactivated floodplains and/or remobilization of accumulated organics and sediment would terminate after the flood event ends, but water quality standards could be violated, at least for short periods (e.g., hours, days, weeks), and effects could extend downstream of the study area. A large flood effect would most likely occur during winter storms, including rain-on-snow events when absorption rates are low and runoff rates are high. During these large events, background turbidity tends to be extremely high, and aesthetic beneficial uses are less prevalent.

Although unexpectedly large flows could damage the active channel and/or backfilled channels, causing instability that could continue beyond the initial flood event and/or propagate over time to affect additional locations, this could also occur under existing conditions. A flood flow of this same magnitude under existing conditions or the No Project/No Action Alternative would also produce streambed and streambank erosion that could mobilize some areas of the existing floodplain. However, the project would modify the specific locations, areal extent, and soil/vegetation conditions that would be exposed to the flows in the channel or across the reactivated floodplain and localized risks of increased erosion and sedimentation could occur that may result in violations of narrative or numeric water quality standards, at least briefly. This short-term impact would be potentially significant.

The effects could produce a violation of Section 5.2 of the Basin Plan, despite efforts to minimize risks. State Parks would request an exemption for the potential construction-related violation(s) of water quality standards from the Lahontan RWQCB as part of CWA compliance. However, for purposes of this analysis, any violation of any duration and magnitude would be potentially significant.

Mitigation Measure 3.4-7A (Alt. 2): Minimize Fine Sediment and Organic Material Available for Mobilization.

Final project design and revegetation specifications for a reactivated channel and floodplain that has remnant channels with accumulated fine sediment and/or organic materials will include measures to minimize the risk that such materials would become mobilized if a large flood flow occurs during the first few years after construction. The measures would remove and/or stabilize the materials adequately to resist expected erosive forces if a large flood (i.e., 25-year peak flow) occurred within the first 5 years after implementation:

- Remove loose, unvegetated, or otherwise unstable fine sediment and/or organic material within remnant channel sections to be reactivated (either directly connected to the restored channel or as part of reactivated floodplain) to eliminate the potential pollutant source. The excavated materials could be salvaged for soil amendment and revegetation use in off-channel areas if suitable or will be disposed of properly off-site.

- Revegetate loose, unvegetated, or otherwise unstable fine sediment and/or organic material within remnant channel sections to be reactivated (either directly connected to the restored channel or as part of reactivated floodplain) to increase roughness and reduce velocities. Revegetation of these areas will meet species, density, planting methods, irrigation, and success criteria similar to streambank plantings.

Mitigation Measure 3.4-7B (Alt. 2): Adaptively Manage Potential Flood Damage in the Interim Period after Construction.

State Parks will develop and implement a project reach adaptive management plan focused on potential short-term water quality degradation that could result if unexpectedly large flood flows occur within the first 5 years after construction. The plan would identify specific data collection and monitoring protocols, describe decision-making processes and authorities for corrective actions or activities. The performance criteria for the corrective actions would focus on preventing initial flood damage or turbidity effects from becoming a persistent, recurring, or chronic source.

With implementation of Mitigation Measures 3.4-7A (Alt. 2) and 3.4-7B (Alt. 2) as described above, Impact 3.4-7 (Alt. 2), short-term risk of surface water or groundwater degradation following construction, would be minimized, because the amount of fine sediment and organic material available for mobilization would be minimized and potential flood damage in the interim period after construction would be adaptively managed. However, the potential for violations of narrative or numerical water quality standard for turbidity, at least for short periods of time, cannot be feasibly eliminated. The residual impact would remain significant and unavoidable.

IMPACT 3.4-8 (Alt.2) Risks of Stormwater and Groundwater Contamination from Golf Course Operations. *Alternative 2 would involve relocating and slightly expanding the golf course footprint area, but modifying its configuration to reduce areas in SEZ , reduce intensively managed landscaping, and increase buffers along surface water bodies, and upgrading the irrigation and drainage systems. Risks of surface water and groundwater contamination could occur despite some localized improvements and continued water quality protection regulations, with updated monitoring, reporting, and response requirements under direct oversight of the Lahontan RWQCB. This impact would be* ***potentially significant****.*

Alternative 2 would reduce managed golf course landscaping in SEZ and buffers of minimally managed or natural landscape would be widened adjacent to the Upper Truckee River, Angora Creek, and the unnamed creek. Alternative 2 would involve constructing new, updated, and more effective irrigation and drainage systems and employing turf types and a landscaping approach and management methods that minimize the rate of chemical use and reduce opportunities for excess application and/or accumulations. Risks related to maintenance vehicle operation along the river and on golf course bridges would be substantially reduced by the increased buffer widths and the elimination of four crossings over the Upper Truckee River and all crossings of Angora Creek. Operational risks related to the clubhouse facilities, maintenance yard, and parking would remain unchanged or possibly would be improved by paving and providing curb/gutter and other BMPs for the existing unpaved parking. These measures could result in potential improvements in water quality protection relative to existing conditions.

However, Alternative 2 would involve expanding the overall footprint of the golf course, including areas of upland that have not previously been developed for this type of land use. Much of this upland area was previously disturbed by a former quarry, logging, roads, and trails but it also has sensitive areas of surface and groundwater interaction. The footprint area would be increased due to larger areas of minimally managed and natural landscapes included, but the intensively managed/turf areas would be reduced compared to existing conditions. The relocated golf course areas west of the river would include new stormwater features that either need to avoid and/or incorporate natural drainages to the Upper Truckee River that are presently outside of any developed storm drainage system. At the conceptual level of design, it is uncertain whether the specific stormwater system features would include adequate protections to: 1) isolate upslope (unaltered) runon from stormwater or irrigation drainage off of managed golf course surfaces; 2) prevent infiltration and percolation of golf course runoff that may include contaminants into shallow groundwater via natural seeps and springs and/or the planned pond; and; 3) adequately detain and pre-treat stormwater that may be released or overflow to the Upper Truckee River. It is expected that the major reconfiguration of the golf course under Alternative 2 would prompt the Lahontan RWQCB to revisit the facility's waste discharge permit, likely updating monitoring locations and strengthening monitoring and reporting requirements, but the details of these requirements are not yet known.

Implementing Alternative 2 would result in risks posed by the golf course layout and operations that might locally be increased within the study area relative to those under existing conditions or the No Project/No Action Alternative. This impact would be potentially significant.

Mitigation Measure 3.4-8 (Alt. 2): Prevent Water Quality Degradation from Golf Course Operations.

State Parks will incorporate measures within the final stormwater system design that:

1. limit opportunities for irrigation and stormwater that will be in contact with managed golf course landscaping to interact with unaltered runon from upslope areas within Washoe Meadows SP. This can be accomplished by incorporating buffer strips along downslope sides of intensively managed turf, intercepting and routing flows around landscape areas if needed, allowing natural drainages to continue to convey water from upslope without adding golf course runoff to those drainages by routing the golf course stormwater to other artificial drainages, or similar measures;

2 prevent irrigation and stormwater that will be in contact with managed golf course landscaping from interacting with shallow groundwater and/or surface water in the vicinity of natural seeps within Washoe Meadows SP. The measures required would be determined by site-specific analysis of the surface/groundwater interactions and could include the installation of sheet pile and/or other subsurface barriers; and,

3 minimize potential percolation and/or surface overflow from any new detention and/or storage pond features that will have irrigation or stormwater runoff from the golf course landscaping through inclusion of adequate liners and appropriate sizing.

With implementation of Mitigation Measure 3.4-8 (Alt. 2), as described above, the risk of possible sediment or chemical pollutant discharges to surface or groundwater would be minimized over the life of golf course operations and Impact 3.4-8 (Alt. 2) would be less than significant.

### Alternative 3: River Ecosystem Restoration with Reduced Play Golf Course

IMPACT 3.4-1 (Alt.3) Stream Channel Erosion within the Study Area. *Alternative 3 would involve making direct changes to the channel of the Upper Truckee River and the mouths of Angora Creek and the unnamed creek. The changes would offset past geomorphic response to historic disturbances and the undersized bridges within the study area by lengthening the channel, reactivating and constructing more appropriately sized channel sections, improving floodplain connectivity, and removing bridges. These modifications would prompt improved stream function and reduce overall erosion of the streambed and banks, reducing the release of sediment and nutrients that degrade the river and lake water quality relative to existing conditions and the No Project/No Action Alternative. This would be a substantial long-term benefit overall, but localized erosion could increase at the bridge removal sites, downstream of the treated reaches, and/or in the two tributary creeks. This localized risk of increased erosion would be* ***potentially significant****.*

Implementing Alternative 3 would reduce potential runoff volumes or peak flows generated within the study area relative to Alternative 2 and the No Project/No Action Alternatives (see Impacts 3.3-1 [Alt. 3] and 3.3-2 [Alt. 3] in Section 3.3, "Hydrology and Flooding") because impervious surface areas would be decreased. This would be a beneficial effect on the driving forces of channel erosion.

The modifications to the existing streambank stabilization features and the meander reconnections and new channel construction on the Upper Truckee River under Alternative 3 would be similar to those under Alternative 2, producing the same long-term beneficial reduction in channel erosion relative to existing conditions and the No Project/No Action Alternative.

As under Alternative 2, the raised water surface elevations in the treated reaches would result in a steep transition downstream to the untreated existing Upper Truckee River channel under Alternative 3, which would result in similar potential impacts of localized channel and overbank erosion downstream of RS 2000.

The changes to the alignment, length, and mouth elevation of Angora Creek and the unnamed creek under Alternative 3 would be similar to those under Alternative 2, which would result in similar potential impacts on channel stability of the two tributary creeks.

Similar to Alternative 2, all the existing golf course bridges would be removed under Alternative 3, which would result in similar potential impacts on localized erosion and sedimentation at the bridge removal sites.

Although the overall long-term channel erosion impact for the treated reaches of the Upper Truckee River under Alternative 3 would be beneficial compared to existing conditions and the No Project/No Action, some portions of the study area could experience increased channel erosion. This impact would be potentially significant.

Mitigation Measure 3.4-1A (Alt. 3): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

This mitigation measure is identical to Mitigation Measure 3.4-1A (Alt. 2).

Mitigation Measure 3.4-1B (Alt. 3): Ensure Bed and Bank Stability Downstream of the Treated Reaches.

This mitigation measure is identical to Mitigation Measure 3.4-1B (Alt. 2).

Mitigation Measure 3.4-1C (Alt. 3): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.4-1C (Alt. 2).

With implementation of Mitigation Measures 3.4-1A (Alt. 3), 3.4-1B (Alt. 3), and 3.4-1C (Alt. 3) as described above, Impact 3.4-1 (Alt. 3) would be less than significant for the same reasons described for Mitigation Measure 3.4-1A (Alt. 2) through Mitigation Measure 3.4-1C (Alt. 2).

| | |
|---|---|
| IMPACT 3.4-2 (Alt.3) | Risk of Channel Erosion Damage to Sewer Pipelines. *Implementing Alternative 3 would improve existing protective cover over sewer pipelines crossing the Upper Truckee River, but with the new alignment, the channel would be placed within 25 feet of the buried pipeline in two locations. Natural geomorphic adjustments following construction may pose a risk of damage to these portions of the sewer pipelines, as well as the two Angora Creek crossings, potentially releasing untreated wastewater to the river and creek that would eventually reach Lake Tahoe. This impact would be* ***potentially significant****.* |

Similar to Alternative 2, implementing Alternative 3 would improve protection at two existing buried sewer pipeline crossings under the Upper Truckee River. However, the proposed active channel would be located within 25 feet of the sewer pipeline at two new sites, with additional bank stabilization and lateral migration measures designed to meet an as-yet-undetermined flood event standard. Changes to the mouth of Angora Creek would be made, including bed and bank stabilization designed to meet as-yet-undetermined flood event standards. Proposed grading and excavation in the areas of golf course and floodplain modifications could potentially damage sewer lines of uncertain depth and location within the study area.

Under Alternative 3, the risk of damage to the buried sewer pipelines would be reduced relative to existing conditions and the No Project/No Action Alternative for some locations but would be increased in other portions of the study area. This impact would be potentially significant.

Mitigation Measure 3.4-2A (Alt. 3): Protect Vulnerable Portions of the Sewer Pipeline up to the 100-Year Flood Event.

This mitigation measure is identical to Mitigation Measure 3.4-2A (Alt. 2).

Mitigation Measure 3.4-2B (Alt. 3): Verify Utility Locations, Coordinate with Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

This mitigation measure is identical to Mitigation Measure 3.4-2B (Alt. 2).

Mitigation Measure 3.4-2C (Alt. 3): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks

This mitigation measure is identical to Mitigation Measure 3.4-2C (Alt. 2).

With implementation of Mitigation Measures 3.4-2A (Alt. 3), 3.4-2B (Alt. 3), and 3.4-2C (Alt. 3) as described above, Impact 3.4-2 (Alt. 3), the potential increased risk of sewer pipeline damage and water quality degradation, would be less than significant for the same reasons described for Mitigation Measures 3.4-2A (Alt. 2) through 3.4-2C (Alt. 2).

IMPACT 3.4-3 (Alt.3) Long-Term Surface/Soil Erosion within the Study Area. *Alternative 3 would not involve modifying the topography, soils, vegetation, or drainage on the areas of existing surface erosion caused by prior surface disturbances within Washoe Meadows SP. Existing areas of active erosion would persist. This impact would be less than significant.*

Similar to Alternative 1, no changes to the areas of accelerated soil erosion within Washoe Meadows SP would be expected under Alternative 3. Existing adverse conditions would continue. The long-term benefits expected under Alternative 2 would not occur as part of the project. However, as part of its normal administrative responsibilities (separate from this project), State Parks would prepare interim management guidelines for Washoe Meadows SP, with the revised boundaries, which would provide additional guidance for protection of resources and management of permissible uses for that unit. The management plan would likely include small parking areas, signage, and some trail improvements on higher capability land. However, additional development in the remaining park area would not occur, because much of the area is within sensitive low-capability lands. State Parks may choose to prepare a general plan for Washoe Meadows SP in the future, if development of new facilities were contemplated; however, this would be a separate action subject to its own environmental review under CEQA. For a discussion of potentially significant short-term risks of surface/soil erosion within the study area and proposed mitigation measures, see Impact 3.6-1 (Alt. 3) in Section 3.6, “Earth Resources”). This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-4 (Alt.3) Fine Sediment and Nutrient Retention within the Study Area. *Implementing Alternative 3 would directly reduce the channel capacity and raise the streambed elevation in several subreaches to increase the frequency of overbanking, enlarge the area of functional active floodplain, and offset past natural geomorphic adjustments to historic disturbances. Implementing Alternative 3 would result in a substantial beneficial improvement in fine sediment and nutrient retention in the study area relative to the existing degraded condition. This effect would be beneficial.*

Similar to Alternative 2, the channel would be lengthened, the bed profile would be raised, bank heights would be lowered, and channel capacity would be reduced under Alternative 3. The same changes in overbank frequency, duration, and enlarged active floodplain anticipated under Alternative 2 would result under Alternative 3. The same beneficial improvements to fine sediment and nutrient retention within the study area and reduction of pollutants released downstream expected under Alternative 2 would result under Alternative 3.

Under Alternative 3, fine sediment and nutrient retention in the study area would be substantially improved relative to the existing degraded condition and would result in a beneficial reduction of these pollutants released downstream to the Upper Truckee River and/or Lake Tahoe. This effect would be beneficial.

No mitigation is required.

IMPACT 3.4-5 (Alt.3) Modifications in Upper Truckee River Coarse Sediment Transport and Delivery Downstream. *Alternative 3 would involve making major modifications to the channel bed profile, bank and bed materials, and hydraulic conditions controlling bedload (i.e., sands and gravel) transport within the study area and into the downstream reaches of the Upper Truckee River. Naturally declining watershed coarse sediment yield would continue and potentially would be worsened, particularly during the initial channel adjustment phase, with possible adverse effects on downstream channel erosion and beach erosion adjacent to the river mouth (Cove East and Barton Beach). In the long term, climate change effects could either exacerbate or counteract present trends. Over the long term, the potential effects could range from worse than the existing degraded condition to a possible improvement. Any determination regarding climate change effects on coarse sediment transport and delivery downstream would be too speculative for a meaningful conclusion. Over the short term, implementing Alternative 3 would modify coarse sediment transport and deposition within various portions of the study area and likely decrease coarse sediment delivery to downstream reaches. This short-term impact would be* ***potentially significant****.*

Alternative 3 would involve making the same changes to the streambed profile and the same changes to streambank and streambed materials as under Alternative 2, and the channel adjustments following construction would be expected to be the same as under Alternative 2. This would produce the same short-term reductions in coarse sediment discharged downstream. This short-term impact would be potentially significant.

Implementing Alternative 3 would result in the same highly uncertain long-term effects on coarse sediment delivery downstream and local beach erosion as Alternative 2. This long-term impact would be less than significant.

Mitigation Measure 3.4-5 (Alt. 3): Monitor and Supplement Coarse Sediment Delivery Downstream

Mitigation Measure 3.4-5 (Alt. 3) is identical to Mitigation Measure 3.4-5 (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measure 3.4-5 (Alt. 3), Impact 3.4-5 (Alt. 3) would be less than significant.

IMPACT 3.4-6 (Alt.3) Short-Term Risk of Surface Water or Groundwater Degradation during Construction. *Implementing Alternative 3 would require major or prolonged construction activities along or in the channel of the Upper Truckee River and sections of Angora Creek and the unnamed creek. Although temporary BMPs would be implemented, short-term risks of water quality degradation during construction could occur during each summer construction season or the intervening winters. Implementing Alternative 3 could result in short-term violations to the Basin Plan water quality standards, including turbidity due to construction implementation. This short-term impact would be* ***potentially significant****.*

Similar to Alternative 2, implementing Alternative 3 would require 3–4 years of seasonal construction (between May 1 and October 15), with winter closedowns, except for BMP maintenance and monitoring. Construction would disturb the active floodplain and the main channels of the Upper Truckee River, Angora Creek, and the unnamed creek, with similar phasing (see Table 2-6), access, staging, and storage (see Exhibit 2-9). However, Alternative 3 would not include construction of new golf course facilities west of the Upper Truckee River.

Similar to Alternative 2, permits and approvals would need to be obtained from several entities, but the specific measures, performance standards, and enforcement elements required are not yet known. The same general

construction management measures and general BMPs would be included as for Alternative 2, with similar dewatering approaches and winterization needs. As with Alternative 2, the probability of a large storm runoff or streamflow event that exceeds temporary capacity occurring during construction would not be reasonably foreseeable.

Based on the conceptual information regarding proposed construction management for Alternative 3, it remains possible that violations of water quality standards could occur, at least for short periods during each summer's activities and/or over each intervening winter and snowmelt season. The effects could produce a violation of Section 5.2 of the Basin Plan, despite efforts to minimize risks. It is anticipated that State Parks would request an exemption for the potential construction-related violation(s) of water quality standards from the Lahontan RWQCB as part of CWA compliance. However, for purposes of this analysis, any violation of any duration and magnitude would be potentially significant. The surface water and/or groundwater degradation caused by the risk of temporary turbidity increases could potentially be of a magnitude and duration that would impair beneficial uses of the Upper Truckee River, including visible turbidity that impairs aesthetic values or other potential effects on other beneficial uses. Impairment of beneficial uses would be expected to require considerably higher turbidity levels, orders of magnitude above the very low background value for the river. Regardless, the significance conclusion for this environmental document is based on the potential to violate the turbidity standard; therefore, the impact is considered potentially significant.

Mitigation Measure 3.4-6 (Alt. 3): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.4-6 (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measure 3.4-6 (Alt. 3), the residual Impact 3.4-6 (Alt. 3) would remain significant and unavoidable.

IMPACT 3.4-7 (Alt.3) Short-Term Risk of Surface Water or Groundwater Degradation Following Construction. *Implementing Alternative 3 would require major or prolonged construction activities. Biotechnical streambank treatments and other revegetated areas could be vulnerable during a flood flow within the first few years following construction. Furthermore, the proposed features would require a period of channel adjustment following construction to meet final design. Therefore, implementing Alternative 3 could result in potential short-term turbidity that violates the water quality standard in the Basin Plan (i.e., within 10 percent increase over natural background levels). This short-term impact would be* ***potentially significant.***

Alternative 3 would have the same river channel impacts as Alternative 2. Potential impacts from overbank and upland areas would be similar to those under Alternative 2, although the area of disturbance west of the river would be avoided and the extent of disturbance in the existing golf course (including active and 100-year floodplain) would be larger.

Mitigation Measure 3.4-7A (Alt. 3): Minimize Fine Sediment and Organic Material Available for Mobilization.

This mitigation measure is identical to Mitigation Measure 3.4-7A (Alt. 2).

Mitigation Measure 3.4-7B (Alt. 3): Adaptively Manage Potential Flood Damage in the Interim Period after Construction.

This mitigation measure is identical to Mitigation Measure 3.4-7B (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measures 3.4-7A (Alt. 3) and 3.4-7B (Alt. 3), the residual Impact 3.4-7 (Alt. 3) would remain significant and unavoidable.

IMPACT 3.4-8 (Alt.3) Risks of Surface Water and Groundwater Contamination from Golf Course Operations. *Alternative 3 would involve reducing the golf course footprint, modifying its configuration to reduce areas in SEZ and increase buffers along surface water bodies, and upgrading the irrigation and drainage systems. Risks of surface water and groundwater contamination could still occur but would likely be reduced from existing conditions because of the improvements and continued water quality protection regulations, with updated monitoring, reporting, and response requirements under direct oversight of the Lahontan RWQCB. This impact would be* ***less than significant****.*

Implementing Alternative 3 would reduce the overall footprint of the golf course. The managed golf course landscaping in SEZ would be reduced to 80 acres, and buffers of minimally managed or natural landscape would be widened adjacent to the Upper Truckee River and the unnamed creek. Managed golf course landscaping would be entirely eliminated along Angora Creek. Alternative 3 would involve constructing new, updated, and more effective irrigation and drainage systems and involve employing turf types and a landscaping approach and management methods that could further minimize the rate of chemical use and reduce opportunities for excess application and/or accumulations. Risks related to maintenance vehicle operation along the river and crossing on golf course bridges would be substantially reduced by the increased buffer and elimination of all five crossings of the Upper Truckee River and all crossings of Angora Creek. Operational risks related to the clubhouse facilities, maintenance yard, and parking would remain unchanged from existing conditions and the No Project/No Action Alternative. Additionally, it is expected that the reconfiguration of the golf course under Alternative 3 would prompt the Lahontan RWQCB to revisit the facility's waste discharge permit, likely updating and strengthening monitoring and reporting requirements.

Implementing Alternative 3 would result in a beneficial reduction in risks posed by the golf course layout and operations relative to those under existing conditions and the No Project/No Action Alternative or Alternative 2. This impact would be less than significant.

No mitigation is required.

### Alternative 4: River Stabilization with Existing 18-Hole Regulation Golf Course

IMPACT 3.4-1 (Alt.4) Stream Channel Erosion within the Study Area. *Alternative 4 would involve making direct changes to the channel of the Upper Truckee River, the mouth of Angora Creek, and the mouth of the unnamed creek. The changes would limit continued geomorphic response to historic disturbances and reduce the effects of undersized bridges within the study area by stabilizing the streambed elevation, protecting streambanks, and removing two bridges. These modifications would reduce overall erosion of the streambanks and streambed and reduce the release of sediment and nutrients that degrade the river and lake water quality relative to existing conditions and the No Project/No Action Alternative. This would be a substantial long-term benefit overall, but increased localized erosion could result at the bridge removal sites. This localized risk of increased erosion would be* ***potentially significant****.*

Alternative 4 would not involve modifying the area or location of existing impervious surfaces or making changes to the channel or drainages that would modify runoff volumes or peak flows. (See Impacts 3.3-1 [Alt. 4] and 3.3-2 [Alt. 4] in Section 3.3, "Hydrology and Flooding.") Therefore, Alternative 4 would not involve modify on-site driving forces causing stream channel erosion.

Under Alternative 4, existing streambank stabilization treatments already in place would be replaced and/or repaired. Existing streambed knickpoints would be addressed by installing anchored high-gradient riffles at the upstream and downstream project boundaries and placing boulder steps throughout the treatment reach at intervals to prevent continued streambed erosion. Streambank erosion throughout the treatment reach would be reduced by installing protection measures that generally feature rock armor on outside bends and biotechnical measures on inside bends, as needed, to resist expected shear stress and keep the channel stable up to the 100-year peak flow.

Compilation of the TMDL streambank erosion results (California Water Boards and NDEP 2007:211–215) for specific subreaches of the Upper Truckee River allows a quantitative estimate of the effect of the proposed alternatives on stream channel erosion. Although the specific measures proposed under Alternative 4 were not modeled for the TMDL, they can be represented by using the "bank protection" tier results for the treatment subreaches within the study area. The estimated fine sediment loads from streambank erosion in the study area would be 546 cubic yards, which represents a 55.6-percent reduction for the study area and a 15.8-percent reduction for the entire river relative to existing conditions and the No Project/No Action Alternative (Table 3.4-12). This would be a substantial beneficial effect relative to existing conditions and the No Project/No Action Alternative.

**Table 3.4-12**
**Estimated Stream Channel Bank Erosion of Fine Sediment on the Upper Truckee River under Alternative 4**

| River Reach | Distance Upstream of Lake(feet) | Bank Erosion of Fine Sediment[1] | |
|---|---|---|---|
| | | Alternative 1 (No Project/No Action) (cubic yards) | Alternative 4 (cubic yards) |
| Downstream reaches | 0–40,000 | 2,451 | 2,451 |
| Study area reaches | 40,000–48,458 | 1,228 | 546 |
| Upstream reaches | 48,458–79,364 | 2,451 | 2,451 |
| **Total** | **79,364** | **4,320** | **3,638** |

Note:
[1] Fine sediment is less than 0.063 millimeter in diameter.
Source: California Water Boards and NDEP 2007 (compiled for these subreaches in Appendix F)

Under Alternative 4, the two existing golf course bridges upstream of holes 6 and 7 (approximately RS 8200 and RS 7575) would be replaced with a single, longer span bridge between RS 7800 and RS 8100 (subreach 3B). The new bridge would span the channel and active floodplain and would not require placing piers in the channel bed; therefore, it is not expected to constrict flows or increase flow velocity in the vicinity. In addition, an inset floodplain would be excavated in the vicinity, and local streambed and streambank protections would be installed at the new bridge. The existing streambed scour and streambank erosion at the two existing undersized bridges would be eliminated. Removal of these two undersized bridges would eliminate the existing high-flow constrictions, modify local hydraulics, slow the velocity at and just downstream of each bridge crossing, and speed up velocities just upstream of each crossing relative to existing conditions. This change in local hydraulics could, if not addressed by sufficient bed and bank stabilization measures, result in increased shear forces sufficient to increase bed and bank erosion upstream of each former bridge. Under Alternative 4, streambed and streambank protection measures would be implemented at each bridge removal site, but the performance standards for those measures are not specified. Therefore, it is possible that localized erosion could be worsened relative to existing conditions and the No Project/No Action Alternative.

Implementing Alternative 4 would not substantially raise the streambed elevation and water surface elevations within the treated reaches (RS 1400 to RS 8800). Minor hydraulic changes in roughness attributable to placement of rock and biotechnical treatments, without reduction in channel capacity, would not be expected to increase shear stress relative to existing conditions in the reach downstream of RS 2000. Because implementing Alternative 4 would not enlarge the active floodplain or increase the frequency of overbanking, no potential effect on return flows disturbing streambanks would be expected.

Alternative 4 would not involve relocating the mouths of Angora Creek and the unnamed creek but may include implementing streambed and streambank protection measures at each existing confluence to match the adjoining treatments and finished grade within the Upper Truckee River. These changes would not substantially modify the length or mouth elevation of either creek.

Although the overall long-term channel erosion impact for the treated reaches of the Upper Truckee River under Alternative 4 would be beneficial compared to existing conditions and the No Project/No Action Alternative, some portions of the study area could experience increased localized channel erosion. This impact would be potentially significant.

Mitigation Measure 3.4-1 (Alt. 4): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

Final design will include specific streambed stabilization and streambank protection measures at each proposed bridge removal site (at least 100 feet upstream and downstream) that will minimize future erosion under the modified hydraulic conditions, as verified by quantitative modeling that demonstrates stability up to the 100-year peak event. The measures may include grading to modify the channel dimensions (e.g., eliminate existing large scour pool) and the shape of the channel bed and banks, along with installation of rock and/or biologic materials.

With implementation of Mitigation Measure 3.4-1 (Alt. 4) as described above, Impact 3.4-1, the potential increase in localized channel erosion, would be less than significant because bed and bank stabilization measures would be provided at and immediately upstream and downstream of the bridge removal sites.

IMPACT 3.4-2 (Alt.4) Risk of Channel Erosion Damage to Sewer Pipelines. *Implementing Alternative 4 would improve existing protective cover over buried sewer pipelines crossing the Upper Truckee River or within 25 feet of the existing banks and include measures to stabilize the channel to reduce future streambed or streambank erosion. These measures would decrease the risk of damage to buried pipelines and possible release of untreated wastewater to the river and/or Lake Tahoe relative to existing conditions and the No Project/No Action Alternative. This impact would be* ***less than significant****.*

The existing sewer pipeline crossing under the Upper Truckee River at RS 1400 is an inverted siphon that has approximately 1 foot of cover, and the upstream crossing at RS 8800 is an exposed concrete encasement. Both of these crossings are inspected by STPUD twice per year (Adams, pers. comm., 2009). Continued normal channel dynamics, particularly any additional channel bed erosion in the future, could further diminish the remaining protective cover and increase the risk of damaging effects during a major flood flow. If the sewer pipeline is damaged during a major flood, untreated wastewater could be released into the river and potentially reach Lake Tahoe. Under Alternative 4, a hard grade control (anchored high-gradient riffle) that increases the thickness and resistance of the channel bed would be installed over these crossings and for some distances upstream and downstream, diminishing the risk of damaging effects during a major flood flow.

A few hundred feet of sewer pipeline are located parallel to and within 25 feet of the eroding streambank on the Upper Truckee River between RS 6500 and RS 5900. Continued normal channel dynamics, particularly any additional channel widening in the future, may undermine and/or expose this section of the sewer pipeline and increase the risk of damaging effects during a major flood flow. If the sewer pipeline is damaged during a major flood, untreated wastewater could be released into the river and potentially reach Lake Tahoe. Under Alternative 4, rock armor streambank protection would be installed along this bank, coupled with upstream and downstream hard grade controls (boulder steps), to stabilize the streambed and prevent undermining of the proposed bank protection. Implementing these measures would reduce the risk of damaging effects on the pipeline during a major flood flow.

Under Alternative 4, the risk of damage to the buried sewer pipelines would be reduced relative to existing conditions and the No Project/No Action Alternative. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-3 (Alt.4) Long-Term Surface/Soil Erosion within the Study Area. *Alternative 4 would not involve modifying the topography, soils, vegetation, or drainage on the areas of existing surface erosion caused by prior surface disturbances within Washoe Meadows SP. Existing areas of active erosion would persist. This impact would be* ***less than significant****.*

Similar to Alternatives 1 and 3, no changes to the areas of accelerated soil erosion within Washoe Meadows SP would be expected under Alternative 4. The long-term benefits expected under Alternative 2 would not occur. However, as part of its normal administrative responsibilities (separate from this project), State Parks would prepare interim management guidelines for Washoe Meadows SP, with the revised boundaries, which would provide additional guidance for protection of resources and management of permissible uses for that unit. The management plan would likely include small parking areas, signage, and some trail improvements on higher capability land. However, additional development in the remaining park area would not occur, because much of the area is within sensitive low-capability lands. State Parks may choose to prepare a general plan for Washoe Meadows SP in the future, if development of new facilities were contemplated; however, this would be a separate action subject to its own environmental review under CEQA.

For a discussion of potentially significant short-term risks of surface/soil erosion within the study area and proposed mitigation measures, see Impact 3.6-1 (Alt. 4) in Section 3.6, "Earth Resources"). This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-4 (Alt.4) Fine Sediment and Nutrient Retention within the Study Area. *Alternative 4 would not involve directly modifying the channel capacity, elevation, frequency of overbanking, or area of functional active floodplain, and implementing this alternative would limit future natural geomorphic adjustments to historic disturbances. Implementing Alternative 4 would maintain the existing impaired fine sediment and nutrient retention conditions. This impact would be* ***less than significant****.*

Under Alternative 4, the channel and 36-acre active floodplain in the study area would have only minor modifications through the addition of 0.4 acre of inset floodplain. The channel capacity would remain large, the streambed elevation would remain low, and streambanks would remain high, all of which would limit normal frequent flows (i.e., the 2-year peak flow) from overbanking onto the surrounding former floodplain (now a terrace). The estimated area and location of the active floodplain would remain similar to existing conditions (Exhibit 3.3-14).

Natural geomorphic adjustments along the Upper Truckee River would be restricted by the streambed stabilization and streambank protection measures that would be installed throughout the treatment reaches (RS 1400 to RS 8800). The existing degraded floodplain connectivity to surrounding terrace surfaces would not be allowed to worsen over time. The active floodplain area and potential for frequent overbanking in the study area would be either similar to existing conditions or potentially worse if climate change reduces available streamflow. These factors would reduce the frequency, area, and duration of floodplain inundation. Under Alternative 4, channel widening would be restricted, and no additional inset floodplains would be formed between the high-terrace banks aside from the 0.4 acre to be constructed. Net sediment and nutrient retention would not be substantially improved from existing degraded conditions.

Under Alternative 4, the adverse existing conditions would persist. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-5 (Alt.4) **Modifications in Upper Truckee River Coarse Sediment Transport and Delivery Downstream.** *Alternative 4 would involve making minor modifications to the channel bed profile, bank and bed materials, and hydraulic conditions controlling bedload (i.e., sands and gravel) transport within the study area and into the downstream reaches of the Upper Truckee River. Naturally declining watershed coarse sediment yield would continue, with possible adverse effects on downstream channel erosion and beach erosion adjacent to the river mouth (e.g., at Cove East and Barton Beach), with only a minor decrease in local coarse sediment expected under Alternative 4. In the long term, climate change effects could either exacerbate or counteract present trends. The potential effect could range from worse than the existing degraded condition to a possible improvement. Any determination regarding climate change effects on coarse sediment transport and delivery downstream would be too speculative for a meaningful conclusion. This impact would be* ***less than significant****.*

Alternative 4 would involve stabilizing the streambed to prevent additional incision and to limit knickpoint migration upstream through installation of boulder steps throughout the treatment reaches and anchored high-gradient riffles at the upstream and downstream ends of the project. Implementing this alternative would generally maintain the existing profile, locally raising portions near the boulder steps and AHGRs by up to 1.3 feet, but would not create any abrupt or major breaks in the bed profile. Implementing Alternative 4 would protect the existing high streambanks along the incised channel from excessive erosion through the installation of rock armor and biotechnical streambank protection throughout the treatment reaches. The streambed and streambank protection measures would prevent channel dynamics within the treated reach over the life of the project, reducing sediment loads generated by channel erosion and, therefore, limiting coarse sediment generation within the study area. The channel bed and bank protection measures, although reducing local sediment sources, would not substantially impair transport of sediment from upstream sources through the project reach. Long-term delivery of coarse sediment to downstream reaches and ultimately to the beaches by the river mouth could be diminished proportional to the reduction of coarse sediment sources from eroding streambanks in the study area. However, as under the No Project/No Action Alternative, there are potentially offsetting factors that may result over the long term from climate change, and the net effect on downstream river dynamics and beach erosion is highly uncertain, so any determination regarding the effects on coarse sediment transport and delivery downstream would be speculative.

After thorough investigation, determination on the outcome of Alternative 4 remains too speculative. This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-6 (Alt.4) **Short-Term Risk of Surface Water or Groundwater Degradation during Construction.** *Implementing Alternative 4 would require construction activities along or in the channel of the Upper Truckee River and at the mouths of Angora Creek and the unnamed creek. Although temporary BMPs would be implemented, short-term risks of water quality degradation during construction could occur during summer construction seasons or intervening winters. Implementing Alternative 4 could result in short-term violations to the Basin Plan water quality standards, including turbidity due to construction implementation. This short-term impact would be* ***potentially significant****.*

This impact would be similar to that under Alternative 2 but under Alternative 4, there would be a shorter overall construction period of 2–3 years and a higher percentage of construction disturbance within the existing active floodplain, within the main channel of the Upper Truckee River, and at the mouths of Angora Creek and the unnamed creek (see Alternative 4 construction schedule section in Table 2-8). Only minor areas of floodplain reconstruction and golf course restroom facilities and overflow parking area improvements would be completed "off-channel" (outside of the active channel). Disturbance areas, access routes, and most staging areas would be within the 100-year floodplain, whereas the staging location west of the Upper Truckee River would be outside the 100-year floodplain, similar to Alternative 2.

The project permits and approvals would be the same as under Alternative 2. Conceptual approaches to dewatering have been identified for various elements of Alternative 4 in-channel work (see Chapter 2, "Project Alternatives"), but specific measures have not yet been determined. Efforts would be made to work as quickly as possible to move from initial disturbance through final revegetation throughout, but it is expected that disturbed areas would be exposed to winter conditions between summer construction seasons. Winterization protection could be needed throughout the construction zone, and overwinter use of staging, storage, or access areas would be likely.

All temporary stormwater controls and/or overwinter flood flow protections would be designed and sized to meet the same standards as Alternative 2. Similar to Alternative 2, the probability of a large storm runoff or streamflow event that exceeds temporary capacity occurring during construction would not be reasonably foreseeable.

Based on the conceptual information regarding proposed construction management for Alternative 4, it remains possible that violations of water quality standards could occur, at least for short periods during each summer's activities and/or over each intervening winter and snowmelt season. The effects could produce a violation of Section 5.2 of the Basin Plan, despite efforts to minimize risks. It is anticipated that State Parks would request an exemption for the potential construction-related violation(s) of water quality standards from the Lahontan RWQCB as part of CWA compliance. However, for purposes of this analysis, any violation of any duration and magnitude would be potentially significant. The surface water and/or groundwater degradation caused by the risk of temporary turbidity increases could potentially be of a magnitude and duration that would impair beneficial uses of the Upper Truckee River, including visible turbidity that impairs aesthetic values or other potential effects on other beneficial uses. Impairment of beneficial uses would be expected to require considerably higher turbidity levels, orders of magnitude above the very low background value for the river. Regardless, the significance conclusion for this environmental document is based on the potential to violate the turbidity standard; therefore, the impact is considered potentially significant.

Mitigation Measure 3.4-6 (Alt. 4): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.4-6 (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measure 3.4-6 (Alt. 4), residual Impact 3.4-6 (Alt. 4) would remain significant and unavoidable.

IMPACT 3.4-7 (Alt.4) Short-Term Risk of Surface Water or Groundwater Degradation Following Construction. *Implementing Alternative 4 would require major or prolonged construction activities. Biotechnical streambank treatments and other revegetated areas could be vulnerable during a flood flow within the first few years following construction, but the proposed treatments would not require a period of channel adjustment following construction to meet final design, and the active floodplain would not be enlarged. Implementing Alternative 4 would make changes to the existing condition that would increase short-term risk of water quality degradation following construction in some locations within the study area. Therefore, short-term violations of the turbidity water quality standard in the Basin Plan (i.e., >10 percent over natural background) could result. This short-term impact would be* ***potentially significant****.*

Implementing Alternative 4 would require major or prolonged construction activities, but the proposed treatments would not require a period of channel adjustment following construction to achieve final design. Minor channel adjustments may occur in response to the construction disturbance. However, the treatments would cover the entire potential erosion source area (channel boundaries without new floodplain construction), and in a flood flow situation, the background/natural turbidity would be elevated. Additionally, the type and extent of streambank and streambed treatments would be expected to perform much better than the existing channel conditions, as soon as construction is complete. Therefore, no increased long-term turbidity above the expected channel conditions under existing conditions would be likely. However, a violation of the water quality standards could result, at least for a short period of time. The bank protection measures proposed will limit post construction channel

adjustments and therefore the extent and duration of the potential turbidity effects, lessening the potential for impairment of noncontact beneficial uses (aesthetics) compared to Alternatives 2, 3, and 5.

Under Alternative 4, the river system would be expected to respond to an unusually large flood within the first few years after construction differently than Alternative 2, since Alternative 4 would treat the entire reach between hard grade controls (RS 1400 to RS 8800), would not enlarge or reactivate as floodplain portions of the existing terrace that have remained isolated from flow and have accumulated sediment, and would not modify the alignment or create backfilled channels that could be vulnerable to recapture. These differences reduce the potential likelihood and magnitude of effects from a large flood event relative to existing conditions. While the residual effects of an unusually large flood within the first few years of construction would be no worse than under the existing conditions and the No Project/No Action Alternative, a potential for narrative or numeric water quality standards to be violated would exist. This short-term impact would be potentially significant.

The effects could produce a violation of Section 5.2 of the Basin Plan, despite efforts to minimize risks. State Parks would request an exemption for the potential construction-related violation(s) of water quality standards from the Lahontan RWQCB as part of CWA compliance. However, for purposes of this analysis, any violation of any duration and magnitude would be potentially significant.

Mitigation Measure 3.4-7 (Alt. 4): Adaptively Manage Potential Flood Damage in the Interim Period after Construction.

This mitigation measure is identical to Mitigation Measure 3.4-7B (Alt. 2).

With implementation of Mitigation Measure 3.4-7 (Alt. 4) as described above, Impact 3.4-7 (Alt. 4), short-term risk of surface water or groundwater degradation following construction, would be minimized, because the potential flood damage in the interim period after construction would be adaptively managed. However, the potential for violations of narrative or numerical water quality standard for turbidity, at least for short periods of time, cannot be feasibly eliminated. The residual impact would remain significant and unavoidable.

IMPACT 3.4-8 (Alt.4) Risks of Surface Water and Groundwater Contamination from Golf Course Operations. *Alternative 4 would not involve modifying the footprint area, configuration, or landscaping management of the existing golf course. Risks of surface water and groundwater contamination would remain similar to those under existing conditions, and operations would continue to be subject to water quality protection regulations, with monitoring, reporting, and response requirements under direct oversight of the Lahontan RWQCB. This impact would be* ***less than significant****.*

Similar to Alternative 1, the physical layout and management practices of the existing landscaped golf course would not be modified under Alternative 4. The area of golf course within SEZ and the limited buffer distances to surface water bodies would remain the same as under Alternative 1. Drainage conditions, use of chemicals, and normal activities posing erosion hazards or risk of accidental spills would continue to be regulated under the same waste discharge permit.

Implementing Alternative 4 would not modify the existing adverse risk posed by the golf course layout and operations under existing conditions and the No Project/No Action Alternative. This impact would be less than significant.

No mitigation is required.

### Alternative 5: River Ecosystem Restoration with Decommissioned Golf Course

IMPACT 3.4-1 (Alt.5) Stream Channel Erosion within the Study Area. *Alternative 5 would involve making changes to the channel of the Upper Truckee River, the mouth of Angora Creek, and the mouth of the unnamed creek. The changes would offset past geomorphic response to historic disturbances and the undersized bridges within the study area by lengthening the channel, reactivating and constructing more appropriately sized channel sections, improving floodplain connectivity, and removing bridges. These modifications would prompt improved stream function and reduce overall erosion of the streambanks and streambed and would reduce the release of sediment and nutrients that degrade the river and lake water quality relative to existing conditions and the No Project/No Action Alternative. This would be a substantial long-term benefit overall, but localized erosion could increase at the bridge removal sites, downstream of the treated reaches, and/or in the two tributary creeks. This localized risk of increased erosion would be* ***potentially significant****.*

Similar to Alternative 3, potential runoff volumes and peak flows generated within the study area under Alternative 5 would be reduced relative to Alternative 2 and the No Project/No Action Alternative because most of the impervious surface areas would be removed. (See Impacts 3.3-1 [Alt. 5] and 3.3-2 [Alt. 5] in Section 3.3, "Hydrology and Flooding") This would be a beneficial effect on the driving forces of channel erosion.

The same modifications to the existing streambank stabilization features and the same meander reconnections and new channel construction on the Upper Truckee River would occur under Alternative 5 as under Alternatives 2 and 3, producing the same long-term beneficial reduction in channel erosion relative to existing conditions and the No Project/No Action Alternative.

Similar to Alternatives 2 and 3, the raised water surface elevations in the treated reaches would result in a steep transition downstream to the untreated existing Upper Truckee River channel under Alternative 5, which would result in similar potential impacts of increased localized channel and overbank erosion downstream of RS 2000.

The same changes to the alignment, length, and mouth elevation of Angora Creek and the unnamed creek would occur under Alternative 5 as under Alternatives 2 and 3, which would result in similar potential impacts on channel instability in the two tributary creeks.

Similar to Alternatives 2 and 3, all the existing golf course bridges would be removed under Alternative 5, which would result in similar potential impacts of increased localized erosion and sedimentation at the bridge removal sites.

Although the overall long-term channel erosion impact for the treated reaches of the Upper Truckee River under Alternative 5 would be beneficial compared to that under existing conditions and the No Project/No Action Alternative, some portions of the study area could experience increased localized channel erosion. This impact would be potentially significant.

Mitigation Measure 3.4-1A (Alt. 5): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

This mitigation measure is identical to Mitigation Measure 3.4-1A (Alt. 2).

Mitigation Measure 3.4-1B (Alt. 5): Ensure Bed and Bank Stability Downstream of the Treated Reaches.

This mitigation measure is identical to Mitigation Measure 3.4-1B (Alt. 2).

Mitigation Measure 3.4-1C (Alt. 5): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.4-1C (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measures 3.4-1A (Alt. 5) through 3.4-1C (Alt. 5), Impact 3.4-1 (Alt. 5) would be less than significant.

IMPACT 3.4-2 (Alt.5) Risk of Channel Erosion Damage to Sewer Pipelines. *Implementing Alternative 5 would improve existing protective cover over sewer pipelines crossing the Upper Truckee River, but with the new alignment, the channel would be placed within 25 feet of the buried pipeline in two locations. Natural geomorphic adjustments following construction may pose a risk of damage to these portions of the sewer pipelines, as well as the two Angora Creek crossings, potentially releasing untreated wastewater to the river and creek that eventually could reach Lake Tahoe. This impact would be* ***potentially significant****.*

Similar to Alternatives 2 and 3, implementing Alternative 5 would improve protection at two existing buried sewer pipeline crossings under the Upper Truckee River. However, the proposed active channel would be located within 25 feet of the sewer pipeline at two new sites, with additional bank stabilization and lateral migration measures designed to meet an as-yet-undetermined flood event standard. Changes to the mouth of Angora Creek would be made, including bed and bank stabilization designed to meet as-yet-undetermined flood event standards. Proposed grading and excavation in the areas of golf course and floodplain modifications could potentially damage sewer lines of uncertain depth and location within the study area.

Under Alternative 5, the risk of damage to the buried sewer pipelines would be reduced relative to existing conditions and the No Project/No Action Alternative for some locations but increased in other portions of the study area. This impact would be potentially significant.

Mitigation Measure 3.4-2A (Alt. 5): Protect Vulnerable Portions of the Sewer Pipeline up to the 100-Year Flood Event.

This mitigation measure is identical to Mitigation Measure 3.4-2A (Alt. 2).

Mitigation Measure 3.4-2B (Alt. 5): Verify Utility Locations, Coordinate with Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

This mitigation measure is identical to Mitigation Measure 3.4-2B (Alt. 2).

Mitigation Measure 3.4-2C (Alt. 5): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.4-2C (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measures 3.4-2A (Alt. 5) through 3.4-2C (Alt. 5), Impact 3.4-2 (Alt. 5) would be less than significant.

IMPACT 3.4-3 (Alt.5) Long-Term Increased Surface/Soil Erosion within the Study Area. *Alternative 5 would not involve modifying the topography, soils, vegetation, or drainage on the areas of existing surface erosion caused by prior surface disturbances within Washoe Meadows SP. Existing areas of active erosion would persist. This impact would be* ***less than significant****.*

Similar to Alternatives 1, 3, and 4, no direct or indirect changes to the areas of accelerated soil erosion within Washoe Meadows SP would be expected under Alternative 5. Existing adverse conditions would continue. No interim management plan would be prepared as part of Alternative 5, because State Parks would complete a more detailed planning process in the future to evaluate alternative uses of the study area. For a discussion of potentially significant short-term risks of surface/soil erosion within the study area and proposed mitigation measures, see Impact 3.6-1 (Alt. 5) in Section 3.6, "Earth Resources." This impact would be less than significant.

No mitigation is required.

IMPACT 3.4-4 (Alt.5) Fine Sediment and Nutrient Retention within the Study Area. *Alternative 5 would involve directly reducing the channel capacity and raising the streambed elevation in several subreaches to increase the frequency of overbanking, enlarge the area of functional active floodplain, and offset past natural geomorphic adjustments to historic disturbances. Implementing Alternative 5 would result in a substantial beneficial improvement in fine sediment and nutrient retention in the study area relative to the existing degraded condition. This effect would be* ***beneficial****.*

Similar to Alternatives 2 and 3, the channel would be lengthened, the bed profile would be raised, bank heights would be lowered, and channel capacity would be reduced under Alternative 5. The same changes in overbank frequency and duration and the enlarged active floodplain anticipated under Alternatives 2 and 3 also would result under Alternative 5. The same beneficial improvements to fine sediment and nutrient retention within the study area and reduction of pollutants released downstream expected under Alternatives 2 and 3 would result under Alternative 5.

Under Alternative 5, fine sediment and nutrient retention in the study area would be substantially improved relative to the existing degraded condition and would result in a beneficial reduction of these pollutants released downstream to the Upper Truckee River and Lake Tahoe. This effect would be beneficial.

No mitigation is required.

IMPACT 3.4-5 (Alt.5) Modifications in Upper Truckee River Coarse Sediment Transport and Delivery Downstream. *Alternative 5 would involve making major modifications to the channel bed profile, bank and bed materials, and hydraulic conditions controlling bedload (i.e., sands and gravel) transport within the study area and into the downstream reaches of the Upper Truckee River. Naturally declining watershed coarse sediment yield would continue and potentially would be worsened, particularly during the initial channel adjustment phase, with possible adverse effects on downstream channel erosion and beach erosion adjacent to the river mouth (e.g., at Cove East and Barton Beach). In the long term, climate change effects could either exacerbate or counteract present trends. The potential effect could range from worse than the existing degraded condition to a possible improvement. Any determination regarding climate change effects on coarse sediment transport and delivery downstream would be too speculative for a meaningful conclusion. Over the short term, implementing Alternative 5 would modify coarse sediment transport and deposition within various portions of the study area and likely would decrease coarse sediment delivery to downstream reaches. This impact would be* ***potentially significant****.*

Alternative 5 would involve making the same changes to the streambed profile, would involve making the same changes to streambank and streambed materials, and would be expected to experience the same channel adjustments as Alternatives 2 and 3. Implementing Alternative 5 would result in the same highly uncertain long-term effects on coarse sediment delivery downstream and local beach erosion as Alternatives 2 and 3, so any determination regarding these effects would be speculative. This long-term impact would be less than significant. Implementing this alternative would produce the same short-term reductions in coarse sediment discharged downstream. This short-term impact would be potentially significant.

Mitigation Measure 3.4-5 (Alt. 5): Monitor and Supplement Coarse Sediment Delivery Downstream.

This mitigation measure is identical to Mitigation Measure 3.4-5 (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measure 3.4-5 (Alt. 5), Impact 3.4-5 (Alt. 5) would be less than significant.

IMPACT 3.4-6 (Alt.5) Short-Term Risk of Surface Water or Groundwater Degradation during Construction. *Implementing Alternative 5 would require major or prolonged construction activities along or in the channel of the Upper Truckee River and sections of Angora Creek and the unnamed creek. Although temporary BMPs would be implemented, short-term risks of water quality degradation during construction could occur during each summer construction season or the intervening winters. Implementing Alternative 5 could result in short-term violations to the Basin Plan water quality standards, including turbidity due to construction implementation. This short-term impact would be* ***potentially significant****.*

Similar to Alternatives 2 and 3, Alternative 5 would require 3–4 years of seasonal construction (between May 1 and October 15), with winter closedowns, except for BMP maintenance and monitoring. Construction would disturb the active floodplain and the main channels of the Upper Truckee River, Angora Creek, and the unnamed creek, with similar phasing (see Table 2-10), access, staging, and storage (see Exhibit 2-13). However, Alternative 5 would not include construction of new golf course facilities west of the Upper Truckee River. Existing golf course facilities would be removed if operating a temporary 9-hole golf course is infeasible. If a 9-hole course is feasible it would be in a similar footprint as Alternative 3 until other uses of the SP and SRA were evaluated as part of a separate planning process.

As under Alternatives 2 and 3, permits and approvals from several entities would need to be obtained under Alternative 5, but the specific measures, performance standards, and enforcement elements required are not yet known. The same general construction management measures and general BMPs would be included as for Alternatives 2 and 3, with similar dewatering approaches and winterization needs. Similar to Alternatives 2 and 3, the probability of a large storm runoff or streamflow event that exceeds temporary capacity occurring during construction would not be reasonably foreseeable under Alternative 5.

Based on the conceptual information regarding proposed construction management under Alternative 5, it remains possible that violations of water quality standards could occur, at least for short periods during each summer's activities and/or over each intervening winter and snowmelt season. The effects could produce a violation of Section 5.2 of the Basin Plan, despite efforts to minimize risks. It is anticipated that State Parks would request an exemption for this potential violation of water quality standards from the Lahontan RWQCB as part of CWA compliance. However, for purposes of this analysis, any violation of any duration and extent would be potentially significantThe surface water and/or groundwater degradation caused by the risk of temporary turbidity increases could potentially be of a magnitude and duration that would impair beneficial uses of the Upper Truckee River, including visible turbidity that impairs aesthetic values or other potential effects on other beneficial uses. Impairment of beneficial uses would be expected to require considerably higher turbidity levels, orders of magnitude above the very low background NTU levels for the river. Regardless, the significance conclusion for this environmental document is based on the potential to violate the turbidity standard; therefore, the impact is potentially significant.

Mitigation Measure 3.4-6 (Alt. 5): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.4-6 (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measure 3.4-6 (Alt. 5), residual Impact 3.4-6 (Alt. 5) would remain significant and unavoidable.

IMPACT 3.4-7 (Alt.5) Short-Term Risk of Surface Water or Groundwater Degradation Following Construction. *Implementing Alternative 5 would require major or prolonged construction activities. Biotechnical streambank treatments and other revegetated areas could be vulnerable during a flood flow within the first few years following construction, and any of the proposed features would require a period of channel adjustment following construction to meet final design. Therefore, implementing Alternative 5 could result in potential short-term turbidity that violates the water quality standard in the Basin Plan (within 10 percent above natual background). This short-term impact would be* ***potentially significant****.*

Alternative 5 would have the same river channel impacts as Alternatives 2 and 3. Potential impacts from overbank and upland areas would be the similar to those under Alternative 3, but the extent of disturbance in the existing golf course (including active and 100-year floodplain) would be larger under Alternative 5. This impact is potentially significant.

Mitigation Measure 3.4-7A (Alt. 5): Minimize Fine Sediment and Organic Material Available for Mobilization.

This mitigation measure is identical to Mitigation Measure 3.4-7A (Alt. 2).

Mitigation Measure 3.4-7B (Alt. 5): Adaptively Manage Potential Flood Damage in the Interim Period after Construction.

This mitigation measure is identical to Mitigation Measure 3.4-7B (Alt. 2).

For the same reasons as described under Alternative 2, with implementation of Mitigation Measures 3.4-7A (Alt. 5) and 3.4-7B (Alt. 5), residual Impact 3.4-7 (Alt. 5) would remain significant and unavoidable.

IMPACT 3.4-8 (Alt.5) Risks of Surface Water and Groundwater Contamination from Golf Course Operations. *Alternative 5 would involve ultimately removing golf course land uses in SEZ and the need for land use buffers along all surface water bodies. Risks to surface water and groundwater contamination from golf course operations would be eliminated, with the exception of the clubhouse, maintenance, and parking facilities. During the future planning process, golf course conditions and operations similar to those under Alternative 3 may exist and produce temporary impacts similar to those of Alternative 3. The long-term effects would be beneficial relative to existing conditions and the No Project/No Action Alternative and all other action alternatives. This impact would be* ***less than significant****.*

Alternative 5 would involve removing the golf course, and all managed golf course landscaping in SEZ would be eliminated, aside from the clubhouse, maintenance, and parking facilities. Managed golf course landscaping would be entirely eliminated along the Upper Truckee River, Angora Creek, and the unnamed creek. However, long term use of the property and potential water quality impacts of those uses would be evaluated in a separate planning process based on input from this EIR/EIS/EIS. It can be expected that long-term irrigation and chemical use would be eliminated with the exception of areas surrounding the clubhouse. Risks related to maintenance vehicle operation along the river and crossing on golf course bridges would be eliminated. Operational risks related to the clubhouse, maintenance, and parking facilities would be similar to those under existing conditions and the No Project/No Action Alternative but could vary based on the interim and long-term uses of the facilities. During the additional planning efforts, it is possible that a temporary 9-hole golf course may remain in place, with similarities to the golf course layout under Alternative 3 but lacking updated or improved irrigation and drainage systems. Additionally, it is expected that the modified short-term and long-term use of the facilities under Alternative 5 would prompt the Lahontan RWQCB to revisit the facility's waste discharge permit and likely close the existing permit when golf course operations cease. Updating the monitoring and reporting requirements for a new permit for future uses may be necessary.

Implementing Alternative 5 would result in a long-term beneficial reduction in risks posed by the golf course layout and operations relative to those under existing conditions and the No Project/No Action Alternative or Alternatives 2 and 3. It is possible that short-term effects would be similar to those under Alternative 3. This impact would be less than significant.

No mitigation is required.

# 3.5 BIOLOGICAL RESOURCES (FISHERIES AND AQUATIC RESOURCES, VEGETATION, AND WILDLIFE)

This section describes the terrestrial and aquatic biological resources that are known or have the potential to occur in the study area. Biological resources include common vegetation, wildlife, and fisheries resources; sensitive plant communities; and special-status plant and animal species. Federal, State, and local regulations related to biological resources are summarized. Potential impacts of the proposed alternatives are analyzed, and mitigation measures are provided for those impacts determined to be significant. Consistency with TRPA goals and policies is presented in Section 3.2 Land Use, Table 3.2-1. Cumulative biological impacts are addressed in Section 3.16, "Cumulative Impacts." The project's effects on thresholds are described in Section 4.6, "Consequences for Environmental Threshold Carrying Capacities."

## 3.5.1 AFFECTED ENVIRONMENT

### REGULATORY SETTING

### Federal

#### *Federal Endangered Species Act*

The U.S. Fish and Wildlife Service (USFWS) has authority over projects that may result in take of a species listed as threatened or endangered under the Federal Endangered Species Act (ESA) of 1973 (Title 50, Part 17 of the Code of Federal Regulations [50 CFR 17]), as amended under the USFWS Mitigation Policy of 1956 (Title 16, Chapter 35, Section 1531 of the United States Code [16 USC 1531 et seq.], as well as those species that are designated by Region 1 of USFWS as species of concern. The ESA defines *take* as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (Public Law 93-205, as amended by Section 3 of Public Law 107-136 [16 USC 1532]). USFWS has also interpreted the definition of "harm" to include habitat modification that could result in take. If a project is likely to result in take of a Federally listed species, either an incidental take permit under ESA Section 10(a) or a Federal interagency consultation under ESA Section 7 is required before the take may occur. Such a permit typically requires various types of mitigation to compensate for or to minimize a take.

#### *Migratory Bird Treaty Act*

The Migratory Bird Treaty Act (MBTA), first enacted in 1918, implements domestically a series of international treaties that provide protection for migratory birds. It authorizes the Secretary of the Interior to regulate the taking of migratory birds and provides that it will be unlawful, except as permitted by regulations, to pursue, take, or kill any migratory bird, or any part, nest, or egg of any such bird (16 USC 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. (The current list of species protected by the MBTA can be found in CFR Title 50, Section 10.13 [50 CFR 10.13].)

#### *Bald and Golden Eagle Protection Act*

The Bald and Golden Eagle Protection Act, enacted in 1940 and amended multiple times since, prohibits the taking of bald and golden Eagles without a permit from the Secretary of the Interior. Similar to the ESA, the Bald and Golden Eagle Protection Act defines "take" to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" (16 USC 668-668c). For the purpose of the Act, disturbance that would injure an eagle, decrease productivity, or cause next abandonment, including habitat alterations that could have these results, are considered take and can result in civil or criminal penalties.

### *Section 404 of the Clean Water Act*

Section 404 of the Clean Water Act (CWA) establishes a requirement for a project applicant to obtain a permit before engaging in any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Under Section 404 of the CWA, the U.S. Army Corps of Engineers (USACE) regulates and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States. Fills of less than 0.5 acre of nontidal waters of the United States for residential, commercial, or institutional development projects can generally be authorized under USACE's nationwide permit (NWP) program, provided that the project satisfies the terms and conditions of the particular NWP. Fills that do not qualify for a NWP require a letter of permission or an individual permit.

In the Tahoe Basin the USACE has established a regional general permit to authorize certain activities with minimal individual and cumulative impacts on waters of the U.S. that are subject to extensive regulatory review by other agencies, such as the Lahontan Regional Water Quality Control Board and TRPA. Called Regional General Permit 16 (GP 16), this permit can be used to authorize fill for restoration of stream channels and wetlands, among other things. The current term of GP 16 ends September 30, 2010, but it can be renewed by the USACE.

### *U.S. Forest Service, Lake Tahoe Basin Management Unit*

The U.S. Forest Service (USFS) Lake Tahoe Basin Management Unit (LTBMU) manages nearly 80 percent of lands within the Tahoe Basin. The proposed project would not be implemented on LTBMU lands, and USFS has no regulatory authority over the project. However, LTBMU lands are adjacent to and minor lands within the study area, and biological resources there could be affected by project implementation.

Management of the USFS lands adjacent to or near the study area is guided by the LTBMU Forest Plan (USFS 1988), as amended by the *Sierra Nevada Forest Plan Amendment* (USFS 2004). According to the forest plan, USFS will do all of the following, in order of priority:

- protect and enhance water clarity and quality,
- protect threatened and endangered plant and animal species native to the area,
- preserve significant cultural resources,
- achieve air quality standards for health and visibility and prevent the adverse impacts of atmospheric deposition upon water quality,
- maintain viable populations of wildlife,
- achieve diverse vegetation communities, and
- enhance outdoor recreational opportunities.

More specific standards and guidelines for biological and other resources are described in detail in the record of decision for the *Sierra Nevada Forest Plan Amendment*. In addition, the LTBMU maintains a list of plants and animals designated as sensitive by the Regional Forester of USFS Region 5, and a list of management indicator species, that should be addressed when a project may affect LTBMU land.

## State

### *California Endangered Species Act*

The California Endangered Species Act (CESA) (California Fish and Game Code Section 2050 et seq.) requires that a project proponent obtain a permit from California Department of Fish and Game (CDFG) if the project could take a species that is State-listed as threatened or endangered. Section 2080 of CESA prohibits take of State-listed species without a permit. Under the CESA, *take* is defined as any activity that would directly or indirectly kill an individual of a species. This definition does not include "harm" or "harass," as the Federal definition does. As a result, the threshold for take is higher under the CESA than under the ESA (e.g., habitat modification is not necessarily considered take under the CESA). Under the CESA (Section 2081[b]), a permit is required for take of State-listed species incidental to otherwise lawful activities. Section 2081 authorizes the State to issue an incidental-take permit or to coordinate with USFWS during the Federal process so that the Federal permit will also cover State-listed species. For species that are listed under both the ESA and the CESA, a Federal Section 10(a) or Section 7 permit can suffice for a CESA incidental-take permit, if CDFG finds that the ESA permit is consistent with the requirements of the CESA.

CDFG is also concerned with the protection of species designated as California species of special concern and plants considered rare, threatened, or endangered by the California Native Plant Society (CNPS). These resources are not legally protected by the CESA, but impacts on these resources may be considered significant under the CEQA.

### *California Fish and Game Code—Fully Protected Species*

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species. CDFG is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. CDFG has informed non-Federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

### *California Fish and Game Code Section 1602—Streambed Alterations*

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California are subject to regulation by CDFG under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by CDFG, or to use any material from the streambeds, without first notifying CDFG of such activity. *Stream* is defined as a body of water that flows at least periodically or intermittently through a bed or channel with banks. This includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFG streambed alteration agreement must be obtained for any project that would affect a river, stream, lake, or its adjacent riparian vegetation.

### *California Fish and Game Code Sections 3503–3503.5—Protection of Bird Nests and Raptors*

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., hawks, owls, eagles, and falcons), including their nests or eggs. Typical violations of these codes include destroying active nests by removing the vegetation in which the nests are located. Disturbance of nesting pairs by nearby project construction that results in the failure of active raptor nests could also violate Section 3503.5.

### *Section 401 Water Quality Certification/Porter-Cologne Water Quality Control Act*

Under Section 401 of the CWA, an applicant for a Section 404 permit must obtain a certificate from the appropriate State agency, stating that the intended dredging or filling activity is consistent with the State's water quality standards and criteria. In California, the authority to grant water quality certification is delegated by the State Water Resources Control Board to the nine regional water quality control boards (RWQCBs). Each of the RWQCBs must prepare and periodically update a basin plan for water quality control in accordance with the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) (California Water Code Section 13000 et seq.). Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to protect wetlands by establishing water quality objectives. Under the Porter-Cologne Act, wetlands and drainages that are considered waters of the United States by USACE are often classified as waters of the State, as well. The applicable water quality standards and control measures for the proposed project are discussed in Section 3.4, "Geomorphology and Water Quality."

### *Lake Valley State Recreation Area General Plan*

The *Lake Valley State Recreation Area General Plan*, established in 1988, sets forth policies regarding the management of natural resources at Lake Valley SRA. The purpose of Lake Valley SRA is to make available an 18-hole golf course and the scenic Upper Truckee River and its environs for the enjoyment and inspiration of the public. The management program includes development and maintenance of a stream management sensitivity zone, a river management plan, a natural resource management element of the golf course management plan for ecological resources, and a water quality monitoring program. The policies call for the management of plant communities in undeveloped areas and along the Upper Truckee River to reestablish normal successional trends and for systematic surveys of rare and endangered plants before any development in the Lake Valley SRA. Policies require that altered natural habitats that are to remain undeveloped will be restored to natural conditions and that an aquatic life habitat enhancement program will be implemented for the Upper Truckee River and Angora Creek within the Lake Valley SRA.

## Tahoe Regional Planning Agency

TRPA implements its authority to regulate growth and development in the Lake Tahoe region through the Regional Plan. TRPA's *Regional Plan* includes the following documents: environmental threshold carrying capacities (adopted in 1982 and evaluated every 5 years since 1991), Goals and Policies (September 1986 and updated), Regional Transportation Plan—Air Quality Plan (1992), Water Quality Management Plan (1988), Scenic Quality Improvement Program (1989), Plan Area Statements (August 1987 and updated), and Code of Ordinances (May 1987 and updated).

### *1987 Regional Plan*

The 1987 Regional Plan had a 20-year scope and is currently being reviewed and updated through a collaborative effort lead by TRPA. These agencies are working together to update several important environmental documents for the Tahoe Basin. These Regional Plan updates will guide land management, resource management, and environmental regulations in the Tahoe Basin over the next 20 years. The Regional Plan update is anticipated to be completed by 2011.

#### Regional Plan Goals and Policies

The Conservation Element (Chapter IV) of the TRPA Goals and Policies establishes goals for the preservation, development, utilization, and management of natural resources within the Tahoe Basin (TRPA 2004a). These policies and goals are designed to achieve and maintain adopted environmental threshold carrying capacities and are implemented through the TRPA Code of Ordinances.

The Conservation Element includes 10 subelements that address the range of Lake Tahoe's natural and historical resources. The Vegetation, Wildlife, and Stream Environment Zone (SEZ) Subelements are discussed in this section, and the goals related to each of these subelements are identified below.

Chapter IV of the Goals and Policies identifies the following five goals for vegetation:

- provide for a wide mix and increased diversity of plant communities;
- provide for maintenance and restoration of such unique ecosystems as wetlands, meadows, and other riparian vegetation;
- conserve threatened, endangered, and sensitive plant species and uncommon plant communities;
- provide for and increase the amount of late seral/old-growth stands; and
- retain appropriate stocking level and distribution of snags and coarse woody debris in the region's forests to provide habitat for organisms that depend on such features and to perpetuate natural ecological processes.

The two goals identified for wildlife are as follows:

- maintain suitable habitats for all indigenous species of wildlife without preference to game or nongame species through maintenance of habitat diversity; and
- preserve, enhance, and where feasible, expand habitats essential for threatened, endangered, rare, or sensitive species found in the Basin.

The goal identified for fisheries is:

- improve aquatic habitat essential for the growth, reproduction, and perpetuation of existing and threatened fish resources in the Lake Tahoe basin.

The goal identified for SEZs is:

- provide for the long-term preservation and restoration of stream environment zones.

In addition to these broader goals identified within the Conservation Element, special attainment goals have been developed to further focus management efforts and provide a measure of progress. These attainment goals are defined by the TRPA thresholds. The Conservation Element specifically identifies several attainment goals or thresholds for certain vegetation and wildlife resources. TRPA thresholds are discussed in the "TRPA Environmental Threshold Carrying Capacities" section below.

### *Code of Ordinances*

The applicable provisions of the TRPA Code of Ordinances regarding vegetation, wildlife, and fisheries are summarized below.

#### Protection and Management of Vegetation

The Code of Ordinances requires the protection and maintenance of all native vegetation types. Chapter 74, "Vegetation Protection and Management," provides for the protection of stream environment zone (SEZ) vegetation, other common vegetation, uncommon vegetation, and sensitive plants in SEZs (TRPA 2004b). TRPA defines an SEZ as an area that owes its biological and physical characteristics to the presence of surface water or groundwater. The term SEZ includes perennial, intermittent, or ephemeral streams; meadows and marshes; and

other areas with near-surface water influence within the Tahoe Basin. No project or activity may be implemented within the boundaries of a SEZ except as otherwise permitted for habitat improvement, dispersed recreation, vegetation management, or as provided in Chapter 20, "Land Coverage Standards," of the Code of Ordinances. TRPA can require the preparation and implementation of a remedial vegetation management plan, where the need has been identified, for the purposes of environmental threshold maintenance or attainment. In addition, Chapter 77, "Revegetation," specifies policies for revegetation programs.

### Protection of Sensitive and Uncommon Plants

Chapter 75, "Sensitive and Uncommon Plant Protection and Fire Hazard Reduction," of the TRPA Code of Ordinances establishes standards for preserving and managing sensitive plants and uncommon plant communities; these plants and communities are referenced below in "Environmental Threshold Carrying Capacities." Projects and activities that are likely to harm, destroy, or otherwise jeopardize sensitive plants or their habitat must fully mitigate their significant adverse effects. Measures to protect sensitive plants and their habitat include:

- fencing to enclose individual populations or habitat,
- restricting access or intensity of use,
- modifying project design as necessary to avoid adverse impacts,
- dedicating open space to include entire areas of suitable habitat, or
- restoring disturbed habitat.

### Tree Removal

TRPA regulates the management of forest resources in the Tahoe Basin to achieve and maintain the environmental thresholds for species and structural diversity, to promote the long-term health of the resources, and to create and maintain suitable habitats for diverse wildlife species. Provisions for tree removal are provided in Chapter 71, "Tree Removal," and Chapters 30, "Design Standards"; 65, "Vegetation Protection During Construction"; 75, "Sensitive and Uncommon Plant Protection and Fire Hazard Reduction"; and 77, "Revegetation," of the TRPA Code of Ordinances, and tree removal requires the review and approval by TRPA (TRPA 2004b).

Project proponents must obtain a tree removal permit from TRPA for cutting of live trees greater than 14 inches diameter at breast height (DBH). (At its November 2007 meeting, the TRPA Governing Board approved an increase in the tree-diameter threshold for a permit from 6 inches to 14 inches; the revised ordinance that reflects this change is presently in effect [Thayer, pers. comm., 2008].) However, trees of any size marked as a fire hazard by a fire protection district or fire department that operates under a memorandum of understanding with TRPA can be removed without a separate tree permit.

Trees greater than 30 inches DBH must be retained, except under circumstances specified in the Code of Ordinances. As stated in Sections 71 and 71.2.B of the TRPA Code of Ordinances:

> Within the non-SEZ urban area, individual trees larger than 30 inches DBH that are healthy and sound will be retained as desirable specimen trees having aesthetic and wildlife value, unless: (1) all reasonable alternatives are not feasible to retain the tree, including reduction of parking areas or modification of the original design; or (2) paragraphs 71.2.A(1), 71.2.A(2), 71.2.A(3), 71.2.A(7), 71.2.A(8), or 71.2.A(9) can be applied.

In addition, trees and vegetation not scheduled to be removed must be protected during construction in accordance with Chapter 65, "Vegetation Protection During Construction," of the TRPA Code of Ordinances.

If a project would result in substantial tree removal (as defined by TRPA Code Section 71.4.I), a tree removal or harvest plan must be prepared by a qualified forester. The required elements of this plan, and TRPA's review process for tree removal plans, are described in Chapter 71 (Section 71.3.B) of the Code of Ordinances.

The Code of Ordinances (Chapter 78) also provides quantitative requirements for snag and coarse woody debris retention and protection by forest type, in terms of size, density, and decay class.

### Wildlife

TRPA sets standards for preserving and managing wildlife habitats, with special emphasis on protecting or increasing habitats of special significance, such as deciduous trees, wetlands, meadows, and riparian areas (TRPA Code of Ordinances, Chapter 78). Specific habitats that are protected include riparian areas, wetlands, and SEZs; wildlife movement and migration corridors; important habitat for any species of concern; critical habitat necessary for the survival of any species; nesting habitat for raptors and waterfowl; fawning habitat for deer; and snags and coarse woody debris. In addition, TRPA special-interest species (also referred to as "threshold species"), which are locally important because of rarity or other public interest, and species listed under the ESA or CESA are protected from habitat disturbance by conflicting land uses.

TRPA special-interest wildlife species are northern goshawk (*Accipiter gentilis*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus anatum*), mule deer (*Odocoileus hemionus*), and waterfowl species.

The TRPA Code of Ordinances includes the following requirements for protection of wildlife movement and migration corridors:

- SEZs adjoining creeks and major drainages that link islands of habitat will be managed, in part, for use by wildlife as movement corridors. Structures, such as bridges, proposed within these movement corridors will be designed to avoid impairment of wildlife movement.

- Projects and activities in the vicinity of deer migration areas will be required to mitigate or avoid significant adverse impacts.

The Code of Ordinances also contains several provisions regarding critical habitat. TRPA defines critical habitat as any element of the overall habitat for any species of concern that, if diminished, could reduce the existing population or impair the stability or viability of the population. This applies also to habitat for special-interest species native to the Tahoe Basin whose breeding populations have been extirpated, but could return or be reintroduced. The Code of Ordinances includes the following critical-habitat provisions:

- No project or activity will cause, or threaten to cause, the loss of any habitat component considered critical to the survival of a particular wildlife species.

- No project or activity will threaten, damage, or destroy nesting habitat of raptors and waterfowl or fawning habitat of deer.

- Wetlands will be preserved and managed for their ecological significance, including their value as nursery habitat to fishes, nesting and resting sites for waterfowl, and as a source of stream recharge, except as permitted pursuant to Chapter 20 of the Code of Ordinances.

- No project or activity will be implemented within the boundaries of a SEZ except as otherwise permitted for habitat improvement, dispersed recreation, vegetation management, or as provided in Chapter 20 of the Code of Ordinances.

### Fish Resources

Chapter 79, "Fish Resources," of the TRPA Code of Ordinances includes provisions for the protection of fish habitat and the enhancement of degraded habitat. For instream habitats, protection provisions include prohibiting stream channel alterations, facilitating fish movement at stream crossings, removing barriers to fish movement,

mitigating impacts on fish habitat from development, maintaining instream flows, preventing sediment entry into the stream system, and encouraging native vegetative cover.

The maintenance of essential habitat serves as the fisheries management emphasis for the Conservation Element of TRPA's Goals and Policies (TRPA 2004a). The first goal of the Conservation Element fisheries is to "improve aquatic habitat essential for the growth, reproduction and perpetuation of existing and threatened fish resources in the Lake Tahoe Basin." For streams within the Tahoe Basin, management focus is on the quality and quantity of habitat provided for fish species, including spawning and rearing habitat, food supply, and cover. The Conservation Element identifies the following five attainment policies related to instream fish habitat:

- Development proposals affecting streams, lakes, and adjacent lands will evaluate impacts on the fishery.
- Unnatural blockages and other impediments to fish movement will be prohibited and removed wherever appropriate.
- Habitat improvement projects in streams and lakes will be encouraged.
- Instream flows will be maintained or enhanced.
- State and Federal efforts to reintroduce Lahontan cutthroat trout will be supported.

### *Environmental Threshold Carrying Capacities*

TRPA thresholds have been established for water quality, air quality, scenic resources, soil conservation, fish, vegetation, wildlife, noise, and recreation. TRPA cannot approve projects that would cause a significant adverse effect on a threshold area without appropriate mitigation. As mentioned above, every 5 years TRPA conducts a comprehensive reevaluation to determine whether each threshold is being achieved and/or maintained, creates specific recommendations to address problem areas, and directs general planning efforts for the next 5-year period. The most recent threshold evaluation was completed in 2006 (TRPA 2007). However, changes to the threshold standards that were recommended in the most recent evaluation report have not yet been adopted.

The adopted TRPA thresholds for vegetation, wildlife, and fisheries are listed below, and Table 3.5-1 summarizes the 2006 attainment status for these thresholds (TRPA 2007).

#### V-1—Common Vegetation

Increase plant and structural diversity of forest communities through appropriate management practices as measured by diversity indices of species richness, relative abundance, and pattern by using the following indicators:

- provide for the perpetuation of yellow pine forest, red fir forest, subalpine forest, shrub associations, sagebrush scrub, deciduous riparian, meadow associations, wetland associations, cushion plant association;
- maintain at least 4 percent meadow and wetland vegetation, 4 percent deciduous riparian vegetation;
- maintain no more than 25 percent dominant shrub vegetation;
- maintain 15–25 percent of the yellow pine forest in seral stages other than mature;
- maintain 15–25 percent of the red fir forest in seral stages other than mature;
- limit acreage size of new forest openings to no more than 8 acres; and

- ensure that adjacent forest openings are not of the same relative age class or successional stage.

### V-2—Uncommon Plant Communities

Provide for the nondegradation of the natural qualities of any plant community that is uncommon to the Tahoe Basin or of exceptional scientific, ecological, or scenic value. This threshold will apply but not be limited to the deep-water plants of Lake Tahoe, Grass Lake (sphagnum fen), Osgood Swamp, the Freel Peak Cushion Plant Community, Hell Hole (sphagnum fen), Upper Truckee Marsh, Taylor Creek Marsh, and Pope Marsh.

### V-3—Sensitive Plants

Maintain the following minimum number of population sites for TRPA special-interest plant species: Galena Creek rockcress (*Arabis rigidissima* var. *demota*) (seven sites); long-petaled lewisia (*Lewisia longipetala*) (two sites); Cup Lake draba (*Draba asterophora* var. *macrocarpa*) (two sites); Tahoe draba (*Draba asterophora* var. *asterophora*) (five sites); and Tahoe yellow cress (*Rorippa subumbellata*) (26 sites).

### V-4—Late Seral/Old-Growth Ecosystems

Attain and maintain a minimum percentage of 55 percent by area of forested lands within the Tahoe Basin in a late seral or old-growth condition, and distributed across elevation zones. Forested lands within TRPA-designated urban areas are excluded in the calculations for threshold attainment.

### W-1—Wildlife Species of Special Interest

Provide a minimum number of population sites for six TRPA special-interest wildlife taxa: northern goshawk (12 sites); osprey (four sites); bald eagle (two winter sites and one nesting site); golden eagle (four sites); peregrine falcon (two sites); and waterfowl (18 sites). Mule deer is also a special-interest species; however, no threshold site number for deer has been specified. Perching and nesting sites of special-interest bird species will not be physically disturbed. TRPA maintains a nondegradation standard within buffer zones ("disturbance zones") around nest sites of these species. In areas outside existing urban areas, projects or land uses within the disturbance zones will not, directly or indirectly, significantly affect the habitat or cause the displacement or extirpation of the population. Habitat within disturbance zones will not be manipulated in any manner, except for habitat enhancement. The disturbance zone for northern goshawk and bald eagle is a 0.5-mile radius around each nest site; the disturbance zone for osprey, peregrine falcon, and golden eagle is a 0.25-mile radius around each nest site. TRPA has also mapped disturbance zones for wintering bald eagles. Disturbance zones for deer are meadows.

The nondegradation standard in wildlife disturbance zones does not apply to situations where these species select areas in proximity to existing developed parcels.

### W-2—Habitats of Special Significance

Apply a nondegradation standard to habitats consisting of deciduous trees, wetlands, and meadows (i.e., riparian, wetland, and meadow habitats) while providing for opportunities to increase the acreage of such riparian associations. This includes but is not limited to preserving existing natural functioning SEZ lands in their natural hydrologic condition, restoring all disturbed SEZ lands in undeveloped, unsubdivided lands, and restoring 25 percent of the SEZ lands that have been identified as disturbed, developed, or subdivided, to attain a 5 percent total increase in the naturally functioning SEZ land.

### F-1—Lake Habitat

Apply a nondegradation standard to fish habitat in Lake Tahoe. Achieve the equivalent of 5,948 total acres of excellent (prime) habitat.

### F-2—Stream Habitat

Maintain 75 miles of excellent, 105 miles of good, and 38 miles of marginal stream habitat, as indicated by the map on page 76 of the EIS for the Establishment of Environmental Thresholds.

### F-3—Instream Flow

Until instream flow standards are established in the Regional Plan to protect fishery values, a nondegradation standard will apply to instream flows.

### F-4—Lahontan Cutthroat Trout

Support, in response to justifiable evidence, State and Federal efforts to reintroduce Lahontan cutthroat trout.

**Table 3.5-1**
**TRPA Vegetation and Wildlife Resource Thresholds and Their Attainment Status**

| TRPA Threshold | 2006 Attainment Status |
|---|---|
| **Vegetation** | |
| V-1 Common Vegetation | Nonattainment |
| V-2 Uncommon Plant Communities | Attainment |
| V-3 Sensitive Plants | Attainment |
| V-4 Late Seral/Old-Growth Ecosystems | Nonattainment |
| **Wildlife** | |
| W-1 Special-Interest Species—Northern Goshawk | Nonattainment, Near Attainment |
| W-1 Special-Interest Species—Osprey | Attainment |
| W-1 Special-Interest Species—Bald Eagle–Nesting | Nonattainment |
| W-1 Special-Interest Species—Bald Eagle–Wintering | Nonattainment, Near Attainment |
| W-1 Special-Interest Species—Golden Eagle | Unknown |
| W-1 Special-Interest Species—Peregrine Falcon | Unknown |
| W-1 Special-Interest Species—Waterfowl | Nonattainment |
| W-1 Special-Interest Species—Deer | Nonattainment |
| W-2 Habitats of Special Significance | Nonattainment |
| **Fisheries** | |
| F-1—Lake Habitat | Non Attainment, but Near Attainment |
| F-2—Stream Habitat | Unknown |
| F-3—Instream Flow | Attainment |
| F-4—Lahontan Cutthroat Trout | Attainment |

Note: TPRA = Tahoe Regional Planning Agency
Source: TRPA 2007

## ENVIRONMENTAL SETTING

To evaluate and describe the presence and quality of common and sensitive biological resources in the study area, and to identify potential effects of project implementation on those resources, field surveys of the study area were conducted and the following data sources were reviewed:

- *Riparian Ecosystem Restoration Feasibility Report* for the project reach (River Run Consulting 2006);
- Memoranda and survey reports on wildlife resources from State Parks personnel and contractors (Fields, pers. comms., 2005a, 2005b, 2005c, 2006, 2007a, 2007b, 2008; Wildlife Resource Consultants 2007, 2008a, 2008b);
- Communications with botanist, Adrian Juncosa (consultant who performed vegetation mapping and surveys of Washoe Meadows SP and Lake Valley SRA) (Juncosa, pers. comm., 2006);
- TRPA Code of Ordinances (TRPA 2004a);
- The TRPA *2006 Threshold Evaluation Report*: Chapter 5, "Vegetation"; Chapter 6, "Fisheries"; and Chapter 7, "Wildlife" (TRPA 2007);
- CDFG's California Natural Diversity Database (CNDDB 2008);
- CNPS's Electronic Inventory (CNPS 2007);
- *List of Endangered and Threatened Species that May be Affected by Projects in the Lake Tahoe Basin* (USFWS 2008);
- *Wildlife Inventory and Monitoring in the Lake Tahoe Basin, California: Pre-Restoration* (Borgmann and Morrison 2004);
- *Riparian Biological Diversity in the Lake Tahoe Basin* (Manley and Schlesinger 2001);
- *Lake Tahoe Watershed Assessment* (Murphy and Knopp 2000); and
- *Vegetation Monitoring Report for the Upper Truckee River Restoration and Golf Course Relocation Project* (UC Davis Center for Plant Diversity 2007).

Wildlife biologists and botanists conducted reconnaissance-level field surveys in the study area to identify vegetation and wildlife resources. Also, a focused aquatic resource assessment was conducted by aquatic biologists; this assessment included stream habitat typing, snorkel surveys, and bioassessment.

The following sections describe the vegetation types, primary terrestrial and aquatic habitat functions provided, and sensitive biological resources in the study area.

### Vegetation

The study area is characterized by a continuum of plant associations and developed land cover types, ranging from golf course, meadow, and riparian areas along the Upper Truckee River to predominantly conifer forest at the highest elevations. Vegetation types in the study area were mapped and described by River Run Consulting in the *Riparian Ecosystem Restoration Feasibility Report* (2006). The vegetation map was verified by botanists during reconnaissance-level field surveys conducted on July 18 and 19, 2006.

The vegetation types, originally described by River Run Consulting (2006), are summarized below and illustrated in Exhibit 3.5-1. The vegetation names are those used by River Run Consulting.

Vegetation in the study area is managed by State Parks for a variety of fuels management, forest health, and riparian/hardwood management goals. For example, as part of the Lake Sector Wildfire Management Plan, State Parks has treated much of the study area for fuels reduction. Additional treatments may be implemented in the future to further reduce fuels in some areas (Walck, pers. comm., 2010). Also, State Parks is currently implementing a Riparian Hardwood Restoration Project funded through a grant from the Reclamation on State Park land, including Washoe Meadows SP and Lake Valley SRA. The Riparian Hardwood Restoration Project involves removal of lodgepole pines along the maintenance road and adjacent to the Upper Truckee River; it should be completed within the study area prior to implementation of the proposed project.

### *Lodgepole Pine–Dry Type Forest and Lodgepole Pine–Mesic Type Forest*

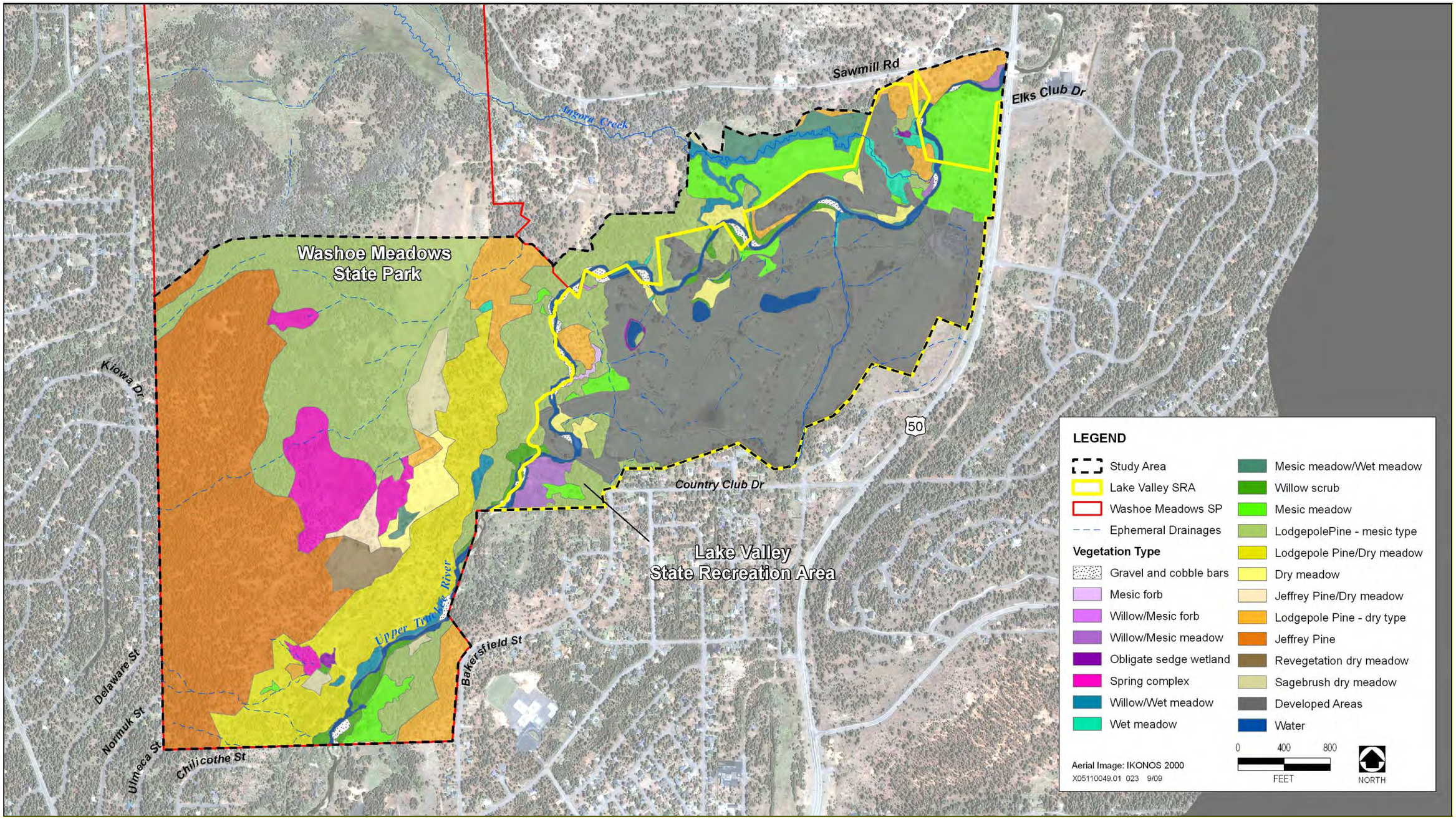
Lodgepole pine forest occupies approximately 185 acres of the study area. This vegetation type is dominated by lodgepole pine (*Pinus contorta* ssp. *murrayana*) with occasional white fir (*Abies concolor*) and Jeffrey pine (*P. jeffreyi*). The forest canopy structure ranges from open to dense. Where the canopy is more open, scattered shrubs are present. The cover and species composition of the herbaceous layer are highly variable. The distinction between lodgepole pine–dry type forest and lodgepole pine–mesic type forest is based on the shrub and herbaceous layers. The shrub layer of lodgepole pine–dry type forest usually is sparse and consists of upland species such as wax currant (*Ribes cereum*), mountain whitethorn (*Ceanothus cordulatus*), and mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*). In lodgepole pine–mesic type forest, the shrub layer may not be present and is limited to riparian species such as willow (*Salix* spp.) that persist along small, abandoned channels. The herbaceous layer of lodgepole pine–dry type forest is dominated by upland grasses such as blue wildrye (*Elymus glaucus*), Kentucky bluegrass (*Poa pratensis*), mountain brome (*Bromus carinatus)*, squirreltail (*Elymus elymoides*), and/or needlegrass (*Achnatherum* spp.). Nongrasses, such as Torrey's monkeyflower (*Mimulus torreyi*), Torrey's popcornflower (*Plagiobothrys torreyi* var. *diffusa*), and whiskerbrush (*Linanthus ciliatus*), also are present. The lodgepole pine–mesic type forest has an herbaceous layer dominated by nongrasses, such as fireweed (*Epilobium angustifolium*), cow parsnip (*Heracleum lanatum*), false Solomon's seal (*Smilacina stellata*), meadow-rue (*Thalictrum fendleri*), and corn lily (*Veratrum californicum*).

### *Jeffrey Pine Forest*

Jeffrey pine forest occupies approximately 95 acres of the study area. This vegetation type is present primarily in the western portion of the study area, away from the immediate vicinity of the Upper Truckee River. The forest canopy has variable-age pine trees, some exceeding 30 inches DBH. The majority of the canopy trees are Jeffrey pine; a small portion of the canopy is lodgepole pine and white fir. The boundary between the lodgepole pine–dry type forest (described above) and the Jeffrey pine forest is indistinct. Along the eastern edge of the area mapped as Jeffrey pine forest, the forest has a more significant lodgepole pine component. The subcanopy and understory of Jeffrey pine forest lacks the solid shrub layer that is seen in some other mixed coniferous forest communities in the Tahoe Basin. The Jeffrey pine forest herb layer also is sparse. Species composition of the shrub and herbaceous understory layers is similar to that of the lodgepole pine–dry type forest (described above) and dry meadow (described below).

### *Willow Scrub*

Willow scrub occupies approximately 17 acres of the study area. Willow scrub is present interspersed with mesic and wet meadow vegetation, and on depositional bars. Willow species present in the study area include Lemmon's willow (*Salix lemmonii*), Geyer's willow (*S. geyeriana*), and Pacific willow (*S. lucida* ssp. *lasiandra*). Mountain alder (*Alnus incana* ssp. *tenuifolia*) also is present in willow scrub. Herbaceous species present in willow scrub in the study area are essentially the same as those associated with the mesic forb and wet meadow vegetation types (described below).




Source: California State Parks 2008 (amended by EDAW (now AECOM) Botanists September 2009)

**Vegetation Types in the Study Area** **Exhibit 3.5-1**

### *Dry Meadow*

Dry meadow occupies approximately 10 acres of the study area. Dry meadow is an herbaceous plant community that is dominated by upland plant species present throughout the study area. Sometimes dry meadow is interspersed with the mesic meadow plant community described below. Scattered trees, primarily lodgepole pine, are present in most areas mapped as dry meadow; however, the habitat and restoration planning value of these areas is primarily meadow, not woodland. Dry-meadow habitat is structurally different from the habitat of other meadow types, with much lower vegetative cover than those types discussed below. Consequently, this community type is highly susceptible to both small-scale surface erosion that results from intense precipitation and large-scale erosion that results when channels become reoriented through previously unflooded areas. The species composition of this community is somewhat variable, depending on its ecological history. Typical dominant species of dry meadow in the study area are squirreltail, mountain brome, Ross' sedge (*Carex rossii*), brown sedge (*C. subfusca*), dwarf lupine (*Lupinus lepidus*), groundsmoke (*Gayophytum* spp.), and needlegrass (*Achnatherum* spp.).

### *Revegetation Dry Meadow*

Revegetation dry meadow is ecologically and structurally similar to dry meadow described above; however, it occurs in areas that have experienced surface disturbance and have been revegetated using species that are not native to the Tahoe Basin. Revegetation dry meadow is present at two locations in the study area and occupies a total of approximately 4.5 acres. During the long time that has passed since these areas were revegetated, they have been colonized by many of the dry-meadow species. However, revegetation dry meadow usually is dominated by nonnative soil stabilization species such as orchard grass (*Dactylis glomerata*), smooth brome (*Bromus inermis*), hard fescue (*Festuca trachyphylla*), and pubescent wheatgrass (*Elytrigia intermedia*).

### *Sagebrush Dry Meadow*

Sagebrush dry meadow occupies approximately 7.3 acres and is present in openings among dry lodgepole and Jeffrey pine forests in the western half of the study area. This sagebrush dry meadow is a mixture of scrub and meadow vegetation, with somewhat lower shrub cover than is typical of the sagebrush dry-meadow vegetation type. Some scattered trees are present in sagebrush dry meadow; however, the habitat values are scrub and meadow rather than woodland. The species composition of sagebrush dry meadow is the same as that described for dry meadow, except that mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is dominant and species that are sometimes found in wetlands such as Kentucky bluegrass and blue wildrye are rare or absent. Other characteristic herbaceous species present in sagebrush dry meadow are dwarf lupine, dusky horkelia (*Horkelia fusca*), and naked buckwheat (*Eriogonum nudum*).

### *Mesic Forb*

Mesic forb vegetation occupies approximately 0.4 acre and is found interspersed with other wetland communities throughout the study area. Mesic forb is a dense, herbaceous, wetland vegetation type, generally with 90–100 percent cover and a relatively diverse assemblage of plants. Typical species present in mesic forb include corn lily, bigleaf lupine (*Lupinus polyphyllus*), meadow-rue, cow parsnip, western polemonium (*Polemonium occidentale*), arrowleaf groundsel (*Senecio triangularis*), false Solomon's seal (*Smilacina stellata*), shooting star (*Dodecatheon jeffreyi*), and large-leaf avens (*Geum macrophyllum*). Depending on soil moisture regime, Kentucky bluegrass, blue wildrye, sedges (*Carex* spp.), and/or rushes (*Juncus* spp.) also may be present as a small component of the total vegetative cover.

### *Mesic Meadow*

Mesic meadow occupies approximately 26.2 acres of the study area, in patches ranging from large openings of many acres to small patches interspersed with willow scrub. Mesic meadow is characterized by grasses, sedges, and rushes and has a relatively high vegetative cover (70–80 percent). Dominants include both upland and

wetland species, such as Kentucky bluegrass, yarrow (*Achillea millefolium*), brown sedge (*Carex subfusca*), slender cinquefoil (*Potentilla gracilis*), checkerbloom (*Sidalcea oregana*), meadow beardtongue (*Penstemon rydbergii* var. *oreocharis*), Baltic rush (*Juncus balticus*) and dwarf lupine. Because species composition includes plants with a range of wetland indicator statuses, areas of mesic meadow may be delineated as upland or jurisdictional wetland. Because its dominant plants have fibrous roots as well as rhizomes (creeping surface and subsurface stems bearing leaves or shoots), areas of mesic meadow with high cover are relatively resistant to erosion.

Many occurrences of mesic meadow are actually dewatered wet meadow (described below); however, wetland dominants such as Baltic rush and Nebraska sedge (*Carex nebrascensis*) are abundant, although they are not vigorous, usually flowering little or not at all. An important difference between the two meadow types is that mesic meadow is susceptible to invasion by lodgepole pine, whereas wet meadow is not. In addition, mesic meadow is too dry to allow establishment of vigorous willow clumps. Ecologically, both mesic meadow and wet meadow are similar to willow scrub. Consequently, wet/mesic meadow and willow scrub vegetation usually occur as mixed mosaics.

### *Wet Meadow*

Wet meadow occupies approximately 2.7 acres and is found in small patches throughout the study area. Wet meadow has higher vegetative cover than mesic meadow (95–100 percent). Consequently, this community has the highest erosion resistance of all herbaceous-dominated vegetation types in the study area. Wet meadow that is located away from the river channel is dominated by Nebraska sedge, Baltic rush, checkerbloom, tufted hairgrass (*Deschampsia caespitosa*), and meadow beardtongue. Wet meadow that is adjacent to the river channel is dominated by fowl bluegrass (*Poa palustris*) and Sierra rush (*Juncus nevadensis*). Most wet meadow also includes some proportion of one or more upland species, such as meadow foxtail (*Alopecurus pratensis*), Kentucky bluegrass, yarrow, dandelion (*Taraxacum officinale*), or Lemmon's yampah (*Perideridia lemmonii*).

### *Obligate Sedge Wetland*

Obligate sedge wetland occupies approximately 0.8 acre and is found in small patches throughout the study area. Obligate sedge wetland occurs primarily in depressions on floodplains or in areas where springs supply perennial surface saturation. Structurally almost identical to wet meadow, this vegetation type features a dense rhizome and root turf; it is distinguished from wet meadow by its much lower species diversity, typically dominated by beaked sedge (*Carex utriculata*), Nebraska sedge, water sedge (*C. aquatilis*), and/or blister sedge (*C. vesicaria*).

### *Gravel/Cobble Bar*

Gravel and cobble bar vegetation is present on recently deposited sediment bars within the study area. The surface of the deposited sediment bar is covered by either cobble-sized particles or sand and gravel. Vegetation on the bars is variable. Species that may be present include Lemmon's and Geyer's willows, sedges, fowl bluegrass, Sierra rush, goldenrod (*Solidago canadensis*), dwarf lupine, and common pepperweed (*Lepidium densiflorum*).

### *Spring Complexes (Including Fens)*

Four areas located in the southwest portion of the study area have been mapped as spring complexes. These complexes include: (1) a large undisturbed fen area within Washoe Meadows SP; (2) a groundwater-supported wetland mosaic in the old quarry (located on the quarry high wall and part of the pit floor on the west side of the quarry), adjacent to and east of the large fen; (3) a smaller fen located approximately 1,000 feet north of the large fen; and (4) a spring and associated wetland vegetation at the south end of the park within the study area. The wetland mosaic in the old quarry receives drainage from the large fen and groundwater to the west. This wetland mosaic apparently was created by an old borrow pit cut into the hillside intercepting the water table, which drains into the old pit floor. The wetlands that comprise this complex are distributed on both the quarry high wall and the disturbed pit floor. The disturbed wetlands on the pit floor also receive surface runoff directly from the large fen

to the west via a small rivulet. The vegetation type in this mosaic is a stable matrix of obligate sedge wetland, mesic forb, and lodgepole pine vegetation.

Areas mapped as spring complex are composed of wetlands that are supported by groundwater, where the groundwater is sufficiently significant to support distinctive vegetation communities. These areas are of particular biological importance for species diversity because they support a number of plant species that are not found in other wetland types within the study area, including some that are considered special-status species (see discussion of special-status species that follows).

### *Developed Areas*

Golf course areas designated as developed in Exhibit 3.5-1 feature soils or vegetation that have been substantially disturbed or altered such as fairways, greens, golf cart paths, buildings, or gravel and dirt roads. The landscape management approach for this area is discussed further in Chapter 2, "Projects Alternatives".

### *Vegetation Mosaics*

Several locations in the study area are depicted on the vegetation map as mosaics of multiple units of the previously described vegetation. In the Tahoe Basin, shrub-dominated communities and herbaceous communities commonly occur in tandem. It is neither practical nor useful to map such communities separately. A vegetation mosaic can have different wildlife habitat values than when one of its representative community types occurs alone. Some mixed types represent areas where the vegetation is merely intermediate, for example, Mesic meadow/wet meadow. Others represent stable long-term types that are the result of the normal geomorphic process, such as willow scrub/wet meadow.

### *Nonnative Invasive Species*

An extensive weed survey has not been conducted for the Lake Valley SRA or Washoe Meadows SP but two nonnative species of concern in the Tahoe Basin, cheatgrass (*Bromus tectorum*) and bull thistle (*Cirsium vulgare*), were observed within the study area during vegetation monitoring surveys conducted in 2007 (UC Davis Center for Plant Diversity 2007). Bull thistle is on the Lake Tahoe Basin Weed Coordinating Group's List B Priority Invasive Weeds of the Tahoe Basin (Lake Tahoe Basin Weed Coordinating Group 2009). These are species that are known to be found in the Tahoe Basin and there are focused efforts to control the spread of existing populations with the goal of eradication. Cheatgrass is mentioned in the Sierra Nevada Forest Plan Amendment as a noxious weed (USFS 2001).

Nonnative, invasive weeds compete with native plant species; their introduction and proliferation in ecosystems can significantly alter the dynamics of native aquatic and terrestrial communities. This conversion can indirectly affect associated wildlife and fish species by changing and often reducing food sources and habitat structure and can lead to competition between native plant species and the weeds, often resulting in loss of native vegetation. The TRPA Goals and Policies specifically prohibit the release of nonnative plant and animal species in the Tahoe Basin because they can invade important wildlife habitats and compete for resources. However, invasive weeds can be introduced inadvertently during grading and construction activities when construction equipment is moved into a site from another area where populations of weeds occur.

## WILDLIFE HABITAT FUNCTIONS

The mix of forest, meadow, and riparian-wetland habitat types in the study area support a variety of native wildlife species. These vegetation communities form a mosaic of habitats along hydrologic, elevation, and land use gradients (Exhibit 3.5-1). Annual variability in environmental conditions influences the abundance and distribution of these communities. Many wildlife species use several of the communities as habitat. In addition, the proximity of one community to another may be essential for some species. For example, willow flycatchers

(not recently found in the study area, but detected there in 1998) (*Empidonax traillii*) are associated with willow scrub, with areas of open water or saturated soils nearby.

In general, most of the vegetation and aquatic communities likely to be affected by the proposed alternatives can be grouped into the following primary wildlife habitat types: conifer forest (Jeffrey pine and lodgepole pine), willow-riparian, montane meadow, and stream. The following sections summarize the general conditions and functions of these wildlife habitat types. The riparian ecosystem restoration feasibility report prepared by River Run Consulting (2006) has provided additional discussion of terrestrial and aquatic habitat functions of the study area. Special-status species and other habitat functions and resources (e.g., wildlife movement corridors) are addressed in the "Sensitive Biological Resources" section below.

### Conifer Forest Habitat (Jeffrey Pine and Lodgepole Pine)

Jeffrey pine covers approximately 95.7 acres in the western portion of the study area. This habitat type has trees in various age and size classes with highly variable structure and density within the study area; trees and snags with cavities are abundant. Some locations have contiguous canopy cover, and others are open with few trees and a dry meadow understory. Lodgepole pine forest is the most abundant habitat in the study area, covering over 120 acres, varying greatly in stand and understory vegetation structure, as described previously.

Conifer forest supports a variety of birds, such as woodpeckers, nuthatches, and kinglets; it also provides suitable roosting habitat for common bat species. This habitat type provides perch sites for raptors such as red-tailed hawk (*Buteo jamaicensis*) and Cooper's hawk (*Accipiter cooperii*) that use meadow areas for foraging. It also provides foraging and nesting for forest raptors. Great-horned owl (*Bubo virginianus*), western screech-owl (*Megascops kennicottii*), and northern saw-whet owl (*Aegolius acadicus*) have been detected in conifer forest in the study area (Fields, pers. comms., 2005b, 2007). Western screech-owl and northern saw-whet owl are both cavity-nesters. Other cavity-nesting species such as tree swallow (*Tachycineta bicolor*), white-breasted nuthatch (*Sitta carolinensis*), hairy woodpecker (*Picoides villosus*), northern flicker (*Colaptes auratus*), and red-breasted sapsucker (*Sphyrpicus ruber*) may nest in this community. Snags and downed logs, common in lodgepole pine forests in the study area, provide structure for wildlife resting, nests, and dens. In some locations near the river, an understory of riparian shrubs is present, providing further habitat structure for wildlife.

Other common bird species observed or likely to occur (based on habitat conditions of conifer forest in the study area) include mountain chickadee (*Poecile gambeli*), red-breasted nuthatch (*Sitta canadensis*), pygmy nuthatch (*Sitta pygmaea*), American robin (*Turdus migratorius*), yellow-rumped warbler (*Dendroica coronata*), Steller's jay (*Cyanocitta stelleri*), western tanager (*Piranga ludoviciana*), chipping sparrow (*Spizella passerina*), dark-eyed junco (*Junco hyemalis*), Brewer's blackbird (*Euphagus cyanocephalus*), and brown-headed cowbird (*Molothrus ater*).

Common small mammal species observed or likely to occur include golden-mantled ground squirrel (*Spermophilus lateralis*), California ground squirrel (*S. beecheyi*), western gray squirrel (*Sciurus griseus*), Douglas' squirrel (*Tamiasciurus douglasii*), vagrant shrew (*Sorex vagrans*), and yellow-pine chipmunk (*Tamias amoenus*). Conifer forest also provides important habitat for larger mammals—raccoon (*Procyon lotor*), coyote (*Canis latrans*), black bear (*Ursus americanus*), and possibly mule deer (*Odocoileus hemionus*). Common amphibians and reptiles likely to inhabit the study area include Pacific chorus frog (*Pseudacris regilla*), sagebrush lizard (*Sceloporus graciosus*), and rubber boa (*Charina bottae*).

Black bears are present in the conifer forests within the study area and the project vicinity. The summer home range of black bears in California varies from a few square miles up to around 20 square miles for some males (Zeiner et al. 1988:294–295). Black bears forage on grasses, insects, carrion, and fruits seasonally, and will eat human refuse if available. They use large downed logs, dense vegetation cover, cavities in trees, or other large hiding places for den sites. Sites on densely covered hillsides tend to be preferred (Zeiner et al. 1988:294–295).

The study area supports summer bear use and potentially winter hibernation dens, although female winter natal dens may be less likely to be located in the study area due to the relatively high levels of recreational disturbance.

### Willow-Riparian Habitat

Willow-riparian habitat covers over 17 acres of the study area. This habitat has multiple vegetation types: willow scrub, willow scrub/mesic forb, willow/wet meadow and willow/mesic meadow. Each of these vegetation communities or mosaics provides different wildlife habitat values, depending on hydrology, configuration (e.g., linear riparian vs. meadow), vegetation structure, and species composition; however, they are discussed together here because of their dominance or codominance by willows.

The following discussion provides an overview of riparian habitat functions and values in the Sierra Nevada bioregion, to establish a general reference of potential conditions and factors that influence habitat quality for wildlife. The willow-riparian habitat conditions and functions present in the study area are summarized at the conclusion of this discussion.

Riparian habitats are transitional between an aquatic source (e.g., stream, ponded water, subsurface water) and terrestrial uplands. They are distinguished by unique ecological processes and biological communities, a biophysical linkage between surface or subsurface hydrology and surrounding uplands, sharp ecological gradients, high primary productivity, and biological diversity (Keddy 2000, Brinson et al. 2002, USFS 2001, RHJV 2004). In the Sierra Nevada, important forms of riparian habitat are linear riparian corridors along streams and deciduous shrub components of wet meadows. Specific functions of riparian habitat in this region are listed below (Keddy 2000, Brinson et al. 2002).

- Biological functions:
  - Maintenance of native aquatic and terrestrial vegetation communities
  - Maintenance of movement, foraging, and breeding habitat for a variety of aquatic and terrestrial wildlife species
  - Contribution to local and regional biological diversity
  - Providing habitat for neotropical migrant bird communities
  - Providing habitat links between locations within and across watersheds

- Biogeochemical functions:
  - Primary production
  - Carbon storage
  - Phosphorus, nitrogen, and micronutrient cycling

- Hydrologic and geomorphic functions:
  - Groundwater recharge, surface water storage
  - Sediment and organic matter transport
  - Sediment storage
  - Maintenance of channel and floodplain landforms

Riparian areas provide habitat for aquatic and terrestrial organisms such as aquatic insects, insectivorous birds, aquatic reptiles, amphibians, and mammals. These habitats are among the most productive and species-rich areas in the Sierra Nevada bioregion.

In the Tahoe Basin, riparian habitats support a rich avian and mammal community and contribute a relatively high amount to landscape-level species diversity. For example, of 101 bird species detected by Manley and Schlesinger (2001:113), nearly 40 percent were associated with riparian, meadow, or aquatic habitats.

In California (including the Sierra Nevada), riparian habitats also support a high proportion of neotropical migrant landbird species (i.e., birds that breed in North America and winter in locations such as Mexico and Central and South America), making them among the most important habitats for such species in the western United States (RHJV 2004:16, 70). These areas function as breeding grounds as well as important stopover areas during spring and fall migration.

Species associated with riparian habitats vary considerably in their requirements for riparian vegetation structure, home range or territory sizes, and use of upland habitats. Consequently, more diverse assemblages of wildlife are associated with heterogeneous, wide, and contiguous riparian corridors, bordered by natural upland vegetation. Amphibian and reptile species use a variety of microhabitats, sunny and shaded. For cover, mammal species often require dense vegetation that is close to the ground. Many breeding bird species primarily use early-successional and shrub-dominated vegetation; other bird species prefer late-successional vegetation with taller trees and snags.

Generally, the number of species within riparian and stream corridors increases with the width, continuity, and presence of surface water or saturated soils in the stream channel and adjacent floodplain. Numerous studies in a variety of riparian ecosystems demonstrate this for birds (Keller, Robbins, and Hatfield 1993; Dickson et al. 1995; Sanders and Edge 1998; Kilgo et al. 1998; Rottenborn 1999; Hagar 1999; Hannon et al. 2002; Heath and Ballard 2003). The importance of wide, contiguous corridors may be related to increased habitat heterogeneity in larger corridors, the absence of interior habitats in narrower, fragmented corridors, and the ability of corridors with greater area to support species with large home ranges.

Width and continuity also affect the use of riparian and adjacent uplands as movement corridors. Very narrow corridors, corridors fragmented by development, or corridors lacking dense cover may not be used by some species. In particular, if the riparian and adjacent upland does not meet a species' habitat requirements, it may not be used for dispersal and hence will not provide a suitable corridor that is capable of connecting habitat patches, particularly for smaller, less mobile animals (Noss et al. 1996; Rosenberg, Noon, and Meslow 1997; and Brinson et al. 2002).

Habitat suitability for some riparian-associated bird species is also influenced by hydrologic conditions. For example, important characteristics of meadows and riparian corridors suitable for breeding willow flycatchers in the Sierra Nevada are a high water table that results in standing or slow-moving water, or saturated soils (e.g., "swampy" conditions) during the breeding season; abundant riparian deciduous shrub cover (particularly willow); and riparian shrub structure with moderate to high foliar (leaf) density that is uniform from the ground to the shrub canopy (Sanders and Flett 1989; Bombay 1999; and Green, Bombay, and Morrison 2003).

In the study area, vegetation structure and configuration, species composition, and hydrologic conditions within riparian habitats vary. The riparian corridor width is limited by existing golf course facilities and the continuity of the corridor is broken and disturbed by the golf course and bridges. Some locations support 100-foot-wide willow patches, and willow-dominated habitat generally exists in linear, disconnected, narrow bands along the Upper Truckee River. Also, several meadows with a significant willow component are located along or adjacent to the river's floodplain, and along Angora Creek at the north end of the study area. Although willow-riparian habitat is probably the most biologically productive and diverse in the study area, its distribution, quality, future establishment, and habitat functions are limited by the existing physical and hydrologic conditions of the Upper Truckee River corridor and adjacent land uses, including constraints on habitat distribution and values by the adjacent golf course. The streambed and banks are incised throughout and are severely undercut in some locations. Much of the riparian vegetation grows above the water table, as evidenced by exposed roots along the eroded and incised banks. Also, much of the riparian corridor lacks an herbaceous understory, probably because of inadequate soil moisture, failing banks, large piles of woody debris, and shading from lodgepole pines.

Although the riparian corridor and meadow areas are relatively disturbed and disconnected many important habitat functions and values are provided by the riparian habitats present in the study area. Willow-riparian vegetation provides cover and forage for many species of songbirds. In general, this community provides foraging

and nesting habitat for flycatchers, warblers, and sparrows. Riparian-associated species documented in the study area during the breeding season were song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius phoeniceus*), spotted sandpiper (*Actitis macularius*), yellow warbler (*Dendroica petechia*), warbling vireo (*Vireo gilvus*), and black-headed grosbeak (*Pheucticus melanocephalus*) (Fields, pers. comm., 2006). Yellow warbler is designated as a species of special concern by CDFG and is discussed in "Sensitive Biological Resources" below. Several other riparian-associates were observed by a biologist (in 2008) nearby and likely use portions of the study area during breeding and migration seasons: Wilson's warbler (*Wilsonia pusilla*), orange-crowned warbler (*Vermivora celata*), MacGillivray's warbler (*Oporornis tolmiei*). Other avian species primarily associated with conifer forest habitats, such as mountain chickadee, western wood-pewee (*Contopus sordidulus*), and yellow-rumped warbler, use the willow-dominated communities as foraging habitat. The willows provide especially important foraging habitat during migration, when birds require stopover habitats to rest and forage.

Common amphibian and reptile species known to occur nearby and likely to use riparian communities in the study area are Pacific chorus frog (*Pseudacris regilla*), western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*T. sirtalis*), and Sierra (western aquatic) garter snake (*T. couchii*). Several bat species have been detected in wetland areas near the study area (e.g., Upper Truckee Marsh) and likely forage in the willow scrub–wet meadow communities: hoary bat (*Lasiurus cinereus*), long-eared myotis (*Myotis evotis*), little brown bat (*M. lucifigus*), and Mexican free-tailed bat (*Tadarida brasiliensis*) (Borgmann and Morrison 2004).

Special-status species associated with riparian habitats (e.g., willow flycatcher and yellow warbler) are discussed below in "Sensitive Biological Resources."

### Montane Meadow Habitat

Montane meadow habitat covers approximately 56 acres of the study area. This habitat has multiple meadow vegetation types: wet meadow, mesic meadow/wet meadow, mesic meadow, mesic forb, dry meadow, revegetation dry meadow, and sagebrush dry meadow (discussed above). Such habitat is dominated by grasses, forbs, sedges, rushes, or woody shrubs, depending on soil moisture and type, hydrology, and disturbance history. Unlike meadows in willow-riparian habitat, these meadows do not support a substantial riparian deciduous shrub (e.g., willow) component.

Montane meadows provide habitat for many species of ground-nesting birds, support populations of small mammals, and provide foraging opportunities for raptors. Different species use different aspects of these meadows as habitat. Water level modifies this meadow habitat; some species prefer drier areas, and others require moister conditions.

Several mammal species use montane meadow habitat in the study area: long-tailed vole (*Microtus longicauses*), shrew (*Sorex* spp.), deer mouse (*Peromyscus maniculatus*), western jumping mouse (*Zapus princes*), California ground squirrel, coyote, and black bear. During a survey of small mammals conducted in 2008 (Wildlife Resource Consultants 2008b), shrews and western jumping mouse were the most commonly detected small mammal species in the study area. Small mammal populations provide foraging opportunities for raptors such as red-tailed hawk and Cooper's hawk. Amphibian species such as Pacific chorus frog and long-toed salamander (*Ambystoma macrodactylum*) may breed in montane meadow habitats when conditions are wet enough to maintain ponded areas for eggs to develop and metamorphose.

### Stream Habitat

The Upper Truckee River flows through the center of the study area. Angora Creek flows across the northern portion of the study area in a previously restored reach through meadow and the Lake Tahoe Golf Course and empties into the Upper Truckee River. In shallow-water areas at stream edges, wading birds such as great blue heron (*Ardea herodias*) and snowy egret (*Egretta thula*) may be present. Shorebird species such as spotted sandpiper use open banks along these stream habitats. When the river floods, fish-free ponds are created, which could provide suitable habitat for long-toed salamander; however, this may not occur frequently due to the incised

condition of the channel. Also, the filling of historic channel meanders by spring snow melt could create seasonal pools, which would also provide habitat for amphibians.

Bullfrogs (*Rana catesbeiana*) have been documented in golf course ponds in the study area (McMorrow 2003, Wildlife Resource Consultants 2008a). In the western United States, bullfrog is a nonnative species and serious management concern because it adversely affects ecosystem function by preying on and reducing population viability of native amphibians, snakes, and rodents.

## FISHERIES AND AQUATIC RESOURCES

This section presents a summary description of fisheries and aquatic resources in the study area, based on field surveys conducted by biologists, the *Riparian Ecosystem Restoration Feasibility Report* completed for the project (River Run Consulting 2006), and other documents and reports relevant to aquatic resources. Field surveys took place during fall 2006, and included stream habitat typing, snorkel surveys, and bioassessment. Stream habitat typing was conducted throughout the study area, snorkel surveys were conducted in selected deep-water habitats in each of the three main river reaches identified within the study area, and bioassessment surveys were conducted at two sites representative of study reaches 1 and 2. A complete report on survey activities with detailed data and analyses is provided in Appendix G, *Aquatic Resources Technical Memorandum* (EDAW [now AECOM] 2009). Aquatic habitat types, study reaches, and snorkel survey and bioassessment locations are shown in Exhibit 3.5-2.

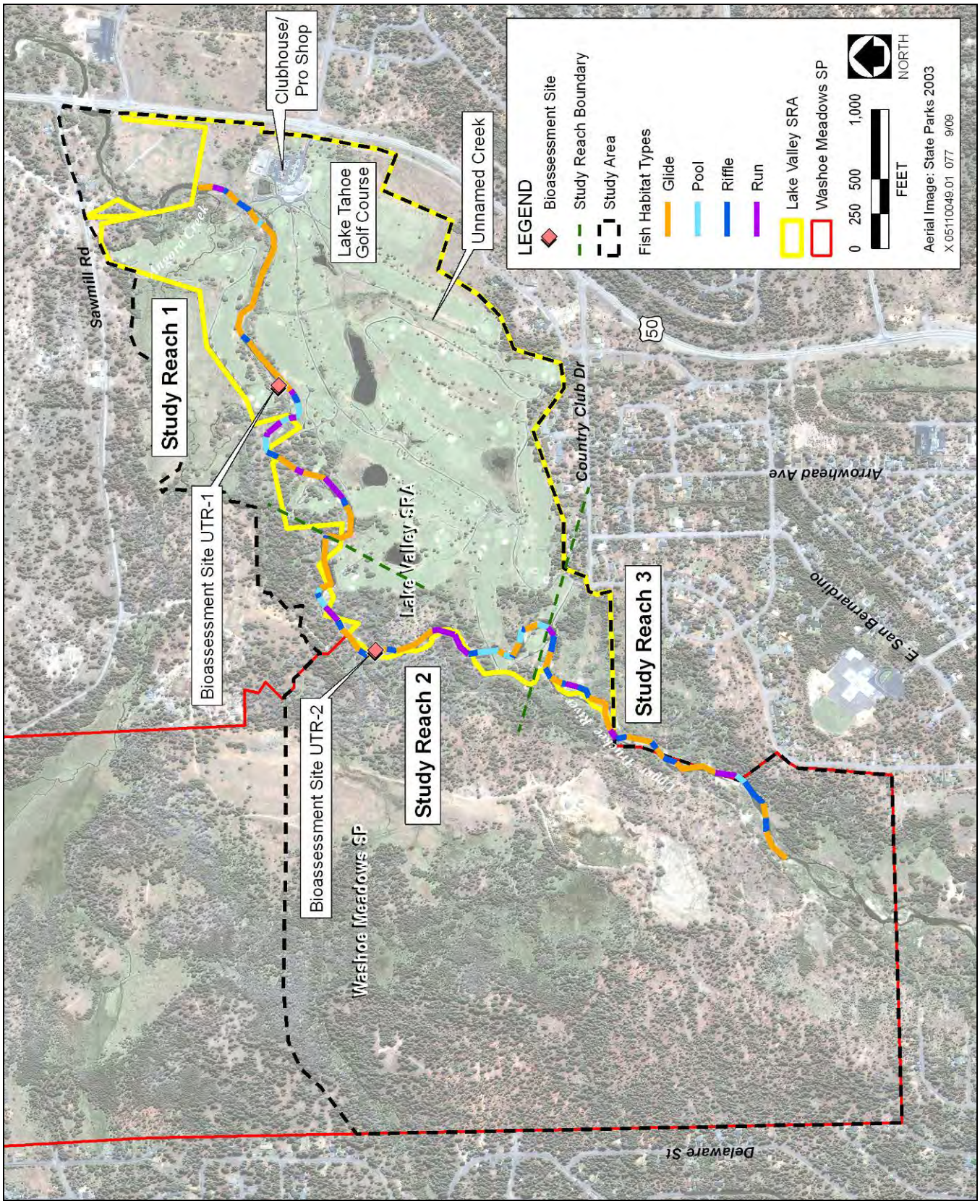
### Overview of Aquatic Habitat Function and Use

Fish and aquatic macroinvertebrates use habitats in the Upper Truckee River for adult and juvenile foraging, spawning, egg incubation, larval development, juvenile nursery areas, and migratory corridors. Species use of aquatic habitats for any of these functions may vary in response to a suite of factors, including life stage timing patterns, habitat suitability, and access that may vary daily, seasonally, and annually. The Upper Truckee River's aquatic environment is dynamic, varying in response to the magnitude and duration of seasonal runoff and baseflows, physical habitat structure, and a variety of other physical, chemical and biological processes, including water temperature, dissolved oxygen concentrations, and species interactions (e.g., predator-prey relationships, competition), and forage availability. Although most of the species inhabiting the study area are resident, some species or individuals may only use the area for a specific life stage, such as migration or spawning.

Information regarding species habitat requirements, life history strategies, and habitat usage patterns provides an important foundation for understanding the habitat functions of the river system. Information on habitat functions and use for various species and life stages, therefore, provides a useful framework for assessing existing habitat conditions.

### Fisheries Resources

Seven native fish species (Table 3.5-2) are known to occur in the Upper Truckee River (Murphy and Knopp 2000, Moyle 2002, Dill and Cordone 1997, Schlesinger and Romsos 2000). The general abundance of the native fish community has declined considerably since the arrival of the first Euro-Americans in the Tahoe Basin in the 1840s. Several factors are believed to have contributed to the decline or extinction of native fish and the degradation of fish habitat in the Upper Truckee River as well as throughout the greater Tahoe Basin. Logging, water diversions, grazing, commercial harvest, road building, and the introduction of nonnative fish and other aquatic organisms have contributed cumulatively to the change in the Tahoe Basin's fisheries composition and degradation of fish habitat (Murphy and Knopp 2000). Since the Comstock Era (circa 1860), 20 additional species of nonnative fish have been introduced into Tahoe Basin aquatic communities, and at least six (Table 3.5-2) are known to occur in the Upper Truckee River (Murphy and Knopp 2000, Moyle 2002, Dill and Cordone 1997, Schlesinger and Romsos 2000, EDAW [now AECOM] 2009). The variety of nonnative fish introduced into the Tahoe Basin is the result of numerous attempts by State agencies and anglers to establish sustainable commercial and recreational fisheries. The introduction of nonnative fish has greatly influenced the native fish community.




Source: Data compiled by EDAW (now AECOM) in 2009

**Fish Habitat and Bioassessment Survey Sites** **Exhibit 3.5-2**

### *Native Fish Species*

The Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) is the only salmonid native to lakes and streams in the Tahoe Basin. In the late 1800s and early 1900s, this species supported a commercial fishery in the Tahoe basin. The fishery declined in the 1920s, and it collapsed in the early 1930s (Cordone and Frantz 1966). By 1939, the Lahontan cutthroat trout was extirpated in the Tahoe Basin, from overharvesting, habitat degradation, and the introduction of nonnative fishes (Moyle 2002:292). Numerous attempts have been made to reintroduce this native trout. Between 1956 and 1964, Lahontan cutthroat trout was planted annually in headwater streams of the Upper Truckee River (Cordone and Frantz 1966). In 1970, the species was Federally listed as endangered, but was reclassified as threatened in 1975 (40 *Federal Register* 29864, July 16, 1975), to facilitate its management and allow angling.

**Table 3.5-2**
**Fish Species in the Upper Truckee River**

| Common Name | Scientific Name | Observed in the Study Area during Fall 2006 Survey |
|---|---|---|
| **Native Fish Species** | | |
| Lahontan cutthroat trout | *Oncorhynchus clarki henshawi* | |
| Mountain whitefish | *Prosopium williamsoni* | |
| Tahoe sucker | *Catostomus tahoensis* | X |
| Paiute sculpin | *Cottus beldingi* | |
| Lahontan speckled dace | *Rhinichthyes osculus robustus* | |
| Lahontan redside | *Richardsonius egregious* | X |
| Tui chub | *Gila bicolor* | |
| **Nonnative Fish Species** | | |
| Rainbow trout | *Oncorhynchus mykiss* | X |
| Brown trout | *Salmo trutta* | X |
| Brook trout | *Salvelinus fontinalis* | |
| Kokanee salmon | *Oncohynchus nerka* | |
| Bluegill | *Lepomis macrochirus* | X |
| Brown bullhead catfish | *Ictalurus nebulosus* | |

Source: Moyle 2002, Dill and Cordone 1997, Schlesinger and Romsos 2000, data compiled by EDAW (now AECOM) in 2009

Numerous efforts have been made to restore Lahontan cutthroat trout populations in streams and small lakes, including the upper reaches of the Upper Truckee River. Reintroduction efforts in the Tahoe Basin have been hampered by the presence of nonnative trout (see below), which compete with, predate on, and/or hybridize with Lahontan cutthroat trout (Moyle 2002:292). For reintroduction of Lahontan cutthroat trout to be successful, nonnative salmonids must first be removed.

Large numbers of Lahontan cutthroat trout were stocked into lakes in the Upper Truckee River watershed between 1996 and 2001. In 2001, CDFG curtailed planting all trout (including Lahontan cutthroat trout) in backcountry lakes and streams in the Sierra Nevada above 5,000 feet elevation because of concerns over their effects on native amphibians, particularly the Sierra Nevada yellow-legged frog (*Rana sierrae*) (Knutson, pers. comm., 2005 and Lehr, pers. comm., 2005). Lahontan cutthroat trout are presently confined to headwater tributaries of the Upper Truckee River and are not present in the study area.

The mountain whitefish (*Prosopium williamsoni*) is native to lakes and streams of western North America, including the Tahoe Basin. Adults spawn in the fall or early winter among gravel, cobble, and boulders, in riffles of tributary streams. Mountain whitefish favor stream bottoms and feed mainly on aquatic insect larvae. Their current distribution throughout the Tahoe Basin is poorly documented, and they generally are believed to be less abundant and less widely distributed relative to historic levels. The reason for decline is unclear; construction of dams and predation on whitefish fry by nonnative trout species are believed to be possible causes (Moyle 2002:244-245). Mountain whitefish were not observed in the study area during field surveys.

The Tahoe sucker (*Catostomus tahoensis*) is native to lakes and streams in the Tahoe Basin. This fish may spawn in Lake Tahoe or its tributary streams, including the Upper Truckee River. In streams, spawning generally occurs in runs or areas of small gravel in pools. Juveniles prefer pools and deep runs with abundant cover (Moyle 2002:191–194). Tahoe sucker was observed in the study area during field surveys.

The Paiute sculpin (*Cottus beldingi*) is the only sculpin native to the Upper Truckee River watershed. This species inhabits streams with slight to moderate current and is found in riffle areas among rubble or large gravel. It also occurs in lakes, including Lake Tahoe. Its diet includes a variety of aquatic invertebrates. The Paiute sculpin is an important prey item for some species of trout (Moyle 2002:357–359) and it has been documented in the study area. However, Paiute sculpin were not observed in the study area during field surveys.

The speckled dace (*Rhinichthyes osculus*) is the most widely distributed fish in western North America. Lahontan speckled dace (*R. o. robustus*) occurs throughout streams and lakes in the Tahoe Basin and is the only dace subspecies native to the Upper Truckee River. Lahontan speckled dace may spawn among gravel areas in riffles in tributary streams. In streams, fry (i.e., early life stage, postlarval) speckled dace concentrate in warm shallows, particularly between large rocks or among emergent vegetation. Adults prefer large substrates (i.e., material on the channel bottom; gravel, cobbles, boulders) with interstitial spaces, shallow rocky riffles and runs, and submerged vegetation or tree roots (Moyle 2002:162–163). Speckled dace were not observed in the study area during field surveys.

The Lahontan redside (*Richardsonius egregious*) is native to streams and lakes in the Tahoe Basin, including the Upper Truckee River watershed. Spawning occurs in the littoral zone (less than 3 feet deep) in lakes or among gravel and cobble substrate in tributary streams. In small streams, adults associate with high-velocity water along the stream margin or in backwater areas (Moyle 2002:134–136). Lahontan redsides were observed in the study area during field surveys.

The tui chub (*Gila bicolor*) is native to streams and lakes in the Tahoe Basin. Two subspecies of tui chub have been reported to occur in the Tahoe Basin: the Lahontan lake tui chub (*G. b. pectinifer*) and the Lahontan stream tui chub (*G. b. obesa*). The lake form is a pelagic fish that feeds on zooplankton in the open waters of Lake Tahoe. The stream form is a benthic fish that feeds on bottom invertebrates in Lake Tahoe and tributary streams. The two forms are difficult to distinguish because of slight variations in morphology and are more readily indentified by their different habitat preferences. Both generally spawn over sandy bottoms or at the mouths of tributaries. Larvae of both forms eventually move out of nursery areas and into their respective habitats (Moyle 2002:122–126). No tui chubs, lake nor stream, were observed during field surveys.

### *Nonnative Fish Species*

Rainbow trout (*Oncorhynchus mykiss*) were first introduced into Lake Tahoe in the late 1800s. Large numbers of domestic, hatchery-raised rainbow trout are currently planted annually into Lake Tahoe. Rainbow trout have also been occasionally stocked in an irrigation pond (hole 9 pond) on the golf course. In the recent past, rainbow trout from the hole 9 pond have been transplanted into the Upper Truckee River (with approval by CDFG) before the pond was drained to make repairs. Rainbow trout have the potential to threaten Lahontan cutthroat trout through competition, predation, and hybridization. Rainbow trout were observed in the study area during snorkel surveys.

Brown trout (*Salmo trutta*) were first introduced into eastern North America, and then into California in 1893 (Dill and Cordone 1997:94). This fish likely was introduced into the Tahoe Basin shortly after its first planting in other parts of California. Brown trout are fall spawners and have the potential to threaten cutthroat trout through predation and competition. Brown trout were not observed during field surveys; however, they have been documented within the Upper Truckee River watershed.

Brook trout (*Salvelinus fontinalis*) are native to eastern North America and were first brought to California in 1871 (Dill and Cordone 1997:102–103). They were planted in numerous streams and lakes throughout California. However, the timing of the first introduction of brook trout into the Tahoe Basin is undocumented. Large numbers of brook trout reportedly were planted into Lake Tahoe between 1953 and 1958 (Cordone and Frantz 1968). Brook trout introductions can fundamentally change alpine lake and stream ecosystems. Brook trout have eliminated yellow-legged frogs, other amphibians, and large invertebrates through predation. Brook trout also have been documented to contribute to elimination of native cutthroat trout through competitive interactions (Moyle 2002:292). Brook trout were not observed during field surveys in the study area; however, they have been documented within the Upper Truckee River watershed.

Several warm-water species—bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), and brown bullhead catfish (*Ictalurus nebulosus*)—have been introduced into Lake Tahoe and some tributary streams (Moyle 2002:398, 402; USFS unpublished data). Their influence on the aquatic ecosystem is unknown; however, their introduction likely has had an adverse effect on native fishes. Bluegill was observed during the fall 2006 field surveys in the study area, while largemouth bass, smallmouth bass, and brown bullhead catfish were not.

### *Aquatic Habitat Factors Affecting Abundance and Distribution*

Several key components determine suitability of aquatic habitat for various aquatic organisms and may impose potentially limiting factors. These components (discussed below) include the frequency and diversity of habitat types, substrate conditions, and bank and riparian canopy conditions, and they interact to various degrees and also are influenced by streamflow. Additional information on physical habitat features within the study area is included in Appendix G, *Aquatic Resources Technical Memorandum* (EDAW [now AECOM] 2009).

#### Habitat Type Diversity

Different habitat types serve a variety of functions for fish and macroinvertebrates. Habitat diversity has important influences on the aquatic community. Habitat types are often categorized by flow relationships. Four flow-related habitats exist within the study area:

- **Riffles—**Riffles are shallow sections in a stream, where water breaks over rocks or other partially submerged organic debris and produces surface agitation. Riffles are typically higher gradient than other habitat types, and substrates in these sections are usually dominated by larger particle sizes (e.g., coarse gravel, cobble, and boulders). Riffles exhibit conditions conducive to spawning for certain fish species, improve water quality (e.g., turbulence increases dissolved oxygen), and often are productive areas for the macroinvertebrate community.

- **Runs—**Runs are swiftly flowing reaches with little surface agitation and no major flow obstructions. They often appear as flooded or fully inundated riffles. Typical substrate in this habitat type consists of gravel, cobble, and boulders. Runs frequently are formed on the downstream end of riffles and provide many of the same functions. They meet varying habitat requirements for different species or different size class individuals.

- **Glides—**Glides are wide, relatively homogenous habitat types with uniform channel bottoms. Flows typically exhibit low to moderate velocities, lacking pronounced turbulence. Substrate usually consists of smaller particle sizes (sand, gravel, and cobble). Glides provide important transitional habitats between riffles, runs,

and pools. Glides with adequate cover (in the form of substrate or woody debris, as described below) provide important rearing habitat for juvenile fish species.

- **Pools—**Pools are deep habitat types, formed and maintained by hydraulic forces that create a scouring effect. Pools can be found in various locations, depending on the dominant processes associated with the formation. Pool habitat is important because they provide velocity refugia (i.e., shelter) during high winter and spring flows, and they are an especially supportive habitat during the summer low-flow period as well as during periodic droughts. Adults of many aquatic species, including rainbow trout, mountain whitefish, and Tahoe sucker, rely heavily on pool habitat. Deeper pools with good shelter characteristics provide important habitat (Bjornn and Reiser 1979).

The extent and quality of glide and pool habitats can be greatly influenced by the health of riparian vegetation (see below), which provides important structure and shelter components.

Throughout the study area, habitat type diversity varies longitudinally along the river, with a pattern of decreasing diversity from upstream to downstream. Habitat in Reach 1, the furthest downstream reach, is least diverse in the study area, dominated by long, homogeneous glides with a few deep holes. Reach 2 also includes several long glides; however, these habitats are more frequently broken by small riffles and pools. Reach 3 has the largest relative length of habitat types classified as riffles (see also Exhibit 3.5-2).

### Substrate Conditions

Substrate conditions influence production of aquatic invertebrates that are important in the aquatic food web. Many fish species, including salmonids, also rely on relatively loose, clean gravel substrate with low amounts of fine sediments for reproduction. Larger substrate, such as cobbles and boulders, can provide hiding areas and velocity refugia for juveniles of many species. Silt and sand that are present in excessive amounts fill spaces between the larger substrate elements and reduce its ability to support benthic macroinvertebrate production, habitat for spawning, egg incubation, and escape cover (Bjornn and Reiser 1979, Harrington and Born 2000).

Cobble embeddedness can be estimated in habitat surveys by observing the average proportion of individual cobble size substrate that is embedded in finer material. Substrate size class and cobble embeddedness were estimated during bioassessment surveys at two locations in the study area (Reach 1 and Reach 2; see Exhibit 3.5-2). The Reach 2 site exhibited generally larger substrate size particles, and the Reach 1 site was documented to have a higher amount of embeddedness (EDAW [now AECOM] 2009).

### Bank and Canopy Conditions

Riparian vegetation on stream banks is intricately linked to the aquatic environment and influences it in many ways (Bjornn and Reiser 1979). Shaded riverine aquatic vegetation and instream tree and shrub debris provide important fish habitat. Such habitat is defined as the nearshore aquatic habitat occurring at the interface between a river and adjacent woody riparian habitat. The principal attributes of this cover type are an adjacent bank with natural, eroding substrates; supporting riparian vegetation that either overhangs or protrudes into the water; and water that contains variable amounts of woody debris, such as leaves, logs, branches, and roots, and has variable depths, velocities, and currents. Riparian habitat provides structure and food for fish species. Shade decreases water temperatures, and low, overhanging branches can attract terrestrial insects. As a riparian area matures, the vegetation sloughs off into the river, creating structurally complex habitat consisting of large woody debris that furnishes refugia from predators, creates increased water velocities, and provides habitat for aquatic invertebrates. For these reasons, many fish species are attracted to this habitat.

Bank and canopy conditions were generally assessed throughout the study area and in more detail at each of the bioassessment survey sites. Reach 1 was highly channelized with a thin band of vegetation running throughout most of the reach and golf course turf throughout the adjacent floodplain. Bank stability was classified as vulnerable (approximately 80 percent of both banks) and riprap was present over half the area assessed during the

survey. Large woody debris was noted only in a single location. In Reach 2, riparian vegetation was more extensive, with increased canopy, ground cover, and bank stability, but still with local areas bounded by golf course turf and extensive areas of eroding bank and incision. Large woody debris was present in greater abundance in this reach. In Reach 3, improved channel, bank, and canopy conditions were noted, compared to the lower reaches. Reach 3 is only minimally incised.

### Streamflow Patterns

Streamflow patterns are important in driving geomorphic processes that, in turn, create, maintain, and/or change aquatic habitats. Pool, riffle, run, and glide habitat types as well as substrate composition are directly influenced by fluvial geomorphic processes and associated streamflow patterns. Streamflow patterns also dictate the abundance and types of organisms present in a system. The flow needs for sustaining fisheries and other aquatic life together with the amount, timing, and variability of flow are important elements of the overall ecosystem function. Salmonid eggs require sufficient flows during the incubation period to prevent egg exposure to freezing or desiccation, and to provide necessary water quality and temperature conditions. Rearing juveniles and adults both require flows necessary to maintain suitable water temperatures and dissolved oxygen concentrations. During the field survey, flows were documented to be 9.9 cubic feet per second (cfs), water temperatures were measured to be 12.8 and 8.3 degrees Celsius, and dissolved oxygen concentrations were measured to be 7.86 and 8.18 milligrams per liter, in reaches 1 and 2, respectively. Additional discussion on streamflows and water quality in the Upper Truckee River is provided in Section 3.3, “Hydrology and Flooding,” and Section 3.4, “Water Quality and Geomorphology.”

## Aquatic Macroinvertebrates

Aquatic macroinvertebrates are common and important inhabitants of the aquatic environment in the Upper Truckee River. A general description of taxa, position, and basic functions in aquatic ecosystems and their role as an indicator of stream degradation is presented below, followed by a discussion of aquatic invertebrate populations specific to the study area.

Insects are the main types of aquatic macroinvertebrates typically present and commonly include mayflies (*Ephemeroptera*), stoneflies (*Plecoptera*), caddisflies (*Trichoptera*), and true flies (*Diptera*). Noninsect invertebrates include snails (*Gastropoda*), leeches (*Hirudinea*), worms (*Annelida*), and scuds (*Amphipoda*) (Herbst 2001:2). Interactions among aquatic invertebrates, their physical habitats, and their food resources vary among functional groups. Five functional groups are frequently identified, based on feeding behavior, which is also related to habitat:

- Scrapers are adapted to graze or scrape materials (periphyton or attached algae and its associated microbiota) from mineral and organic substrates.
- Shredders primarily comminute (i.e., grind or shred) large pieces of decomposing vascular plant tissue (greater than 1 millimeter in diameter), along with associated microflora and fauna, feeding directly on living vascular macrophytes or gouging decomposing wood.
- Collectors feed primarily on fine particulate organic matter (less than 1 millimeter in diameter) that is deposited in streams.
- Filterers have specialized anatomical structures (e.g., setae, mouth brushes, fans) or silk and silk-like secretions that act as sieves to remove particulate matter from suspension.
- Predators feed primarily on animal tissue, by either engulfing the prey or piercing the prey and sucking its body contents.

Aquatic invertebrates are essential to the proper ecological function of all types of aquatic systems. Many aquatic invertebrates exploit the physical characteristics of aquatic ecosystems to obtain their food. As consumers at intermediate trophic levels (lower levels of the food web), aquatic invertebrates are influenced by both bottom-up and top-down forces in streams and serve as the conduits by which these effects are propagated. Aquatic invertebrates can have an important influence on nutrient cycles, primary productivity, decomposition, and translocation of materials. Aquatic invertebrates constitute an important source of food for numerous fish, and unless outside energy subsidies are greater than instream food resources for fish, effective fisheries management must account for fish-invertebrate linkages and invertebrate linkages with resources and habitats.

Aquatic macroinvertebrates have been shown to be sensitive and informative indicators of stream ecosystem health and water quality. They have been used for many decades as a monitoring tool, known as bioassessment, to assess degradation or disturbance of aquatic and terrestrial habitats. The principle behind bioassessment is to determine the biological integrity of an affected site by comparing its biotic community to that of a known unaffected or reference site. Aquatic macroinvertebrates are a critical component of bioassessment because they are more diverse, ubiquitous, and abundant than fish. Furthermore, in streams, these organisms are in contact with both the water and the bottom substrate.

Biological metrics used in bioassessment procedures include taxa richness measures, species composition measures, tolerance/intolerance measures, and functional feeding groups. These biological metrics define characteristics of the macroinvertebrate assemblage that may change (increase or decrease) in some predictable way with increased human disturbance and/or ecological restoration. For example, EPT taxa (number of families in the Ephemeroptera [mayfly], Plecoptera [stonefly], and Trichoptera [caddisfly] insect orders) are generally sensitive taxa groups with low tolerance to disturbed or degraded conditions. However, caddisflies in the Hydropsychidae family and mayflies in the Baetidae family tend to be more tolerant of disturbance and/or degradation. General trends in biological metrics associated with disturbance are presented in Table 3.5-3.

**Table 3.5-3**
**Trends in Biological Metrics Associated with Disturbance**

| Biological Metrics | Response to Disturbance |
|---|---|
| **Richness Measures** | |
| Taxa Richness | Decrease |
| EPT Taxa | Decrease |
| **Composition Measures** | |
| EPT Index | Decrease |
| Sensitive EPT Index | Decrease |
| Percent Hydropsychidae | Increase |
| Percent Baetidae | Increase |
| **Tolerance/Intolerance Measures** | |
| Tolerance Value | Increase |
| Percent Intolerant Organisms | Decrease |
| Percent Tolerant Organisms | Increase |
| Percent Dominant Taxa | Increase |

| Table 3.5-3<br>Trends in Biological Metrics Associated with Disturbance | |
|---|---|
| Biological Metrics | Response to Disturbance |
| **Trophic Measures** | |
| Percent Collectors | Increase |
| Percent Filterers | Increase |
| Percent Scrapers | Increase |
| Percent Predators | Increase |
| Percent Shredders | Decrease |
| Source: Harrington and Born 2000 | |

### *Aquatic Macroinvertebrates in the Study Area*

Surveys of aquatic macroinvertebrates in the Upper Truckee River watershed were conducted in the lower portion of the Upper Truckee River in 1999 and 2000 (Herbst 2001), and in the study area in 2006 (EDAW [now AECOM] 2009). The survey data from both studies indicate that impairment of aquatic biota in the river worsens downstream. The findings are generally consistent between the two surveys and indicate a simplified channel that lacks habitat diversity and structure.

The data from the identification of the sorted aquatic invertebrates for each sample site (UTR-1 and UTR-2; see Exhibit 3.5-2) were used to generate biological metrics that allow for an assessment of the biological condition of the reach at each sampling location. These biological metrics define a characteristic of the aquatic macroinvertebrate assemblage that may change in some predictable way with increased human disturbance and/or ecological restoration. The biological metrics are classified into four categories: richness measures, composition measures, tolerance/intolerance measures, and trophic measures. These metrics were quantified for each site to characterize the parameter ranges for each portion of the watershed.

#### Richness Measures

Richness measures include taxa richness and EPT taxa. Richness measures reflect the diversity of the aquatic assemblage where increasing diversity correlates with increasing health of the assemblage and suggests that niche space, habitat, and food sources are adequate to support survival and propagation of particular species. Taxa richness was the same for both reaches sampled with 55 taxa groups found. EPT taxa were sampled throughout both reaches with 20 taxa found in UTR-1 and 26 in UTR-2.

#### Composition Measures

Composition metrics reflect the relative contribution of the population of individual taxa to the total fauna. Choice of a relevant taxon is based on knowledge of the individual taxa and their associated ecological patterns and environmental requirements, such as those that are environmentally sensitive or a nuisance species. Percent Hydropsychidae and Baetidae (two tolerant families) are regional metrics that have evolved to be particularly useful in California streams. The metric values usually increase as the effects of pollution in the form of fine particulate organic matter and sedimentation increase. Composition measures include EPT index, sensitive EPT index, percent Hydropsychidae, and percent Baetidae. More EPT were found in UTR-2 (26) than in UTR-1 (20) and similarly both the EPT and sensitive EPT indexes were higher for UTR-2. The percentage of Baetid and Hydropsychid taxa sampled ranged from 1-2 percent in both reaches, demonstrating a lack of domination by tolerant EPT taxa.

### Tolerance/Intolerance Measures

Tolerance/intolerance measures include the tolerance value, percent intolerant organisms, percent tolerant organisms, and percent dominant taxa. Tolerance/intolerance measures reflect the relative sensitivity of the community to aquatic disturbances. The taxa used are usually pollution tolerant and intolerant, but are generally nonspecific to the type of pollution or stressors. High percentages of intolerant taxa in both reaches demonstrate healthy stream conditions. Both reaches had high values of intolerant taxa sampled with 26.8 percent in UTR-1 and 37.3 percent in UTR-2. Tolerant taxa were less abundant with values of 7.7 percent in UTR-1 and 8.7 percent in UTR-2. Percent dominant taxon was 17.6 percent in UTR-1 and 20.1 percent in UTR-2.

### Trophic Measures

Trophic measures include percent collectors-filterers, percent scrapers, percent predators, and percent shredders. Trophic measures (i.e., functional feeding group measures) provide information on the balance of feeding strategies in the aquatic assemblage. The composition of the functional feeding group is a surrogate for complex processes of trophic interaction, production, and availability of food sources. An imbalance of the functional feeding groups can reflect unstable food dynamics and can indicate a stressed condition. Both UTR-1 and UTR-2 were dominated by collector-gatherers and scrapers, with predators being the next most prominent feeding group. UTR-1 had 29.8 percent collector gatherers and 28.8 percent scrapers, and UTR-2 had 33.3 percent collector-gatherers and 29.6 percent scrapers. Although dominated by collectors and scrapers, both UTR-1 and UTR-2 contain diversity in functional feeding groups, demonstrating stream health.

### Abundance

Abundance provides a measure of density of individuals collected over a fixed area. Because the abundance of individuals can be dominated by a single taxon and/or tolerant taxa, this measure does not necessarily reflect ecological health, function, or value. Nevertheless, abundance is a useful measure to document increases and/or decreases in the aquatic population over a given area. UTR-1 had a higher abundance per square foot of individuals with 284. UTR-2 had a slightly lower abundance at 241. The relatively high abundance at UTR-1 can likely be attributed to more diverse and favorable substrate conditions, including higher concentrations of boulders and the lack of hardpan substrate.

Additional information on these bioassessment surveys is provided in Appendix G, *Aquatic Resources Technical Memorandum* (EDAW [now AECOM] 2009).

Aquatic mollusks have received special attention due to marked declines throughout North America. The western pearlshell mussel (*Margaritifera falcata*) is known to occur within the lower reaches of the Upper Truckee River with large aggregations occurring near the airport (Entrix 2007). The western pearlshell mussel is known to be a highly sensitive indicator species (Nedeau, Smith, and Stone 2005; CDFG 2008). It is not known if *M. falcata* occurs in the Upper Truckee River within the study area; however, this species could be present based on past surveys conducted downstream (Entrix 2007; Taylor, pers. comm., 2009). No aquatic invasive macroinvertebrates were identified during the 2009 BMI study (EDAW [now AECOM] 2009).

## Nonnative Aquatic Invasive Species

Nonnative aquatic invasive species have become a priority for education, prevention, and control in the Tahoe Basin. The draft Lake Tahoe Region Aquatic Invasive Species Management Plan (USACE 2009) was released in 2009; this document details past introductions of aquatic nonnative and invasive species, their current status, and future management strategies to avoid additional introductions and spread of current nonnative invasive populations (USACE 2009). Two invasive nonnative aquatic mussels – quagga mussel (*Dreissena bugensis*) and zebra mussel (*Dreissena polymorpha*) – are of particular concern due to their highly invasive nature and potential to disrupt ecosystem function. The presence and distribution of nonnative aquatic invasive species are not well-documented in the study area.

## SENSITIVE BIOLOGICAL RESOURCES

In this analysis sensitive biological resources include those species that receive special protection through the TRPA Code of Ordinances, ESA, CWA, USFS Manual, or local plans, policies, and regulations; or that are otherwise considered sensitive by Federal, State, or local resource conservation agencies and organizations. These resources are addressed in the following sections.

### Special-Status Species

Special-status species are plants and animals that are legally protected or otherwise considered sensitive by Federal, State, or local resource conservation agencies and organizations. In this document, special-status species are defined as:

- species listed or proposed for listing as threatened, rare, or endangered under the ESA or CESA;
- species considered as candidates for listing under the ESA or CESA;
- wildlife species identified by CDFG as Species of Special Concern;
- animals fully protected under the California Fish and Game Code;
- species designated as a sensitive, special-interest, or threshold species by TRPA;
- species designated as sensitive by the USFS Regional Forester in Region 5; or
- plants on CNPS List 1B (plants that are rare, threatened, or endangered in California and elsewhere) or List 2 (plants that are rare, threatened, or endangered in California but more common elsewhere) (CNPS 2007).

Federal "species of concern" are no longer designated or recognized by USFWS; therefore, species previously designated as such are not addressed.

#### *Special-Status Plants*

A preliminary list of special-status plant species with potential to occur in the study area was initially developed based on a review of Federal, State, and local guidelines:

- the CNPS Electronic Inventory of Rare and Endangered Vascular Plants of California (CNPS 2007);
- a list of special-status species known to occur within the Echo Lake and eight surrounding U.S. Geological Survey 7.5-minute quadrangles, obtained from the California Natural Diversity Database (CNDDB 2008);
- a list of species designated as sensitive species in the USFS LTBMU (USFS 2005);
- a list of taxa designated by TRPA as sensitive or threshold species (TRPA 2007); and
- species that are Federally listed as endangered or threatened, or candidate species that may be affected by projects in the Tahoe Basin (USFWS 2008).

The initial data review preliminarily identified 23 special-status plant, lichen, and fungi species that could occur in the region. Table 3.5-4 summarizes the potential for occurrence of each special-status plant species that was evaluated during this analysis. Based on a review of existing documentation and discussion with local botanists with extensive experience, 10 of these special-status plant species either have the potential to occur or are known to exist in the study area.

**Table 3.5-4**
**Special-Status Plant Species Evaluated for the**
**Upper Truckee River Restoration and Golf Course Relocation Project**

| Common and Scientific Name | Regulatory Status[1] | | | Habitat and Flowering Period | Potential for Occurrence |
|---|---|---|---|---|---|
| | Federal | State | Local/CNPS | | |
| Galena Creek rockcress<br>*Arabis rigidissima* var. *demota* | FSS | – | TRPA<br>CNPS List 1B | Fir–pine–quaking aspen associations, and meadow edges, usually on north-facing slopes and rocky outcrops; 7,021–10,020 ft.<br>Blooms August. | **Not expected to occur.** No suitable forest habitat present in the study area. Closest occurrences are along the north shore of Lake Tahoe. |
| Upswept moonwort<br>*Botrychium ascendens* | FSS | – | CNPS List 2 | Grassy fields and lower montane coniferous forest near springs and creeks; 4,921–7,497 ft.<br>Fertile in August. | **Could occur.** Suitable mesic habitats occur in the study area. |
| Scalloped moonwort<br>*Botrychium crenulatum* | FSS | – | | Bogs and fens, lower montane coniferous forest, meadows and seeps, freshwater marshes and swamps; 4,921–10,761 ft.<br>Fertile July–August. | **Not expected to occur.** No suitable forest habitat in the study area, and elevations of known occurrences exceed those elevations in the study area. |
| Slender moonwort<br>*Botrychium lineare* | FSS | – | – | Upper montane coniferous forest, often in disturbed areas; 8,530 ft.<br>Fertile period not known. | **Not expected to occur.** No suitable forest habitat in the study area, and elevations of known occurrences exceed those elevations in the study area. |
| Bolander's candle moss<br>*Bruchia bolanderi* | FSS | – | – | Lower montane coniferous forest in mesic soils; 5,597–8,999 ft.<br>Fertile period not specified. | **Could occur.** Suitable mesic habitats occur in the study area. |
| Shore sedge<br>*Carex limosa* | – | – | CNPS List 2 | Upper montane coniferous forest, lower montane coniferous forest, bogs and fens, meadows and seeps, marshes and swamps (in floating bogs and soggy meadows, often at edges of lakes); 3,697–9,104 ft.<br>Blooms June–August. | **Observed in Study Area.** Observed within the large undisturbed fen area in Washoe Meadows SP in 2003 and 2006. |
| Tahoe draba<br>*Draba asterophora* var. *asterophora* | FSS | – | TRPA<br>CNPS List 1B | Alpine boulder and rock fell fields, subalpine coniferous forest, on open talus slopes or decomposed granite, outcrops; 8,202–11,499 ft.<br>Blooms July–September. | **Not expected to occur.** No suitable subalpine habitat in the study area, and elevations of known occurrences exceed those elevations in the study area. |
| Cup Lake draba<br>*Draba asterophora* var. *macrocarpa* | FSS | – | TRPA<br>CNPS List 1B | Subalpine coniferous forest, usually in relatively deep soil in the shade of granitic rocks; 8,202–9,235 ft.<br>Blooms July–August. | **Not expected to occur.** No suitable subalpine habitat in the study area, and elevations of known occurrences exceed those elevations in the study area. |

**Table 3.5-4**
**Special-Status Plant Species Evaluated for the**
**Upper Truckee River Restoration and Golf Course Relocation Project**

| Common and Scientific Name | Regulatory Status[1] | | | Habitat and Flowering Period | Potential for Occurrence |
|---|---|---|---|---|---|
| | Federal | State | Local/CNPS | | |
| Subalpine fireweed<br>*Epilobium howellii* | FSS | – | – | Subalpine coniferous forest, meadows and seeps; 6,562–8,858 ft.<br>Blooms July–August. | **Not expected to occur.** No occurrences known from the southern side of the Tahoe Basin. |
| Oregon fireweed<br>*Epilobium oreganum* | – | – | CNPS List 1B | Upper montane coniferous forest, lower montane coniferous forest, in or near streams, bogs, or fens; 1,640–7,349 ft.<br>Blooms June–September. | **Could occur.** Suitable mesic habitats occur in the study area. Only known from the northern end of Lake Tahoe. |
| Marsh willowherb<br>*Epilobium palustre* | – | – | CNPS List 2 | Bogs and fens, meadows, and seeps; 7,218 ft.<br>Blooms July–August. | **Not expected to occur.** In California, known only in the Grass Lake area. |
| Starved daisy<br>*Erigeron miser* | FSS | – | – | Upper montane coniferous forest in rocky soils; 6,036–8,596 ft.<br>Blooms June–October. | **Not expected to occur.** No suitable coniferous forest habitat present in the study area, and no occurrences known from the southern side of the Tahoe Basin. |
| Donner Pass buckwheat<br>*Eriogonum umbellatum* var. *torreyanum* | FSS | – | – | Rocky, volcanic substrate in meadows and upper montane coniferous forest. 6,086–8,596 ft.<br>Blooms July–September. | **Not expected to occur.** No volcanic substrate and suitable forest habitat present in the study area. |
| Short-leaved hulsea<br>*Hulsea brevifolia* | FSS | – | CNPS List 1B | Lower and upper montane coniferous forest often on slate; 4,921–10,499 ft.<br>Blooms May–August. | **Not expected to occur.** No suitable coniferous forest and substrate habitat present in the study area. |
| Long-petaled lewisia<br>*Lewisia longipetala* | FSS | – | TRPA<br>CNPS List 1B | Alpine boulder and rock field, subalpine coniferous forest; 8,202–9,596 ft.<br>Blooms July–August. | **Not expected to occur.** No suitable subalpine habitat present in the study area, and elevations of known occurrences exceed those elevations in the study area. |
| Three-ranked hump moss<br>*Meesia triquetra* | FSS | – | CNPS List 2 | Bogs and fens, meadows and seeps, upper montane coniferous forest on mesic soil; 4,265–8,202 ft.<br>Fertile period not specified. | **Observed in Study Area.** Observed in the large undisturbed fen in Washoe Meadows SP in 2002 and 2003. |
| Broad-nerved hump moss<br>*Meesia uliginosa* | FSS | – | CNPS List 2 | Bogs and fens, meadows and seeps, upper montane coniferous forest on mesic soil; 4,265–8,202 ft.<br>Fertile period not specified. | **Could occur.** Suitable mesic habitats occur in the study area. |

**Table 3.5-4**
**Special-Status Plant Species Evaluated for the**
**Upper Truckee River Restoration and Golf Course Relocation Project**

| Common and Scientific Name | Regulatory Status[1] | | | Habitat and Flowering Period | Potential for Occurrence |
|---|---|---|---|---|---|
| | Federal | State | Local/CNPS | | |
| Veined water lichen<br>*Peltigera hydrothyria* | FSS | – | – | Cold, unpolluted streams and springs in coniferous forest.<br>Fertile period not specified. | **Could occur.** Suitable mesic habitats occur in the study area. |
| Slender-leaved pondweed<br>*Potamogeton filiformis* | – | – | CNPS List 2 | Marshes and swamps, clear water of lakes and drainage channels (assorted shallow water); 984–7,579 ft.<br>Blooms May–July. | **Could occur.** Suitable mesic habitats occur in the study area. Known from west side of Lake Tahoe. |
| Tahoe yellow cress<br>*Rorippa subumbellata* | FC<br>FSS | CE | TRPA | Decomposed granitic beaches 6,217–6,233 ft.<br>Blooms May–September. | **Not expected to occur.** Only known occurrences are along the shores of Lake Tahoe. |
| Water bulrush<br>*Scirpus subterminalis* | – | – | CNPS List 2 | Bogs and fens, marshes and swamps (montane lake margins in shallow water); 2,461–7,661 ft.<br>Blooms July–August. | **Could occur.** Suitable mesic habitats occur in the study area. |
| Marsh skullcap<br>*Scutellaria galericulata* | – | – | CNPS List 2 | Lower montane coniferous forest, meadows and seeps, marshes and swamps; 0–6,890 ft.<br>Blooms June–September. | **Could occur.** Suitable mesic habitats occur in the study area. Large population known to occur along a restored portion of Angora Creek to the north of the study area in Washoe Meadows SP. |
| Crème-flowered bladderwort<br>*Utricularia ochroleuca* | – | – | CNPS List 2 | Meadows and seeps, marshes and swamps (lake margins). 4,691–4,724 ft.<br>Blooms June–July. | **Not expected to occur.** Only known from two populations north of Lake Tahoe. |

Notes:
CNPS = California Native Plant Society; ft=feet
[1] Regulatory Status Codes:
*Federal:*
FC = Federal Candidate for listing
FSS = U.S. Forest Service Sensitive
*State (California Department of Fish and Game):*
CE = California Endangered
*Local:*
TRPA = TRPA threshold species
*California Native Plant Society Listing Categories:*
1B = Plants rare, threatened, or endangered in California and elsewhere
2 = Plants rare, threatened, or endangered in California, but more common elsewhere

Source: Data compiled by EDAW in 2006

Upswept moonwort (*Botrychium ascendens*) is a CNPS List 2 species and is on the USFS Regional Forester's list of sensitive species. This fern is a member of the Adder's tongue family (*Ophioglossaceae*) and exhibits fertile fronds in August. Suitable habitat consists of grassy fields and lower montane coniferous forest near springs and creeks. This species was not observed within the study area during reconnaissance-level habitat surveys in 2006 or vegetation monitoring surveys in 2007.

Bolander's candle moss (*Bruchia bolanderi*), three-ranked hump-moss (*Meesia triquetra*), and broad-nerved hump-moss (*M. uliginosa*) are three mosses on the USFS Regional Forester's list of sensitive species. Bolander's candle moss is found on mesic soils in coniferous forests, and three-ranked hump-moss and broad-nerved hump-moss are found in bogs, fens, and wet meadows. Three-ranked hump-moss has been observed at Washoe Meadows SP in 2002 in the undisturbed spring-fen complex area.

Shore sedge (*Carex limosa*) is a CNPS List 2 species. This perennial herbaceous member of the sedge family (*Cyperaceae*) blooms from June to August and can be found in bogs, fens, meadows, seeps, and other saturated settings. This species has been observed in Washoe Meadows SP in the large undisturbed spring-fen complex area.

Oregon fireweed (*Epilobium oregonese*) is a CNPS List 1B species. This perennial herbaceous member of the evening primrose family (*Onagraceae*) blooms from June to September and is found in very wet bogs, fens, or stream edges. It is often confused with the more common fringed willowherb (*E. ciliatum* ssp. *glandulosum*) and is only known from one occurrence in the Tahoe Basin. This species was not observed within the study area during reconnaissance-level habitat surveys in 2006 or vegetation monitoring surveys in 2007.

Veined water lichen (*Peltigera hydrothyria*), a nonvascular plant species on the USFS Regional Forester's list of sensitive species, is found in cold, unpolluted perennial streams and springs in coniferous forest. This species was not observed within the study area during reconnaissance-level habitat surveys in 2006 or vegetation monitoring surveys in 2007.

Slender-leaved pondweed (*Potamogeton filiformis*) is a CNPS List 2 species in the pondweed family (*Potamogetonaceae*) that blooms May through July. It is a perennial herb, found in marshes, swamps, and clear waters of lakes and drainage channels. This species was not observed within the study area during reconnaissance-level habitat surveys in 2006 or vegetation monitoring surveys in 2007.

Water bulrush (*Scirpus subterminalis*) is a CNPS List 2 species in the sedge family that blooms during the months of July and August. Suitable habitat for this perennial herb consists of bogs, fens, and shallow lake margins. This species was not observed within the study area during reconnaissance-level habitat surveys in 2006 or vegetation monitoring surveys in 2007.

Marsh skullcap (*Scutellaria galericulata*) is a CNPS List 2 species found growing in meadows, seeps, marshes, and swamps in lower montane coniferous forests. It is a perennial herb in the mint family (*Lamiaceae*). A large population was found in a meadow in Washoe Meadows SP in 2003 along a restored stretch of Angora Creek.

The potential for occurrence of these special-status plant species is low in the Jeffrey pine and lodgepole pine forest in the study area because of a lack of suitable habitat there. However, the wetlands throughout the study area could provide suitable habitat for these species.

### *Special-Status Wildlife and Fish*

A preliminary list of special-status wildlife and fish species known or with potential to occur in the study area was developed based on a review of Federal, State, and local guidelines:

- species that are Federally listed as endangered or threatened, or candidate species that may be affected by projects in the Tahoe Basin (USFWS 2008);

- CDFG's *Special Animals* report (CDFG 2008), which includes Federally listed and State-listed taxa, CDFG species of special concern, and other special-status animals;
- a list of special-status species known to occur within the Echo Lake and eight surrounding U.S. Geological Survey 7.5-minute quadrangles obtained from the California Natural Diversity Database (CNDDB 2008);
- a list of species designated as sensitive by the USFS Regional Forester in Region 5 (USFS 2005); and
- a list of taxa designated by TRPA as special-interest or threshold species (TRPA 2007).

The preliminary data review identified 30 special-status wildlife species and two special-status fish species that could occur in or near the study area. Of these 32 species, 19 are not expected to occur or have a low potential to occur, and 13 have a moderate to high likelihood to occur or are known to occur. This determination was based primarily on the types, extent, and quality of habitats in the study area; the proximity of the study area to known extant occurrences of the species; and the regional distribution and abundance of the species. Occurrence information for some species was based primarily on results of surveys conducted by State Parks biologists and biological consultants.

Table 3.5-5 summarizes the potential for occurrence of each special-status fish and wildlife species that was evaluated during this analysis. Species with a moderate to high potential to occur or that are known to occur in the study area are described below.

### Bald Eagle

Bald eagle is listed as endangered under CESA, designated as a sensitive species by USFS, and designated as a special-interest species by TRPA; it also is fully protected under the California Fish and Game Code. Effective August 8, 2007, bald eagle was removed from the Federal list under the ESA by USFWS because of population recovery throughout most of its range. Bald eagle is still Federally protected by USFWS under the Bald and Golden Eagle Protection Act.

Bald eagles require large bodies of water or free-flowing streams with abundant fish and adjacent snags or other perches for hunting. They generally nest in undisturbed coniferous forests, usually within a mile of a lake or reservoir. Bald eagle habitat typically consists of several components, most significantly, proximity to large bodies of water and wetlands associated with lakes, mature coniferous stands with presence of dominant trees, and adequate protection from human disturbance.

Bald eagles are known to nest within the Tahoe Basin, including Emerald Bay and Marlette Lake (USFS 2000). Bald eagles do not nest in or adjacent to the study area; however, they could forage or perch there throughout the year.

### Willow Flycatcher

Three subspecies of willow flycatcher occur in the Sierra Nevada (*E. t. brewsteri*, *E. t. adastus*, and *E. t. extimus*). The Tahoe Basin is within the breeding range of *E. t. adastus*. Willow flycatcher (all subspecies) is designated as sensitive by the Regional Forester of USFS Region 5 and listed as endangered under the CESA; additionally, *E. t. extimus* (southwestern willow flycatcher) is Federally listed as endangered under the ESA. Willow flycatcher was identified in the notice of intent for the *Sierra Nevada Forest Plan Amendment* as one of seven aquatic, riparian, and meadow-dependent vertebrate species at risk in the Sierra Nevada bioregion. This species is recognized by USFS Region 5 as the highest priority landbird species in the Sierra Nevada bioregion and is considered to have the highest likelihood of being extirpated from the Sierra Nevada in the near future.

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| **Fish** | | | | | |
| Lahontan lake tui chub<br>*Gila bicolor pectinifer* | FSS | | | Pelagic fish that feed on zooplankton in the open water of Lake Tahoe. | **Not expected to occur.** Not known nor expected to occur outside of Lake Tahoe. |
| Lahontan cutthroat trout<br>*Oncorhynchus clarki hanshawi* | FT | | | Only salmonid native to lakes and streams in the Tahoe Basin. | **Not expected to occur.** Introduced populations are confined to headwater streams and lakes of the Upper Truckee River watershed. Not known nor expected to occur in the study area. |
| **Amphibians** | | | | | |
| Yosemite toad<br>*Bufo canarus* | FC | SC | | Endemic California toad found in wet meadows between 4,000 and 12,000 feet in the Sierra Nevada from Alpine County south to Fresno County. | **Not expected to occur**. The study area is outside the known range of this species. |
| Mount Lyell salamander<br>*Hydromantes platycephalus* | | SC | | Isolated populations occur in the Sierra Nevada, from Sierra County south to Tulare County, at approximately 4,000–12,000 feet elevation. Associated with large rock outcrops in mixed conifer, red fir, lodgepole pine, and subalpine habitats. Individuals usually found on the ground surface, in areas of open water in the form of seeps, drips, or spray. | **Not expected to occur.** Suitable habitat is not present. |
| Northern leopard frog<br>*Rana pipiens* | FSS | SC | | Usually occurs in permanent water with abundant aquatic vegetation. Associated with wet meadows, marshes, slow-moving streams, bogs, ponds, potholes, and reservoirs. | **Not expected to occur.** Suitable habitat may be present in the study area. However, no documented occurrences are available for the study area. |
| Sierra Nevada yellow-legged frog<br>*Rana sierrae* | FC, FSS | SC | | Occurs in upper elevation lakes, ponds, bogs, and slow-moving alpine streams. Most Sierra Nevada populations are found between 6,000–12,000 feet elevation. Almost always found within 3.280853 feet of water, and associated with montane riparian habitats in lodgepole pine, ponderosa pine, Jeffrey pine, sugar pine, white fir, whitebark pine, and wet meadow | **Low potential to occur.** Several records show this species to be located near the study area in Desolation Wilderness. However, suitable habitat is not known to occur in the study area (McMorrow 2003) because of hydrologic conditions, presence of predators (e.g., bullfrogs, nonnative trout), and disturbed aquatic habitat. In |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| | | | | vegetation types. Alpine lakes inhabited by mountain yellow-legged frogs generally have grassy or muddy margin habitat, although below treeline sandy and rocky shores may be preferred. Suitable stream habitat can be highly variable, from high gradient streams with plunge pools and waterfalls, to low gradient sections through alpine meadows. Low-gradient streams are preferred because breeding and tadpole development cannot occur in streams with fast-moving water. Small streams are generally unoccupied and have no potential breeding locations because of the lack of depth for overwintering and refuge. Although Sierra Nevada yellow-legged frogs have been observed successfully breeding in shallow locations less than 7 feet deep, typically depth is an important factor for breeding locations since adults and larvae require overwintering habitat. For up to 9 months, adults and larvae will live/hibernate below ice, or in nonfrozen portions of ponds or lakes, so adequate depth (greater than 2 m) is necessary to avoid having the pond or lake freeze through. | 2008, yellow-legged frog surveys were conducted in the study area (Wildlife Resource Consultants 2008a); no yellow-legged frogs were observed. |
| **Birds** | | | | | |
| Northern goshawk<br>*Accipiter gentilis* | FSS | SC | SI | In the Sierra Nevada, this species generally requires mature conifer forests with large trees, snags, downed logs, dense canopy cover, and open understories for nesting; aspen stands also are used for nesting. Foraging habitat includes forests with dense to moderately open overstories and open understories interspersed with meadows, brush patches, riparian areas, or other natural or artificial openings. Goshawks reuse old nest structures and maintain alternate | **Moderate potential to occur (foraging).** Preliminary surveys for goshawk were initiated by State Parks in 2007; full protocol surveys were initiated in 2008. No goshawks have been detected (Fields, pers. comm. 2008). Goshawks have been observed foraging outside the study area, in the northern portion of Washoe Meadows SP, near Angora Creek (River Run Consulting 2006). |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| | | | | nest sites. | A small amount of suitable habitat is located in the study area (Fields, pers. comms., 2007b, 2008); however, northern goshawk has not been detected there. Conifer forest in the study area is more likely to function as foraging habitat than nesting habitat because of forest structure and disturbance levels. The lack of substantial area of suitable nesting habitat and high disturbance levels in the surrounding area [e.g., residential, recreation, and commercial development] result in a low potential for this species to nest in the study area. Before the Angora fire (2007), the nearest goshawk territory (and USFS protected activity center [PAC]) was located approximately 0.9 mile west of the study area, in the existing burn area. Presently, the nearest territories are approximately 0.6 mile (Seneca Pond), 1.4 miles (Lower Saxon Creek), and 1.8 miles (Tahoe Mountain) away from the study area. The Seneca Pond PAC was recently established by USFS to replace the PAC lost in the 2007 Angora fire. Goshawks were detected in this new PAC in 2008. |
| Golden eagle<br>*Aquila chrysaetos* | | FP | SI | Mountains and foothills throughout California. Nest on cliffs and escarpments or in tall trees. | **Low potential to occur**. Suitable nesting habitat is not present in the study area. A failed nest was located in 2009 near Angora Peak, 2-3 miles west of the study area (Lyon, pers comm., 2010). Due to disturbance levels and habitat quality in the study area, and higher quality habitat outside the study area, golden eagle is not expected to nest or regularly forage in the study area. |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| Long-eared owl<br>*Asio otus* | | SC | | Found in a variety of habitat types throughout its range. Nest in woodland, forest, and open settings (e.g., grassland, shrub-steppe, and desert). Occupy wooded and nonwooded areas that support relatively dense vegetation (e.g., trees, shrubs) adjacent to or within larger open areas such as grasslands or meadows (i.e., habitat edges) (Bloom 1994; Marks, Evans, and Holt 1994). This species also has been documented breeding in contiguous conifer forest habitat with heavy mistletoe infestation (Bull, Wright, and Henjum 1989). Trees and shrubs used for nesting and roosting include oaks, willows, cottonwoods, conifers, and junipers (Marks, Evans, and Holt 1994). | **Observed in the Study Area.** In 2006, this species was detected in conifer forest near the restored quarry on the west side of the study area by State Park biologists during owl surveys (Fields, pers. comm., 2007a). A possible long-eared owl detection was also made in 2007 (Fields, pers. comm., 2009). Breeding status in the study area is unknown. |
| Northern harrier<br>*Circus cyaneus* | | SC | | Found in a variety of open grassland, wetland, and agricultural habitats. Open wetland habitats used for breeding include marshy meadows, wet and lightly grazed pastures, and freshwater and brackish marshes. Breeding habitat also includes dry upland habitats, such as grassland, cropland, drained marshland, and shrub-steppe in cold deserts. Winters throughout California where suitable habitat occurs. Wintering habitat includes open areas dominated by herbaceous vegetation, such as grassland, pastures, cropland, coastal sand dunes, brackish and freshwater marshes, and estuaries (Grinnell and Miller 1944, Martin 1987, MacWhirter and Bildstein 1996). | **Low potential to occur.** This species has not been documented in the study area, but it occurs approximately 4 miles away in the Upper Truckee Marsh. Larger meadows in the study area that sustain high vegetation cover (e.g., mesic meadow) could provide suitable habitat for northern harrier. However, northern harriers typically nest in areas that remain undisturbed during the nesting season. The level of recreational activity in the study area throughout the summer months limit its suitability for nesting. |
| Olive-sided flycatcher<br>*Contopus cooperi* | | SC | | Summer resident and migrant that breeds primarily in late-succession conifer forest with open canopy. Species prefers to forage near forest openings or edges. | **Observed in the Study Area.** Known to occur in open canopy conifer forests within the Tahoe Basin, and was observed within the study area in 2006 (Fields, pers. comm., 2006). Species is not uncommon in the Tahoe Basin. |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| Bank swallow<br>*Riparia riparia* | | SE | | Nests in fine-textured or sandy banks or cliffs along rivers, streams, ponds, or lakes. Typically nests in colonies. | **Not expected to occur.** Although bank habitat is present in the study area, the Tahoe Basin is not within the current breeding range of bank swallow (see Garrison 1998). The only documented records are from the Tahoe Keys area in 1962 (10 birds) and 1976 (one bird) (CNDDB 2008). Species was not detected during a focused survey in July 2009, or during several other avian surveys along the Upper Truckee River in the study area. |
| Yellow warbler<br>*Dendroica petechia* | | SC | | In the Sierra Nevada, yellow warbler typically breed in wet areas with dense riparian vegetation. Breeding habitats primarily include willow patches in montane meadows, and riparian scrub and woodland dominated by willow, cottonwood, aspen, or alder with dense understory cover. Localized breeding has been documented in more xeric sites including chaparral, wild rose (*Rosa* spp.) thickets, and young conifer stands (Siegel and DeSante 1999, RHJV 2004). | **Observed in the Study Area**. Yellow warblers were detected in 2005, 2006, and 2007 during avian surveys conducted by State Parks biologists (Fields, pers. comm., 2005b, 2007a, 2009), in willow-dominated habitat along the Upper Truckee River in the study area. |
| Willow flycatcher<br>*Empidonax traillii* | FSS | SE | | In the Sierra Nevada, suitable habitat typically consists of montane meadows that support riparian deciduous shrubs (particularly willows) and remain wet through the nesting season (i.e., midsummer). Important characteristics of suitable meadows include a high water table that results in standing or slow-moving water, or saturated soils (e.g., “swampy” conditions) during the breeding season; abundant riparian deciduous shrub cover (particularly willow); and riparian shrub structure with moderate to high foliar density that is uniform from the ground to the shrub canopy. Most breeding occurrences are in | **Moderate potential to occur.** Suitable breeding habitat for willow flycatcher is limited in the study area, primarily because of the channel morphology, hydrology, and willow conditions. Potential habitat was mapped by River Run Consulting (River Run Consulting 2006). In 1998, a willow flycatcher detection was made in the study area (Fields, pers. comm., 2005a); however, nesting has not been documented. Surveys coordinated by State Parks in 2001, 2002, and 2007 did not detect willow flycatchers (Fields, pers. comm., 2005a, 2007b; Wildlife Resource Consultants 2007). In |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| | | | | meadows larger than 19 acres, but the average size of occupied meadows is approximately 80 acres. Although less common in the Sierra Nevada, riparian habitat along streams also can function as suitable habitat for willow flycatcher. However, those areas must support the hydrologic and vegetation characteristics described for suitable meadows (e.g., standing or slow-moving water, and abundant and dense riparian vegetation). | 2007, willow flycatcher was detected along the Upper Truckee River near the airport, approximately 1.4 miles downstream from the study area. The nearest known breeding population occurs along the Upper Truckee River, approximately 4.5 miles south (upstream) of the study area. (USFS unpublished data) |
| Peregrine falcon<br>*Falco peregrinus* | FSS | SE, FP | SI | Nest and roost on protected ledges of high cliffs, usually adjacent to water bodies and wetlands that support abundant avian prey. | **Not expected to occur**. Suitable habitat not present in the study area. |
| Bald eagle<br>*Haliaeetus leucocephalus* | | SE, FP | SI | Use ocean shorelines, lake margins, and river courses for both nesting and wintering. Most nests are within 1 mile of water, in large trees with open branches. Roost communally in winter. | **Moderate potential to occur.** Potential foraging habitat is available in the study area. Large trees may function as perch sites. This species does not nest in the study area. Nearest known nest site is several miles away at Emerald Bay. |
| Osprey<br>*Pandion haliaetus* | | SC | SI | Associated with large fish-bearing waters. Nest usually within 0.25 mile of fish-producing water, but may nest up to 1.5 miles from water. In the Tahoe Basin, osprey nests are distributed primarily along the Lake Tahoe shoreline, at the northern portion of the east shore and southern portion of the west shore. Other osprey nest sites in the Tahoe Basin occur along the shorelines of smaller lakes (e.g., Fallen Leaf Lake) and in forest uplands up to 1.5 miles from lakes. | **Observed in the Study Area**. Ospreys have been observed in the study area along the Upper Truckee River (Fields, pers. comm., 2006); they also have been observed foraging in the large pond on the golf course, which is stocked with rainbow trout. They are not known to nest in the study area. Nest platforms were installed around the golf course in 2002, but have not been used by osprey (Fields, pers. comm., 2007a). |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| Great gray owl<br>*Strix nebulosa* | FSS | SE | | Found in Central Sierra mature mixed conifer forests near meadows. Scattered along the west slope of the Sierra, between 4,500 and 7,500 feet elevation, from Plumas County to Yosemite National Park. | **Not expected to occur.** Suitable habitat is not available in the study area. Habitat with biophysical attributes considered suitable for great gray owl (e.g., meadows bordered by large trees) occurs near the study area. However, these areas experience high disturbance levels, and neither the historic nor present occurrence of great gray owl in the Tahoe Basin has been confirmed. |
| California spotted owl<br>*Strix occidentalis occidentalis* | FSS | SC | | Occur in several forest vegetation types including mixed conifer, ponderosa pine, red fir, and montane hardwood. Nesting habitat is generally characterized by dense canopy closure (i.e., greater than 70 percent) with medium to large trees and multistoried stands (i.e., at least two canopy layers). Foraging habitat can include intermediate to late-successional forest with greater than 40 percent canopy cover. | **Low potential to occur.** Suitable breeding habitat is not available in the study area, and high disturbance levels in the surrounding area (e.g., residential and commercial development) contribute to a low potential for occurrence.<br>In addition to general owl inventories conducted in 2006–2007, protocol surveys for California spotted owl were initiated by State Parks in 2007, and were continued in 2008 (Fields, pers. comm., 2008). No spotted owls have been detected. |
| Waterfowl species (collectively) | | | SI | Nest and roost in wetlands and around waters such as lakes, creeks, drainages, marshes, and wet meadows. | **Observed in the Study Area.** Several common waterfowl species occur in the study area including common merganser (*Mergus merganser*), mallard (*Anas platyrhynchos*), American coot (*Fulica americana*), and Canada goose (*Branta canadensis*). Waterfowl occur in both the Upper Truckee River and the golf course ponds. |
| Yellow-headed blackbird<br>*Xanthocephalus xanthocephalus* | | SC | | Typically breeds in marshes that have tall emergent vegetation such as cattails or tules, in open areas near and over relatively deep water. | **Observed in the Study Area.** Species has been observed at artificial ponds in the golf course. The breeding status of this species in the study area is unknown. Due to the limited emergent vegetation and suitable |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| | | | | | marsh habitat, the study area is not expected to function as an important nesting area. However, nesting could occur in relatively low densities. |
| **Mammals** | | | | | |
| Pallid bat<br>*Antrozous pallidus* | FSS | SC | | Locally common at lower elevations in California and occurs in grassland, shrubland, woodland, and mixed conifer forests. Absent from highest elevation locations in the Sierra Nevada. Rocky outcrops, caves, crevices, and occasional tree cavities or buildings provide roosts. | **Low potential to occur.** High-quality roosting habitat is not present in the study area. |
| Sierra Nevada mountain beaver<br>*Aplodontia rufa californica* | | SC | | Use riparian habitats with soft, deep soils for burrowing, lush growth of preferred food sources such as willow and alder, and a variety of herbaceous species for bedding material. Vegetation types preferred include wet meadows and willow-alder–dominated riparian corridors typically near water sources. Suitable riparian habitats are characterized by dense growth of small deciduous trees and shrubs near permanent water. Mountain beaver is generally solitary, except during its short breeding season; beavers spend a high proportion of their time in extensive underground burrow systems with multiple openings, tunnels, and food caches. | **Not expected to occur.** No suitable riparian habitat present in the study area. Surveys were conducted in 2008 by Wildlife Resource Consultants (Wildlife Resource Consultants 2008). |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens* | FSS | SC | | Range throughout California, mostly in mesic habitats. Limited by available roost sites (i.e., caves, tunnels, mines, and buildings). | **Not expected to occur.** Suitable habitat not present in the study area. Until 2007, no occurrences reported within the Tahoe Basin (Schlesinger and Romsos 2000). However, this species was detected several miles from the study area in Blackwood Canyon and Cookhouse Meadow in 2007 (Roth, pers. comm., 2008). |
| California wolverine *Gulo gulo luteus* | FSS | ST, FP | | Inhabit upper montane and alpine habitats of Sierra Nevada, Cascades, Klamath, and north Coast Ranges. Need water source and denning sites. Rarely seen. Sensitive to human disturbance. | **Not expected to occur.** Suitable habitat not present in the study area. Very few documented occurrences in or near the Tahoe Basin. |
| Western red bat *Lasiurus blossevillii* | FSS | SC | | Day roosting common in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. An association with intact riparian habitat may exist (particularly willows, cottonwoods, and sycamores). | **Moderate potential to occur.** Suitable roosting and foraging habitat exists in the study area along the riparian corridors, and the species has been detected at Tallac Marsh, approximately 5 miles outside the study area (Borgmann and Morrison 2004). |
| Sierra Nevada snowshoe hare *Lepus americanus tahoensis.* | | SC | | In the Sierra Nevada, found only in boreal zones, typically inhabiting riparian communities with thickets of deciduous trees and shrubs such as willows and alders. | **Observed in the Study Area.** Suitable habitat is present in the study area, and the species has been documented in the region, including the south Upper Truckee River watershed (USFS unpublished data). In December 2008, snowshoe hare tracks were observed in the west portion of the study area by a State Parks biologist. |
| Western white-tailed jackrabbit *Lepus townsendii* | | SC | | Year-round resident in sagebrush, subalpine conifer, juniper, and other habitats along the crest and the eastern slope of the Sierra Nevada. Uncommon to rare. | **Not expected to occur.** No suitable habitat present in the study area. |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| American marten<br>*Martes americana* | FSS | | | Inhabit dense canopy conifer forests with large snags and downed logs. Prefers old growth stands with multiple age classes in vicinity. | **Moderate potential to occur.** Marten occurs throughout the Tahoe Basin in suitable habitat. In 2002, marten surveys were conducted in the study area by State Parks; no martens were detected (Fields, pers. comm., 2005a). The study area supports some suitable marten habitat (River Run Consulting 2006); however, the potential to function as denning/breeding habitat is limited by high levels of recreation and residential disturbance nearby. |
| Pacific fisher<br>*Martes pennanti pacifica* | FC, FSS | SC | | Inhabit stands of pine, Douglas fir, and true fir in northwestern California and Cascade-Sierra ranges. Fishers are considered extirpated throughout much of the Central and Northern Sierra Nevada (Zielinski, Kucera, and Ba 1995). | **Not expected to occur**. No suitable habitat present in the study area. This species is considered extirpated from the Tahoe Basin. |
| Mule deer<br>*Odocoileus hemionus* | | | SI | Year-long resident or elevational migrant that prefer a wide distribution of various-aged vegetation for cover, meadow, and forest openings, and free water. In the Sierra Nevada, early to mid-successional forests, woodlands, and riparian and brush habitats are preferred because of the greater diversity of shrubby vegetation and woody cover. In addition to forage, vegetative cover is critical for thermoregulation. Suitable habitats include a mosaic of vegetation such as forest or meadow openings, dense woody thickets and brush, edge habitat, and riparian areas. Fawning habitat, used by does during birth and by newborn fawns, is of critical importance for reproductive success. A diversity of thermal cover, hiding cover, succulent forage, and water are needed during fawning. Optimal deer fawning habitat has been described as having | **Moderate potential to occur**. Suitable foraging and movement habitat is present in the study area and on nearby USFS lands; mule deer have been documented foraging and resting in riparian habitat upstream of the study area, above the U.S. 50 crossing in Meyers (River Run Consulting 2006). Mule deer have not been documented in the study area, including during 2008 mammal surveys conducted by Wildlife Resource Consultants. Deer fawning is not expected to occur in the study area. Riparian and meadow habitat in the study area may not be suitable for fawning because of disturbance levels and adjacent land uses. |

**Table 3.5-5**
**Special-Status Fish and Wildlife Species Evaluated for the Upper Truckee River Restoration and Golf Course Relocation Project**

| Common Name and Scientific Name | Regulatory Status[1] | | | Habitat Associations[1] | Potential for Occurrence[2] |
|---|---|---|---|---|---|
| | Federal | State | TRPA | | |
| | | | | moderate to dense shrub cover near forest cover and water, such as riparian zones. A source of surface water (e.g., creek or river) is especially important to mule deer. Typical fawning habitat varies in size, but an area of 5–26 acres is adequate, with optimal fawn-rearing habitat of around 400 acres. | |
| Sierra Nevada red fox<br>*Vulpes vulpes necator* | FSS | ST | | Inhabits upper montane and alpine habitats of Sierra Nevada, Cascades, Klamath, and north Coast Ranges. Need water source and denning sites. Rarely seen. Sensitive to human disturbance. | **Not expected to occur.** Presumed extirpated from the Tahoe Basin (Schlesinger and Romsos 2000). |

Notes:
PAC = protected activity center; U.S. 50 = U.S. Highway 50; USFS = U.S. Forest Service
[1] Regulatory Status Definitions:
*Federal—U.S. Fish and Wildlife Service:*
FE = Endangered species under the Federal Endangered Species Act
FT = Threatened species under the Federal Endangered Species Act
FC = Candidate for listing under the Federal Endangered Species Act
FSS = USDA Region 5 Sensitive Species (FSM 2672)
*State—California Department of Fish and Game:*
ST = Threatened
SE = Endangered
FP = Fully Protected
SC = Species of special concern
*TRPA:*
SI = Special interest/threshold species

[2] Potential for Occurrence Definitions:
*Observed*—Species was observed in the study area during site visits or was documented there by another reputable source.
*High potential to occur*—All of the species' specific life history requirements can be met by habitat present in the study area, and populations are known to occur in the immediate vicinity.
*Moderate potential to occur*—Some or all of the species life history requirements are provided by habitat in the study area; populations may not be known to occur in the immediate vicinity, but are known to occur in the region.
*Low potential to occur*—Species not likely to occur because of marginal habitat quality or distance from known occurrences.
*Not expected to occur*—None of the species' life history requirements are provided by habitat in the study area and/or the study area is outside of the known distribution for the species. Any occurrence would be very unlikely.

Source: Data compiled by EDAW (now AECOM) in 2009

Willow flycatchers are migratory songbirds that nest in shrubby, wet habitats. In the Sierra Nevada, willow flycatchers tend to prefer willow stands interspersed with open meadow that are near standing or running water (Sedgwick 2000). Important characteristics of meadows suitable for breeding willow flycatchers are a high water table that results in standing or slow-moving water or saturated soils (e.g., "swampy" conditions); abundant riparian deciduous shrub cover (particularly willow [*Salix* spp.]), and riparian shrub structure with moderate to high foliar density that is uniform from the ground to the shrub canopy (Sanders and Flett 1989; Bombay 1999; Green, Bombay, and Morrison 2003).

One study in the Sierra Nevada documented that willow flycatcher nests typically are located in willows with about 70 percent foliage cover. Nests are also typically found about 3–4 feet above the ground and within about 7 feet from the edge of the clump (Sanders and Flett 1989).

Although less common in the Sierra Nevada, riparian habitat along streams can also function suitably for breeding willow flycatchers. However, such areas must support the hydrologic and vegetation characteristics described for suitable meadows (e.g., standing or slow-moving water, abundant and dense riparian vegetation). Stream channels that are high gradient, deeply incised, and lacking a floodplain (e.g., potential for saturated soils or standing water), and characterized by a sparse or narrow riparian vegetation corridor are not suitable for breeding willow flycatchers.

Although willow flycatchers have nested in meadows less than 1 acre in size, most nest in much larger meadows. Serena (1982) and Harris, Sanders, and Flett (1987) reported that more than 80 percent of such occurrences were in meadows larger than about 20 acres. An area of approximately 2.5 acres was estimated as the minimum size required to support a family of willow flycatchers in the Sierra Nevada (Sanders and Flett 1989). However, another study of 125 meadows in the Sierra Nevada showed that willow flycatchers were found only in meadows approximately 10 acres or larger (Harris, Sanders, and Flett 1987), although meadows as small as 0.6 acre have been reported to support successful breeding of flycatchers in the past (KRCD 1985). A recent summary of willow flycatcher occurrence data for the Sierra Nevada indicates that occupied meadows range in size from 1 to 716 acres, and average approximately 80 acres (USFS 2001).

Much of the study area may not provide suitable habitat for nesting willow flycatchers because of the degraded hydrologic conditions, channel morphology, and current willow structure and distribution (e.g., lack of saturated soils or standing water within willow stands during the breeding season; limited dense willow cover in floodplain). Potential habitat was mapped by River Run Consulting (2006). In 1998, a willow flycatcher was detected in the study area (Fields, pers. comm., 2005a); however, nesting has not been documented. Surveys conducted by State Parks in 2001, 2002, and 2007 did not detect willow flycatchers in the study area (Fields, pers. comm., 2005a, 2007). In 2007, willow flycatcher was detected along the Upper Truckee River near the airport, approximately 1.4 miles downstream of the study area (USFS unpublished data). The nearest known breeding population occurs along the southern reaches of the Upper Truckee River, approximately 4.5 miles south (upstream) of the study area (USFS unpublished data).

### Osprey

Osprey is designated by CDFG as a species of special concern, and by TRPA as a special-interest species. Osprey is associated with large fish-bearing waters. In the Tahoe Basin, osprey nests are distributed primarily along the northern portion of the east shore and southern portion of the west shore of Lake Tahoe. Other osprey nests in the Tahoe Basin are located along the shorelines of smaller lakes (e.g., Fallen Leaf Lake) and in forest uplands up to 1.5 miles from water. Ospreys forage in Lake Tahoe as well as several other fish-bearing lakes, streams, and rivers within the Tahoe Basin.

Ospreys have been observed in the study area along the Upper Truckee River (Fields, pers. comm., 2006); they also have been observed foraging in the hole 9 pond on the golf course, which is stocked with rainbow trout. This species is not known to nest in the study area. Nest platforms were installed around the golf course in 2002; however, they have not been used by osprey (Fields, pers. comm., 2007).

### Northern Goshawk

Northern goshawk is designated as a species of special concern by CDFG, is listed as sensitive by USFS Region 5, and is considered a special-interest species by TRPA. Northern goshawks generally require mature conifer forests with large trees, snags, downed logs, dense canopy cover, and open understories for nesting. Areas of foraging habitat for this species are forests with dense to moderately open overstories; open understories interspersed with meadows, brush patches, riparian areas; or other natural or artificial openings.

A small amount of suitable habitat is located in the study area (Fields, pers. comms., 2007b, 2008); however, northern goshawks have not been detected. Preliminary surveys for northern goshawks were initiated by State Parks in 2007, and full protocol surveys were initiated in 2008. No goshawks have been detected in the study area (Fields, pers. comm., 2008). Goshawks have been observed foraging in the northern portion of Washoe Meadows SP, near Angora Creek (River Run Consulting 2006) and are known to nest to the west.

Conifer forest in the study area is more likely to function as foraging habitat than nesting habitat because of forest structure and disturbance levels. The potential for this species to nest in the study area is low because of the lack of substantial area for suitable nesting and high disturbance levels in the surrounding area (e.g., noise from residential, recreation, and commercial development). Before the 2007 Angora fire, the nearest goshawk territory (and USFS protected activity center [PAC]) was located approximately 0.9 mile west of the study area, in the burn area. Presently, the nearest goshawk territories are approximately 0.6 mile (Seneca Pond), 1.4 miles (Lower Saxon Creek), and 1.8 miles (Tahoe Mountain) outside of the study area. The Seneca Pond PAC was recently established by USFS to replace the PAC lost in the 2007 Angora fire. Goshawks were detected in this new PAC in 2008.

### Yellow Warbler

Yellow warbler is designated by CDFG as a species of special concern; TRPA is considering adding it as a special-interest species because of its potential to serve as an indicator of riparian health (TRPA 2007). In the Sierra Nevada, yellow warblers typically breed in wet areas with dense riparian vegetation. Breeding habitats primarily are willow patches in montane meadows, and riparian scrub and woodland dominated by willow, cottonwood, aspen, or alder with dense understory cover. Localized breeding has been documented in more xeric (dry) sites, including chaparral, wild rose (*Rosa* spp.) thickets, and young conifer stands (Siegel and DeSante 1999, RHJV 2004).

Willow scrub in the study area provides summer breeding and foraging habitat for yellow warblers. Individual yellow warblers were detected in 2005, 2006, and 2007 during avian surveys conducted by State Parks biologists (Fields, pers. comms., 2005b, 2007, 2008).Yellow warblers were detected in willow-dominated habitat along the Upper Truckee River in the study area. Although breeding has not been confirmed there (nest surveys have not been conducted), yellow warblers could nest in riparian habitats in the study area. As recently as 2004, Borgmann and Morrison (2004) documented yellow warblers breeding in the Upper Truckee Marsh, approximately 4 miles outside of the study area. However, a high level of nest parasitism (equal to or greater than 50 percent) by brown-headed cowbirds (*Molothrus ater*) also was documented at that location.

### Yellow-Headed Blackbird

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*) is designated by CDFG as a species of special concern. This species breeds primarily in marsh and wetland habitats with tall emergent vegetation such as cattails and tules. Relatively deep water and consistent water levels are important factors in nest placement and success, with water depth at breeding locations ranging from 16 centimeters (cm) to 110 cm (Shuford and Gardali, 2008).

Yellow-headed blackbirds have been observed in the study area during the breeding season, at the golf course pond west of the green at hole 4 (Fields, pers. comm., 2010); however, the breeding status of this species within the study area is unknown. The pond where yellow-headed blackbirds have been observed supports some

potential breeding habitat. Because this species was observed during the breeding season and potential breeding habitat is present, yellow-headed blackbirds may nest there in low densities. The study area is not known to support other suitable breeding habitat for yellow-headed blackbird (Fields, pers. comm., 2010). The other golf course ponds do not provide high-quality marsh habitat; they have limited emergent vegetation that is confined to the margins of the ponds. Therefore, the study area likely does not function as a core breeding area for this species.

### Olive-Sided Flycatcher

Olive-sided flycatcher is designated by CDFG as a species of special concern. In general, this species breeds in open canopy, late-succession forest. Open conifer forests are used within the Sierra Nevada, and forest edges are important for foraging. Tree species used for nesting varies throughout the species range; snags provide valuable habitat and nesting features throughout the range. Olive-sided flycatcher uses lofty perches for foraging and singing, and can often be found perched on the apical tip of trees, above the surrounding canopy (Shuford and Gardali, 2008).

Olive-sided flycatcher was documented in the study area in 2006 (Fields, pers. comm., 2006), and forest habitat conditions within the study area could support all life stages of this species. Mixed-conifer forests with ample edge habitat dominated by Jeffrey pine or lodgepole pine could provide foraging and nesting habitat for olive-sided flycatcher.

### Long-Eared Owl

Long-eared owl (*Asio otus*) is designated by CDFG as a species of special concern. Specific habitat associations of long-eared owl vary over the species' range, and confusion has resulted over whether it is a forest or open-country species (Holt 1997). Long-eared owls nest in woodland, forest, and open settings (e.g., grassland, shrub-steppe, and desert). Wooded and nonwooded areas that are occupied by long-eared owls often support relatively dense vegetation (e.g., trees, shrubs) adjacent to or within larger open areas such as grassland or meadows (e.g., habitat edges) (Bloom 1994; Marks, Evans, and Holt 1994; Small 1994). However, this species also has been documented as breeding in contiguous conifer forest habitat with heavy mistletoe infestation (Bull, Wright, and Henjum 1989). In California, this species occurs in medium-aged and mature live oak and riparian woodlands. Long-eared owls also breed in oak thickets and conifer forests at higher elevations (Zeiner et al. 1990).

In 2006, a long-eared owl was detected in a conifer forest on the west side of the study area, by State Parks biologists during owl surveys (Fields, pers. comm., 2007). Also, a possible long-eared owl detection was made in 2007 (Fields, pers. comm., 2009). The breeding status of long-eared owl in the study area is unknown. Long-eared owls also have been documented elsewhere in the Tahoe Basin (Smith 2002); however, their habitat use has not been well studied.

### Waterfowl

Waterfowl is designated by TRPA as a special-interest group of species because its nesting habitat in the Tahoe Basin is limited. Several waterfowl species occur in the Tahoe Basin during spring and summer months: Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), green-winged teal (*A. crecca*), common merganser (*Mergus merganser*), ruddy duck (*Oxyura jamaicensis*), northern pintail (*A. acuta*), northern shoveler (*A. clypeata*), cinnamon teal (*A. cyanoptera*), American widgeon (*A. americana*), gadwall (*A. strepera*), and ring-necked duck (*Aythya collaris*). Most of these species nest along shallow-water margins of streams or lakes, in areas of emergent vegetation or other vegetation that provides concealment. Typically nests are in marshes or adjacent meadows (Ehrlich, Dobkin, and Wheye 1988). Most of these ducks are dabblers and feed on vegetation in water approximately 6–10 inches deep. Ring-necked duck and common mergansers feed by diving under water, in aquatic areas that are anywhere from 3 feet to 10 feet deep.

Recreational activities and human access to wetlands may disrupt normal waterfowl behavior (Knight and Cole 1995). Because of increased recreational encroachment into wetland areas, habitat quality at TRPA-designated waterfowl threshold sites has been degraded and the threshold standard is not in compliance with the nondegradation standard (TRPA 2002).

In the Tahoe Basin, wetlands provide nesting, resting, and foraging habitat for waterfowl; open-water and some stream habitats provide foraging and resting habitat. Important areas for waterfowl are Pope Marsh, Upper Truckee Marsh, Taylor Creek Marsh, Grass Lake, and Spooner Lake (TRPA 2007). Several common waterfowl species—common merganser, mallard, Canada goose, American coot—occur in golf course ponds and the river corridor in the study area.

### American Marten

American marten (*Martes americana*) is designated by the Regional Forester of USFS Region 5 as a sensitive species. In California, martens were historically distributed throughout the Sierra Nevada, Cascade Range, and the Coast Ranges, from the Oregon border south to Sonoma County. Presently, martens are distributed throughout the Sierra Nevada and Cascades (Buskirk and Zielinski 1997). This species occurs primarily between 5,500 and 10,000 feet elevation; in the Sierra Nevada, martens are found most frequently above 7,200 feet (USFS 2001). However, in the Tahoe Basin, martens have been detected regularly below 7,200 feet.

Suitable habitat for American marten consists generally of conifer forest with large-diameter trees and snags, large downed logs, moderate to high-canopy closure, and an interspersion of riparian areas and meadows. Martens are closely associated with relatively mesic, late-successional coniferous forests, although they may occur in other vegetation types. Important habitat attributes include vegetative diversity in predominantly mature forests, snags, and dispersal cover and large woody debris (Allen 1987). Studies in the Sierra Nevada indicate that martens have a strong preference for forest-meadow edges, and riparian forests appear to be important foraging habitats (Spencer, Barrett, and Zielinski 1983; Martin 1987). Marten natal dens are typically found in cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas. The dens are lined with vegetation and occur in structurally complex, late-successional forests (Buskirk and Ruggiero 1994). Canopy cover and the number of large, old trees in these patches exceed levels available in the surrounding area (USFS 2001).

The most important element for forest carnivore habitat may be the structural diversity of the vegetation (Allen 1987). Complex physical structures (large snags, large downed woody material, and debris piles), especially those near the ground, appear to provide protection from predators, prey sources, access to subnivean (below snow) spaces, and protective thermal microenvironments, especially during winter (Spencer, Barrett, and Zielinski 1983; Buskirk and Powell 1994; Thompson and Harestad 1994). Sites used for subnivean entry have greater percent cover and total volume of coarse woody debris, greater numbers of log layers, greater volume of undecayed and moderately decayed logs, less volume of very decayed logs, and fewer small root masses than surrounding forest stands (Corn and Raphael 1992). Other elements that contribute to habitat suitability include low branches of live trees, tree boles in various stages of decay, large coarse woody debris, presence of squirrel middens, a shrub layer to the canopy, and large-diameter trees and snags (USFS 2001).

American martens generally avoid habitats that lack overhead cover, presumably because these areas do not provide protection from avian predators (Allen 1987; Bissonette, Fredrickson, and Tucker 1988; Buskirk and Powell 1994; Spencer, Barrett, and Zielinski 1983). In Yosemite National Park, martens avoided areas lacking overhead cover and preferred areas with 100 percent overhead cover, especially when resting (Hargis and McCullough 1984). Preliminary results of studies in the southern Sierra Nevada indicate that marten rest sites are associated with closed canopy, multilayered conditions (Zielinski, Kucera, and Ba 1995). Martens selected stands with 40–60 percent canopy closure for resting and foraging, and they avoided stands with less than 30 percent canopy closure (Spencer, Barrett, and Zielinski 1983).

American marten occurs throughout the south Tahoe Basin in its preferred habitat. In 2002, marten surveys were conducted in the study area by State Parks biologists; no martens were detected (Fields, pers. comm., 2005a). The study area supports some suitable marten habitat (River Run Consulting 2006) in conifer forests and forest-meadow edges; however, its potential to function as denning/breeding habitat is limited by high levels of recreation, residential disturbance nearby, and marginal forest structure conditions for the species.

### Sierra Nevada Snowshoe Hare

Sierra Nevada snowshoe hare (*Lepus americanus tahoensis*) is designated by CDFG as a species of special concern. This species is associated with riparian communities with thickets of willows and alders, and conifer forests with abundant cover, composed of shrubs or small trees. In the Tahoe Basin, snowshoe hare can be found in dense brush near the edges of meadows or riparian communities.

Conifer forest, willow-riparian, and meadow habitats in the study area provide suitable habitat for snowshoe hare, and the species has been documented in the region, including the south Upper Truckee River watershed (USFS unpublished data). In December 2008, snowshoe hare tracks were observed in the west portion of the study area outside the study area by a State Parks biologist. Because of the high level of human activity in and around the study area the study area is not expected to provide important breeding habitat for this species.

### Western Red Bat

Western red bat (*Lasiurus blossevilli)* has a broad distribution, ranging from British Columbia, Canada, to Chile. In California, western red bat is designated by CDFG as a species of special concern and by USFS Region 5 as sensitive. Suitable habitat includes edge habitats adjacent to streams or open fields, orchards, and sometimes urban areas. Roost sites are generally hidden from view in all directions; lack obstruction beneath, allowing the bat to drop downward for flight; lack lower perches that allow visibility by predators; have dark ground cover to minimize solar reflection; have nearby vegetation to reduce wind and dust; and are generally located on the south or southwest side of a tree. They may have an association with intact riparian habitat, particularly willow, cottonwoods, and sycamores.

Western red bat is not known to occur in the study area; however, bat surveys have not been conducted there. Suitable roosting and foraging habitat exists along riparian corridors in the study area. This species has been detected at Tallac Marsh, approximately 5 miles away (Borgmann and Morrison 2004). .

### Mule Deer

Mule deer is designated by TRPA as a special-interest species. Both the Carson River and Loyalton-Truckee deer herds occur in the Tahoe Basin during snow-free months for fawning and summer range activities. Mule deer numbers in the Tahoe Basin are relatively low. Over the last 10 years, migratory habitat loss and fragmentation has increased throughout the herds' range because of residential development; also, the mule deer population has declined. The loss of wintering habitat and reduced access to wintering areas may be the primary causes of this population decline (TRPA 2007).

Mule deer use early to mid-successional stages of several vegetation types, including riparian, meadow, and forest for summer range. Important habitat requirements for mule deer fawning include undisturbed meadow and riparian areas that provide hiding cover and forage. Mule deer have been documented foraging and resting in riparian habitat upstream of the study area, above the U.S. Highway 50 (U.S. 50) crossing in Meyers (River Run Consulting 2006). Mule deer have not been documented in the study area, including during 2008 mammal surveys conducted by Wildlife Resource Consultants. Deer fawning is not expected to occur in the study area. Important habitat requirements for mule deer fawning include undisturbed meadow and riparian areas that provide hiding cover and forage. Riparian and meadow habitat in the study area is likely not suitable for fawning because of disturbance levels from recreation (including golfers, pedestrians, and bicyclists), and residential development (including the regular presence of dogs), and from adjacent land uses. Because the study area provides cover and

forage habitat, and the species has been documented nearby, mule deer may occasionally use the study area for foraging and could be disturbed by construction activities. However, the study area is not considered an important or core foraging area for mule deer. Mule deer are relatively rare in the Tahoe Basin near the study area. Deer have not been detected in the study area incidentally during biological surveys (for other species) conducted over the last several years; and the presence of dogs and other disturbance sources reduces the habitat quality for mule deer.

### Sensitive Habitats

Sensitive habitats are those of special concern to resource agencies or those that are afforded specific consideration, based on the TRPA Goals and Policies, TRPA Code of Ordinances, Section 404 of the CWA, and other applicable regulations. This concern may be due to locally or regionally declining status of these habitats, or because they provide important habitat to common and special-status species. Many of these communities are tracked in CDFG's Natural Diversity Database, an inventory of the locations and conditions of the State's rarest plant and animal taxa and vegetation types (CNDDB 2008).

Wetland habitats in the study area, including seasonal wetlands, intermittent drainages, and spring/fen complex, would be considered sensitive habitats as defined above. Most of the areas within these habitats are designated as SEZ. These areas would likely be considered jurisdictional by USACE and the Lahontan RWQCB under Section 404 of the Federal CWA and the State's Porter-Cologne Act. In addition, CDFG has jurisdiction over activities affecting the bed and bank of the drainages traversing the study area, including the Upper Truckee River and Angora Creek, and their adjacent riparian vegetation.

### Other Ecologically Significant or Special-Interest Resources

A resource is considered ecologically significant or of special interest if it is:

- important to the essential character of the unit and contributes, in part, to its statewide significance;
- regionally significant, is an important component of a systemwide plan, or contributes to the persistence of regional or statewide biodiversity; or
- documented as significant on recognized preservation or protection lists, or is otherwise designated with special status by a recognized authority.

Four other resources in the study area are considered ecologically significant or of special interest: the riparian bird community and neotropical migrant landbirds, the raptor community, wildlife movement corridors, and common migratory birds.

#### *Riparian Bird Communities and Neotropical Migrant Landbirds*

The significance of riparian bird communities and neotropical migrant birds was introduced previously in the section "Wildlife Habitat Functions." The quality of riparian habitats and diversity of neotropical migrants in the southern portion of the Tahoe Basin indicate the importance of this area to regional avian conservation and management. Riparian, meadow, and forest habitats in the study area are favorable for numerous neotropical migrant bird species during the breeding season as well as during spring and fall migration.

#### *Raptor Community*

Raptors are considered ecologically significant as a group because they:

- function at a high trophic (feeding) level and their populations are typically sensitive to the distribution and local abundance of prey populations;

- represent a wide range of life histories with respect to nesting, foraging, and habitat-use requirements;
- include several species sensitive to habitat disturbance and loss; and
- are generally visible and an important component of a wildlife viewing experience.

The extent and mix of forest, riparian, and meadow habitats found in the study area provide winter, breeding, and migration habitat for many raptor species known to occur throughout the Tahoe Basin. Raptors known to occur in the study area are great horned owl, western screech-owl, northern saw-whet owl, Cooper's hawk, osprey, and long-eared owl (Fields, pers. comms., 2005b, 2007, 2009).

### *Wildlife Movement Corridors*

Wildlife movement corridors are considered an important ecological resource by various agencies (e.g., USFWS, USFS, State Parks, and TRPA) and are also protected under the TRPA Code of Ordinances. Movement corridors may provide favorable locations for wildlife to travel or disperse between various habitat areas (e.g., foraging sites, breeding sites, cover areas, and preferred summer and winter range locations).

The California Essential Habitat Connectivity Project is a recently-completed, peer-reviewed statewide assessment of important habitat linkages (Spencer et al. 2010). The project's goal was to identify large remaining blocks of intact habitat or natural landscape at a coarse spatial scale, and model linkages between them that are important to maintain as corridors for wildlife. The study area is not within any area identified as a high priority for maintaining regional wildlife corridors. However, the study area could function as a movement corridor or a link to a larger movement route at multiple spatial scales. On a regional scale, because of its large size, geographic position, and habitat types and quality, the study area provides a stepping stone or seasonal habitat for waterfowl and shorebirds migrating along the Pacific Flyway. On a watershed (i.e., across habitats within the Upper Truckee watershed or Tahoe Basin) or site (i.e., within the study area) scale, wetland, riparian, and aquatic habitats may facilitate movement of waterbirds, songbirds, and other species. The primary feature of the study area that provides value for wildlife movement would be the riparian corridor of the Upper Truckee River. The riparian habitat is not continuous, because the golf course abuts the riverbank in several locations, so its current wildlife corridor value of the river is degraded.

The study area is not expected to function as a significant corridor for common or sensitive wildlife species due to its proximity to residential neighborhoods to the west (North Upper Truckee Road and adjoining neighborhoods), north (Echo View Estates, Tahoe Mountain), and south (San Bernardino Road and South Upper Truckee neighborhoods), and well-traveled roads (U.S. 50 to the south and east, Sawmill Road to the north). On a watershed scale, the roadway and residences may limit the study area's potential value to facilitate long-ranging wildlife movement, particularly that of medium-sized and large animals. However, Washoe Meadows SP composes a large block of open space, positioned between Angora Ridge and the south Upper Truckee River watershed. The mix of forest, meadow, and riparian habitat in this block of open space, within the context of the larger complex of open space or low-density development to the north and south of the study area, provides a habitat link within the Upper Truckee watershed and the Tahoe Basin.

### *Common Migratory Birds*

A large number of common bird species are migratory and fall under the jurisdiction of the MBTA (see the discussion of Federal regulations in the "Regulatory Setting" section above). A comprehensive list of MBTA species that could occur in the study area is too lengthy to provide here (because it would contain essentially all native birds); however, it includes familiar species such as mountain chickadee, red-breasted nuthatch, yellow-rumped warbler, and several other warbler species. The nests of all migratory birds are protected under the MBTA, which makes it illegal to destroy any active migratory bird nest. Several migratory bird species nest in the study area, as described above.

## 3.5.2 ENVIRONMENTAL CONSEQUENCES

### SIGNIFICANCE CRITERIA

For this analysis, significance criteria are based on the checklist presented in Appendix G of the State CEQA Guidelines; the TRPA Initial Environmental Checklist; factual or scientific information and data; and regulatory standards of Federal, State, and local agencies. Effects on thresholds of the Tahoe Regional Planning Compact were considered during development of mitigation measures for significant project impacts. The project's effects on thresholds are further described in Chapter 4, Section 4.6, "Consequences for Environmental Threshold Carrying Capacities."

### CEQA Criteria

Under CEQA, an alternative was determined to result in a significant impact related to biological resources if it would:

- have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFG or USFWS;
- have a substantially adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFG and USFWS;
- have a substantial adverse effect on Federally protected wetlands as defined by CWA Section 404 (including but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or State habitat conservation plan; or
- result in the loss of forest land or conversion of forest land to non-forest use.

### NEPA Criteria

Under NEPA, an alternative was determined to result in a significant impact related to vegetation and wildlife if it would:

- substantially reduce the size, continuity, or integrity of a plant community through temporary or permanent removal, interruption of natural processes that support it, and/or disturbance that favors the establishment of invasive nonnative species;
- substantially reduce the size, continuity, or integrity of wildlife or fish habitat, or result in unnatural changes in the abundance, diversity, or distribution of wildlife or fish species; or
- have a substantial effect, either directly or through habitat modifications, on any species indentified as a candidate, threatened, endangered, or special-status species under the ESA or the MBTA.

These factors that are taken into account under NEPA to determine the significance of an action in terms of the context and the intensity of its effects are encompassed by the CEQA criteria used for this analysis. Under NEPA, the significance of an effect is used solely to determine whether an EIS must be prepared.

### TRPA Criteria

Based on TRPA's Initial Environmental Checklist, an alternative was determined to result in a significant impact related to vegetation, wildlife, and aquatic resources if it would:

- remove native vegetation in excess of the area utilized for the actual development permitted by TRPA's land capability program/Individual Parcel Evaluation System (IPES);
- remove riparian vegetation or other vegetation associated with critical wildlife habitat, through either direct removal or indirect lowering of the groundwater table;
- introduce new vegetation that would require excessive fertilizer or water, or would provide a barrier to the normal replenishment of existing species;
- cause a substantial change in the diversity or distribution of species, or the number of any species of plants (including trees, shrubs, grass, crops, microflora, and aquatic plants);
- reduce the numbers of any unique, rare, or endangered species of plants;
- remove streambank and/or backshore vegetation, including woody vegetation such as willows;
- remove any native live, dead, or dying trees 30 inches or greater DBH within TRPA's Conservation or Recreation land use classifications;
- change the natural functioning of an old-growth ecosystem;
- cause a substantial change in the diversity or distribution of species, or the numbers of any species of animals (birds or land animals including reptiles, insects, mammals, amphibians, or microfauna);
- reduce the number of any unique, rare, or endangered animal species;
- introduce new species of animals into an area, or result in a barrier to the migration or movement of animals; or
- cause the quantity or quality of existing wildlife habitat to deteriorate.

## METHODS AND ASSUMPTIONS

### Fisheries and Aquatic Resources

The impact analysis for fisheries and aquatic resources examines effects of each alternative in both the short term, temporary and the long term. Short-term, temporary effects could occur over hours, days, or weeks during the active construction phase. In addition, the river system is expected to experience adjustments after construction, so the analysis of short-term, temporary impacts also looks at interim effects that might occur during the first few years after construction, assuming that streamflows are at least average, or until the first moderately large flood event (approximate 10-year peak flow) occurs. Long-term effects are the result of changes to the river channel and associated riparian corridor and include changes to habitat conditions over a period of time after the channel has responded and achieved a new dynamic equilibrium.

Information related to the study area and vicinity and professional experience on similar projects has been referenced and incorporated into the analysis of the river system history, existing condition, likely future conditions, and conditions expected under each action alternative. The impact analysis for fisheries and aquatic resources relies on information and analysis provided in Section 3.3, "Geomorphology and Water Quality," and Section 3.4, "Hydrology and Flooding." As discussed in Section 3.4, "Geomorphology and Water Quality" potential violations of the narrative turbidity standard at the low end of the NTU range, while considered a significant impact for CEQA/NEPA/TRPA analysis for the water quality discussion in this document, would not necessarily correspond to an adverse effect on beneficial uses related to fisheries and other aquatic organisms. To evaluate effects on beneficial uses the water quality analysis considers aesthetic values under Non-Contact Recreation Use designation in the Basin Plan (Lahontan RWQCB 1995:2-2) as the most sensitive indicator of an effect on any beneficial uses. The numeric turbidity values that would correlate with this impairment of aesthetics-related beneficial use might not occur unless turbidity was increased beyond natural seasonal background by several orders of magnitude. This is well beyond the <10 percent increase in background turbidity standard of the Basin Plan that was used to evaluate water quality impacts in the water quality section due to the sensitivity of Lake Tahoe. Turbidity levels would also likely need to exceed the minimum aesthetic criterion to have adverse effects on other beneficial uses, including those supporting aquatic organisms. A finding of a significant unavoidable water quality impact caused by exceedance of the stringent numeric standard does not automatically correspond to an adverse condition for aquatic organisms because impairment of related beneficial uses would likely require the proposed project to elevate turbidity levels considerably further than 10 percent above background for a larger magnitude and longer duration beyond the limited area and brief period that was used for the water quality analysis. Significance of a potential impact to aquatic species was evaluated based on anticipated effects on population levels, survival rates, distribution, and habitat use.

### Vegetation and Wildlife

Potential impacts of each alternative on vegetation and wildlife resources were initially identified by overlaying geographic information system (GIS) layers of proposed project components on the vegetation map of the study area shown as Exhibit 3.5-1. Any area of proposed modification that overlapped with natural communities was considered to be directly affected during project construction. Short-term construction impacts would occur where natural vegetation would be removed to modify the geomorphology of the site or construct new facilities. Long-term impacts would occur in areas that would experience a conversion in land use and cover (i.e., conversion of natural vegetation to golf course, existing stream channel to restored stream channel). Impacts on trees were determined by estimating the number of trees to be removed based on the project footprint and the density of trees per acre as determined by a State Parks forester (Shasha, pers. comm., 2009).

The boundaries of SEZs within the study area were derived from the revised TRPA land capability map and were used to calculate the SEZ acreage that would be lost or gained under each alternative. A formal wetland delineation according to USACE criteria will be conducted after selection of a preferred alternative and prior to project permitting, but it is not needed for the EIR/EIS/EIS phase. The detailed map of plant community boundaries (Exhibit 3.5-1) and the map of SEZ boundaries were used as an intermediary method of determining the approximate limits of potentially jurisdictional wetlands. This method was approved during informal consultation with the Sacramento District office of USACE during discussion regarding a nearby and related project, the Upper Truckee River and Marsh Restoration Project (Roukey, pers. comm., 2008). Areas mapped as the following vegetation types are presumed to potentially qualify as jurisdictional wetlands: lodgepole pine–mesic type forest (LPM), obligate sedge wetland (OM), spring and fen complex (OM/MF/LP), wet meadow (WM), willow/wet meadow (W/WM), willow scrub (W), mesic meadow (MM), mesic meadow/wet meadow (MM/WM), willow/mesic meadow (W/MM), mesic forb (MF), and possibly dry meadow (DM).

## IMPACTS FOUND TO BE LESS THAN SIGNIFICANT AND NOT DISCUSSED FURTHER

**Fisheries and Wildlife Resources—**Section 3.5.1, "Affected Environment," discusses all special-status fish and wildlife species evaluated in this analysis, and Table 3.5-5 summarizes the potential for each of these species to

occur in the study area. Those wildlife and fish species not expected or with a low probability to occur (because of a lack of suitable habitat, recent focused surveys that did not detect the species, or lack of other occurrence records) are not addressed further in this analysis. Implementation of this project is not expected to affect those species.

## IMPACT ANALYSIS AND MITIGATION MEASURES

### Alternative 1: No Project/No Action: Existing River and 18-Hole Regulation Golf Course

IMPACT 3.5-1 (Alt. 1) Short-Term Degradation of Fish and Aquatic Habitat Resulting from Construction and Initial Channel Response. *Under Alternative 1, no short-term effects or changes to fish and aquatic habitat would result from construction or initial channel response because no construction would occur. The fish community and aquatic habitat conditions would continue to be affected by ongoing altered geomorphic processes and periodic bank treatments. This impact would be* ***less than significant****.*

The size and configuration of stream channels or associated aquatic habitats in the study area would not be physically modified under Alternative 1. However, aquatic habitat functions and values for fish and other aquatic organisms would continue to be influenced by trends in natural geomorphic processes caused by the current encroachments on the stream corridor. Channelization, incision, and resulting channel widening (in response to incision) of the Upper Truckee River channel would continue to occur throughout the project reach.

It is anticipated that treatments would be applied to eroding banks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e.g., bridges), or bridges may be replaced if needed. However, the potential for application of these treatments would be the same as under current conditions. The nature and extent of these potential activities are unknown and would not be a direct result of implementing Alternative 1. In the short term the simplified condition of aquatic habitats would remain similar to the existing degraded condition. This impact would be less than significant.

No mitigation is required.

IMPACT 3.5-2 (Alt. 1) Long-Term Changes to Fish and Aquatic Habitat. *Under Alternative 1, fish and aquatic habitat in the study area would not change in the long term because no changes would be made to the river system. The fish community and aquatic habitat conditions would continue to be affected by ongoing altered hydraulic and geomorphic processes and periodic treatments to address bank erosion. This impact would be* ***less than significant.***

Stream channels in the study area would not be physically modified under Alternative 1, and aquatic habitat conditions would continue to be influenced by natural geomorphic trends caused by past land uses and current encroachments on the stream corridor. Treatments may be applied to eroding banks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e.g., bridges), or bridges may be replaced if needed. In the long term (over many years), portions of the widened Upper Truckee River channel with simplified, degraded habitat conditions would likely adjust to disturbances by developing inset floodplains in areas of the project reach where the golf course is not adjacent to the river and where treatments would not be applied periodically. With such adjustments, the low-flow channel could become more defined, resulting in very minor, localized beneficial changes to aquatic habitats relative to existing conditions. This impact would be less than significant.

No mitigation is required.

IMPACT 3.5-3 (Alt. 1) Short-Term, Construction-Related Disturbance or Loss of Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens, and SEZ). *Under Alternative 1, the river restoration and golf course reconfiguration would not be implemented and would not affect sensitive habitats. Eroding banks along the Upper Truckee River would continue to be periodically treated and maintained as necessary; some of these treatments could be implemented within or adjacent to sensitive habitats. However, the potential for and frequency of implementing these treatments would be the same as under current conditions. Any potential effects of ongoing maintenance of riverbanks on sensitive habitats would be* ***less than significant****.*

Sensitive habitats in the study area include riparian vegetation along the Upper Truckee River, Angora Creek, and the unnamed creek; jurisdictional wetlands; SEZ; and spring complexes (including fens) west of the river. Under Alternative 1, no construction for river restoration or golf course reconfiguration would be implemented. It is anticipated that treatments may be applied to eroding banks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e. g., bridges), or bridges may be replaced, as needed. Repairs to existing bank stabilization, infrastructure, and additional spot stabilization would continue to occur in response to erosion, damage, or failure, as it does presently. These periodic treatments would also serve to retain vegetation within the riparian corridor and floodplain. Some of these treatments could be implemented within or adjacent to sensitive habitats along the Upper Truckee River. However, the potential for and general frequency of implementing these treatments would be the same as under current conditions; and the specific nature and extent of these potential activities are unknown and would not be a direct result of implementing Alternative 1. Therefore, any potential effects of ongoing treatment and maintenance of riverbanks on sensitive habitats under Alternative 1 would be less than significant. Riparian areas subject to continued treatment and maintenance activities under Alternative 1 are not in the vicinity of the spring complexes (including fens) west of the Upper Truckee River; these areas would not be affected.

No mitigation is required.

IMPACT 3.5-4 (Alt. 1) Short-Term, Construction-Related Disturbance or Removal of Special-Status Plants. *Under Alternative 1, the river restoration and golf course reconfiguration would not be implemented and habitat conditions for special-status plants would remain the same as under existing conditions. Eroding banks along the Upper Truckee River would continue to be periodically treated and maintained as necessary. Although special-status plants have not been documented in riparian zones where bank treatments would be implemented, some of these treatments could be implemented within or adjacent to habitat for these species. If special-status plants occur in suitable habitats along riverbanks in the study area, ongoing bank erosion or periodic treatments could disturb or remove them. However, the potential for and frequency of implementing these treatments would be the same as under current conditions. Any potential effects of ongoing maintenance of riverbanks on special-status plants would be* ***less than significant****.*

Riparian zones in the study area (along the Upper Truckee River, Angora Creek, and the unnamed creek) provide suitable habitat for special-status plant species, including marsh skullcap, Oregon fireweed, and Bolander's candle moss. Under Alternative 1, no construction for river restoration or golf course reconfiguration would be implemented. It is anticipated that treatments may be applied to eroding riverbanks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e. g., bridges), or bridges may be replaced, as needed. Repairs to existing bank stabilization, infrastructure, and additional spot stabilization would continue to occur in response to erosion, damage, or failure, as it does presently. These periodic treatments would also serve to retain vegetation within the riparian corridor and floodplain. Special-status plant species have not been documented in riparian zones where treatments would occur; however, some of these treatments could be implemented within or adjacent to suitable habitat for these species. If special-status plant species occur in suitable habitats along riverbanks in the study area, ongoing bank erosion or periodic bank treatments could disturb or remove them. The potential for and general frequency of implementing these treatments would be the same as under current conditions; and the specific nature and extent of these potential activities are unknown and

would not be a direct result of implementing Alternative 1. Therefore, any potential effects of ongoing treatment and maintenance of riverbanks on special-status plant species under Alternative 1 would be less than significant.

No mitigation is required.

IMPACT 3.5-5 (Alt. 1) **Long-Term Effects on Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens and SEZ) and Special-Status Plant Species.** *Under Alternative 1, the river restoration and golf course reconfiguration would not be implemented, and sensitive habitats and habitat for special-status plants would remain the same as under existing conditions. Streambanks within the study area are expected to continually erode, resulting in long-term degradation of riparian vegetation. Also, the 18-hole golf course would remain as it currently exists, much of which is adjacent to the Upper Truckee River. Although the adverse condition of riparian habitat degradation would continue, it would not be a change caused by the alternative; therefore, this impact would be* ***less than significant.***

Under Alternative 1, project-generated changes would not occur and the banks of the Upper Truckee River would continue to respond to past land uses through channel widening. Treatments may be applied to eroding banks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e.g., bridges), or bridges may be replaced, as needed. Repairs to existing bank stabilization, infrastructure, and additional spot stabilization would occur in response to erosion, damage, or failure, as it does presently. These periodic treatments would also serve to retain vegetation within the riparian corridor and floodplain; however, erosion of the unstable streambanks would continue degrading sensitive habitats within the riparian corridor and floodplain, including adjacent woody riparian vegetation along the riverbanks. This is an existing adverse condition that would continue unchanged under the alternative. Under Alternative 1, golf course use would continue adjacent to the Upper Truckee River, Angora Creek, and the unnamed creek and would occupy 123 acres of SEZ, limiting available riparian function and habitat. Effects on sensitive habitats would be similar to existing and ongoing conditions.

Ongoing operational uses of the study area are not expected to result in substantial adverse impacts to special-status plant species because areas presently used for golf course activities are not considered suitable habitat for these species. Riparian zones in the study area (along the Upper Truckee River, Angora Creek, and the unnamed creek) provide suitable habitat for special-status plants, including marsh skullcap, Oregon fireweed, and Bolander's candle moss. As previously discussed, the quality of riparian habitat in the study area for these species could gradually become degraded in the long term with the continuation of streambank erosion; also, emergency or as-needed repair of riverbanks could result in some disturbance or loss of riparian vegetation. Disturbances associated with golf course use and operations (e.g., trampling of vegetation) would continue to limit riparian habitat functions along the Upper Truckee River, Angora Creek, and the unnamed creek.

The four spring complexes would not be affected by Alternative 1, including the previously disturbed wetland within the old quarry.

Although the adverse condition of riparian and special-status plant habitat degradation would continue, it would not be a change caused by Alternative 1. These effects are expected to be similar to existing and ongoing conditions. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.5-6 (Alt. 1) **Tree Removal and Forest Land Conversion.** *No trees would be removed under Alternative 1 beyond existing nonproject-related fuels and forest management. State Parks would continue to manage vegetation and periodically remove trees for fuels reduction, forest health, and riparian/hardwood management. Any effects related to these activities would be similar to those under existing and ongoing conditions. Impacts related to ongoing tree removal to achieve existing vegetation and fuels management objectives would be the same as current conditions, so it would be considered* ***less than significant****.*

Under Alternative 1, existing conditions in the study area would remain unaltered from current conditions. The Upper Truckee River would not be restored and the golf course would not be reconfigured; therefore, no trees would be removed beyond existing nonproject-related fuels and forest management purposes, and no conversion of forest land to non-forest use would occur. State Parks would continue to periodically manage vegetation for fuels reduction, forest health, and riparian/hardwood management. Although State Parks has treated much of the study area for fuels reduction as part of the Lake Sector Wildfire Management Plan, additional tree removal and stand thinning may occur in the future to further reduce tree densities and fuels in some areas (Walck, pers. comm., 2010). Additionally, some lodgepole pines would be removed within the riparian corridor as part of State Parks' existing management objectives to reduce conifer encroachment in riparian and meadow habitats and to enhance riparian hardwood growth (as part of the Riparian Hardwood Restoration Project). Any effects related to these activities would be similar to those under existing and ongoing conditions and would not affect any old growth forests. Therefore, impacts related to ongoing tree removal to achieve existing vegetation and fuels management objectives would be less than significant.

No mitigation is required.

IMPACT 3.5-7 (Alt. 1) **Introduction and Spread of Weeds and Aquatic Invasive Species.** *Under Alternative 1, no project-related ground-disturbing activities would occur to facilitate weed or aquatic species invasion into the study area. Spot herbicide treatments of weeds in the existing golf course footprint would continue. This impact would be* ***less than significant.***

Under Alternative 1, the Upper Truckee River would not be restored and the golf course would not be reconfigured; current conditions as they relate to the introduction and spread of weeds and aquatic invasive species would persist but would not be a direct result of Alternative 1 implementation. Bank stabilization treatments may be applied to eroding banks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e.g., bridges), or bridges may be replaced as needed. However, the nature and extent of these modifications are unforeseeable. As described in Chapter 2, "Project Alternatives," spot herbicide treatments of weeds in the existing golf course footprint would continue. This impact would be less than significant.

No mitigation is required.

IMPACT 3.5-8 (Alt. 1) **Short-Term, Construction-Related Disturbance or Loss of Special-Status Wildlife Species and Habitats.** *Under Alternative 1, the river restoration and golf course reconfiguration would not be implemented and would not affect special-status wildlife species or habitats. Eroding banks along the Upper Truckee River would continue to be periodically treated and maintained as necessary; some of these treatments could be implemented within or adjacent to habitat for special-status wildlife species. However, the potential for and frequency of implementing these treatments would be the same as under current conditions. Any potential effects of ongoing maintenance of riverbanks on special-status wildlife species or their habitats would be* ***less than significant.***

Six special-status wildlife taxa have been documented in the study area, and eight additional special-status wildlife species were identified as having a moderate or high potential to occur within the study area (Table 3.5-5). Under Alternative 1, no construction for river restoration or golf course reconfiguration would be

implemented. It is anticipated that treatments may be applied to eroding banks periodically to prevent the loss of areas managed as golf course and to maintain the stability of structures (e. g., bridges), or bridges may be replaced, as needed. Repairs to existing bank stabilization, infrastructure, and additional spot stabilization would continue to occur in response to erosion, damage, or failure, as it does presently. These periodic treatments would also serve to retain vegetation within the riparian corridor and floodplain. Some of these treatments could be implemented within or adjacent to habitat for special-status wildlife species along the Upper Truckee River (e.g., yellow warbler). If special-status wildlife species are present where periodic bank treatments would be implemented, the treatment and maintenance activities could disturb them, particularly during the breeding season. However, the potential for and general frequency of implementing these treatments would be the same as under current conditions; and the specific nature and extent of these potential activities are unknown and would not be a direct result of implementing Alternative 1. Therefore, any potential effects of ongoing treatment and maintenance activities on special-status wildlife species or their habitats under Alternative 1 would be less than significant.

No mitigation is required.

IMPACT 3.5-9 (Alt. 1) Long-Term Effects on Special-Status and Common Wildlife Species and Habitats. *Under Alternative 1, the river restoration and golf course reconfiguration would not be implemented, and habitat for special-status and common wildlife species would remain the same as under existing and ongoing conditions. Streambanks within the study area are expected to continually erode, resulting in long-term degradation of riparian habitat that provides habitat for some special-status and common wildlife species. Also, the 18-hole golf course would remain as it currently exists, much of which is adjacent to the Upper Truckee River. Although the adverse condition of riparian habitat degradation would continue, it would not be a change caused by Alternative 1; therefore, this impact would be* ***less than significant****.*

Riparian zones in the study area (along the Upper Truckee River, Angora Creek, and the unnamed creek) provide suitable habitat for special-status wildlife species, including yellow warbler and waterfowl, and a variety of common species. Upland habitats (e.g., conifer forest) also provide habitat for special-status and common wildlife species. Under Alternative 1, ongoing operational uses of the study area are not expected to result in substantial adverse impacts to special-status or common wildlife species. The quality of riparian habitat in the study area could gradually become degraded in the long term with the continuation of streambank erosion; also, emergency or as-needed repair of riverbanks could result in some disturbance or loss of riparian vegetation. Disturbances associated with golf course use and operations (e.g., noise generated by visitors, staff, and equipment, and trampling of vegetation) would continue to limit riparian habitat functions along the Upper Truckee River, Angora Creek, and the unnamed creek. The quality of riparian habitat would continue to be relatively low for special-status wildlife species sensitive to vegetation composition and structure (e.g., density), patch size, and hydrology of riparian zones, such as willow flycatcher and yellow warbler. These effects are expected to be similar to existing and ongoing conditions. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.5-10 (Alt. 1) Effects on Potential Wildlife Movement Corridors. *Under Alternative 1, the river restoration and golf course reconfiguration would not be implemented, and potential wildlife movement corridors would remain the same as under existing and ongoing conditions. Habitat quality could gradually become degraded in the long term along the Upper Truckee River corridor with the continuation of streambank erosion. However, this impact would be* ***less than significant****.*

While no wildlife movement corridors have been confirmed to occupy the study area, its large size and location between the river and nearby forest areas make it potentially suitable for wildlife movement. Under Alternative 1, no construction for river restoration or golf course reconfiguration would be implemented. Therefore, no impact to potential wildlife corridors as a result of project construction would occur. As discussed in existing conditions above, the quality of riparian habitat along the Upper Truckee River, which could function as a movement

corridor, is degraded by the presence of the golf course close to or abutting the river in several locations. Riparian habitat quality could become more degraded in the long term with the continuation of streambank erosion in locations where the golf course already limits the width of riparian vegetation. However, the potential for the SEZ and other portions of the study area to function as a wildlife movement corridor would be similar to existing conditions. Therefore, this potential impact would be less than significant.

No mitigation is required.

### Alternative 2: River Ecosystem Restoration with Reconfigured 18-Hole Regulation Golf Course

IMPACT 3.5-1 (Alt. 2) Short-Term Degradation of Fish and Aquatic Habitat Resulting from Construction and Initial Channel Response. *Alternative 2 construction activities could result in temporary adverse effects on water quality, aquatic habitats, and the aquatic community. Effects could also occur during the initial channel-response period within the study area and in areas downstream. This impact would be* ***significant****.*

Alternative 2 involves restoring a 13,430-foot-long reach of the Upper Truckee River and adjoining floodplain; relocating several golf course holes to an area on the west side of the river that contains less-sensitive land that is farther from the river; and replacing all five existing bridges with one new, longer bridge.

#### *Water Quality: Sedimentation and Turbidity, Release and Exposure of Contaminants*

Construction activities would disturb instream sediments and soils adjacent to waterways for 3–4 years. As discussed in Chapter 2, "Project Alternatives," and Section 3.4, "Geomorphology and Water Quality," the project would include specific measures to protect water quality:

- Wash cobbles and gravels before installation.
- Use a combination of sod blankets, willow transplants or wattles, woody debris or mulch or erosion control fabrics over seeds to stabilize excavated inset-floodplain surfaces.
- Prime new and reconnected meanders by prewetting and introducing controlled flows that would remain isolated from the active channel (protected by berms, water-filled dams, or similar measures), then pump turbid water into settling basins or spray the water onto uplands without return flow to the channel.

The project would also be expected to include a full suite of construction best management practices (BMPs); however, exact BMP measures are not known at this time.

During the first year of construction, diversion of the streamflow around the bridge piers and pumped dewatering of the interior of isolated work areas would be anticipated. The year 2, pre-wetting of reconnected historic meanders, constructed new river channel, and irrigation of associated re-vegetation may require partial diversion and/or pumping of streamflow, but no in-channel work is planned that would require full diversion/bypassing of streamflow. Year 3 of construction would require temporary dewatering of the entire streamflow around sites or reaches that would receive streambed and streambank treatments. In areas of active streamflow, dewatering would be required at the footings and abutments of existing bridges that would be removed. Reaches would be constructed sequentially along the river (either upstream to downstream or downstream to upstream).

Even with the proposed measures described above, the erosion or disturbance of instream sediments and soils resulting from construction could still temporarily increase turbidity and cause sedimentation downstream of the construction sites on an intermittent basis in the study area if soils were transported in the river flows or stormwater runoff. Reduced fish population levels and survival rates have been linked to elevated turbidity levels and silt deposition. Prolonged exposure to high levels of suspended sediment would reduce the visual capability of fish in the study area's aquatic habitats. This reduction in visual capacity could lead to a reduction in feeding

and growth rates; a thickening of the gills, potentially causing the loss of respiratory function; the clogging and abrasion of gills; and increases in stress levels. These effects, in turn, could reduce the tolerance of fish to disease and toxicants, especially during low flows in the summer months, when background conditions would be expected to exhibit high water clarity (Waters 1995). Turbidity also could result in increased water temperature, especially in shallow quiet pools and during summer months, and affect dissolved oxygen (DO) concentrations. Both effects would place greater stress on fish respiration.

Also, high levels of suspended sediments could cause the movement and redistribution of fish populations, and could diminish the character and quality of the physical habitat important to fish survival. Once suspended sediment is deposited, it would reduce water depths in stream pools, decreasing the water's physical carrying capacity for juvenile and adult fish (Waters 1995). The pools provide important habitat to ensure survival during low-flow periods and are particularly sensitive to effects from sediment. Increased sediment loading would degrade food-producing habitat downstream of construction areas. Sediment loading would interfere with photosynthesis of aquatic flora and displace aquatic fauna. Many fish, including salmonids, are sight feeders, and turbid waters reduce the ability of these fish to locate and feed on prey. Some fish, particularly juveniles, could become disoriented and leave areas where their main food sources are located, ultimately reducing their growth rates. Prey (e.g., macroinvertebrates) of resident fish populations could be adversely affected by a decline in habitat (i.e., water quality conditions) caused by factors such as increased turbidity, decrease in DO content, or an increased level of pollutants or—although unlikely as a project effect—an extreme change in pH or water temperatures (Harrington and Born 2000). Decreases in the diversity and abundance of smaller organisms living on or in the sediments have been associated with smaller sediment grain sizes and the associated DO decreases in those sediments (Harrington and Born 2000).

Avoidance of adverse habitat conditions by fish is the most common result of increases in turbidity and sedimentation. Fish will not occupy areas unsuitable for survival unless they have no other option. Therefore, if high turbidity were to result from construction activities, some fish species may be precluded from occupying habitat required for specific life stages. In some stream reaches, few opportunities for escape from turbid waters may be available, particularly during the summer season when flows are decreased and fish over-summer in smaller pools.

The potential exists for contaminants such as fuels, oils, other petroleum products, cement, and various chemicals used in construction activities to be accidentally introduced into the water system, either directly through spills or incrementally through surface runoff, from work within or immediately adjacent to the channel (see also Section 3.4, "Water Quality and Geomorphology"). In sufficient concentrations, contaminants would be toxic to fish occupying habitats in the study area or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival. Trash, plastic bags, cans, tape, paper, wrapping material, and other solid wastes also could be deposited in streams and could entrap, injure, or otherwise be harmful to fish and other aquatic life.

### *Direct Disturbance and Temporary Loss of Habitat during Construction Activities*

As described above, several aspects of project construction under Alternative 2 would require dewatering of the active channel to allow for access. These activities would occur during the low-flow summer months. The native fish and macroinvertebrate species occupying aquatic habitats could be injured or killed by heavy equipment during site access, preparation, or construction activities, if present in the affected area. Dewatering activities could cause these fish and macroinvertebrates to become stranded and could dry out their habitat or lead to predation by birds or mammals.

Project construction activities would also result in the temporary loss of riparian trees and shrubs that provide important shaded riverine aquatic habitat functions, such as shade, cover, complexity, and substrate for macroinvertebrates. (See Impact 3.5-3 [Alt. 2] for additional discussion of effects on riparian vegetation.)

### *Initial Channel Response*

After the completion of construction activities, some habitat improvements associated with river ecosystem restoration activities and reconfiguration of the golf course would be realized immediately. For example, removing bridges and reconfiguring the golf course would result in fewer encroachments and other adverse effects on the SEZ. Restoration efforts would create a longer, more meandering channel and more connected riparian zone, resulting in increased habitat complexity, pool volume, and cover. Armored riffle substrates used in grade control could provide spawning substrate and would also provide habitat for aquatic macroinvertebrates. Water turbulence created by the armored riffles would provide increased DO concentrations, which is vital for many species of fish and macroinvertebrates.

The new physical form of the channel and associated floodplain would also result in immediate changes to hydraulic conditions, which in turn would result in a geomorphic response for some period of time until a new dynamic equilibrium was reached. Depending on the specific, localized circumstances (e.g., flows and channel geometry), this could include localized changes in water velocities, sediment transport, and depositional patterns. Because the geomorphic response is process driven and subject to several highly variable conditions (e.g., frequency, duration, and magnitude of intermediate- to high-flow events; local sediment grain sizes; local channel geometry), it can be extremely difficult to predict the nature and extent of short-term (interim) outcomes. Nevertheless, it is possible that some aquatic habitat conditions could become degraded during the channel's initial response to the changed physical condition. For example, initial channel responses could result in the formation of localized sediment deposits that disconnect surface water and physically interfere with fish movement during low-flow conditions. In addition, floodplain surface deposits (e.g., off-channel depressions) could form, which could lead to fish stranding after overbanking flow events. Additional discussion on the potential initial channel response is provided in Section 3.3, "Hydrology and Flooding," and Section 3.4, "Water Quality and Geomorphology."

### *Impact Summary*

Project construction activities would occur for 3–4 years. Such activities could result in intermittently increased turbidity and downstream sedimentation and could result in the release and exposure of construction-related contaminants. These would be potential short-term, temporary effects. Such exposure could reduce or adversely affect aquatic habitat and populations, including salmonids and other native aquatic species. Alternative 2 includes a suite of measures, including BMPs, that would minimize this potential effect. Construction would include dewatering activities that would result in the temporary loss of aquatic habitat. Fish and macroinvertebrates could become stranded during dewatering activities, and habitat could dry out or predation by birds or mammals could occur; or the organisms could be injured or killed by heavy equipment during site access, preparation, or construction activities. However, in the short term, implementing Alternative 2 could result in both adverse and beneficial effects on aquatic habitats, depending on the effects of the river channel's geomorphic response on sediment transport and deposition processes during the initial channel-response period. This impact would be significant.

Mitigation Measure 3.5-1A (Alt. 2): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.4-6 (Alt. 2) in Section 3.4, "Geomorphology and Water Quality."

Mitigation Measure 3.5-1B (Alt. 2): Implement Preconstruction Surveys for Western Pearlshell Mussels.

Before the initiation of construction activities, State Parks will survey for western pearlshell mussels to determine whether they are present. If it is determined that western pearlshell mussels are present in the study area, then specific measures will be included to address this species in the native-fish and mussel capture and translocation plan described in Mitigation Measure 3.5-1C (Alt. 2) below.

Mitigation Measure 3.5-1C (Alt. 2): Develop and Implement Native-Fish and Mussel Capture and Translocation Plan.

State Parks or its representative will develop and implement a measure to prevent the loss of native fish and mussel species occupying habitat within the study area. Before any construction activities that require dewatering commences, a CDFG-approved biologist will conduct native-fish and mussel relocation activities within the construction dewatering area. All captured native fish and mussel species will be immediately released to a suitable habitat near the study area. Future restoration should not be planned for the relocation site within the next few years to allow for reestablishment of habitat and coordination with other agencies (i.e., USFS, Conservancy, City of South Lake Tahoe) should be completed so all relocation is not occurring in one reach of the river. The qualified biologist will place nets with 1/8-inch mesh at the upstream and downstream extents of the area to be dewatered to keep fish out of the area during fish removal activities. After completion of removal activities, the work area will be cleared for dewatering. Fish rescue and relocation will continue until the area is completely dewatered or until it is determined that no fishes remain in the dewatering area. These activities will take place in consultation with CDFG.

Mitigation Measure 3.5-1D (Alt. 2): Limit Potential Localized Channel Erosion in the Upper Truckee River and Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.4-1A (Alt. 2) in Section 3.4, “Geomorphology and Water Quality.”

Mitigation Measure 3.5-1E (Alt. 2): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

This mitigation measure is identical to Mitigation Measure 3.4-1B (Alt. 2) in Section 3.4, “Geomorphology and Water Quality.”

Mitigation Measure 3.5-1F (Alt. 2): Ensure Bed and Bank Stability Downstream of the Treated Reaches.

This mitigation measure is identical to Mitigation Measure 3.4-1C (Alt. 2) in Section 3.4, “Geomorphology and Water Quality.”

Mitigation Measure 3.5-1G (Alt. 2): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.4-1D (Alt. 2) in Section 3.4, “Geomorphology and Water Quality.”

Mitigation Measure 3.5-1H (Alt. 2): Monitor and Supplement Coarse-Sediment Delivery Downstream and Monitor Instream Habitat Conditions.

State Parks will implement Mitigation Measure 3.4-5 (Alt. 2) in Section 3.4, “Geomorphology and Water Quality.” In addition, State Parks will monitor instream habitat conditions for potential geomorphic response–related effects. Specifically, if sediment deposition is occurring within the study area that results in the loss of surface water connectivity and/or creates an impediment to fish movement in the low flow channel, State Parks will conclude that a project effect on fish movement/migration is occurring. In response, State Parks will regrade portions of the instream area to create a low-flow channel that restores surface water connectivity and fish movement/migration. State Parks will use BMPs similar to those described for the project alternatives and implement Mitigation Measures 3.5-1A (Alt. 2) through 3.5-1C (Alt. 2) to ensure that any subsequent adverse effects on fish habitat would be avoided and/or minimized.

With implementation of Mitigation Measures 3.5-1A (Alt. 2) through 3.5-1H (Alt. 2) as described above, potential short-term adverse effects on fish habitat would be avoided and/or minimized, or corrective actions would be implemented, and Impact 3.5-1 (Alt. 2) would be less than significant.

IMPACT 3.5-2 (Alt. 2) **Long-Term Changes to Fish and Aquatic Habitat.** *River restoration activities under Alternative 2 would result in long-term beneficial effects on aquatic habitats and the fish community in the Upper Truckee River. These beneficial effects would result from several changes: the removal of encroachments in the SEZ and channel; improved conditions for riffle and pool complexes and substrate through restored geomorphic processes; improved floodplain connectivity and access to secondary channels; increased habitat structure and complexity; and reduced sediment inputs into the river associated with existing, ongoing bank erosion. This effect would be* ***beneficial****.*

River restoration and reconfiguration of the golf course under Alternative 2 would substantially increase the length of the channel and width of the riparian corridor and would restore natural processes within the study area, resulting in higher quality and increased quantity habitat for the fish and macroinvertebrate community. Increased sinuosity would improve pool development and maintenance, and a wider and more rigorous riparian vegetation community would lead to increased riparian cover and instream complexity with the introduction of woody debris.

Pool habitats provide important functions for the native fish community. Pools provide deep, low-velocity areas, with submerged structural elements that provide cover (Moyle 2002, Raleigh et al. 1984), winter habitat, and flood and thermal refugia for fish. During upstream migrations, adult fish (including trout that have been foraging as adults in Lake Tahoe) typically move quickly through higher velocity riffles and rapids and pause for varying durations in deep holding pools. These holding pools provide safe areas in which fish can rest when low flows and/or fatigue inhibit their migration. Proposed restoration activities under Alternative 2 have the potential to result in beneficial effects on fundamental physical processes related to pool formation and maintenance. The partial sedimentation of pools during summer low-flow periods and their subsequent scour during spring-snowmelt high-flow periods are widely recognized seasonal processes. During high flows, coarse particles eroded from upstream riffles are transported through pools to downstream riffles. This process occurs because velocity and shear stress increase in pools at a faster rate than at riffles as flow increases toward bankfull (National Marine Fisheries Service 2004). As discharge increases, the energy to transport coarse sediment increases in pools at a faster rate than at riffles. A threshold is generally reached when flows approach the effective-discharge flow and the pool scour process begins, and coarse sediment eroded from upstream reaches continues through pools to downstream riffles where it may be deposited. The pool scour process becomes most dominant at the effective-discharge flow in undisturbed stream channels because flow depth increases only slightly once the adjacent bars or banks are overtopped and the floodplain is inundated (National Marine Fisheries Service 2004).

Restoration activities have the potential to increase the convergence of flows through pools, thereby increasing the effectiveness of the scour mechanisms that maintain pools. Reduced confinement of flows could be expressed as an increased width-to-depth ratio for the active channel. Restoring more natural hydraulic conditions and associated geomorphic processes has the potential to decrease width-to-depth ratios. As a result, pool formation and maintenance processes could be restored.

Reducing the channel gradient would allow increased storage of gravel bed load in the channel, with the development of riffles important for macroinvertebrate production, fish spawning, and water quality. Riffles provide many important habitat functions for salmonids and other fish species, including spawning areas for adults and rearing areas for juveniles. Important to these habitat functions are appropriately sized, stable gravels and cobbles with clear interstitial spaces (i.e., spaces free of fine sediments) for spawning and egg incubation, and habitat complexity with periodic coarse cobbles and boulders for juvenile rearing (providing localized velocity refugia [i.e., pockets] that serve as important feeding stations). In addition to providing habitat function for fish, riffles are turbulent water areas that are important for the maintenance of high DO concentrations in the water column and provide important habitat for benthic macroinvertebrates.

Benthic macroinvertebrates are the principal food source for most juvenile salmonids (Moyle 2002:40-41). Mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera), referred to collectively as EPT taxa, are considered the most productive, preferred, and available foods for stream fishes (Waters 1995). The EPT

group typically inhabits the interstitial spaces of coarse substrates (i.e., gravel to cobble-sized particles), although some species of mayfly and certain other aquatic insects (e.g., chironomidae) prefer highly organic fine sediments. Sands and silt are the least productive substrates for aquatic macroinvertebrates (Harrington and Born 2000) and are more easily mobilized, making them less suitable because they are less stable. Therefore, reducing the intrusion of sediment that reduces the interstitial spaces of cobbles and gravel would directly increase the habitable area for these taxa. Changes in the biomass and structure of benthic macroinvertebrate assemblages could increase the vigor of native fish populations that depend on them.

Under Alternative 2, the golf course would be removed from most areas adjacent to the Upper Truckee River channel, and adjoining riparian vegetation communities would be restored. Approximately 97 acres of floodplain and meadow would be restored, including 37 acres of SEZ. The increased area and improved ecosystem functions of SEZ, floodplain, and riparian communities would be beneficial because they would result in a long-term net increase in instream cover, shade, and woody debris recruitment.

### *Impact Summary*

Alterations in hydraulics and geomorphic processes have resulted in the creation of incised channels, followed by lateral erosion and widening. This ultimately has resulted in reduced aquatic habitat quality with a wider, more uniform channel section with less lateral variation in depth, and reduced convergence of flows that are necessary to maintain pool depth and volume. Alternative 2 would include restoration of the physical channel form, hydraulic conditions, and geomorphic processes. Many of the benefits of the restoration project would be realized over time, as functional geomorphic processes shape channel morphology and associated habitat features that provide important functions and values to the fish and macroinvertebrate community. For example, reduced streambank height and increased riparian vigor would allow the development of undercut streambanks, which provide important cover for fish. The cover provided by riparian vegetation would also increase as riparian vegetation matures. Colonization of floodplains, streambanks, and instream bars by riparian vegetation would result in variability in erosion resistance and would promote deposition in localized areas, increasing channel complexity. These processes, which rely on regular disturbance resulting from flood events, would result in improvements in aquatic habitat functions and values over a period of several decades, and would assure that aquatic habitat would be maintained over time. This effect would be beneficial.

No mitigation is required.

IMPACT 3.5-3 (Alt. 2) Short-Term, Construction-Related Disturbance or Loss of Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens, and SEZ). *Implementing Alternative 2 would result in the removal of riparian and meadow vegetation along the Upper Truckee River and placement of fill into the active channel for geomorphic restoration of the river. Alternative 2 also includes golf course construction and wetland restoration in the vicinity of spring complexes in Washoe Meadows SP, including wetland restoration in the old quarry adjacent to the large fen, and could affect these complexes either directly or by changing local hydrology. The locations of the spring complexes are well-documented and Alternative 2 proposes to avoid these areas. However, because of the close proximity of the current conceptual design of golf course reconfiguration and quarry restoration to the spring complexes (including a fen), these complexes could be directly or indirectly affected by final project design, construction, and operation without more specific design parameters and measures to avoid direct or indirect effects on these sensitive resources. Because the likelihood and potential magnitude of these effects are presently unknown and Alternative 2 would result in disturbance within SEZ and jurisdictional wetlands this impact is considered* ***significant****.*

The stream channel's size, configuration, and floodplain connection would be directly modified throughout the study area under Alternative 2 by increasing channel length (adding 1,590 feet), elevating the streambed 2–4 feet in many locations, and reducing channel capacity in a majority of reaches. Modifications would also involve placing fill in approximately 2,600 feet of existing channel. Restoration would involve removing some existing riparian vegetation, but the riparian vegetation to be removed would be salvaged and used elsewhere to the extent

feasible. Salvaged vegetation would consist of transplanted sod and shrubs, native sod revetments and native sod blankets, and woody debris brush boxes. Sod and shrub materials would be obtained from within the footprint of the new channels and salvaged from the bottom of reconnected meanders or from adjacent meadows (aside from landscaped areas with nonnative sod). As part of project design, in all near-bank areas that would experience construction disturbance, protecting the existing bank vegetation would be emphasized.

Other improvements proposed under Alternative 2 include the area where the old quarry pit cut into the hillside intercepting subsurface water, which drains to the base of the slope and forms a small wetland on the disturbed topography of the old quarry floor. This small wetland is part of the mapped spring complex on the wall and pit floor of the old quarry, located adjacent to and east of the large fen in Washoe Meadows SP. The drainage would be reconfigured to a more naturalized channel, and a wetland pond covering about 0.5 acre would be constructed to form a more natural habitat. This wetland pond would be outside of but adjacent to the golf course footprint. Drainage out of the pond would cross the golf course, requiring a small cart path bridge. The quarry restoration would require some disturbance to the existing wetlands, including hydrologic changes and vegetation disturbance. The existing disturbed wetland on the pit floor, which would be restored under Alternative 2, is hydrologically connected to and receives drainage from the large fen to the west via a small rivulet as well as being fed by groundwater. Although Alternative 2 proposes to avoid the fen, wetland restoration and drainage reconfiguration in the quarry could inadvertently alter the groundwater or surface water hydrology and availability for the fen upslope. A risk would exist that drainage from the fen could potentially increase and cause the fen to become drier if landscape alteration downslope of the fen modifies groundwater flow. Because the proposed restoration in the quarry is conceptual, the specific potential for and magnitude of this effect cannot presently be known.

Two areas mapped as spring complexes are located adjacent to the location of the reconfigured golf course holes and fairways proposed under Alternative 2: (1) the groundwater-supported wetland mosaic in the old quarry (located on the quarry high wall and part of the pit floor on the west side of the quarry), adjacent to and east of the large fen; and (2) the spring and associated wetland vegetation at the south end of the park. The wetland mosaic in the old quarry (which includes the small wetland that would be restored under Alternative 2, as previously discussed) is located adjacent to the proposed tee box, fairway, and green for hole 12. The spring and associated wetland vegetation at the south end of the park is adjacent to the proposed golf course holes 9, 10, and 11. Alternative 2 proposes to avoid direct effects on spring complexes by designing the layout of the golf course around or away from these areas and by including a protective buffer. Because the design of the golf course holes is conceptual and not finalized, potential for the final design, construction, and operation of these holes to inadvertently degrade this sensitive biological resource exists without more specific design parameters and measures to avoid direct or indirect effects on the spring complexes.

Wetland habitat has been adequately identified for purposes of the EIR/EIS/EIS using vegetation as the primary indicator and hydrology, where it is apparent. While this approach would encompass all wetland areas ultimately confirmed to be protected under the CWA, a formal delineation of jurisdictional wetlands subject to USACE jurisdiction under Section 404 of the CWA (i.e., using vegetation, hydrology, and soils as indicators) would not be conducted until the permitting phase after selection of a preferred alternative. The Upper Truckee River is considered a water of the United States. As mentioned in the “Methods and Assumptions” section of this impact analysis, habitat types associated with the riparian corridor of the Upper Truckee River, Angora Creek, the other unnamed creek drainages within the study area, and potentially the quarry ponds are assumed to be considered jurisdictional wetlands, subject to USACE jurisdiction under CWA Section 404. These habitat types are also considered habitats of special significance by TRPA. Deciduous riparian vegetation (willow scrub) and montane meadow vegetation are two of TRPA’s threshold common vegetation types. Implementation of Alternative 2 would involve removing riparian vegetation and working within areas that would qualify as jurisdictional wetlands and other waters of the United States and SEZ. The project would require a CWA Section 404 permit from USACE (i.e., Regional General Permit 16), a CWA section 401 permit from the RWQCB, and streambed alteration agreement from CDFG for work on the streambed and banks of the Upper Truckee River, Angora Creek, and the other unnamed creek drainages within the study area. Geomorphic restoration under Alternative 2

would include placement of fill in the Upper Truckee River and removal of some adjacent woody riparian and meadow vegetation. This would result in the temporary disturbance of sensitive habitat types, including SEZ, and the placement of fill material into jurisdictional waters of the United States, including wetlands subject to USACE jurisdiction under CWA Section 404.

Because the likelihood and magnitude of the potential effects on the spring complex hydrology are presently unknown and Alternative 2 would result in disturbance within SEZ and jurisdictional wetland, this impact is considered significant.

Mitigation Measure 3.5-3A (Alt. 2): Conduct Delineation of Waters of the United States and Obtain Authorization for Fill and Required Permits.

Before approval of detailed design used for project construction, a delineation of waters of the United States, including wetlands that would be affected by project implementation, will be conducted by a qualified biologist through the formal Section 404 wetland delineation process. The delineation will be submitted to and verified by the Sacramento District of USACE. Authorization for fill or reconstruction of jurisdictional waters of the United States, including wetlands, will be secured from the Sacramento District of USACE through the Section 404 permitting process. Because the project involves wetland and stream restoration activities in the Tahoe Basin, it is anticipated that the project would be authorized under Regional General Permit 16. This permit requires the following general permit terms:

- a determination of the volume and types of material to be placed into waters of the United States;
- a determination of the total area of waters of the United States to be directly and indirectly affected;
- a wetland delineation in accordance with the 1987 *Wetland Delineation Manual* and the *Western Mountain Regional Supplement* (USACE 2008) when wetlands are proposed for impacts;
- a description of habitat, including plant communities, located in the study area;
- a description of any environmental impacts that are expected to occur, including methods to avoid, minimize, or mitigate adverse impacts on water quality or aquatic functions at the study area;
- any other information pertinent to the wetland, stream or water body involved;
- for projects involving the restoration of greater than 3 acres of wetlands, evidence that USFWS has been provided with a courtesy copy of the project notification; and
- a copy of the 401 water quality certification or waiver issued for the project.

State Parks will coordinate with USACE as appropriate and obtain coverage under Regional General Permit 16 for the construction of all aspects of the project. All general terms required for permit compliance will be implemented.

In addition, implementation of Alternative 2 would require a streambed alteration agreement from CDFG for work on the bed and banks of the Upper Truckee River. State Parks will obtain the streambed alteration agreement from CDFG and implement all terms required for permit compliance.

Mitigation Measure 3.5-3B (Alt. 2): Implement Vegetation Protection Measures and Revegetate Disturbed Areas.

To minimize the loss of native wetland vegetation at the site, salvage actions will be implemented for wet meadow and riparian vegetation. As detailed in Chapter 2, “Project Alternatives,” and mentioned in the impact discussion, riparian vegetation within the SEZ would be avoided to greatest extent feasible. A minimum number

of channel access points will be used to avoid and minimize adverse effects on bank vegetation. If avoidance is not possible, trees will be shielded, and shrubs will be pruned while protecting soil and root structures. In areas where existing streambank vegetation must be removed, plant materials will be salvaged, stored, and reused as possible.

Mitigation Measure 3.5-3C (Alt. 2): Avoid Effects on the Spring Complexes (Including Fens) through Final Project Design and Implement Protection Measures During Project Construction.

To avoid potential adverse effects of golf course relocation and operation on the spring complexes west of the Upper Truckee River, and potential effects of quarry restoration on the large fen adjacent to and west of the quarry, the following mitigation measures will be implemented.

(1) State Parks will develop and implement specific parameters and measures to ensure that the final design, operation, and management of golf course holes 9, 10, 11, and 12 avoid potential direct and indirect impacts to the spring complexes in Washoe Meadows SP.

(2) Before construction, a qualified biologist will clearly identify the boundaries of the relevant spring complexes in the field with flagging, and protective fencing will be placed around the features to protect them from project-related effects. No construction-related activities will be allowed within areas fenced for avoidance, and construction personnel will be briefed about the presence of this sensitive resource and the need to avoid impacts to it.

(3) The edges of the spring complexes will be further protected from indirect effects of the managed turf by the "naturalized landscape" and "minimally managed landscape" buffer areas that are part of the project design. The latter, which will function as the ultimate buffer between the golf course and the adjacent native vegetation, will be areas of native vegetation within the golf course that are generally not mowed, irrigated, or fertilized. Vegetation height and structure may be managed (trim, thin, etc.) to enhance course playability, but in general these areas will serve to buffer the spring complexes from indirect effects of the golf course management.

(4) Proposed restoration of the quarry will be further designed to avoid potential direct or indirect effects on the large fen west of the quarry. The plans and specifications will ensure that the groundwater and surface water hydrology that support the fen will not be adversely affected by the project.

With the measures described above, the locations of sensitive habitats would be identified, and the project would minimize effects of project construction and compensate for loss of sensitive habitats (jurisdictional wetlands, riparian vegetation, and SEZ); potential impacts to the spring complexes as a result of golf course relocation and operation would be avoided through final project design of the golf course holes, installation of protective fencing, and training of construction crews; and potential effects of quarry restoration on the large fen west of the quarry would be avoided through final restoration design that avoids potential hydrologic impacts to the fen. Therefore, with implementation of Mitigation Measures 3.5-3A (Alt. 2), 3.5-3B (Alt. 2), and 3.5-3C (Alt. 2), Impact 3.5-3 (Alt. 2) would be less than significant.

IMPACT 3.5-4 (Alt. 2) Short-Term, Construction-Related Disturbance or Removal of Special-Status Plants. *Alternative 2 would involve temporary disturbance and removal of plant communities that provide suitable habitat for several special-status plant species known to occur in the vicinity of the study area. While surveys to date have not detected these species in proposed construction areas, pre-construction, focused surveys would be conducted to confirm absence during the permitting phase. Because suitable habitat exists where ground disturbance is planned, if special-status plant species are found in follow-up, pre-construction surveys, then implementing Alternative 2 could result in their removal or disturbance. This impact would be* ***potentially significant****.*

Several special-status plant species are known to occur in and adjacent to the study area or have potential to occur in the study area. Suitable habitat for these species within the study area exists in mesic conditions along the Upper Truckee River and in the spring complexes west of the river. Some of these species, specifically shore sedge and three-ranked hump-moss, are known to occur in the large fen in Washoe Meadows SP. Shore sedge and three-ranked hump-moss could also occur in other spring complexes in the study area, including the small wetland in the old quarry that would be restored under Alternative 2. Two special-status vascular plant species, marsh skullcap and Oregon fireweed, and one special-status moss species, Bolander's candle moss, could occur in moist riparian habitats that are suitable for the species along the Upper Truckee River, Angora Creek, and the unnamed creek within the existing golf course, and in spring complexes west of the river. Marsh skullcap has been documented just outside the study area in Washoe Meadows SP, where it is found along a creek channel in an open meadow growing with sedges and mint. Similar conditions and associated plant species occur along the Upper Truckee River and other drainages in the study area. Oregon fireweed and Bolander's candle moss have not been documented in the vicinity of the study area, but are known to occur under similar conditions elsewhere in the Tahoe Basin. Although special-status plant species have been documented or could occur in the study area, none have been identified during any vegetation monitoring or rare-plant surveys, or otherwise documented, within proposed construction areas to date. However, pre-construction, focused surveys would be conducted to confirm absence prior to implementation. Because suitable habitat exists in locations where ground-disturbing activities would be implemented, marsh skullcap, Oregon fireweed, Bolander's candle moss, shore sedge, three-ranked hump-moss could be found in proposed construction areas during follow-up, pre-construction surveys and adversely affected by implementation of Alternative 2.

Alternative 2 involves restoring a 13,430-foot stretch of the Upper Truckee River and adjoining floodplain, including the removal of the five existing bridges and the construction of one new, longer bridge. Activities associated with the geomorphic restoration would entail local, temporary disturbances to the existing vegetation to restore natural geomorphic processes. Also, the quarry wetland restoration and pond construction would require some vegetation disturbance and hydrologic changes to the existing wetlands (see Impact 3.5-3 [Alt.2] for further discussion), which provide suitable habitat for special-status plants. Under this alternative, 97 acres of floodplain and meadow would be restored, including 39 acres of the 100-year floodplain and 37 acres of SEZ, all of which could provide suitable habitat for marsh skullcap, Oregon fireweed, and Bolander's candle moss in the future. Where marsh skullcap occurs in Washoe Meadows SP, it has responded favorably to stream restoration along Angora Creek with an increase in growth after restoration; therefore, long-term effects of the project could be beneficial. However, if populations of these special-status species exist in portions of the Upper Truckee River riparian corridor or the quarry wetlands that would be disturbed during implementation of Alternative 2, construction activities could have a substantial short-term adverse effect on special-status species. This impact would be potentially significant.

Implementing Alternative 2 also involves reconfiguring the Lake Tahoe Golf Course by fully relocating seven golf course holes and partially relocating two holes to the west side of the Upper Truckee River. Vegetation within the conceptual golf course footprint is mapped primarily as lodgepole pine forest with a dry understory, Jeffrey pine forest, dry meadow, and sagebrush dry meadow. These habitat types are not considered suitable habitat for special-status plant species with potential to occur in the study area. In addition, the native vegetation in this portion of the relocated footprint has been disturbed and degraded by historic quarry mining activities. The ephemeral drainages in the southwest corner of the study area that would fall within the footprint of the reconfigured golf course holes are also not considered habitat for these species because they do not convey perennial water and lack established riparian vegetation. Because these species are not expected to inhabit this portion of the study area, relocating the golf course holes is not expected to affect special-status plant species.

Mitigation Measure 3.5-4 (Alt. 2): Conduct Follow-up, Pre-construction, Focused Surveys and Avoid, Minimize, or Compensate for Impacts on Special-Status Plants.

To avoid, minimize, or compensate for possible adverse effects on special-status plant species resulting from the proposed restoration of the Upper Truckee River or quarry wetlands, the following management requirements would be implemented in the following order:

(1) A qualified botanist familiar with the vegetation of the Tahoe Basin will conduct a focused preconstruction survey for special-status plants (e.g., marsh skullcap, Oregon fireweed, Bolander's candle moss) along all portions of the Upper Truckee River where construction (e.g., geomorphic restoration, bridge construction) is proposed. Preconstruction surveys will also be conducted at the quarry wetlands for special-status plants that could occur there and be affected by proposed wetland restoration in the quarry (e.g., three-ranked hump-moss, shore sedge, Bolander's candle moss, marsh skullcap, and other special-status plants associated with mesic conditions). Surveys will be conducted between June and September when target species are clearly identifiable and will follow CDFG's *Guidelines for Assessing the Effects of Proposed Development on Rare, Threatened, and Endangered Plants and Plant Communities* (CDFG 2000).

(2) If no special-status plants are found during the survey, the results of the survey will be documented in a letter report to the lead agencies that would become part of the project environmental record, and no further actions will be required.

(3) If occurrences of special-status plants are documented during the survey, they will be clearly identified in the field and protected from impacts associated with construction activities. Protective measures will include flagging and fencing of known plant locations and avoidance where possible. No construction-related activities will be allowed within areas fenced for avoidance, and construction personnel will be briefed about the presence of the plants and need to avoid effects on the populations.

(4) If avoidance is not possible, a mitigation plan to reduce impacts on special-status plants to a less-than-significant level will be developed in coordination with the lead agencies, CDFG (for CNPS List 2 species), and USFS (for forest sensitive species), depending on the species affected. The mitigation plan will include provisions for minimizing impacts on special-status plant populations during construction and for relocation and establishment of plants at new protected locations in the study area. The mitigation plan will also include provisions for follow-up monitoring to determine mitigation success, and remedial measures should the initial efforts to mitigate fail. The plan will be adopted and implemented by State Parks.

With the measures described above, any special-status plants that may be present within areas of ground disturbance would be identified before construction and the project would avoid, minimize, and compensate for potential construction-related impacts on those species. Therefore, with implementation of Mitigation Measure 3.5-4 (Alt. 2), Impact 3.5-4 (Alt. 2) would be less than significant.

IMPACT 3.5-5 (Alt. 2) Long-Term Effects on Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens and SEZ) and Special-Status Plant Species. *The long-term goal of the project under Alternative 2 is to minimize the footprint of the golf course within the SEZ, and to increase floodplain meadow vegetation as well as wetland area and functions. Implementing Alternative 2 would restore approximately 97 acres of floodplain vegetation and result in a net increase of 37 acres of restored SEZ. Restored floodplain and SEZ would also provide suitable habitat for the special-status plant species that have the potential to occur in the area. Because of the increased area and improved ecosystem functions of SEZ, floodplain, and wetland communities, this effect would be* beneficial.

Under Alternative 2 the golf course would be removed from most areas adjacent to the Upper Truckee River channel, and adjoining riparian vegetation communities would be restored. Approximately 97 acres of floodplain and meadow would be restored. Golf course holes would be relocated to an area on the west side of the river,

farther from the river, that contains less sensitive land; this would reduce the amount of SEZ occupied by the golf course. A total of 37 acres of SEZ would be restored. In addition, drainage around the area occupied by the old quarry pit on the west side of the Upper Truckee River would be improved and would include the creation of a natural channel and a wetland pond covering about 0.5 acre. As discusses under Impact 3.5-4 (Alt 2) the fen and other spring complexes outside of the disturbed quarry area would not be affected by the project. The restoration approach is designed to reverse the negative trends of erosion caused by past channelization, existing infrastructure, and associated land uses. The increased area and improved ecosystem functions of SEZ, floodplain, and wetland communities would be beneficial because they would result in a long-term net increase in the acreage of sensitive habitats (wetlands, riparian vegetation, and SEZ).

In addition, areas of restored SEZ and floodplain meadow vegetation would increase the area of suitable habitat for special-status plant species that have the potential to occur within the area. Marsh skullcap, Oregon fireweed, and Bolander's candle moss, discussed under Impact 3.5-4 (Alt. 2), have potential to occur in moist riparian habitats and would benefit from the long-term increase in this habitat type. A nearby population of marsh skullcap in Washoe Meadows SP responded favorably to a restoration project along Angora Creek and grows vigorously along the newly created banks of that creek. The increased size of SEZ, floodplain, and wetland communities could provide additional habitat for these species. This effect would be beneficial.

No mitigation is required.

IMPACT 3.5-6 (Alt. 2) Tree Removal and Forest Land Conversion. *Implementing Alternative 2 would result in the loss of an estimated 1,640 native trees greater than 10 inches DBH, including 1,395 trees in the area proposed for golf course relocation, 120 trees for geomorphic restoration, and 125 trees for access road construction. The relocation of a portion of the golf course to the west side of the river would involve conversion of forest to non-forest use (approximately 45 acres). This preliminary estimate of trees removed includes three trees greater than 30 inches DBH. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction. The magnitude of proposed tree removal in the study area is considered "substantial" as defined in the TRPA Code of Ordinances. However, tree removal will not affect any old growth forests. Implementing Alternative 2 would require a tree removal and management plan developed with TRPA. Substantial tree removal and the loss of trees greater than 30 inches DBH would be a* ***significant*** *impact.*

Implementing Alternative 2 would involve reconfiguring the Lake Tahoe Golf Course by fully relocating seven golf course holes and partially relocating two holes to the west side of the Upper Truckee River. The relocated golf course would be moved to higher capability lands farther from the river to minimize the use of SEZ lands and avoid sensitive biological resources in Washoe Meadows SP. The layout for the relocated holes would be designed to minimize removal of trees by maximizing placement of new holes in relatively open and previously disturbed areas. All trees would be removed from proposed tees, greens, and fairways; approximately 80 percent of trees located in the proposed rough would be removed. Approximately 45 acres mapped as Jeffrey pine and lodgepole pine would be removed to develop the relocated golf holes. For purposes of this EIR/EIS/EIS, the relocation of the golf course holes would require conversion of these 45 acres of mapped pine forest to non-forest uses. However, much of this acreage includes disturbed habitat on the old quarry lands that now support small trees, and dense lodgepole pine cover that is encroaching into meadows and riparian areas.Some tree removal from riparian areas would also be required for access to the river and geomorphic restoration under Alternative 2. However, as a result of geomorphic, floodplain, and SEZ restoration, a net increase in riparian tree abundance, cover, and productivity is expected following project implementation.

Under Alternative 2, an estimated total of 1,640 trees greater than 10 inches DBH would be removed, including 1,395 trees for golf course relocation, 120 trees for geomorphic restoration, and 125 trees for access road construction. This estimate includes three trees greater than 30 inches DBH, with at least one tree greater than 30 inches DBH within the proposed golf course footprint and two trees greater than 30 inches DBH that would be removed for geomorphic restoration. However, trees to be removed under Alternative 2 will not affect an old

growth forest. Tree removal estimates were calculated by State Parks based on an estimate of tree density (number of trees per acre) that is typical in the study area for each of the vegetation types that would be affected (130 trees per acre for lodgepole pine/moist understory, 75 trees per acre for lodgepole pine/dry understory, 90 trees per acre for Jeffrey pine, 38 trees per acre for lodgepole pine/dry meadow, and 8 trees per acre for meadow types) combined with the acreage of each vegetation type affected. Trees greater than 30 inches DBH were located during field reconnaissance. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction. The tree removal estimates reflect tree thinning recently completed by State Parks for fuels management treatments. Much of the study area has been treated for fuels management and forest health at least once-(Walck, pers. comm., 2010).

The tree removal estimates for Alternative 2 include trees that may be removed in the future for additional forest health and fuels treatments prior to, or in the absence of, project implementation, as part of State Parks' existing Lake Sector Wildfire Management Plan. Although State Parks has treated much of the study area for fuels reduction, some proportion of trees estimated for removal under Alternative 2 may be removed in the future regardless of project implementation (Walck, pers. comm., 2010), to further reduce densities in some areas. Additionally, some lodgepole pines that would be removed within the riparian corridor as part of the geomorphic restoration under Alternative 2 would also be removed as part of State Parks' existing management objectives to reduce conifer encroachment in riparian and meadow habitats and to enhance riparian hardwood growth (as part of the Riparian Hardwood Restoration Project).

As previously discussed, approximately 45 acres mapped as Jeffrey pine and lodgepole pine would be converted to golf course, including area previously disturbed by the old quarry. As a result of geomorphic, floodplain, and SEZ restoration, a net increase in riparian tree cover and productivity would occur under Alternative 2. Effects of this conifer forest conversion and increase in riparian vegetation on common and sensitive biological resources as a result of Alternative 2 are discussed below in Impacts 3.5-8 (Alt. 2), 3.5-9 (Alt. 2), and 3.5-10 (Alt. 2). Implications of this conifer forest conversion and increase in riparian vegetation for forest carbon cycling and climate change are discussed in Section 3.16, "Cumulative Impacts."

Provisions for tree removal are provided in the TRPA Code of Ordinances (Chapter 71, and Chapters 30, 65, 75, and 77), and tree removal requires the review and approval of TRPA. TRPA defines "substantial" tree removal as "activities on project areas of twenty acres or more and proposing the removal of more than 100 live trees 10 inches DBH or larger, or proposing the removal of more than 100 live trees 10 inches DBH or larger within land capability districts 1a, 1b, 1c, 2, or 3 regardless of the project area, or proposing tree removal that, as determined by TRPA after a joint inspection with appropriate State or Federal forestry staff, does not meet the minimum acceptable stocking standards set forth in Subsection 71.4.B" (TRPA Code of Ordinances, Section 71.4.I). Additionally, trees greater than 30 inches DBH must be retained, except under circumstances specified in the Code of Ordinances.

The magnitude of estimated tree removal (1,640 native trees greater than 10 inches DBH) under Alternative 2 would be substantial as defined by TRPA, and approximately three trees greater than 30 inches DBH would be removed. This impact would be significant.

Mitigation Measure 3.5-6 (Alt. 2): Minimize Tree Removal and Develop a Tree Removal and Management Plan.

Where feasible, the project will avoid and minimize the removal of trees, especially those 30 inches in DBH or larger. This avoidance and minimization will be achieved through project design to the greatest extent feasible. Tree removal that cannot be avoided will be mitigated with the following measures.

In accordance with Chapter 71, Section 71.3.B of the TRPA Code of Ordinances, a tree removal and management plan will be prepared by a qualified environmental professional (i.e., a restoration specialist, registered professional forester [RPF], or certified arborist with restoration qualifications, or similar qualified professional), and will be submitted to a TRPA RPF or other qualified TRPA professional for review and approval. TRPA

approval of the plan will be obtained before project approval. Alternatively, if a timber harvesting plan is required to be submitted to California Department of Forestry and Fire Protection and meets the requirements described in this mitigation measure, the timber harvesting plan may be submitted to TRPA for review and approval in lieu of a separate tree removal and management plan.

The tree removal and management plan will adhere to the provisions in Chapter 71 of the TRPA Code of Ordinances, including the preservation of trees larger than 30 inches DBH (Section 71.2.A). The plan will include protection measures for snags and coarse woody debris. In accordance with the TRPA criteria *Standards for Common Vegetation*, the plan will maintain relative species richness, relative abundance, and relative age class, as appropriate and feasible, to contribute to the attainment of the regionwide threshold standard.

Permanent disturbance (i.e., disturbance after project construction caused by the proposed land use changes) and temporary disturbance (i.e., disturbance from construction activities) of all trees to be preserved will be minimized. This will include minimizing cuts, fills, grade changes, paving or other coverage, soil compaction, and landscaping effects within the critical root zone of all trees, as determined by a qualified environmental professional. Creation of detailed site plans and construction documents will be coordinated with a qualified environmental professional to minimize permanent and temporary disturbance. The tree removal and management plan will demonstrate how site development design will minimize the permanent disturbance of all trees to be preserved, and how construction planning will minimize temporary disturbance of all trees to be preserved.

To minimize temporary disturbance, the tree removal and management plan will provide for vegetation protection during construction in accordance with Chapters 65 and 30 of the TRPA Code of Ordinances. Protection measures will include the following, at a minimum:

- Sturdy high-visibility protective fencing will be installed at the limits of construction (including all grading, road improvements, underground utilities, staging, storage, parking, or other development activity), and outside of the critical root zone of all trees to be preserved that have critical root zones in the limits of construction. The critical root zone is defined here as the area 5 times the diameter of the tree. This fencing will be included on all site plans (e.g., staging, grading, drainage, and utility plans) and will be depicted in the tree removal and management plan.

- If grading, trenching, or transplanting is necessary within the root zone of trees to be preserved, the work will be supervised by a qualified environmental professional, a RPF, or another qualified biologist, and the following measures will be implemented:

    - Soil will be removed in lines radial to, rather than tangential to, the tree to avoid excessive ripping and shattering of roots.

    - If root cutting cannot be avoided, roots will be cut cleanly at a 90-degree angle.

    - A minimum of 6 inches of soil or sand will be placed over exposed cuts and roots to reduce soil desiccation until the area is backfilled.

    - Native soil will be used to backfill all cuts.

- All necessary pruning will be performed under the supervision of a certified arborist or RPF or similar qualified specialist.

All tree protection obligations required in the tree removal and management plan will be incorporated into construction contracts. Tree protection measures will be installed, and will be inspected by staff from TRPA before issuance of a grading permit.

As part of the tree removal and management plan, a tree replacement plan may be prepared by a qualified environmental professional, in accordance with Chapters 30 and 77 of the TRPA Code of Ordinances. Tree replacement needs and specifications will be determined in cooperation with TRPA during development of the tree removal and management plan. Determining whether tree replacement is appropriate, and the amount of project-related tree removal subject to mitigation by tree replacement, should be based on several considerations related to local and Basin-wide vegetation and fuels management goals and opportunities. These considerations include: (1) the condition, stocking level, and encroachment potential of stands where trees would be removed relative to vegetation/fuels management objectives, desired ecological conditions, and relevant TRPA thresholds for those areas (e.g., stands proposed for removal that are presently overstocked, encroaching into other native vegetation types, or otherwise undesirable may not warrant full replacement); (2) whether on- or off-site tree replacement, which could increase tree density and cover at replanting sites, would either contribute to or conflict with fuels/vegetation and forest health goals for those locations or Basin-wide; and (3) how tree replacement may affect attainment of TRPA thresholds for vegetation. If a tree replacement plan is required, it would be submitted to and approved by a TRPA RPF or other qualified TRPA professional before tree removal or the issuance of a grading permit. Tree replacement will only be implemented in a manner that is also consistent with fire fuel management objectives for the replanted properties.

If tree replacement is required, the following provisions shall be incorporated into the tree replacement plan.

- The tree replacement plan will include a plant list, a description of appropriate planting stock for new trees, a planting plan, planting and maintenance techniques, and measures to control the introduction or spread of invasive plants. Transplanting will follow the International Society of Arboriculture's standard digging and transplanting techniques to ensure proper handling and successful transplanting of trees and vegetation.

- All trees planted to offset project impacts will be monitored for a period of at least 5 years, in conjunction with the monitoring program described below. Any tree that does not survive will be replaced on a 1:1 basis, and likewise monitored for a period of 5 years.

- Tree replacement may occur on-site if remaining undeveloped project areas can support additional trees, as determined by a qualified environmental professional and consistent with fire fuel management objectives. If the remaining undeveloped project areas cannot support sufficient plantings, off-site replacement will be required. Off-site replacement will occur in areas in need of additional trees, will be located as close to the study area as possible, and will be preserved in perpetuity by a conservation easement, deed restriction, or other similar mechanism.

- A certified arborist, a RPF, or qualified biologist will inspect the results of construction activities to document which trees were removed by grading and construction, and to document disturbance of preserved trees. This documentation will be provided to TRPA, and the total number of trees to be replanted, as described in the tree replacement plan, will be modified as necessary to reflect the actual tree removal and disturbance that occurs during construction.

- A vegetation monitoring approach will be developed and included as part of the tree replacement plan. Monitoring will be implemented by a certified arborist, a RPF, or another qualified biologist, for areas to be revegetated as mitigation. This approach will include monitoring protocols, including the protocol for evaluating tree health and vigor. A monitoring report detailing vegetation success will be submitted annually to TRPA through the monitoring period, for a minimum period of 5 years. The mitigation and monitoring of a replaced tree will continue until the tree satisfies the criteria for a successfully established sapling, dies, or is otherwise no longer part of a mitigation effort. Criteria for successful establishment will include survivorship for a period of at least 5 years, with at least 2 years without supplemental watering.

With the measure described above, the project would minimize tree removal and compensate, as needed, for the loss of trees. Therefore, with implementation of Mitigation Measure 3.5-6 (Alt. 2), Impact 3.5-6 (Alt. 2) would be less than significant.

IMPACT 3.5-7 (Alt. 2) Introduction and Spread of Weeds and Aquatic Invasive Species. *Implementing Alternative 2 has the potential to introduce and spread invasive weeds and aquatic invasive species during project construction and revegetation periods. The introduction and spread of invasive weeds or aquatic invasive species would degrade plant and wildlife habitat, including habitats of special significance (riparian) within the study area. In the long term, the new golf course area on the west side of the Upper Truckee River could provide a new source of nonnative plant and invasive weed populations that could colonize native vegetation nearby. However, implementation of the golf course's existing weed management plan would continue and would sufficiently prevent the spread of nonnative plants within areas of native vegetation during operation of the golf course. Introduction and spread of invasive weeds and aquatic invasive species during construction and revegetation would be a* ***potentially significant*** *impact.*

Implementing Alternative 2 would involve temporary ground-disturbing activities along stretches of the Upper Truckee River proposed for the geomorphic restoration and removal of portions of the existing golf course, as well as approximately 60 acres of previously disturbed Jeffrey pine, lodgepole pine, and other vegetation types for the reconfigured golf course. These ground-disturbing activities could result in the inadvertent introduction and/or spread of nonnative, invasive weed species. In addition, Alternative 2 would involve restoring a 13,430-foot-long reach of the Upper Truckee River and the replacement of five bridges with one longer bridge. These activities in and near the Upper Truckee River could spread aquatic invasive species into the Upper Truckee River. Waders or boots for construction personnel could harbor aquatic invasives such as New Zealand mudsnail, if that equipment has been exposed to those species in another water body, and is not sufficiently cleaned and sanitized. Nonnative, invasive weeds and nonnative aquatic invasive species compete with native plant and animal species; their introduction and proliferation in ecosystems can substantially alter the dynamics of native aquatic and terrestrial communities. This conversion can indirectly affect associated wildlife and fish species by changing and often reducing food sources and habitat structure and can lead to competition between native plant species and the weeds, often resulting in loss of native vegetation. The TRPA Goals and Policies specifically prohibit the release of nonnative plant and animal species in the Tahoe Basin because they can invade important wildlife habitats and compete for resources. However, invasive weeds and aquatic invasive species can be introduced inadvertently during grading and construction activities when construction equipment is moved into a site from another area where populations of weeds or aquatic invasive species occur.

Invasive weed species often are better competitors than native species, particularly in areas where the ground has been disturbed. Therefore, ground disturbance from construction activities could increase the local distribution and abundance of invasive weeds. An extensive weed survey has not been conducted for the Lake Valley SRA or Washoe Meadows SP, but two species on the USFS LTBMU's list of priority noxious weeds in the Tahoe Basin, cheatgrass (*Bromus tectorum*) and bull thistle (*Cirsium vulgare*), occur within Washoe Meadows SP. Furthermore, construction equipment entering the study area from weed-infested areas could result in the transport and spread of weeds. The geomorphic restoration of the Upper Truckee River and the construction of the reconfigured golf course west of the Upper Truckee River would temporarily create areas of open ground that could be colonized by weed species. Some of the generalized construction BMPs included in Chapter 2, "Project Alternatives," such as mulching and hydroseeding, would reduce the potential effects from weeds by reducing the amount of open ground. Without mitigation to address the introduction and spread of weeds, however, this short-term, construction-related impact would be potentially significant.

The relocated golf holes on the west side of the Upper Truckee River could provide a new source of nonnative plant and invasive weed populations in Washoe Meadows SP that could colonize native vegetation nearby. Additionally, although Alternative 2 involves removing existing golf course coverage within the SEZ along the Upper Truckee River (and restoring those areas to native vegetation), which could reduce the risk of weed invasion risk in the SEZ in localized areas, the overall golf course footprint would increase (from 133 acres to 156

acres). This includes areas of native vegetation such as areas of "naturalized landscape" that surround all of the areas of intensively and minimally managed landscape, which would serve as buffers against the spread of nonnative plant species from the golf course areas into the surrounding native vegetation. After development of the golf course on the west side of the river, implementing the golf course's existing weed management plan (see Chapter 2, "Project Alternatives") is expected to sufficiently prevent the spread of nonnative plants within the intensively managed and minimally managed landscaped areas into adjacent areas of native vegetation. The weed management plan implemented by the golf course as part of its routine maintenance would prevent the spread of weeds from areas within the existing golf course that would remain golf course under Alternative 2.

Mitigation Measure 3.5-7A (Alt. 2): Implement Weed Management Practices during Project Construction.

In consultation with TRPA, State Parks or its representative will implement appropriate weed management practices during project construction. Recommended practices include the following:

- A qualified biologist with experience in the Tahoe Basin will conduct a preconstruction survey to determine whether any populations of invasive/noxious weeds are present within areas proposed for ground-disturbing activities. This could be conducted in coordination with the focused special-status plant survey recommended above under Mitigation Measure 3.5-4 (Alt. 2), "Conduct Follow-up, Pre-construction, Focused Surveys and Avoid, Minimize, or Compensate for Impacts on Special-Status Plants." If noxious weed species are documented, they will be removed or their spread otherwise prevented before the start of construction. Control measures may include herbicide application, hand removal, or other means of mechanical control. This would help eliminate the threat of spreading the species throughout the study area and adjacent areas.

- All equipment entering the study area from weed-infested areas or areas of unknown weed status will be cleaned of all attached soil or plant parts before being allowed into the study area.

- To ensure that fill material and seeds imported to the study area are free of invasive/noxious weeds, the project will use on-site sources of fill and seeds whenever available. Fill and seed materials that need to be imported to the study area will be certified weed-free. In addition, only certified weed-free imported materials (or rice straw in upland areas) will be used for erosion control.

After project construction, the study area will be monitored on an annual basis for infestations of invasive weeds until the restored vegetation has become fully established. If new populations of invasive weeds are documented during monitoring, they will be treated and eradicated to prevent further spread. Emphasis in monitoring will be given to those areas designated as "minimally managed landscape" and "naturalized landscape" that serve as a buffer between the newly created golf course holes west of the Upper Truckee river and adjacent forest and riparian vegetation to ensure that these areas do not act as source points for infestations of weeds.

Mitigation Measure 3.5-7B (Alt. 2): Implement Aquatic Invasive Species Management Practices during Project Construction.

In consultation with TRPA, State Parks or its representative will implement appropriate aquatic invasive species management practices during project construction. Recommended practices include the following:

- All equipment, including individual equipment such as waders, wading boots, etc., entering the study area that will be used in or around the Upper Truckee River, or new aquatic golf course features will be decontaminated using recommended methods (USACE 2009) before being allowed into the study area.

With the measures described above, weed and aquatic invasive species management practices would be implemented during project construction and the inadvertent introduction and spread of weeds or aquatic invasive species from project construction would be prevented. Therefore, with implementation of Mitigation Measure 3.5-7A (Alt. 2) and 3.5-7B (Alt. 2), Impact 3.5-7 (Alt. 2) would be less than significant.

IMPACT 3.5-8 (Alt. 2) **Short-Term, Construction-Related Disturbance or Loss of Special-Status Wildlife Species and Habitats.** *Under Alternative 2, restoration activities along the Upper Truckee River and reconfiguration of the golf course could result in the loss of individuals or nests, or disruptions to nesting attempts, of six special-status bird species (yellow warbler, olive-sided flycatcher, osprey, long-eared owl, yellow-headed blackbird, and waterfowl species); potential disturbance of future nesting by willow flycatcher; and removal of active roost sites for, or injury to, western red bat. This impact would be* ***potentially significant*** *for species known to be present and for willow flycatcher and western red bat, if the species nests or roosts, respectively, in the study area in the future where construction would occur.*

Six special-status wildlife taxa have been documented in the study area: yellow warbler, yellow-headed blackbird, olive-sided flycatcher, long-eared owl, osprey, and waterfowl species. Eight additional special-status wildlife species were identified as having a moderate or high potential to occur within the study area (Table 3.5-5). Although project implementation is expected to provide long-term benefits for some of these species through restoration of the river corridor and adjacent floodplain (see Impact 3.5-9 [Alt. 2] for a discussion of long-term effects), some short-term adverse impacts are anticipated. These impacts are discussed below for each species. A discussion of those impacts that would be considered significant is provided under "Impact Summary" below.

### *Yellow Warbler, Willow Flycatcher, Yellow-Headed Blackbird, and Waterfowl*

Yellow warbler, willow flycatcher, yellow-headed blackbird, and waterfowl are special-status bird species associated with riparian, wetland, or aquatic habitats (e.g., ponds) that could be affected during construction within and adjacent to the Upper Truckee River channel.

Yellow warbler is designated as a species of special concern by CDFG. Willow scrub in the study area provides summer breeding and foraging habitat for yellow warblers. Individual yellow warblers were detected during the breeding season in 2005 and 2006, during avian surveys conducted by State Parks biologists (Fields, pers. comms., 2005b, 2007a); and this species possibly nests in the study area (surveys to confirm nesting status in the study area have not been conducted). The project is expected to improve habitat along the Upper Truckee River for riparian birds, including yellow warbler, over the long term by increasing riparian vegetation cover, corridor width, and hydrologic connectivity with the stream channel (see Impact 3.5-9 [Alt. 2]). As part of the geomorphic restoration under Alternative 2, fill would be placed in the Upper Truckee River and some adjacent woody riparian and meadow vegetation, which could provide nesting habitat for yellow warbler, would be removed. Under Alternative 2, 5,000 feet of the existing channel would be modified, 2,490 feet of historic channel remnants would be reconnected, and 1,700 feet of new channel would be constructed. Also, a small amount of willow scrub/willow wet meadow (0.20 acre) could be affected by the golf course reconfiguration. Construction within occupied yellow warbler habitat could cause effects on breeding and nesting activities and could affect the size or viability of the local population. Removal of occupied nesting habitat would be a substantial impact if yellow warblers were taken or deterred from occupying breeding and nesting locations. Construction could also result in noise, dust, and other disturbances to nesting birds in the vicinity, resulting in potential nest abandonment and mortality to eggs and chicks.

Willow flycatcher, listed as endangered under CESA, is not known to nest in the study area. This species has not been detected recently during repeated focused surveys, and breeding habitat suitability in the study area is considered marginal because of the degraded hydrologic and vegetation conditions. Although not expected regularly or in substantial numbers, it is possible that willow flycatchers could attempt to nest in riparian habitat before or during project implementation; this assumption is based on a past detection of the species in the study area, recent detections nearby, the study area's proximity to known populations, and the presence of some potential habitat in the study area. A willow flycatcher was detected in the study area in 1998. In 2007, willow flycatcher was detected along the Upper Truckee River near the airport, approximately 1.4 miles downstream of the study area; and a breeding population occurs along the south Upper Truckee River, approximately 4.5 miles upstream of the study area. If willow flycatchers attempted to nest in the study area along the Upper Truckee

River or elsewhere, project construction could cause the same types of disturbances and loss described for yellow warbler (i.e., removal of occupied nesting habitat, loss of nests or individuals).

Yellow-headed blackbird is designated by CDFG as a species of special concern. Yellow-headed blackbirds have been observed in the study area during the breeding season, at the golf course pond west of the green at hole 4 (Fields, pers. comm., 2010); however, the breeding status of this species within the study area is unknown. The pond where yellow-headed blackbirds have been observed supports some potential breeding habitat. Because this species was observed during the breeding season and potential breeding habitat is present, yellow-headed blackbirds may nest there. Under Alternative 2, habitat occupied by yellow-headed blackbird (the pond west of hole 4) and adjacent areas could be affected by the proposed golf course reconfiguration (e.g., reconfiguration of naturalized landscape surrounding the pond west of hole 4). Construction within or adjacent to occupied yellow-headed blackbird habitat could cause effects on breeding and nesting activities. Removal or disturbance of occupied nesting habitat would be a substantial impact if yellow-headed blackbirds were taken or deterred from occupying breeding and nesting locations. Construction could also result in noise, dust, and other disturbances to nesting birds in the vicinity, resulting in potential nest abandonment and mortality to eggs and chicks.

"Waterfowl" is designated as a special-interest group of species by TRPA. Common waterfowl such as mallard, Canada goose, and common merganser occur in the study area along the Upper Truckee River and golf course ponds. The study area does not include any TRPA-designated waterfowl threshold sites. The quality of nesting habitat for waterfowl is limited along much of the river corridor. The streambed and banks along the Upper Truckee River are incised throughout and severely undercut in some locations. Much of the riparian vegetation grows above the water table, as evidenced by exposed roots along the eroded and incised banks. Also, much of the riparian corridor lacks an herbaceous understory. These conditions do not provide adequate cover for most nesting waterfowl. However, some potential nesting habitat exists within or near the riparian corridor, where vegetation cover is relatively dense. Because surveys for nesting waterfowl have not been conducted within the study area, whether waterfowl species use this area for nesting is presently unknown. Construction-related disturbance (such as noise) associated with these project activities could affect foraging or resting waterfowl. If waterfowl use the area for nesting, construction could result in the loss of active nests, and injury or mortality to individuals.

### *Olive-Sided Flycatcher*

Olive-sided flycatcher is designated by CDFG as a species of special concern. Olive-sided flycatcher has been documented within the study area. Golf course relocation would result in the loss of conifer forest that may provide breeding habitat for this species. If olive-sided flycatcher uses the study area for nesting, construction and vegetation removal associated with geomorphic restoration, golf course relocation, bridge construction, and trail development within occupied habitat could impair breeding and nesting activities. Removal of occupied nesting habitat would be a substantial impact if olive-sided flycatchers were taken or deterred from occupying breeding and nesting locations. Construction within occupied habitat could cause effects on breeding and nesting activities. Project effects could include removal of occupied nesting habitat if individuals were taken or deterred from occupying breeding and nesting locations. Construction could also result in noise, dust, and other disturbances to nesting birds in the vicinity, potentially resulting in nest abandonment and mortality to eggs and chicks.

### *Osprey and Bald Eagle*

Osprey is designated by TRPA as a special-interest species. Bald eagle is listed as endangered under CESA, designated as a sensitive species by USFS, and designated as a special-interest species by TRPA; it also is fully protected under the California Fish and Game Code and protected under the Bald and Golden Eagle Protection Act. Ospreys have been observed in the study area along the Upper Truckee River; they also have been observed foraging in the hole 9 pond on the golf course, which is stocked with rainbow trout. However, this species is not known to nest in the study area. Bald eagles do not nest in or adjacent to the study area; although, they could forage or perch there throughout the year.

If ospreys or bald eagles use the study area or immediate vicinity for foraging, construction related to river restoration, golf course reconfiguration, bridge construction and removal, and trail development could disturb their foraging activities, particularly where these activities would occur near the Upper Truckee River or the hole 9 pond within the golf course. However, because of the presence of existing recreation use and maintenance activities, the existing disturbance level is relatively high; additional construction-related disturbance would not substantially affect the foraging patterns of bald eagle or osprey. Also, abundant and suitable foraging habitat is available in other areas nearby. Construction activities associated with Alternative 2 are not expected to cause injury or mortality to individuals, disrupt breeding attempts, or affect the population size or viability of these species.

### *Western Red Bat*

Western red bat is designated by CDFG as a species of special concern and by USFS Region 5 as sensitive. Western red bat is not known to occur in the study area; however, bat surveys have not been conducted there. Suitable roosting and foraging habitat exist in the study area. Western red bat has been detected at Tallac Marsh, approximately 5 miles away (Borgmann and Morrison 2004). Red bats are found primarily in dense riparian woodland habitats containing willow, cottonwood, and sycamore trees. If roost sites for red bats are present in riparian zones on the study area, project activities that remove or disturb trees (such as any necessary tree removal during geomorphic restoration) could remove or cause abandonment of these features.

### *Northern Goshawk and Long-Eared Owl*

Northern goshawk is designated as a species of special concern by CDFG, is listed as sensitive by USFS Region 5, and considered a special-interest species by TRPA. A small amount of suitable habitat is located in the study area; however, northern goshawks have not been detected during protocol surveys for the species. Goshawks have been observed foraging in the northern portion of Washoe Meadows SP, near Angora Creek (River Run Consulting 2006). (These foraging birds were likely from the Angora Creek territory, which was removed during the 2007 Angora Fire.) Conifer forest in the study area could provide foraging habitat; however, the potential for goshawks to nest in the study area is low because of the lack of substantial area for suitable nesting and high disturbance levels in the surrounding area (e.g., noise from recreation and residential and commercial development).

Effects on breeding goshawks as a result of implementation of Alternative 2 are not expected. If goshawks use the proposed golf course relocation area for foraging, construction could disturb individuals and remove foraging habitat. Because the species typically forages within 1 mile of nest sites, and currently there are no known active nests within 1 mile of the study area and no detections have been recorded within the study area during protocol surveys, this area is not considered an important foraging area for goshawks. Furthermore, larger areas of higher quality habitat nearby (Saxon Creek, Tahoe Mountain, Trout Creek) are available within and adjacent to those territories.

Long-eared owl is designated by CDFG as a species of special concern. In 2006, a long-eared owl was detected in conifer forest on the west side of the study area, by State Parks biologists during owl surveys. The breeding status of long-eared owl in the study area is unknown. Long-eared owls also have been documented elsewhere in the Tahoe Basin (Smith 2002); however, their habitat use has not been well studied. Conifer forest and riparian habitat in the study area provide suitable foraging and nesting habitat for long-eared owl.

If long-eared owls use the study area for nesting, construction and vegetation removal associated with geomorphic restoration, golf course relocation, bridge construction, and trail development within occupied habitat could impair breeding and nesting activities. Removing or disturbing occupied nesting habitat would result in a substantial effect if long-eared owls were taken or deterred from occupying breeding and nesting locations. Construction could also result in noise, dust, and other disturbances to nesting birds in the vicinity, potentially resulting in nest abandonment and mortality to eggs and chicks.

### *American Marten and Sierra Nevada Snowshoe Hare*

American marten is designated as a sensitive species by the USFS Regional Forester and a species of special concern by CDFG; Sierra Nevada snowshoe hare is designated as a species of special concern by CDFG. In 2002, marten surveys were conducted in the study area by State Parks biologists; no martens were detected during the 2002 survey or otherwise documented. The study area supports some suitable marten habitat (River Run Consulting 2006) in conifer forests and forest-meadow edges; however, its potential to function as denning/breeding habitat is limited by high levels of recreation, residential disturbance nearby, and marginal forest structure conditions for the species.

Conifer forest, willow-riparian, and meadow habitats in the study area provide suitable habitat for snowshoe hare, and the species has been documented in the region, including the south Upper Truckee River watershed (USFS unpublished data). In December 2008, snowshoe hare tracks were observed in the west portion of the study area by a State Parks biologist. Because of the high level of human activity in and around the study area (and marginal forest structure for marten), the study area is not expected to provide important breeding or denning habitat for these species. Implementing Alternative 2 is not expected to substantially affect breeding individuals or reproductive success.

If American marten or snowshoe hare use the study area for foraging, noise or other factors associated with construction activities (vegetation removal, clearing, and excavation) could temporarily disturb foraging or movement activities and temporarily displace individuals. Also, individuals could alter their behavior by avoiding the project area during construction. The behavior and local distribution of prey species for marten could be temporarily altered by project activities; this could influence foraging patterns. However, potential disruptions of prey populations would occur locally and are not likely to occur over a substantial portion of any individual's foraging range. Although Alternative 2 could adversely affect individuals and habitat locally, the magnitude and intensity of potential adverse effects are not expected to affect the species' distribution, breeding productivity, local population size, or regional populations of American marten or snowshoe hare.

### *Mule Deer*

Mule deer is designated as a special-interest species by TRPA. Mule deer have been documented foraging and resting in riparian habitat upstream of the study area, above the U.S. 50 crossing in Meyers (River Run Consulting 2006). Mule deer have not been documented in the study area, including during 2008 mammal surveys conducted by Wildlife Resource Consultants. Deer fawning is not expected to occur in the study area. Important habitat requirements for mule deer fawning include undisturbed meadow and riparian areas that provide hiding cover and forage. Riparian and meadow habitat in the study area is likely not suitable for fawning because of disturbance levels from recreation (including golfers, pedestrians, and bicyclists), and residential development (including the regular presence of dogs), and from adjacent land uses. Because the study area provides cover and foraging habitat and the species has been documented nearby, mule deer may occasionally use the study area for foraging and could be disturbed by construction activities. However, the study area is not considered an important or core foraging area for mule deer. Mule deer are relatively rare in the Tahoe Basin near the study area. Deer have not been detected in the study area incidentally during biological surveys (for other species) conducted over the last several years; and the presence of dogs and other disturbance sources reduces the habitat quality for mule deer. Therefore, any potential effects of project implementation on mule deer would not affect the species' distribution, breeding productivity, or local population size.

### *Impact Summary*

Project construction under Alternative 2 could result in the loss of individuals or nests, or disruptions to nesting attempts, of yellow warbler, olive-sided flycatcher, waterfowl, or long-eared owl; potential disturbance of willow flycatcher if the species nests in a construction area in the future; and the removal of an active roost site for, or

injury to, western red bat. This impact would be potentially significant for species known to inhabit the study area and for willow flycatcher and western red bat, if they use the site in the future.

Mitigation Measure 3.5-8A (Alt. 2): Conduct Preconstruction Surveys for Nesting Special-Status Birds (Yellow Warbler, Willow Flycatcher, Olive-Sided Flycatcher, Yellow-Headed Blackbird, Waterfowl, and Long-Eared Owl), and Implement a Limited Operating Period If Necessary.

For construction activities that would occur in suitable habitat during the nesting season (generally April 1–August 31, depending on species and weather), a qualified wildlife biologist will conduct focused surveys for active nest sites of special-status birds. The biologist should be able to identify Sierra Nevada bird species audibly and visually. The following provides general guidelines for conducting surveys for yellow warbler, olive-sided flycatcher, willow flycatcher, waterfowl, and long-eared owl.

### *Yellow Warbler, Olive-Sided Flycatcher, Yellow-Headed Blackbird, Waterfowl, Long-Eared Owl*

Focused surveys for yellow warbler, olive-sided flycatcher, yellow-headed blackbird, waterfowl, and long-eared owl nests will be conducted by a qualified wildlife biologist within 14 days before construction activities are initiated each construction season. The preconstruction survey for yellow warbler, olive-sided flycatcher, yellow-headed blackbird, waterfowl, and long-eared owl nests will be conducted using a nest-searching technique appropriate for the species. For example, for yellow warbler, an appropriate technique involves first conducting point counts in suitable riparian habitat to determine occupancy, followed by nest searching if the species is present. For long-eared owl, surveys typically involve tape playbacks of recorded long-eared owl calls.

### *Willow Flycatcher*

For construction activities initiated in suitable breeding habitat for willow flycatcher after May 31, a preconstruction survey for nesting willow flycatchers will be conducted each construction season. The survey will follow *A Willow Flycatcher Survey Protocol for California* (Bombay et al. 2003). The protocol requires a minimum of two survey visits to determine presence or absence of willow flycatcher: one visit during survey period 2 (June 15–25) and one during either survey period 1 (June 1–14) or period 3 (June 26–July 15).

If an active special-status bird nest is located during the preconstruction surveys, the biologist will notify TRPA and CDFG. If necessary, modifications to the project design to avoid removal of occupied habitat while still achieving project objectives will be evaluated, and implemented to the extent feasible. If avoidance is not feasible or conflicts with project objectives, the following limited operating periods will apply to avoid disturbances during the sensitive nesting season. If a yellow warbler, willow flycatcher, yellow-headed blackbird, or waterfowl nest is located, construction will be prohibited within a minimum of 500 feet (or at a distance directed by the appropriate regulatory agency) of the nest to avoid disturbance until the nest is no longer active. If an active long-eared owl nest is located, construction within 0.25 mile of the nest site will be delayed until the site is no longer active. These recommended buffer areas may be reduced through consultation with TRPA or CDFG.

Mitigation Measure 3.5-8B (Alt. 2): Conduct Preconstruction Surveys for Special-Status Bats, Avoid Removal of Important Roosts, and Implement a Limited Operating Period If Necessary.

Bat surveys will be conducted by a qualified wildlife biologist within 14 days before any tree removal or clearing each construction season. Locations of vegetation and tree removal or excavation will be examined for potential bat roosts. Potential roost sites identified will be monitored on two separate occasions for bat activity, using bat detectors to help identify species. Monitoring will begin 30 minutes before sunset and will last up to 2 hours at any potential roost identified. Removal of any significant roost locations discovered will be avoided to the extent feasible. If avoidance is not feasible, roost sites will not be disturbed by project activities until September 1 or later, when juveniles at maternity roosts would be volant (i.e., able to fly).

With the measures above, the project would avoid the loss of individuals, nests, or roost sites of special-status wildlife species during construction. Therefore, with implementation of Mitigation Measures 3.5-8A (Alt. 2) and 3.5-8B (Alt. 2), Impact 3.5-8 (Alt. 2) would be less than significant.

IMPACT 3.5-9 (Alt. 2) Long-Term Effects on Special-Status and Common Wildlife Species and Habitats. *The long-term ecosystem response to river and floodplain restoration under Alternative 2 is expected to substantially improve habitat quality and functions for riparian and aquatic wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. River and floodplain restoration would also increase the size and enhance functions of TRPA-designated wildlife habitats of special significance (i.e., wetlands, meadows, and riparian areas). The effect of river and floodplain restoration on common and special-status wildlife associated with riparian, wetland, and aquatic habitat, and wildlife habitats of special significance would be* ***beneficial****.*

*Fully relocating seven golf course holes and partially relocating two holes would remove and fragment upland habitat and increase disturbance levels west of the Upper Truckee River. The new trail at the north end of the reconfigured golf course could facilitate increased access to Washoe Meadows SP to the west and affect common wildlife species. However, the golf course reconfiguration and trail development proposed in Alternative 2 are not expected to substantially affect breeding productivity or population viability of any common or special-status wildlife, or cause a change in species diversity locally or regionally. Therefore, the impact of golf course reconfiguration and trail development on common and special-status wildlife would be* ***less than significant****.*

### *River and Floodplain Restoration*

As discussed previously, under Alternative 2, incompatible land uses associated with the golf course would be removed from most areas adjacent to the Upper Truckee River channel and adjoining riparian vegetation communities would be restored. Approximately 97 acres of floodplain and meadow would be restored. Golf course holes would be relocated to an area on the west side of the river, farther from the river, that contains less sensitive land; relocating the holes would reduce the acreage of SEZ occupied by the golf course. A total of 37 acres of SEZ would be restored.

Implementing Alternative 2 would involve several activities, including restoration of the physical channel form combined with restored hydraulic conditions and geomorphic processes. Many benefits of the restoration project would be realized over time as functional geomorphic processes shape channel morphology and associated habitat features that provide important functions and values for riparian and aquatic wildlife communities. Increased riparian vigor would provide important cover for riparian and aquatic wildlife such as amphibians. Riparian vegetation cover and patch size within the SEZ would also increase and become more contiguous as riparian vegetation matures. Riparian vegetation would colonize streambanks and instream bars, resulting in variability in resistance to erosion and promoting deposition in localized areas, which in turn would increase channel complexity. These processes, which rely on regular disturbance resulting from flood events, would improve riparian and aquatic habitat functions and values over a period of several decades, and would maintain these habitats over time.

Under Alternative 2, the active floodplain would be restored and enlarged, providing increased hydrologic connectivity and frequency of river overbanking through channel restoration. The active (5-year) floodplain area would increase from 36 acres under the existing condition to 77 acres under Alternative 2. Implementing Alternative 2 would increase the frequency of river overbanking, which would improve the development, persistence and regeneration, and quality of wetland and riparian vegetation (and wildlife habitat) within the floodplain.

In the long term, ecosystem response to restoration under Alternative 2 is expected to substantially improve habitat quality and functions for riparian and aquatic wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. Expected long-term results of ecosystem restoration along the river

that would improve habitat are increased riparian vegetation cover and continuity, corridor width, and patch size; development of a riparian understory; and increased soil moisture and saturation within the floodplain, as a result of improved hydrologic connectivity of the floodplain to the stream channel. For example, in the Sierra Nevada, surface wetness and soil saturation are primary factors limiting the distribution and persistence of wet meadow systems that can function as songbird population sources. Increases in soil saturation and standing or slow-moving water in floodplain meadows can improve foraging conditions and breeding productivity of several riparian species, and enhance habitat for amphibians and other species that require wet conditions.

### *Golf Course Reconfiguration and Trail Development*

Implementing Alternative 2 involves reconfiguring the Lake Tahoe Golf Course by fully relocating seven golf course holes and partially relocating two holes to the west side of the Upper Truckee River. Approximately 60 acres of lodgepole pine forest, Jeffrey pine forest, dry meadow, sagebrush dry meadow, and other vegetation types would be removed as a result of the golf course relocation. Also, a new designated trail system would be constructed to extend the informal dispersed recreation trails on the west side of the river across the new bridge, where they would tie in to new trails on the east side of the river. The trail system would include a new trail around the north end of the western section of the golf course that would allow access across a new bridge.

Several common resident and migratory wildlife species (described in Section 3.5.1, "Affected Environment") use habitats in the proposed golf course relocation area for foraging, shelter, and breeding. Regionally and locally common wildlife species would be subject to the loss of habitat and increased localized habitat fragmentation. Habitat loss and fragmentation could result in the reduction of population sizes and diminished use of the study area by some local wildlife populations. However, other local wildlife populations that are not sensitive to human disturbance or landscape conversion to golf course turf, or that benefit from increased habitat edges created by fragmentation would not be affected.

Regionally and locally common wildlife species would also be disturbed by operation of the golf course through increased and regular human intrusion in the area between the Upper Truckee River and the neighborhoods to the south and west. Increased recreational use of this area would further reduce the habitat value for wildlife. Most of the new trail at the north end of the new golf course holes would be located within the golf course's matrix of minimally managed landscape, naturalized landscape, turf, and greens and tees. Therefore, the new trail is not expected to substantially increase use at this location above levels that would already result from access and use of the relocated golf course. However, the new trail's connection to existing trails and designation as part of a trail system could facilitate increased access of Washoe Meadows SP to the west, which would affect common wildlife species.

These common species are relatively abundant locally and regionally, and not limited by the availability of habitat in the region. Also, upland habitat in the proposed golf course relocation area is presently degraded and experiences relatively high levels of disturbance from use of volunteer trails by bicyclists and pedestrians (and dogs), and edge effects from adjacent residential development. This area of upland habitat is not considered critical or limiting to the presence or viability of common wildlife populations in the region. Relocating the golf course holes as proposed under Alternative 2 would not cause wildlife populations to decrease below self-sustaining levels, or result in a change in species diversity.

Special-status wildlife species known or with potential to use upland habitats in the study area for foraging or breeding (long-eared owl, olive-sided flycatcher, northern goshawk, American marten, Sierra Nevada snowshoe hare, mule deer) could be affected in the same ways as common wildlife (i.e., by habitat loss and fragmentation, increased recreation disturbance). However, for the reasons discussed in Impact 3.5-8 (Alt. 2) (marginal forest structure, high levels of disturbance, or lack of occurrence records), upland habitat in the golf course relocation area is not expected to provide important or core breeding habitat for these species, or foraging areas critical to population viability and local or regional distribution. Furthermore, larger areas of higher quality and less disturbed habitat for these species are available nearby (e.g., south Upper Truckee River watershed, Saxon Creek

watershed, Trout Creek watershed). Therefore, implementing Alternative 2 is not expected to substantially affect breeding productivity, local population size, or regional populations of any special-status wildlife species.

### *Impact Summary*

The long-term ecosystem response to river and floodplain restoration under Alternative 2 is expected to substantially improve the quality and functions of habitat for riparian and aquatic wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. River and floodplain restoration would also increase the size and enhance the functions of TRPA-designated wildlife habitats of special significance (i.e., wetlands, meadows, and riparian areas). The effect on common and special-status wildlife associated with riparian, wetland, and aquatic habitat, and wildlife habitats of special significance would be beneficial.

Under Alternative 2, fully relocating seven golf course holes and partially relocating two holes would remove and fragment upland habitat and increase disturbance levels west of the Upper Truckee River. The new trail at the north end of the new golf course could facilitate increased access to Washoe Meadows SP to the west, which would affect common wildlife species. However, the golf course relocation and trail development proposed in Alternative 2 are not expected to substantially affect breeding productivity or population viability of any common or special-status wildlife, or to cause a change in species diversity locally or regionally. Therefore, the impact of golf course relocation and trail development on common and special-status wildlife would be less than significant.

No mitigation is required.

IMPACT 3.5-10 (Alt. 2) Effects on Potential Wildlife Movement Corridors. *Under Alternative 2, the increased area and improved ecosystem functions of SEZ, floodplain, and riparian and wetland communities along the Upper Truckee River would benefit wildlife communities. These benefits would improve the localized SEZ's wildlife corridor function by increasing habitat quality, native vegetation connectivity, and corridor width. This effect would be beneficial.*

*Golf course relocation would remove approximately 60 acres and fragment upland habitat west of the Upper Truckee River. This area is not expected to function as a significant movement corridor for common or sensitive wildlife species. Therefore, the impact of golf course relocation on wildlife movement corridors would be less than significant.*

The California Essential Habitat Connectivity Project has a recently-completed, peer-reviewed statewide assessment of important habitat linkages (Spencer et al. 2010). The project's goal was to identify large remaining blocks of intact habitat or natural landscape at a coarse spatial scale, and model linkages between them that are important to maintain as corridors for wildlife. The study area is not within any area identified as a high priority for maintaining regional wildlife corridors. While no wildlife movement corridors have been confirmed to occupy the study area, its large size and location between the river and nearby forest areas make it potentially suitable for localized wildlife movement. The study area is bordered on the east and south by U.S. 50, on the west by residential neighborhoods, and on the north by Sawmill Road. On a watershed scale, the roadways and residences may limit the study area's potential value to facilitate long-ranging wildlife movement, particularly that of medium-sized and large animals. Washoe Meadows SP and the west side of the study area compose a large block of open space, positioned between Angora Ridge and the south Upper Truckee River watershed. The mix of forest, meadow, and riparian habitat in this block of open space, within the context of the larger complex of open space or low-density development to the north and south of the study area, provides a potential habitat link within the Upper Truckee River watershed and the Tahoe Basin.

Of all locations and habitats within the study area, the Upper Truckee River's riparian corridor is considered the most likely to function as a potentially important wildlife movement corridor. Depending on their setting, quality, and physical connectivity to other habitats, stream corridors are thought to often be used by wildlife as movement corridors in many landscapes; the Upper Truckee River may serve this function. The Upper Truckee River's

riparian corridor is a well-defined linear landscape feature that provides unique biophysical conditions, traverses a variety of ecotones and connects upstream and downstream areas within the watershed; however, it is degraded in its current condition within the study area by the presence of the golf course near or abutting the river. The presence of golf course adjacent to the river has also disrupted riparian habitat continuity in some locations. As discussed previously, the increased area and improved ecosystem functions of SEZ, floodplain, and wetland communities along the Upper Truckee River under Alternative 2 would benefit wildlife communities locally; these benefits would improve the SEZ's corridor function by increasing habitat quality, connectivity of native vegetation, and corridor width.

Golf course relocation under Alternative 2 would remove approximately 60 acres and fragment upland habitat west of the Upper Truckee River. This area is not expected to function as a significant corridor for common or sensitive wildlife species. Existing potential for upland habitat at this location to function as a wildlife movement corridor is compromised by its proximity to residential neighborhoods to the west (North Upper Truckee Road and adjoining neighborhoods), north (Echo View Estates, Tahoe Mountain), and south (San Bernardino Road and South Upper Truckee neighborhoods), and well-traveled roads (U.S. 50 to the south and east, Sawmill Road to the north). Reconfiguring the golf course is not expected to bifurcate any important habitat areas or prevent wildlife from continuing to access or travel between habitat areas in the vicinity.

None of the special-status species that could be affected by golf course reconfiguration and that require ground-based movements or dispersal (e.g., mammals such as American marten, mule deer, Sierra Nevada snowshoe hare) are expected to use upland communities in the study area for critical foraging or breeding habitat (see Impacts 3.5-8 [Alt. 2] and 3.5-9 [Alt. 2]), and the golf course relocation area likely does not function as a movement corridor required to maintain population viability. This area is disturbed by recreation and residential and commercial development, and provides relatively low-suitability habitat for these species. Populations of common species that range medium to long distances and that likely use conifer forest west of the Upper Truckee River, such as black bear and coyote, could still cross through the area from dusk to dawn o access nearby lands without encountering golfers. In the Tahoe Basin, these common species are relatively abundant, generally adapted to human disturbance, and can move through a variety of urban and nonurban landscapes. Also, these species would be able to use higher-quality habitat along the restored river and floodplain.

### *Impact Summary*

The increased area and improved ecosystem functions of SEZ, floodplain, and riparian and wetland communities along the Upper Truckee River under Alternative 2 would benefit wildlife communities; these benefits would improve the SEZ's wildlife corridor function by increasing habitat quality, connectivity of native vegetation, and corridor width. This effect would be beneficial.

Golf course reconfiguration under Alternative 2 would remove approximately 60 acres and fragment upland habitat west of the Upper Truckee River. However, this area is not expected to function as a significant corridor for common or sensitive wildlife species. Therefore, the impact of golf course reconfiguration on wildlife movement corridors would be less than significant.

No mitigation is required.

## Alternative 3: River Ecosystem Restoration with Reduced Play Golf Course

IMPACT 3.5-1 (Alt. 3) **Short-Term Degradation of Fish and Aquatic Habitat Resulting from Construction and Initial Channel Response.** *Alternative 3 construction activities could result in temporary adverse effects on water quality, aquatic habitats, and the aquatic community. Effects could also occur during the initial channel-response period within the study area and in areas downstream. This impact would be* ***significant****.*

Alternative 3 involves restoring a 13,430-foot-long reach of the Upper Truckee River and adjoining floodplain, and reconstructing a reduced-play golf course on the east side of the river, which would be designed to minimize the footprint of the golf course within the SEZ.

### *Water Quality: Sedimentation and Turbidity, Release and Exposure of Contaminants*

As under Alternative 2, construction activities under Alternative 3 would disturb instream sediments and soils adjacent to waterways. However, the active channel would not be disturbed during year 1 of construction. Any resulting erosion or disturbance of instream sediments and soils would temporarily increase turbidity and sedimentation downstream of the construction sites throughout the study area if soils were transported in the river flows or stormwater runoff. The potential also exists for contaminants used in construction activities to be accidentally introduced into the water system, either directly through spills or incrementally through surface runoff, from work within or immediately adjacent to the channel. Several measures would be implemented as part of Alternative 3 to minimize potential water quality effects. (See Chapter 2, "Project Alternatives," and Section 3.4, "Water Quality and Geomorphology," for additional discussion of this issue.) Potential effects on fish and aquatic habitat would be similar to those described for Alternative 2.

### *Direct Disturbance and Temporary Loss of Habitat during Construction Activities*

Several aspects of project construction under Alternative 3 would require dewatering of the active channel to allow access to and removal of riparian vegetation that provides important shade and cover. These activities and the associated effects on fish and aquatic habitats would be similar to those described for Alternative 2. Dewatering would occur only in year 3 and possibly in year 4. Some water would be diverted during year 2 for channel seasoning of off-channel sections completed in year 1.

### *Initial Channel Response*

After the completion of construction activities, some habitat improvements associated with river ecosystem restoration activities would be realized immediately. However, the new physical form of the channel and associated floodplain would also result in immediate changes to hydraulic conditions, which in turn would result in a geomorphic response for some period of time until a new dynamic equilibrium was reached. Depending on the specific, localized circumstances, this could include localized changes in water velocities and sediment transport and depositional patterns. Because the geomorphic response is process driven and subject to several highly variable conditions (e.g., frequency, duration, and magnitude of intermediate- to high-flow events; local sediment grain sizes; local channel geometry), it can be extremely difficult to predict the nature and extent of short-term (interim) outcomes. Nevertheless, as described for Alternative 2, it is possible that some aquatic habitat conditions could become degraded during the channel's initial response to the changed physical condition.

### *Impact Summary*

As under Alternative 2, project construction activities under Alternative 3 could result in intermittently increased turbidity and downstream sedimentation and could result in the release and exposure of construction-related contaminants. These would be potential short-term, temporary effects. Such exposure could reduce or adversely affect fish habitat and fish populations, including salmonids and other native fish species. Alternative 3 includes a suite of measures, including BMPs, that would minimize this potential effect. Construction would include dewatering activities that would result in the temporary loss of aquatic habitat. Fish and macroinvertebrates could become stranded during dewatering activities, and habitat could dry out or predation by birds or mammals could occur; or the organisms would be injured or killed by heavy equipment during site access, preparation, or construction activities. Lastly, implementing Alternative 3 could result in short-term adverse effects on aquatic habitats because the river channel's geomorphic response would affect sediment transport and deposition processes during the initial channel-response period. This impact would be significant.

Mitigation Measure 3.5-1A (Alt. 3): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.5-1A (Alt. 2).

Mitigation Measure 3.5-1B (Alt. 3): Implement Preconstruction Surveys for Western Pearlshell Mussels.

This mitigation measure is identical to Mitigation Measure 3.5-1B (Alt. 2).

Mitigation Measure 3.5-1C (Alt. 3): Develop and Implement Native-Fish and Mussel Capture and Translocation Plan.

This mitigation measure is identical to Mitigation Measure 3.5-1C (Alt. 2).

Mitigation Measure 3.5-1D (Alt. 3): Limit Potential Localized Channel Erosion in the Upper Truckee River and Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.5-1D (Alt. 2).

Mitigation Measure 3.5-1E (Alt. 3): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

This mitigation measure is identical to Mitigation Measure 3.5-1E (Alt. 2).

Mitigation Measure 3.5-1F (Alt. 3): Ensure Bed and Bank Stability Downstream of the Treated Reaches.

This mitigation measure is identical to Mitigation Measure 3.5-1F (Alt. 2).

Mitigation Measure 3.5-1G (Alt. 3): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.5-1G (Alt. 2).

Mitigation Measure 3.5-1H (Alt. 3): Monitor and Supplement Coarse-Sediment Delivery Downstream and Monitor Instream Habitat Conditions.

This mitigation measure is identical to Mitigation Measure 3.5-1H (Alt. 2).

With the measures described above, potential short-term adverse effects on aquatic habitat would be avoided and/or minimized, or corrective actions would be implemented. Therefore, with implementation of Mitigation Measures 3.5-1A (Alt. 3) through 3.5-1H (Alt. 3), Impact 3.5-1 (Alt. 3) would be less than significant.

IMPACT 3.5-2 (Alt. 3) Long-Term Changes to Fish and Aquatic Habitat. *River restoration activities under Alternative 3 would result in long-term beneficial effects on aquatic habitats and the fish community in the Upper Truckee River. These beneficial effects would result from several changes: the removal of golf course infrastructure adjacent to and within the river; improved conditions for riffle and pool complexes and substrate through restored geomorphic processes; improved floodplain connectivity and access to secondary channels; increased habitat structure and complexity; and reduced sediment inputs into the river associated with existing, ongoing bank erosion. This effect would be* ***beneficial****.*

River restoration activities under Alternative 3 would substantially increase the length of the channel and width of the riparian corridor and would restore natural processes within the project area, resulting in greater availability of habitat for the fish and macroinvertebrate community. Increased sinuosity would improve pool development and maintenance, and a wider and more rigorous riparian vegetation community would lead to increased riparian cover and instream complexity through the introduction of woody debris. As under Alternative 2, many of the benefits of river restoration under Alternative 3 would be realized over time, as functional geomorphic processes

shape channel morphology and associated habitat features that provide important functions and values to the fish and macroinvertebrate community. These processes, which rely on regular disturbance resulting from flood events, would result in improvements in aquatic habitat functions and values over a period of several decades, and would assure that aquatic habitat is maintained over time. This effect would be beneficial.

No mitigation is required.

IMPACT 3.5-3 (Alt. 3) Short-Term, Construction-Related Disturbance or Loss of Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens, and SEZ). *Implementing Alternative 3 would result in the removal of riparian and meadow vegetation along the Upper Truckee River, and placement of fill into the active channel for geomorphic restoration of the river. This impact would be* ***significant****.*

Treatment for the Upper Truckee River under Alternative 3 would be the same as the river treatment under Alternative 2 except that Alternative 3 would not include any bridges over the river. Alternatives 2 and 3 would treat the lower portion of Angora Creek, the mouth of the unnamed creek, and restoration of adjoining floodplain and meadow similarly. Effects on sensitive habitats (jurisdictional wetlands, riparian vegetation, and SEZ) would be similar to those described in Impact 3.5-3 (Alt. 2) because these sensitive habitats occur primarily along the Upper Truckee River, Angora Creek, and the unnamed drainage in the golf course. Please refer to Impact 3.5-3 (Alt. 2) for a detailed description of the potential impact. Because the golf course would not be relocated west of the river and the quarry wetlands would not be restored under Alternative 3, spring complexes (including fens) and other sensitive habitats west of the Upper Truckee River riparian corridor and floodplain would not be affected. Under this alternative, sensitive habitat types, including SEZ, would be temporarily disturbed and fill material would be placed into jurisdictional waters of the United States, including wetlands subject to USACE jurisdiction under CWA Section 404. Therefore, this impact would be significant.

Mitigation Measure 3.5-3A (Alt. 3): Conduct Delineation of Waters of the United States and Obtain Authorization of Fill and Required Permits.

This mitigation measure is identical to Mitigation Measure 3.5-3A (Alt. 2).

Mitigation Measure 3.5-3B (Alt. 3): Implement Vegetation Protection Measures and Revegetate Disturbed Areas.

This mitigation measure is identical to Mitigation Measure 3.5-3B (Alt. 2).

With the measures described above, sensitive habitats would be identified, and the project would compensate for their loss and define measures for increasing riparian and wetland vegetation. Therefore, with implementation of Mitigation Measures 3.5-3A (Alt. 3) and 3.5-3B (Alt. 3), Impact 3.5-3 (Alt. 3) would be less than significant.

IMPACT 3.5-4 (Alt. 3) Short-Term, Construction-Related Disturbance or Removal of Special-Status Plants*. Alternative 3 would involve temporary disturbance and removal of plant communities that provide suitable habitat for several special-status plant species known to occur in the vicinity of the study area. While surveys to date have not detected these species, focused surveys to confirm absence would not be conducted until the project permitting phase. Because suitable habitat exists where ground disturbance could occur, implementing Alternative 3 could result in removal or disturbance of special-status plant species. This impact would be* ***potentially significant****.*

This impact would be similar to Impact 3.5-4 (Alt. 2). Treatment for the Upper Truckee River in Alternative 3 would be the same as the river treatment under Alternative 2. Alternatives 2 and 3 would treat the lower portion of Angora Creek, the mouth of the unnamed creek, and restoration of adjoining floodplain and meadow similarly. However, Alternative 3 would not include any bridges over the Upper Truckee River or Angora Creek; nor does it propose golf course reconfiguration on the west side of the Upper Truckee River. Instead this alternative proposes to reduce the area disturbed by golf course and keep it within the existing footprint. River treatments under

Alternative 3 would involve ground-disturbing activities in areas where special-status plant species have potential to occur. (Please refer to Impact 3.5-4 [Alt. 2] for a detailed description of potential effects.) Therefore, this impact would be potentially significant.

Mitigation Measure 3.5-4 (Alt. 3): Conduct Follow-up, Pre-Construction, Focused Surveys and Avoid, Minimize, or Compensate for Impacts on Special-Status Plants.

This mitigation measure is identical to Mitigation Measure 3.5-4 (Alt. 2).

With the measure described above, the project would avoid the loss of special-status plant species. Therefore, with implementation of Mitigation Measure 3.5-4 (Alt. 3), Impact 3.5-4 (Alt. 3) would be less than significant.

IMPACT 3.5-5 (Alt. 3) **Long-Term Effects on Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens and SEZ) and Special-Status Plant Species.** *The long-term goal of the project under Alternative 3 is to minimize the footprint of the golf course within the SEZ, and increase floodplain meadow vegetation as well as wetland area and functions. Implementing Alternative 3 would restore approximately 112 acres of floodplain meadow vegetation and 43 acres of SEZ. This effect would be* ***beneficial****.*

Under Alternative 3, incompatible land uses associated with the golf course would be removed from areas adjacent to the Upper Truckee River and Angora Creek, and adjoining riparian vegetation communities would be restored. All five existing bridges over the Upper Truckee River and four cart path/pedestrian bridges over Angora Creek would be removed. Approximately 112 acres of floodplain and meadow would be restored. The golf course's footprint would be reduced to 86 acres, reducing the amount of SEZ occupied by the golf course by 43 acres. A net total of 43 acres of SEZ would be restored. In addition, as part of floodplain restoration, the 0.75-acre storm drainage pond by existing holes 14 and 15 would be reconfigured, designed as a wetland or oxbow feature, and revegetated. The approach to restoration is designed to reverse the negative trends of erosion caused by past channelization, existing infrastructure, and associated land uses. The increased area and improved ecosystem functions of SEZ, floodplain, and wetland communities would be beneficial because they would result in a long-term net increase in the acreage of sensitive habitats. No construction disturbance related to golf course reconfiguration, quarry restoration, or trail development would occur on the west side of the Upper Truckee River under this alternative; therefore, spring complexes (including fens) and other sensitive habitats west of the Upper Truckee River riparian corridor and floodplain would not be affected.

In addition, areas of restored SEZ and floodplain would increase the area of suitable habitat for special-status plant species that have potential to occur within the area. Marsh skullcap, Oregon fireweed, and Bolander's candle moss, discussed under Impact 3.5-4 (Alt. 2), have potential to occur in moist riparian habitats and would benefit from the long term increase in this habitat type. A nearby population of marsh skullcap in Washoe Meadows SP responded favorably to a restoration project along Angora Creek and grows vigorously along the newly created banks of that creek. The increased size of SEZ, floodplain meadow vegetation, and wetland communities could provide additional habitat for these species. This effect would be beneficial.

No mitigation is required.

IMPACT 3.5-6 (Alt. 3) Tree Removal and Forest Land Conversion. *Implementing Alternative 3 would result in the loss of an estimated 253 native trees greater than 10 inches DBH, including 120 trees for geomorphic restoration, 125 trees for access road construction, and eight trees for golf course redesign east of the Upper Truckee River. None of the tree removal would involve conversion of forest to non-forest uses and no old growth forest systems would be affected. This preliminary estimate of trees removed includes two trees greater than 30 inches DBH. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction. The magnitude of proposed tree removal in the study area is considered "substantial" as defined in the TRPA Code of Ordinances. Implementing Alternative 3 would require a tree removal and management plan developed with TRPA. Substantial tree removal and the loss of trees greater than 30 inches DBH would be a* ***significant*** *impact.*

Implementing Alternative 3 would involve the same geomorphic restoration treatments as Alternative 2. As a result, under Alternative 3, tree removal in the riparian zone of the Upper Truckee River would be similar to that described under Impact 3.5-6 (Alt. 2) for Alternative 2. Because Alternative 3 does not involve creating new golf course holes or removing trees from upland forest habitat on the west side of the river, forest land conversion to golf course would not occur and substantially fewer trees would be removed under this alternative. Implementing Alternative 3 would result in the removal of approximately 253 native trees greater than 10 inches DBH, including 120 trees for geomorphic restoration, 125 trees for access road construction, and eight trees for golf course redesign on the east side of the river. This estimate includes two trees greater than 30 inches DBH that would be removed for geomorphic restoration. However, trees to be removed under Alternative 2 will not affect an old growth forest. Tree removal estimates were calculated by State Parks, as discussed in Impact 3.5-6 (Alt. 2) for Alternative 2. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction.

The tree removal estimates for Alternative 3 include trees that may be removed in the future for additional vegetation management and fuels treatments prior to, or in the absence of, project implementation. For example, some lodgepole pines that would be removed within the riparian corridor as part of the geomorphic restoration under Alternative 3 would be removed as part of State Parks' existing management to reduce conifer encroachment in riparian and meadow habitats and to enhance riparian hardwood growth (as part of the Riparian Hardwood Restoration Project), and as part of the Lake Sector Wildfire Management Plan. Removal of conifers from SEZs for riparian hardwood enhancement is a specific land management objective of State Parks, and some of the tree removal implemented under Alternative 3 would have a long-term beneficial ecological effect. Also, as a result of geomorphic, floodplain, and SEZ restoration, a net increase in riparian tree abundance, cover, and productivity is expected following project implementation.

Provisions for tree removal are provided in the TRPA Code of Ordinances (Chapter 71, and Chapters 30, 65, 75, and 77), and tree removal requires the review and approval of TRPA. TRPA defines "substantial" tree removal as "activities on project areas of twenty acres or more and proposing the removal of more than 100 live trees 10 inches DBH or larger, or proposing the removal of more than 100 live trees 10 inches DBH or larger within land capability districts 1a, 1b, 1c, 2, or 3 regardless of the project area, or proposing tree removal that, as determined by TRPA after a joint inspection with appropriate State or Federal forestry staff, does not meet the minimum acceptable stocking standards set forth in Subsection 71.4.B" (TRPA Code of Ordinances, Section 71.4.I). Additionally, trees greater than 30 inches DBH must be retained, except under circumstances specified in the Code of Ordinances.

Although geomorphic restoration and golf course reconfiguration requiring tree removal in Alternative 3 would be ecologically beneficial over the long term, the magnitude of estimated tree removal (253 native trees greater than 10 inches DBH) would be substantial as defined by TRPA; and approximately two trees greater than 30 inches DBH would be removed. This impact would be significant.

Mitigation Measure 3.5-6 (Alt. 3): Minimize Tree Removal and Develop a Tree Removal and Management Plan.

This mitigation measure is identical to Mitigation Measure 3.5-6 (Alt. 2).

With the measure described above, the project would minimize tree removal and compensate, as needed, for the significant loss of trees. Therefore, with implementation of Mitigation Measure 3.5-6 (Alt. 3), Impact 3.5-6 (Alt. 3) would be less than significant.

IMPACT 3.5-7 (Alt. 3) Introduction and Spread of Weeds and Aquatic Invasive Species. *Implementing Alternative 3 has the potential to introduce and spread invasive weeds and aquatic invasive species during the initial phases of project construction and implementation. The introduction and spread of invasive weeds or aquatic invasive species would degrade plant and wildlife habitat, including habitats of special significance (riparian) within the study area. During the construction related to the transition from an 18-hole golf course to a reduced-play golf course, the course could serve as an additional source point or harbor for the introduction and/or establishment of weeds. However, implementation of the golf course's existing weed management plan would continue on the reduced-play golf course and would sufficiently prevent the spread of nonnative plants within areas of native vegetation during operation of the golf course. Introduction and spread of invasive weeds and aquatic invasive species during construction and revegetation would be a* ***potentially significant*** *impact.*

Alternative 3 would involve the same geomorphic restoration treatments as Alternative 2 and the construction of a reduced-play golf course in place of the current 18-hole golf course. Treatment for the Upper Truckee River under Alternative 3 would be the same as under Alternative 2 except that Alternative 3 would not include any bridges over the river. Alternatives 2 and 3 would treat the lower portion of Angora Creek, the mouth of the unnamed creek, and restoration of adjoining floodplain and meadow similarly. The total area of ground disturbance would be much less under Alternative 3 because golf course holes would not be relocated west of the river under this alternative. However, substantial ground-disturbing activities and construction activities within the Upper Truckee River would still occur, and effects from the introduction and spread of weeds and aquatic invasive species would be similar to those described in Impact 3.5-7 (Alt. 2) for Alternative 2. Please refer to Impact 3.5-7 (Alt. 2) for a detailed description of potential effects. This short-term, construction-related impact would be potentially significant.

During the transition from an 18-hole golf course to a 9-hole golf course, the course could serve as an additional source point or harbor for the introduction and/or establishment of weeds. This effect would be similar to but of less magnitude than the effect under Alternative 2. Once the reduced-play golf course is established, the weed management plan implemented by the existing golf course (see Chapter 2, "Project Alternatives") is expected to sufficiently prevent the long-term spread of nonnative plants from the golf course into adjacent areas of native vegetation.

Mitigation Measure 3.5-7A (Alt. 3): Implement Weed Management Practices during Project Construction.

This mitigation measure is identical to Mitigation Measure 3.5-7A (Alt. 2).

Mitigation Measure 3.5-7B (Alt. 3): Implement Aquatic Invasive Species Management Practices during Project Construction.

This mitigation measure is identical to Mitigation Measure 3.5-7B (Alt. 2).With the measures described above, weed and aquatic invasive species management practices would be implemented during project construction and the inadvertent introduction and spread of weeds or aquatic invasive species from project construction would be prevented. Therefore, with implementation of Mitigation Measure 3.5-7A (Alt. 3) and 3.5-7B (Alt.3), Impact 3.5-7 (Alt. 3) would be less than significant.

IMPACT 3.5-8 (Alt. 3) **Short-Term, Construction-Related Disturbance or Loss of Special-Status Wildlife Species and Habitats.** *Under Alternative 3, restoration activities along the Upper Truckee River and golf course reconfiguration could result in the loss of individuals or nests, or disruptions to nesting attempts of six special-status bird species (yellow warbler, olive-sided flycatcher, osprey, long-eared owl, yellow-headed blackbird, and waterfowl species); potential disturbance of future nesting by willow flycatcher; and removal of active roost sites for, or injury to, western red bat. This impact would be* ***potentially significant*** *for species known to be present and for willow flycatcher and western red bat if the species nests or roosts, respectively, in the study area in the future where construction would occur.*

Alternative 3 would involve the same geomorphic restoration treatments as Alternative 2. Construction activities could result in the disturbance or loss of nests for yellow warbler, olive-sided flycatcher, willow flycatcher, waterfowl, or long-eared owl and the removal of roost sites for western red bat. All of these special-status species could use the Upper Truckee River corridor for breeding habitat. Habitat occupied by yellow-headed blackbird (the pond west of hole 4) and adjacent areas could be affected by the proposed golf course reconfiguration (e.g., reconfiguration of naturalized landscape surrounding the pond west of hole 4). These impacts would be the same as those described for the river and floodplain restoration and golf course reconfiguration components of Impact 3.5-8 (Alt. 2). Please refer to Impact 3.5-8 (Alt. 2) for a detailed description of potential effects. Under Alternative 3, no construction disturbance related to golf course relocation or trail development on the west side of the Upper Truckee River would occur; therefore, the amount of potential habitat for long-eared owl and olive-sided flycatcher (which could nest in upland habitats west of the river) affected would be lower under Alternative 3 than under Alternative 2.

Project construction under Alternative 3 could result in the loss of individuals or nests, or disruptions to nesting attempts, of yellow warbler, waterfowl, olive-sided flycatcher, yellow-headed blackbird, or long-eared owl; potential disturbance of willow flycatcher if the species nests in a construction area in the future; and the removal of an active roost site for, or injury to, western red bat. This impact would be potentially significant for species known to inhabit the study area and for willow flycatcher and western red bat, if they use the habitat in the future.

Mitigation Measure 3.5-8A (Alt. 3): Conduct Preconstruction Surveys for Nesting Special-Status Birds (Yellow Warbler, Olive-Sided Flycatcher, Willow Flycatcher, Yellow-Headed Blackbird, Waterfowl, and Long-Eared Owl), and Implement a Limited Operating Period If Necessary.

This mitigation measure is identical to Mitigation Measure 3.5-8A (Alt. 2).

Mitigation Measure 3.5-8B (Alt. 3): Conduct Preconstruction Surveys for Special-Status Bats, Avoid Removal of Important Roosts, and Implement a Limited Operating Period If Necessary.

This mitigation measure is identical to Mitigation Measure 3.5-8B (Alt. 2).

With the measures above, the project would avoid the loss of individuals, nests, or roost sites of special-status wildlife species during construction. Therefore, with implementation of Mitigation Measures 3.5-8A (Alt. 3) and 3.5-8B (Alt. 3), Impact 3.5-8 (Alt. 3) would be less than significant.

IMPACT 3.5-9 (Alt. 3) **Long-Term Effects on Special-Status and Common Wildlife Species and Habitats.** *The long-term ecosystem response to river and floodplain restoration under Alternative 3 is expected to substantially improve habitat quality and functions for riparian and aquatic wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. River and floodplain restoration would also increase the size and enhance functions of TRPA-designated wildlife habitats of special significance (i.e., wetlands, meadows, and riparian areas). This effect would be* ***beneficial****.*

Alternative 3 would involve the same geomorphic restoration treatments as Alternative 2. The long-term ecosystem response to river and floodplain restoration under Alternative 3 is expected to substantially improve

habitat quality and functions for riparian and aquatic wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. River and floodplain restoration would also increase the size and enhance functions of TRPA-designated wildlife habitats of special significance (i.e., wetlands, meadows, and riparian areas). Please refer to Impact 3.5-9 (Alt. 2) for a detailed description of potential effects.

Additionally, under Alternative 3, the existing golf course footprint would be reduced from the present 133 acres to 86 acres; it would also be 70 acres smaller than under Alternative 2 (156 acres). Relative to Alternative 2, Alternative 3 would result in the restoration of 6 more acres of SEZ, 7 more acres of 100-year floodplain, and 15 more acres of floodplain/meadow.

For the reasons described above, this effect would be beneficial.

No mitigation is required.

IMPACT 3.5-10 (Alt. 3) Effects on Potential Wildlife Movement Corridors. *Under Alternative 3, the increased area and improved ecosystem functions of SEZ, floodplain, and riparian and wetland communities along the Upper Truckee River would benefit wildlife communities. These benefits would improve the SEZ's localized wildlife corridor function by increasing habitat quality, native vegetation connectivity, and corridor width. This effect would be beneficial.*

Please refer to Impact 3.5-10 (Alt. 2) for a discussion of the potential for the Upper Truckee River corridor to function as a wildlife movement corridor, and the ways in which habitat enhancement there could improve this potential function. Alternative 3 would involve the same geomorphic restoration treatments as Alternative 2, and would improve the potential function of the Upper Truckee River SEZ and floodplain as a localized wildlife corridor by increasing habitat quality, native vegetation connectivity, and corridor width. This impact would be similar to that described for the river and floodplain restoration component of Impact 3.5-10 (Alt. 2) under Alternative 2. Please refer to Impact 3.5-10 (Alt. 2) for a detailed description of the potential impact. However, relative to Alternative 2, Alternative 3 would result in restoration of 6 more acres of restored SEZ, 7 more acres of 100-year floodplain, and 15 more acres of floodplain/meadow.

Additionally, under Alternative 3, no habitat loss or potential wildlife corridor disturbance related to golf course relocation or trail development on the west side of the Upper Truckee River would occur. Therefore, any potential degradation or disturbance of the Upper Truckee River corridor as a result of new golf course development west of the river (i.e., edge effects of golf course development) would not occur under Alternative 3, and the overall value of the river corridor for wildlife movement would be higher than under Alternative 2.

For the reasons described above, this effect would be beneficial.

No mitigation is required.

### Alternative 4: River Stabilization with Existing 18-Hole Regulation Golf Course

IMPACT 3.5-1 (Alt. 4) Short-Term Effects on Fish and Aquatic Habitat Resulting from Construction and Initial Channel Response. *Alternative 4 construction activities could result in temporary adverse effects on water quality, aquatic habitats, and the aquatic community. Because Alternative 4 would stabilize the river, initial channel-response effects within the study area and in areas downstream would be minimal. This impact would be significant.*

Alternative 4 would use a combination of hard and soft stabilization to keep the river in its present configuration and would make only minor changes to the existing golf course. It would involve the systematic and extensive installation of bank protection and grade controls (boulder steps) within the present river alignment and at the existing elevations. Although the streambed and streambank protections would be relatively rigid, biotechnical

treatments with native riparian vegetation would be incorporated to the maximum extent possible. Three of the existing bridges would remain in place while the two upstream bridges would be replaced by one longer bridge.

### *Water Quality: Sedimentation and Turbidity, Release and Exposure of Contaminants*

As under Alternatives 2 and 3, construction activities under Alternative 4 would disturb instream sediments and soils adjacent to waterways. Work would be completed over a shorter period (2–3 years) under this alternative than under Alternative 2 or Alternative 3. As under Alternative 2, it is expected that cost savings would be realized and water quality protection would be simplified if all in-channel work (from bridge demolition through streambank revegetation) were conducted concurrently within each designated work reach, and that work reaches would be constructed sequentially along the river (probably from upstream to downstream so that the replacement bridge near the upstream end would be constructed during year 1).

The approach to dewatering in each work reach might vary by anticipated treatment, reach length, and flow conditions. The reaches that are proposed to have an anchored high-gradient riffle (at the upstream and downstream ends of the entire project) or to have armored riffles and inset floodplains (by the replacement bridge) would likely be dewatered using diversion structures and piped bypass of the entire streamflow. Reaches where extensive streambank treatment between widely spaced boulder steps is proposed these areas might be dewatered using diversion structures and a center barrier, to bypass flow along either the left or right bank within each work reach.

Any resulting erosion or disturbance of instream sediments and soils could temporarily increase turbidity and sedimentation downstream of the construction sites throughout the study area if soils were transported in the river flows or stormwater runoff. The potential also exists for contaminants used in construction activities to be accidentally introduced into the water system, either directly through spills or incrementally through surface runoff, from work within or immediately adjacent to the channel. Several measures would be implemented as part of the project to minimize potential effects on water quality. As under Alternative 2, project construction activities under Alternative 4 could result in increased turbidity and downstream sedimentation and could result in the release and exposure of construction-related contaminants, which could reduce or adversely affect aquatic habitat and populations, including salmonids and other native species. However, because the duration and magnitude of construction would be less under Alternative 4 than under Alternative 2, the resulting effects would also be reduced.

### *Direct Disturbance and Temporary Loss of Habitat during Construction Activities*

Several aspects of project construction under Alternative 4 would require dewatering of the active channel to allow access to and removal of riparian vegetation that provides important shade and cover. These activities and the associated effects on fish and aquatic habitats would be similar to those described for Alternative 2. However, under Alternative 4, more of the project construction activities than under Alternative 2 or Alternative 3 would require dewatering of the active channel. Some water would be diverted during year 2 for channel seasoning of historic meanders completed in year 1 and to be reconnected after channel seasoning.

### *Initial Channel Response*

After the completion of construction activities, changes associated with river stabilization activities would be realized immediately. Because the approach would be to stabilize the channel in place by using bank treatments and grade controls, the channel would not be expected to go through a substantial initial geomorphic response.

### *Impact Summary*

As under Alternatives 2 and 3, project construction activities under Alternative 4 could result in intermittently increased turbidity and downstream sedimentation and could result in the release and exposure of construction-related contaminants. These would be potential short-term, temporary effects. Such exposure could reduce or

adversely affect aquatic habitat and populations, including salmonids and other native species. Alternative 4 includes a suite of measures, including BMPs, that would minimize this potential effect. Construction would include dewatering activities that would result in the temporary loss of aquatic habitat. Fish and macroinvertebrates could become stranded during dewatering activities, and habitat could dry out or predation by birds or mammals could occur; or the organisms would be injured or killed by heavy equipment during site access, preparation, or construction activities. Because the approach of Alternative 4 would be to stabilize the channel in place by using bank treatments and grade controls, the channel would not be expected to go through a substantial initial geomorphic response. This impact would be significant.

Mitigation Measure 3.5-1A (Alt. 4): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.5-1A (Alt. 2).

Mitigation Measure 3.5-1B (Alt. 4): Implement Preconstruction Surveys for Western Pearlshell Mussels.

This mitigation measure is identical to Mitigation Measure 3.5-1B (Alt. 2).

Mitigation Measure 3.5-1C (Alt. 4): Develop and Implement Native-Fish and Mussel Capture and Translocation Plan.

This mitigation measure is identical to Mitigation Measure 3.5-1C (Alt. 2).

Mitigation Measure 3.5-1D (Alt. 4): Limit Potential Localized Channel Erosion in the Upper Truckee River and Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.5-1D (Alt. 2).

Mitigation Measure 3.5-1E (Alt. 4): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

This mitigation measure is identical to Mitigation Measure 3.5-1E (Alt. 2).

With the measures described above, potential short-term adverse effects on aquatic habitat would be avoided and/or minimized, or corrective actions would be implemented. Therefore, with implementation of Mitigation Measures 3.5-1A (Alt. 4) through 3.5-1E (Alt. 4), Impact 3.5-1 (Alt. 4) would be less than significant.

IMPACT 3.5-2 (Alt. 4) Long-Term Changes to Fish and Aquatic Habitat. *River stabilization activities under Alternative 4 would reduce the ongoing adverse effects on aquatic habitats and the fish community in the Upper Truckee River. These beneficial effects would result from the removal of bridges, the use of biotechnical approaches to stabilize banks where possible, increased habitat structure and complexity, and reduction of sediment inputs into the river associated with existing, ongoing bank erosion. This effect would be* ***beneficial****.*

As described above, Alternative 4 would use a combination of hard and soft stabilization to keep the river in its present configuration and would include only minor changes to the existing golf course. Three of the existing bridges would remain in place while the two upstream bridges would be replaced by one longer bridge. The stream channel's existing longitudinal profile and plan form would remain under Alternative 4. Bank treatment and grade control areas were selected to achieve localized stability and minimize damage from erosion and sudden changes in channel position. River stabilization activities under Alternative 4 would not increase the length of the channel or the width of the riparian corridor, and would not restore natural geomorphic processes within the study area. However, the stabilization measures would contribute to a small incremental improvement to fish and aquatic resources by limiting future sediment inputs and creating some additional habitat complexity where biotechnical approaches would be applied. For example, 18–21 boulder steps and approximately 7,400 linear feet of biotechnical bank treatments would be applied throughout the study area. Further, creating a

relatively small area of inset floodplain (0.4 acre) would result in localized improvement of conditions supporting the development of additional riparian cover and providing high-flow refugia for fish. Although the effect would be less than under Alternatives 2, 3 and 5, this effect would be beneficial.

No mitigation is required.

IMPACT 3.5-3 (Alt. 4) Short-Term, Construction-Related Effects on Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens, and SEZ). *Implementing Alternative 4 would result in the removal of riparian and meadow vegetation along the Upper Truckee River and placement of fill into the active channel for stabilization of the river. This impact would be* ***potentially significant****.*

Under Alternative 4, streambank erosion throughout the treatment reach would be reduced by installing protection measures, generally featuring rock armor on outside bends and biotechnical measures on inside bends. Effects on sensitive habitats (jurisdictional wetlands, riparian vegetation, and SEZ) would be similar in type to those described under Impact 3.5-3 (Alt. 2) for Alternative 2, but would be less in extent because a smaller area would be affected by the activities. No changes are proposed on the west side of the Upper Truckee River outside of the historic meander belt, including no changes to the quarry ponds. Please refer to Impact 3.5-3 (Alt. 2) for a detailed description of potential effects.

Under Alternative 4, riverbank stabilization would be implemented along approximately 7,400 feet of stream channel, and the two golf course bridges at holes 6 and 7 would be removed and replaced by a single bridge as under Alternative 2. Because the golf course would not be relocated west of the river and the quarry wetlands would not be restored under Alternative 4, spring complexes (including fens) and other sensitive habitats west of the Upper Truckee River riparian corridor and floodplain would not be affected. Under this alternative, sensitive habitat types, including SEZ, would be temporarily disturbed and fill material would be placed into jurisdictional waters of the United States, including wetlands subject to USACE jurisdiction under CWA Section 404. This impact would be potentially significant. No project-related activities would occur west of the Upper Truckee River historic meander belt under Alternative 4, including areas near the spring complexes (including fens).

Mitigation Measure 3.5-3A (Alt. 4): Conduct Delineation of Waters of the United States and Obtain Authorization of Fill and Required Permits.

This mitigation measure is identical to Mitigation Measure 3.5-3A (Alt. 2).

Mitigation Measure 3.5-3B (Alt. 4): Implement Vegetation Protection Measures and Revegetate Disturbed Areas.

This mitigation measure is identical to Mitigation Measure 3.5-3B (Alt. 2).

With the measures described above, sensitive habitats would be identified, and the project would compensate for their loss and identify measures for increasing riparian and wetland vegetation implementation. Therefore, with implementation of Mitigation Measures 3.5-3A (Alt. 4) and 3.5-3B (Alt. 4), Impact 3.5-3 (Alt. 4) would be less than significant.

IMPACT 3.5-4 (Alt. 4) Short-Term, Construction-Related Disturbance or Removal of Special-Status Plants. *Alternative 4 would involve temporary disturbance and removal of plant communities that provide suitable habitat for several special-status plant species known to occur in the vicinity of the study area. While surveys to date have not detected these species, focused surveys to confirm absence would not be conducted until the project permitting phase. Because suitable habitat exists where ground disturbance could occur, implementing Alternative 4 could result in removal or disturbance of special-status plant species. This impact would be* ***potentially significant****.*

Effects on special-status plants would be similar to those described under Impact 3.5-4 (Alt. 2) for Alternative 2. The potential effects would be the same where disturbance activities would take place for the bank stabilization treatments. Because the extent of ground-disturbing activities would be less than under Alternatives 2 and 3 the potential effects would be less severe. Removal of native vegetation during construction would be minimized under Alternative 4. However, focused surveys for special-status plants have not been conducted throughout all suitable habitat where ground disturbance could occur. Therefore, construction activities associated with the bank stabilization treatments could have a substantial adverse effect on plant species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFG or USFWS. This impact would be potentially significant.

Mitigation Measure 3.5-4 (Alt. 4): Conduct Follow-up, Pre-construction, Focused Surveys and Avoid, Minimize, or Compensate for Impacts on Special-Status Plants.

This mitigation measure is identical to Mitigation Measure 3.5-4 (Alt. 2).

With the measure described above, the project would avoid the loss of special-status plant species. Therefore, with implementation of Mitigation Measure 3.5-4 (Alt. 4), Impact 3.5-4 (Alt. 4) would be less than significant.

IMPACT 3.5-5 (Alt. 4) Long-Term Effects on Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens, and SEZ) and Special-Status Plant Species. *Streambank stabilization and biotechnical treatments along 7,400 feet of channel are expected to reduce erosion of banks along the Upper Truckee River, which could allow for an eventual increase of riparian vegetation. Creating a small inset floodplain would also increase cover of riparian vegetation. This effect would be* ***beneficial****.*

Proposed river stabilization activities associated with Alternative 4 would not increase the length of the channel or the width of the riparian corridor, and would not restore natural geomorphic processes within the study area. However, the biotechnical measures would contribute to a small increase in riparian vegetation. The relatively small area of inset floodplain creation (0.4 acre) would result in an increase in the acreage of sensitive habitats. Although the magnitude of the increase would be relatively small, this would be a beneficial effect. No construction disturbance related to golf course reconfiguration, quarry restoration, or trail development would occur on the west side of the Upper Truckee River under this alternative; therefore, spring complexes (including fens) and other sensitive habitats west of the Upper Truckee River riparian corridor and floodplain would not be affected.The biotechnically treated areas and the small area of inset floodplain created has the potential to become suitable habitat for special-status plant species that have potential to occur within the area. Marsh skullcap, Oregon fireweed, and Bolander's candle moss, discussed under Impact 3.5-4 (Alt. 2), have potential to occur in moist riparian habitats and would benefit from the long-term increase in this habitat type. Although the effects would be considerably smaller than effects under Alternative 2, 3, or 5, this effect would be beneficial.

No mitigation is required.

IMPACT 3.5-6 (Alt. 4) Tree Removal and Forest Land Conversion. *Implementing Alternative 4 would result in the loss of an estimated 555 native trees greater than 10 inches DBH, including 420 trees for bank stabilization and biotechnical treatments, 100 trees for access road construction, and 35 trees for bridge construction. None of the tree removal would involve conversion of forest to non-forest uses and no old growth forest systems would be affected. This preliminary estimate of trees removed includes five trees greater than 30 inches DBH. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction. The magnitude of proposed tree removal in the study area is considered "substantial" as defined in the TRPA Code of Ordinances. Implementing Alternative 4 would require a tree removal and management plan developed with TRPA. Substantial tree removal and the loss of trees greater than 30 inches DBH would be a* ***significant*** *impact.*

Implementing Alternative 4 would involve bank stabilization, biotechnical treatments, and numerous grade control features on approximately 7,400 feet of the Upper Truckee River. Effects on trees within the riparian corridor would be similar to those described in Impact 3.5-6 (Alt. 2) for Alternative 2. Because Alternative 4 does not involve creating new golf course holes or removing trees from upland forest habitat west of the Upper Truckee River, forest land conversion to golf course would not occur and substantially fewer trees would be removed under this alternative than under Alternative 2. Because of the extensive construction proposed along the existing channel, more trees would be removed under this alternative than under Alternative 3. Implementing Alternative 4 would result in the removal of approximately 555 native trees greater than 10 inches DBH, including 420 trees for bank stabilization and biotechnical treatments, 100 trees for access road construction, and 35 trees for bridge construction. This estimate includes five trees greater than 30 inches DBH that would be removed for bank stabilization (4 trees) and bridge construction (1 tree). However, trees to be removed under Alternative 2 will not affect an old growth forest. Tree removal estimates were calculated by State Parks, as discussed in Impact 3.5-6 (Alt. 2) for Alternative 2. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction.

The tree removal estimates for Alternative 4 include trees that may be removed in the future for additional vegetation management and fuels treatments prior to, or in the absence of, project implementation. For example, some lodgepole pines that would be removed within the riparian corridor as part of bank stabilization and biotechnical treatments under Alternative 4 would be removed as part of State Parks' existing management to reduce conifer encroachment in riparian and meadow habitats and to enhance riparian hardwood growth (as part of the Riparian Hardwood Restoration Project), and as part of the Lake Sector Wildfire Management Plan. Removal of conifers from SEZs for riparian hardwood enhancement is a specific land management objective of State Parks, and some of the tree removal implemented under Alternative 4 would have a long-term beneficial ecological effect.

Provisions for tree removal are provided in the TRPA Code of Ordinances (Chapter 71, and Chapters 30, 65, 75, and 77), and tree removal requires the review and approval of TRPA. TRPA defines "substantial" tree removal as "activities on project areas of twenty acres or more and proposing the removal of more than 100 live trees 10 inches DBH or larger, or proposing the removal of more than 100 live trees 10 inches DBH or larger within land capability districts 1a, 1b, 1c, 2, or 3 regardless of the project area, or proposing tree removal that, as determined by TRPA after a joint inspection with appropriate State or Federal forestry staff, does not meet the minimum acceptable stocking standards set forth in Subsection 71.4.B" (TRPA Code of Ordinances, Section 71.4.I). Additionally, trees greater than 30 inches DBH must be retained, except under circumstances specified in the Code of Ordinances.

The magnitude of estimated tree removal (555 native trees greater than 10 inches DBH) under Alternative 4 would be substantial as defined by TRPA; and approximately five trees greater than 30 inches DBH would be removed. This impact would be significant.

### Mitigation Measure 3.5-6 (Alt. 4): Minimize Tree Removal and Develop a Tree Removal and Management Plan

This mitigation measure is identical to Mitigation Measure 3.5-6 (Alt. 2).

With the measure described above, the project would minimize tree removal and compensate, as needed, for the significant loss of trees. Therefore, with implementation of Mitigation Measure 3.5-6 (Alt. 4), Impact 3.5-6 (Alt. 4) would be less than significant.

IMPACT 3.5-7 (Alt. 4) Introduction and Spread of Weeds and Aquatic Invasive Species. *Implementing Alternative 4 has the potential to introduce and spread invasive weeds and aquatic invasive species during the initial phases of project construction and implementation. The introduction and spread of invasive weeds or aquatic invasive species would degrade vegetation and wildlife habitat, including wildlife habitats of special significance (riparian) within the study area. Implementation of the golf course's existing weed management plan would continue and would sufficiently prevent the spread of nonnative plants within areas of native vegetation during operation of the golf course. Introduction and spread of invasive weeds and aquatic invasive species during construction and revegetation would be a* ***potentially significant*** *impact.*

Alternative 4 would involve bank stabilization treatments, biotechnical treatments, and numerous grade control features on approximately 7,400 feet of the channel. Ground disturbance and in-channel construction within the Upper Truckee River from these activities has the potential to introduce and spread invasive weeds and aquatic invasive species during the initial phases of project construction and implementation. Alternative 4 would involve less ground disturbance than Alternatives 2 and 3; however, because some ground-disturbing activities and in-channel construction would occur, effects from the introduction and spread of weeds and aquatic invasive species would be less than but similar to those described under Impact 3.5-7 (Alt. 2) for Alternative 2. Please refer to Impact 3.5-7 (Alt. 2) for a detailed description of the potential impact. Because Alternative 4 would involve ground disturbance, in-channel construction, and the movement of construction equipment into the study area from potentially weed or aquatic invasive species infested areas, this short-term construction-related impact would be potentially significant.

Alternative 4 would involve only minor changes to the existing golf course. The weed management plan for the existing golf course is expected to sufficiently prevent the long-term spread of nonnative plants from the golf course into adjacent areas of native vegetation.

Mitigation Measure 3.5-7A (Alt. 4): Implement Weed Management Practices during Project Construction.

This mitigation measure is identical to Mitigation Measure 3.5-7A (Alt. 2).

Mitigation Measure 3.5-7B (Alt. 4): Implement Aquatic Invasive Species Management Practices during Project Construction.

This mitigation measure is identical to Mitigation Measure 3.5-7B (Alt. 2).

With the measures described above, weed and aquatic invasive species management practices would be implemented during project construction and the inadvertent introduction and spread of weeds or aquatic invasive species from project construction would be prevented. Therefore, with implementation of Mitigation Measure 3.5-7A (Alt. 4) and 3.5-7B (Alt.4), Impact 3.5-7 (Alt. 4) would be less than significant.

IMPACT 3.5-8 (Alt. 4) Short-Term, Construction-Related Disturbance or Loss of Special-Status Wildlife Species and Habitats. *Under Alternative 4, riverbank stabilization activities along 7,400 feet of channel and bridge replacement could result in loss of individuals or nests, or disruptions to nesting attempts of five special-status bird species (yellow warbler, olive-sided flycatcher, osprey, long-eared owl, and waterfowl species); potential disturbance of future nesting by willow flycatcher; and removal of active roost sites for, or injury to, western red bat. This impact would be* ***potentially significant*** *for species known to be present and for willow flycatcher and western red bat, if the species nests or roosts, respectively, in the study area in the future where construction would occur.*

Alternative 4 would primarily include riverbank stabilization along 7,400 feet of the Upper Truckee River. Also, two bridges that span the Upper Truckee River would be replaced by one longer bridge. Construction activities could result in disturbance or loss of the nests of yellow warbler, olive-sided flycatcher, willow flycatcher, waterfowl, or long-eared owl, and removal of roost sites for western red bat. All of these special-status species could use the Upper Truckee River corridor for breeding habitat. This impact would be similar to that described

for the river and floodplain restoration component of Impact 3.5-8 (Alt. 2) under Alternative 2. Please refer to Impact 3.5-8 (Alt. 2) for a detailed description of the potential impact mechanisms related to these species. Because the existing golf course would not be reconfigured under Alternative 4, occupied yellow-headed blackbird habitat at the pond west of hole 4 would not be affected and impacts to this species are not expected.

Under Alternative 4, no construction disturbance related to golf course relocation or trail development on the west side of the Upper Truckee River would occur; therefore, the amount of potential habitat for long-eared owl and olive-sided flycatcher (which could nest in upland habitats west of the river) affected would be lower under Alternative 4 than under Alternative 2.

Project construction under Alternative 4 could result in the loss of individuals or nests, or disruptions to nesting attempts, of yellow warbler, olive-sided flycatcher, waterfowl, or long-eared owl; potential disturbance of willow flycatcher if the species nests in a construction area in the future; and the removal of an active roost site for, or injury to, western red bat. This impact would be potentially significant for species known to inhabit the study area and for willow flycatcher and western red bat, if they use the habitat in the future.

Mitigation Measure 3.5-8A (Alt. 4): Conduct Preconstruction Surveys for Nesting Special-Status Birds (Yellow Warbler, Willow Flycatcher, Olive-Sided Flycatcher, Waterfowl, and Long-Eared Owl), and Implement a Limited Operating Period If Necessary.

This mitigation measure is similar to Mitigation Measure 3.5-8A (Alt. 2). Because impacts to yellow-headed blackbird are not expected under Alternative 4, preconstruction surveys for this species would not be required for this alternative.

Mitigation Measure 3.5-8B (Alt. 4): Conduct Preconstruction Surveys for Special-Status Bats, Avoid Removal of Significant Roosts, and Implement a Limited Operating Period If Necessary.

This mitigation measure is identical to Mitigation Measure 3.5-8B (Alt. 2).

With the measures described above, the project would avoid the loss of individuals, nests, or roost sites of special-status wildlife species during construction. Therefore, with implementation of Mitigation Measures 3.5-8A (Alt. 4) and 3.5-8B (Alt. 4), Impact 3.5-8 (Alt. 4) would be less than significant.

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| IMPACT 3.5-9 (Alt. 4) | Long-Term Effects on Special-Status and Common Wildlife Species and Habitats. *Streambank stabilization along 7,400 feet of channel is expected to reduce sediment inputs and enhance instream habitat complexity for aquatic wildlife. Creating a small inset floodplain would improve riparian cover, which provides habitat for common and special-status species such as yellow warbler. This effect would be* ***beneficial****.* |

River stabilization activities associated with Alternative 4 would not increase the length of the channel or the width of the riparian corridor, and would not restore natural geomorphic processes within the study area. However, the stabilization measures would contribute to a small improvement to aquatic resources by limiting future sediment inputs and creating some additional habitat complexity where biotechnical approaches could be applied. This would improve instream habitat conditions for aquatic wildlife such as amphibians. The relatively small area of inset floodplain created (0.4 acre) would result in localized improvement of conditions supporting the development of riparian cover, which provides habitat for several common and special-status wildlife species. Although the magnitude of the effect would be small compared to long-term effects of Alternatives 2, 3, and 5, this effect would be beneficial.

No mitigation is required.

IMPACT 3.5-10 (Alt. 4) **Effects on Potential Wildlife Movement Corridors.** *Under Alternative 4, a small increase in riparian habitat quality is expected as a result of riverbank stabilization, biotechnical treatments, and creation of inset floodplain along the Upper Truckee River. This could result in a small improvement to the SEZ's localized wildlife corridor function. This effect would be* ***beneficial****.*

Please refer to Impact 3.5-10 (Alt. 2) for a discussion of the potential for the Upper Truckee River corridor to function as a wildlife movement corridor, and how habitat enhancement there could improve this function. As discussed in Impact 3.5-9 (Alt. 4), the riverbank stabilization measures in Alternative 4 would contribute to a small improvement to aquatic resources by limiting future sediment inputs and creating some additional habitat complexity where biotechnical approaches could be applied. This would improve instream habitat conditions for aquatic wildlife such as amphibians. The relatively small area of inset floodplain created (0.4 acre) would result in localized improvement of conditions that would support the development of riparian cover. These habitat enhancements could result in a small increase in wildlife use and potential corridor function of the SEZ, although Alternative 4 would not actively create a continuous riparian corridor. Although the magnitude of the effect would be small relative to long-term effects of Alternatives 2, 3, and 5, the increased potential for the Upper Truckee River SEZ to function as a wildlife movement corridor would be beneficial.

Under Alternative 4, no habitat loss or potential wildlife corridor disturbance related to golf course relocation or trail development on the west side of the Upper Truckee River would occur. Therefore, no degradation or disturbance of the Upper Truckee River corridor would be caused by development of a new golf course west of the river (i.e., edge effects of golf course development) under Alternative 4.

For the reasons described above, this effect would be beneficial.

No mitigation is required.

### Alternative 5: River Ecosystem Restoration with Decommissioned Golf Course

IMPACT 3.5-1 (Alt. 5) **Short-Term Degradation of Fish and Aquatic Habitat Resulting from Construction and Initial Channel Response.** *Alternative 5 construction activities could result in temporary adverse effects on water quality, aquatic habitats, and the aquatic community. Effects could also occur during the initial channel-response period within the study area and in areas downstream. This impact would be* ***significant****.*

Alternative 5 proposes to decommission and remove the 18-hole regulation golf course and restore the golf course footprint to meadow and riparian habitat. Under this alternative the river would be restored in a similar manner to Alternatives 2 and 3. A 13,430-foot reach of the Upper Truckee River and adjoining floodplain would be restored. All five Upper Truckee River bridges, the four Angora Creek bridges, and the four cart path bridges on the unnamed creek would be removed. Golf holes would be removed from sensitive lands adjacent to the river and the area farther away from the river, and the footprint would be restored as native meadow and riparian habitat. The clubhouse facility, parking area, and maintenance yard would remain with the clubhouse available for public use. If economically feasible, a 9-hole golf course may remain in use while State Parks evaluates alternative uses of the Lake Valley SRA and Washoe Meadows SP.

#### *Water Quality: Sedimentation and Turbidity, Release and Exposure of Contaminants*

As under Alternatives 2 and 3, construction activities under Alternative 5 would disturb instream sediments and soils adjacent to waterways. Construction would occur in phases over a 3- to 4-year period. Year 1 would focus on off-channel work. If a temporary 9-hole course were to remain, golf play either would be limited to the east side of the river to allow construction access adjacent to the river during all years of construction, or would be removed during the first year of construction. It is anticipated that in year 2 of construction, most off-channel river restoration work would be completed and vegetation would be allowed to properly establish. No additional

construction activities would occur in year 2. Removal of the bridges, in-channel work, and connection of historic meanders and new channel sections would take place during year 3.

Any resulting erosion or disturbance of instream sediments and soils could intermittently increase turbidity and sedimentation downstream of the construction sites throughout the study area if soils were transported in the river flows or stormwater runoff. These would be potential short-term, temporary effects. The potential also exists for contaminants used in construction activities to be accidentally introduced into the water system, either directly through spills or incrementally through surface runoff, from work within or immediately adjacent to the channel. Several measures would be implemented as part of the project to minimize potential effects on water quality. (See Chapter 2, "Project Alternatives," and Section 3.4, "Geomorphology and Water Quality," for additional discussion of this issue.) Potential effects on fish and aquatic habitat would be similar to those described for Alternative 2.

### *Direct Disturbance and Temporary Loss of Habitat during Construction Activities*

Several aspects of project construction under Alternative 5 would require dewatering of the active channel to allow access to and removal of riparian vegetation that provides important shade and cover. These activities and the associated effects of fish and aquatic habitats would be similar to those described under Alternative 2 except that the channel disturbance would be less severe. Dewatering would occur only during year 3 and possibly in year 4. Some water would be diverted during year 2 for channel seasoning of off-channel sections completed in year 1.

### *Initial Channel Response*

After the completion of construction activities, some habitat improvements associated with river ecosystem restoration activities would be realized immediately. However, the new physical form of the channel and associated floodplain would also result in immediate changes to hydraulic conditions, which in turn would result in a geomorphic response for some period of time until a new dynamic equilibrium was reached. Depending on the specific, localized circumstances, localized changes in water velocities and sediment transport and depositional patterns could occur. Because the geomorphic response is process driven and subject to several highly variable conditions (e.g., frequency, duration, and magnitude of intermediate- to high-flow events; local sediment grain sizes; local channel geometry), it can be extremely difficult to predict the nature and extent of short-term (interim) outcomes. Nevertheless, as described for Alternative 2, it is possible that some aquatic habitat conditions could become degraded during the channel's initial response to the changed physical condition.

### *Impact Summary*

As under Alternatives 2–4, project construction activities under Alternative 5 could result in increased turbidity and downstream sedimentation and could result in the release and exposure of construction-related contaminants. Such exposure could reduce or adversely affect aquatic habitat and populations, including salmonids and other native species. Alternative 5 includes a suite of measures, including BMPs that would minimize this potential effect. Construction would include dewatering activities that would result in the temporary loss of aquatic habitat. Fish and macroinvertebrates could become stranded during dewatering activities, and habitat could dry out or predation by birds or mammals could occur; or the organisms would be injured or killed by heavy equipment during site access, preparation, or construction activities. Lastly, implementing Alternative 5 could result in short-term adverse effects on aquatic habitats because the river channel's geomorphic response would affect sediment transport and deposition processes during the initial channel-response period. This impact would be significant.

Mitigation Measure 3.5-1A (Alt. 5): Prepare and Implement Effective Site Management Plans.

This mitigation measure is identical to Mitigation Measure 3.5-1A (Alt. 2).

Mitigation Measure 3.5-1B (Alt. 5): Implement Preconstruction Surveys for Western Pearlshell Mussels.

This mitigation measure is identical to Mitigation Measure 3.5-1B (Alt. 2).

Mitigation Measure 3.5-1C (Alt. 5): Develop and Implement Native-Fish and Mussel Capture and Translocation Plan.

This mitigation measure is identical to Mitigation Measure 3.5-1C (Alt. 2).

Mitigation Measure 3.5-1D (Alt. 5): Limit Potential Localized Channel Erosion in the Upper Truckee River and Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.5-1D (Alt. 2).

Mitigation Measure 3.5-1E (Alt. 5): Provide Bed and Bank Stabilization Measures at and Immediately Upstream and Downstream of Bridge Removal Sites.

This mitigation measure is identical to Mitigation Measure 3.5-1E (Alt. 2).

Mitigation Measure 3.5-1F (Alt. 5): Ensure Bed and Bank Stability Downstream of the Treated Reaches.

This mitigation measure is identical to Mitigation Measure 3.5-1F (Alt. 2).

Mitigation Measure 3.5-1G (Alt. 5): Ensure Bed and Bank Stability in the Lower Reaches of the Two Tributary Creeks.

This mitigation measure is identical to Mitigation Measure 3.5-1G (Alt. 2).

Mitigation Measure 3.5-1H (Alt. 5) Monitor and Supplement Coarse Sediment Delivery Downstream and Monitor Instream Habitat Conditions.

This mitigation measure is identical to Mitigation Measure 3.5-1H (Alt. 2).

With the measures described above, potential short-term adverse effects on aquatic habitat would be avoided and/or minimized, or corrective actions would be implemented. Therefore, with implementation of Mitigation Measures 3.5-1A (Alt. 5) through 3.5-1H (Alt. 5), Impact 3.5-1 (Alt. 5) would be less than significant.

IMPACT 3.5-2 (Alt. 5) Long-Term Changes to Fish and Aquatic Habitat. *River restoration activities under Alternative 5 would result in long-term beneficial effects on aquatic habitats and the fish community in the Upper Truckee River. These beneficial effects would result from several changes: the removal of encroachments in the SEZ and channel; improved conditions for riffle and pool complexes and substrate through restored geomorphic processes; improved floodplain connectivity and access to secondary channels; increased habitat structure and complexity; reduced sediment inputs into the river associated with existing, ongoing bank erosion; and reduced inputs of fertilizers and other pollutants used in golf course turf management. This effect would be* ***beneficial****.*

River restoration under Alternative 5 would substantially increase the length of the channel and the width of the riparian corridor, and would restore natural processes within the project area, resulting in more available habitat for the fish and macroinvertebrate community. Increased sinuosity would improve pool development and maintenance, and a wider and more vigorous riparian vegetation community would lead to increased riparian cover and instream complexity with the introduction of woody debris. As under Alternative 2, many of the benefits of the restoration project would be realized over time, as functional geomorphic processes shape channel morphology and associated habitat features that provide important functions and values to the fish and macroinvertebrate community. These processes, which rely on regular disturbance resulting from flood events, would result in improvements in aquatic habitat functions and values over a period of several decades, and would

assure that aquatic habitat would be maintained over time. Other improvements in water quality and associated aquatic habitat conditions would result from decommissioning and removal of the golf course because the use of fertilizers and other pollutants used in golf course turf management would be discontinued. This effect would be beneficial.

No mitigation is required.

IMPACT 3.5-3 (Alt. 5) Short-Term, Construction-Related Disturbance or Loss of Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens, and SEZ). *Implementing Alternative 5 would result in the removal of riparian and meadow vegetation along the Upper Truckee River and placement of fill into the active channel. This impact would be* ***significant****.*

Alternative 5 would involve the same geomorphic restoration treatments as those described in Alternatives 2 and 3. Therefore, effects on sensitive habitats (jurisdictional wetlands, riparian vegetation, and SEZ) would be similar to those described in Impact 3.5-3 (Alt. 2) and Impact 3.5-3 (Alt. 3). Please refer to Impact 3.5-3 (Alt. 2) for a detailed description of potential effects. Alternative 5 would result in restoration of a larger area of SEZ. No construction disturbance related to golf course relocation, quarry restoration, or trail development would occur on the west side of the Upper Truckee River under this alternative; therefore, spring complexes (including fens) and other sensitive habitats west of the Upper Truckee River riparian corridor and floodplain would not be affected. Under this alternative, sensitive habitat types, including SEZ, would be temporarily disturbed and fill material would be placed into jurisdictional waters of the United States, including wetlands subject to USACE jurisdiction under CWA Section 404. This impact would be significant.

Mitigation Measure 3.5-3A (Alt. 5): Conduct Delineation of Waters of the United States and Obtain Authorization of Fill and Required Permits.

This mitigation measure is identical to Mitigation Measure 3.5-3A (Alt. 2).

Mitigation Measure 3.5-3B (Alt. 5): Implement Vegetation Protection Measures and Revegetate Disturbed Areas.

This mitigation measure is identical to Mitigation Measure 3.5-3B (Alt. 2).

With the measures described above, sensitive habitats would be identified and the project would compensate for their loss and define measures for increasing riparian and wetland vegetation. Therefore, with implementation of Mitigation Measures 3.5-3A and 3.5-3B (Alt. 5), Impact 3.5-3 (Alt. 5) would be less than significant.

IMPACT 3.5-4 (Alt. 5) Short-Term, Construction-Related Disturbance or Removal of Special-Status Plants. *Alternative 5 would involve temporary disturbance and removal of plant communities that provide suitable habitat for several special-status plant species known to occur in the vicinity of the study area. While surveys to date have not detected these species, focused surveys to confirm absence would not be conducted until the project permitting phase. Because suitable habitat exists where ground disturbance could occur, implementing Alternative 5 could result in removal or disturbance of special-status plant species. This impact would be* ***potentially significant****.*

Alternative 5 would involve the same geomorphic restoration treatments within suitable habitat for special-status plants as those described for Alternatives 2 and 3. As a result, effects of Alternative 5 on special-status plants would be similar to those described in Impact 3.5-4 (Alt. 2) and Impact 3.5-4 (Alt. 3). Please refer to Impact 3.5-4 (Alt. 2) for a detailed description of potential effects. This impact would be potentially significant.

Mitigation Measure 3.5-4 (Alt. 5): Conduct Follow-up, Pre-construction, Focused Surveys and Avoid, Minimize, or Compensate for Impacts on Special-Status Plants.

This mitigation measure is identical to Mitigation Measure 3.5-4 (Alt. 2).

With the measure described above, the project would avoid the loss of special-status plant species. Therefore, with implementation of Mitigation Measure 3.5-4 (Alt. 5), Impact 3.5-4 (Alt. 5) would be less than significant.

IMPACT 3.5-5 (Alt. 5) Long-Term Effects on Sensitive Habitats (Jurisdictional Wetlands, Riparian Vegetation, Fens and SEZ) and Special-Status Plant Species. *The long-term goal of the project under Alternative 5 is to achieve a net increase of SEZ, floodplain meadow vegetation, and wetland area and functions. Alternative 5 would restore approximately 131.5 acres of floodplain meadow vegetation and 123 acres of SEZ. This effect would be* ***beneficial****.*

Under Alternative 5, the existing golf course would be decommissioned and ecosystem processes along the Upper Truckee River would be restored in a manner similar to Alternatives 2 and 3. Approximately 131.5 acres of floodplain/meadow and 123 acres of SEZ would be restored. If economically feasible, a 9-hole golf course may remain in use while State Parks evaluates alternative uses of the SRA. If keeping the temporary 9-hole course in place during the additional planning process were found to be infeasible, the entire golf course would be removed and meadow and riparian habitat reestablished. Areas within the active floodplain that are currently disturbed by golf course infrastructure and associated use would be restored to riparian habitat, using the same approach as under Alternatives 2 and 3. The net increase of 123 acres of restored SEZ and 131.5 acres of restored floodplain and meadow vegetation would be greater than under Alternatives 2, 3, and 4. The increased size and improved ecosystem functions of SEZ, floodplain, and wetland communities would be beneficial because they would result in a long-term net increase of sensitive habitats (jurisdictional wetlands, riparian vegetation, and SEZ). No construction disturbance related to golf course relocation, quarry restoration, or trail development would occur on the west side of the Upper Truckee River under this alternative; therefore, spring complexes (including fens) and other sensitive habitats west of the Upper Truckee River riparian corridor and floodplain would not be affected.In addition, areas of restored SEZ and floodplain meadow vegetation would increase the area of suitable habitat for special-status plant species that have potential to occur within the area. Marsh skullcap, Oregon fireweed, and Bolander's candle moss, discussed under Impact 3.5-4 (Alt. 2), have potential to occur in moist riparian habitats and would benefit from the long term increase in this habitat type. A nearby population of marsh skullcap in Washoe Meadows SP responded favorably to a restoration project along Angora Creek and grows vigorously along the newly created banks of that creek. The increased size of SEZ, floodplain, and wetland communities could provide additional habitat for these species. This effect would be beneficial.

No mitigation is required.

IMPACT 3.5-6 (Alt. 5) Tree Removal and Forest Land Conversion. *Implementing Alternative 5 would result in the loss of an estimated 245 native trees greater than 10 inches DBH, including 120 trees for geomorphic restoration and 125 trees for construction of access roads. None of the tree removal would involve conversion of forest to non-forest uses and no old growth forest systems would be affected. This preliminary estimate of trees removed includes two trees greater than 30 inches DBH. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction. The magnitude of proposed tree removal in the study area is considered "substantial" as defined in the TRPA Code of Ordinances. Implementing Alternative 5 would require a tree removal and management plan developed with TRPA. Substantial tree removal and the loss of trees greater than 30 inches DBH would be a* ***significant*** *impact.*

Alternative 5 would involve geomorphic restoration treatments similar to those described for Alternatives 2 and 3. As a result, under Alternative 5, effects on trees resulting from this component of the project would be essentially the same those described in Impact 3.5-6 (Alt. 2) and Impact 3.5-6 (Alt. 3). Under Alternative 5, tree removal in the Upper Truckee River riparian zone would be similar to that described under Impact 3.5-6 (Alt. 2) for

Alternative 2. Because Alternative 5 does not involve creating new golf course holes or removing trees from upland forest habitat west of the Upper Truckee River, forest land conversion to golf course would not occur and substantially fewer trees would be removed under this alternative than under Alternative 2. Implementing Alternative 3 would result in the removal of approximately 245 native trees greater than 10 inches DBH, including 120 trees for geomorphic restoration and 125 trees for construction of access roads. This estimate includes two trees greater than 30 inches DBH that would be removed for geomorphic restoration. However, trees to be removed under Alternative 2 will not affect an old growth forest. Tree removal estimates were calculated by State Parks, as discussed in Impact 3.5-6 (Alt. 2) for Alternative 2. The final acres, number, and stand condition of trees removed will be determined in cooperation with TRPA prior to construction.

The tree removal estimates for Alternative 5 include trees that may be removed in the future for additional vegetation management and fuels treatments prior to, or in the absence of, project implementation. For example, some lodgepole pines that would be removed within the riparian corridor as part of the geomorphic restoration under Alternative 5 would be removed as part of State Parks' existing management to reduce conifer encroachment in riparian and meadow habitats and to enhance riparian hardwood growth (as part of the Riparian Hardwood Restoration Project), and as part of the Lake Sector Wildfire Management Plan. Removal of conifers from SEZs for riparian hardwood enhancement is a specific land management objective of State Parks, and some of the tree removal implemented under Alternative 5 would have a long-term beneficial ecological effect. Also, as a result of geomorphic, floodplain, and SEZ restoration under Alternative 5, a net increase in riparian tree abundance, cover, and productivity would occur following project implementation.

Provisions for tree removal are provided in the TRPA Code of Ordinances (Chapter 71, and Chapters 30, 65, 75, and 77), and tree removal requires the review and approval of TRPA. TRPA defines "substantial" tree removal as "activities on project areas of twenty acres or more and proposing the removal of more than 100 live trees 10 inches DBH or larger, or proposing the removal of more than 100 live trees 10 inches DBH or larger within land capability districts 1a, 1b, 1c, 2, or 3 regardless of the project area, or proposing tree removal that, as determined by TRPA after a joint inspection with appropriate State or Federal forestry staff, does not meet the minimum acceptable stocking standards set forth in Subsection 71.4.B" (TRPA Code of Ordinances, Section 71.4.I). Additionally, trees greater than 30 inches DBH must be retained, except under circumstances specified in the Code of Ordinances.

Although geomorphic restoration requiring tree removal in Alternative 5 would be ecologically beneficial, the magnitude of estimated tree removal (245 native trees greater than 10 inches DBH) would be substantial as defined by TRPA; and approximately two trees greater than 30 inches DBH would be removed. This impact would be significant.

Mitigation Measure 3.5-6 (Alt. 5): Minimize Tree Removal and Develop a Tree Removal and Management Plan.

This mitigation measure is identical to Mitigation Measure 3.5-6 (Alt. 2).

With the measure described above, the project would minimize tree removal and compensate, as needed, for the significant loss of trees. Therefore, with implementation of Mitigation Measure 3.5-6 (Alt. 5), Impact 3.5-6 (Alt. 5) would be less than significant.

IMPACT 3.5-7 (Alt. 5) Introduction and Spread of Weeds and Aquatic Invasive Species. *Implementing Alternative 5 has the potential to introduce and spread invasive weeds and aquatic invasive species during the initial phases of geomorphic restoration and golf course decommissioning. The introduction and spread of invasive weeds or aquatic invasive species would degrade vegetation and wildlife habitat, including wildlife habitats of special significance (riparian) within the study area. Over the long term, restoring the existing golf course to native vegetation would likely reduce the existing risk of weed invasion or spread in the study area. Introduction and spread of invasive weeds and aquatic invasive species during the construction and revegetation phases would be a potentially significant impact. This impact would be* ***potentially significant****.*

This impact would be similar to Impact 3.5-7 (Alt. 3) for Alternative 3, because Alternative 5 would involve similar geomorphic restoration of the Upper Truckee River. Please refer to Impact 3.5-7 (Alt. 3) for a detailed description of the potential impact. Additionally, this alternative would include potentially decommissioning the existing golf course and restoring the SEZ, floodplain, and meadow habitat. Golf course decommissioning and restoration would involve temporary ground-disturbing activities on up to 131.5 acres. These ground-disturbing activities could result in the inadvertent introduction and/or spread of nonnative, invasive weed species. The introduction or spread of nonnative, invasive weeds and aquatic invasive species during project construction and revegetation would be a potentially significant impact. Because the existing golf course is considered a potential source point or harbor for weed species, golf course decommissioning and restoration to native vegetation would likely reduce the existing risk of weed invasion or spread into or from the study area. This long-term effect would be beneficial.

Mitigation Measure 3.5-7A (Alt. 5): Implement Weed Management Practices during Project Construction.

This mitigation measure is identical to Mitigation Measure 3.5-7A (Alt. 2).

Mitigation Measure 3.5-7B (Alt. 5): Implement Aquatic Invasive Species Management Practices during Project Construction.

This mitigation measure is identical to Mitigation Measure 3.5-7B (Alt. 2).

With the measures described above, weed and aquatic invasive species management practices would be implemented during project construction and the inadvertent introduction and spread of weeds or aquatic invasive species from project construction would be prevented. Therefore, with implementation of Mitigation Measure 3.5-7A (Alt. 5) and 3.5-7B (Alt.5), Impact 3.5-7 (Alt. 5) would be less than significant.

IMPACT 3.5-8 (Alt. 5) Short-Term, Construction-Related Disturbance or Loss of Special-Status Wildlife Species and Habitats. *Under Alternative 5, restoration activities along the Upper Truckee River and golf course decommissioning could result in loss of individuals or nests, or disruptions to nesting attempts of six special-status bird species (yellow warbler, olive-sided flycatcher, osprey, long-eared owl, yellow-headed blackbird, and waterfowl species); potential disturbance of future nesting by willow flycatcher; and removal of active roost sites for, or injury to, western red bat. This impact would be* ***potentiallysignificant*** *for species known to be present and for willow flycatcher and western red bat, if the species nests or roosts, respectively, in the study area in the future where construction would occur.*

Alternative 5 would involve the same geomorphic restoration treatments as those described for Alternatives 2 and 3. Construction activities could result in disturbance or loss of nests for yellow warbler, willow flycatcher, waterfowl, olive-sided flycatcher, or long-eared owl and removal of roost sites for western red bat. All of these special-status species could use the Upper Truckee River corridor for breeding habitat. Habitat occupied by yellow-headed blackbird (the pond west of hole 4) and adjacent areas could be affected by the proposed golf course decommissioning. These impacts would be similar to those described for the river and floodplain restoration and golf course reconfiguration components of Impact 3.5-8 (Alt. 2) under Alternative 2. Please refer to Impact 3.5-8 (Alt. 2) for a detailed description of potential effects. Under Alternative 5, no construction

disturbance related to golf course relocation or trail development on the west side of the Upper Truckee River would occur; therefore, the amount of potential habitat for long-eared owl and olive-sided flycatcher (which could nest in upland habitats west of the river) affected would be lower under Alternative 5 than under Alternative 2.

Project construction under Alternative 5 could result in the loss of individuals or nests, or disruptions to nesting attempts, of yellow warbler, olive-sided flycatcher, yellow-headed blackbird, waterfowl, or long-eared owl; potential disturbance of willow flycatcher if the species nests in a construction area in the future; and the removal of an active roost site for, or injury to, western red bat. This impact would be potentially significant for species known to inhabit the study area and for willow flycatcher and western red bat, if they use the habitat in the future.

Mitigation Measure 3.5-8A (Alt. 5): Conduct Preconstruction Surveys for Nesting Special-Status Birds (Yellow Warbler, Willow Flycatcher, Olive-Sided Flycatcher, Yellow-Headed Blackbird, Waterfowl, and Long-Eared Owl), and Implement a Limited Operating Period If Necessary.

This mitigation measure is identical to Mitigation Measure 3.5-8A (Alt. 2).

Mitigation Measure 3.5-8B (Alt. 5): Conduct Preconstruction Surveys for Special-Status Bats, Avoid Removal of Significant Roosts, and Implement a Limited Operating Period If Necessary.

This mitigation measure is identical to Mitigation Measure 3.5-8B (Alt. 2).

With the measures described above, the project would avoid the loss of individuals, nests, or roost sites of special-status wildlife species during construction of Alternative 5. Therefore, with implementation of Mitigation Measures 3.5-8A (Alt. 5) and 3.5-8B (Alt. 5), Impact 3.5-8 (Alt. 5) would be less than significant.

IMPACT 3.5-9 (Alt. 5) Long-Term Effects on Special-Status and Common Wildlife Species and Habitats. *The long-term ecosystem response to river and floodplain restoration under Alternative 5 is expected to substantially improve habitat quality and functions for riparian and aquatic wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. River and floodplain restoration would also substantially increase the size and enhance functions of TRPA-designated wildlife habitats of special significance (i.e., wetlands, meadows, and riparian areas). This effect would be* **beneficial**.

As discussed under Alternatives 2 and 3, river restoration activities under Alternative 5 would substantially increase the length of the channel and the width of the riparian corridor. Natural processes would be restored, resulting in more functional and valuable habitat for terrestrial and aquatic common and sensitive wildlife, including special-status species such as yellow warbler, willow flycatcher, and waterfowl. The long-term ecosystem response to river and floodplain restoration under Alternative 5 is expected to provide a more vigorous riparian vegetation community, increased riparian cover, and instream complexity. River and floodplain restoration would also increase the size and enhance functions of TRPA-designated wildlife habitats of special significance (i.e., wetlands, meadows, and riparian areas). Please refer to Impact 3.5-9 (Alt. 2) for a detailed description of potential effects. Additionally, under Alternative 5, the existing 133-acre golf course would be removed, which would result in restoration of 123 acres of SEZ, 56 acres of 100-year floodplain, and 133 acres of floodplain/meadow. This effect would be beneficial and the magnitude of the benefit would be relatively high.

No mitigation is required.

IMPACT 3.5-10 (Alt. 5) Effects on Potential Wildlife Movement Corridors. *Under Alternative 5, the substantially increased area and improved ecosystem functions of SEZ, floodplain, and riparian and wetland communities along the Upper Truckee River would benefit wildlife communities. These benefits would improve the SEZ's wildlife corridor function by increasing habitat quality, native vegetation connectivity, and corridor width. This effect would be* **beneficial**.

Please refer to Impact 3.5-10 (Alt. 2) for a discussion of the potential for the Upper Truckee River corridor to function as a wildlife movement corridor, and the ways in which habitat enhancement there could improve this function. Alternative 5 would involve the same geomorphic restoration treatments as those described for Alternative 2, and would improve the Upper Truckee River SEZ's potential wildlife corridor function by substantially increasing habitat quality, native vegetation connectivity, and corridor width. This impact would be similar to that described for the river and floodplain restoration component of Impact 3.5-10 (Alt. 2) under Alternative 2. Please refer to Impact 3.5-10 (Alt. 2) for a detailed description of potential effects. Additionally, the existing golf course would be removed, which could result in restoration of up to 123 acres of SEZ, 56 acres of 100-year floodplain, and 131.5 acres of floodplain/meadow. Removal of the existing golf course would also reduce recreation- and maintenance-related disturbances (e.g., noise) to wildlife. However, State Parks would evaluate alternative uses of both Lave Valley SRA and Washoe Meadows SP through a separate planning process. At a minimum, restoration of SEZ, floodplain and meadow would be similar to Alternative 3. This effect would be beneficial.

No mitigation is required.

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# 3.6 EARTH RESOURCES

This section discusses the regulatory guidance and existing environmental conditions in the study area for earth resources, and evaluates potential environmental effects related to geology, soils, mineral resources, and includes land capability and coverage analysis associated with project implementation. Potential environmental effects related to water quality resulting from soil erosion and other stormwater issues are addressed in Sections 3.2, "Hydrology and Flooding" 3.4, "Geomorphology and Water Quality." Consistency with TRPA goals and policies is presented in Section 3.2, "Land Use," Table 3.2-1. Cumulative earth resources impacts are addressed in Section 3.16, "Cumulative Impacts." The project's effects on thresholds are described in Section 4.6, "Consequences for Environmental Threshold Carrying Capacities."

## 3.6.1 AFFECTED ENVIRONMENT

### REGULATORY SETTING

### Federal

No Federal plans, policies, regulations, or laws related to earth resources are applicable.

### State

#### *Soil and Water Resources Conservation Act of 1977*

The Soil and Water Resources Conservation Act of 1977, as amended (RCA) provides the United States Department of Agriculture (USDA) broad strategic assessment and planning authority for the conservation, protection, and enhancement of soil, water, and related natural resources. Through RCA, USDA appraises the status and trends of soil, water, and related resources on non-Federal land and assesses their capability to meet present and future demands; evaluates current and needed programs, policies, and authorities; and develops a national soil and water conservation program to give direction to USDA soil and water conservation activities.

### Clean Water Act

The Clean Water Act (CWA) regulates discharges into waters of the United States, including a range of potential point and nonpoint sources of water-transported pollutants, and the discharge of fill into waters such as wetlands and intermittent stream channels. The purpose of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters through prevention and elimination of pollution.

The law requires that a CWA Section 404 permit be obtained from the U.S. Army Corps of Engineers (USACE) for any dredged or fill materials discharged into wetlands or waters of the United States whether the discharge is temporary or permanent. A National Pollutant Discharge Elimination System permit is required through the appropriate regional water quality control board (RWQCB) CWA Section 401 requires that water quality certifications or waivers be issued by the U.S. Environmental Protection Agency (EPA), the states, or both (see below). Projects must be consistent with the State Non-point Source Pollution Management Program (CWA Section 319). Projects effecting waterbodies identified as impaired would also need to comply with Section 303(d) of the CWA. Waterbodies subject to Section 303(d) of the CWA are discussed further in Section 3.4, "Geomorphology and Water Quality."

Clean Water Act (CWA) Section 402 mandates that certain types of construction activity comply with the requirements of Environmental Protection Agency's National Pollution Discharge Elimination System (NPDES) stormwater program. Construction activities that disturb one or more acres of land must obtain coverage under the NPDES general construction activity stormwater permit, which is issued by the RWQCB. Obtaining coverage

under the NPDES general construction activity stormwater permit generally requires that the project applicant complete the following steps:

- File a Notice of Intent with RWQCB that describes the proposed construction activity before construction begins
- Prepare a Storm Water Pollution Prevention Plan (SWPPP) that describes Best Management Practices (BMPs) that would be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction.
- File a notice of termination with RWQCB when construction is complete and the construction area has been permanently stabilized.

### *Alquist-Priolo Earthquake Fault Zoning Act*

The Alquist-Priolo Act (Public Resources Code Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The law's main purpose is to prevent the construction of such structures on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as "earthquake fault zones" around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and State agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed structures would not be constructed across active faults.

### *Seismic Hazards Mapping Act*

The Seismic Hazards Mapping Act of 1990 (Public Resources Code Sections 2690–2699.6) addresses earthquake hazards from nonsurface fault rupture, including liquefaction and seismically induced landslides. The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

### *California Building Standards Code*

The State of California provides minimum standards for building design through the California Building Standards Code, or California Building Code (CBC), in Title 24 of the California Code of Regulations. The CBC is based on the Uniform Building Code, which is used widely throughout the United States and has been modified for California conditions with numerous more detailed and/or more stringent requirements.

The California Building Standards Commission coordinates, manages, adopts, and approves building codes in California. In July 2007, the commission adopted and published the 2006 International Building Code as the 2007 CBC. This new code became effective on January 1, 2008, and updated all subsequent codes under Title 24 of the California Code of Regulations.

The State earthquake protection law (California Health and Safety Code, Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum requirements for seismic safety and structural design are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix J of the 2007 CBC regulates grading activities, including drainage, erosion control, and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

### *California Surface Mining and Reclamation Act of 1975*

The California Surface Mining and Reclamation Act (Public Resources Code, Section 2710 et seq.) was enacted in 1975 to regulate activities related to mineral resource extraction. The act requires the office of the State Geologist to classify lands within California based on mineral resource availability. The State Geologist is responsible for classifying lands subject to urban development by Mineral Resource Zones according to the presence or absence of significant sand, gravel, or stone deposits that are suitable as sources of aggregate. The process is based solely on underlying geology without regard to existing land use or land ownership. The primary goal of mineral land classification is to ensure that local government decision-makers recognize and consider the mineral potential of the land before making land use decisions that could preclude mining.

In compliance with the California Surface Mining and Reclamation Act (SMARA), CGS has established the classification system shown in Table 3.6-1 to denote both the location and significance of key extractive resources.

**Table 3.6-1**
**California Division of Mines and Geology Mineral Land Classification System**

| Classification | Description |
|---|---|
| MRZ-1 | Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence |
| MRZ-2 | Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists |
| MRZ-3 | Areas containing mineral deposits, the significance of which cannot be evaluated from existing data |
| MRZ-4 | Areas where available information is inadequate for assignment to any other MRZ zone |

Note: MRZ = Mineral Resource Zone
Source: Loyd 1995

### *Lake Valley State Recreation Area General Plan*

In 1988, the State Parks adopted the *Lake Valley State Recreation Area General Plan* (State Parks 1988), which is discussed in Section 3.2, "Land Use." None of the policies contained in that document are applicable to the geology, soils, and land capability and coverage analysis.

## Tahoe Regional Planning Agency

### *1987 Regional Plan*

TRPA implements its authority to regulate growth and development in the Lake Tahoe region through the *Regional Plan for the Lake Tahoe Basin* (*Regional Plan*). TRPA's *Regional Plan*, adopted in 1987, consists of several documents: Goals and Policies, Code of Ordinances, Water Quality Management Plan, Regional Transportation Plan—Air Quality Plan, Plan Area Statements, and Scenic Quality Improvement Plan.

The 1987 Regional Plan had a 20-year scope and is currently being reviewed and updated through a collaborative effort led by TRPA. These agencies are working together to update several important environmental documents

for the Tahoe Basin. These Regional Plan updates will guide land management, resource management, and environmental regulations in the Tahoe Basin over the next 20 years. The Regional Plan update is anticipated to be completed by 2011.

## Regional Plan Goals and Policies

The following TRPA Goals and Policies (TRPA 2004) relate to earth resources and are applicable to this analysis:

**LAND USE GOAL 3:** All new development shall conform to the coefficients of allowable land coverage as set forth in "The Land Capability Classification of the Lake Tahoe Basin, California-Nevada, A Guide for Planning, Bailey, 1974." This goal calls for policies which limit allowable impervious land coverage associated with new development. These policies set allowable land coverage by applying the recommended Bailey land coverage coefficients to specifically defined and related areas. In some instances, provisions are made to allow additional coverage by transfer. The transfer programs shall operate by a direct offset method. In addition, land capability is one of the basic factors in determining the suitability of lands for development and appropriateness of land uses.

- **Policy 3:** *Rehabilitation, reconstruction, and upgrading of the existing inventory of structures, or other forms of coverage in the Tahoe Region, are high priorities of the regional plan. To encourage rehabilitation and upgrading of structures, the following policies shall apply:*

  B. Reconstruction, rehabilitation, modification, relocation, or major repair of structures or coverage other than as specified in A above may be allowed, provided such use is allowed under the land use subelement, Goal #2, Policies 8, 9 and 10. For parcels with existing coverage in excess of the Bailey Coefficients, a land coverage mitigation program shall be set by ordinance, which shall provide for the reduction of coverage in an amount proportional to the cost of the repair, reconstruction, relocation, rehabilitation, or modification, and to the extent of excess coverage. To accomplish these reductions, property owners shall have at least the following options:

  i. reducing coverage on-site;

  ii. reducing coverage off-site in a hydrologically-related area;

  iii. paying a rehabilitation fee in lieu of off-site coverage reduction in an amount established by Agency ordinance to help fund a land bank program established to accomplish coverage reductions;

  iv. lot consolidation with a contiguous parcel or lot line adjustment to reduce the percentage of excess coverage on the resulting parcels; or

  v. any combination of the foregoing options.

  C. Existing coverage may be relocated within a parcel provided it is relocated to areas of equal or superior environmental capability consistent with B above.

  D. In establishing the rehabilitation fee schedule(s) provided for in (3.B.iii), above, the following procedures shall be followed: [Policy 3.D. then describes the procedures for establishing the rehabilitation fee schedule.]

  E. In approving repair, reconstruction, rehabilitation, modification, or relocation of structures or other coverage, the Agency shall also apply other relevant standards, including installation of best management practices or compliance with the design review guidelines.

- **Policy 4:** *Land coverage allowed pursuant to redevelopment plans shall be established by TRPA-approved redevelopment plans. However, in no case shall there be a net increase in land coverage in the redevelopment project area.*

**NATURAL HAZARDS GOAL 1:** *Risks from natural hazards (e.g., flood, fire, avalanche, earthquake) will be minimized.* Land uses within the Tahoe Basin should be cognizant of natural hazards so as to help prevent damage to property and to protect public health. Natural hazard areas or situations can be identified and precautionary measures taken to minimize impacts.

- **Policy 2:** *Prohibit construction, grading, and filling of lands within the 100-year flood plain and in the area of wave run-up except as necessary to implement the goals and policies of the plan. Require all public utilities, transportation facilities, and other necessary public uses located in the 100-year flood plain and area of wave run-up to be constructed or maintained to prevent damage from flooding and to not cause flooding.* The Tahoe Basin is often subject to rain or storm events which cause extreme fluctuations in stream flows or wave run-up which can result in flooding and damage to property. Grading, filling, and structural development within the flood plain causes alteration of the stream flow and may accentuate downstream flooding. Development within the floodplain is subject to damage and inundation as a result of flooding and is generally prohibited by federal regulation (Executive Order No. 11988, 1977 and No. 11296, 1966).

The following goals and policies in Chapter IV (Conservation Element) of TRPA's Goals and Policies (TRPA 2004) related to soil productivity and stream environment zones (SEZ) are applicable to this analysis:

**SOILS GOAL 1:** *Minimize soil erosion and the loss of soil productivity.* Protection of the Region's soil is important for maintaining soil productivity and vegetative cover and preventing excessive sediment and nutrient transport to the streams and lakes. Soil protection is especially critical in the Basin where the soils are characteristically shallow and highly susceptible to erosion. Strategies for soil conservation are consistent with thresholds established for soil, water, and vegetation.

- **Policy 1:** *Allowable impervious land coverage shall be consistent with the threshold for impervious land coverage.* The Land Use Subelement (see Goal #4) establishes policies which limit impervious land coverage consistent with the impervious land coverage limits set forth in the "Land-Capability Classification of the Lake Tahoe Basin, California-Nevada, a Guide for Planning", Bailey, 1974.

- **Policy 2:** *No new land coverage or other permanent disturbance shall permitted in land capability districts 1–3 except for those uses as noted in A, B and C below:*

  A. Single family dwellings may be permitted in land capability districts 1–3 when reviewed and approved pursuant to the individual parcel evaluation system (IPES). (See Goal #1, Policy 2, Development and Implementation Subelement.)

  B. Public outdoor recreation facilities may be permitted in land capability districts 1–3 if:

     (1) The project is a necessary part of a public agency's long range plans for public outdoor recreation;

     (2) The project is consistent with the recreation element of the Regional Plan;

     (3) The project, by its very nature must be sited in land capability districts 1–3;

     (4) There is no feasible alternative which avoids or reduces the extent of encroachment in land capability districts 1–3;

     (5) The impacts are fully mitigated; and

(6) Land capability districts 1–3 lands are restored in the amount of 1.5 times the area of land capability districts 1–3 which is disturbed or developed beyond that permitted by the Bailey coefficients. To the fullest extent possible, recreation facilities must be sited outside of Land Capability Districts 1–3. However, the six-part test established by the policy allows encroachment of these lands where such encroachment is essential for public outdoor recreation, and precautions are taken to ensure that such lands are protected to the fullest extent possible. The restoration requirements of this policy can be accomplished on-site or off-site, and shall be in lieu of any coverage transfer or coverage mitigation provisions elsewhere in this Plan.

C. Public service facilities are permissible uses in land capability districts 1–3 if:

(1) The project is necessary for public health, safety or environmental protection;

(2) There is no reasonable alternative, which avoids or reduces the extent of encroachment in land capability districts 1–3;

(3) The impacts are fully mitigated; and

(4) Land capability districts 1–3 lands are restored in the amount of 1.5 times the area of land capability districts 1–3 which is disturbed or developed beyond that permitted by the Bailey coefficients. Development within Land Capability Districts 1–3 is not consistent with the goal to manage high hazard lands for their natural qualities and shall generally be prohibited except under extraordinary circumstances involving public works. Each circumstance shall be evaluated based on the above four-point test of this policy. The restoration requirements of this policy can be accomplished on-site or off-site, and shall be in lieu of any coverage transfer or coverage mitigation provisions elsewhere in this Plan.

- **Policy 3:** *The land capability map may be reviewed and updated*. TRPA shall provide for a procedure to allow land capability challenges for reclassification of incorrectly mapped areas.

- **Policy 4:** *TRPA shall develop specific policies to limit land disturbance and reduce soil and water quality impacts of disturbed areas.* Like impervious surfaces, disturbed and compacted areas result in increased soil loss and surface runoff. The Regional Plan sets policies designed to reduce existing surface disturbance and avoid new disturbance (see Water Quality Subelement, Goal #1, Policies 2 and 3; Vegetation Subelement, Goal #1, Policy 5). TRPA shall set guidelines defining "disturbance" and determine what types of disturbed and compacted areas should be counted as impervious surfaces for purposes of applying land coverage limits. Coverage limits shall not be applied so as to prevent application of best management practices to existing disturbed areas.

- **Policy 5:** *TRPA shall conduct a survey to identify areas where existing excess coverage is causing environmental damage.* Over a five-year period, TRPA shall survey the streams and watersheds in the Basin to identify areas that show empirical evidence of soil erosion or adverse changes in hydrological conditions as a result of excess coverage. The survey shall propose specific programs to address the problem of excess coverage and may include limits on new coverage, coverage removal, and remedial erosion and runoff control projects.

- **Policy 6:** *Grading, filling, clearing of vegetation (which disturbs soil), or other disturbances of the soil are prohibited during inclement weather and for the resulting period of time when the site is covered with snow or is in a saturated, muddy, or unstable condition. Special regulations and construction techniques will apply to all construction activities occurring between October 15 and May 1.* Impacts related to soil disturbance are highly exaggerated when the soil is wet. For precautionary reasons, all project sites must be adequately winterized by October 15 as a condition for continued work on the site. Exceptions to the grading prohibitions

will be permitted in emergency situations where the grading is necessary for reasons of public safety or for erosion control.

- **Policy 7:** *All existing natural functioning SEZs shall be retained as such and disturbed SEZs shall be restored whenever possible.* Stream environment zones (SEZs) shall be managed to perpetuate their various functional roles, especially pertaining to water cleansing and nutrient trapment. This requires enforcement of a non-degradation philosophy. This policy is common to the Water Quality, Vegetation, Stream Environment Zone, and Wildlife Subelements and will be implemented through the Land Use Element and capital improvements program.

**STREAM ENVIRONMENT ZONE GOAL 1:** *Provide for the long-term preservation and restoration of stream environment zones.* The preservation of SEZs is a means for achieving numerous environmental thresholds. Policies that promote their maintenance, protection, and restoration are listed below.

- **Policy 1:** *Restore all disturbed stream environment zone lands in undeveloped, unsubdivided lands, and restore 25 percent of the SEZ lands that have been disturbed, developed, or subdivided.* Many acres of SEZ lands have been modified or disturbed. TRPA shall identify the number of acres to be restored and prepare a list of projects to achieve the environmental threshold carrying capacity for stream environment zones. TRPA shall develop an implementation program to restore the necessary acreage, and establish an annual tracking program. The implementation program shall provide for restoration over a twenty year period, with 90 percent of the acreage to be restored within the first fifteen years.

- **Policy 2:** *SEZ lands shall be protected and managed for their natural values.* SEZ lands and associated riparian vegetation are scarce in the Basin relative to other plant communities. Because SEZs provide many beneficial functions (especially pertaining to water quality) only forest management practices, stream improvement programs, and habitat restoration projects are permissible uses.

- **Policy 3:** *Groundwater development in SEZ lands shall be discouraged when such development could possibly impact associated plant communities or instream flows.* Withdrawal of water from SEZ lands may lower surface and ground waters and, by so doing, alter plant composition of the riparian vegetation and reduce instream flows. Groundwater proposals in SEZs and riparian plant communities will be evaluated against those concerns.

- **Policy 4:** *Golf courses in Stream Environment Zones shall be encouraged to retrofit course design in combination with fertilizer application standards (see Water Quality Subelement, Goal #1, Policy 5) to prevent release of nutrients to adjoining ground and surface waters.* A combination of strategies to include fertilizer application standards and course redesign may be necessary to control off-site nutrient release from golf course fairways and greens.

- **Policy 5:** *No new land coverage or other permanent land disturbance shall be permitted in Stream Environment Zones except for those uses as noted in A, B, C, D, and E below:*

  A. Public outdoor recreation facilities are permissible uses in stream environment zones if:

     (1) The project is a necessary part of a public agency's long range plans for public outdoor recreation;

     (2) The project is consistent with the recreation element of the regional plan;

     (3) The project, by its very nature, must be sited in a stream environment zone;

     (4) There is no feasible alternative which would reduce the extent of encroachment in stream environment zones;

(5) The impacts are fully mitigated;

(6) Stream environment zone lands are restored in the amount of 1.5 times the area of stream environment zone which is disturbed or developed by the project. To the fullest extent possible, recreation facilities must be sited outside of stream environment zones. Some recreation facilities, such as river access points or stream crossings for hiking trails, by their very nature require some encroachment of stream environment zones. However, the six-part test established by this policy allows encroachment of SEZs where such encroachment is essential for public outdoor recreation and precautions are taken to ensure that stream environment zones are protected to the fullest extent possible. The restoration requirements of this policy can be accomplished on-site or off-site, and shall be in lieu of any coverage transfer or coverage mitigation provisions elsewhere in this Plan.

B. Public service facilities are permissible uses in stream environment zones if:

(1) The project is necessary for public health, safety, or environmental protection;

(2) There is no reasonable alternative, including spans, which avoids or reduces the extent of encroachment in stream environment zones;

(3) The impacts are fully mitigated; and

(4) Stream environment zone lands are restored in the amount of 1.5 times the area of stream environment zone which is disturbed or developed by the project. Development within stream environment zones is not consistent with the goal of managing stream environment zones for their natural qualities and shall generally be prohibited except under extraordinary circumstances involving public works. Each circumstance shall be evaluated based on the conditions of this policy. The restoration requirements of this policy can be accomplished on-site or off-site, and shall be in lieu of any coverage transfer or coverage mitigation provisions elsewhere in this Plan.

C. Projects which require access across stream environment zones to otherwise buildable sites are permissible in SEZs if:

(1) There is no reasonable alternative, which avoids or reduces the extent of encroachment in the SEZ;

(2) The impacts are fully mitigated; and

(3) SEZ lands are restored in the amount of 1.5 times the area of stream environment zone which is disturbed or developed by the project. The restoration requirements can be accomplished on-site or off-site, and shall be in lieu of any coverage transfer or coverage mitigation provisions elsewhere in this Plan.

D. New development may be permitted in man-modified stream environment zones where:

(1) The area no longer exhibits the characteristics of a stream environment zone;

(2) Further development will not exacerbate the problems caused by development in stream environment zones;

(3) Restoration is infeasible; and

(4) Mitigation is provided to at least partially offset the losses which were caused by modification of the stream environment zones.

E. Stream environment zone restoration projects and erosion control projects.

- **Policy 6:** *Replacement of existing coverage in stream environment zones may be permitted where the project will reduce impacts on stream environment zones and will not impede restoration efforts.* Existing structures in stream environment zones may be repaired or rebuilt. Minor reconstruction may be permitted so long as drainage improvements, protection of the stream environment zone from disturbances, or other measures are carried out which provide a net benefit to the area's capacity to serve as a naturally-functioning stream environment zone. Major reconstruction or replacement may also be permitted if there is a net benefit to the stream environment zone and if the replacement or reconstruction is consistent with stream environment zone restoration programs (see Policy 1).

### Code of Ordinances

Section IV (Site Development Provisions) and Section VIII (Grading and Construction Provisions) of the TRPA Code of Ordinances (TRPA 2008) contain the following chapters with requirements applicable to the proposed alternatives related to geology, soils, and land coverage:

- Chapter 20, "Land Coverage Standards," regulates implementation of the land capability system, land capability districts (LCDs), land coverage, and transfer and mitigation of land coverage.

  - Section 20.4 discusses prohibitions on installation of new land coverage or other permanent disturbances within areas assigned to LCDs 1, 2, or 3 (see "Tahoe Regional Planning Agency Land Coverage Regulations" below for a discussion of LCDs). Exceptions to these prohibitions exist for single-family dwellings that are subject to review under the individual parcel evaluation system, qualifying public outdoor recreation facilities, and qualifying public facilities (e.g., water quality control facilities, including erosion control projects; habitat restoration projects; wetland rehabilitation projects; and SEZ restoration projects).

  - Section 20.5 discusses the excess land coverage mitigation program where the amount of land coverage existing prior to the project in the project area exceeds the base land coverage for the project area. Section 20.5.C discusses relocation of existing land coverage where relocation from one portion of a SEZ to another portion is allowed due to a net environmental benefit to the stream environment zone. Net environmental benefit to a SEZ is defined as an improvement in the functioning of the SEZ and includes, but is not limited to: (a) Relocation of coverage from a less disturbed area to a more disturbed area or to an area further away from the stream channel; (b) Retirement of land coverage in the affected SEZ in the amount of 1.5:1 of the amount of land coverage being relocated within a SEZ; or (c) For projects involving the relocation of more than 1000 square feet of land coverage within a SEZ, a finding, based on a report prepared by a qualified professional, that the relocation will improve the functioning of the SEZ and will not negatively affect the quality of existing habitats. Under the later criteria land coverage relocation in the affected SEZ can be a 1:1 ratio (pers. comm. Gustafson 2010).

- Chapter 25, "Best Management Practices Requirements," sets forth the requirements for installation of BMPs for the protection or restoration of water quality and attainment of minimum discharge standards. BMPs, as described in the *Handbook of Best Management Practices* (Volume II of the *Lake Tahoe Basin Water Quality Management Plan*), or equivalent practices approved by TRPA, will be applied to all public and privately owned lands. In addition to the standard requirements of Section 25.5, the project conditions of approval will list any other appropriate required BMPs to meet minimum discharge standards. Construction in SEZs or Land Capability Districts 1–3, inclusive, normally will require special conditions of approval because of the sensitivity of those areas to disturbance.

- Chapter 28, "Natural Hazard Standards," regulates activities to prevent damage to property and protect public health relating to natural hazards.

- Chapter 61, "Special Information Reports and Plans," regulates the need for special investigations, reports, and plans determined to be necessary by TRPA to protect against adverse effects from grading, including potential effects on slope stability, groundwater or antiquities.

- Chapter 62, "Grading and Construction Schedules," regulates schedules for grading and construction when those activities are anticipated to occur pursuant to a TRPA permit. Section 62.2 specifies, "For projects presenting special problems with regard to project completion, site development or water quality management, such as crossings of stream environment zones, major earthworks, or major clearing projects, TRPA may require, as a condition of approval, submittal and approval of project schedules prior to site disturbance."

- Chapter 64, "Grading Standards," regulates excavation, filling, and clearing to avoid adverse effects related to exposed soils, unstable earthworks, or groundwater interference. Chapter 64 specifically addresses seasonal limitations, winterization techniques, discharge prohibitions, dust control, disposal of materials, standards for cuts and fills, and excavation limitations.

- Chapter 65, "Vegetation Protection during Construction," regulates the requirements for protection of vegetation and soil during construction activities. Chapter 65 specifically addresses protection of vegetation not designated and approved for removal, limits on size, type, and location of equipment use, and revegetation of disturbed areas.

### *Tahoe Regional Planning Agency Land Coverage Regulations*

Soil conservation is essential for the maintenance of plant communities, prevention of erosion, protection of water quality, maintenance of stream systems, and protection of lake clarity. Soil conservation in the Tahoe Basin is addressed in the context of two key concepts, impervious land coverage and SEZs. Impervious land coverage, such as asphalt, concrete, and roofs, prevents stormwater runoff from absorbing into the ground. When runoff bypasses natural processes of infiltration and migration through soil, it is not filtered by the soil and does not contribute to local groundwater supplies. Excess runoff overloads stream channels, erodes streambanks, and unnecessarily damages vegetation. Stream channel erosion transports nutrients and sediments to Lake Tahoe and contributes to the degradation of water clarity. SEZs are characterized by the presence of water, such as a stream and its banks, as well as marshes, meadows, and wetlands. They provide natural treatment and disperse runoff over large areas, allowing sediment to settle out and vegetation to take up nutrients.

### *Land Capability Districts*

Since 1972, TRPA has used the Bailey System (a land capability classification system) to evaluate applications that request either additional impervious land coverage to existing developed lots or building permits for new development (Bailey 1974). The Bailey System was developed to mitigate the deleterious effects on stream systems and water quality that result from excessive coverage of land by impervious surfaces. The Bailey System restricts the amount of impervious land coverage on all parcels and generally prohibits new land coverage in areas classified as SEZ.

Land capability is defined as "the level of use an area can tolerate without sustaining permanent (environmental) damage through erosion and other causes" (Bailey 1974). The Bailey system uses LCDs ranging from 1 to 7, which assign a percentage of land coverage allowable in the designated LCD area (see Table 3.6-2). Land coverage includes impervious surfaces such as roadways, sidewalks, and structures that prevent precipitation from directly reaching the soil surface.

**Table 3.6-2**
**Capability Districts for Tahoe Basin Lands**

| Capability Levels | Maximum Allowable Coverage (%) | Tolerance for Use | Slope Percent[1] | Relative Erosion Control | Runoff Potential[2] | Disturbance Hazards |
|---|---|---|---|---|---|---|
| 7 | 30 | Most | 0–5 | | Low to moderately low | Low-hazard lands |
| 6 | 30 | | 0–16 | Slight | Low to moderately low | |
| 5 | 25 | | 0–16 | | Moderately high to high | |
| 4 | 20 | | 9–30 | Moderate | Low to moderately low | Moderate-hazard lands |
| 3 | 5 | | 9–30 | Moderate | Moderately high to high | |
| 2 | 1 | | 30–50 | High | Low to moderately low | |
| 1a | 1 | Least | 30+ | High | Moderately high to high | High-hazard lands |
| 1b | 1 | | (Poor Natural Drainage) | | | |
| 1c | 1 | | (Fragile Flora and Fauna)[3] | | | |

[1] Most slopes occur within this range. There may be, however, small areas that fall outside the range given.
[2] Low to moderately low - hydrologic-soil groups A and B; moderately high to high - hydrologic-soil groups C and D.
[3] Areas dominated by rocky and stony land.
Source: Data compiled by EDAW (now AECOM) from Bailey 1974

LCDs were derived by analyzing the land capability according to frequency and magnitude of hazards that might be encountered and by considering the type and intensity of uses suitable for each unit (Bailey 1974). Capability classes are expressed as levels of tolerance that a unit can withstand without sustaining permanent damage through erosion or other causes (i.e., water quality or land productivity). Table 3.6-3 summarizes the characteristics and intensity of uses for LCDs. The integration of the LCDs and land use suitability resulted in limits on land-surface modifications for each unit. The limits are expressed as a percentage of each area that can be used for impervious coverage.

**Table 3.6-3**
**Characteristics of Lands According to Capability Class and Suitable Uses Based on Relative Tolerance Levels**

| Capability Level (Class) | General Characteristics | Intensity of Uses |
|---|---|---|
| Low-hazard lands—Classes 5–7 | Gently sloping foothills and plains with deep soils. Surface erosion and drainage problems are generally minor to moderate. | Generally suited for various development activities and concentrated public occupancy. Access should be by high-standard roads and trails. May support most kinds of intensive or mass recreational uses. Facilities include campgrounds, recreational residences, hotels, and resorts or other commercial services where these uses would not destroy other values. |
| Moderate-hazard lands—Classes 3 and 4 | Moderately steep mountain slopes. These lands may provide visual backdrops for low-hazard areas. | Recreation use may be varied and concentrated, including campgrounds, picnic areas, and winter sports sites. Access should be by low-standard roads and trails. Low-density housing may be permitted in some circumstances. Limited timber harvest may be appropriate. |

**Table 3.6-3**
**Characteristics of Lands According to Capability Class and Suitable Uses Based on Relative Tolerance Levels**

| Capability Level (Class) | General Characteristics | Intensity of Uses |
|---|---|---|
| High-hazard lands—Class 2 | Steep slopes and a fragile environment with unique plants and animals. High scenic value. Little or no soil mantle. Generally occurs in scattered areas at the base of steep slopes and along entrenched stream valleys. | Generally suited for limited recreation, restricted grazing, and selective timber harvest because of erosion hazard on slopes greater than 30 percent. These lands should generally remain in their natural condition. Access facilities should be restricted to foot and horse trails. Dispersed recreational uses could include hiking, backcountry camping, and fishing. These lands should not be managed for intensive commercial uses. |
| High-hazard lands—Class 1 | Mountaintops with little or no soil mantle, and very steep slopes with shallow soils. Subclasses (i.e., 1a, 1b, 1c) refer to marshes, stream channels, SEZs, floodplains, meadows, and beaches. | Some of the uses specified under Class 2 apply to Class 1 as well. However, Class 1 areas are not suited for development, grazing, or forestry uses. Areas identified as Class 1 provide valuable wildlife habitat and are suited for low-intensity recreational uses. Protection of water supplies and watershed values is desirable. |

Source: Data compiled by EDAW (now AECOM) from Bailey 1974

Chapter 2 of the TRPA Code of Ordinances defines land coverage as a human-made structure, improvement, or covering that prevents normal precipitation from directly reaching the surface of the land underlying the structure, improvement, or covering (TRPA 2008). Examples include roofs, decks, patios, and surfaces paved with asphalt, concrete, or stone. Such structures are defined as "hard coverage." Areas of compacted soils without structures are defined as "soft coverage" (e.g., areas where parking of cars or heavy pedestrian traffic have compacted soils to an extent that prevents substantial infiltration of water).

### Plan Area Statements

Each PAS outlines land use classifications, special policies, planning considerations, permissible uses, and maximum allowances for a portion of the Tahoe Basin. The study area is located in PAS 119 (Country Club Meadow), which is designated as an outdoor recreation and natural resource area with opportunities for SEZ restoration (TRPA 2005b:1). PAS 119 planning considerations include a statement that the riverbanks are locally unstable and that log jams are contributing to streambank erosion. The following special policies are relevant to geology for this particular PAS (TRPA 2005b:2):

- Whenever possible, opportunities for restoration of disturbed SEZs and land coverage removal should be encouraged, including strategies to mitigate the impacts of the golf course.
- Erosion control, runoff control, and SEZ restoration are all permissible uses under resource management of PAS 119.

## *Environmental Threshold Carrying Capacities*

TRPA thresholds are standards or environmental quality targets to be achieved in the Tahoe Basin. TRPA cannot approve projects that would cause a significant adverse effect on a threshold. The thresholds discussed below were adopted by TRPA in 2002. Every 5 years TRPA conducts a comprehensive evaluation of whether thresholds are being achieved, maintained, or both; makes specific recommendations to address problem areas; and directs general planning efforts for the next 5-year period. The results of the most recent evaluation were released in 2007 (TRPA 2007b).

To evaluate soil conservation in the Tahoe Basin, TRPA applies two thresholds related to limiting impervious coverage and preserving SEZs:

- **SC-1 Impervious Coverage.** This threshold has two components. The first is based on controlling the amount of new impervious coverage, and the second involves a continuing effort to bring all land coverage into compliance with Bailey System coefficients (see Table 3.6-3).

- **SC-2 Naturally Functioning SEZ.** This threshold also has two components. The first relates to preservation of existing naturally functioning SEZ areas, and the second addresses restoration of disturbed SEZ areas.

The Tahoe Basin's status in 2006 was nonattainment for both SC-1 and SC-2; however, the 2006 Threshold Evaluations Report states, "There has been significant progress and an upward trend in the area of Soil Conservation" (TRPA 2007b:9). The report indicates that the key cause for the nonattainment determination for SC-1 is unmitigated excess coverage associated with pre-1987 development (i.e., development that occurred before adoption of the 1987 Regional Plan). New projects must comply with TRPA's land capability classification requirements, thus SC-1 may be better described as being in "partial attainment" (TRPA 2007b:9).

### El Dorado County

Chapter 15.14 of the El Dorado County Code (2007), Grading, Erosion, and Sediment Control Ordinance, was enacted to accomplish all of the following:

- regulate grading within the unincorporated area of El Dorado County to safeguard life, limb, health, property, and public welfare;

- avoid pollution of watercourses; and

- ensure that the intended use of a graded site is consistent with the *El Dorado County General Plan* (El Dorado County 2004), any applicable specific plans, the adopted stormwater management plan, California Fire Safe Standards, and applicable El Dorado County ordinances, including the Zoning Ordinance (Title 17, El Dorado County Code), and applicable chapters of the CBC.

This ordinance establishes the administrative procedures for issuance of permits and provides for approval of plans and inspection of grading construction. The exemptions listed in Section 15.14.140 are not applicable in the Tahoe Basin. All other provisions defined in the ordinance apply. When conflicts with Federal, State, or local laws and regulations occur, the most restrictive are to apply."

## ENVIRONMENTAL SETTING

### Geology

The Tahoe Basin is located in the northern Sierra Nevada, between the Sierra crest to the west and the Carson Range to the east. The Sierra Nevada is the most prominent mountain range in California, and in conjunction with the Central Basin, forms part of the Sierra Nevada microplate, an element of the broad Pacific–North American plate boundary (Argus and Gordon 1991). Before becoming part of the transform plate margin, the Sierra Nevada was the site of a Cenozoic volcanic arc, with related deposits draping over pre-Cenozoic metamorphic and plutonic rocks (Wakabayashi and Sawyer 2000:173). The general asymmetry of the Sierra Nevada reflects uplift and gentle westward tilting, evidenced by the mountain range sloping gently westward and abruptly eastward from its crest to west of the study area.

The Tahoe Basin was formed more than 2 million years ago by a combination of faulting and volcanism. As a result, the basin contains a combination of granitic, metamorphic, and volcanic rock. The predominant bedrock in the basin is Cretaceous granodiorite of the Sierra Nevada batholith. Cretaceous rock formed during the later

period of the Mesozoic Era, characterized by the development of flowering plants and ending with the sudden extinction of dinosaurs and many other forms of life. Pre-Cretaceous metamorphic rocks are found in localized areas. Over the past 1.5 million years, the Tahoe region has been altered by glacial activity. During this activity, valley glaciers dammed the Truckee River Canyon, raising the water level of Lake Tahoe. Lacustrine sediments were deposited in the bays and canyons around the lake as a result of the rising lake levels. The faulting, folding, and in some cases overturning of rock formations that have taken place during various periods of geologic activity, in combination with erosion, deposition, and subsequent cementation of rock materials that have occurred during relatively quiet periods, have left a complex arrangement of geologic rock types and structures in the area. However, the extraordinary clarity of Lake Tahoe is related to the prevalence of resistant granitic bedrock in the Tahoe Basin and an unusually small drainage basin relative to the size of the lake.

Exhibit 3.6-1 indicates that most of the northern portion of the study area is located within an area of Holocene-age (10,000 years ago to present) floodplain deposits composed of gravelly to silty sand and sandy to clayey silt (Saucedo 2005). Approximately one-third of the study area, primarily within the most southern and western areas, is made up of unconsolidated bouldery till.

The study area is located on the U.S. Geological Survey Emerald Bay and Echo Lake, California, 7.5-minute quadrangle maps. The study area is located in a relatively flat area; elevations range from approximately 6,300 to 6,460 feet above mean sea level.

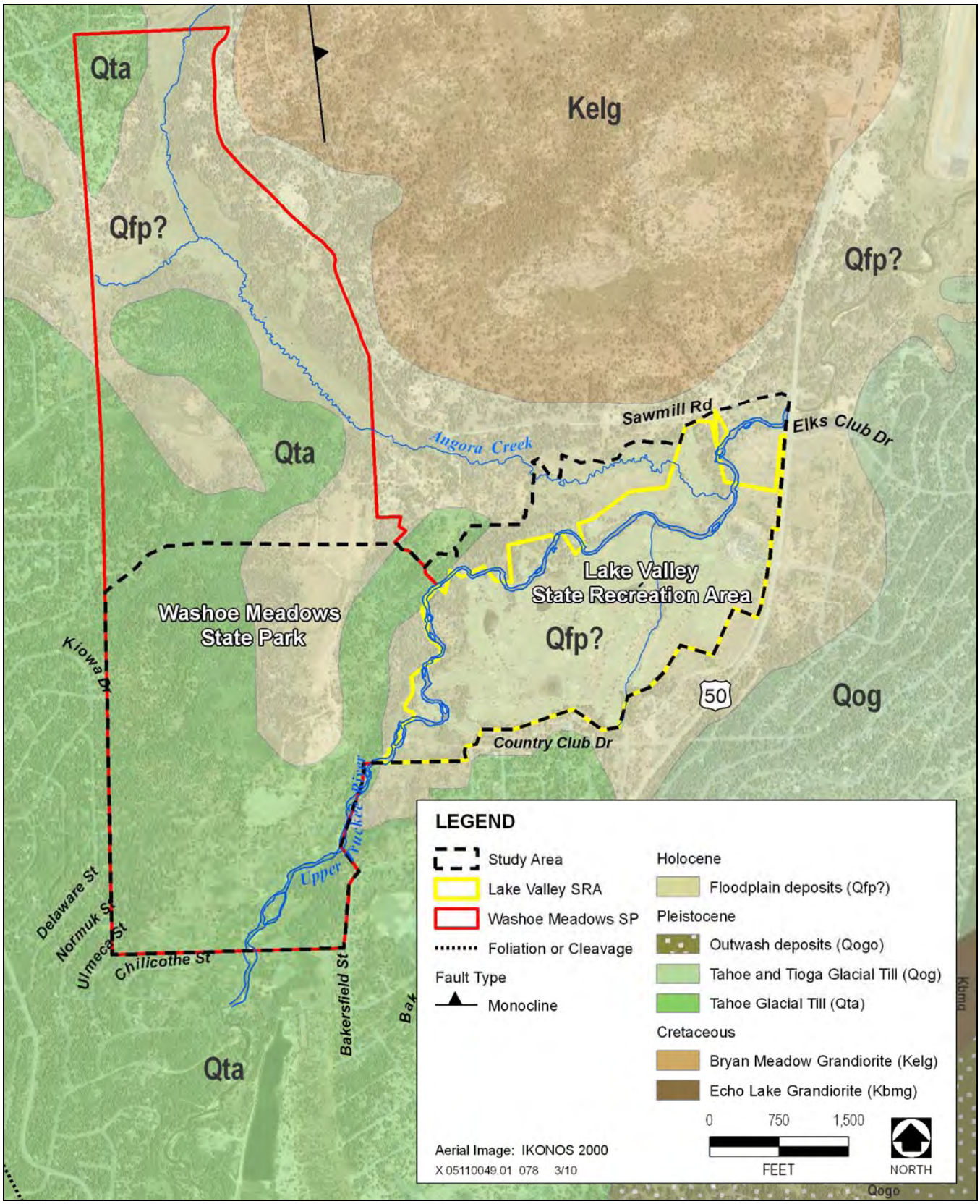
### Seismicity

The study area is located approximately 5 miles south of the southern shore of Lake Tahoe within a regionally significant downfaulted graben (i.e., trench-like geologic feature), sometimes referred to as a half-graben. The study area is in Uniform Building Code Seismic Zone 3. It is not located near any active faults, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the California Department of Conservation, Division of Mines and Geology (now California Geological Survey) (Hart and Bryant 1999). However, the Geologic Map of the Lake Tahoe Basin, California and Nevada (Saucedo 2005) shows that several unnamed faults mapped near the study area.

The North Tahoe Fault, located beneath the lake, is a northeast-southwest trending fault, approximately 7.0 miles long. The northeast-southwest trending Incline Village Fault zone appears to be the landward extension of the submerged North Tahoe Fault and also trends northeast toward the Truckee Meadows Fault. All three of these faults may be part of a system of normal faults that rupture together. Evidence indicates that an earthquake may have occurred along the Incline Village Fault as recently as 500 years ago, and all three faults are estimated to be capable of generating an earthquake of magnitude 7.0 (Seitz and Kent 2004).

The East Tahoe Fault, much of which is also located under Lake Tahoe, is inferred along the east margin of the basin (Sawyer 1999). The fault shows bedding terminating against a planar west-dipping bedrock surface, suggesting young movement. Recent bathymetry of Lake Tahoe reveals that the escarpment is deeply dissected, has an irregular base, and is partly buried at the base by well-developed sediment aprons. The subaqueous fault has probably been modified by the deposition of thick debris avalanche deposits, appearing to have accumulated against the eastern basin escarpment after one or more very large debris avalanches that initiated on the west wall of the basin. Schweickert et al. (1999:A-93) speculated that at least one megalandslide on the west side of the basin was triggered by a Holocene faulting event. No evidence has been reported that the East Tahoe Fault displaces Quaternary deposits on the north or south shores of the lake.

The north-south trending West Tahoe–Dollar Point Fault zone is another prominent normal slip fault zone in the Tahoe Basin (Ichinose et al. 1999). The West Tahoe Fault is submerged from Emerald Bay to McKinney Bay. The Dollar Point Fault is the northern continuation of the West Tahoe Fault northward from McKinney Bay. According to the Earthquake Potential Map for Portions of Eastern California and Western Nevada, the Tahoe




Source: Data adapted by EDAW (now AECOM) 2009

**Geologic Unit in the Study Area** **Exhibit 3.6-1**

area is considered to have a relatively low to moderate potential for shaking caused by seismic-related activity (CGS 2005). Estimates of the peak ground acceleration have been made for the Basin based on probabilistic models that account for multiple seismic sources. Under these models, consideration of the probability of expected seismic events is incorporated into the determination of the level of ground shaking at a particular location. The California Geological Survey has estimated the expected peak horizontal acceleration (with a ten percent chance of being exceeded in the next 50 years) generated by any of the seismic sources potentially affecting the study area as 0.275. (CGS 2003). The Nevada Seismological Laboratory catalog lists eight earthquakes with Richter magnitudes (M) of 4.2 or greater that have occurred since 1950, within approximately 18 miles of the center of Lake Tahoe. These include an M 4.5 earthquake (at Tahoe Vista, approximately 40 miles northwest of the study area) on June 3, 2004. The 2004 event has been attributed to an increase in upper crustal seismicity following a deep dike swarm of 1,611 earthquakes in the Tahoe Vista area, at the site of a deep magma injection event beneath Lake Tahoe (Smith et al. 2004:1278).

### Glaciation

The glacial history of the Upper Truckee River watershed was reviewed by SH+G (2004) and River Run Consulting (2006). Tioga glaciers (about 18-26k years before present [ybp]) do not appear to have progressed further downslope than Meyers. However, Tahoe moraines (60-90k ybp) are mapped on the west edge of the project area, and pre-Wisconsin (Donner Lake, 400-600k ybp) moraines are found to the east. Much of the valley floor through the project area is composed of outwash and reworked till from these glaciations and subsequent entrenchment and fluvial reworking during interglacials. Much of the sediment available locally to the modern river is found in outwash terraces, particularly in the reach upstream of the study area and in the upper third of the study area.

Changing lake levels throughout the Pleistocene and early Holocene have also strongly influenced sedimentology of the valley flat along the lower river. Based on the elevation of Donner Lake till in the Truckee River canyon downstream of Lake Tahoe, Birkeland (1963) suggest that the lake may have been impounded by ice during this time to an elevation of about 6,840 feet, a rise of 600 feet, about the current elevation of Page Meadow. Evidence for this high lakestand includes a prominent bench at about elevation 6,800 feet throughout the Lake Tahoe basin, though Birkeland (1963) notes that lakestands at this elevation may have been due to volcanic flows. He also notes that deltaic sands and gravels just north of Ward Creek at an elevation of 6,440, near the top of the Ward Creek alluvial fan, are pre-Wisconsin in age and may be Donner Lake.

Birkeland (1963) also suggests that Tahoe glaciation tills in the Truckee River canyon are evidence for lakestands up to 6,440 feet, or about 210 feet above current lake level. However, there is no evidence for a lakestand at this elevation in the Lake Tahoe basin, although there are several terraces around the lake at 6,320 feet, or about 90 feet above current lake level. Birkeland (1963) concludes that if the higher lakestands occurred during the Tahoe glaciation, they did not persist for long periods, and that the evidence supports maximum lake levels of around 90 feet. There is also a prominent 40-foot (elevation 6,280 feet) high terrace in several locations around Lake Tahoe, and Birkeland attributes this to Tahoe glaciation high lakestands as well. He notes that evidence of Tioga glacial advances in the Truckee River canyon suggests that ice may have caused local damming, but was unlikely to have substantially raised the surface of Lake Tahoe. It is important to note that the high lakestands produced by glacial damming would have been relatively ephemeral; because ice is lighter than water, glacial dams tend to fail as the lake behind them fills. The resulting floods, termed jokulhlaups, often are of extremely high magnitude.

Within the project area, the lower portion is mapped as lacustrine deposits, grading into Tahoe morainal deposits at the upstream end. The upstream end of the project area is near the upper end of Tahoe stage high lakestands. There was likely a delta in this area in Tahoe times, with coarser outwash deposits grading into fine-grained lacustrine deposits. Tioga and recent floodplain processes have reworked these deposits. Upstream of the Tahoe delta, the more recent fluvial processes have entrenched within the older Tahoe outwash, resulting in the modern floodplain entrenched within Tahoe and Tioga outwash terraces. A distinct transition occurs near the upstream end of the project area, downstream of which well-bedded, sorted and compact Tahoe age lacustrine deposits are

the primary unit. Similar to reaches above the project area, Tioga and recent fluvial reworking of these deposits has occurred, but the underlying Tahoe deposits are of a different character. The study area is at the transition between the narrower outwash confined valley typical of upstream areas and wider valley and floodplain areas influenced by back water during high lake stands. These glacial deposits influence channel form and function. The study area can be divided into three reaches: upstream outwash reach, middle transition reach, and downstream meadow reach. The upstream reach has coarser bank and bed materials and narrower floodplain. It transitions to the broader meadow valley downstream.

The lacustrine deposits strongly influence channel form and function within the lower half of the study area in the meadow reach. In many locations, resistant outcrops on the streambed influence channel gradient. Simon et al. (2003) noted that these resistant outcrops, likely lacustrine from high lake level stands, also influence patterns of streambank erosion. Mussetter Engineering (2000) suggests that resistant lacustrine deposits have limited widening subsequent to incision.

Another transition through deltaic deposits associated with lower lake stands occurs downstream of the study area, from the U.S. 50 (Elks Club) crossing downstream to the upper end of the Lake Tahoe airport. From this area downstream, broad meadows are primarily mapped as lake deposits. Mussetter Engineering (2000) notes that lacustrine deposits in the meadow just upstream of the lower U.S. 50 (City of South Lake Tahoe) crossing are relatively young.

### Minerals

Under SMARA, the State Mining and Geology Board may designate certain mineral deposits as being regionally significant to satisfy future needs. The board's decision to designate an area is based on a classification report prepared by CDMG and on input from agencies and the public. The study area is underlain by silt, silty sand, sandy to clayey silt, sand and gravel, and artificial fill of varying composition. It lies within the designated MRZ-1 for gold deposits formed by mechanical concentrations (placer deposits) (CGS 2001:Plate 7); MRZ-1 (v) for deposits formed by volcanogenic processes (CGS 2001:Plate 6); MRZ-4 (s) for gold deposits formed by contact (CGS 2001:Plate 8). Plates 2 and 4 (CGS 2001) identify a historic sand and gravel site #572 (stone), Anderson Quarry as being located within the SRA golf course meadow. However, the quarry site is actually located on the west side of the Upper Truckee within the SP, within the area proposed as golf course under Alternative 2.

While the exact dates of use are unknown the quarry site is visibly active in a 1969 aerial photograph of the study area. Quarrying was discontinued before parks purchase in 1985. It consists of 3 contiguous lobes, trending NNE, totaling approximately 17 acres. The middle lobe was the deepest, with the back headwall approximately 30 feet tall. This lobe was filled with material from Lower Westside Restoration project in 2001, and revegetated using compost to recreate a soil layer and native seed in 2002. The headwall of northern lobe intercepts the water table from a fen located upslope creating a man made wetlands type environment on the former quarry floor. The topography and vegetation have not been restored, but the seepage does support the artificial wetland. The southern lobe is the shallowest, and a ditch was dug to drain it toward the northeast. The ditch has since headcut and gullied. Both the north and south pits have asphalt and brick waste within them dating from the time of mining the quarry.

### Soils

Soil profile formation within the study area is a result of the interplay of geomorphic and hydrologic processes, vegetation, and in situ chemical processes. General trends are described below.

Although the Upper Truckee River has reduced overbank frequency and inundation because of channel deepening and widening that has reduced connectivity with the floodplain under existing conditions, some overbanking and floodplain sedimentation does occur during less frequent flow events (>5-10 year). However, the sediment retention rates represent a very small percentage of the recent sediment load being supplied via streams and surface runoff, and substantial loads of suspended sediment continue to be delivered downstream and to Lake Tahoe.

The following descriptions are qualitative summaries of soil types based on the *Soil Survey for the Lake Tahoe Basin Area* (NRCS 2007):

- **Pits and dumps (Map Unit 7031)**—This soil type consists of pits and dumps with minor Arents and Xerorthents. It is not subject to flooding or ponding. There are no ratings for wind erosion, excavations, roads, or dwellings.

- **Tahoe complex, 0 to 5 percent slopes gravelly (Map Unit 7042)**—This soil type is located in riparian corridors all around the Tahoe Basin within floodplains and valley flats. The soils are derived from granitic and volcanic parent material. Soils consist of mucky gravelly silt loam, gravelly loam, gravelly loamy fine sand, and gravelly fine sand. The soil has moderate permeability, is naturally poorly drained, and is occasionally subject to flooding. The soil has a low shrink-swell potential (nonexpansive) and has a very high runoff potential. Wind erosion hazard is high. There are limitations on excavations, road construction, and dwellings.

- **Watah peat, 0 to 2 percent slopes (Map Unit 7071)**—This soil type is located in the southern part of the Tahoe Basin in fens, floodplains, and valley flats. Soils are derived from an organic layer over an alluvium. The near surface soils consist of peat and mucky peat to mucky gravelly coarse sandy loam and gravelly loamy coarse sand at the substratum. The soil has moderate permeability and low shrink-swell potential, is very poorly drained, and has very high surface runoff potential. Flooding and ponding occur frequently. Wind erosion hazard is high. There are limitations on excavations, road construction, and dwellings.

- **Celio loamy coarse sand, 0 to 5 percent slopes (Map Unit 7431)**—This soil type is located in the southern part of the Tahoe Basin within outwash terraces. Soils are derived from an alluvium or outwash granodiorite and consist of loamy coarse sand, gravelly loamy coarse sand, and gravelly loamy coarse sand to extremely gravelly coarse sand and extremely gravelly coarse sand at the substratum. The soil has rapid permeability and low shrink-swell potential, is somewhat poorly drained, and has high surface runoff potential. Flooding is rare and ponding occurs occasionally. The wind erosion hazard is low. There are limitations on excavations, road construction, and dwellings.

- **Gefo gravelly loamy coarse sand, 2 to 9 percent slopes (Map Unit 7451)**—This soil type is located in the southern part of the Tahoe Basin within hillslopes and outwash terraces. The soils are derived from an outwash granodiorite and consist of gravelly loamy coarse sand and gravelly coarse sand. The soil has rapid permeability and low shrink-swell potential, is somewhat excessively drained, and has very low surface runoff potential. Flooding and ponding do not occur. The wind erosion hazard is low. There are limitations on excavations. There are no limitations on road construction and dwellings.

- **Gefo gravelly loamy coarse sand, 9 to 30 percent slopes (Map Unit 7452)**—This soil type is located in the southern part of the Tahoe Basin within hillslopes and outwash terraces. The soils are derived from an outwash granodiorite and consist primarily of gravelly loamy coarse sand. The soil has rapid permeability and low shrink-swell potential, is somewhat excessively drained, and has low surface runoff potential. Flooding and ponding do not occur. The wind erosion hazard is low. There are limitations on excavations and dwellings. There are no limitations on road construction.

- **Jabu coarse sandy loam, 0 to 9 percent slopes (Map Unit 7461)**—This soil type is located in the southern part of the Tahoe Basin within hillslopes and outwash terraces. The soils are derived from a granodiorite outwash and consist of slightly decomposed plant material and coarse sandy loam to gravelly coarse sandy loam, coarse sandy loam, stratified fine sandy loam to silty clay, and coarse sandy loam. The soil has very slow permeability and low shrink-swell potential, is well drained, and has low surface runoff potential. Flooding and ponding do not occur. The wind erosion hazard is low. There are limitations on excavations and road construction. There are no limitations on dwellings.

- **Marla loamy coarse sand, 0 to 5 percent slopes (Map Unit 7471)**—This soil type is located in the southern part of the Tahoe Basin within outwash terraces and valley flats. Soils are derived from alluvium granodiorite. The near-surface soils consist of slightly decomposed plant material, loamy coarse sand, clay loam, stratified sandy loam, and fine sandy loam at the substratum. The soil has slow permeability and low shrink-swell potential, is poorly drained, and has very high surface runoff potential. Flooding is rare; however, ponding does occur. The wind erosion hazard is low. There are limitations on excavations, road construction, and dwellings.

- **Meeks gravelly loamy coarse sand, 5 to 15 percent slopes, stony (Map Unit 7482)**—This soil type is located in the southwestern part of the Tahoe Basin within hillslopes and outwash terraces. Soils are derived from a granodiorite outwash and/or till. The near surface soils consist of slightly decomposed plant material and gravelly loamy coarse sand to extremely stony loamy coarse sand and gravelly loamy coarse sand at the substratum. The soil has slow permeability and low shrink-swell potential, is somewhat excessively drained, and has very low surface runoff potential. Flooding and ponding does not occur. The wind erosion hazard is low. There are limitations on excavations, road construction, and dwellings.

## LAND CAPABILITY AND COVERAGE WITHIN THE STUDY AREA

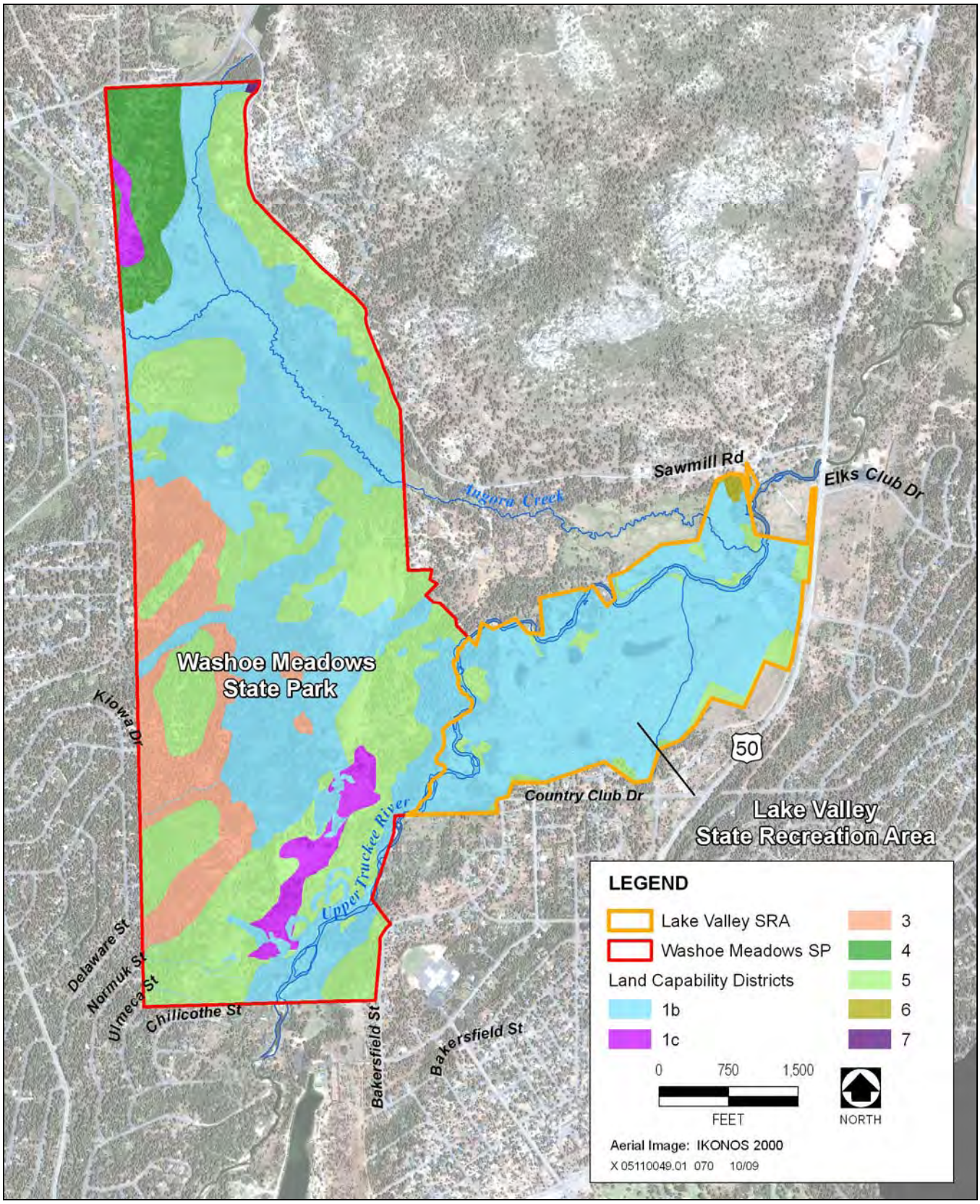
The study area includes LCDs 1b, 1c, 3, 5, and 6 (Exhibit 3.6-2) as verified by TRPA in 2008 (TRPA file number LCAP2008-006). The existing golf course is primarily within LCD 1b with the majority of the higher capability land being located within the southern half of Washoe Meadows SP. Approximately 17 acres of previously disturbed quarry (described above) is LCD 1c.

Coverage within the Lake Tahoe Golf Course consists of the golf cart paths, the parking lot, unpaved parking area and associated club house and maintenance building as well as a small pump house and the golf course bridges. While the golf course landscaping is considered disturbance it is not considered coverage. Coverage within Washoe Meadows SP includes several trails, gravel and dirt service roads, and a barn. The coverage in both units existed prior to acquisition by State Parks. A program has been implemented by State Parks to restore some of the disturbed areas of coverage both in Washoe Meadows SP and Lake Valley SRA and the pre-1972 coverage has been banked as mitigation. Tables 3.6-4 and 3.6-5 contain the distribution of land coverage per land class for both Washoe Meadows SP and Lake Valley SRA. An additional 3,312 square feet of pre-1972 coverage is located within the study area adjacent to Lake Valley SRA on Conservancy property.

**Table 3.6-4**
**Existing Land Area, Land Capability, and Land Coverage Calculations for Washoe Meadows State Park (square feet)**

| Land Class | Gross Area | TRPA Allowable Base Coverage (%) | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Existing Pre-1972 Coverage | Restored Pre-1972 Coverage | Banked Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | 1 | – | – | – | – | – |
| 1b | 5,039,839 | 1 | 50,398 | 130,133 | 126,648 | 35,983 | 30,757 |
| 1c | 539,184 | 1 | 5,392 | 141,582 | 141,582 | 174,132 | 174,132 |
| 2 | – | 1 | – | – | – | – | – |
| 3 | 2,180,496 | 5 | 109,025 | 56,365 | 53,781 | 21,766 | 19,182 |
| 4 | – | 20 | – | – | – | – | – |
| 5 | 5,246,359 | 25 | 1,311,590 | 126,344 | 124,493 | 108,848 | 106,997 |
| 6 | – | 30 | – | – | – | – | – |
| 7 | – | 30 | – | – | – | – | – |
| **Totals** | **13,005,878** | **–** | **1,476,405** | **454,424** | **446,504** | **340,729** | **331,068** |

Source: Data provided by State Parks 2010




Source: Data adapted by EDAW (now AECOM) 2009

**Land Capability** **Exhibit 3.6-2**

**Table 3.6-5**
**Existing Land Area, Land Capability, and Land Coverage Calculations for Lake Valley State Recreation Area (square feet)**

| Land Class | Gross Area | TRPA Allowable Base Coverage (%) | Base Coverage Allowed Per the Bailey System | Existing TRPA Verified Existing Coverage | Existing Pre-1972 Coverage | Restored Pre-1972 Coverage | Banked Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | 1 | – | – | – | – | – |
| 1b | 8,396,269 | 1 | 83,963 | 286,219 | 251,536 | 85,436 | 33,412 |
| 1c | – | 1 | – | – | – | – | – |
| 2 | – | 1 | – | | – | – | |
| 3 | – | 5 | – | | – | – | |
| 4 | – | 20 | – | | – | – | |
| 5 | 868,343 | 25 | 217,086 | 13,585 | 12,747 | 5,964 | 5,126 |
| 6 | 75,197 | 30 | 22,559 | | – | – | |
| 7 | – | 30 | – | | – | – | |
| **Totals** | **9,339,809** | – | **323,608** | **299,804** | **264,283** | **91,400** | **38,538** |

Source: Data provided by State Parks 2010

## 3.6.2 ENVIRONMENTAL CONSEQUENCES

### SIGNIFICANCE CRITERIA

For this analysis, significance criteria are based on the checklist presented in Appendix G of the State CEQA Guidelines; the TRPA Initial Environmental Checklist; factual information; scientific data; and regulatory standards of Federal, State, and local agencies. In development of mitigation measures for significant impacts of the project, effects on environmental thresholds of the Compact were considered. The project's effects on thresholds are further described in Chapter 4, Section 4.6, "Consequences for Environmental Threshold Carrying Capacities."

### CEQA Criteria

Based on Appendix G of the State CEQA Guidelines, a geology, soils, or mineral resources impact is considered significant if implementation of an alternative would do any of the following:

- expose people or structures to potential substantial adverse effects, including loss or injury from seismic hazards, such as earthquake fault rupture, strong seismic ground shaking, liquefaction, or landslides;
- result in substantial soil erosion or loss of topsoil;
- be located on a geologic unit that is unstable or would become unstable as a result of the project;
- be located on expansive soil;
- have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available; or

- result in the loss of availability of known mineral resources that would be of future value to the state or the region.

### NEPA Criteria

An environmental document prepared to comply with NEPA must consider the context and intensity of the environmental effects that would be caused by or result from the proposed action. Under NEPA, the significance of an effect is used solely to determine whether an EIS must be prepared. The factors that are taken into account under NEPA to determine the significance of an action in terms of the context and the intensity of its effects are encompassed by the CEQA criteria used for this analysis.

### TRPA Criteria

Based on TRPA's Initial Environmental Checklist, an alternative would result in a significant impact on geology, soils, and land capability and coverage if it would:

- result in a change in the topographic features of the site inconsistent with the natural surrounding conditions;
- change the undisturbed soil or native geologic substructures or grading in excess of 5 feet;
- continue or increase wind or water erosion of soils;
- result in changes in siltation, deposition, or erosion that could modify the channel of a river or stream or the bed of a lake;
- compact or cover soil with impervious surfaces beyond the limits allowed in the land capability districts;
- expose people or property to seismic hazards such as earthquakes, landslides, backshore erosion, avalanches, mud slides, ground failure, or similar hazards; or
- be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

Impacts related to stream channel erosion are discussed in Section 3.3, "Hydrology and Flooding," and Section 3.4, "Geomorphology and Water Quality."

## METHODS AND ASSUMPTIONS

Impacts associated with geology, soils, mineral resources, and land capability and coverage that could result from project construction and operational activities were evaluated qualitatively based on expected construction practices, materials, and locations and the duration of project construction and related activities; relevant site-specific reports; a field visit; the alternatives description in Chapter 2, "Project Alternatives"; and a review of published geologic literature, including maps, books, and journal articles. The impact analysis for earth resources also relies on information and analysis provided in Section 3.3, "Hydrology and Flooding" and Section 3.4, "Geomorphology and Water Quality." As discussed in Section 3.4, "Geomorphology and Water Quality" potential violations of the narrative turbidity standard, while considered a significant impact for CEQA/NEPA/TRPA analysis for the water quality discussion in this document, would not necessarily correspond to an adverse effect on beneficial uses. This is also true for effects on soils. Turbidity levels would also likely need to exceed the minimum aesthetic criterion to have adverse effects on soils. A finding of a significant unavoidable water quality impact does automatically correspond to an adverse condition on soils, because impairment of related beneficial uses would likely require the proposed project to elevate turbidity levels considerably more than 10 percent above background for a larger magnitude and longer duration beyond the limited area and brief period used for the water quality analysis.

The verified TRPA coverage information and the TRPA Land Classification System (Tables 3.5-2 through 3.5-5) and coverage requirements were used to analyze potential impacts on sensitive slope, soils, and drainage conditions. Although coverage is presented separately for Washoe Meadows SP (parklands within the study area) and Lake Valley SRA to show relative changes between these areas, the coverage impacts are addressed as one contiguous area.

The earth resources–related environmental consequences of implementing the proposed alternatives were determined from a comparison with existing conditions, which are also embodied in Alternative 1, the No Project/No Action Alternative. Mitigation is identified for all potential impacts. The proposed mitigation meets CEQA, NEPA, and TRPA requirements by reducing earth resources–related impacts to a less-than-significant level when feasible.

## IMPACTS FOUND TO BE LESS THAN SIGNIFICANT AND NOT DISCUSSED FURTHER

**Expansive Soils -** Expansive soils shrink and swell as a result of moisture change. Over time, these volume changes can damage building foundations, underground utilities, and other subsurface facilities and infrastructure if they are not designed and constructed appropriately to resist the changing soil conditions. Volume changes of expansive soils also can result in the consolidation of soft clays following the lowering of the water table or the placement of fill. Placing buildings or constructing infrastructure on or within unstable soils can result in structural failure. Based on a review of NRCS soil survey data discussed above, the entire study area is underlain by soils with low shrink-swell potential, indicating the soils are not expansive as defined in Table 18-1-B of the Uniform Building Code. Because construction would occur on soils with low shrink-swell potential, there would be no risk to life or property related to construction on expansive soils.

**Landslide/Mudslide Potential -** A landslide or mudslide is the downhill movement of earth material under the force of gravity. The factors contributing to landslide potential are steep slopes, unstable terrain, and proximity to earthquake faults. This process typically involves the surface soil and an upper portion of the underlying bedrock. Subsurface water in slopes can be an important indicator of landslide potential where water may be forced to the surface along impermeable layers. Springs or seeps may result from impermeable layers and near-surface water. Topographic depressions, heavy irrigation, or disrupted surface water channels can cause ponding and increased infiltration of surface water. The presence of shallow subsurface water is an important factor because pore-water pressure reduces the forces resisting landslide movement. Furthermore, expansive soil on slopes tends to shrink and swell in response to moisture content changes, and during this shrinking and swelling process, gravity tends to work the soil downslope. The potential for any of the alternatives to induce large mass movements or to create new mass movement hazards is a direct function of the type and extent of the ground disturbances and topographic alterations that would result from project construction. The study area has a relatively low gradient. There are areas where groundwater seepage does occur along the cut slope within areas proposed for restoration under Alternative 2; however, these areas were extensively disturbed many years prior, during the period when the quarry was active, and they show no indication of unstable slopes that would cause a landslide. Therefore, implementing any of the project alternatives would not cause any potential risk to people and structures associated with landslides.

**Avalanche Potential -** An avalanche is a rapid flow of snow down a slope, from either natural triggers or human activity, typically occurring in mountainous terrain. For a slope to generate an avalanche, it must be simultaneously capable of retaining snow and allowing snow to accelerate after it is set in motion. The angle of the slope that can hold snow depends on the ductile and shear strength of the snow, which is determined by the temperature and moisture content of the snow. The study area is located in a relatively flat glacial valley where the potential for avalanche is extremely low. Therefore, implementing any of the project alternatives would have no effect on life and property related to avalanches.

## Alternative 1: No Project/No Action: Existing River and 18-Hole Regulation Golf Course

IMPACT 3.6-1 (Alt. 1) Soil Erosion, Sedimentation and Loss of Topsoil. *Under Alternative 1, no restoration would occur, formerly disturbed areas (i.e., trails, roads, and streambanks) would continue to erode, and on-site construction equipment would continue to be operated as it is today (i.e., for fuels management and lawn mowing); thus, soil erosion would remain comparable to the current conditions. This impact would be* ***less than significant.***

Under Alternative 1, formerly disturbed areas (i.e., trails, roads, and streambanks) would continue to erode, and on-site equipment would continue to be operated as it is today (i.e., for fuels management and lawn mowing); thus, soil erosion would remain comparable to the current conditions. Repairs would be completed, as necessary, to stabilize streambanks and/or infrastructure, but this potential for emergency maintenance would be the same as current conditions. Repairs, under this alternative, would be localized stabilization treatments designed to slow erosion and protect infrastructure, but would not restore natural channel morphology or function. The nature and extent of these unforeseeable activities are unknown and would not be a direct result of implementing Alternative 1. This impact would be less than significant.

No mitigation is required.

IMPACT 3.6-2 (Alt. 1) Risks to People and Structures Caused by Strong Seismic Ground Shaking. *Fault activity in the project vicinity could subject people and existing structures in the study area to damage or other risks associated with strong seismic ground shaking; however, Alternative 1 would not modify existing facilities and because risks of earth shaking activity is relatively low this impact would be* ***less than significant.***

Implementation of Alternative 1 does not include construction of any new buildings or other structures. The potential for earth shaking activity to occur is low to moderate according to probabilistic modeling for the area; however, if seismic ground shaking were to occur it could potentially affect existing structures and people within the study area. Because Alternative 1 would not modify existing facilities and the potential for earth shaking activity is relatively low, this impact is less than significant.

No mitigation is required.

IMPACT 3.6-3 (Alt. 1) Land Coverage Changes. *Coverage within the study area would not be modified under Alternative 1. Existing coverage associated with golf course uses would continue to be located adjacent to the Upper Truckee river and Angora Creek, as well as throughout the SRA. Because existing land uses within Washoe Meadows SP and Lake Valley SRA and associated coverage would continue this impact is* ***less than significant.***

Coverage within the study area would not be modified under Alternative 1. Existing coverage for Washoe Meadows SP and Lake Valley SRA under Alternative 1 is presented in Tables 3.6-6 and 3.6-7. Existing coverage associated with golf course uses would continue to be located adjacent to the Upper Truckee River and Angora Creek, as well as throughout the SRA. Coverage associated with existing access roads, volunteer trails and the former quarry site would also continue. Coverage allowed is based on TRPA allowable base coverage or the pre-1972 “grandfathered” coverage, whichever is greater. Coverage allowed within 1b in the study area (both units) is 480,521 sf. Under Alternative 1, 416,353 sf of existing coverage with in LCD 1b would continue to be used, including cart paths, bridges, trails, and other existing coverage that would not be modified. Coverage allowed within LCD 1c in the study area is 315,714 sf. Under Alternative 1, 141,582 sf of coverage within LCD 1c, including existing trails and roads, as well as other existing coverage that would not be modified. Coverage allowed within LCD 3 in the study area is 109,025 sf. Under Alternative 1, 56,365 sf of existing trail coverage will continue to be used in LCD 3. Coverage allowed within LCD 5 in the study area is 1,528,676 sf. Under Alternative 1, 122,430 sf of coverage with in LCD 5, including cart paths and designated trails, as well as other

existing coverage that would not be modified. Coverage allowed within LCD 6 in the study area is 22,559 sf; no coverage is located within LCD 6. There are no areas within the study area classified as LCD 1a or 7.

**Table 3.6-6**
**Alternative 1 Coverage Impacts Summary for Washoe Meadows State Park (square feet)**

| Land Class | Gross Area[1] | Hard/ Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – |
| 1b | 5,039,839 | 1,122/129,011 | 50,398 | 30,757 | NR | NI |
| 1c | 539,184 | 0/141,582 | 5,392 | 174,132 | – | NI |
| 2 | – | – | – | – | – | – |
| 3 | 2,180,496 | 0/56,365 | 109,025 | 19,182 | – | NI |
| 4 | – | – | – | – | – | – |
| 5 | 5,246,359 | 0/108,844 | 1,311,590 | 106,997 | NR | NI |
| 6 | – | – | – | – | – | – |
| 7 | – | – | – | – | – | – |
| **Total** | **13,005,878** | **0/435,802** | **1,476,405** | **331,068** | **NR** | **NI** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadows SP and Lake Valley SRA located within the study area.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

**Table 3.6-7**
**Alternative 1 Coverage Impacts Summary for Lake Valley State Recreation Area (square feet)**

| Land Class | Gross Area[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – |
| 1b | 8,396,269 | 269,866/16,354 | 83,963 | 33,412 | NR | NI |
| 1c[2] | – | – | – | – | – | – |
| 2 | – | – | – | | – | – |
| 3 | – | – | – | | – | – |
| 4 | – | – | – | | – | – |
| 5 | 868,343 | 10,143/3,443 | 217,086 | 5,126 | NR | NI |
| 6 | 75,197 | – | 22,559 | | – | – |
| 7 | – | – | – | | – | – |
| **Total** | **9,339,809** | **280,009/19,797** | **323,608** | **38,538** | **NR** | **NI** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadows SP and Lake Valley SRA within the study area.
[2]Coverage estimate does not include 3,312 sf of existing pre-1972 golf course related coverage located on Conservancy property.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

Under Alternative 1, no changes to Lake Valley SRA or Washoe Meadows SP would occur. State Parks may continue to restore and bank existing coverage, but those changes would not be a component of Alternative 1. Because existing land uses and associated coverage would continue this impact is less than significant.

No mitigation is required.

IMPACT 3.6-4 (Alt. 1) Result in Loss of Availability of Known Mineral Resources. *Alternative 1 would not include any changes to existing conditions, including the former gravel and sand quarry located within Washoe Meadows SP. Therefore, this impact would be* ***less than significant****.*

Alternative 1 would not include any changes to existing conditions, including the former gravel and sand quarry located within Washoe Meadows SP. The quarry has not been in use since before State Parks acquired the property in 1985 and currently has a limited viable resource. Furthermore, the central lobe of the quarry has been restored with fill material, compost, and native seed to match the natural surroundings. Therefore, this impact would be less than significant**.**

No mitigation is required.

### Alternative 2: River Ecosystem Restoration with Reconfigured 18-Hole Regulation Golf Course

IMPACT 3.6-1 (Alt. 2) Soil Erosion, Sedimentation, and Loss of Topsoil. *The topography, soils, vegetation, and drainage within Washoe Meadows SP would be modified under Alternative 2 by incorporating disturbed areas into the reconfigured golf course, offsetting the existing erosion caused by prior surface disturbances. Undersized bridges and golf course uses adjacent to the Upper Truckee River and Angora Creek within the SRA would be removed. Conditions related to erosion, sedimentation, and loss of top soil would be improved; however, project-related construction, grading, and stockpile storage associated with implementation of Alternative 2 would result in exposure of soil to potential wind and water erosion until the project site is effectively stabilized and revegetated. This impact would be* ***potentially significant****.*

The existing disturbed former quarry and some of the unpaved access roads, informal trails, and other disturbed surfaces that have accelerated soil erosion within Washoe Meadows SP would be modified under Alternative 2. The reconfigured golf course would be designed so that it takes advantage of the existing topography to limit grading; however grading would be in excess of 5 feet in some locations within the project area. The natural drainages would be considered and incorporated within planned stormwater drainage improvements, and erosive areas that were previously disturbed within the proposed golf course footprint would be revegetated. Permanent BMP design details are not yet known; however, existing BMPs would continue or be improved upon in the final design. Alternative 2 includes improved irrigation water management, use of stormwater ponds, sediment management, good subsurface drainage routing, regulated runoff impoundments, and use of land absorption areas. Therefore, implementing Alternative 2 is expected to have a beneficial effect on surface erosion by restoring some areas that are actively eroding or are compacted and limiting infiltration under the existing conditions. However, because design details and their performance standards are not yet known, this impact is potentially significant.

Implementing Alternative 2 would require 3–4 years of seasonal construction (between May 1 and October 15), with winter closedowns, except for BMP maintenance and monitoring. Construction would disturb areas in uplands (west of the river), as well as in the active and 100-year floodplain and the main channels of the Upper Truckee River, Angora Creek, and the unnamed creek. The extent of in-channel work would vary by year (see Alternative 2 construction schedule section in Table 2-4). Bridge removals, the new bridge installation, grade controls, bank protection measures, and transition connections between channel segments would require work in the active channel. The reconnected meanders and newly constructed meanders, as well as portions of the floodplain reconstruction, existing golf course reconfiguration, and new golf course construction, would be completed outside of the existing active channel. Nearly all of the disturbance areas, access routes, and staging areas (except the driving range) proposed north and/or east of the Upper Truckee River would be within the 100-

year floodplain. Most of the disturbance areas, access routes, and staging locations proposed west of the Upper Truckee River would be outside the 100-year floodplain (see Exhibit 2-7).

Although implementing Alternative 2 would involve salvaging, reusing, and protecting on-site resources (e.g., willows, sod, trees) where possible, exact details have not yet been determined. The design is expected to minimize vegetation removal, which would assist in decreasing potential erosion, but extensive tree removal is proposed within the golf course reconfiguration footprint. Within this area and the new channel sections, it can be expected that salvageable topsoil would be removed and reused on-site where grading exceeds the depth of topsoil, minimizing the loss of topsoil and the need to import topsoil into the study area.

Permits and approvals from several entities (e.g., El Dorado County, TRPA, Lahontan RWQCB, USACE, and CDFG) that would impose conditions and requirements to minimize construction phase risks of water quality degradation by sediment or other pollutants would need to be obtained. Although the general types of permit documents and their components are known, the specific measures, performance standards, and enforcement elements would not be established until the time of acquisition. Several general construction management measures would be implemented to minimize environmental impacts, along with specific measures to control wind- and water-related erosion and to protect water quality related beneficial uses (see Chapter 2, "Project Alternatives"). Exact erosion control measures (BMPs) or their performance standards are not specified at this time, but general BMPs would include use of construction fencing, silt fences, hay bales, temporary settling basins, vegetation protection, hydroseeding, and straw mulch. Construction activities that require access to the existing streambed or streambanks would require temporary dewatering of surface water in the river channel, and, where subsurface access is needed, temporary dewatering/pumping of groundwater that seeps into the work area may also be required. Conceptual approaches to dewatering have been identified for various elements of Alternative 2 in-channel work, but specific measures have not yet been determined.

Although efforts would be made to work as quickly as possible to move from initial disturbance through final revegetation throughout the study area, it is expected that disturbed areas would be exposed to winter conditions between summer construction seasons. Winterization protection could be needed throughout the construction zone, and possible overwinter use of staging, storage, or access areas has not yet been determined. All temporary stormwater controls and/or overwinter flood flow protections would likely be designed and sized to meet typical regulatory requirements (e.g., 20-year rainstorm for stormwater; 50-year peak streamflow) but could be overwhelmed by larger event if it occurred during the construction period. However, the probability of an event of greater magnitude occurring during either the summer low-flow seasons or the couple of intervening winters is very low and would not be reasonably foreseeable.

Based on the conceptual information regarding proposed construction management for Alternative 2, it remains possible that erosion, sedimentation, and loss of topsoil could occur. This impact would be potentially significant.

Mitigation Measure 3.6-1A (Alt. 2): Prepare and Implement Effective Site Management Plans.

This mitigation measure is similar to Mitigation Measure 3.4-6. The project is expected to be required to develop and implement several construction phase site management plans as part of various permit and approval requirements, including but not limited to a grading and erosion control plan, a dewatering and channel seasoning plan, a winterization plan, and a monitoring and oversight plan. The following measures will be implemented by State Parks within each of these plans to be developed for specific permits or as independent mitigation measures;

- Restrict the area and duration of construction disturbance to the absolute minimum necessary to accomplish work.

- Protect existing vegetation outside construction area and salvage and re-use riparian or plant new vegetation in disturbed areas.

- Design, install, and maintain temporary BMPs to protect disturbed areas and minimize soil erosion, prevent surface runoff interaction with disturbed surfaces, and limit the potential for release of sediment to surface water bodies for storm events up to the 20-year precipitation event.

- Design, install, and maintain internally draining construction area(s) on either side of each of the Upper Truckee River, Angora Creek, and the unnamed creek within the study area to prevent discharge of untreated stormwater into these surface water bodies. Anticipate runon from upslope groundwater seeps west of the Upper Truckee River, and reroute it around the construction zone.

- Salvage topsoil to be reused on-site during project-related grading.

- Provide winterization that isolates and protects disturbed areas from high streamflow on the Upper Truckee River and Angora Creek (up to the 50-year event).

- Secure a source of transportation and a location for deposition and/or storage of all excavated and imported materials at the project site. Protect stockpiled and transported materials or debris from wind or water erosion. Store soil and other loose material at least 100 feet from the active channel during the construction season.

- Avoid overwinter storage of materials, vehicles, equipment, or debris within the 100-year floodplain.

- Provide site-specific and reachwide dewatering/bypassing plans that indicate the scheduling approach and or maximum diverted flows to minimize risks from summer thunderstorms, specific diversion/bypass/ dewatering methods and equipment, defined work areas and diversion locations, the types and locations of temporary BMPs for the diversions and reintroduction points, measures and options for treating turbid water before release back to the channel, and stated water quality performance standards.

- Provide wetting flows before activation of new and reconnected river channel sections based on a ”channel seasoning” plan that indicates the water source(s); volumes and duration required; phased placement of clean, washed gravels; and the measures and options for treating potentially turbid water.

- Monitor the status and effectiveness of temporary erosion control, stormwater facilities, and flood flow protections throughout the construction area, including each of the internally draining zones that could separately discharge to various surface water bodies. Monitor turbidity in the Upper Truckee River upstream and downstream of the construction zone and, if needed, to further describe background, upstream in Angora Creek. Monitoring shall be conducted by the engineer or its qualified representative on a regular basis during summer construction and on an event basis when runoff equals or exceeds the BMP design standards. Document failures and/or threats of BMP failures, and identify remedial measures implementation. Repair BMP failures within 24 hours of documentation.

Mitigation Measure 3.6-1B (Alt. 2): Provide On-Site Storm Drainage Facilities and Accompanying Stormwater Drainage Plan to Prevent Surface Erosion from Discharging to Creek or River Channels.

This mitigation measure is similar to Mitigation Measure 3.3-1 (Alt 2). Stormwater improvements shall be incorporated into the final detailed project design. Before issuance of grading permits, State Parks shall submit a detailed stormwater drainage plan to El Dorado County and TRPA for review and approval. The plan shall identify the locations, sizes, and types of facilities used to retain and treat project related runoff. The detailed design shall meet the following minimum performance criteria:

- Stormwater facilities shall be installed in the sub-watershed of each existing natural drainages (e.g., swales, seeps, creeks) that will experience project-related changes to topographic, soil, and/or vegetation cover;

- Peak runoff discharge from the stormwater system to each of the existing natural drainage swales, creeks, or the Upper Truckee River shall be equal or less than pre-project conditions up to the 10-year event;

- Nuisance perennial discharge of excess irrigation water shall be prevented; and

- Where rerouting of drainages or point discharges from the stormwater facilities are necessary, those discharges shall be designed to prevent streambed or streambank erosion in the receiving water body.

The stormwater designs and drainage plan shall strive to incorporate BMPs where feasible, including but not limited to:

- pervious pavement or pavers,
- strategically placed bioswales and vegetated swales,
- constructed wetlands and detention ponds,
- rock- or boulder-lined areas to prevent disruption or erosion, and
- training of maintenance personnel on stormwater pollution prevention measures.

While Impact 3.4-6 (Alt. 2) will remain significant and unavoidable due to the strict water quality criteria with implementation of Mitigation Measure 3.6-1A (Alt. 2) and 3.6-1B (Alt 2) as described above, the likelihood of erosion, sedimentation, and loss of topsoil would be minimized by design measures and BMPs with performance requirements as appropriate, and Impact 3.6-1 (Alt. 2) would be less than significant.

IMPACT 3.6-2 (Alt. 2) Risks to People and Structures Caused by Strong Seismic Ground Shaking. *Fault activity in the project vicinity could subject people and structures within the study area to damage or other risks associated with strong seismic ground shaking. This impact would be* ***potentially significant****.*

As discussed in the setting, the potential for earth shaking activity to occur is low to moderate according to probabilistic modeling of the project vicinity. However fault activity in the Tahoe Basin may could result in exposure to adverse effects, including the risk of injury or death to people and loss of structures within the study area because of strong seismic ground shaking effects. New habitable structures are not proposed under Alternative 2; however, a new bridge and restroom with sewer connection would be constructed. The 2007 CBC requirements for seismic design, which were adopted in 2008, require that site-specific seismic investigations be performed. Furthermore, Alternative 2 would involve modifications where shallow groundwater occurs and where tree removal would be extensive. Although the grading would be limited by designing the golf course to the existing topography, tree removal could cause instability in soils.

Even though modeling probability of earth shaking activity for the area is somewhat low there is a potential for damage or injury from strong seismic ground shaking within the study area, the risk to people and structures from strong seismic ground shaking would be a potentially significant impact.

Mitigation Measure 3.6-2 (Alt 2): Prepare a Final Geotechnical Engineering Report, and Implement All Applicable Recommendations.

Before construction begins, State Parks will obtain the services of a licensed geotechnical engineer to prepare a final engineering report for the proposed project. The final engineering report shall address and make recommendations on the following:

- structural/seismic design of bridges;
- site preparation, including tree removal;
- appropriate sources and types of fill;
- potential need for soil amendments;
- access roads, pavement, asphalt, and parking areas;
- shallow groundwater table; and
- soil and slope stability.

All recommendations contained in the final engineering report shall be implemented by State Parks. Special recommendations contained in the engineering report shall be noted on the grading plans and implemented as appropriate before construction begins. Design and construction of all phases of the project shall be in accordance with the 2007 or subsequently adopted CBC.

With implementation of Mitigation Measure 3.6-2 (Alt. 2) as described above, the potentially significant impact of seismically induced risks to people and structures would be minimized by requiring that the design recommendations of a geotechnical engineer in accordance with the 2007 or subsequently adopted CBC be incorporated into infrastructure, and Impact 3.6-2 (Alt. 2) would be less than significant.

IMPACT 3.6-3 (Alt. 2) Land Coverage Changes. *Alternative 2 would involve removing and relocating coverage primarily associated with golf course land uses and some trails within LCD 1b to allow for restoration of the floodplain, Upper Truckee River and lower Angora Creek, while still making an 18-hole regulation golf course available to the public. Alternative 2 decreases coverage in LCDs 1b and 1c. Coverage within LCD 3 will stay the same and no coverage will be located in LCD 6, similar to existing conditions. Also, existing coverage within LCD 1b will be relocated to higher capability land (LCD 5). Overall, the proposed coverage reduction within LCD 1b, SEZ lands, the relocated coverage to higher capability (LCD 5) and previously disturbed lands, and restoration of floodplain currently occupied by golf course landscaping and infrastructure adjacent to the Upper Truckee River would provide a net environmental benefit. For this reason, this would be a* ***beneficial*** *effect.*

TRPA evaluates both hard and soft coverage within Washoe Meadow State Park and Lake Valley SRA as one combined, contiguous area, all as coverage not separated into hard and soft coverage. For comparative purposes coverage has been presented separately by existing boundaries of the SP and SRA and by hard and soft coverage proposed for each alternative in Tables 3.6-8 and 3.6-9. Alternative 2 would involve removing and relocating coverage primarily associated with golf course land uses and some trails within LCD 1b to allow for restoration of the floodplain, SEZ, the Upper Truckee River and lower Angora Creek while still making an 18-hole regulation golf course available to the public. The golf course landscaping removed from SEZ and floodplain adjacent to the Upper Truckee River and Angora Creek would allow for improved geomorphic function and lessen golf course related water quality impacts to the river; however, landscaping is not considered coverage by TRPA definition (See section 3.4 Geomorphology and Water Quality for additional information on water quality impacts and Regulatory Setting above for additional discussion on TRPA land capability and coverage).

Coverage allowed is based on TRPA allowable base coverage or the pre-1972 “grandfathered” coverage (includes existing and banked pre-1972 coverage), whichever is greater. Coverage allowed within 1b in the study area (both units) is 480,521 sf. Under Alternative 2, 378,499 sf of coverage is proposed in LCD 1b, including cart paths, bridges, designated trails, parking area improvements, as well as other existing coverage that would not be modified. This is a decrease of 37,853 sf from existing coverage (416, 352 sf) within LCD 1b. Coverage allowed within LCD 1c in the study area is 315,714 sf. Under Alternative 2, 55,020 sf of coverage is proposed in LCD 1c, including cart paths, small bridges, designated trails, as well as other existing coverage that would not be modified. This is a decrease of 86,562 sf from existing coverage (141,582 sf) within LCD 1c.

Coverage allowed within LCD 3 in the study area is 109,025 sf. No new coverage is proposed however 56,365 sf of existing access roads and trail coverage would continue to be used in LCD 3. Coverage allowed within LCD 5 in the study area is 1,528,676 sf. Under Alternative 2, 150,659 sf of coverage is proposed in LCD 5, including cart paths, designated trails, the restroom facility, some of the parking improvements, as well as other existing coverage that would not be modified. This is an increase in coverage by 10,730 sf, however LCD 5 is higher capability land than lands previously discussed where coverage is being relocated from. Furthermore, coverage proposed within LCD 5 does not exceed that allowed by TRPA. Coverage allowed within LCD 6 in the study area is 22,559 sf. No coverage is proposed under Alternative 2 within LCD 6. There are no areas within the study area classified as LCD 1a or 7.

**Table 3.6-8**
**Alternative 2 Coverage Impacts Summary for Washoe Meadows State Park Within the Study Area (square feet)**

| Land Class | Gross Area[1] | Hard/ Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 5,039,839 | 7,913/126,401 | 50,398 | 130,133 | 30,757 | NR | Beneficial |
| 1c | 539,184 | 13,237/41,783 | 5,392 | 141,582 | 174,132 | NR | Beneficial |
| 2 | – | – | – | – | – | – | – |
| 3 | 2,180,496 | 0/55,810 | 109,025 | 56,365 | 19,182 | NR | NI |
| 4 | – | – | – | – | – | – | – |
| 5 | 5,246,359 | 35,282/100,042 | 1,311,590 | 126,344 | 106,997 | NR | NI |
| 6 | – | – | – | – | – | – | – |
| 7 | – | – | – | – | – | – | – |
| **Total** | **13,005,878** | **56,432/324,036** | **1,476,405** | **454,424** | **331,068** | **NR** | **Beneficial** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadows SP and Lake Valley SRA located within the study area.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

**Table 3.6-9**
**Alternative 2 Coverage Impacts Summary for Lake Valley State Recreation Area (square feet)**

| Land Class | Gross Area[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 8,396,269 | 229,631/14,554 | 83,963 | 286,219 | 33,412 | NR | Beneficial |
| 1c[2] | – | – | – | – | – | – | – |
| 2 | – | – | – | – | – | – | – |
| 3 | – | – | – | – | – | – | – |
| 4 | – | – | – | – | – | – | – |
| 5 | 868,343 | 12,742/2,593 | 217,086 | 13,585 | 5,126 | NR | NI |
| 6 | 75,197 | – | 22,559 | – | – | NR | NI |
| 7 | – | – | – | – | – | – | – |
| **Total** | **9,339,809** | **242,373/17,147** | **323,608** | **299,804** | **38,538** | **NR** | **Beneficial** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadows SP and Lake Valley SRA within the study area.
[2]Coverage estimate does not include 3,312 sf of existing pre-1972 golf course related coverage located on Conservancy property.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

As part of its normal administrative responsibilities (separate from this project), State Parks would prepare interim management guidelines for Washoe Meadows SP which would provide additional guidance for protection of resources and management of permissible uses for that unit. The management plan would likely include small parking areas, signage, and some trail improvements on higher capability land; however, additional development in the remaining park area would not occur because most of the park is within sensitive, low-capability lands. While potential coverage modifications in relation to these improvements cannot be calculated at this time it is expected that any new coverage will be within that allowed by TRPA and coverage modifications would go through their own environmental review process under TRPA.

Alternative 2 decreases coverage in LCDs 1b and 1c. Coverage within LCD 3 will stay the same and no coverage will be located in LCD 6, similar to existing conditions. Existing coverage within LCD 1b will be relocated to higher capability land (LCD 5) to allow for restoration of the river, floodplain and SEZ. Coverage relocated on-site is expected to occur at a 1:1 ratio as allowed for an EIP project per the Code of Ordinances (discussed in the Regulatory section above). Additional coverage not used for relocation would be banked by State Parks for potential use within the study area or on other State Parks land as appropriately allowed by TRPA. Overall, the proposed coverage reduction within LCD 1b, SEZ lands, the relocated coverage in higher capability (LCD 5) and previously disturbed lands, and restoration of floodplain currently occupied by golf course landscaping and infrastructure adjacent to the Upper Truckee River would provide a net environmental benefit. For this reason, this would be a beneficial effect.

No mitigation is required.

IMPACT 3.6-4 (Alt. 2) **Result in Loss of Availability of Known Mineral Resources.** *Under Alternative 2, golf course development and restoration activities would occur within the historical gravel and sand quarry located within Washoe Meadows SP. The quarry currently has a limited viable resource, it is no longer being mined, components have been restored, and the proposed project would cover existing mineral resources at the site with turf grass and a cart path. This impact would be* ***less than significant****.*

Under Alternative 2, golf course development and restoration activities would occur within the former gravel and sand quarry within Washoe Meadows SP. The quarry has not been in use since before State Parks acquired the property in 1985 and currently has a limited viable resource. The 17-acre site consists of three contiguous lobes. The middle lobe was formerly the deepest, with the back headwall approximately 30 feet tall. This lobe was restored with fill material from the Lower Westside Restoration Project in 2001 and revegetated in 2002. The headwall of the eastern lobe intercepts the water table from a fen located upslope, creating an artificial wetland on the former quarry floor. The quarry floor would be restored to improve function and habitat within the area. The western lobe is the shallowest, and several years ago, a ditch was dug to drain it toward the northeast. The ditch has since headcut and gullied. This area would be regraded and restored as part of Alternative 2. Both the eastern and western pits have asphalt and brick waste within them dating from the time of quarry mining. These materials would be removed and much of the area used within the golf course footprint. Because the quarry is no longer in use, there are no plans to use it in the future, some areas have been restored, and other areas are slated for restoration or to be covered by only golf course turf and cart paths and could therefore be accessed at a later date. This impact is less than significant.

No mitigation is required.

## Alternative 3: River Ecosystem Restoration with Reduced Play Golf Course

IMPACT 3.6-1 (Alt. 3) **Soil Erosion, Sedimentation, and Loss of Topsoil.** *Alternative 3 would not include beneficial modifications to offset the existing erosion caused by prior disturbances within Washoe Meadows S; however, implementing this alternative would improve existing conditions related to erosion and sedimentation by removing undersized bridges and golf course uses adjacent to the Upper Truckee River and Angora Creek within the SRA. Nevertheless, project-related construction, grading, and stockpile storage associated with implementation of this alternative would result in exposure of soil to potential wind and water erosion until the project site is effectively stabilized and revegetated. This impact would be* ***potentially significant****.*

This impact is similar to Impact 3.6-1 (Alt. 2) except that it would not include the extensive tree removal and beneficial improvements to offset past disturbance within Washoe Meadows SP. Under Alternative 3 the golf course would stay completely within the existing footprint on the east side of the Upper Truckee River. Golf course uses would be removed from the floodplain and SEZ adjacent to the Upper Truckee River and Angora Creek. The approach to Alternative 3 includes salvaging, reusing, protecting, and minimizing removal of on-site resources, which would assist in reducing erosion and loss of topsoil. The amount of salvageable topsoil would be limited because disturbance would be less than under Alternative 2.

Implementing Alternative 3 would require 3–4 years of seasonal construction (between May 1 and October 15), with winter closedowns, except for BMP maintenance and monitoring. Construction would disturb the active floodplain and the main channels of the Upper Truckee River, Angora Creek, and the unnamed creek, with phasing (see Table 2-6), access, staging, and storage (see Exhibit 2-9) similar to those under Alternative 2; however, upland disturbance would be much less.

Similar to Alternative 2, permits and approvals would be required from several entities, but the specific measures, performance standards, and enforcement elements required are not yet known. The same general construction management measures and general BMPs would be included as for Alternative 2, with similar dewatering approaches and winterization needs. Similar to Alternative 2, it is not reasonably foreseeable that a large storm runoff or streamflow event would exceed temporary capacity during construction.

Based on the conceptual information regarding proposed construction management for Alternative 3, it remains possible that erosion, sedimentation, and loss of topsoil could occur. This impact would be potentially significant.

Mitigation Measure 3.6-1 (Alt. 3): Prepare and Implement Effective Site Management Plans

This mitigation measure is identical to Mitigation Measure 3.6-1A (Alt. 2).

Mitigation Measure 3.6-1B (Alt. 3): Provide On-Site Storm Drainage Facilities and Accompanying Stormwater Drainage Plan to Prevent Surface Erosion from Discharging to Creek or River Channels.

This mitigation measure is identical to Mitigation Measure 3.6-1B (Alt. 2).

With implementation of Mitigation Measure 3.6-1A (Alt. 3) and Mitigation Measure 3.6-1B (Alt. 3), Impact 3.6-1 (Alt. 3) would be less than significant, for the same reasons as described for Impact 3.6-1 (Alt. 2).

IMPACT 3.6-2 (Alt. 3) **Risks to People and Structures Caused by Strong Seismic Ground Shaking.** *Active faults in the project vicinity could subject people and structures within the study area to damage from strong seismic ground shaking; however, Alternative 3 does not include construction of any new structures or parking areas and does not include extensive tree removal, which could cause unstable soils. This impact would be* ***less than significant****.*

As discussed in the setting, several faults in the Tahoe Basin may be capable of generating a large-magnitude earthquake, albeit the probability is fairly low exposure to adverse effects could occur, including the risk of injury or death to people and loss of structures within the study area because of strong seismic ground shaking effects. Although risk of exposure within the study area exists, no new structures or parking areas are proposed under Alternative, and this alternative does not include extensive tree removal, which could cause unstable soils. While, Alternative 3 does include removing existing bridges final design schematics will be prepared by a licensed engineer for both the river restoration and golf course modifications, furthermore, these components of the project would not cause potential risk to people or structures. This impact would be less than significant.

No mitigation is required.

IMPACT 3.6-3 (Alt. 3) Land Coverage Changes. *Similar to Alternative 2, Alternative 3 would involve removing coverage primarily associated with golf course land uses within LCD 1b to allow for restoration of the floodplain, SEZ, Upper Truckee River and lower Angora Creek, improving geomorphic function and lessening golf course related water quality impacts to the river. Alternative 3 will limit the size of the golf course to areas within the existing footprint and outside of the active floodplain. Golf infrastructure in the active floodplain would be removed including cart paths and all bridges on the Upper Truckee River and Angora Creek. No coverage changes are proposed on the west side of the river. Overall, the proposed coverage reduction within LCD 1b, SEZ lands, and restoration of floodplain currently occupied by golf course landscaping and infrastructure adjacent to the Upper Truckee River would provide a net environmental benefit. For this reason, this would be a* ***beneficial*** *effect.*

Similar to Alternative 2, Alternative 3 would involve removing coverage primarily associated with golf course land uses within LCD 1b to allow for restoration of the floodplain, SEZ, Upper Truckee River and lower Angora Creek, improving geomorphic function and lessening golf course related water quality impacts to the river. Alternative 3 will limit the size of the golf course to areas within the existing footprint and outside of the active floodplain. Golf infrastructure in the active floodplain will be removed including cart paths and all bridges on the Upper Truckee River and Angora Creek. No coverage changes are proposed on the west side of the river. Alternative 3 does not include and restroom facility or paving of the unimproved parking area. For comparative purposes coverage has been presented separately by existing boundaries of the SP and SRA and by hard and soft coverage proposed for each alternative in Tables 3.6-10 and 3.6-11.

Coverage allowed is based on TRPA allowable base coverage or the pre-1972 “grandfathered” coverage (includes existing and banked pre-1972 coverage), whichever is greater. Coverage allowed within 1b in the study area is 480,521 sf. Under Alternative 3, 351,094 sf of coverage is proposed in LCD 1b, including cart paths, designated trails, as well as other existing coverage that would not be modified. This is a decrease of 65,259 sf from existing coverage within LCD 1b. Coverage allowed within LCD 1c is 315,714 sf and within LCD 3 is 109,025 sf. While no new coverage is proposed 141,582 sf of existing coverage within LCD 1c and 56,365 sf within LCD 3, including trails and access roads will continue to be used under Alternative 3. Coverage allowed within LCD 5 in the study area is 1,528,676 sf. Under Alternative 3, 121,231 sf of coverage is proposed in LCD 5, including cart paths as well as other existing coverage that would not be modified. This is decrease in coverage by 18,698 sf. Coverage allowed within LCD 6 in the study area is 22,559 sf no coverage is proposed under Alternative 3 within LCD 6. There are no areas within the study area classified as LCD 1a or 7.

As part of its normal administrative responsibilities (separate from this project), State Parks would prepare interim management guidelines for Washoe Meadows SP which would provide additional guidance for protection of resources and management of permissible uses for that unit. The management plan would likely include small parking areas, signage, and some trail improvements on higher capability land; however, additional development in the remaining park area would not occur because most of the park is within sensitive, low-capability lands. While potential coverage modifications in relation to these improvements cannot be calculated at this time it is expected that any new coverage will be within that allowed by TRPA and coverage modifications would go through their own environmental review process under TRPA.

**Table 3.6-10**
**Alternative 3 Coverage Impacts Summary for Washoe Meadows State Park (square feet)**

| Land Class | Gross Area[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 5,039,839 | 1,122/129,011 | 50,398 | 130,133 | 30,757 | NR | NI |
| 1c | 539,184 | 0/141,582 | 5,392 | 141,582 | 174,132 | NR | NI |
| 2 | – | – | – | – | – | – | – |
| 3 | 2,180,496 | 0/56,365 | 109,025 | 56,365 | 19,182 | NR | NI |
| 4 | – | – | – | – | – | – | – |
| 5 | 5,246,359 | 0/108,844 | 1,311,590 | 126,344 | 106,997 | NR | NI |
| 6 | – | – | – | – | – | – | – |
| 7 | – | – | – | – | – | – | – |
| **Total** | **13,005,878** | **1,122/435,802** | **1,476,405** | **454,424** | **331,068** | **NR** | **NI** |

[1]Gross area is defined as gross area within existing boundaries for Washoe Meadows SP and Lake Valley SRA located in the study area.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

**Table 3.6-11**
**Alternative 3 Coverage Impacts Summary for Lake Valley State Recreation Area (square feet)**

| Land Class | Gross Area[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact to Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 8,396,269 | 206,356/14,605 | 83,963 | 286,219 | 33,412 | NR | Beneficial |
| 1c[2] | – | – | – | – | – | – | – |
| 2 | – | – | – | | – | – | – |
| 3 | – | – | – | | – | – | – |
| 4 | – | – | – | | – | – | – |
| 5 | 868,343 | 9,793/2,594 | 217,086 | 13,585 | 5,126 | NR | Beneficial |
| 6 | 75,197 | – | 22,559 | | – | NR | NI |
| 7 | – | – | – | | – | – | – |
| **Total** | **9,339,809** | **216,149/17,199** | **323,608** | **299,804** | **38,538** | **NR** | **Beneficial** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadow SP and Lake Valley SRA within the study area and not proposed boundary changes.
[2] Coverage estimate does not include 3,312 sf of existing pre-1972 golf course related coverage located on Conservancy property.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

Alternative 3 decreases coverage in LCDs 1b and 5. Coverage within LCDs 1c and 3 will stay the same and no coverage will be located in LCD 6, similar to existing conditions. Coverage relocated on-site is expected to occur at a 1:1 ratio as allowed for an EIP project per the Code of Ordinances (discussed in the Regulatory section above). Additional coverage not used for relocation would be banked by State Parks for potential use within the study area or on other State Parks land as appropriately allowed by TRPA. Overall, the proposed coverage reduction within LCD 1b, SEZ lands, and restoration of active floodplain currently occupied by golf course landscaping and infrastructure adjacent to the Upper Truckee River and Angora Creek would provide a net environmental benefit. For this reason, this would be a beneficial effect.

No mitigation is required.

IMPACT 3.6-4 (Alt. 3) Result in Loss of Availability of Known Mineral Resources. *Alternative 3 would not include any changes within the historical gravel and sand quarry located within Washoe Meadows SP. The quarry currently has a limited viable resource and is no longer being mined. Therefore, no impact would occur.*

Alternative 3 would not include any modifications within the former gravel and sand quarry or anywhere within Washoe Meadows SP outside of the historic meander belt. The quarry has not been in use since before State Parks acquired the property in 1985, and currently it has limited viable resources. No impact would occur.

No mitigation is required.

### Alternative 4: River Stabilization with Existing 18-Hole Regulation Golf Course

IMPACT 3.6-1 (Alt. 4) Soil Erosion, Sedimentation, and Loss of Topsoil. *Alternative 4 would not include beneficial modifications to offset the existing erosion caused by prior disturbances within Washoe Meadows SP or provide a buffer between the golf course and the river; however, implementing this alternative would improve existing conditions related to erosion and sedimentation by removing two undersized bridges and incorporating stabilization measures into the Upper Truckee River. Nevertheless, project-related construction, grading, and stockpile storage associated with implementing Alternative 4 would result in exposure of soil to potential wind and water erosion until the project site is effectively stabilized and revegetated. This impact would be potentially significant.*

This impact is similar to Impact 3.6-1 (Alt. 3) except that Alternative 4 would not provide a buffer between the golf course and the Upper Truckee River and Angora Creek. Implementing Alternative 4 would limit natural channel adjustments to historic disturbances and reduce the effects of undersized bridges within the study area by stabilizing the streambed elevation, protecting streambanks, and removing two bridges to be replaced by one longer spanned bridge. These modifications would reduce overall erosion of the streambed and banks, but sediment sources related to past disturbance within Washoe Meadows SP would not be reduced under Alternative 4.

Alternative 4 would have a shorter overall construction period than Alternatives 2 and 3 (2–3 years). Most of the construction disturbance would be adjacent to and within the existing main channel of the Upper Truckee River, and at the mouths of Angora Creek and the unnamed creek (see Alternative 4 construction schedule section in Table 2-8). Only minor areas of floodplain reconstruction and golf course restroom facilities and unimproved parking area paving and BMP improvements would be completed outside of the active channel. The only area where topsoil could potentially be salvaged would be within the unimproved parking areas. Disturbance areas, access routes, and most staging areas would be within the 100-year floodplain, whereas the staging location west of the Upper Truckee River would be outside the 100-year floodplain, similar to Alternative 2. No modifications are proposed within Washoe Meadows SP.

The project permits and approvals would be the same as under Alternative 2. Conceptual approaches to dewatering have been identified for various elements of Alternative 4 in-channel work (see Chapter 2, “Project

Alternatives"), but specific measures have not yet been determined. Efforts would be made to work as quickly as possible to move from initial disturbance through final revegetation throughout, but it is expected that disturbed areas would be exposed to winter conditions between summer construction seasons. Winterization protection could be needed throughout the construction zone, and possible overwinter use of staging, storage, or access areas has not yet been determined.

All temporary stormwater controls and/or overwinter flood flow protections would be designed and sized to meet the same standards as Alternative 2. Similar to Alternative 2, it is not reasonably foreseeable that a large storm runoff or streamflow event would exceed temporary capacity occurring during construction.

Based on the conceptual information regarding proposed construction management for Alternative 4, it remains possible that erosion, sedimentation, and loss of topsoil could occur. This impact would be potentially significant.

Mitigation Measure 3.6-1 (Alt. 4): Prepare and Implement Effective Site Management Plans

This mitigation measure is identical to Mitigation Measure 3.6-1A (Alt. 2).

Mitigation Measure 3.6-1B (Alt. 4): Provide On-Site Storm Drainage Facilities and Accompanying Stormwater Drainage Plan to Prevent Surface Erosion from Discharging to Creek or River Channels.

This mitigation measure is identical to Mitigation Measure 3.6-1B (Alt. 2).

With implementation of Mitigation Measure 3.6-1A (Alt. 4) and Mitigation Measure 3.6-1B (Alt. 4), Impact 3.6-1 (Alt. 4) would be less than significant, for the same reasons as described for Impact 3.6-1 (Alt. 2).

| | |
|---|---|
| IMPACT 3.6-2 (Alt. 4) | Risks to People and Structures Caused by Strong Seismic Ground Shaking. *Fault activity in the project vicinity could subject people and structures within the study area to damage or other risks associated with strong seismic ground shaking. This impact would be* ***potentially significant****.* |

This impact is similar to Impact 3.6-2 (Alt. 2). As previously discussed, the potential for earth shaking activity to occur is low to moderate according to probabilistic modeling of the project vicinity; however fault activity in the Tahoe Basin may could result in exposure to adverse effects, including the risk of injury or death to people and loss of structures within the study area because of strong seismic ground shaking effects. New habitable structures are not proposed under Alternative 4, however, a new bridge and restroom with sewer connection would be constructed. Tree removal would be much less under Alternative 4 than Alternative 2.

Even though modeling probability of earth shaking activity for the area is somewhat low there is a potential for damage or injury from strong seismic ground shaking within the study area, the risk to people and structures from strong seismic ground shaking would be a potentially significant impact.

Mitigation Measure 3.6-2 (Alt 2): Prepare a Final Geotechnical Engineering Report, and Implement All Applicable Recommendations.

This mitigation measure is identical to Mitigation Measure 3.6-2 (Alt. 2).

With implementation of Mitigation Measure 3.6-2 (Alt. 4), Impact 3.6-2 (Alt. 4) would be less than significant, for the same reasons as described for Impact 3.6-2 (Alt. 2).

IMPACT 3.6-3 (Alt. 4) Land Coverage Changes. *Alternative 4 would not involve removing and relocating coverage within LCD 1b to restore the SEZ and floodplain adjacent to the Upper Truckee River and Angora Creek but instead would limit natural channel adjustments to historic disturbances and reduce the effects of undersized bridges within the study area by stabilizing the streambed elevation, protecting streambanks, and removing two bridges to be replaced with one longer spanned bridge while still making an 18-hole regulation golf course available to the public within the existing golf course footprint. Golf course landscaping and infrastructure will continue to occupy lands adjacent to the Upper Truckee River and Angora Creek, thereby limiting water quality improvements of the project compared to Alternative 2. Changes proposed include cart paths, a restroom facility near hole 5, paving and BMP installation at the unimproved parking lot. Most existing coverage would not be modified under Alternative 4. Alternative 4 increases coverage in LCDs 1b, 1c, and 5; however, proposed coverage is still within that allowed within the study area as determined by TRPA. Coverage within LCD 3 will decrease and no coverage will be located in LCD 6, similar to existing conditions. Therefore, this impact is* ***less than significant.***

Alternative 4 would not involve removing and relocating coverage within LCD 1b to restore the SEZ and floodplain adjacent to the Upper Truckee River and Angora Creek but instead would limit natural channel adjustments to historic disturbances and reduce the effects of undersized bridges within the study area by stabilizing the streambed elevation, protecting streambanks, and removing two bridges to be replaced with one longer spanned bridge while still making an 18-hole regulation golf course available to the public within the existing golf course footprint. Golf course landscaping and infrastructure will continue to occupy lands adjacent to the Upper Truckee River and Angora Creek, thereby limiting water quality improvements of the project compared to Alternative 2. Coverage for Washoe Meadows SP and Lake Valley SRA under Alternative 4 is presented in Tables 3.6-12 and 3.6-13. Changes proposed include cart paths, a restroom facility near hole 5, paving and BMP installation at the unimproved parking lots. Coverage allowed is based on TRPA allowable base coverage or the pre-1972 "grandfathered" coverage (includes existing and banked pre-1972 coverage), whichever is greater. Most existing coverage would not be modified under Alternative 4.

**Table 3.6-12**
**Alternative 4 Coverage Impacts Summary for Washoe Meadows State Park (square feet)**

| Land Class | Gross Area[1] | Hard/ Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 5,039,839 | 1,122/129,011 | 50,398 | 130,133 | 30,757 | NR | LTS |
| 1c | 539,184 | 0/141,582 | 5,392 | 141,582 | 174,132 | NR | NI |
| 2 | – | – | – | – | – | – | – |
| 3 | 2,180,496 | 0/56,365 | 109,025 | 56,365 | 19,182 | NR | NI |
| 4 | – | – | – | – | – | – | – |
| 5 | 5,246,359 | 0/108,844 | 1,311,590 | 126,344 | 106,997 | NR | LTS |
| 6 | – | – | – | – | – | – | – |
| 7 | – | – | – | – | – | – | – |
| **Total** | **13,005,878** | **1,122/435,802** | **1,476,405** | **454,424** | **331,068** | **NR** | **LTS** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadows SP and Lake Valley SRA located within the study area.
NR = none required.
LTS = less than significant.
NI = no impact.
Source: Data provided by State Parks 2010

Coverage allowed within 1b in the study area is 480,521 sf. Under Alternative 4, 423,768 sf of coverage is proposed in LCD 1b, including primarily existing infrastructure with some modified cart paths and removal of two bridges with one replacement bridge, a new restroom as well as other existing coverage that would not be modified. This is an increase of 7,416 sf from existing coverage within LCD 1b; however, it is still within coverage allowed by TRPA. Coverage proposed in 1c includes some cart path and parking modifications as well as existing coverage that would not be modified. Coverage allowed within LCD 1c is 315,714 sf and within LCD 3 is 109,025 sf. Under Alternative 4, 141,582 sf of existing coverage is in LCD 1c56,365 sf of existing trails and access roads will continue to be used. Coverage allowed within LCD 5 in the study area is 1,528,676 sf. Under Alternative 4, 156,174 sf of coverage is proposed in LCD 5, including cart paths and parking area improvements, as well as other existing coverage that would not be modified. This is an increase in coverage by 16,245 sf, however LCD 5 is high capability land and coverage proposed is still within that allowed by TRPA within LCD 5. Coverage allowed within LCD 6 in the study area is 22,559 sf no coverage is proposed under Alternative 4. There are no areas within the study area classified as LCD 1a or 7.

**Table 3.6-13**
**Alternative 4 Coverage Impacts Summary for Lake Valley State Recreation Area (square feet)**

| Land Class | Gross Area (sq. ft.)[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 8,396,269– | 277,281/16,354 | 83,963 | 286,219 | 33,412 | NR | LTS |
| 1c[2] | – | – | – | – | – | – | – |
| 2 | – | – | – | | – | – | – |
| 3 | – | – | – | | – | – | – |
| 4 | – | – | – | | – | – | – |
| 5 | 868,343 | 43,887/3,443 | 217,086 | 13,585 | 5,126 | NR | LTS |
| 6 | 75,197 | – | 22,559 | | – | NR | NI |
| 7 | – | – | – | | – | – | – |
| **Totals** | **9,339,809** | **321,168/19,797** | **323,608** | **299,804** | **38,538** | **NR** | **LTS** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadow SP and Lake Valley SRA and not proposed boundary changes.
[2] Coverage estimate does not include 3,312 sf of existing pre-1972 golf course related coverage located on Conservancy property.
NR = none required.
LTS = less than significant
NI = no impact.
Source: Data provided by State Parks 2010

As part of its normal administrative responsibilities (separate from this project), State Parks would prepare interim management guidelines for Washoe Meadows SP which would provide additional guidance for protection of resources and management of permissible uses for that unit. The management plan would likely include small parking areas, signage, and some trail improvements on higher capability land; however, additional development in the remaining park area would not occur because most of the park is within sensitive, low-capability lands. While potential coverage modifications in relation to these improvements cannot be calculated at this time it is expected that any new coverage will be within that allowed by TRPA and coverage modifications would go through their own environmental review process under TRPA.

Alternative 4 increases coverage in LCDs 1b and 5; however, proposed coverage is still within that allowed as determined by TRPA. Coverage within LCD 1 and 3 will stay the same as under existing conditions and no coverage will be located in LCD 6, similar to existing conditions. Coverage relocated on-site is expected to occur

at a 1:1 ratio as allowed for an EIP project per the Code of Ordinances (discussed in the Regulatory section above). Additional coverage not used for relocation would be banked by State Parks for potential use within the study area or on other State Parks land as appropriately allowed by TRPA. Therefore, this impact is less than significant.

No mitigation is required.

IMPACT 3.6-4 (Alt. 4) Result in Loss of Availability of Known Mineral Resources. *Alternative 4 does not include any changes within the historical gravel and sand quarry located within Washoe Meadows SP. The quarry currently has a limited viable resource and is no longer being mined. Therefore, **no impact** would occur.*

This impact is identical to Impact 3.6-4 (Alt. 3). Alternative 4 does not include any modifications within the former gravel and sand quarry or anywhere within Washoe Meadows SP. The quarry has not been in use since before State Parks acquired the property in 1985, and it currently has limited viable resources. No impact would occur.

No mitigation is required.

### Alternative 5: River and Meadow Ecosystem Restoration and Decommissioned Golf Course

IMPACT 3.6-1 (Alt. 5) Soil Erosion, Sedimentation, and Loss of Topsoil. *Alternative 5 would not include beneficial modifications to offset the existing erosion caused by prior disturbances within Washoe Meadows SP; however, implementing this alternative would improve existing conditions related to erosion and sedimentation by removing undersized bridges and golf course uses adjacent to the Upper Truckee River and Angora Creek within the SRA. Nevertheless, project-related construction, grading, and stockpile storage associated with implementation of Alternative 5 would result in exposure of soil to potential wind and water erosion until the project site is effectively stabilized and revegetated. This impact would be **potentially significant**.*

This impact is similar to Impact 3.6-1 (Alt. 2), because it would not include the extensive tree removal and beneficial improvements to offset past disturbance within Washoe Meadows SP proposed under Alternative 2. Under Alternative 5, the golf course would be completely restored as SEZ, meadow, and floodplain habitat, (although future planning efforts may limit the restored area); however, the clubhouse, maintenance yard, and parking would remain. Alternative 5 includes salvaging, reusing, protecting, and minimizing removal of on-site resources, which would assist in reducing erosion and loss of topsoil, but it is expected that salvageable topsoil as a resource would be limited because disturbance would be less than under Alternative 2, and topsoil within the existing golf course would be used for revegetation of that area.

Implementing Alternative 5 would require 3–4 years of seasonal construction (between May 1 and October 15), with winter closedowns, except for BMP maintenance and monitoring. Construction would disturb the active floodplain and the main channels of the Upper Truckee River, Angora Creek, and the unnamed creek, with phasing (see Table 2-6), access, staging, and storage (see Exhibit 2-9) similar to Alternative 2; however, upland disturbance under Alternative 5 would be much less than under Alternative 2.

Similar to Alternative 2, permits and approvals would be obtained from several entities, but the specific measures, performance standards, and enforcement elements required are not yet known. The general construction management measures and general BMPs included for Alternative 2 would be included for this alternative, with similar dewatering approaches and winterization needs. Similar to Alternative 2, it is not reasonably foreseeable that a large storm runoff or streamflow event would exceed temporary capacity occurring during construction.

Based on the conceptual information regarding proposed construction management for Alternative 5, it remains possible that erosion, sedimentation, and loss of topsoil could occur. This impact would be potentially significant.

Mitigation Measure 3.6-1 (Alt. 5): Prepare and Implement Effective Site Management Plans

This mitigation measure is identical to Mitigation Measure 3.6-1A (Alt. 2).

Mitigation Measure 3.6-1B (Alt. 5): Provide On-Site Storm Drainage Facilities and Accompanying Stormwater Drainage Plan to Prevent Surface Erosion from Discharging to Creek or River Channels.

This mitigation measure is identical to Mitigation Measure 3.6-1B (Alt. 2).

With implementation of Mitigation Measure 3.6-1A (Alt. 5) and Mitigation Measure 3.6-1B (Alt. 5), Impact 3.6-1 (Alt. 5) would be less than significant, for the same reasons as described for Impact 3.6-1 (Alt. 2).

IMPACT 3.6-2 (Alt. 5) Risks to People and Structures Caused by Strong Seismic Ground Shaking. *Active faults in the project vicinity could subject people and structures within the study area to damage from strong seismic ground shaking; however, Alternative 5 does not include any new structures or a parking lot and does not include extensive tree removal, which could cause unstable soils. This impact would be* ***less than significant****.*

This impact is similar to Impact 3.6-2 (Alt. 3), except that all golf course infrastructure would be removed from the study area, with the exception of the existing clubhouse, maintenance building, and parking areas, and pump station. As discussed in the setting, several faults in the Tahoe Basin may be capable of generating a large-magnitude earthquake, albeit the probability is fairly low exposure to adverse effects could occur, including the risk of injury or death to people and loss of structures within the study area because of strong seismic ground shaking effects. Although risk of exposure within the study area exists, no new structures or parking areas are proposed under Alternative, and this alternative does not include extensive tree removal, which could cause unstable soils. While, Alternative 5 does include removing existing bridges final design schematics will be prepared by a licensed engineer for both the river restoration and golf course modifications, furthermore, these components of the project would not cause potential risk to people or structures. This impact would be less than significant.

No mitigation is required.

IMPACT 3.6-3 (Alt. 5) Land Coverage Changes. *Similar to Alternatives 2 and 3, Alternative 5 would involve removing coverage associated with golf course land uses and some trails within LCD 1b to allow for restoration of SEZ, the floodplain, Upper Truckee River and lower Angora Creek, improving geomorphic function and remove golf course related water quality impacts to the river. Golf infrastructure including cart paths and all bridges on the Upper Truckee River and Angora Creek will be removed. No coverage changes are proposed on the west side of the river; however, under Alternative 5 the golf course would be removed and other uses of Lake Valley SRA and Washoe Meadow SP would be evaluated during a separate planning process. Coverage removed as part of this alternative could be reused within the study area in the future. Alternative 5 decreases coverage in LCDs 1b, and 5. Coverage within LCD 1c and 3 will stay the same and no coverage will be located in LCD 6, similar to existing conditions. Overall, the proposed coverage reduction within LCD 1b, SEZ lands and restoration of floodplain currently occupied by golf course landscaping and infrastructure adjacent to the Upper Truckee River would provide a net environmental benefit. For this reason, this would be a* ***beneficial*** *effect.*

Similar to Alternatives 2 and 3, Alternative 5 would involve removing coverage associated with golf course land uses and some trails within LCD 1b to allow for restoration of SEZ, the floodplain, Upper Truckee River and lower Angora Creek, improving geomorphic function and remove golf course related water quality impacts to the river. No coverage changes are proposed on the west side of the river. Alternative 5 does not include and restroom facility or paving of the unimproved parking area. Golf infrastructure including cart paths and all bridges on the Upper Truckee River and Angora Creek will be removed and other uses of Lake Valley SRA and Washoe Meadow SP would be evaluated during a separate planning process. During the future planning process a

temporary golf course, similar to the footprint presented in Alternative 3 may be left in place. Refer to Impact 3.6-3 (Alt 3) for a discussion of potential coverage impacts related to a temporary smaller course. Coverage removed as part of this alternative could be reused within the study area in the future. Coverage for Washoe Meadows SP and Lake Valley SRA under Alternative 5 is presented in Tables 3.6-14 and 3.6-15. Coverage allowed is based on TRPA allowable base coverage or the pre-1972 "grandfathered" coverage (includes existing and banked pre-1972 coverage), whichever is greater.

**Table 3.6-14**
**Alternative 5 Coverage Impacts Summary for Washoe Meadows State Park (square feet)**

| Land Class | Gross Area[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 5,039,839 | 1,122/129,011 | 50,398 | 130,133 | 30,757 | NR | NI |
| 1c | 539,184 | 0/141,582 | 5,392 | 141,582 | 174,132 | NR | NI |
| 2 | – | – | – | – | – | | – |
| 3 | 2,180,496 | 0/56,365 | 109,025 | 56,365 | 19,182 | NR | NI |
| 4 | – | – | – | – | – | – | – |
| 5 | 5,246,359 | 0/108,844 | 1,311,590 | 126,344 | 106,997 | NR | NI |
| 6 | – | – | – | – | – | – | – |
| 7 | – | – | – | – | – | – | – |
| **Total** | **13,005,878** | **1,122/335,802** | **1,476,405** | **454,424** | **331,068** | **NR** | **NI** |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadows SP and Lake Valley SRA located within the study area.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

Coverage changes presented here are based on the end result removing golf course infrastructure and landscaping while leaving the clubhouse, maintenance yard and parking area in place until alternative uses have been evaluated as part of a separate planning process. Coverage allowed within 1b in the study area is 480,521 sf. Under Alternative 5, 241,354 sf of coverage is proposed in LCD 1b, including the pump station, clubhouse and other existing coverage that would not be modified. This is a decrease of 174,999 sf from existing coverage within LCD 1b. Coverage allowed within LCD 1c is 315,714 sf and within LCD 3 is 109,025 sf. While no new coverage is proposed in LCDs 1c or 3, 141,582 sf within LCD 1c and 56,365 sf within LCD 3of existing coverage, including trails and access roads will continue to be used under Alternative 5. Coverage allowed within LCD 5 in the study area is 1,528,676 sf. Under Alternative 5, 121,431 sf of existing trails and access roads will continue to be used. Coverage within LCD 5 that is associated with cart paths will be removed. This will decrease coverage by 18,498 sf. Coverage allowed within LCD 6 in the study area is 22,559 sf no coverage is proposed under Alternative 5 within LCD 6. There are no areas within the study area classified as LCD 1a or 7. No interim management plan would be prepared under Alternative 5, therefore no associated parking or trail improvements would be expected.

Alternative 5 decreases coverage in LCDs 1b, and 5. Coverage within LCD 1c and 3 will stay the same and no coverage will be located in LCD 6, similar to existing conditions. Coverage relocated on-site is expected to occur at a 1:1 ratio as allowed for an EIP project per the Code of Ordinances (discussed in the Regulatory section above). Coverage not used would be banked by State Parks for potential use within the study area or on other State Parks land as appropriately allowed by TRPA. Overall, the proposed coverage reduction within LCD 1b, SEZ lands and restoration of floodplain currently occupied by golf course landscaping and infrastructure adjacent

to the Upper Truckee River would provide a net environmental benefit. For this reason, this would be a beneficial effect.

No mitigation is required.

**Table 3.6-15**
**Alternative 5 Coverage Impacts Summary for Lake Valley State Recreation Area (square feet)**

| Land Class | Gross Area[1] | Hard/Soft Coverage Proposed | Base Coverage Allowed per the Bailey System | Existing TRPA Verified Existing Coverage | Banked Coverage | LCD Coverage Mitigation | Impact on Land Coverage |
|---|---|---|---|---|---|---|---|
| 1a | – | – | – | – | – | – | – |
| 1b | 8,396,269 | 102,866/8,355 | 83,963 | 286,219 | 33,412 | NR | NI |
| 1c[3] | – | – | – | – | – | – | – |
| 2 | – | – | – | | – | – | – |
| 3 | – | – | – | | – | – | – |
| 4 | – | – | – | | – | – | – |
| 5 | 868,343 | 10,143/2,444 | 217,086 | 13,585 | 5,126 | NR | NI |
| 6 | 75,197 | – | 22,559 | | – | NR | NI |
| 7 | – | – | – | | – | – | – |
| **Total** | **9,339,809** | **113,866/10,799** | **323,608** | **299,804** | **38,538** | NR | NI |

[1]Gross area is defined as gross area of existing boundaries for Washoe Meadow SP and Lake Valley SRA within the study area and not proposed boundary changes.
[2] Coverage estimate does not include 3,312 sf of existing pre-1972 golf course related coverage located on Conservancy property.
NR = none required.
NI = no impact.
Source: Data provided by State Parks 2010

IMPACT 3.6-4 (Alt. 5) Result in Loss of Availability of Known Mineral Resources. *Alternative 5 does not include any changes within the historical gravel and sand quarry located within Washoe Meadows SP. The quarry currently has a limited viable resource and is no longer being mined. Therefore, no impact would occur.*

Alternative 5 does not include any modifications within the former gravel and sand quarry or anywhere within Washoe Meadows SP outside of the historic meander belt. The quarry has not been in use since before State Parks acquired the property in 1985, and it currently has limited viable resources. No impact would occur.

No mitigation is required.

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