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Ms. Magalie R. Salas
Secretary
Federal Energy Regulatory Commission
888 First Street NE
Room 1A
Washington, DC 20426

Re: COMMENTS, Scoping of Environmental Issues, Comments on PAD, and Study Requests, Tacoma Hydroelectric Project No. 12589-000

Dear Secretary Salas:

This submission is in response to the Commission's issuance on July 21, 2005 requesting comments on Scoping Document 1 and the Pre-Application Document (PAD) filed by Public Service Company of Colorado. It includes the initial study requests being made by the USDA, Forest Service for this proceeding.

Enclosure 1 contains comments by the USDA, Forest Service on Scoping Document 1.

Enclosure 2 includes USDA, Forest Service comments on the PAD.

Enclosure 3 includes 10 study requests. These study requests contain comments and review of the draft issue assessments provided by Devine Tarbell and Associates prior to September 8, 2005.

Please contact Gerrish Willis, Regional Hydropower Coordinator, at 801-236-3469 for any additional information.

Sincerely,

/s/ Rick D. Cables
RICK D. CABLES
Regional Forester

Enclosures

Enclosure 1
USDA Forest Service Comments on Scoping Document 1
Tacoma Hydroelectric Project, P-12589-000

SPECIFIC COMMENTS

Section 4.0, SCOPE OF CUMULATIVE EFFECTS AND ENVIRONMENTAL ISSUES FOR THE TACOMA PROJECT

Page 14, paragraph 5 (4.1.1): Threatened and endangered species and water quality are identified as resources that may be cumulatively affected by the proposed continued operation of the project. Additionally, water quantity should be analyzed for cumulative effects.

Page 18, paragraph 1 (4.2.4): Scoping Document 1 notes the following Recreation and Land Use issue: "What federally administered lands are occupied by the existing Tacoma Project?" This question should be expanded to address all components of the hydroelectric system that occupy National Forest System (NFS) lands, including those that are not located in the project boundary. Any facilities occupying NFS lands, but not included within the FERC project boundary, would need to be permitted under a USDA Forest Service special use authorization. These areas should be analyzed in the applicable study plan requests submitted by the USDA Forest Service (i.e., #7, Project Effects on special status species and habitat; #9, Project effects on wetlands and riparian habitats; and occurrence, distribution, and abundance of amphibians; #10, Historic Properties Management Plan; and #11, Condition of Project Facilities on Cascade Creek) so that the environmental analysis completed by FERC may be used by the Forest Service to support authorization of these facilities. Examples of such facilities include the access road across NFS lands from Electra Lake to Forebay Lake, the road to the Cascade Creek diversion, gates, and the maintenance facility near Cascade Creek.

Enclosure 2
USDA Forest Service Comments on Pre-Application Document
Tacoma Hydroelectric Project, P-12589-000

GENERAL COMMENTS

Overall, the Pre-Application Document (PAD) is a thorough and well-written document that provides good documentation of the existing environment and resource impacts from project operations. Because the company will not issue a second document of this type, our specific comments pertain to factual information that should be corrected prior to submittal of the Preliminary License Proposal and License Application; we have not attempted to provide minor editorial corrections.

All lands managed by the USDA Forest Service are owned by the people of the United States, and should be referred to as "National Forest System lands", not as "Forest Service lands" or "national forest lands" or as "lands owned by the Forest Service".

Several locations in the PAD indicate that the company plans no major changes to existing facilities. This contradicts statements made at resource work group meetings, where representatives from Public Service Company of Colorado and Devine Tarbell and Associates have stated that the licensee intends to replace the wooden flume section of the Cascade Creek conveyance facilities as well as increasing the plant capacity through installation of a new turbine. Please clarify these apparent contradictions when you submit the preliminary licensing proposal and license application.

SPECIFIC COMMENTS

Pages 12-15, figures 3-6. The legend indicates both private land and Forest Service land are on these maps. The Federal lands should be designated as National Forest System lands. Additionally, it is not possible to see the differences in land ownership on any of these maps.

Page 29, paragraph 5 (4.5): The PAD states that the normal maximum and minimum reservoir elevations are 8377 and 8357 feet respectively, a difference of *20 feet*. The PAD states that these elevations correspond to staff gage readings of 32 and 10 feet respectively, a difference of *22 feet*. Please clarify this apparent discrepancy between operating levels.

Page 30, paragraph 2 (4.6): The PAD states that the plant connects to transmission lines owned by La Plata Electric Association which can transport the electricity via its Silverton to Durango 44 kV system. La Plata Electric Association owns the system only to the Cascade substation. From that point to Silverton, Tri State Electric Association is the owner.

Page 35, paragraph 1 (4.10): In resource work group meetings, representatives from Public Service Company of Colorado and Devine Tarbell and Associates have stated that the licensee intends to replace the wooden flume section of the Cascade Creek conveyance facilities. This major change to project works is not identified in the PAD, which only suggests: "In addition, it is likely that substantial repairs may be needed to the wooden flume section of the Cascade Creek conveyance facilities prior to receiving a new license. PSCO would undertake this maintenance under the terms of the current license."

Why is future maintenance of the flume not part of the proposed action? Was an HPMP created in conjunction with the current license that addressed maintenance on the wooden flume in a manner consistent with preserving the historic integrity present in the flume? Does the current license consider the effects of maintenance to this historic property through the Section 106 process? If not, maintenance of the structure under the current license would be out of compliance with the National Historic Preservation Act, potentially resulting in an adverse effect to this historic property. Maintenance of this historic property should be part of the proposed action and addressed in the HPMP that will be generated for the new license.

Page 36, Section 5: Section 5 of the PAD is called "Description of Existing Environment and Resource Impacts". There are excellent descriptions of the existing environment for all resources; however, resource impacts from project operations are either not disclosed or are very brief. For example, the PAD clearly displays flows diverted from Cascade Creek, but does not identify resource impacts associated with the diversion (i.e., water quantity, fish and aquatic resources, and wildlife). All resource impacts that are the effect of project operations need to be disclosed.

Page 38, paragraph 3 (5.1): The PAD states that "the Animas River upstream of the Project is largely inaccessible except near its headwaters near Silverton, Colorado." This statement is not entirely accurate because the upper Animas River is routinely accessed by raft, kayak, and the Durango Silverton Train.

Page 42, paragraph 5 (5.3.1): The PAD provides average monthly flow diversions from Cascade Creek (Table 4, page 43; Figure 17, page 46), indicating that 100% of flows are diverted except when inflow exceeds the capacity of the flume, or about 95% of the time. Diverting all flows from a stream 95% of the time is likely to affect resources. The effects of project operations on water quantity and other resources in Cascade Creek need to be disclosed.

Page 43, paragraph 1 (5.3.1): The PAD states that the project delivers water "into the natural channel of Little Cascade Creek" and provides monthly values for these augmented flows. The PAD does not disclose within this discussion of water quantity that all flows are again diverted at Aspaas Dam, leaving no flow in the lower reaches of Little Cascade Creek year-round. The effects of project operations on water quantity and other resources in the lower reaches of Little Cascade Creek need to be disclosed.

Page 45, paragraph 3 (5.3.1): The PAD states that "the Cascade Creek diversion works allow a continuous release of approximately 1.0 cfs to Cascade Creek" and that "PSCo voluntarily releases, year-round, about 0.5 to 1.0 cfs into Elbert Creek". How are these quantities derived? How is the flow into Elbert Creek released? Is there a device to verify that these flows occur year-round?

Page 95, paragraph 1 (5.8.7): The PAD lists three campgrounds in the vicinity of Lemon Reservoir. Please note that Mill Creek Campground is actually named Miller Creek Campground.

For existing information purposes, please also note that the entire Lemon Reservoir and Vallecito Reservoir areas were burned in the 2001 Missionary Ridge Fire (72,000 acres).

Page 96, paragraph two, bullet number one (5.8.7): The PAD references Old Times Campground. The correct name is Old Timers Campground, which is currently closed because debris flows from the Missionary Ridge fire could potentially affect the safety of campers.

Page 103, paragraph three (5.9.2): The PAD states that access is only available via the Durango to Silverton Narrow Gauge Railroad. There is also a foot trail from Forebay Lake down Sawmill Gulch that currently provides some limited access to hikers. Hikers may also access the area via Canyon Creek. Neither trail is a Forest System Trail, but are user created.

Page 106, paragraph 2 (5.10.1): The PAD states: "currently, there are no plans to replace any of the existing Project structures". As noted in previous comments, representatives from Public Service Company of Colorado and Devine Tarbell and Associates have stated that the licensee intends to replace the wooden flume section of the Cascade Creek conveyance facilities. Please clarify.

Page 118, paragraph 5 (6.4): The PAD states: "there are no ground-disturbing activities currently being proposed". As noted in previous comments, representatives from Public Service Company of Colorado and Devine Tarbell and Associates have stated that the licensee intends to replace the wooden flume section of the Cascade Creek conveyance facilities. Representatives from Public Service Company of Colorado and Devine Tarbell and Associates have also stated that new ground disturbance would be caused by the installation of a penstock between the blind flange of the bifurcation structure and the proposed fourth generating unit. Please clarify.

Enclosure 3
USDA Forest Service Study Requests
Tacoma Hydroelectric Project, P-12589-000

GENERAL COMMENTS

The USDA Forest Service generally supports all issue assessments and proposed studies developed collaboratively in the various Resource Work Groups (RWG) except as noted below, but we have included study requests only for those issues that either directly or indirectly affect National Forest System lands.

We are concerned, however, with the purpose and need for the study entitled "Project Effects on Little Cascade Creek". The original reason that this issue was raised in the RWG was to identify possible geomorphic effects in Little Cascade Creek as a result of the augmented flows from project operations that are considerably higher than natural flows in Little Cascade Creek. The purpose of this study has evolved to focus more on biological objectives such as salmonid spawning habitat, which is already described as "excellent" in the project effects section of the issue assessment. The study proposal also identifies that if flows to Little Cascade Creek were to change significantly, aquatic resources could be impacted. The study as proposed primarily provides a qualitative description of current habitat conditions in Little Cascade Creek, but the study does not propose to quantify the potential impacts of changes in flows. To quantify the flow-habitat relationship, the study would need to evaluate a range of instream flows and commensurate fish habitat that may result from potential changes in project operations. If this study were to be implemented, the scope of the study should be expanded to include all reaches of Little Cascade Creek potentially affected by project operations, including the stream below Aspaas Dam. The USDA Forest Service recommends that all limitations of this qualitative study be identified. In addition, we ask that the study plan specifically discuss how the qualitative results of this study would be used in this relicensing.

Multiple references have been made in several of the issue assessments regarding potential effects to Little Cascade Creek, if instream flows were prescribed for Cascade Creek. These references are present in the Water RWG Issue Assessment #2 (USDA FS Study Request No. 1), Terrestrial RWG Issue Assessment #3 (USDA FS Study Request No. 6), and in Water RWG Issue Assessment No. 10, the aforementioned qualitative assessment of Little Cascade Creek. As mentioned above, if the intent is to compare gains and losses in habitat from operational changes, it is critical to evaluate aquatic habitat in a like manner for the two studies. Because of this, we are now endorsing the need to expand the Cascade Creek study scope to include Little Cascade Creek. To address this need, we have included suggested edits to the initial instream flow issue assessment for Cascade Creek. Please see our Study Request No. 1 below.

We have previously provided edits and suggestions for the draft issue assessments that were available prior to September 8, 2005; these were sent directly to Devine Tarbell and Associates. These edits are also provided in bold italics below within each issue assessment. We have also added specific management direction from the San Juan National Forest Land and Resource Management Plan (LRMP) for each study request to add more detail to the sections on resource

management goals. In some cases, we have also suggested that some issue assessments be combined into a single study to increase efficiency.

Study requests are required to meet seven specific criteria established by the Federal Energy Regulatory Commission (CFR 18 §5.9). The criteria include: goals and objectives, resource management goals, relevant public interest, existing information and need for additional information, nexus between project operations and effects, a study methodology consistent with accepted practices, and estimated level of effort and cost. The issue assessments generally address these seven criteria as written, although sometimes not explicitly. Devine Tarbell plans to include specific references for how each criterion is addressed within each study request when Public Service Company of Colorado submits the Tacoma study plan in November 2005. One criterion that is not explicitly addressed within each issue assessment is project nexus, but this has been established for each issue via a collaborative effort within each RWG; the specific issues and their relevance to the project are displayed in Table 21 of the Tacoma Pre-Application Document (pp. 119-121).

Tacoma Project Study Request No. 1

Title of Proposed Study: Instream Flows below Cascade Creek Diversion Dam

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of project effects on instream flows below Cascade Creek diversion dam. This study should include evaluation of Tacoma Water Resource Work Group (RWG) Issue Assessment #2. This issue assessment was developed in collaboration with the members of the RWG. The RWG received the first draft of this study by e-mail from Devine Tarbell and Associates on September 8, 2005, which allowed for a very limited review of the study proposal. Based on the description of the issue and project effects within the issue assessment below, it is clearly identified that Little Cascade Creek could be affected by changes in project operations, including potential instream flows in Cascade Creek. If the intention of studies on Cascade Creek and Little Cascade Creek is to provide comparative gains and losses in potential habitat resulting from changes in project operations, the methodology used for the studies must be consistent. Therefore, consistent with our comments above regarding the current proposed study on Little Cascade Creek, we are recommending that this instream flow study also include appropriate reaches of Little Cascade Creek, with methodology to be developed through consultation with the RWG. We have provided some general criteria to be addressed in study design immediately below. We have also provided suggested edits and specific applicable Forest Plan direction in italics within the issue assessment draft below.

Criteria for Instream Flow Study Design

- Decision criteria must be identified and agreed upon by the RWG early during the study design phase.
- Study design must include quantification of existing and potential habitat in order to show compliance with LRMP standards.
- Study design must include quantification of other criteria in addition to the LRMP standard, if desired by the RWG.
- If spawning habitat quantification is desired, the study needs to be designed for that purpose.
- Selection of reach and transect locations is critical. Interested members of the RWG should be involved in this process.
- The consultant chosen by PSCo to complete the study should meet with the RWG early in the design process so all stakeholders understand the scope of the analysis.

WATER RESOURCE WORK GROUP
Draft Issue Assessment No. 2
Instream Flows Below Cascade Creek Diversion Dam

1.0 Description of Issue

Flows from Cascade Creek are diverted by Public Service Company of Colorado (PSCo) at its Cascade Creek diversion dam for delivery to Electra Lake via Little Cascade Creek. The Cascade Creek diversion dam is located approximately 0.8 miles upstream of where U.S.

Highway 550 crosses Cascade Creek. The top-of-spillway elevation at the diversion dam is approximately 8,900 feet. Currently, PSCo diverts Cascade Creek flows up to the capacity of the wooden flume which carries the diverted water downstream from the diversion dam. Cascade Creek continues for about 6 miles downstream of the diversion dam to the Animas River. Lime Creek enters Cascade Creek about three miles downstream of the diversion dam.

The Project's diversion of the flow of Cascade Creek ***results in ongoing effects [Delete: has created an existing condition related]*** to fisheries, macroinvertebrates, water quality, and riparian vegetation communities downstream of the diversion dam. If the diversion amount is changed, there is likely to be an effect on the existing conditions in Cascade Creek and Little Cascade Creek.

The amount, location, and seasonal variability of flow accretions below the diversion dam are currently unknown. Sources of increased flows may include springs, seeps, deep groundwater, treated effluent, and tributary inflows.

2.0 Project Effects

The operation of the Tacoma Hydro Project affects the flow characteristics and flow regime in Cascade Creek below the Cascade Creek diversion dam and in Little Cascade Creek from the discharge point of the flowline to Aspaas Lake. The Project operations, which have been occurring for 100 years, have resulted in establishing the existing conditions in Cascade Creek downstream of the Project diversion dam. The current habitats and aquatic populations reflect this existing flow regime. The Project also affects Little Cascade Creek by its increased flow regimes and now established riparian zones. In general, PSCo exercises its senior water right (400 cfs) to divert the entire flow of Cascade Creek up to the current capacity of the existing wood flume (~250 cfs). The diversion dam and diversion works are not water tight and a small, unknown amount of leakage occurs below the diversion dam at flows below the capacity of the flume. When Cascade Creek flows exceed the flume capacity, water is spilled at the diversion dam. The diversion dam is approximately 10 feet high and has no usable storage capacity. During periods of flow less than 250 cfs, plant operations divert all flows into the flume ***(approximately 95% of the time),*** except for leakage.

The Cascade Creek channel, from the diversion structure to Purgatory Flats, a total distance of 3.9 miles, is not dewatered. Leakage at the diversion dam combined with accretions from groundwater and tributary sources provide stream channel flows estimated during late summer to early fall (2004) field visits to be 2 to 4 cfs in the channel at the U.S. Highway 550 bridge (about 1 mile below the diversion point). Below U.S. Highway 550, channel flows begin a gradual increase as they proceed downstream until nearing Purgatory Flats where significant tributary inflow resulted in a flow of roughly 25 cfs. Approximately two-thirds of this flow was attributable to Lime Creek (which flows into the Cascade Creek near the upper end of Purgatory Flats). The other one-third (8 to10 cfs) was the result of accretions into Cascade Creek.

The area of interest on Little Cascade Creek extends from the Cascade Flowline Gauging Station, located at the end of the flowline near the south boundary of the Durango Mountain Resort, downstream through Columbine Lake to the point where the diverted flow enters Aspaas

Lake (near the upper end of Electra Lake), a total distance of 2.5 miles. Flows within Little Cascade Creek are essentially entirely made up of diversion flows from Cascade Creek. The drainage area of Little Cascade Creek at Aspaas Lake is approximately 2.7 mi^2. Altering the amount of diverted flow at Cascade Creek diversion dam to increase flows in Cascade Creek would remove an equal amount of flow from Little Cascade Creek.

The current status of the aquatic resources in Cascade Creek and Little Cascade Creek is largely unknown. Cascade Creek***, below Highway 550,*** is primarily confined to a steep gradient canyon below the diversion dam and is a pool and drop environment with numerous boulders. The pools generally are bordered by steep canyon walls with little change in lateral extent with increasing flows. Cascade Creek is characterized by high velocities during times of moderate to high flow.

Little Cascade Creek is also steep, dropping roughly 450 feet in its 2.5 miles traversed from the outlet of the flowline to Aspaas Lake. Much of this occurs at a series of cascades located roughly 1 mile upstream of Aspaas Lake.

It is known that at least a portion of the lower part of Little Cascade Creek (just above Aspaas Lake) provides excellent spawning habitat for the trout species of Electra Lake, especially the fall-spawning brook trout.

Data on the aquatic resources of Cascade Creek prior to Project construction does not exist. Current conditions in Cascade Creek are also affected by discharges from the Cascade Wastewater Treatment Plant (Cascade WWTP). Direct observation of algae growth on rocks (Wanner 2004) in Cascade Creek has been reported. Cascade WWTP effluent discharge is limited by the current flow regime in Cascade Creek.

The opportunity to enhance aquatic resources in Cascade Creek by reducing the flows into Little Cascade Creek will require PSCo to conduct an assessment of modified flow regimes on Cascade Creek. Naturally occurring low winter flows may be a significant factor in any such evaluation as these often drop to 1 to 2 cfs upstream of the Cascade Creek diversion dam. ***[Comment: How were these estimates made? How often do low flows of 1-2 cfs occur? This needs to be validated.]***

3.0 Relevant Existing Information

Existing instream flow information is very limited for Cascade Creek. Diverted flows are estimated at the diversion dam through use of a staff gage and at the flowline gauging station. It is unknown what amounts of accretion flows enter Cascade Creek below the diversion. CDOW has done occasional random sampling of the fishery in Cascade Creek watershed during the last 30+ years (CDOW 1976, CDOW 1991, CDOW 1992, CDOW 2004). These surveys include Cascade Creek, Lime Creek and Mill Creek. Results indicated good numbers of brook trout (*Salvelinus fontinalis*) existed at sites sampled in all three creeks while low numbers of rainbow trout (*Oncorhynchus mykiss*) and cutthroat trout (*Oncorhynchus clarki*) were occasionally recorded.

The drainage area of Cascade Creek at the Cascade Creek diversion dam is about 26.2 mi^2. The drainage area of Cascade Creek at U.S. Highway 550 is about 28 mi^2 and the drainage area of Mill Creek, which enters Cascade Creek about 3,000 feet below U.S. Highway 550, is 7.0 mi^2. At Purgatory Flats, the drainage area of Cascade Creek is 36.9 mi^2 and the drainage area of Lime Creek is 42.1 mi^2.

4.0 Need for Additional Information

Additional information concerning flow regimes in Cascade Creek ***and Little Cascade Creek*** is needed to determine to what extent Project operations may be affecting aquatic habitats in Cascade Creek ***and Little Cascade Creek***. A flow regime assessment will provide an increased understanding of the impact (both biologically and economically) of providing additional flows to Cascade Creek between the diversion dam and U.S. Highway 550, and downstream of U.S. Highway 550.

5.1 Final Study Plan
5.2 Purpose of Study and Use of Study Results

The purpose of the study will be to evaluate how changes in streamflow may affect aquatic habitat for target species (resident rainbow trout, brook trout, ***cutthroat trout,*** and sculpin species) in specific sections of Cascade Creek. The study will examine the amount of physical habitat for resident fishes available over a range of flows from the diversion dam downstream to U.S. Highway 550. Additionally, general habitat characteristics will be documented in an approximate 1 mile stream section encompassing upper Purgatory Flats immediately above Lime Creek to the first major unnamed tributary on the right bank ascending.

The Physical Habitat Simulation Model (PHABSIM) is an integral part of the US Fish and Wildlife Service's (USFWS) Instream Flow Incremental Methodology (IFIM) process (Bovee 1986). PHABSIM will be used to describe the relationship between physical aquatic habitat (based on velocity, depth, and substrate/cover) and streamflow. The streamflow evaluation will provide information to participants in the relicensing process which, in combination with the water quality study (Tacoma Water RWG Issue No. 3 Study Plan – Potential for Degradation of Water Quality of Electra Lake), the Little Cascade Creek inventory (Tacoma Water RWG Issue No. 10 Study Plan – Project Effects on Little Cascade Creek), and other resource and economic studies, will provide a basis for streamflow-related resource management decisions on the section of Cascade Creek below the Project diversion dam.

5.3 Relevant Resource Management Goals

Cascade Creek is located on public lands managed by the U.S. Forest Service in the San Juan National Forest. Current forest management plans primarily emphasize timber harvest and fuels reduction. Recent plan amendments have increased their emphasis on protecting riparian and aquatic habitats and the species that depend upon these habitats through maintenance, improvement and enhancement. Specific LRMP direction includes:

Forest-Wide Direction

Wildlife and Fish Resource Management (03). Maintain habitat for viable populations of all existing vertebrate wildlife species.

a. Habitat for each species on the forest will be maintained at least at 40 percent or more of potential.

Wildlife and Fish Resource Management (05). Manage waters capable of supporting self-sustaining trout populations to provide for those populations.

Riparian Area Management (02). Design and implement activities in management areas to protect and manage the riparian ecosystem.

Water Uses Management (01). Determine and obtain rights to instream flow volumes to protect and maintain stream channel stability and capacity and to accomplish any proposed increase in use or resource activity.

Water Uses Management (03). Special use Permits, easements, rights-of-way, and similar authorizations for use of NFS lands shall contain conditions and stipulations to maintain instream or bypass flows necessary to fulfill all National Forest uses and purposes.

Water Resource Improvement and Maintenance (01). Maintain instream flows and protect public property and resources.

Management-Area Direction/Riparian Area Management (9A)

Wildlife Habitat Improvement and Maintenance (04). Manage riparian areas identified as essential habitat for indicator species by retaining suitable habitats.

b. Cutthroat, Rainbow, Brown, and Brook Trout. Implement structural and non-structural improvements to maintain or improve fisheries habitat in aquatic ecosystems. In streams and rivers, develop habitat that will provide protective cover for trout during low water and escape and feeding cover during periods of low flow.

Wildlife Habitat Improvement and Maintenance (07). Maintain instream flows in cooperation with state wildlife agencies to support a sustained yield of natural fisheries resources.

The USFWS also has resource management plans that may be considered relevant to this resource. The San Juan River Recovery Implementation Plan, while primarily dealing with two endangered fish outside of the Project area, does pertain to drainages, including the Animas River, that are tributary to the San Juan River. The primary goals of this plan are the protection and enhancement of habitats and flows determined to be critical to various life history stages of the two endangered fish species.

5.3 Relevant Public Interest Considerations

Cascade Creek is important to the general public for dispersed recreational activities (fishing, hiking, hunting, winter sports) and aesthetics. It is also important to providing the primary water supply to Little Cascade Creek and Electra Lake. Electra Lake is an important waterbody for associated recreational, aesthetic and economic benefits to the area.

5.4 Study Methodology – PHABSIM (1-D)

PHABSIM 1-D is a one-dimensional computational tool composed of a suite of programs used in an IFIM analysis. PHABSIM consists of three components: (1) channel structure; (2) hydraulic simulation; and (3) aquatic habitat suitability criteria. Channel structure includes all fixed-channel features that generally do not change with discharge. These include channel cross-sectional geometry, substrate composition and distribution, and structural cover. Hydraulic variables are those that change with discharge, such as water surface elevations, depth, velocities, wetted perimeter, and channel surface area. Habitat suitability criteria are numeric representations of preferred depths, velocities, substrate, and cover for the various life stages of the aquatic species of interest (Bovee et al. 1998). ***[Comment: This citation is not included in the reference list and should be added.]*** The hydraulic modeling component predicts the values of hydraulic variables at discharges that were not measured. The aquatic habitat suitability criteria, commonly referred to as HSC or HSI (habitat suitability index) curves, contain information on tolerances--or preferences--of aquatic organisms with respect to the hydraulic and structural characteristics of the stream. They most often consist of depth, velocity, and substrate/cover preferences.

5.4.1 Study Area

The instream flow study area covers the reach of Cascade Creek from the diversion dam downstream to U.S. Highway 550; and a second area in upper Purgatory Flats extending from Lime Creek to the Boyce Lake stream. The scope of study for each reach is described more fully in Section 5.4.5 below.

5.4.2 Study Reaches

[Comment: Bovee et al. (1998) provide specific protocols for determination of the study area, including delineation of stream segments, sub-segments, study sites, and cross sections. For example, stream segments are typified by a geographically homogenous flow regime, with discharges relatively equal at the top and bottom of the segment, and by consistent overall channel geomorphology (slope, sinuosity, channel pattern and structure, geology, and land use). Segment boundaries are typically inserted wherever the base flow changes by 10% or more as a result of tributary or ground-water accretion (Bovee et al., page 36). All of these protocols should be followed and decisions about reach breaks should be made in the field. An additional useful reference that summarizes the procedure for segmenting the study area and selecting individual study sites was provided by Waddle (Waddle, T.J., ed., 2001, PHABSIM for Windows: User's Manual and Exercises: Fore Collins, CO, U.S. Geological Survey, 288 p.).]

A study reach is defined as a sub-section of the overall Project study area. For the purposes of this study, a reach is a segment of river where slope, hydrology, sinuosity (i.e., channel meandering), and channel type, width to depth ratio, and substrate are relatively homogenous throughout its defined length. Stratification of the overall study area into reaches permits a more precise treatment of flow characteristics and the resultant effects on aquatic habitat.

For the Tacoma Project study area, PSCo proposes to develop PHABSIM models for one reach, which consists of the Cascade Creek channel from the diversion dam downstream to U.S. Highway 550, an approximate distance of 4,000 feet. An additional reach, approximately 4,200 feet long, will be mapped identifying general habitat types and their characteristics. This reach is located on Cascade Creek from immediately above its confluence with Lime Creek to the first major tributary (above the Boyce Lake drainage) entering from the right bank ascending. This area includes upper Purgatory Flats which has different channel characteristics and slope gradients than the reach above U.S. Highway 550. In addition, this lower reach has an additional unregulated drainage area of about 14 mi^2.

The upper reach of Cascade Creek is a high gradient stream channel (>2%) with an average width of less than 20 feet. The substrate is mostly composed of larger sized cobbles and boulders. The habitat types are also primarily boulder runs***, [Delete: and]*** boulder cascades***, and plunge pools [Delete: with a limited number of pools]***. The reach in upper Purgatory Flats is a moderate gradient (1.5%) stream channel with an average width of approximately 23 feet. The substrate is well graded with a combination of gravels, cobbles, boulders and bedrock. There is also a diverse mixture of habitat types including riffles, runs, glides, pools and cascades.

5.4.3 Habitat Typing and Mapping

In the PHABSIM methodology, habitat typing is used to characterize and categorize the types of habitats (e.g., pools, runs, and riffles) in a given river reach. Habitat mapping quantifies the amount and distribution of each habitat type. Results of habitat mapping are used in PHABSIM to select and weight each transect where hydraulic data are collected in proportion to the occurrence of that habitat type in the study reach. In November 2004 and July 2005, an on-foot video was made of the study area for Cascade Creek. This video, along with field notes taken during the video site visits, will be used to determine habitat typing. The video will also be used to perform a frequency analysis of habitat types to determine habitat weighting. Finally, the video will be used for identifying potential areas for transect locations.

5.4.4 Transects

Within the study reach, transects are selected that represent important biological features for up to three target aquatic species to be studied (i.e., resident rainbow trout, ***cutthroat trout,*** brook trout, and sculpin). A transect is a designated line across the river channel (from river bank to river bank), generally perpendicular to the direction of flow, where instream flow variables are measured (depth, velocity, and substrate/cover). It is usually marked with a steel headpin and tailpin on each respective bank to sight the transect line across the river.

Transects will be placed after coordination and consultation with the Tacoma Water Resource Work Group (RWG). However, PSCo proposes to place transects at cross-sections that represent habitat types that are significant biologically and are the most sensitive to changes in flow. An example of this type of transect would be a riffle that is important to resident fish species biologically and also exhibits significant changes in depth, velocity, and wetted perimeter as stream flow changes. In Cascade Creek, the availability of over wintering habitat may be most critical***, therefore, pool habitat must also be sampled***.

5.4.5 Field Data Collection Methods

5.4.5.1 ***Cascade Creek:*** U.S. Highway 550 upstream to Diversion Dam

For the PHABSIM study in the upper reach, PSCo proposes to collect field data at three different flows that will allow PHABSIM to simulate the desired range of flows. The general rule of thumb is that flows can be reliably simulated up to 2.5 times the high calibration flow and 0.4 times the low calibration flow. ***[Comment: This rule of thumb is unsubstantiated by any technical or scientific basis, and should not be used to extend the PHABSIM model outside the desired range of flow releases provided below.]***

The proposed releases for field data collection are 2, 5, and 12 cfs. ***Additionally, two other flow conditions should be evaluated; a baseline condition to provide existing habitat under current project operations, and a "natural" condition that reflects the average annual flow in the Cascade Creek watershed at the diversion location.*** This will provide a simulation range from 0.8 cfs to approximately 30 cfs. Physical habitat and hydraulic parameters will be measured using a combination of standard techniques of the USFWS' IFIM methodology (Trihey and Wegner 1981; Bovee 1982; Bovee et al. 1998), the USGS (Rantz 1982), and techniques established in consultation with the agencies.

Streamflows during calibration measurements will be regulated by PSCo during the study to achieve specific target flow levels within the study reach. Flows will be held as steady as possible while measurements are made at a particular reach. The proposed strategy is to complete the PHABSIM field data collection in early summer on the descending arm of the high flow season to provide the greatest flexibility of flow deliveries below the diversion dam.

5.4.5.2 ***Cascade Creek:*** Upper Purgatory Flats Area

PSCo proposes to map substrate, cover, and other habitat characteristics in this reach and quantify habitat types within the stream channel. Habitat characteristics that will be measured for each habitat type include: length, average width, maximum depth, and dominant/subdominant substrate. Flow measurements will only be made during the actual evaluation of habitats and will not be used for modeling purposes.

5.4.5.3 Little Cascade Creek

Little Cascade Creek methodology is to be developed through consultation with the RWG; see sections 5.4.5.1 and 5.4.5.2 for examples.

5.4.6 Surveying and Controls

PSCo will use standard differential surveying techniques while conducting the PHABSIM evaluation for the upper reach (above U.S. Highway 550). A total station instrument or a survey auto-level will be used to measure headpin and tailpin elevations, water surface elevations (WSE), hydraulic controls (i.e., point of channel bed flow control at zero flow conditions), above-water bed and bank elevations, and distances along transects. Where practicable, all vertical measurements will be tied together. Except when surveying the bed profile, vertical measurements will be accurate to the nearest 0.02 feet.

Channel Structure

- **Cross Sectional Profile** - Channel cross-sectional profiles between each headpin and tailpin will be obtained at all transects. Bed elevations above water will be determined by using standard survey techniques. Bed elevations below the water surface will be obtained by subtracting the measured depths taken during the velocity calibration from the water surface elevations for that particular transect.
- **Hydraulic Controls** - Elevation of hydraulic controls within the study site will be obtained by standard survey techniques.

Hydraulics

The PHABSIM hydraulic model requires at least three water surface elevation/discharge (WSE/Q) pairs for the stage/discharge regression equation. Bovee et al (1998) advises that the hydraulic caliberation data should include at least three WSE/Q pairs and one set of calibration velocities.

WSE/Discharge - WSE/Q measurements will be obtained at three discharges. Water surface elevations at each transect will be obtained using standard survey techniques. The number and placement of WSE points will be dependent on water depth. In a simple channel where the water is too deep to stand anywhere but along the edge only, two points will be measured — one on each shoreline. WSE will be measured on all shorelines in a split channel. Whenever it is possible to stand in the channel, additional measurements will be taken; the number and placement of measurements will be dictated by the variation in water surface elevations across each transect.

Discharge through the study site will be measured using a calibrated digital, Swoffer® brand, propeller-type velocity meter mounted on a standard top-set USGS wading rod. Note that only one discharge estimate (i.e., the "best" estimate) is required per reach.

Calibration Velocities - In addition to the WSE/Q calibration, one calibration velocity set will be collected at each transect. Velocity measurements will be taken manually using a calibrated digital, Swoffer® brand, propeller-type velocity meter mounted on a standard top-set USGS wading rod. Manually measured velocities will be taken at six-tenths of the depth when depths are less than 2.5 feet, at two-tenths and eight-tenths of the depth when depths equal or exceed 2.5 feet, and when the expected velocity profile is altered by an obstruction immediately upstream.

These rules for placement of verticals (measured velocities) along each transect will be closely followed. If there is uncertainty about whether a vertical is warranted, the vertical will usually be placed at that point. In addition to stationing, notes will be taken regarding top set rod placement relative to upstream obstructions and substrate that may affect the velocity column.

Temporary staff gage levels and the time of day will be recorded at the beginning and end of each transect measurement to note potential changes in stage. In-situ continuous recording water level-loggers may also be installed at some or all the study sites to monitor changes in stage during the calibration measurements.

Substrate and Cover

Substrate and cover will be measured visually and/or by tactile inspection at wadeable depths. Substrates in deeper water or with no to poor visibility will be measured by feeling substrate coarseness through a metal rod. Classification will be in accordance with the proposed coding system shown below in Tables 5-1 and 5-2. Some modifications may be made to the proposed substrate and cover coding system once the Habitat Suitability Curves (described in Section 5.4.6) are agreed to by the Tacoma Water Resource Work Group. Note that proximal cover is a cover object not at a vertical, but within 4.0 feet in any direction.

TABLE 5-1
PROPOSED SUBSTRATE SIZE CLASSIFICATION AND CODES

Code	Abbreviation	Description	Inches
0	ORG	Organic Detritus	N/A
1	SI	Silt, Clay	<0.1
2	SA	Sand	<0.1
3	SGR	Small Gravel	0.1-0.5
4	MGR	Medium Gravel	0.5-1.5
5	LGR	Large Gravel	1.5-3.0
6	SCOB	Small Cobble	3.0-6.0
7	LCOB	Large Cobble	6.0-12.0
8	SBOL	Small Boulder	12.0-36.0
9	LBOL	Large Boulder	>36.0
10	SBR	Smooth Bedrock	N/A
11	IBR	Irregular Bedrock	N/A

TABLE 5-2
PROPOSED COVER TYPE CLASSIFICATION AND CODES

Overhead Cover			Proximal Cover	
Code	**Abbreviation**	**Description**	**Abbreviation**	**Code**
0.0	NC	No Cover	N/A	
0.1	UCB	Undercut Bank	PUCB	0.14
0.2	OHV	Overhanging Vegetation Touching Water	POHV	0.24
0.3	ROOT	Root Wad (greatest width 1.5 feet)	PROOT	0.34
		(dropped)		
0.5	SNAG	Snags, stream wood	PSNAG	0.54
0.6	WEED	Submerged Aquatic Vegetation	PWEED	0.64
0.7	DEB	Fine Organic Substrate	PDEB	0.74
0.8	TV	Terrestrial Grass and Bushes	N/A	
0.9	ISC	Instream Cover	PISC	0.94

5.4.6 Weighted Usable Area

Weighted Useable Area (WUA) is defined as "…the sum of stream surface area within a study site, weighted by multiplying area by habitat suitability variables (most often velocity, depth, and substrate or cover) which range from 0.0 to 1.0 each, normalized to square units (either feet or meters) per 1,000 linear units." (Payne 2003 http://www.fort.usgs.gov/conferences/ifimconf/Presentations.asp). It does not translate to actual area of suitable habitat but indicates the relative suitability of the available habitat.

Habitat suitability criteria (HSC) and habitat suitability index (HSI) curves are terms that are often used interchangeably for the habitat variables used to calculate WUA. PSCo will compile existing HSC data, in collaboration with the resource agencies, to create a database of ***suitability*** curves that can be reviewed for applicability to the Project. PSCo anticipates that criteria will be needed for yearling fry, juvenile and ***[Delete: spawning] adult*** rainbow trout, ***cutthroat trout***, brook trout and possibly sculpin species. The database of curves will be reviewed in consultation with the agencies, and screening criteria applied (if necessary) to minimize the number of curves for further consideration.

Following a review and discussion of applicable HSC curves, existing curves may be selected and/or modified for use on the Project. Given the large number of rainbow and brook trout curves available, PSCo does not anticipate the need for establishing site-specific curves.

5.4.7 Hydrology Analysis

Monthly flow duration curves will be developed for the upper reach at designated flow nodes. Identification of hydrologic nodes is necessary because river flow increases downstream as tributary and seepage inflow is added with increased river basin drainage area. The hydrologic nodes will be developed at the drainage area midpoints in the upper reach, unless unique aspects of this reach warrant a different location.

Using monthly flow duration curves in combination with the WUA curves will provide useful information on how much additional instream habitat is gained, or lost, by increasing flows from Project operations.

5.5 Schedule and Level of Effort

PSCo proposes to conduct habitat mapping and/or frequency analysis during 2006. Also, identification of the fish species and life-stages to be analyzed, along with the Habitat Suitability Criteria curves for those species and life-stages, will be finalized in early 2006 in coordination and consultation with the resource agencies. Transects will be established by early summer 2006, flow conditions permitting. Once the transects are established, hydraulic data and cross-sectional data will be collected. High flow calibration data will also be collected during the early summer 2006 runoff period followed by collection of the low- calibration flow measurements by the fall of 2006. Habitat characterizations for the lower reach will be done during this same time frame.

Data analysis, PHABSIM modeling, and report preparation will begin in fall 2006 after data collection is complete.

5.7 Discussion of Alternative Approaches

5.8 Data Analysis and Reporting

PHABSIM modeling, results analysis, and report preparation will begin in fall 2006 after field data collection is complete.

PHABSIM Modeling

Once field data collection is completed, the data will either be downloaded or manually entered into Excel spreadsheets – one for each transect and for each calibration flow. Each of these spreadsheets will undergo a QA/QC process whereby an independent reviewer will compare all of the field notes to the Excel spreadsheets to check for accuracy. Where questions arise, the originator and reviewer will consult with the person that collected the field data to clarify and or correct the field data.

Once the QA/QC process is completed, the spreadsheets will be turned over to the lead modeler for conversion of the Excel spreadsheets into the input format that the PHABSIM model uses.

The next step is calibration of the PHABSIM model using the hydraulic data from the calibration flows. During calibration, a Calibration Report is generated that lists all assumptions made and/or changes that were made in order to calibrate the model to match the data collected in the field. A very conservative approach is taken in that changes are not made unless they are thoroughly justified. The Calibration Report will be made available to the resource agencies for their review.

After the PHABSIM model is calibrated, the Habitat Suitability Criteria (HSC) and life-stage periodicity information is input to the model in order to generate Weighted Usable Area (WUA).

For this study, generation of WUA information is the end result of the PHABSIM modeling effort.

Results Analysis
In order to put the WUA generated from the PHABSIM model into context, PSCo proposes to generate monthly flow duration curves for the study reach. The monthly flow duration curves will be used to determine amounts of physical habitat predicted from PHABSIM flow simulations. Because this instream flow study is focused on lower flow months, it is expected that the majority of the analysis will be focused on the late-summer, fall, and winter months. These months are considered to be critical for trout spawning and over wintering.

Report Preparation
Reporting requirements (initial and updated study reports and meetings) will be conducted within the timeframes set forth in 18 CFR § 5.15. Progress reports will be provided to the RWG Relicensing Participants semi-annually. At the conclusion of the study, a report will be produced containing a description of the methodology, documentation of assumptions and model calibrations, modeling results including Weighted Usable Areas, and the relationship to existing hydrology in the form of monthly flow duration curves.

5.9 Level of Effort and Study Cost

The preliminary level of effort to conduct the field studies and reporting under this study plan will be approximately twenty-two person weeks.

6.0 References

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Bain, M. B., and N. J. Stevenson, editors. 1999. Aquatic habitat assessment: common methods. American Fisheries Society, Bethesda, Maryland.

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Payne, T.R. 1992. Stratified random selection process for the placement of Physical Habitat Simulation (PHABSIM) transects. Paper presented at AFS Western Division Meeting, July 13-16, in Fort Collins, CO.

Rosgen, D. L. 1996. Applied river morphology. Wildland Hydrology. Pagosa Springs, CO.

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Tacoma Project Study Request No. 2

Title of Proposed Study: Evaluation and mapping of ownership within project boundary

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes evaluation and mapping of ownership within the project boundary. This study should include evaluation of Tacoma Water Resource Work Group (RWG) Issue Assessment #5. We have included the most recent draft of this assessment as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. We have no suggested changes, edits, or additions.

WATER RESOURCE WORK GROUP
Draft Issue Assessment No. 5
What Federal and State Lands are Occupied by the Project?

1.0 Description of Issue

The Water Resource Work Group (RWG) requested a description of any federally administered and state-owned lands within the Tacoma Project Boundary. The Federal Energy Regulatory Commission (FERC) license sets out a specific boundary for the Project in its original license authorizing the construction and operation of the project facilities. Parts of the Tacoma Project occupy National Forest system lands managed by the U.S. Forest Service (USFS).

2.0 Project Effects

Public Service Company of Colorado (PSCo) intends to identify, delineate, and quantify the amount of federally administered lands occupied by the Tacoma Project. There are no state-owned lands within the Project Boundary.

3.0 Relevant Existing Information

Information currently available from both PSCo and U.S. Forest Service maps may not be up to date related to the actual amount of public lands administered by the U.S. Forest Service that are occupied by the Tacoma Project.

Available databases include PSCo's Exhibit G mapping and USFS' GIS mapping for the San Juan National Forest. Recent federal land swamps immediately adjacent to the Project may have altered the amount and location of federal lands occupied by the Project, especially along the right-of-way.

4.0 Need for Additional Information

It is necessary to have an accurate accounting of the amount and location of federal lands that are occupied by the Project. FERC-licensed projects that occupy federal lands are subject to federal land charges and certain conditioning authorities under the Federal Power Act (FPA).

5.0 Final Study Plan

The sections below provide a description of the work to be performed to acquire the information needed to adequately address the issues raised under the Water RWG Issue Assessment No. 5.

5.4 Purpose of Study and Use of Study Results

The purpose of the work to be undertaken to address this issue is to accurately define the amount of federal land occupied by the Tacoma Project and the location of these lands. This information will be used to determine payments owned to the federal government for use of the lands occupied by the Project, and the proper limits on the mandatory conditioning authority granted to the federal land administering authority (USFS in this case) under the FPA.

5.2 Relevant Resource Management Goals

Lands within the San Juan National Forest are managed under the founding statutes and the current and relevant USFS management plan, including in this case the Amended Land and Resource Management Plan, San Juan National Forest.

5.3 Relevant Public Interest Considerations

The issue of accurately defining the amount and location of federal lands within the Project Boundary is largely an issue of federal interest for the purpose of “rent” payments and authorities under the FPA.

5.4 Study Methodology

PSCo has commissioned a new land survey of the Project Boundary which will also include searches of the most recent files in the county land offices for land ownership. The survey will be done in accordance with standard metes and bounds methods for land surveys for determination of land boundaries and tract ownership. PSCo will share its findings with the USFS for their review and comparison with USFS’ records.

5.5 Schedule

The aerial photogrammetry and supporting ground survey of the Project have been completed. Mapping of the Project Boundary and determination of land ownership within the Project Boundary is underway and expected to be ready for review by the USFS by the end of 2005.

5.6 Duration and Level of Effort

The duration of the work will likely extend up to the submittal of the Final License Application in order to accurately record any land ownership changes up to that point.

5.7 Discussion of Alternative Approaches

No alternate approaches have been proposed by others at this time.

5.8 Data Analysis and Reporting

The study will result in the production of new Exhibit G maps to relevant FERC specifications. The maps will delineate the location and acreage of federal land ownership within the Project Boundary.

6.0 References

United States Forest Service. Amended San Juan National Forest Land and Resource Management Plan, Rocky Mountain Region. 1992.

Tacoma Project Study Request No. 3

Title of Proposed Study: Project effects on the water quantity and quality of the Animas River

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of project effects on the water quantity and quality of the Animas River. This study should include evaluation of Tacoma Water Resource Work Group (RWG) Issue Assessments #7 and #13, which were combined. We have included the most recent draft of this assessment as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

WATER RESOURCE WORK GROUP
Draft Issue Assessment No. 7[1]
Project Effects on the Water Quantity and Quality of the Animas River

1.0 Description of Issue

An issue was raised related to how Tacoma plant operations might potentially be affecting the water quantity and quality in the Animas River downstream of the confluence of Cascade Creek and the Animas River, and downstream of the Tacoma powerhouse. Of particular mention were the potential effects on organics, metals, nutrient loadings, and dilution. The uncertainty as to the potential for such water quality effects was more the issue than that there was knowledge or evidence of actual effects on water quality.

2.0 Project Effects

The Tacoma project diverts flows from Cascade Creek into Little Cascade Creek, and thence into Electra Lake. The Project operations do not add measurable levels of metals, organics, or nutrients to the Animas River. However, because of the timing of the transfer of water from Cascade Creek to Electra Lake and then from Electra Lake to the Animas River, the potential exists for a change in dilution related to these water quality parameters in the Animas River downstream of Cascade Creek. Therefore, the Project effects associated with this issue would primarily be related to the timing of the flow into and out of Electra Lake, and thereby is primarily a question of water quantity. There is no evidence or indication that the Project is directly affecting water quality in the Animas River, other than the potential to do so due to the change in timing of water quantity. Accordingly, Public Service Company of Colorado (PSCo) intends to undertake a study of the hydrologic effects of the Cascade Creek diversions on flows into and in the Animas River.

3.0 Relevant Existing Information

[1] Original Issue No. 8.

To address the primary question of the affect of the Tacoma Project on the flows in the Animas River, PSCo will rely heavily on flow records maintained by the Colorado State Engineers' Office and by streamflow gauge records recorded and maintained by the U.S. Geological Survey.

Relevant hydrologic records include data from the following sources:

- USGS gauge number 09361500: Animas River at Durango, Colorado
- USGS gauge number 09359500: Animas River above Tacoma (discontinued)
- Colorado Division of Water Resources Annual Water Diversion Reports: Elbert Creek
- Colorado Division of Water Resources Annual Water Diversion Reports: Cascade Creek
- PSCo Discharge Records from the Tacoma Powerhouse and PSCo's Electra Lake Reservoir Elevations

Other relevant information includes the size of the various drainage areas relevant to this issue. These are shown in Figure 14 of PSCo's Pre-Application Document (PAD) and is repeated here in Attachment A.

4.0 Need for Additional Information

To understand the nature of the seasonal change in flow distribution in the Animas River due to the Tacoma Project, a substantial amount of additional information will be necessary. This information will be developed by hydrologic analysis. No additional data collection will be required.

5.0 Final Study Plan

The sections below provide a description of the work to be performed to acquire the information needed to adequately address the issues raised under the Water RWG Issue Assessment No. 7.

5.1 Purpose of Study and Use of Study Results

The purpose of this study plan is to develop a quantitative understanding of the effects of the operations of the Tacoma Project on flows in the Animas River, and by association, potential effects on water quality in the Animas River on parameters potentially affected by dilution (metals concentration, nutrient concentration, organics).

The study results will be used to demonstrate the change in the hydrologic flow regime of the Animas River as a result of Project operations. This will improve informed decision-making related to the effects of any potential future change in Project operations on Animas River flow, and by extension, Animas River water quality.

5.2 Relevant Resource Management Goals

Jurisdiction over the water quality in the Animas River rests with the Colorado Water Quality Control Commission. Jurisdiction over the allocation of the use of water in Colorado lies with

the Colorado Water Conservation Board which administers water rights in the state. The water resource management goals of these agencies are established by state statute.

Other relevant water resource management goals for those lands and waters located within the boundaries of federal lands managed by the USFS are contained in the appropriate Forest Plan, in this case the 1992 Amended Land and Resource Management Plan of the San Juan National Forest. ***Specific direction includes:***

Forest-Wide Direction

> ***Riparian Area Management (02). Design and implement activities in management areas to protect and manage the riparian ecosystem.***

5.3 Relevant Public Interest Considerations

Other parties with an interest in this issue include various public, NGO, and private entities, including the City of Durango, the San Juan Citizen's Alliance (SJCA) and numerous private water users (Durango Mountain Resort and Tamarron Resort).

Water quantity and quality in the Animas River has been a topic of interest and some research in the past. Primary water quality concerns historically had centered on metals loadings due to historical and current mining operations.

5.4 Study Methodology

The study approach to establish the effects of Project operations on flows and, by extension, water quality in the Animas River will be quantitative in nature, primarily focused on developing an understanding of historical flows at various points in the Animas River and the magnitude of the Project's effects on these flows.

5.4.1 Qualitative Overview of Project Operations

Qualitatively, a reasonable assessment of effects can be described by a basic understanding of how the Tacoma Project operates. The Project's main reservoir, Electra Lake, fills during periods of high runoff (late April through early July). This indicates that the Project operation results in a reduction in flows when the Animas River is at its peak seasonal runoff. Electra Lake levels are normally kept fairly constant through the July through October recreation season, indicating that inflows are roughly equal to outflow over a daily to multi-day time frame during this period.

From November to March, Electra Lake is drawn down, meaning that Project operations result in an increase in flows when the Animas River is at its lower flow period. The daily distribution of this delivery is affected by Project peaking operations.

5.4.2 Approach to Quantitative Assessment

The sequence of the hydrologic analysis to be undertaken is outlined below. This may be adjusted as the analysis proceeds to refine the approach based on findings that are made as the work proceeds.

Step 1: Compile and Evaluate Existing Data Sources
This step will confirm the availability, reliability, and accuracy of the various data sources.

Step 2: Select Target Locations for Analysis
On a preliminary basis, the target locations on the Animas River appropriate to this issue are (1) above Cascade Creek; (2) below Cascade Creek; (3) above Tacoma powerhouse; (4) below Tacoma powerhouse; and (5) at Durango.

Step 3: Select an Appropriate Period of Record for Analysis
By evaluating the available sources of data, and relevant changes in the watershed that have occurred over time, a period of record for the analysis will be selected.

Step 4: Develop Hydrologic Relationships
By using statistical techniques, develop relationships as necessary between gauge records to enable the development of hydrologic data suitable to the target locations identified in Step 2.

Step 5: Develop Hydrographs of Runoff in the Animas River to Assess Project Effects on Animas River Flows
Using the relationships developed in Step 4, develop synthetic hydrographs for the target locations of Step 2 for the time period identified in Step 3. Evaluate these differences and their likely effect on the dilution capability of the Animas River at the various target locations.

5.5 Schedule

The study will extend from February 2006 to September 2006, at which time a report of the findings will be issued.

5.6 Duration and Level of Effort

The duration of the study is provided in Section 5.5 above. It is estimated that the study will require about 12 person-weeks of effort including report writing.

5.7 Discussion of Alternative Approaches

No alternative approaches have been proposed by others at this time.

6.0 References

Public Service Company of Colorado. Pre-Application Document Tacoma Project. May 2005.

Tacoma Project Study Request No. 4

Title of Proposed Study: Project effects on riparian habitat and fish habitat in the Animas River

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of project effects on riparian habitat and fish habitat in the Animas River. This study should include evaluation of Tacoma Water Resource Work Group (RWG) Issue Assessment #8. We have included the most recent draft of this assessment as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

WATER RESOURCE WORK GROUP
Draft Issue Assessment No. 8[2]
Project's Effects on Riparian Habitat and Fish Habitat in the Animas River

1.0 Description of Issue

It was noted that the general consensus was that the cold-water fishery in the Animas River in the vicinity of the Tacoma Project had improved considerably in recent years due, at least in part, to the improvement of water quality (reduced metal concentrations). A question was raised concerning whether plant operations might be affecting Animas River channel characteristics (channel morphology) and fish habitat. It was questioned whether the withdrawal of water at Cascade Creek, its temporary storage, and its re-discharge into the Animas River in a peaking mode was possibly affecting the quantity and quality of habitat in the Animas River.

2.0 Project Effects

The Tacoma project tailrace is located approximately 4.5 miles downstream of the mouth of Cascade Creek. The diversion of flows by the Project affects the flow regime in the Animas River. These effects are expected to be minor as the drainage area of the Animas River below Cascade Creek is approximately 340 square miles, and the drainage area above the Cascade Creek diversion dam is 25 square miles, or about 7% of the total. Therefore, the effect of the diversion on Cascade Creek on flows in the Animas River (which relates directly to riparian habitat and fish habitat) would be expected to be minor.

Below the Tacoma powerhouse, Project effects are primarily related to the amount and timing of peaking releases relative to river flows at the time of powerhouse operation. Public Service Company of Colorado (PSCo) will examine the likely effects of Tacoma peaking flows on the Animas River by reviewing actual discharge records from the powerhouse and the Animas River.

[2] Original Issue No. 9

3.0 Relevant Existing Information

Information relevant to this issue will be the results of the studies to be completed as part of Water RWG Issue Assessment No. 7 and PSCo's records of Tacoma powerhouse discharges.

4.0 Need for Additional Information

In addition to hydrographs developed in the study associated with Water RWG Issue Assessment No. 7, it will be necessary to develop a representative seasonally-adjusted daily operation schedule for the Tacoma plant.

The specific concern raised in this issue was the affect of peaking operations on Animas River flows; and thereby, effects on riparian habitat and fish habitat. Therefore, representative peaking operations would be overlayed on to Animas River flows that occur above the Tacoma plant.

The Tacoma plant does not operate in a peaking fashion during the reservoir fill period of April through June. Peaking operations normally commence sometime in July and extend through September, then reoccur during the winter months December through March.

5.0 Final Study Plan

The sections below provide a description of the work to be performed to acquire the information needed to adequately address the issues raised under the Water RWG Issue Assessment No. 8.

5.1 Purpose of Study and Use of Study Results

The purpose of this study is to determine the potential for Project peaking operations to impact riparian habitat and/or fish habitat in the Animas River below the Tacoma powerhouse. The study will assist in making informed decisions about the degree of environmental impact, if any, resulting from Project peaking operations.

5.2 Relevant Resource Management Goals

Jurisdiction over the water quality in the Animas River rests with the Colorado Water Quality Control Commission. Jurisdiction over the allocation of the use of water in Colorado lies with the Colorado Water Conservation Board which administers water rights in the state. The water resource management goals of these agencies are established by state statute.

Other relevant water resource management goals for those lands and waters located within the boundaries of federal lands managed by the USFS are contained in the appropriate Forest Plan, in this case the 1992 Amended Land and Resource Management Plan of the San Juan National Forest. ***Specific direction includes:***

Forest-Wide Direction

Wildlife and Fish Resource Management (03). Maintain habitat for viable populations of all existing vertebrate wildlife species.

c. Habitat for each species on the forest will be maintained at least at 40 percent or more of potential.

Wildlife and Fish Resource Management (05). Manage waters capable of supporting self-sustaining trout populations to provide for those populations.

Riparian Area Management (02). Design and implement activities in management areas to protect and manage the riparian ecosystem.

Management-Area Direction/Riparian Area Management (9A)

Wildlife Habitat Improvement and Maintenance (04). Manage riparian areas identified as essential habitat for indicator species by retaining suitable habitats.

d. Cutthroat, Rainbow, Brown, and Brook Trout. Implement structural and non-structural improvements to maintain or improve fisheries habitat in aquatic ecosystems. In streams and rivers, develop habitat that will provide protective cover for trout during low water and escape and feeding cover during periods of low flow.

5.3 Relevant Public Interest Considerations

Other parties with an interest in this issue include various public, NGOs and private entities, including the City of Durango, the San Juan Citizen's Alliance (SJCA) and numerous private water users (Durango Mountain Resort and Tamarron Resort).

5.4 Study Methodology

The approach to this study will be to determine, as an essential first step, the nature, degree, and magnitude of changes in Animas River flows over a normal daily period due to Tacoma peaking operations. Potential impacts to riparian habitat and fish habitat are presumed to be closely related to the changes in flow in the Animas River from above to below the Tacoma powerhouse. The Animas River below Tacoma is a steep-gradient stream confined in a well-defined, narrow channel. The sequence and scope of the work are outlined below.

Step 1: <u>Develop representative peaking schedules for Project operations</u>
PSCo will develop, based on a review of recent operating records, seasonally-based representative peaking schedules for the flow through the Tacoma powerhouse on an hourly basis for a typical day.

Step 2: <u>Develop typical flows on a monthly basis for the Animas River above Tacoma</u>

This data will be derived from the analysis conducted as part of the Water RWG Issue Assessment No. 7. Typical wet, dry, and normal year flows for each month of the year that peaking occurs will be developed.

Step 3: Apply Peaking Schedule to Monthly Flows
This step will consist of overlaying the results of Step 1 and Step 2 to develop an understanding of the potential changes to flow that occur as a result of Project operations.

Step 4: Identify Representative Transects of the Animas River below the Tacoma Powerhouse and Record Actual Changes in Stage as a Result of Peaking
This step will consist of recording actual changes in river stage at representative river transects downstream of the Tacoma powerhouse. These will be recorded by a water-level logger at pre-selected transects.

Step 5: Assess Likely Changes in Flow and Stage Due to Peaking Operations
By combining the results of Step 3 and Step 4, a reasoned assessment of the potential degree of impact can be identified.

Step 6: Prepare Summary Report
A study report will be prepared describing the methodology, data, analyses, and findings of the study.

5.5 Schedule

This study will commence about April 1, 2006 and be complete in December 2006.

5.6 Duration and Level of Effort

The duration of the study is 8 months and the level of effort is estimated to be 10 person-weeks.

5.7 Discussion of Alternative Approaches

No alternative approaches have been proposed by others at this time.

5.8 Data Analysis and Reporting

The analysis is summarized in Section 5.4 above. The report will be completed in December, 2006.

6.0 References

Public Service Company of Colorado. Pre-Application Document Tacoma Project. May 2005.

Tacoma Project Study Request No. 5

Title of Proposed Study: Fuels Management Coordination

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of fuels management coordination. This study should include evaluation of Tacoma Terrestrial Resource Work Group (RWG) Issue Assessment #1. We have included the most recent draft of this assessment as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

TERRESTRIAL RESOURCE WORK GROUP
Draft Issue Assessment No. 1
Fuels Management

1.0 Description of Issue

Fuels management in the vicinity of the Tacoma Project has been identified as an issue. In many parts of southwestern Colorado, years of fire suppression in disturbance-dependent forests have resulted in high fuel loads that can increase the frequency and intensity of wildfire. In response, the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and other land management agencies have coordinated their efforts under the auspices of the National Fire Plan to fund fire management at the wildland-urban interface, reduce fuel loads through forest management (which could include prescribed fire or mechanical treatments), and conduct other associated activities (Robison and Wilson 2003). There is a need to conduct fuels reduction activities within the Project Boundary. These activities need to be coordinated with local projects such as the Electra Sporting Club Fuels Reduction Project and the United States Forest Service Electra Lake Fuels Reduction Project (ELFRP), with the overall goal of enhancing the ecological integrity of forest resources and protection of existing and future residences, project facilities and structures. Fuels reduction topics addressed during the Tacoma relicensing will be led by the Recreation Land Use & Aesthetics Resource Work Group, working in consultation with the Terrestrial Resource Work Group (RWG).

2.0 Project Effects

The Tacoma Project is located within and adjacent to public lands administered by the USFS. The USFS is undertaking a program of fuels management in the immediate vicinity of the Project. It is recognized that high fuel loads are the result of ecological processes and forest management decisions unrelated to Project operations. However, land management activities within the Project Boundary could substantially affect the overall success of forest management activities on adjacent lands, as well as potentially impact Project facilities and structures and other beneficial uses of the Project area. As a result, a study of the need for a fuels reduction program within the Project Boundary is warranted.

3.0 Relevant Existing Information

General information regarding fuels management needs and goals in Colorado is widely available (e.g., Robison and Wilson 2003). In addition, the USFS Columbine Ranger District and San Juan Public Lands Center has prepared documentation for the Electra Lake Fuels Reduction Project (ELFRP), which would thin or mow approximately 890 acres of USFS managed lands near Electra and Haviland Lakes. The preliminary list of issues addressed by USFS related to the proposed ELFRP includes (1) access to U.S. Route 550, (2) impacts to recreational use and visual corridors, and (3) the introduction and spread of noxious weeds (Ellis 2004). The USFS' ELFRP has been approved for implementation.

4.0 Need for Additional Information

Assessment of fuels loading has not been performed within the Project Boundary. Such an assessment is warranted given the proximity of public lands requiring fuels management. In addition, coordination between the USFS, the Electra Sporting Club (ESC), and PSCo is needed to meet resource management goals on federal lands managed by the USFS adjacent to the Project.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The goals of this effort are (1) to solicit the participation and advice of USFS and Colorado State Forest Service experts in assessing lands within the Project Boundary from a fuels management perspective, and (2) to coordinate with appropriate USFS personnel to ensure that the USFS and ESC have access to lands proposed for their fuels management activities.

5.2 Relevant Resource Management Goals

Fuels management in the Tacoma Project area is affected by numerous plans and resource management goals. As described by the US Bureau of Land Management (2004), ***[Please provide the reference for this citation; is this a document published jointly by the BLM and the USDA Forest Service?]*** these include the following:

Federal Land Policy and Management Act (FLPMA) of 1976
The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.: 90 Stat. 2743; P.L. 94-579) directs that public lands be managed in a manner that will provide food and habitat for fish and wildlife.

Healthy Forests Restoration Act of 2003
This federal statute is intended to improve the capacity of the Secretary of Agriculture and the Secretary of the Interior to conduct fuels reduction projects on lands managed by the National Forest System and Bureau of Land Management aimed at protecting communities, watersheds, and certain other at-risk lands from catastrophic wildfire, to enhance efforts to protect watersheds and

address threats to forest and rangeland health from hazards including catastrophic wildfire.

National Fire Plan of 2000 The Secretary of Agriculture and Secretary of the Interior, through the National Fire Plan, have directed offices to reduce fuels in order to help reduce the risk of large catastrophic fire. Additionally, BLM has been directed to manage fire and resources together to protect people, natural resources and property, and to restore forest, wildlife and rangeland health.

Also relevant to this study are the management goals described in the current forest management plan for the San Juan National Forest, including the Amended Land and Resource Management Plan. Specific direction includes:

Forest-Wide Direction

Fuel Treatment (01). Maintain fuel conditions which permit fire suppression forces to meet fire protection objectives for the area.

a. Reduce or otherwise treat all fuels so the potential fireline intensity of an area will not exceed 400 BTU/sec/ft on 90% of the days during the regular fire season, or break up continuous fuel concentrations exceeding the above standard into manageable units with fuel breaks or fire lanes, or provide additional protection for areas exceeding the above standard when such protection will not be required for more than five years.

Vegetation Treated by Burning (01). Use prescribed fire to accomplish resource management objectives, such as reducing fuel load buildup, wildlife habitat improvement, etc.

Vegetation Treated by Burning (02). Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values.

Management-Area Direction/Rural and Roaded-Natural Recreation (2B)

Fuel Treatment (01). Maintain fuel conditions which permit fire suppression forces to meet fire protection objectives for the area.

a. Reduce or otherwise treat all fuels on areas where wildfires are likely to threaten lives or property so the potential fireline intensity of an area will not exceed 100 BTU's/sec/ft (Burning Index 38) on 90% of the days during the regular fire season, or break up continuous fuel concentrations exceeding the above standards into manageable units with fuel breaks or fire lanes.

5.3 Public Interest Considerations

The Terrestrial RWG, which is comprised of public agencies, private entities, and other interested parties, has identified this issue as being of substantial public interest, affecting resources such as timber and wildlife. Fuels reduction may be warranted within the Project Boundary, and coordination between existing fuels reduction programs is needed.

5.4 Study Methodology

PSCo will undertake a review of its lands for the purpose of assessing the need for and the cost of implementing fuels reduction. PSCo will seek the active involvement of experts within the USFS and the Colorado State Forest Service experienced with fuels management issues and field indicators of fuels loading. The study area includes lands in the Project Boundary adjacent to Electra Lake and along access roads used primarily for Project purposes. Field investigations will be conducted during which these agency experts, PSCo staff, and other knowledgeable parties will tour lands within the Project Boundary. For each major land parcel or habitat type within the Project Boundary, the field team will describe current conditions and make recommendations for potential fuels management projects. Each recommendation will include a justification/statement of need, as well as a prioritization relative to other lands within the Project Boundary. PSCo will evaluate the cost of implementing any recommended fuels reduction efforts including the cost of environmental impact assessment, before adopting any specific Fuels Reduction Treatment Plan.

The USFS' Electra Lake Fuels Reduction Project is recognized as an important resource goal for the USFS in the Project vicinity. PSCo expects to provide coordination and cooperation (e.g., access to Tacoma Project access roads) as needed by the USFS to implement the ELFRP.

5.5 Schedule

The study will be conducted during the summer of 2006. A draft report will be issued no later than six months after field efforts are completed.

5.6 Level of Effort

Initial field investigations with agency personnel are estimated to require approximately 60 hours of effort. The level of additional effort required for this study will be determined after reviewing field findings and any specific recommendations of agency experts.

5.7 Discussion of Alternative Approaches

There have been no alternative approaches proposed at this time.

5.8 Data Analysis and Reporting

Reporting for this study will be descriptive; no quantitative analyses are proposed. Tabular and text summaries of study results will be prepared for lands within the Project Boundary in the Electra Lake area. Findings from this study, including any implementation plan, will be integrated into the Final License Application for the Tacoma Project. Environmental surveys associated with any Fuels Reduction Treatment Plan to be proposed in the license application will be conducted prior to the submittal of the Final License Application.

6.0 References

Ellis, P. 2004. Letter dated August 5, 2004 describing public scoping for the Electra Lake Fuels Reduction Project. US Forest Service Columbine Ranger District and San Juan Public Lands Center, Bayfield Colorado.

Robison, L, and P. Wilson. 2003. Making southwest Colorado a safer place to live. Pages 1-2 *in:* Wilson, P (editor). Fire and fuels in southwest Colorado. Online document: http://www.southwestcoloradofires.org/default.asp. Accessed December 2004.

Tacoma Project Study Request No. 6

Title of Proposed Study: Project effects on special-status species and habitat

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of project effects on special-status species and habitat. This study should include evaluation of Tacoma Terrestrial Resource Work Group (RWG) Issue Assessment #3. We would also suggest that Issue Assessment #5 (Migratory Bird Treaty Act) be included within this effort We have included a new suggested paragraph within Issue Assessment #3 below to address the Migratory Bird Treaty Act. We believe that one study can be developed to address both issue assessments. Our suggested edits are provided in italics within the issue assessment below.

TERRESTRIAL RESOURCES WORK GROUP
Draft Issue Assessment No. 3
Special-Status Species and Habitats

1.0 Description of Issue

The occurrence and distribution of special-status species and habitats in the immediate vicinity of the Tacoma Project has been identified as a potential issue. Categories defined as "special-status" include ESA-listed (endangered, threatened, and candidate) taxa, USFS/BLM sensitive and management indicator species (MIS), ***migratory birds,*** and all categories currently tracked by the Colorado Division of Wildlife (CDOW) or the Colorado Natural Heritage Program (CNHP), including plants, birds, mammals, fish, invertebrates, and natural communities ***[Comment: Is it necessary to address the CNHP for all species and communities or is this primarily related to plants?].***

The Terrestrial Resources Work Group (Terrestrial RWG) issue related to special-status species includes the potential adverse affects associated with future ground-disturbing Project activities and the uncertainty of the species existence in the Project area. Although the USFS has indicated it will use FERC's NEPA review as the basis for its assessment of the Tacoma Project, analyses of special-status species and habitats should be consistent with USFS, NEPA, and NFMA processes and standards. USFS indicates that general inventories of management indicator species may be ***needed [delete: necessary]*** to fulfill the requirements of ***NFMA [delete: NEPA]***. The standard for determining the need for on-the-ground studies consist of (1) defining the proposed action and (2) evaluating the potential for impact, and (3) tailoring any studies to the scope of potential impacts.

An Executive Order titled responsibilities of federal agencies to protect migratory birds was enacted in 2001 (EO 13186). This Executive Order (http://ceq.eh.doe.gov/nepa/regs/eos/eo13186.html) highlights the important role of cooperation and communication among federal agencies in implementing bird conservation activities. The order requires federal agencies to consider the effect of land management planning and project implementation on migratory birds, particularly those species for which

there may be conservation concern. Executive Order 13186 requires federal agencies to "support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions." Agencies are to "restore and enhance the habitat of migratory birds, as practicable" and to "evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern." This direction is to be implemented "to the extent permitted by law and subject to the availability of appropriations and within administration budgetary limits, and in harmony with agency missions."

2.0 Project Effects

Public Service Company of Colorado (PSCo) is not proposing any changes in Project operations that are expected to result in ground-disturbing activities. There is currently no indication or documentation of adverse affects to terrestrial special status species and habitats as a result of existing Project operations. Therefore, there is no reasonable basis for attributing to the Project impacts to terrestrial special status species and habitats within the Project Boundary or associated with Project operations. ***[Comment: This statement is speculative. It is unknown whether the Project is affecting terrestrial special-status species and/or habitats, thus justifying the need for the study.]***

Potential Project effects on special-status species and habitats, however, could be associated with changes to instream flow levels below the Cascade Creek diversion, changes to the normal operations of Electra Lake, or management of flowline/penstocks and other terrestrial areas of the Project resulting from relicensing. ***[Comment: This statement is speculative. It is unknown whether changes in Project operations would affect special-status species and/or habitats, thus justifying the need for the study.]*** The scope of any potential effects would be expected to be in proportion to the reliance of the individual species on a given habitat and the degree to which such habitats would change.

Previous studies of the Project's relationship to, or impacts upon, special-status species or habitats do not exist; nor is there any evidence of the effect of the Project on such species or habitats. However, it is understood that portions of the Project (e.g. Electra Lake, Little Cascade Creek) include areas of relatively unique habitats that may be expected to support sensitive species. In addition, PSCo intends to identify occurrences of special status species that are potentially affected by any new ground disturbing activities associated with the Project (e.g., vegetation management or fuels management efforts). The evaluation of potential Project effects on fish will be covered in the Water RWG. ***The evaluation of potential Project effects on amphibians will be covered in the Terrestrial RWG, Issue Assessment No. 2.***

3.0 Relevant Existing Information

Numerous special-status species potentially occur in the Project area; however, most of the Project area has not been surveyed ***specifically*** for special-status species and few occurrences have been documented. Bald eagle is the only federally threatened or endangered species documented to occur at the Project, with intermittent breeding records at Electra Lake since

1974. Other special-status animal species documented in the Project vicinity are northern leopard frog (*Rana pipiens*) (***USFS sensitive species and*** Colorado species of concern), peregrine falcon (*Falco peregrinus*) (USFS sensitive species and Colorado species of concern)), and American three-toed woodpecker (*Picoides tridactylus*) (USFS sensitive species) (Japhet 1997, CNHP 2005). Grace's warbler (Dendroica graciae), a species tracked by CNHP but not accorded special status by any of the agencies, has also been reported for the Project vicinity (CNHP 2005). ***[Comment: This species is protected by the Migratory Bird Treaty Act.]***

No federally listed endangered or threatened plant species are known to occur in the Project vicinity, and occurrence is unlikely (USFWS 2005). However, numerous plant taxa categorized as sensitive by USFS and/or BLM, or tracked by CNHP potentially occur. CNHP (2005) records indicate the documented occurrence of six of these species within or near the Project area at about the same elevation: American spikenard (*Aralia racemosa*), Canadian single-spike sedge (*Carex scirpoidea*), green sedge (*Carex viridula*), American yellow lady's-slipper (*Cypripedium calceolus* spp. *parviflorum*), variegated scouring rush (*Hippochaete* [*Equisetum*] *variegata*), and New Mexico cliff fern (*Woodsia neomexicana*).

One of the goals of managing National Forest System Lands is to provide for healthy ecosystems capable of sustaining viable populations of all native and desired non-native wildlife species, consistent with the overall multiple-use objectives stated in each National Forest's Land and Resource Management Plan (Forest Plan) (36 CFR 291.27-Planning, Management Requirements). It would not be practical to simultaneously evaluate the status of all native and desired non-native species that occur on a National Forest administrative unit as well as monitoring their trends over time. Therefore, a smaller subset of species is selected to represent larger groups of species which have similar habitat needs or similar population characteristics, and whose populations can be monitored. This subset is collectively referred to as Management Indicator Species (MIS). MIS are species whose population changes are believed to indicate the effects of management activities on other species of selected major biological communities, or on water quality, and whose population changes are believed to indicate the effects of management activities on wildlife populations as a whole (36 CFR 219.19(a)(1)).

[Please delete this sentence: Designation of MIS is intended by USFS to help guide forest assessment and planning. MIS are described as those "whose response to land management activities can be used to predict the likely response of species with similar habitat requirements."] The San Juan National Forest (SJNF) MIS list includes some uncommon species found on other special-status species lists. However, most of the species are common and are not tracked by occurrence by the agencies or CNHP.

4.0 Need for Additional Information

Additional site-specific information is necessary to evaluate the effects of vegetation management on special status species and communities. In the event that any new ground-disturbing activities are proposed (e.g., fuels management or new recreational developments), additional information to evaluate the effects of those activities may also be required when existing site-specific information on the condition of habitats and the occurrence of special-status

species is lacking or out-of-date. Evaluations of proposed ground-disturbing activities would address habitat suitability for special-status species, the scope of the proposed activity, and the degree to which special-status species rely on habitats affected by the proposed activity. The need for additional site-specific information will be contingent on the potential for significant adverse effects to special-status species and habitats.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The purpose of the study is to assess the potential for effects to special-status species and habitats based on known occurrences or the likelihood of occurrence, and the scope of the activity. Assessments may include field evaluations of habitat suitability and surveys for species that could be ***affected [delete: "jeopardized"]*** by ground-disturbing activities. Study results will be used in review of ongoing vegetation management and any proposed ground-disturbing activities.

5.2 Relevant Resource Management Goals and Public Interest Considerations

USFWS, BLM, and USFS are signatories of the Lynx Conservation Agreement and Strategy (http://fsweb.r2.fs.fed.us/rr/tes/tes_listedspp.html) which outlines management goals, objectives and strategies for lynx conservation. The USFWS Recovery Plan for the Southwestern Willow Flycatcher is required to be implemented within existing laws and policy. This plan may be accessed at:

(http://ecos.fws.gov/docs/recovery_plans/2002/020830c_combined.pdf)

Management goals and objectives for public lands administered by the USFS are derived from the Forest Plan and the Forest Plan is developed [delete: " for public lands administered by the USFS come"] from a variety of sources, including the National Forest Management Act (NFMA), as amended, the Endangered Species Act of 1974, as amended, the Forest Service Manual (FSM), and local forest planning documents, including the Amended Land and Resource Management Plan for the San Juan National Forest. The NFMA includes direction to preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that their diversity is at least as great as that which would be expected in a natural forest (36 CFR § 219.26 and § 219.27). In addition, the NFMA requires the maintenance of plant and animal diversity commensurate with the overall multiple-use objectives of the USFS. The FSM requires review of projects that may affect species listed as Sensitive, and preparation of a Biological Evaluation to ensure that activities do not increase the likelihood of future Endangered Species listing. In addition, the USFWS is required under the authority of the Endangered Species Act to review and provide comment on federally authorized projects that may affect listed or ***proposed [delete: candidate]*** species. ***The LRMP identifies MIS and contains management goals, objectives, standards and guidelines, and monitoring requirements that are specific to MIS.***

Specific LRMP direction for special-status species includes:

Forest-Wide Direction

> ***Wildlife and Fish Resource Management (01). Where present, the following species are Management Indicator Species: deer, elk, and all Federally-listed endangered or threatened plant and animal species.***

The USDA Forest Service also has specific policy direction regarding sensitive species, including:

- ***Develop and implement management practices to ensure that species do not become threatened or endangered.***
- ***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.***
- ***Develop and implement management objectives for populations and/or habitat of sensitive species (USDA Forest Service Manual 2670.22).***
- ***Assist States in achieving their goals for conservation of endemic species.***
- ***As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.***
- ***Avoid or minimize impacts to species whose viability has been identified as a concern.***
- ***If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing.)***
- ***Establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the FWS or NMFS and the States (USDA Forest Service Manual 2670.32).***

Forest Plan direction that is most relevant for bird conservation relates to vegetation diversity, landscape structural diversity, snags and down woody material, riparian condition, habitat improvements, and disturbance processes.

5.3 Study Methodology

All areas ***[delete: within the Project Boundary]*** that are subject to ground-disturbing activities related to Project operations or maintenance will be surveyed for special-status plants and habitats and assessed for their potential to support special-status wildlife. ***[Comment: What survey methodology would be used?]*** Special-status species and habitats are defined as those listed by the CNHP, USFWS, USFS, and/or BLM. USFS MIS taxa not included on other lists will be considered common and not addressed by this study. Project-related ground-disturbing

activities are currently restricted to areas subject to periodic vegetation management, e.g., penstock corridors; additional areas will be surveyed in the event new ground-disturbing activities are proposed.

Botanical survey methods will follow guidelines established by the Washington Natural Heritage Program (WNHP 2005). (The CNHP has not yet developed survey guidelines, and endorses those of the WNHP [personal communication, Dave Anderson, CNHP Botany Team Leader, June 2005]). Surveys will be conducted by individuals with: (1) experience conducting floristic field surveys; (2) knowledge of plant taxonomy and plant community ecology and classification; (3) familiarity with the plants of the area; (4) familiarity with appropriate state and federal statutes related to plants and plant collecting; and (5) experience with analyzing impacts to plants and plant communities. Surveys will be floristic in nature and conducted during the time of year when these taxa are most easily identified (i.e., when any plants present should possess features, such as flowers or fruit, required for identification). Each study area will be surveyed two times in order to locate all potential special-status plant species during appropriate phenological periods and prepare an accurate inventory.

Wildlife assessments will review the habitats present in the area subject to ground disturbance in relation to species distributions, habitat requirements and life history information. This information will be used to assess (1) the availability of appropriate habitat within the proposed or current activity area and (2) the potential for each species to be affected by the proposed or current activity. No directed field surveys are proposed***, however, if habitat is present and the project is identified to potentially affect identified habitat then species inventories may be needed. Surveys will be conducted by individuals with: (1) experience conducting wildlife field surveys; (2) knowledge of wildlife taxonomy and wildlife community ecology and classification; (3) familiarity with the wildlife of the area; (4) familiarity with appropriate state and federal statutes related to wildlife; and (5) experience with analyzing impacts to wildlife and wildlife communities. A potential inventory to utilize would be the Rocky Mountain Observatory, which has developed a bird inventory protocol specific to migratory birds.***

If special status species or habitats are documented or likely to occur in the study area, Project effects on each will be assessed with consideration of the size of the affected area, the timing and duration of disturbance, the type of activity, the reliance of the individual species on a given habitat and the degree to which such habitats are disturbed or otherwise affected. If warranted, these considerations will be incorporated into management or mitigation efforts developed in consultation with the resource agencies.

5.4 Schedule

The study will be initiated in late 2005, and field studies to address this issue will be conducted in spring and summer of 2006. A draft report will be issued no later than six months after field efforts are completed.

5.5 Level of Effort

Initial field studies for this study are estimated to require approximately 50 hours of effort, not including report requirements. The level of effort required to evaluate future areas of ground disturbance will be evaluated at the time such activities are proposed.

5.6 Discussion of Alternative Approaches

No alternative approaches have been proposed.

5.7 Data Analysis and Reporting

Reporting for this study will be descriptive; no quantitative analyses are proposed. Study reporting will be incorporated into the Tacoma Project license application, and will include study objectives, study area, methods, survey results, assessment of Project-effects on special-status species and habitats, and recommendations for resource measures, if warranted. The report will also include species summaries (e.g., life history, habitat requirements, current status and threats) for special-status species identified within the study area. ***[Comment: This is a large workload (~60 species) that may not be necessary. A more efficient use of time and project dollars may be completing field investigations (surveying) and determining actual effects of project operations on these species rather than providing detailed species summaries.]***

6.0 References

Colorado Natural Heritage Program (CNHP). 2005. Locations and status of rare and/or imperiled species and natural communities known from or likely to occur within the general vicinity of the project area. Colorado State University, Fort Collins, Colorado. Report Generated 2 March 2005.

Japhet, M. 1997. Amphibian survey at Forebay Lake and vicinity. Copy of amphibian survey data sheet dated 6/2/1997.

US Fish and Wildlife Service (USFWS). 2005. Letter by the USFWS in response to the January 24, 2005 inquiry by the licensee requesting a list of threatened and endangered species for the Tacoma-Ames Hydroelectric Project.

Tacoma Project Study Request No. 7

Title of Proposed Study: Project effects on invasive plants

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of project effects on invasive plants. This study should include evaluation of Tacoma Terrestrial Resource Work Group (RWG) Issue Assessment #4. We have included the most recent draft of this assessment as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

TERRESTRIAL RESOURCE WORK GROUP
Draft Issue Assessment No. 4
Invasive Plant Species

1.0 Description of Issue

The occurrence and distribution of invasive species in the immediate vicinity of the Tacoma Project has been observed as being an issue. Invasive species can affect terrestrial, aquatic, recreational, and other resources by displacing native species, changing ecosystem processes, and undermining aesthetic values. Invasive species potentially occurring in the Tacoma Project vicinity include 85 plants classified as noxious weeds by the Colorado Department of Agriculture, especially the nine species currently known from La Plata County (CDA 2004). Data from San Juan County are not available. There is a clear need for the Project to have an invasive species management plan coordinated with adjacent land ownerships and fuels reduction projects.

2.0 Project Effects

Invasive species around Electra Lake and in the larger Project vicinity are most often associated with roads, grazing, and development, suggesting the role of Project operations in their distribution, if any, is small. Plant invasions require propagule availability, dispersal, and establishment in suitable habitats (most often disturbed areas). Each of these requirements are met in parts of the Project vicinity, but only the latter two are likely affected by Project operations. Propagule availability for most plants is a function of regional-scale invasions and land-use patterns, neither of which is associated with the Project. However, plant dispersal may be affected by the Project by way of maintenance and/or vegetation management along access roads or penstocks, or via introduction by recreational boating which may provide a potential dispersal vector for existing infestations of exotic plants. Vegetation management along access roads or penstocks also creates habitat for invasive plants that would be otherwise unlikely to succeed in more intact systems (e.g., forested areas). The hydrologic disturbance associated with the normal operation of Electra Lake may have the potential to support plant invasions, but empirical evidence for such an effect is quite limited, and few invasive plant populations occur within the normal operation zone of Electra Lake.

Active vegetation management associated with the Project occurs along the flume, penstocks, flowline, recreation facilities, the dams, and the powerhouse. Public Service Company of Colorado (PSCo) intends to conduct a survey of invasive plants at these Project facilities.

3.0 Relevant Existing Information

The Colorado Department of Agriculture reports that nine noxious weeds are currently known to occur within La Plata County (CDA 2004). Data from San Juan County are not available. Noxious weeds reported for Tacoma Project USGS quadrangles (Electra Lake and Engineer Mountain), as well as those expected to occur in the Tacoma Project vicinity by the USFS, are listed in Table 10 of PSCo's Pre-Application Document (PAD) which is repeated below.

NOXIOUS WEEDS REPORTED OR EXPECTED TO OCCUR IN THE TACOMA PROJECT VICINITY

Name	Common Name	Colorado Weed Rating	Acres reported in Project Quads[1]	Expected in Project Vicinity[2]
Bromus tectorum	Cheatgrass	C	0	Yes
Carduus nutans	musk thistle	B	0	Yes
Centaurea biebersteinii	spotted knapweed	B	6	No
Cirsium arvense	Canada thistle	B	37	Yes
Cynoglossum officinale	Hound's-tongue	B	0	Yes
Euphorbia esula	leafy spurge	B	1	No
Leucanthemum vulgare	oxeye daisy	B	124	Yes
Linaria vulgaris	yellow toadflax	B	2	No
Onopordum acanthium	Scotch thistle	B	0	Yes

[1] Source: Colorado Department of Agriculture quarter-quad noxious weed surveys, 2002. Data available at http://www.ag.state.co.us/DPI/weeds/mapping/QuarterQuadSurvey.html.

[2] Sources: personal communication, Rob Cook, La Plata County Weed Supervisor, March 2005; personal communication, Mark Tucker, San Juan National Forest Rangeland Management Program Leader, March 2005.

4.0 Need for Additional Information

No inventories of invasive plants have been conducted in areas subject to Project vegetation management or the larger Project area. Additional information is needed on the composition and distribution of invasive plant species in these areas to the degree they are subject to Project-related ground disturbing activities. In addition, Project vegetation management does not currently address invasive plants, and efforts are currently not coordinated with adjacent land owners and land managers.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The study will describe the composition and distribution of invasive plant species in areas subject to Project vegetation management efforts (e.g., penstock rights-of-way). This information will support the development of a formalized vegetation management plan designed to (1) allow continued vegetation management as needed for Project operations, (2) affect the prevention, eradication, or containment (in order of preference) of invasive plants, and (3) ensure coordination of vegetation management efforts between PSCo and adjacent land owners and land managers.

5.2 Relevant Resource Management Goals

This study is consistent with relevant agency resource management goals. The 1992 San Juan National Forest Land and Resource Management Plan includes the directive to employ Integrated Pest Management methods on significant pests in the Forest, including noxious weeds. Noxious weeds are considered to "be increasing in population at a rate that would be a threat to resources and uses" of the Forest, thereby requiring management efforts. ***Specific LRMP direction includes:***

Forest-Wide Direction

> ***Range Resource Management (05). Treat noxious farm weeds in the following priority:***
>
> ***a. Leafy spurge and Russian and spotted knapweed;***
> ***b. Invasion of new plant species classified as noxious farm weeds;***
> ***c. Infestation in new areas;***
> ***d. Expansion of existing infestations of Canada and musk thistle, and other noxious farm weeds; and***
> ***e. Reduce acreage of current infestation.***

In addition, the Colorado Noxious Weed Act §§35-5.5-101 – 119 C.R.S (2003) states that noxious weed management is in the public interest, finding that "certain undesirable plants constitute a present threat to the continued economic and environmental value of the lands of the state and if present in any area of the state must be managed."

5.3 Public Interest Considerations

The Terrestrial RWG, which is comprised of public agencies, private entities, and other interested parties, has identified this issue as being of substantial interest, potentially affecting resources such as wildlife habitat and aesthetic values.

5.4 Study Methodology

5.4.1 Surveys

All Project lands and facilities subject to vegetation management will be field surveyed for the presence of invasive plant populations. Plants defined as invasive will include all those listed as "A" or "B" noxious weeds in Colorado, as well as other species considered of particular concern by the Terrestrial RWG. Invasive plant populations located during survey efforts will be mapped using GPS or hand-sketched onto Project orthophotos and subsequently digitized for use in a GIS data base. Large or diffuse populations may be unwieldy to map in detail; these will be described more generally. Standard descriptive data (e.g., plant list, population size, estimated number of individuals, estimated size of weed patch in acres/hectares, qualitative assessment of potential trends in patch growth, flowering phenology, and suggested potential treatment applications) will be collected at each population. All invasive plants located during field surveys will be addressed by the vegetation management plan (see below).

PSCo is not proposing any changes to Project infrastructure, operation, or use that would be expected to affect invasive species. In the event such changes are proposed, the affected lands will be surveyed for invasive plants and incorporated into the vegetation management plan.

While conducting field surveys associated with this Study Plan, PSCo will also record observations of any Special Status Species survey as referenced in Terrestrial RWG Issue Assessment No. 3, Special-Status Species and Habitats. If rare plants are found, data collected will include estimated number of individuals, estimated size of plant patch in acres/hectares, qualitative assessment of potential trends in patch growth (expansion/contraction), flowering phenology, and potential protection measures.

Field surveys will be conducted during seasonal timing most conducive to species identification. At this time, field work is planned in June and August.

5.4.2 Vegetation Management Plan

Project vegetation management practices will be formalized into a vegetation management plan that integrates vegetation removal and invasive plant management. The plan will be developed with the following goals: (1) allow continued vegetation removal as needed for Project operations, (2) effect the prevention, eradication, or containment (in order of preference) of invasive plants, and (3) ensure coordination of vegetation management efforts between PSCo and adjacent land owners and managers. The plan will be limited to those areas currently affected by vegetation management, but additional lands affected by any future changes to Project infrastructure, operation, or use will be added as such changes are proposed.

5.5 Data Analysis and Reporting

All reporting for this study will be incorporated into the vegetation management plan, with survey results and mapping presented as an appendix. The plan will describe current management practices and define overall vegetation management goals, with emphasis on continued Project operations and the prevention, eradication, and containment of invasive plant species. Reporting will include a discussion of all areas at which vegetation management associated with the Project occurs, including the flume, penstocks, flowline, recreation facilities, dams, and powerhouse.

5.6 Schedule

Surveys of areas subject to vegetation management are scheduled for completion in the summer of 2006. Survey results and mapping will be developed and integrated into an invasive plants management plan which will be available as a draft report within six months of the completion of all field surveys.

5.7 Level of Effort

Initial surveys and mapping for this study are estimated to require approximately three person-weeks of effort, plus approximately one person-week of GIS time. The drafting of a vegetation management plan will require an additional two person-weeks.

5.7 Discussion of Alternative Approaches

There have been no alternative approaches proposed at this time.

6.0 References

Colorado Department of Agriculture (CDA). 2004. Division of Plant Industry noxious weed lists for Colorado and Colorado counties. Online data: http://www.ag.state.co.us/DPI/weeds/mapping.html. Accessed December 2004.

Colorado Natural Diversity Information Source (CNDIS). 2004. Known or likely wildlife species occurrence lists. Online data: http://ndis.nrel.colostate.edu/wildlife.asp. Accessed December 2004.

United States Forest Service (USFS). 1992. Land and Resource Management Plan for the San Juan National Forest. USFS Rocky Mountain Region, Durango, Colorado.

Tacoma Project Study Request No. 8

Title of Proposed Study: Project effects on wetlands, riparian habitats, and occurrence, distribution, and abundance of amphibians

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes a study of project effects on wetland and riparian habitats. This study should include evaluation of Tacoma Terrestrial Resource Work Group (RWG) Issue Assessment #7. We would also suggest that Issue Assessment #2 (Occurrence, Distribution, and Abundance of Amphibians at the Tacoma Project) be included within this effort. We have included the most recent drafts of these assessments as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

TERRESTRIAL RESOURCE WORK GROUP
Draft Issue Assessment No. 7
Wetlands & Riparian Habitats[3]

1.0 Description of Issue

The occurrence and distribution of wetlands in the immediate vicinity of the Tacoma Project has been identified as an issue. The Terrestrial Resource Work Group (RWG) also asked about the relationship of project-dependent wetlands and project operations, indicating that the maintenance and/or enhancement of these habitats needed to be addressed. National wetland inventory (NWI) maps of the Project area indicate that wetlands are numerous at various locations within the Project area and in adjacent areas that could be affected by the Project. Wetlands are valuable ecosystem components that can provide important wildlife habitats, help maintain water quality, and serve as a link between terrestrial and aquatic systems. In addition, numerous special-status species potentially occurring in the Tacoma Project vicinity are known to use or require wetland habitats. Potential future ground-disturbing activities that may impact wetlands need to be evaluated for their impact to these habitats.

Also, the occurrence and distribution of riparian habitats in the immediate vicinity of the Tacoma Project has been identified as an issue. This includes the request to delineate current conditions of riparian habitat along Elbert Creek. The Terrestrial RWG asked that the maintenance and/or enhancement of these habitats be addressed. Riparian areas are important ecosystem components that can provide important wildlife habitats, help maintain water quality, and serve as a link between terrestrial and aquatic systems (Nilsson and Svedmark 2002). Numerous special-status species potentially occurring in the Tacoma Project vicinity are known to use riparian habitats. In addition, riparian areas often support important economic and recreational

[3] The original Issue Assessment No. 10, Riparian Habitats has been consolidated with this Issue Assessment No. 7, Wetlands by the Terrestrial RWG. In addition, this Issue Assessment study plan addresses Water RWG Issue Assessment No. 13, Effects of Leakage from the Cascade Flowline on Adjoining Land.

uses such as grazing, mining, or swimming. Riparian plant associations for Colorado were defined by Kittel et al. (1999), who included ratings for riparian condition and overall site quality for over 1,880 riparian plots statewide, including some in San Juan and La Plata counties.

2.0 Project Effects

NWI maps indicate that a variety of palustrine wetlands occur in areas potentially associated with the Project, including along Project-influenced stream reaches, around Electra, Aspaas, and Columbine Lakes, and along the route of the Cascade Creek pipeline. Forebay Lake is also classified as a palustrine wetland. ***[Comment: Please also include the pond that is 0.5 miles NW of Forebay Lake.]*** Direct effects of Project operation on these wetlands are not currently known. However, the Project could affect wetlands by limiting hydrology in bypassed reaches, increasing hydrology in supplemented reaches, or fluctuating hydrology in Project lakes. For example, diversion can reduce the extent of wetland areas along bypass reaches or shift wetland types as the water regime becomes less persistent. The opposite effect may occur on flow-supplemented reaches. Reservoir water surface fluctuations during the growing season can also affect wetland functions and values, if rapid or extreme water fluctuations inhibit vegetation development or deter wildlife use (e.g., use by nesting waterfowl or breeding amphibians). In addition, wetlands along the Cascade Creek pipeline route might be indirectly affected by periodic maintenance of the pipeline (e.g., via vehicle use). The extent of each these effects is influenced by topography, geomorphology, adjacent land management, and recreational use.

The Project has been in existence for 100 years and the wetland habitats associated with the Project have developed in conjunction with the Project operations over that period of time. Public Service Company of Colorado (PSCo) is proposing to continue to operate the Tacoma Project in the manner that it has operated the facilities in the past; therefore, there is not likely to be any changes to the existing wetland habitats. Opportunities for enhancing existing wetlands may exist.

Riparian habitats are associated with the Tacoma Project. During normal operations, water is diverted from Cascade Creek into the Little Cascade Creek watershed, flowing into Electra Lake, and subsequently the Animas River. Electra Lake functions as a storage reservoir, releasing water for use at the Tacoma powerhouse. Each of these areas supports a degree of riparian vegetation associated with existing Project operations.

Stream diversions can influence riparian habitats by modifying water availability downstream. Conversely, diversion can also increase the prevalence of riparian vegetation, as has been observed in areas otherwise subject to inundation or scour under an unregulated flow regime (Nilsson and Svedmark 2002). The effects of diversion are strongly influenced by geomorphology: low-gradient stream reaches with adjacent floodplains, for example, are often more affected by hydroelectric operations than are high-gradient systems subject to large variations in flow and flow velocities. In addition, diversion effects can be substantially modified or mitigated by downstream accretion or tributary inflows, which can allow essentially unregulated riparian conditions below diversion points. Below the Cascade Creek diversion dam, seepage and accretions from groundwater and tributary sources provide stream channel flows of 2–4 cfs in the bypassed channel at the U.S. Highway 550 tunnel (1 mile below the

diversion point). Below U.S. Highway 550, channel flows have been observed during normal Project operations to gradually increase to approximately 25 cfs below Lime Creek. Approximately one-third (8 to10 cfs) of this flow is believed to reflect accretion in the bypassed channel.

PSCo intends to locate existing wetland systems within the Project Boundary. PSCo also intends to map riparian habitats on Elbert Creek and Forebay Lake, downstream of Terminal dam. ***[Comment: Please also include the pond that is 0.5 miles NW of Forebay Lake.]***

3.0 Relevant Existing Information

Only limited information is available concerning riparian areas within the Project Boundary. A CDOW (2005) riparian vegetation map shows small areas of riparian vegetation adjacent to Electra Lake, including the following types: riparian deciduous tree – aspen; riparian deciduous tree – cottonwood; riparian shrub; and riparian evergreen tree – general. Descriptions of these vegetation types or accompanying species lists are not available.

Wetlands are depicted on the "Electra Lake, Colorado" and "Engineer Mountain, Colorado" NWI maps. Both maps are based on color infrared aerial photography dated July 1986. The types of palustrine wetlands shown to occur are primarily PAB (aquatic bed), PSS (scrub-shrub) and PEM (emergent). Wetland hydrology is mostly depicted as saturated or intermittently exposed. Topography suggests that wetlands in the vicinity of the Cascade Creek flowline are supported by drainage from Hermosa Cliffs, forming the headwaters of Little Cascade Creek. A report discussing some of the wetlands in the vicinity of the flowline adjacent to Duranto Mountain Resort are characterized as willow scrub-shrub, alder/willow scrub-shrub, sedge emergent, and aquatic bed (Ecosphere Environmental Services 2000). The latter report describes aquatic bed wetlands as dominated by yellow pond lily (*Nuphar lutea*).

Wetlands within the Project Boundary around Electra Lake are mostly situated on the west shore of the lake and are classified by NWI as seasonally flooded. In the flow-supplemented reach of Little Cascade Creek and on Elbert Creek downstream of Electra Lake, wetlands are associated with stream reaches of low gradient and a relatively wide floodplain.

4.0 Need for Additional Information

Site-specific information on riparian and wetland habitats in the Project area is needed to assess their functional condition, and the degree to which protection, management or enhancement of these habitats is warranted.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The purpose of the study is to provide a descriptive inventory of riparian and wetland conditions within the Project Boundary and elsewhere as defined in section 5.4.1. Riparian and wetland habitats and bank conditions will be documented based on a review of existing information and a

reconnaissance-level survey of the study area. If feasible, these conditions will be compared to reference habitats described elsewhere (e.g., by the Colorado Natural Heritage Program). The collected information will be used to assess the functional condition of Project-affected riparian and wetland habitats and to document areas potentially suitable for protection or enhancement efforts.

5.2 Relevant Resource Management Goals

This study is consistent with resource goals established by federal land management agencies with lands potentially affected by the Tacoma Project. The San Juan National Forest Land and Resource Land and Management Plan, for instance, includes the directive to "protect streams, lakes, riparian areas, and other bodies of water through management activities." ***Specific LRMP direction includes:***

Forest-Wide Direction

> ***Wildlife and Fish Resource Management (03), Maintain habitat for viable populations of all existing vertebrate wildlife species.***
>
> ***a. Habitat for each species on the forest will be maintained at least at 40 percent or more of potential.***
>
> ***Riparian Area Management (02). Design and implement activities in management areas to protect and manage the riparian ecosystem.***

In addition, Executive Order 11990 authorizes federal protection of wetlands. The order requires federal agencies to consider the potential effects of a proposed project on the survival and quality of wetlands including the conservation and long term productivity of existing faunal species and habitat diversity and stability. However, executive Order 11990 does not apply to the issuance by federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-federal lands.

5.3 Public Interest Considerations

The Terrestrial RWG, which is comprised of public agencies, private entities, and other interested parties, has identified this issue as being of substantial interest, involving potentially valuable ecosystem components that can provide important wildlife habitats, help maintain water quality, and serve as a link between terrestrial and aquatic systems

5.4 Study Methodology

[Comment: If present, Southwestern Willow Flycatcher habitat, as described by USFWS, is most likely to occur within wetland and riparian habitat so it would be effective to document the presence of Southwestern Willow Flycatcher habitat if identified in riparian and wetland inventories.]

5.4.1 Study Area

The study area encompasses wetlands and riparian areas within the Project Boundary, and along Elbert Creek in approximately the first mile downstream of Terminal dam. ***Additionally, inventories will be completed for areas immediately adjacent to project facilities located outside the project boundary. [Comment: Please also include Forebay Lake and the pond that is 0.5 miles NW of Forebay Lake.]***

The latter is upstream of a steep reach (a setting in which riparian vegetation is characteristically limited in extent) and is also upstream of the point where Elbert Creek receives inflow from Haviland Lake.

5.4.2 Mapping and Classification

Riparian and wetland habitats within the study area will be mapped and classified consistent with Kittel et al. (1999) for riparian areas and Carsey et al. (2003) for wetlands; wetlands will also be defined according to wetland types described by Cowardin et al. (1979). Base maps for field use will be prepared using the most recent available digital orthophotos, with a minimum polygon size of one acre. Draft habitat polygons apparent on the photos will be identified prior to field studies, and verified and adjusted as necessary by a field team.

5.4.3 Field Assessment

A descriptive inventory of representative wetland and riparian polygons in the study area will be performed and "Proper Functioning Condition" (PFC) (Prichard et al. 1998a, 1998b) will be assessed. PFC assessment considers a series of functional attributes of vegetation, hydrology, and erosion/deposition in wetland or riparian systems in identifying site-specific characteristics in riparian and wetland habitats.

For riparian zones of the study area, the PFC standard checklist of 17 attributes will be completed in representative reaches (Prichard et al. 1998a) (Appendix 1). Observations of representative conditions and noteworthy atypical conditions (e.g., site-specific erosion) will also be documented by photographs and GPS-determined locations will be recorded. Recorded information will include noting dominant and sub-dominant species; characterizing evidence of periodic recruitment; and rating dominant and sub-dominant species for known association with moist soil conditions according to Reed (1997) and capability for maintaining bank stability against the erosive forces of moving water. The latter will be determined based on stability ratings for 200 riparian community types of the Intermountain Region (which includes Colorado) (Winward 2000), other published sources, or by interpreting field observations of erosion or bank failures.

Lentic wetlands in the study area will be assessed for PFC based on the standard checklist of 22 attributes (Prichard et al. 1998b) (Appendix 2). The following supporting descriptive information will also be collected: (1) vegetation composition (dominant and sub-dominant species; the presence of aquatic and/or emergent vegetation); (2) hydrologic characteristics

(sources of hydrology, estimated duration of inundation, maximum water depth, near-shore water depth); ***[delete: and]*** (3) observations of fish, amphibians, and other wildlife or wildlife signs; ***and (4) documentation of the presence of Southwestern Willow Flycatcher habitat as defined by the USFWS***.

Work undertaken as part of this study plan will also include documenting apparent leakage from the Cascade flowline and the effects of this leakage (addresses Water RWG Issue Assessment No. 13, Effects of Leakage from the Cascade Flowline on Adjoining Land).

5.5 Schedule

The study will be initiated in late 2005, and field studies associated with this issue will be conducted in spring and summer of 2006. A draft report will be issued no later than six months after field efforts are completed.

5.6 Level of Effort

Field work for this study is estimated to require approximately 120 hours of effort by a two-person team.

5.7 Discussion of Alternative Approaches

No alternative approaches have been proposed at this time.

5.8 Data Analysis and Reporting

Reporting for this study will be descriptive; no quantitative analyses are proposed. Study results will include a PFC assessment for representative wetland and riparian habitats, classifying system attributes as either "in proper functioning condition," "nonfunctional," or "at risk." Documentation and biological rationale for each assessment will be included and presented in tabular form. Opportunities for protection or enhancement of riparian systems and wetlands will be identified. The results of this study will be incorporated in the Tacoma Project Final License Application.

6.0 References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31, US Fish and Wildlife Service Office of Biological Services, Washington D.C.

Kittel, G., E. VanWie, M. Damm, R. Rondeau, S. Kettler, A. McMullen, and J. Sanderson. 1999. A classification of riparian wetland plant associations of Colorado: user guide to the classification project. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.

Nilsson, C., and Svedmark, M. (2002). Basic principals and ecological consequences of changing water regimes: riparian plant communities. Environmental Management 30: 468-480.

Platts, W.S., W.F. Megahan, and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. Gen. Tech. Rep. INT-138. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah. 70 pp.

Prichard, D., J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leonard, B. Mitchell, and J. Staats. 1998. A user guide to assessing proper functioning condition and the supporting science for lotic areas. Technical Reference 1737-15. Bureau of Land Management, BLM/RS/ST-98/001+1737, Service Center, Denver, CO. 136 pp.

Prichard, D., C. Bridges, W. Hagenbuck, R. Krapf, and S. Leonard. 1998. Process for assessing proper functioning condition for lentic riparian-wetland areas. Technical Reference 1737-9. Bureau of Land Management, BLM/RS/ST-98/001+1737, Service Center, Denver, CO. 46 pp.

Appendix 1

Proper Functioning Condition Checklist for Riparian Areas

Date:_____ ID Team Observers:_____

Name of Riparian Area:_____

Segment/Reach ID: and Location _____

Yes	No	N/A	HYDROLOGIC
			Floodplain inundated by relatively frequent events (1-3 years)
			Active/stable beaver dams
			Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting
			Floodplain zone is widening
			Upland watershed not contributing to riparian degradation

Yes	No	N/A	VEGETATIVE
			Diverse age structure of vegetation
			Diverse composition of vegetation
			Species present indicate maintenance of riparian and moisture characteristics
			Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
			Riparian plants exhibit high vigor
			Adequate vegetative cover present to protect banks and dissipate energy during high flows
			Plant communities in the riparian zone are an adequate source of coarse and/or large woody debris

Yes	No	N/A	EROSION DEPOSITION
			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
			Point bars are revegetating
			Lateral stream movement is associated with natural sinuosity
			System is vertically stable
			Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition).

Field Notes:

Functional Rating:

Proper Functioning Condition
Functional – At Risk
Nonfunctional
Unknown

Appendix 2

Proper Functioning Condition Checklist for Wetland Areas

Date:_____ ID Team Observers:_____

Name of Wetland and Location:_____

Yes	No	N/A	HYDROLOGIC
			Wetland area is saturated at or near the surface or inundated in "relatively frequent" events
			Fluctuation of water levels is not excessive
			Riparian/wetland area is enlarging or has achieved potential extent
			Upland watershed is not contributing to riparian-wetland degradation
			Water quality is sufficient to support riparian-wetland plants
			Natural surface or subsurface flow patterns are not altered by disturbance (i.e., hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
			Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATIVE
			Diverse age-class distribution of vegetation (recruitment for maintenance/recovery)
			Diverse composition of vegetation
			Species present indicate maintenance of soil moisture characteristics
			Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g., storm events, snow melt)
			Plants exhibit high vigor
			Adequate vegetative cover present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
			Frost or abnormal hydrologic heaving is not present
			Favorable microsite condition (i.e., woody debris, water temperature. etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
			Accumulation of chemicals affecting plant productivity/composition is not apparent
			Saturation of soils (e.g., ponding, flooding frequency and duration) is sufficient to comprose and mainatain hydric soils
			Underlying geologic structure/soil material is capable of restricting water percolation
			Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition).
			Islands and shoreline characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate wind and wave event energies

Field Notes:

Functional Rating:
Proper Functioning Condition
Functional – At Risk
Nonfunctional
Unknown

TERRESTRIAL RESOURCE WORK GROUP
Draft Issue Assessment No. 2
Occurrence, Distribution and Abundance of Amphibians at the Tacoma Project

1.0 Description of Issue

The occurrence, distribution, and/or abundance of amphibians in the immediate vicinity of the Tacoma Project have been identified as questions. Amphibians are an important component of many terrestrial systems and include numerous special-status species tracked by the U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and Colorado Natural Heritage Program (CNHP). ***The occurrence of some amphibians in the Project area is well known and documented to occur; however, there is minimal information on their distribution and abundance.*** Any potential future ground-disturbing activities may impact amphibians.

2.0 Project Effects

All the amphibians that might occur in the Project area are aquatic-breeding species and some could potentially breed in Electra Lake or other seasonally or permanently flooded aquatic habitats associated with the Project.

Public Service Company of Colorado (PSCo) is proposing to continue to operate the Tacoma Project under the next license term in the same manner as it is currently operated; that is, there are no changes in Project operations currently planned that would result in ground-disturbing activities. There is currently no indication or documentation of adverse affects to amphibian populations as a result of existing Project operations. Therefore, there is no reasonable basis for attributing to the Project impacts to amphibian populations within the Project Boundary or associated with Project operations. ***[Comment: The previous two statements are speculative and misleading. Project operations have altered the stream flow regime with the potential for adverse impacts to amphibian habitat. The extent of any effects to amphibians is unknown, one of the reasons that this study and the instream flow study are being requested.]***

There are wetland complexes and water bodies associated with the Project that are likely to support amphibian populations, including the Columbine Lake area, the Aspaas Lake area, and Elbert Creek downstream of Terminal dam. These areas may represent opportunities for enhancement of existing populations and/or opportunities for resource protection intended to preserve or improve current amphibian populations.

Amphibians within the Project's terrestrial habitats could potentially be affected by project-related activities (e.g., vegetation clearing). Issue Assessment No. 1, Fuels Management

includes an assessment of potential fuels management activities that may be warranted to support USFS fuels management efforts. To the extent that specific fuels management activities are identified, the potential for these activities to affect existing amphibian populations will be evaluated.

3.0 Relevant Existing Information

Amphibian species known or possibly occurring in the vicinity of the Project are limited to five wide-ranging native species: tiger salamander (*Ambystoma tigrinum*), boreal toad (*Bufo boreas*), Woodhouse toad (*Bufo woodhousii*), boreal chorus frog (*Pseudacris maculata*), and northern leopard frog (*Rana pipiens*) (Schrupp et al. 2000) (Table 1). Bullfrog (*Rana catesbeiana*) has been introduced to Colorado and could potentially occur in permanent ponds or lakes associated with the Project. Bullfrogs are found in aquatic habitats during all life stages and are easily documented by their loud vocalizations.

Amphibian site records for the Project vicinity are scarce. Juvenile northern leopard frogs have been found at Rainbow Lake (just south of Electra Lake) (Japhet 1999) and at a beaver pond 0.5 miles NW of Forebay Lake, where a tiger salamander was also found (Japhet 1997). ***Juvenile northern leopard frogs were also found at the sites mentioned above as well as Forebay Lake by Forest Service biologists in 2004 (personal communication, Chris Schultz, San Juan NF, Columbine Ranger District and BLM Field Office Wildlife Biologist).*** Amphibian surveys for the proposed expansion of the Durango Mountain Resort in the vicinity of the Cascade flowline indicated the presence of tiger salamanders at seven of twelve wetland sites that were considered suitable for amphibians (Ecosphere Environmental Services 2000).

Because breeding habitats of the target species are known to be diverse, criteria for amphibian habitat suitability can only be broadly defined. Larvae of all of the target species are adapted for lentic (i.e., still or slow-moving water) habitats; fast-flowing streams are not breeding habitat for these species. Water must persist, uninterrupted, for a period sufficient for larvae to complete development (for boreal toad this period can sometimes be as brief as 45 days, but in most cases a longer period is required [Loeffler 2001]); thus, wetlands described by the National Wetland Inventory (NWI) as “seasonally saturated” (USFWS 1998) are unlikely to constitute breeding habitat, unless areas of standing water also occur. The presence of shallow water exposed to direct sunlight is frequently an attribute of occupied habitat (shallow, warmer water accelerates embryonic and larval development, and may also constitute a refuge from larger, aquatic predators). The presence of predatory fish tends to reduce habitat suitability, although not for toads (Loeffler 2001).

Table 1. Amphibian species known to occur or potentially occurring in the vicinity of the Tacoma Project

Species	Breeding Habitats and Known Occurrences
Tiger salamander *Ambystoma tigrinum*	Various habitats, including seasonal to permanent ponds, lakes, stock ponds, and farm ponds. Documented occurrences in project vicinity.
Boreal toad *Bufo boreas*[1]	Small pools, ponds, bogs, marshes, and the shallow margins of lakes; rarely breeds in streams.
Woodhouse toad *Bufo woodhousii*	Various shallow, quiet waters including ponds, lakes, reservoirs, marshes, river backwaters and floodwater pools, low gradient streams, and irrigation ditches.
Boreal chorus frog *Pseudacris maculata*	Seasonal pools, marshy ponds, and cattail swamps; not found where predatory fish occur.
Northern leopard frog *Rana pipiens*	Ponds (including glacial kettles and beaver ponds), marshes, lakes, reservoirs, stream backwaters, and irrigation ditches. Documented occurrences in project vicinity.

[1]Southern Rocky Mountain Population

Boreal toad (Southern Rocky Mountain Population) is a federal candidate species for listing under the Endangered Species Act (listing "warranted but precluded") not documented to occur in San Juan or LaPlata counties, but considered possible in suitable areas (usually above 8,500 ft elevation). A variety of federal and state agencies, including USFWS, USFS, U.S. Bureau of Land Management (USBLM), and Colorado Division of Wildlife (CDOW) are represented on the Boreal Toad Recovery Team, and participate in survey, monitoring, and research activities for the conservation of the boreal toad. Survey protocols for boreal toad have been developed and are recommended for use in determining the presence of the species (Loeffler 2001).

4.0 Need for Additional Information

Additional information concerning the distribution of amphibian populations and suitability of existing wetland habitats for amphibians is needed to supplement existing information and to identify potential opportunities for enhancement and/or resource protection on Project lands. In the event that ground-disturbing activities are proposed (e.g., vegetation or fuels management, or new recreational developments), site-specific information on amphibian occurrence may be required in order to evaluate the effects of proposed activities.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The purpose of the study is to provide baseline information on the suitability of existing wetland habitats for amphibians in the Project area. The proposed study will focus on an inventory of habitats within and immediately adjacent to the Project Boundary, but information on the occurrence of amphibian species will only be collected incidentally. For sites where ground-disturbing activities (including fuels management work) are proposed by PSCo, the potential for effects to amphibians will be assessed; if potential boreal toad breeding habitat is jeopardized by these activities, a protocol-level boreal toad survey will be conducted. The amphibian study will support and be integrated with the wetland/riparian assessment to be conducted in accordance with Terrestrial RWG Issue No. 7, Wetland and Riparian Habitats.

5.2 Relevant Resource Management Goals or Public Interest Considerations

[Please delete this sentence: USFWS, USFS, and CDOW are signatories of the Boreal Toad Conservation Plan and Agreement and are each represented on the Boreal Toad Recovery Team (Loeffler, 2001).] If a proposed activity will adversely affect boreal toad habitat, these agencies may recommend surveys to obtain site-specific information on occurrence (presence) and habitat suitability, and seek to minimize adverse effects.

Management goals ***and objectives*** for wildlife species on public lands administered by the U.S. Forest Service ***are derived from the Forest Plan and the Forest Plan is developed [delete: come]*** from a variety of sources, including the National Forest Management Act, as amended, the Endangered Species Act of 1974, as amended, the Forest Service Manual (FSM), and local forest planning documents, including the Amended Land and Resource Management Plan for the San Juan National Forest. The FSM requires review of projects that may affect species listed as Sensitive, such as boreal toad, and preparation of a Biological Evaluation to ensure that activities do not increase the likelihood of a future listing under the Endangered Species Act. Specific direction from the LRMP includes:

Forest-Wide Direction

> ***Wildlife and Fish Resource Management (03). Maintain habitat for viable populations of all existing vertebrate wildlife species.***
>
> ***a. Habitat for each species on the forest will be maintained at least at 40 percent or more of potential.***
>
> ***Riparian Area Management (02). Design and implement activities in management areas to protect and manage the riparian ecosystem.***

The USFWS is required under the authority of the Endangered Species Act to review and provide comment on federally-authorized actions that may affect listed or candidate species.

5.2 Study Methodology

[Comment: Southwestern Willow Flycatcher habitat as described by USFWS if present is most likely to occur in the same habitat being surveyed for amphibians.]

A wetland inventory and habitat evaluation will be conducted for all wetlands within the Project Boundary as described in Terrestrial RWG Issue Assessment No. 7. Amphibian habitat suitability will be evaluated based on hydrologic characteristics (e.g., estimated duration of inundation, maximum water depth, near-shore water depth), the presence of aquatic and/or emergent vegetation, and the presence of fish. Site conditions will be documented with a pedestrian, reconnaissance-level survey, during which sites will be photographed and incidental observations of amphibians will be noted. ***If habitat meets the definition for Southwestern Willow Flycatcher, then that should be noted as well.*** Opportunistic searches for amphibians

will also be conducted at selected sites to confirm conclusions concerning habitat suitability. Amphibian search methods will consist of commonly accepted techniques described in Olson et al. (1997). These may include the use of dip-net or aquatic funnel traps to document larval amphibians (Thoms et al. 1997), visual encounter (Crump & Scott 1994), or cover object searches.

Site-specific habitat evaluations for amphibians will be conducted for any ground-disturbing activity (including vegetation and fuels management work) that PSCo may propose. Proposed activities will be screened for potential affects on amphibians based on the likelihood that the activity could adversely affect an amphibian breeding habitat. Existing information (including information collected as described above) will be used to assess known or likely amphibian occurrences, with supplemental surveys where warranted. If proposed activities are deemed likely to adversely affect amphibian breeding habitat, protocol-level surveys for boreal toad (Loeffler 2001) will be conducted. These surveys would consist of daytime searches of potential breeding sites on multiple dates; the survey techniques are also likely to document other species of amphibians that may occur. Biologists engaged in surveys will follow precautionary measures outlined by the Declining Amphibian Population Task Force for cleaning field equipment and boots to avoid the spread of pathogens between sites (Loeffler 2001).

5.4 Schedule and Level of Effort

Field work for wetland habitat evaluations will be conducted in July 2006. Because larvae of the target species are typically present at wetland sites for a longer period than other life stages (adult, eggs, or post-metamorphosed juvenile), the field schedule may be adjusted to maximize the likelihood of documenting amphibians incidentally or with opportunistic sampling of larvae at selected, representative sites.

Habitat evaluations and surveys to assess effects of new ground-disturbing activities on amphibians will be conducted in the event that such activities are proposed.

Amphibian habitat assessment efforts are incorporated into estimates of effort for Issue No. 7, Wetland & Riparian Habitats. The level of effort required for additional, site-specific assessments or surveys is a function of the scale of proposed actions, if any. This could range from one hour (for a Project change with no effects on amphibian habitats) to over 120 hours (for a larger Project change requiring field efforts or agency consultation).

5.5 Discussion of Alternative Approaches

No alternative approaches have been proposed at this time.

5.6 Data Analysis and Reporting

The habitat data collected for this Study Plan will be summarized and compared to known habitat criteria for the target species, and documented amphibian occurrences at similar sites. If site-specific ground-disturbing activities are proposed by PSCo, the results of habitat evaluations and amphibian surveys will also be presented. The study report will include descriptions, habitat

data summaries, and photographs of each site, as well as documentation of amphibians found and conclusions regarding habitat suitability for species not documented. The draft report will be prepared for review and the final report will be incorporated in the Tacoma Project Final License Application. The report will include study objectives, study area, methods, tabulated results, maps of sites, and an assessment of opportunities to enhance and/or protect amphibians within the Project Boundary.

6.0 References

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Tacoma Project Study Request No. 9

Title of Proposed Study: Historic Properties Management Plan

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes the development of a Historic Properties Management Plan (HPMP). This study should include evaluation of Tacoma Cultural Resource Work Group (RWG) Issue Assessments #1, #2, #3, and #4. We have included the most recent draft provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

CULTURAL RESOURCE WORK GROUP
Draft Issue Assessment Number 1[4], 2, 3, and 4
Section 106 of the National Historic Preservation Act

1.0 Description of Issues

Issue Assessment Number 1: An issue was raised concerning how the Section 106 review will be conducted in the context of the Tacoma Project relicensing. Many of the issues identified within the Cultural Resource Work Group (RWG) are essentially sub-issues of the overall Section 106 review process

Issue Assessment Nos. 2, 3, and 4 will be considered during the Section 106 review process. For descriptions of these Issue Assessments, see Attachments A, B, and C of this document.

2.0 Project Effects

As the lead Federal agency for hydropower relicensing, the Federal Energy Regulatory Commission (FERC) is responsible for satisfying Section 106 consultation requirements under the National Historic Preservation Act (NHPA). Implementation regulations for Section 106 have been published by the Secretary of the Interior in 36 CFR 800. To accomplish this, FERC needs to document consultation with interested parties on Project effects on historic properties eligible for protection under the NHPA. This consultation must document that FERC has considered the affects of the undertaking (the issuance of a new federal operating license) on historic properties eligible for listing on the National Register of Historic Places (NRHP) and allow the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on its conclusions. FERC satisfies Section 106 requirements by delegating day-to-day consultation and study authority to the Licensee (PSCo).

Many Licensees of FERC-jurisdictional hydroelectric facilities have recently been implementing a program of conservation archeology as a core component of Section 106 consultation, particularly at relicensings where there are often not many operational changes or proposed ground disturbances as compared to original licensings where a new project is to be constructed.

[4]This Issue Assessment No. 1 was a new issue raised in the January 19, 2005 Cultural RWG Meeting and was deemed to be a fundamental, overarching issue by the RWG.

Licensees that choose to incorporate a strong program of conservation archeology design the historic properties studies to minimize disturbance of eligible or potentially-eligible sites in order to preserve as much of the data in place. ***This study approach generally includes background research (Class I overview) and inventory (Class III inventory) to identify cultural resources within the Area of Potential Effect (APE) and evaluate them for inclusion on the National Register of Historic Places***. ***[Delete: This study approach generally includes background research (Class I overview) and inventory (Class III inventory) to identify sites that may be eligible for inclusion on the NRHP within the Area of Potential Effect (APE).]*** With the overview and inventory data in hand, the Licensee is in a position to proceed directly to the development of a Historic Properties Management Plan (HPMP) that considers all eligible or potentially-eligible sites in future management.

For historic structures that are part of project facilities located within the APE, the Licensee determines if the building or structure is NRHP eligible; and if so, determines what character-defining features need to be managed across the term of the next license. [Comment: The first two sentences of this paragraph were combined for clarity; please delete: For historic structures that are part of project facilities located within the APE, the approach is somewhat different. Here the Licensee determines if the building or structure is NRHP eligible; and if so, determines what character-defining features need to be managed across the term of the next license.] The HPMP will then include provisions to lessen impacts to these character-defining features during changes that will likely occur to these properties through upgrades, maintenance, and other changes that will need to be made to the properties. FERC and the ACHP issued guidelines on developing HPMPs that specifically recognize that hydroelectric projects are critical energy production facilities. These facilities will need to be upgraded to remain competitive and to continue to produce power in a cost-effective manner rather than museums that need to be maintained in their original constructed condition. FERC's HPMP guidelines satisfy both historic preservation needs as well as the Licensee's interests in keeping the project economically sound.

The following general description outlines the steps that Public Service Company of Colorado (PSCo) will follow to satisfy Section 106 consultation during relicensing in order to provide FERC with the documentation it needs to comply with the NHPA, complete NEPA, and issue a new license.

- **Stakeholders** - Identify interested parties and stakeholders. PSCo will identify Section 106 consulting/interested parties following the development of the draft HPMP.

- **APE** - Consult with stakeholders on the project's Area of Potential Effect (APE). This largely defines the geographic study scope for Section 106 consultation and often is defined as the property within the FERC project boundary. This approach also recognizes the geographic area over which FERC has jurisdiction.

- **Background Research** – a qualified archeological/historic consultant conducts a search of prior research on work done in the project area to obtain an understanding of what is known about historic use in the APE. This information is used to scope the field work

and to provide context for the later HPMP (if needed). In Colorado, this literature review and site file search stage is referred to as a Class I cultural resource overview.

- **Inventory** – Field crews walk transects at pre-determined intervals, usually 15-m (50-foot), and identify archaeological and historical sites within the APE. Sometimes limited archaeological testing is included to establish significance under the NRHP criteria. This is referred to as a Class III cultural resource inventory.

- **Historic Properties Management Plan** – if NRHP-eligible historic properties are located within the Project APE, then FERC will require the Licensee to consult with the Section 106 parties to develop an appropriate HPMP. FERC developed and published HPMP guidelines in consultation with the ACHP recently that provide a framework for developing a project-specific management plan as appropriate. The HPMP will include distinction for and definitions of routine maintenance, major maintenance, and emergency operations.

- **Programmatic Agreement** - FERC develops and distributes a Programmatic Agreement (PA) for signature that commits the Licensee to complete all outstanding identified work related to historic properties. This documents FERC's completion of the Section 106 consultation process and allows the ACHP to sign off on FERC's assessment of the Project effects on NRHP-eligible historic properties.

Reports that include site forms are developed and distributed to the Section 106 consultation parties for review and comment as appropriate. A single report will be written that encompasses the work completed. Any reports that include site location information must be kept confidential to avoid disclosing this information to surface collectors, site looters, or vandals.

3.0 Relevant Existing Information

Existing information regarding cultural resource sites and previous inventories in the Project area is on file at the Office of Archaeology and Historic Preservation of the Colorado Historical Society in Denver and at the San Juan Public Lands Office of the San Juan National Forest in Durango. Historic information about land use, land ownership, and water rights in the Project area are available at the La Plata and San Juan County Clerk's office in Durango and Silverton and in the General Land Office records on file at the Bureau of Land Management in Durango, Montrose, and Denver. More detailed water rights files of historical importance are available at the State Engineer's Office in Denver. Files pertaining to initial Homestead Patents now part of the Project area are at the National Archives in Washington, D.C. Additional historical information about the Project area can be gleaned from local newspapers and documents on file at local libraries and historical societies and at the Colorado Historical Society Library and the Western History Collection at the Denver Public Library. Historical information specific to the Tacoma Project is present in the Western Colorado Power Company Collection housed at the Center of Southwest Studies at Fort Lewis College in Durango. It is also likely that information of historical importance may be present in the files of PSCo.

4.0 Need for Additional Information

Some previous site recordings, Historic American Engineering Record (HAER) documentations, and cultural resource inventories have taken place in or near the Project. Recordation and HAER documentation of Terminal Dam, Aspaas Dam, and Power Flume No. 1 (Hawley 1980, 1983a and b), all integral parts of the Tacoma Hydroelectric Project, were conducted so that those elements could be replaced. Recordation of the Tacoma powerhouse was done in 1979 (Alexander and Conner 1979) and resulted in the plant being officially determined National Register eligible, but is a poor recording in need of updating. No systematic inventories of the existing facilities or the fluctuating shoreline of Electra Lake have been conducted. A few prehistoric sites and isolated finds are known in and near the Project, but comprehensive knowledge is lacking of whether prehistoric sites are present within the seasonally exposed Electra Lake basin or in close proximity to existing facilities. It is known that two historic wagon roads passed through the Project area and that other historic activities took place in the area prior to the construction of the Tacoma Project, but it is unknown if any evidence of these early activities remains in the Project area. In addition, the Tacoma Project is itself historic and historic evidence of its construction and use are in need of identification and documentation. These would include not only constructed elements of the Project including dams, flumes, and pipelines but work camps, sawmills, and employee housing. Synthesis of primary historical documentation of the Project, examination of state and federal agency site files, and review of regional prehistoric overviews for the Project area have not taken place and are necessary for a cultural resource context to be developed for the HPMP and proper treatment of sites under Section 106.

Recordation and National Register evaluation of historic and prehistoric sites within the seasonally exposed pool area of Electra Lake, along or in close proximity to existing facilities, and the historic facilities themselves will enable significant cultural resources to be managed and considered under Section 106 of the NHPA and will facilitate ongoing operation of the Tacoma Project.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The purpose of this study is to identify and evaluate cultural resources comprising the existing facility, in or near existing Project facilities, and potentially being impacted by current operations so that they can be considered under Section 106 of the NHPA and be managed appropriately. Additional data will be compiled with the survey data for the preparation of the HPMP, with the final goal of entering into a Programmatic Agreement (PA) for the management and treatment of cultural resources for the Project.

5.2 Relevant Resource Management Goals

The goals of the study will be that historic properties (i.e., significant cultural resources) comprising the Project, in close proximity to Project facilities, and potentially being impacted by current Project operations are known and their values understood so that they can be considered under Section 106 and managed in a manner that facilitates Project operation. By inventorying those portions of the Project in direct use that have not been previously been inventoried, continued operation and planning for maintenance, modification, upgrading, or expansion can take place with full knowledge of what historic properties are present, their nature, potential for avoidance, or likely mitigation needs will be. Such an approach is proactive and fully satisfies the goals of the Section 106 process, which is intended to prevent inadvertent disturbance or destruction of historic properties for projects on federal land or under federal authorization and allows for consultation where historic properties are concerned. Areas within the Project Boundary not currently in use and not anticipated for ground disturbance under current or foreseen plans will not be included in the inventory effort, but will be inventoried on a project-specific and place-specific basis if future plans involving ground disturbance require it.

Data from the inventory will be combined with a historic and prehistoric context derived from site file search, prehistoric overview, and synthesized primary historical data to prepare the HPMP. The HPMP will serve as a guide for cultural resource compliance for the license period for the Project. It is expected that the HPMP will result in a PA between PSCo, FERC, the Advisory Council on Historic Preservation (ACHP), and other interested parties that serves as a binding agreement for the treatment of cultural resources.

Other relevant water resource management goals for those lands and waters located within the boundaries of federal lands managed by the USFS are contained in the appropriate Forest Plan, in this case the 1992 Amended Land and Resource Management Plan of the San Juan National Forest. Specific direction includes:

Forest-Wide Direction

> ***Cultural Resource Management (01). Protect, find an adaptive use for, or interpret all cultural resources on National Forest System (NFS) lands which are listed on the National Register of Historic Places, the National Register of Historic Landmarks, or have been determined to be eligible for the National Registers.***
>
> ***a. Follow direction in FSM 2360.***
>
> ***Cultural Resource Management (02). Nominate or recommend cultural resource sites to the National Register of Historic Places by 1990 in the following priority:***
>
> ***a. Sites representing multiple themes;***
> ***b. Sites representing themes which are not currently on the National Register within the State; or***
> ***c. Sites representing themes which are current6ly represented by single sites.***

Cultural Resource Management (03). Protect and foster public use and enjoyment of cultural resources:

- ***a. Complete cultural resource surveys prior to any ground-disturbing project;***
- ***b. Avoid disturbance of known cultural resource until evaluated and determined not significant;***
- ***c. Collect and record information from sites where there is no other way to protect the properties;***
- ***d. Issue antiquities permits to qualifying academic institutions or other organizations for the study and research of sites;***
- ***e. Protect appropriate cultural resource properties for ceremonial/religious or other socio-cultural purposes by Native Americans and other cultural/ethnic groups.***

5.3 Relevant Public Interest Considerations

The guiding principle behind historic preservation legislation is that protection of important historic and archaeological sites is for the common good of the American people. The foremost and most relevant method for that to take place in the Project area is through the mandate of Section 106 of the NHPA. In addition to satisfying legal requirements, identification, evaluation, and management of cultural resources in the Project Area will benefit the public through the additional information acquired about prehistoric and historic use of the region and the importance of the Tacoma Project to the development of the San Juan Mountains and Durango area. The HPMP and PA for the management and treatment of cultural resources will ensure proper consideration of cultural resources for the life of the Project license.

5.4 Study Methodology

5.4.1 Study Area and Sites

Cultural resource inventories will take place in three specific areas. ***Additionally, inventories will be completed for areas adjacent to project facilities located outside the project boundary that are used for operation and maintenance of the Project.***

The first inventory will be the shoreline of Electra Lake (including adjacent Aspaas Lake), done at the time when the reservoir is near its lowest water level and the shoreline is clear of snow. This will be in the spring or fall of 2006. Because the reservoir is at its lowest point during the late winter or early spring and typically begins filling before the shoreline is free of snow, it is likely that the inventory will not be possible when the reservoir is at its lowest level. Still, a considerable amount of the shoreline below the high water mark will be visible at the time of the inventory. Terminal Dam and Aspaas Dam were replaced in 1980 and they were the subject of HAER documentation (Hawley 1980, 1983a). It is unknown if remnants of Stagecoach Dam still exist on the shoreline of Electra Lake.

The second inventory will be of the Cascade diversion dam, wooden Cascade Flume, the inverted siphon over Cascade Creek, and previously uninventoried portions of the buried water pipeline to Columbine Lake. The diversion dam will be recorded as an individual site and the

flume, siphon, and visible portions of the pipeline will be recorded as elements of a linear site. The diversion, flume, and siphon were constructed in 1924, and the pipeline was constructed from 1949 to 1952 to replace the original box flume. In addition to documenting these facilities, a survey of 50 feet on either side of the flume, siphon, and pipeline will be completed where previous inventories have not taken place. This 100-foot-wide corridor conforms to the Project boundary.

The third inventory will be along the Little Cascade Creek drainage between Columbine Lake and Aspaas Lake. Historical information suggests that the drainage was modified to carry water for the Project and that the lower 1,500 feet may have been contained in a wooden box flume. Again, a 100-foot-wide corridor (50 feet on either side of the drainage) will be inventoried to conform to the Project boundary.

A fourth inventory will be performed in areas within the Project Boundary that have a high potential for prehistoric cultural resources. These areas are defined as having relatively gentle slopes in close proximity of natural water sources.

In addition, the recordation of the Tacoma power plant structure should be updated with the completion of a current site form. Much of the documentation of the plant is currently underway as a volunteer partial HAER project being overseen by the National Park Service.

The second through fourth inventories will take place during the summer of 2006. Completion of site form for the power plant should be done during the summer of 2006 to take advantage of the completed partial HAER documentation.

No work is proposed at this time along the power flume portion of the Project below Electra Lake. It is expected that installation of a completely new pipeline and penstock system in this area in 1980, with HAER documentation of the Power Flume No. 1 at that time (Hawley 1983b), has resulted in a disturbed corridor with little or no potential for intact cultural resources to exist.

5.4.2 Methods

A Class I cultural resource site file search and overview will take place prior to fieldwork commencing in the identified survey areas. A file search at the San Juan Public Lands office of the San Juan National Forest in Durango was conducted on July 13, 2005. This revealed that a number of cultural resource inventories of blocks of land have covered a large amount of the Cascade Creek pipeline, and inventories have taken place of a few linear and smaller block areas elsewhere within the Project Area, but have covered an inconsequential amount of land. An initial search of the Colorado Historical Society's site files was conducted using the on-line COMPASS database, but finalization of the site file search will need to be completed at the Colorado Historical Society's Office of Archaeology and Historic Preservation in Denver. Background overview information has also begun to be gathered about the project area, but will need to be completed. Besides the site file information from the San Juan National Forest and the Colorado Historical Society, the most important information about the prehistory of the area will be gained through reference to the two pertinent Colorado prehistory contexts (Lipe et al. 1999; Reed and Metcalf 1999). The Western Colorado Power Company records on file at the

Center of Southwest Studies at Fort Lewis College in Durango have been examined and information about the Tacoma Project obtained. Information has also been gathered through on-line historical newspapers of the area. Additional historical information will be gathered at the Colorado Historical Society's library and at the Western History Collection of the Denver Public Library. Oral informants may be consulted to fill gaps in the historical record.

The Class III cultural resource inventory of the specified areas in the project area will be carried out under the direction of a qualified archaeologist under the Secretary of Interior's standards, permitted by the State of Colorado, and permitted by the US Forest Service for lands on the San Juan National Forest. Surveys will be conducted by linear pedestrian transects spaced at 15-m (50-foot) intervals so as to give complete coverage to the areas to be inventoried. When artifacts or cultural features are encountered, the crew will intensively inspect the surrounding area to determine whether a site or an isolated find is represented. Sites are defined as five or more artifacts, in relatively close proximity to one another, exceeding 50 years old. Locations with four or less artifacts will usually be classified as isolated finds. Sites may also be defined for features, structures, rock art, or facilities exceeding 50 years of age that lack artifacts. Site maps will be prepared with the aid of a GPS unit capable of submeter accuracy and locations will be plotted on USGS quadrangle maps using the same GPS units. Site maps will illustrate site boundaries, datums, and cultural and topographic features. Aside from the site maps, all sites will be photographed using black-and-white film to aid in the site relocation.

Sites will be evaluated for significance in terms of their eligibility for inclusion on the National Register of Historic Places (NRHP). Recommendations of significance will be made using the NRHP criteria for eligibility, as published in the U.S. Government Code of Federal Regulations (36 CFR 60). These read as follows:

National Register criteria for evaluation. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that has yielded, or may be likely to yield, information important in prehistory or history.

Identification and evaluation of cultural resources at the Project permit formulation of management recommendations. Isolated finds, by definition, are not eligible for inclusion on the NRHP.

Reports will be prepared that document the inventories and provide information about the discovered sites and their recommended National Register eligibility. These reports will be

prepared to the standards of the Secretary of Interior, San Juan National Forest, and the Colorado Historical Society. The reports will serve as the basis for PSCo to conduct consultation under Section 106 of the NHPA.

Data from the Class I site file search and overview and the Class III cultural resource inventories will form the basis for the preparation of the HPMP. The HPMP provides a state of knowledge of cultural resources and their management in the FERC license area by:

- outlining applicable federal and state laws
- establishing a context for historic and prehistoric sites of the area
- identifying known cultural resources and their significance ***[Comment: Based on this direction, the cultural resource inventories should be expanded to include the inventory, documentation, and evaluation of the all known cultural resources within the Area of Potential Effect. This would include, but not be limited to, the Animas City to Silverton Wagon Road, the cabin at Little Cascade Creek near Aspaas Lake, the remains of the Tramway that ascended the slope above the Tacoma power plant, and any other cultural resources that are known to exist within the Area of Potential Effect, but remain unrecorded and unevaluated.]***
- predicting what other cultural resources may exist in the license area
- identifying areas that have been previously inventoried for cultural resources
- identifying potential sources of impact to cultural resources within the licensing period
- outlining measures for the management of cultural resources
- establishing procedures for the implementation of cultural resource management

The HPMP will be prepared in accordance with the Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects (FERC 2002). A considerable focus of the document will be on existing project facilities because many are themselves historic, with several elements already officially determined to be eligible for inclusion on the National Register of Historic Places. Historic American Engineering Record documentation packages (HAER No. CO-15, CO-16, and CO-17) were prepared for Terminal Dam, Aspaas Dam, and Power Flume No. 1 by Colorado-Ute Electric Association, Inc. to allow removal or replacement of those elements of the project in 1980 (Hawley 1980, 1983a, 1983b). Other related or unrelated historic cultural resources may fall within the project boundaries, as may unidentified prehistoric sites or Traditional Cultural Properties. Another important element of the document is expected to be a plan for identifying and assessing the significance of currently unknown cultural resources within the project boundaries for the purposes of management and Section 106 compliance during continued operation of Project facilities, new construction, or modification of existing facilities.

5.5 Schedule

The inventory of the shoreline of Electra Lake and Aspaas Lake will be done as soon as snow has cleared from the shore early in the spring of 2006 so that as much of the shoreline as possible is available for viewing. Inventories of the Cascade Creek diversion, Cascade Flume, siphon and pipeline, the Little Cascade Creek drainage, and the areas of high prehistoric cultural resource

potential will take place during the summer of 2006. Updating of the site form for the power plant should take place after the partial HAER documentation is completed, probably during the summer of 2006. Preparation of the HPMP is currently underway. It is expected to be completed by at least June 2007 to conform to the Ames-Tacoma relicensing schedule.

5.6 Level of Effort

It is estimated that the inventory of the approximately 11 miles of shoreline around Electra Lake and the areas of high prehistoric cultural potential will take eight days time for a crew of three archaeologists. The inventory of 1.5 miles of 100-foot-wide strip along Little Cascade Creek is estimated to take two days for a crew of two archaeologists, the inventory of a 100-foot-wide strip centered on the Cascade Creek flume, siphon, and pipeline is expected to take three days for a crew of two archaeologists. An additional field day will be required to update the recordation of the power plant for two archaeologists. Collection of historical data, site file information, and prehistoric context data is expected to take four weeks of time, with three weeks required for synthesis and writing. An additional three weeks of time are expected to prepare a draft HPMP.

5.7 Discussion of Alternative Approaches

It would be possible to prepare the HPMP without the benefit of the proposed cultural resource inventories. However, few cultural resources are known in the Project area, existing facilities are either undocumented or poorly recorded, whether cultural resources are being impacted by fluctuations in Electra Lake would remain unknown, and whether cultural resources are present along Little Cascade Creek would be unknown. Inventories of these areas could be prescribed in the HPMP, but the resulting document would be less complete and would not enable a proactive and comprehensive approach to managing cultural resources to take place. ***[Comment: Preparation of an HPMP without the benefit of the proposed cultural resource inventories would result in a document that does not adequately identify effects to cultural resources by project activities (potentially caused by both the current operation of the system and proposed improvements), and would therefore not be acceptable for compliance with Section 106 of the National Historic Preservation Act.]***

5.8 Data Analysis and Reporting

The results of the cultural resource inventories would be reported upon in one or more cultural resource reports, depending upon the timing of the inventories. These reports would be prepared in accordance with the Secretary of Interior's guidelines and to the standards of the US Forest Service and Colorado State Historic Preservation Office. Data from the inventories will be incorporated into the HPMP and will facilitate cultural resource management of the Project.

6.0 References

Alexander, Robert K., and Carl E. Conner
1979 *Cultural Resource Inventory Report of the Tacoma Project for Colorado-Ute Electric Association, Inc.* GRI/CRI Report 7914. Grand River Institute, Grand Junction, Colorado. On file at the Colorado Historical Society, Office of Archaeology and Historic Preservation, Denver. (USFS Project No. 13-142).

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1980 *Historic American Engineering Record No. CO-15, Terminal Dam (Tacoma Project).* Colorado-Ute Electric Association, Inc., Montrose, Colorado. On file at the Colorado Historical Society, Office of Archaeology and Historic Preservation, Denver.

1983a *Historic American Engineering Record No. CO-16, Aspaas Dam (Tacoma Project).* Colorado-Ute Electric Association, Inc., Montrose, Colorado. On file at the Colorado Historical Society, Office of Archaeology and Historic Preservation, Denver.

1983b *Historic American Engineering Record No. CO-17, Power Flume No. 1 (Tacoma Project).* Colorado-Ute Electric Association, Inc., Montrose, Colorado. On file at the Colorado Historical Society, Office of Archaeology and Historic Preservation, Denver.

Lipe, William D., Mark D. Varien, and Richard H. Wilshusen, editors
1999 *Colorado Prehistory: A Context for the Southern Colorado River Basin.* Colorado Council of Professional Archaeologists, Denver.

Reed, Alan D., and Michael D. Metcalf
1999 *Colorado Prehistory: A Context for the Northern Colorado River Basin.* Colorado Council of Professional Archaeologists, Denver.

ATTACHMENT A
CULTURAL RESOURCES WORKING GROUP
Draft Issue Assessment No. 2[5]
The Tacoma Project Has Considerable Historical Value. Therefore, How Can the Plant's Historical and Cultural Value Be Acknowledged and Protected, Including Its Associated Recreational Features

1.0 Description of Issue

It was pointed out that the Tacoma Project is comprised of numerous features with potentially significant historical and cultural value. Elements of these potentially significant historical and

[5] Previously Issue Nos. 2 & 3.

cultural values may include: the context of its significance as a state and national hydroelectric generation site; the relationship to the Silverton, Mayflower Mill, and Durango-Silverton Railroad National Historic Landmarks; and evaluating the powerhouse as a National Historic Landmark in its own right. These project facilities include water diversions, wooden flumes, pipelines, reservoirs, dams, powerhouse, and even the older recreation camps on Electra Lake. There also have been long-term recreational uses such as fishing, boating, and hiking associated with some of the features. The powerhouse, as it currently exists, was constructed in the first decade of the 1900s at a time when alternating current was still relatively new. The majority of these features and recreational uses are considered by many as having historical and cultural importance. An issue was identified as to how these potentially significant features would be identified and protected. This issue includes the question of which agency and/or organization will perform this function and which process will be utilized.

These issues are considered in the overall Section 106 review process.

2.0 Project Effects

The Tacoma Project became operational in 1906 and constitutes one of the early economic developments in this region of Colorado. The Tacoma Project continues to be a valuable energy source providing electrical generation on-peak when most needed by electricity users. Public Service Company of Colorado (PSCo) is proposing to continue to operate the Tacoma Project as it has in the past and is not proposing any changes to Project facilities or operations. At the same time, PSCo recognizes the historic significance of the Project and intends to meet the requirements of Section 106 of the National Historic Preservation Act (NHPA) as outlined in the Cultural RWG Issue Assessment No. 1. This compliance also applies to any changes to Project facilities that may be considered as a result of relicensing (e.g. changes to recreation use).

ATTACHMENT B
CULTURAL RESOURCES WORKING GROUP
Draft Issue Assessment No. 3[6]
Identifying And Protecting Known And Unknown Cultural Resources;
Not Just Project Facilities

1.0 Description of Issue

An issue was raised about the need to identify and protect known and, as of yet, unknown cultural and/or historical resources within the area controlled by the Tacoma Project. There may be known and unknown cultural and/or historical resources within these Project boundaries. It was questioned whether during the relicensing of the Project there would be the need to identify, protect, and preserve these cultural features. If so, it must also be determined which agency and/or organization will perform this function and which process will be utilized. It was indicated that portions of the Project may be located on private property not owned by Public Service Company of Colorado (PSCo).

These sub-issues will be considered during the Section 106 review process.

[6] Previously Issues Nos. 4, 5, & 7

2.0 Project Effects

The Tacoma Project facilities and operations will be evaluated as part of PSCo's compliance with Section 106 of the National Historic Preservation Act (NHPA). A description of the relationship between the Project and historic properties is contained within Cultural RWG Issue Assessment No. 1.

ATTACHMENT C
CULTURAL RESOURCES WORKING GROUP
Draft Issue Assessment No. 4[7]
What Are The Effects Of Proposed Project Modifications As They Relate To Cultural Resources

1.0 Description of Issue

A concern was identified related to the potential effects of any proposed project modifications, improvements, or changes in operations on the cultural resources in the Tacoma Project area. It was asked how any such impacts would be identified and addressed.

These issues will be considered during the Section 106 review process.

2.0 Project Effects

Public Service Company of Colorado (PSCo) is not proposing any changes to the Tacoma Project facilities or operations at this time. However, changes over the next license term (30 to 50 years) may be necessary. By the process outlined in Cultural RWG Issue Assessment No. 1, PSCo will develop a management plan for identifying and implementing future project modifications that may affect historic and cultural resources.

[7] Previously Issue No. 6

Tacoma Project Study Request No. 10

Title of Proposed Study: Condition of Project Facilities on Cascade Creek

Sponsor of Proposed Study: USDA Forest Service

The USDA Forest Service proposes an evaluation of the condition of project facilities on Cascade Creek. This study should include evaluation of Tacoma Recreation, Land Use, and Aesthetics Resource Work Group (RWG) Issue Assessment #7. We have included the most recent draft of this assessment as provided by Devine Tarbell and Associates and developed in collaboration with the members of the RWG. Our suggested edits are provided in italics within the issue assessment below.

RECREATION, LAND USE, AND AESTHETICS RESOURCE WORK GROUP
Draft Issue Assessment No. 7[8]
Condition of Project Facilities on Cascade Creek

1.0 Description of Issue

The issue of documenting the current condition and status of facilities on Cascade Creek and related current amount and type of use was raised. The documentation of the status and condition of Project facilities within the Cascade Creek drainage was requested. This would include documenting the status and condition of the bridge over the wooden flume, compliance with the special use permits for storage and facility areas, and fencing and equipment. Additionally, it is suggested that there is increased public use of the area and a determination of the appropriate manner to address the aesthetic character of the area may be warranted.

2.0 Project Effects

The Tacoma Project facilities include the Cascade Creek diversion dam and intake, elevated wooden flume, and siphon crossing Cascade Creek just upstream of U.S. Highway 550. Access to this part of the Project is via U.S. Forest Service (USFS) Cascade Creek Pack/4WD trail. Most of the Project facilities in this portion of the Project occupy federal lands managed by the USFS. As part of its relicensing process, the Project will be reviewed as to its overall compliance with USFS policies and management plans to identify areas of non-compliance or areas for improvement. A particular emphasis will be placed on the area between Cascade Creek diversion dam and U.S. Route 550 with respect to access.

3.0 Relevant Existing Information

Existing information regarding recreation and land use in the Project area is provided in PSCo's Pre-Application Document (PAD) and is listed in the *References* section of this Study Plan. Information regarding the current physical condition of facilities at Cascade Creek is summarized in the PAD, Section 5.

[8] Originally Issue Nos. 8 & 9 on the Unedited Issues List; Issue Nos. 9 & 10 on the Revised Issues List.

4.0 Need for Additional Information

Information on the current compliance of the Project facilities with USFS policies and management plans do not currently exist. This study will be undertaken to obtain the information needed to evaluate Project facilities located between U.S. Route 550 and the Cascade Creek diversion dam.

5.0 Final Study Plan

5.1 Purpose of Study and Use of Study Results

The purpose of this study is to identify Project components and associated recreation use impacts to the surrounding characteristic landscape in the area between Cascade Creek diversion dam and U.S. Route 550. For the visual contrast assessment, the surrounding landscape would be evaluated for various characteristics, such as its scenic attractiveness, scenic integrity, visual absorption capacity, public visibility, visual distance zones, visual sensitivity and, where applicable, USFS and Bureau of Land Management (BLM) visual quality objectives. Information from this assessment would be used to identify potential measures to reduce Project-related visual contrast with the surrounding environment specific to the area between Cascade Creek diversion dam and U.S. Route 550.

This study will be used to document aesthetic resource conditions at the Project and identify the Project effects on aesthetic resources in the area of the Cascade Creek diversion dam as well as consistency with current land management plans and policies.

5.2 Relevant Resource Management Goals

The relevant water resource management goals for those lands and waters located within the boundaries of federal lands managed by the USFS are contained in the appropriate Forest Plan, in this case the 1992 Amended Land and Resource Management Plan of the San Juan National Forest. Specific direction includes:

Forest-Wide Direction

> ***Visual Resource Management (02). Rehabilitate all existing projects and areas which do not meet the adopted visual quality objective(s) (VQO) specified for each management area. Set priorities for rehabilitation, considering the following:***
>
> ***a. Relative importance of the area and the amount of deviation from the adopted VQO. Foreground areas have the highest priority;***
> ***b. Length of time it will take natural processes to reduce the visual impacts so that they meet the adopted VQO;***
> ***c. Length of time it will take rehabilitation measures to meet the adopted VQO; and***
> ***d. Benefits to other resource management objectives to accomplish rehabilitation.***

Management-Area Direction/Rural and Roaded-Natural Recreation (2B)

The Cascade Diversion and associated facilities are located within the 2B Management Prescription Area. Emphasis is for rural and roaded-natural recreation opportunities. Visual resources are managed so that management activities maintain or improve the quality of recreation opportunities. Management activities are not evident, remain visually subordinate, or may be dominant, but harmonize and blend with the natural setting.

> ***Visual Resource Management (01). Design and implement management activities to provide a visually appealing landscape. Enhance or provide more viewing opportunities and increase vegetation diversity in selected areas.***
>
> ***a. Do not exceed an Adoped Visual Quality Objective (VQO) of Partial Retention.***
>
> ***b. Manage visual resources using the above standards in accordance with FSM 2380 and FSH 2309.16 through FSH 2309.25.***

Management-Area Direction/Semi-Primitive Motorized Recreation (2A)

The road to Forebay Lake and pipeline are located in a 2A Management Prescription Area. Emphasis is for semi-primitive motorized recreation opportunities. Visual resources are managed so that management activities are not evident or remain visually subordinate.

> ***Visual Resource Management (01). Design and implement management activities to provide a visually appealing landscape. Enhance or provide more viewing opportunities and increase vegetation diversity in selected areas.***
>
> ***a. Do not exceed an Adopted Visual Quality Objective (VQO) of Partial Retention.***
>
> ***b. FS System travel routes are Sensitivity Level one.***
>
> ***c. Apply rehabilitation practices where the above objectives are not currently being met.***
>
> ***d. Manage visual resources using the above standards in accordance with FSM 2380 and FSH 2309.16 through 2309.25.***

5.3 Relevant Public Interest Considerations

The Recreation, Land Use, and Aesthetics Resource Work Group requested that as part of the relicensing process, the Project should be reviewed as to its overall compliance with USFS policies and management plans to identify areas of non-compliance or areas for improvement. The focus of this issue was the area between Cascade Creek diversion dam and U.S. ***Highway*** 550 with respect to aesthetics.

5.4 Study Methodology and Analysis

To address aesthetic impacts, a visual assessment study will be conducted consisting of three components: (1) an inventory and assessment of the area's visual resources and landscape

character; (2) a review of the visual management polices applicable to the specific area; (3) an assessment of any visual contrast between the Project's components and surrounding landscape; ***and (4) Review of housekeeping practices and their compliance with visual resources.***

5.4.1 Inventory/Assessment of Visual Resources

Building on information presented in section 5.9 of the PAD, an inventory of all Project facilities in the vicinity of the Cascade Creek diversion dam will be undertaken. The visual characteristics of the area ***and/or site*** will be evaluated and photographed. Unique and important visual resources as well as the characteristic landscapes within the area will be identified. Unique landscape units, key public view points, and key public viewing areas including distance zones for Project components will be identified and evaluated. The scenic attractiveness, scenic integrity, absorption capacity, and visual sensitivity of the landscapes in the area between Cascade Creek diversion dam and U.S. ***Highway*** 550 will be assessed.

5.4.2 Review of the Visual Management Polices

USFS management plans relevant to visual resources in the study area will be identified. Land management plans, transportation plans, and other resource use plans will be evaluated to identify visual resource management considerations applicable to the area. On U.S. Forest system lands, the Project's relationship to current Visual Quality Objectives (VQOs) will be assessed. Any highway and road scenery management regulations and policies as well as any trail or waterway designations that may be applicable will also be identified.

5.4.3 Assessment of Visual Contrast

Within the area between Cascade Creek diversion dam and U.S. ***Highway*** 550, the visual compatibility of the Project features with the surrounding landscape, including linear features such as the wooden flume, siphon and all ancillary facilities will be evaluated. In addition, facilities at the gauging station at Elbert Creek and facilities at Forebay Lake will be reviewed. Visual contrast, compatibility of the Project components, potential recreation use impacts, and potential impacts on the surrounding landscape will be evaluated.

The visual assessment methods to be used in this study will be consistent with the relevant Forest Service and Bureau of Land Management visual assessment methods (USDA Forest Service 1995 and 1974; BLM undated Handbook H-8400 series). This methodology as applied to the mix of federal and non-federal lands within a hydroelectric project area has been successfully used in the recent Pit 3, 4, 5 relicensing and Upper North Fork Feather River relicensing studies.

The results of this study will be of use and consideration in the recreation, land management and historic resources study work as there is cross-over areas of interest in both structures and visual compatibility of Project components within the larger landscapes.

5.5 Schedule

This study will be coordinated with field work for the recreation facility inventories and assessments to be conducted during the summer of 2006. The time estimated to complete the field review is approximately 4 days.

5.6 Level of Effort

This effort will be coordinated with work proposed in Issue Assessment No. 2, ADA Compliance. Field work will be conducted during the same time period as Issue Assessment No. 2, as part of an overview of facilities and ADA compliance.

5.7 Discussion of Alternative Approaches

There have been no alternative approaches proposed at this time.

5.8 Reporting

The study methods and results will be contained in a stand alone report that will be included in the Final License Application.

References

Landscape Aesthetics, A Handbook for Scenery Management. USDA Forest Service, Agriculture Handbook Number 701. December 1995

National Forest Landscape Management, series, USDA Forest Service, Agricultural Handbooks, Number 462 (1974), 478 (1975), 666 (1987). Also referenced at their web site http://www.fs.fed.us/im/directives/fsm/2300/2380.doc

Visual Resource Management, Manual H-8400, et. seq, Bureau of Land Management (http://www.blm.gov/nstc/VRM/index.html)

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