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October 9, 2002

Ms. Magalie R. Salas, Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, D. C. 20426

Subject: **FOREST SERVICE PRELIMINARY 4(e) CONDITIONS  
PG&E - Pit 3, 4, 5 Hydroelectric Project No. 233**

Dear Ms. Salas:

Enclosed for filing are the Forest Service's Preliminary Terms and Conditions for inclusion in a new license for this project, comments, recommendations and rationale pursuant to Sections 4(e) and 10(a) of the Federal Power Act. This filing is in response to your notice of "Ready for Environmental Assessment" (REA).

The preliminary "4(e) license conditions" and "10(a) recommendations" contained in this document were developed by comparing the "desired condition" (the condition towards which we are trying to move the resources) with the Forest Service's knowledge of the resources' existing condition (the state of the resources today). The basis for the desired condition comes from Comprehensive Plan direction, Forest Service policy, rules, laws, and regulations. The basis for the existing resource condition comes from the results of studies completed by PG&E, FS data collection, observations of the affected resources during project base flows and control flow tests in May and August of 2002, and professional judgment.

Where the "desired" and "existing" resource conditions are not the same, the objective is to move the resources towards the "desired" condition. Where this difference can be demonstrated to result from direct or indirect effects of the Pit 3/4/5 Hydroelectric Project (Project), "4(e) license conditions" or "10(a) recommendations" are defined in this document. The Forest Service has

prescribed mandatory 4(e) license conditions and explanatory rationale where there is a direct or indirect linkage between the project and effects to National Forest System lands. Optional 10(a) recommendations and a rationale are provided for your consideration, where project effects are **not** directly or indirectly affecting National Forest System lands.

The license conditions and recommendations in this document will be used as the “proposed action” from which the Forest Service will solicit public review through the scoping process as defined in the National Environmental Policy Act. Study results, especially those associated with flows and river stage-height are not yet complete. Results of these studies could alter, eliminate, or increase our concern with specific resources. Due to the fact that public input has not yet been solicited and river flow related studies are not yet complete, conditions in this document are preliminary.

**Enclosure 1** contains the 4(e) preliminary terms and conditions found to be necessary for the protection and utilization of the Shasta National Forest, as administered by the Lassen and Shasta-Trinity National Forests. Applicable comprehensive plans include: the Lassen and Shasta-Trinity National Forest Land and Resource Management Plans (1992 and 1995 respectively), amendments to those plans including the “Sierra Nevada Forest Plan Amendment”, Record of Decision for Amendment to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl” Chalk Mountain Comprehensive Late Successional Reserve Assessment” “Supplement to Watershed Analysis for Chalk Mountain Late Seral Reserve” and others.

The preliminary terms and conditions submitted herein are predicated on a new license term of 30 years. The Forest Service reserves the authority to submit revised terms and conditions in the event the Commission issues a license with a term exceeding 30 years.

**Enclosure 2** contains the rationale for the 4(e) mandatory license conditions found in Enclosure 1. This information will be supplemented during the NEPA process, as additional information becomes available from incomplete PG&E studies. Appendices 1 and 2 to this enclosure, which include tables, graphs and photographs resource concerns, will be filed separately because of the digital size of those documents.

**Enclosure 3** contains Forest Service recommendations and rationale for those recommendations.

The schedule for submittal of final terms and conditions and modified terms and conditions is as follows:

Pursuant to 18 CFR, Section 4.34(b)(1) the Forest Service will issue a NEPA Decision and file final terms and conditions and supporting information for the Pit 3, 4, and 5 Hydroelectric Project within 90 days of publication of the Commission's final NEPA document for license. Pursuant to 18 CFR, Section 4.34(b) (4), the USDA Forest Service will issue modified terms and conditions and provide additional information in response to the draft NEPA document prepared by the Commission.

The Forest Service is submitting a lengthy rationale (Enclosure 2) for the Preliminary License Terms and Conditions in an effort to provide the FERC with an adequate explanation of the relationship of these measures to comprehensive plan direction and the nexus to National Forest System lands. This is in compliance with the 2001 Interagency Task Force (ITF) "NEPA Procedures in FERC Hydroelectric Licensing" Report. Due to the complexity of the aquatic based issues on this Project, the Forest Service recommends a "clarification meeting", as allowed in the ITF documents, if additional explanation is needed.

Please contact Kathy Turner, Land & Recreation Officer, Hat Creek Ranger District, Lassen National Forest at (530) 336-5521 if you have questions concerning this submittal.

Sincerely,

/s/

Jack Gipsman

Attorney for the Forest Service

Enclosures

cc: Kathy Turner, Hat Creek RD, Lassen NF  
Bob Hawkins, RHAT  
Service List

JG/am



## **Enclosure 1**

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## **ENCLOSURE 1**

### **Pit 3, 4, and 5 HYDROELECTRIC PROJECT, FERC No. 233**

### **PACIFIC SOUTHWEST REGION, USDA FOREST SERVICE**

### **PRELIMINARY 4(e) TERMS AND CONDITIONS**

#### **General**

License articles contained in the Federal Energy Regulatory Commission's (Commission) Standard Form L-1 issued by Order No. 540, dated October 31, 1975, cover those general requirements that the Secretary of Agriculture, acting by and through the Forest Service, considers necessary for adequate protection and utilization of the land and related resources of the Shasta National Forest, as administered by the Lassen and Shasta-Trinity National Forests. Under authority of section 4(e) of the Federal Power Act (16 U.S.C. 797(e)), the following terms and conditions are deemed necessary for adequate protection and utilization of the Shasta National Forest lands and resources. These terms and conditions are based on those resources and management requirements enumerated in the Organic Administration Act of 1897 (30 Stat. 11), the Multiple-Use Sustained Yield Act of 1960 (74 Stat. 215), the National Forest Management Act of 1976 (90 Stat. 2949), and any other law specifically establishing a unit of the National Forest System or prescribing the management thereof (such as the Wilderness Act or the Wild and Scenic Rivers Act), as such laws may be amended from time to time, and as implemented by regulations and approved Land and Resource Management Plans prepared in accordance with the National Forest Management Act. Therefore, pursuant to section 4(e) of the Federal Power Act, the following conditions covering specific requirements for protection and utilization of National Forest System lands shall also be included in any license amendment issued.

#### **STANDARD CONDITIONS**

##### **Condition No. 1 - Forest Service Approval of Final Design**

Prior to undertaking activities on National Forest System lands (NFSL), the Licensee shall obtain written approval from the Forest Service for all final design plans for project components that the Forest Service deems as affecting or potentially affecting National Forest System lands and resources. As part of such prior written approval, the Forest Service may require adjustments in final design plans and facility locations to preclude or mitigate impacts and to assure that the project is compatible with on-the-ground conditions. Should the Forest Service, the Commission, or the Licensee determine that necessary changes are a substantial change, the Licensee shall follow the procedures of

Article 2 of the license. Any changes to the license made for any reason pursuant to Article 2 or Article 3 shall be made subject to any new terms and conditions the Secretary of Agriculture may make pursuant to section 4(e) of the Federal Power Act.

### **Condition No. 2 - Approval of Changes After Initial Construction**

Notwithstanding any license authorization to make changes to the project, the Licensee shall obtain written approval from the Forest Service prior to making any changes in any constructed project features or facilities, or in the uses of project lands and waters the Forest Service deems as affecting or potentially affecting National Forest System lands and resources. Following receipt of such approval from the Forest Service, and a minimum of 60-days prior to initiating any such changes, the Licensee shall file a report with the Commission describing the changes, the reasons for the changes, and showing the approval of the Forest Service for such changes. The Licensee shall file an exact copy of this report with the Forest Service at the same time it is filed with the Commission. This article does not relieve the Licensee from the requirement for license amendment or other requirements of Article 2 or Article 3 of this license. Any changes to the license made for any reason pursuant to Article 2 or Article 3 shall be made subject to any new terms and conditions the Secretary of Agriculture may make pursuant to section 4(e) of the Federal Power Act.

### **Condition No. 3 - Consultation**

Each year during the 60-days preceding the anniversary of this license, or as arranged with the Forest Service, the Licensee shall consult with the Forest Service with regard to measures needed to ensure protection and utilization of the National Forest System lands and resources affected by the Project. Within 60 days following such consultation, the Licensee shall file with the Commission evidence of the consultation with any recommendations made by the Forest Service. The Forest Service reserves the right, after notice and opportunity for comment and administrative review, to require changes in the project and its operation through revision of the 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest lands and resources. A copy of any violation report filed by PG&E with FERC shall be sent concurrently to the Forest Service. Annual consultation shall include discussion of the following:

- A brief written report on large woody debris augmentation and gravel monitoring results for that annual reporting period. The Report shall include, at a minimum, amounts and dates of large woody debris supply augmentation activities, observations of materials entrained during the previous year, results of the gravel monitoring plan, and annual project implementation costs.

#### **Condition No. 4 - Hazardous Substances Plan**

Within 6 months of license issuance, the Licensee shall file with the Commission, a Hazardous Substances Plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup.

At a minimum, the Licensee shall:

- Outline the Licensee's procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their assigned responsibilities,
- Maintain in the project area, a cache of spill cleanup equipment suitable to contain any spill from the project,
- Semi-annually inform the Forest Service of the location of the spill cleanup equipment on National Forest System lands and of the location, type, and quantity of oil and hazardous substances stored in the project area; and,
- Inform the Forest Service immediately of the nature, time, date, location, and action taken for any spill affecting National Forest System lands and Licensee adjoining fee title property.

#### **Condition No. 5 - Maintenance of Improvements**

The Licensee shall maintain all its improvements and premises on National Forest System lands to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the Forest Service. The Licensee shall comply with all applicable Federal, State, and local laws, regulations, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., the Resources Conservation and Recovery Act, 42 U.S.C. 6901 et seq., the Comprehensive Environmental Response, Control, and Liability Act, 42 U.S.C. 9601 et seq., and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siting, construction, operation, maintenance of any facility, improvement, or equipment.

#### **Condition No. 6 - Safety During Project Construction**

Within 60-days of planned ground-disturbing activity, the Licensee shall file with the Commission a Safety During Construction Plan that identifies potential hazard areas and measures necessary to protect public safety. Areas to consider include construction activities near public roads, trails, and recreation areas and facilities.

The Licensee shall perform daily (or on a schedule otherwise agreed to by the Forest Service in writing) inspections of Licensee's construction operations on National Forest System lands and Licensee adjoining fee title property while construction is in progress. The Licensee shall document these inspections (informal writing sufficient) and shall deliver such documentation to the Forest Service on a schedule agreed to by the Forest Service. The inspections must specifically include fire plan compliance, public safety,

and environmental protection. The Licensee shall act immediately to correct any items found to need correction.

**Condition No. 7 - Existing Claims**

The license shall be subject to all valid claims and existing rights.

**Condition No. 8 - Compliance with Regulations**

The Licensee shall comply with the regulations of the Department of Agriculture and all Federal, State, county, and municipal laws, ordinances, or regulations in regard to the area or operations covered by this license, to the extent federal law does not preempt ordinances or regulations.

**Condition No. 9 - Protection of United States Property**

The Licensee shall exercise diligence in protecting from damage the land and property of the United States covered by and used in connection with this license.

**Condition No. 10 – Surrender of License or Transfer of Ownership**

Prior to any surrender of this license, the Licensee shall restore National Forest System resources to a condition satisfactory to the Forest Service. In advance of the proposed surrender, the Licensee shall file a restoration plan for approval by the Forest Service. The restoration plan shall identify the measures to be taken to restore National Forest System resources and shall include adequate financial assurances such as a bond or letter of credit, to ensure performance of the restoration measures.

Any agreement made by the licensee to transfer or sell the License shall require the transferee or purchaser to post a bond to cover the cost of surrender and restoration of National Forest System resources. Prior to any request for approval from the commission for a sale or transfer of ownership of the license, the licensee shall pay for the cost of experts, selected by the Forest Service, to develop a restoration plan and estimate the cost of surrender and restoration. The licensee shall not request approval from the commission for the sale or transfer until the restoration plan and cost estimates are completed and the transferee or purchaser posts a bond, approved by the Forest Service, to cover the estimated cost of surrender and restoration.

**Condition No. 11 - Self Insurance**

The Licensee shall indemnify, defend, and hold the United States harmless for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of the Licensee in connection with the use and/or occupancy authorized by this license. This indemnification and hold harmless provision applies to any acts and omissions of the Licensee or the Licensee's heirs, assigns, agents, employees, affiliates, subsidiaries, fiduciaries, contractors, or lessees in connection with the use and/or occupancy authorized by this license which result in: (1) violations of any laws and regulations which are now or which may in the future become applicable, and including but not limited to environmental laws such as the Comprehensive Environmental Response Compensation and Liability Act, Resource Conservation and Recover Act, Oil Pollution Act, Clean Water Act, Clean Air Act; (2) judgments, claims, demands, penalties, or fees assessed against the United States; (3) costs, expenses, and damages incurred by the United States; or (4) the release or threatened release of any solid waste, hazardous substances, pollutant, contaminant, or oil in any form in the environment.

#### **Condition No. 12 - Water Pollution**

Unless authorized by the State, the Licensee shall discharge no waste or byproduct if it contains any substances in concentrations that would result in violation of water quality standards set forth by the State; would impair present or future beneficial uses of water; would cause pollution, nuisance, or contamination; or would unreasonably degrade the quality of any waters in violation of any federal or state law. During any new construction, the Licensee shall prevent water pollution by using management practices identified as necessary by the Forest Service.

#### **Condition No. 13 - Damage--High Hazard**

The Licensee is hereby made liable for all injury, loss, or damage to the United States land and property, including but not limited to fire suppression costs, directly or indirectly resulting from or caused by the Licensee's power lines covered by this license, or any other high risk use and occupancy of the area covered by this license, regardless of whether the Licensee is negligent or otherwise at fault, provided that the maximum liability without fault shall not exceed \$1,000,000 for any one occurrence, and provided further that the Licensee shall not be liable when such injury, loss, or damage results wholly, or in part, from a negligent act of the United States, or from an act of a third party not involving the facilities of Licensee.

Determination of liability for injury, loss, or damage, including fire suppression costs, in excess of the specified maximum, shall be according to the laws governing ordinary negligence.

#### **Condition No. 14 - Risks and Hazards**

The Licensee is responsible for inspecting its site, right of way and immediate adjoining area for dangerous trees, hanging limbs, and other evidence of hazardous conditions and is responsible for removing such hazards, after securing permission from the Forest Service, except in an emergency where there is an imminent risk of death or injury to the public or damage to facilities in which case the Licensee shall notify the Forest Service of the action as soon as possible.

#### **Condition No. 15 - Signs**

The Licensee shall consult with the Forest Service prior to erecting any signs on NFSL relating to this license. The Licensee must obtain the approval of the Forest Service as to the location, design, size, color, and message. The Licensee shall be responsible for maintaining all Licensee erected signs to neat and presentable standards.

#### **Condition No. 16 - Pesticide-Use Restrictions**

Pesticides may be used to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, trash fish, etc., with the prior written approval of the Forest Service. The Licensee shall submit a request for approval of planned uses of pesticides. The request must cover annual planned use and be updated as required by the Forest Service. The Licensee shall provide information essential for review in the form specified by the Forest Service. Exceptions to this schedule may be allowed only when unexpected outbreaks of pests require control measures that were not anticipated at the time the report was submitted. In such an instance, an emergency request and approval may be made.

The Licensee shall use on National Forest System land only those materials registered by the U.S. Environmental Protection Agency for the specific purpose planned. The Licensee must strictly follow label instructions in the preparation and application of pesticides and disposal of excess materials and containers.

#### **Condition No. 17 - Traffic Control During Construction**

When construction is in progress adjacent to or on Forest Service controlled roads open to public travel, the Licensee shall furnish, install, and maintain temporary traffic controls to provide the public with adequate warning and protection from hazardous or potentially hazardous conditions associated with the Licensee's operations. Device must be appropriate to current conditions and must be covered or removed when not needed. Except as otherwise agreed, flaggers and devices must be as specified in the "Manual on Uniform Traffic Control Devices for Streets and Highways".

#### **Condition No. 18 - Area Access**

The United States shall have unrestricted use of any road constructed within the project area for all purposes deemed necessary or desirable in connection with the protection, administration, management, and utilization of Federal lands or resources and shall have the right to extend rights and privileges for use of the right-of-way and road thereon to States and local subdivisions thereof, as well as to other users, including members of the public, except contractors, agents and employees of the Licensee; provided, that the agency having jurisdiction shall control such use so as not unreasonably to interfere with use of the road by the Licensee.

**Condition No. 19 - Road Use**

The Licensee shall confine all project vehicles, including but not limited to administrative and transportation vehicles, and construction and inspection equipment, to roads or specifically designed access routes. The Forest Service reserves the right to close any and all such routes where damage is occurring to the soil or vegetation, or if requested by Licensee, to require reconstruction/construction by the Licensee to the extent needed to accommodate the Licensee's use. The Forest Service agrees to provide notice to the Licensee and the FERC prior to road closures, except in an emergency, in which case notice will be provided as soon as practicable.

**Condition No. 20 - Modification of Forest Service Conditions**

The Forest Service reserves the right to modify these conditions, if necessary, to incorporate changes necessitated by additional information provided by studies which have not been completed to date, by findings in the Project of new noxious terrestrial or aquatic biota, and to address new listings of Threatened, Endangered, and other special status species on the Project.

**PROJECT SPECIFIC CONDITIONS**

**Condition No. 21 - Minimum Instream Flow Regime**

The Licensee shall, beginning as early as practicable within 3 months after license issuance, maintain minimum streamflows in the Pit River of 400 cfs in the Pit 3 Project bypass reach and 450 cfs in the Pit 4 Project bypass reach.

Upon completion of outstanding Summer 2002 two-dimensional habitat mapping and fishability study results and other applicable study results (or within one year after license issuance, whichever is sooner), the Licensee, as approved by the Forest Service, filed with the Commission, and in consultation with other applicable agencies shall, where appropriate, shape the minimum flows outlined above. Shaping may include within year changes (e.g., slightly higher flows in spring and lower flows in summer and fall) and

between year changes (slightly higher flows in wet years and lower flows in dry years). Shaping of flows will be based on the 1970 to 1999 period of record. Where shaping occurs, instantaneous minimum flows will not exceed 1000 cfs and will not go below 300 cfs.

Where facility modification is required to maintain the specified minimum streamflows, the Licensee shall complete such modifications as soon as practicable and no later than 2 years after license issuance. The Licensee shall modify minimum streamflow release facilities such that the modified facilities can safely, accurately, and continuously release flows in 50 cfs increments ranging from 300 cfs to 1,000 cfs, and produce flow changes on at least a bi-weekly frequency without an unreasonable manual effort. Prior to such required facility modifications, the Licensee shall make a good faith effort to provide the specified minimum streamflows as far as feasible within the capabilities of the existing facilities.

The minimum streamflows may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the streamflow is so modified, the Licensee shall provide notice to the Forest Service as soon as possible, but no later than 10 days after such incident. The minimum streamflows specified may also be temporarily modified for short periods in non-emergency situations 5 days after Forest Service approval.

#### **Instream Flow Measurement:**

The Licensee shall measure and document all instream flow releases in publicly available and readily accessible formats. For the purposes of measuring and documenting compliance with the required minimum instream flows in the Pit 3 and Pit 4 Project bypass reaches, the Licensee shall prepare and file with the Commission an Instream Flow Measurement Plan (Plan) that is approved by the Forest Service. The Plan shall include a description of existing or proposed instream flow measurement gages or devices, including flow gages, spillway or reservoir outlet discharge measurement devices, etc., and a detailed proposal for measuring instream flow in each of the Project reaches with existing or proposed devices. The Plan must describe existing or proposed provisions for making mean daily flow data continuously available to the public from the United States Geological Survey (USGS) via the Internet, and for making hourly and 15-minute gage data publicly available through the USGS. The Plan shall include evidence of gage calibration and historical and recent cross-section data, if applicable. The Licensee shall submit the Plan to the Forest Service as soon as practicable and no later than one year after license issuance and shall not begin construction of flow measurement devices or implementation of Plan elements until the Plan has been formally approved in writing from the Forest Service and filed with the Commission. In the interim, prior to approval and implementation of the Plan, the Licensee shall maintain continual compliance with the Pit 4 minimum instream flow schedule at the existing Pit 4 reach gage (PG&E gage PH 30). There is presently no flow measurement device in the Pit 3

Project reach. Interim to implementation of the above Plan, compliance in Pit 3 will be met based on the best available methods.

## **Condition No. 22 - Maximum Ramping Rate & Up Ramping Analysis**

The Licensee shall within one year of license issuance, obtain Forest Service approval and file with the Commission an analysis to operate the Project to minimize impacts to the recession limb of natural spills into the Pit 3 and 4 Project reaches and regulate both the up ramping and down ramping rates of emergency or planned maintenance outages (with the exception of up ramp rates of some emergency spills, which cannot be managed), for the purpose of minimizing negative ecological effects of unnaturally rapid flow and stage fluctuations.

Downramping of natural spills (i.e., inflows to the Project bypassed reaches that exceed the capacity of the reservoirs and diversion structures) shall downramp at approximately the same rate as the natural attenuation of the inflow that caused the spill (i.e., no manipulation of Lake Britton or Pit 4 reservoir levels and Pit 3 and Pit 4 penstock releases during spills), or downramp slowly enough so as not to produce stage changes at any approved Project bypassed reach stage gage exceeding one inch per hour. These requirements shall apply whenever instream flow measured hourly in the Pit 3 and 4 Project bypassed reaches are less than 4,000 cfs and decreasing following a natural or outage spill. During such time the Licensee shall either: (1) hold the Project reservoir spillway(s) elevation and outflows (penstock diversion and instream flow diversion) magnitudes constant until the completion of the spill (i.e., flow over spillway ceases); or (2) manually manage the spill discharge into the Project reach(es) such that the maximum negative rate of change of flow stage measured at the approved Project reach stage gage is not more than one inch per hour.

Downramping rates of all other flow releases into the Pit 3 and 4 bypassed reaches including those following emergency releases or planned releases shall follow a one inch per hour rate of change at approved stage gages.

For the purposes of implementing the maximum ramping rate requirement in the Pit 3 and 4 Project reaches, the Licensee shall establish methods for reliably and accurately measuring flow stage on an hourly or 15-minute basis. The Licensee shall therefore propose a plan for stage measurement for Forest Service approval, including proposed use of existing or to-be-established flow stage gages, as part of the Instream Flow Measurement Plan (above).

The Licensee shall conduct a Forest Service approved safety analysis of existing data (from this or other comparable Projects), or develop a study to determine appropriate upramping rates to assure river user safety. Following completion of the analysis/study, the Licensee shall propose for Forest Service approval, the maximum allowable upramp rate which will then be filed with the Commission.

These ramping rates shall be implemented at the time that new minimum instream flows are implemented.

### **Condition No. 23 - Dry Year Freshet Flow**

The Licensee shall, after obtaining Forest Service approval and filing with the Commission, release a spring freshet flow into the Pit 3 and 4 Project bypassed reaches each year that one does not naturally occur. The freshet flow shall consist of a magnitude that exceeds the capacity of the existing baseflow channel and inundates the baseflow channel "floodplain" up to the elevation of the toe of the historical channel banks. This magnitude is approximately equal to the minimum instantaneous historical base flow of 1,500 cfs. On March 1st of each year, if a spill exceeding 1,500 cfs for a continuous duration of at least 1 day has not occurred in either or both the Pit 3 and 4 Project bypass reaches, and the average weekly temperature at known locations of Foothill Yellow-Legged Frog (FYLF) tadpoles in the Pit 4 bypassed reach has not exceeded 11 degrees C (interim temperature value pending results of "Amphibian Monitoring Plan" license condition), then the Licensee shall intentionally release a freshet flow into the Pit 3 and 4 Project bypass reaches with the following timing, duration, magnitude, and ramping rate criteria and specifications:

**Minimum Total Duration:** 21 days

**Minimum Peak Duration:** 2 days at or exceeding minimum peak magnitude (1,500 cfs)

**Minimum Peak Magnitude:** Peak at 1,500 cfs for a minimum of 2 days within the first 3 days of release, then linearly decline (constant daily flow changes) to minimum instream flow.

**Interim Timing** (until completion of "Amphibian Monitoring Plan"): Immediately (within 3 days) following the first weekly average temperature in the Pit 4 reach exceeding 11 degrees C. If weekly average temperatures already exceed 11 degrees C by March 1 then no intentional freshet flow spill is required.

**Maximum Ramping Rates:** Ramping rates from base flows up to maximum peak magnitude (1,500 cfs) and, from maximum peak magnitude (1,500 cfs) down to base flows, shall not exceed the set maximum ramping rate criteria in this license.

As part of this license article, the Licensee shall conduct a five-year monitoring study of Foothill Yellow Legged Frog (FYLF) onset of breeding activity and timing (see "Amphibian Monitoring Plan" license condition). One year following submittal of the final results of the five-year study, the Forest Service will revise the intentional freshet flow release timing if necessary and appropriate to ensure that freshet flow releases are reliably timed to occur prior to laying of FYLF egg masses.

Following completion and review of the flow mapping results (and any other applicable flow studies) from the 2002 empirical flow release studies, the Forest Service will revise this freshet flow release schedule if necessary and appropriate to achieve riparian vegetation and aquatic habitat objectives including but not limited to reducing vegetation encroachment, providing access to diverse habitat on the channel floor for aquatic species, preventing, reducing, or removing bullfrog populations, and providing spring recreation flows.

### **Condition No. 24 - Adaptive Management for Peak Flow Management**

Within two years of license issuance, Licensee shall develop and implement an Adaptive Management Plan for Peak Flow Management for the purpose of reducing the existing large magnitude flow fluctuations (e.g. winter and spring) and extending the duration of spring peak flows. This will provide longer inundation periods on the bars in the bottom of the natural channel not inundated by minimum flows (this area is the “floodplain” of the minimum flow channel). The purpose is to minimize impacts on biota from high magnitude flow fluctuations and allow biota access to the “floodplain” to complete life history processes. Longer inundation periods would improve riparian conditions by providing flows for vegetation dynamics at higher elevations in the channel and decrease vegetation encroachment at low elevations in the channel. The plan shall be developed in consultation with other resource agencies, and be approved by the Forest Service prior to filing with the Commission.

### **Condition No. 25 - Maximum Lake Britton (Pit 3 Reservoir) Drawdown**

The Licensee shall, after approval by the Forest Service and filing with the Commission, operate and/or alter existing Project facilities such that the maximum instantaneous reservoir water surface elevation of Lake Britton shall not go below 2,750 feet elevation (PG&E datum), for the purposes of consistently maintaining recreation opportunities on Lake Britton and regulating the maximum high flow attenuation effect on natural flow spills into the Project bypassed reaches. In the summer, maximum reservoir elevation shall not exceed 2,756 feet elevation (PG&E datum), so as not to inundate recreational sites on the lake. These elevation limits are consistent with how the Licensee currently operates the Lake Britton reservoir. This condition is not intended to override fluctuations or necessary modifications by the Licensee for emergency and flood management events. Exceptions to this requirement may be approved by the Forest Service as provisions of the Licensee’s Emergency and Planned Maintenance Outage Spill Minimization Plan license condition (below).

### **Condition No. 26 - Notification and Minimization of Emergency and Planned Maintenance Outage Spill Plan**

The Licensee shall prepare within one year of license issuance, for Forest Service approval and filing with the Commission, a “Notification and Minimization of Emergency and Planned Maintenance Outage Spill Plan” (Plan), for the purpose of minimizing the negative ecological effects of uncontrolled high flows into the Pit 3 and 4 Project bypassed reaches resulting from emergency and planned hydropower facilities maintenance outages. The Plan shall include proposed potential measures for minimizing the magnitude and duration of planned and emergency outage spills into the Pit 3 and 4 Project reaches, including use of available storage within the Project and coordinated use of available storage upstream from the project.

The Licensee shall also prepare, within one year, as approved by the Forest Service and filed with the Commission, a feasibility study for providing flow continuation devices on the Pit 3 and Pit 4 powerhouses to provide continuation of flow through the penstock in the event of planned and emergency turbine shutdowns. In the event the Forest Service, in consultation with other agencies determines the continuation devices to be feasible, the Licensee shall install such devices in a timely manner. In the event that any species become Federally listed as threatened or endangered (e.g., FYL frogs), the Forest Service reserves the right to re-evaluate the feasibility of having flow continuation devices installed.

During the license term, the Licensee shall provide written notification to the Forest Service 90 days prior to any planned or scheduled maintenance outages in the Pit 3 and 4 Project bypassed reaches, including a description of Project and coordinated measures the Licensee plans to take to minimize the magnitude and duration of resulting spills into the Project reaches, and appropriate selection of the seasonal timing of the planned outage spill to lessen negative ecological effects. The Licensee shall not proceed with the planned maintenance outage without the formal written approval of the Forest Service. The Licensee shall document all scheduled outage spills and measures taken to minimize their magnitude and duration and documentation should be provided for the annual consultation meeting.

Furthermore, during the license term, the Licensee shall maintain project operations and timely coordination with upstream project operations and storage availability such that the Licensee is able to make reasonable and timely use of Project and upstream available water storage immediately upon the initiation of emergency maintenance outage spills into the Project reaches. The objective is to minimize, to the extent feasible, the magnitude and duration of the resulting spill into the Pit 3 and 4 Project reaches.

### **Condition No. 27 - Gravel and Woody Debris Supply Management Program**

The Licensee shall file with the Commission within one year of license issuance, a Gravel and Large Woody Debris Management Plan that is approved by the Forest Service. At a minimum the Program shall include:

#### **1. Gravel Management Plan**

The Plan shall include a multi-year integrated study proposal for evaluating the physical and biological effects of actual gravel supply augmentation in the Pit 3 Project bypassed reach. Upon completion, study results will be used to determine if gravel supply augmentation produces measurable and important physical, biological, and recreational changes to the Pit 3 bypass reach, and, if so, what gravel augmentation methods and amounts would be appropriate and effective for continuing gravel augmentation in the Pit 3 and/or Pit 4 bypassed reaches during the life of the license term. Potential physical changes to the Pit 3 bypass reach include

increased gravel-sized sediment storage on the channel bed and bar surfaces. Potential associated biological and recreational changes include increases in spawning habitat and young-of-the-year fish production, benthic invertebrates and macroinvertebrate habitat and production, and improved angler access and safety through increased wadeability.

The Plan shall therefore outline a multi-year integrated study proposal detailing the proposed schedule, objectives, and proposed methods for two study phases. The purpose of the first study phase is to quantify baseline young-of-the-year fish production, spawning use, benthic invertebrate and macroinvertebrate habitat and production, and wadeability in the Pit 3 Project bypass reach. The first phase of the study may require three or more continuous study years as determined by biometrics.

The second study phase would begin upon the completion of the first study phase. The purpose of the second study phase is to evaluate the actual physical and associated biological effects compared to the baseline condition of augmenting gravel supply through direct placement of clean, rounded, gravel-sized sediment in the Pit 3 project reach, at and downstream from the gravel addition site(s). The second phase of the study may require three or more continuous study years as determined by biometrics. Direct gravel placement and physical and biological measurements and monitoring shall continue until such time that cumulative study results are sufficient to determine whether or not reasonable amounts and methods of direct gravel placement results in: (1) physical changes, i.e. increased in-channel gravel storage particularly on shallow inundated boulder-cobble bar surfaces immediately adjacent to the low-flow channel; and (2) biological and/or recreational changes associated with the physical changes, i.e., increased young-of-the-year fish, benthic invertebrate, and macroinvertebrate production compared to baseline production rates, increased fish spawning redd construction, and/or increased angler access/safety. Following completion of the study the Forest Service will determine continuing 4e conditions for gravel management.

## **2. Large Woody Debris Management Plan**

Licensee shall file with the Commission within one year of license issuance, a Large Woody Debris (LWD) Management Plan (Plan) that is approved by the Forest Service. At a minimum, the Plan shall outline the methods and criteria the Licensee shall employ to simulate LWD transport through the project reservoirs and into the downstream Project bypassed reaches, by manually depositing all woody debris material pieces removed from Pit 3 and Pit 4 Project reservoirs and afterbays at approved channel bank sites downstream from the Pit 3 and Pit 4 Project dams, respectively.

The Plan shall include a detailed description of proposed collection and deposition methods with summary tables and schematic diagrams of proposed improvements and

construction cost estimates (if applicable) and a quantitatively supported rationale for deposition site and method selection and cost minimization.

### **Condition No. 28 - Reservoir and Afterbay Dredging**

The Licensee shall file with the Commission and notify the Forest Service in writing not less than 90 days prior to any proposed or scheduled reservoir or afterbay dredging operations to occur on, or affecting National Forest System lands. For the purposes of increasing sediment supply to the Project reaches and minimizing ecological impacts related to dredging operations, the notification shall include information regarding the purpose of dredging, dredging location and extent, approximate amount, composition, and size of dredged spoils materials, proposed start and end date of dredging and disposal activities, and proposed disposal method and site location. The Licensee shall then enter into discussions with the Forest Service regarding potential modifications and alternatives to the proposed dredging activity including but not limited to: modifications to proposed start and end date, proposed dredging and disposal methods, amounts or alternatives for materials processing and/or direct disposal into Project reaches to increase sediment supply, or disposal locations. The Licensee shall not begin proposed reservoir or afterbay dredging and disposal activities until formal written permission to implement an approved plan is provided by the Forest Service.

### **Condition No. 29 - Water Quality Plan**

Within one year of license issuance, and in consultation with applicable Federal and State agencies, the Licensee shall file with the Commission a water quality plan that is approved by the Forest Service, as it relates to aquatic habitats managed by the Forest Service. This plan shall, as appropriate, include:

- Sanitation facilities and public information at appropriate key recreation locations to eliminate water contamination effects to National Forest recreationists, and aquatic habitats.
- Monitor water temperature effects to beneficial uses, (including recreationists, and target aquatic habitats including those used by foothill yellow legged frogs, fish, and benthic macroinvertebrates) resulting from any changes in project instream flows. Monitoring to be conducted by project segments (i.e. reservoirs and reaches).
- Reduction of suspended sediments downstream of project dams and their effects to aquatic habitats by developing appropriate ramping rates (see also “Instream Flow” license condition above).
- Address “Aquatic Conservation Strategy” objectives within the Northwest Forest Planning area, and other FS planning objectives elsewhere in the project.
- Address how hydroelectric operations and maintenance will meet water quality “Best Management Practices” (BMP’s) by specifically addressing:
  - Developed & dispersed recreation
  - Roads

- Vegetation manipulation
- Prescribed fire and wildland fire planning, and fire suppression
- Watershed practices

### **Condition No. 30 - Fish and Benthic Macroinvertebrate Monitoring of Project Reaches and Reservoirs**

Within one year of license issuance, and in consultation with the Forest Service and other applicable agencies, the Licensee shall file with the Commission a fish population and condition trend-monitoring plan outlining sampling that shall be conducted in the Pit 3 and 4 Project bypassed reaches and reservoirs. Similarly, the licensee shall conduct benthic macroinvertebrate population robustness, feeding group and tolerance/intolerance trend monitoring in the Pit 3 and 4 bypassed reaches. The licensee shall also conduct quantitative fish entrainment monitoring following procedures developed by the Licensee and agreed to by the Forest Service and other consulting agencies at the Pit 3 and Pit 4 tailraces.

The monitoring plans shall attempt to standardize sampling protocol to ensure comparability of results. Sampling shall occur at least once every three years during the first decade after license issuance and then at least once every five years thereafter. Methods used by the Licensee's contractors during the summer of 2002 shall be refined and standardized as the offered methodologies.

A draft technical report shall be prepared following completion of each sampling effort. In addition to describing the results, the report is to compare results with those of previous surveys. The fish-based sampling shall discuss implications regarding trends in fish abundances, changes to bald eagle prey species, and any indication that bass are moving into project reaches. The benthic macroinvertebrate sampling report shall discuss any changes over time regarding the composition of functional feeding groups, overall population heterogeneity and robustness, and pollution tolerance/intolerance trends. The fish entrainment sampling report shall address effects and trends on entrained fish species that could lead toward federal listing.

### **Condition No. 31 - Amphibian Monitoring Plan**

The Licensee shall within one year of license issuance develop and implement an amphibian monitoring plan in consultation with other agencies, approved by the Forest Service, and filed with the Commission. The Plan shall include at a minimum, the following components:

1. Develop the elements of a protocol to monitor changes in foothill yellow-legged frog (*Rana boylei*) use of the Pit 4 reach, as well as distribution or presence of Cascades Frogs and/or foothill yellow legged frogs (FYLF) in the Pit 3 reach. Specifically:

- For the first 5 years, monitoring shall occur periodically throughout the spring and summer of each year to determine the presence and life stage development of FYLF.
  - Conduct a more thorough search during the spring breeding season to identify population centers / breeding sites (other than Deep Creek) and count numbers of clutches found.
  - Determine whether changes in instream flows result in breeding in newly inundated margins, or utilization of old sites that are now deeper.
  - Assess whether the new breeding sites: 1) connect with the summer lower flow channel; 2) remain as disconnected off channel water bodies; or 3) dry up entirely.
  - Schedule return visits to breeding sites and adjacent low flow areas that may be tadpole rearing habitat to assess survival of tadpoles to metamorphosis. Beginning after hatching of larvae, revisit a subset of breeding sites every 3 weeks to determine survival and time of metamorphosis. To ensure comparability of density estimates, time and area constrained searches shall be used. This monitoring data will also be relevant to determining timing of young of the year population metamorphosis (full tail reabsorption).
  - Determine water-quality effects on tadpoles. To determine whether the high tadpole mortality observed in 2002 was due to a water quality factor, predator-free tadpole enclosures shall be established at relatively remote sites (unlikely to be found by anglers) to monitor survival.
  - Monitor water temperatures as previously required in the “Water Quality Plan” license condition above; FYLF water temperature monitoring to occur annually March through May for 5 years starting in 2003, or upon issuance of a new license. Monitoring is for the purpose of determining at what temperatures breeding initiates and terminates. This information shall be developed into a predictive tool in future years to avoid untimely spills or flow fluctuations that could detrimentally affect FYLF recruitment.
2. The Licensee shall following Forest Service approval, file with the Commission and implement a monitoring plan for western pond turtle (*Clemys marmorata*). Population trends of western pond turtles can be assessed by developing a size class distribution of the extant population.

### **Condition No. 32 - Vegetation Management Plan**

The Licensee shall file with the Commission, within two years of license issuance or prior to any ground-disturbing activities, a Vegetation Management Plan that is approved by the Forest Service. At a minimum the plan shall:

- Identify and prioritize (into high, moderate, and low priority sites) all inadequately vegetated areas to be re-vegetated or rehabilitated along with an implementation schedule.

- List the plant species to be used along with planting locations, methods, and densities (emphasis shall be given to use of native plant species, especially those with cultural importance). Emphasis shall also be given to using seed from certified weed-free sources and using seed from local sources.
- The licensee shall finance or seek cooperative funding for prescribed fire treatment on up to 920 acres of upland habitat and forest around Lake Britton to enhance natural plant communities by rejuvenating decadent brush and reducing natural fuels buildup in oak and conifer forests. Treatments shall be on a 20 year re-treatment cycle.
- Implement Valley Elderberry Longhorned Beetle surveys in appropriate vegetation prior to implementing any ground disturbing activities.
- Address vegetation management under existing project-associated distribution and transmission lines on NFSL.

### **Condition No. 33 - Noxious Weed Management Plan**

The Licensee shall file with the Commission, within one year of license issuance or prior to any ground-disturbing activities, a Noxious Weed Management Plan that is approved by the Forest Service for the purpose of controlling and containing the spread of noxious weeds on NFSL. This plan shall be implemented following approval. At a minimum the plan shall include:

- Inventory and mapping of new populations of noxious weeds.
- Actions/strategies to prevent and control spread of known populations or introductions of new populations, such as vehicle/equipment wash stations.
- Treatment of all new infestations (any class) and existing infestations of California class A and B rated weeds, plus select class C weeds: Klamath weed (*hypericum perforatum*) and Scotch broom (*Cytisus scoparius*).
- At specific sites where other objectives need to be met (e.g. recreational use) all classes of noxious weeds may be required to be treated.
- Monitoring of known populations of noxious weeds to evaluate the effectiveness of re-vegetation and noxious weed control measures.
- As per the “Modification of Forest Service Conditions” license condition above, the Forest Service may request that the Licensee identify and implement methods for prevention of aquatic noxious weeds. These actions may include, but may not be limited to: (1) public education and signing of public boat access, (2) preparation of an Aquatic Plant Management Plan approved by the Forest Service, and in consultation with other agencies and, (3) boat cleaning stations at boat ramps for the removal of aquatic noxious weeds.

### **Condition No. 34 - Bald Eagle Management Plan**

Within 3 months of license issuance, the Licensee shall initiate consultation with the Forest Service and other appropriate agencies to develop a new Bald Eagle Management

Plan for the Project area. After approval by all involved parties, the Plan shall be filed with the Commission. This plan shall be completed within 2 years of license issuance and will assist in the ongoing bald eagle recovery efforts and will be a tool for future management of all lands around these projects. As a minimum the plan shall include:

- Periodic monitoring of human use patterns to discern human/bald eagle interaction conflicts.
- Annual monitoring of bald eagle reproduction around Lake Britton and along the Pit River to the Pit 5 powerhouse.
- Coordination of any plans for timber harvest or mining on PG&E lands within the larger Lake Britton area and along the Pit 3, 4, and 5 reaches with the Forest Service and other appropriate agencies, to reach the goals and requirements set forth in this plan.
- Coordination of woodcutting activities on PG&E lands.

### **Condition No. 35 - Wildlife Mitigation and Monitoring Plan**

The Licensee shall file with the Commission within one year of license issuance, and following approval of the Forest Service and other appropriate agencies, a wildlife mitigation and monitoring plan to include as a minimum:

- Population monitoring of bank swallow colonies around Lake Britton every 5 years.
- Annual monitoring of Peregrine falcon nest territories, or until such time it's determined that the study can cease.
- Construct a bat "friendly" gate at the tunnel entrance below Pit 4 reservoir.
- Continue the speed restriction zone at Upper Lake Britton, west of the gasline crossing where it currently exists.

### **Condition No. 36 - Protection of Threatened, Endangered, Proposed for Listing and Sensitive Species Plan**

Before taking actions to construct new project features on NFSL (including, but not limited to, proposed recreation developments) that may affect a species proposed for listing, or listed under the federal Endangered Species Act (ESA), or that may affect that species' critical habitat, or a Forest Service sensitive, survey and manage, or other special status species or their habitats, the Licensee shall prepare, in consultation with other appropriate agencies, a biological evaluation evaluating the potential impact of the action on the species or its habitat and submit it to the Forest Service for approval. In consultation with the Commission, the Forest Service may require mitigation measures for the protection of the affected species. For species where current information on population occurrence is lacking (e.g. valley elderberry longhorned beetle, terrestrial molluscs, Pacific fisher, and survey and manage species) the Licensee shall perform necessary surveys prior to ground-disturbing activities. The biological evaluation shall include:

- Develop procedures to minimize adverse effects to listed species.

- Ensure project-related activities shall meet restrictions included in site management plans for listed species.
- Develop implementation and effectiveness monitoring of measures taken or employed to reduce effects to listed species.

### **Condition No. 37 - Cultural Resources Management Plan**

The Licensee shall file with the Commission, within one year following license issuance, a Cultural Resources Management Plan (CRMP), approved by the Forest Service, for the purpose of protecting and interpreting heritage resources. The Licensee shall consult with the State Historic Preservation Officer, Native American Tribes, Forest Service, and other applicable agencies and communities during the preparation of the plan. The CRMP shall be incorporated into the Programmatic Agreement, of which the Forest Service will be a signatory, by reference. The CRMP shall accurately define the area of potential effects, including effects of implementing Section 4(e) conditions, and shall take into account Project effects on the National Register Lake Britton Archaeological District, National Register properties, Native American traditional cultural values, and Project-induced recreational impacts to archaeological properties on or affecting National Forest System lands. The CRMP shall also provide measures to mitigate the identified impacts, a monitoring program, and management protocols for the ongoing protection of archaeological properties. The plan shall be filed with the Commission.

If, prior to or during ground-disturbing activities or as a result of project operations, items of potential cultural, historical, archeological, or paleontological value are reported or discovered, or a known deposit of such items is disturbed on National Forest System lands and Licensee adjoining fee title property, the Licensee shall immediately cease work in the area so affected. The Licensee shall then: (1) consult with the California State Historic Preservation Officer (SHPO) and the Forest Service about the discovery; (2) prepare a site-specific plan, including a schedule, to evaluate the significance of the find and to avoid or mitigate any impacts to sites found eligible for inclusion in the National Register of Historic Places; (3) base the site-specific plan on recommendations of the SHPO, the Forest Service, and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; (4) file the site-specific plan for Commission approval, together with the written comments of the SHPO and the Forest Service; and (5) take the necessary steps to protect the sites from further impact until informed by the Commission that the requirements have been fulfilled.

### **Condition No. 38 - Recreation Coordination and Review**

Licensee shall, every six years (coinciding with the Commission's recreation inspection schedule), consult with the Forest Service, appropriate agencies, and interested parties to review and adjust project-wide recreation management objectives. This consultation should take the form of an in-person meeting within reasonable distance to the project. This review shall be based on monitoring results from recreation surveys, law

enforcement monitoring, and other applicable study and monitoring results. The review shall address, as a minimum, the following factors:

- Capacity; including developed and dispersed sites, roads, trails, water bodies, and river reaches
- Kinds and condition of facilities
- Kinds, quality, quantity, and range of opportunities
- Health and safety
- User and resource conflicts

### **Condition No. 39 – Recreation Survey**

Licensee shall conduct a Recreational Survey (RS) and prepare a Report on Recreational Resources once every six years from license issuance. The RS shall include but not be limited to changes in kinds of use and use patterns both on water surfaces and land, user surveys as to preferences in recreational activities, kinds and sizes of recreational vehicles including boats, preference for day use versus overnight use, and recreation user trends within the project area. The Report shall include a summary of regional and statewide trends in recreation based on available surveys and reports. Survey methods shall be reviewed and approved by the Forest Service. A copy of the survey results shall be provided to the Forest Service. The Report on Recreational Resources shall comply with the Commission's regulations at 18 CFR Section 4.51(f) (1996), and shall be filed with the Commission after Forest Service approval. The Forest Service reserves the right, after notice and opportunity for comment and administrative review, to require changes in the project and its operation through revision of the 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources identified as a result of those surveys.

### **Condition No. 40 – Interpretive, Education, and Public Information Plan**

Within two years of license issuance, the Licensee, in consultation with the Forest Service and appropriate agencies and interested parties, shall complete an Interpretive, Education, and Public Information Plan (I & E Plan) that shall be approved by the Forest Service and filed with the Commission. At a minimum, the plan shall include themes, design, audience, delivery methods, and schedule for implementation. Specific projects include:

- Informational kiosks at 5 Corners, Pit 3 powerhouse, Big Bend Interagency Fire Station, Jamo Boat Ramp, or other locations, as agreed.
- Interpretive signs at Hwy 299 and the Red Cinder Road, Hwy 299 and Sand Pit Road, Pit 3 dam, Big Bend road and Pit 5 Powerhouse Road, and other locations, as agreed.
- Brochures of various topics including a scenic loop drive.
- Informational website.

## **Condition No. 41 – Recreation Construction and Reconstruction**

The Licensee shall obtain Forest Service approval, file with the Commission, and implement the following recreation construction and reconstruction measures within the timelines stipulated below.

### **1. Lake Britton Facilities**

1. Dusty Campground - On a schedule approved by the Forest Service, Licensee shall improve the existing facility as follows:
  - a. Add picnic tables to all campsites.
  - b. Make one campsite and adjacent restroom, and lake access accessible. Construct or modify path and restroom to meet current ADA standards, while keeping the balance of the campground at a lower development level.
  - c. In consultation with the Forest Service, expand the number of campsites by up to four.
  - d. Develop a potable water source within the campground.
  - e. Continue to maintain and augment sand at the Dusty campground beach. After approval by the Forest Service, expand the beach area within the bounds of the campground.
  - f. Designate swim/beach area to separate swimming and wading, from boat beaching and mooring.
  - g. PG&E shall continue to manage and maintain Dusty campground under an operations agreement with the Forest Service.
  
2. Jamo Boat Ramp – within two years, in order to improve access for visitors to the National Forest areas of the project, Licensee shall, in consultation with the Forest Service,
  - a. Modify the existing boat ramp to provide for an accessible boat-loading platform. This can be incorporated into the current structure.
  - b. Redesign/modify Jamo fishing platform to accommodate a fluctuating water level and to comply with any current ADA standards.
  - c. Designate parking spaces for vehicles with trailers using signs and asphalt markings. Require site host to monitor for compliance.
  - d. Provide a convenience picnic table between the restroom and the shoreline.
  - e. Develop a potable water source at Jamo Boat Ramp or Pines Picnic Area that can be accessed by recreationists at all times.
  
3. Water Surface Facilities – the Licensee shall, in consultation with the Forest Service and other interested parties, develop a Lake Britton Facilities Plan addressing recreational and sanitation facility development, for the purpose of alleviating sanitation and recreational resource issues on lands adjacent to the lake (including NFSL). Upon Forest Service approval, and after filing with the Commission, PG&E shall implement the Plan. This plan shall be completed within one year of license issuance.

4. New Day-Use Facilities - Within 3 years of license issuance, the Licensee shall construct a new Day-Use Beach on Lake Britton. Possible locations include between Pines Picnic Area and Jamo Boat Launch or at the North Ferry Crossing. The new day-use area shall have regularly maintained beach sand, restrooms on site or nearby, access by road, parking, trash collection, and regular monitoring by a host or Licensee employee, and Law Enforcement patrol.

## **2. Lake Britton Dispersed Areas**

Within two years of license issuance, the Licensee shall:

1. Improve and maintain the road to the car-top boat launch south of the gas pipeline by grading and cindering the road and cindering the launch ramp.
2. Close the parking area (Parking area 6) on the north side of the lake, due north of the Hat Creek Fish Barrier.
3. Maintain recreational access to NFSL and PG&E lands on the south side of Hat Creek. At the Fish Barrier parking area, construct a hardened ADA accessible path, compatible with the Recreation Opportunity Spectrum classification, for fishing access to the river.
4. In consultation with the Forest Service, create an interpretive drive loop road from existing roads on the north side of Lake Britton, part of which is the Red Cinder Road between Hwy 299 and Soldier Creek. The interpretive loop should include road cindering, locational, and interpretive signing and/or brochure and, designated and improved scenic viewpoints.

## **3. Lake Britton Water Surface Management**

1. Monitor for high-speed boating use conflicts with bald eagles in Upper Britton - Beginning the season following issuance of a new license, Licensee shall monitor lake-based activities between Highway 89 Bridge and the east end of Slalom Bay between April 1 and August 1, during morning bald eagle foraging hours ending at 9 am. The first 2 years of data will be considered baseline. The survey shall continue annually. If the water-based use increases by 20% over baseline, a speed limit (5 mph between dawn and 9 am until August 1 annually) shall be enacted between the Highway 89 Bridge easterly to the existing 5 mph restriction on Upper Lake Britton, if determined by the Forest Service to be necessary. If the speed limit is determined necessary by the Forest Service, the Licensee shall seek a Shasta County ordinance to implement the speed limit and shall post and enforce the rule.
2. Ferry Crossing Change No Boating Buoy Line – Within one year of license issuance, in order to increase the amount of lake area open to fishing, change the no boating buoy line at the Ferry Crossing to a 5 mph speed zone. In consultation with interested and affected agencies, establish a new “no boats” buoy line closer to the Pit 3 dam in accordance with any applicable FERC and DSOD regulations.
3. Change in Highway 89 Bridge “no ski” zoning – Within one year of license issuance, change the current no ski zoning to a 5mph speed restriction from the Highway 89 bridge to the end of the narrow channel (The Narrows) before

- reaching Dusty Campground. Licensee shall work with Shasta County to modify the current County Ordinance to enforce the speed limit.
4. Current restrictions to continue - Existing 5 mph speed zone on the Upper Lake Britton/Hat Creek area to continue.
  5. In addition to 1. above, monitor boat use numbers and activity types from Memorial Weekend through Labor Day on all areas of Lake Britton. This information shall be incorporated into the Report on Recreational Resources.

#### **4. Pit River Reach Facilities**

The following facilities shall be constructed by the Licensee, on a timeline to be approved by the Forest Service, in the locations listed below:

- 1 Pit 3 reach
  - a. Construct and maintain to a standard approved by the Forest Service, three river access trails at Powder Spur (serves to access NF lands), Delucci Ridge, and Rock Creek, or other locations as agreed to by the Forest Service. At each trail location, trailhead parking will be improved by leveling, barriers, and signing as approved by the Forest Service. At Powder Spur, construct trailhead parking to accommodate up to 10 vehicles at one time, on the north side of the Pit 3 road across from the Powder Spur trail. All trail locations and designs shall address erosion control needs.
  - b. Improve parking at the Talus Siren by removing road debris piles on the south side of the road.
  - c. Construct an accessible fishing Day Use Area at the Pit 3 powerhouse on the east side of the tailrace. Design and construct, in consultation with the Forest Service and appropriate agencies, a cantilevered platform to get visitors better access over the water for fishing; provide accessible toilet, potable water, trash receptacles, and improve the parking area by grading and hardening, as per ADA standards. Licensee shall pursue a minor shift (couple hundred feet to the east) in the wild trout fishery boundary with CDF&G in this vicinity so that this accessible Day Use Area will be outside of the designated Wild Trout Fishery.
2. Pit 4 reach
  - a. Construct and maintain to a standard approved by the Forest Service, two river access trails at Malinda Gulch and Oak Flat or other locations as agreed to and approved by the Forest Service. In order to reduce resource impacts at each trail location, trailhead parking shall be improved by leveling, barriers, and signing as approved by the Forest Service and in a manner appropriate to a lower Recreation Opportunity Spectrum. Trail design shall address erosion control needs.
  - b. Ruling Creek Dispersed Camping Area: Develop and implement a site improvement plan consistent with the Recreation Opportunity Spectrum (ROS) setting for approval by the Forest Service including:

- i. Provide amenities commensurate with the ROS, including installing and maintaining a portable, vault-style toilet (such as a CXT toilet).
  - ii. Remove road debris piles
  - iii. Implement noxious weed mitigations
  - iv. Realignment of road away from river
  - v. Eliminate use of site as spoil pile disposal area
  - vi. Address existing 40,000 cubic yards of tunnel spoil material and incorporate, where feasible into site plan
  - vii. Address erosion control needs associated with spoil pile disposal in this area and adjacent river
  - viii. Address riverbank erosion associated with old roadbed
- c. Pile #4D - Spoil Pile restoration. Develop a site plan for Forest Service approval to convert the existing 240,000 cubic yard spoil pile covering 3.35 acres on NFSL into a canyon scenic overlook. Site plan shall include:
  - i. Removal of all non-native materials visible on the surface of this pile.
  - ii. Stabilizing and erosion control to prevent further erosion into the active river channel and avoid further collapse of southern canyon wall.
  - iii. Revegetation with native plants, and reduction of star thistle invasion.
  - iv. Cease any further use of this site as a disposal site.
  - v. Submit a sampling plan for 5 years of testing at annual intervals to ensure there are no longer hazardous materials in the piles that are leaching into the ecosystem, unless completed tests can conclusively demonstrate that there are no hazardous materials buried in the piles. If hazardous materials are later discovered in the pile, the Forest Service reserves the right to require PG&E to clean up or totally remove this pile.
  - vi. Designated parking, pathways, safety barriers at the edge, and interpretive signing shall be part of the plan.
- d. Provide a trash collection location at the Pit 4 powerhouse for recreationists.
- e. Provide a potable water source available to recreationists in the Pit 4 reach, possibly at the Pit 4 powerhouse.
- f. Reconstruct, if necessary, and maintain, to Forest Service approved standards as fishing access to the Pit River, the Deep Creek trail from Deep Creek Camp to a point across from Oak Flat (approximately ½ mile).

#### **5. Pit 4 Reservoir Recreation Use**

Within one year of license issuance, the Licensee shall pursue a change in the County ordinance to open the Pit 4 reservoir to non-motorized boats, motorized boats with battery-powered trolling motors, and float tubes between August 1<sup>st</sup> and December 31<sup>st</sup> in consultation with the Forest Service and other appropriate agencies. Additionally, Licensee shall pursue a change in the County ordinance to reflect a 5

mph speed limit. The unimproved boat ramp currently used by Licensee shall be signed and modified to accommodate this use.

#### **Condition No. 42 – Law Enforcement Monitoring and Patrol Plan**

Within one year of license issuance, the Licensee shall, in consultation with the State Parks, County Sheriff, and other interested parties, and approved by the Forest Service, file a law enforcement monitoring and patrol plan with the Commission for the project area. This plan shall coordinate all agency and Licensee activities in the project area as they pertain to recreational uses including OHV, Dispersed Camping, Developed Camping, and Boating, and act as support to cultural resource monitors. The plan shall specify the objectives, frequency, and type of monitoring. In addition, the Licensee shall monitor the Pit 3 and Pit 4 River reaches at a frequency and level approved by the Forest Service. The objectives are to gather information about resource degradation due to recreational uses, provide information to visitors, monitor types of uses, and document and perform site and facility maintenance where necessary. Annually, the Licensee shall hold a coordination meeting with the agencies to review information from the prior season and to plan any adjustments for the next high use season (April through October).

#### **Condition No. 43 – Upper Britton Off-Highway Vehicle (OHV) and Vehicle Management Plan**

Within two years of license issuance, the Licensee, in consultation with appropriate agencies including applicable law enforcement agencies, shall file with the Commission an OHV and vehicle management plan approved by the Forest Service for the project area and adjacent agency lands bounded by Lake Britton on the north, Highway 299 on the south, and Highway 89 on the west. The plan shall address the following:

- Identify where existing use patterns are creating resource damage, including archaeological site disturbance.
- Restrictions/controls for protection of bald eagles, cultural resources, upland oak and riparian habitats, and other resources affected by vehicle use.
- Time frames of seasonal road closures.
- Rehabilitation needs for areas already disturbed by this activity.
- Specifically address the Hat Creek Fishing barrier area where resource disturbance is occurring on PG&E Project lands and adjacent National Forest System lands.

#### **Condition No. 44 - Whitewater Boating**

Within one year of license issuance, the Licensee shall develop, in consultation with the Forest Service and other appropriate agencies and communities and file with the Commission, a plan for whitewater boating including the following components:

- 1) Flow phone installation: Provide flow information via the web (Internet) and telephone for the Pit 3, and 4 reaches. Web information would include real time flow data for the past 7 days. In dry years, the schedule of the dry year freshet flow releases (including ramping rate) would be provided, so that boaters could plan their trip accordingly. Web information shall be made available to, and posted on, PG&E and American Whitewater websites, with links to other pertinent websites. Phone information would provide the peak flow for the past three days which occurred between 8:00 am and 6:00 pm, as well as any forecasted dry year freshet flow releases. Real time flow data and peak flow data shall be made available year round.
- 2) The acceptable boating flow range is estimated to be between 1,100 and 3,000 cfs in the Pit 4 reach, and is unknown at this time in the Pit 3 reach. “Dry Year Freshet Flow” releases as described in the license condition above, will provide 10 continuous days of acceptable boating flows between 1,500 and 1,100 cfs during the first part of March. These flow releases will occur if there have been no spills equal to or greater than 1,500 cfs by March 1, and if water temperatures meet the criteria related to protection of foothill yellow-legged frogs. It is estimated that these dry year freshet releases will occur in 30% of the years. In average and wet precipitation years when “freshets” are not required to be released, there will be naturally occurring spill flows in the river which would meet or exceed whitewater boating flows for variable numbers of days.
- 3) Whitewater boating access points shall be developed in concert with local communities, resource agencies, and interested publics. Mitigations for potential whitewater boating/archaeological site conflicts shall be addressed in the Cultural Resource Management Plan.

#### **Condition No. 45 - Roads and Facilities Management Plan**

Licensee shall file with the Commission, within one year following the issuance of a new project license, a Roads and Facilities Management Plan, approved by the Forest Service, for protection and maintenance of roads associated with this license. At a minimum the Plan shall:

1. Include a map showing all roads, both Forest Service system roads (classified), and Forest Service unclassified roads associated with this project. Included in the map shall be the location of road watering sources, and all disposal sites for surplus material, i.e. rocks, brush, additional spoil pile material etc.
2. Identify the uses (i.e. recreation, facility access) of the roads, and season of operation.
3. Identify the condition of the roads including any construction or maintenance needs. The Forest Service has available documentation forms for road condition inventory, stream crossing information, and fish passage that can be linked to Road Analysis indicators utilized by the Forest Service. Information shall include length and width of road, location and size of culverts, grade, slope position,

- hydrologic connectivity, surfacing, maintenance level, service level, and jurisdiction sufficient for the Forest Service to conduct a Road Analysis Plan (RAP) to close roads, to create new roads, or recommend upgrading the condition of the road.
4. Include updates of all existing Forest Service road special use authorizations, and identify responsibilities and schedule of road maintenance activities.
  5. Include a map of a Traffic safety and Signage plan, for all roads within the project area. Include both safety and destination/distance information signs at major road intersections and features. An inventory of all signs together with photographs of each sign shall be included. Mapping shall be completed using global positioning system (gps) instrumentation and made available as a digital format layer. Signs shall conform to Forest Service Manual direction.
  6. Include a map of all drainage crossings of bridges and culverts. Provide hydraulic calculations verifying that all intermittent and perennial stream crossings shall pass a 100 year storm event and associated bedload and debris, and allow fish passage through all culverts that are identified as fish habitat areas. The Licensee shall develop a plan for Forest Service approval to upgrade those culverts not meeting this standard. Priority for upgrading will be based on the potential impact to the ecological value of the riparian resources effected. The Licensee shall construct, operate, and maintain Project facilities, including roads, parking and storage lots, reservoir shorelines, bridges, and culverts to maintain natural fluvial and colluvial sediment transport to the Project reaches, as far as feasible. The Licensee shall notify the Forest Service in writing within 10 days of identifying any natural or human-induced landslide activity potentially contributing sediment directly to the Pit River channel or canyon floor in amounts exceeding approximately 30,000 tons, or approximately ten percent of the average annual sediment supply to the Project reaches, as determined by R2 Resource Consultants, Inc. (2002).
  7. Address project road improvements to be made when future use levels (as determined through review of the 5 year "Traffic Use Surveys" and 6 year "Recreational Surveys") trigger a Forest Service decision for additional road modifications, including paving of the entire Pit 4 reach road if increased use indicates this need.
  8. Address measures to control erosion related to project facilities including dams, roads, penstocks, powerlines, transformer sites, reservoirs, and reaches. Consider stream sedimentation, dust, and soil movement induced by project roads and road maintenance activities, preventing loss of roads through on-going hillside erosion, sediment management of roads within 150 feet of the river, diversion prevention dips in specified areas to minimize damage from culvert failure, etc.

#### **Condition No. 46 - Traffic Use Surveys**

The Licensee shall file with the Commission a road/traffic use survey as approved by the Forest Service. The report shall be prepared every five years from license issuance. A copy of the survey and survey results shall be provided to the Forest Service. The Forest

Service reserves the right, after notice and opportunity for comment and administrative review, to require changes in the project, its roads, and operation through revision of the 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources and provide for public safety identified as a result of these surveys. At a minimum the road/traffic survey shall:

- Include the installation of traffic counters at the following locations: Pit 3 Reach Road (existing counter above the Pit 3 dam), hydrologic gaging station in Pit 4 reach, north side of the Pit 5 dam, Dusty Campground, and North Shore Campground access roads.
- Include the number of vehicles per day, type of vehicle, i.e. log trucks, recreational vehicles, passenger cars, emergency vehicles (fire), PG&E vehicles etc.
- Traffic counts shall be conducted for: opening of fishing season, Memorial weekend, July 4<sup>th</sup> holiday weekend, Labor Day weekend, and random weekends, and weekdays during the period from April to October. A minimum of 60 survey days/year shall be required.

#### **Condition No. 47 - Project Road Rehabilitation**

The Licensee shall, in consultation with and as approved by the Forest Service, take appropriate measures to rehabilitate and maintain existing project roads to provide for current public use levels and safety, to protect road facilities from failure, and to reduce existing resource degradation resulting from improperly maintained roads on National Forest System lands. The rehabilitation items below shall be accomplished within 3 years of license issuance, or as otherwise specified, with the most urgent safety concerns, as determined by the Forest Service, to take priority.

##### **General road rehabilitation needs:**

1. All gates and signing used for road closures shall be as specified in the “Manual of Uniform Traffic Control Devices” (latest edition).
2. For construction projects or other ground disturbing activities, implement a vehicle/equipment wash station, in an approved location, to prevent introduction of noxious weed species to the disturbed site.
3. Implement Forest Service “Best Management Practices – Water Quality Management for Forest System Lands in California” for all road construction/maintenance activities.
4. Inspect all bridges in accordance with State and Federal Regulations, every four years. Provide inspection reports on each site to the Forest Service when completed.
5. Gates or other vehicle control measures shall be installed where necessary to achieve erosion protection.
6. Complete normal maintenance activities including: repair/replace damaged culverts identified in road logs, remove existing vegetation to allow adequate sight distances, repaint fog lines, replace faded signs and object markers as per

- sign plan, add milepost markers for maintenance, public service, and emergency response (not posted on trees).
7. Every ten years of the license period, the Licensee, in consultation with the Forest Service and other appropriate agencies, shall review traffic and recreation use surveys for campground access roads. The Forest Service will then determine if road conditions need to be improved (e.g. paving, widening, additional turn-outs, etc.) by PG&E to meet the current level of campground development and use.
  8. Sign project roads and related recreational access points and facilities to assist non-local recreationists in locating destinations and project waters.

**Specific road rehabilitation needs:**

Pit 3 Reach Road - 37N60Y

- Repave road.
- Reconstruct road to a 12 foot minimum road width with 1 foot shoulders.
- Install additional paved turnouts (a minimum of 5 turnouts need to be constructed).
- Reconstruct sharp curves, at specified areas to improve sight distance, including reducing the existing cut bank slope (a minimum of 3 areas needed).
- Install crib walls in specified areas where roadbed and shoulders have eroded, to maintain minimum road width of 12 feet with 1 foot shoulders and to prevent loss of road (a minimum of 5 locations need to be repaired).

Bridges: Rock Creek, Screwdriver Creek, Underground Creek

- Replace or reconstruct all bridges to conform to AASHTO Standard Specifications for Highway Bridges (latest edition), including guardrails.
- Paint steel girder substructure (Rock and Screwdriver Creeks).
- Provide hydrology information to verify 100-year storm and associated debris could pass through existing cross sectional area of bridges.
- Perform engineering calculations for inventory and overload loadings on all bridges, and provide it to the Forest Service.
- Pave bridge approaches 50 feet either side.

River Road (USFS#50-within NFSL)

- Expand existing paved road from the Pit 3 Powerhouse (M.P. 5.8) to the Gravel Bar turn-off in the Pit 4 reach (M.P. 8.8).
- Install culverts at specified spring locations to provide direct drainage into the Pit River (minimum of 5 sites).
- Repair two existing crib walls, add additional crib walls where needed to prevent road slippage into river.
- Repair existing road surface being held in place by a rotting log berm about ¼ mile east of the Pit 4 powerhouse, if not done so before relicensing.
- Install concrete ford through drainage approximately ¼ mile west of Underground Creek.
- Replace existing logs parking barriers with metal guardrails at Pit 4 Dam.
- Stabilize eroding cut and fill slopes that are depositing sediment into the river.

River Road – Spur A (Pit 4 Dam Spoils Pile to Pit River)

- Review access needs to river, and if needed, develop a plan to provide vehicle access as a component of the spoil pile restoration (see license condition “Recreation Construction and Reconstruction” above).

River Road – Spur B (Ruling Creek)

- Refer to “Recreation Construction and Reconstruction”, above for specific road rehabilitation needs.

Rock Creek Penstock Road 37N60YA

- Replace waterbars with rolling dips, blade road, remove rock off NFSL.

Pit 4 Valve House Road

- See “Spoil Disposal Site Plan” condition below.

Dusty Campground Road – 37N59Y

- Install signs on highway approach, advising recreational visitors that “trailers are not recommended”.
- Construct four additional turnouts along the existing road.

North Shore Campground Road

- Install a new/larger entrance sign for the campground, and stop sign at intersection of campground and Clark Creek Road.

Jamo Point/Pines Picnic Area Access Road

To address the immediate safety issue at this junction, Licensee shall implement the following measures on this public road, which accesses both PG&E recreational facilities and NFSL:

- Install additional signing at intersection with State Highway 299 advising public that no left turns are permitted. “Vehicles must turn right and proceed 500 feet to turnaround to go north.”
- Existing turnaround area shall be modified, so that adequate sight distance is provided in both directions. Coordination with the California State Department of Transportation shall occur.
- Access road shall have “steep slope” sign posted at the beginning of the road.

Additionally, within 1 year of license issuance, Licensee shall develop a plan approved by the Forest Service and filed with the Commission to reconstruct the existing intersection into a “T” intersection. Reconstruction to be completed within 2 years of license issuance.

#### **Condition No. 48 – Rights-of-Way**

Within 3 months of license issuance, the Licensee shall either file with the Commission and provide to the Forest Service an existing document, or initiate the process to provide an easement across the Project's Pit 3 dam for public use of the Pacific Crest Trail on that Project facility. If a new easement is needed, the Licensee shall issue an easement within 2 years of license issuance.

#### **Condition No. 49 - Updating Obsolete Forest Service Special-Use Authorizations**

The Licensee shall, within 3 months of license issuance, consult with the Forest Service to bring existing special-use authorizations for project related occupancy and use of National Forest System lands up to current standards through the reissuance of obsolete authorizations. The Licensee shall obtain the executed authorization, to be filed with the Commission, before beginning ground-disturbing actions related to these permitted activities on National Forest System lands, or within one year of license issuance.

The Licensee may commence ground-disturbing activities authorized by the License and special-use authorization no sooner than 60 days following the date the Licensee files the Forest Service special-use authorizations with the Commission, unless the Commission prescribes a different commencement schedule.

In the event there is a conflict between any provisions of the Project License and Forest Service special-use authorization, the special-use authorization shall prevail to the extent that the Forest Service, in consultation with the Commission, deems necessary to protect and utilize National Forest System resources.

#### **Condition No. 50 - Visual Management Plan**

Within 1 year of license issuance or 60-days prior to any ground-disturbing activity, the Licensee shall file with the Commission a Visual Management Plan that is approved by the Forest Service. At a minimum, the Plan shall address:

- Clearings, spoil piles, and project facilities such as diversion structures, penstocks, pipes, ditches, powerhouses, other buildings, transmission lines, corridors, and access roads.
- Facility configurations, alignments, building materials, colors, landscaping, and screening.
- Proposed mitigation and implementation schedule necessary to bring project facilities into compliance with National Forest Land and Resource Management Plan direction.

Mitigation measures shall include, but are not limited to:

- Surface treatments with colors and materials that are in harmony with the surrounding landscape.

- Use of native plant species to screen facilities from view, where appropriate.
- Reshaping and revegetating disturbed areas to blend with surrounding scenic characteristics.
- Development of scenic overlooks along scenic routes.
- Removal of project induced debris piles which detract from the visual quality.
- General maintenance and upkeep of facilities.

### **Condition No. 51 – Land Adjustment Proposal**

The Licensee shall, within 2 years of license issuance, develop a Land Adjustment Proposal that would address possible land exchanges or other management actions that would result in more efficient land management by concerned parties. This proposal shall include consideration of a three party exchange between McArthur Burney Falls State Park, the Forest Service, and PG&E, and shall require consultation with the involved parties and filing of the Proposal with the Commission.

### **Condition No. 52 - Fire Prevention Plan**

Within 1 year of license issuance or 60-days prior to any ground-disturbing activity, the Licensee shall file with the Commission a Fire Prevention Plan that is approved by the Forest Service in consultation with appropriate State (California Department of Forestry and Fire Protection) and local fire agencies. At a minimum, the Licensee shall:

- Address availability of fire access roads, community road escape routes, helispots to allow aerial firefighting assistance in the steep canyon, water drafting sites in the river that meet resource concerns, and other pre-fire suppression strategies.
- Identify fire hazard reduction measures (e.g., eliminating ladder fuels, reducing fuel loading, clearing around fire rings and dispersed camping areas, thinning & slash treatment 50' on either side of designated and developed trails, fuelbreaks, etc.) to prevent the escape of project-induced fires.
- Analyze fire prevention needs to ensure that prevention equipment and personnel are available. Provide the Forest Service a list of the location of available fire-prevention equipment and the location and availability of fire-prevention personnel.
- Develop fire prevention restrictions based on fire danger, that are consistent with adjacent public land ownership for project-induced recreation on PG&E lands. Implement these measures through signage and patrols, as necessary.
- See Vegetation Management Plan condition for related prescribed fire treatment measures.

### **Condition No. 53 - Spoil Disposal Plan**

Within two years of license issuance and at least 90 days prior to any ground disturbing or soil producing or piling activity, Licensee shall file with the Commission, a Spoil

Disposal Plan, approved by the Forest Service, for protection of forest resources affected by disposal and storage of project related natural materials on National Forest System lands. There are currently no approved project associated borrow sites on NFSL.

General Spoil Disposal requirements:

- Remove all road spoil piles not currently located in approved areas on NFSL to a location either off the Forest, or to a Forest Service approved disposal site. Revegetate removal area with approved native (locally collected) seed to reduce invasion of noxious weeds. Monitor and eradicate noxious weeds as specified in the “Noxious Weeds Management Plan” license condition.
- All visible non-native materials, including construction debris shall be removed from the surface of piles located on NFSL.
- All native material allowed to be left on NFSL shall require a plan to address erosion control, slope stability, revegetation, and compliance with visual quality objectives.

Specific Spoil Disposal Requirements:

**Spoil Pile site #4P (at Pit 4 powerhouse):**

This is the only site located on NFSL currently considered for disposal of project related native materials (dirt, rocks, vegetation, not asphalt or other non-native wastes).

1. Develop a stabilization/rehabilitation plan for the site incorporating future placement of roads spoils from project roads, site leveling, slope revegetation, and other erosion prevention measures.
2. Submit a pit plan to show the current site (after above work considered) and calculations showing the amount of material the site could hold for future spoils placement. Include a final pit plan including reclamation that shall also be submitted to Shasta County for compliance with Surface Mining and Reclamation Act (SMARA) regulations.
3. Additional visual mitigations may be necessary if this site is additionally used as a vista point for the public.

**Condition No. 54 - Geologic and Seismic Hazard Inspections and Reports**

Every five years from license issuance, the Licensee shall certify that all facilities meet Federal and State requirements. A copy of the certification shall be provided to the Forest Service and filed with the Commission. The Forest Service reserves the right, after notice and opportunity for comment and administrative review, to require changes in the project and its operation through revision of the 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources identified as a result of these surveys. At a minimum the certification shall:

1. Include copies of the Inspection Reports (latest edition) for the Pit 3, 4, and 5 Diversion Dams, Pit 5 Open Conduit Dam, Rock Creek Conduit Crossing, (including penstocks, and surge/tunnel chambers).
2. Provide latest flood inundation maps for each dam under dam failure conditions.

## Enclosure 2

### RATIONALE INDEX

#### **Pit 3, 4, and 5 Hydroelectric Project, FERC No. 233 Forest Service Rationale for 4(e) Terms and Conditions**

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## **Enclosure 2**

### **Rationale Document**

#### **To Accompany Preliminary 4(e) Terms and Conditions**

##### **PG&E Pit 3, 4, and 5 Project #233**

### **INTRODUCTION**

The purpose of this enclosure is to explain the Forest Service (FS) rationale for the attached “Preliminary 4(e) License Terms and Conditions” (Enclosure 1), which are necessary for the adequate protection and utilization of the affected National Forest System lands, in this case the Shasta National Forest, as administered by the Lassen and Shasta-Trinity National Forests. The Forest Service has the authority to prescribe license conditions under Section 4(e) of the Federal Power Act, when a direct or indirect nexus between the project and effects to National Forest System lands (NFSL) can be demonstrated. It is mandatory for the Federal Energy Regulatory Commission (FERC) to incorporate 4e’s into the project license. The Forest Service is also submitting “Recommendations”, as allowed under Section 10(a) of the Federal Power Act. The “Recommendations” are applicable to areas where project effects are **not** directly or indirectly affecting National Forest System lands, and are optional for consideration by the FERC, as the lead federal agency. The “Recommendations” and the rationale for them are provided in Enclosure 3.

The Forest Service determined appropriate mandatory 4(e) license conditions for the Pit 3, 4, and 5 Project by comparing the “desired condition” of the resources (the condition towards which we are trying to move), with our knowledge of the resources’ existing condition (the state of the resources today). The Forest Service has used this comparison of “Existing” to “Desired” resource condition as a measure of project affects since starting this relicensing. Appendix 2 of the May 1999 FS “Response to PG&E First Stage Consultation Document”, contains the original comparison table. The FS July 20, 2001 “Response to PG&E’s Draft Application For New License”, Appendix A, details project desired conditions for resources as a result of collaborative discussions. Comprehensive Plan direction (including Forest Land and Resources Management Plans, the Chalk Mountain Late Successional Reserve Assessment, Northwest Forest Planning Record of Decision, etc.), Forest Service policy, rules, laws, and regulations were used as the basis for determining the desired conditions. The FS original desired condition statements were adopted by the Pit River Collaborative Team and have been refined during collaborative meetings. The results of many studies completed by PG&E (Licensee), FS data collection, observations of the affected resources both during project base flows and during two controlled flow test periods in May and August of 2002, and professional judgment were used as the basis for determining the existing resource condition. Where there are gaps between the “Existing” and “Desired” conditions, then laws, rules, or policy are not being met, and 4(e) license conditions are prescribed. With

these license conditions, resources are expected to either meet, or move towards the “Desired Condition”.

Some PG&E study results, especially the flow and river stage-height related studies conducted in August of 2002, are not yet complete. When results are received and interpreted, they could alter, eliminate, or increase our concerns about specific resources. Any changes necessitated by additional scientific information will be incorporated into our final 4(e) Terms and Conditions, or if still not complete at that time, into a Final 4(e) license condition that will allow for modification, if necessary, when study results are available.

The decision on whether or not to relicense this hydroelectric project lies with the Federal Energy Regulatory Commission - as the lead federal agency. Therefore, the Forest Service mandatory 4(e) license conditions and any 10(a) recommendations accepted by the FERC, would become a portion of the overall license, if issued by the FERC.

The FERC relicensing process is initiated five years prior to the expiration of the existing license. The Pit 3/4/5 license was issued on February 26, 1981 for a 30 year term (the 30 year term is from the expiration date of the previous license, not from the issuance date of the new license), and expires October 31, 2003. Therefore the Forest Service must prepare 4(e) license conditions and 10(a) recommendations to be incorporated into any new license issued by the FERC on that timeline; that includes this response to the FERC’s August 12, 2002 notice of “Ready for Environmental Assessment” (REA), which requires applicable agencies and Tribes to provide conditions and recommendations within 60 days. The FERC will use the input from this response to start their environmental process including their draft Environmental Assessment (EA) which will be noticed for public review. The FS will use this response as the “proposed action” to initiate FS scoping (public involvement), as per the National Environmental Policy Act process. Public input and the disclosure of outstanding PG&E study results will further refine project-related issues. As a result, the preliminary conditions and recommendations can be modified prior to the development of the Forest Service final 4(e) license conditions and recommendations. These preliminary 4(e)’s are therefore **not** intended to be a final document.

The FERC license project boundary includes Licensee’s facilities that produce hydroelectric energy (i.e. dams, intake, transformer sites, etc.), and those facilities that are appurtenant to, or result from hydroelectric generation facilities (e.g. roads, campgrounds, etc.). However, this limited extent of FERC project boundaries, does not include, in all cases, the extent of the resources affected by the project and its appurtenances. For example, the Pit 3, 4, and 5 river reaches (those portions of the Pit River between the 3 dams and their respective powerhouses) are not included within the FERC license boundary. Yet the river reaches have been dramatically altered by the approximate 95% reduction of river summer base flows induced by Project hydropower generation. This reduction has had a concomitant effect on the riverine biological and botanical resources. Since some of these project-affected river resources are on National Forest System lands (NFSL) in both the Pit 3 and 4 reaches, 4(e) license conditions for

those resources associated with instream flows are prescribed. Another example of Project effects outside of the limited FERC license boundary is recreation. Changes in recreation and the associated influx of visitors were induced by the changed Project flows and Project features (i.e. reservoirs). The area of Project effects varies by resource so it is not feasible to develop an “affected area” boundary.

The intent of this “Rationale” document is to demonstrate the Project to resource nexus, which is displayed below by resource area. Within each heading the applicable License Conditions are listed, following by a comparison of the “Existing” and “Desired” resource condition and the Rationale to move the resources to, or towards, the desired state. There is overlap between effects in these resource groupings, as one project-induced change may cause several resource effects (positive or negative) in other resource areas.

## **A. GENERAL, STANDARD AND PROJECT SPECIFIC CONDITIONS**

### License Conditions

No. 1 - 54: “General, Standard, and Project Specific Conditions”

### Existing Condition

As briefly outlined above, and detailed below, the Pit 3, 4, and 5 Hydroelectric Project has affected resource condition and function on National Forest System lands as administered by the USDA-Forest Service.

### Desired Condition

A number of laws and regulations have been promulgated to ensure resource protection on NFSL, of which the following are most germane to this relicensing:

- Federal Power Act of 1950
- Organic Administration Act of 1897
- Multiple-Use Sustained Yield Act of 1960
- National Forest Management Act of 1976, including Land and Resource Management Plan Standards and Guidelines, (Comprehensive Plan direction including the Northwest Forest Planning Record of Decision, Chalk Mountain Late Successional Reserve Assessment, etc.).

### Rationale

The Forest Service has developed a set of “standardized” 4(e) license conditions, to be applied to each relicensing project. Standardized conditions No. 1-20 are included in order to meet the applicable laws and regulations that are germane to this project. Project Specific Conditions # 21-54, have additional rationale as discussed below.

## **B. HYDROLOGY**

### License Conditions

- No. 21 Instream Flows
- No. 22 Maximum Ramping Rate and Up Ramping Analysis
- No. 23 Dry Year Freshet Flow
- No. 24 Adaptive Management for Peak Flow Management
- No. 25 Maximum Lake Britton Drawdown
- No. 26 Notification & Minimization of Emergency & Planned Maintenance Outages

### Existing Condition

- As a result of the Pit 3, 4, and 5 hydropower projects, eight miles of the Pit River have been inundated by Lake Britton, Pit 4 reservoir and Pit 5 reservoir. Pit River flows have been diverted around 23.6 miles of the Pit River. Many of the effects of the hydropower projects are described in the Pit 3, 4, and 5 Project application for new license (FERC No. 233). Below we describe in detail the problems with the existing flow regime of 150 cubic feet per second (cfs) year round in the Pit 3 and 4 Project reaches.
- Present aquatic conditions on the Pit River in the Pit 3, 4, and 5 hydropower project relicensing area do not meet the aquatic management objectives of the Lassen and Shasta-Trinity National Forest Land and Resources Management Plans (Forest Plans), the Northwest Forest Plan's Aquatic Conservation Strategy (ACS) objectives, or other Forest Service management directives. Below, we outline some key components of those documents and provide a narrative description of the project area including problems with the existing aquatic conditions, and provide a reasonable list of Pit 3, 4, and 5 hydropower project modifications to protect, mitigate, and enhance existing conditions.
- The amount of baseflow aquatic habitat and habitat diversity (macroinvertebrate, fish, amphibian, and eagle foraging) is significantly below its actual potential due to static low base flows.
- Temperatures are marginal (too warm) during summer months in Pit 4 and Pit 5 reaches for salmonids.
- Static low base flows enhance conditions for non-native species (e.g., bullfrogs and signal crayfish) and potentially are having adverse impacts on the food web.
- Low base flows are out of balance with natural high flow events. High flow to low flow ratio (variability) has increased an order of magnitude.
- Static low base flows have allowed significant encroachment of the channel with vegetation (torrent sedge and willows) reducing habitat for foothill yellow-legged frogs, reducing potential eagle foraging habitat on channel margin bars, and impeding flow onto channel margin bars (confining flows to the thalweg).
- Natural intra- and interannual flow variability and timing has been significantly altered by static base flow conditions and by effectively increasing the magnitude of flood events (relative to baseflows) and by dramatically shortening the duration

of high flow events. Altered flow variability and timing affects species access to key lifestage habitats such as complex margin and “floodplain” like habitats for early lifestage rearing. Increasing the magnitude of flood events has potential detrimental impacts to relatively immobile species and early lifestages.

Shortening of the duration of high flow events reduces the inundation of low elevation channel bars (increasing vegetation encroachment), affects riparian processes at higher elevations in the channel (decreases woody species such as willow and cottonwood regeneration), and reduces access to complex margin and “floodplain” like habitat for aquatic species and early lifestages.

- The Project reservoirs reduce gravel-sized sediment supply 89-100, 92-100, and 48-100 percent in the Pit 3, 4, and 5 Project bypassed reaches, respectively. In-channel gravel-sized sediment storage available for aquatic habitat, including spawning habitat for native rainbow trout, has been reduced to negligible to non-existent levels immediately below the Project dams to significantly reduced levels in the lower portion of the bypassed reaches.
- Project induced spill events have the potential to destroy entire year classes of sensitive species/lifestages (e.g., foothill yellow legged frogs) due to low base flows.
- The facility can be mechanically operated to create ramping rates (changes in flows) that differ from the existing ramping rates to better consider safety to river users and damage to aquatic biota (primarily due to fluctuating flows and stranding/trapping).
- Lake Britton elevations affect recreation facilities and use, erosion of cultural resource sites, and other resources.

#### Desired Condition (from Comprehensive Plans)

- To meet or move the resources towards achieving Aquatic Conservation Strategy (ACS) objectives in the Pit 3 & 4 Project reaches (see specific objectives below).
- Riparian areas are healthy, and streams continue to provide clean water and high quality habitat for all native and compatible non-native game species, and to meet domestic use needs.
- Mitigation for loss of public resources, resulting from hydroelectric project development, will be borne by the licensee. Included, as applicable, will be compensation for lost riparian areas, wildlife habitat, cultural resources, fishery values, and recreational experiences.
- Identify and treat areas with a degraded watershed condition in a cost-effective manner and according to beneficial use priorities, including sensitive species habitat.
- Where uses conflict, favor protection of riparian-dependent resources (water, fish, vegetation, wildlife, and aesthetics) over other resources.
- Rehabilitate Screwdriver and Rock Creeks. Apply special management practices to protect the sensitive nature of these watersheds.
- Identify in-stream flows needed to maintain riparian resources, channel conditions, and fish passage.

- During re-licensing of hydroelectric projects, provide written and timely license conditions to FERC that emphasize in-stream flows and habitat conditions that maintain or restore riparian resources and channel integrity.
- Locate new support facilities (hydroelectric) outside Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to FERC that ensure ACS objectives are met. Where these objectives can not be met, provide recommendations to FERC that such support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves will be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of ACS Objectives.

### Rationale for License Conditions 21 – 24, and 26

#### **Aquatic Conservation Strategy (ACS)**

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The Aquatic Conservation Strategy specifically states that

Any species-specific strategy aimed at defining explicit standards for habitat elements would be insufficient for protecting even the targeted species. The Aquatic Conservation Strategy must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century, to accomplish all of its objectives. Some improvements in aquatic ecosystems, however, can be expected in 10 to 20 years.

Improvement relates to restoring biological and physical processes within their ranges of natural variability.

The Aquatic Conservation Strategy objectives are:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Late-Successional and Riparian Reserves are an important component of the Aquatic Conservation Strategy. The standards and guidelines under which Late-Successional and Riparian Reserves are managed provide increased protection for all stream types. Refugia are a cornerstone of most species conservation strategies. They are designated areas that either provide, or are expected to provide, high quality habitat. Because these reserves possess late-successional and riparian characteristics, they offer core areas of high quality stream habitat that will act as refugia and centers from which degraded areas can be recolonized as they recover. Streams in these reserves may be particularly important for endemic or locally distributed fish species and stocks.

## **Sediment Regime**

The existing sediment regime in the Pit 3, 4, and 5 Project bypassed reaches does not meet Aquatic Conservation Strategy (ACS) objective 5, which seeks to maintain and restore the timing, volume, rate, and character of sediment input or supply into the project bypassed reaches. ACS objective 5 also explicitly seeks to maintain and restore the resulting distribution and character of sediment storage on the channel bed and floodplain surfaces that is available for aquatic habitat.

The Project bypassed reaches have relatively steep and confined boulder-bed channels in the Pit River Canyon. The sediment transport capacity is relatively great compared to the sediment supply. Therefore, severe disruptions to the naturally continuous sediment supply can cause severe reductions to the amount and distribution of sediment on the channel bed, particularly gravel-sized channel bed materials available for aquatic and spawning habitat. The Project reservoirs reduce the total sediment supply to the Pit 3, 4, and 5 Project bypassed reaches by 51, 48, and 45 percent, respectively (R2 Resources Consultants, Inc. 2001). More importantly, the Project reservoirs reduce the gravel-sized sediment supply to the Project bypassed reaches by 100 percent immediately below the Project dams, and accounting for natural gravel-sized sediment inputs from adjacent hillslopes and tributary streams, the Project reservoirs reduce the gravel-sized sediment supply to the downstream sections of the Project bypassed reaches by 89, 92, and 48 percent, respectively (R2 Resources Consultants, Inc. 2002:xi). The 90 to 100 percent reduction in gravel-sized sediment supply significantly reduces the gravel-sized sediment storage on the channel bed, here characterized by the frequency and area and volume of individual gravel-sized sediment dominated areas on the channel bed (i.e., patches, bars, pocket gravels, pool tail-outs). Therefore the frequency of isolated gravel-sized sediment dominated areas on the channel bed that provide suitable spawning habitat are negligible to non-existent in the large majority of the Project bypassed reaches.

### ***Problem:***

The Project reservoirs reduce gravel-sized sediment supply 89-100, 92-100, and 48-100 percent in the Pit 3, 4, and 5 Project bypassed reaches, respectively. In-channel gravel-sized sediment storage available for aquatic habitat, including spawning habitat for native rainbow trout, has been reduced to negligible to non-existent levels immediately below the Project dams to significantly reduced levels in the lower portion of the bypassed reaches. In general, the only isolated occurrences of gravel-sized sediment dominated areas on the channel bed are immediately downstream from local natural gravel-sized sediment sources, and in the lower portion of the Pit 5 Project bypassed reach where the gravel-sized sediment supply is approximately 50 percent of the natural supply.

### ***Solution:***

Implement a multi-year phased Gravel Management Plan (Plan) in the Pit 3 Project bypassed reach, as outlined in the license condition, to first develop baseline physical and biological data, including young-of-the-year rainbow trout

standing crop data, benthic invertebrate density, and wadeability, and then measure the downstream physical and biological effects of gravel additions to the Pit 3 Project bypassed reach. Use multi-year study results to determine if gravel additions substantially increase in-channel gravel-sized sediment storage at study sites, and if the increased gravel storage results in increased spawning use or other ecological and recreational benefits, compared to baseline conditions. If the ecological benefits are significant enough to justify continuing gravel augmentation in the Pit 3 and 4 Project bypassed reaches, use the study results to determine the appropriate and effective amounts and methods of gravel augmentation. (See “Gravel and Large Woody Debris Supply Management Program” license condition).

## **Flow Regime**

The flow regimes in the bypassed reaches currently consist of relatively very low static minimum flow releases, 100 – 150 cubic feet per second (cfs) (depending on the reach). The flow releases are very low relative to unimpaired (without project) flows. Dry season unimpaired base flows are about 2,000 cfs and essentially never drop below 1,500 cfs in this river (minimum synthesized mean daily unimpaired flows for 1970-1999 in the Pit 3, 4, and 5 reaches are 1,440, 1,488, and 1,518 cfs, respectively). The existing 100-150 cfs (with project) flow releases do not change from year to year. During the vast majority of each year the minimum flow is the only flow released into each bypassed reach. In fact, during 9 of the 30 years in the 1970 to 1999 historical record essentially no other flow was released into the bypassed reaches effectively resulting in a “flat line” hydrograph. During several additional years (historical record) only a brief duration reservoir spill (flow release greater than the minimum flows) occurred into the bypassed reaches as a result of storm events exceeding the diversion and limited storage capacity of the project. The Project’s maximum storage capacity is about 14,300, 1,300, and 202 acre feet (af), in the Pit 3, 4, and 5 reservoirs, respectively, and the maximum diversion capacity is about 4,300 cfs, 4,500 cfs, and 4100 cfs in the Pit 3, 4, and 5 powerhouses, respectively. Appendix 1, Figure 1 shows an example unimpaired and existing condition hydrograph for a dry year (1994).

Superimposed upon the existing low flow conditions are numerous years when very large (sometimes 20,000+ cfs) unaltered winter and spring spills occur from the project reservoirs into the bypassed reaches. These natural flow spill events are often very spiked and erratic (e.g., end abruptly) during the winter/spring season (due to natural rainstorm and snowmelt events) and often drop flows back to the minimum base flows only to spike up again. These events are in a sense unaltered natural events because their magnitude greatly exceeds the diversion capacity of the project (ca. 4,100 – 4,500 cfs) and because little storage capability exists in the project. Appendix 1, Figure 2 shows an example unimpaired and existing condition hydrograph for an average water year (1995).

In many places the current minimum flows are wholly contained within an incised thalweg of the much larger natural (historical) channel. Appendix 1, Figures 3a and 3b shows typical existing canyon floor conditions, including the natural (or historical)

channel thalweg and bar surfaces, approximate base flow and higher flow stages, and typical substrate and vegetation conditions. Appendix 1, Figure 3c shows through photographs (Delucci Ridge, Pit 3 reach), the concept of riparian inundation at various stage heights as depicted schematically in Appendix 1, Figures 3a and 3b. Note how the natural (historical) channel low flow thalweg confines the flows and provides aquatic habitat, but also periodically becomes the location of maximum channel bed scour during large winter/spring uncontrolled spill events. Virtually no gravel for invertebrate and spawning habitat exists in the thalweg. In addition, the natural (historical) bar surfaces, which were completely and continuously inundated by the unimpaired flow regime, have become a surrogate “floodplain” for the existing low flow thalweg channel. This surrogate “floodplain”, however, is rarely accessed by “natural” long duration naturally (slowly) receding flows. This “floodplain” or natural channel floor typically receives either high magnitude scouring flows or long periods without inundation. Therefore the woody riparian vegetation dominating these surfaces is not able to mature and diverse riparian gallery forests do not develop. Moreover, the bar surfaces also do not provide shallow unvegetated aquatic habitat suitable for bald eagle foraging, and fish and amphibian habitat.

As is shown below, the existing flow regime conditions do not meet the primary directive of the Aquatic Conservation Strategy regarding improvement of degraded conditions: “Improvement relates to restoring biological and physical processes within their ranges of natural variability. For the Pit River, the “range of natural variability” is encompassed by the reconstructed unimpaired Pit River hydrograph / sediment budget and the physical conditions in other similar river systems that the existing biota in the Pit River are adapted to exploit. These conditions represent an environmental reference state (sensu Paine 1984) in which we can assume that the physical conditions match the conditions in which the native community assembled and in which the native species evolved and adapted. While the Forest Service is not attempting to return the river to this unimpaired state, one of our objectives is to drive the resource condition towards that state. It is also important to improve the physical flow regime to meet Forest Land and Resource Management Plan (LRMP) standards and guidelines for the dependent aquatic and riparian communities. It is clear by comparing and contrasting the hydrologic “existing” and “desired” conditions above, that presently the flow regime does not meet the LRMP or ACS guidelines. These impaired physical and biological functions and processes that need to be improved are discussed in more detail below.

### **Base Flow Effects on Habitat and Trophic Energy Transfer**

Existing base flows do not meet Aquatic Conservation Strategy objectives 1 and 9, they do not meet the objectives of increasing faster water habitats needed by trout, which are to be emphasized in the Pit River (see “Biological Resources” below), and they do not meet LRMP standards and guidelines as detailed below.

The existing static minimum flows are approximately 5% of the natural mean annual flow (mean annual flows are 2900 to 3300 cfs in the project reaches). Many studies have repeatedly shown that the amount of physical habitat for aquatic species, particularly fish,

attains its highest availability near 30+% of mean annual flow and that flows less than about 10% of mean annual flow typically provide relatively low amounts of habitat (or relatively poor habitat conditions) (Hatfield and Bruce 2000, Tenant 1976, others). Flows that are often viewed as providing moderate protection of biological habitat are approximately 20% of mean annual flow, which would equate to approximately 600 cfs in the Pit River (450 cfs greater than existing flows).

Site specific data also show that base flows in the Pit River reaches would benefit aquatic biota if they were significantly higher and within the range that previous instream flow studies have identified. Empirical flow releases of 150, 250, 400, 600, 800, 1200, and 1800 cfs during the summer of 2002, in the Pit 3, 4, and 5 reaches clearly indicated that much better and diverse aquatic habitat could be obtained at flows higher than the existing minimum flows (Craig Addley, Bill Brock, Kathy Turner, Deb Romberger, Pers. Obser.). Flows in the 250 to 600 cfs range significantly enhanced habitat conditions for faster water species (native rainbow trout and Sacramento suckers) while providing a diverse array of edge and slow water habitats for juvenile lifestages and other slower water species. The best flows depended on local channel characteristics. Historical (WESCO 1985) Physical Habitat Simulation (PHABSIM) studies in the bypassed reaches, despite being flawed both by 1) only looking at a narrow range of flows and 2) by containing known, but uncorrected (at this point) modeling problems (e.g., erroneous hydraulic modeling calibrations), also indicate that the habitat of rainbow trout and sucker adults (key species and lifestages in this system) reach their highest level between and above 250 to 600 cfs. Other species and lifestages also maintain high levels of habitat within this range of flows.

*Unique Low Flow Channel Bench (cobble/boulder bar surface)*--A unique feature of the Pit River channel, particularly in the Pit 3 and Pit 4 bypassed reaches, is the existence of a relatively flat cobble/boulder bar forming a floodplain-like bench just above the incised thalweg. This bench is the bottom or floor of the historical channel (see Figures 3a and 3b). At existing conditions (e.g., 150 cfs), very little or no water accesses this bench, which potentially can provide large amounts of diverse relatively shallow water habitat for juvenile fishes, amphibians, and eagle foraging habitat. Flows above 250 cfs, and in some cases as high as 600 cfs, are needed to access this unique bench and add a diversity of side channel, “backwater”, and shallow water habitats. For foothill yellow-legged frog (*Rana boylei*), inundation of this bench in the spring and summer will create additional oviposition and tadpole rearing habitat. For the two known and six potential breeding sites that were monitored in Pit 4 during the 2002 test flows, there was an increase in the number of patches where depth, velocity, substrate, and lack of canopy cover were suitable for egg laying. At 250 cfs there were only 15 patches, whereas at 400 and 600 cfs there were 36 and 32 patches respectively (Sarah Kupferberg, Pers. Comm.).

Heavy encroachment of these bars by large torrent sedges and young willows (due to low base flows), currently retards flow onto the benches in many places. Retardation of flow onto the benches and dense vegetation makes the benches less effective in providing juvenile fish, foothill yellow-legged frog (FYLF), and eagle foraging habitat and increases main channel velocities when flows do exceed the 150 cfs minimum flows

(Craig Addley, Pers. Obser.). Retardation of flow, in some areas, deposits sediments and cuts off access to side channels (PG&E License Application, pg E3.1-147), reducing potential habitat diversity. In some situations, the dense encroached vegetation may provide beneficial slow velocities and cover for fry. Again, however, existing baseflows do not access the bench. Only relatively short duration high flow spill events inundate the bench making them ineffective for providing habitat.

*Unique Large Slow Moving Pools/Deep Runs at Existing Minimum Flows*--Another unique feature of the Pit River Project bypassed reaches, largely due to the geomorphology of the channel, is that the river consists of a series of runs (includes riffles and boulder pocket waters) connecting large, deep slow moving pools (and some deep slow runs) Wild native rainbow trout and Sacramento Sucker prefer faster water habitats (e.g., riffles, but are also found in other habitats) and Sacramento pikeminnow and hardhead prefer slow to moderate velocity habitats (e.g., pools, but are also found in other habitats). In a relative sense, compared to reference conditions for the Pit River ecosystem (much higher flows and faster water conditions), existing conditions provide proportionally less amounts of faster water habitat and larger amounts of slower water habitat. In the pools the only faster water is at immediate heads and tails at the extreme upstream and downstream ends of the pools. Increased base flows in the range of 250 to 600+ cfs change the general character of the river and increase the velocities in pools (particularly in the heads and tails) and slow runs and increase the amount of these habitats suitable for adult rainbow trout and Sacramento sucker, while maintaining and in some cases increasing habitat for adult pikeminnow and hardhead (Personal Observations, PG&E License Application pg E3.1-288 to 296).

*Years Without Natural Magnitude, Timing, and Duration Higher Flow Events*—Under existing conditions, many years, 9 of 30, (1970-1999) exhibit no fluctuations in flow releases. These unnatural “flatline” conditions lead to enhanced encroachment of riparian vegetation onto bar surfaces (e.g., PG&E License Application pg E3.1-134) and “fossilization” of those surfaces and negative changes in biota. There is strong experimental evidence from the Trinity River that dense vegetation up to the edge of the base flow channel (as occurs in the bypassed reaches under the static baseflow regime) is detrimental to FYLF frogs. Point bars that were unsuitable and un-used by FYLF for breeding were rapidly recolonized after riparian vegetation was removed (Lind et al. 1996).

A particular concern of sustained low base flows is the invasion/establishment of harmful non-native taxa (Moyle and Light 1996). In the Pit River, signal crayfish (*Pacifastacus leniusculatus* (Dana)) invasion has progressed during the years of flow alteration (Light et al. 1995). In smaller unregulated Sierran streams, signal crayfish invasion is constrained by high intensity (bankfull and higher) flood events (Light 2002). Similar observations of susceptibility to high intensity flow events have been made for other species of crayfish as well (Gamradt and Kats 1996, Robinson, et al 2000). Crayfish are known predators of amphibian eggs and larvae (Axelsson et al. 1997) and can interfere with newt breeding (Gamradt et al. 1997). Signal crayfish may pose a significant threat to *R. boylei* in the Pit River. There was a rapid disappearance of tadpoles at the Deep

Creek site during May, and it was suspected that the predation by the abundant crayfish seen near eggs and tadpoles was the cause (Maria Ellis, pers. comm. to S. Kupferberg). This disappearance occurred after the May test flows and prior to the first of the emergency spills that could have provided alternative explanations. Because signal crayfish are capable of long-distance upstream movements (Holdich 1991) and can rapidly recolonize from the reservoirs/impoundments in between the Pit 3/4/5 bypass reaches it is important that a more natural annual regime of high magnitude flow events occur to keep crayfish densities in check.

Non-native bullfrog populations also pose a dramatic threat to native foothill yellow-legged (FYLF) frog populations (Moyle 1973, Hayes and Jennings 1986, Kupferberg 1997). Bullfrogs are currently in Pit 5 and could potentially colonize the Pit 4 reach in the future. Bullfrogs are best eliminated or prevented from entering reaches by natural high flow events as has been observed in the Eel River of northwestern California (Kupferberg 1996a). Bullfrog tadpoles must overwinter as tadpoles for at least one year. During the larval lifestage they are dramatically reduced or removed by natural winter flow events. FYLF, however, avoid this source of mortality because their tadpoles metamorphose prior to winter (Zweifel 1955).

In addition to affecting habitat, the existing low base flows disrupt the key biological process of re-assembly of aquatic food webs after scouring floods. In northern California rivers, wet season scouring flows actually lengthen functional food chain length. The absence of scour reduces energy transfer from lower to higher trophic levels, i.e. from algae to grazers to predators (e.g. fish). The general pattern of succession for algae and grazers is from more edible to less edible taxa. The existing condition of total absence of scouring floods in dry years can lead to dominance by late successional species of aquatic insect grazers that are either heavily armored, e.g. cased caddis flies, or sessile grazers, e.g. *Petrophila*, that are relatively invulnerable to aquatic insect predators and fish predators. Whereas, after scouring floods, grazer guilds are dominated by highly mobile and less defended taxa that are more easily consumed by higher trophic levels. “The life-history trade-offs (that organisms make) between resilience to physical disturbance and resistance to predation occur because of design constraints: Adaptations and life styles which protect consumers from predators tend to slow the recovery of their populations from indiscriminate mortality imposed by physical disturbances.” (Power et al. 1996a, p. 292). Experiments and comparisons between free-flowing and dammed rivers in northern California have confirmed that in the absence of wet-season scouring floods the abundance of predator resistant grazers increases and, the occurrence of algae decreases, thus blocking the transfer of energy from algae to fish (Power, et al. 1996b). Regulated rivers “exhibited significantly higher occurrence of predator resistant grazers (369%), a significantly lower occurrence of algae (-58%) and predators (-87%), and a slightly, but not significantly lower occurrence of predator-susceptible grazers (-41%), relative to the rivers with natural flows.” (Wootton, et al. 1996).

Floods that occur in the winter and early spring are beneficial, but floods that occur during the summer are not beneficial and do not lengthen food chains. Seasonality of flooding, species succession, and food-web assembly is not highly variable for rivers in

California's Mediterranean climate. Winter and spring flooding is followed by a summer low flow period. Sustained low summer base flows punctuated by extremely unseasonal peak flows due to powerhouse operations / shutdowns, are outside the range of natural variability and the ability of some species to recover. When dry season high flow "spates" occur, the base of the food chain (i.e. macroalgae, macrophytes, and epiphytic periphyton and the macroinvertebrate consumers) are dislodged and transported out of the river system into the reservoirs. Thus, un-seasonal flow disturbance has the effect of shortening food chains and reducing the flow of energy to higher trophic levels (Power et al 1996a). At the Pit River the solution to this problem is the return to a more natural hydrograph and the elimination of dry season (summer) floods. The results of PG&E's algal dislodgement study done during August 2002 demonstrate that both the pre-study emergency spills and the test flows significantly reduced algal standing crop.

Macrophytic vegetation, such as Elodea, density is correlated with the frequency of high flow condition. The absence of scouring flows allows rooted macrophytic aquatic vegetation to flourish, whereas scouring floods keep macrophytes in check (Henry et al. 1994, Kupferberg 1996b). Large stands of Elodea are detrimental in the Pit River for at least two reasons, it is prime habitat for non-native taxa and, at least during this years test flow releases, build-up of sloughed vegetation interfered with Powerhouse operations by clogging intakes and lead to a large unseasonal emergency spill. With regard to harmful non-native taxa, bullfrogs lay their eggs at the surface of Elodea mats and provide cover for bullfrog tadpoles. Elodea is also an important resource for signal crayfish. Rearing experiments have shown that the presence of Elodea significantly improves juvenile growth and reduces juvenile mortality of signal crayfish (Blake et al. 1994). As omnivores, with juveniles eating mostly animal food and adults consuming mostly vegetation and detritus, signal crayfish can exert strong impacts in benthic foodwebs. Experiments have shown that they significantly reduce the total biomass of other invertebrates especially herbivorous/detritivorous taxa (Nystrom, et al. 1996) that are important links in the food chains supporting predatory fish.

Continuous low baseflows that encourage vegetation encroachment of the channel, and as a result reduce the conveyance capacity of the channel, can also cause increased damage when high flow events (floods) occur. Reduced flow conveyance from encroaching vegetation can increase flood stage, results in scouring and deposition of vegetation debris in power intakes, and cause channel damage when high flows are routed outside of the existing channel.

**Problem:** The amount of baseflow aquatic habitat and habitat diversity is significantly below its actual potential, despite the fact that existing conditions provide a relatively good and diverse fishery. Static base flows have allowed significant encroachment of the channel with young seral stage vegetation and enhance conditions for non-native species (e.g., bullfrogs and signal crayfish) and potentially are having adverse impacts on the food web.

**Solution:** Increase base flows within the range of 400 to 600 cfs depending on natural water availability and timing (see "Minimum Instream Flow Regime")

license condition). Provide a more evenly distributed disturbance regime from year to year including dry year scouring flows (specifically a dry year freshet flow of approximately 1,500 cfs to inundate the channel floor with a linear decline back to baseflows over a 21 day period) and longer duration and more naturally downramping inundation regime of channel floor following spills (see “Maximum Ramping Rate and Up Ramp Analysis”, “Dry Year Freshet Flow”, and “Adaptive Management for Peak Flows Management” license conditions).

## **High Flows**

Natural high flow events are a critical component of structuring river channels, maintaining proper functioning riparian vegetation, and sustaining aquatic biota (e.g., fish spawning and rearing habitats for fry). However, flows can be detrimental when the magnitude or duration or timing of high flow events is outside of the natural range of variability to which species are adapted. The existing high flow regime in the Pit River bypassed reaches does not meet the Aquatic Conservation Strategy objectives 3 and 6-9, it does not provide for Forest Planning emphasis of favoring protection of riparian-dependent resources (water, fish, vegetation, wildlife, and aesthetics) over other resources, and the emphasis for in-stream flows and habitat conditions during hydroelectric relicensing.

The ratio between high peak flows and base flows has been repeatedly shown to have a strong influence on aquatic biota. Systems that have large peak to base flow ratios (high flow events imposed on low base flows) and rapid changes in flow are considered physically harsh systems that can be colonized by fewer species (primarily generalist species) and are relatively less productive (Poff et al. 1997; Jowett and Richardson 1990; Jowett and Duncan 1990, Resh et al. 1988; Power et al. 1988, Kinsolving and Bain 1993, see “References Cited” section). Frequent flow fluctuations reduce fish abundance and diversity (particularly shallow-slow water fishes) and invertebrate abundance and diversity in rivers (e.g., Horwitz 1978; Schlosser 1982; Gislason 1985; Cushman 1985; Irvin 1985; Bain et al. 1988; Morgan 1991; Moog 1993). Flow fluctuations temporally alter habitat suitability (depths, velocities, and shear) in the permanently wetted channel and create temporally and spatially variable ‘varial’ zones along the margins of channels. Fishes that utilize margin habitats are subjected to rapidly changing conditions (e.g., Bain et al. 1988). In addition, the substrates in the varial zone are dewatered causing loss of benthic invertebrate biomass in the varial zone (Fisher and LaVoy 1972; Perry and Perry 1986; Blinn et al. 1995). Artificial and natural fluctuations in water velocities increase out-migration of fry (Ottaway and Forest 1983; Irvine 1986; Heggenes and Traaen 1988; Jowett and Richardson 1989; Latterell et al. 1998; see also citations in these papers) and the abundance of older fish in a river system is directly related to fry abundance unless the carrying capacity of the river has been reached (e.g. Bjornn and Reiser 1991; Nehring and Anderson 1993.)

In New Zealand river studies, the intermediate depth channel margins have been shown to have the highest benthic invertebrate densities, while in the center of the channel

(thalweg) where high shear stress and disturbance rates occur, invertebrate densities are relatively low (Jowett, in press). In the Pit River bypassed reaches, the entire aquatic community (algae, invertebrates, fish) is contained in the thalweg due to low base flows, and as a result, when large flow events occur the aquatic biota is subjected to intense scour. This problem may be mitigated to some extent in the Pit River due to the large coarse, stable substrates that likely provide some protection to biota from scour.

Flow fluctuations in the Pit River under existing conditions are more than an order of magnitude greater than they would be under natural conditions. This occurs due to the limited influence the project has on natural peak flow events and the greatly reduced baseflow. Where naturally flows ranged from 20,000+ to 2,000 cfs (one order of magnitude) they now range from 17,000+ to 150 cfs (two orders of magnitude). In Appendix 1, Figure 4, the “existing” surface plot (bottom) of all flow years, with its low base flow, graphically depicts this order of flow magnitude difference when compared to the unimpaired plot (top). That is, under existing conditions there is more than an order of magnitude increase in peak to base flows. Appendix 1, Figure 2 shows a plot of an example average water year (1995) with both unimpaired flows and existing flows. Both Appendix 1, Figures 1 and 2 illustrate the large magnitude of flow variability existing presently compared to unimpaired flow variability. Naturally the system would be viewed as a relatively stable high baseflow system whereas now it would be viewed as a flashy, harsher system (see Poff and Ward 1990, Poff et. al. 1997, Poff and Ward 1989, and Jowett and Duncan 1990 for a description and classification of river flow regimes).

The lifestages that are most sensitive to flow fluctuations and that are most likely to limit populations are spawning, incubation, hatching, emergence, fry, and early juvenile. For example, in their paper describing a 13-year study aimed at determining population-limiting salmonid habitats in 11 Colorado streams, Nerhing and Anderson (1993) state the following:

“... it became apparent after 4-5 years of study that the early life stages (spawning, incubation, hatching, emergence, and early fry) were the most vulnerable to flow induced variations in habitat. These life stages, due to a stationary nature or relative immobility, are unable to respond quickly (if at all) to flow-induced habitat variations. It is at these early life stages that the “bottleneck” habitat theory is most valid. The loss of a year-class (in the early stages of development) due to flow-induced changes in habitat carries through for the entire potential life span of that cohort. Not only is the cohort lost from a recreational standpoint, but all of the potential progeny from the cohort are lost as well.”

While little site specific information exists on the Pit River to address the consequences of the existing winter and spring flow fluctuations, indeed it would be nearly impossible to assess the effects due to lack of statistical control and difficult sampling issues, it is safe to assume that the increased range of fluctuations as a result of the Project has not been beneficial for most species (note exception addressed above regarding Elodea, bullfrogs, and signal crayfish).

The coefficient of variability (CV) of mean annual flow in the Pit River bypassed reaches has increased from 24% to 74% as result of the low baseflows and high peak flows. The CV is the ratio of the standard deviation of mean annual flow to the mean annual flow and is a measure of annual flow variability. Streams with a higher CV have more variable flows from year to year. Based on data in Bayley and Li (1992) the increase in annual flow CV in the Pit River would be expected to increase the CV of fish recruitment more than 100% (more than double). Meaning that the variability in young fish numbers each year would more than double (become more sporadic) compared to the range of natural variability expected for this system.

A site specific, illustrative Pit River example of damaging effects of reduced baseflows superimposed by natural (in this example not natural) higher flow events occurred this spring (2002) with foothill yellow-legged frogs (a sensitive species). In April, frogs laid egg masses within the 150 cfs minimum flow channel at the tailout of a pool and along the margins of the channel near Deep Creek. FYL frogs lay egg masses in sites very insensitive to flow fluctuations (Kupferberg 1996a, Yarnell 2000). As a result of both an emergency spill (PG&E) and biological study flow releases of approximately 1,200 cfs, nearly the entire year class of frogs was lost due to scour of egg masses. Some egg masses were salvaged by moving them to a protected tributary stream, otherwise most of the known egg masses would have been lost. The 1,200 cfs flows were relatively small (20% less than the unimpaired driest year base flows) and not an uncommon event during years when natural spill events occur (or in this case a study and emergency spill occurred). But the flows were very damaging because of the low base flow. Essentially an order of magnitude flow increase occurred (150 to 1,200+ cfs). Had the frogs laid egg masses in a base flow of 600+ cfs the egg masses would have likely survived (Sarah Kupferburg, Pers. Comm.). Given a higher baseflow, 600 cfs, it would have taken a flow of roughly 6,000 cfs to produce an equivalent order of magnitude spill event (i.e., compared to the 150 to 1,200 cfs event).

In river systems where flow regimes have been implemented to reduce flow fluctuations, the systems have exhibited large increases in biotic populations. By implementing minimum flows below a hydropeaking facility, Travnicek et al. (1995) found that the resulting reduction in the magnitude of flow fluctuations (no change in the frequency of the fluctuations) caused a doubling in species richness and abundance. Similarly Weisberg and Burton (1993) found that fish growth rates, benthic macroinvertebrate abundance and the proportion of fish with full stomachs increased significantly when a power peaking discharge regime was mitigated by maintaining a higher minimum base flow. McKinney et al. (2001) found that increased minimum flows, higher mean flows, and more stable flow releases below Glen Canyon Dam increased the abundance of wild spawned rainbow trout fourfold.

**Problem:** Low base flows are out of balance with natural high flow events. High flow to low flow ratio (variability) has increased an order of magnitude.

**Solution:** Reduce project induced increase in flow variability by ½ order of magnitude. Increase base flows during seasons and water years when frequent and large flood (spill) events occur. (See “Adaptive Management for Peak Flows” license condition).

**Timing and Duration**

The timing and duration of flow events is critical because the life cycles of many aquatic and riparian species are timed to exploit or avoid various flows (e.g., Poff et al. 1997). For riparian guilds, individual species differences in seasonal sequence of flowering, seed dispersal, germination, seedling growth, rate at which seedling roots stay connected to receding flows, and tolerance to inundation or drought or large flow disturbances helps to maintain high species and age class diversity in flow regimes with naturally varying intra- and inter-annual variability. Spawning and early lifestage rearing success of many aquatic species is tied to the natural timing of high flow events and access to floodplain, backwater, and edge habitats created by naturally receding high flows (many references possible). A thorough periodicity chart of aquatic and riparian species phenologies has not been developed for the Pit River reaches, but Table 1 provides some basic life history and timing information for selected fishes in the Pit River (P.B. Moyle, 2002).

Table 1

<b>Fish Species</b>	<b>Reproductive Timing &amp; Behavior</b>	<b>Habitat Preferences</b>	<b>Water Temperature Preferences</b>	<b>Other Anecdotes</b>
Rainbow Trout  (RBT)	From February into June	Fry <50 mm. found in quiet water of shallow edges; up to 1 year old in riffles; 1-3 years old in runs; and age 3+ in deeper runs and pools.	Growth best accommodated from 15-18 deg. C.; eggs will hatch in about 30 days in a range of from 10-15 deg. C.; 24-27 deg. C. is lethal despite acclimatization.	RBT rarely competes with non-salmonid species. Pikeminnow adults can prey on RBT juveniles. RBT juveniles known to follow Sacto. suckers & consume discarded food.

<b>Fish Species</b>	<b>Reproductive Timing &amp; Behavior</b>	<b>Habitat Preferences</b>	<b>Water Temperature Preferences</b>	<b>Other Anecdotes</b>
Sacramento Pikeminnow	Information is scarce because they apparently spawn at night. Males ready first but 'larvae' seen into July. Free-released eggs are fertilized by at least one male then adhere to the stream bottom. Eggs hatch in 1 week at 18 deg. C. Larval fry begin shoaling 1 week later in shallow pool edges and backwater.	Young juveniles can enter deeper water quickly after their initial quiet water preference. Newborn young of year drift downstream, older juveniles can migrate upstream to runs & riffles. Adults prefer water 1m deep or more and velocity of 40 cm/sec. Prefer deep pools, undercut banks and overhanging vegetation	Prefer temperatures from 18-26 deg. C.	Adults can prey upon trout juveniles. They can be preyed upon by bass species so they normally avoid these waters.
Sacramento Sucker	Initiates in early spring when water temps. ascend to 12-18 deg. C. Prefer tributaries to mainstem rivers generally. A direct correlation between heavy precipitation years and large year classes.	Eat algae and invertebrates. Prefer bottom location with some turbulence. Male grouping behavior prior to spawning facilitates successful bald eagle predation. Overall ecology incomplete.	Prefer temperatures of 20-25 deg. C; can tolerate temps from 15-30 deg. C	Suckers and trout easily co-exist by partitioning habitat preferences. California regulated reservoir stream environments have promoted sucker range expansion.

<b>Fish Species</b>	<b>Reproductive Timing &amp; Behavior</b>	<b>Habitat Preferences</b>	<b>Water Temperature Preferences</b>	<b>Other Anecdotes</b>
Hardhead  {Forest Service 'sensitive' species}	Behavior assumed to be similar to pikeminnow but rarely documented.	Information scarce. Larvae presumably prefer water edges within dense cover of vegetation. Omnivores who reside with sucker and pikeminnow as adults.	Optimal temperature limit may be up to 28 deg. C. Prefer summer temps of 20 deg. C or more.	Pit River population may serve as a California stronghold as they are generally declining throughout their range. Populations plummet when bass are successfully introduced. They prefer the upstream half of Lake Britton away from the majority of bass.
Pit Sculpin	Spawning occurs from February into April. Males hide in a 'cave' and attempt to lure females	Typical sculpin preference of faster flowing water at stream bottom.	Prefer 10-16 deg. C. but can tolerate temps. up to 25 deg. C.	Relatively common in the Pit River system and population appears to be stable. Longest individual measured is 127 mm.

<b>Fish Species</b>	<b>Reproductive Timing &amp; Behavior</b>	<b>Habitat Preferences</b>	<b>Water Temperature Preferences</b>	<b>Other Anecdotes</b>
Tule Perch	Mating occurs from July to September but the eggs are 'delay-fertilized' in January within the female. Individuals are born alive from within the female and school early on.	Forage into fast water but generally reside behind a boulder in eddies. Found at the edges of large deep pools in the Pit. Prefer aquatic plants in the vicinity. Eat small invertebrates and aquatic plants.	Rarely found in water >25 deg. C; prefer temps. <22 deg. C.	Are among the most abundant specie found in Pit project reservoirs and Lake Britton.
Pit Roach	Spawning from March to early July when water temperatures first exceed 16 deg. C. Eggs dropped by females then males fertilize. Hatch in 2-3 days; larvae hide in rock crevices eating small crustaceans and diatoms.	Can tolerate temps. up to 30-35 deg. C. Prefer deep pool bottoms with lower velocities and aquatic plant mats. Discreet populations found in the Pit worthy of active protection. Has disappeared from the upper Pit River system upstream of the project.	Can tolerate temps. up to 35 deg. C. but prefers cooler environment.	Annual growth in early summer. Seldom lives more than three years or grows longer than 120 mm.

<u>Fish Species</u>	<u>Reproductive Timing &amp; Behavior</u>	<u>Habitat Preferences</u>	<u>Water Temperature Preferences</u>	<u>Other Anecdotes</u>
Speckled Dace	<p>Spawning occurs in June or July likely tied to a specific rising water temperature. Spawning behavior similar to Pit Roach but eggs hatch in one week. Larval fish seek shelter for another week. Fry head for shallow warmish water between large rock and emergent vegetation.</p>	<p>Prefer shallow riffles among rocks and plants but can tolerate most any habitat. Extremely adaptable and most widespread western native fish species.</p>	<p>Can tolerate temps. down to freezing and up to 31 deg. C.</p>	None
Smallmouth Bass	<p>Occurs in May or June in Calif. Reservoirs but into July for stream reaches. When water temps. ascend to 13 deg. C males migrate to suitable nesting areas 1.5 m deep and 'fan' nest depressions. Males guard young for weeks.</p>	<p>Bass can prey upon native frog species. Compete directly with hardhead over crustacean food sources and triumph.</p>	<p>Prefer temps. of 20-27 deg. C but can tolerate temps. up to 30 deg. C.</p>	<u>None</u>

Fish Species	Reproductive Timing & Behavior	Habitat Preferences	Water Temperature Preferences	Other Anecdotes
Rough Sculpin  {Forest Service 'Sensitive' Species}	Likely are spring spawners in project waters although are fall spawners in adjacent Fall River. Stream bottoms 'caves' are used with eggs adhering to underside. Eggs hatch in 2-3 weeks and young stay in the cave for several days.	Restricted to spring-fed tributaries of the Pit River, but most frequent in adjacent Fall River. River-run hydroelectric projects may promote local populations to develop while hindering migration throughout the former range.	Prefer cooler water temps up to 15 deg. C and show stress above this level.	Pit 3/4/5 project may technically extend its former range with caveat under 'Habitat Preferences'. The Federal listing of Shasta Crayfish will secondarily protect the sculpin due to habitat preference similarities.

Life cycle synchronization of riparian and aquatic species occurs both on an annual and intra-annual basis. Species frequently breed/reproduce in the spring, but the timing of those events varies from year to year depending on weather conditions. Weather conditions synchronize both natural hydrology (e.g., high flow events) and biology. Willow seed dispersal in the vicinity of the Pit River occurs from April to late June depending on temperatures during late winter and spring. Having a natural hydrograph that produces flooding earlier for warm years and later for colder years will maximize seedling establishment for willows and cottonwoods on the floodplain. Cottonwood seed dispersal occurs primarily during May and June. Willow seeds are viable for a short time-- roughly a week. Therefore, for example, in willow recruitment, it is **very important** that the flood hydrograph be timed to willow seed dispersal as much as possible. Conversely, to avoid encroachment of the channel with vegetation it important that the channel be inundated during recruitment windows. Other aquatic species' lifecycle timings are also correlated with weather and flow. For example, foothill yellow-legged frogs breed earlier in warm, dry springs than in cool, wet springs.

As a result of the reality of how river ecosystems function, historical methods of providing static minimum flows in rivers (i.e., the same static minimum flows that exist in the Pit River bypassed reaches during most of the year) have been severely criticized and most scientists agree (Poff et al. 1997) that static flow regimes do not maintain ecosystem integrity. The Instream Flow Council, composed primarily of state and provincial instream flow coordinators, asserts that instream flow standards

should provide intra- and interannual variability in a manner that maintains or restores riverine form and function (IFC 2002).

In the Pit River bypassed reaches, the intra- and interannual timing of large flood events has not been affected by project operations, but the duration of those events has greatly shortened and the frequency of smaller events (“freshets”) has greatly decreased. Because the project’s diversion capacity is relatively large, large spill events quickly recede to minimum baseflows and during drier years no higher flow events occur at all. The flood events that do occur, happen earlier because they are of shorter duration, and moderate flow variations that would occur in drier years do not occur at all. Figure 1 shows a dry year hydrograph that naturally would have provided flow variation contrasted with the existing static minimum flow regime that exhibits no flow variation. Figure 2 shows a wetter year where, under natural conditions, the last high flow event(s) began on the 1<sup>st</sup> of May and didn’t completely attenuate until the end of August (nearly 4 months), whereas under the existing condition the flow event started the 1<sup>st</sup> of May, but was completely attenuated by the end of May (only one month, excluding a brief spike in flow for a few days in June).

Figure 5 shows the same 1995 hydrograph with an approximate (very generic) declining flow that would promote woody vegetation (e.g., cottonwood) germination and recruitment at the 5,000 cfs level in the Pit River Channel (Dave Weixelman, Pers. Comm.). The 5,000 cfs level is very roughly a level in the channel that large woody vegetation could persist without being removed by large floods and similar in elevation to where many natural riparian processes would have occurred under natural conditions. The declining flow line for recruitment is generic (based on young plant root growth) and can slide earlier or later in the year depending on flow and weather conditions. In this case, for illustration, it was slid along the x-axis of the graph to match the timing of the last flood event. As can be observed from Figure 5, natural flow conditions would have provided a better than necessary duration of flow (declining limb of the hydrograph) condition for recruitment. Contrasted to the existing conditions, however, the duration of existing flow conditions is much too short (recession is too fast). In addition to allowing vegetation to establish and mature on the margins of the channel, the long duration of the unimpaired flow regime would have provided an extended period of inundation on the flatter bottom of the natural channel that would have also prevented vegetation recruitment within the channel proper. A natural/lengthy inundation period would also provided fishes and other aquatic organisms access to channel margin habitats for several months to complete life history cycles (e.g., spawning and recruitment). Under existing conditions, stage height drops rapidly allowing young seral stage colonization of the bars in the channel and drops too fast to allow fishes and aquatic organisms useful access to the complex channel margin (“floodplain”) habitats (on the historical channel bed and bar surfaces). The longer duration (unimpaired) flows would have had positive implications for aquatic invertebrate production (increase wetted perimeter for longer time, detritus, etc.).

**Problem:** Natural intra- and interannual flow variability has been significantly altered by static base flow conditions during many time periods and by effectively increasing the magnitude of flood events (relative to baseflows) and by dramatically shortening the duration of high flow events.

**Solutions:** Prescribe a flow regime that increases baseflows in proportion to unimpaired baseflows and according to the variable timing of winter/spring runoff in the Pit River watershed (see “Minimum Instream Flow” and “Adaptive Management for Peak Flows” license conditions), extends the duration of high flow events, and provides a more naturally downramping inundation regime on the channel floor for the benefit of both riparian vegetation diversity and aquatic biota. (See “Adaptive Management for Peak Flow Management” and “Maximum Ramping Rate and Up Ramping Analysis” license condition, and “Real-Time Flow Regime Example” at the end of this Hydrology section).

### **Project Induced Spill Events**

In recent years there have been several emergency spill events into Pit River bypassed reaches. In general, the spill events are simply the amount of unimpaired base flow in the system (several thousand cfs). However, because they occur on top of very low base flows of 150 cfs, they have the potential, depending on timing, to cause serious biological damage. In particular, foothill yellow-legged frogs are very susceptible to losing either year classes of eggs or young tadpoles to inopportune pulses in flow. First hand experience with this occurred this spring (see discussion of base flows above). Young fishes would also be susceptible to losses due to inopportune spills (e.g., Nerhing and Anderson 1993, Jowett and Richardson 1990).

**Problem:** Project induced spill events have the potential to destroy entire year classes of sensitive species/lifestages.

**Solution:** Determine if it is feasible to install flow continuation devices on powerhouses. Develop a plan to reduce frequency and magnitude of spill events. Increase base flows to minimize the impact of spill events. (See “Notification and Minimization of Emergency and Planned Maintenance outages” license condition).

### **Ramping Rates**

Ramping rates are primarily important with respect to user safety (during up ramp) and stranding of aquatic species (during down ramp). In addition, ramping rates are sometimes used to discourage large fluctuations in discharge over time that cause biological damage regardless of the rate that they occur (e.g., dewatering of redds, displacement of species). On the Pit Project rapid declines in flow are a biological issue. Stranding and trapping of fish and invertebrates is one concern. Stranding studies during August 2002 flow releases found some, but not large amounts of

stranding/trapping. Unfortunately, stranding/trapping results are highly dependent on the number of fish present to be stranded/trapped, so without this knowledge it is difficult to interpret the results. There is anecdotal information that during the tail of spill events, flows are rapidly shut off below Lake Britton due to operation of the air bladder gates on the dam spillway crest. At the present time we do not have compiled information on existing ramping rates in Pit 4 reach and no gage exists in the Pit 3 reach, therefore, it is hard to assess the existing conditions.

The unimpaired rates of hydrograph decline are typically equal to and more often less than 1 inch per hour at flows below 4,000 cfs. Down ramping rates in the range of 1 inch per hour in other rivers have been shown to help protect aquatic species (e.g., Hunter 1992). Ramping rates in the range of 1 inch per hour would help minimize stranding/trapping and somewhat temper the drop in the flows at the end of a spill event. These ramping rates, however, would not significantly extend or slow the decline of existing spill hydrographs. Even at one inch per hour, using the Pit 5 reach rating curve (USGS gage no. 11363000), flows can drop from 4,000 cfs to base flows in 2 days. A better way to address declines in peak flow events is either to pass the peak flow events through the system at a natural decline rate by holding project reservoir spillway elevations and penstock releases steady until completion of reservoir spill, or use some percentage (scaling) of the unimpaired flow hydrograph to prescribe releases into the bypassed reaches.

We are aware of no up ramping safety studies or analysis that have occurred in the Pit River. Wading conditions are very difficult under existing static flow conditions due to boulder-bed stream conditions with negligible to non-existent pocket gravel deposits. If there is a safety analysis it will require Forest Service review, if not, there should be an analysis/study undertaken.

***Problem:*** The facility can be mechanically operated to create ramping rates (changes in flows) that are either dangerous for users on the river or that are damaging to aquatic biota (primarily due to fluctuating flows and stranding/trapping).

***Solution:*** Establish maximum down ramping and up ramping criteria that minimize the potential biological and safety problems of unrestrained ramping. Set down ramping to one inch per hour. Set maximum up ramping rate in inches per hour according to an analysis or study of up ramping safety. (See “Maximum Ramping Rate and Up Ramping Analysis” license condition).

## **Temperature Problems**

Existing temperature conditions are a concern in the Pit River bypassed reaches. A reasonable maximum temperature threshold for rainbow trout is about 23°C (e.g., Bartholow (1991) and mean temperatures in the near about 20°C cause some level of weight reduction (e.g., Sullivan et al. 2000). Optimum growth temperature is typically about 17 degrees C (Hokanson, et al. 1977), but depends on food

availability. Temperatures in the Pit River bypassed reaches (Pit 4 and 5) are in the range of concern. Figure 6a-b show temperature recordings for the Pit 3 and Pit 4 reaches for July and August during empirical flow releases of 150, 250, 400, 600, 800, 1200, and 1800. During July instantaneous temperatures in the Pit 4 reach exceeded 22°C and mean temperatures were in the range of 20 to 21°C. During the increased flow releases August 4-12, 2002, a clear and substantial decrease in the range of daily temperatures and the mean daily temperature occurred as a result of increased flow releases. The range of daily temperatures decreased by a degree and the mean daily temperatures decreased by 1.5 to 2°C. The 400 cfs flow release decreased maximum and daily mean temperatures below 19°C. Daily temperature fluctuations in Pit 3 reach decreased and, depending on the flow, mean temperature slightly decreased or remained about the same (means and maximums all below 18°C).

There are some detail issues with regards to the “cold” water pool in Lake Britton and the effects of cool water tributary inflows. In general, however, modeling shows that during the summer Lake Britton increases the temperature in the Pit River bypassed reaches by a few degrees as a result of surface warming in Lake Britton (Pit 4 and Pit 5 bypassed reaches) (Ed Cheslak, Pers. Comm.), but decreases temperature slightly in Pit 3 reach due to the bottom reservoir withdrawal (compared to “without reservoir” conditions). Under existing project conditions, temperatures in Pit 4 and Pit 5 can be reduced by 1 to 1.5 °C (daily maximums and means) by increasing flows to 400 cfs (slightly further decreases in water temperature occur at higher flows). Temperatures in the Pit 3 reach would increase a degree or so, but would stay below the range of concern for trout. In the Pit 5 reach there is some dilution of cool water tributary inflows that occurs as a result of increased baseflows and as a result some sections of the river would exhibit increased temperature due to increased flows (a negative effect).

***Problem:*** Temperatures are too warm during summer months in Pit 4 and Pit 5 reaches.

***Solution:*** Increase flows to about 400 cfs or more to decrease daily maximum and mean temperatures to near 19°C or below. Monitor temperatures for five years to substantiate results expected from modeling. (See “Minimum Instream Flow Regime” license condition).

### **Solution to Existing Pit 3, 4, and 5 Project Aquatic Flow Regime Problems**

To address the existing aquatic flow regime problems outlined in this rationale above, our primary focus for our “Minimum Instream Flow Regime” 4(e) license condition, was to improve base flow conditions and secondarily, in an adaptive manner, on increasing the duration and reducing the magnitude of the existing high flow fluctuating regime. A goal of incorporating an intra- and inter-annual varying flow regime is in some measure deferred at the present time until study results are available and an adaptive approach to

managing the natural high flow releases can be implemented. In addition, a “Dry Year Freshet” license condition was developed.

Preliminary 4e license conditions include increasing base flows to the minimum values acceptable for each reach. These flows are 400 cfs in Pit 3, 450 in Pit 4 reach and 500 in Pit 5 reach (recommendation for Pit 5). Flexibility for slight modifications of the ratio of “allocated” minimum flows in the Pit 3 and Pit 4 reaches (slightly more in Pit 3 and less in Pit 4 or vice versa) or within year shaping of the stated amount of flow is provided in the preliminary license condition to allow future incorporation of pending study results. A study to develop ways to improve the duration of existing high flow events and reduce the magnitude of those events (in relation to base flows), the “Adaptive Management for Peak Flows” license condition, is to be completed within two years of the new license; a dry year “freshet” flow is proposed to eliminate years with no flow fluctuation; an applied sediment study is proposed to address the loss of gravels; a ramping rate plan and woody debris management plan will provide additional clarity on these remaining physical processes to maximize the biotic productivity of the system; and for the aquatic dependent resources, studies are proposed to improve habitat conditions and quantify life history timing for foothill yellow-legged frogs, as well as to obtain population and trend information for fish, benthic macroinvertebrate, and turtles.

The solutions proposed and the resultant “Minimum Instream Flow Regime” 4(e) license condition are not viewed by the Forest Service as completely resolving the aquatic resource problems identified in this rationale.. An example flow regime that deals with the aquatic resource problems, but requires the same or slightly more water than our preliminary license condition was also developed by the Forest Service, and is provided here for reference (e.g., for consideration during high flow adaptive management study, future resource decisions, negotiations, etc.) but is not a proposed license condition. This example flow regime addresses (at some level of magnitude) the entire range of problems addressed above, but again is currently **not** the proposed preliminary license flow regime.

To provide additional ecological benefits while not increasing mean annual instream flow and not further reducing water available for hydropower generation, the example flow regime attempts to schedule instream flow releases according to a fixed percentage of the actual project inflow, or the flow that would have occurred in the without-project natural system. For example, by implementing a “real-time” baseflow scheduling method, base flows would be increased during naturally occurring reservoir spills such that the spills would ramp down to a temporarily elevated base flow and thereby reduce stranding and flow fluctuation concerns. Also, the base flows would become elevated earlier or later in the spring depending on natural climatic (wet and cold, or warm and dry) conditions and therefore better meet riparian and aquatic habitat management objectives of increasing base flows during riparian tree seed-set and amphibian breeding onset. The example “real-time” mode flow regime also potentially increases water available for power generation for any given mean instream flow by providing higher base flows during actual wet periods when project inflow makes more water available for both instream flow needs and hydropower generation, and by reducing base flows to minimum levels during actual dry periods when the least water is available.

The example “real-time” flow regime requires biweekly calculations of average project inflow and biweekly modification of minimum instream flow releases to meet a fixed percentage of the project inflow. For illustration purposes, a percentage of 17.5% of inflow was selected for the bypass reaches, and minimum and maximum instream flows were at 350 cfs and 1,000 cfs, respectively.

Appendix 1, Figures 7 and 8 show the 1994 and 1995 water year (same hydrographs as Figure 1 & 2) with the example 17.5% real-time flow release regime superimposed. The actual flow would be the example base flow release regime in combination with the spill events. Notice that the elevated winter base flows that result essentially fill in the gaps between the spill events and thereby both extend the duration of the high spill events and reduce the ratio between spills and baseflows. During all seasons and between years the flow pattern mimics a natural flow regime in sequencing and timing. Figure 9 shows the resulting mean monthly flows for the entire period of record (i.e., flow releases that would have occurred during the period of record under the example flow regime), which clearly shows the intra-variability of flows that would be achieved with this flow regime that is missing by using set monthly averages, as is our “Minimum Instream Flow Regime” license condition. A full description of the example real-time flow regime, using 17.5% for illustration purposes (but could be adjusted) is provided below.

**Real-Time Flow Regime, an example for the Pit River:**

The Licensee shall provide a flow regime that reduces the problems associated with the existing Project induced low flow regime while at the same time providing water for hydropower production. The flow regime shall provide water for aquatic biota in proportion to the amount naturally available in the system depending on yearly and seasonal availability. When more water is available in the system (e.g., wet periods and wet water years) the Licensee shall provide proportionally more water for aquatic biota (and provide proportionally less water for aquatic biota in dry periods and dry water years) in a manner consistent with the seasonality and the timing of natural processes to maintain ecosystem integrity. The flow regime shall provide intra- and interannual variability in a manner that maintains and restores riverine form and function within the range of natural variability. The flow regime shall specifically reduce unnaturally high Project induced winter and spring flow variability caused by relatively high natural reservoir spills superimposed on a proportionally low baseflow, and remove static low flow summer conditions. A flow regime that meets these objectives is described below.

<b>Purpose</b>	<b>Standards &amp; Basis</b>
<b>Summer Base Flows</b>	
<ul style="list-style-type: none"> <li>• Typically Maintain Temperature below 19°C</li> </ul>	Minimum Flow 350 cfs
<ul style="list-style-type: none"> <li>• Maintain and Enhance Diversity of Habitat (all species &amp; lifestages, Particularly adult trout, Sacramento Sucker, Foothill yellow-legged frog, Eagle Foraging, etc.)</li> </ul>	Flows range between 350 – 500 cfs
<ul style="list-style-type: none"> <li>• Maintain accessible fishery</li> </ul>	Flows range between 350 – 500 cfs

**Fall Base Flows**

- Maintain and Enhance Diversity of Habitat (e.g., adult rainbow trout, adult Sac. Sucker, maintain relatively high habitat values for other species & lifestages)

Flows range between 350 – 600 cfs

**Winter Base Flows**

- Reduce Project Induced Flow Variability Approximately ½ and Provide More Consistent Channel Floor Inundation Regime (Particularly during years when spill events occur)

Increase base flows proportional to natural inflows. Maximum minimum flow release capped at 1000 cfs. Release flows (not including spills) range from 350 – 1000 cfs. Typical drier year flows 400 –500 cfs, typical average year flows 500 – 700, wetter water years maximum 1000 cfs.

**Spring Base Flows**

- Reduce Project Induced Flow Variability Approximately ½
- Provide Longer Duration Inundation Flows Onto Floor of Natural Channel (reduce vegetation encroachment & increase access to “floodplain” like habitats for aquatic species)
- Provide Natural Timing of Baseflow Changes To Synchronize Hydrologic and Biologic Timing

Increase base flows proportional to natural inflows (see winter flows above for flow ranges).

Increase base flows proportional to natural inflows in a pattern consistent with natural inflows. (See winter flows ranges above )

Provide baseflow pattern consistent with natural inflows.

For the purpose of providing the flow regime outlined above we describe a simple flow release scheduling method that the Licensee shall follow to release and maintain baseflows in the Pit 3 and Pit 4 bypassed reaches. The flow release scheduling method appears to be the most efficient mechanism to achieve the flow regime objectives including providing timing of baseflow changes to synchronize hydrologic and biologic timing while having the least impact on the amount of water available for power generation. We, however, also provide the Licensee the opportunity to develop an alternative mechanism by which to schedule flow releases. The alternative mechanism will be approved by the Forest Service if it meets the objectives outlined above, including the objectives or intent embodied in the flow release schedule provided herein by the Forest Service.

The Licensee shall release into the bypassed reaches 17.5% of the average natural calculated unimpaired inflows into the Pit River at the location of the Lake Britton dam for Pit 3 reach flow releases and at the Pit 4 dam for Pit 4 reach releases. Inflows are calculated from the previous ½ month period. Biweekly changes in the flow releases shall follow existing ramping rate criteria and be altered promptly at the end of each biweekly period. Biweekly periods begin and end on the first weekday of each month and on the nearest weekday at the middle of the month. Minimum flow releases are 350 cfs. The maximum required flow release is 1000 cfs.

The licensee shall develop an approved method of calculating biweekly unimpaired inflows. In the interim the following regression equations that account statistically for inflows other than those occurring at the Pit 1 reach USGS gage will be used.

$$\begin{aligned}\text{Pit 3 Unimpaired} &= 1.1591 \times \text{Pit 1 gage} + 609.97 \\ \text{Pit 4 Unimpaired} &= 1.2648 \times \text{Pit 1 gage} + 525.75\end{aligned}$$

Where: Pit 1 gage = previous biweekly average flow (cfs)  
Pit 3 Unimpaired = calculated Pit 3 reach biweekly average flow (cfs)  
Pit 4 Unimpaired = calculated Pit 4 reach biweekly average flow (cfs)

Flow shall be released into the Project reaches on a biweekly basis according to the following equations (interim until a better unimpaired inflow calculation method is approved).

$$\begin{aligned}\text{Pit 3 Flow Release} &= \text{Pit 3 Unimpaired} \times 17.5 \% \\ \text{Pit 4 Flow Release} &= \text{Pit 4 Unimpaired} \times 17.5 \%\end{aligned}$$

The licensee must modify project release facilities, if needed, to achieve flow release schedules.

If inflows to the Pit Reaches change as a result of upstream diversions, storage, or project operations, the Forest Service reserves the right to modify flow release requirements consistent with the original intent of the license conditions.

### **Rationale for License Condition No. 25 “Maximum Lake Britton Drawdown:**

According to Appendix E5-2, Lake Britton: Recreation Opportunities and Management Strategies, of the PG&E Application for License, PG&E operates the Lake Britton reservoir in a range of a 6-foot drawdown. These drawdowns usually occur during the middle of the day each weekday (to coincide with peak energy demand). The water is partially replaced on weekday nights with a resulting drop in the lake level by the end of the workweek. As demand is lower on weekends, the lake elevation comes back up on Saturday and Sunday. Depending on energy demand, weekly drawdowns may be less than 6 feet. Under their existing license, PG&E is allowed to draw down a total of 9 feet. For a number of reasons, recreation, cultural resources, and operational advantages, PG&E does not utilize the full 9-foot drawdown allowed. The intent of the 4(e) condition is to formalize current operations.

Whenever drawdown occurs, areas of the lake that are shallow become unavailable to many watercraft. Also, these exposed areas are “mud flats” which are not conducive to shore recreation. A secondary problem occurs when recreationists beach their boats during higher pool and then drawdown does not allow them to refloat until water levels return. We recognize that many of these problems are inherent in recreation at a reservoir developed for power generation. Where optimal operational conditions (head pressure at higher pool) are also optimal for recreation, this condition should be formalized.

An opposite situation must also be recognized. At maximum pool, beaches, picnic areas, and parking at the McArthur Burney State Park are partially underwater and unusable. Other beach areas, sand or natural, are much reduced in size. The number of sites available to visitors to the State Park is reduced, causing them to go elsewhere for the experience. This can cause crowding at Dusty Campground on the National Forest, and at other facilities on Lake Britton, which also have reduced beach areas. Again, recognizing the nature of power generation, it is desirable to maintain as much of the parking, beach, and picnic areas as possible when use is heaviest. This normally occurs between Memorial Day weekend and Labor Day weekend.

***Problem:*** Reservoir operating range can conflict with recreation, cultural resources, reservoir fishery objectives, and other resources.

***Solution:*** Operate reservoir at current normal operating levels. Do not operate the reservoir below 2,750 feet elevation (PG&E datum). Do not operate the reservoir above 2,756 feet elevation (PG&E datum) in the summer during high use recreation season (Memorial weekend through Labor Day). Since this Project has several datums associated with its operations, we will need to assure that all references utilize the same datum. (See “Maximum Lake Britton Drawdown” license condition”).

## C. GEOMORPHOLOGY

### License Conditions

No. 27 Gravel and Large Woody Debris Supply Management Program  
No. 28 Reservoir & Afterbay Dredging

### Existing Condition

The existing condition for the gravel-sized sediment supply and transport regime in the Project bypassed Pit 3 and Pit 4 reaches as it is affected by the Project is summarized as follows:

- As a result of the Pit 3, 4, and 5 hydropower projects, eight miles of the Pit River have been inundated by Lake Britton, Pit 4 reservoir and Pit 5 reservoir. Pit River flows have been diverted around 23.6 miles of the Pit River. Many of the effects of the hydropower projects are described in the Pit 3, 4, and 5 Project application for new license (FERC No. 233). Below we describe the problems with the existing sediment regime.
- Lake Britton traps 100 percent of gravel-sized sediment entering the Project, thereby reducing the supply of gravel-sized sediment to upstream portions of the Pit 3 Project bypassed reach by 100 percent. Adjacent hillslope and spoils pile erosion and particularly major downstream tributary stream contributions thus constitute the existing gravel-sized sediment supply to the Pit 3 Project bypassed reach. Accounting for these contributions, the existing gravel-sized sediment supply to the downstream portion of the Pit 3 Project bypassed reach is reduced 89 percent (R2 Resource Consultants, Inc. 2002:xi).
- Pit 4 reservoir traps 100 percent of gravel-sized sediment entering from the Pit 3 Project bypassed reach, thereby reducing the supply of gravel-sized sediment to the upstream portion of the Pit 4 Project bypassed reach by 100 percent. Adjacent hillslope and spoils pile erosion and particularly major downstream tributary stream contributions thus constitute the existing gravel-sized sediment supply to the Pit 4 Project bypassed reach. Accounting for these contributions, the existing gravel-sized sediment supply to the downstream portion of the Pit 4 Project bypassed reach is reduced 92 percent (R2 Resource Consultants, Inc. 2002:xi).
- The frequency and average size and volume of gravel-sized sediment dominated channel bed material is significantly reduced (to negligible to non-existent) in the upstream portion of the Pit 3 and Pit 4 Project bypassed reaches and significantly reduced in the downstream portion of the Pit 3 and Pit 4 Project bypassed reaches, with the least reduction evident immediate downstream vicinity of major tributary streams where local gravel-sized sediment supply is relatively greater (R2 Resource Consultants, Inc. 2002:ix).
- The trapped sediments and woody debris which are depleted from the channel bed of the impaired system are not available to provide this unique habitat for freshwater mollusks, invertebrates, benthic invertebrates, including breeding habitat for FYLF and spawning habitat for native rainbow trout.

- Depleted gravel sized material in pockets between large cobbles and boulders on the channel bed have resulted in difficult river access (wadeability) and reduced safety for recreationists, and anglers.
- The sediment regime in the Pit River bypassed reaches does not meet Aquatic Conservation Strategy objectives 2 or 4.

The existing condition for the large woody debris (LWD) supply and transport regime in the Project bypassed Pit 3 and Pit 4 reaches as it is affected by the Project is summarized as follows:

- Lake Britton traps 100 percent of the LWD entering the project, and Pit 4 reservoir traps 100 percent of the LWD entering the Pit 4 Project bypassed reach from the Pit 3 Project bypassed reach. The Licensee extracts an unknown percentage of the trapped LWD from the Project reservoirs, where it is burned, or piled elsewhere. Some of the material is piled in recreation areas, and on other unapproved sites on NFSL.

### Desired Condition

The desired condition for the gravel-sized sediment supply and transport regime as it is affected by this Project includes:

- Meeting or moving the sediment regime existing condition towards attainment of the Aquatic Conservation Strategy objectives as directed by Forest LRMPs and amendments. The applicable Aquatic Conservation Strategy objectives include: “Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport (# 1, 2, 3, and 5).”
- Maintaining and restoring the physical processes to ensure protection of the aquatic systems to which species, populations and communities (freshwater mollusks, invertebrates, benthic invertebrates, including breeding habitat for FYLF and spawning habitat for native rainbow trout, on this project) are uniquely adapted.
- During re-licensing of hydroelectric projects, provide written and timely license conditions to FERC that emphasize in-stream flows and habitat conditions that maintain or restore riparian resources and channel integrity.

The desired condition for the LWD supply and transport regime as it is affected by this Project includes:

- Meeting or moving the sediment regime existing condition towards attainment of the Aquatic Conservation Strategy objectives as directed by Forest Plan and amendments. The applicable Aquatic Conservation Strategy objectives include: “Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.”

- Retain patterns of sediment, nutrient, and woody debris routing to provide aquatic habitat for which species, populations and communities (freshwater mollusks, invertebrates, benthic invertebrates, including breeding habitat for FYLF and spawning habitat for native rainbow trout, on this project) are uniquely adapted.

### Rationale

Studies (R2 Resource Consultants, Inc. 2002:xi) confirm that the Project reduces gravel-sized sediment supply to the Pit 3 and Pit 4 Project bypassed reaches by 90 to 100 percent. Studies also confirm that existing in-channel gravel-sized sediment storage available for aquatic habitat, here characterized by the frequency and area and volume of individual gravel-sized sediment dominated channel bed materials (i.e., patches, bars, pocket gravels, pool tail-outs) is also significantly reduced by the Project. Studies also confirm that relative increases in the local gravel-sized sediment supply, such as immediately downstream from major tributaries, results in locally increased gravel-sized sediment storage; where the local natural gravel-sized sediment contributions approach 50 percent of the natural mainstem gravel-sized sediment supply (i.e., Pit 5 Project bypassed reach downstream from tributary Kosk Creek), the frequency and volume of gravel-sized sediment dominated materials increases significantly (R2 Resource Consultants, Inc. 2001:6-8). Furthermore, Forest Service field observations indicate that outstanding tracer gravel study results will confirm that existing gravel-sized sediment dominated channel bed materials are only partially mobilized at flows up to 4,800 cfs, indicating that the residence time of gravel-sized sediment in the Project bypassed reaches is likely sufficient to sustain a measurable increase in sediment storage if supply were significantly increased. Additionally, Project reservoirs trap suspended sediment that normally would have provided finer sediments for floodplains and bar formation.

Biologically, these physical channel attributes and processes, which have been adversely affected by the Project and its operations, are necessary for the health of the aquatic and riparian habitats for fish, benthic macroinvertebrates, amphibians, riparian vegetation, etc. This reduction in gravels has also adversely affected angler wadeability due to reduced gravels between boulders; making these River reaches notoriously challenging.

Dozens of multi-year gravel augmentation programs have been undertaken to mitigate for reduced gravel-sized sediment supply and associated losses of suitable spawning habitat for salmonids below dams in California (Kondolf et al. 2002). Annual gravel additions on comparably sized rivers (e.g., Tuolumne, Stanislaus, Trinity, American, Feather Rivers) have ranged from one to ten tons/year with annual program costs ranging from \$50,000 to \$300,000. The majority of these programs entailed direct deposition of clean, rounded, alluvial gravel of a specified size range onto the channel bed and bank immediately downstream from the dam with annual monitoring of downstream changes in sediment storage and use by spawning salmonids (redd surveys).

A similar gravel augmentation program could be employed to increase gravel-sized sediment storage in the Pit 3 and Pit 4 Project bypassed reaches and associated aquatic habitat and recreational values, including a potential increase in the standing crop of the native rainbow trout fishery through increased availability of suitable spawning gravel. However, inadequate data exist in the present and outstanding study results to establish the appropriate amount (tons/year) of annual gravel augmentation or to reliably predict the physical and biological effects of gravel augmentation in the Pit 3 and Pit 4 Project bypassed reaches.

Implementing a Gravel Management Plan (Plan) in the Pit 3 Project bypassed reach, as outlined in this license condition, would provide the baseline biological data, including young-of-the-year rainbow trout standing crop data, and document annual monitoring measurements of both the physical and biological effects of gravel augmentation. The Plan would therefore provide the necessary information to determine if the results show that significant ecological and recreational benefits result from gravel augmentation in the Pit 3 Project bypassed reach, and if so, the appropriate amounts and methods of gravel augmentation for continuation throughout the remainder of the license term, and expansion to include gravel augmentation in the Pit 4 Project bypassed reach. Implementing the plan would therefore provide the information necessary to both determine the extent to which reasonable management and mitigation measures can succeed in meeting or moving toward the desired conditions for gravel-sized sediment supply, storage, and associated habitat, and the necessary information to design such management and mitigation measures.

Implementing a Large Woody Debris Management Plan in the Pit 3 and Pit 4 Project bypassed reaches, as outlined in this license condition, would practically eliminate the interruptions of LWD transport caused by the Project reservoirs, and thereby increase the LWD supply to the Project bypassed reaches and meet or move toward the desired conditions for LWD supply and storage and associated habitat. LWD is an important biological component of any river system. It provides nutrient cycling, disrupts the river current creating microhabitats of sediment deposition, and provides structural habitat for other aquatic species.

Requiring the Licensee to notify the Forest Service of any proposed reservoir or afterbay dredging activities would ensure that a reasonable peer-reviewed effort is put forth on behalf of the Licensee to both minimize the ecological impacts of dredging and to realize potential ecological benefits by using processed dredged materials to augment sediment supply in the Project bypassed reaches.

***Problem:*** Reduced fine and bedload (e.g., gravels) inflow into bypassed reaches resulting from Project dams, and subsequently reduced gravel and finer sediment deposits on bars and as pocket gravels. There is very limited mainstem spawning potential or “vertical” benthic invertebrate habitat, difficult wading conditions, and there are potential reductions in bar development for riparian vegetation.

**Solution:** Augment gravel in a study reach and determine benefits. If benefits are tangible, augment gravels in bypassed reaches (in amounts and methods determined from studies) to replace gravels trapped in reservoirs. (See “Gravel and Large Woody Debris Supply Management Program” license condition).

## **D. WATER QUALITY**

### License Condition

No. 29 Water Quality Plan

### Existing Condition

The Forest Service has identified concerns with several water quality attributes resulting from project operations that directly affect the resources and management of the National Forests. These project-related “existing conditions” include:

- Fecal and coliform bacteria levels that have exceeded State standards.
- Water temperatures have exceeded “cold water fishery” objectives in project reaches. Lack of growth by rainbow trout during summer months is documented in PG&E’s Application for License.
- Algal blooms are caused by changes in water quality parameters induced by project dams and reservoirs. The FS has personally observed at least two algal blooms in the last decade; a heavy blue-green algae forming in the summer of 1994, and a brown algae (reportedly *Volvox*) in the summer of 2002.
- Road maintenance procedures and low/stable instream flows requirements are adversely affecting suspended sediment loads in project waters.
- Water temperatures exceed some species tolerance levels – addressed under “Hydrology” above.

### Desired Condition

The desired condition for water quality as it is affected by this project includes:

- Meeting, or moving the existing condition towards applicable “Aquatic Conservation Strategy” (ACS) objectives, as directed by Forest Plans and Amendments. This includes “Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities”.
- Forest Plan direction stipulates maintaining high water quality that meets or exceeds State Standards.
- Recreational objectives include providing a variety of high quality outdoor and water oriented recreational facilities that are well maintained, and are sufficient to handle increased demand.

- Implement "Best Management Practices" for protection or improvement of water quality, as described in "Water Quality Management for National Forest System lands in California".

## Rationale

The "existing" and "desired" water quality conditions above show obvious differences, some of which are the result of project facilities, operations and maintenance. 4(e) license conditions in this resource area, as well as in the overlapping resource areas of recreation, hydrology, geomorphology, and hydropower generation will drive the existing water quality project condition towards the desired condition.

The State of California (State and Regional Water Quality Control Boards) has primary jurisdiction for water quality issues in the State, and prepares an independent water quality certification for this Project license. For that reason, we do not provide detailed license conditions for water quality. However, since existing water quality conditions do not meet Forest Service desired conditions, we have included one license condition for water quality as it relates specifically to FS concerns associated with recreation and biotic habitats.

Inadequate restroom availability, especially along the shoreline of Lake Britton has resulted in areas of heavy accumulations of human waste (see Appendix 2, Photographs on "Sanitation Concerns"). This is also a concern in project reaches, although to a lesser degree. The lack of sanitation facilities for project induced recreational use has a direct effect on *e-coli* loading in project waters; sanitation facilities are prescribed by the Forest Service to assist in reducing this bacterial loading.

Algal blooms in the reservoir are affecting project induced recreational use, including recreation on NFSL and campgrounds. PG&E's "Application for License" discussed the decrease in algal blooms after adding the bladder gates in the 1990's. However, as described under "existing condition" above, this situation does not appear to be resolved, and additional conditions are warranted.

Aquatic and riparian biota are affected by project induced suspended sediments, which can cover limited spawning gravels, and cause other deleterious affects. Maintaining or improving water quality is necessary for the entire fish assemblage, not just for a single species. Water temperatures exceeding the biota's natural range of variability can affect the growth, health, and even the survival of aquatic and riparian species.

Implementing the water quality plan, instream flow requirements, road maintenance paving and improved road maintenance procedures, and other mandated license conditions will positively affect water quality on this project, and assist in meeting FS resource desired conditions.

## **E. BIOLOGICAL RESOURCES**

### License Conditions

- No. 30 Fish and Benthic MI Monitoring of Project Reaches and Reservoirs
- No. 31 Amphibian Monitoring Plan
- No. 32 Vegetation Management Plan
- No. 33 Noxious Weed Management Plan
- No. 34 Bald Eagle Management Plan
- No. 35 Wildlife Mitigation and Monitoring Plan
- No. 36 Protection of Threatened, Endangered, Sensitive (TES), & Proposed Species Plan

### Aquatic Resources Existing Condition

- From PG&E study results, it appears that although a few number of small mouth and large mouth bass have become entrained and ended up in downstream Project reservoirs (Pit 4 & 5), they have not become established in the Project reaches, where habitat features (faster, cooler water) are not as conducive to their survival or reproduction.
- The fish fauna contained in project reservoir and bypass stream reaches vary from one typified by native coldwater, coolwater, and introduced non-native warmwater game species.
- A ‘trophy’ rainbow trout recreational fishery occurs in the Pit 3 bypass stream reach.
- The aquatic ecosystem and associated fish fauna experience a static project flow release (9 of 30 years) for one or more consecutive years in Project bypass flow reaches.
- Water temperatures in project bypass stream reaches regularly surpass levels whereby stress is induced to the native coldwater fish species, adversely affecting growth and overall health.
- The rough sculpin, a Forest Service ‘sensitive’ status fish species, along with other fish species occasionally become entrained and die in project diversion tunnels, powerhouses, and tailraces.
- Project bypassed reaches provide substantially reduced water surface area, wetted perimeter, depths, and velocities compared to the natural flow regime in which the fish and associated aquatic ecosystem evolved.
- Project facilities combine with Federal water conveyance facilities downriver to impede historic fish passage for anadromous salmon and steelhead historically native to project waters.
- Macroinvertebrate populations in all Project bypassed river reaches were sampled during the summer seasons of 2000 and 2001.
- The portion of the samples comprised of insects yielded a greater fraction indicative of pollution intolerance. Considering all invertebrates collected, a greater proportion was tolerant of pollution.

- Although ‘collectors’ were the most dominant feeding group overall, filter-feeding organisms dominated the sampled populations closest to Project bypass flow release sites and comprised a slight majority of insects sampled. Greater heterogeneity occurred moving downstream in each bypassed reach.
- Foothill yellow legged frog (FYLF) adults, eggs, and young have been found in the Project Pit 4 reach. Adult FYLF have been found in the upper portion of the Pit 5 reach. No FYLF have been found in the Pit 3 reach at this time. FYLF is being considered for possible future listing, but is not a listed (i.e. TES) species at this time. It is a FS “sensitive” species, and lack of protective measures for this species could drive them towards listing.
- Signal crayfish have become introduced and completely dominate the Pit River system, most likely to the detriment of the Shasta Crayfish, FYLF, fish spawn, and other native species.
- Western pond turtles (*Clemys marmorata*), a Forest Service sensitive species, are found in the project reservoirs and river reaches.

#### Aquatic Resources Desired Condition

- Increased and more frequently variable instream flows released to the Project bypassed reaches that can establish an aquatic condition more closely resembling the natural range of variability inherent in the watershed as the ACS objectives.
- Existing balances of indigenous fish populations are protected and maintained, total fish habitat and therefore carrying capacity is increased, and existing coldwater fish condition factors and growth rates are improved. These conditions must be met in order to move each project bypass stream reach toward the natural range of variability inherent in the watershed.
- Populations of invasive non-native fish species are largely confined to project reservoirs.
- Invasive non-native fish species that may yet to be introduced to project waters would be maintained at levels where they do not significantly compete with species native to the watershed.
- The aforementioned desired conditions are scientifically monitored to ensure that goals and objectives are ascertained. In cases where insufficient progress may be made in moving toward a desired condition, then submitted technical reports will describe those additional measures that may be needed to achieve the desired condition.
- Provide for aquatic species by maintaining the health and functionality of the aquatic habitat to which these species are uniquely adapted, through implementation of ACS objectives 1, 2, 4, 8, & 9.
- Cooperate in efforts to reduce impacts on fisheries from water level fluctuations in Lake Britton.
- Water quality in the Pit River drainage is maintained at a high level to meet a variety of objectives including promoting trout fisheries.
- Maintain or improve selected habitats for coldwater and warm water resident fisheries.

- Plant communities in riparian areas and wetlands are diverse and healthy, and provide essential ecological functions such as nutrient filtering, erosion protection, adequate temperature regulation in winter and summer, down wood and other debris that contribute to stability and needed habitat complexity.

### Rationale for Aquatic Resources

The reaches of the Pit River that presently comprise Project waters, historically contained flow discharges disproportionately greater than the annual precipitation would otherwise indicate. The volume of water was due to large perennial springs associated with volcanism in the region. The discharge from the basin that occurred in excess of annual precipitation totals could be considered ‘surplus’ in a developmental context. Nonetheless, an aquatic ecosystem did evolve that fully accommodated all of the habitat space and variability inherent with pre-project flows.

An important aspect of the historic condition was the accessibility to Project stream reaches by anadromous salmon and steelhead. Historically abundant populations have been documented migrating up the Sacramento River from the Pacific Ocean through San Francisco Bay. Along with completion of the federal Central Valley Project downriver, access to completed Project river reaches was blocked for anadromous fish. Completion of project facilities either initially diverted all or the vast majority of natural discharges from project bypassed reaches to hydroelectric generation.

The prescribed instream flow releases will measurably increase aquatic habitat variables that are conducive to an expanded aquatic ecosystem. Achieving a greater wetted perimeter, more diverse water depths, and a more naturally variable range of water velocities will produce measurably greater overall fish habitat. This condition better represents the natural range of variability otherwise inherent in the watershed. Increased bypassed reach flows will measurably lengthen the time required to achieve undesirable water temperatures from point of release for coldwater native fishes. The prescribed flow releases will also lessen the maximum temperatures achieved in the bypass reaches during the summer season that presently induces intermittent harm to native coldwater fish species.

The prescribed instream flow discharges to the Project bypassed reaches are still but a small fraction of the flows naturally inherent to the same portion of the Pit River watershed. But the scientific evidence currently available to the Forest Service strongly indicates that the prescribed flows will substantially increase and diversify aquatic riverine habitat. Aquatic organisms, including fish species, will therefore ultimately increase significantly in numbers, diversity, and overall health.

It is in the best interest of all parties to document the responsive changes to the Project bypassed river reaches to ensure that the desired conditions are ultimately achieved. The ensuing technical reports must also recommend changes that could more effectively achieve those conditions when and wherever applicable.

Benthic aquatic invertebrates comprise the foundation of the food web critical to all aquatic carnivores, including fish. The organisms are also indicative of the overall aquatic habitat condition in which they occur because different kinds of taxa predominate in differing habitat conditions.

The portion of the Pit River comprising the Project bypassed reaches and reservoirs will receive increasing public visitation pressure into the foreseeable future. Watershed development adjacent to Project facilities may also occur. The prescribed benthic invertebrate sampling will be key to monitoring the status of the indicative populations that could be affected by Project-related disturbance sources. It is possible that, due to their primary role in the aquatic food web, changes to the basic composition of the aquatic invertebrate fauna over time may be evident through this sampling prior to the changes becoming evident by fish or hydrologic sampling.

Bullfrogs, a fierce competitor with FYLF's have not yet been found in the Pit 3 & 4 reaches. But the prescribed instream flow license condition for these reaches could assist in discouraging movement up into this reach from where they have been found in the Project Pit 5 reach. Some of the resource objectives for instream flows, freshet flows, and amphibian monitoring are to alter the hydrologic regime such that it will match the life history adaptations of native FYLF and constrain the invasion of non-native bullfrogs. In California rivers, "the most important factor determining the success of an invading fish species is the match between the invader and the hydrologic regime" (Moyle and Light 1996, p. 1669). The same is true for bullfrog invasions. Bullfrogs are best eliminated or prevented from entering reaches by high flow events as has been observed in the Eel River of northwestern California (Kupferberg 1996a). Bullfrogs lay their eggs in summer, and the tadpoles do not reach metamorphosis during one dry season, they must overwinter as tadpoles. During the larval lifestage they are dramatically reduced or removed by natural winter flow events. FYLF, however, avoid this source of mortality because their eggs are laid early in spring and tadpoles metamorphose in late summer (Zweifel 1955). Metamorphs grow rapidly in the fall in order to attain a large enough size to survive the winter and high flow disturbances (Van Wagner 1996).

Introduced bullfrog populations pose a dramatic threat to native FYLF frog populations both as predators and larval competitors (Moyle 1973, Hayes and Jennings 1986, Kupferberg 1997). The higher and variable instream flows, as well as the higher winter peak flows in all years (either through natural spill or by induced "freshets" in dry years) should assist in preventing bullfrog tadpoles introduction into the Pit 3 and 4 reaches. Currently, the river has had several years, 9 of 30 (1970-1999), with no fluctuations in flow releases. These unnatural conditions improve habitat for bullfrogs and degrade habitat for FYLF. Riparian vegetation encroaches onto bar surfaces (e.g., PG&E License Application page E3.1-134) and "fossilizes" those surfaces. There is strong experimental evidence from the Trinity River, west of the Project, that dense vegetation up to the edge of the base flow channel (as occurs in Pit 3 & 4 reaches under the static baseflow regime) is detrimental to FYLF frogs.

When riparian vegetation was removed from point bars, FYLF rapidly re-colonized and used the sites for breeding (Lind et al. 1996).

Similarly, aquatic macrophytic vegetation flourishes with year round unvarying flows. In particular, large mats of Elodea, are an important component of bullfrog habitat and would be dislodged by high flow events (Henry et al. 1994, Kupferberg 1996a, and empirical observations during the August 2002 control test flows in the Pit 3 & 4 reaches caused Elodea to break loose and build up on the Pit 4 dam intake structure).

Without monitoring, it will not be known if this flow objective is being met, or if so, to what extent. Additionally, monitoring the effects of the new instream flow regime would provide a better understanding of how the timing, magnitude, and duration of both high and low flows meshes with the timing of these amphibians' complex life cycles. Any future consideration of whitewater boating will depend on this knowledge to determine when this type of activity would be least detrimental to native frogs and most helpful to limit the upstream invasion on non-native frogs.

The Forest Service sensitive species, western pond turtle (*Clemys marmorata*), is present in the Project reaches and reservoirs. Due to its status, it is important for the Forest Service to assure that changes in the Project license do not adversely affect this species and move it on a trend towards listing. Because turtles are long lived, it is important to assess the presence/absence of smaller size classes. If recruitment is not occurring, the long term viability of the population may be threatened even if there are consistent numbers of large adults from year to year. By having the Licensee develop a size class distribution of the extant population, the Forest Service can monitor the population trend.

#### Terrestrial Resources Existing Condition

- Bank swallow populations have dramatically declined State-wide due to loss of riverine habitat from the harnessing of rivers for flood control and hydroelectric power generation.
- The previously listed Peregrine falcons recovery plan requires monitoring for 5 years to assure populations remain stable. After those 5 years, it is anticipated that this species will remain as a FS sensitive species.
- The Project facilities, including the Pit 4 tunnel adit, attract roosting bats. The Pit 4 adit site provides suitable bat habitat, but is also the target of teenage party use, vandalism, and campfires, which disturbs this use.
- Speed restrictions on upper Lake Britton were implemented as a recovery strategy for bald eagles during the past relicensing, and have been successful in reducing disturbance to foraging bald eagles.
- TES, sensitive, and special status species are present on the project (northern spotted owl, habitat for Valley Elderberry Long-horned beetle (VELB), terrestrial

- molluscs, etc.). There are laws and regulations that require special mitigative measures for listed and special status species.
- The bald eagle, a listed threatened species, is present in this Project. This area has the highest density of nesting bald eagles in the State of California. The existing bald eagle management plan to aid in the recovery of this species is obsolete.
  - Plant communities have not had any naturally occurring fires for many decades in the Project area and surrounding NFSL. This has resulted in over-mature brush species and accumulations of fuels in the forested areas; this condition will lead to a stand replacing wildfire. With increasing Project induced recreational use, the incidence of human caused fires will increase.
  - Deer are a key management indicator species for the Lake Britton management area, and the resident wintering deer herd has suffered serious declines in populations over the last 10 years. Their food source in the Lake Britton winter range is the brush that has not been rejuvenated through prescribed fire or other treatments. The resulting old and woody brush does not provide sufficient nutrition for the deer herd, which affects their health and ability to survive during winter months.
  - There are not complete surveys to determine the presence or absence of certain species such as VELB, pacific fisher, terrestrial molluscs, survey and mange species, etc. There cannot be an assessment of impacts to these species from Project driven mitigation measures without additional information.
  - There are special status plants in the Pit 3, 4, and 5 project.
  - There are 195 occurrences of nine noxious weed species that have been found to date on the Project.
  - There are no existing plans for vegetation treatment in power and transmission line corridors in place on this Project.
  - There are areas of PG&E ground disturbance that are inadequately revegetated that have led to erosion and introduction of noxious weeds.
  - Culturally significant plants are not known, and have not been used to revegetate Project lands.

#### Terrestrial Resources Desired Condition

- Mitigation for loss of public resources, resulting from hydroelectric project development, will be borne by the licensee. Included, as applicable, will be compensation for lost riparian areas, wildlife habitat, cultural resources, fishery values, and recreational experiences.
- Maintain year-long road closure in the North Shore Bald Eagle Territory.
- Apply special silvicultural prescriptions to enhance bald eagle habitat.
- Give mule deer priority by allocating forage in winter range areas. Continue regenerating decadent brush fields to improve winter range.
- Through NEPA analysis and biological evaluations, address the needs of wildlife, timber and other resources within spotted owl, marten and fisher habitat areas, before starting management activities that might change their special vegetative characteristics.

- Late-successional forest stands are managed to maintain health and diversity components through the use of prescribed fire and thinning from below.
- Riparian zones along the Pit River are managed to encourage habitat for bald eagle and peregrine falcon. Bald eagle habitat is suitable to support the number of nest sites capable on this area.
- Maintain or improve selected habitats for deer, elk, turkey, bear, bald eagles, peregrine falcons, and spotted owls.
- Populations of game species such as mule deer, black-tailed deer, elk, and turkey improve through management action and are in balance with the ecosystem.
- Maintain diversity of native vertebrate, invertebrate, and plant species; and insure species populations remain healthy.
- Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of ACS objectives.
- Undesirable exotic species do not interfere with or degrade the quality of ecological functions or recreational experiences in the project area.
- The Forest Service is directed to inventory, monitor, and control the spread of specified noxious weeds.
- Manage old growth habitat (also called late seral habitat) to benefit plant and animal species associated with old growth.
- Manage habitat for Federally listed threatened and endangered (T&E) and candidate species, and State-listed species.

#### Rationale For Terrestrial Resources

There is obvious overlap between hydrology and geomorphology, especially as they relate to habitat for aquatic flora and fauna, and land management activities as they relate to upland biological resources. Discussions for this resource are limited to those not covered elsewhere in this document.

How PG&E manages their lands and operates their hydroelectric facility has direct and indirect effects on NF biological resources. Biological resource license conditions were developed to restore or move the resources towards a condition that maximizes health and diversity of habitat as required by Forest Service comprehensive plans and other laws and regulations. Conditions were specifically designed to:

- Provide old growth attributes on Late Successional Reserve designated lands
- Manage habitat for Federally listed T&E, candidate, State listed, and other special status species.
- Implement land and vegetation management activities for upland wildlife habitats.
- Manage riparian/aquatic/wetlands habitats through a well-balanced flow regime, and meeting the nine aquatic conservation strategy (ACS) objectives.
- Manage exotic species/noxious weeds so they do not interfere or degrade ecological function of native species or impair recreational experiences.

- Operate project facilities so they do not unduly harm or impede developing life stages.

Monitoring of biological resources becomes an important component of any license, as it is through this means that it can be determined if resource objectives are being met, and if not, what possible changes in license conditions are needed. Therefore, biological monitoring is also a license condition.

### Rationale for Vegetation Management Plan

The licensee's Project and watershed lands surround Lake Britton. These lands are very important habitat for many species, and require mitigation for on going project impacts. This habitat has not had naturally occurring fire for almost 100 years. By reintroducing fire into this ecosystem, the licensee will protect conifer forests used by nesting bald eagles from a stand replacing wildfire. A wildfire is very likely in the future from accidental starts by recreationists using the project waters and adjacent lands during the summer months. (See "Hydropower Generation" Fire Prevention Plan Rationale.) Fuels treatment, especially the use of prescribed fire in the coniferous forest, oak woodlands, and brush fields will rejuvenate the plant communities and provide valuable forage for a diverse group of species. The underburns will also prevent a wildfire from escaping onto National Forest lands upslope from the project associated lands.

As a result of the Pit 3, 4, and 5 hydropower projects, ground disturbing activities are on-going in the project area. Many of these disturbed areas have not received appropriate revegetation resulting in a number of concerns:

- Bare ground has not been revegetated (tunnel and other spoil sites) or been colonized by noxious weed species which can crowd out native plants (see Noxious Weed rationale below).
- Revegetation by PG&E has not always considered use of native seed and plants with cultural significance.
- Wildlife surveys associated with botanical species (i.e. VELBs) have not been satisfactorily completed by the Licensee, and additional surveys will be required prior to ground-disturbing areas where there is habitat and surveys have not been conducted.
- There are no plans for PG&E vegetation management under/along project power and transmission lines; and past PG&E practices have conflicted with FS direction for treatments in riparian reserves. It will be necessary for PG&E to have an approved plan to cover this maintenance work.

### Rationale for Noxious Weed Management Plan:

Noxious weeds are widespread in the project area and are concentrated along access roads, around powerhouses and at recreation facilities due to regular contacts with vectors such as vehicle and equipment tires and recreationists. Garcia and Associates (GANDA) recorded and mapped 195 occurrences of nine noxious weed species in the project area. Once these noxious weeds colonize an area, they can be very difficult and expensive to eradicate. In order to control the spread of noxious weeds, all projects involving ground disturbance and revegetation (planting or seeding) will adhere to regional native plant policies. The Forest Service is required to control the spread of noxious weeds by completing noxious weed inventories based on Regional protocols, evaluate treatment options relative to the risk of weed spread, and monitor noxious weed populations. The “Noxious Weed Management Plan” license condition will assist in meeting this requirement on NFSL affected by the Project.

### Rationale for the Bald Eagle Management Plan:

This plan is needed to ensure the continued recovery of the species. The plan is made necessary by the Endangered Species Act (ESA), by Forest Service direction, and the Lassen and Shasta-Trinity National Forest Land and Resource Management Plans. There are additionally PG&E management decisions regarding use of their lands that can affect bald eagle management on adjacent landownership, such as National Forest. A plan to address PG&E land uses such as woodcutting, grazing, timber harvest, etc. needs to include discussions with the Forest Service.

### Rationale for Wildlife Mitigation and Monitoring:

The proposals are mostly for non-TES species that are impacted by project operations (except for the last one which also affects bald eagles).

- Bank swallows live in colonies along certain sections of upper Lake Britton. Their habitat can be affected by wave erosion, lake levels, mining, and Project induced recreational use. This is a species of concern that has lost most of its habitat in California due to the construction of dams and the taming of many of its rivers.
- There are 2 peregrine falcon territories now within or adjacent to the project at locations known to PG&E and the Forest Service. This species was recently de-listed but as part of the ongoing efforts to ensure recovery it needs to be monitored. This is necessary under the Endangered Species Act (ESA).
- Many species of bats roost in structures such as the tunnel adit below Pit 4 reservoir. This adit could be shut off from the public by installing a “bat friendly” gate. The tunnel could still be inspected as needed by PG&E personnel.
- By restricting the speed limit in the upper Lake Britton area the Licensee currently provides resting area for waterfowl and an area for bald eagles to

forage without conflicts with the public. The justification is found in the ESA and in the existing license from FERC.

Rationale for the Protection of Threatened, Endangered, Proposed for Listing and Sensitive Species Plan:

This condition is necessary for the Licensee and the Forest Service to comply with the ESA, the National Environmental Policy Act, the Northwest Forest Plan, current Forest Service direction and the two applicable Forest Land and Resource Management Plans. There are a number of both botanical and wildlife species that are within “special status” designations and Project effects on these species must be considered.

During spring and summer 2000, surveys of the Pit River corridor from the Highway 299 bridge near the confluence of Hat Creek and the Pit River to the Pit 5 Powerhouse were conducted. The PG&E study found and mapped 43 occurrences of seven special-status plant species including one newly described taxon and four Forest Service watch list species. Forest Service sensitive species found during the 2000 surveys include Geyer’s sedge (*Carex geyeri*), starry Clarkia (*Clarkia stellata*), and four species interest species (mountain lady-slipper (*Cepripedium montanum*), Bidwell’s knotweed (*Polygonum bidwelliae*), Susanville milk-vetch (*Astragalus inversus*), silvery false-lupine (*Thermopsis californica var. argentata*) and Ishi jewel flower (*Streptanthus shastensis*). Therefore, at least 43 populations of TES plant species are found in the project. The 4(e) condition for Threatened, Endangered and Sensitive plant (TEPS) species are necessary in order to meet Forest Service requirements of maintaining habitat and viable populations for the purpose of eventual de-listing of Sensitive plants that are found on the Forest. The 4(e) conditions are also necessary to minimize or eliminate direct and indirect impacts from management activities on TEPS plants unless the activity is designed to maintain or improve plant populations, and to evaluate all proposed projects for potential Threatened, Endangered, or Sensitive plant habitat.

**F. ARCHAEOLOGICAL RESOURCES**

License Conditions

No. 37 Cultural Resources Management Plan

Existing Condition

The Forest Service has identified concerns with current and past cultural resource management resulting from project operations that directly and indirectly affect cultural resource sites within the APE. These project related “existing conditions” include:

- Cultural resource sites damaged by wave erosion along the shorelines of Lake Britton created by project peaking operations. Many of these damaged sites have had previous bank stabilization efforts, but still exhibit limited to severe on-going erosion.
- Damage to cultural resource sites by human impacts such as roads, ATV trails, and foot trails going directly through sites; modern fire hearths built within cultural resource site features; Project activities (PG&E personnel) doing ground disturbance with heavy machinery within known site boundaries, removing historic buildings without going through the Section 106 process, and not monitoring and fixing road closures when users “reopen” the roads into cultural resource sites.
- Intentional vandalism and looting of cultural resource sites.
- Cultural Resource Management Plan is out-dated.
- Lake Britton Archaeological District nomination record is out-dated (1975) and there are many sites not listed in that record. In addition, the majority of the sites within the Archaeological District have not been evaluated for eligibility to the National Register of Historic Places as Contributing Elements to the Archaeological District, though they are obviously eligible on their site features alone (no site testing would be required).

#### Desired Condition

The desired condition for Cultural Resources, as they are affected by this project, is to ensure that the draft Pit 3/4/5 Cultural Resources Management Plan (CRMP) is updated and meets current and future needs.

#### Rationale

The Cultural Resources Management Plan (CRMP) is being developed to manage historic properties within the Area of Potential Effects (APE) of the Pit 3 & 4 Project. The licensing of the Project is a federal undertaking. The FERC must therefore comply with Section 106 of the National Historic Preservation Act, which requires any federal undertaking to take into account the effect to the undertaking on historic properties, and afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking prior to the issuance of the license (16 U.S.C.).

### **G. RECREATION & ROAD RESOURCES**

#### License Conditions

- No. 38 Recreation Coordination and Review
- No. 39 Recreation Survey
- No. 40 Interpretive, Education, and Public Information Plan
- No. 41 Recreation Construction and Reconstruction
- No. 42 Law Enforcement Monitoring and Patrol Plan
- No. 43 Upper Britton OHV, and Vehicle Management Plan

- No. 44 Whitewater Boating
- No. 45 Roads & Facilities Management Plan
- No. 46 Traffic Use Surveys
- No. 47 Project Road Rehabilitation
- No. 48 Rights-of-Way

Existing Condition for Recreation:

- Recreation use at the Project has, over the years, been managed to minimize impacts to bald eagles and cultural resources, both of which are prevalent in the project area. Nonetheless, use has steadily increased.
- McArthur Burney Falls State Park facilities at or near capacity during the high-use summer season.
- Crowding and competition for day-use parking and beach spots at Dusty Campground during the summer season.
- Parking problems between cars, and vehicles with trailers at Jamo Boat Ramp.
- A sense of crowding at Pit 3 reach fishing areas.
- Over 100 user-created trails along Lake Britton and the river reaches.
- Possible lake surface crowding on weekend days during the summer.
- Many dispersed campsites have been created by users, often too close to the river, resulting in resource damage and sanitation concerns.
- Bald eagles have thrived since the last license issuance. The project area and its surrounds has one of the highest concentrations of bald eagles nesting in the “lower 48” and for many years, the reproductive success has exceeded the management plan goals.
- According the PG&E surveys, 50 to 60% of recreationists to Lake Britton come to the project area to participate in one of the following: camping, fishing, general shore use (sunning/swimming/picnicking), and wildlife viewing. 25 to 40% of recreationists also participate in boating, fishing from a boat, bait spin angling, hiking, and driving for pleasure. For the river reaches, 95% of the visitors come to stream fish as their primary activity. Between 19% and 34% of all visitors participate in the following: primitive camping, wildlife viewing, bait/spin angling, relaxing/sunning. 8% to 12% of visitors sampled participated in picnicking, trail hiking, swimming, and driving for pleasure.
- Existing public developed recreation is located at Lake Britton. There are 118 overnight camping sites provided by McArthur Burney Falls State Park, 7 sites at Dusty and 30 sites at North Shore. There are 52 picnic sites at the State Park and 10 sites at Pines Picnic area. There are two sand beaches, the largest at the State Park and small areas at Dusty Campground. Potable water is only available at the State Park and at North Shore Campground, which is not convenient to Dusty Campground, The Pines Picnic area, or Jamo Boat Ramp.
- There are no developed sites in the river reaches. At the western end of the project, in the Big Bend vicinity, there are overnight facilities. These, however, consist of two houses that are only known by word-of-mouth and are booked one year in advance, or a fly-fishing lodge at the price of \$160 - \$240/day. The only camping facility is at Big Bend Hot Springs (Healing Waters), which was

condemned by the County of Shasta and is not licensed as a campground. It is a “clothing optional” facility that may not appeal to the wider public. The Forest Service campground at Deep Creek was decommissioned due to the cost of maintenance. It continues to be used as a dispersed camping area but has limited facilities and is not regularly patrolled.

- Facilities for boating at the project are focused at Lake Britton. The State Park provides a launch ramp. The parking lot there is shared with the day use picnicking and beach areas. Another developed ramp is administered by the Licensee at Jamo and has 38 parking spots. A gravel “car top” ramp is located in Upper Lake Britton and serves canoeists, kayakers, and duck hunters. The other reservoirs within the project are not open to use by craft of any kind.

#### Desired Condition for Recreation:

The Desired condition for recreation in the Project bypassed Pit 3 and Pit 4 reaches as it is affected by the Project is summarized as follows:

- Mitigation for loss of public resources, resulting from hydroelectric project development, will be borne by the licensee. Included, as applicable, will be compensation for lost riparian areas, wildlife habitat, cultural resources, fishery values, and recreational experiences.
- During licensing procedures, require licensee to develop, operate, maintain, or replace recreational facilities.
- Maintain Dusty Camp as a campground to be administered by PG&E.
- Manage recreation according to the Recreation Opportunity Spectrum classes.
- Manage the Pit River for dispersed, water-oriented recreation opportunities.
- Manage the Forest land base and resources to provide a variety of high quality outdoor experiences.
- Encourage use of the Forests by the disadvantaged, physically challenged, and minorities. Provide barrier-free recreation facilities that are accessible to physically challenged individuals.
- Develop or expand opportunities for scenic drives and vista points.
- Erosion control and primary access are priorities of trail maintenance.
- Trails will be maintained as needed for specific management objectives. Erosion control and primary access will receive priority.
- Licensee will adopt the Forests’ design motif and standard details to coordinate recreational/visual standards.
- Priorities for law enforcement are: provide for employee and visitor safety and to protect resources and property.

#### Rationale for Recreation:

This project has induced a large increase in recreational use, and increased the diversity of recreational experiences available to the public. The Project created Pit 3 forebay (i.e. Lake Britton) provides a lake setting that has induced new recreation opportunities to the area including beaches, boating, water skiing, bass and bass

angling, etc. This increased use created the need for campgrounds; the only three Project related public campgrounds are located around Lake Britton. Project construction required access, which led to the construction of the Pit 3 & 4 reach roads. Without this hydro project it is likely that the area under NFSL management, would have remained unroaded due to its steep topography and unroaded character. Since canyon access has been provided to the public, these two reaches have grown tremendously in popularity as blue ribbon trout fisheries, which are actively used by permitted angling outfitters and guides, as well as by non-commercial anglers. The road also provides opportunities for driving for pleasure, bird watching, picnicking, hunting, and other outdoor pursuits throughout the Canyon. Current conditions (approximately 5% of pre-project summer base flow), induced by hydroelectric generation provide wading opportunities for anglers and water play that would not have been possible at historic flows.

Recreational use has the potential to cause the most conflict with resources, which was the reasoning for the lack of recreational facility development during past relicensings. While this strategy was successful in minimizing the development of public facilities, it has neither decreased the public's use of the area, nor decreased site degradation of the project area. In fact, use of the project area has increased over the last license period and is expected to continue to increase based on statewide recreational projections. Areas where use has been high and where no facilities or management have been provided to the public are becoming seriously degraded (see Appendix 2, "Sanitation Concerns" Photo Page). The lesson is clear: manage areas of concentrated human use through a wide variety of management tools so that usage is compatible with resource values and prevents site degradation.

Where resource values are high, either no new development or minimally expanding existing facilities was the Forest Service strategy employed in development of 4(e) license conditions. In areas where resource issues were minimal, new developments are planned to provide for the increasing project induced recreation. In areas where there are resource concerns, but limited means to eliminate human usage (such as in areas where boat-in shoreline use is affecting cultural sites), developments are proposed to provide overall site protection and mitigation, as the "hands-off" approach has not been successful.

Where construction of new facilities is the desired management tool, development must be commensurate with the resource value and desired use capacity of the area. It is not desirable to develop all project areas to the same standard. The Forest Service recommended, and the collaborative recreational sub-group adopted the "Recreation Opportunity Spectrum" (ROS) rating system to define development levels. These levels are divided into 6 major classes of use that maintain a broad spectrum of choices in development levels to the public. Providing a range of these classifications is important to the public, and is described in our comprehensive planning documents as a recreational objective. These classifications are: primitive, semi-primitive non motorized, semi-primitive motorized, roaded natural, rural, to urban, and are described by factors such as access, remoteness, social encounters,

visitor impacts, and facilities/site management. Use of ROS classifications are the basis for the Forest Service recreation license conditions and recommendations.

It is the desire of the Forest Service and other participants in the Pit River Collaborative team to continue a level of coordination and adjustment of management objectives for the Project area as a whole. A number of stakeholders have oversight and interest in various natural resources that can be impacted both positively and negatively by recreational pursuits. By having specific coordination meetings, results of surveys, and other input from prior years can be reviewed. Data from ongoing recreation surveys will assist in making any needed changes in management of the area and for future planning.

While interpretive opportunities were not specifically in high demand by current project area users, an interpretive plan will coordinate the types and delivery of information to assist existing users and, more importantly, potential users to orient them to the project resources and facilities. There is a high level of future projected demand (50% to 100% increase during the next 30 years) for sightseeing, hiking, observing wildlife, and utilizing facilities such as boat ramps, campgrounds, and beaches. There is a tremendous need for information concerning such things as: What kind of wildlife will I see? Where can I launch a boat? What hiking trails exist to get me to the river? A plan will look at these needs and project how best to get information to the audience. Especially important will be the Internet; in order to get this information to those who have not yet visited the area or, are looking for up-to-date information.

A number of facility improvements are requested. These improvements will directly serve the National Forest, as in the case of Dusty Campground, or, will serve to facilitate access and use of the project area by visitors to project lands and adjacent National Forest areas, as in the case of Jamo Boat Ramp and a new day-use facility. A survey of visitors to the Project study area revealed a high percentage desired more facilities. The top five indicated were:

Showers 50% of respondents, drinking water 40 % of respondents, picnic tables 34% of respondents, flush toilets 30% of respondents, and more restrooms 24% of respondents.

A new day use beach at Lake Britton will help to provide this opportunity to more visitors. Dusty Campground has limited parking for day-users yet the beach area is teeming with visitors on summer weekends and parking is problematic. While not counted as a day-use area in occupancy studies, Dusty is already at 71% weekend overnight occupancy during the summer season. In a study by PG&E, it is projected that there will be close to a 60% increase in demand for beach use/sunbathing and 58% increase in demand for swimming/wading over the next 30 years.

Lake-based recreation is, and will continue to be in high demand over the next licensing period. Forest Service studies indicate that motorized and non-motorized boating demand is projected to increase by more than 50 percent from 2000 to 2035.

This is fueled, in part, by projected population increases in the counties where most visitors to the project area live. Counties near the project face increases of 75% in population by the year 2035. California, as a whole, is projected to increase by 61% by the year 2035. As use of the lake surface increases, so will the possibility of impacts to resources and to other users. The need for sanitation facilities to accommodate the boaters will increase. We have seen recent examples of undeveloped beach areas where large numbers of toilet paper “flowers” were behind every tree within 100 feet of the beach. There may be more crowding and incidents relating numbers of boats and speed as well as conflicts between different types of craft (canoes vs. ski boats). For these reasons, the Forest Service is proposing changes in lake surface “zoning”.

The buoy line at the Ferry Crossing, was implemented years ago when the Ferry Crossing was active with heavy truck crossings. The existence of cables dictated that boaters not cross this area and head west toward the Pit 3 dam. As the ferry no longer exists, it seems reasonable to open more of the lake to recreational activities. By making the no boating buoy line a speed restriction zone, it would allow boats, especially fishing boats and canoes, to utilize more of the lake surface. A new restrictive buoy would need to be installed at the dam to exclude boats there. Other conditions would preserve the existing variety of boating opportunities while making some areas of the lake, such as the Narrows, potentially safer.

In the Pit River reaches, the Forest Service is requiring improvements in hiking trails, parking, accessible fishing, sanitation, dispersed camping opportunities, and boating opportunities. While current users expressed a preference to “leave things as they are”, there is a resource need for some improvements. The highest amount of dissatisfaction with regard to facilities, services, or resource condition was for trails and river access. Having designated and maintained trails to the river will reduce erosion caused by having so many user created trails. These trails will be attractive to new visitors who are unfamiliar with the area and desire more structure to get oriented. Dispersed camping along the river reaches is popular. Because of the amount of unregulated use, there is a need for a restroom facility that is consistent with the semi-primitive motorized setting. Additionally, trash collection and potable water provided at central locations would serve these visitors.

One of the areas of concentrated recreational use is called Ruling Creek or the tunnel adit site, which is attractive due to its level ground, road access, and proximity to the river. This site was leveled by PG&E during dam construction for the disposal of tunnel spoil material. Hence this site is on top of Spoil Pile #4A which currently contains approximately 40,000 cubic yards of tunnel spoil material and covers 4.8 acres on NFSL (PG&E “Appendix E2.5-2, Volume 4 of Application). This Appendix discusses continuing erosion from this pile, and is more recently being utilized by PG&E for unapproved disposal of road waste debris. Photographs #30-40 in the above reference Appendix show pictures of the erosion into the River, road debris piles, etc. This site provides an excellent location for a low level recreational development in keeping with the ROS class, since the topography lends itself to use,

trees have become reestablished on-site and provide shade and screening, and has been “padded over” with tunnel spoil by PG&E’s construction activities. Due to the lack of sanitation facilities in the reaches, recreationists have begun to improvise facilities such as the screened bucket toilet as shown in Appendix 2 “Sanitation Concerns” photographs. These inadequate facilities and resource effects strongly indicate a need to manage this site. The Plan that PG&E is to develop needs to address the concerns of sanitation, road erosion into the river, excess spoil piles and noxious weeds they have brought in, while providing amenities commensurate with a dispersed recreation site.

Just upstream, PG&E tunnel spoil Pile #4D is located next to the Pit 4 dam. This pile is approximately 240,000 cubic yards in size, covering 3.35 acres of NFSL and contains: tunnel debris, road maintenance debris, construction debris (including past storage of hazardous materials-asbestos), and vegetation removed from the Pit 4 intake trash rack. This pile has caused a landslide on the opposing canyon wall from placement in the river flood channel. Other concerns with this pile include impairment of the area visual quality, on-going disposal of materials by PG&E, noxious weed introduction, erosion into the Pit River, and possible contamination from buried materials (tests are being conducted by PG&E). Rather than requiring a costly effort to remove this pile, the FS 4e license condition calls for PG&E to develop a plan to convert the existing eye sore (see PG&E photographs #14-29 in PG&E’s Application, Volume 4, “Appendix E2.5-2) into a low development level scenic view point, while resolving the other resource concerns.

The desire for more “family fishing” opportunities was expressed by 32% of bait/spin anglers in the river reach. Developing the Pit 3 powerhouse site as an accessible fishing day-use area, will provide this chance for families with children as well as those with mobility problems unable to access the river by other means. A restroom, trash collection, and potable water will serve this site as well as serving other visitors to the river reaches.

Many who use the Pit River reaches have commented that they have never seen a law enforcement patrol. This presence is necessary to assure that visitors are complying with laws and regulations (such as fire use and fishing regulations) as well as informing managers of resource problems so that action can be taken. Without regular monitoring, problems of long-term occupancy (squatters), vandalism, archaeological site disturbance, dumped trash and cars, etc. will increase. Surveys did not capture the number of visitors that left the area because they did not feel there was an administrative presence of authority. A combination of physical presence, orienting information, and judicious development may improve the experience of more visitors.

For upper Britton OHV and Vehicle Management Plan - The objective of implementing and enforcing both the “Upper Britton OHV and Vehicle Management Plan”, and “Cultural Resource Management Plan” 4e license conditions, is to

eliminate impacts to cultural and archaeological sites, and to better manage resource damage created by uncontrolled vehicle use.

#### Existing Condition for Whitewater Boating:

##### **Project Impacts - Comparison of Unimpaired vs. Impaired Hydrograph:**

The following comparison of unimpaired vs. impaired hydrograph is based on an analysis of the past 30 years (1970 through 1999) of flow and precipitation data on the Pit 4 reach. For the purpose of this discussion, precipitation from the Pit 3 gauge was used. A dry year was defined as <35", an average year 35 to 45", and a wet year is >45".

Because minimum and optimum boating flows derived from the whitewater flow study are not available at the time of this analysis, an *estimate* of the range of boatable flows was derived from a conversation with Kevin Lewis (American Whitewater/Shasta Paddlers), for purposes of comparison between the regulated vs. unregulated hydrograph. The minimum flow for whitewater boating is estimated to be 800 cfs and the high end of optimum at 3,000 cfs.

Base flows in this system are spring fed, and therefore are very consistent and stay relatively high year-round. For peak flows, the system is event driven rather than snowmelt driven. This means the watershed reacts immediately to storm events, regardless of when they occur. This makes the runoff regime very flashy and unpredictable, compared to Sierran streams. Because of low reservoir capacities, the project has very little control of storm events, and hydropower operations are supported by the consistent year round spring flows.

##### Unregulated Hydrograph (without project):

- Stable spring fed flows, averaging between 2,000 to 2,500 cfs, were present from July through October regardless of water year type. These spring-fed flows could range between 1,500 to 3,000 cfs.
- Peak flows from storm events could occur between November through June, for all water years, with most storm events and peak flows occurring between January and April.
  - In dry years (37% of total years), peak flows above 3,000 occurred infrequently for short durations, or sometimes did not occur at all.
  - In average years, (23% of total years), and wet years (40% of total years) peak flows above 3,000 occurred very frequently.

##### Regulated hydrograph (with project):

- From July through October spring flows are diverted leaving an instream flow of around 150 cfs for all water year types in the current flow regime.
- There were virtually no peak flows/spill events in dry years, flow remains around 150 cfs year round.

- Peak or spill flows in May through June, and November through December only occur in 4 out of the last 30 years (13%). Besides these exceptions, flow is around 150 cfs during this period.
- Peak or spill flows frequently occur from January through April for Average and Wet years. Flows between 800 to 3,000 cfs occur more frequently than in the unregulated hydrograph. These can range from 6 (in 1973) to 64 (in 1975) days in an average year, and from 20 (in 1986) to 100 (in 1998) days in a wet year.

Project Impacts to Whitewater Recreation opportunity (given the above information):

- From July – October
  - Loss of 120 days of boating opportunity in all Water Years.
- November, December and May and June
  - Loss of 120 days of boating opportunity in dry years (37 %).
  - Loss of 60 to 120 days of boating opportunity in average/wet years (63%)
- January through April
  - Loss of 120 days of boating opportunity in dry years (37%).
  - Flows in boatable range generally occur more frequently in Average/Wet years (63% of years). Days of boatable flow can range from 6 to 100.

Desired Condition for Whitewater Boating:

Manage the Pit River for dispersed, water-oriented recreation opportunities.

Rationale for Whitewater Boating:

Flow information, provided by both flow phone and internet, will better enable boaters to utilize opportunity during spill periods when it exists. Scheduled down ramping during spring spill flows, as prescribed in the “Maximum Ramping Rate and Up Ramping Analysis” 4(e) license condition, may provide a few additional days of acceptable boating flows during this period. Additionally, the “Dry Year Freshet Flow” requirement, which calls for holding flows at 1,500 cfs for 2 days and then ramping down linearly to the baseflows would provide 10 continuous days of acceptable boating flows between 1,100 and 1,500 cfs during the first part of March. These flow releases will occur if there have not been any spills equal to or greater than 1,500 cfs by March 1, and if water temperatures meet the criteria related to protection of foothill yellow-legged frogs. It is estimated that these dry year freshet releases will occur in 30% of the years. In average and wet precipitation years when “Freshets” are not required to be released, there will be naturally occurring spill flows in the river which would meet or exceed whitewater boating flows for variable numbers of days.

The results of ecological monitoring of pulse and recreation flows from other relicensing efforts (i.e. Mokelumne, Feather River, San Joaquin, etc.), should be reviewed to evaluate the effects of low numbers of recreation flows on aquatic ecosystems, to better understand any applicability to the Pit River.

#### Existing Condition for Roads:

The Forest Service has identified concerns with current and past PG&E road management resulting from Project road construction, reconstruction, operation and maintenance that directly and indirectly affects NFSL and the public. These Project related “existing” conditions include:

- Project roads were mostly constructed by PG&E during project construction starting in the 1920's. The Pit 3 reach road was initially a railroad grade to bring people and supplies into the Canyon during project construction.
- Given the incised canyon and difficult access, it is likely that the FS would have never constructed a road into the Pit River Canyon, thus the PG&E constructed road most likely prevented designation of the area as a wilderness or a wild and scenic river.
- Over the decades, there have been minimal road improvements or rehabilitation to bring them up to current standards, which is why it is an emphasis during this relicensing.
- Road maintenance and rehabilitation is urgently required in a number of locations, especially on the Pit 3 reach road. The Pit 3 reach road is a single lane road with two way traffic. There are places where the road shoulder has slid down the raveling canyon wall, with the paved road surface also breaking off and being undercut from erosion, resulting in an extremely hazardous situation. Field measurements made at five different locations indicate road widths that are less than 12 feet wide with no shoulder and a 100% drop from the road to the Pit River below. See the photos in Appendix 2, “Road Concerns” for examples of this occurrence.
- Besides the above situation, other portions of both the Pit 3 & 4 reach roads are in immediate need of repair to meet current standards, including the need for: improving site distance and widening of blind corners (some with vertical escarpments with drops of hundreds of feet), installing crib walls where erosion has eliminated road support, (including a drainage about ½ mile east of the Pit 4 powerhouse where stacked rotting logs are holding the road surface in place), paving portions of the Pit 4 road adjacent to the Pit 4 reservoir where sediment is entering project waters and preventing attainment of “Best management practices” and ACS objectives, including siltation of fish and benthic macroinvertebrate habitat, etc.
- Other portions of roads require general road upkeep such as repaving, reinstalling missing signs, filling of potholes, repainting of fog lines, etc. which have not been kept current by PG&E.
- Safety standards on portions of the Pit 3 reach road, and to a lesser degree the Pit 4 reach road, are not being met, which the Forest Service has discussed

with PG&E for over a decade, but upgrades have been minimal (road sign/speed plan, striping of turnouts).

- The Project roads were never designed or constructed to meet current use which has nearly tripled on the Pit 3 & 4 Reach road since 1985 (as per PG&E's October 2001 Application, Wildlife Report, Volume 2, Section E3.2, Page 25 as discussed in the Rationale below), let alone to meet increasing projected recreational traffic loads. Immediate action will be necessary to avoid imminent road failure or a serious injury/fatal vehicle accident.
- Project road culverts are becoming plugged during storm events, and PG&E relicensing road studies have identified the culverts which are not meeting road standards. Additionally, these blocked culverts do not meet ACS and biological standards of allowing passage of needed tributary gravels and materials to maintain biotic habitat in the Pit River.
- Noxious weeds are being spread along Project roads by PG&E road maintenance activities, and vehicles, including PG&E administrative traffic and Project induced recreational traffic.
- PG&E has, until the past several years sidecast road maintenance sediment into the Pit River. Although they have stopped this intentional practice, where roads are adjacent to or crossing the Pit River and tributaries (miles of Project roads), sediment is still becoming unintentionally delivered into the Pit River and tributaries during maintenance activities.
- Project roads are not adequately signed to provide visitors with an understanding of their location, distances to destinations, etc.
- Transportation planning, including signage between PG&E and the Forest Service on the FS road system and non-system roads has not been done to date.
- Gates and bridges do not currently meet FS and other standards.
- There are dangerous intersections of Project roads with State Highways.
- PG&E road use permits with the Forest Service have become obsolete.
- PG&E stockpiles road maintenance debris throughout Project roads, recreational areas, and other unapproved sites on NFSL.

#### Desired Condition for Roads:

The Desired condition for Project roads in the bypassed Pit 3 and Pit 4 reaches as it is affected by the Project is summarized as follows:

- Assess the potential impacts of road construction and related activities on slope stability and watershed condition for areas identified as moderately or highly unstable.
- Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and instream flow needed to maintain riparian resources, channel conditions, and fish habitat.
- Cooperate with Federal, State, and County agencies to achieve consistency in road design, operation, and maintenance necessary to attain ACS objectives.

- Construct or reconstruct roads so that a stable road prism is established. This includes road cuts and fills and the road surface. Minimize sedimentation by employing construction practices such as 1) placing surfacing on the roadway, 2) establishing a vegetative cover on slopes; and 3) installing proper drainage structures.
- Upgrade the surfacing on the Forests' road system as necessary to protect the road and other resource values.
- Minimize sediment delivery to streams from roads.
- Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the ACS objectives.
- Minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
- Restrict sidecasting as necessary to prevent the introduction of sediment to streams.
- Manage the Forests' transportation system to facilitate resource management activities, protect wildlife, meet water quality objectives, and provide recreational access.
- Review location and design specifications for roads built under permit or license, and require protection of all resources.
- Meet safety standards for protection of the recreating public, downstream property, and affected resources. Road conditions and maintenance shall be appropriate to achieve recreation and resource protection objectives.
- Forest Service handbook 7709.56, Chapter 4 states that the minimum traveled way shall be 12 feet on single lane roads with turnouts.
- Forest Service roads that are open to the public are also subject to the requirements of the Highway Safety Act (FSM 1535.11, Memorandum of Understanding, Federal Highway Administration; FSM 7731, FSM 7733, and FSH 7709.59).

#### Rationale for Roads:

Rehabilitation of Project roads is one of the major emphasis items with this relicensing because the "existing" road conditions are vastly different from the "desired" road condition. Areas of concern center on the following points:

- Public safety & comfort.
- Avoiding loss of existing road structures.
- Reducing on-going resource damage from lack of, or improper, existing road maintenance, and from potential road failure.
- Adequate planning to provide for future road needs for the length of the license.

When road standards aren't met, both safety and unacceptable resource effects result. This Project does not meet road standards (FS, State, and Federal) in a number of areas. As many of the project roads are under Forest service jurisdiction, manual direction does not allow us to compromise public safety. Forest Service roads that

are open to the public are also subject to the requirements of the Highway Safety Act (Forest Service Manual (FSM) 1535.11, Memorandum of Understanding, Federal Highway Administration; FSM 7731, FSM 7733, and FSH 7709.59).

For over a decade the Forest Service and PG&E have debated at what point in time future road improvement measures will be needed. Since the existing roads do NOT meet standards at this point in time, and road use has already increased dramatically over the span of the past relicense, there is no reason to set a use trigger for immediate needs of the roads. In PG&E's Wildlife Report, (Volume 2, Section E3.2, Page 25), where road traffic is monitored, as it relates to wildlife disturbance, they state: "The greatest increase in recreation use in the Project has occurred along the North River Road, which includes the Pit 3 Reach Road and the Pit 4 Reach Road. Use of this lower river area has almost tripled since the BFES (Bald Eagle and Fish Study of 1985), and levels have increased 50 percent since 1992."

The current intersection of the Clark Creek road and Jamo Point/Pines Picnic area is another example of serious road problems that need to be repaired. The current intersection with State Highway 89 is a "Y" type intersection. As such, southbound traffic on Highway 98 are unable to make a right turn and must first proceed to a signed turnaround area. Likewise, northbound exiting traffic, from Jamo Point/Pines must also use the turnaround. The intersection is located near a curve and has limited sight distance. This intersection needs to be realigned to be perpendicular to Highway 89. It is recognized that the California Department of Transportation (Caltrans) is proposing to realign the Highway 98 bridge in 2009. This will result in a realignment of the road and this intersection. However, it is felt that due to the public safety issues, this realignment cannot be postponed until 2009 and that work needs to be completed within two years of license issuance.

As presented in short bullets in "road existing conditions" and other discussions above, some of the Project licensed roads, especially the Pit 3 and 4 reach roads and the Jamo Boat Launch road, require immediate repair to prevent road loss or loss of life. With both the increasing use and the poor condition of the existing roads, the ability of the roads to accommodate use in a safe and environmentally acceptable manner has been exceeded. Appendix 2, "Road Concerns" shows just a few examples of concerns with Project roads. The "Project Road Rehabilitation" license condition includes road rehabilitation and reconstruction that is needed now to alleviate these concerns.

Additionally, it is expected that during the 30-50 life of the license, additional road measures may be needed to accommodate future increases in road use. It is anticipated the increasing use by the public will eventually, again, exceed the capacity of the roads to accommodate use in a safe and environmentally acceptable manner. We are requiring that PG&E continue their 5 year road condition report, and traffic count study for the duration of the next relicensing period (i.e. in 2005, 2010, for the life of the license. The 5 year studies will provide data from which to determine

when roads have reached their capacity, and thus “trigger” Forest Service decisions regarding the need for additional road rehabilitation for implementation by PG&E.

More background information on this Project road safety situation is available on Pages 44-47 of the Forest Service December 11, 2001 “Additional Information Request” response to the FERC. That information is incorporated into this document by reference, so will not be reiterated in its entirety here.

In 1990 a Traffic Safety and Signage Plan was implemented for the Pit 3 Reach Road in response to concerns about increasing public use and safety. The plan was developed in consultation with PG&E. This plan requires updating and expansion to include the entire project area. Signage must include both safety, and destination/distance information at major road intersections and features. In the Public Safety and Traffic Management Report by PG&E in March 2001 it was recognized that “. . .hazard signs were used sparingly on project road access. At power house sites present signs are fading, peeling, fallen, and non permanent. Signage for public access to river reaches and the Pit 4 and 5 reservoirs convey a mixed message to users”.

Forest Service Manual direction requires that all intermittent and perennial stream crossings shall pass a 100 year storm event and associated bedload and debris, for which a license condition is stipulated. One objective of this plan is for PG&E to provide a map and calculations regarding culvert size and to implement measures to allow natural hillslope sediment production and delivery of bedload to the Project reaches. PG&E should be monitoring culverts during large storm events to assure blockage and overtopping does not occur and wash out or damage project roads as has occurred in the past (Underground Creek, approximately 1997, and the unnamed creek to the west as seen in Appendix 2, “Road Concern” photographs), which should also be discussed in the Plan to be developed by PG&E. Connectivity must also be ensured for all life stages of fish and other aquatic species at each project facility tributary crossing, for both upstream and downstream migrational purposes.

Road planning is the final area of concern, with FS license conditions to provide the framework for planning road maintenance for increasing use over the next license period. Road planning is key to addressing roads covered by both the FERC license and under FS special use permits which are currently obsolete (Pit 3 reach road SUP is dated 1932 and has never been updated). Additionally, planning needs to discuss suitable road disposal sites and rehabilitation of unsuitable existing disposal sites.

In order to meet our desired condition, adequate road data must first be compiled. Maps of all classified system roads are needed to clearly identify all roads within the project areas and identify potential impacts to cultural and wildlife concerns. The road 4(e) license conditions will give us the necessary reference data on the existing road system. This information will allow for management of the Forest’s transportation and trail systems in the Project area while protecting forest resources, meeting water quality objectives, and providing reliable recreational access.

As per Forest Service Manual 7710-200-3 and 1920, all project decisions made after January 12, 2002 require a roads analysis, if they involve new permanent road construction, or the reconstruction or decommissioning of existing roads. As this is a science based decision process, information that is being required of PG&E on Project roads (i.e. grades, slopes, hydrologic connectivity, surfacing, etc.) will enable the Forest Service to conduct the required Roads Analysis Process.

Fugitive dust is coming off of graveled project road surfaces. This dust affects air quality and delivers sediments into project waters where the road is adjacent to, or near the river. This is one reason the FS included a license condition for expanding road paving from its current western extension at the Pit 3 Powerhouse to the gravel bar area. West of the gravel bar, the road moves away from the river, so does not present a sedimentation hazard for the western portion of the Pit 4 reach. The public has identified road dust in the vicinity of Camp Pit, near the projects Tunnel Reservoir, as a “recreational nuisance”. Paving in these areas would eliminate “dusting” of recreationists, as well as address other resource concerns such as sedimentation and siltation of the River, as addressed above.

Together these components of the roads issue: maintenance, safety, resource damage, and planning will provide the guidelines for continued use of NFSL roads for the upcoming license period.

The purpose for acquiring a Right of Way for the Pacific Crest Trail crossing is to assure public access across this nationally renowned trail in perpetuity.

## **H. LAND MANAGEMENT/AESTHETICS**

### License Conditions

- No. 49 Updating Obsolete FS Special Use Authorizations
- No. 50 Visual Management Plan
- No. 51 Land Adjustment Proposal

### Existing Condition

- Project PG&E road special use permits are obsolete.
- There is no Project visual management plan to guide PG&E on colors, or other measures to improve the visual quality of their facilities.
- Many PG&E facilities have not been painted, nor maintained to meet visual quality standards (the Pit 3 powerhouse is an exception, having been painted in the past year).
- Some PG&E hydroelectric facilities are in conflict with existing Visual Quality Objectives (VQO's), specifically, the Pit 4 powerhouse.

- There has been no attempt to provide for an enhanced visual experience for the public along scenic stretches of the Project, such as through scenic drives or vista point development.
- Portions of the lands administered by the State at McArthur-Burney Falls State Park are leased to them by PG&E, while others are under permit to them from the Forest Service providing for conflicting direction and unnecessary administrative workload for the involved parties, including the Forest Service.

### Desired Condition

- Licensee will adopt the Forests' design motif and standard details to coordinate recreational/visual standards.
- Manage activities and projects to meet adopted visual quality objectives (VQO).
- Proposed modifications to adopted VQO's must go through the NEPA process and be approved by the appropriate Forest Supervisor.
- Where past management activities do not meet adopted visual quality objectives, use visual rehabilitation to return visual quality to an acceptable level.
- Develop or expand opportunities for scenic drives and vista points.
- Exchange lands under special use permit to McArthur-Burney Falls Memorial State Park.

### Rationale:

Forest Plans and regulations require private use of NFSL to be covered by a current authorization. While several of the special use permits issued to PG&E (i.e. warning sirens) are current, others, most notably the road authorizations, were issued starting in the 1930's and are obsolete. Project road conditions have seriously deteriorated during this extended period, standards and traffic patterns have changed, and use has increased as a result of changes in project operations. Bringing these permits into compliance with current standards, as well as combining them, where applicable, will be required with this relicensing.

Land exchanges of public lands are a management tool to trade lands of equal value where it provides a public benefit. There are several possible alternatives which could simplify land management in context of this relicensing that should be further pursued. This includes a land exchange between the Licensee, FS, and McArthur Burney Falls State Park where FS land are currently under a term permit to the Park.

### **Visuals:**

The Lassen and Shasta-Trinity National Forest Land and Resources Management Plans (LRMP's), manual direction, and policy define visual quality objectives for NFSL in the project area. Pit 3/4/5 project facilities and operations are clearly visible on the landscape, with PG&E buildings contrasting sharply from the surrounding forested setting. Project roads, campgrounds, and appurtenant facilities are also obvious to the casual observer. Conditions and recommendations in this section are

intended to decrease conflicts with visual management objectives of the National Forests, while allowing for continued operation of the project. Where project facilities can not be made to comply with the current visual objectives during the environmental review process, altering the VQO designations can be considered. The Forest Plans also provide for expansion of visual opportunities with programs such as development of vista points and scenic drives.

#### Rationale for Land Adjustment Proposal:

This project relicensing provides an opportunity, such as during the recent Pit 1 relicensing, for PG&E to resolve longstanding management difficulties induced by project facilities (such as Lake Britton) and landownership patterns. The McArthur Burney Falls State Park is currently leasing lands from PG&E, and is utilizing National Forest System lands under a Forest Service special use authorization at Lake Britton. It is to the benefit of the 3 “landowners” (PG&E, FS, & State Parks) as well as the public to consolidate management of these lands under the State Park System. There may be additional examples where high resource values, such as riparian or upland watershed lands, could be better managed for the resource values by a resource agency. A proposal to consider land exchanges would potentially benefit both the public and resource values associated with this project.

### **I. HYDROWPOWER GENERATION AND TRANSMISSION**

#### License Conditions

- No. 52 Fire Prevention Plan
- No. 53 Spoil Disposal Plan
- No. 54 Geologic and Seismic Hazard Inspections & Reports

#### Existing Condition

- Continued emphasis on hydroelectric generation can be expected.
- PG&E has not undertaken fuels treatment measures (such as prescribed burning) to reduce the fire hazard on Project and associated upland PG&E lands.
- PG&E studies show that recreational use of the Project is increasing, and is projected to continue to increase (see Recreation resource area above).
- There have been 9 large fires (over 100 acres in size) since 1911, and 220 small fires since 1981, on or in the vicinity of the Pit 3/4/5 Hydro Project (as per PG&E’s Application Volume 6, Appendix E6-5). See the Rationale below for further discussion of this existing condition.
- PG&E has disposed of various materials (road maintenance debris, tunnel spoil piles, trash rack vegetative debris, logs, culvert and misc. materials, etc.) on NFSL without an approved plan, and for the most part, without Forest Service permission.
- Previous inspections have revealed geologic slippage and associated concerns at Project facilities.

## Desired Condition

- Rely on fuel reduction and an effective fire protection organization to minimize wildfire losses.
- Promote fire prevention commensurate with resource values at risk.
- Reduce fuels by prescribing fire and allowing biomass use, while maintaining soil and water quality.
- Plan and implement fuel treatments emphasizing those treatments that will replicate fires natural role in the ecosystem.
- Natural fuels will be treated in the following order of priority: 1) public safety 2) high investment situations (structural improvements, powerlines, etc.), 3) known high fire occurrence areas, and 4) coordinated resource benefits, i.e. ecosystem maintenance for natural fire regimes.
- Manage, construct, and maintain buildings and administrative sites to meet applicable codes and to provide the necessary facilities to support resource management.
- Inspect dams and bridges at prescribed intervals and provide the maintenance necessary to keep them safe.
- Minerals and energy development continues in areas where they are compatible with other uses. Non-commodity outputs such as wildlife, biological diversity, and scenic quality are emphasized equally with commodity outputs.
- Provide for continued use and new development of hydroelectric facilities.
- Locate new support facilities (hydroelectric) outside Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to FERC that ensure ACS objectives are met. Where these objectives can not be met, provide recommendations to FERC that such support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves will be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of ACS Objectives.
- Consider volcanic, seismic, flood, and slope stability hazards in the location and design of administrative and recreation facilities.
- Inspect dams and bridges at prescribed intervals and provide the maintenance necessary to keep them safe.

## Rationale

This category refers to resource effects induced by project operations and activities.

### **1) Fire Prevention:**

PG&E's Application, Volume 6, Appendix E6-5 provides statistical frequency of fires, on, and in the vicinity of the Project. Although the PG&E text states that the large fires are those greater than 300 acres, the referenced Map (Figure E6-5.1) shows fires in excess of 100 acres in size. The text also states that only 2 of the 9 large fires

were “human caused”, while the same Map classifies 5 of the 9 fires as “unknown” or “unidentified”, which typically are human caused, as lightning and other “natural” causes are typically easy to identify. It therefore appears that 7 of the 9 fires are human caused, including the 1967 fire (#6) which was started by a camper at PG&E’s North Shore Campground. None-the-less the number of large fires are relatively few, which indicates that fuel loadings in the project vicinity have not been significantly removed through previous historic fire events. Additionally, there have been 220 small fires in the past 20 years, typically less than one acre in size. This large number of small fires indicates the presence of many “ignition sources”, but due to other factors (favorable weather, presence of people to extinguish the fires, limited fuelbed, etc.) the fires did not become large. This IS a high number of fire starts for this concentrated area, and it is only a matter of time until another start becomes a large fire statistic. It appears that the trend in fire starts is increasing, with an average of 6.6 fires during the 6 years recorded in the 1980’s, and 14.7 fires during the 10 years recorded in the 1990’s. (With only two years of data for the 2000’s, the average is at 9.5 fires.)

This project has created, and continues to create a wildfire threat. Project facilities, including generators, construction equipment, transmission and distribution lines, transformer sites, and other operation and maintenance activities contribute towards this danger. Additionally, project induced recreation on the reservoirs and project reaches, including PG&E developed facilities and user created dispersed sites pose a significant risk. The risk of a catastrophic fire occurring on and from this project is increasing.

Lack of vegetation management for many decades is creating stands of flammable vegetation. In the mid 1990’s PG&E conducted a timber sale on the inaccessible south side of the Pit 3 Reach using helicopters to fly out the merchantable timber, leaving behind many tons of limbwood and slash. Lookouts can not see into this area due to the deep canyon in the Pit 3 & 4 reaches, so a fire will only be detected after it is large enough to produce a column that can be seen above the canyon walls. Additionally, with the hot south aspect of the canyon, and distance from the nearest fire station, a fire in the Canyon (Pit 3 &4 reaches) will become large before any suppression forces can get on scene. Human use is increasing around Lake Britton and the project reaches, especially anglers in the previously dewatered Pit 3 reach. This increased use has led to the “development” of user created trails and dispersed camping areas with fire rings in the brush, as documented in PG&E’s recreation studies. See Appendix 2, “Fire Prevention/Dispersed Recreation” Photograph page. The vegetation management aspect of fire prevention is addressed under “Biological Resources, Vegetation Management Plan” above.

While the results of a catastrophic fire can not be predicted with certainty, it will most likely result in damage to PG&E project facilities, loss of project recreational facilities and opportunities, destruction of the visual/scenic beauty of the Pit River Canyon for decades, large increases in sediment to the Pit River with associated loss of aquatic life and impairment of their habitat, large increases in particulate matter

from fire and smoke, further impairing Shasta County air quality, and shut-down of transmission lines and commensurate loss of electrical generation to avoid arcing of lines in smoke. All of these repercussions will result in unacceptable resource damage that will prevent attainment of desired conditions for this area as defined by applicable comprehensive plans as well as lost electrical generation and revenues. Although a wildfire in this canyon is inevitable, implementation of mitigations can delay and minimize those effects.

Whether a fire is “human caused”, or can be tied to Project operations or induced recreation is not a significant issue (except as it relates to payment of suppression costs). The issue with the relicensing is if there are fire prevention and fuels treatment measures in place, such as those identified in the “Fire Prevention Plan” and “Vegetation Management Plan” that will provide for the objectives of: protecting Project facilities (including recreational facilities), minimizing damage to the resources, and providing for public safety. Given the known high incidence of fire starts and untreated fuels in the area, it is necessary for PG&E to take reasonable preventative and pre-suppression actions to provide for these objectives.

## **2) PG&E project operations:**

The way in which PG&E hydroelectric operations are conducted has an effect on adjacent National Forest resources. Since there are often multiple ways to accomplish the same operational objective, the FS needs to be involved to assure that methods employed by PG&E create the least impact to FS resources. The Forest Service understands that there are operational emergencies beyond the control of the Licensee, and for short periods of time that would exceed operational plan agreements, but those would be the rare exception.

Facility maintenance activities can, in some cases affect management on adjacent federal lands. As appropriate, project maintenance activities that have a direct or indirect affect on NFSL need to be addressed and agreed upon prior to implementation. By no means does this require that PG&E has to get FS approval for all maintenance activities on PG&E lands. However, when those activities either directly (e.g. powerline maintenance) or indirectly (e.g. visual conflicts) affect the national forest resources, agreements need to be addressed and agreed upon prior to implementation.

## **3) Project created tunnel, construction debris, and road spoil piles:**

Project construction and maintenance activities have created a number of piles of native and non-native materials throughout the project. Of the 16 project spoil piles identified by PG&E in Report E2.5.2, (PG&E Application Volume 4 of 9) only 3 are a significant concern to the FS that are addressed by license conditions. The FS is concerned with these three piles because they create a visual nuisance, have an identified (by PG&E) risk of erosion, are an obstruction to recreational use and

access, provide a seed bed for noxious weeds, are a sediment source for materials into the river, smell (rotted trash rack vegetation), and are potentially a source of hazardous waste contamination. Additionally, pile 4D on NFSL at the Pit 4 dam was placed on the rivers edge as seen in a historic photo dated March 15, 1954 (PG&E Application Appendix E2.5.2 Volume 4 of 9). This pile has significantly washed into the river since its placement in 1954, causing a shift in the rivers course creating a landslide of material into the river on the opposing canyon wall (as per FS observations, and PG&E reports). Only 240,000 cubic yards of its previously unknown volume remains, and still has a moderate erosion potential according to PG&E's report.

It is not acceptable for PG&E to dump piles of vegetation, road maintenance debris, and other natural materials on NFSL in an area not covered by an approved disposal plan. Non-native materials will not be considered for disposal on NFSL, even in an approved native material disposal site. PG&E is required to develop plans to address the affects of these project induced piles. Instead of requiring removal of hundreds of thousands of yards of existing tunnel debris material, the FS license conditions were developed to provide reasonable mitigation of the existing piles by removing human created debris, while reshaping and revegetating the piles, two for recreational use (4A, 4D-see Recreation above) and one for future use as a disposal site (4P).

PG&E Pile #4P (located at the Pit 4 powerhouse, on the road to the valve house): This site contains approximately 354,000 cubic yards of project generated material on 7.25 acres, mostly on NFSL. This pile has low erosion as per PG&E studies, is located more than 800 feet away and uphill from the rivers edge, and out of the main view of the normally traveled route, so provides for a reasonable disposal site for project generated native materials, such as road debris (dirt, rocks, vegetation,-not asphalt or other non-native wastes). FS license condition calls for PG&E to develop a plan on their continued use of this site as a disposal pile site.

#### **4) Geologic and seismic concerns:**

The Forest Service does not have jurisdiction for dam and facility structure safety, these being covered by the FERC and the Department of Dam Safety (DSOD). However, the proximity of these structures to NF resources could lead to serious negative resource effects, should a catastrophic facility failure occur. For this reason, the FS has developed a condition which includes receiving applicable inspection reports, with the ability to introduce changes in a new 4(e) license conditions should it be necessary for the adequate protection and utilization of the National Forest, as allowed under the Federal Power Act.

## **J. AIR QUALITY:**

### License Conditions

NONE

### Rationale

Air quality is under the jurisdiction of State and County agencies. From the Forest Service perspective, air quality concerns on the Pit 3/4/5 project are limited to the two areas below. Since Forest Service 4(e) measures address both of these concerns (see License Conditions for “Project Road Rehabilitation”, “Vegetation Management Plan”, and “Fire Prevention Plan” in Enclosure 1), no further recommendations are being made for air quality. However, the following information is provided to explain the rationale for our air quality concerns and provide additional justification for the 4(e)’s listed elsewhere in this submittal:

- 1) Fugitive dust is coming off of graveled project road surfaces. This dust affects air quality and delivers sediments into project waters where the road is adjacent or near the river. This is one of the reasons the FS included a license condition for expanding road paving from its current western extension at the Pit 3 Powerhouse to the gravel bar area. West of this location, the road moves away from the river, so does not present a sedimentation hazard for the rest of the Pit 4 reach. The public has identified road dust in the vicinity of Camp Pit, near the projects Tunnel Reservoir, as a “recreational nuisance”. Paving in these areas would eliminate “dusting” of recreationists, as well as address other resource concerns such as sedimentation (as discussed under the 4(e) Rationale for roads).
- 2) FS license conditions regarding development of vegetation management treatments, including prescribed burning should also reduce smoke and particulate matter which affect air quality, especially during hot summer months. Measures listed under 4(e) License Conditions would reduce both fuel loadings and the overall risk of a catastrophic wildfire in the project providing for increased air quality on this project.

PG&E has asserted another air quality issue related to decreased power generation from this project. According to PG&E any increase in bypass flows, would result in a commensurate increase in fossil fuel generation, leading towards decreased State air quality. This issue is outside of the FS purview, so will need to be addressed by the appropriate agency.

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## Enclosure 3

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## **Enclosure 3**

### **10(a) Recommendations and Rationale**

The following recommendations are for areas where there are resource effects induced by the project construction, operation, or maintenance, but where no National Forest System lands (NFSL) are being directly or indirectly affected. Therefore, these are recommendations for consideration by the FERC.

#### **Recommendation No. 1 - Minimum Instream Flow for Pit 5 Reach**

We recommend that the licensee, beginning as early as practicable within 3 months after license issuance, maintain minimum streamflows in the Pit River of 500 cfs in the Pit 5 Project bypass reach.

Upon completion of outstanding Summer 2002 two-dimensional habitat mapping and fishability study results and other applicable study results (or within one year after license issuance, whichever is sooner), the Licensee will, where appropriate shape the minimum flows outlined above, as approved by the Forest Service, filed with the Commission, and in consultation with other applicable agencies. Shaping may include within year changes (e.g., slightly higher flows in spring and lower flows in summer and fall) and between year changes (slightly higher flows in wet years and lower flows in dry years). Shaping of flows will be based on the 1970 to 1999 period of record. Where shaping occurs, instantaneous minimum flows will not exceed 1000 cfs and will not go below 300 cfs.

Where facility modification is required to maintain the specified minimum streamflows, the licensee should complete such modifications as soon as practicable and typically not later than 2 years after license issuance. The licensee should modify minimum streamflow release facilities such that the modified facilities can safely, accurately, and continuously release flows in 50-cfs increments ranging from 300 cfs to 1,000 cfs, and produce flow changes on at least a bi-weekly frequency without an unreasonable manual effort. Prior to such facility modifications, the licensee should make a good faith effort to provide the specified minimum streamflows as far as feasible within the capabilities of the existing facilities.

The minimum streamflows may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the licensee.

#### **Instream Flow Measurement**

The Licensee should measure and document all instream flow releases in publicly available and readily accessible formats. For the purposes of measuring and documenting compliance with the required minimum instream flows in the Pit 5 Project bypass reach, the Licensee should, in consultation with the Forest Service,

prepare and file an Instream Flow Measurement Plan (Plan) to the Commission. The Plan should include a description of existing or proposed instream flow measurement gages or devices, including flow gages, spillway or reservoir outlet discharge measurement devices, etc., and a detailed proposal for measuring instream flow in the Pit 5 Project reach with existing or proposed devices. The Plan should describe existing or proposed provisions for making mean daily flow data continuously available to the public from the USGS via the Internet, and for making hourly and 15-minute gage data publicly available through the USGS. The Plan should include evidence of gage calibration and historical and recent cross-section data, if applicable. The Licensee should submit the Plan to the Commission as soon as reasonably practicable and no later than one year after license issuance and should not begin construction of flow measurement devices or implementation of Plan elements until the Plan has been formally approved. In the interim, prior to approval and implementation of the Plan, the Licensee should maintain continual compliance with the Pit 5 minimum instream flow schedule at the existing Pit 5 reach gage at the Big Bend Bridge.

#### **Rationale:**

The Rationale for this recommendation in the Pit 5 reach is the same as the Rationale under our 4(e) “Minimum Instream Flow Regime” license condition (in Enclosure 2) - to benefit the aquatic resources. The Pit 5 reach is separated out as a “Recommendation” because it does not directly nor indirectly affect National Forest System lands. The recommended flow of 500 cfs in this reach is based on the Pit 4 base flows of 450 cfs, with additional accretion flows from Pit 5 tributaries such as Kosk and Nelson Creeks, as would have occurred in the natural condition. Additionally, PG&E’s Application confirms that flows in the Pit 5 reach were higher than those in either the Pit 3 or 4 reaches.

#### **Recommendation No. 2 - Maximum Ramping Rate & Up Ramping Analysis**

We recommend the Licensee operate the Project to minimize impacts to the recession limb of natural spills in the Pit 5 Project reach and regulate both the up and down ramping rates of emergency or planned maintenance outages (with the exception of up ramp rates of some emergency spills, which cannot be managed), for the purpose of minimizing negative ecological effects of unnaturally rapid flow and stage fluctuations.

Downramping of natural spills (i.e., inflows to the Project bypassed reaches that exceed the capacity of the reservoirs and diversion structures) should downramp at approximately the same rate as the natural attenuation of the inflow that caused the spill (i.e., no manipulation of Pit 5 reservoir levels and Pit 5 penstock release during spills), or downramp slowly enough so as not to produce stage changes at any approved Project bypassed reach stage gage exceeding one inch per hour. These recommendations will apply whenever instream flow measured hourly in the Pit 5

Project bypassed reach is less than 4,000 cfs and decreasing following a natural or outage spill. During such time the Licensee should either: (1) hold the Project reservoir spillway(s) elevation and outflows (penstock diversion and instream flow diversion) magnitudes constant until the completion of the spill (i.e., flow over spillway ceases); or (2) manually manage the spill discharge into the Project reach such that the maximum negative rate of change of flow stage measured at the approved Project reach stage gage is not more than one inch per hour.

Downramping rates of all other flow releases into the Pit 5 bypassed reaches including those following emergency releases or planned releases should follow a one inch per hour rate of change at approved stage gages.

For the purposes of implementing the maximum ramping rate recommendation in the Pit 5 Project reach, the Licensee should establish methods for reliably and accurately measuring flow stage on an hourly or 15-minute basis. The Licensee should therefore propose a plan for stage measurement, including proposed use of existing or to-be-established flow stage gages, as part of the Instream Flow Measurement Plan (above).

The Licensee should conduct a Forest Service approved safety analysis of existing data (from this or other comparable Projects), or develop a study to determine appropriate upramping rates to assure river user safety. Following completion of the analysis/study, the Licensee, after consultation with the Forest Service, should propose for Commission approval the maximum allowable upramp rate.

These ramping rates should be implemented at the time that new minimum instream flows are implemented.

### **Rationale:**

The rationale for this recommendation in the Pit 5 reach is the same as the rationale for our 4(e) “Maximum Ramping Rate and Up Ramping Analysis” license condition (in Enclosure 2); to benefit the aquatic resources and provide for public safety. The Pit 5 reach is separated out as a “Recommendation” because it does not directly nor indirectly affect the National Forest System lands, and so is not a mandatory condition.

### **Recommendation No. 3 - Dry Year Freshet Flow**

We recommend the Licensee, in consultation with the Forest Service and after approval from the Commission, release a spring freshet flow in the Pit 5 Project bypass reach each year that one does not naturally occur. The freshet flow would consist of a magnitude that exceeds the capacity of the existing baseflow channel and inundates the baseflow channel “floodplain” up to the elevation of the toe of the historical channel banks. This magnitude is approximately equal to the minimum instantaneous historical base flow of 1,500 cfs. On March 1st of each year, if a spill

exceeding 1,500 cfs for a continuous duration of at least 1 day has not occurred in the Pit 5 Project bypass reaches, and the average weekly temperature at known locations of FYLF tadpoles in the Pit 4 bypassed reach has not exceeded 11 degrees C (interim temperature value pending results of “Amphibian Monitoring Plan” license condition) then the Licensee should intentionally release a freshet flow into the Pit 5 Project bypass reach with the following timing, duration, magnitude, and ramping rate criteria and specifications:

**Minimum Total Duration:** 21 days

**Minimum Peak Duration:** 2 days at or exceeding minimum peak magnitude (1,500 cfs)

**Minimum Peak Magnitude:** Peak at 1,500 cfs for a minimum of 2 days within the first 3 days of release, then linearly decline (constant daily flow changes) to minimum instream flow.

**Interim Timing** (until completion of “Amphibian Monitoring Plan”): Immediately (within 3 days) following the first weekly average temperature in the Pit 4 reach exceeding 11 degrees C. If weekly average temperatures already exceed 11 degrees C by March 1 then no intentional freshet flow spill is required.

**Maximum Ramping Rates:** Ramping rates from base flows up to maximum peak magnitude (1,500 cfs) and from maximum peak magnitude (1,500 cfs) down to base flows should follow a linear decline (constant daily flow changes) to the minimum instream flow.

Following completion and review of the flow mapping results (and any other applicable flow studies) from the 2002 empirical flow release studies, the Forest Service may revise this freshet flow release schedule if necessary and appropriate to achieve riparian vegetation and aquatic habitat objectives including but not limited to reducing vegetation encroachment, providing access to diverse habitat on the channel floor for aquatic species, preventing, reducing, or removing bullfrog populations, and providing spring recreation flows.

#### **Rationale:**

The rationale for this recommendation in the Pit 5 reach is the same as the rationale for our 4(e) “Dry Year Freshet Flow” license condition (in Enclosure 2); to benefit the aquatic resources. The Pit 5 reach is separated out as a “Recommendation” because it does not directly nor indirectly affect the National Forest System lands, and so is not a mandatory condition.

#### **Recommendation No. 4 - Adaptive Management for Peak Flow Management**

We recommend that within two years of license issuance, Licensee develop and implement an Adaptive Management Plan for Peak Flow Management for the purpose of reducing the existing large magnitude flow fluctuations (e.g. winter and spring) and extend the duration of spring peak flows to provide longer inundation

periods on the bars in the bottom of the natural channel not inundated by minimum flows (this area is the “floodplain” of the minimum flow channel). This would minimize impacts on biota from high magnitude flow fluctuations, and allow biota access to the “floodplain” to complete life history processes. It would improve riparian conditions by providing flows for vegetation dynamics at higher elevations in the channel and decrease vegetation encroachment at low elevations in the channel. The plan should be developed in consultation with the Forest Service and other resource agencies, and be filed with the Commission.

**Rationale:**

The rationale for this recommendation in the Pit 5 reach is the same as the rationale under our 4(e) “Adaptive Management for Peak Flow Management” license condition (in Enclosure 2); to benefit the aquatic resources. The Pit 5 reach is separated out as a “Recommendation” because it does not directly nor indirectly affect the National Forest System lands, so this is not a mandatory condition.

**Recommendation No. 5 - Woody Debris Supply Management Plan**

We recommend the Licensee, in consultation with the Forest Service, file with the Commission within one year of license issuance, a Large Woody Debris Supply Management Plan. The Pit 5 Project reservoir traps 100 percent of the upstream large woody debris supply to the Pit 5 Project bypassed reach, resulting in reduced in-channel large woody debris storage and its associated habitats. At a minimum, the Plan should outline the methods and criteria the Licensee should employ to simulate LWD transport through the project reservoirs and into the downstream Project bypassed reaches, by manually depositing in their entirety all woody debris material pieces removed from Pit 5 Project reservoir at an approved channel bank site downstream from the Pit 5 Project dam.

The Plan should include a detailed description of proposed collection and deposition methods with summary tables and schematic diagrams of proposed improvements and construction cost estimates (if applicable), and a quantitatively supported rationale for deposition site and method selection, and cost minimization.

**Rationale:**

The rationale for this recommendation in the Pit 5 reach is nearly the same as the rationale under our 4(e) “Woody Debris Supply Management Plan” license condition (in Enclosure 2) except this recommendation does not include the gravel study as required in the Pit 3 Reach. Woody debris benefits the aquatic resources by providing physical habitat, nutrient cycling, microsite diversity of flows, etc. The Pit 5 reach is separated out as a “Recommendation” because it does not directly nor indirectly affect the National Forest System lands, and so is not mandatory.

### **Recommendation No. 6 - Notification and Minimization of Emergency and Planned Maintenance Outage Spill Plan**

We recommend the Licensee consult with the Forest Service and file with the Commission, within one year of license issuance, a “Notification and Minimization of Emergency and Planned Maintenance Outage Spill Plan” (Plan), for the purpose of minimizing the negative ecological effects of uncontrolled high flows into the Pit 5 Project bypassed reach resulting from emergency and planned hydropower facilities maintenance outages. The Plan should include proposed potential measures for minimizing the magnitude and duration of planned and emergency outage spills into the Pit 5 Project reach, including use of available storage within the Project and coordinated use of available storage upstream from the project.

The Licensee should also prepare, within one year, a feasibility study for providing flow continuation devices on the Pit 5 powerhouse to provide continuation of flow through the penstock in the event of planned and emergency turbine shutdowns. In the event the continuation devices are determined to be feasible, the Licensee should install such devices in a timely manner. In the event that any species become listed as threatened or endangered (e.g., FYL frogs), the Forest Service recommends the feasibility of having flow continuation devices installed be re-evaluated.

Furthermore, during the license term, the Licensee should maintain project operations and timely coordination with upstream project operations and storage availability such that the Licensee is able to make reasonable and timely use of Project and upstream available water storage immediately upon the initiation of emergency maintenance outage spills into the Project reach. The objective is to minimize, as to the extent feasible, the magnitude and duration of the resulting spill into the Pit 5 Project reach.

#### **Rationale:**

The rationale for this recommendation in the Pit 5 reach is the same as the rationale under our 4(e) “Notification and Minimization of Emergency and Planned Maintenance Outage Spill Plan” license condition (in Enclosure 2); to benefit the aquatic resources. The Pit 5 reach is separated out as a “Recommendation” because it does not directly nor indirectly affect the National Forest System lands, and so is not a mandatory condition.

### **Recommendation No. 7 – Noxious Weed Management Plan for Licensee’s lands**

The Forest Service recommends that within one year of license issuance, the Licensee, in consultation with the Forest Service, file and implement a Noxious Weed Management Plan for the purpose of controlling and containing the spread of noxious weeds on Licensee’s lands. This plan should include:

- Inventory and mapping of new populations of noxious weeds.
- Actions/strategies to prevent and control spread of known populations or introductions of new populations, such as vehicle/equipment wash stations.
- Treatment of all new infestations (any class) and existing infestations of California class A and B rated weeds plus selected Class C weeds - Klamath weed (*hypericum perforatum*) and Scotch broom (*Cytisus scoparius*).
- Treatment of all classes of noxious weeds may be requested at specific sites where other objectives need to be met (e.g. recreational use).
- Monitoring of known populations of noxious weeds to evaluate the effectiveness of re-vegetation and noxious weed control measures.

### **Rationale:**

The Forest Service is required to monitor and control the spread of noxious weeds on National Forest System lands. In order for the Forest Service to accomplish this on their own lands, it is important to monitor and control noxious weed establishment on adjacent lands, including Licensee's lands. This license issuance provides an excellent opportunity to provide for monitoring and control of noxious weeds and a proactive strategy for their management.

### **Recommendation No. 8 - Amphibian Monitoring Plan**

We recommend that within one year of license issuance, the Licensee develop and implement an amphibian monitoring plan in consultation with the Forest Service and other interested resource agencies for the Pit 5 Reach, and file it with the Commission. The Plan should, at a minimum, include the following components:

Develop the elements of a protocol to survey for, and if found, monitor changes in foothill yellow-legged frog (*Rana boylei*) and bullfrog (*Rana catesbeiana*) use of the Pit 5 reach. Specifically:

- For the first 5 years, surveys would occur periodically throughout the spring and summer of each year to determine the presence and life stage development of FYLF.
- Conduct a more thorough search during the spring breeding season to identify population centers / breeding sites and count numbers of clutches found.
- Determine whether changes in instream flows result in breeding in newly inundated margins, or utilization of old sites that are now deeper.
- Assess whether the new breeding sites: 1) connect with the summer lower flow channel; 2) remain as disconnected off channel water bodies; or 3) dry up entirely.
- Schedule return visits to breeding sites and adjacent low flow areas that may be tadpole rearing habitat to assess survival and time to metamorphosis. Beginning after hatching of larvae (if any found), revisit a subset of breeding sites every 3-4 weeks. To ensure comparability of density estimates, time and area constrained searches should be used. These monitoring data will also be

relevant to determine whether / when juvenile frogs leave the main channel to avoid winter disturbance.

- Develop a monitoring protocol to determine if instream flows are altering bullfrog populations, and any direct or indirect effects this change is having on the FYLF.

### **Rationale:**

New instream flow license conditions for the Pit 5 reach could affect both the FYLF and bullfrog populations. The resource objective, and one of the goals of our Pit 5 recommendations for instream flows, freshet flows, and amphibian monitoring is to alter the hydrologic regime such that it will match the life history adaptations of native FYLF and constrain the invasion of non-native bullfrogs. In California rivers, “the most important factor determining the success of an invading fish species is the match between the invader and the hydrologic regime” (Moyle and Light 1996, p. 1669). The same is true for bullfrog invasions. Bullfrogs are best eliminated or prevented from entering reaches by high flow events as has been observed in the Eel River of northwestern California (Kupferberg 1996a). Bullfrogs lay their eggs in summer, and the tadpoles do not reach metamorphosis during one dry season, they must overwinter as tadpoles. During the larval lifestage they are dramatically reduced or removed by natural winter flow events. FYLF, however, avoid this source of mortality because their eggs are laid early in spring and tadpoles metamorphose in late summer (Zweifel 1955). Metamorphs grow rapidly in the fall in order to attain a large enough size to survive the winter and high flow disturbances (Van Wagner 1996).

Introduced bullfrog populations pose a dramatic threat to native FYLF frog populations both as predators and larval competitors (Moyle 1973, Hayes and Jennings 1986, Kupferberg 1997). Bullfrogs are currently in Pit 5 and could potentially colonize the Pit 4 reach. The higher and variable instream flows, as well as the higher winter peak flows in all years (either through natural spill or by induced “freshets” in dry years) should assist in flushing bullfrog tadpoles downstream and out of the system in the Pit 5 reach during winter events. Currently, the river has had several years, 9 of 29 (1970-1999), with no fluctuations in flow releases. These unnatural conditions improve habitat for bullfrogs and degrade habitat for FYLF. Riparian vegetation encroaches onto bar surfaces (e.g., PG&E License Application page E3.1-134) and “fossilizes” those surfaces. There is strong experimental evidence from the Trinity River, west of the Project, that dense vegetation up to the edge of the base flow channel (as occurs in Pit 5 under the static baseflow regime) is detrimental to FYLF frogs. When riparian vegetation was removed from point bars, FYLF rapidly re-colonized and used the sites for breeding (Lind et al. 1996).

Similarly, aquatic macrophytic vegetation flourishes with year round unvarying flows. In particular, large mats of Elodea, are an important component of bullfrog habitat and would be dislodged by high flow events (Henry et al. 1994, Kupferberg 1996a, and empirical observations during the August 2002 control test flows in the Pit

3 and 4 reaches caused Elodea to break loose and build up on the Pit 4 dam intake structure).

Without monitoring, it will not be known if this flow objective is being met, or if so, to what extent. Additionally, monitoring the effects of the new instream flow regime would provide a better understanding of how the timing, magnitude, and duration of both high and low flows meshes with the timing of these amphibians' complex life cycles. Any future consideration of whitewater boating will depend on this knowledge to determine when this type of activity would be least detrimental to native frogs and most helpful to limit the upstream invasion on non-native frogs.

### **Recommendation No. 9 – Cultural Resource Protection Off NFSL**

The Cultural Resources Management Plan (CRMP) will contain specific Forest Service recommendations for management of historic properties within the Area of Potential Effect (APE), but outside of the boundaries of National Forest System lands.

#### **Rationale:**

The emphasis of archaeological license conditions and recommendations is to assure the protection and preservation of existing Cultural Resource Sites and Traditional Cultural Properties. As a cooperating agency, the Forest Service is evaluating cultural resources by looking at the project as a whole, not just those resources located on National Forest System lands. The FERC relies on all participating agencies to ensure that this project complies with Section 106 procedures. We are, therefore, commenting based on our specialists' intimate knowledge of the present condition and, the effects of past management activities on the cultural resources within the APE for this Project. These conditions and recommendations will be wrapped together into the "Cultural Resources Management Plan" which provides the framework for meeting both site-specific and project-wide cultural resource needs.

### **Recommendation No. 10 – Recreational Project Development off NFSL**

We recommend the Licensee consult with the Forest Service, file with the Commission, and implement the following recreational development within the timeframes suggested below.

#### **Lake Britton Facilities**

##### **1. Northshore Campground**

Within 3 years of license issuance, institute improvements to North Shore Campground including the following:

- Flush toilets and showers.
- Create and maintain beaches on the west shore of the campground and at the old launch ramp.

- Institute measures to reduce shoreline erosion due to beach use such as constructed stairways and bin walls.
  - Designate swimming areas to separate swimming, and boat mooring/beaching.
  - Consistent with any required sign plans, provide a larger directional entrance sign at Clark Creek Road and the campground access road.
2. Upper Lake Britton Day Use Facilities
- Hat Creek Park - Reconstruct and operate the Hat Creek Park to provide accessible day use river fishing. This location may provide the best accessibility within the Project vicinity. Include new restrooms, accessible picnicking facilities, and an accessible river fishing access.
  - Hat Creek South Parking – maintain road to the south parking area to provide recreation access to the river.
3. New Overnight Facilities
- When Northshore Campground reaches 70% occupancy on weekends between Memorial Day weekend and Labor Day inclusive, the Licensee will construct a new campground at Lake Britton to accommodate up to 40 sites. Possible locations include the North Ferry Crossing or near Camp Shasta. The new campground should be a high development level and include water, flush toilets, showers, paved interior roads and spurs and, if feasible, hookup sites for recreational vehicles.
4. New Day-Use Facilities
- Within 3 years of license issuance, the Forest Service recommends construction of a new Day-Use Beach on Lake Britton. Possible locations include between Pines Picnic Area and Jamo Boat Launch or at the North Ferry Crossing. The new day-use area should have regularly maintained beach sand, restrooms on site or nearby, road access, parking, trash collection, and regular monitoring by a host or Licensee employee.
5. Facility Operations
- Extend the term of the host at Jamo Boat Ramp until September 30 in order to keep the facility clean and orderly. Extend the season of the Pines Picnic area by opening on weekends in September. Keep North Shore campground open through September and continue needed care and policing.
6. Clark Creek Falls Trail
- Construct and maintain a hiking trail from Lake Britton at the mouth of Clark Creek easterly to Clark Creek Falls, a distance of approximately 1/3 mile.

## **Rationale for Lake Britton Recreation Improvements:**

Recreation use at all facilities on Lake Britton has seen steady increases since the last relicensing according to use data gathered by PG&E (Application for License). The McArthur Burney Falls State Park is at capacity during the summer use season and has limited expansion capability for day use. Overnight expansion for family camping is not allowed under the State Park's current management plan. Summer season weekend occupancy for non-State Park camping on Lake Britton is between 50% and 90% at Dusty Campground, and 35% to 70% for Northshore Campground. Total number of camping units is only 37 for both of these campgrounds. Private camping opportunities in the Lake Britton area are confined to a single park that is well away from the lake and caters mostly to full-time residents. A second private campground, nearer the Lake, recently closed. A locally based survey showed that there would be interest (19% of all users and 26% of State Park users surveyed) for a "State Park-like" campground on the lake should they be denied entry to the existing State Park. This would indicate a demand for a higher level of development.

There is a high level of existing demand Statewide for trail hiking, developed and primitive camping, picnicking, swimming, fishing, and beach activities according to data researched by PG&E. Future participation in hiking, boating, developed camping, beach use, picnicking, and swimming is projected to increase by more than 50 percent during the license period.

While demand for camping, day use, and boat use falls dramatically after Labor Day, there is a continuing need for these opportunities during good weather in late summer and early fall. Also, its proximity to the main route, Highway 89, between Reno, Nevada and Interstate 5 in northern California, make the project area desirable for transient recreation as well; those passing through on their way northward or southward. The recent designation of this highway as the National Volcanic Scenic Byway may induce more visitation to the area as the route is publicized and visitor centers are finished.

### **Pit 5 River Reach Facilities**

1. Reconstruct, if necessary, and maintain to Forest Service standards, the Little Joe Flat trail from Blue Jay Creek trailhead to Iron Canyon road.
2. Within 5 years of relicensing, construct a full-service campground of at least 20 units, near Camp Pit and the Tunnel Reservoir. The campground should accommodate both recreational vehicles (RV) and tent camping. There should be showers, flush toilets, and power/water RV hookups.
3. Remodel and open to public rental at least three cabin units of Camp Pit. At least one unit should be fully accessible or as required by County or State regulation.
4. Improve the Trailer Road for dispersed camping opportunities by grading to a maintenance level 3 and regular patrols by a host or sheriff to prevent long-term occupancy.

### **Pit 5 Reservoir Operations**

We recommend the Licensee request a change in the County ordinance to open the Pit 5 reservoir to non-motorized boats, motorized boats with battery –powered trolling motors, and float tubes between August 1<sup>st</sup> and December 31<sup>st</sup>. We recommend PG&E install a restrictive buoy near the intake structure, and that the area be signed to indicate the new regulation.

### **Rational for Pit 5 River Reach Facilities:**

Based on PG&E user surveys of the Canyon, a majority of the users come from the Bay Area and visit from three to four days at a time. Most of these users must travel quite a distance to hotels in nearby areas such as Burney or Redding or, are staying at the PSEA camps, which are limited to current and former PG&E employees and are not available to the public. The owner of Evergreen Lodge, a private residence available for rent in the Big Bend vicinity, said recently that demand for his residence was so high that people wanted to reserve 3 years in advance. Henderson’s Spring Resort, also in the Big Bend area, is a fly fishing resort with private ponds and does not cater to overnight lodging alone. Rates range from \$160 to over \$240 per night per person, which includes meals and fishing on the property. This demonstrates that there is an existing demand for a greater amount and a higher development level of overnight accommodation in the lower Pit River reaches.

The Forest Service recommends any new recreational facilities be constructed where development already exists, such as near Big Bend. This would be consistent with minimizing development in reaches where the Recreation Opportunity Settings are semi-primitive motorized to semi-primitive non-motorized, versus the rural setting as one approaches the community. This preference was also expressed by existing users who indicated a desire to maintain the river reaches at a roaded modified setting or less. Existing river users also expressed a need for more trash cans, restrooms, and potable water, which are commonly found at developed sites.

As previously indicated above, hiking is, and will continue to be, in great demand Statewide and within the project area. A survey of existing river reach users indicated that 24% felt that more shore access trails were needed and 20% wanted more hiking trails. Project roads and operations have brought visitors to the area to fish, which is the primary activity within the river reaches. Well-maintained trails, which will serve to access the river reaches, will meet both access and hiking needs while ameliorating resource damage and erosion from steep user created trails.

Currently PG&E limits public use in Project reservoirs that appear to not warrant these restrictions. In the Application for New License, Page B-5, PG&E states, “Lake Britton, Pit 4 forebay and Pit 5 forebay water surface elevations do not vary dramatically...” While safety should be a prime consideration for any use of project reservoirs, it is not clear why non-motorized use of the reservoir would not provide increased recreational use while the seasonal dates avoid resource conflicts with foraging bald eagles. With the very slow movement of water into the intake in this

reservoir, and the placement of an appropriate restrictive barrier, it appears that recreational use could be expanded into the Pit 5 Project reservoir.

The Forest Service has been a member of, and major contributor to, the Pit River Collaborative Team recreation sub-group, which includes PG&E and other interested parties. The recommendations for recreation facility development above are in keeping with the sub-group's recommendations and concepts. The recommendations allow for a better balance of project induced recreational facilities throughout the 30 mile length of the project, and place emphasis on correcting on-going resource effects from the lack of facilities. It will be necessary to work with the Pit River Tribe, local communities, and other interested parties to assure protection of sensitive sites, and to consider the desires of adjacent communities.

### **Recommendation No. 11 –Whitewater boating in the Pit 5 Reach**

Within one year of license issuance, the Licensee should develop, in consultation with the Forest Service and other appropriate agencies and communities, and file with the Commission a plan for whitewater boating including the following components:

- 1) Flow phone installation: Provide flow information via the web (Internet) and telephone for the Pit 5 reach. Web information would include real time flow data for the past 7 days. In dry years, the schedule of the dry year freshet flow releases (including ramping rate) would be provided, so that boaters could plan their trip accordingly. Web information would be made available to, and posted on, PG&E and American Whitewater websites, with links to other pertinent local websites. Phone information would provide the peak flow for the past three days which occurred between 8:00 am and 6:00 pm, as well as any forecasted dry year freshet flow releases. Real time flow data and peak flow data would be made available year round.
- 2) The acceptable boating flow range in the Pit 5 reach is unknown at this time. "Dry Year Freshet Flow" releases as described in Recommendation No. 3 above, will provide 10 continuous days of acceptable boating flows between 1,500 and 1,100 cfs during the first part of March. These flow releases will occur if there have been no spills equal to or greater than 1,500 cfs by March 1, and if water temperatures meet the criteria related to protection of foothill yellow-legged frogs. It is estimated that these dry year freshet releases will occur in 30% of the years. In average and wet precipitation years when "freshets" are not required to be released, there will be naturally occurring spill flows in the river which would meet or exceed whitewater boating flows for variable numbers of days.
- 3) Whitewater boating access points should be developed in concert with local communities, resource agencies, and interested publics. Mitigations for potential whitewater boating/archaeological site conflicts should be addressed in the Cultural Resource Management Plan.

**Rationale:**

This recommendation for the Pit 5 reach is provided for the same reasons as the 4(e) license condition on the Pit 3 and 4 reaches as described in Enclosure 2. It provides for some whitewater boating opportunity while keeping with a more natural hydrograph of increased flows during spring precipitation and snowmelt periods when the flow regime is normally greater. It does not induce any out of season spikes in the hydrograph that are outside of the range of natural variability as per the hydrograph of record from 1970-1999.

**Recommendation No. 12 – Road Reconstruction and Maintenance**

The Forest Service recommends that the Licensee complete the following road rehabilitation project and apply the following road maintenance standards to project roads not on, nor affecting, NFSL for the purpose of protecting the road facility and surrounding resource attributes. Many of these same measures were recommended by PG&E’s contractor during the relicensing road study, as denoted with an \* symbol.

**General Recommendations:**

1. All gate signs used for road closures use the “Manual of Uniform Traffic Control Devices” (latest edition) standards.
2. Implement “Best Management practices for all road construction/maintenance activities.”
3. Complete on an annual basis normal maintenance activities including: repair/replace damaged culverts, remove existing vegetation to allow for adequate sight distances, clean ditches, remove fallen trees on roads, replace faded signs etc.
4. Install gates or other vehicle control measures where necessary to achieve erosion protection.
5. Sign project roads and related recreational access points/facilities to assist non-local recreationists in finding destinations and project waters.

**General Road Rationale:**

Fugitive dust is coming off of graveled project road surfaces. This dust affects air quality and delivers sediments into project waters where the road is adjacent to, or near the river. This is one reason the FS included a license condition for expanding road paving from its current western extension at the Pit 3 Powerhouse to the gravel bar area. West of the gravel bar, the road moves away from the river, so does not present a sedimentation hazard for the western portion of the Pit 4 reach. The public has identified road dust in the vicinity of Camp Pit, near the projects Tunnel Reservoir, as a “recreational nuisance”. Paving in these areas would eliminate “dusting” of recreationists, as well as address other resource concerns such as sedimentation (as discussed under the 4(e) Rationale for roads).

While the paving license condition will assist with sedimentation of the river, adopting reasonable road maintenance techniques on all project roads will decrease sedimentation on river reaches not directly affecting NFSL.

Besides sedimentation, adequate signage and gating to prohibit inappropriate access, and to protect the driving public and resources is needed. Current road barriers include a cable with plastic flagging across a public road, which may not be visible to drivers. For safety reasons these need to be removed from Project roads. We recommend that PG&E use standard gate and signage packages, such as the Forest Service standard to provide for adequate resource protection and for public safety.

### **Specific Recommendations:**

#### **Lake Britton/Hat Creek Fish barrier Access Road**

1. Reconstruct this project road intersection with State Highway 299E in coordination with California State Department of Transportation (CALTRANS). Reconstruction is needed to incorporate a left hand turn lane, straighten the blind corner, or other public safety measures.
2. Install additional drainage structures on road, i.e. culverts and rolling dips where flowing water is eroding the road surface and surrounding terrain.
3. Install six inches of compacted surface material, i.e. cinders over existing road. Recommended road width should be 12 feet.
4. Develop appropriate access in conformance with both the “Upper Britton OHV and Vehicle Management Plan”, and “Cultural Resource Management Plan” license conditions. \*
5. Recommend installation of a sign on Highway 299E “Minor Side Road”, W2-2-30, to warn users that there may be slowing, entering, or exiting vehicles. \*

### **Rationale:**

The existing intersection of this Project Road and State Highway 299 has a very poor alignment, with recent traffic fatalities. Eastbound traffic must stop completely on a blind corner if westbound traffic prevents them making the left hand turn immediately. With the vehicle stopped on this corner, additional eastbound traffic traveling at the posted 55 mph speed limit has no opportunity to slow their vehicle or to avoid a collision with the stopped vehicle. This is a public safety issue as it relates to project induced recreationists’ use of a Project road to access Hat Creek and the Pit 3, 4, and 5 Project waters.

Traffic counts show that over 100 vehicles per day use the road during the opening day of fishing season. Additionally, this road is heavily used by Off-Highway Vehicle (OHV) recreationists on project and adjacent NFS lands. As there is no well-defined traveled way, and lack of drainage structures have induced vehicles to go around standing water, road widths have increased from 12 feet to up to 16 feet wide. The native road surface and flat terrain of the area has

resulted in OHV users throughout the area, which has impacted cultural resources and is causing wildlife disturbance. Surfacing the road will clearly identify the road location to the recreationists. The objective of implementing the above measures for the Hat Creek fish barrier access road are to protect cultural resources, reduce sedimentation to Project waters from user created road development, reduce disturbance to wildlife, and provide an easily identifiable and well maintained route for project induced recreation. These measures are reasonable and necessary for not only the affected resources, but for public safety.

### **Hagen Flat Road (FR50)**

1. Install a road name sign at appropriate intersections along this road.
2. Extend the pavement on this road from where it currently ends near the PSEA Camp Pit, to the west end of the Pit 5 Dam (the dam itself is currently paved so this measure would extend pavement to the east end of the dam). Total estimated length would be less than 1 ½ miles.

### **Rationale:**

The road signs would assist non-local recreationists in locating project waters and facilities. An extension of existing pavement was requested by current users and Big Bend community members in order to reduce dust resulting from traffic along this graveled road. Additionally, it would assist in reducing Project road maintenance activity sediments from entering Project waters at Tunnel Reservoir, and down the grade as you approach the Pit 5 Dam and intake structures. These sediments prevent attainment of “best management practices” and are detrimental to fish habitat, etc.

### **Pit 5 Powerhouse Road**

1. Resurface existing asphalt road. \*
2. Repair existing 200-foot section of road (in the first ½ mile of this road after leaving the junction with the Hillcrest/Big Bend Road) that has settled due to drainage problems.
3. Extend existing crib wall adjacent to “Miners Creek” to prevent continued erosion, and possible road failure.
4. Repair/replace all damaged culverts as identified in road logs from PG&E Public Safety and Traffic Management Report (March 2001). \*
5. Replace faded signs and add additional object markers. All signs should conform to the Manual of Uniform Traffic Control Devices, (MUTCD). \*
6. Install hazard markings on facilities adjacent to the road. \*
7. Add milepost markers for maintenance, public service, and emergency response.\*
8. Remove debris piles, material and equipment storage, etc. scattered along various portions of the road to a central location. \*

**Rationale:**

This project road is heavily used by PG&E for administrative traffic associated with Pit 5 powerhouse operations. It is additionally used by project-induced recreationists, and has not had major repairs for a number of years. Work items listed are necessary to maintain the road surface, and to reduce erosion leading to downstream sedimentation caused by inadequate road maintenance.

One of the most potentially serious road problems is #2, where the existing crib wall does not extend far enough along the cut bank. Continued erosion could eventually result in road failure, with a heavy rain event expediting this failure.

**Bush Bar Road**

Develop a Pit 5 reach disposal plan which provides for appropriate disposal of PG&E operational materials outside of areas being used by project induced recreationists, and where sedimentation to river resources cannot occur. This plan should eliminate use of this site at Bush Bar as a waste disposal area and provide measures for returning this site to a more natural setting.

**Rationale:**

This is one of many areas where PG&E is indiscriminately piling maintenance debris, including: dirt, rock, old culvert pieces, log debris, and other material. See Enclosure 2, Appendix 2, "Road Concerns" for a photograph of one of these piles at School House Foundation site, (another name for Bush Bar). This approximately ½ mile road dead-ends in an area of moderate project induced recreational use (as per PG&E recreation surveys), including the most accessible (and Big Bend communities favorite) swimming hole in the Pit 5 Reach. These piles of material prevent parking in a portion of the area, are visually unattractive, are in conflict with the historic site at this location, have introduced a seed bed which noxious weeds have exploited, and with several of the piles located adjacent to the Pit river, provide a sediment source during pile erosion. Developing a plan to rehabilitate inappropriate pile locations, while providing appropriate locations for disposal of material away from recreational and resource concerns would greatly benefit the public, and resources, while fulfilling PG&E's administrative need to have approved disposal sites.

**Upper Lake Britton/Gas Pipeline Loop Road**

1. Install six inches of crushed cinders over surface of the road.
2. Install additional drainage structures on road, i.e. culverts and rolling dips.
3. Restrict access in conformance with both the "Upper Britton OHV and Vehicle Management Plan", and "Cultural Resource Management Plan" license conditions.

4. Install a sign at the entrance of intersection with Highway 299E, restricting OHV travel off existing roads.
5. Install object markers and replace faded sign on existing gate.
6. Install signs on Highway 299E “Minor Side Road”, W2-2-30, to warn users that there may be slowing, entering, or exiting vehicles. \*
7. Install “Steep Grade” signs at the top of two existing spur roads to warn drivers of the steep grade before encountering it. \*

**Rationale:**

The primary concerns of this road, as with the Lower Hat Creek Loop Road, are the impacts due to vehicle use on cultural resource sites, increased sedimentation to Project waters, and disturbance of wildlife. The existing native road surface consists of approximately 6 inches of fine material, which, when wet, creates very slick driving conditions. The flat terrain has resulted in vehicle use throughout the area. Surfacing the road will clearly identify the road prism location and keep traffic on the traveled way. It is recommended that the road system to be developed have the least impact on cultural resources. All other “unclassified roads” should be closed and rehabilitated.

**Recommendation No. 13 – Grazing on Project Lands**

Grazing on project lands, which was eliminated during the last relicense, should not be allowed on project-associated lands for the duration of this upcoming license.

**Rationale:**

The elimination of grazing on Licensee’s lands during the previous relicensing has since resulted in improved riparian habitat and functioning along the shores of Lake Britton, which has led to reduced erosion. Further, cattle disturbance to archaeological sites has been reduced, and recreational values have increased where human use conflicted with cattle grazing. While there have been no discussions from the Licensee concerning returning cattle grazing to project lands, we recommend that this use not be reintroduced.

**Recommendation No. 14 – Socioeconomic Plan**

Within 2 years of license issuance, it is recommended that the Licensee develop a Socioeconomic Plan that addresses how PG&E’s Pit 3, 4, and 5 Project will provide economic value to the adjacent communities. Possible components of this plan could include:

- Development of recreational facilities either on PG&E or other private lands to provide a better balance of public recreational opportunities, especially in the western portion of the Project (currently all 3 public campgrounds are at Lake Britton on the eastern side of this Project).
- Development of an economic action plan should include all of the major stakeholders including: PG&E, Forest Service, Shasta County, Shasta Cascade Wonderland Association, major economic development entities such as Superior California Development District and Economic Development Corporation of Shasta County, economic and recreation department representatives from Chico State University, and residents of Big Bend, Burney, and other affected communities. The planning effort for the economic action plan needs to be facilitated by a knowledgeable and experienced economic development specialist who is familiar with Northern California.
- Assess any economic effects to third party water users by PG&E's operation under new license requirements.
- Assure that a proper proportion of recreational use of the project is being provided to the public, which in turn provides economic returns to the project affected communities through purchases of food, services, and amenities.

**Rationale:**

The communities influenced by recreational use of the Pit 3, 4, and 5 hydroelectric Project have not fully developed the Projects economic potential. The FS encourages local communities to develop facilities that accommodate increasing recreational interest in the project area, and has community economic development programs that could potentially provide the framework for a community to start such a project. One of the major goals of National Forest management is to assist rural communities in diversifying their economies, particularly those communities that have been heavily dependent on wood products from National Forests. Development of tourism and recreation facilities and programs offer one of the proven means of accomplishing this objective. Water oriented tourism/recreation has one of the highest potentials for successful economic development. The Pit River corridor (Pit 3, 4, and 5 Project) offers outstanding economic opportunities for development based on tourism/recreation. To date, communities have not requested this assistance, but it will continue to be an option during our environmental phase. Since private parties have not come forward to develop facilities on private lands, it is our recommendation that PG&E provide for project induced recreational use from this project. PG&E construction of new facilities would provide an increased economic return to nearby communities through sales of groceries, gasoline, and other amenities, but community support, or lack thereof, for such a development must also be a consideration. See "Recreation" discussion above for a more thorough discussion of recreation based "Recommendations" and Enclosures 1 and 2 for Recreation 4(e) License Conditions and Rationale.

There are currently three public campgrounds on this project, all concentrated at Lake Britton, the eastern terminus of this approximately 30 mile long project. PG&E also has three private camps, two in the Lake Britton area (Camp Shasta and Camp Britton), and one near Big Bend in the Pit 5 Reach (Camp Pit). These private facilities were originally built to provide housing during the construction of this hydro facility many decades ago, and are run by a PG&E employee association under a PG&E lease. The lease for this private use (PG&E current and retired employees only) will come up for reissuance in the next several years. This will provide an opportunity to provide for a more appropriate proportion of public to private use on this project, by either converting some of the private use directly to public, or by constructing new public opportunities, so the public to private use is not so disproportionate. Since PG&E has minimized recreational development on this project due to resource concerns with bald eagles and cultural properties, these existing PG&E lease sites could provide an avenue for providing public developments while minimizing resource effects associated with new developments.

There is a socioeconomic concern posed by the South Fork Irrigation District (SFID). Since the 1970's PG&E put a number of parties, including the SFID, on notice of a water rights conflict involving allocation of Pit River water. The State, and not the FS has jurisdiction over water rights. FS conditions for instream flows are based on the benefits to the resources. The task of balancing effects and evaluating the economic impact of a changed flow regime to other parties lies with the FERC.

### **Recommendation No. 15 – Miners Creek Tunnel Spoil Pile rehabilitation in Pit 5 Reach**

The Licensee, in consultation with the Forest Service and filed with the Commission, should develop a spoil pile rehabilitation plan to prevent continuation of resource disturbance and on-going erosion into the Pit River by considering the following:

1. Measures to stop active erosion and gullyng into Miner's Creek.
2. Revegetation measures to assist with site stabilization/erosion, aesthetics, noxious weed prevention, etc.
3. Remove non-native material such as asphalt, trash, yard debris, etc, and dispose in an off-site facility.
4. Close site for any additional disposal, and prevent local dumping at site.

### **Rationale:**

This large pile (287,000 cubic yards of material, covering approximately 5.6 acres) was one of the 16 piles inventoried and examined for erosion during PG&E's relicensing studies (see Report E2.5.2 in Volume 4 of 9- PG&E Application). As stated in that report; "The erosion potential rating for this disposal site is considered to be high to medium (H/M) based upon the extensive gully formation, apparent loss of spoil pile materials through erosion, and the close proximity of Miners Creek at the toe of the disposal pile." Although this pile has been in place for decades, it has

neither stabilized nor revegetated (except by a heavy invasion of noxious weeds). See photographs of this, and other PG&E tunnel spoil piles in the reference Report above. Additionally, there are downstream effects from the erosion of this pile, including siltation and sedimentation of the river and substrates used by fish and benthic macroinvertebrates. The recommendations listed above, while not extensive, would greatly reduce erosional impacts of this Project induced pile on Project and non-project waters.

### **Recommendation No. 16 – Air Quality**

Nothing additional, see below.

#### **Rationale:**

Air quality is under the jurisdiction of State and County agencies. From the Forest Service perspective, air quality concerns on the Pit 3, 4, and 5 project are limited to two areas: 1) Fugitive dust from graveled project roads and 2) Particulate matter released during catastrophic fire events. Since Forest Service 4(e) License Conditions address both of these concerns (see “Project Road Rehabilitation”, “Vegetation Management Plan”, and “Fire Prevention Plan” Conditions in Enclosure 1), no further recommendations are being made for air quality. However, the following information provides the rationale for our air quality concerns listed elsewhere in this submittal:

- Fugitive dust is coming off of graveled project road surfaces. This dust affects air quality and delivers sediments into project waters where the road is adjacent to, or near the river. This is one reason the FS included a license condition for expanding road paving from its current western extension at the Pit 3 Powerhouse to the gravel bar area. West of the gravel bar, the road moves away from the river, so does not present a sedimentation hazard for the western portion of the Pit 4 reach. The public has identified road dust in the vicinity of Camp Pit, near the projects Tunnel Reservoir, as a “recreational nuisance”. Paving in these areas would eliminate “dusting” of recreationists, as well as address other resource concerns such as sedimentation (as discussed under the 4(e) Rationale for roads).
- FS license conditions regarding development of vegetation management treatments, including prescribed burning should also reduce smoke and particulate matter which affects air quality, especially during hot summer months. Measures listed under 4(e) License Conditions would reduce both fuel loadings and the overall risk of a catastrophic wildfire in the project providing for increased air quality from this project.

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