Taylor and Tallac Restoration Project
NEPA Environmental Assessment/CEQA Initial Study
Tahoe Regional Planning Agency Initial Environmental Checklist

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Prepared by:

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Lahontan Regional Water Quality Control Board, California

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Chapter 1 – Introduction

The Forest Service, Lahontan Regional Water Quality Control Board (Water Board), and Tahoe Regional Planning Agency (TRPA) prepared this Environmental Assessment (EA), Initial Study (IS), Initial Environmental Checklist (IEC) in compliance with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), TRPA Compact, and other relevant Federal and State laws and regulations. This EA, IS, and IEC disclose the direct, indirect, and cumulative environmental impacts that would result from the proposed action as modified by project design features. Additional documentation, including more detailed analyses of project area resources may be found in the project record located at the Lake Tahoe Basin Management Unit Supervisor's Office in South Lake Tahoe, California and at the Lahontan Regional Water Quality Control Board Office in South Lake Tahoe, California.

1.1 Purpose and Need for Action

The Taylor and Tallac Restoration proposed project area (~2600 acres) is characterized by a variety of sensitive habitats (e.g., barrier beaches, wetlands, meadows, stream channels) and important natural processes (e.g., hydrological) that have been adversely affected by previous land management practices such as grazing, infrastructure construction, and introduction of aquatic invasive species (Figure 1). The proposed project area contains approximately 11 miles of perennial stream and 470 acres of Stream Environment Zone which is a combination of wetland, meadow, and riparian habitat that supports a suite of native, non-native, and aquatic invasive species. The proposed project area includes a heavily used recreation site (Taylor Creek Visitor Center) and one of the most popular beach destinations in the Lake Tahoe basin (Baldwin Beach, Figure 2). Impacts on natural processes and sensitive habitats have not only degraded the ecological conditions of the area but also indirectly affected the recreation experience by degrading both visual characteristics and water quality conditions in the area.

Historically, Taylor and Tallac Creeks in the proposed activity area were connected through a series of lake-influenced swales that formed a large wetland complex. The connectivity of water in the swales and the overall level of water in the wetland complex depended on the water level of Lake Tahoe and the amount of spring flows in the creeks. These swales are now hydrologically disconnected from Tallac Creek flows due to channel incision creating a new dominant flow path out to Lake Tahoe, directing Tallac Creek flows past the swales. This flow path has been in existence since at least 1940 (per 1940 aerial photo) and is believed to have resulted from a variety of impacts associated with a historic dairy, cattle grazing, road construction, and water diversions. Channel incision in response to fluctuating lake levels has continued to occur, exposing the top of the South Tahoe Public Utility District sewer line that crosses Tallac Creek. The sewer line was installed in 1972. When flows enter the swales from high lake levels, swale flow circulation is also affected by undersized culverts, which were installed in the 1950's and 1960's. The degraded hydrologic condition has promoted the introduction of aquatic invasive species to these creeks and threatens the native species throughout the proposed project area.

Fallen Leaf Lake is also within the proposed project area. Fallen Leaf Lake has two dams, the Fallen Leaf Lake dam, also known as the Anita Baldwin dam, and the Lucky Baldwin dam (Figure 3). The Fallen Leaf Lake dam was constructed in 1934 to replace the Lucky Baldwin dam, which was constructed in 1907. The Lucky Baldwin dam Lake restricts mixing of water in the lake, and the retained (pooled) water between the two dams can create unnaturally warm water temperatures favorable for invasive species. The Lucky Baldwin dam also restricts the amount of water that can flow into Taylor Creek during low water months.

Much of the Baldwin beach recreation site receives heavy visitor use. Many of the facilities in the recreation site have a high level of deferred maintenance and have not been updated to meet Forest Service universal accessibility standards such as the Architectural Barriers Act requirements and the Forest Service Outdoor Recreation Accessibility Guidelines. The rainbow trail is a challenge to maintain because it becomes flooded by Taylor Creek, preventing access and resulting in the creation of user-created trails as visitors attempt to get past the flooded areas. Throughout the proposed project area, recreation facilities and access pathways do not adequately manage the heavy use the area receives, resulting in trampling of vegetation.

The Taylor and Tallac Restoration Project is identified as a priority project on the Lake Tahoe Environmental Improvement Program (#01.02.01.0016). Projects in the Environmental Improvement Program focus on improving air, water, and scenic quality, forest health, fish and wildlife, and public access to the Lake and other recreation areas.

The purpose of the Taylor and Tallac Restoration project is to begin restoring ecological processes and functions in the proposed project area while maintaining or enhancing existing recreational facilities and infrastructure. To accomplish this purpose the following project needs have been identified:

- Restore and enhance stream channel, lagoon, wetland, and swale hydrologic condition to enhance plant and wildlife habitat for native aquatic and riparian dependent species, and increase resilience to a changing climate.
- Remove existing invasive plant and wildlife species, to further enhance habitat for native species.
- Enhance existing recreational facilities and infrastructure to provide quality recreation experience while protecting sensitive habitat.
- Improve the visual quality of the landscape features, including existing fencing and interpretive signage.
- Enhance public access for non-motorized use to high-use recreation sites.
- Enhance educational and interpretive opportunities.
- Reduce impacts to Tahoe yellow cress plant occurrences from trampling.

The goals of this project are consistent with the current Forest Plan (Plan) published in 1988 as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) published in 2004. The Forest Plan Direction that applies to this project includes management area direction for Fallen Leaf Management Area (Plan p. IV-85 – IV-92) and forest wide standards and guidelines for Riparian Conservation Objective #2 (SNFPA p. 63-64).

Figure 1. Proposed project area.

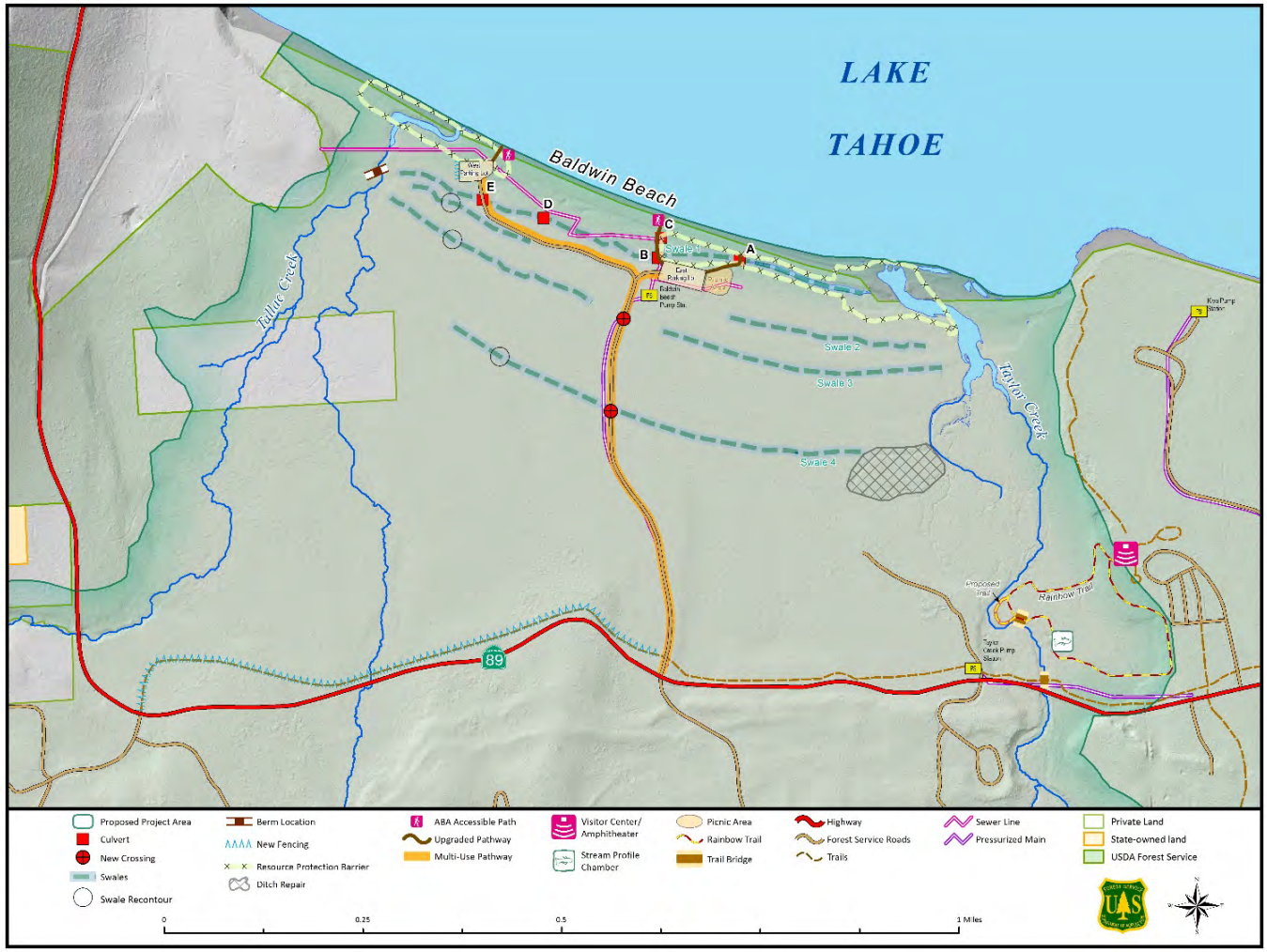

Figure 2. Detailed view of the proposed project area north of Highway 89.

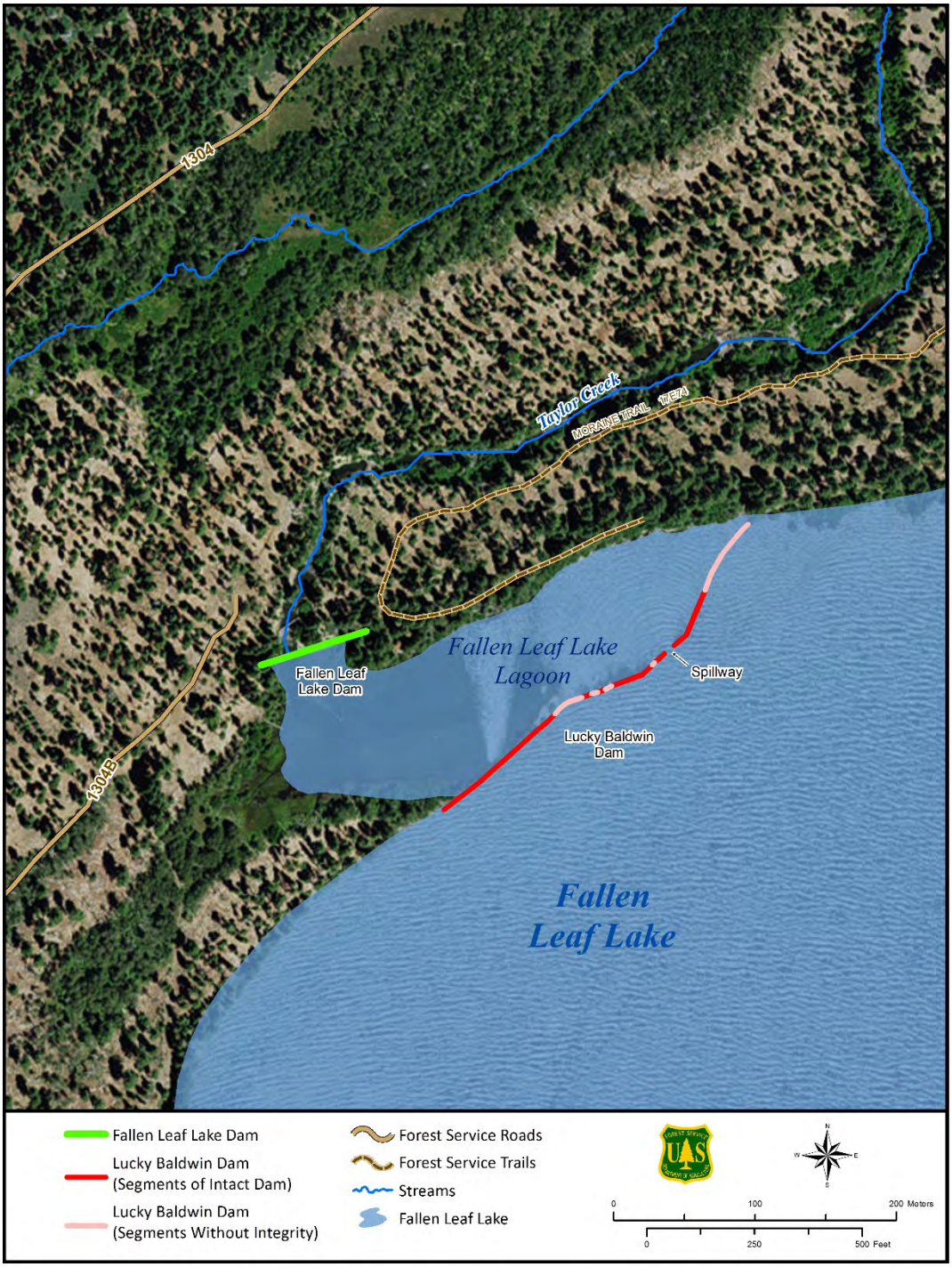

Figure 3. The Fallen Leaf Lake (Anita Baldwin dam) and Lucky Baldwin dams in Fallen Leaf Lake

1.2 Decision Framework

The Forest Supervisor is the Responsible Official for this project under NEPA. Given the purpose and need, the Responsible Official reviews the proposed action in order to decide whether or not the restoration project will be implemented as described.

The Water Board is the CEQA lead agency for this project. Water Board staff completed a CEQA Initial Study, which is included in Appendix A. The Water Board will regulate discharges from the project by: (1) granting coverage under the Water Board's General Waste Discharge Requirements and National Pollutant Discharge Elimination System Permit for Storm Water Discharges Associated with Construction Activity in the Lake Tahoe Basin (Lake Tahoe NPDES Construction Permit), (2) issuing Clean Water Act section 401 Water Quality Certification (401 WQC), and (3) granting exemptions to prohibitions contained in the Water Quality Control Plan for the Lahontan Basin (Basin Plan). Issuing 401 WQC and Basin Plan prohibition exemptions are discretionary actions which trigger compliance with CEQA. Final design plans will submitted for Water Board review prior to permit issuance.

TRPA is the lead agency under the Tahoe Regional Planning Compact. An Initial Environmental Checklist (IEC) has been prepared in accordance with Article VII of the Compact, Article 6 of the Rules of Procedure and Chapter 3 of the Code of Ordinances (Appendix B).

1.3 Public Involvement

The Forest Service first listed the Taylor and Tallac Restoration Project in the January 2014 Lake Tahoe Basin Management Unit Schedule of Proposed Actions (http://www.fs.fed.us/sopa/forest-level.php?110519).

The NEPA scoping (request for comments) period began on October 17, 2014 and ran until December 5, 2014. Public scoping included notification to local media outlets, scoping letters mailed or emailed to interested parties, and posting information on the Forest Service website. During the scoping period the Forest Service met with Water Board, TRPA, South Tahoe Public Utility District (STPUD), Tahoe Resource Conservation District (Tahoe RCD), Washoe Tribe (Darrel Cruz), California Department of Fish and Wildlife (CDFW), and U.S. Fish and Wildlife Service (USFWS) to discuss the initial proposed action and receive their comments. The Forest Service received a total of seventeen comments from interested parties.

On December 16, 2014 the Forest Service met with STPUD to discuss the proposed action and the STPUD sewer line that crosses Tallac Creek. On January 5, 2016, the Water Board and Forest Service met with STPUD again to discuss progress on the draft proposed action as it relates to the sewer line that crosses Tallac Creek.

From October 23, 2015 to November 25, 2015, the Water Board (lead CEQA agency) requested early consultation and comment from interested parties on the proposed action. The request for early consultation was circulated through the State of California Office of Planning and Research's State Clearinghouse. A total of four comment letter were submitted to the Water Board. One comment letter repeated comments submitted to the Forest Service during the NEPA scoping period.

Chapter 2 – Alternatives

2.1 Alternative 1 (No Action)

No action would be taken. Hydrologic conditions and aquatic organism passage would continue to be disconnected by dilapidated and failing culverts. The quality and quantity of habitat for aquatic organisms in Taylor and Tallac Creeks would continue to not meet desired conditions. Infrastructure (e.g., fish ladder, bridge abutments, Rainbow Trail, stream profile chamber, picnic area) would

continue to exist in poor condition. Aquatic invasive species would continue to persist and thrive. Sensitive resources (e.g., Tahoe yellow cress plants) would continue to be at risk from human impact. Forest Service universal accessibility standards (including Architectural Barrier Act compliance) would be limited to existing access.

2.2 Alternative 2 (Proposed Action)

Based on extensive scoping, the Forest Service developed the following proposed action. This proposed action differs slightly from the initial proposed action based on input from scoping and further study of the proposed project area (see *Actions Considered but Eliminated from Detailed Study* below). This proposed action uses performance standards which describe the functional expectations of the various activities/infrastructure. Because methodologies and technologies to implement the proposed action have the potential to improve over time, and because implementation will be phased over time, the performance standards allow the flexibility to utilize new technologies and will be incorporated into project designs.

1. **Swale restoration**: Restore hydrologic connectivity and improve aquatic organism passage and the movement of water. For all swales, crossing structures described below (including any pedestrian/bicycle crossings) would meet the following performance standards:
    - The swale bottom through the crossing structure(s) is contiguous with surrounding substrate in elevation and material.
    - Up to bankfull flow conditions[1], the crossing structure(s) maintain function as a connected water body. Crossings do not inhibit natural flow and aquatic organism passage.
    - Above bankfull flow, the crossing would not cause accelerated channel erosion.

    - **Swale 1**: Reestablish Swale 1 as the primary flow path for Tallac Creek to restore hydrologic connectivity, maintain aquatic organism passage and the movement of water to Taylor Creek. Remove the five existing culverts (A-E) and associated fill. Re-contour portions of swale impacted by existing culverts (Figure 2). Replace culverts A, B, C and E with crossing structures with the following criteria: pedestrian access for all crossing structures and vehicle access for the crossing structure at B (for sewer line easement access) and E. Do not replace culvert D. Re-vegetate portions of swale 1 with native vegetation (primarily willow). Existing native vegetation and soil removed in existing culvert/fill footprint would be salvaged and transplanted to the extent feasible.
    - **Swales 2 and 3**: Re-contour portions of swale 2 and 3 west of the Baldwin Beach access road (near Tallac creek) where old roads and stock trails have impacted form and function (Figure 2). Install crossing at swale 3 under Baldwin beach access road (Figure 2).
    - **Swale 4**: Install crossing structure where swale crosses Baldwin Beach access road (Figure 2). Re-contour portions of swale that have been impacted by road creation and fill. Re-contour portions of swale 4 west of the Baldwin Beach access road (near Tallac Creek) where old roads and stock trails have impacted form and function (Figure 2). Fill and/or plug man made ditches within the ditch repair area (Figure 2) near Taylor Creek to match surrounding contours.

2. **Stream Restoration**

[1] Bankfull flow conditions: Bankfull flows are those that are predicted to occur at a range of 1.5 to 2 year recurrent interval, and are the volume at which stream channel flows begin to overtop channel banks into the adjacent floodplain.

- **Taylor Creek**
  - Install large wood in creek south of Highway 89 to improve aquatic habitat. Logs would be anchored in position using natural materials. The installation of large woody debris would meet the following performance standards:
    - Log placement does not impede more than 30 percent of the bank full channel.
    - Log placement creates natural patterns of sediment scour and deposition.
    - Logs would be placed in such a way that flow is deflected away from banks that are at risk of erosion.
  - Re-vegetate riparian area with native vegetation within the floodplain adjacent to the creek.
  - Renovate fish ladder at the Fallen Leaf Lake dam to restore function that could support future Lahontan Cutthroat trout recovery actions. Activities would include, but are not limited to, installing flash boards, excavating directly upstream of ladder, and removing concrete wall on the upstream portion of ladder. The renovated ladder would have the capacity to allow passage by multiple species (e.g., suckers) and life stages.
  - Remove portions of the Lucky Baldwin dam that are considered not to have historic integrity to improve hydrologic connectivity and circulation between Fallen Leaf Lake, Fallen Leaf Lake Lagoon, and Taylor Creek (Figure 3). The methods may include a combination of hand tools and mechanical equipment. Removal of portions of the Lucky Baldwin dam would meet the following performance standards:
    - Portions of the dam with historic integrity would not be effected during project actions.
    - Removal would not affect the lake levels agreed upon in the Memorandum of Understanding for operation of Fallen Leaf Lake between the Forest Service and Fallen Leaf Lake Protection Association (1972 with Amendments in 1981 and 1987).
    - Removal would not affect the function and integrity of the Fallen Leaf Lake Dam (Anita Baldwin dam).
  - Maintain and protect the structural integrity of the existing Pope-Baldwin Bike Path Bridge and the Rainbow Trail Bridge (Figure 2). Maintenance activities to stop streambank migration and abutment scouring would include but are not limited to stabilizing banks and repairing and protecting concrete abutments.
- **Tallac Creek**
  - Return the downstream portion of Tallac Creek to its historic channel by installing a berm[2] (elevation 6228 feet[3]) upstream of the STPUD sewer line and encouraging the

[2] Berm: A grade control feature constructed of native materials (earth, rocks, logs etc.) used to fill in a portion of eroded floodplain. The surface of this feature will also function as a stable overflow channel.

[3] The elevation datum for the planning of the proposed action (and analysis) is 6224.0 taken at USGS Lake Tahoe lake level gage 103377000 during LIDAR data collection in August 2010. Lake level data is based on the U.S. Bureau of Reclamation datum as stated on the USGS Water Data public website. See the Hydrology/Soils Specialist Report (Project Record) for detailed information on elevations used for planning and analysis of the proposed action.

majority of the stream to flow into swale 1 to Taylor Creek, to mimic historic/natural flow patterns down swale 1. Restore the channel downstream of the berm to convey flows from the berm to Lake Tahoe in a stable, low energy, surface flow path that protects the integrity of the existing sewerline (Figure 2). The berm would be constructed of natural materials and meet the following performance standards:

- All flows in Tallac creek below bankfull flows (50 cubic feet per second (cfs), see the Hydrology/Soils Specialist Report in the Project Record), at median or lower lake levels, would enter swale 1 and not overtop the berm in the existing creek channel. Above 50 cfs, flow would overtop the berm.
- When the berm is overtopped, the berm would be designed to be stable (i.e., not erode) up to a 100 year flow event (471 cfs).
- The berm overflow capacity will be designed so that flows in swale 1 do not inundate recreation infrastructure, or increase inundation frequency of private land (Figure 2).

o Re-contour, fill, and revegetate the Tallac Creek overflow channel downstream of the berm to convey flows from the berm to Lake Tahoe in a stable grassy swale/or low gradient riffle channel with low surface flow energy, that protects the integrity of the existing sewer line (Figure 2). The channel bed would be constructed of natural materials and meet the following performance standards:

- The overflow channel would be a geomorphically stable flow path, with very low energy surface flow velocity for approximately 400 feet downstream of the berm. The end point (lake side; elevation 6223 feet) of the reconstructed channel will be determined during final design, but will be somewhere near the current 90 degree bend. Channel slope/longitudinal profile will result in negligible pooling or backwatering.
- Grade control structures and fill material would be installed as needed to maintain desired channel bed elevations and slope.
- Channel slope and bed elevation would be designed to maintain a minimum of two feet of fill material over the top of the sewer line encasement.
- Aquatic organisms would be able to move up from the constructed end (lake side) of the Tallac creek overflow channel past the berm, when the overflow channel is passing sufficient flow volumes to sustain aquatic organisms, and lake elevations are at or above the elevation of the last grade control structure (lake side).

o Infrastructure would be constructed to secure the STPUD sewer line that crosses Tallac Creek. The infrastructure would meet the following performance standards:

- The infrastructure would be made of natural materials and would not be constructed higher than an elevation of 6225.2 feet.
- The sewer line encasement and associated infrastructure (e.g., grade control structures) would be constructed in a manner that is compatible and consistent with the restored channel/floodplain profile.

o Allow the existing sand bar at the confluence of swale 1 and Taylor creek (Figure 2) to breach naturally. However, if the above performance standards related to flooding recreation infrastructure or the private in holdings are not met because the flow in

swale 1 has not exited into Taylor Creek, the sand bar between swale 1 and Taylor Creek would be notched using hand tools to encourage the flow to exit swale 1 into Taylor Creek.

- Re-vegetate native riparian species along the floodplain adjacent to the creek.

3. **Aquatic Invasive Species Control/Removal**: Control or eradicate aquatic invasive species (e.g., warm water fish, American bullfrogs, aquatic invasive weeds) from the proposed project area using manual (chemical free) methods[4] . Aquatic invasive species are known to occur from Lake Tahoe up Taylor, Tallac and Spring Creek drainages (Figure 1). Aquatic invasive species treatment is the only activity proposed above Highway 89 in Tallac and Spring Creek.
4. **Resource Protection Barriers**: Replace existing fencing and install new barriers (natural or fenced) in areas indicated in Figure 2. Natural barriers would include willows or other vegetation screening, downed logs, boulders, or other natural materials. Barriers would comply with the following performance standards:
   - Barriers would discourage pedestrian access to sensitive habitat (e.g. Tahoe yellow cress, *Rorippa subumbellata*, swale habitat) but not prevent beach access.
   - Barriers would protect the majority of Tahoe yellow cress occurrences and be able to be moved as necessary to continue such protection.
   - Barriers would be used in areas where appropriate for existing vegetation types, use native, locally abundant species, and not interfere with the establishment or persistence of existing Tahoe yellow cress occurrences.
   - Barriers would allow for unrestricted wildlife movement.
   - Barriers would visually compliment the natural environment.
5. **Wildlife Enhancement:** Install nest/perch structures for waterfowl and sensitive raptors, install bat boxes, and plant willow in select locations for willow flycatcher.
6. **Beach Circulation**: Construct access paths using stable, non-eroding materials, from west and east parking areas to the beach that meet Forest Service universal accessibility standards (Figure 2).
7. **Recreation Amenities**:
   - Formalize and upgrade the picnic area at Baldwin Beach. Improve the picnic area within the existing foot print, maintaining the existing capacity. Improvements would include but not be limited to installing new tables and table pads, paths, large grills at group sites, and upgrading to meet accessibility standards.
   - Install foot washing stations at each restroom.
   - Install necessary pathways for accessibility and connectivity to beach, picnic area, parking area and restrooms.
   - Install an accessible multi-use pathway in the existing Baldwin Beach Road corridor from Highway 89 to Baldwin Beach parking areas. The pathway would accommodate two-way pedestrian and bicycle traffic. Disturbance would be within 25 feet of existing Baldwin Beach Road alignment, on either or both sides of the road, except on the access road to

[4] Manual methods of aquatic invasive species removal could include, but would not be limited to: bottom barriers and diver-assisted hand pulling of weeds, and electro-shocking and netting of bull frogs and warm water fish.

the west parking lot in which disturbance would be limited to the north side of the road (away from swale 2) (Figure 2).

- Install permanent Best Management Practices (BMPs) in the parking lot areas, restrooms, and formalized picnic area to capture and infiltrate storm water. Permanent BMPs would be consistent with Forest Service, TRPA, and Water Board requirements. The BMPs would include but not be limited to installation of infiltration basins, re-contouring and repaving of the parking areas to ensure proper drainage of storm water off paved surfaces, drip-line trenches, or other means of directing and infiltrating storm water.

8. **Stream Profile Chamber and Rainbow Trail**:

- Upgrade the stream profile chamber building to meet contemporary building codes.
- Modify the stream profile chamber and associated inflow/outflow system to discourage the exchange of aquatic species with Taylor Creek.
- Upgrade (e.g., elevate, replace with boardwalk) portions of the rainbow trail. Reroute small portions to areas less susceptible to flooding (typically within 20 feet of existing trail).
- Move and formalize the user-created trail that leads to the gravel bar by Taylor Creek (Figure 2). Stream and gravel bar functioning for aquatic species would be maintained and the trail would not limit or reduce existing spawning habitat. The trail would not influence the flow path of Taylor Creek.

2.3 Actions Considered but Eliminated from Detailed Study

The initial proposed action scoped as part of the NEPA process was modified in the following ways after the scoping period:

- We removed the proposal to modify existing flow releases at Fallen Leaf Lake Dam to mimic natural flow regimes in Taylor Creek. Due to the complexity of this action and the need for additional coordination with multiple partner agencies, it was decided that this action would be addressed separately at a later date.
- We modified the proposal to construct a pedestrian pathway along Baldwin Beach between the west and east parking areas to state that pathways would be constructed to provide universal accessibility to the beach at three access points but the pathway would not extend the west and east length of the beach.
- We removed the proposal to install a pavilion or other overhead structure and hardened surface in the Baldwin Beach picnic area.

2.4 Project Design Features

The proposed action would be implemented by the Forest Service and other partners. All construction activities would adhere to applicable local, state, and federal regulations and the project design features including the TRPA Standard Conditions of Approval (Appendix C – 1). All on-site work and access to the construction footprint would follow project design features and be coordinated with and approved by the Forest Service if implemented by a partner. Where increases in coverage would occur, they would be mitigated in accordance with TRPA and Water Board regulations.

The following project design features apply to the proposed action:

Multiple Resources (Aquatics, Botany, Heritage, Wildlife)

1. In cases where resource conflicts occur as identified in the following design features, an interdisciplinary team composed of the affected resource specialists would determine the appropriate course of action.
2. If previously unidentified resources are discovered before or during implementation activities, the affected specialist(s) would develop appropriate measures (e.g., flag and avoid, limited operating period, buffer zones) to protect such resources:
    a. Federal (ESA) and State (CESA) Threatened, Endangered, Candidate, and Proposed species, Forest Service Sensitive species, TRPA special interest and sensitive species, other botanical resources (e.g., peat-dominated soils), migratory bird nests, and CDFW/CNPS listed species.
    b. Cultural resources: Any sighting of previously undiscovered cultural or historical resources will result in a stoppage of project work in the vicinity of the discovery and will be reported immediately to the appropriate specialist.
3. In addition to the known infestation of invasive species, new infestations discovered prior to or during project implementation would be assessed for possible treatment as described in the below project design features.

Hydrology, Soil, and Water Resources

Project design features comply with federal, state, and local requirements and serve as the foundation upon which applicable, site-specific Best Management Practices (BMPs) prescriptions would be developed during the final planning and design phase, and before implementation. The following documents would be used to develop specifications to protect soil and water resources:

- Requirements of the TRPA Standard Conditions of Approval (Appendix C – 1).

  http://www.trpa.org/wp-content/uploads/Attachment_Q_Standard_Conditions_Grading.pdf
- Guidance provided in USDA Forest Service National Best Management Practices for Water Quality Management on National Forest Lands, Volume 1: National Core BMP Technical Guide, FS-990a (USDA April 2012) (Appendix C – 2, Table 1).

  http://www.fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf
- Guidance provided in USDA Forest Service Region 5, Water Quality Management Handbook. R5 FSH 2509.22, Chapter 10, Amendment 2509.22-2011-01 (USDA December 2011) (Appendix C – 3, Table 1).

  http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5399662.pdf

The National and Regional guidance documents (USDA 2011, 2012) describe recommended methods (i.e., practices and implementation) to achieve each BMP objective. Although the methods presented in the guidance documents are general and nonprescriptive, they are the basis upon which detailed specifications for on the ground soil and water protection measures would be developed. Table 1 identifies the 15 National and Regional BMPs that apply to the proposed project.

A BMP guidance checklist would be completed during the final stages of project planning that would be used to identify where additional project specifications are needed in design plans, contracts, and permit documents to carry out the methods presented in the National and Regional BMP guidance document. The checklist would be based on the National and Regional BMP guidance and the TRPA Standard Conditions of Approval. The checklist is included in Appendix C – 4. Since there is some redundancy between the TRPA Standard Conditions of Approval and the USDA BMP guidance documents, the most protective language is identified in Appendix C – 4.

Table 1. The 15 Forest Service National and Regional Best Management Practices (BMPs) titles and objectives applicable to the proposed project. See Appendices C – 2 and C – 3 for methods guidance for each BMP.

National (N) or regional (R) BMP guidance document[1]	**BMP Title***/Objective*
(N) Plan-2	**Project Planning and Analysis**/*Use the project planning, environmental analysis, and decision making processes to incorporate water quality management BMPS into project design and implementation*
(N) Plan-3	**Aquatic Management Zone Planning**/*To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique value and importance to water quality while implementing land and resource management activities.*
(N) AqEco-1	**Aquatic Ecosystem Improvement and Restoration Planning**/*Reestablish and retain ecological resilience of aquatic ecosystems and associated resources to achieve sustainability and provide a broad range of ecosystem services.*
(N) AqEco-2	**Operations in Aquatic Ecosystems**/*Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.*
(N) AqEco-4	**Stream Channels and Shorelines**/ *Design and implement stream channel and lake shoreline projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.*
(N) Fac-2	**Facility Construction and Stormwater Control**/*Avoid minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling erosion and managing stormwater discharge originating from ground disturbance during construction of developed sites.*
(N)Fac-7	**Vehicle and Equipment Wash Water**/*Avoid or minimize contamination of surface water and groundwater by vehicle or equipment wash water that may contain oil, grease, phosphates, soaps, road salts, and other chemicals, suspended solids and invasive species.*
(N)Rec-2	**Developed Recreation Sites**/*Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources at developed recreation sites by maintaining desired levels of ground cover, limiting soil compaction, and minimizing pollutants entering waterbodies.*
(N)Rec-4	**Motorized and Nonmotorized Trails**/ *Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling soil erosion, erosion of trail surface materials, and water quality problems originating from*

National (N) or regional (R) BMP guidance document[1]	**BMP Title**/*Objective*
	construction, maintenance, and use of motorized and non-motorized trails.
(N)Road-5	**Temporary Roads**/*Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and used of temporary roads.*
(R)BMP 2.8	**Stream Crossings**/*Minimize water, aquatic, and riparian resource disturbances and related sediment production when constructing, reconstructing, or maintaining temporary and permanent water crossings.*
(R) BMP 2.10	**Parking and Staging Areas**/*Construct, install, and maintain an appropriate level of drainage and runoff treatment for parking and staging areas to protect water, aquatic, and riparian resources.*
(N) Road-10	**Equipment Refueling and Servicing**/ *Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resource during equipment refueling and servicing activities.*
(N)WatUses-4 and (R) BMP 2.5	**Water Diversions and Conveyances**/ *Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from construction, operation, and maintenance of water diversion and conveyance structures.* **(R) BMP 2.5 – Water Source Development and Utilization**/*To supply water for road construction, maintenance, dust abatement, fire protection and other management activities, while protecting and maintain water quality.*

[1] (N): Guidance provided in USDA Forest Service National Best Management Practices for Water Quality Management on National Forest Lands, Volume 1: National Core BMP Technical Guide, FS-990a (April 2012).
(R): Guidance provided in USDA Forest Service Region 5, Water Quality Management Handbook. R5 FSH 2509.22, Chapter 10, Amendment 2509.22-2011-01 (December 2011).

Another source for soil and water protection specifications that would be utilized when developing detailed on the ground soil and water protection measures for project designs and specifications, and contracts, would be the BMP fact sheets presented in the CalTrans Storm Water Quality Handbooks, Construction Site Best Management Practices Manual and at this link: http://www.dot.ca.gov/hq/construc/stormwater/factsheets.htm. There is a fair bit of redundancy between the USDA BMP guidance documents, the TRPA Standard Conditions of Approval, and the Caltrans Construction Site BMP Fact sheets. The most specific and protective language will be incorporated in project designs and specifications, and stormwater pollution and prevention plans. As an example, the following is a list of several of the CalTrans Fact Sheets (see hyperlink above) that would be applicable to the project (along with the corresponding USDA BMP). Additional Caltrans BMP Fact Sheets may be identified and utilized as final designs are developed.

- WM-4 Spill Prevention and Control (Road-10)

- NS-9 Vehicle and Equipment Fueling (Road -10)
- NS-10 Vehicle and Equipment Maintenance (Road -10)
- WM-3 Stockpile Management (BMP 2.10)

Additional project specific soil and water protection measures beyond the methods identified in the National and Regional BMPs, TRPA Standard Conditions of Approval, and CalTrans Facts Sheets presented in Appendix C include (corresponding USDA BMP identified in parenthesis):

4. Staging areas and other disturbed bare ground will be restored by decompacting and recontouring to surrounding grade, and mulching/seeding per recommendations of the appropriate staff (e.g., botanist) – (Fac-2 and BMP 2.10).
5. Displacement of silt loams and peat soils would be avoided wherever possible by strategic placement of temporary construction access paths and strict construction area limits. In cases where silt loams and peat soils cannot be avoided, additional BMPs (e.g., encapsulated roads or steel plates to distribute the force of the machinery) would be used to reduce compaction – (AqEco 2 and Road 5).
6. Any actions requiring a 401 permit, Basin Plan Prohibition exemption, or a Lake Tahoe National Pollutant Discharge Elimination System construction permit would require the completion of a daily BMP implementation checklist and turbidity monitoring, when conducting work in waterbodies – (AcEco -2, BMP 2.10).
7. Review on the ground BMPs prior to a forecasted rain event (using NOAA weather forecast website). Watershed or transportation specialists would review on the ground project BMPs prior to a large forecasted storm event (1 inch in 24 hours rain event, or prolonged periods or rain over a 48 hour period exceeding a total of 2.5 inches) that may exceed BMP capacity and would notify appropriate staff (e.g., contract administrator) if additional BMPs are recommended to disconnect runoff from surface water features – (All).
8. To minimize potential turbidity impacts related to work within waterbodies, turbidity monitoring would occur before water is released from the work area. Water would not be reintroduced downstream until permit requirements for turbidity are met – (AqEco 2, BMP 2.10).
9. Temporary roads would be used only if other tools for access are not feasible due to site conditions; however methods to minimize ground disturbance would be deployed – (Road -2).
10. Onsite dust abatement procedures would be implemented on disturbed soil areas and stockpiled soil materials to ensure fine sediments are not transported off site as airborne particles. Abatement procedures could include both watering and physically covering bare soils – (AqEco-2 and Fac-2).

Aquatics

11. Leave existing downed trees and large woody debris that are in perennial or intermittent stream channels in place unless removal would enhance or maintain channel stability.
12. Avoid removing or altering bank stabilizing vegetation, live or dead trees within 5 feet of the bank edge of perennial or intermittent streams and lakes or ponds, unless the action is needed to meet project objectives.
13. If water drafting or pumping diversions are needed for project implementation activities, water levels at drafting locations would be maintained to support the needs of aquatic dependent species and associated habitat. Such activities would use guidance described in BMP 2.5 (Regional BMP guidance, USDA 2011) to protect water quality and aquatic species.

14. Salvage/recovery of fish would be conducted within anticipated construction dewatering or diversion zones operations by electro-shocking or other suitable means as developed through consultation with the California Department of Fish and Wildlife. Fish would be moved approximately 500 -700 feet upstream or downstream of project activities. Block nets would be installed to ensure fish do not move back into the project area. Nets would be cleaned as needed to ensure the nets are functioning.
15. Any contractor would be solely responsible for ensuring that all equipment, boats, and other aquatic equipment meet the Lake Tahoe Aquatic Invasive Species Watercraft Inspection Program. Further information is found at www.tahoeboatinspection.com.
16. Retain/add downed wood in the open meadow areas where feasible for native amphibian species. Density would be approximately three logs of > 12 inches (30 cm) diameter at midpoint per acre (0.4 ha).
17. Field gear (waders, float tubes, etc.) would be cleaned, decontaminated, and/or fully dried prior to entering or moving between aquatic habitats.
18. Electrofishing in Lahontan Cutthroat Trout-occupied or potential streams would follow Guidelines for Electrofishing in Waters Containing Salmonids Listed under the Endangered Species Act (Appendix D) during stream salvage activities.
19. Suitable habitat for Sierra Nevada yellow-legged frog within the project area will have three surveys to determine occupancy. As stated in the Programmatic Biological Opinion (FF08ESMF00-2014-F-0557) the three surveys will be within the last 10 years , can be staggered during one season from 14 calendar days after the date snowmelt begins through September 15 (early, mid, late season) or conducted three season during separate consecutive years. At least one of the surveys will be conducted during a calendar year where snowpack is 80 percent or greater than normal (USDI 2014).

Aquatic Invasive Species

20. Benthic barriers would be cleaned at an established and TRPA-approved decontamination facility.
21. All invasive plant and animal species would be disposed of offsite.
22. Any boats used in aquatic invasive species removal activities would have an Emergency Spill Response Plan and clean up kit.

Botany

23. Tahoe yellow cress:
    a. Within suitable habitat (i.e. shorezone, barrier beach and backshore of Lake Tahoe), survey for Tahoe yellow cress prior to (but after June 15th), but in the same year as, project implementation.
    b. To the extent feasible, avoid Tahoe yellow cress plants during construction. During construction, temporary fences would be established around any Tahoe Yellow Cress occurrences within 100 feet of construction areas, staging areas and access ways.
    c. Plants that intersect with proposed construction areas would be salvaged and transplanted to the nearest appropriate occurrence or suitable habitat using known best management practices for transplanting (e.g. Tahoe Yellow Cress Conservation Strategy, recommendations from Tahoe Yellow Cress Adaptive Management Working Group). If salvaged plants do not survive (i.e. are not alive the following growing season), then additional Tahoe Yellow Cress plants (nursery stock collected from locally collected

seed) would be used to replace any losses at a minimum of 2:1 replacement using best management practices for out planting (e.g. Tahoe Yellow Cress Conservation Strategy, recommendations from Tahoe Yellow Cress Adaptive Management Working Group).

d. For aquatic invasive species removal and potential sand bar breaching at the mouth of Taylor Creek and swale 1, and at the crossing construction (culvert A), a biological monitor will be on-site during ground disturbance activities to implement the project design features (e.g., identify Tahoe yellow cress plants, remove as many Tahoe yellow cress plants that would be affected as possible and re-plant, try to direct disturbance in other areas).

e. Where upgrades are within 50 feet of Tahoe yellow cress occurrences then resource protection barriers would be implemented.

24. Other botanical resources: During construction planning, review known locations of peat-dominated soils so that avoidance is prioritized. Vehicle and equipment access will not impair peat-dominated soils. Excavation of peat-dominated soils will be avoided during construction.

Terrestrial Invasive Species

25. Staging areas: Avoid staging equipment, materials, or crews in invasive plant-infested areas.

26. Control (avoidance) areas: Equipment traffic and soil-disturbing project activities would be excluded from invasive plant infestations, where feasible. These areas will be identified on project maps and delineated in the field with flagging.

27. Implementation: All equipment and vehicles (Forest Service and contracted) used for project implementation must be free of invasive plant material before moving into the project area. Equipment would be considered clean when visual inspection does not reveal soil, seeds, plant material or other such debris. Cleaning would occur at a vehicle washing station or steam-cleaning facility before the equipment and vehicles enter the project area. Equipment used during emergency work is exempt from the cleaning requirement. When working in known invasive plant infestations, equipment would be cleaned before moving to other National Forest System lands. These areas would be identified on project maps and delineated in the field with flagging.

28. Post-project monitoring: In areas with proposed ground disturbance activities, survey for new or spreading invasive plant infestations at least once during each of the following two growing seasons. New infestations will be treated according to project design features.

29. Gravel, fill, and other materials--All gravel, fill, or other materials are required to be weed-free. Use onsite sand, gravel, rock, or organic matter when possible. Otherwise, obtain weed-free materials from sources that have been certified as weed-free.

30. Mulch and topsoil--Use weed-free mulches and topsoil. Salvage topsoil from project area for use in onsite revegetation, unless contaminated with invasive species. Do not use material (or soil) from areas contaminated by cheat grass.

31. Revegetation—

a. Seed and plant mixes must be approved by Forest botanist. Seed lots would be tested for weed seed.

b. Persistent non-natives, such as timothy (*Phleum pretense*), orchardgrass (*Dactylis glomerata*), ryegrass (*Lolium* spp.), or crested wheatgrass (*Agropyron cristatum*) will not be used in revegetation.

c. Seed and plant material would be from native, high-elevation sources as much as possible. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed, and at a similar elevation whenever possible.

32. Treatment—The following infestations intersect with the proposed activity area and would be treated prior to implementation (within 30 days if possible). If additional infestations are identified prior to implementation, these would be evaluated for treatment. All treatments must comply with the management direction established in the 2010 Terrestrial Invasive Plant SpeciesTreatment Project (USFS 2010).

    a. Bull thistle (*Cirsium vulgare*): There are 50+ bull thistle infestations. Chemical treatment not authorized.

    b. Canada thistle (*Cirsium arvense*): There are three infestations (736B, 781, 861). Chemical treatment is preferred.

    c. St Johnswort (*Hypericum perforatum*): There are two known infestations (308A, 529). Chemical treatment is preferred.

    d. Scotch thistle (*Onopordum acanthium*): There are two infestations (467A, 900). Manual treatment is preferred.

Built Environment

33. Any system trails used for construction access would be returned to pre-project condition.
34. Construction near public facilities would be limited to weekdays, unless approved on a case-by-case basis.
35. No new permanent roads would be constructed.
36. STPUD infrastructure would be protected from damage during project activities. If a grade control structure surrounding the STPUD sewer line is constructed by STPUD, the structure would be designed as described in the proposed action and meet the performance standards listed in the proposed action. If the impact footprint (permanent structures and/or temporary construction access) extends outside of STPUD's permitted area, as described in permit ELD400806, these new undertakings would be authorized under the appropriate permit.

Heritage

37. Flag and avoid known Washoe heritage sites.
38. Provide advanced notice to Washoe Tribal site monitors to observe ground disturbing activities, including trenching and tree stump removal at specified locations.
39. Historic properties located within 82 feet of ground disturbing activities will be flagged for avoidance and monitored before and after the ground disturbing activities take place.
40. The Fallen Leaf lake dam (Anita Baldwin) will be maintained in accordance with the Secretary of the Interiors Standards and Guidelines for Rehabilitation.

Recreation

41. Prepare a traffic safety and control plan prior to commencing project implementation. The plan would provide for public safety on Forest Service controlled roads and trails open to public travel.
42. Only consider a temporary forest closure during the project activity period when public safety concerns exist. Closure would be as limited as possible to reduce restrictions to public access.

43. Provide advanced notice to the public and area permittees to ensure that they are aware of proposed project activity, including tree removal. Post signs in project areas near public access points to highlight the proposed action and impacts to public access.
44. Maintain recreational facilities in a usable condition to the extent possible unless there is a concern for human health and safety and/or project implementation is impeded.
45. Coordinate with permittee about proposed construction schedule prior to implementation.

Wildlife

46. Maintain Limited Operating Periods (LOP) for federal, state, and TRPA listed species if/when it is determined that permitted activities would occur within a PAC, or disturbance or buffer zone. If LOPs are updated prior to implementation and/or if Threatened, Endangered, Candidate, or Proposed species, or other protected species are added to the list of protected wildlife, the project would maintain the most current LOPs and maintain the most current list of protected species. LOPs may be waived or added. Currently required LOPs include:
    a. A goshawk LOP would be in effect February 15 through September 15 for the Northern goshawk threshold zone (which encompasses the Spring Creek PAC) if the species is nesting. Conduct surveys for goshawk prior to but during the same season as aquatic invasive species removal activities.
    b. A willow flycatcher LOP will be in effect from June 1 through August 15 in the areas shown in Figure 4 if detected during surveys. Conduct surveys for willow flycatcher prior to but within the same season as any implementation activities that occur in Tallac or Taylor Creek willow flycatcher sites.
    c. A bald eagle wintering area LOP will be in effect from October 15 through March 15 in the designated bald eagle wintering area (Figure 4).
    d. An osprey LOP will be in effect March 1-August 15 within the disturbance zones of FLL18, FLL19, FLL21, SLT06, SLT08, and SLT18 nests if nesting (Figure 4). Use the most current data on osprey nesting status from TRPA.
47. Retain nest trees for Forest Service Sensitive, state, and TRPA Special Interest Species.
48. All trash created during construction will be properly contained (wildlife-resistant containers) or removed at the end of each day.
49. In order to protect migratory birds, any project activity that requires removal of trees and shrubs should be conducted outside the avian nesting season (April 1 through August 15) unless a qualified biologist determines that no nesting is occurring. To determine nesting, conduct a focused survey for active nest sites of birds within a 1/8 mile radius of removal location prior to the onset of construction activities during the nesting season (i.e. within 15 days). If active nests are located during the preconstruction surveys a buffer would be placed around the nest. The buffer would be implemented until the juveniles fledge or the adults abandon the site if the nest fails. The size of the buffer would depend on various factors such as vegetation and topographic screening and the type of project activities in the nest's vicinity.
50. Salvage/retain large trees outside of heavily used recreation areas for wildlife habitat, future large wood recruitment, and to create snags in the future, unless removal is necessary to meet proposed action.
51. Install specifically designed wildlife-resistant garbage containers in the upgraded picnic area.

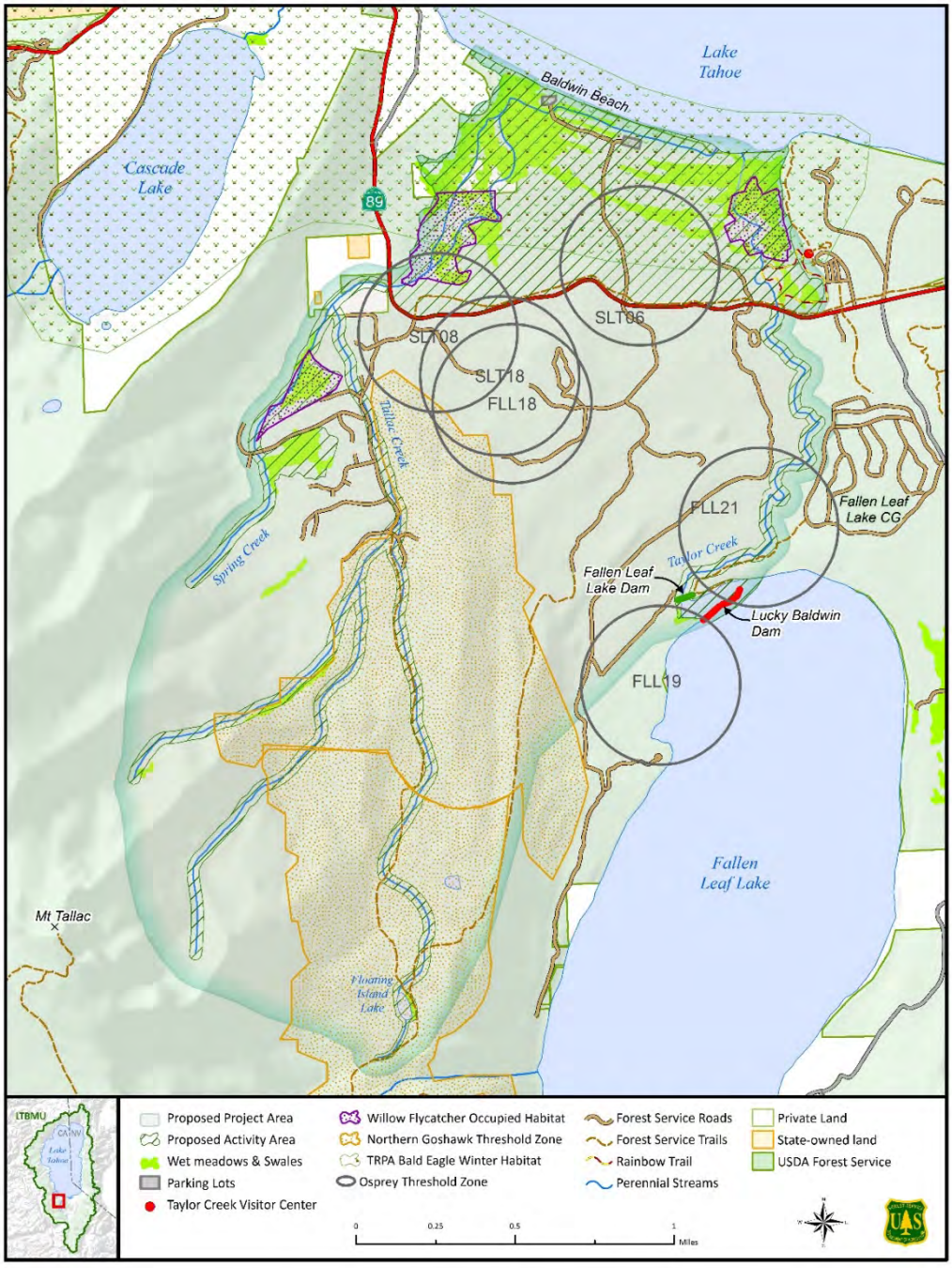

Figure 4. Potentially sensitive terrestrial wildlife resources in the proposed project area.

Chapter 3 – Environmental Consequences

This section summarizes the potential environmental consequences of implementing the proposed action (as compared to the no action alternative) on resources in the affected project area. For each resource area (e.g., aquatics, botany) the description of consequences is organized by issue, rule, analysis, and conclusion. The issue is the specific resource of concern (e.g., fine sediment movement) where there is a notable difference between consequences from the no action and proposed action alternatives or where there has been concern expressed by commenters during the scoping period. The rule is the measure of that resource and the acceptable limits that are used to affirm or deny significant effects. The analysis for each resource are the results or findings. The conclusion is the clear interpretation of the analysis in the context of significance or importance of the environmental consequences.

The analysis of environmental consequences focuses primarily on long-term consequences of the proposed action and no action alternative. Short term impacts from implementation are discussed where relevant but would be mitigated by project design features and BMPs.

The following resource specialist reports prepared for this project are incorporated by reference in this EA: Aquatic Wildlife Biological Evaluation/Biological Assessment (BE/BA), Botany BE, Invasive Plant Species Risk Assessment, Other Botanical Resources Assessment, Hydrology report, Terrestrial Wildlife BE/BA, Management Indicator Species and Migratory Landbird Conservation reports, and cultural resource input including the letter submitted to State Historic Preservation Officer regarding the Lucky Baldwin Dam effect assessment. These reports are available for review as part of the Project Record.

3.1 Assumptions

The future cannot be always be precisely known or quantifiable. Situations may change that are unforeseeable and outside the control of the Forest Service. For example, the price of gas may alter visitation patterns. It is not possible or useful to describe every possible future scenario. Therefore, the environmental consequences rely on the following assumptions:

- The proposed action and analyses are based on lake level conditions after the installation of the Lake Tahoe dam in 1874 (current configuration 1913).
- Visitation to the Lake Tahoe Basin and this recreation area will remain about the same as the last decade.
- There will continue to be fluctuations in hydrologic conditions of the area but overall the change will not vary dramatically over the next ten years from current conditions.
- The Forest Service and partners or other agencies implementing the work have the relevant experience to conduct this work, and the engineering knowledge and technology is available to construct the project to meet the stated performance standards. The project will be constructed to the standards described in this document.
- Activities would be strategically phased over time as needed.
- The implementation of other projects planned within the proposed project area will not substantially change the existing conditions

3.2 Consequences by Resource

3.2.1 Hydrology

Background

1) Water flow characteristics/ hydrologic connectivity- Historically, Taylor and Tallac Creeks were connected in the project area through a series of lake-influenced swales that formed a large wetland complex, depending on lake level and spring flows. These swales are now hydrologically disconnected from Tallac creek flows due to channel incision, which created a new dominant flow path out to Lake Tahoe, directing Tallac Creek flows past the swales. This flow path has been in existence since at least 1940 (per 1940 aerial photo) and is believed to have resulted from a variety of impacts associated with a historic dairy operation, cattle grazing, road construction, and water diversions. Channel incision has continued to occur as a result of continued adjustment of the channel in response to fluctuating lake levels. The continued incision has exposed the top of the sewer line crossing Tallac Creek that was installed in 1972. When flows do enter the swales during high lake levels, swale flow circulation is affected by undersized culverts, which were installed in the 1950's and 1960's. The degraded hydrologic condition alters the hydrologic connectivity which in turn effects water temperature.

The Lucky Baldwin dam (Figure 3) restricts mixing of water in Fallen Leaf Lake, particularly during times of the year when lake levels are low, and the retained (pooled) water between Lucky Baldwin dam and Taylor Creek (Fallen Leaf Lake Lagoon; Figure 3). The disconnected hydrologic condition is likely creating unnaturally warm water temperatures in Fallen Leaf Lake Lagoon and in-stream flow releases into Taylor Creek. Please refer to the Hydrology/Soils Specialist Report in the Project Record for a much more in depth background discussion.

2) Impact to soil, water, and riparian resources/water quality: The project proposes numerous activities that involve directly working in and adjacent to stream channels and stream environment zones. The USDA Forest Service has developed National and Regional Guidance for the planning, design, and implementation of soil, water and riparian resource protection best management practices (BMPs) (USDA 2011, 2012). This guidance provides the foundation for managing USFS activities in a manner that is protective of soil, water, and riparian resources and is included in the proposed action as design features.

Resource Concerns

1) Existing hydrologic condition has resulted in degraded hydrologic connectivity which has influenced the water temperature in Taylor Creek and wetland swales.

2) Impact of the project on soil, water, and riparian resources along with compliance with water quality pollutant reduction targets established in the Lake Tahoe Total Maximum Daily Load (TMDL) for upland source areas and stream channels (EPA 2010).

Rule

The indicators and measures used to measure environmental consequences are described below.

1) Water flow characteristic/Hydrologic connectivity – Analysis involves identifying changes in frequency, duration, and extent of 1) tributary surface flow discharges into adjacent swales and adjacent wetlands, 2) connectivity of Fallen Leaf Lake water to Taylor Creek flows. Analysis focuses particularly on changes during late summer, in prolonged periods of

drought, when lake levels are low, and how water flow characteristics may affect water temperatures in wetlands swales and Taylor Creek.

2) **Impact to soil, water, and riparian resources/water quality:** Analysis looks at increased resiliency of stream channels and wetlands to high flow events, and mitigation of potential inputs of fine sediment/nutrients to Lake Tahoe, as a result of proposed action.

Analysis

1) **Water Flow Characteristics/Hydrologic Connectivity**

a) Tributary surface flows to wetland swales

Existing and restored wetland water levels were analyzed using LiDAR data, lake levels (based on period of record surface water elevations between 1900 and 2003), and estimates of flow through topographic controls that dictate wetland water surface. Flow estimates were obtained from the flood frequency, hydraulic modeling, and bankfull indicator analysis presented in the Ecosystem Assessment Report (EDAW 2005). Wetland water level analysis was conducted on calculated average base flows[5] and bankfull flows between median, and low lake levels. Average base flows are the low tributary stream flows that persist throughout the summer after the cessation of snowmelt runoff. The timing of when spring runoff flow ends, and base flows start, varies depending on climatic conditions but generally occurs between mid – June to mid – July and persist typically through September. Bankfull flows are those that are predicted to occur at a range of 1.5 to 2 year recurrent interval, and are the volume at which stream channel flows begin to overtop channel banks into the adjacent floodplain.

No LiDAR analysis was conducted for lake levels greater than the median lake level of 6227 feet, because during these conditions Lake Tahoe exerts an overwhelmingly dominant influence on water flow characteristics in swale 1 and the lower half of the Taylor/Tallac wetland (EDAW 2005). Therefore it is assumed that restoration actions will have a neutral impact on water flow characteristics during the 50 percent of the time Lake Tahoe levels are above the median surface elevation (6,226.8 ft. as measured at the USGS lake level gage at Tahoe City). The discussion below describes and illustrate the changes in water flow characteristics between the existing conditions and the proposed actions during the 50 percent of the time when Lake Tahoe is below median surface elevations. For the analysis below, it is assumed that an outlet/inlet exists between swale one and Taylor Creek under the proposed action.

Bankfull flows (50 cubic feet per second (cfs) Tallac Creek, 282 cfs Taylor Creek)

Upper Range - median lake levels (6,226.8 feet). At median lake level, the lake still exerts a dominant influence on water flow characteristics; however, restoration actions start to exert some influence over the amount of ponded water that appears within the wetland. Under the existing conditions water is present within the full length of swale one, however there is no outlet into Taylor Creek (Figure 5). Water is completely stagnant and not moving. As a result of the proposed action the area of ponded[6] water within swale 1 and the wetland increases from 38 acres under current conditions to 55 acres following restoration (Figure 6).

[5] Base flows: tributary stream flows that persist throughout the summer after the cessation of snowmelt runoff in the spring.
[6] Ponded water within both the stream channel and wetland are areas that exhibit very little to no visible flow velocity.

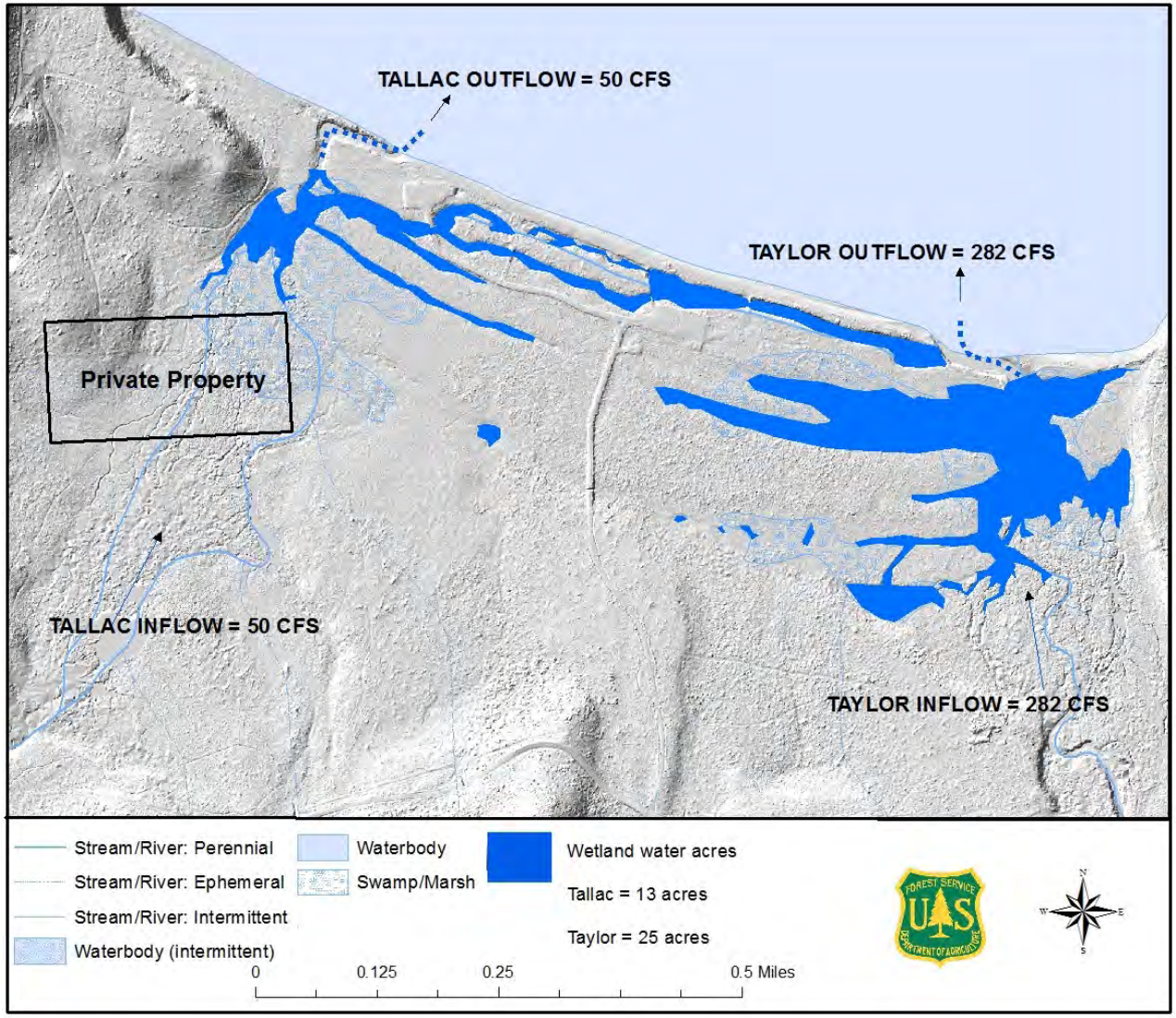

Figure 5. Existing wetland water area at bankfull flow at median lake level (elevation 6226.8 feet, U.S. Geological Survey water level datum).

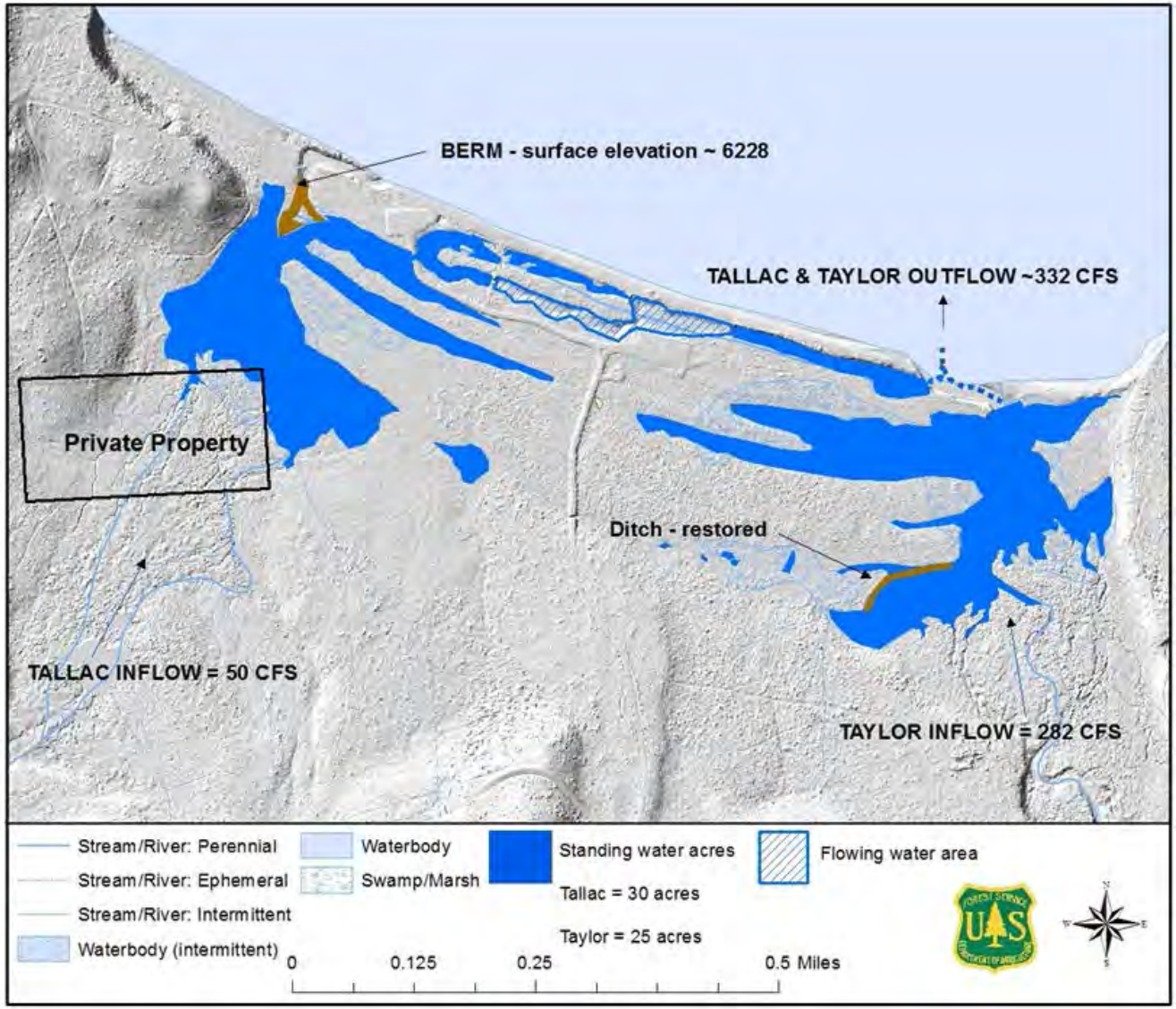

Figure 6. Restored wetland water area at bankfull flow at median lake level (elevation 6226.8 feet, U.S., Geological Survey water level datum).

Lower Range -low lake levels (6,224 feet and below). Historically lake levels at our below this elevation have occurred 20 percent of the time over the period of record. At low lake levels, Lake Tahoe provides no water to the swale one or the Taylor/Tallac wetland. Under existing conditions Tallac Creek bankfull flow does provide some water to swale one, but the water is not moving (Figure 7). As a result of the proposed action, the amount of ponded water within swale 1 and the wetland increases from 7 acres under current conditions to 16 acres following restoration (Figure 8).

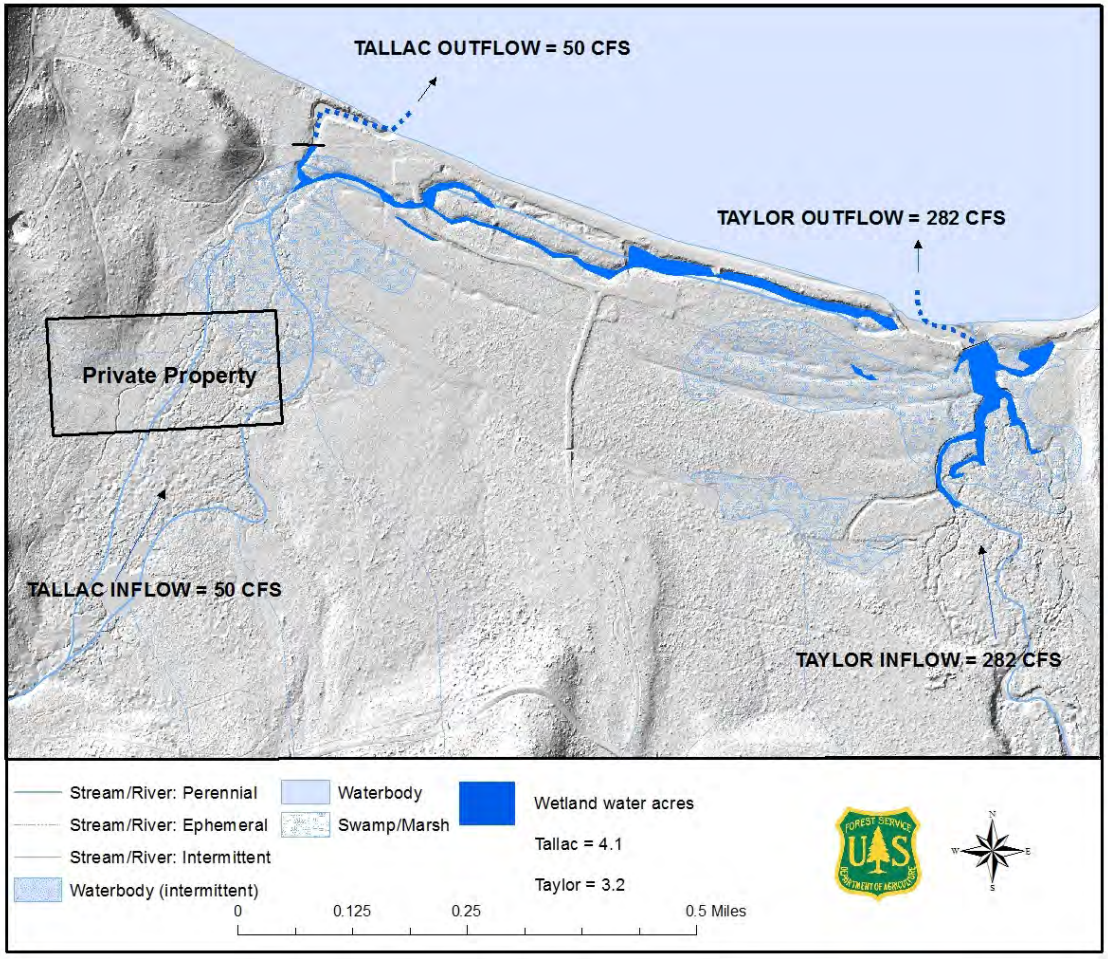

Figure 7. Existing wetland water area at bankfull flow at low lake level (below elevation 6224.0 feet, U.S. Geological Survey water level datum).

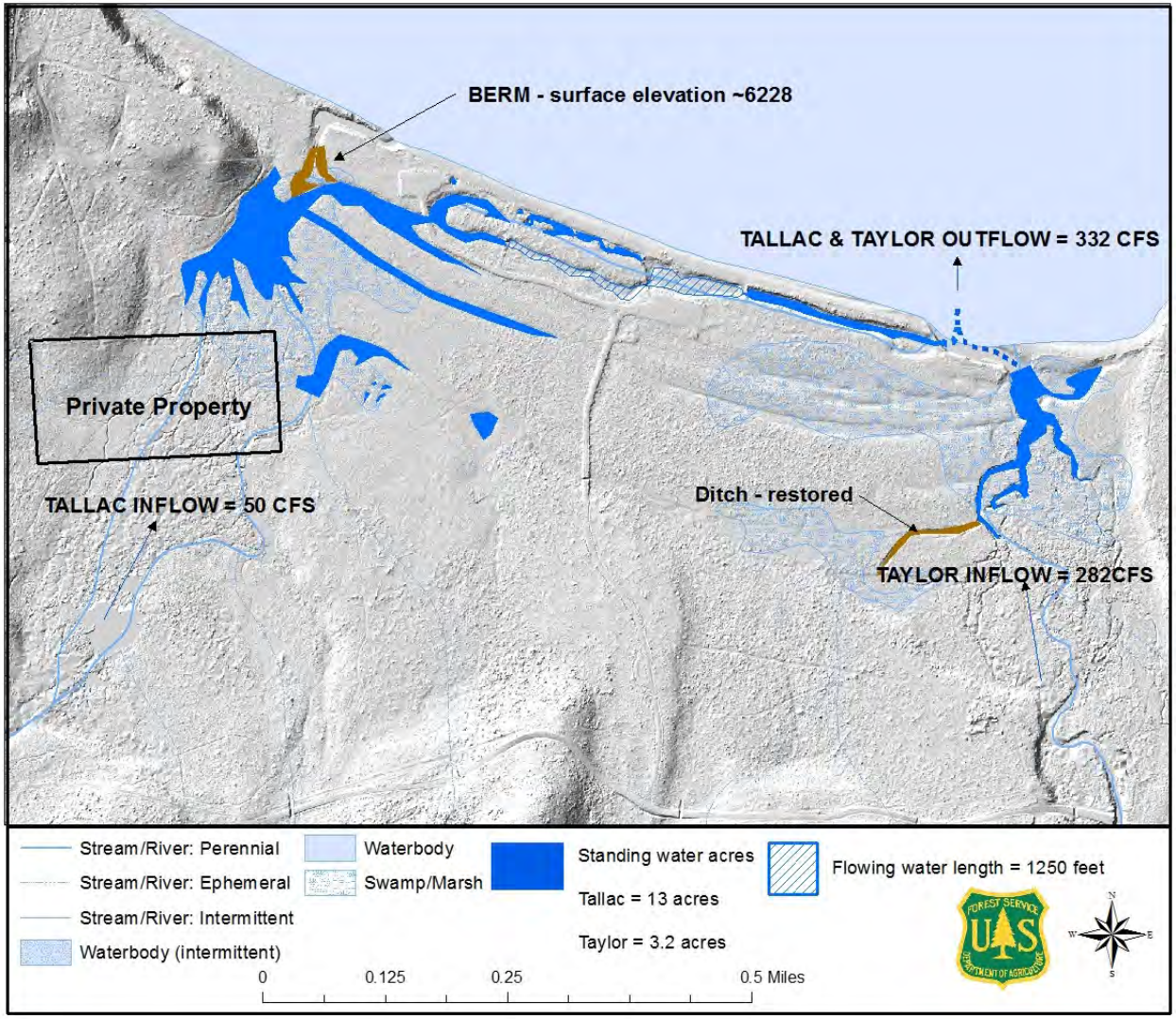

Figure 8. Restored wetland water area at bankfull flow at low lake level (below elevation 6224.0, U.S. Geological Survey water level datum).

Average annual base flows (3 cfs Tallac Creek, 7 cfs Taylor Creek)

Upper Range - median lake levels. Under the existing condition water is present in much of Swale 1. However again this water is stagnant and not moving (Figure 9). As a result of the proposed action, the area of ponded water in swale 1 and the wetland increases slightly from 23 acres under current conditions to 25 acres following restoration (Figure 10).

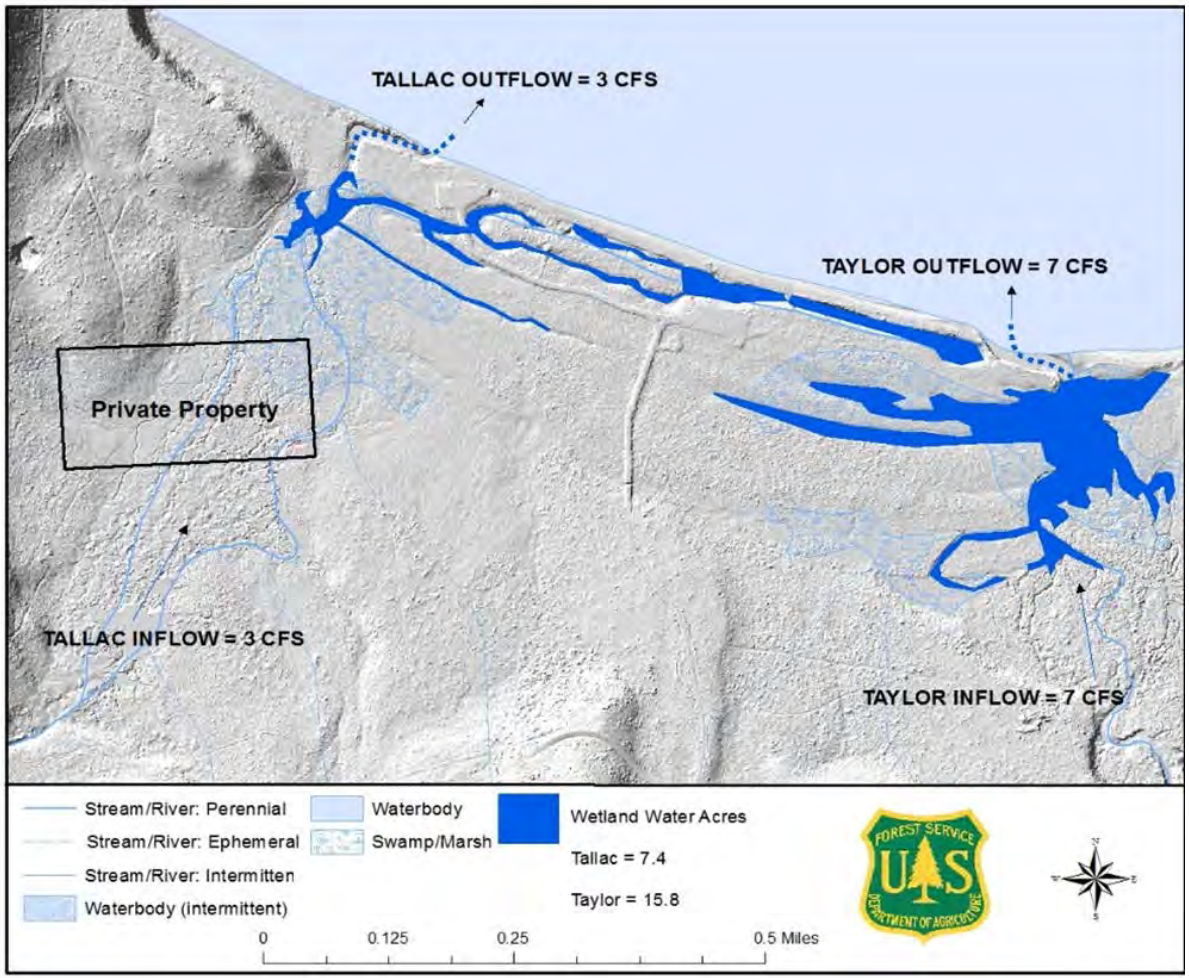

Figure 9. Existing wetland water area at base flow at median lake level (elevation 6226.8 feet, U.S. Geological Survey water level datum).

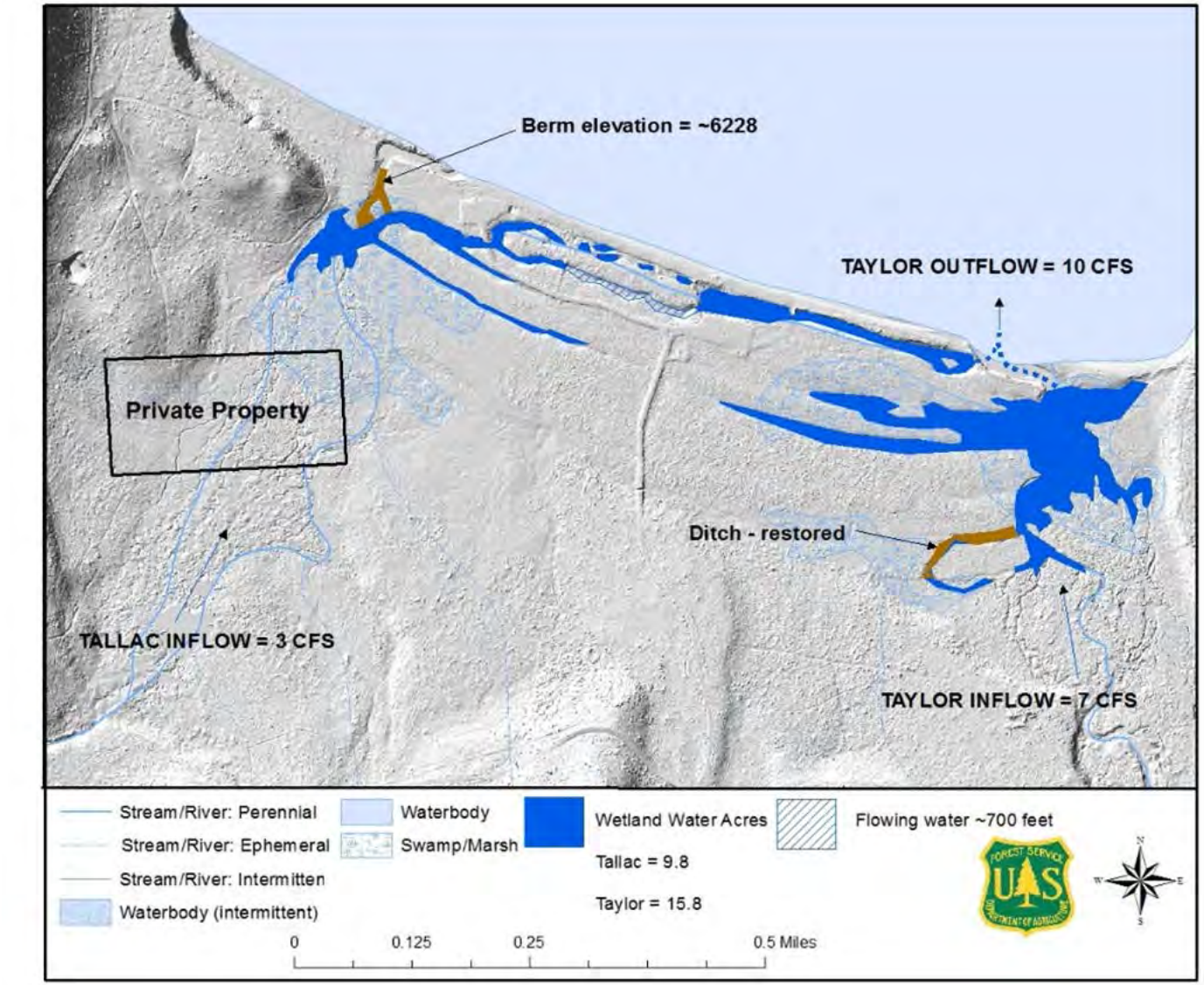

Figure 10. Restored wetland water area at base flow at median lake level (elevation 6226.8 feet, U.S. Geological Survey water level datum).

Lower Range - low lake levels. Under the existing condition very little water is present in Swale 1 (Figure 11). As a result of the proposed action the area of ponded water in swale 1 and the wetland increases from 1 acre under current condition to seven acres following restoration (Figure 12).

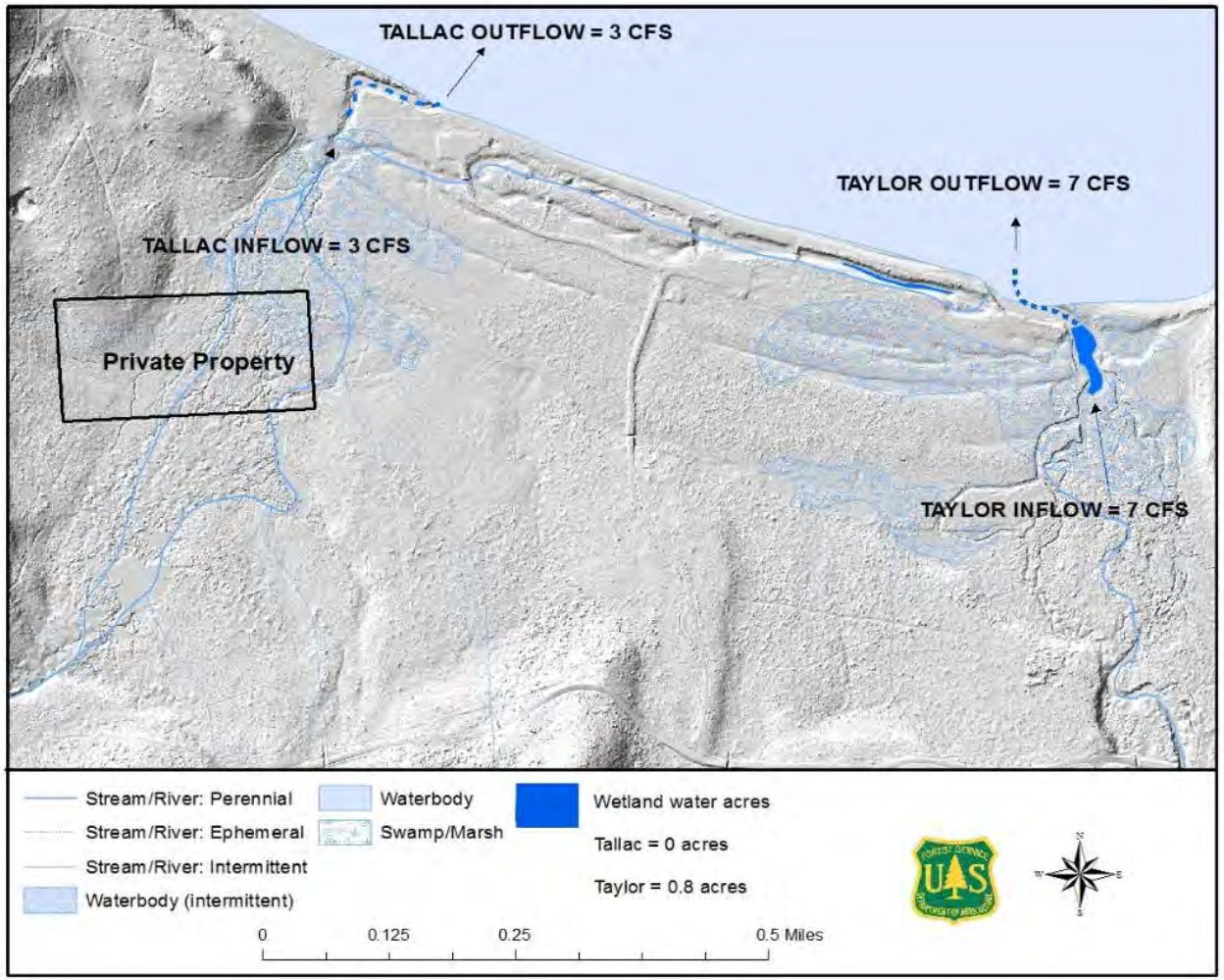

Figure 11. Existing wetland water area at base flow at low lake level (below elevation 6224.0 feet, U.S. Geological Survey water level datum).

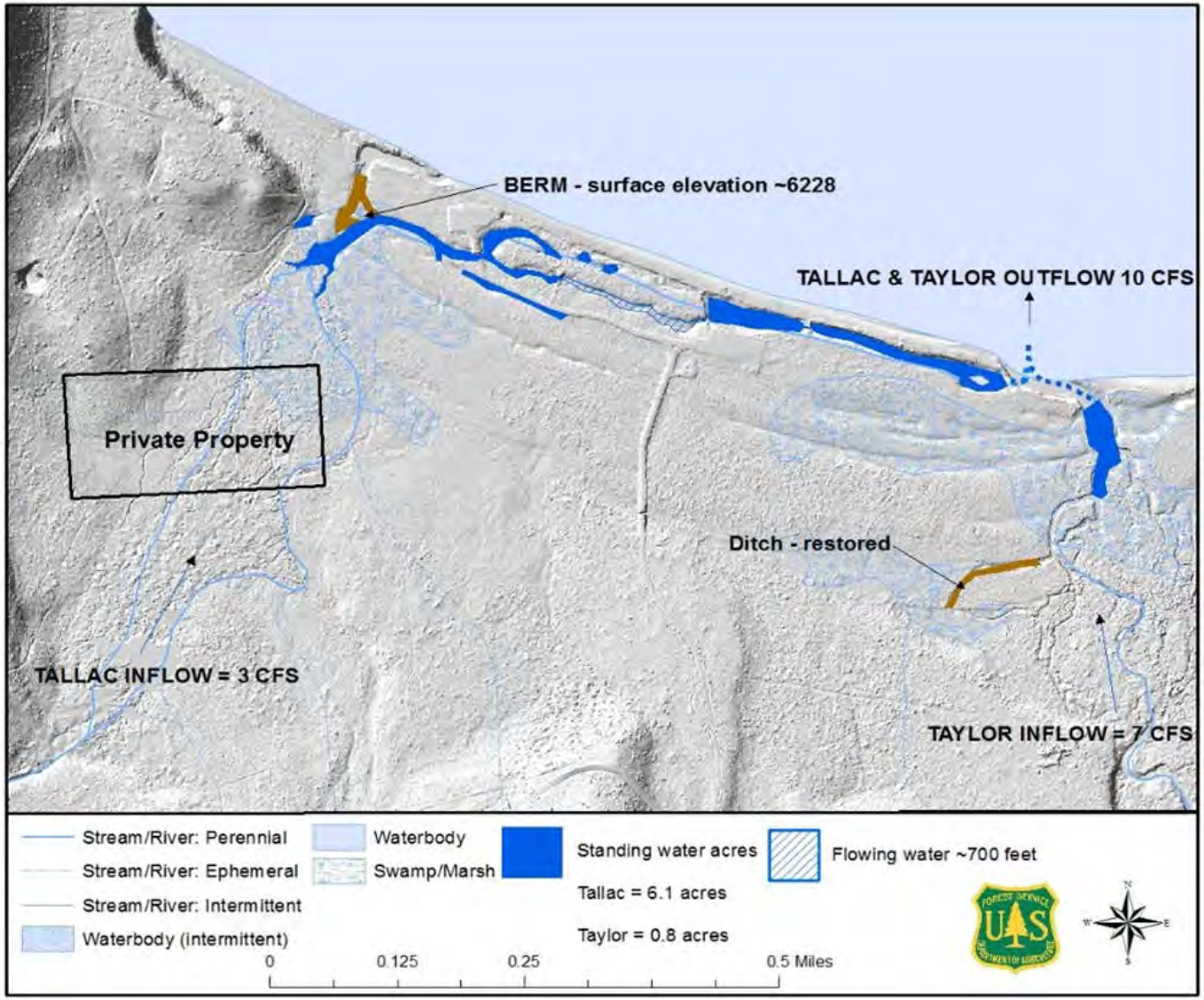

Figure 12. Restored wetland water area at base flow at low lake level (elevation 6224.0, U.S. Geological Survey water level datum).

Flow Velocity

Under all lake levels and tributary flow conditions described above, under existing conditions when water is present in swale 1, it is stagnant and not moving. After restoration actions, under all lake levels and flow conditions restoration actions result in the creation of 1,250 linear feet of visibly flowing water in swale 1. Both the redirection of flow into swale 1, as well as restoration of the road crossings contribute to this result. If the road crossing improvements were not implemented, there would continue to be a restriction in hydrologic connectivity from the undersized existing culvert crossings.

Water Flow Design Limitations

Swale 1 restoration actions do have important design limitations due to existing infrastructure. They are 1) bankfull flows must not inundate the private grazing pasture inholding upstream and 2) restoration shall not cause undesired flooding of the existing and proposed recreational infrastructure. Modeling results indicate that the berm should be constructed to a surface elevation of roughly 6,228 feet (U.S. Geological Survey water level datum). This height would ensure that water begins flowing over the berm at around 50 cfs. This will provide backwater relief and keep water from inundating the floodplain at the median lake level; providing that the sand berm between the swale 1 and Taylor Creek has breached

In the event that breaching does not occur naturally and the inholding is threatened by inundation, the sand berm between the swale 1 and Taylor would be breached manually. Modeling also shows that recreational infrastructure (roads and parking lots) will not be impacted by swale restoration, since they are several feet above predicted surface water levels for peak flows at median lake levels.

Groundwater Levels

The EDAW (2005) analysis of ground water levels indicates that groundwater elevations ranged from 2.8 feet to 5 feet below the wetland ground surface between swales 3 and 1 (see Hydrology/Soils Specialist Report in the Project Record for the graph). This data was collected for a very short period (November 2002 through September of 2003), and lakes levels were in the low range (around 6,224 feet) during this period. This ground water data indicates that at low lake levels groundwater levels decreases steadily as you get closer to the lake. The EDAW report concludes that low lake levels have a relatively small region of influence on meadow groundwater, and likely exerts a greater influence as lake level rises.

The analysis of surface flows presented above indicate that during low lake levels, restoration will likely supply more water to swale 1 and portions of the wetland throughout the year. However the soils within the swales and adjacent to the swales are highly porous, and it is unknown to what degree the rate of inflow will exceed the rate of seepage underneath these ponded water areas. We do not anticipate that restoration will result in significant changes in overall groundwater levels. We do expect that subsurface flows between surface water elevations and the groundwater table will be increased, in areas below and immediately adjacent to the ponded water areas (Figures 6, 8, 10 and 12). However we do not expect contribution to subsurface flows to extend very far laterally adjacent to the ponded water areas, or have an influence on groundwater levels, because of the porous nature of the beach soils in this area.

Overall the proposed action restores water flow characteristics/hydrologic connectivity between Fallen Leaf Lake, Taylor and Tallac stream channels and wetland swales.

b) Fallen Leaf Lake to Taylor Creek

Decrease circulation of water within the Fallen Leaf Lake Lagoon (and the outlet to Taylor Creek (Figure 3)), occurs when surface elevation of Fallen Leaf lake get closer to 2.9 feet as measured at the Fallen Leaf lake gauge. This is the lake elevation that correlates with the surface elevation of the intact fill material of the Lucky Baldwin Dam. The concrete portions of the Lucky Baldwin Dam above this fill material is currently in place on approximately 60 percent of the dam length and further restricts circulation of water. These conditions allow movement only of water at the lake surface down to 2.9 feet, which would be warmer than lake water below 2.9 feet.

Based on analysis presented in the Hydrology/Soils Specialist Report (Project Record) lake levels measured at Fallen Leaf Lake gauge from 2009 through 2015 ranged between 2.4 to 4.3 feet between July and September. Therefore, at the most only 2.4 feet of upper lake surface water circulates through the 40 percent of the Lucky Baldwin Dam where the concrete portion no longer is in place. In 4 out of these 7 years, there were periods of time between July and September where water surface elevations were below 2.9 feet; therefore, surface flow is restricted to the 30 foot wide spillway, which has a bottom elevation of 1.9 feet.

Decreased circulation contributes to increasing the water temperatures within the Fallen Leaf Lake Lagoon and outflows to Taylor Creek. During 2014 and 2015 water temperatures in Taylor Creek frequently exceeded the desired threshold of 68°F during July and August. Please see Aquatic Resources section for more information regarding Taylor Creek water temperatures and impacts to aquatic species.

Implementing the proposed action to remove portions of the Lucky Baldwin dam fill material to the historic lake bottom, will increase circulation of water between Fallen Leaf Lake and the Fallen Leaf Lake Lagoon, ensure water temperature in the lagoon is closer to the temperature of Fallen Leaf Lake, and reduce temperature of flows entering into Taylor Creek.

2) Soil, water, and riparian resources/water quality:

The proposed actions for this project related to channel restoration are expected to result in channels that are more resistant to future channel erosion. Because channels within the project area are considered to be stable in terms of rates of bed and bank erosion (EDAW 2005), the expected benefits in terms of channel stability are considered to be relatively minor in scale, but may be more important in the long term if climate change results in more bed and bank erosion as a result of increased flood intensity.

Overall channel structural stability is expected to be increased along several segments totaling 850 feet of upper Taylor Creek (upstream of Highway 89), where additional large wood placements are proposed. Channel stability is also expected to increase along a 300 foot section of Tallac Creek at the Lake Tahoe outlet. In the event that no action is taken, channel stability conditions in Taylor Creek will probably not change much; however, if restoration does not occur on Tallac Creek, a large scale flood may leave the Tallac Creek outlet and the sewer line crossing more vulnerable to erosion than under the proposed action.

In addition, the proposed action to block the current outlet of the Tallac Creek channel, and restore flows up to 50 cfs to its historic alignment is expected to result in a slight improvement to the water quality of Tallac Creek. This would occur through the increase in natural filtration of fine sediments and nutrients transported in Tallac Creek channel flows to the wetland swales, compared to the existing condition. The scale of this benefit is expected to be relatively minor given the good channel function and long term persistence of beaver dams upstream of the wetland, which modulate sediment coming in to Upper Tallac Creek.

Project activities will be designed to minimize ground disturbing activity, and any temporary disturbance created during restoration activities would be mitigated, through the application of BMPs, following USDA Forest Service National and Regional Guidance documents. The BMP guidance that is relevant to this project are described in the proposed action.

This BMP guidance has been identified in this document as part of planning, but the guidance is also meant to be used during project design and implementation, as additional project specific soil and water protection measures are developed and incorporated in project implementation documents (including designs, contracts, and regulatory permits).

Stream channel restoration work by its nature does represent a risk related to temporary discharges of sediment and associated nutrients to downstream waterbodies during implementation. In addition, if the restoration approach is flawed, this could result in undesired longer term discharges.

Because of the proximity of much of the proposed stream channel restoration activity to Lake Tahoe the risk of transport of pollutants does exist. However in addition to the application of BMPs and Design Features, the following factors reduce the potential for significant pollutant generation.

1) The total area of ground disturbing activity is relatively small. The maximum amount of disturbance for restoration actions with direct connectivity to stream channels/Fallen Leaf Lake in the project area is approximately 8 acres (see Hydrology/Soils Specialist Report in the Project Record for breakdown of disturbance estimates).
2) The soils that will be disturbed are resistant to compaction and contain very little fine sediments. Surface soils in the Taylor Tallac wetland are classified as beach sands, mucky silt loams, and wetland peat. Displacement of silt loams and peat soils will be avoided wherever possible by strategic placement of access paths and strict construction area limits. In cases where sensitive soils cannot be avoided, additional BMPs (steel plates to distribute the force of the machinery for example) would be used to reduce compaction. Beach sands are naturally unsusceptible to compaction. The manual or natural breach of the swale 1 sand berm at Taylor creek will displace roughly 20 cubic yards of coarse beach sands. Beach sands contain very little fine sediment (up to a maximum of 10.5 percent silts and clays). See Hydrology/Soils Specialist Report in the Project Record for more information on soil classifications in the project area.
3) Because of relatively flat stream and surface slopes (generally less than 0.3 percent), the transport potential during active construction will be very low.

Conclusions

The proposed action would:

- Increase ponded water in the wetland from the current range of 1 acre to 38 acres depending on lake level and stream flows to a range of 8 acres to 55 acres.
- Result in the creation of 1,250 linear feet of visibly flowing water in swale 1 during favorable hydrologic conditions.
- Increase the extent, duration, and frequency of ponded water within the Taylor/Tallac wetland during the 50 percent of time when lake water surface elevations are at median levels and below.
- Decrease the water temperatures of Taylor Creek and wetland ponded water and surface flows when compared to the existing conditions.
- Have little effect on groundwater levels.
- Ensure that temperatures in the Fallen Leaf Lake Lagoon are similar to the main body of Fallen Leaf Lake. Resulting in cooler water temperature of flows entering Taylor creek.
- Result in minor improvements to stream stability that contribute to resiliency in light of changes predicted by climate change, and/or major hydrologic events (e.g. flooding).
- Limit adverse impacts to soil, water and riparian resources from restoration activities to less than significant, and contribute to water quality pollutant reduction targets established in the Lake Tahoe Total Maximum Daily Load (TMDL) for upland source areas and stream channels (EPA 2010).

3.2.2 Climate Change

This section first presents a general overview of the climate change projections for the Lake Tahoe Basin. Then secondly, focuses on the relationship of regional changes to the Taylor and Tallac project. Finally, the section addresses the potential for the proposed project to influence greenhouse gases per CEQA requirements.

Temperature

Over the last 81 years (1930-2011), mean annual, mean maximum, and mean minimum (i.e., nighttime) temperatures in the Lake Tahoe Basin have each risen by about two degrees Fahrenheit (Safford and Sawyer 2012). The average number of days in a year on which the average air temperature remains below freezing has dropped by 27 days from 78 to 51 since 1910 (Safford and Sawyer 2012). Increasing annual temperatures are consistent with other climate analyses both in the southern Sierra Nevada (Edwards and Redmond 2011, Gonzalez 2012) and at higher elevations in the region (Diaz and Eischeid 2007, Das and Stephenson 2012). However, the Lake Tahoe Basin rise in nighttime temperatures is higher than in many California locations and may be linked to the thermal mass of Lake Tahoe, whose surface waters have increased in temperature by one degree F in the last 25 years (TERC 2008).

Downscaled climate models for the Lake Tahoe Basin suggest that under the scenario in which there is a strong increase in greenhouse gases, Coats (2010) found that the models suggest strong upward trends in maximum and minimum temperatures, with an increase of up to 9°F for the Lake Tahoe Basin by 2100 (Coats 2010). This increase in temperature is the equivalent of dropping the elevation of the Lake Tahoe Basin by over 2500 feet.

Precipitation

Mean annual and mean seasonal precipitation has shown no significant change over the last century (1910-2012) (Safford and Sawyer 2012). However, year-to-year variability in precipitation has increased over the course of the last century: nine of the 20 wettest years have occurred since 1980 and recent drought years 2007, 2008 and 2012-2015 are among the ten driest years on record (Safford and Sawyer 2012). Mean annual snowfall has not changed significantly over the last century (TERC 2008), though the non-significant positive trend in precipitation combined with the non-significant negative trend in snowfall suggests that the proportion of precipitation falling as snow (vs. rain) is decreasing. At the beginning of the last century, about 54% of precipitation fell as snow, today the average is about 35% (Safford and Sawyer 2012). Snowpack measurements show a strong downward trend across northern California over the last half century, with the Sierra Nevada near Lake Tahoe experiencing decreases of >70% in snow water equivalent (the amount of water contained in the snow) in many places (Moser et al. 2009).

Modeled climate scenarios with a strong increase in greenhouse gases and temperature show a slight drying trend in annual precipitation (Coats 2010). However, future climate scenarios project a continuing shift from snowfall to rain (from about 35% snowfall currently to 10-18% by 2100) (Coats 2010). Current snowpack duration in the Lake Tahoe Basin is between 240 and 250 days. Climate scenarios with a strong increase in greenhouse gases and temperature project a mean snowpack duration of only 184 days by the last third of the 21st century (Coats 2010).

Hydrology

Over the last half-century, peak runoff/streamflow has shifted earlier in the year for many Sierra Nevada watersheds (Young et al. 2009, McCabe and Clark 2005, Regonda et al. 2005, Stewart et al. 2005) and there has been a decline in total spring runoff (Moser et al. 2009). March flows in Sierra Nevada streams were significantly higher by 3-10%, whereas June flows were mostly lower by the same amount, and overall spring and early summer streamflow was down in most studied streams (Stewart et al. 2005). Compared to 40-50 years ago, current peak snowmelt in the Lake Tahoe Basin is occurring 2 to 2½ weeks earlier (TERC 2008, Coats 2010). In the future timing of peak flow may be expected to advance by up to seven weeks by 2100 (Young et al. 2009) and runoff in the winter and early spring is predicted to be higher because higher temperatures cause snow to melt earlier (Miller et al. 2003).

In addition to temporal shifts, California has also exhibited one of the greatest increases in variability in streamflow in the Western U.S. since the 1980s (Pagano and Garen 2005). This increased variability, coupled with high year-to-year persistence (i.e. the probability that a wet year is followed by another wet

year, or a dry by a dry year) has resulted in extended and extreme dry and wet spells (Pagano and Garen 2005). This trend of increased variability in streamflow is predicted to increase with dramatic increases in flood magnitude and drought severity.

Under simulated future climate scenarios, all models predict greater flood magnitude and most predict greater flood frequency in both the Northern and Southern Sierra Nevada (Das et al. 2011). Flood potential in California rivers that are fed principally by snowmelt (e.g., streams in and around Lake Tahoe) was predicted to increase under all scenarios of climate change, principally due to earlier dates of peak daily flows and the increase in the proportion of precipitation falling as rain (Miller et al. 2003). Under the wettest climate scenario modeled by Miller et al. (2003), the volume of flow during the highest flow days could more than double in many Sierra Nevada rivers by 2100.

Warming temperatures are expected to extend the period of summer drought, and decrease flow magnitude in the dry months (Reba et al. 2011). Under future climate scenarios, Central Sierra Nevada watersheds are likely to experience extended periods of low flow conditions (Null et al. 2010). Climate scenarios with a strong increase in greenhouse gases and temperature project a loss in stream inflow into Lake Tahoe of 20-40% of baseline (average of 1967-1999) by 2100 (Coats 2010).

Aquatic

As air temperatures rise, water temperatures are expected to continue to warm as well, potentially resulting in local species extirpations, increased non-native species invasions, declines in macroinvertebrate communities, and temporal disruptions to spawning and larval life stages (Kaushal et al. 2010, Viers and Rheinheimer 2011). Those aquatic species with a competitive advantage in colder waters will also likely suffer losses due to both thermal stress and increased competition as water temperatures rise (Rahel et al. 2008, Kennedy et al. 2009). Salmonids may be particularly sensitive to warming water temperatures (ISAB 2007).

Taylor and Tallac Project Specific to Climate Change

Beneath these general trends, there is a lot of variation in the range of hydrologic response to climate change in the Sierra Nevada, due principally to variation in the locations and elevations of studied watersheds. Without more detailed field data and extensive hydrologic modeling coupled with future climate modeling it is challenging to identify specifics associated with how the proposed project may makes the system more resilient under future climate. However, we can make some generalizations that support the work making the system more resilient under future climate scenarios.

By increasing the area of ponded water, rather than having water move through a channel, the project will increase the extent of water and amount of time that the wetland remains saturated. When wetland soil reaches saturation it takes longer to drain, and therefore duration of wetness is increased. The project increases the area of saturation in portions of the project area (see Figures 5-12).

Swale restoration combined with channel stability work on Upper Taylor Creek (850 feet) and Tallac Creek (300 feet) will improve resilience to varying flows, which will be critical during years and seasons prone to future flooding.

As peak flow shifts earlier in the season water availability decreases during peak growing season for vegetation. Under future climate scenarios, meadows may experience a shift from wet meadow to dry meadow species, as well as encroachment by surrounding shrubs and trees (e.g., Ababneh and Wollfenden 2010). By increasing duration and extent of wetness, the project provides more resilience to wet meadow species and reduces the potential of dry meadow or forested conversion.

By improving flows (changing stagnant water in swales to 1250 feet of flowing water) and removing portions of the Lucky Baldwin dam, water temperature in Taylor Creek should trend towards being cooler than it otherwise would be. This is critical for aquatic resources as the temperature increases under future climate because native fish are adapted for colder water.

Greenhouse Gases

Greenhouse gases (GHGs) include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. During construction, the proposed project would temporarily cause GHG emissions from combustion of fossil fuels (i.e., diesel, gasoline) used to run construction equipment and vehicles, both onsite and offsite. Construction of all phases of the proposed project would occur over a several year period. During construction, a very small net increase in GHG emissions would result from engine exhaust from construction equipment and worker trips. The GHG emissions would predominantly occur as CO2 from diesel engine exhaust.

Although the proposed project would emit GHGs during construction, these emissions would be temporary. The proposed project does not include any permanent GHG emissions. In the context of statewide emissions, the proposed project's contribution to the global impact of climate change would not be substantial. Because construction-related impacts would be temporary and finite, GHG emissions related to the proposed project would be less than significant.

3.2.3 Aquatics

Background

Aquatic species rely on multiple aquatic habitats to fulfil various life history requirements including both lotic (stream) and lentic (wetland/marsh, lake, and pond) habitat. Many fishes may depend on two or more habitats during their annual or lifetime cycles (Moyle et al. 2013). For example, the adult stage of the native speckled dace (*Rhinichthys osculus*) and Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), require cold, clean, gravel habitat that is well oxygenated for reproduction and warm shallow water with cover such as large wood, boulders or emergent vegetation as juveniles (fry) (Moyle 2002). Amphibian species such as the native Sierra Nevada yellow-legged frogs (*Rana sierrae*), will utilize both lentic and lotic habitat as adults but typically rely on lentic habitat for reproduction.

The project area contains multiple habitat types (e.g. wetland, meadow, perennial stream) and provides known or potential habitat for the Sierra Nevada yellow-legged frogs (Federally Endangered), Lahontan cutthroat trout (Federally Threatened), and the Lahontan tui chub (Forest Service Sensitive).

Although no Sierra Nevada yellow-legged frogs have been detected, the project area contains approximately 490 acres of suitable habitat, as defined in the Programmatic Biological Opinion (December 19, 2014, Ref #:FFO8ESMFOO-2014-F-0557) and described in more detail in the Aquatic Biological Evaluation and Assessment (Project Record).

Lahontan cutthroat trout are known to occur in the project area (Table 2). A population occurs in Fallen Leaf Lake where spawning has been documented in Glen Alpine creek, which flows into Fallen Leaf Lake. Lahontan cutthroat trout have been stocked into Fallen Leaf Lake since 2005. There is no downstream barrier preventing Lahontan cutthroat trout migration from Fallen Leaf Lake into Taylor Creek; however, there is an upstream barrier (Fallen Leaf dam) that would prevent migration from Taylor Creek into Fallen Leaf Lake. Lahontan cutthroat trout were stocked in Lake Tahoe in 2011 and have been documented in adjacent streams. Individuals that survive predatory pressures in Lake Tahoe are expected to migrate upstream into creeks. Lahontan cutthroat trout have not been detected in Tallac Creek. Spawning habitat is limited in Tallac Creek; however, habitat exists for rearing habitat.

Multiple fish assessments of 27 streams in the Lake Tahoe basin were completed by the LTBMU in 2007, 2012, and 2014 as part of the Basin-wide Native Nongame Fish Assessment project (see Project Record for draft comprehensive report 2007-2014). This multi-year survey effort found that Taylor Creek had the highest diversity of all fish species (14 species), all native species (8), and all non-native species (6) (Table 1).

Table 2. Total catch of fishes in Taylor and Tallac creeks during the basin-wide native nongame fish assessment project 2007-2014.

Waterbody	Native species								Non-native game species			Non-native, invasive species		
	Lahontan cutthroat trout	Lahontan redside shiner	Lahontan tui chub	Mountain sucker	Mountain whitefish	Paiute sculpin	Speckled dace	Tahoe sucker	Brook trout	Brown trout	Rainbow trout	Bluegill	Brown bullhead	Goldfish
Tallac		557	2	5			651	6	685	6	4		39	
Taylor	2	4132	1	7	2	4	3940	259	44	1223	320	4	1245	1

The project area also supports a variety of native and non-native amphibian and reptile species (Table 3). Figure 13 indicates the current known distribution of aquatic invasive species in the project area. Many of these species are supported by the near stagnant water in swale 1 and at Taylor and Tallac Creek outlets to Lake Tahoe. The project area was surveyed in 2012-2014 (see project record for annual reports). The overwhelming majority of detections (3119 of 3143 detections, 99%) were American bullfrogs, especially tadpoles (2802 detections). Introduced bullfrogs have been implicated in the decline or displacement of many amphibians and a few reptiles. Bullfrogs are considered one of the most destructive invasive species, largely due to its rapid population growth and voracious and unspecialized feeding habits (Lowe et al. 2000, Kraus 2009, Jancowski and Orchard 2013). Bullfrogs develop nonlethal infections from chytridiomycosis, caused by the chytrid fungus (*Batrachochytrium dendrobatidis*) (Daszak et al. 2004). Chytrid fungus appears capable of infecting most all amphibian species and has been linked to significant populations declines (Fisher et al. 2009). The project area is considered a source bullfrog population for potential expansion. A source population is a site that has known breeding and a high potential for expansion to adjacent suitable habitat. LTBMU biologist presume that the number of bullfrog detections in this survey effort represent a small fraction of the current population.

Table 3. Amphibian and reptile detection in the project area from 2012 – 2014 survey efforts.

Native species				Non-native, invasive species		
Sierran treefrog adult	Sierran treefrog tadpole	Mountain garter snake	Valley garter snake	Bullfrog Adult	Bullfrog sub-adult	Bullfrog tadpole
1	21	1	1	152	165	2802

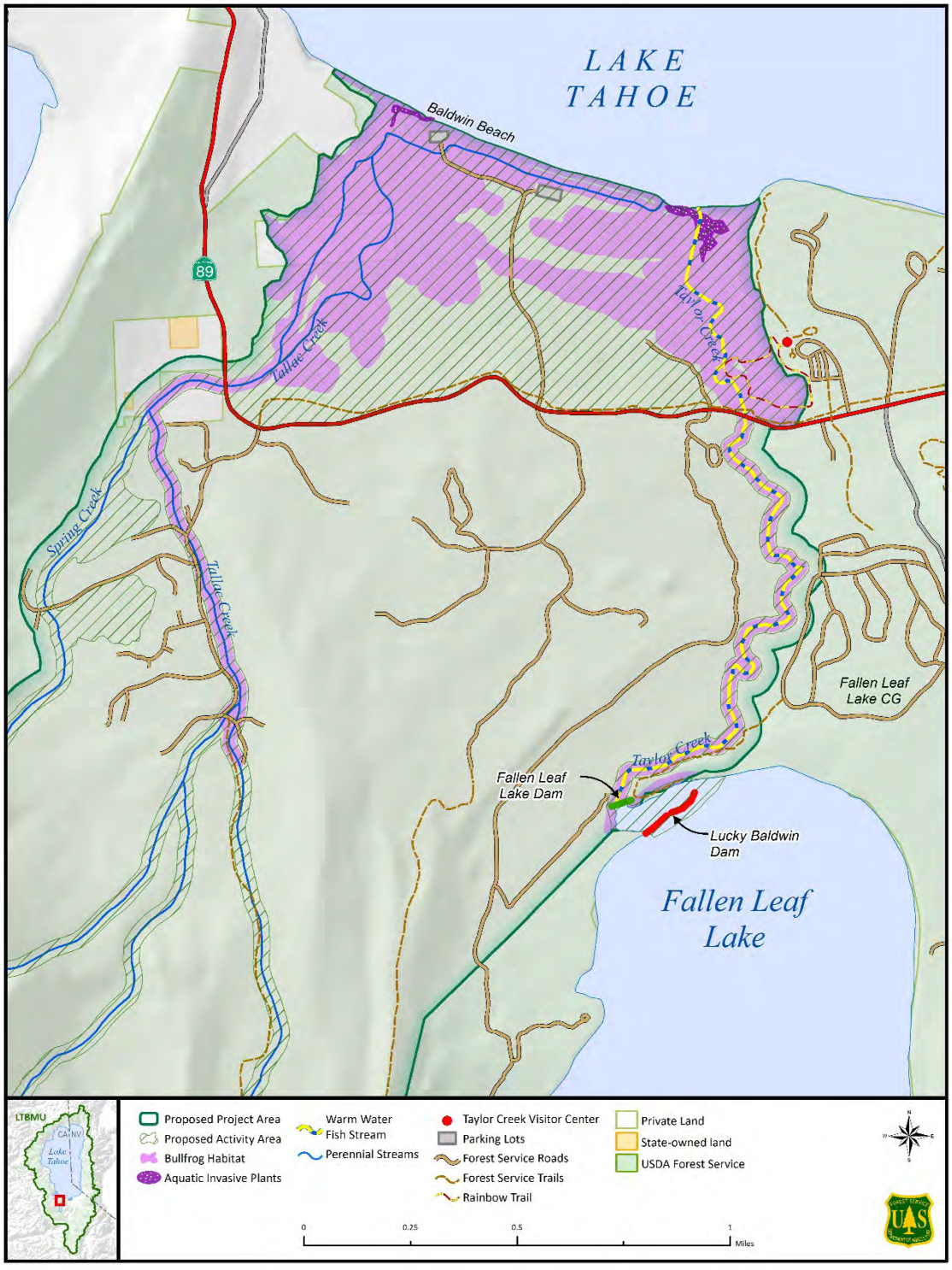

Figure 13. Current distribution of aquatic invasive species in the proposed project area.

The project area also supports various known infestations of warm water invasive fish and aquatic invasive plants (Table 4, see Figure 13). The water in both the swales and creeks (particularly Taylor Creek) are most likely warmer than historic conditions due to existing infrastructure (dams and culverts). This is confounded by drought conditions. Stream temperature data collected in Taylor Creek from 2014-2015 (see project record for data) depicts that temperatures exceeded 68°F (20°C) by early summer (Table 5). Temperatures above 68°F affect the success of reproduction, survival and growth of numerous native aquatic species but enhance preferred habitat for warm water invasive amphibians and fish.

Table 4. Quantity of habitat infested by aquatic invasive species within the Taylor and Tallac proposed project area.

	Bluegill	Brown Bullhead	American bullfrog	Eurasian watermilfoil	Curly leaf pondweed
Taylor	1 mile	2 mile	~30 acres/ 2 miles	~3.5 acres	<0.25
Tallac	0	0.5 mile	~300 acres/ 4.5 miles	unknown	unknown

Table 5. Taylor creek stream temperature (°F) from 7/2/2014-10/29/2015.

Year	Month	Avg. Temp	Min	Max
2014	July	69	61	78
2014	August	65	58	76
2014	September	59	47	71
2014	October	51	42	60
2014	November	41	36	47
2014	December	38	34	43
2015	January	38	32	44
2015	February	42	37	46
2015	March	45	38	55
2015	April	47	39	56
2015	May	53	47	64
2015	June	61	54	72
2015	July	61	53	73
2015	August	63	55	71
2015	September	57	50	66
2015	October	55	47	62

Warm-water fish were illegally introduced in the Lake Tahoe basin beginning in the mid-late 1970's (Reuter and Miller 2000). Concern has risen in recent years regarding the continual range expansion of warm water fish presumably due to warming waters caused by climate change and expansion of aquatic weed beds, which provide habitat for warm water fish (and amphibians) (Chandra et al. 2009; Ngai et al. 2013). The expansion of warm water fishes has led to reduced food web efficiency and decreased biodiversity of native fish assemblages in other ecosystems (MacRae and Jackson 2001). The presence of warm water invasive fish alters the habitat by increasing the risk of predation and competition for resources. Moyle et al. (2011) determined that of the 15 categories of anthropogenic threats impacting

California's inland fish, invasive species was one of the biggest threats likely to diminish status of a native species.

Dense growth of non-native, invasive aquatic plants impede water flow, discourage recreational activities, deleteriously affect water quality, and reduce native plant diversity (Frodge et al. 1991, Boylen et al. 1999, Mullin et al. 2000). Aquatic invasive weeds increase sediment–bound nutrients into the water column through plant root uptake and subsequent plant senescence. These rooted plants "pump" nutrients from the sediment to the overlying water column (Carignan and Kalff 1980, Granéli and Solander 1988, Walter et al. 2000) during growth and may be contributing to increased phytoplankton and reductions in water clarity at Lake Tahoe.

Resource Concern

The quality and quantity of aquatic habitat to meet life history requirements for native aquatic species.

Rules

Environmental consequences of the proposed action will be analyzed based on changes to the quantity and quality of aquatic habitat. The quantity of habitat is measured by the total amount of habitat available to meet the various life history requirements (spawning (spring), embryo development (summer), rearing (late summer/fall)). The quantity of habitat is correlated to the duration, timing and extent of surface water. Habitat quality is measured by the complexity and diversity of habitat, water temperature, presence/absence of aquatic invasive species, and connectivity.

Habitat quality is based on the following parameters and associated supporting direction from the Sierra Nevada Forest Plan Amendment (SNFPA) and associated Riparian Conservation Objectives (RCOs) (USDA 2004):

1. Complex and diverse habitat to meet various life history requirements of desired aquatic species.
    - RCO #2 – Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, bogs, fens, wetlands, vernal pools, springs; (2) streams, including instream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.
    - RCO #3 – Ensure a renewable supply of large down logs that (2) provide suitable habitat within and adjacent to the Riparian Conservation Area.
    - RCO # 5 – Preserve, restore or enhance special aquatic features, such as meadows, lakes, ponds, bog, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.
        - Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other aquatic features (SG100).
2. Water quality conditions support and perpetuate conditions to support life history requirements of desired aquatic species.
    - RCO #1 – Ensure that identified beneficial uses for the water body are protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.
        - Beneficial uses identified in the Lahontan Basin Plan within the project area include municipal and domestic supply, agricultural supply, ground water recharge, water contact recreation, non-contact water recreation, commercial and sport fishing, cold fresh water habitat, wildlife habitat, rare threatened or

endangered species, migration of aquatic organisms, spawning reproduction and development, water quality enhancement, flood peak attenuation/flood water storage.

- RCO #6 – Identify and implement restoration actions to maintain, restore, or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.
  - Ensure that management activities do not adversely affect water temperature necessary for local aquatic and riparian dependent species (SG 96).

3. Spatial and temporal connectivity of aquatic habitat that supports the unobstructed movement of desired aquatic species for survival, migration, and reproduction.
   - RCO #2 – Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, bogs, fens, wetlands, vernal pools, springs; (2) streams, including instream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.
     - Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other aquatic features (SG100).
     - Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species (SG 101).

Analysis

Although there could be short term impacts to habitat quality during implementation, the project design features and BMPs (Table 1) are expected to prevent these impacts. Long term effects are discussed below.

1. How would the proposed action increase the complexity and diversity of aquatic habitat to meet various life history requirements of desired aquatic species?

Enhancing the aquatic habitat availability and connectivity in swale 1, by removing (and in some cases replacing) the culverts and installing the berm at Tallac Creek would enhance and increase rare lagoon/aquatic habitat that can be used as rearing and refugia habitat for numerous native aquatic species during various life stages. The routing of Tallac creek into swale 1 is expected to positively influence the timing, duration, and extent (quantity) of available aquatic habitat in the swale. The timing and duration of available habitat will be most evident in years with low lake stands, drought years, and/or later in the season (because there will be more surface water later in the year and during lower lake stands); making the habitat more resilient to a changing climate. According to the hydrological assessment during late season conditions, when native species are seeking rearing and refugia habitat, available habitat would increase from 1 to 8 acres in low lake levels (Table 6). In addition, by redirecting Tallac Creek into its' historic path, an additional 1250 linear feet of flowing water within swale 1 will be available for various life history stages.

Table 6. Acres of surface water in swale 1 and Tallac wetland.

	median lake		low lake	
	spring flow	base flow	spring flow	base flow
no action	38	23	7	1
restored	55	26	16	8

Removal of culverts and replacing them with new crossing structures designed to pass aquatic species would improve habitat connectivity and provide unobstructed movement for aquatic species from Taylor

Creek to Tallac Creek and vice versa (via swale 1). This will allow species, pending lifestage, to move freely from lotic to lentic habitat. Additionally, seasonal backwatering of Tallac Creek due to installation of the berm will increase (extent) the amount of standing water (wetland) in average or below average water years. More importantly, this habitat will be available later in the year and in drier years (timing and duration). This will increase that amount of habitat (Table 6) for reproduction for amphibians, typically in the spring, and nursery and rearing habitat for fish, typically in base flow conditions.

Installation of resource protection barriers would increase bank stability and complexity of shoreline. Use of shrubs, wood, or boulders would increase cover, and refuge areas. The resource protection barriers will add stream bank protection, shade, and reduce unintended impacts from visitors by discouraging the creation of user-created trails across swale 1. Installation of large woody debris would increase stream complexity by providing/creating side channel refuge, slow water microhabitats, and areas for sediment deposition (increased feeding opportunities). Installation of resource protection barriers and large woody debris improve the quality of available habitat.

2. ***How would the proposed action improve water quality conditions to support and perpetuate conditions that support life history requirements of desired aquatic species?***

By routing the majority of flow from Tallac Creek through swale 1, water quality conditions needed by desirable aquatic species would improve, thus improving the quality of aquatic habitat. Because swale 1 is expected to carry the majority of flows, the habitat would have more surface water later in the year with cooler water temperature in comparison to existing water temperatures. Dissolved oxygen is correlated with stream temperature with cooler water having more oxygen. Dissolved oxygen level would therefore be improved. Native species have temperature requirements, which if exceeded will impede growth, increase stress, and potentially cause mortality. Actions that reduce water temperatures improve the quality of habitat.

Although water temperatures in swale 1 will be cooler than existing conditions, the restored habitat will be providing warm water habitat. This habitat is valuable for various native species and life stages, as stated above; however, it is also prime habitat for warm water invasive species. Species that are tolerant of increased temperatures and/or lowered dissolved oxygen concentrations, such as warm water invasive fish or bullfrogs, may increase in abundance or range if proposed manual removal efforts are not implemented prior to actions intended to restore the historical hydrological functions.

Eradication of Eurasian watermilfoil would reduce water temperatures and nutrients, increase dissolved oxygen, and, over time, improve substrate conditions; reducing conditions that favor the further expansion of invasive plants and animals.

Installing large woody debris in Taylor Creek and repairing bridge abutments would reduce erosion and sediment movement, improving water quality conditions by reducing fine sediment and improving the availability of spawning habitat.

Removing portions of the Lucky Baldwin dam would enhance aquatic habitat connectivity between Fallen Leaf Lake and Taylor Creek improving the ability to manage flows and decrease water temperatures in Taylor Creek, specifically in the late summer or early fall.

3. ***How would the proposed action improve the spatial and temporal connectivity of aquatic habitat that supports the unobstructed movement of desired aquatic species for survival, migration, and reproduction?***

Removal of five aquatic organism passage barriers in swale 1 would restore connectivity of 0.75 miles of aquatic habitat.

Removing fill and installing a crossing at swale 4 will restore aquatic organism passage between Taylor and Tallac wetland. This will be a benefit to amphibians and reptiles, specifically in the spring.

The renovation of the fish ladder at the Fallen Leaf Lake dam would provide the potential to connect approximately two miles of stream from Lake Tahoe to Fallen Leaf Lake when operated in the future.

Removal of aquatic invasive species will increase the spatial and temporal availability and connectivity of habitat; improving both the quantity and quality of habitat. The presence of these species create habitat unsuitable for survival and reproduction of native species and could influence current movement habits. Removal of warm water invasive fish and bullfrogs will eliminate known predators and resource competitors.

Conclusion

The proposed action is expected to increase the overall quantity of quality aquatic habitat in the project area as compared to existing conditions by:

- Increasing the quantity of available habitat, specifically in late season, low lake levels.
- Increasing the quantity of complex and diverse habitats (lotic and lentic) that are hydrologically connected.
- Increasing quantity and quality of complex and diverse habitat available for life history requirements of native species.
- Improving the quality of habitat by improving water quality characteristics (e.g. temperature, dissolved oxygen levels, reduced sedimentation).
- Restoring habitat connectivity for migration needed to fulfil life history requirements.

The proposed action will enhance the following beneficial uses identified in the Lahontan Basin Plan: water contact recreation, non-contact water recreation, commercial and sport fishing, cold fresh water habitat, wildlife habitat, rare threatened or endangered species, migration of aquatic organisms, spawning reproduction and development, water quality enhancement, flood peak attenuation/flood water storage.

3.2.4 Botany

The analysis below describes environmental consequences to Federally, Regionally, and TRPA listed species. All California listed species that do not have federal, regional, or TRPA status are addressed in section 3.2.9.

Background

As one of the largest marsh systems in the Lake Tahoe Basin, the Taylor and Tallac wetland is important habitat for many botanical species (plants, lichen, fungi)—including Tahoe yellow cress (*Rorippa subumbellata*), a Forest Service Sensitive species —and other botanical resources (e.g. special habitats, and uncommon plant communities). Analysis focuses on special status species (e.g. Forest Service Sensitive) because these have been evaluated by the Forest Service and deemed to be at risk from management activities. Effects to botanical resources are analyzed in detail in the project's Biological Evaluation of Botanical Species and Other Botanical Resource Assessment (Project Record).

Resource Concern

Tahoe yellow cress is globally rare (G1) and lives only along shorelines of Lake Tahoe (California Native Plant Society 2012, NatureServe 2015). The species is found within the proposed project area. In addition to being a Forest Service Sensitive species, Tahoe yellow cress is a TRPA sensitive species, considered endangered by the State of California and threatened by the State of Nevada and was considered a candidate for federal listing from 1985-2015 until the USDI Fish and Wildlife Service deemed its listing unwarranted (80 F.R. 60834 2015). The number of sites within the range of the species has been dramatically decreased by the high intensity of recreation use and infrastructure construction along Tahoe's shoreline (Stanton et al. 2015).

Rules

The potential effects to Tahoe yellow cress were analyzed by both the scope and scale of effects relative to the species geographic extent at the scale of the LTBMU and the species entire geographic range (includes lands managed by other entities in the Lake Tahoe Basin). Both beneficial and potential detrimental effects are discussed.

The following criteria were used to analyze the scale of effects: 1) the number and acres of known sites affected by proposed project activities; 2) the percentage of known sites affected on the LTBMU and across the species range; and 3) acres of suitable habitat affected. The interagency Tahoe Yellow Cress Adaptive Management Working Group site designation was used to determine the number of sites, while the Forest Service's Natural Resource Inventory System (NRIS) was used to quantify the number of sub-occurrences within sites (i.e. polygons separated by more than 100 feet or change in habitat type) that intersect the proposed project area and acres (Stanton et al. 2015, USDA Forest Service 2015). Acres of suitable Tahoe yellow cress habitat were determined using the LTBMU's Tahoe yellow cress habitat model; the model uses LiDAR imagery to characterize habitat suitability solely based on elevation, using the upper elevation limit specified in the 2002 Tahoe Yellow Cress Conservation Strategy (6230 ft. LTD) (Pavlik et al. 2002). Because all known Tahoe yellow cress suitable habitat within the proposed project area have been surveyed within the last five years (LTBMU survey ID: 14-13-04) (USDA Forest Service 2015), current survey data are considered adequate for analyzing the extent of effects.

The following criteria were used to analyze the scope of effects: 1) type (i.e. direct or indirect) and relative intensity of potential effect for each of the relevant proposed action components compared to the no action alternative and2) relative conservation value of affected sites and suitable habitat. The proposed action as analyzed includes all project design features. Therefore, this analysis describes only those effects (positive and adverse) that would occur after the project design features (e.g., flag and avoid, biological monitors on site, transplanting, mitigation planting) are taken into account.

Analysis

Scale of impacts to Tahoe Yellow Cress

Using the site designations agreed upon by the Tahoe Yellow Cress Adaptive Management Working Group, there are four sites, consisting of ten sub-occurrences within the proposed project area totaling approximately 2 acres (Table 7, Figure 14). The proposed project area contains 7 percent of all known Tahoe yellow cress sites across the species range (Stanton et al. 2015). There are nine additional sites (16%) managed by LTBMU that are outside of the project area; the vast majority of sites (93%) will not be impacted by project activities. There are approximately 24 acres of suitable habitat that intersects the proposed project area.

Table 7. Known Tahoe yellow cress sites, sub-occurrences, and acres in the proposed project area.

AMWG Site Name ***LTBMU Site ID***	**Number of sub-occurrences**	**Number of plants (estimate)[1]**	**Acres[2]**	**Conservation Ranking[3]**
Baldwin Beach	4			MEDIUM
ROSU4a		300	0.14	
ROSU4b		7	<0.01	
ROSU4c		26	0.02	

AMWG Site Name ***LTBMU Site ID***	**Number of sub-occurrences**	**Number of plants (estimate)[1]**	**Acres[2]**	**Conservation Ranking[3]**
ROSU4d		73	0.03	
Kiva Beach/Valhalla	1			EPHEMERAL
ROSU6a		4	0.01	
Tallac Creek	1			HIGH
ROSU3b		250	0.10	
Taylor Creek	4			CORE
ROSU5a		350	0.68	
ROSU5b		2,000	0.99	
ROSU5d		12	0.01	
ROSU5e		7	<0.01	
Grand Total	10	3,029	1.97	

[1]Plant counts from last interagency TYC survey (Tahoe Yellow Cress Adaptive Management Working Group 2014).

[2]Area acreage calculated from LTBMU corporate GIS data.

[3] Conservation ranking from Tahoe Yellow Cress Conservation Strategy (Stanton et al. 2015).

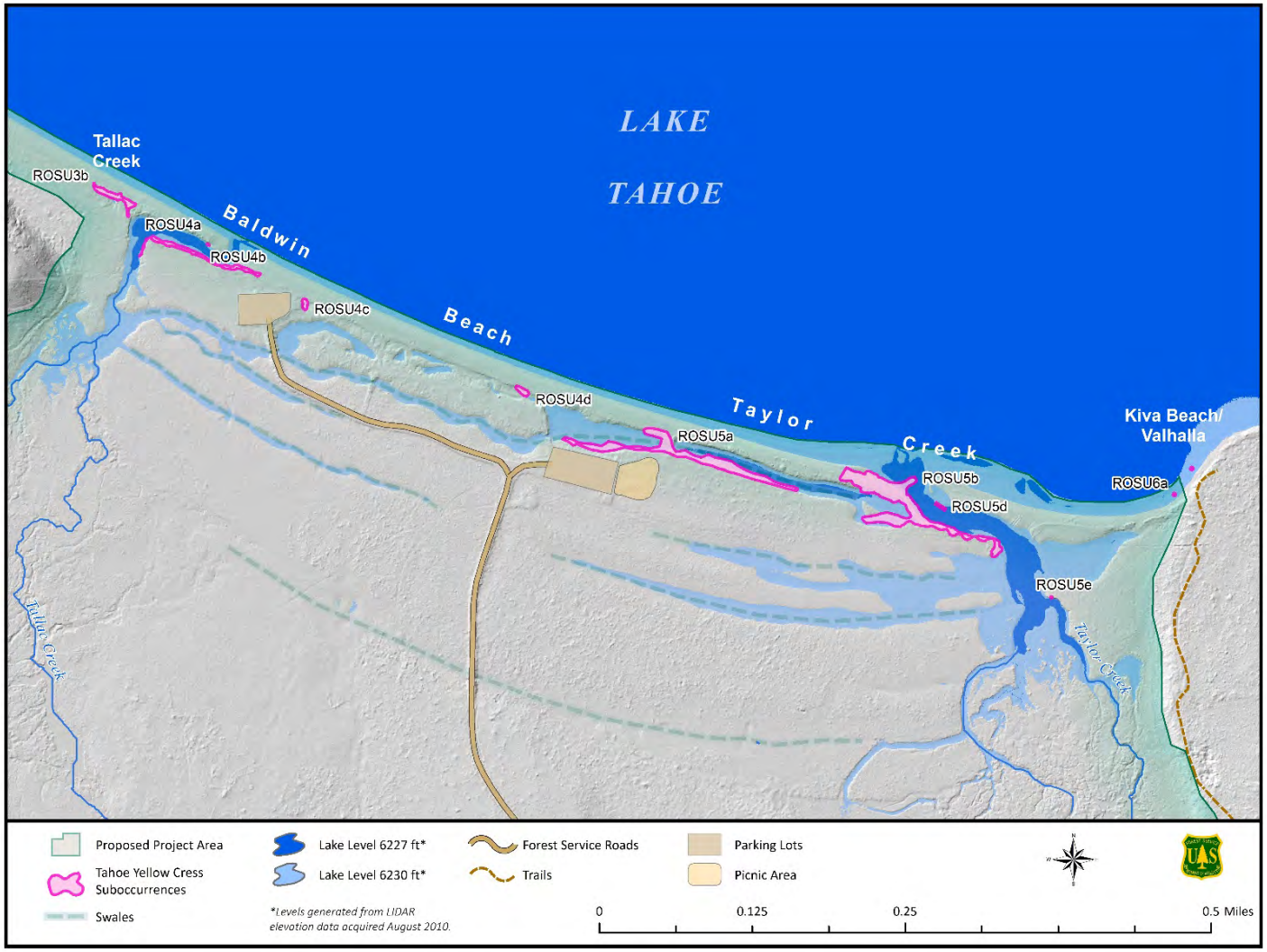

Figure 14. Tahoe Yellow Cress sites in the proposed project area north of Highway 89.

Scope of impacts to TYC

The proposed action has potential to improve environmental conditions over the long-term for up to six Tahoe yellow cress sub-occurrences (in three sites). The proposed installation of permanent resource protection barriers including fences, movable barriers, and vegetation screening represents a substantial improvement over the no-action alternative. Due to the high recreation intensity during summer months at Baldwin Beach, Tallac Creek and Taylor Creek, Tahoe yellow cress plants are often trampled unknowingly by visitors. Fences and barriers—especially with educational signing—are considered a critical tool for Tahoe yellow cress conservation (Stanton et al. 2015). Although small areas at Baldwin Beach and Taylor Creek are currently fenced, these fences are dilapidated and not functioning as intended. The proposed action proposes to expand the size of protected areas and improve the types of barriers used to reduce pedestrian traffic through the Tahoe yellow cress sub-occurrences.

It is anticipated that at least two proposed action components; removal and replacement of culvert A, and potential breaching of the natural sand bar at the confluence of swale 1 and Taylor Creek (Figure 2) would result in direct effects to Tahoe yellow cress plants that would not occur under the no-action alternative, including some unavoidable plant mortality. The swale 1 crossing structure replacement at culvert A could result in unavoidable plant mortality for up to 350 plants on the west side of the crossing (ROSU5a). However, the potential severity of effects would be lessened by the presence of on-site monitors that would flag, avoid, and also transplant identified Tahoe yellow cress plants during implementation activities (design feature 23). Furthermore, known mortalities would be quantified and mitigated at a ratio of 2:1 within the project area (design feature 23.c). Naturally or manually breaching the sand bar at swale 1 and Taylor Creek could result in trampling and potential plant mortality (ROSU5b), although the intensity and extent may vary. Natural breach—which does not necessitate additional disturbance—would likely impact the fewest number of plants—probably less than 50—and may not result in mortality. These two proposed action components are concentrated in and around one of the six core sites (Taylor Creek), which is ranked second overall in conservation value based on site persistence and size (Stanton et al. 2015). Because the Taylor Creek site is considered to be of core conservation value, impacts to this site are considered more critical to species persistence than other sites in the proposed project area.

However, by restoring the hydrologic connectivity of swale 1 to Taylor Creek and removing fill associated with the existing, non-functioning culverts, environmental conditions that support Tahoe yellow cress habitat would improve over time and could support population expansion. This site also has the potential to experience beneficial effects in two important ways following project implementation: 1) restoring flows in swale 1 and connecting swale 1 with Taylor Creek would enhance the stream and swale systems that support the dynamic hydrologic characteristic needed for Tahoe yellow cress, and 2) installing resource protection barriers that cover larger areas and are also moveable based on Tahoe yellow cress locations would passively direct visitors away from this site.

There is potential to indirectly affect Tahoe yellow cress through habitat alteration associated with the swale and creek restoration activities at Baldwin Beach. Constructing the berm on Tallac Creek would likely result in an altered geomorphologic regime at the mouth of Tallac Creek; there remains uncertainty as to how exactly the mouth will change, but it is likely that less water will flow through the Tallac Creek mouth. Beaches associated with permanent creek mouths support the most persistent Tahoe yellow cress sites throughout the species range, so this habitat type is considered more important to species persistence (Stanton et al. 2015). A lack of water at the Tallac Creek mouth may degrade suitable habitat; however, Tahoe yellow cress persistence is more closely tied to lake level (Stanton et al. 2015), which will not be altered by the proposed action. A detailed analysis on the relationship between lake level and swale/wetland habitat is located in the hydrology section (3.2.1).

Conclusion

The proposed action could result in both potential short-term negative and long-term positive effects to Tahoe yellow cress. No long term negative impacts are expected. The scale of effects on Tahoe yellow cress is approximately 7% of all known Tahoe yellow cress sites. The scope of potential short-term negative effects could include unavoidable plant mortality and a concentrated disturbance in a core Tahoe yellow cress site (Taylor Creek); however, plant mortality will be mitigated at a 2:1 ratio. Although the proposed action was driven in part by the need to improve conditions for the species and reduce inadvertent trampling, and project design features (part of the proposed action) would reduce or eliminate much of the potential implementation-related negative effects, some risk to these sites from implementation would remain. Conversely, the proposed action would improve protections from recreation use (e.g., trampling) that would continue if no action is taken. The amount of suitable habitat is also expected to increase in the long-term as hydrologic function is restored.

Resource Concern: Other Botanical Resources

In addition to Tahoe yellow cress, the following botanical resources were considered: 1) Candidate and Forest Service Sensitive (FSS) botanical species (TEPCS) and 2) special habitats and uncommon plant communities. There are no federally threatened, endangered, or proposed botanical species, or LTBMU Watch List species known to occur or with known suitable habitat within LTBMU so these species were not analyzed further. Only those Candidate and FSS species with occurrences or known suitable habitat on the LTBMU and those special habitat or uncommon plant communities referenced by TRPA or in the LTBMU Land and Resource Management Plan as amended by the Sierra Nevada Forest Plan Amendment (namely, fens and bogs) were considered (Tahoe Regional Planning Agency 2012; USDA Forest Service 1988, 2004).

Rule

The potential effects to other botanical resources were analyzed by both the scope and scale using the following criteria: 1) the number and acres of the botanical resources affected by proposed action components; 2) type and intensity of effects from proposed action components; and 3) adequacy of project's design features to reduce or eliminate effects.

It is assumed that those species present or with suitable habitat within the analysis area (i.e. the proposed project area – Figure 1) have the highest potential to be effected by the proposed action components. Conversely, species outside of the analysis area are not anticipated to be effected either directly, indirectly, or cumulatively. Therefore, species outside the analysis area were considered, but dismissed from further analysis. It is assumed that direct effects (e.g. trampling, construction activities, plant removal) are more impactful to a resource than indirect effects (e.g. habitat alteration, impacts to reproductive success).

Analysis

Other Candidate and Forest Service Sensitive Botanical Species

There is one candidate species known to occur on the LTBMU—whitebark pine (*Pinus albicaulis*); the analysis area is too low in elevation to support whitebark pine, so it will not be affected. Of the 26 Forest Service Sensitive botanical species known to occur or with known suitable habitat within LTBMU, there is only one known to occur in the analysis area—Tahoe yellow cress (discussed above)—and eight have suitable habitat that intersects proposed activities: upswept moonwort (*Botrychium ascendens)*, scalloped moonwort (*Botrychium crenulatum)*, slender moonwort (*Botrychium lineare)*, common moonwort (*Botrychium lunaria)*, Mingan moonwort (*Botrychium minganense)*, western goblin (*Botrychium montanum)*, Blandow's bog-moss (*Helodium blandowii)* and board-nerved hump-moss (*Meesia uliginosa)*. Although these eight species vary in their ecological requirements and life history

characteristics, they are all restricted to wet habitats—the mosses are further restricted to fens—and the effects of proposed activities to their suitable habitat are expected to be similar.

Compared to other management activities for which the changes to wet habitat are well documented (e.g. grazing, ground water draining, road construction), there is a higher level of uncertainty in the outcomes of watershed restoration due to the complexity of interactions in hydrological and ecological processes (Matthews and Endress 2008; Rey Benayas et al. 2009; Zedler and Callaway 1999). Nonetheless, it is expected that the proposed creek and swale restoration activities will increase the amount of wet meadow and montane riparian habitat in the Taylor Tallac marsh because the extent of ponded water during an average spring flow is expected to increase. Fen habitats are the exception; it is unlikely that the amount of fen habitat would increase as a result of project activities because peat accumulation rates are so slow (estimated at between 4-16 inches per thousand years in the Rocky Mountains) (Cooper 1990, Chimner and Cooper 2002). No construction activities are planned in or near the fen habitat, but aquatic invasive species removal along Tallac Creek intersects one fen. Project design features are included to limit disturbance and protect peat-bearing soils, so fen habitat will not be affected.

On the whole, the project will likely provide more habitat for these botanical species, but the quantity is negligible in the context of all of the suitable habitat available on LTBMU. When these effects to suitable habitat are considered in conjunction with the fact that there are no known occurrences of these species affected by the project, there will be no significant impact to other Candidate or FSS botanical species.

Special habitats and uncommon plant communities.
Taylor Creek marsh (~250 ac) is listed as an uncommon plant community by TRPA and considered to be at or somewhat better than target condition (Tahoe Regional Planning Agency 2011, 2012). The proposed project is expected to restore hydrologic function, resulting in expansion or enhancement of the vegetation communities. Project design features are included to limit disturbance, prevent invasive plant introduction and spread, and protect peat-bearing soils. There are two fens (3.9 ac) in the activity area—both along Tallac Creek. No construction activities are planned in or near the fens, but aquatic invasive species removal is planned near one. Project design features are included to limit disturbance and protect peat-bearing soils, so fens will not be affected.

Conclusion

Other botanical resources will not be significantly affected based upon the very limited scale—only one uncommon plant community, one fen and no other botanical resources intersect proposed activities—and the limited scope—no ground disturbance, except in Taylor Creek marsh, which is expected to improve or extend the plant community—as well as the adequacy of the project's design features to nearly eliminate negative effects.

Resource Concern:

Potential risk of introduction and spread of invasive plants

In 2003, the Forest Service identified invasive species as one of four critical threats to the nation's ecosystems (Bosworth 2003). Invasive plants pose a significant threat to ecological function due to their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife, and degrade soil structure (Bossard et al. 2000). Infestations can also reduce the recreational or aesthetic value of native habitats.

Rules

Risks from invasive plants are analyzed in detail in the project's invasive plant risk assessment. Risk is assessed using the seven factors outlined in Invasive Plant Risk Assessment (Project Record): 1) inventory; 2) known infestations; 3) habitat vulnerability; 4) non-project-related vectors; 5) non-project-related habitat disturbance; 6) project related vectors; and 7) project related habitat disturbance. Then, the

adequacy of proposed project design features to reduce or eliminate risk is evaluated. Aquatic invasive species are addressed in the aquatic analysis.

Analysis

Inventory is considered adequate because nearly all of the project area has been surveyed within five years; only small portions of the upper reaches of Tallac Creek, where only aquatic invasive species removal is proposed, have not been surveyed. There is a very high concentration of known infestations: 51 infestations (21.4 ac) that intersect proposed activities with another 16 nearby (3.0 acres)(USDA Forest Service 2015). LTBMU prioritizes its invasive species of management concern based upon their ecological impact and the Unit's ability to effectively control the species (McKnight and Rowe 2015). The vast majority of infestations (45 infestations, 20.6 acres) are of low priority species, mostly bull thistle (*Cirsium vulgare)* and a few oxeye daisy species *(Leucanthemum vulgare)* (Figure 15). There are three infestations (0.32 acres) of high priority species—all Canada thistle (*Cirsium arvense*)—near Swale 3 and 4. Wet habitats, such as meadows and marshes, are comparatively less vulnerable to invasion than other vegetation types on LTBMU, so the project's habitat vulnerability is low. Compared to other high recreation use areas and other vegetation types on LTBMU, the proposed project area exhibits relatively low habitat disturbance. Construction will necessitate the use of imported materials and equipment which represents the most substantial vector for invasive plant introduction on LTBMU, as most materials and equipment come from low elevations areas with much higher weed densities, so the project-related vectors are high. Despite the relatively large proposed project area, the amount of proposed ground disturbance is relatively low and mostly concentrated in vegetation types that are resilient to disturbance, so the project related habitat disturbance is moderate. Standard invasive plant prevention measures—such as equipment cleaning and the use of weed-free materials—have been incorporated into the project design features. In addition, a site-specific invasive plant treatment plan has been developed to address specific infestations that pose the greatest risk of spread.

Conclusion

There are substantial project and non-project related vectors for introduction and spread—some of which cannot be managed by design features, such as the high recreation use density. Although the project design features cannot eliminate the risks from invasive plants, they will greatly reduce the risks and the proposed action will not have a significant impact.

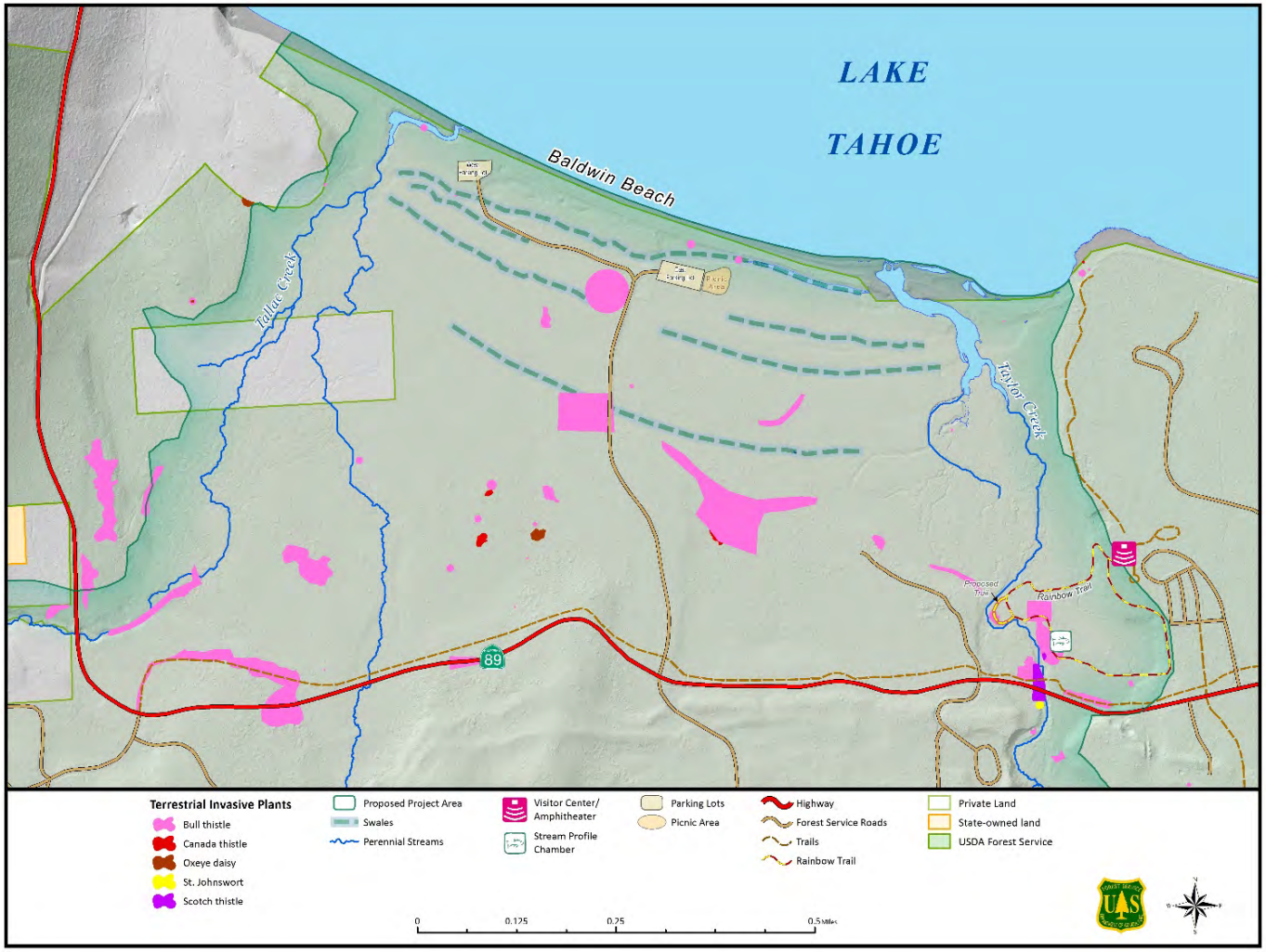

Figure 15. Known occurrences of terrestrial invasive plants in the proposed project area at and north of Highway 89.

3.2.5 Wildlife

The analysis below describes environmental consequences to Federally, Regionally, and TRPA listed species. All California listed species that do not have federal, regional, or TRPA status are addressed in section 3.2.9.

Background

The analysis area supports Forest Service Sensitive Species and Management Indicator Species, TRPA Special Interest Species, and migratory birds. There are no Federally Endangered, Threatened, Candidate or Proposed species or Critical Habitat found within the analysis area. The analysis area (4,650 acres) encompasses the entire project area. On the east it follows the west shoreline of Fallen Leaf Lake and then continues along Fallen Leaf Lake Road, then north along Kiva Beach Road to the shore of Lake Tahoe. On the north it is bounded by the lake shore. On the south and west sides the analysis area follows the ridge line that goes from Cathedral Peak to Mt. Tallac before following the smaller ridge that divides the Tallac Creek and Cascade Creek watersheds (HUC 7) to the lake shore.

Resource Concern

Effects to US Forest Service Sensitive Species:

- Northern goshawk (*Accipiter gentilis*)
- Willow flycatcher (*Empidonax traillii*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Great gray owl (*Strix nebulosa*)
- California spotted owl (*Strix occidentalis occidentalis*)
- Pallid bat (*Antrozous pallidus*)
- Townsend's big-eared bat (*Corynorhinus townsendii*)
- Fringed myotis (*Myotis thysanodes*)
- North American wolverine (*Gulo gulo luscus*)
- Pacific marten (*Martes caurina*)
- Western bumble bee (*Bombus occidentalis*)

Rule

- Forest Service Manual and Handbooks (FSM/H 2670)
    - 2670.22 - Sensitive Species
        - 1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
        - 2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
        - 3. Develop and implement management objectives for populations and/or habitat of sensitive species.

- Lake Tahoe Basin Management Unit Land and Resource Management Plan (LRMP)
    - Section D. Wildlife and Fish – 12. Nonstructural Wildlife Habitat Management, pgs. IV-26 and IV-27
- Sierra Nevada Forest Plan Amendment – Final Supplemental Environmental Impact Statement Record of Decision (2004)
    - Appendix A: Management Direction, Section B. Land Allocation and Desired Conditions Pg. 36-40
    - Appendix A: Management Direction, Section D. Management Standard and Guidelines pg. 49-66
- USDA Forest Service, Pacific Southwest Region, Sensitive Species list, October 10, 2014. http://www.fs.usda.gov/main/r5/plants-animals

Analysis

There are 2,789 acres of northern goshawk habitat and three Protected Activity Centers (PACs), comprising one active territory, within the analysis area. This territory has been active nine of the previous 16 years (2000-2015) and successfully reproduced young five of those years. There are 259 acres of willow flycatcher habitat and three reproductive areas within the analysis areas. The analysis area is partially within the bald eagle winter management area and bald eagle are frequently found in this area. There are no nests within the analysis area. There are 2,792 acres California spotted owl habitat and one PAC within the analysis area. This PAC was last reproductively active in 2002 and the most recent detection was in 2012. Depending on the species there are between 450 and 700 acres of habitat for sensitive bat species within the analysis area. There are no detections of pallid bat, two detections of Townsend's big-eared bat and 28 detections of fringed myotis within the analysis area. There are no known roosts for these species within the analysis area. There are 3,155 acres of Pacific marten habitat but only one detection and no known dens within the analysis area. Western bumble bee habitat within the analysis area would consist of all areas where there are flowering plants. There are no known recent detections of western bumble bee within the analysis area.

Great gray owl and North American wolverine are not known to occur on the LTBMU therefore these species will not be affected by this project and will not be further addressed.

For all sensitive species found within the analysis area, the proposed project has the potential to cause disturbance type effects. These effects would be minor and would be limited to the time of implementation. Disturbance to reproducing individuals would be prevented by project design features, particularly the use of LOPs. Phasing of implementation would further reduce disturbance.

Project activities would positively alter habitat for willow flycatcher, bald eagle, pallid bat, Townsend's big-eared bat, and fringed myotis by improving and expanding riparian and wet meadow habitats. Snags and large trees would not be removed except where necessary for implementation of the proposed action or safety. Habitat of northern goshawk, California spotted owl and Pacific marten will not be altered. The only species for which habitat may be lost is the western bumble bee. However, for all species the amount of altered habitat would not be of an amount that would be noticeable to the LTBMU population as a whole. Further information on these species within the analysis area can be found in the Taylor and Tallac Restoration Project Biological Assessment/Biological Evaluation (Project Record).

Resource Concern

Effects to Migratory Landbird Conservation

Rule

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

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

Analysis

Likely impacts to habitats and select migratory bird populations resulting from the Taylor and Tallac Restoration Project have been assessed in detail within the project Management Indicator Species (MIS) report and impacts to select TES birds and their habitats have been analyzed in the project BA or BE. These impacts are summarized below:

The project will not adversely impact migratory landbird species or their associated habitats. Potential impacts to migratory species would be minimized through the adherence of LRMP Standards and Guidelines for snags/down woody debris, limited ground disturbance, and maintenance of canopy closure. The project is designed to improve habitat conditions by expanding wet meadow and riparian habitats, while still maintaining current functional habitat. Additionally, habitat would be improved by swale restoration, removing aquatic invasive species, stream restoration, resource protection barriers and installing nest/perch structures. Specific project design criteria include; leaving downed woody debris in place where possible, retaining bank stabilizing vegetation and woody debris, staging areas would avoid damage to wet meadows, use of limited operating periods, retaining known nest trees, trimming or removal of vegetation would occur outside of the avian nesting season and retaining large snags.

Resource Concern

Effects to Management Indicator Species Habitat

Rule

MIS are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Lake Tahoe Basin Management Unit LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the Lake Tahoe Basin Management Unit LRMP as amended.

Analysis

- Riverine and Lacustrine – aquatic macroinvertebrates
- Riparian – yellow warbler *(Dendroica petechia)*
- Wet Meadow – Pacific tree (chorus) frog *(Pseudacris regilla)*

- Early Seral Coniferous Forest – Mountain quail *(Oreortyx pictus)*
- Mid Seral Coniferous Forest – Mountain quail *(Oreortyx pictus)*
- Late Seral Open Canopy Coniferous Forest – Sooty (blue) grouse *(Dendragapus obscurus)*
- Late Seral Closed Canopy Coniferous Forest – California spotted owl *(Strix occidentalis occidentalis), Pacific marten (Martes caurina), Northern flying squirrel (Glaucomys sabrinus)*
- Snags in Green Forest – Hairy woodpecker *(Picoides villosus)*

The Late Seral Closed Canopy Coniferous Forest habitat type does not occur within the analysis area and therefore there will be no effects to this habitat type. The Early Seral Coniferous Forest, Mid Seral Coniferous Forest, Late Seral Open Canopy Coniferous Forest and Snags in Green Forest habitat types are found within the analysis area but the associated habitat components will not be altered by this project.

There are approximately 11 miles of riverine and 1400 acres of lacustrine habitat in the aquatic analysis area (see Aquatic Specialist Resort in Project record for description of aquatic analysis area). Habitat components that support aquatic macroinvertebrates will not be altered. Riverine habitat will improve with the placement of large woody debris and actions reducing water temperature. No changes are expected to lacustrine habitat. The Taylor and Tallac Restoration Project will not alter the existing trend in the habitat, nor lead to a change in the distribution of aquatic macroinvertebrates across the Sierra Nevada bioregion.

There are currently 38,140 acres of riparian habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is stable. Changes in the amount of riparian habitat, changes in deciduous and total canopy cover and changes in tree size class within the Taylor and Tallac Restoration Project action area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of yellow warblers across the Sierra Nevada bioregion.

Wet meadow habitat in the project area is expected to expand from 3 to 27 acres depending on stream flow and lake level post restoration. Although the project will expand habitat for Pacific tree (chorus) frog, it will not alter the existing trend in the habitat, nor lead to a change in distribution across the Sierra Nevada bioregion.

Full analysis of effects to these habitat types can be found in the Taylor and Tallac Restoration Project Management Indicator Species report.

3.2.6 Heritage

Background

The National Historic Preservation Act (NHPA) requires that Federal agencies take into account the effects that their undertakings could have on properties listed on or eligible to the National Register of Historic Places (NRHP). This effects assessment is accomplished through inventory, evaluation, and determination of effects in consultation with the State Historic Preservation Officer (SHPO), the public, and pertinent Native American Tribes. The Washoe Tribe attended a scoping meeting at the start of project development in December 2014 and also provided comments during the scoping period. In their scoping comments, the Washoe Tribe expressed support of efforts to restore both natural ecosystem processes and native species in the project area.

For the purpose of NHPA compliance, the Area of Potential Effects (APE) for this project is considerably less than the total proposed project area. The APE consists of the locations within the proposed project area where ground disturbing activities will occur. The entire APE was either previously surveyed or is located in areas where there is no potential for heritage resources to be present (i.e. active stream channels). As a result of this previous inventory 10 sites were located. Of these 10, two had previously

been determined "not eligible" to the NRHP. The remaining eight sites consist of one Bedrock Mortar site, four prehistoric lithic scatters, one multi component lithic scatter/historic trash site, one historic dairy, and one historic water works consisting of two dams and other water diversion components. One of these sites, the Water Works, has been determined eligible to the NRHP, the rest are unevaluated but potentially eligible. The Fallen Leaf Dam and Water and Electrical Transmission System (Water Works) (FS Site Number 05190417) consists of the Lucky Baldwin Dam, the Fallen Leaf Lake Dam (Anita Baldwin Dam), Water Pipe Line, Electrical Transmission Line, Power House, tail race, Fish Hatchery and fish ladder.

Resource Concern

Effects to cultural and heritage resources.

Rule

Cultural and Heritage Resources will be affected if project activities will have an adverse effect to the integrity of the property.

Analysis

With the exception of the Lucky Baldwin Dam, all project activities will avoid known cultural or historic properties located within the APE. Design features included in the proposed action reduce any possible unintended impacts to these resources. Properties located within 82 feet (25 meters) of ground disturbing activities will be flagged for avoidance and monitored before and after the ground disturbing activities take place. Any sighting of previously undiscovered cultural or historical resources will result in a stoppage of project work in the vicinity of the discovery and will be reported immediately to the LTBMU heritage staff.

The Lucky Baldwin Dam has previously been determined eligible to the NRHP. Approximately 340 feet of the dam is extant and retains integrity. The northern 100 feet of the dam has deteriorated to rubble and no longer retains integrity. Three small breeches (10 feet, 6 feet, and 9 feet) in the extant portion of the dam have deteriorated and also lack integrity. A 60 foot section of the dam which connects to a small peninsula is also deteriorated and lacks integrity. The rubble from these deteriorated sections will be removed to increase the hydraulic intermixing of water between Fallen Leaf Lake and the lagoon behind the dam (see Figure 3). In accordance with SHPO guidelines, we submitted a finding of no adverse impact to the Lucky Baldwin dam to the SHPO on April 21, 2016. This finding is supported by an evaluation of the existing condition and analysis of potential effects as described in the Historic Resources Evaluation Report written for the project (Project Record).

Conclusion

There will be "no adverse effect" from this project on cultural and heritage resources. Except for the Water Works complex, all resources within the APE will be protected and avoided. The Lucky Baldwin Dam will have the portions removed from the non-contributing sections of the dam which will not affect the integrity of the contributing portions of the dam and therefore not affect its eligibility for listing on the NRHP.

3.2.7 Recreation

Background

Taylor Creek and Tallac Creek form a beautiful wetland, stream, and barrier beach system that support a variety of wildlife and ecosystems that together with the amazing scenery attract many visitors wishing to experience the unique landscape. Within the project area visitors can view a stream from an underground angle, walk over a boardwalk along a stream and through a meadow, view seasonal wildlife migrations, ride or walk on multi-use paths, walk through multiple different wetland ecosystems, picnic, and recreate

along Lake Tahoe's beautiful sandy shoreline. The area's popularity is due to this unique landscape and access to Lake Tahoe.

The Baldwin Beach recreation site is managed under special use permit and the remainder of the site is managed by the USFS. Visitation in the summer and fall throughout the area is very high, especially on weekends; however the site is sufficiently large enough that visitors can find areas of relative solitude on the beach and along the many trails in the proposed project area. Conserving the ability to find solitude and maintaining the relatively low level of development infrastructure on the site were issues raised during the scoping period. Overall visitors enjoy the current level of development and wish to maintain the existing opportunities for active and passive recreation and wildlife viewing that exist on the site.

Resource Concern

Changes in Access to Recreation

Rule

Project activities would be considered to have a significant impact on access to recreation resources if the activities significantly increased or decreased the ability of the public to access a site for the purposes of recreation. Changes to access are subjective in nature and are considered in terms of context, time, and intensity when compared to the existing condition. Improving the quality of existing access points and circulation patterns is not considered to significantly alter access.

Additionally, the Forest Service is required to comply with accessibility standards (the Architectural Barriers Act and the Forest Service Outdoor Recreation Accessibility Guide) in order to serve persons with disabilities. All new and remodeled facilities must meet these standards. Upgrading existing facilities to meet these standards is not considered to significantly increase access. However a loss of accessibility would potentially be considered an adverse effect.

This analysis relies on the LTBMU's Forest Plan (USDA 1988), the Forest Service Outdoor Recreation Accessibility Guidelines (USDA 2006), the Architectural Barriers Act/American Disabilities Act, and Forest Service Manual direction (USDA 2006a: Section 2333–Site and Facility Planning and Design; USDA 2003: Chapter 2380–Landscape Management).

Analysis

All proposed new recreation facilities in the project area are within the context and intensity of the existing access to recreation facilities. Currently visitors can only access Baldwin Beach via the entrance road where vehicles, pedestrians, and bikers all must share the road. This condition has been identified as undesirable both from vehicle drivers and from pedestrians/bikers attempting to mingle with the vehicles. The addition of a new multi-use trail connecting State Route 89 to Baldwin Beach would provide a pathway outside of the vehicle travel route, reducing pedestrian/biker/vehicle conflicts and improving the experience of visitors attempting to access the site via non-motorized means. Vehicular traffic would also flow more smoothly on the Baldwin Beach entrance road with the separation of bikers/pedestrians from the vehicle travel route. No change in the number of parking spaces or restroom facilities is proposed and general access and use of the site is not expected to change, resulting in no significant change to the context or intensity of the existing access to the recreation site

All activities are proposed to meet all applicable universal accessibility guidelines and will improve the quality of the existing facilities that currently do not meet accessibility standards. All proposed improvements to accessibility are required to meet the Forest Service accessibility guidelines. The newly modified Rainbow Trail segments, new pedestrian circulation pathways at Baldwin Beach, new beach access routes from the Baldwin parking areas out to the beach, and new accessible pathways within the Baldwin picnic/parking/restroom areas would all result in improved overall access for families, individuals with mobility impairments, and individuals with disabilities. Accessible beach pathways (similar to the accessible pathways that are proposed in this proposed action) were installed at the

LTBMU Nevada Beach Day Use Site on the east shore of Lake Tahoe and the response from visitors has been extremely positive. Previously, users filtered through the vegetation from the parking areas onto the beach, requiring travel through the soft sand, which can be difficult with small children, beach equipment, etc. Now the majority of the visitors use the walkways as the main access point from the parking areas due to the hardened surface. As a result there is less trampling of the beach vegetation and users have an improved experience. A similar result is expected after the installation of the beach access routes at Baldwin Beach.

Improvements to the Stream Profile Chamber and elevation of the Rainbow Trail would result in reduced flooding of the Stream Profile Chamber area and Rainbow Trail pathways. Reduced flooding of the trails would allow for visitors to use the trail system for longer periods throughout the year and would limit the number of user-created trails that are created as visitors attempt to bypass flooded areas by leaving the pathways for higher ground.

Swale restoration work and stream restoration work on Taylor Creek and Tallac Creek would not impact existing access to Baldwin Beach or the Rainbow Trail. Changes in hydrology on the site are not expected to inundate any recreation facilities. Some changes to the existing off-trail use in the Taylor Creek marsh and swales may occur. Currently visitors cut through the swales on user-created trails during dry periods as a short-cut from the beach to the parking areas. Installation of resource protection barriers along the parking lots and swales would limit this type of unmanaged access; however the existing swale crossings will continue to provide beach access. Additionally one of the swale crossings would be improved with an accessible surface, improving the beach access overall. No impacts to any National Forest System trails would result from any swale or restoration work. Pedestrians cutting through the meadow may find some non-system user-created trails blocked as a result of seasonal water ponding for longer periods of time during the year due to increased wetting of the meadow.

Pedestrian connectivity from east to west across the area where Tallac Creek currently flows into Lake Tahoe would be improved during normal lake stand levels after the majority of Tallac Creek flows into swale 1 as a result of the berm installation. It is anticipated that a barrier beach would form for longer periods during the year at the Tallac Creek mouth (which currently happens during late summer months or during dry seasons), allowing for easier movement of pedestrians across the outlet of Tallac Creek.

Installation of nest and perch structures, installation of willows, removal of aquatic invasive species, and tree removal activities would not alter the access to any recreation sites. Work on the Lucky Baldwin Dam and fish ladder at Fallen Leaf Lake are also not expected to alter any access to recreation resources.

The limited construction season overlaps with the heaviest use periods for the recreation sites in the project area. This will create a limited short term impact on access due to the timing overlap of these activities. Only construction work associated with road improvements, culvert replacement, and multi-use trail construction is expected to result in closure of Baldwin Beach Road. Because the entrance road is the only automobile access to Baldwin Beach, work on this road would essentially close the site from Highway 89. A temporary public access road is not planned due to the highly sensitive ecosystem and potentially negative impacts that would result. While the LTBMU makes every effort to keep site closures to a minimum, closure of the site may be required during the busy summer months due to the limitations of the grading season and necessary curing time of any concrete structures that are planned for use during the culvert replacement. It is anticipated that closure of the entrance road and Baldwin Beach recreation site could span over two seasons (i.e. span from one summer over the winter into the next spring), however the busy season from Memorial Day weekend through Labor Day weekend would be impacted at a maximum for one season. Dispersed use of Baldwin Beach may still continue such as boat/kayak/paddle board access or via pathways from the Tallac Historic Site and across the mouth of Taylor Creek. The public would only be physically excluded from areas in immediate proximity to the actual construction work. When the recreation site is closed, facilities such as restrooms would not be available. Closure notices would be posted at the site and in advance via press release and on the

LTBMU website. Visitors may still access Lake Tahoe beaches in the South Lake Tahoe area via other public recreation sites such as Camp Richardson Resort, Pope Beach Day Use Site, the Tallac Historic Site, Regan Beach Commons, and Nevada Beach Day Use Site.

Other site work and recreation improvements such as installation of accessible pathways, upgrades to the picnic areas, etc. may extend across multiple seasons and occur in phases; however this type of work is expected to have very short term impacts to access and only for small portions of the site at a time.

Because the areas surrounding the Rainbow Trail are also extremely sensitive ecosystems and no temporary trail reroutes are planned, Rainbow trail upgrades would also necessitate a closure of at least portions of the trail. Work would be planned outside of the periods of highest use for the Rainbow Trail (holidays and the fall during seasonal wildlife migrations). The Stream Profile Chamber would be closed during construction work that poses a threat to user safety. Small scale interior improvements may proceed while the building is open to the public.

Conclusion

The proposed new recreation facilities are within the context and intensity of existing access to the recreation sites and would not result in a significant increase in access to the site. Overall the quality of access to Baldwin Beach, the Stream Profile Chamber, and the Rainbow Trail areas will be improved. Universal accessibility guidelines will be met where applicable and access for individuals with disabilities, mobility impairments, and families with small children will be much improved. These improvements are within the context and intensity of existing features and not considered a significant increase to site access. Some user-created trails may be impacted by the restoration and swale work. The timing of temporary closures for construction work may occur during the high use summer months. There will be no significant long term change to access to any of the recreation sites within the project area resulting in no significant impact.

Resource of Concern

Changes in Recreation Opportunity and Experience

Rule

This area falls within the LTBMU Forest Plan's Fallen Leaf Management Area, which is the heaviest developed and used recreation area within the LTBMU. The Forest Plan classifies this area to be managed with a Recreation Opportunity Spectrum (ROS) class of rural where this level of development is permitted. Project activities that result in a new ROS designation for a site would be considered a significant impact. Additionally, subjective changes to recreation opportunity and experience are considered in terms of context and intensity when compared to the existing level of recreation opportunity and the existing experience of recreating at the site.

This analysis relies on the LTBMU's Forest Plan (USDA 1988), the Forest Service Outdoor Recreation Accessibility Guidelines (USDA 2006), the Architectural Barriers Act/American Disabilities Act, the Forest Service Built Environment Image Guide (USDA 2001), and Forest Service Manual direction (USDA 2003: Chapter 2380–Landscape Management, USDA 2006a: Section 2333–Site and Facility Planning and Design).

Analysis

The overall level of development at Baldwin Beach is not increasing from existing levels with the exception of the installation of accessible pathways and the multi-use path from highway; however the overall quality of the recreation experience at the site is expected to improve. The overall increase in development at the site is consistent with existing context and intensity of infrastructure at the site, therefore no change in the ROS would result from project activities. All proposed facilities would meet the Forest Service Built Environment Image Guidelines for visual appearance, further ensuring that the facilities fit within the context of the existing infrastructure and landscape that they sit in.

Recreation upgrades at Baldwin Beach would improve the opportunity for individuals with disabilities to recreate on Lake Tahoe beaches by providing access to the beach and picnic site via new accessible walkways. Upgrades to the Rainbow Trail would also increase the opportunity for individuals to experience the marsh ecosystem. The formalized user-created trail that leads to the gravel bar by Taylor Creek would allow visitors a much closer view of seasonal wildlife migrations along an accessible pathway. Installation of the foot washing stations would improve the experience of visitors at the site and reduce the need for maintenance in the bathrooms to clean sand from the facility sand traps. All upgraded facilities would have a reduced level of deferred maintenance, resulting in an improved experience for visitors.

The ability to find solitude was mentioned by the public as an important value to maintain at Baldwin Beach. The installation of the beach access pathways is expected to actually reduce the number of people who travel down the beach for significant distances, which may result in an increased sense of solitude at the periphery of the site. The experience at Nevada Beach where similar pathways were installed has shown that when given the opportunity, visitors would use these access points that are easier to maneuver and won't travel as far down the beach. A previously proposed pavilion and pathway on the beach connecting the two parking areas was removed from the proposed action after scoping, over concern regarding the level of proposed development at the site and the need to maintain the relatively dispersed feeling.

The stream and restoration activities are not expected to significantly alter the existing opportunity or experience at Baldwin Beach. While some of the vegetation patterns may change from a drier chaparral to a wet meadow ecosystem with standing water, these conditions currently exist during spring flow conditions and are not outside the existing variability seen at the site from year to year and season to season. The experience of recreating on a beach next to a swale ecosystem would not change. The amount of flowing water at the mouth of Tallac Creek may be reduced, but it is not anticipated to be significantly different than what currently happens during seasonal variability and dry years. The general pattern of visitors recreating on Lake Tahoe near a swale and creek ecosystem would not be altered and swale/creek conditions will continue to be highly variable between the seasons and from year-to-year.

Installation of nest and perch structures and willows may slightly improve the ability to view birds in close proximity to the recreation site. Removal of aquatic invasive species would improve the clarity of the water in the swales and creeks and also increase the likelihood of viewing native fish, amphibians, and birds.

Work on the Lucky Baldwin Dam is not expected to alter the existing opportunity to view the dam at Fallen Leaf Lake. The dam is only visible during low water levels and is not easily navigable by pedestrians due to the existing perforations in the dam, although some visitors do climb on the dam. Only portions of the dam are proposed for removal and the opportunity to view and observe the dam up close would remain.

Conclusion

The overall increase in development at the site is consistent with existing context and intensity of infrastructure at the site, therefore no change in the ROS would result from project activities. The opportunity for persons with disabilities and mobility impairments to enjoy Baldwin Beach and the picnic site would be improved. The existing recreation opportunities within the project area would not significantly change in intensity. The newly proposed recreation facilities and upgraded facilities would fit within the existing site context and intensity of development and would not result in a significant change in the opportunity to recreate within the project area. The experience of recreating at Baldwin Beach is expected to improve through the reduction in deferred maintenance and improved facilities. The experience of viewing and walking through a marsh ecosystem, recreating at Baldwin Beach, wildlife viewing, and experiencing a swale/creek ecosystem would be improved through the restoration activities and improved facilities.

3.2.8 Scenic

Background

The proposed activity area is located on a relatively flat area that is a mixture of a more dense stream habitat (willow and aspen overstory), open marsh habitat (low grasses and small shrubs), wet meadow (swales with short grasses and some willows), and open sandy beachfront on Lake Tahoe. The backdrop landscape consists of the Sierra Nevada Crest and Mt. Tallac to the south and west. The clear blue waters of Lake Tahoe and the mountains of the East Shore of the Tahoe Basin serve as the backdrop to the site to the north and east.

Existing facilities are noticeable but visually subordinate to this landscape. However, these facilities, including day use parking, pathways, and the stream profile chamber, are noticeably well- worn and aging due to long-term concentrated recreational use of this highly popular site and the level of deferred maintenance.

The project is visible from TRPA Scenic Shoreline Unit 4, Taylor Creek Meadow, which is in attainment with TRPA Scenic Thresholds. TRPA Scenic Roadway Unit 2 (Highway 89) goes through the project area and is not in attainment with TRPA Scenic Thresholds. The proposed action in this area on Highway 89 would create a bike path connection from Baldwin Beach to the bike path on Highway 89, new fencing along the bike path on Highway 89, and bank stabilization at the Taylor Creek crossing on Highway 89.

Resource Concern

Changes to Scenic Character

Rule

All of the project components are considered key viewing points and are within the foreground view area, which is being managed in accordance with the visual quality objective (VQO) of partial retention.

A change in the VQO designation for a site as a result of project activities would be considered a significant impact the scenic character. Additionally, changes to scenic character are considered on a subjective basis in terms of context (site character), time, and intensity (scale) when compared to the existing condition. All facilities on NFS lands must meet the Built Environment Image Guide for materials, scale, and style of design. This analysis relies on the LTBMU's Forest Plan (USDA 1988), the Forest Service Built Environment Image Guide (USDA 2001), and Forest Service Manual direction (USDA 2003: Chapter 2380–Landscape Management). The project cannot degrade the scenic quality of the TRPA Shoreline Unit, which currently has a high scenic quality rating of 3.

Analysis

The newly modified Rainbow Trail segments, upgrades to the Stream Profile Chamber, new pedestrian circulation pathways at Baldwin Beach, new beach access routes from the Baldwin parking areas out to the beach, the formalized picnic area, and new accessible pathways within the Baldwin picnic/parking/restroom areas would be within the scale of existing development, and would meet the USFS Built Environment Image Guide (BEIG) for materials, scale, and style of design and would fit within the existing VQO of partial retention. These enhancements would improve the visual character of the recreation facilities within the site. The new multi-use pathway along the entrance road and the new accessible pathways leading out to the beach would result in a small increase in the amount of infrastructure visible from existing facilities, however these new facilities would be within the scale of the existing facilities and would meet the BEIG. These ground-level improvements are generally considered a positive aesthetic improvement within sites where similar infrastructure exists and when the new infrastructure is designed to improve ease of access to facilities. Comparable structures installed at Nevada Beach are not considered a detracting feature on the landscape. Changes to the view from Lake Tahoe of the new accessible pathways on Baldwin Beach are expected to be extremely small in scale and

visually subordinate to the surrounding landscape due to the low profile design, natural-appearing materials, and low viewing angle from the lake (similar to the pathways at Nevada Beach). It is expected that the new observation deck on the Rainbow Trail would reduce the presence of muddy, flooded user-created trails and trampled vegetation and improve the overall scenic experience of viewing seasonal wildlife.

As a result of the restoration activities, the marsh habitat and swales may change from a drier chaparral to a wet meadow with more standing water. This condition exists currently during spring peak flow conditions. This wetter condition may persist longer through the season. This is not outside of the existing condition during extremely high lake levels. Dry stream bed conditions may persist longer at the mouth of Tallac Creek. This condition currently exists during dry summer months. The exact configuration of swale 1 and Taylor Creek may be somewhat changed from existing due to possible increased breaching of swale 1 at the mouth of Taylor Creek, however this is also within the existing natural range of variability in that location for both timing and intensity. The scale of proposed changes to the landscape is considered to be small.

Replacement of culverts and swale crossing structures would reduce the amount of aged infrastructure in the landscape and improve the aesthetic quality of these facilities. Resource protection barriers along the beach would result in improved aesthetics through reduced erosion and vegetative trampling, as well as through removal of the existing dilapidated fencing. Aquatic invasive species removal activities may alter the swales from the existing system of dense invasive milfoil vegetation towards a more natural clear water system with grasses/forbs.

Breaching of Lucky Baldwin Dam is proposed only in small sections and would be consistent with the existing perforated quality of the dam.

Installation of nest/perch structures would have minimal impact to the visible foreground of the site facilities. Tree removal activities associated with multi-use path installation and culvert replacement are not expected to change the overall experience of viewing stream/marsh/swale vegetation in random patches along the entrance road. In some areas the aesthetic quality of the vegetation would be improved from that of an overgrown lodgepole pine stand to one of healthy stream/marsh/swale vegetation. The overall visual experience at the site would remain one of shrubs or small trees and meadow vegetation in the foreground with the background of the Sierra Nevada Crest and Mount Tallac.

Conclusion

Improvements to the recreation facilities and access roadways/pathways within the site may result in a small increase in overall infrastructure visible at the site, however these improvements are considered to be beneficial to the aesthetics of the site through the replacement of aged infrastructure, reduced trampling of vegetation and erosion, and increased cohesion within the site. These improvements fit within the existing scale and intensity of the existing facilities. Restoration activities may result in a change in the appearance of the existing landscape and existing vegetation regimes, however these changes are within the existing and historic seasonal and annual variability at the site and are consistent with the overall site character. The changes will not decrease the numeric rating of the Scenic Shoreline Unit or the TRPA Scenic Roadway Unit 2 (Highway 89). The overall visual experience of the stream/marsh/swale/beach habitat in the foreground and background of tall mountains will persist. The scale of visual changes at the site is not considered significant. The infrastructure that would be replaced (e.g., bridge abutments, fencing) or built (e.g., bike path connections) would blend rather than contrast with the natural environment.

3.2.9 California Species (California Environmental Quality Act Compliance)

To comply with CEQA, we evaluated the potential for the following species to occur in the project area and the larger Emerald Bay quadrangle and the potential for project-level effects: endangered, threatened, and/or candidate by California Endangered Species Act (CESA); California Department of Fish and

Wildlife designated Species of Special Concern (SSC), Fully Protected (FP) species, and Watch List (WL) species; California threatened and endangered plant species with a California Native Plant Society (CNPS) Rare Plant Rank of 1 and 2; and rare plants with a 4 rank that are also on the TRPA list (Table 9). The table below describes the potential effects to species that do not also have another federal or local status and were described previously in the document (endangered, threatened, candidate, proposed, Forest Service Sensitive, Management Indicator Species, and TRPA Species of Interest).

Table 9. California species evaluated for the proposed project.

Species	Status[1]		Determination	Rationale/Mitigation
	State	CNPS		
Aquatics				
Northern leopard frog (*Lithobates pipiens*)	SSC		No effect	No potential to occur, outside of species range.
Mountain sucker (*Catostomus platyrhynchus*)	SSC		Not likely to jeopardize the continued existence of the species	Individuals could be adversely affected by electrofishing. However, species is not known to occur in the project area; it has not detected in project area during surveys.
Mountain whitefish (*Prosopium williamsoni*)	SSC		Not likely to jeopardize the continued existence of the species	Few individuals could be adversely affected by electrofishing because of the relatively small population size documented in the project area as compared to their geographic range.
Botany				
marsh skullcap (*Scutellaria galericulata)*		2B.2	Not likely to jeopardize the continued existence of the species	There is one occurrence in the analysis area, consisting of three polygons, but none of the polygons intersect proposed activities (California Department of Fish and Wildlife 2015).
Austin's milkvetch (*Astragalus austiniae)*		1B.3	Not likely to jeopardize the continued existence of the species	Current occupancy in the project area is uncertain; only data include two historical records from Mt Tallac (1925) and Granite Lake (1976).
Watershield (*Brasenia schreberi)*		2B.3	Not likely to jeopardize the continued existence of the species	Occupancy in project area uncertain; detected in Truckee Marsh at Pope Beach (2011).
Davy's sedge *(Carex davyi)*		1B.3	Not likely to jeopardize the continued existence of the species	Current occupancy in the project area is uncertain; only data include one historical record from near Gilmore Lake in 1946.
Mud sedge		2B.2	Not likely to	Occupancy in project area

(Carex limosa)			jeopardize the continued existence of the species	uncertain; detected in Truckee Marsh at Pope Beach (2011).
American mannagrass *(Glyceria grandis)*		2B.3	Not likely to jeopardize the continued existence of the species	Current occupancy in the project area is uncertain; only data include one historical record from Upper Glen Alpine Falls (1907).
Slender-leaved pondweed *(Stuckenia filiformis ssp. alpine)*		2B.2	Not likely to jeopardize the continued existence of the species	Current occupancy in the project area is uncertain; only data include one historical record from north of Emerald Bay (1929).
Wildlife				
Sharp-shinned hawk *Accipiter striatus*)	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible but there would be no changes to suitable habitat.
Long-eared owl (*Asio otus*)	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible but there would be no changes to suitable habitat.
Black-backed woodpecker (*Picoides arcticus*)	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area. There are detections in the vicinity but not within the analysis area. Disturbance type effects are possible but there would be no changes to suitable habitat.
White-headed woodpecker *Xanthocephalus xanthocephalus)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible. Proposed actions may positively alter suitable habitat.
Red-breasted sapsucker *(Sphyrapicus ruber)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible. Proposed actions may positively alter suitable habitat.
Bank swallow *(Riparia riparia)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area. There are detections in the vicinity but not within the analysis area.[2] Disturbance type effects are

				possible. Proposed actions may positively alter suitable habitat.
American badger *(Taxidea taxus)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible but there would be no changes to suitable habitat.
Sierra Nevada snowshoe hare *(Lepus americanus tahoensis)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible but there would be no changes to suitable habitat.
Sierra Nevada mountain beaver *(Aplodontia rufa californica)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible but there would be no changes to suitable habitat.
Long-legged myotis*(Myotis volans)*	SSC		Not likely to jeopardize the continued existence of the species	Suitable habitat within the analysis area, but not known to occur.[2] Disturbance type effects are possible. Proposed actions may positively alter suitable habitat.

[1] CESA, CDFW, Status Definitions:
ST = State Threatened
FP = Fully Protected
SSC = Species of Special Concern
WL = Watch List Species

Local/California Native Plant Society (CNPS) Status Definitions:
CNPS Listing Categories:
1B Plants rare, threatened, or endangered in California and elsewhere
2 Plants rare, threatened, or endangered in California but more common elsewhere
3 Plants for which more information is needed – a review list
4 Plants of limited distribution – a watch list

[2] Project design features (e.g., 1 and 2a) would implement protections if species are detected in the project area.

3.2.10 Temporary Construction Impacts

Potential temporary construction impacts requiring design features and/or BMPs have been identified based on the CEQA checklist (Appendix A) related to biological resources, hydrology and water quality, and recreation. Impacts are mainly related to construction activity creating soil disturbance (including grading, temporary access roads and instream activities), noise from heavy equipment use, and limiting public access for safety.

Potential construction related biological impacts are discussed in Sections 3.2.3 (Aquatics), 3.2.4 (Botany), 3.2.5 (Wildlife), and 3.2.9 (California Species). Project elements with the potential to affect biological resources during construction include: culvert replacement in Swale 1 and culvert installation along the Baldwin Beach access road, restoration of historic impacts to Swales 2, 3, and 4, installation of the berm on Tallac Creek, protection of the STPUD sewer line, and installation of the multi-use pathway parallel to the Baldwin Beach access road. Implementation of these elements may require the use of heavy equipment in stream environment zones. The project may affect individuals of a species but is not likely to result in a loss of viability. The project will improve conditions for native species through the removal and management of invasive species. The project is designed to improve geomorphic and hydrologic conditions, which will increase riparian and floodplain habitat. Impacts to the local hydrology are described in Section 3.2.1 (Hydrology). Construction related impacts are reduced through implementation of BMPs described in Section 2.4, Table 1, and design features 5-9. The project will improve movement of wildlife species through the replacement of culverts through swale 1 and stabilization of the South Tahoe Public Utility District sewer line that crosses Tallac Creek. Potential construction related impacts to wildlife are reduced through implementation of design features 46-51.

Project elements with potential construction related water quality impacts are described in Section 2.2 (Proposed Action, Items 1-3 and 8). Impacts to hydrology and water quality are discussed in the Section 3.2.1 (Hydrology). Construction activity including grading and soil disturbance near streams and swale restoration, Lucky Baldwin dam removal, upgrades to the fish ladder, stream profile chamber and rainbow trail, and protection of bridge abutments in Taylor Creek have the potential to cause short-term violations of water quality standards both during construction and immediately following project completion. The activities may require the use of heavy equipment in and adjacent to waterbodies. BMPs as prescribed from the following sources are required as each phase of the project is permitted. National and Regional USFS BMPs that minimize potential impacts from construction activities in waterbodies and SEZs are described in Table 1 and Appendix C, including: Plan-3 (Aquatic Management Zone Planning), AqEco-2 (Operations in Aquatic Ecosystems), AqEco-4 (Stream Channels and Shoreline), Fac-2 (Facility Construction and Stormwater Control), Fac-7 (Vehicle and Equipment Wash Water), Road-10 (Equipment Refueling and Servicing), and WatUses-4/BMP2.5. Design features 5, 6, 8, and 11-13 provide measures necessary to mitigate potential impacts to hydrology and water quality to less than significant levels. In addition, all work within waterbodies would comply with requirements of permits issued by the Water Board, including Basin Plan Prohibition Exemptions and Clean Water Act section 401 Water Quality Certifications. The mitigation identified herein will be incorporated into the terms of the permits.

Potential construction related recreation impacts are analyzed in Section 3.2.7 (Recreation). Construction on various portions of the project will require temporary limited access due to public safety concerns. The limited construction season overlaps with the heaviest use periods for the recreation sites in the project area. This will create a limited short term impact on access due to the timing overlap of these activities. Only construction work associated with road improvements, culvert replacement, and multi-use trail construction is expected to result in closure of Baldwin Beach road. Dispersed use of Baldwin Beach may still continue such as boat/kayak/paddle board access or via pathways from the Tallac Historic Site and across the mouth of Taylor Creek. Closure notices would be posted at the site and in advance via press release and on the LTBMU website.

3. 3 Cumulative Effects

A cumulative effect is the effect on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its

effects are considered in sum with the effects of other past, present, and reasonably foreseeable future actions, the effects may be significant (40 CFR 1508.7, 1508.8). Cumulative effects can result from individually minor, but collectively significant actions, taking place over a period of time. Table 10 below, summarizes the environmental consequences of past, present, and future projects within the project area when added to the proposed action.

Cumulative effects are commonly confused with indirect effects. The cumulative effects analysis takes a look at the other past, present and foreseeable future actions: by the Forest Service as well as other agencies.

- *Cumulative effects*, generally speaking, are those additive effects to resources on the landscape from:
    1) the actions proposed in this project (as an additive effect) when combined with
    2) the effects of:
        a) past projects,
        b) currently active projects, and
        c) projects that are planned in the foreseeable future.

This analysis relies on *current environmental conditions* as a proxy for the *impacts of past actions*. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment (and might contribute to cumulative effects). While some of the recent past actions are identified and summarized in Table 10, the cumulative effects analysis does not attempt to quantify the effects of all past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach.

1. A catalog and analysis of all past actions would be impractical to compile – and unduly costly to obtain. Current conditions within the project area have been impacted by innumerable actions over the last century (and longer); attempting to isolate the individual actions that continue to have residual impacts would be nearly impossible.
2. Providing the details of past actions, on an individual basis, would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions can risk ignoring the important residual effects of past natural events, which also contribute to cumulative effects. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.
3. Public scoping for this project did not identify any public interest or need for detailed information on individual past actions.
4. The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions” (Connaughton 2005).

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

> “CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment.

> With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

The *reasonably foreseeable future actions* used in the cumulative analysis are limited to projects that are funded and have progressed in the planning stages sufficiently to clearly identify the anticipated direct and indirect environmental effects. Projects where the implementation may take place at some undefined point in the future and/or have unformed proposed actions which do not yet have specific environmental consequences cannot be reasonably included in the analysis.

Stated simply, if the specific location, action, direct and indirect effects, and timing cannot be predicted with some degree of certainty, then including that project in the analysis is only speculative – which may lead to inaccurate cumulative effects analyses Future actions are only included if their impacts are forecasted to occur before the impacts of the proposed action have ended.

For the cumulative effects analysis, we considered projects and activities that were wholly or at least in part within the project area. For the analysis of cumulative effects to aquatic resources, the analysis boundary extends beyond the project boundary to include all of Fallen Leaf Lake and Glen Alpine Creek because the lake and creek are hydrologically connected to Taylor Creek in the project area. It is assumed that future projects would be implemented within the next five years.

Table 10 below displays the cumulative effects findings. The table lists the past-present-future projects, when the project has or will have an impact (date), proximity to the proposed action, the relevant effect of the project from the appropriate environmental analysis, the effect of the proposed action on that resource, and finally the finding of cumulative effect. The environmental documents for each of the projects in Table 10 can be found on the website for the Forest Service Lake Tahoe Basin Management Unit (Land and Resource Management/Projects): http://www.fs.usda.gov/projects/ltbmu/landmanagement/projects.

Following the table is a more in depth description of the Cumulative Watershed Effects.

Table 10. Cumulative effects findings.

Project	Date	Proximity	Relevant Effect of project	Taylor and Tallac Effect	Cumulative Effect
USFWS Fallen Leaf Lake LCT research	2005	In project boundary	Stocking LCT	Improving habitat for native fish (including LCT) by decreasing water temperature, improving hydrologic connectivity (swales), and habitat complexity.	None

Project	Date	Proximity	Relevant Effect of project	Taylor and Tallac Effect	Cumulative Effect
Spring Creek bridge replacement	2009	In project boundary	Removed aquatic organism barrier on Spring creek for 1.5 stream miles	0.5 miles of streams restored/enhanced	Improved aquatic organism passage on 2 stream miles
Baldwin Allotment EA	2009	In project boundary	Improved water quality (reduced pathogens) by closing grazing allotment in meadow next to Tallac Creek.	Improve water quality (decreased temperature) through improved hydrologic connectivity.	Beneficial cumulative effect to water quality.
Tallac Creek Highway 89 (Caltrans)	2015	In project boundary	Removed aquatic organism barrier on Tallac creek for 1 stream mile	0.5 miles of streams restored/enhanced	Improved aquatic organism passage on 1.5 stream miles
Aspen Community Restoration	2009-present	In project boundary	Improved approximately 23 acres and approximately 75 acres planned for improvement before Jan 2018	No improvements planned, little or no effects.	No cumulative effect
Caltrans Highway 89 BMPs	2014-present	In project boundary	Improved water quality by installing BMPs	Improving water quality by installing BMPs in parking lots and also by improved hydrological connectivity (decreased temperature)	Beneficial cumulative effect
South Shore Fuels	2012-present	In project boundary	Minor disturbance effects to wildlife during implementation	Minor disturbance effects to wildlife during implementation	Minor disturbance-type effects during project implementation

Project	Date	Proximity	Relevant Effect of project	Taylor and Tallac Effect	Cumulative Effect
Fallen Leaf ATM	2015-present	In project boundary	Updating trail system and parking lots, and installing BMPs to improve circulation and protect sensitive areas.	Upgrading rainbow trail and installing new pedestrian pathways, and installing BMPs to improve circulation, discourage trampling and protect sensitive areas.	Beneficial cumulative effect to recreation experience and sensitive resources.
Restoration of Fire Adapted Ecosystems	Future	In project boundary	Improving meadow condition by conducting prescribed burns, improving wildlife habitat (willow planting).	Improving meadow wetness and improving meadow conditions for wildlife.	Beneficial cumulative effects
Tallac Historic Site BMPs	Future	At edge of project boundary	Installing resource protection barriers, BMPs, and updates pedestrian and motorized circulation.	Installing resource protection barriers, BMPs, and updates pedestrian and motorized circulation.	Beneficial cumulative effect to recreation experience and sensitive resources
USFWS: Lahontan Cutthroat Trout Recovery and Fishery Management Plan	Future	In project boundary	Improve habitat for native fish (including LCT) by removing non-native predators and competitors.	Improving habitat for native fish (including LCT) by decreasing water temperature, improving hydrologic connectivity (swales), and habitat complexity.	Beneficial cumulative effect for native fish habitat.

Cumulative Watershed Effects

A Cumulative Watershed Effects (CWE) analysis describes the expected impacts of the proposed action in the context of the effects on the watershed in which it lies, including the cumulative effects of other past, present, and reasonably foreseeable future actions.

Cumulative watershed response is assessed based on whether the cumulative effects of past, present and future projects are expected to cause an overall change in watershed hydrology, including increases in peak flows which can cause destabilization of stream channels that are not adapted to those flows. This type of cumulative watershed response can be caused by an excessive amount of soil disturbance and compaction which exceeds the ability of the watershed to infiltrate surface runoff generated from storm events, generating flow volumes and sediment loads that exceed the transport capacity of the stream channel network.

The current condition of stream channels within the Taylor and Tallac Creek watersheds do not currently exhibit evidence of cumulative watershed effects. The Taylor Creek watershed, below the Fallen Leaf lake outlet, is 2,508 acres. And the Tallac Creek watershed is 3,794 acres. See the Hydrology/Soils Specialist Report in the Project Record for more watershed details, including figures.

For projects that involve a large amount of ground disturbing activity, there are procedures for quantitatively assessing the risk of cumulative watershed response. However because the estimated disturbance footprint of the proposed project is so small in comparison to the watershed size (6.2 acres in the Taylor Creek watershed, and 3.8 acres in the Tallac Creek watershed), and the fact that the project is located at the bottom of the watershed, it was determined that a qualitative assessment was more reasonable.

The proposed project is expected to result in a small scale overall increase in geomorphic stability in both the Taylor and Tallac Creek channels. In addition the redirection of Tallac creek channel flows to wetland swales is expected to result in a small scale overall increase in natural filtration of nutrients and fine sediments contained in Tallac Creek flows.

Other recently past, current, or foreseeably future projects involving ground disturbing activities within these watersheds are listed below. Stream crossings upgrades implemented were designed to improve aquatic organism passage as well as passage of stream flows and sediment load.

In the South shore fuels reduction project 272 acres were treated using mechanical vegetation treatment methods (Cut to Length forwarder/harvester) in 2012 in the Taylor Creek watershed, and 92 acres in the Tallac Creek watershed in 2015. There is 37 acres planned for treatment in 2016 in the Taylor Creek watershed, and 136 acres in 2016/2017 in the Tallac Creek watershed. There is an additional 12 acres of treatment planned in the Taylor watershed, and 113 acres in the Tallac watershed, but the implementation date for these treatments in not certain; the soonest would be 2018.

The proposed action along with the above described past, present and reasonably foreseeable future actions are not expected to result in an adverse cumulative watershed effect, and in fact overall watershed health is expected to be improved.

Consultation and Coordination

The Forest Service, Water Board, and TRPA consulted the following individuals, Federal, State, and local agencies, tribes and others during the development of this Environmental Assessment, Initial Study, and TRPA Checklist:

ID Team Core and Extended Members

Jordan Burge, Civil Engineer

Stephanie Coppeto, Forest Wildlife Biologist

Tom Fuller, Heritage Resources

Brian Hansen, Lands Realty Specialist

Mike LeFevre, Planning Staff Officer

John Maher, Heritage Resources Program Manager

Sarah Muskopf, Aquatic Biologist

Craig Oehrli, Forest Hydrologist

Sue Norman, Forest Hydrologist

Courtney Rowe, Forest Botanist

Maura Santora, Fish Biologist

Ashley Sibr, Landscape Architect/Recreation Planner

Shay Zanetti, Fish and Wildlife Biologist

Partnering Agencies

The proposed action (including project design features) and analysis of environmental consequences was developed with the Lahontan Regional Water Quality Control Board (Water Board) and the Tahoe Regional Planning Agency (TRPA).

Federal, State, and Local Agencies

United States Department of the Interior Fish and Wildlife Service, California Department of Fish and Wildlife, Tahoe Resource Conservation District, and South Tahoe Public Utilities District.

Tribes

Washoe Tribe

References

Ababneh, L. and W. Woolfenden. 2010. Monitoring for potential effects of climate change on the vegetation of two alpine meadows in the White Mountains of California, USA. Quaternary International 215:3-14.

Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley, CA.

Bosworth, D. 2003. Invasive Species. USDA Forest Service. Letter to all employees; July 16, 2003.

California Department of Fish and Wildlife. 2015. California Natural Diversity Database (CNDDB), RareFind Version 5.

Boylen, C.W., L.W. Eichler, and J.D. Madsen. 1999. Loss of native aquatic plant species in a community dominated by Eurasian watermilfoil. Hydrobiologia. 415:207-211.

California Native Plant Society. 2012. Inventory of Rare and Endangered Plants.

Carignan, R. and J. Kalff. 1980. Phosphorus sources for aquatic weeds: water or sediments? Science. 207(4434):987-989.

Chandra, S., K.L.C. Ngai, M. Kamerath, and B. Allen. 2009. Warm-water non-native fishes in Lake Tahoe. Report prepared for Elizabeth Harrison, Nevada State Lands.

Coats, R., 2010, Climate change in the Tahoe basin: regional trends, impacts and drivers: Climatic Change, v. 102, p. 435-466.

Das, T., M. D. Dettinger, D. R. Cayan, and H. G. Hidalgo. 2011. Potential increase in floods in California's Sierra Nevada under future climate projections. Climatic Change 109:71-94.

Daszak P, Strieby A, Cunningham A.A, Longcore J.E, Brown C.C, Porter. D 2004. Experimental evidence that the bullfrog (Rana catesbeiana) is a potential carrier of chytridiomycosis, an emerging fungal disease of amphibians Herpetol. J 14 201–207

Diaz, H. F., and J. K. Eischeid. 2007. Disappearing “alpine tundra” Köppen climatic type in the western United States. Geophysical Research Letters 34: L18707.

EDAW (2005). The Taylor, Tallac, and Spring Creek Ecosystem Assessment Report. Prepared for the Lake Tahoe Basin Management Unit, USFS.

Edwards, L.M., and K.T. Redmond. 2011. Climate Assessment for the Sierra Nevada Network Parks Natural Resource Report NPS/2011/NRR—2011/482. U.S. Department of Interior, National Park Service. Fort Collins, CO.

EPA. 2010. Final Lake Tahoe Total Maximum Daily Load Report. United States Environmental Protection Agency Region 9. 380pp.

Fisher, M. C., Garner, T. W. J. & Walker, S. F. 2009. Global emergence of Batrachochytrium dendrobatidis and amphibian chytridiomycosis in space, time, and host. Annu. Rev. Microbiol. 63, 291–310

Frodge, J.D., G.L. Thomas, and G.B. Pauley. 1991. Sediment phosphorus loading beneath dense canopies of aquatic macrophytes. Lake and Reservoir Management 7:61-71.

Gonzalez, P. 2012. Climate change trends and vulnerability to biome shifts in the southern Sierra Nevada. U.S. Department of Interior, National Park Service, Climate Change Response Program Natural Resource Stewardship. Washington, D.C.

Granéli, W. and D. Solander. 1988. Influence of aquatic macrophytes on phosphorus cycling in lakes. Hydrobiologia. 170(1):245-266.

ISAB - Independent Scientific Advisory Board. 2007. Climate change impacts on Columbia River Basin fish and wildlife. ISAB Climate Change Report ISAB 2007-2. Portland, OR.

Jancowski, K., Orchard, S.A. (2013): Stomach contents from invasive American bullfrogs Rana catesbeiana (Lithobates catesbeianus) on southern Vancouver Island, British Columbia, Canada. NeoBiota 16: 17–37.

Kaushal, S. S., G. E. Likens, N. A. Jaworski, M. L. Pace, A. M. Sides, D. Seekell, K. T. Belt, D. H. Secor, and R. L. Wingate. 2010. Rising stream and river temperatures in the United States. Frontiers in Ecology and the Environment 8:461-466.

Kennedy, T.L., D.S. Gutzler, and R.L. Leung. 2009. Predicting future threats to the long-term survival of Gila trout using a high-resolution simulation of climate change. Climate Change 94: 503 – 515.

Kraus F (2009) Alien Reptiles and Amphibians a Scientific Compendium and Analysis. Springer, Dordrecht.

Lowe S, Browne M, Boudjelas S, De Poorter M (2000) 100 of the World's worst invasive alien species a selection from the global invasive species database. The Invasive Species
Specialist Group (ISSG), Auckland

MacRae, P.S.D., and D. A. Jackson. 2001. The influence of smallmouth bass (*Micropterus dolomieu*) predation and habitat complexity on the structure of littoral zone fish assemblages. Canadian Journal of Fisheries and Aquatic Sciences 58: 342–351.

Matthews, J.W., and A.G. Endress. 2008. Performance criteria, compliance success, and vegetation development in compensatory mitigation wetlands. Environmental Management 41(1):130-141.

McCabe, G. J. and M. P. Clark. 2005. Trends and variability in snowmelt runoff in the western United States. Journal of Hydrometeorology 6:476-482.

McKnight, S., and C.J. Rowe. 2015. Reassessment of the Management Ranking System For Terrestrial Invasive Plant Species, Lake Tahoe Basin Management Unit USDA Forest Service, Lake Tahoe Basin Management Unit. 16.

Miller, N. L., K. E. Bashford and E. Strem. 2003. Potential impacts of climate change on California hydrology. Journal of the American Water Resources Association 39: 771-784.

Moser, S., G. Franco, S. Pittiglio, W. Chou, D. Cayan. 2009. The future is now: An update on climate change science impacts and response options for California. California Climate Change Center Report CEC-500-2008-071, May 2009. California Energy Commission, Sacramento, CA.

Moyle, P.B., J. V. E. Katz and R. M. Quiñones. 2011. Rapid decline of California's native inland fishes: a status assessment. Biological Conservation 144: 2414-2423.

Moyle, P.B., J. D. Kiernan, P. K. Crain, and R. M. Quiñones. 2013. Climate change vulnerability of native and alien freshwater fishes of California: a systematic assessment approach. PLoS One. http://dx.plos.org/10.1371/journal.pone.0063883

Moyle, P. B. 2002. *Inland Fishes of California. Revised and expanded*. Berkeley: University of California Press. 502 pp.

Mullin, B.H., L.W.J. Anderson, J.M. DiTomaso, R.E. Eplee, and K.D. Getsinger. 2000. Invasive Plant Species. Council for Agricultural Science and Technology (CAST), Issue Paper No. 13. 18 pp.

NatureServe. 2015. NatureServe Explorer: Online Encyclopedia of Life [web application], Version 7.1. Arlington, Virginia.

Ngai, K. L. C., B.J. Shuter, D.A. Jackson, and S. Chandra. 2013. Projecting impacts of climate change on surface water temperatures of a large subalpine lake: Lake Tahoe, USA. Climatic Change. 118: 841-855

Null, S. E., J. H. Viers, J. F. Mount. 2010. Hydrologic response and watershed sensitivity to climate warming in California's Sierra Nevada. PLoS ONE 5(4):e9932. doi:10.1371/journal.pone.0009932

Pagano, T. and D. Garen. 2005. A recent increase in western US streamflow variability and persistence. Journal of Hydrometeorology 6:173-179.

Pavlik, B., D. Murphy, and Tahoe Yellow Cress Technical Advisory Group. 2002. Conservation Strategy for Tahoe Yellow Cress (Rorippa subumbellata). P. 188 p. Tahoe Regional Planning Agency, Lake Tahoe, NV.

Rahel, F.J., B. Bierwagen, and Y. Taniguchi. 2008. Managing aquatic species of conservation concern in the face of climate change and invasive species. Conservation Biology 22: 551-561

Reba, M. L., D. Marks, A. Winstral, T. E. Link, and M. Kumar. 2011. Sensitivity of the snowcover energetics in a mountain basin to variations in climate. Hydrological Processes 25:3312-3321.

Regonda, S. K., B. Rajagopalan, M. Clark, and J. Pitlick. 2005. Seasonal cycle shifts in hydroclimatology over the western United States. Journal of Climate 18:372-384.

Reuter JE, Miller WW (2000) Aquatic resources, water quality and limnology of Lake Tahoe and its upland watershed. pp 150-166, Department of the Interior, US.

Rey Benayas, J.M., A.C. Newton, A. Diaz, and J.M. Bullock. 2009. Enhancement of Biodiversity and Ecosystem Services by Ecological Restoration: A Meta-Analysis. Science 325(5944):1121-1124.

Rueter, J.E., and W.W. Miller. 2000. Aquatic Resources, Water Quality and Limnology of Lake Tahoe and Its Upland Watershed. In: Lake Tahoe Watershed Assessment: Volume 1. Gen. Tech. Rep. PSW-GTR-175. USDA Forest Service, Pacific Southwest Research Station, Albany, CA.

Safford, H., and S. Sawyer, 2012, A summary of current trends and probable future trends in climate and climate-driven processes in the Lake Tahoe Basin and the neighboring Sierra Nevada., in P. S. R. USDA Forest Service, ed.

Stanton, A., Tahoe Yellow Cress Adaptive Management Working Group, and Tahoe Yellow Cress Executive Committee. 2015. Conservation Strategy for Tahoe Yellow Cress (Rorippa subumbellata). USDA Forest Service Pacific Southwest Research Station. 130 pp + appendices.

Stewart, I.T., D. R. Cayan, and M. D. Dettinger. 2005. Changes toward earlier streamflow timing across western North America. Journal of Climate 18: 1136-1155.

Tahoe Regional Planning Agency. 2002. Regional Plan for the Lake Tahoe Basin: Threshold Evaluation. Tahoe Regional Planning Agency, Zephyr Cove, NV.

Tahoe Regional Planning Agency. 2011. Threshold Evaulation Report.

Tahoe Regional Planning Agency. 2012. Code of Ordinances. South Lake Tahoe, CA.

Tahoe Yellow Cress Adaptive Management Working Group. 2014. TYC Interagency Survey Data. Tahoe Yellow Cress Adaptive Management Working Group, Unpublished data on file at USDA Forest Service, Lake Tahoe Basin Management Unit, South Lake Tahoe, CA.

TERC. 2008. Tahoe State of the Lake Report. Tahoe Environmental Research Center, University of California, Davis, CA.

USDA Forest Service. 1974. Landscape Aesthetics, National Forest Landscape Management Vol. 2 No. 462. Washington, DC: USDA Forest Service.

USDA Forest Service. 1982. ROS Users Guide. Washington, DC: U.S. Department of Agriculture, Forest Service; 37p.

USDA Forest Service. 2001. The Built Environment Image Guide for National Forests and Grasslands. September.

USDA Forest Service. 2003. Forest Service Manual 2300 – Recreation, Wilderness, and Related Resource Management; Chapter 2380 – Landscape Management. Approved March. Washington, D.C.

USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement, Record of Decision. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

USDA Forest Service. 2006. Forest Service Outdoor Recreation Accessibility Guide. Updated 2013.

USDA Forest Service. 2006a. Forest Service Manual 2300 – Recreation, Wilderness, and Related Resource Management. Approved February. Washington, D.C.

USDA Forest Service. 2011. RF FSH 2509.22- Soil and Water Conservation Handbook, Chapter 10- Water Quality Management Handbook. Pacific Southwest Region, Vallejo, CA.

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide, FS-990a. Washington D.C.

USDA Forest Service. 2012a. Visitor Use Report, Lake Tahoe Basin Management Unit, USDA Forest Service Region 5, National Visitor Use Monitoring, Data collected FY 2010, Last Updated May 23, 2012

USDA Forest Service. 2014. Pacific Southwest Region, Sensitive Species list, October 10, 2014. http://www.fs.usda.gov/main/r5/plants-animals

USDA Forest Service. 2015. Natural Resource Information System (NRIS) Threatened, Endangered, and Sensitive Plant and Invasive Species (TESP-IS) Data for LTBMU.

USDA Forest Service LTBMU. 1988. Land and Resource Management Plan for the Lake Tahoe Basin Management Unit. South Lake Tahoe, CA: USDA Forest Service LTBMU.

USDA Forest Service LTBMU. 2010. Terrestrial Invasive Plant Species Treatment Project.

USDI Fish and Wildlife Service. FF08ESMF00-2014-F-0557. Programmatic Biological Opinion on Nine Forest Programs on Nine National Forest in the Sierra Nevada of California for the Endangered Sierra Nevada Yellow-legged Frog, Endangered Northern Distinct Segment of Mountain Yellow-legged Frog, and Threatened Yosemite Toad. .

USDI Fish and Wildlife Service. 80 F.R. 60834. 2015. Endangered and Threatened Wildlife and Plants; 12-Month Findings on Petitions to List 19 Species as Endangered or Threatened Species. P. 17, US Fish and Wildlife Service (ed.).

Viers, J. H. and D. E. Rheinheimer. 2011. Freshwater conservation options for a changing climate in California's Sierra Nevada. Marine and Freshwater Research 62:266-278.

Walter, K.M., L.W. Anderson, and C.R. Goldman. 2000. Assessing potential for spread and impacts of Eurasian watermilfoil (*Myriophyllum spicatum*) in Lake Tahoe using *in situ* transplants, microcosms, and bioassays. Available: http://trg.ucdavis.edu/research/annualreport/contents/lake/article10.html

Young, C. A., M. I. Escobar-Arias, M. Fernandes, B. Joyce, M. Kiparsky, J. F. Mount, V. K. Mehta, D. Purkey, J. H. Viers, and D. Yates. 2009. Modeling the Hydrology of Climate Change in California's Sierra Nevada for Subwatershed Scale Adaptation1. Journal of the American Water Resources Association 45:1409-1423.

Zedler, J.B., and J.C. Callaway. 1999. Tracking wetland restoration: Do mitigation sites follow desired trajectories? Restoration Ecology 7(1):69-73.

Appendices

Appendix A – 1 CEQA Initial Study

California Regional Water Quality Control Board
Lahontan Region

CEQA Environmental Checklist

PROJECT DESCRIPTION AND BACKGROUND

Project Title:	**Taylor and Tallac Restoration Project**
Lead agency name and address:	Lahontan Regional Water Quality Control Board 2501 Lake Tahoe Blvd. South Lake Tahoe, CA 96150
Contact person and phone number:	Laurie Scribe, (530) 542-5465 Laurie.Scribe@waterboards.ca.gov
Project Location:	Taylor Creek and Tallac Creek watersheds, near City of South Lake Tahoe, El Dorado County
Project sponsor's name and address:	US Forest Service Lake Tahoe Basin Management Unit (LTBMU) 35 College Drive South Lake Tahoe, CA 96150
Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation.)	The project is described in detail in Chapter 2, Proposed Action, of this document. The project involves aquatic habitat restoration and installation and upgrades of public outdoor recreation facilities.
Surrounding land uses and setting; briefly describe the project's surroundings:	Forest, stream, meadow and lake settings with recreational land uses surround the Project area. The lands within and around the project area are managed by the LTBMU for resources, recreation, and transportation routes. Seasonal recreation residences, campgrounds, and one private parcel border some of the project area.
Other public agencies whose approval is required (e.g. permits, financial approval, or participation agreements):	Tahoe Regional Planning Agency, United States Army Corps of Engineers, California Department of Fish and Wildlife, California Department of Transportation

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, as indicated by the checklist on the following pages.

☐	Aesthetics	☐	Agriculture and Forestry	☐	Air Quality
☒	Biological Resources	☒	Cultural Resources	☐	Geology/Soils
☐	Greenhouse Gas Emissions	☐	Hazards and Hazardous Materials	☒	Hydrology/Water Quality
☐	Land Use/Planning	☐	Mineral Resources	☐	Noise
☐	Population/Housing	☐	Public Services	☒	Recreation
☐	Transportation/Traffic	☐	Utilities/Service Systems	☐	Mandatory Findings of Significance

DETERMINATION:

On the basis of this initial evaluation:

☐	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☒	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required

Signature:	**Date:**
Printed Name: PATTY Z. KOUYOUMDJIAN, EXECUTIVE OFFICER	

CEQA Environmental Checklist

This checklist identifies physical, biological, social and economic factors that might be affected by the proposed project as described in Chapter 2, Section 2.2. In many cases, background studies performed in connection with the project indicate no impacts. A NO IMPACT answer in the last column reflects this determination. Where there is a need for clarifying discussion, the discussion is included either following the applicable section of the checklist or referenced to the appropriate section of the document. The words "significant" and "significance" used throughout the following checklist are related to CEQA impacts. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

The proposed project is subject to the requirements of both the federal National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Section 15226 of the CEQA Guidelines directs state lead agencies to cooperate with federal agencies to the fullest extent possible to reduce duplication between CEQA and NEPA, including the preparation of joint environmental documents.

Therefore, the Water Board is circulating this joint environmental document in compliance with CEQA guidelines. This CEQA checklist was developed by Water Board staff to inform the public and interested agencies of the project and describe the mitigation measures identified as necessary by the Water Board. A discussion of growth inducing impacts and mandatory findings of significance, as required by CEQA, is also included in the CEQA checklist.

The project was designed to prevent negative environmental impacts by incorporating “Design Features” (DFs) into the project design to minimize or prevent negative environmental effects. For each resource category, the CEQA Environmental Checklist identifies the DFs that have been incorporated into the federal project design to reduce impacts. The DFs are further described in the Section 2.4 of the document. In addition, water quality Best Management Practices (BMPs) that are part of the project are described in Section 2.4 and included in Appendix C. Project area maps are located in Section 1.1.

Additional documentation, including more detailed analyses of project area resources may be found in the project record located at the Lake Tahoe Basin Management Unit Supervisor’s Office in South Lake Tahoe, California and at the Lahontan Regional Water Quality Control Board Office in South Lake Tahoe, California.

I. AESTHETICS: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Potential impacts to scenic resources are analyzed in Section 3.2.8 (Scenic Resources). The Project will have some short term construction related impacts however these are offset by the long term improvement in scenic quality of the improved recreation facilities and enhanced meadow condition.

a) and c) The project is visible from TRPA scenic shoreline and scenic roadway units. Improvements to the recreation facilities and access roadways/pathways within the site may result in a small increase in overall infrastructure visible at the site, however these improvements are considered to be beneficial to the aesthetics of the site through the replacement of aged infrastructure, reduced trampling of vegetation and erosion, and increased cohesion within the site. These improvements fit within the existing scale and intensity of the existing facilities. The visual character and quality of the area will not change significantly from existing conditions; therefore the appropriate finding is less than significant.

b) Highway 89 in the project area is a state scenic highway. Project activities potentially within view of the highway include repair to the abutments on the pedestrian bridge and addition of the multiuse trail. These improvements fit within the existing scale and intensity of the existing facilities. The visual character and quality of the area will not change significantly from existing conditions; therefore the appropriate finding is less than significant.

d) The project does not include the development of new sources of light or glare; therefore the appropriate finding is no impact.

II. AGRICULTURE AND FOREST RESOURCES:
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

a-b) There are no farmland or agricultural resources in or adjacent to the Project area, therefore the appropriate finding is no impact.

c-e) The Project does not involve the conversion of agricultural or forest land, therefore the appropriate finding is no impact.

III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☒
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

a-e) Construction activities, as described in the EA/MND are most likely to affect air quality by generating short-term and minor amounts of vehicle exhaust and fugitive dust associated with temporary construction activities. The Project will not construct any permanent facilities that produce emissions or create odors. The Project will not exceed state and local air quality standards.

Project BMPs to minimize air quality impacts from construction are described in DF 10 and Appendix C of this document and include dust abatement, stockpile management, and prevention of off-site tracking.

IV. BIOLOGICAL RESOURCES: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

The EA/MND discusses potential biological impacts in Sections 3.2.3 (Aquatics), 3.2.4 (Botany), 3.2.5 (Wildlife), and 3.2.9 (California Species). Information found in Sections 3.2.3, 3.2.4, and 3.2.5 is based upon the *Biological Assessment/Biological Evaluation Aquatic and Terrestrial Species for the Taylor and Tallac Restoration Project*.

a) As described in Section 3.2.4, there are potential direct and indirect impacts to individual species, especially Tahoe Yellow Cress; however significant negative

effects are not expected due to implementation of project DFs and adherence to the recommendations in the Tahoe Yellow Cress Conservation Strategy. The project may affect individuals of a species but is not likely to result in a loss of viability. The project will improve conditions for native species through the removal and management of invasive species.

b) and c) The project is designed to improve geomorphic and hydrologic conditions, which will increase riparian and floodplain habitat. Impacts to the local hydrology are described in Section 3.2.1 (Hydrology). Construction related impacts are reduced through implementation of BMPs described in Section 2.4, Table 1, and DFs 5-9.

d) The project will improve movement of wildlife species through the replacement of culverts through swale 1 and stabilization of the South Tahoe Public Utility District sewer line that crosses Tallac Creek. Potential construction related impacts to wildlife are reduced through implementation of DFs 46-51.

V. CULTURAL RESOURCES: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

The EA/MND Section 3.2.6 discusses impacts to heritage and cultural resources. The project area that will be subject to ground disturbing activity has been evaluated for the presence of historic and archeological resources; a total of 10 sites were documented. No known archaeological resources, paleontological resources, or human remains are planned to be affected by the project. One site, which includes the Lucky Baldwin Dam, has been determined eligible to the National Register of Historic Places. The project proposes to remove degraded portions of the Lucky Baldwin Dam to improve water temperature conditions. The LTBMU consulted with the CA State Historic Preservation Office (SHPO) regarding activities proposed at the Lucky Baldwin Dam. SHPO concurred with the findings of no adverse effects related to proposed removal of degraded portions of the Lucky Baldwin Dam.

DFs 2a and 37-40, describe measures to protect heritage and cultural resources. Any sighting of previously undiscovered cultural or historical resources will result in a stoppage of work and the discovery reported to LTBMU heritage staff.

Assembly Bill AB-52 Tribal Cultural Resources

AB-52 requires that CEQA lead agencies consult with California Native American Tribes (Tribes) regarding potential impacts of a project to tribal cultural resources. The Water Board received a request for notification pursuant to AB-52 after the completion of the CEQA scoping period. The Water Board informed the Tribe of the project by mailing the CEQA request for early consultation and project description, but the Tribe did not request consultation. Additional tribal consultation is documented in Sections 1.3 and 3.2.6.

VI. GEOLOGY AND SOILS: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c) 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?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

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a i-iv) The proposed project is not located in an earthquake fault zone and does not change the way people use the project area, therefore the appropriate finding is no impact.

b) The project will not create large areas of destabilized soil. However, project implementation could result in short-term increases in erosion potential from the use of mechanical equipment for swale 1 restoration and berm placement, culvert

replacement, and use of temporary access roads and staging areas. Potential construction impacts are reduced through implementation of BMPs (Appendix C) and DFs 4-10.

c-e) The Project is not located on an unstable geologic unit or expansive soil, and does not involve any wastewater disposal, therefore the appropriate finding is no impact.

VII. GREENHOUSE GAS EMISSIONS: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Climate change and greenhouse gas (GHG) emissions are discussed in Chapter 3.2.2. Although the proposed Project would emit GHGs during construction, these emissions would be temporary. The Project does not include any permanent GHG emissions. In the context of statewide emissions, the Project's contribution to the global impact of climate change would not be substantial. Because construction-related impacts would be temporary and finite, GHG emissions related to the proposed Project would be less than significant.

VIII. HAZARDS AND HAZARDOUS MATERIALS:
Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

a-b) The project will not routinely transport, use, or dispose of hazardous materials. The LTBMU will use excavators and other heavy equipment within the project area during construction. There is the potential for gasoline, diesel fuel, oil, and hydraulic fluid spills and leaks that could create a small hazard to the environment. National and Regional USFS BMPs that minimize potential impacts from construction related hazardous materials are described in Table 1, Chapter 2, including, Fac-2 (Facility Construction and Stormwater Control), Fac-7 (Vehicle and Equipment Wash Water), and Road-10

(Equipment Refueling and Servicing). These measures will mitigate impacts from the minimal use of hazardous materials in the project area to less than significant levels.

a) The project is not located within one-quarter mile of any school, therefore the appropriate finding is no impact.

b) The project does not alter or weaken any requirements to identify risks due to hazardous materials sites pursuant to Government Code Section 65962.5 therefore the appropriate finding is no impact.

e-f) The project does not involve activities near an airport or airstrip that would result in a safety hazard, therefore the appropriate finding is no impact.

g) The project will not alter paved traffic routes, nor impede traffic flow and thus will not interfere with an emergency evacuation or response plan, therefore the appropriate finding is no impact.

h) The project does not construct any new structures or modify use of the area by the public from baseline conditions; therefore the appropriate finding is no impact.
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IX. HYDROLOGY AND WATER QUALITY: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☒	☐	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☒	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☒	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☒	☐	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow	☐	☐	☐	☒

Project activities impacting local hydrology and streams are described in Section 2.2 (Proposed Action, Items 1-3 and 8). Impacts to hydrology and water quality are discussed in the Section 3.2.1 (Hydrology).

a), c), d), f) and h) Project components involving stream and swale restoration, dam removal, and protection of bridge abutments have the potential to cause short-term violations of water quality standards both during construction and immediately following project completion. The installation of a berm across Tallac Creek will alter the path of the creek by redirecting flows below bankfull into swale 1; higher flows will still flow through the current outlet of Tallac Creek. Historic maps of the area contained in the project record show that Tallac Creek previously flowed through swale 1.

National and Regional USFS BMPs that minimize potential impacts from construction activities in waterbodies and SEZs are described in Table 1 and Appendix C, including: Plan-3 (Aquatic Management Zone Planning), AqEco-2 (Operations in Aquatic Ecosystems), AqEco-4 (Stream Channels and Shoreline), Fac-2 (Facility Construction and Stormwater Control), Fac-7 (Vehicle and Equipment Wash Water), Road-10 (Equipment Refueling and Servicing), and WatUses-4/BMP2.5.

In addition DFs 5, 6, 8, and 11-13 provide measures necessary to mitigate potential impacts to hydrology and water quality to less than significant levels.

In addition, all work within waterbodies would comply with requirements of permits issued by the Water Board, including Basin Plan Prohibition Exemptions and Clean Water Act section 401 Water Quality Certifications. The mitigation identified herein will be incorporated into the terms of the permits.

b) The project, as discussed in section 3.2.1, does not propose any use of groundwater supplies and will not interfere substantially with groundwater recharge; therefore, the appropriate finding is no impact.

e) The project will not increase storm water drainage therefore the appropriate finding is no impact.

g) There is no housing developed for this project, therefore the appropriate finding is no impact.

i) The project will not subject people or non-natural structures to flooding; therefore the appropriate finding is no impact.

j) The project does not create a risk of inundation by seiche, tsunami, or mudflow therefore the appropriate finding is no impact.

X. LAND USE AND PLANNING: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b)Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

a) The Project does not include any development or construction that will physically divide the community, therefore the appropriate finding is no impact.

b-c) The proposed project does not conflict with any applicable land use plans, habitat conservation plan or natural community conservation plan. Because the project does not involve these elements, the appropriate finding is no impact.

XI. MINERAL RESOURCES: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

a-b) There are no known mineral resources or locally-important mineral resource recovery sites within the project area; therefore the appropriate finding is no impact.

XII. NOISE: Would the project result in:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

a, b, d) The project is located on National Forest lands and at developed recreation facilities. There are very few permanent residences near the project area, and some seasonal use areas such as campgrounds, recreation residences, and group facilities. The project may cause minor, short-term noise impacts from heavy equipment usage for construction. Given the limited scope of noise and vibration generating activities, and the lack of residential neighborhoods, the appropriate finding is less than significant.

c) The project will not result in any permanent increases of ambient noise; therefore the appropriate finding is no impact.

e-f) The project is not located within two miles of any airport or within an airport land use plan; therefore the appropriate finding is no impact.

XIII. POPULATION AND HOUSING: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a-c) The project does not include plans that would influence population growth, housing, businesses, or new infrastructure; therefore the appropriate finding is no impact.

XIV. PUBLIC SERVICES:

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a)Fire protection?	☐	☐	☐	☒
b)Police protection?	☐	☐	☐	☒
c)Schools?	☐	☐	☐	☒
d)Parks?	☐	☐	☐	☒
e)Other public facilities?	☐	☐	☐	☒

a-e) The project includes minor improvements to governmental facilities that would not substantially affect public services; therefore the appropriate finding is no impact.

XV. RECREATION:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☒	☐	☐

Recreation resources are analyzed in detail in Section 3.2.7 (Recreation).

a) The project is primarily focused on aquatic habitat restoration and improvements to existing facilities that are not likely to increase usage of the area. The project does not propose to increase vehicle parking in or around the project area. The addition of a non-motorized access path along the Baldwin Beach access road could result in minor increases in use of the beach area but not to a level that would impact the condition of facility; therefore the appropriate finding is no impact.

b) The project includes improvements to recreational facilities located within or adjacent to stream environment zones (SEZs), the addition of a multi-use pathway along Baldwin Beach road which will traverse SEZs, and new pathways from parking areas to the beach. Without mitigation, these activities have potential adverse effects on the environment related to equipment usage in streams, SEZ disturbance, earth moving, and removal of existing vegetation.

National and Regional USFS BMPs that minimize potential impacts from construction activities in waterbodies and SEZ are described in Table 1, including: Plan-3 (Aquatic Management Zone Planning), AqEco-2 (Operations in Aquatic Ecosystems), AqEco-4 (Stream Channels and Shoreline), Fac-2 (Facility Construction and Stormwater Control), Fac-7 (Vehicle and Equipment Wash Water), Road-10 (Equipment Refueling and Servicing), and WatUses-4/BMP2.5. In addition, DFs 5-12, 25-36, and 41-45 also reduce or mitigate potential adverse physical effects of the project. These measures will mitigate impacts to the physical environment to less than significant levels.

XVI. TRANSPORTATION/TRAFFIC: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

The transportation system in the project area consists of paved and natural surface roads, trails, and Highway 89. The project does not propose any transportation related elements except for the addition of a non-motorized multi-use pathway along the Baldwin Beach access road.

XVII. UTILITIES AND SERVICE SYSTEMS: Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

a-g) The Project will not have any effect on utilities or service systems, including storm water or wastewater treatment facilities, nor will it produce much, if any, solid waste; therefore the appropriate finding is no impact.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

a-b) Without adequate mitigation, the Project has the potential to degrade the environment. Specifically, temporary stream flow diversions may cause short term impacts to biological resources, heritage resources may be encountered during construction; gasoline, diesel fuel, oil, and hydraulic fluid spills and leaks from construction equipment are possible; and short-term violations of water quality standards may occur during and immediately following project construction.

However, due to the short duration of construction and the implementation of design features, BMPs, and TRPA requirements in Appendix C, identified potential impacts will be reduced to less than significant levels. The overall project will result in improved ecological conditions and recreational experience.

c) The project is intended to improve people's experience in this National Forest area by providing improved physical facilities such as bike/pedestrian path to Baldwin Beach from Highway 89 and riparian ecosystem improvements such as meadow and stream restoration.

Appendix A – 2 CEQA Response to Comments from Early Consultation

Comments	Response
California State Lands Commission Comments: Taylor Creek, Tallac Creek, and Fallen Leaf Lake. The portion of the Project in Taylor Creek, Tallac Creek, and Fallen Leaf Lake may include State-owned sovereign land; however, the extent of the State's sovereign interest at these locations has not been determined. Therefore, a lease from the CSLC will not be required for this portion of the Project at this time. A lease for this location may be required in the future when the exact extent of the State's fee ownership is determined.	CSLC-1 No response needed unless in the future CSLC determines the extent of their sovereign lands.

Lake Tahoe. Any portion of the Project at Lake Tahoe below the low water mark of Elevation 6,223 feet, Lake Tahoe Datum would involve State-owned sovereign land under the jurisdiction of the CSLC. Based on the information submitted in the Consultation, CSLC is currently unable to determine if the Project will be located on sovereign land in Lake Tahoe. CSLC staff requests as the Project proceeds, the Board contact Mary Jo Columbus (see contact information below) to determine whether the Project or any components of the Project would require a lease. Additionally, we request to be placed on any future distribution mailing list for this Project. Even where the CSLC may not have leasing jurisdiction, please be aware that the Project still lies in an area that is subject to a public navigation easement. This easement provides that members of the public have the right to navigate and exercise the incidences of navigation in a lawful manner on State waters that are capable of being physically navigated by oar or motor-propelled small craft. Such uses may include, but not be limited to, boating, rafting, sailing, rowing, fishing, fowling, bathing, skiing, and other water-related public uses. The proposed Project must not restrict or impede the easement right of the public.	CSLC-2 No work is planned below the low water mark of Lake Tahoe unless the low water mark is upstream from the mouths of Taylor and/or Tallac Creeks. As planning progresses more detailed surveys will be completed with accurate topographic contours allowing planners to determine the low water mark of Lake Tahoe. Barriers to navigation are not a planned component on this project. The CSLS will be included in future correspondence relating to their jurisdiction.

General Comments 1. Project Description: The list of proposed actions should be presented in the EA/MND with a thorough and complete Project Description in order to facilitate meaningful environmental review of potential impacts and mitigation measures. The Project Description should be as precise as possible in describing the details of all allowable activities such as culverts removed and replaced, new crossings constructed, swales re-contoured, ditches repaired, etc. It should also include the types of equipment or methods that may be used, how the equipment would be brought to the Project site, how the equipment would be taken away from the Project site, where the equipment would be staged, where equipment would be refueled, what the maximum area of impact or volume of sediment removed or disturbed would be, seasonal work windows, locations for material disposal, and details of the timing and length of activities. Thorough descriptions will facilitate CSLC staff's determination of the extent and locations of its leasing jurisdiction, make for a more robust analysis of the work that may be performed, and minimize the potential for subsequent environmental analysis to be required.	CSLC-3 Many of the concerns in this comment will be refined and included as requirements by permitting agencies as planning progresses regarding protection of sensitive areas, staging and fueling areas, construction access routes, areas of disturbance, volumes of grading, and seasonal construction windows depending on weather, seasons, and/or wildlife issues. Project Design features in Section 2.4 or the EA/IS address potential impacts identified in the comment.

2. Recreation Impacts: As stated on page 2 and shown in Figure 2 several swales would be constructed or restored, along with several crossings and culverts. CSLC staff recommends the EA/MND discuss how these proposed Project-related activities would be constructed, removed, and replaced with new structures. CSLC staff also requests that the EA/MND explain in detail how the proposed Project-related activities might impact public parking lots, public roads in the area, beach access, and hiking trails, and discuss the construction schedule, construction signs, and how the public would be notified of the construction (see "CSLC Jurisdiction and Public Trust Lands" discussion above).	CSLC-4 Temporary public access may be impacted due to safety concerns during certain phases of construction. Permanent public access will be improved especially for pedestrians and bicycles. Beach areas will not be closed at any time, but Baldwin Beach road may have temporary closures. Specific details are contained in the EA/IS in Section 2.4, numbers 56 through 60.
3. Sewer Line Protection: On page 3, under "Tallac Creek" the document states "[a]ny flow between Tallac Creek and Lake Tahoe will occur in an unmanaged, natural flow path. Berm and overflow path (downstream area) would protect sewer line." However, it is not clear from Figure 2 or the explanation how the berm and overflow (downstream area) would protect the sewer line given that a portion of the sewer line is close to and/or runs through Swale 1. CSLC staff recommends explaining in the EA/MND how the sewer line would be protected by the berm and overflow path and explain if there would be different measures at different locations to protect the sewer line running through Swale 1 or to the north of proposed berm seen in Figure 2.	CSLC-5 Sewer line protection measures are expanded and clarified in the EA/MND. Four locations of proposed construction within the project area are near active sewer lines. The South Tahoe Public Utility District (STPUD) submitted comments and met with lead agencies on January 5, 2016 about their concerns. The Tallac Creek channel will be modified and stabilized where the sewer line crosses. No work is planned on any of the other 3 locations. Details are contained in section 2.2, number 2, Tallac Creek.

4. Best Management Practices: Bullet #7 on page 4 states "[i]nstall permanent Best Management Practices (BMPs) in the parking lot areas, restrooms, and formalized picnic area to capture and infiltrate stormwater." CSLC staff recommends that all BMPs be included as mitigation measures if they will be imposed to reduce an impact to less than significant. If the impacts are already less than significant, and the proposed measures are just additional measures to further ensure already less than significant impacts, then the mitigation measures would be appropriate to be referenced as BMPs instead of mitigation measures.	CSLC-6 The permanent BMPs are not mitigation for impacts related to the project. Water quality BMPs are a requirement in the Tahoe Region whenever improvements to public areas are constructed. BMP retrofit of infrastructure is detailed in Section 2.2, number 7.
Biological Resources 5. Screening Devices: Item #3 on page 5 states "[u]se screening devices for water drafting pumps (Fire suppression activities are exempt during initial attack). Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats." CSLC staff requests that a detailed explanation be included in the EA/MND about the need for these screening devices, locations of these screening devices on a map, and their relationship to fire suppression activities, and that the EA/MND assess the potential environmental impacts from carrying out these activities.	CSLC-7 The water pumping devices referenced are temporary and will only be used during construction if necessary to de-water an area temporarily. It is not anticipated that the pumps will be used as a fire suppression apparatus. Pumps will not remain after completion of construction. The locations of pumping will not be known until commencement of construction and therefore cannot be located on a map. Screens on the pumps are needed to avoid damaging biological resources.

6. Consultations with Wildlife Agencies: CSLC staff recommends that the EA/MND also discuss results of consultation discussions with the Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS), including any recommended mitigation measures and potentially required permits identified by these agencies. CSLC staff also expects that results of queries of the CDFW's California Natural Diversity Database and USFW's Special Status Species Database be included in the EA/MND to help the reader understand how special-status plant or wildlife species that may occur in the Project area were identified.	CSLC-8 Consultation with CDFW and USFWS is planned prior to final release of the EA/IS. Results of consultation will be discussed in the EA/IS along with any recommended mitigation measures. The EA/IS discusses impacts to California, Federal, and TRPA special status species. Any required permits will be obtained prior to construction. Wildlife and botanical resources are discussed in detail in the EA/IS in Sections 3.2.4 (Botany), 3.2.5 (Wildlife) and 3.2.9 (California Species).
7. Construction Noise: The CSLC staff recommends that the EA/MND evaluate noise and vibration impacts on fish and birds from construction and removal activities in the swales, Taylor Creek, Tallac Creek, Lake Tahoe, and Fallen Leaf Lake. As stated earlier, CSLC recommends including results of consultations with the appropriate agencies be included in the EA/MND to help the reader understand what measures would take place to reduce possible noise-related impacts to sensitive species.	CSLC-9 Limited operating periods for wildlife are determined based on pre-construction surveys and species present. (Section 2.4, Wildlife) Section 2.4 refers to TRPA Standard Conditions of Approval limiting noise that exceeds standards to daytime hours.

8. Mitigation Measures: In order to avoid the improper deferral of mitigation, mitigation measures should either be presented as specific, feasible, enforceable obligations, or should be presented as formulas containing "performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way" (State CEQA Guidelines, §15126.4, subd. (b)). CSLC staff recommends the following be included in the EA/MND to avoid impermissible deferral of mitigation: • Dewatering and diversions plans; • Field crew/worker educational training material; • Emergency spill response plan and clean up kit; • Criteria for revegetation in staging areas; • Post Project monitoring criteria; • Criteria for stabilizing and revegetating staging and storage area; • Turbidity monitoring criteria; • Traffic safety and control plan; • Pre-construction survey measures; and • Migratory bird protection measures.	CSLC-10 Required mitigation measure performance standards are contained in the EA/IS and will not be deferred. Section 2.4, Project Design Features, specifically address potential impacts listed and performance standards. As specific projects contained in the EA/IS are further developed and planned, increasingly specific standards will be refined. Project design features comply with federal, state, and local requirements and serve as the foundation upon which applicable, site-specific Best Management Practices (BMPs) prescriptions would be developed during the final planning and design phase, and before implementation. The following documents would be used to develop specifications to protect soil and water resources: • Requirements of the TRPA Standard Conditions of Approval (Appendix C – 1). http://www.trpa.org/wp-content/uploads/Attachment_Q_Standard_Conditions_Grading.pdf • Guidance provided in USDA Forest Service National Best Management Practices for Water Quality Management on National Forest Lands, Volume 1: National Core BMP Technical Guide, FS-990a (USDA April 2012) (Appendix C – 2, Table 1). http://www.fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf • Guidance provided in USDA Forest Service Region 5, Water Quality Management Handbook. R5 FSH 2509.22, Chapter 10, Amendment 2509.22-2011-01 (USDA December 2011) (Appendix C – 3, Table 1). http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5399662.pd

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Cultural Resources 9. Title to Resources: Item# 37 on page 10 states the measures that would be implemented if unidentified archeological deposits are discovered. CSLC staff recommends that the EA/MND should also state that the title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the CSLC (Pub. Resources Code, § 6313). CSLC staff requests that the Board consult with Assistant Chief Counsel Pam Griggs (see contact information below), should any cultural resources on State lands be discovered during construction of the proposed Project.	CSLC-11 No work is planned below the low water mark of Lake Tahoe unless the low water mark is upstream from the mouths of Taylor and/or Tallac Creeks. As planning progresses more detailed surveys will be completed with accurate topographic contours allowing planners to determine the low water mark of Lake Tahoe. If any work occurs below the low water mark of Lake Tahoe and any historic or cultural resources are found, the California State Lands Commission will be notified.

10. Tribal Cultural Resources: The Board should document and discuss how it complied with the provisions for required consultation with California Native American Tribes pursuant to the requirements added to CEQA by Assembly Bill (AB) 52, which applies to all CEQA projects initiated after July 1, 2015.[1] CSLC staff notes that these provisions require a lead agency to conduct this notification and consultation prior to determining whether to prepare an MND or an environmental impact report (EIR). The consultation document provided by the Board indicates that an EA/MND is expected to be prepared, that the requirements of Section 106 of the National Historic Preservation Act will be followed, and that notice will be provided to Washoe Tribal site monitors; however, the document does not mention compliance with AB 52 to ensure consultation with affected Tribes and avoidance of Tribal Cultural Resources.	CSLC-12 Tribal consultation is discussed in Section 1.3 and concerns are addressed in Section 2.4, Numbers 52 through 55. AB52 compliance and Tribal Cultural Resources is addressed in the EA/IS, Appendix A, CEQA Checklist comments.
Climate Change 11. Greenhouse Gases: Because of the expected use of heavy equipment use, CSLC staff requests that a State CEQA Guidelines required greenhouse gas (GHG) emissions analysis be included in the EA/MND that should be consistent with the California Global Warming Solutions Act (AB 32). This analysis should identify a threshold for significance for GHG emissions, calculate the level of GHGs that will be emitted as a result of construction, determine the significance of the impacts of those emissions, and, if impacts are significant, identify mitigation measures that would reduce them to the extent feasible.	CSLC-13 The analysis is completed in accordance with AB 32 and the results are contained in the EA/IS, 3.2.2.

South Tahoe Public Utility District Comments: **Swale 1:** The District has a 12" sewer gravity main pipeline crossing Swale 1 (shown on Figure 2). Engineering details of the crossing structure proposed to replace Culvert B should be provided for District review to insure that the structural integrity of this pipeline is maintained;	STPUD-1 Proximity of construction to sewer lines and potential impacts are not significant. Specific designs will be refined as more detailed plans are developed after the EA/IS process is finished. Lead agencies met with STPUD on January 5, 2016 to clarify concerns and impacts. STPUD will be involved throughout the planning process.
Swale 4: The District has a 10" sewer force main pipeline that is aligned along the west side of Baldwin Beach Road (shown on Figure 2). Engineering details of the crossing structure proposed at Swale 4 should be provided for District review to insure that the structural integrity of this pipeline is maintained;	STPUD-2 Proximity of construction to sewer lines and potential impacts are not significant. Specific designs will be refined as more detailed plans are developed after the EA/IS process is finished. STPUD will be involved in planning.
Taylor Creek: The District has a 12" sewer force main pipeline that crosses Taylor Creek along the alignment of Highway 89/Emerald Bay Road. Potential changes in the stream profile related to project activities should be considered, including whether measures are needed to maintain the long-term structural integrity of this pipeline; and	STPUD-3 Proximity of construction to sewer lines and potential impacts are not significant. Specific designs will be refined as more detailed plans are developed after the EA/IS process is finished. STPUD will be involved in planning.

Tallac Creek: The District supports the installation of a proposed berm to encourage average or below average flows to Swale 1. The District looks forward to working with the USFS-LTBMU and the LRWQCB towards developing an appropriate design to provide long-term protection of the sewer line encasement presently exposed in Tallac Creek.	STPUD-4 Sewer line protection measures are expanded and clarified in the EA/IS. Four locations of proposed construction within the project area are near active sewer lines. The South Tahoe Public Utility District (STPUD) submitted comments and met with lead agencies on January 5, 2016 about their concerns. The Tallac Creek channel will be modified and stabilized above and below where the sewer line crosses. No work is planned on any of the other 3 locations. Details are contained in section 2.2, number 2, Tallac Creek.
Sierra Wildlife Coalition Comments: We are concerned about many native species such as beavers, coyotes, bears, and very numerous birds, which although 'common', all depend very much on the very limited amount of wetlands available in the Tahoe basin, and so need to be considered.	SWC-1 The EA/IS address all mandated species and associated effects (TESPC). However, associated habitat (aquatic and terrestrial) as it relates to effects on associated native species is also addressed. Quality and quantity of wet meadow habitat will be increased through project implementation.
Also noted is that "Taylor Creek was the most degraded of 10 sampled creeks in the Tahoe Basin". What criteria were used? There are certainly aquatic invasive species (especially bullfrogs and Eurasian milfoil), but the numerous beaver dams in the wetlands downstream of the Stream Display have filtered out much of the sediment (and other pollutants, as was verified about phosphorus by Sarah Muskopf's 2007 thesis).	SWC-2 The criteria are based on the February 2007 report titled, "Development and Testing of Biomonitoring Tools for Stream Macroinvertebrates in the Lake Tahoe Basin"

Under "Proposed Action: Stream Restoration: Taylor Creek" we would question the need to install "large wood" in the lower Taylor Creek wetlands, since there are numerous beaver dams performing the function of' large wood', as well as quite a quantity of existing large wood, probably sent downstream in the 1997 floods. Removing those beaver dams would certainly be detrimental. Otherwise the proposals for Taylor Creek seem very appropriate. We do wonder why controlling aquatic invasive species was only noted under Tallac Creek, since there are many present in Taylor Creek as well?	SWC-3 Large wood is only proposed for areas upstream of State Route 89. This is clarified in the EA/IS, (Section 3.2.1, 2), Soil, water, and riparian resources/water quality). The project does not include removal of beaver dams. Invasive species removal is under its own heading and not a subheading under Tallac Creek in the scoping document. Invasive species removal is proposed for both Taylor and Tallac Creeks.
Under "Recreation Amenities: Stream Profile Chamber and Rainbow Trail" we fully support the plan to "upgrade, raise in elevation, or replace with boardwalk portions of the trail." Portions of the paved trail adjacent to the Stream Display are lower than even very low flows in the creek, and also slope to the side away from the creek, trapping any water that does get there (from rain or the creek). And the paved trail downstream from the existing boardwalk, below the gravel bar, bisects the marsh and meadow area where water would otherwise drain across, replenishing the meadow and groundwater, before rejoining the creek below the bend. This situation is exacerbated by the addition of extra water to that marsh/meadow from the man-made outflow channel from the Stream Display which crosses and saturates the upper part of that marsh/meadow.	SWC-4 Improvements to these areas are proposed to reduce resource damage, provide safer and easier access, and enhance the visitor experience. Details are in the EA/IS Section 2.2, Number 8.
Another big advantage of boardwalks is encouraging visitors to stay on the trails, and not trample sensitive wetlands. Moving and formalizing the user-created trail to the gravel bar on the bend of Taylor Creek below the Stream Display would also help.	SWC-5 Boardwalks are proposed to reduce resource damage by giving visitors a defined path. See EA/IS Section 2.2, Number 8

California Department of Transportation Comments: Please be advised that any work or traffic control that would encroach onto the State Right of Way (ROW) requires an encroachment permit that is issued by Caltrans. To apply, a completed encroachment permit application, environmental documentation, and five sets of plans clearly indicating State ROW must be submitted to the address below. Charles Laughlin California Department of Transportation District 3 Office of Permits 703 B Street Marysville, CA 95901	Caltrans-1 Work within the Caltrans right-of-way would not occur unless an encroachment permit is required and issued.
Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process. See the website link below for more information. http://www.dot.ca.gov/hq/traffops/developserv/permits/.	Caltrans-2 Negative traffic impacts are not identified in the EA/IS. Traffic is addressed in the EA/IS, Appendix A, CEQA Checklist comments.
Please provide our office with copies of any further actions regarding this project. We would appreciate the opportunity to review and comment on any changes related to this development.	Caltrans-3 Caltrans will be notified of project details as the planning process progresses.

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Appendix B – TRPA Initial Environmental Checklist (IEC)

TAHOE REGIONAL PLANNING AGENCY

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HOURS
Mon. Wed. Thurs. Fri
9 am-12 pm/1 pm-4 pm
Closed Tuesday
New Applications Until 3:00 pm

Print Form

INITIAL ENVIRONMENTAL CHECKLIST
FOR DETERMINATION OF ENVIRONMENTAL IMPACT

I. Assessor's Parcel Number (APN)/Project Location	**National Forest Land in/around Baldwin Beach (see attached map)**
Project Name	**Taylor and Tallac Restoration Project**
County/City	**El Dorado**

Brief Description of Project:

The Taylor and Tallac Restoration project is an Environmental Improvement Program (EIP) project, EIP # 01.02.01.0016. The goal of the proposed project is to restore ecological processes and functions in the Taylor and Tallac creeks and in the meadow, wetland, and swale systems around Baldwin Beach. The proposed project area includes a variety of wetlands, meadows, stream channels, swales, and patches of riparian and coniferous forest that provide habitat to a variety of species.

Historically, Tallac and Taylor creeks were connected through a series of swales forming a large wetland complex. These swales are currently disconnected by built infrastructure (e.g. culverts, roads) and this disruption of flow alters the hydrologic conditions of the area.

The project proposes to restore the hydrologic connectivity and the persistence of water in the swale system, reconnecting Taylor and Tallac creeks through the swale system, improving hydrologic function of the creeks, controlling/removing aquatic invasive species, and enhancing other habitat features for sensitive species.

The area is also a popular recreation destination. A goal of the project is to maintain or enhance the existing recreational facilities and infrastructure while restoring the natural habitat.

The following questionnaire will be completed by the applicant based on evidence submitted with the application. All "Yes" and "No, With Mitigation" answers will require further written comments. Use the blank boxes to add any additional information. If more space is required for additional information, please attach separate sheets and reference the question number and letter.

II. ENVIRONMENTAL IMPACTS:

1. Land

Will the proposal result in:

a. Compaction or covering of the soil beyond the limits allowed in the land capability or Individual Parcel Evaluation System (IPES)?

See additional comments section	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

b. A change in the topography or ground surface relief features of site inconsistent with the natural surrounding conditions?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

c. Unstable soil conditions during or after completion of the proposal?

See additional comments section	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

d. Changes in the undisturbed soil or native geologic substructures or grading in excess of 5 feet?

Project design features including temporary BMPs will protect sensitive resources during construction (see proposed action).	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

e. The continuation of or increase in wind or water erosion of soils, either on or off the site?

See additional comments section	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

f. Changes in deposition or erosion of beach sand, or changes in siltation, deposition or erosion, including natural littoral processes, which may modify the channel of a river or stream or the bed of a lake?

The project will restore the project area to natural hydrologic conditions (see proposed action including design features).	☒ Yes	☐ No	
	☐ No, With Mitigation	☐ Data Insufficient	

g. Exposure of people or property to geologic hazards such as earthquakes, landslides, backshore erosion, avalanches, mud slides, ground failure, or similar hazards?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

2. Air Quality

Will the proposal result in:

a. Substantial air pollutant emissions?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

b. Deterioration of ambient (existing) air quality?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

c. The creation of objectionable odors?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

d. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

e. Increased use of diesel fuel?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

3. Water Quality

Will the proposal result in:

a. Changes in currents, or the course or direction of water movements?

A goal of the project is to restore the natural flow path of Tallac Creek (see proposed action).	☒ Yes	☐ No
	☐ No, With Mitigation	☐ Data Insufficient

b. Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff so that a 20 yr. 1 hr. storm runoff (approximately 1 inch per hour) cannot be contained on the site?

The project will implement water quality BMPs to treat the 20 year/1 hour storm from all impervious surfaces.	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

c. Alterations to the course or flow of 100-yearflood waters?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

d. Change in the amount of surface water in any water body?

See additional comments section.	☒ Yes	☐ No
	☐ No, With Mitigation	☐ Data Insufficient

e. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?

The proposed action and required temporary BMPs will prevent discharges or alterations of surface water quality	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

f. Alteration of the direction or rate of flow of ground water?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

g. Change in the quantity of groundwater, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

h. Substantial reduction in the amount of water otherwise available for public water supplies?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

i. Exposure of people or property to water related hazards such as flooding and/or wave action from 100-year storm occurrence or seiches?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

j. The potential discharge of contaminants to the groundwater or any alteration of groundwater quality?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

k. Is the project located within 600 feet of a drinking water source?

See additional comments section	☒ Yes	☐ No	
	☐ No, With Mitigation	☐ Data Insufficient	

4. Vegetation

Will the proposal result in:

a. Removal of native vegetation in excess of the area utilized for the actual development permitted by the land capability/IPES system?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

b. Removal of riparian vegetation or other vegetation associated with critical wildlife habitat, either through direct removal or indirect lowering of the groundwater table?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

c. Introduction of new vegetation that will require excessive fertilizer or water, or will provide a barrier to the normal replenishment of existing species?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

d. Change in the diversity or distribution of species, or number of any species of plants (including trees, shrubs, grass, crops, micro flora and aquatic plants)?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

e. Reduction of the numbers of any unique, rare or endangered species of plants?

There is the potential for construction related impacts to Tahoe Yellow Cress during construction. Design features for TYC will protect the species.	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

f. Removal of stream bank and/or backshore vegetation, including woody vegetation such as willows?

The project will remove some SEZ vegetation, however the goal of the project is vegetation enhancement.	☐ Yes	☐ No	
	☒ No, With Mitigation	☐ Data Insufficient	

g. Removal of any native live, dead or dying trees30 inches or greater in diameter at breast height (dbh) within TRPA's Conservation or Recreation land use classifications?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

h. A change in the natural functioning of an old growth ecosystem?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

5. Wildlife

Will the proposal result in:

a. Change in the diversity or distribution of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects, mammals, amphibians or microfauna)?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

b. Reduction of the number of any unique, rare or endangered species of animals?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

d. Deterioration of existing fish or wildlife habitat quantity or quality?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

6. Noise

Will the proposal result in:

a. Increases in existing Community Noise Equivalency Levels (CNEL) beyond those permitted in the applicable Plan Area Statement, Community Plan or Master Plan?

The project will be exempt from TRPA noise standards between 8:00 am and 6:30 pm when they have an active TRPA permit.

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

b. Exposure of people to severe noise levels?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

c. Single event noise levels greater than those set forth in the TRPA Noise Environmental Threshold?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

d. The placement of residential or tourist accommodation uses in areas where the existing CNEL exceeds 60 dBA or is otherwise incompatible?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

e. The placement of uses that would generate an incompatible noise level in close proximity to existing residential or tourist accommodation uses?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

f. Exposure of existing structures to levels of ground vibration that could result in structural damage?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

7. Light and Glare

Will the proposal:

a. Include new or modified sources of exterior lighting?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

b. Create new illumination which is more substantial than other lighting, if any, within the surrounding area?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

c. Cause light from exterior sources to be cast off -site or onto public lands?

If construction occurs at night this may be possible. Contractor will comply with appropriate BMPs and the impact will be temporary and short-term.	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

d. Create new sources of glare through the siting of the improvements or through the use of reflective materials?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

8. Land Use

Will the proposal:

a. Include uses which are not listed as permissible uses in the applicable Plan Area Statement, adopted Community Plan, or Master Plan?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

b. Expand or intensify an existing non-conforming use?

	☐ Yes	☒ No		
	☐ No, With Mitigation	☐ Data Insufficient		

9. Natural Resources

Will the proposal result in:

a. A substantial increase in the rate of use of any natural resources?

	☐ Yes	☒ No		
	☐ No, With Mitigation	☐ Data Insufficient		

b. Substantial depletion of any non-renewable natural resource?

	☐ Yes	☒ No		
	☐ No, With Mitigation	☐ Data Insufficient		

10. Risk of Upset

Will the proposal:

a. Involve a risk of an explosion or the release of hazardous substances including, but not limited to, oil, pesticides, chemicals, or radiation in the event of an accident or upset conditions?

Temporary BMPs will be required by the TRPA Permit and the site will be inspected on a regular basis to ensure all BMPs are functioning.	☐ Yes	☐ No		
	☒ No, With Mitigation	☐ Data Insufficient		

b. Involve possible interference with an emergency evacuation plan?

	☐ Yes	☒ No		
	☐ No, With Mitigation	☐ Data Insufficient		

11. Population

Will the proposal:

a. Alter the location, distribution, density, or growth rate of the human population planned for the Region?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

b. Include or result in the temporary or permanent displacement of residents?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

12. Housing

Will the proposal:

a. Affect existing housing, or create a demand for additional housing?

To determine if the proposal will affect existing housing or create a demand for additional housing, please answer the following questions:

(1) Will the proposal decrease the amount of housing in the Tahoe Region?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

(2) Will the proposal decrease the amount of housing in the Tahoe Region historically or currently being rented at rates affordable by lower and very-low-income households?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

Number of Existing Dwelling Units: _____

Number of Proposed Dwelling Units: _____

b. Will the proposal result in the loss of housing for lower-income and very-low-income households?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

13. Transportation/Circulation

Will the proposal result in:

a. Generation of 100 or more new Daily Vehicle Trip Ends (DVTE)?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

b. Changes to existing parking facilities, or demand for new parking?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

c. Substantial impact upon existing transportation systems, including highway, transit, bicycle or pedestrian facilities?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

d. Alterations to present patterns of circulation or movement of people and/or goods?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

e. Alterations to waterborne, rail or air traffic?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

f. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

14. Public Services

Will the proposal have an unplanned effect upon, or result in a need for new or altered governmental services in any of the following areas?

a. Fire protection?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

b. Police protection?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

c. Schools?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

d. Parks or other recreational facilities?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

e. Maintenance of public facilities, including roads?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

f. Other governmental services?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

15. Energy

Will the proposal result in:

a. Use of substantial amounts of fuel or energy?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

b. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

16. Utilities

Except for planned improvements, will the proposal result in a need for new systems, or substantial alterations to the following utilities:

a. Power or natural gas?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

b. Communication systems?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

c. Utilize additional water which amount will exceed the maximum permitted capacity of the service provider?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

d. Utilize additional sewage treatment capacity which amount will exceed the maximum permitted capacity of the sewage treatment provider?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

e. Storm water drainage?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

f. Solid waste and disposal?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

17. Human Health

Will the proposal result in:

a. Creation of any health hazard or potential health hazard (excluding mental health)?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

b. Exposure of people to potential health hazards?

☐ Yes ☒ No ☐ No, With Mitigation ☐ Data Insufficient

18. Scenic Resources/Community Design

Will the proposal:

a. Be visible from any state or federal highway, Pioneer Trail or from Lake Tahoe?

Construction will be visible from Lake Tahoe and Highway 50 but the impacts will be temporary and short-term.	☒ Yes	☐ No
	☐ No, With Mitigation	☐ Data Insufficient

b. Be visible from any public recreation area or TRPA designated bicycle trail?

Construction will be visible from Baldwin Beach, the Rainbow Trail, and other trails but the impacts will be temporary and short-term.	☒ Yes	☐ No
	☐ No, With Mitigation	☐ Data Insufficient

c. Block or modify an existing view of Lake Tahoe or other scenic vista seen from a public road or other public area?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

d. Be inconsistent with the height and design standards required by the applicable ordinance or Community Plan?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

e. Be inconsistent with the TRPA Scenic Quality Improvement Program (SQIP) or Design Review Guidelines?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

19. Recreation

Does the proposal:

a. Create additional demand for recreation facilities?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

b. Create additional recreation capacity?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

c. Have the potential to create conflicts between recreation uses, either existing or proposed?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

d. Result in a decrease or loss of public access to any lake, waterway, or public lands?

	☐ Yes	☒ No	
	☐ No, With Mitigation	☐ Data Insufficient	

20. Archaeological/Historical

a. Will the proposal result in an alteration of or adverse physical or aesthetic effect to a significant archaeological or historical site, structure, object or building?

see additional comments section	☐ Yes	☐ No	
	☒ No, With Mitigation	☐ Data Insufficient	

b. Is the proposed project located on a property with any known cultural, historical, and/or archaeological resources, including resources on TRPA or other regulatory official maps or records?

see additional comments section	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

c. Is the property associated with any historically significant events and/or sites or persons?

There are known historic and prehistoric sites within the project area. See additional comments section.	☐ Yes	☐ No
	☒ No, With Mitigation	☐ Data Insufficient

d. Does the proposal have the potential to cause a physical change which would affect unique ethnic cultural values?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

e. Will the proposal restrict historic or pre-historic religious or sacred uses within the potential impact area?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

21. Findings of Significance.

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California or Nevada history or prehistory?

	☐ Yes	☒ No
	☐ No, With Mitigation	☐ Data Insufficient

b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time, while long-term impacts will endure well into the future.)

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environmental is significant?)

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

d. Does the project have environmental impacts which will cause substantial adverse effects on human being, either directly or indirectly?

☐ Yes ☒ No
☐ No, With Mitigation ☐ Data Insufficient

DECLARATION:

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this initial evaluation to the best ofmy ability, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Signature: **(Original signature required.)**

Shannen Friedman At TRPA Date: 6/8/16

Person Preparing Application County

Applicant Written Comments: (Attach additional sheets if necessary)

1. a - The project may result in additional coverage beyond the limits allowed in the Baileys or IPES requirements; however all coverage permitted will be the minimum necessary to achieve the long-range plans for the project area and all excess coverage will be permitted and fully mitigated per chapter 30 of the TRPA Code.

1.c - There is the potential for unstable soil conditions during construction, however it will be mitigated through the implementation of temporary BMPs. Temporary BMPs will be a requirement of the TRPA permit and will be inspected on a regular basis to ensure they are properly functioning.

1.e - There is the potential for an increase in wind or water erosion of soils during construction, however it will be mitigated through the implementation of temporary BMPs. Temporary BMPs will be a requirement of the TRPA permit and will be inspected on a regular basis to ensure they are properly functioning.

3.d - The project will restore natural hydrologic processes which includes promoting the persistence of water in teh swales for longer duration, connecting Tallac and Taylor creeks. Tallac creek may have more water present depending on the water year.

3.k - The project is located within 600 feet of an active well at Baldwin Beach. At this time there are no project elements that will impact the well. The project will be designed and permitted in accordance with chapter 60.3 of the TRPA code including soliciting comments from the owner/operator of the well and the Department of Public Health if there is a potential moving forward that the well will be impacted.

20. (a - c) - The project proposes to remove portions of the Lucky Baldwin Dam and Fish Ladder, both of which are eligible to be listed on the National Register of Historic Places. Removal will be done in accordance with chapter 67 of the TRPA code including a resource protection plan. In addition, the USFS has submitted a Historical Resource Evaluation Report tot he State Historic Preservation Office which made a finding of "no adverse effect" to historical or cultural resources within the Taylor and Tallac Restoration project area. The State Historic Preservation Officer concurred with the USFS finding and agree that A Finding of No Adverse Effect os appropriate for the proposed action.

Print Form

FOR OFFICE USE ONLY

Date Received: 6/8/16 By: Shannon Friedman

Determination:

On the basis of this evaluation:

a. The proposed project could not have a significant effect on the environment and a finding of no significant effect shall be prepared in accordance with TRPA's Rules of Procedure.

☐ Yes ☒ No

b. The proposed project could have a significant effect on the environment, but due to the listed mitigation measures which have been added to the project, could have no significant effect on the environment and a mitigated finding of no significant effect shall be prepared in accordance with TRPA's Rules and Procedures.

☒ Yes ☐ No

c. The proposed project may have a significant effect on the environment and an environmental impact statement shall be prepared in accordance with Chapter 3 of the TRPA Code of Ordinances and the Rules of Procedure.

☐ Yes ☒ No

Shannon Friedman Date: 6/8/16

Signature of Evaluator

Senior Planner, TRPA

Title of Evaluator

Appendix C – 1 TRPA Standard Conditions of Approval

TAHOE REGIONAL PLANNING AGENCY

OFFICE
128 Market St.
Stateline, NV

Phone: (775) 588-4547
Fax: (775) 588-4527

MAIL
PO Box 5310
Stateline, NV 89449-5310

trpa@trpa.org
www.trpa.org

HOURS
8am. Wed. Thurs. Fri
9 am-12 pm/1 pm-4 pm
Closed Tuesday

New Applications Until 3:00 pm

ATTACHMENT Q
STANDARD CONDITIONS OF APPROVAL FOR GRADING PROJECTS

This handout on the standard conditions that must be met in all projects involving grading is divided into the following three sections:

I. Pre-Grading Conditions (Pre-activity, where applicable)
II. Construction/Grading Conditions
III. General Conditions/Design Standards

Please read all of the conditions carefully to avoid any delays in construction of your project.

NOTE: Your plans have been reviewed and approved as required under Tahoe Regional Planning Agency (TRPA) Rules, Regulations and Ordinances only. TRPA has not reviewed and shall not be responsible for any elements contained in your plans, i.e., structural, electrical, mechanical, etc., which are not required for review under said Rules, Regulations and Ordinances.

I. PRE-GRADING/PRE-ACTIVITY CONDITIONS:

The following conditions must be completely complied with prior to any site disturbance or commencement of activity.

A. Final Construction Plans:

Final construction plans must be submitted to and reviewed by TRPA to determine conformance with the approval. Said plans shall clearly depict the following:

1. Slope stabilization methods to stabilize all existing and proposed cut and fill slopes.
2. Areas to be revegetated, including complete specifications for such revegetation.
3. Fencing for vegetation protection.
4. Temporary and permanent erosion control devices.
5. Utility trenches.
6. Dust control measures.
7. All water quality improvements (BMPs) required in the conditional approval. Drainage facilities shall be designed to be capable of retaining runoff water for a two (2) year, six (6) hour storm.
8. The final plans shall contain equipment specifications necessary to establish compliance with Standard Conditions III. A-F.

B. Securities:

A security shall be posted with the TRPA to insure compliance with all permit conditions. The security shall include an amount equal to 110 percent of the cost of the BMPs and other erosion control and water quality improvements required. For further information on the acceptable types of securities, see Attachment J.

C. Mitigation Fees.

All required air quality, water quality, and excess coverage and offsite coverage mitigation fees shall be paid to TRPA.

D. Temporary BMPs:

The following temporary BMPs are required to be installed onsite prior to any grading activity occurring:

1. Installation of temporary erosion controls.

2. Installation of vegetation protection measures.

3. Installation of construction site boundary fencing.

E. Required Inspection:

An onsite inspection by TRPA staff is required prior to any construction or grading activity occurring. TRPA staff shall determine if the onsite improvements required by Condition II (1), above, have been properly installed. No grading or construction shall be undertaken by the permittee until receipt of TRPA notification that the pre-grading/pre-activity conditions of approval have been satisfied.

F. Required Notices.

The following notices to the TRPA are required prior to any grading or construction occurring on the project site:

1. Notice for Pre-Grading Inspection: The permittee shall notify the TRPA when all onsite improvements required under Condition II(1), above, have been installed so that the required pre-grading inspection may be scheduled.

2. Notice of Commencement of Construction: The permittee shall notify the TRPA at least 48 hours prior to commencement of construction or grading on the project site. Said notice shall include the date when construction will commence.

II. CONSTRUCTION/GRADING CONDITIONS:

The following conditions shall be complied with during the grading and construction phase of the project.

A. All construction shall be accomplished in strict compliance with the plans approved by TRPA.

B. The TRPA permit and the final construction drawings bearing the TRPA stamp of approval shall be present on the construction site from the time construction commences to final TRPA site inspection. The permit and plans shall be available for inspection upon request by any TRPA employee. Failure to present the TRPA permit and approved plans may result in the issuance of a Cease and Desist Order by the TRPA.

C. Whenever possible, utilities shall occupy common trenches to minimize site disturbance.

D. There shall be no grading or land disturbance performed with respect to the project between October 15 and May 1, except as follows:

1. The grading or land disturbance is for excavation and backfilling for a volume not in excess of three cubic yards.

2. The activity is completed within a 48-hour period.

3. The excavation site is stabilized to prevent erosion.

4. The pregrade inspection is performed by TRPA staff, and the activity passes the inspection.

5. The grading/project does not represent or involve a series of excavations, which, when viewed as a whole, would exceed the provisions of this Standard Condition of Approval, and Subsection 2.3 of the TRPA Code of Ordinances.

Grading is prohibited any time of the year during periods of precipitation and for the resulting period of time when the site is covered with snow, or is in a saturated, muddy, or unstable condition (pursuant to Subsection 33.3.1.A of the TRPA Code of Ordinances.)

E. All material obtained from any excavation work that is not contained within foundations, retaining walls, or by other methods approved by TRPA shall be removed form the subject parcel and disposed of at a site approved by TRPA.

F. Replanting of all exposed surfaces, in accordance with the revegetation and slope stabilization plan, shall be accomplished within the first growing season following disturbance, unless an approved construction/inspection schedule establishes otherwise.

G. All trees and natural vegetation to remain on the site shall be fenced for protection. Scarring of trees shall be avoided and, if scarred, damaged areas shall be repaired with tree seal.

1. Fencing specified shall be at least 48 inches high and shall be constructed of metal posts and either orange construction fencing or metal mesh fencing also at least 48 inches high (Section 33.6.1). Job sites with violations of the fencing standards will be required to re-fence the job site with a high gauge metal fencing.
2. No material or equipment shall enter or be placed in the areas protected by fencing or outside the construction areas without prior approval from TRPA. Fences shall not be moved without prior approval (Section 33.6).
3. To reduce soil disturbance and damage to vegetation, the area of disturbance during the construction of a structure shall be limited to the area between the footprint of the building and the public road. For the remainder of the site the disturbance areas shall not exceed 12 feet from the footprint of the structure, parking area or cut/fill slope. The approved plans should show the fencing and approved exceptions (Section 36.2).

H. Soil and construction material shall not be tracked off the construction site. Grading operations shall cease in the event that a danger of violating this condition exists. The site shall be cleaned up and road right-of-way swept clean when necessary.

I. During grading and construction, environmental protection devices such as erosion control devices, dust control, and vegetation protection barriers shall be maintained.

J. Loose soil mounds or surfaces shall be protected from wind or water erosion by being appropriately covered when construction is not in active progress or when required by TRPA.

K. Excavated material shall be stored upgrade from the excavated areas to the extent possible. No material shall be stored in any stream zone or wet areas.

L. Only equipment of a size and type that, under prevailing site conditions, and considering the nature of the work to be performed, will do the least amount of damage to the environment shall be used.

M. Limit idling time for diesel powered vehicles exceeding 10,000 GVW and self-propelled equipment exceeding 25 hp to no more than 15 minutes in Nevada and 5 minutes in California, or as otherwise required by state or local permits.

N. Utilize existing power sources (e.g. power poles) or clean-fuel generators rather than temporary diesel power generators wherever feasible.

O. No washing of vehicles or construction equipment, including cement mixers, shall be permitted anywhere on the subject property unless authorized by TRPA in writing.

P. No vehicles or heavy equipment shall be allowed in any stream environment zone or wet areas, except as authorized by TRPA.

Q. Locate construction staging areas as far as feasible from sensitive air pollution receptors (e.g. schools or hospitals).

R. All construction sites shall be winterized by October 15 to reduce the water quality impacts associated with winter weather as follows:

1. For the sites that will be inactive between October 15 and May 1:

   (a) Temporary erosion controls shall be installed;

   (b) Temporary vegetation protection fencing shall be installed;

   (c) Disturbed areas shall be stabilized;

   (d) Onsite construction slash and debris shall be cleaned up and removed;

   (e) Where feasible, mechanical stabilization and drainage improvements shall be installed; and

   (f) Spoil piles shall be removed from the site.

2. For sites that will be active between October 15 and May 1, in addition to the above requirements:

   (a) Permanent mechanical erosion control devices shall be installed, including paving of driveway and parking areas; and

   (b) Parking of vehicles and storage of building materials shall be restricted to paved areas.

III. GENERAL CONDITIONS/DESIGN STANDARDS:

A. Projects approved by TRPA shall be subject to inspections by TRPA at any reasonable time. The permittee shall be responsible for making the project area accessible for inspection purposes. TRPA shall not be liable for any expense incurred by the permittee as a result of TRPA inspections.

B. Construction shall be completed in accordance with an approved construction schedule. An extension of a completion schedule for a project may be granted provided the request is made in writing prior to the expiration of the completion schedule, a security is posted to ensure completion or abatement of the project, and TRPA makes either of the following findings:

1. The project was diligently pursued, as defined in Subparagraph 2.2.4.C of the Code of Ordinances, during each building season (May 1 - October 15) since commencement of construction.

2. That events beyond the control of the permittee, which may include engineering problems, labor disputes, natural disasters, or weather problems, have prevented diligent pursuit of the project.

C. Water conservation appliances and fixtures shall be installed in all new facilities or, when replaced, in existing facilities: low flow flush toilets; low flow showerheads (3 gpm rated maximum flow); faucet aerators; and water-efficient appliances (e.g., washing machines and dishwaters).

D. Water heaters shall not emit nitrogen oxides greater than 40 nanograms of nitrogen oxide (NO_2) per joule of heat output.

E. Space heaters shall not emit greater than 40 nanograms of nitrogen oxides (as NO_2) per joule of useful heat delivered to the heated space.

F. Wood heaters to be installed in the Region shall meet the safety regulations established by applicable city, county, and state codes. Coal shall not be used as a fuel source.

1. Emission Standards: Wood heaters installed in the Region shall not cause emissions of more than 7.5 grams of particulates per hour for noncatalytic wood heaters or 4.1 grams per hour for catalytically equipped wood heaters.

2. Limitations: Wood heaters shall be sized appropriately for the space they are designed to serve. Multi-residential projects of five or more units, tourist accommodations, commercial, recreation and public service projects shall be limited to one wood heater per project area.

3. List of Approved Heaters: TRPA shall maintain a list of wood heaters which may be installed in the Region. The list shall include the brand names, model number, description of the model and the name and address of the manufacturer. Wood heaters certified for use in either Colorado or Oregon shall be considered in compliance with 6(a), above.

G. Construction materials shall be secured to prevent them from rolling, washing, or blowing off the project site. Rehabilitation and clean-up of the site following construction must include removal of all construction waste and debris.

H. Plant species on the TRPA Recommended Native and Adapted Plant List shall be used for lawns and landscaping.

I. The following sizes and spacing shall be required for woody plant materials at time of planting:

1. Trees shall be a minimum six feet tall or 1-1/2 inch caliper size or diameter at breast height;

2. Shrubs shall be a minimum three gallon pot size where upright shrubs have a minimum height of 18 inches and a minimum spread of 18 inches; and spreading shrubs have a minimum spread of 18-24 inches.

3. Groundcovers shall be a minimum four inch pot size or one gallon container and shall be maximum 24 inches on center spacing.

J. Plant species not found on the TRPA Recommended Native and Adapted Plant List may be used for landscaping as accent plantings but shall be limited to borders, entryways, flower-beds, and other similar locations to provide accent to the overall native or adapted landscape design.

K. The following exterior lighting standards shall apply:

1. Exterior lights shall not blink, flash or change intensity. String lights, building or roofline tube lighting, reflective or luminescent wall surfaces are prohibited.

2. Exterior lighting shall not be attached to trees except for Christmas season.

3. Parking lot, walkway, and building lights shall be directed downward.

4. Fixture mounting height shall be appropriate to the purpose. The height shall not exceed the limitations set forth in Chapter 37 of the Code.

5. Outdoor lighting shall be used for purposes of illumination only, and shall not be designed for, or used as, an advertising display. Illumination for aesthetic or dramatic purposes of any building or surrounding landscape utilizing exterior light fixtures projected above the horizontal is prohibited.

6. The commercial operation of searchlights for advertising or any other purpose is prohibited. Seasonal lighting displays and lighting for special events which conflict with other provisions of this section may be permitted on a temporary basis.

L. Any normal construction activities creating noise in excess of the TRPA noise standards shall be considered exempt from said standards provided all such work is conducted between the hours of 8:00 a.m. and 6:30 p.m.

M. Engine doors shall remain closed during periods of operation except during necessary engine maintenance.

N. Stationary equipment (e.g. generators or pumps) shall be located as far as feasible from noise-sensitive receptors and residential areas. Stationary equipment near sensitive noise receptors or residential areas shall be equipped with temporary sound barriers.

O. Sonic pile driving shall be utilized instead of impact pile driving, wherever feasible. Pile driving holes shall be predrilled to the extent feasible subject to design engineer's approval.

P. Fertilizer use on this property shall be managed to include the appropriate type of fertilizer, rate, and frequency of application to avoid release of excess nutrients and minimize use of fertilizer.

Q. No trees shall be removed or trimmed without prior TRPA written approval unless otherwise specifically exempted under Chapter 2 of the Code of Ordinances.

R. The architectural design of this project shall include elements that screen from public view all external mechanical equipment, including refuse enclosures, satellite receiving disks, communication equipment, and utility hardware on roofs, buildings or the ground. Roofs, including mechanical equipment and skylights, shall be constructed of nonglare finishes that minimize reflectivity.

S. The permittee is responsible for insuring that the project, as built, does not exceed the approved land coverage figures shown on the site plan. The approved land coverage figures shall supersede scaled drawings when discrepancies occur.

T. The adequacy of all required BMPs as shown on the final construction plans shall be confirmed at the time of the TRPA pre-grading inspection. Any required modifications, as determined by TPRA, shall be incorporated into the project permit at that time.

U. It is the permittee's obligation to locate all subsurface facilities and/or utilities prior to any grading, dredging or other subsurface activity. The permittee is responsible for contacting the Northern Underground Service Alert (USA, usually known as USA DIGS 1-800-227-2600) prior to commencement of any activity on the site.

V This approval is based on the permittee's representation that all plans and information contained in the subject application are true and correct. Should any information or representation submitted in connection with the project application be incorrect or untrue, TRPA may rescind this approval or take other appropriate action.

Appendix C – 2 National BMP Guidance

Plan-2. Project Planning and Analysis

Manual or Handbook Reference FSM 1950, FSH 1909.15, and FSM 2524.

Objective Use the project planning, environmental analysis, and decisionmaking processes to incorporate water quality management BMPs into project design and implementation.

Explanation The project planning, environmental analysis, and decisionmaking process is the framework for incorporating water quality management BMPs into project design and implementation. The process should identify likely direct, indirect, or cumulative impacts from the proposed project or

management activities on soils, water quality, and riparian resources in the project area. Project documents (plans, contracts, permits, etc.) should include site-specific BMP prescriptions to meet water quality objectives as directed by the environmental analysis. Project planning should ensure that activities are consistent with land management plan direction; State BMPs, floodplain, wetland, coastal zone; and other requirements including CWA 401 certification, CWA 402 permits, and CWA 404 permits; wilderness or wild and scenic river designations; and other Federal, State, and local rules and regulations.

Practices

- Include watershed specialists (hydrologist, soil scientist, geologist, and fish biologist) and other trained and qualified individuals on the interdisciplinary team for project planning, environmental analysis, and decisionmaking to evaluate onsite watershed characteristics and the potential environmental consequences of the proposed activity(s).
- Determine water quality management objectives for the project area.
  - Identify water quality management desired conditions and objectives from the land management plan.
  - Identify and evaluate the condition of water features in the project area (e.g., streams, lakes, ponds, reservoirs, wetlands, riparian areas, springs, groundwater-dependent ecosystems, recharge areas, and floodplains).
  - Identify State-designated beneficial uses of waterbodies and the water quality parameters that are critical to those uses.
  - Identify locations of dams and diversions for municipal or irrigation water supplies, fish hatcheries, stockwater, fire protection, or other water uses within the project area.
  - Identify any impaired (e.g., 303[d] listed) waterbodies in the project area and associated Total Maximum Daily Load (TMDL) analyses or other restoration plans that may exist.
  - Identify threatened, endangered, or sensitive species in or near water, wetlands, and riparian areas in the project area and their habitat needs related to water quality.
- Determine potential or likely direct and indirect impacts to chemical, physical, and biological water quality, and watershed condition from the proposed activity.
  - Always assume hydrological connections exist between groundwater and surface water in each watershed, unless it can reasonably be shown none exist in a local situation.
  - Consider the impacts of current and expected environmental conditions such as atmospheric deposition and climate change in the project area when analyzing effects of the proposed activities.
  - Evaluate sources of waterbody impairment, including water quantity, streamflows, and water quality, and the likelihood that proposed activities would contribute to current or future impairment or restoration to achieve desired watershed conditions.
  - Identify and delineate unstable areas in the project area.
  - Identify soil limitations and productivity impacts of proposed activities.
  - Verify preliminary findings by inspecting the sites in the field.
  - Develop site-specific BMP prescriptions, design criteria, and mitigation measures to achieve water quality management objectives. Consult local, regional, State, or other agencies' required or recommended BMPs that are applicable to the activity.
  - Consider enhanced BMPs identified in a TMDL or other watershed restoration plan to protect impaired waterbodies within the project area.

- Use site evaluations, professional experience, monitoring results, and land management plan standards, guidelines, and other requirements.
- Identify Federal, State, and local permits or requirements needed to implement the project. Examples include water quality standards, CWA 401 certification, CWA 402 permits (including stormwater permits), CWA 404 permits, and Coastal Zone Management Act requirements.
- Plan to limit surface disturbance to the extent practicable while still achieving project objectives.
- Designate specific AMZs around water features in the project area (see BMP Plan-3 [AMZ Planning]).
- Design activities on or near unstable areas and sensitive soils to minimize management-induced impacts.
- Use local direction and requirements for prevention and control of terrestrial and aquatic invasive species.

* Use suitable tools to analyze the potential for cumulative watershed effects (CWE) to occur from the additive impacts of the proposed project and past, present, and reasonably foreseeable future activities on NFS and neighboring lands within the project watersheds.
  - Consider the natural sensitivity or tolerance of the watershed based on geology, climate, and other relevant factors.
  - Consider the existing condition of the watershed and water quality as a reflection of past land management activities and natural disturbances.
  - Estimate the potential for adverse effects to soil, water quality, and riparian resources from current and reasonably foreseeable future activities on all lands within the watershed relative to existing watershed conditions.
  - Use land management plan direction; Federal, State, or local water quality standards; and other regulations to determine acceptable limits for CWE.
  - Modify the proposed project or activity as necessary by changing project design, location, and timing to reduce the potential for CWE to occur.
  - Consider including additional mitigation measures to reduce project effects.
  - Identify and implement opportunities for restoration activities to speed recovery of watershed condition before initiating additional anthropogenic disturbance in the watershed.
  - Coordinate and cooperate with other Federal, State, and private landowners in assessing and preventing CWE in multiple ownership watersheds.
* Integrate restoration and rehabilitation needs into the project plan.
  - Consider water quality improvement actions identified in a TMDL or other watershed restoration plan to restore impaired waterbodies within the project area.
* Identify project-specific monitoring needs.
* Document site-specific BMP prescriptions, design criteria, mitigation measures, and restoration, rehabilitation, and monitoring needs in the applicable National Environmental Policy Act (NEPA) documents, design plans, contracts, permits, authorizations, and operation and maintenance plans.
  - Delineate all protected or excluded areas, including, for example, AMZs and waterbodies, 303(d) listed and TMDL waterbodies, and municipal supply watersheds, on the project map.

Plan-3 Aquatic Management Zone Planning

Manual or Handbook Reference FSM 2526.

Objective To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.

Explanation The land around and adjacent to waterbodies plays an important ecologic role in maintaining the structure, function, and processes of the aquatic ecosystem. These areas provide shading, soil stabilization, sediment and water filtering, large woody debris recruitment, and habitat for a diversity of plants and animals. The quality and quantity of water resources and aquatic habitats may be adversely affected by ground-disturbing activities that occur on these areas. Because of the importance of these lands, various legal mandates have been established pertaining to management of these areas, including, but not limited to, those associated with floodplains, wetlands, water quality, endangered species, wild and scenic rivers, and cultural resources. Protection and improvement of soil, water, and vegetation are to be emphasized while managing these areas under the principles of multiple use and sustained yield. Riparian-dependent resources are to be given preferential consideration when conflicts among land use activities occur.

Designation of a zone encompassing these areas around and adjacent to a waterbody is a common BMP to facilitate management emphasizing aquatic and riparian-dependent resources. These management zones are known by several common terms such as streamside management area or zone, riparian management area, stream environment zone, and water influence zone. For purposes of the National Core BMPs, these areas will be referred to as AMZs.

AMZs are intended to be large enough to protect a waterbody and its associated beneficial uses and aquatic and riparian ecosystems. AMZs along streams and rivers may be linear swaths extending a prescribed distance from a bank, though widths are usually adjusted to include features such as riparian vegetation and unstable landforms as well as critical floodplain components necessary to sustain waterbody integrity and protect beneficial uses. AMZ areas around wetlands, lakes, and other nonlinear features may be irregular in shape to encompass sensitive riparian areas and other water-dependent features.

Local regulation often stipulates the area and extent of AMZs and may be listed in land management plans; biological opinions, evaluations, or assessments; and other regional or State laws, regulations, and policies. Virtually all States have BMPs that include AMZs, as do most land management plans.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Proactively manage the AMZ to maintain or improve long-term health and sustainability of the riparian ecosystem and adjacent waterbody consistent with desired conditions, goals, and objectives in the land management plan.
  - Balance short-term impacts and benefits with long-term goals and desired future conditions, considering ecological structure, function, and processes, when evaluating proposed management activities in the AMZ.
- Determine the width of the AMZ for waterbodies in the project area that may be affected by the proposed activities:

- Evaluate the condition of aquatic and riparian habitat and beneficial riparian zone functions and their estimated response to the proposed activity in determining the need for and width of the AMZ.
- Use stream class and type, channel condition, aspect, side slope steepness, precipitation and climate characteristics, soil erodibility, slope stability, groundwater features, and aquatic and riparian conditions and functions to determine appropriate AMZ widths to achieve desired conditions in the AMZ.
- Include riparian vegetation within the designated AMZ and extend the AMZ to include steep slopes, highly erodible soils, or other sensitive or unstable areas.
- Establish wider AMZ areas for waters with high resource value and quality.

* Design and implement project activities within the AMZ to:
  - Avoid or minimize unacceptable impacts to riparian vegetation, groundwater recharge areas, steep slopes, highly erodible soils, or unstable areas.
  - Maintain or provide sufficient ground cover to encourage infiltration, avoid or minimize erosion, and to filter pollutants.
  - Avoid, minimize, or restore detrimental soil compaction.
  - Retain trees necessary for shading, bank stabilization, and as a future source of large woody debris.
  - Retain floodplain function.
  - Restore existing disturbed areas that are eroding and contributing sediment to the waterbody.
* Mark the boundaries of the AMZ and sensitive areas like riparian areas, wetlands, and unstable areas on the ground before land disturbing activities.

Resources for General Planning Activities

Holcomb, J. 1994. Guide for soil/water/air environmental effects analysis in NEPA documents. Atlanta, GA: U.S. Department of Agriculture, Forest Service, Southern Region. 36 p. Available at

Aquatic Ecosystems Management Activities

The purpose of this set of Best Management Practices (BMPs) is to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources that may result from construction and maintenance activities in flowing and nonflowing aquatic ecosystems. Properly functioning streams, lakes, riparian areas, and wetlands are critical in maintaining water quality, water quantity, riparian habitat, aquatic fauna populations and diversity, and downstream beneficial uses. Common management activities in waterbodies include constructing ponds and wetlands, restoring streambanks or channels, and improving or restoring aquatic habitat.

Four National Core BMPs are in the Aquatic Ecosystems Management Activities category. These BMPs are to be used for projects and activities in or near waterbodies on National Forest System (NFS) lands. BMP AqEco-1 (Aquatic Ecosystem Improvement and Restoration Planning) is a planning BMP for improvement or restoration activities in aquatic ecosystems. BMP AqEco-2 (Operations in Aquatic Ecosystems) covers practices for working in or near waterbodies. Applicable practices of this BMP should be used whenever working in or near waterbodies, regardless of the resource activity; for example, when constructing a stream crossing (BMP Road-7 [Stream Crossings]) or mining instream gravel deposits (BMP Min-5 [In-Stream Sand and Gravel Mining]). BMP AqEco-3 (Ponds and Wetlands) is for constructing ponds and wetlands and constructing or maintaining structures in these aquatic ecosystems. BMP AqEco-4 (Stream Channels and Shorelines) is for construction and maintenance activities in stream channels and shorelines. Note BMP Road-7 (Stream Crossings) provides additional direction specific to road-stream crossings.

States will be used in the rest of this resource category to signify both States and those tribes that have received approval from the U.S. Environmental Protection Agency (EPA) for treatment as a State under the Clean Water Act (CWA).

Aquatic Ecosystems BMPs	
AqEco-1	Aquatic Ecosystem Improvement and Restoration Planning
AqEco-2	Operations in Aquatic Ecosystems
AqEco-3	Ponds and Wetlands
AqEco-4	Stream Channels and Shorelines

AqEco-1. Aquatic Ecosystem Improvement and Restoration Planning

Manual or Handbook Reference Forest Service Manual (FSM) 2020.

Objective Reestablish and retain ecological resilience of aquatic ecosystems and associated resources to achieve sustainability and provide a broad range of ecosystem services.

Explanation Every waterbody has unique characteristics that should be considered when developing a site-specific maintenance, improvement, or restoration strategy. Planning is critical to ensure that the project is conducted in a timely and cost-efficient manner and that the ecological and water quality goals are met. A rigorous approach that uses a combination of best available science and professional experience to inform planning is necessary to enhance the potential for long-term success. When planning aquatic ecosystem projects, it is important to understand all the factors that may affect the watershed currently and in the future. These factors include water quantity, quality, flow,

or storage capacity; habitat suitability for native plants, fish, and wildlife; climate change; the primary uses of the watershed and waterbody by people, domestic animals, and wildlife; and past alterations to the waterbody.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use a watershed perspective and available watershed assessments when planning aquatic ecosystem improvement or restoration projects.
  - Consider how existing water quality and habitat conditions at the project site have been affected by past habitat alterations, hydrologic modification, and riparian area changes in the watershed.
  - Consider how past, current, and future land use patterns may affect the proposed project site.
  - Recognize that inhabitants and users at the site (beaver, deer, birds, and people) may change the current ecosystem state to suit their needs.
- Use desired future conditions to set project goals and objectives.
  - Establish desired future conditions that are consistent with the land management plan's goals and direction.
  - Use a reference condition to determine the natural potential water quality and habitat conditions of a waterbody.
  - Consider the potential for future changes in environmental conditions, such as changes in precipitation and runoff type, magnitude and frequency, community composition and species distribution, and growing seasons that may result from climate change.
  - Consider water quality and other habitat needs for sensitive aquatic or aquatic-dependent species in the project area.
- Favor project alternatives that correct the source of the degradation more than alternatives that mitigate, or treat symptoms of, the problem.
  - Consider the risk and consequences of treatment failure, such as the risk that design conditions could be exceeded by natural variability before the treatment measures are established, when analyzing alternatives.
  - Consider as a first priority treatment measures that are self-sustaining or that reduce requirements for future intervention.
- Use natural stabilization processes consistent with stream type and capability where practicable rather than structures when restoring damaged streambanks or shorelines.
- Prioritize sites to implement projects in a sequence within the watershed in such a way that they will be the most effective to achieve improvement or restoration goals.

AqEco-2. Operations in Aquatic Ecosystems

Manual or Handbook Reference None known.

Objective Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.

Explanation Common construction or maintenance operations in waterbodies often involve ground disturbance. The close proximity to, and contact with, the waterbody increases the potential for introducing sediment and other pollutants that can affect water quality. This BMP includes practices for minimizing direct and indirect water quality impacts when working in or adjacent to waterbodies.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (AMZ Planning) when planning operations in aquatic ecosystems.
- Identify the aquatic and aquatic-dependent species that live in the waterbody, Aquatic Management Zone (AMZ), or on the floodplain and their life histories to determine protection strategies, such as timing of construction, sediment management, species relocation, and monitoring during construction.
- Coordinate stream channel, shoreline, lake, pond, and wetland activities with appropriate State and Federal agencies.
  - Incorporate Clean Water Act (CWA) 404 permit requirements and other Federal, State, and local permits or requirements into the project design and plan.
- Use suitable measures to protect the waterbody when preparing the site for construction or maintenance activities.
  - Clearly delineate the work zone.
  - Locate access and staging areas near the project site but outside of work area boundaries, AMZs, wetlands, and sensitive soil areas.
  - Refuel and service equipment only in designated staging areas (see BMP Road-10 [Equipment Refueling and Servicing]).
  - Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity (see BMP Fac-2 [Facility Construction and Stormwater Control]).
  - Prepare for unexpected failures of erosion control measures.
  - Consider needs for solid waste disposal and worksite sanitation.
  - Consider using small, low ground pressure equipment, and hand labor where practicable.
  - Ensure all equipment operated in or adjacent to the waterbody is clean of aquatic invasive species, as well as oil and grease, and is well maintained.
  - Use vegetable oil or other biodegradable hydraulic oil for heavy equipment hydraulics wherever practicable when operating in or near water.
- Schedule construction or maintenance operations in waterbodies to occur in the least critical periods to avoid or minimize adverse effects to sensitive aquatic and aquatic-dependent species that live in or near the waterbody.

- Avoid scheduling instream work during the spawning or migration seasons of resident or migratory fish and other important life history phases of sensitive species that could be affected by the project.
- Avoid scheduling instream work during periods that could be interrupted by high flows.
- Consider the growing season and dormant season for vegetation when scheduling activities within or near the waterbody to minimize the period of time that the land would remain exposed, thereby reducing erosion risks and length of time when aesthetics are poor.

- Use suitable measures to protect the waterbody when clearing the site.
  - Clearly delineate the geographic limits of the area to be cleared.
  - Use suitable drainage measures to improve the workability of wet sites.
  - Avoid or minimize unacceptable damage to existing vegetation, especially plants that are stabilizing the bank of the waterbody.
- Use suitable measures to avoid or minimize impacts to the waterbody when implementing construction and maintenance activities.
  - Minimize heavy equipment entry into or crossing water as is practicable.
  - Conduct operations during dry periods.
  - Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures.
  - Promptly install and appropriately maintain erosion control measures.
  - Promptly install and appropriately maintain spill prevention and containment measures.
  - Promptly rehabilitate or stabilize disturbed areas as needed following construction or maintenance activities.
  - Stockpile and protect topsoil for reuse in site revegetation.
  - Minimize bank and riparian area excavation during construction to the extent practicable.
  - Keep excavated materials out of the waterbody.
  - Use only clean, suitable materials that are free of toxins and invasive species for fill.
  - Properly compact fills to avoid or minimize erosion.
  - Balance cuts and fills to minimize disposal needs.
  - Remove all project debris from the waterbody in a manner that will cause the least disturbance.
  - Identify suitable areas offsite or away from waterbodies for disposal sites before beginning operations.
  - Contour site to disperse runoff, minimize erosion, stabilize slopes, and provide a favorable environment for plant growth.
  - Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.
- Use suitable measures to divert or partition channelized flow around the site or to dewater the site as needed to the extent practicable.
  - Remove aquatic organisms from the construction area before dewatering and prevent organisms from returning to the site during construction.

- Return clean flows to channel or waterbody downstream of the activity.
- Restore flows to their natural stream course as soon as practicable after construction or before seasonal closures.

- Inspect the work site at suitable regular intervals during and after construction or maintenance activities to check on quality of the work and materials and identify need for midproject corrections.
- Consider short- and long-term maintenance needs and unit capabilities when designing the project.
  - Develop a strategy for providing emergency maintenance when needed.
- Include implementation and effectiveness monitoring to evaluate success of the project in meeting design objectives and avoiding or minimizing unacceptable impacts to water quality.
- Consider long-term management of the site and nearby areas to promote project success.
  - Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.

AqEco-4. Stream Channels and Shorelines

Manual or Handbook Reference None known.

Objective Design and implement stream channel and lake shoreline projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.

Explanation Instream projects are often conducted for a variety of purposes, including improving fish and wildlife habitat, stabilizing streambanks, reconnecting the stream channel to the historic floodplain, and removing or replacing culverts. Lakeshores may be degraded by storm events; constant wave action from boats; onshore uses, including recreation, mining, vegetation management, and development; water diversions; freezing and thawing; floating ice; drought; or a fluctuating water table. A shoreline problem is often isolated and may require only a simple patch repair. Methods to stabilize or restore lakeshores differ from streambank measures because of wave action and littoral transport.

Two basic categories of stabilization and protection measures exist: those that work by reducing the force of water against a streambank or shoreline and those that increase their resistance to erosive forces. Appropriate selection and application of stream channel and shoreline protection measures depend on specific project objectives and site conditions.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

All Activities

- Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies.

Stream Channels

- Determine stream type and classification using suitable accepted protocols.
- Determine need to control channel grade to avoid or minimize erosion of channel bed and banks before selecting measures for bank stabilization or protection.
  - Incorporate grade control measures into project design as needed.
- Determine design flows based on the value or safety of area to be protected, repair cost, and the sensitivity and value of the ecological system involved.
  - Obtain peak flow, low flow, channel forming flow, and flow duration estimates.
  - Use these estimates to determine the best time to implement the project, as well as to select design flows.
- Determine design velocities appropriate to the site.
  - Limit maximum velocity to the velocity that is nonscouring on the least resistant streambed and bank material.
  - Consider needs to transport bedload through the reach when determining minimum velocities.
  - Maintain the depth-area-velocity relationship of the upstream channel through the project reach.
  - Consider the effects of design velocities on desired aquatic organism habitat and passage.

- Avoid changing channel alignment unless the change is to reconstruct the channel to a stable meander geometry consistent with stream type.
- Design instream and streambank stabilization and protection measures suitable to channel alignment (straight reach versus curves).
  - Consider the effects of ice and freeze and thaw cycles on streambank erosion processes.
  - Consider the effects that structures may have on downstream structures and stream morphology, including streambanks, in the maintenance of a natural streambed.
- Design channels with natural stream pattern and geometry and with stable beds and banks; provide habitat complexity where reconstruction of stream channels is necessary.
  - Consider sediment load (bedload and suspended load) and bed material size to determine desired sediment transport rate when designing channels.
  - Avoid relocating natural stream channels.
  - Return flow to natural channels, where practicable.
- Include suitable measures to protect against erosion around the edges of stabilization structures.
  - Design revetments and similar structures to include sufficient freeboard to avoid or minimize overtopping at curves or other points where high-flow velocity can cause waves.
  - Use suitable measures to avoid or minimize water forces undermining the toe of the structure.
  - Tie structures into stable anchorage points, such as bridge abutments, rock outcrops, or well-vegetated stable sections, to avoid or minimize erosion around the ends.
- Add or remove rocks, wood, or other material in streams only if such action maintains or improves stream condition, provides for safety and stability at bridges and culverts, is needed to avoid or minimize excessive erosion of streambanks, or reduces flooding hazard.
  - Leave rocks and portions of wood that are embedded in beds or banks to avoid or minimize channel scour and maintain natural habitat complexity.
- Choose vegetation appropriate to the site to provide streambank stabilization and protection adequate to achieve project objectives.
  - Use vegetation species and establishment methods suitable to the project site and objectives, consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.

Shorelines

- Use mean high- and low-water levels to determine the design water surface.
  - Consider the effects of fluctuating water levels, freeze or thaw cycles, and floating ice on erosion processes at the site.
- Design stabilization and protection measures suitable to the site.
  - Determine the shoreline slope configuration above and below the waterline.
  - Consider the effects of offshore depth, dynamic wave height, and wave action on shoreline erosion processes.
  - Determine the nature of the bank soil material to aid in estimating erosion rates.
  - Consider foundation material at the site when selecting structural measures.

- Use vegetation species and establishment methods suitable to the project site and objectives and consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.

- Consider the rate, direction, supply, and seasonal changes in littoral transport when choosing the location and design of structural measures.
- Consider the effect structures may have on adjacent shoreline or other nearby structures.
  - Adequately anchor end sections to existing stabilization measures or terminate in stable areas.

Resources for Aquatic Ecosystems Management Activities

General

Meitl, J.; Maguire, T., eds. 2003. Compendium of best management practices to control polluted runoff: A source book. Boise, ID: Idaho Department of Environmental Quality. Available at http://www.deq.State.id.us/water/data_reports/surface_water/nps/reports.cfm#bmps.

U.S. Environmental Protection Agency (EPA), Office of Water. 2005. National management measures to protect and restore wetlands and riparian areas for the abatement of nonpoint source pollution. EPA-841-B-05-003. Washington, DC. Available at http://www.epa.gov/owow/nps/wetmeasures/.

Bioengineering

Eubanks, C.E.; Meadows, D. 2002. A soil bioengineering guide for streambank and lakeshore stabilization. FS-683P. San Dimas, CA: U.S. Department of Agriculture (USDA), Forest Service, Technology and Development Program. 188 p. Available at http://www.fs.fed.us/publications/soil-bio-guide/.

Pond Construction

Deal, C.; Edwards, J.; Pellman, N.; Tuttle, R. 1997. Ponds—Planning, design and construction. Agriculture Handbook 590. Washington, DC: USDA Natural Resources Conservation Service (NRCS). 85 p. Available at http://www.in.nrcs.gov/pdf%20files/PONDS.PDF.

Shoreline Stabilization

USDA NRCS. 1996. Chapter 16 streambank and shoreline protection. Engineering Field Handbook Part 650. Washington, DC. Available at http://directives.sc.egov.usda.gov/.

Stream Restoration

Bernard, J.; Fripp, J.F.; Robinson, K.R., eds. 2007. Part 654 stream restoration design national engineering handbook (210-VI-NEH). Washington DC: USDA NRCS.

Federal Interagency Stream Restoration Working Group (FISRWG). 1998. Stream corridor restoration: Principles, processes, and practices. GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3. Available at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/quality/?&cid=stelprdb1043448.

Izaak Walton League of America. 2006. A handbook for stream enhancement and stewardship, 2nd ed. ISBN 0-939923-98-X. Blacksburg, VA: McDonald and Woodward and Gaithersburg, MD: The Izaak Walton League of America. 178 p. Available at http://www.mwpubco.com/conservation.htm.

USDA NRCS. National conservation practice standards—322 channel bank vegetation, 584 channel stabilization, 410 grade stabilization structure, 580 streambank and shoreline protection, 395 stream habitat improvement and management. Washington, DC. Available at http://www.nrcs.usda.gov/technical/standards/nhcp.html.

USDA NRCS. National design construction and soil management center stream corridor restoration. Available at http://www.ndcsmc.nrcs.usda.gov/technical/Stream/index.html#Materials.

Fac-2. Facility Construction and Stormwater Control

Manual or Handbook Reference

None known.

Objective

Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling erosion and managing stormwater discharge originating from ground disturbance during construction of developed sites.

Explanation

During construction and operation of facility sites, land may be cleared of existing vegetation and ground cover, exposing mineral soil that may be more easily eroded by water, wind, and gravity. Changes in land use and impervious surfaces can temporarily or permanently alter stormwater runoff that, if left uncontrolled, can affect morphology, stability, and quality of nearby streams and other waterbodies. Erosion and stormwater runoff control measures are implemented to retain soil in place and to control delivery of suspended sediment and other pollutants to nearby surface water. This practice is initiated during the planning phase and applied during project implementation and operation.

This BMP contains practices for managing erosion and stormwater discharge that are generally applicable for any project that involves ground disturbance, including developed recreation, mineral exploration and production sites, pipelines, water developments, etc., and should be used for all such projects.

Practices

Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Obtain Clean Water Act (CWA) 402 stormwater discharge permit coverage from the appropriate State agency or the U.S. Environmental Protection Agency (EPA) when more than 1 acre of land will be disturbed through construction activities.
- Obtain CWA 404 permit coverage from the U.S. Army Corps of Engineers when dredge or fill material will be discharged to waters of the United States.
- Establish designated areas for equipment staging, stockpiling materials, and parking to minimize the area of ground disturbance (see BMP Road-9 [Parking Sites and Staging Areas] and BMP Road-10 [Equipment Refueling and Servicing]).

- Establish and maintain construction area limits to the minimum area necessary for completing the project and confine disturbance to within this area.
- Develop and implement an erosion control and sediment plan that covers all disturbed areas, including borrow, stockpile, fueling, and staging areas used during construction activities.
- Calculate the expected runoff generated using a suitable design storm to determine necessary stormwater drainage capacity.
  - Use site conditions and local requirements to determine design storm.
  - Include run-on from any contributing areas.
- Refer to State or local construction and stormwater BMP manuals, guidebooks, and trade publications for effective techniques to:
  - Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion during construction or before the next growing season.
  - Maintain the natural drainage pattern of the area wherever practicable.
  - Control, collect, detain, treat, and disperse stormwater runoff from the site.
  - Divert surface runoff around bare areas with appropriate energy dissipation and sediment filters.
  - Stabilize steep excavated slopes.
- Develop and implement a postconstruction site vegetation plan using suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per Forest Service Manual (FSM) 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.
- Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable.
- Do not use snow or frozen soil material in facility construction.
- Schedule, to the extent practicable, construction activities to avoid direct soil and water disturbance during periods of the year when heavy precipitation and runoff are likely to occur.
  - Limit the amount of exposed or disturbed soil at any one time to the minimum necessary to complete construction operations.
  - Limit operation of equipment when ground conditions could result in excessive rutting, soil puddling, or runoff of sediments directly into waterbodies.
- Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways before seasonal shutdown of project operations or when severe or successive storms are expected.
- Use low-impact development practices where practicable.
- Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning.
  - Prepare for unexpected failures of erosion control measures.
  - Implement corrective actions without delay when failures are discovered to prevent pollutant discharge to nearby waterbodies.
- Routinely inspect construction sites to verify that erosion and stormwater controls are implemented and functioning as designed and are appropriately maintained.
- Use suitable measures in compliance with local direction to prevent and control invasive species.

Fac-7. Vehicle and Equipment Wash Water

Manual or Handbook Reference None known.

Objective Avoid or minimize contamination of surface water and groundwater by vehicle or equipment wash water that may contain oil, grease, phosphates, soaps, road salts, other chemicals, suspended solids, and invasive species.

Explanation Washing vehicles and equipment is a common method used to maintain vehicles and minimize the spread of noxious and invasive species. Wash water and the resulting residue removed from vehicles and equipment may contain oils, chemicals, or sediment harmful to water and aquatic resources if not properly contained and treated. Work centers, ranger stations, fire stations, and other

facilities may have washing equipment and locations designated for cleaning fleet or contracted vehicles and equipment. Temporary wash locations may also be installed during incident management or project work.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use commercial washing facilities that have proper wastewater treatment systems whenever possible.
  - Maintain a list of appropriate wash stations in the local area and provide the list to local offices, permit holders, and contractors.
- Install temporary wash sites only in areas where the water and residue can be adequately collected and either filtered on site or conveyed to an appropriate wastewater treatment facility.
  - Consider the use of a portable vehicle washer system, such as that designed by the Missoula Technology and Development System, to contain and filter the wash water.
  - Locate temporary wash sites out of AMZs, wetlands, groundwater recharge areas, floodplains, and other environmentally sensitive areas.
  - Use suitable measures to treat and infiltrate wash water to comply with applicable surface water and groundwater protection regulations.

Rec-2. Developed Recreation Sites

Manual or Handbook Reference FSM 2332, FSM 2333, and FSM 2334.

Objective Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources at developed recreation sites by maintaining desired levels of ground cover, limiting soil compaction, and minimizing pollutants entering waterbodies.

Explanation Developed recreation sites provide amenities for user comfort and can be located in motorized or nonmotorized settings. Oftentimes these areas concentrate high volumes of use into relatively small areas and may be located on or near waterbodies, thereby increasing the potential for water quality degradation. Potential pollutants generated by use at developed recreation sites include, but are not limited to, human and animal waste; solid wastes (trash); petroleum products; and other hazardous substances. In addition, continuous or recurring use at one site can cause excessive soil compaction; damage to vegetation, wetlands, and riparian areas; and erosion and sediment transport from the site.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) to construct and maintain appropriate erosion control and stormwater management measures to avoid or minimize adverse effects to water quality from pollutant runoff at the site.
- Use applicable practices of Roads Management Activities BMPs for construction and maintenance of access roads.
- Use applicable practices of BMP Roads-9 (Parking and Staging Areas) for trailheads and other parking areas at develop recreation sites.
- Use applicable practices of BMP Fac-3 (Potable Water Supply Systems), BMP Fac-4 (Sanitation Systems), and BMP Fac-5 (Solid Waste Management) for water, sanitation, and solid waste systems at developed recreation sites.

- Evaluate and adjust design capacity of the site when recreation use is causing adverse effects to water quality or riparian resources.
- Provide hardened campsites located sufficiently far from surface waterbodies to provide an adequate vegetative filter strip to avoid or minimize sediment delivery (see BMP Plan-3 [AMZ Planning]).
- Consider potential impacts to soils, water quality, and riparian resources when establishing recreation site use periods.
- Use suitable measures to avoid or minimize overuse on sensitive areas.
- Use suitable public relations, information, and enforcement tools to encourage the public to conduct their activities in a manner that will avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
    - Provide information on the location of the nearest RV (recreational vehicle) wastewater disposal station.
- Periodically evaluate the condition of soil, water quality, and riparian resources at and near developed sites to identify signs of insufficient ground cover, detrimental soil compaction, excessive runoff, sedimentation, or chemical or pollutant release by recreationists.
    - Relocate trails, parking areas, campsites, play areas, or water distribution points that are causing offsite resource damage.
    - Redesign and reconstruct, or close and rehabilitate, areas of recreation sites that exhibit signs of overuse.
    - Use suitable measures to restrict access, when necessary, to nearby wetlands and riparian areas that show signs of excessive damage from recreation use to allow for vegetative recovery.
- Rehabilitate unwanted user-created trails and sites within the developed recreation site and employ suitable measures to discourage their creation and use (see BMP Fac-10 [Facility Site Reclamation]).
- Use applicable practices of BMP Fac-10 (Facility Site Reclamation) to reclaim the developed recreation site after the need for it ends.

Rec-4. Motorized and Nonmotorized Trails

Manual or Handbook Reference

FSM 2353, FSH 2309.18, FSM 7715.5, FSM 7723, and EM (Engineering Management) 7720-104.

Objective

Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling soil erosion, erosion of trail surface materials, and water quality problems originating from construction, maintenance, and use of motorized and nonmotorized trails.

Explanation

The Forest Service manages about 133,000 miles of trails that are part of the designated transportation system. Only portions of these trails are open to motorized vehicle use. Almost all NFS trails serve nonmotorized users, including hikers, bicyclists, and equestrians, alone or in some combination with motorized uses.

Trail construction, maintenance, and use by motorized vehicles and human or stock traffic can adversely affect water quality by increased sediment delivery and contamination from vehicle fluids and human and animal wastes to nearby waterbodies. Compaction of the trail surface limits water infiltration, which can lead to concentrated runoff on the trail surface. Concentrated runoff on trails lacking adequate drainage causes erosion of the trail surface and can transport sediment and other pollutants directly into waterbodies if not filtered. Heavy tread, foot, or hoof traffic can loosen some trail surface materials, making them more susceptible to erosion.

Trails open to motorized use are designated during the travel management process and depicted on the Motor Vehicle Use Map (MVUM). Motorized use is designated by allowed vehicle class and, if appropriate, time of year, with the objective of minimizing damage to soil and water resources.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use applicable Road Management Activities BMPs for construction, operation, and maintenance of motorized trails.
- Locate or relocate trails to conform to the terrain, provide suitable drainage, provide adequate pollutant filtering between the trail and nearby waterbodies, and reduce potential adverse effects to soil, water quality, or riparian resources.
  - Avoid sensitive areas, such as riparian areas, wetlands, stream crossings, inner gorges, and unstable areas to the extent practicable.
  - Use suitable measures to mitigate trail impacts to the extent practicable where sensitive areas are unavoidable.
  - Use suitable measures to hydrologically disconnect trails from waterbodies to the extent practicable.
- Design, construct, and maintain trail width, grades, curves, and switchbacks suitable to the terrain and designated use.
- Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for control of erosion and stormwater when constructing trails.
- Install and maintain suitable drainage measures to collect and disperse runoff and avoid or minimize erosion of trail surface and adjacent areas.
- Use and maintain surfacing materials suitable to the trail site and use to withstand traffic and minimize runoff and erosion.
  - Pay particular attention to areas where high wheel slip (curves, acceleration, and braking) during motorized use generates loose soil material.
- Design stream crossings to use the most cost-efficient structure consistent with resource protection, facility needs, and types of use and safety obligations (see BMP Road-2 [Road Location and Design] and BMP Road-7 [Stream Crossings]).
- Designate season of use to avoid periods when trail surfaces are particularly prone to unacceptable erosion, rutting, or compaction.
- Designate class of vehicle and type of nonmotorized uses (e.g., hiking, bicycling, and equestrian uses) suitable for the trail width, location, waterbody crossings, and trail surfaces to avoid or minimize adverse effects to soil, water quality, or riparian resources.
- Monitor trail condition at regular intervals to identify drainage and trail surface maintenance needs to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
- Manage designated trails to mitigate adverse effects to soil, water quality, and riparian resources from over-use when closure and rehabilitation is not practicable or desired.
  - Change designated vehicle class and season-of-use period as necessary.
- Close and rehabilitate unauthorized trails that are causing adverse effects on soil, water quality, and riparian resources (see BMP Fac-10 [Facility Site Reclamation]).

Road-5. Temporary Roads

Manual or Handbook Reference None known.

Objective Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.

Explanation Temporary roads may be used in situations where access needs are short-term and the roads can be constructed without requiring advanced engineering design or construction practices to avoid, minimize, or mitigate adverse effects to resources. Practices related to road location and stormwater and erosion control should be applied to temporary roads. Temporary roads are to be decommissioned and the area returned to resource production after the access is no longer needed.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Use applicable practices of BMP Road-2 (Road Location and Design) to locate temporary roads.
- Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when constructing temporary roads.
- Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable.
- Schedule construction activities to avoid direct soil and water-disturbance during periods of the year when heavy precipitation and runoff are likely to occur.
- Routinely inspect temporary roads to verify that erosion and stormwater controls are implemented, functioning, and appropriately maintained.

- Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning.
- Use suitable measures in compliance with local direction to prevent and control invasive species.
- Use temporary crossings suitable for the expected uses and timing of use (See BMP Road-7 [Stream Crossings]).
- Use applicable practices of BMP Road-6 (Road Storage and Decommissioning) to obliterate the temporary road and return the area to resource production after the access is no longer needed.

Road-10. Equipment Refueling and Servicing

Manual or Handbook Reference FSM 2160 and FSH 7109.19, chapter 40.

Objective Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.

Explanation Many activities require the use and maintenance of petroleum-powered equipment in the field. For example, mechanical vegetation management activities may employ equipment that uses or contains gasoline, diesel, oil, grease, hydraulic fluids, antifreeze, coolants, cleaning agents, and pesticides. These petroleum and chemical products may pose a risk to contaminating soils, surface water, and groundwaters during refueling and servicing the equipment. BMP Fac-6 (Hazardous Materials) provides additional guidance for handling hazardous materials.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Plan for suitable equipment refueling and servicing sites during project design.
  - Allow temporary refueling and servicing only at approved locations, located well away from the AMZ, groundwater recharge areas, and waterbodies.
- Develop or use existing fuel and chemical management plans (e.g., Spill Prevention Control and Countermeasures [SPCC], spill response plan, and emergency response plan) when developing the management prescription for refueling and servicing sites.
- Locate, design, construct, and maintain petroleum and chemical delivery and storage facilities consistent with applicable local, State, and Federal regulations.
- Use suitable measures around vehicle service, storage and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills and avoid or minimize soil contamination and seepage to groundwater.
- Provide training for all agency personnel handling fuels and chemicals in their proper use, handling, storage, and disposal.

- Ensure that contractors and permit holders provide documentation of proper training in handling hazardous materials.

- Use suitable measures to avoid spilling fuels, lubricants, cleaners, and other chemicals during handling and transporting.
- Prohibit excess chemicals or wastes from being stored or accumulated in the project area.
- Remove service residues, used oil, and other hazardous or undesirable materials from NFS land and properly dispose them as needed during and after completion of the project.
- Clean up and dispose of spilled materials according to specified requirements in the appropriate guiding document.
- Report spills and initiate suitable cleanup action in accordance with applicable State and Federal laws, rules, and regulations.
  - Remove contaminated soil and other material from NFS lands and dispose of this material in a manner consistent with controlling regulations.
- Prepare and implement a certified SPCC Plan for each facility, including mobile and portable facilities, as required by Federal regulations.
- Use applicable practices of BMP Fac-10 (Facility Site Reclamation) to reclaim equipment refueling and services site when the need for them ends.

WatUses-4. Water Diversions and Conveyances

Manual or Handbook Reference FSM 2729 and FSM 7510.

Objective Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from construction, operation, and maintenance of water diversion and conveyance structures.

Explanation Water may be diverted from waterbodies on NFS lands by third parties and delivered to sites on or off of NFS lands for a variety of purposes, including agriculture, mining, domestic water supply, hydroelectric power generation, or other uses. Water delivery systems consist of a diversion structure

and some type of conduit. Conduits can be ditches, open canals, flumes, tunnels, pipelines, or even natural channels. Structures to regulate flow, dispose of excess water, or trap sediment and debris may also be part of the water delivery system.

The construction, operation, and maintenance of water diversions and conveyances can have adverse direct and indirect effects on soil, water quality, and riparian resources. The construction or presence of access routes, head gates, storage tanks, reservoirs, and other facilities can alter water quality, water yield, runoff regimes, natural channel geomorphic processes, and fish and wildlife habitats. Altered flow regimes can result in elevated water temperatures, proliferating algal blooms, and invasive aquatic flora and fauna. Water yield and runoff changes can change sediment dynamics and affect channel shape and substrate composition. Regular maintenance of diversions and conveyances can result in contamination from pesticide applications, vegetation damage, and continued soil disturbance leading to increased erosion; however, lack of regular maintenance can increase the potential for even greater effects from failures of ditches and diversions.

Practices Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.

- Locate water conveyance structures in stable areas where they are not susceptible to damage from side drainage flooding.
- Design diversion and conveyance structures to efficiently capture and carry design flows in such a manner as to avoid or minimize erosion of streambanks, ditches, and adjacent areas.
  - Design intake and outflow structures to minimize streambank and streambed damage and minimize disruption of desired aquatic organism movement.
  - Design water conveyance structure to have sufficient capacity to carry the design volume of water with appropriate freeboard to avoid or minimize damage or overtopping.
  - Consider velocity of the water, horizontal and vertical alignment of the ditch or canal, amount of stormwater that may be intercepted, and change in water surface elevation at any control structures when determining appropriate freeboard needed.
  - Use suitable measures in the design to control velocity and slope to avoid or minimize erosion of the ditch.
  - Use suitable measures in the design to minimize water loss to evaporation and leakage.
  - Mitigate water imports and water disposal (including reservoir releases) so that the extent of stable banks, channel pattern, profile and dimensions are maintained in each receiving stream reach to meet applicable instream water quality standards.
- Construct diversion and conveyance structures to perform as intended in the most efficient manner and in such a way as to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
  - Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when constructing diversion structures in waterbodies.
  - Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) to control stormwater and erosion when constructing diversion or conveyance structures.
  - Use suitable measures to stabilize the banks of the diversion channel or conveyance structure to avoid or minimize resulting erosion and instream sedimentation.

- Construct or install structures such as inlets, outlets, turnouts, checks, and crossings in such a manner as to maintain the capacity or freeboard of the ditch and the effectiveness of any lining or other channel stabilization measure.
- Use suitable measures at outlets to avoid or minimize erosion downstream of the structure when design flows are released.
- Use suitable measures on inlet structures to avoid or minimize debris entering the water conveyance structure.

- Operate diversion structures in such a manner as to leave desired or required flows and water levels in the source waterbody as determined in project planning (see BMP WatUses-1 [Water Uses Planning]).
- Operate and maintain diversion and conveyance structures in such a manner as to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from failures.
  - Limit operation of the diversion and conveyances to the established period of use.
  - Regularly inspect diversion and conveyance structures at suitable intervals to identify maintenance needs and situations that could lead to future overtopping or failures.
  - Do not flush or otherwise move sediment from behind diversion structures downstream.
  - Deposit and stabilize sediment removed from behind a diversion structure in a suitable designated upland site.
  - Maintain suitable vegetative cover near canal and ditch banks to stabilize bare soils and minimize erosion.
  - Harden or reroute breach-prone segments of ditches to minimize potential for failure and erosion of fill slopes.
  - Maintain and operate water conveyance structures to carry their design volumes of water with appropriate freeboard.
  - Keep water conveyance structures clear of vegetation, debris and other obstructions to minimize potential for failures.
  - Use applicable Chemical Use Activities BMPs when using chemicals to treat vegetation as a part of water conveyance structure maintenance.
- Use applicable measures of BMP AqEco-4 (Stream Channels and Shorelines) and BMP Fac-10 (Facility Site Reclamation) to restore the stream channel and surrounding areas after the diversion or conveyance structure is no longer needed.

Appendix C – 3 Regional BMP Guidance

12.21 Exhibit 05
BMP 2.5 - Water Source Development and Utilization

Objective: To supply water for road construction, maintenance, dust abatement, fire protection, and other management activities, while protecting and maintaining water quality.

Explanation: Water source development is needed to supply water for road construction and maintenance, dust control, and fire control. In-stream water drafting can substantially affect water flow and/or configuration of the bed, bank, or channel of streams. Aquatic species present could be at risk due to rapid changes or sustained reductions in flow, reduced dissolved oxygen, and/or increased water temperature. Exposed surfaces of water holes or other developments could erode and discharge sediment back into the waterway. In addition to direct hydrogeomorphic (forming and shaping landform by water) disruption to the channel and subsequent impacts to aquatic species, water-quality impacts can occur from road approaches that access the water drafting site. Many water drafting sites have steep approaches and in the absence of adequate drainage or surfacing, these approaches can become chronic sources of sediment and runoff to the channel. Water trucks often leak oil, and sometimes fuel, onto drafting pads, becoming a source of petroleum product contamination to surface waters.

Regular monitoring of water supply developments, during construction and use, and enforcement of contract and sale clauses, specifications, and restrictions is the responsibility of inspectors, contracting officer representatives, engineering representatives, sale administrators, and force account crew foreman.

Implementation

Location and Development:

Critical to the effectiveness of this practice is the coordination of engineering representatives, hydrologists, fishery biologists, and permit and sale administrators. Locate existing developments, or proposed streams, and evaluate for feasibility of use; determine scope and scale of environmental risks; select techniques for mitigating disturbance to water quality; and compare with the economics of development and use:

1. Water sources designed for permanent installation, such as piped diversions to off-site storage, are preferred over temporary, short-term-use developments.

2. If off-site storage is not an option then the following locations shall be considered.

   a. Locations where flowing side channels rather than the main thread of the channel can be used for drafting.

   b. Areas with existing pools that can be partially blocked, rather than in-channel excavation are preferred.

12.21 Exhibit 05 -- Continued
BMP 2.5 - Water Source Development and Utilization

c. Sites where road approaches can be hydrologically disconnected from streams.

d. Sites where the drafting pad can be placed above the bankfull elevation of the channel with little or no excavation and/or fill placement.

3. Develop and implement Erosion Control Plan for water supply site construction and use.

4. Follow the forest's wet weather operations standards and guidelines. See BMP 2.13.

5. Excavation of streambed or bank materials for approaches, drafting pads, and water drafting intakes are subject to local or regional restrictions on ground-disturbing activities.

a. Excavations should not occur during peak runoff season.

b. Federally listed threatened and endangered species, sensitive (including State-listed) species, management Indicator species, and aquatic organisms of interest may impose further restrictions.

c. Other restrictions such as spawning season may be applicable

6. Basins shall not be constructed at culvert inlets for the purpose of developing a waterhole, as these can exacerbate plugging of the culvert.

7. Access approaches are located as close to perpendicular as possible to prevent stream bank excavation.

8. Access approaches are stabilized with appropriate materials, depending on expected life and use frequency of the developed water source.

9. Fish-bearing streams that are temporarily dammed to create a drafting pool shall provide fish passage for all life stages of fish.

10. Temporary dams shall be removed when operations are complete.

11. Removal shall be done gradually so that released impoundments do not discharge sediment into the streamflow.

12. When diverting water from streams, bypass flows shall be maintained that ensure continuous surface flow in downstream reaches, and keep habitat in downstream reaches in good condition.

12.21 Exhibit 05 -- Continued
BMP 2.5 - Water Source Development and Utilization

Drafting Operations:

1. For fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs).

2. Below 4.0 cfs, drafting rates should not exceed 20 percent of surface flows.

3. Water drafting should cease when bypass surface flows drop below 1.5 cfs.

4. For non-fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cfs.

5. Drafting rate should not exceed 50 percent of surface flow for non-fish-bearing streams.

6. Water drafting should cease from non-fish-bearing streams when bypass surface flow drops below 10 gallons per minute.

7. Intakes, for trucks and tanks, shall be placed parallel to the flow of water and screened, with opening size consistent with the protection of aquatic species of interest.

8. Drafting from gravity-fed storage tanks shall utilize the following

9. Water storage tanks shall be fitted with properly sized pipes designed to cleanly return the tank overflow to the source stream.

10. Outflow pipes shall be sized to fully contain the tank overflow and prevent it from overflowing onto the drafting pad or road surface.

11. Water storage tank return pipes at the water outfall area shall be armored to prevent erosion of the streambed, bank, or channel.

12. At the end of drafting operations, intake screens shall be removed and drafting pipes plugged, capped, or otherwise blocked or removed from the active channel to terminate water drafting during the winter season.

13. Trucks directly drafting from the channel shall utilize the following practices.

14. Water drafting by more than one truck shall not occur simultaneously

12.21 Exhibit 05 -- Continued
BMP 2.5 - Water Source Development and Utilization

Approaches and Drafting Pads:

1. Road approaches and drafting pads shall be treated to prevent sediment production and delivery to a watercourse or waterhole.

2. Road approaches shall be armored as necessary from the end of the approach nearest a stream for a minimum of 50 feet, or to the nearest drainage structure (for example, waterbar or rolling dip) or point where road drainage does not drain toward the stream.

3. Areas subject to high flood events shall be armored to prevent erosion and sediment delivery to water courses.

4. Where overflow runoff from water trucks or storage tanks may enter the stream, effective erosion control devices shall be installed (for example, gravel berms or waterbars).

5. All water-drafting vehicles shall be checked daily and shall be repaired as necessary to prevent leaks of petroleum products from entering SMZs.

6. Water-drafting vehicles shall contain petroleum-absorbent pads, which are placed under vehicles before drafting.

7. Water-drafting vehicles shall contain petroleum spill kits. Dispose of absorbent pads according to the Hazardous Response Plan.

12.21 Exhibit 08
BMP 2.8 - Stream Crossings

Objective: Minimize water, aquatic, and riparian resource disturbances and related sediment production when constructing, reconstructing, or maintaining temporary and permanent water crossings.

Explanation: Stream crossings present the highest risk to water quality associated with roads. Forest management activities often occur in areas that require surface waters to be crossed. Depending on the activity type and duration, crossings may be needed permanently or temporarily. Permanent crossings are designed to meet applicable standards while also protecting water, aquatic, and riparian resources.

Examples of crossings include culverts, bridges, arched pipes, low water crossings, fords, vented fords, and permeable fills. Crossing materials and construction will vary, based on the type of access required and volume of use expected. Optimally, crossings should be designed and installed to provide passage for the flow of water plus anticipated sediment and debris, provide for desired aquatic organism passage, and minimize disturbance to the surface and shallow groundwater resources. Sizing is based on a weighed balance between providing for larger storm events, and cost feasibility, while still meeting other resource objectives.

Construction, reconstruction, and maintenance of a water crossing usually requires heavy equipment to be in and near streams, lakes, and other aquatic habitats to install or remove culverts, fords and bridges and their associated fills, abutments, piles, and cribbing. Such disturbance near the waterbody can increase the potential for accelerated erosion and sedimentation from destabilization of streambanks or shorelines, vegetation and ground cover removal, and soil exposure or compaction. In addition, heavy equipment has potential for contamination of the surface water from vehicle fluids.

Permits may be required for in-stream work associated with stream crossing construction and maintenance projects. There are specific requirements for such projects under the Clean Water Act and implementing regulations. State and local entities may also provide guidance and regulations.

The risk from construction, reconstruction or maintenance of stream crossings can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation:

Enforcement of the techniques is the responsibility of the inspector and contracting officer's representative for public works contracts, the inspector and engineering representative for timber

12.21 Exhibit 08 -- Continued
BMP 2.8 - Stream Crossings

sale roads, and the permit administrator for stream crossings constructed or reconstructed under administrative operations (for example, Road Use Permit, Special Use Permit). If stream crossings are constructed, reconstructed, or maintained by force account crews, the project manager and foreman are responsible for adherence to project drawings, specifications, and Erosion Control Plan. The forest hydrologist works in conjunction with engineering and administrative personnel to provide additional monitoring and evaluation during implementation, as needed.

Location and Design:

1. Locate roads in an interdisciplinary manner with a hydrologist, soils scientist, and geologist if necessary.

2. Plan and locate surface water crossings to limit the number and extent required to service the activity.

3. Design the stream crossing to pass the 100-year flood flow plus associated sediment and debris; armor to withstand design flows and to provide desired passage of fish and other aquatic organisms.

4. Locate and design crossings to minimize disturbance to the waterbody.

5. Use structures appropriate to the site conditions and traffic levels:

   a. Favor bridges, bottomless arches, or buried pipe-arches for those streams with identifiable floodplains and elevated road prisms, instead of pipe culverts.

   b. Place bridge and arch footings below the scour depth for the 100-year flood flow plus the appropriate factor of safety.

   c. Favor armored fords for those streams where vehicle traffic is either seasonal or temporary, or the ford design maintains the channel pattern, profile and dimension.

   d. For perennial streams, use vented fords, so that the crossing can pass low flows.

6. See BMP BMP 2.2: General Guidelines for the Location and Design of Roads, for further guidance.

12.21 Exhibit 08 -- Continued
BMP 2.8 - Stream Crossings

Construction and reconstruction - permanent and temporary crossings:

1. Implement the approved erosion control plan that covers all disturbed areas, including borrow areas, stockpiles, stream diversions, etc. used during stream crossing construction or reconstruction (see BMP 2.13- Erosion Control Plan).

   a. Use temporary filters, berms, barriers, conveyances or other materials to collect sediment and prevent it from entering surface waters.

   b. Set the minimum construction limits needed for the project and confine disturbance to within this area.

2. Accurately establish and preserve vertical control through design invert and outlet elevations on site for each crossing, to assure that the constructed stream-crossing structure will perform as intended, and promote effective drainage without damage or impact to water, aquatic, or riparian resources.

3. Accurately establish and preserve horizontal alignment for each stream-crossing structure, to assure that flows do not erode stream banks or shoreline.

4. Install stream crossings according to project design specifications and drawings. Design should sustain bankfull dimensions of width, depth and slope, and maintain streambed and bank resiliency.

5. Minimize streambank and riparian area excavation during construction:

   a. Stabilize adjacent areas disturbed during construction using surface cover (mulch), retaining structures, and or mechanical stabilization materials.

   b. Keep excavated materials out of channels, floodplains, wetlands, and lakes.

   c. Install silt fences or other sediment- and debris-retention barriers between the water body and construction material stockpiles and wastes.

6. Bypass roads for use during construction are considered temporary roads, and are subject to the all relevant BMPs. Decommissioning and stabilization of the bypass roads are inherent in the project plan.

7. Ensure imported fill materials meet project specifications, and are free of toxins and invasive aquatic or riparian species.

12.21 Exhibit 08 -- Continued
BMP 2.8 - Stream Crossings

8. To the extent possible, conduct operations during the least critical periods for water and aquatic resources: when streams are dry; during low-water conditions; in compliance with spawning and breeding season restrictions.

9. Divert or dewater stream flow for all live streams or standing waterbodies during crossing installation and invasive maintenance:

a. Return clean flows to channel or water body downstream of the activity.

b. Restore flows to their natural stream course as soon as possible after construction or prior to seasonal closures.

c. Install downstream collection basins, retention facilities, or filtering systems as needed to capture and retain turbid water.

d. Remove collected sediment as needed to maintain their design capacity during the life of the project.

10. Construct diversion prevention dips to accommodate overtopping of runoff if diversion potential exists, when shown on project drawings and specifications. Locate diversion prevention dips downslope of the crossing rather than directly over crossing fill; if designed, armor diversion prevention dips based on soil characteristics and potential risk.

11. Install cross drains (for example, rolling dips; waterbars) to hydrologically disconnect the road above the crossing and to dissipate concentrated flows.

12. Remove all project debris from the water body in a manner that will cause the least disturbance.

13. Dispose of unsuitable material in approved waste areas outside of the SMZ.

14. Clean equipment used for instream work prior to entering the water body:

a. Remove external oil, grease, dirt and mud from the equipment and repair leaks prior to arriving at the project site.

b. Inspect all equipment before unloading at site.

c. Inspect equipment daily for leaks or accumulations of grease, and correct identified problems before entering streams or areas that drain directly to waterbodies.

12.21 Exhibit 08 -- Continued
BMP 2.8 - Stream Crossings

d. Remove all dirt and plant parts to ensure that noxious weeds and aquatic invasive species are not brought to the site.

15. Fuel and service equipment used for in-stream or riparian work (including chainsaws and other hand power tools) only in designated areas (see BMP 2.10).

16. Fully suspend logs, pipes, posts and other transported materials when crossing waterbodies and SMZs.

17. Restore the original surface of the streambed, lake bottom, or wetland upon completing the crossing construction or maintenance. Construct the surface of the streambed according to project specifications and drawings for aquatic passage projects. Stockpile materials by strata or as indicated by specified design criteria when extensive dredging or excavation of these substrates is required.

18. Stabilize streambanks, shorelines, cut and fill slopes, turnouts, and other disturbed areas adjacent to the water resource following crossing installation or maintenance:

a. Use riprap or rock, wood, vegetation, and other native materials as appropriate.

b. Install riprap or other slope protection to prevent erosion from water movement.

c. Size rock slope protection for the 100-year flood flow.

d. Use appropriate construction techniques (keying in riprap) and underlayments (filter blankets or other geotextile) to prevent undermining.

e. Ensure stone used for riprap is free of weakly structured rock, soil, organic material, and other material not resistant to erosive water action.

f. Place stable materials below drainage outlets on erodible soils to dissipate energy.

19. Provide effective soil cover (mulch, woody debris, rock, vegetation, blankets) on exposed soil surfaces for both short- and long-term recovery.

20. Revegetate disturbed areas.

21. Stabilize temporary crossings that must remain in place during high-runoff seasons.

22. Remove temporary crossings and restore the waterbody profile and substrate when the need for the crossing no longer exists.

12.21 Exhibit 08 -- Continued
BMP 2.8 - Stream Crossings

Maintenance:

1. Implement the approved erosion control plan that covers all disturbed areas, including borrow areas, stockpiles, stream diversions used during stream-crossing maintenance and culvert cleaning (see BMP 2.13- Erosion Control Plan). Use temporary filters, berms,

2. barriers, conveyances, or other materials to collect sediment and prevent it from entering surface waters.

3. Remove all project debris from the stream or creek in a manner that will cause the least disturbance.

4. Dispose of unsuitable material in approved waste areas outside of the SMZ.

5. Clean equipment used for instream work prior to entering the stream/creek.

   a. Remove external oil, grease, dirt and mud from the equipment, and repair leaks prior to arriving at the project site.

   b. Inspect all equipment before unloading at site.

   c. Inspect equipment daily for leaks or accumulations of grease, and correct identified problems before entering streams or areas that drain directly to waterbodies.

   d. Remove all dirt and plant parts to ensure that noxious weeds and aquatic invasive species are not brought to the site.

6. Fuel and service equipment used for in-stream or riparian work (including chainsaws and other hand power tools) only in designated areas (see BMP 2.10).

7. Maintain and remove buildup of sediment and debris in diversion prevention dips, rolling dips, and waterbars to ensure they are functioning properly, and do not contribute to the hydrological connectivity of the road.

8. Ensure that inside ditches are maintained properly, and are relieved at regular intervals to eliminate hydrological connectivity. See BMP 2.4, Road Maintenance and Operations.

12.21 Exhibit 10
BMP 2.10 - Parking and Staging Areas

Objective: Construct, install, and maintain an appropriate level of drainage and runoff treatment for parking and staging areas to protect water, aquatic, and riparian resources.

Explanation: Designated parking and staging areas on NFS lands may be permanent or temporary and are associated with a variety of uses including administrative buildings, developed recreation sites, trailheads, off-highway vehicle (OHV) areas, and management projects. These parking facilities sometimes constitute large areas with little or no infiltration capacity. Runoff from these areas can create rills or gullies, and carry sediment, nutrients, and other pollutants to nearby surface waters. The risk from parking and staging areas can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation:

1. Design and locate parking and staging areas of appropriate size and configuration to accommodate expected vehicles and prevent damage to adjacent water; aquatic, and riparian resources.

    a. Avoid sensitive areas such as riparian areas, wetlands, meadows, bogs, fens, inner gorges, overly steep slopes, and unstable landforms to the extent practicable.

    b. For staging areas, designate specific locations for fueling so that water-quality impacts are minimized.

2. Consider the number and type of vehicles to determine parking or staging area size.

    a. Calculate the expected runoff generated using the appropriate design storm to determine necessary drainage based on the size of the parking or staging area.

    b. Consider run-on from any contributing areas.

3. Provide signage to designate parking, staging, and refueling areas, and to minimize impacts to sensitive areas.

4. Use permeable pavements where possible, and integrate vegetative islands to trap and filter runoff.

5. Infiltrate as much of the runoff as possible using permeable surfaces and infiltration ditches or basins in areas where groundwater contamination risk is low.

12.21 Exhibit 10 -- Continued
BMP 2.10 - Parking and Staging Areas

6. Pave parking areas that experience heavy use and those that are used during wet periods.

7. Install curbs and gutters to direct and capture surface flow from these paved surfaces.

8. Install and maintain oil and grease separators in larger parking lots with high use and where drainage discharges directly to streams.

9. Plan for necessary clean out and disposal of material collected in these vaults.

10. Connect drainage system to existing stormwater conveyance systems where available and desirable.

11. Conduct maintenance activities commensurate with parking or staging area surfacing and drainage requirements as well as precipitation timing, intensity, and duration.

12. Limit the size and extent of temporary parking or staging areas.

13. Take advantage of existing openings, sites away from waterbodies, and areas that are apt to be more easily restored.

14. Rehabilitate temporary parking or staging areas immediately following use.

15. Effectively prevent access to the area once site restoration activities have been completed.

16. Consider the need to upgrade roads that access parking areas such as OHV parking areas or snow play areas.

Appendix C – 4 BMP Checklist

Example Checklist for Incorporating BMP Guidance identified in Environmental Assessment into Project Implementation Documents, for National BMP AqEco-2 Operations in Aquatic Ecosystems

BMP Method/Practice from USFS Guidance Document	Additional Design Feature from Environmental Assessment	Type of Implementation Document	Additional specifications needed
Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.			
• Identify the aquatic and aquatic-dependent species that live in the waterbody, Aquatic Management Zone (AMZ), or on the floodplain and their life histories to determine protection strategies, such as timing of construction, sediment management, species relocation, and monitoring during construction.		SWPPP	Provide construction schedule, methods for fish barriers, monitoring plan, and specifications for controlling runoff and erosion from the site.
• Coordinate stream channel, shoreline, lake, pond, and wetland activities with appropriate State and Federal agencies.			
Incorporate Clean Water Act (CWA) 404 permit requirements and other Federal, State, and local permits or requirements into the project design and plan.		Permit applications (TRPA, Lahontan, and Army Corp)	Prepare wetland delineation analysis report.
• Use suitable measures to protect the waterbody when preparing the site for construction or maintenance activities.			
Clearly delineate the work zone.		Design Plan	Delineate protect area, and project area fencing, including signage.

Locate access and staging areas near the project site but outside of work area boundaries, AMZs, wetlands, and sensitive soil areas.	Displacement of silt loams and peat soils would be avoided wherever possible by strategic placement of temporary construction access paths, staging areas, and strict construction area limits. In cases where silt loams and peat soils cannot be avoided, additional BMPs (e.g., encapsulated roads or steel plates to distribute the force of the machinery) would be used to reduce compaction	Design Plan	Delineate location of staging areas.
Refuel and service equipment only in designated staging areas (see BMP Road-10 [Equipment Refueling and Servicing]).		SWPPP	
Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity (see BMP Fac-2 [Facility Construction and Stormwater Control]).		SWPPP/ECP	SWPPP will be prepared for work requiring a 401/404 permit. ECP Plan prepared for all other ground disturbing activity.
Prepare for unexpected failures of erosion control measures.		SWPPP	Describe response to erosion control failures, including daily BMP inspection and storm monitoring.
Consider needs for solid waste disposal and worksite sanitation.		SWPPP	Describe methods for solid waste disposal and worksite sanitation>
Consider using small, low ground pressure equipment, and hand labor where practicable.		Incorporate in Contract RFPs, or Force Account Planning	
Ensure all equipment operated in or adjacent to the waterbody is clean of aquatic invasive species, as well as oil and grease, and is well maintained.		SWPPP	
Use vegetable oil or other biodegradable hydraulic oil for heavy equipment hydraulics wherever practicable when operating in or near water.		Incorporate in Contract RFPs, or Force Account Planning	
• Schedule construction or maintenance operations in waterbodies to occur in the least critical periods to avoid or minimize adverse effects to sensitive aquatic and aquatic-			

dependent species that live in or near the waterbody.			
Avoid scheduling instream work during the spawning or migration seasons of resident or migratory fish and other important life history phases of sensitive species that could be affected by the project.		SWPPP	Provide construction schedule.
Avoid scheduling instream work during periods that could be interrupted by high flows.		SWPPP	Provide construction schedule, and identify maximum flow limits during construction.
Consider the growing season and dormant season for vegetation when scheduling activities within or near the waterbody to minimize the period of time that the land would remain exposed, thereby reducing erosion risks and length of time when aesthetics are poor.		SWPPP	Provide construction schedule.
• Use suitable measures to protect the waterbody when clearing the site.			
Clearly delineate the geographic limits of the area to be cleared.		Design Plans	Delineate construction areas.
Use suitable drainage measures to improve the workability of wet sites.		SWPPP	Describe methods for water diversions and water control.
Avoid or minimize unacceptable damage to existing vegetation, especially plants that are stabilizing the bank of the waterbody.		SWPPP, Design Plans	Delineate areas of protected vegetation on design plans.
• Use suitable measures to avoid or minimize impacts to the waterbody when implementing construction and maintenance activities.			
Minimize heavy equipment entry into or crossing water as is practicable.		Design Plans	Delineate and provide specifications for any water crossings, if applicable.
Conduct operations during dry periods.		SWPPP	Describe acceptable soil moisture and flow conditions to meet prior to implementation.
Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures.		SWPPP	Provide construction schedule, including staging site winterization.

Promptly install and appropriately maintain erosion control measures.		SWPPP	Provide Daily BMP monitoring checklist protocol.
Promptly install and appropriately maintain spill prevention and containment measures.		SWPPP	Provide Daily BMP monitoring checklist protocol.
Promptly rehabilitate or stabilize disturbed areas as needed following construction or maintenance activities.	Onsite dust abatement procedures would be implemented on disturbed soil areas and stockpiled soil materials to ensure fine sediments are not transported off site as airborne particles. Abatement procedures could include both watering and physically covering bare soils	SWPPP	Provide construction schedule, including staged winterization. Provide specifications for control of airborne particles.
Stockpile and protect topsoil for reuse in site revegetation.		SWPPP	Perform cut and fill calculations, and provide specifications for utilization of topsoil.
Minimize bank and riparian area excavation during construction to the extent practicable.	Displacement of silt loams and peat soils would be avoided wherever possible by strategic placement of temporary construction access paths and strict construction area limits. In cases where silt loams and peat soils cannot be avoided, additional BMPs (e.g., encapsulated roads or steel plates to distribute the force of the machinery) would be used to reduce compaction	Design Plans/SWPPP	Delineate areas of construction/access on stream banks and riparian areas. SWPPP -provide specifications for equipment access routes.
Keep excavated materials out of the waterbody.		SWPPP	Describe methods for stockpiling and utilizing excavated material.
Use only clean, suitable materials that are free of toxins and invasive species for fill.		SWPPP	
Properly compact fills to avoid or minimize erosion.		Design specification	Provide specifications for fill compaction.

Balance cuts and fills to minimize disposal needs.		SWPPP	Provide cut and fill calculations.
Remove all project debris from the waterbody in a manner that will cause the least disturbance.		SWPPP	
Identify suitable areas offsite or away from waterbodies for disposal sites before beginning operations.		Design Plans/SWPPP	Design Plans- delineate stockpile areas. SWPPP describe and identify disposal sites if needed.
Contour site to disperse runoff, minimize erosion, stabilize slopes, and provide a favorable environment for plant growth.		Design Plans	Delineate contours.
Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.		Design Plans	Describe revegetation specifications.
• Use suitable measures to divert or partition channelized flow around the site or to dewater the site as needed to the extent practicable.			
Remove aquatic organisms from the construction area before dewatering and prevent organisms from returning to the site during construction.		SWPPP	Describe methods for fish removal and fish barriers.
Return clean flows to channel or waterbody downstream of the activity.	Any actions requiring a 401 permit, Basin Plan Prohibition exemption, or a Lake Tahoe National Pollutant Discharge Elimination System construction permit would require the completion of a daily BMP implementation checklist and turbidity monitoring, when conducting work in waterbodies. To minimize potential turbidity impacts related to work within waterbodies, turbidity monitoring would occur before water is released from the work area. Water would not be reintroduced downstream until permit requirements for turbidity are met	SWPPP	Describe methods for dewatering, diversions, and turbidity monitoring.
Restore flows to their natural stream course as soon as practicable after construction or before seasonal closures.		SWPPP	Provide construction schedule.

• Inspect the work site at suitable regular intervals during and after construction or maintenance activities to check on quality of the work and materials and identify need for mid-project corrections.	Review on the ground BMPs prior to a forecasted rain event (using NOAA weather forecast website). Watershed or transportation specialists would review on the ground project BMPs prior to a large forecasted storm event (1 inch in 24 hours rain event, or prolonged periods or rain over a 48 hour period exceeding a total of 2.5 inches) that may exceed BMP capacity and would notify appropriate staff (e.g., contract administrator) if additional BMPs are recommended to disconnect runoff from surface water features	SWPPP	Provide daily BMP monitoring checklist and protocol, as well as storm monitoring protocol.
• Consider short- and long-term maintenance needs and unit capabilities when designing the project.			
Develop a strategy for providing emergency maintenance when needed.		SWPPP	Provide emergency contact and protocol information.
• Include implementation and effectiveness monitoring to evaluate success of the project in meeting design objectives and avoiding or minimizing unacceptable impacts to water quality.		SWPPP	Provide long term effectiveness monitoring plan.
• Consider long-term management of the site and nearby areas to promote project success.			
Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.		SWPPP	Provide post project signage plan.

Appendix D – Electroshocking Guidelines

Enclosure

National Marine Fisheries Service

Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act

June 2000

Purpose and Scope

The purpose of this document is to provide guidelines for the safe use of backpack electrofishing in waters containing salmonids listed by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA). It is expected that these guidelines will help improve electrofishing technique in ways which will reduce fish injury and increase electrofishing efficiency. These guidelines and sampling protocol were developed from NMFS research experience and input from specialists in the electrofishing industry and fishery researchers. This document outlines electrofishing procedures and guidelines that NMFS has determined to be necessary and advisable when working in freshwater systems where threatened or endangered salmon and steelhead may be found. As such, the guidelines provide a basis for reviewing proposed electrofishing activities submitted to NMFS in the context of ESA Section 10 permit applications as well as scientific research activities proposed for coverage under an ESA Section 4(d) rule.

These guidelines specifically address the use of backpack electrofishers for sampling juvenile or adult salmon and steelhead that are *not* in spawning condition. Electrofishing in the vicinity of adult salmonids in spawning condition and electrofishing near redds are not discussed as there is no justifiable basis for permitting these activities except in very limited situations (e.g., collecting brood stock, fish rescue, etc.). The guidelines also address sampling and fish handling protocols typically employed in electrofishing studies. While the guidelines contain many specifics, they are not intended to serve as an electrofishing manual and do not eliminate the need for good judgement in the field.

Finally, it is important to note that researchers wishing to use electrofishing in waters containing listed salmon and steelhead are not necessarily precluded from using techniques or equipment not addressed in these guidelines (e.g., boat electrofishers). However, prior to authorizing the take of listed salmonids under the ESA, NMFS will require substantial proof that such techniques/equipment are clearly necessary for a particular study and that adequate safeguards will be in place to protect threatened or endangered salmonids. Additional information regarding these guidelines or other research issues dealing with salmon and steelhead listed under the ESA can be obtained from NMFS' Protected Resources Divisions in:

Washington, Oregon, and Idaho
Leslie Schaeffer
NMFS
525 NE Oregon Street, Suite 500
Portland, Oregon 97232-2737
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Appropriateness of Electrofishing

Backpack electrofishing for salmonids has been a principal sampling technique for decades, however, recent ESA listings underscore the need to regulate the technique and assess its risks and benefits to listed species (Nielsen 1998). With over 25 Evolutionarily Significant Units (ESUs) of threatened or endangered salmonids now identified along the U.S. West Coast, researchers can expect to encounter one or more listed species in nearly every river basin in California, Oregon, Washington, and Idaho. There are few if any non-invasive ways to collect distribution, abundance, or morpho-physiological data on salmonids in freshwater. This is reflected in the requirement that all activities that involve intentional take of juvenile salmonids for research or enhancement of an ESA listed species require an ESA Section 10 permit from NMFS. While NMFS has not precluded the use of electrofishing in all cases, researchers must present rigorous study designs and methods for handling fish prior to NMFS authorizing electrofishing to take listed salmonids under the ESA.

NMFS believes there is ample evidence that electrofishing can cause serious harm to fish and the general agency position is to encourage researchers to seek out other less invasive ways to sample listed species. Direct observation by snorkeling is one of the least invasive ways to collect information concerning abundance and distribution, although there can be both practical (e.g., poor viability) and statistical (e.g., large numbers of fish, low observation probability) constraints to direct observation. Preliminary efforts should be directed at study designs that use less invasive methods. If such methods cannot provide the quality of data required or when the benefit exceeds potential mortality risk, then electrofishing can be considered. Electrofishing used on a limited basis to calibrate direct observations (e.g., Hankin and Reeves 1988) is commonly used and methods are currently under development that increase the use of direct observation counts (e.g., bounded counts, "multiple snorkel passes") which, in many cases, will further reduce the need for electrofishing.

Electrofishing Guidelines

Training

Field supervisors and crew members must have appropriate training and experience with electrofishing techniques. Training for field supervisors can be acquired from programs such as those offered from the U. S. Fish and Wildlife Service - National Conservation Training Center (*Principles and Techniques of Electrofishing* course) where participants are presented information concerning such topics as electric circuit and field theory, safety training, and fish injury awareness and minimization. A crew leader having at least 100 hours of electrofishing experience in the field using similar equipment must train the crew. The crew leader's experience must be documented and available for confirmation; such documentation may be in the form of a logbook. The training must occur before an inexperienced crew begins any electrofishing and should be conducted in waters that do not contain ESA-listed fish. Field crew training must include the following elements:

1. A review of these guidelines and the equipment manufacturer's recommendations, including basic gear maintenance.
2. Definitions of basic terminology (e.g. galvanotaxis, narcosis, and tetany) and an explanation of how electrofishing attracts fish.
3. A demonstration of the proper use of electrofishing equipment (including an explanation of how gear can injure fish and how to recognize signs of injury) and of the role each crew member

performs.

4. A demonstration of proper fish handling, anesthetization, and resuscitation techniques.
5. A field session where new individuals actually perform each role on the electrofishing crew.

Research Coordination

Research activities should be coordinated with fishery personnel from other agencies/parties to avoid duplication of effort, oversampling small populations, and unnecessary stress on fish. Researchers should actively seek out ways to share data on threatened and endangered species so that fish samples yield as much information as possible to the research community. NMFS believes that the state fishery agencies should play a major role in coordinating salmonid research and encourages researchers to discuss their study plans with these agencies prior to approaching NMFS for an ESA permit.

Initial Site Surveys and Equipment Settings

1. In order to avoid contact with spawning adults or active redds, researchers must conduct a careful visual survey of the area to be sampled before beginning electrofishing.
2. Prior to the start of sampling at a new location, water temperature and conductivity measurements should be taken to evaluate electroshocker settings and adjustments. **No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the electrofishing survey. In addition, studies by NMFS scientists indicate that no electrofishing should occur in California coastal basins when conductivity is above 350 µS/cm.**
3. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.
4. Equipment must be in good working condition and operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a logbook.
5. Each electrofishing session must start with all settings (voltage, pulse width, and pulse rate) set to the **minimums** needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured, and generally not allowed to exceed conductivity-based maxima (Table 1). Only direct current (DC) or pulsed direct current (PDC) should be used.

Table 1. Guidelines for initial and maximum settings for backpack electrofishing.

	Initial settings	Maximum settings	Notes
Voltage	100 V	Conductivity (µS/cm) / Max. Voltage < 100 / 1100 V 100 - 300 / 800 V > 300 / 400 V	In California coastal basins, settings should never exceed 400 volts. Also, no electrofishing should occur in these basins if conductivity is greater than 350 µS/cm.
Pulse width	500 µs	5 ms	
Pulse rate	30 Hz	70 Hz	*In general*, exceeding 40 Hz will injure more fish

Electrofishing Technique

1. Sampling should begin using straight DC. Remember that the power needs to remain on until the fish is netted when using straight DC. If fish capture is unsuccessful with initial low voltage, gradually increase voltage settings with straight DC.
2. If fish capture is not successful with the use of straight DC, then set the electrofisher to lower voltages with PDC. If fish capture is unsuccessful with low voltages, increase pulse width, voltage, and pulse frequency (duration, amplitude, and frequency).
4. Electrofishing should be performed in a manner that minimizes harm to the fish. Stream segments should be sampled systematically, moving the anode continuously in a herringbone pattern (where feasible) through the water. Care should be taken when fishing in areas with high fish concentrations, structure (e.g., wood, undercut banks) and in shallow waters where most backpack electrofishing for juvenile salmonids occurs. Voltage gradients may be high when electrodes are in shallow water where boundary layers (water surface and substrate) tend to intensify the electrical field.
5. Do not electrofish in one location for an extended period (e.g., undercut banks) and regularly check block nets for immobilized fish.
6. Fish should not make contact with the anode. Remember that the zone of potential injury for fish is 0.5 m from the anode.
7. Electrofishing crews should be generally observant of the condition of the fish and change or terminate sampling when experiencing problems with fish recovery time, banding, injury, mortality, or other indications of fish stress.
8. Netters should not allow the fish to remain in the electrical field any longer than necessary by removing stunned fish from the water immediately after netting.

Sample Processing and Recordkeeping

1. Fish should be processed as soon as possible after capture to minimize stress. This may require a larger crew size.
2. All sampling procedures must have a protocol for protecting held fish. Samplers must be aware of the conditions in the containers holding fish; air pumps, water transfers, etc., should be used as necessary to maintain safe conditions. Also, large fish should be kept separate from smaller prey-sized fish to avoid predation during containment.
3. Use of an approved anesthetic can reduce fish stress and is recommended, particularly if additional handling of fish is required (e.g., length and weight measurements, scale samples, fin clips, tagging).
4. Fish should be handled properly (e.g., wetting measuring boards, not overcrowding fish in buckets, etc.).
5. Fish should be observed for general condition and injuries (e.g., increased recovery time, dark bands, apparent spinal injuries). Each fish should be completely revived before releasing at the location of capture. A plan for achieving efficient return to appropriate habitat should be developed before each sampling session. Also, every attempt should be made to process and release ESA-listed specimens first.
8. Pertinent water quality (e.g., conductivity and temperature) and sampling notes (e.g., shocker settings, fish condition/injuries/mortalities) should be recorded in a logbook to improve technique and help train new operators. *It is important to note that records of injuries or mortalities pertain to the entire electrofishing survey, including the fish sample work-up.*

Citations and Other References

Dalbey, S. R., T. E. McMahon, and W. Fredenberg. 1996. Effect of electrofishing pulse shape and electrofishing-induced spinal injury on long-term growth and survival of wild rainbow trout. North American Journal of Fisheries Management 16:560-569.

Hankin, D. G., and G. H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45:834-844.

Hollender, B. A., and R. F. Carline. 1994. Injury to wild brook trout by backpack electrofishing. North American Journal of Fisheries Management 14:643-649.

Nielsen, J. L. 1998. Electrofishing California's endangered fish populations. Fisheries 23:6-12.

Nielsen, L.A., and D.L. Johnson, editors. 1983. Fisheries techniques. American Fisheries Society, Bethesda, Maryland.

Reynolds, J. B., and A. L. Kolz. 1988. Electrofishing injury to large rainbow trout. North American Journal of Fisheries Management 8:516-518.

Sharber, N. G., and S. W. Carothers. 1988. Influence of electrofishing pulse shape on spinal injuries in adult rainbow trout. North American Journal of Fisheries Management 8:117-122.

Sharber, N. G., S. W. Carothers, J.P. Sharber, J. D. deBos, Jr., and D. A. House. 1994. Reducing electrofishing-induced injury of rainbow trout. North American Journal of Fisheries Management 14:340-346.

Schreck, C.B., and P.B. Moyle, editors. 1990. Methods for fish biology. American Fisheries Society, Bethesda, Maryland.