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Via Electronic Filing

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D. C. 20426

January 29, 2010

**Subject: PRELIMINARY SECTION 4(e) TERMS AND CONDITIONS
AND SECTION 10(a) RECOMMENDATIONS
McCloud-Pit Hydroelectric Project, FERC No. 2106
Pacific Gas and Electric Company**

Dear Ms. Bose:

The following Preliminary Terms and Conditions for the **McCloud-Pit Hydroelectric Project, FERC No. 2106** are being submitted pursuant to Section 4(e) of the Federal Power Act.

Enclosure 1 contains the PRELIMINARY Section 4(e) Terms and Conditions found to be necessary for the protection and utilization of the Shasta-Trinity National Forest. Applicable comprehensive plans include the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) and the Final Environmental Impact Report and Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (USDA, 1994). **Enclosure 2** contains the Rationale Statement to support the Preliminary Section 4(e) Terms and Conditions and to assist in your understanding and analysis of the Conditions in your NEPA analysis. **Enclosure 3** contains 10(a) Recommendations for the Project. We will file FINAL Terms and Conditions for the McCloud-Pit Hydroelectric Project within 60 days of close of comments on the FERC Draft Environmental Impact Statement (EIS), if the Draft document is sufficient to support our supplied terms and conditions.

The conditions contained in this filing provide more specific information than some past Preliminary Section 4(e) terms and conditions. FERC staff has requested agencies provide specificity in order to better analyze potential effects in the environmental analysis and provide improved potential cost estimates. Accordingly, the Forest Service has provided such detail except where there is inadequate information or time has not allowed development of specific mitigations. Specificity in these Preliminary terms and conditions has the benefit of providing refinement and detail that was not provided in the Licensee’s draft plans in the Final License Application (Volume IV). Additionally, we have suggested that we continue working with the Licensee and other interested relicensing participants through the next year until the Draft EIS is issued in the refinement of draft plans so that our final license conditions contain completed plans. We believe developing the detail in the draft mitigation and management plans while

relicensing participants are still engaged in the process, and study results are current, will provide for improved, more efficient, and timely plan finalization.

Specific areas of Forest Service concern addressed in the Preliminary Conditions and rationale include:

1. The Forest Service does not agree that Study CR-S1 is complete. As discussed during relicensing meetings, it is possible that results from Study CR-S2 (Traditional Cultural Properties) may affect final integrity determinations assigned to sites in CR-S1, and results of both studies are needed to develop mitigations in the Heritage Properties Management Plan (HPMP). As a result, the Forest Service concludes that both studies (CR-S1 and CR-S2) are incomplete, and should be completed concurrently to ensure consistency.
2. The Forest Service recommends that the following Project-related facilities, not currently included within the Project boundary, be added to a new license, if issued. Specific sites include:
 - Segment 1 of Forest Road 38N11 (Hawkins Creek Road).
 - Forest Road 37N78 around Iron Canyon Reservoir.
 - The area between the McCloud Reservoir high waterline (elevation 2680') and the outside right-of-way of Forest Road 38N11 (Hawkins Creek, Segment 1), and Forest Road 38N04Y (Star City Road).
 - All new Project recreational facilities.

All of these areas are either occupied by facilities directly related to the operation of the project on Federal land or are appurtenant to a facility with direct impact on Federal lands. These are discussed in more detail in Enclosure 2, Rationale.

The Forest Service has met collaboratively with the Licensee, resource agencies, and other relicensing participants since the spring of 2007 to develop and interpret studies in order to develop protection, mitigation, and enhancement measures, including minimum stream flows for Project reaches. Although there has been agreement for some resources, the delay in receiving some study results did not provide adequate time to reach total agreement between parties. We believe the enclosed set of Preliminary Section 4(e) Conditions are substantially complete but are still interested in working with other interested parties in refining plans and conditions contained in the Preliminary 4(e) conditions. If this collaboration occurs, we believe that our FINAL terms and conditions will reflect consensus measures.

Respectfully submitted,

/s/ Joshua S. Rider

Joshua S. Rider

Attorney for the Forest Service

Enclosure

cc: Shasta-Trinity National Forest
Service List

Certificate of Service

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Mt. Shasta, California, this 29th day of January, 2010.

/s/ Stacy L. Smith

Stacy L. Smith,
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PRELIMINARY LICENSE TERMS AND CONDITIONS
NECESSARY FOR THE PROTECTION AND UTILIZATION
OF THE SHASTA-TRINITY NATIONAL FOREST
IN CONNECTION WITH
THE APPLICATION FOR LICENSE

McCloud-Pit Hydroelectric Project
FERC Project No. 2106
Pacific Gas and Electric Company

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APPENDIX 1: HYDROLOGICAL AND FISHERIES DATA

ENCLOSURE 1:
PRELIMINARY LICENSE TERMS AND CONDITIONS
NECESSARY FOR THE PROTECTION AND UTILIZATION OF THE
SHASTA-TRINITY NATIONAL FOREST
IN CONNECTION WITH THE
MCCLOUD-PIT HYDROELECTRIC PROJECT, FERC NO. 2106
PACIFIC GAS AND ELECTRIC COMPANY

I. GENERAL

The Forest Service (FS) provides the following Preliminary Section 4(e) conditions for the McCloud-Pit Hydroelectric Project, FERC No. 2106 in accordance with 18 CFR 4.34(b)(1)(i). Section 4(e) of the Federal Power Act (FPA), which states the Commission may issue a license for a Project within a reservation only if it finds that the license will not interfere or be inconsistent with the purpose for which such reservation was created or acquired. This is an independent threshold determination made by FERC, with the purpose of the reservation defined by the authorizing legislation or proclamation (see *Rainsong v. FERC*, 106 F.3d 269 (9th Cir. 1977)). The Forest Service, for its protection and utilization determination under Section 4(e) of the FPA may rely on broader purposes than those contained in the original authorizing statutes and proclamations in prescribing conditions (see *Southern California Edison v. FERC*, 116F.3d 507 (D.C. Cir. 1997)).

The following terms and conditions are based on those resource 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 (NFS) 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. Specifically, the 4(e) conditions in this document are based on the Land and Resource Management Plan (as amended) for the Shasta-Trinity National Forest, as approved April 28, 1995 by the Regional Forester of the Pacific Southwest Region.

Pursuant to Section 4(e) of the Federal Power Act, the Secretary of Agriculture, acting by and through the Forest Service, considers the following conditions necessary for the adequate protection and utilization of the land and resources of the Shasta-Trinity National Forest. License articles contained in the Federal Energy Regulatory Commission's (Commission) Standard Form L-1 (revised October 1975) issued by Order No. 540, dated October 31, 1975, cover general requirements. Section II of this document includes administrative conditions deemed necessary for the administration of National Forest System lands. Section III covers specific resource requirements for protection and utilization of National Forest System (NFS) lands.

II. ADMINISTRATIVE FOREST SERVICE PROVISIONS

Condition No. 1 - Consultation

The Licensee shall, beginning the first full calendar year after license issuance, participate in annual meetings with the Forest Service to present Project operation and maintenance activities planned for the next calendar year. In addition, Licensee shall present results from current year monitoring of noxious weeds and special status species as well as any additional information that has been compiled for the Project area, including progress reports on other resource measures. The goals of this meeting are to share information, mutually agreed upon planned maintenance activities, and identify concerns that the Forest Service may have regarding activities and their potential effects on sensitive resources, and any measures required to avoid or mitigate potential effects.

The date of the consultation meeting will be mutually agreed to by the Licensee and the Forest Service. Representatives from the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDF&G), State Water Resources Control Board (SWRCB) or other interested agency representatives concerned with operation of the Project may request to attend the meeting.

Consultation shall include, but not be limited to:

- A status report regarding implementation of license conditions;
- Results of any monitoring studies performed over the previous year in formats agreed to by the Forest Service and the Licensee during development of study plans;
- Review of any non-routine maintenance;
- Discussion of any foreseeable changes to Project facilities or features;
- Discussion of any necessary revisions or modifications to plans approved as part of this license;
- Discussion of needed protection measures for species newly listed as threatened, endangered, or sensitive, or changes to existing management plans that may no longer be warranted due to delisting of species or, to incorporate new knowledge about a species requiring protection;
- Discussion of elements of current year maintenance plans, e.g. road maintenance; and
- Discussion of any planned pesticide use.

A record of the meeting shall be kept by the Licensee and shall include any recommendations made by the Forest Service for the protection of NFS lands and resources. The Licensee shall file the meeting record, if requested, with the Commission no later than 60 days following the meeting.

Copies of other reports related to Project safety and non-compliance shall be submitted to the Forest Service concurrently with submittal to the FERC. These include, but are not limited

to: any non-compliance report filed by the Licensee, geologic or seismic reports, and structural safety reports for facilities located on or affecting NFS lands.

The Forest Service reserves the right, after notice and opportunity for comment, to require changes in the Project and its operation through revision of the Section 4(e) conditions to accomplish protection and utilization of NFS lands and resources.

Condition No. 2 - Approval of Changes

Notwithstanding any license authorization to make changes to the Project, when such changes directly affect NFS lands 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 or any departure from the requirements of any approved exhibits filed with the Commission. 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 condition does not relieve the Licensee from the amendment or other requirements of Article 2 or Article 3 of this license.

Condition No. 3 - Maintenance of Improvements on or Affecting National Forest System Lands

The Licensee shall maintain all its improvements and premises on NFS lands to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the Forest Service. Disposal of all materials will be at an approved existing location, except as otherwise agreed by the Forest Service.

Condition No. 4 - Existing Claims

The license shall be subject to all valid claims and existing rights of third parties. The United States is not liable to the Licensee for the exercise of any such right or claim.

Condition No. 5 - Compliance with Regulations

The Licensee shall comply with the regulations of the Department of Agriculture for activities on NFS lands, and all applicable Federal, State, county, and municipal laws, ordinances, or regulations in regards to the area or operations on or directly affecting NFS lands, to the extent those laws, ordinances or regulations are not preempted by federal law.

Condition No. 6 - Surrender of License or Transfer of Ownership

Prior to any surrender of this license, the Licensee shall provide assurance acceptable to the Forest Service that Licensee shall restore any Project area directly affecting NFS lands to a condition satisfactory to the Forest Service upon or after surrender of the license, as appropriate. To the extent restoration is required, Licensee shall prepare a restoration plan which shall identify the measures to be taken to restore such NFS lands and shall include or identify adequate financial mechanisms to ensure performance of the restoration measures.

In the event of any transfer of the license or sale of the Project, the Licensee shall assure that, in a manner satisfactory to the Forest Service, the Licensee or transferee will provide for the costs of surrender and restoration. If deemed necessary by the Forest Service to assist it in evaluating the Licensee's proposal, the Licensee shall conduct an analysis, using experts approved by the Forest Service, to estimate the potential costs associated with surrender and restoration of any Project area directly affecting NFS lands to Forest Service specifications. In addition, the Forest Service may require the Licensee to pay for an independent audit of the transferee to assist the Forest Service in determining whether the transferee has the financial ability to fund the surrender and restoration work specified in the analysis.

Condition No. 7- Protection of United States Property

The Licensee, including any agents or employees of the Licensee acting within the scope of their employment, 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. 8 - Indemnification

The Licensee shall indemnify, defend, and hold the United States harmless for:

- any violations incurred under any laws and regulations applicable to, or
- judgments, claims, penalties, fees, or demands assessed against the United States caused by, or
- costs, damages, and expenses incurred by the United States caused by, or
- the releases or threatened release of any solid waste, hazardous substances, pollutant, contaminant, or oil in any form in the environment related to the construction, maintenance, or operation of the Project works or of the works appurtenant or accessory thereto under the license.

The Licensee's indemnification of the United States shall include any loss by personal injury, loss of life or damage to property caused by the construction, maintenance, or operation of the Project works or of the works appurtenant or accessory thereto under the license. Indemnification shall include, but is not limited to, the value of resources damaged or destroyed; the costs of restoration, cleanup, or other mitigation; fire suppression or other types of abatement costs; third party claims and judgments; and all administrative, interest, and other legal costs. Upon surrender, transfer, or termination of the license, the Licensee's obligation to indemnify and hold harmless the United States shall survive for all valid claims for actions that occurred prior to such surrender, transfer or termination.

Condition No. 9 - Damage to Land, Property, and Interests of the United States

The Licensee has an affirmative duty to protect the land, property, and interests of the United States from damage arising from the Licensee's construction, maintenance, or operation of the Project works or the works appurtenant or accessory thereto under the license. The Licensee's liability for fire and other damages to NFS lands shall be determined in accordance with the Federal Power Act and standard Form L-1 Articles 22 and 24.

Condition No. 10 - Risks and Hazards on National Forest System Lands

As part of the occupancy and use of the Project area, the Licensee has a continuing responsibility to reasonably identify and report all known or observed hazardous conditions on or directly affecting NFS lands within the Project boundary that would affect the improvements, resources, or pose a risk of injury to individuals. Licensee will abate those conditions, except those caused by third parties or not related to the occupancy and use authorized by the License. Any non-emergency actions to abate such hazards on NFS lands shall be performed after consultation with the Forest Service. In emergency situations, the Licensee shall notify the Forest Service of its actions as soon as possible, but not more than 48 hours, after such actions have been taken. Whether or not the Forest Service is notified or provides consultation, the Licensee shall remain solely responsible for all abatement measures performed. Other hazards should be reported to the appropriate agency as soon as possible.

Condition No. 11 – Protection of Forest Service Special Status Species

Before taking actions to construct new project features on NFS lands that may affect Forest Service special status species or their critical habitat, the Licensee shall prepare and submit a biological evaluation (BE) for Forest Service approval. The BE shall evaluate the potential impact of the action on the species or its habitat. In coordination with the Commission, the Forest Service may require mitigation measures for the protection of the affected species.

The biological evaluation shall:

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

Condition No. 12 - Access

The Forest Service reserves the right to use or permit others to use any part of the licensed area on NFS lands for any purpose, provided such use does not interfere with the rights and privileges authorized by this license or the Federal Power Act.

Condition No. 13 - Crossings

The Licensee shall maintain suitable crossings as required by the Forest Service for all roads and trails that intersect the right-of-way occupied by linear Project facilities (powerline, penstock, ditch, and pipeline).

Condition No. 14 - Surveys, Land Corners

The Licensee shall avoid disturbance to all public land survey monuments, private property corners, and forest boundary markers. In the event that any such land markers or monuments on NFS lands are destroyed by an act or omission of the Licensee, in connection with the use and/or occupancy authorized by this license, depending on the type of monument destroyed, the Licensee shall reestablish or reference same in accordance with (1) the procedures outlined in the "Manual of Instructions for the Survey of the Public Land of the United States," (2) the specifications of the County Surveyor, or (3) the specifications of the Forest Service. Further, the Licensee shall ensure that any such official survey records affected are amended as provided by law.

Condition No. 15 - Pesticide-Use Restrictions on National Forest System Lands

Pesticides may not be used on NFS lands or in areas affecting NFS lands to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, trash fish, etc., without the prior written approval of the Forest Service. During the Annual Consultation meeting described in Condition 1, the Licensee shall submit a request for approval of planned uses of pesticides for the upcoming year. The Licensee shall provide at a minimum the following information essential for review:

- whether pesticide applications are essential for use on NFS lands;
- specific locations of use;
- specific herbicides proposed for use;
- application rates;
- dose and exposure rates; and
- safety risk and timeframes for application.

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.

Pesticide use will be excluded from NFS lands within 500 feet of known locations of Shasta Salamanders, Northern Pond Turtles, Foothill Yellow Legged Frog, or known locations of Forest Service Special Status or culturally significant plant populations. Application of pesticides must be consistent with Forest Service riparian conservation objectives.

On NFS lands, the Licensee shall only use those materials registered by the U.S. Environmental Protection Agency and consistent with those applied by the Shasta-Trinity National Forest and approved through Forest Service review 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. The Licensee may also submit Pesticide Use Proposal(s) with accompanying risk assessment and other Forest Service required documents to use pesticides on a regular basis for the term of the license as addressed further in Condition 25: Vegetation and Invasive Weed Management and Monitoring. Submission of this plan will not relieve the Licensee of the responsibility of annual notification and review.

Condition No. 16 - Modifications of 4(e) Conditions after Biological Opinion or Water Quality Certification

The Forest Service reserves the right to modify these conditions, if necessary, to respond to any Final Biological Opinion issued for this Project by the National Marine Fisheries Service, United States Fish and Wildlife Service; or any Certification issued for this Project by the State Water Resources Control Board.

Condition No. 17 - Signs

The Licensee shall consult with the Forest Service prior to erecting signs related to safety issues on NFS lands covered by the license. Prior to the Licensee erecting any other signs or advertising devices on NFS lands covered by the license, the Licensee must obtain the approval of the Forest Service as to location, design, size, color, and message. The Licensee shall be responsible for maintaining all Licensee-erected signs to neat and presentable standards.

Condition No. 18 – Ground Disturbing Activities

If the Licensee proposes activities that were not specifically addressed in the Commission's NEPA processes, the Licensee, in consultation with the Forest Service, shall determine the scope of work and potential for Project-related effects, and whether additional information is required to proceed with the planned activity. Upon Forest Service request, the Licensee shall enter into an agreement with the Forest Service under which the Licensee shall fund a reasonable portion of Forest Service's staff time and expenses for staff activities related to the proposed activities.

III. ADDITIONAL FOREST SERVICE PROVISIONS

Condition No. 19- Streamflow

Part 1. Minimum Streamflow Requirements and Measurement

Licensee shall maintain specified minimum streamflows in project reaches in accordance with provisions described below. Minimum streamflows shall commence within 90 days of license issuance, unless facility modifications are required. License Condition 16 (Modification of 4(e) Conditions After Biological Opinion or Water Quality Certification) provides the opportunity to adjust these minimum streamflow requirements to comply with the NOAA Biological Opinion and the SWRCB 401 Water Quality Certificate, if needed.

Minimum streamflows for the Lower McCloud River and Iron Canyon Creek shall be measured in two ways: as the 24-hour average of the flow (mean daily flow), and as an instantaneous flow. Minimum streamflow measurement at Pit 7 shall be instantaneous flow. There is no minimum flow at Pit 6. The instantaneous flow is the flow value used to construct the average daily flow value and shall be measured in time increments of at least 15-minutes. The 24-hour average flow is the average of the incremental readings from midnight of one day, to midnight of the following day, or an alternate 24-hour period as agreed. Licensee shall record instantaneous 15-minute streamflow as required by US Geological Survey (USGS) standards at all gages. The minimum instantaneous 15-minute streamflow shall be at least 80 % of the prescribed mean daily flow for those minimum streamflows less than or equal to 10 cubic feet per second (cfs), and at least 90% of the prescribed mean daily flow for those minimum streamflows required to be greater than 10 cfs.

Should the mean daily flow as measured be less than the required mean daily flow but more than the instantaneous flow, Licensee shall begin releasing the equivalent under-released volume of water within 7 days of discovery of the under-release. Credit for such additional releases will not exceed 20% of the instantaneous flow amount, when used to attain the equivalent of the under-released volume.

The Licensee shall schedule the timing of maintenance or other planned outages to avoid negative ecological effects from the resultant spills. The Licensee shall provide written notification to the Forest Service at least 90 days prior to any planned or scheduled maintenance outages that would affect streamflows in the Pit River, McCloud River or Iron Canyon Creek reaches. Notification shall include a description of Project and coordinated measures the Licensee plans to take to minimize the magnitude and duration of spills into the Project reach. The Licensee shall not proceed with the planned maintenance outage without the formal written approval of the Forest Service and notification on Licensee's public Project website. The Forest Service will respond in a timely manner.

The Minimum Streamflow requirements are subject to temporary modification if required by equipment malfunction, as directed by law enforcement authorities, or in emergencies. An emergency is defined as an event that is reasonably out of the control of the Licensee and requires Licensee to take immediate action, either unilaterally or under instruction by law enforcement or other regulatory agency staff, to prevent imminent loss of human life or substantial property damage. An emergency may include, but is not limited to, natural events such as landslides, storms or wildfires, malfunction or failure of Project works, and recreation accidents.

If the Licensee temporarily modifies the requirements of these conditions, then the Licensee shall make all reasonable efforts to promptly resume performance of such requirements and shall notify the Forest Service and other interested or affected governmental agencies within 48 hours of the modification.

Where facility modification is required to implement the efficient release of Minimum Streamflows, the Licensee shall submit applications for permits within one year after license issuance, and complete such modifications and initiate minimum streamflows as soon as reasonably practicable but no later than two years after receipt of all required permits and approvals. Prior to completion of such required facility modifications, the Licensee shall make a good faith effort to provide the specified Minimum Streamflows within the capabilities of the existing facilities.

a) Pit River below Pit 7 Dam

The Licensee shall release instantaneous flow of 150 cfs in the Pit River below Pit 7 Dam as measured at USGS Gage 11365000 year round. Instantaneous flow is defined as the flow value used to construct the average daily flow value and shall be measured in time increments of at most 15-minutes.

b) McCloud River below McCloud Dam

The Licensee shall release mean daily flows of 200 cfs year round from the McCloud Dam. These flows shall be augmented during the period February 15 through June 30 according to the prescription shown below. Flows shall be measured either at Gage MC-7 or directly at McCloud Dam.

Each month, Licensee shall consult Bulletin 120 published by the California Department of Water Resources (or its successor) and determine the “Percent of Average, April through July Forecast” for the McCloud River above Shasta Lake. That value shall be compared to values in Table 1-1 and the flow shall be modified as indicated. No ramping is required between semi-monthly increments.

Licensee shall downramp all spill events once controllable by valve operation (assumed to be at 1000 cfs). Down ramping shall proceed at an increment of 150 cfs decrease each 48 hour period until the prescribed minimum instream flow value is reached. Operational controllable spills (e.g. valve testing for dam safety compliance) also shall be up ramped in increments not to exceed 200 cfs each 24 hour period.

Table 1-1. Flow Rule for McCloud River Instream Flow

If the February 1 McCloud Runoff % is:	then for the period: February 15-29	and for the period: March 1-15
0-75	No Change	No Change
76-89	No Change	Increase flow by 50 cfs
90-99	Increase flow by 50 cfs	Increase flow by 50 cfs
100-119	Increase flow by 100 cfs	Increase flow by 100 cfs
120+	Increase flow by 150 cfs	Increase flow by 150 cfs
If the March 1 McCloud Runoff percentage is:	then for the period: March 16-31	and for the period: April 1-15
0-75	No Change	No Change
76-89	No Change	No Change
90-99	Increase flow by 50 cfs	No Change
100-119	Increase flow by 100 cfs	Increase flow by 50 cfs
120+	Increase flow by 150 cfs	Increase flow by 50 cfs
If the April McCloud Runoff percentage is:	then for the period: April 16- to the last Friday/Saturday in April	
0-89	Decrease flow by 50 cfs (but to no less than 200 cfs)	
Greater than 90	No Change	
Beginning the last Friday/Saturday combination entirely in April, decrease the flow 50 cfs each Friday until the flow reaches 200 cfs		

c) Iron Canyon Creek below Iron Canyon Dam

The Licensee shall release mean daily flows in Iron Canyon Creek below Iron Canyon Dam in accordance with the schedule shown below in Table 1-2 as measured at Gage MC-10.

Table 1-2. Iron Canyon Creek

Month	Mean Daily Flow (cfs) by Water Year		
	Below Normal, Dry, Critically Dry	Above Normal	Wet
Oct	7	7	10
Nov	7	7	10
Dec	7	10	15
Jan	7	10	15
Feb	7	10	15
Mar	10	15	>20**
Apr	10	15	>20**
May	7	10	15
Jun	7	10	15
Jul	7	7	10
Aug	7	7	10
Sep	7	7	10

**In March and April of Wet Water Year Types, the Flow Control Valve on Iron Canyon Dam shall be fully opened. Mean Daily flow shall be at least 20 cfs during this period.

No ramping is required between monthly increments. Valve testing for dam safety compliance shall only occur between March 5 and 15. Up ramping to test flow valve (assumed 200 cfs maximum) shall occur in 20 cfs increments spaced at least 15-minutes apart. Down ramping shall occur in 20 cfs increments spaced at least 30-minutes apart

Part 2. Water Year Type.

The Licensee shall determine the water year type based on the forecast of unimpaired runoff of the Sacramento River near Redding as provided by the California Department of Water Resources (DWR) Bulletin 120 report of water conditions in California. In January, February, March, and April the Licensee shall determine the water year type based on the DWR Bulletin 120 forecast and shall operate for that month based on that forecast. The May forecast shall be used to establish the water year type for the remaining months until the next January, when forecasting shall begin again. Minimum Instream Flows (MIFs) triggered by the water year type will be implemented within two business days of the actual publication date of DWR Bulletin 120.

Part 3. Streamflow Measurement.

For the purpose of determining the river stage and minimum streamflow on the Lower McCloud River below McCloud Dam, Pit River below the Pit 7 Dam, and Iron Canyon Creek below the Iron Canyon Dam, the Licensee shall operate and maintain the existing gages, consistent with all requirements of FERC and under the supervision of the USGS. Any modification of the gage facilities at any of these gages that may be necessary to measure the new Minimum Streamflow releases shall be completed within three years of issuance of the new Project license. Licensee shall install an instream measuring device either within or adjacent to the McCloud Dam to directly measure instream flow releases from McCloud dam

The Licensee shall measure and document all instream flow releases in publicly available and readily accessible formats. Flow data at MC-1 shall be real-time data and posted on the California Data Exchange Center (CDEC) or its successor website. Flow data collected by Licensee from the stream gages will be reviewed by the Licensee's hydrographers as part of its quality assurance/quality control (QA/QC) protocol. Upon completion of the QA/QC process, the data will be catalogued and made available to USGS in annual hydrology summary reports. Licensee understands that the USGS will then complete their QA/QC review of the data and subsequently publish the data and post it within their electronic database that can be accessed via the Internet. The flow values (generally 15-minute recordings) used to construct the 24-hour average flows will be available to the resource agencies from the Licensee upon request.

Condition No. 20 - Water Quality and Temperature Monitoring

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 and Temperature Monitoring Plan that is approved by the Forest Service, as it relates to aquatic habitats managed by the Forest Service. Upon Commission approval, Licensee shall implement the Plan. This plan shall include:

- Periodic monitoring of all project reservoirs once every five years for contaminants (including e. coli, to measure possible sanitation concerns at appropriate key recreation locations, e.g. boat ramps, day use areas, near campgrounds, etc.);
- Periodic monitoring of dissolved oxygen at McCloud, Pit 6 and Pit 7 reservoirs;
- Annual monitoring during the months of May through September at a minimum, for a period of ten years, of potential water temperature effects to beneficial uses including recreation, aquatic habitats, and target species (i.e. Foothill Yellow Legged Frogs, fish, and benthic macroinvertebrates), as a result of modified in-stream flows and reservoir operations. Monitoring to be conducted by Project segment (i.e. reservoirs and Project-affected rivers). If monitoring indicates that high temperatures (above 20^o C) are occurring within the project reservoirs or downstream reaches, then additional monitoring may be required;

- Continuous monitoring of turbidity for the term of the license in the Lower McCloud River (at MC-7 or MC-1) during the fishing season (approximately April 25 to November 15) to record elevated turbidity for recreational use. Turbidity levels shall be available real-time during the fishing season on the Licensee’s public Project website. Periodic turbidity monitoring during construction, re-construction, or other soil disturbing activities to identify point source erosion that may require repair or stabilization;
- Continuous monitoring of turbidity for a minimum of five years after license issuance in Iron Canyon Creek (at MC-10) to ensure that Licensee’s repairs have reduced sedimentation into the creek below the dam. If elevated turbidity (above Basin Plan level) is still occurring after five years, continue monitoring for an additional five years until additional mitigations reduce turbidity to or below Basin Plan level.
- Implement “Best Management Practices” (BMP’s) within the Project and Project-affected area that will satisfy the Aquatic Conservation Strategy objectives within the Northwest Forest Planning area, and mitigate impacts from:
 - Project operation and maintenance activities;
 - Developed and dispersed recreation use;
 - Road use, routine maintenance, and repair;
 - Vegetation manipulation;
 - Prescribed fire and wildland fire planning, and fire suppression;
 - Watershed practices;

Condition No. 21 - Large Woody Debris

Within one year of license issuance, Licensee shall, in consultation with the Forest Service, CDF&G, SWRCB, potentially affected tribes, and other interested parties, prepare a Large Woody Debris Management Plan approved by the Forest Service. The plan shall provide an operating procedure to facilitate the placement of woody debris downstream of McCloud Dam. The Plan will specify: (1) size criteria, (2) placement and storage sites, (3) volume and frequency of placement, and (4) monitoring procedures that assess the effectiveness of (Large Woody Debris) LWD mobilization and dispersal in the Lower McCloud River. Upon Commission approval, Licensee shall implement the Plan.

Condition No. 22 - Erosion and Sediment Control Management and Monitoring

Within one year of license issuance, the Licensee shall file with the Commission an Erosion and Sediment Control Management and Monitoring Plan developed in consultation with the Forest Service, SWRCB, CDF&G, and other interested parties, and approved by the Forest Service that will provide direction for managing erosion and controlling sediment during the term of the new license. Upon Commission approval, Licensee shall implement the Plan.

The plan shall include the following elements:

- Methods for inventorying and monitoring Project-related erosion and sedimentation;
- An inspection schedule for monitoring of Project and Project-related erosion and sedimentation sites during the term of the license. The schedule will include various timelines based on the type of erosion process, type of erosion site, and the activity level of each erosion feature. Effectiveness monitoring of erosion control measures at high priority sites shall occur for a period of three years after treatment in order to determine if further erosion control measures are needed. Periodic monitoring of the entire Project and Project-affected area shall occur at a minimum of once every ten years to assess the effectiveness of erosion control measures at existing sites and to identify new erosion sites. Periodic monitoring should incorporate protocols used in Study GS-S1 (*Inventory and assessment of erosion and sediment from Project Construction, Operation, and Maintenance*) in order to provide a consistent framework for identifying and reporting erosion sites and effectiveness of erosion control measures;
- An inventory of erosion sites (e.g., map and database) included in periodic monitoring. The inventory of Project-related erosion and sedimentation will include Project roads, facilities, infrastructure, tunnel spoils and borrow pits, reservoir shorelines, developed and dispersed recreational use areas, and areas of mass wasting that are Project-related or affected by Project roads and facilities. New erosion sites will be included in subsequent monitoring and treatment schedules;
- Criteria for treating erosion sites including a decision tree for determining when and how specific sites will be treated to control erosion and sedimentation;
- Schedule for repair of erosion sites including a list of sites requiring immediate mitigation and schedule for their implementation. Priority will be placed on the 56 sites ranked as having high erosion potential in study results from *Inventory and Assessment of Erosion and Sediment from Project Construction, Operation, and Maintenance (TM-67)*. Remaining moderate and low priority sites, and any new sites added as a result of periodic monitoring, will be scheduled in priority order for repair;
- Protocols for emergency erosion and sediment control;
- A process and schedule for reporting survey monitoring results, including periodic plan review and revision;
- Erosion control measures will follow best management practices (e.g., USFS, 2002) customized to site-specific conditions.¹

Sites where erosion can be mitigated by routine maintenance (e.g. plugged culverts and ditches) should be addressed as soon as feasible and no later than one year following license issuance, unless the site is incorporated into a larger design change (e.g. reconstruction of roadway and drainage features to achieve Road Management Objectives).

¹ USDA Forest Service, Pacific Southwest Region, 2000. Water quality management for Forest System lands in California.

Annual monitoring reports will include a GIS database, compatible with Forest Service standards, of erosion sites and detailed, site-specific, erosion and sediment control measures where necessary and appropriate.

Erosion Control Guidelines for New Construction or Non-Routine Maintenance

During planning, and before any new construction or non-routine maintenance projects with the potential for causing erosion and/or stream sedimentation on or affecting NFS lands (including but not limited to the planned recreation-related construction), the Licensee shall develop site-specific erosion control plans for each project that will be approved by the Forest Service. The plans shall include measures to control erosion, stream sedimentation, dust, and soil mass movement.

The Plan shall be based on actual on-site geological, soil, and groundwater conditions and shall include:

- A description of the current actual site conditions;
- Detailed descriptions, design drawings, and specific topographic locations of all erosion control measures;
- Measures to divert runoff away from disturbed land surfaces;
- Measures to collect and filter runoff over disturbed land surfaces, including sediment ponds at the diversion and powerhouse sites;
- Revegetating disturbed areas in accordance with current direction on use of weed-free straw, native plants, and locality of plant and seed sources;
- Measures to dissipate energy and prevent future erosion.

Condition No. 23 - Gravel and Coarse Sediment Management and Monitoring

Within one year of license issuance, the Licensee shall develop, in consultation with the Forest Service, CDF&G, SWRCB, and other interested parties, and file with the Commission a Gravel and Coarse Sediment Management Plan that is approved by the Forest Service. Upon Commission approval, Licensee shall implement the Plan.

The plan shall require the addition of between of 150 to 600 tonnes of gravel and associated coarse sediment to the Lower McCloud River annually. The gravel and coarse sediment shall range between 8-128 mm in size. The amount of gravel/coarse sediment will initially be 150 tonnes. This amount may be increased to a maximum of 600 tonnes depending on monitoring results. The source of the gravel and coarse sediment will be the responsibility of the Licensee; however, it is recommended that Licensee consider using sorted gravel and coarse sediment in the Star City Creek inlet as the source of material for the plan. If other sources are selected, the selected gravels shall be clean, rounded and ranging in size from approximately 8-128 mm. Inputs of gravel and coarse sediment will occur within the reach of the Lower McCloud River between the spillway and the Hawkins Creek confluence.

At a minimum, the Gravel and Sediment Management Plan shall:

- Identify the source(s) of gravel and coarse sediment;
- Identify the locations for gravel introduction in the Lower McCloud River below McCloud Dam;
- Identify facilities or improvements necessary for accessing the Lower McCloud River for placement of gravel and coarse sediment;
- Identify approved temporary or long-term stock pile sites, if needed;
- Develop a schedule for gravel and coarse sediment placement;
- Include an adaptive management component to allow non-delivery of gravel and coarse sediment in non-spill years or in years when spill is insufficient to mobilize the gravel and sediment from the placement site(s) or increased delivery above the minimum 150 tonnes if monitoring results indicate a need for greater quantities of the gravel and coarse sediment.

The plan shall also include a monitoring component that is integrated into the Biological Monitoring Plan (see Condition No. 27; Aquatic Biological Monitoring). Monitoring shall evaluate the biological population trends of species that are affected by the gravel and coarse sediment, specifically trout and macroinvertebrates, long term changes in channel morphology, and the fate of introduced gravels and coarse sediment over the course of the license term. The monitoring shall be conducted in the reach of the Lower McCloud River between McCloud Dam and Bald Mountain Creek confluence.

During the Annual Consultation Meeting required by Condition No. 1, the Forest Service will review monitoring results and discuss any needed changes to the Gravel and Coarse Sediment Management Plan. Any proposed changes shall require Forest Service approval.

Condition No. 24 - Reservoir Dredging

If required for the purposes of increasing gravel and sediment supply or for removing sediment from reservoirs to accomplish Project management objectives, the Licensee shall prepare a Reservoir Dredging Plan in consultation with and approved by the Forest Service. Licensee shall file the approved plan with the Commission not less than 90 days prior to any proposed or scheduled reservoir dredging operations. Upon Commission approval, Licensee shall implement the Plan. At a minimum, the Plan shall include:

- Location, amount, and timing of dredging operation (including map and photos);
- Extent, approximate amount, composition and size of dredged materials;
- Identify approved temporary or long-term stock pile sites, if needed;
- Equipment, road access, temporary access needs and storage/staging locations of material;

- Proposed start and end date of dredging;
- Conditions to minimize ecological impacts related to dredging operations;
- Public notification information regarding the purpose of dredging, timing and dredging location.

Condition No. 25 - Vegetation and Invasive Weed Management and Monitoring

Within one year of license issuance, the Licensee shall file with the Commission a Vegetation and Invasive Weed Management Plan approved by the Forest Service and developed in consultation with the Forest Service, appropriate County Agricultural Commissioner, California Department of Food and Agriculture, potentially affected tribes, and other interested parties. Targeted invasive species will be those species defined by the California Department of Food and Agriculture (CDFA) code, the California Invasive Plant Council (Cal-IPC) rating system, or as Forest Service species of concern. The plan will address Special Status species, both aquatic and terrestrial invasive species, and culturally significant plants within the Project boundary and adjacent to Project features directly affecting NFS lands including, roads, and distribution and transmission lines. Upon Commission approval, Licensee shall implement the Plan.

The Vegetation Management and Monitoring plan shall include and/or address the following components:

- Treatment protocols and measures for removing or trimming vegetation within the Project and Project affected area, including:
 - Hazard tree removal and trimming, including slash disposal;
 - Powerline/transmission line clearing, including slash disposal;
 - Vegetation management for habitat improvement;
 - Revegetation of disturbed sites, including standards of success, monitoring schedule and remediation measures when initial efforts are not successful;
 - Soil protection and erosion control, including use of certified weed-free straw and other methods that minimize the risk of introducing non-native invasive species;
 - Establishment of and/or revegetation with culturally important plant populations;
 - Use of clean, weed-free seed with guidance on the use of locally collected native seed. Plan shall include a means for collecting and propagating, or otherwise acquiring an adequate supply of appropriate native plant materials for Licensee use in erosion control, revegetation, and landscaping.
- Protection of Special Status and Culturally Significant plants and populations;
- Invasive Species Management and Monitoring;
- Pesticide/herbicide use restrictions and prohibitions;

Special Status and Culturally Significant Plants and Habitat Component

Licensee shall develop, in consultation with the Forest Service, a Monitoring Component for Special Status Plants, and culturally significant plants² approved by the Forest Service. This Plan Component shall include objectives, monitoring methods, locations of test plots, and a schedule for implementation. At a minimum this Plan Component will:

- Identify the current locations (including the boundaries) of special status and culturally significant plant populations in the Project and Project-affected area, as delineated by using a GPS instrument;
- Provide for periodic monitoring once every five years of the population boundaries to assess any expansion or contraction of the existing special status and culturally significant plant populations;
- Provide for periodic survey of the Project and Project-affected area every ten years to determine if additional special status plant species have moved into the Project or Project-affected area, and if so, measures for addressing those species;
- Survey for any new listings of special status plant species potentially occurring within the Project or Project-affected area, and provide monitoring if located.

In addition, in order to reduce impacts from all operations within the Project and Project-affected area, the Licensee shall share information on the locations of sensitive, culturally significant, invasive species, and other rare plant locations with the managers for operation and maintenance of any power distribution lines that cross portions of the Project area. Information shall include all protective, monitoring and survey measures from the license.

Special Status Species Survey Element

The Licensee shall begin annual consultation with the Forest Service, concurrent with the Annual Consultation Meeting noted in Condition 1 above, to review the most current list of special status plant species (species that are Forest Service Sensitive (FSS), Management Indicator Species (MIS), Survey and Manage species (S&M), or on the Shasta-Trinity National Forest Watch List) that might occur on NFS lands in the Project area or Project-affected area as a result of Project operations.

When a species is added to one or more of the lists, the Forest Service, in consultation with the Licensee, shall determine if the species, or un-surveyed suitable habitat for the species, is likely to occur on such NFS lands. For such newly added species, if the Forest Service determines that the species is likely to occur on such NFS lands, the Licensee shall, within one year, develop and implement a study plan in consultation with the Forest Service to

² Ethnobotanical resources (i.e. culturally sensitive plants) at Tribal collection sites identified in the Traditional Cultural Properties Study (CR-S2) are addressed in the Heritage Properties Management Plan. The reference here pertains specifically to protection of other culturally significant plant populations that have not been identified in that study and revegetation with culturally significant plants following construction, restoration or other ground disturbing activities. This topic could be addressed entirely in the HPMP, but if so, should be referenced in this License Condition.

reasonably assess the effects of the Project on the species. The Licensee shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, a schedule for implementation, and shall provide a draft of the final report to the Forest Service for review and approval. The Licensee shall file the final report, including evidence of consultation, with the Commission.

Invasive Species Management and Monitoring Component

The Invasive Weed Management and Monitoring Component shall include and/or address the following elements:

- Monitoring areas with ground disturbing activities associated with the license annually for three years after disturbance to determine if any invasive weed populations have been introduced into the Project area (including powerline alignments) as a result of construction or re-construction activities associated with the new license conditions (e.g. roads, recreation, micro-hydro installations, etc.).
- Monitoring known populations of invasive weeds annually for the first three years after license issuance to determine if invasive weed populations are expanding into any locations of existing special status or culturally significant plant populations; or if other adverse impacts to these populations are occurring, then once every five years for the term of the license to monitor population size and threat.
- Inventory and mapping of new populations of invasive weeds using a Forest Service compatible database and GIS software. The invasive weed GIS data layer shall be updated every five years and shared with resource agencies;
- Protocols and/or strategies to prevent and control spread of known populations or introductions of new populations, such as:
 - Thoroughly clean all construction equipment before entering the Project area, to reasonably ensure that seeds of invasive weeds are not introduced. Such cleaning will be required for all construction equipment that leaves the road or disturbs the soil, but shall not apply to vehicles used for the Licensee's regular maintenance and operations activities;
 - Use certified weed-free straw for all construction or restoration needs. If certified weed-free straw is not available, rice straw may be substituted. Use gravel and sand from weed-free sources where possible. The Licensee shall use an approved mix of plant species native to the Shasta-Trinity National Forest for restoration or erosion control purposes;
- Development of a schedule for control (containment or eradication) of all known populations of CDFG rated A, B and Q species, Cal-IPC "high" and "moderate" rated species, and selected other rated invasive weed species, designated by resource agencies;
- Annual monitoring of known populations of invasive species for the term of the license in locations tied to Project actions or effects, such as road maintenance, at Project facilities, O&M activities, new construction sites, etc. to evaluate the effectiveness of re-vegetation and invasive weed control measures;

- Provision for an environmental training program for the Licensee’s O&M staff on the location and identification of invasive weeds that may occur in the area;
- Notification of the Forest Service when the Licensee’s O&M staff observes any new populations of invasive weeds and coordination with them on the control of the population;

Licensee shall avoid entering areas with existing populations of invasive species. If entry is necessary, the Licensee shall, where reasonably feasible, conduct work in weed-free areas first and then in the areas with invasive species to avoid spreading them within the Project area.

New infestations of A& B rated or “high” and “moderate” rated species shall be controlled within one year of detection, or as soon as is practical and feasible. The A, B, C, & Q ratings refer to the California Department of Food & Agriculture Action Oriented Pest Rating System. The “high”, “moderate”, and “limited” ratings refer to the California Invasive Plant Council rating system. At specific sites where other objectives need to be met, all classes of invasive species may require treatment.

Monitoring shall be done in the appropriate season when plants are identifiable, but can be done in conjunction with other project maintenance and resource surveys to minimize separate travel and personnel. Monitoring information, in database and GIS formats, will be provided to the Forest Service as part of the annual consultation meeting (see Condition No. 1). To assist with this monitoring requirement, training in invasive weed identification shall be provided to project employees and contractors by the Licensee.

Licensee shall restore/revegetate areas where treatment has eliminated invasive weeds in an effort to prevent the reestablishment or new establishment of invasive weed species. Project-induced ground disturbing activities shall be monitored annually for the first three years after disturbance to detect and map new populations of invasive species. Spot treatments of new, small infestations may be done at the time of detection.

Invasive species known to occur in the Project and Project-affected area include:

- Tree of heaven (*Ailanthus altissima*)(Cal-IPC-moderate)
- Cheatgrass (*Bromus tectorum*)(Cal-IPC-high)
- Italian thistle (*Carduus pycnocephalus*) (Cal-IPC-moderate, CDFA-C)
- Spotted knapweed (*Centaurea maculosa*) (Cal-IPC-high, CDFA-A)
- Yellow star-thistle (*Centaurea solstitialis*) (Cal-IPC-high, CDFA-C)
- Canada thistle (*Cirsium arvense*) (Cal-IPC-moderate, CDFA-B)
- Bull thistle (*Cirsium vulgare*)(Cal-IPC-moderate)
- Gypsyflower (*Cynoglossum officinale*)(Cal-IPC-moderate)
- Scotch broom (*Cytisus scoparius*) (Cal-IPC-high, CDFA-C)
- Fuller’s teasel (*Dipsacus fullonum*)(Cal-IPC-moderate)
- Tall fescue (*Festuca arundinacea*)(Cal-IPC-moderate)
- English ivy (*Hedera helix*)(Cal-IPC-high)

- Common St. Johnswort (*Hypericum perforatum*) (Cal-IPC-moderate, CDFA-C)
- Pale yellow iris (*Iris pseudacorus*)(Cal-IPC-limited)
- Dyer’s woad (*Isatis tinctoria*) (Cal-IPC-moderate, CDFA-B)
- Perennial sweet pea (*Lathyrus latifolius*)(USFS-species of concern)
- Pepperweed (*Lepidium campestre*)(USFS-species of concern)
- Black locust (*Robinia pseudoacacia*)(Cal-IPC-limited)
- Himalayan blackberry (*Rubus discolor*)(Cal-IPC-high)
- Cutleaf blackberry (*Rubus laciniatus*)(USFS-species of concern)
- Spanish broom (*Spartium junceum*)(Cal-IPC-high)
- Spreading hedgeparsley (*Torilis arvensis*)(Cal-IPC-moderate)
- Puncturevine (*Tribulus terrestris*) (CDFA-C)
- Common mullein (*Verbascum Thapsus*)(Cal-IPC-limited)

Where populations of CDFA “A” and “B” rated species, and Cal-IPC “high” and “moderate” rated species are: 1) contiguous and extend outside the Project boundary or 2) downstream of populations inside the Project boundary and have a reasonable nexus to the Project, the Licensee shall make reasonable efforts to control the entire population unit. Populations of CDFA “C” rated, Cal-IPC “Limited” rated, or “USFS species of concern” shall be evaluated for control options based on total population size, access, potential for spread and/or re-infestation.

The plan will include an adaptive management element to implement methods for prevention of aquatic invasive weeds, as necessary. These actions may include, but may not be limited to:

- Public education and signing of public boat access;
- Preparation of an Aquatic Plant Management component to the Plan

Condition No. 26 - Terrestrial Biological Management and Monitoring

Within one year of license issuance, the Licensee shall develop, in consultation with the Forest Service, CDF&G, potentially affected tribes, and other interested parties, and approved by the Forest Service, a Terrestrial Biological Management Plan, including Forest Service special status species (i.e. Forest Service sensitive, survey and manage, and management indicator species) potentially affected by the Project on NFS lands. Upon Commission approval, Licensee shall implement the plan.

To the extent possible, this plan should be developed consistent with completed biological implementation plans from the recently relicensed Pit 3, 4, 5 Project to provide similar data collection protocols for species that span both hydroelectric Project areas on adjacent NFS lands. The Plan shall include, but may not be limited to, the following components:

- Occupation and population monitoring at specific intervals for the species listed below;
- Periodic surveys throughout the term of the license within the Project and Project-affected area to determine if additional populations develop, as specified below;
- Reporting of terrestrial survey and monitoring results including suitable habitat, populations, individuals, pairs, and nest locations every five years (or at Frequency specified below by species) with a Forest Service GIS compatible map that includes base data from study plan surveys, and updated data from periodic monitoring and surveys.

Mitigation measures to be implemented by the Licensee include:

- Licensee shall conduct pre-disturbance/pre-construction surveys for Forest Service special status species that follow standard protocols as reviewed and approved by the Forest Service, or protocols collaboratively developed and approved by the Forest Service if no protocols exist at the time;
- Licensee shall observe Limited Operating Periods (LOP's) where required (LOP's do not apply to emergency situations);
- Licensee shall utilize post-license monitoring and surveys for Forest Service special status species to determine if mitigation measures are necessary to protect Forest Service special status species.

Terrestrial Mollusks

Monitor sensitive terrestrial mollusks once every five years, survey potentially suitable habitat for new populations every ten years for the term of the license. Species to be monitored include the Shasta sideband snail (*Monadenia troglodytes troglodytes*), Wintu sideband snail (*Monadenia troglodytes wintu*), Shasta chaparral snail (*Trilobopsis roperi*), Tehama chaparral (*Trilobopsis tehamana*) and Shasta hesperian (*Vespericola Shasta*) at known sites along the McCloud Reservoir, Lower McCloud River, Iron Canyon Reservoir and Creek, and Pit 6 & 7 Reservoirs. Protect or relocate species when located in development sites.

Elderberry Longhorn Beetle

Monitor known suitable habitat once every 5 years for individuals. Protect if located.

Shasta Salamanders

Monitor for Shasta Salamander (*Hydromantes shastae*) at known locations once every 5 years along the McCloud Reservoir and Fenders Ferry Flat Afterbay, and survey suitable habitat once every ten years. Include estimates of population age distribution in terrestrial reporting.

Foothill Yellow Legged Frog

Survey once every ten years for additional populations of Foothill Yellow Legged Frogs (*Rana boylei*) along the 5.4 miles of NFS lands along the Lower McCloud River, and along the Pit 6 and Pit 7 reservoirs and tributaries. Protect or relocate species if found in areas proposed for construction or disturbance.

North Western Pond Turtles

Monitor North Western Pond Turtle (*Clemys marmorata*) at suitable locations once every five years, and survey suitable habitat once every ten years to identify additional populations. Include estimates of population age distribution in terrestrial reporting. Protect or relocate species if located in areas proposed for construction or disturbance.

Northern Goshawk

Monitor Northern Goshawk (*Accipiter gentilis*) within ¼ mile of detection site(s) identified in study results once every five years, and survey suitable habitat once every ten years to identify any additional individuals or pairs. Conduct surveys in suitable habitat prior to disturbance activities, or observe annual limited operating period of February 1 – August 15.

Bald Eagles

Monitor Bald Eagle (*Haliaeetus leucocephalus*) individuals, pairs and nest productivity annually at the McCloud Reservoir, Iron Canyon Reservoir, Pit 6 and Pit 7 Reservoirs, and any additional locations identified during surveys or monitoring, as approved by the Forest Service. Conduct surveys prior to disturbance activities, or observe annual limited operating period of January 1 – August 1. In addition:

- Identify disturbance factors and appropriate actions needed to minimize disturbances including recreational use, Project operations, timber harvest, road maintenance, etc. Consider actions such as:

- Buffer zones around each known nest territory
- Potential water surface zoning of Project reservoirs with respect to watercraft use.
- Coordinate Licensee and Forest Service land management activities within bald eagle nest territories in the Project area, such as timber harvest, mining, woodcutting, etc.;
- Periodically monitor, in conjunction with recreation monitoring, human use patterns to discern human/bald eagle interaction conflicts. Include monitoring of watercraft use on areas of McCloud Reservoir and Iron Canyon Reservoir near nests;
- Develop an interpretive sign at McCloud and Iron Canyon Reservoirs addressing bald eagles, consistent with specific visual direction in the Interpretation and Education Sign Plan.

Peregrine Falcon

Monitor Peregrine Falcon (*Falco peregrinus*) individuals, pairs, and nest productivity within ¼ mile of the known sites on NFS lands annually, and conduct surveys once every five years in potentially suitable habitat. Conduct surveys prior to disturbance activities, or observe annual limited operating period of February 1 – August 15. In addition:

- Identify disturbance factors and appropriate actions needed to minimize disturbances including recreational use, Project operations, timber harvest, road maintenance, etc. Consider actions such as buffer zones around each known nest territory;
- Coordinate Licensee and Forest Service land management activities within Peregrine Falcon nest territories, such as timber harvest, mining, woodcutting, etc.

Northern Spotted Owl

Monitor Northern Spotted Owl (*Strix occidentalis caurina*) within ¼ mile of suitable habitat in the Project area once every five years, and conduct surveys within suitable habitat once every ten years to identify new individuals, pairs or nest sites. Conduct surveys prior to disturbance activities, or observe annual limited operating period of February 1 – July 9.

Willow Flycatcher

Survey suitable Willow Flycatcher (*Empidonax traillii*) habitat (including dispersed campsites) once every five years, and conduct surveys prior to disturbance activities, or observe annual limited operating period of April 1 – August 30. Restore and enhance existing willow habitat within the Project or Project-affected area where Project activities have impacted vegetation.

Breeding Birds

Conduct surveys for (Neo-tropical) Breeding Birds within suitable habitat prior to disturbance activities or observe annual limited operating period of April 1- August 30.

Special Status Bats

Monitor Special Status Bats including Townsend's Big-eared Bat (*Corynorhinus townsendii*), Pallid Bat (*Antrozous pallidus*), and Western Red Bat (*Lasiurus blossevilli*) annually at known locations around McCloud Reservoir, and Pit 7 reservoir, and conduct surveys once every five years in suitable habitat. Conduct surveys prior to disturbance, or observe annual limited operating period of March 1 to September 30. In addition:

- Prior to any construction or re-construction within 1 mile of known locations, develop a strategy/mitigation plan for the land-based population at McCloud Reservoir;
- Screen all bathroom vents at all existing and proposed recreational sites to reduce bat mortality. Consult with Forest Service prior to implementing any bat exclusion techniques on other Project or Project-affected facilities.

Forest Carnivores (Fisher)

Survey for Fisher (*Martes pennanti*) once every five years in suitable habitat within the Project and Project affected areas.

Documentation and Reporting

Results of pre-construction and pre-disturbance surveys shall be provided to the Forest Service as collected to facilitate review and approval of project activities and construction. Results of pre-construction and pre-disturbance surveys shall also be included in five-year data reports and on GIS layer mapping products.

A draft technical report of all Terrestrial Biological Monitoring components shall be prepared following completion of each survey and monitoring effort for agency review, input, and concurrence. In addition to describing the results, the report shall compare results with those of previous surveys. All monitoring component reports shall discuss implications regarding trends in parameters over time. Additionally, it shall address any monitoring results that may indicate biological concerns and an adaptive process to further assess and implement actions that may be necessary to address identified concerns related to Project effects. A final report incorporating input (or addressing why it was not incorporated) shall be prepared and filed with the Forest Service, applicable agencies, and the Commission.

Special Status Species Surveys

Beginning the first full calendar year after license issuance, the Licensee shall, in consultation with the Forest Service, annually review the current list of special status wildlife species (species that are Forest Service Sensitive (FSS), Survey and Manage (S&M), Management Indicator Species (MIS), or on the Shasta-Trinity National Forest Watch List) that might occur on NFS lands in the Project or Project-affected area.

When a species is added to one or more of the lists, the Forest Service in consultation with the Licensee shall determine if the species or un-surveyed suitable habitat for the species is likely to occur on NFS lands within the Project or Project-affected areas. If the Forest Service determines that the species is likely to occur, the Licensee shall develop and implement a study plan in consultation with the Forest Service to reasonably assess the effects of the Project on the species. The Licensee shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, and a schedule of implementation, and shall provide a draft of the final report to the Forest Service for review and approval. The Licensee shall file the final report, including evidence of consultation, with the Commission. Upon approval by the Commission, Licensee shall implement those resource management measures.

Avian Collision and Electrocuting Hazards

Within one year of license issuance, the Licensee shall file with the Commission, an Avian Collision and Electrocuting Hazards Plan, approved by the Forest Service in consultation with appropriate Federal and State agencies that minimizes adverse interactions between Project transmission lines and avian species. All new or rebuilt power poles shall conform to, guidelines in “Suggested Practices for Raptor Protection—State of the Art in 1996” (APLIC 1996) or updated guidelines when they are issued. Any pole involved in a bird fatality shall be immediately repaired/replaced to meet these guidelines.

Condition No. 27 - Aquatic Biological Management and Monitoring

Within one year of license issuance, the Licensee shall develop, in consultation with the Forest Service, CDF&G, potentially affected tribes, and other interested parties, and approved by the Forest Service, an Aquatic Biological Management Plan, including Forest Service special status species (i.e. Forest Service sensitive, survey and manage, and management indicator species) potentially affected by the Project on NFS lands. Upon Commission approval, Licensee shall implement the plan.

To the extent possible, this plan should be developed consistent with completed biological implementation plans from the recently relicensed Pit 3, 4, 5 Project to provide similar data collection protocols for species that span both hydroelectric Project areas on adjacent NFS lands. The Plan shall include, but may not be limited to, the following components:

- Population trends, age-class structure, and fish condition factors in the McCloud Reservoir, Iron Canyon Reservoir, Pit 6 Reservoir, Pit 7 Reservoir, Lower McCloud River, and the Pit River, and monitoring at specific intervals for the species listed below;
- List of fish species to be monitored, standardized sampling and data protocols consistent with pre-licensing studies, to the extent possible, to ensure comparability of survey results with pre-licensing data;
- Periodic survey once every three years (or as determined by the agencies, potentially affected tribes and other interested parties) for the first 9 years of the license period, and then once every five years for the term of the license;
- Report aquatic survey and monitoring results, including suitable habitat by age class (e.g. fry, juvenile, adult) and populations by age class and species, every five years (or at frequency specified below by species) with a Forest Service GIS compatible map that includes base data from study plan surveys, and updated data from periodic monitoring and surveys.

Benthic Macroinvertebrates

Monitor benthic macroinvertebrate population robustness and heterogeneity, composition of functional feeding groups, and pollution tolerance/intolerance trend on the Lower McCloud River and Iron Canyon Creek. Periodic sampling shall occur once every three years during the first nine years following license issuance, and thereafter, once every five years. The number of sites, site locations, and the frequency of monitoring may be modified with Forest Service approval after consultation with the Forest Service, potentially affected tribes, and other interested parties if needed based on initial sampling results. Ten percent of the sites will be within the first 1.5 miles of the Lower McCloud River below the McCloud Dam.

Special status aquatic mollusks

Monitor special status aquatic mollusks including: the California floater, (*Anadonta californiensis*), nugget pebblesnail (*Fluminicola seminalis*), scalloped juga (*Juga occata*), and the montane peaclam (*Pisidium ultramontanum*). Monitoring will include population trends and changes in distribution. Periodic monitoring will occur once every three years (or for a period determined by the Forest Service to be sufficient that is consistent with other monitoring requirements) during the first nine years after license issuance and once every five years thereafter. The monitoring methodology will be approved by the Forest Service prior to implementation.

Documentation and Reporting

A draft technical report of all Aquatic Biological Monitoring components shall be prepared following completion of each sampling effort for agency review, input and concurrence. The fish-based sampling report shall discuss implications regarding trends in fish abundance, changes in age-class structure, as well as any changes in fish condition factors. 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.

In addition to describing the results, the report is to compare results with those of previous surveys. All monitoring component reports shall discuss implications regarding trends in parameters over time. Additionally, it shall address any monitoring results that may indicate biological concerns and an adaptive process to further assess and implement actions that may be necessary to address identified concerns related to Project effects. A final report incorporating input (or addressing why it was not incorporated) shall be prepared and filed with the Forest Service, applicable agencies, and the Commission.

Special Status Species

In consultation with the Forest Service, the Licensee shall, beginning the first full calendar year after license issuance, annually review the current list of special status aquatic wildlife species (species that are Forest Service Sensitive (FSS), Survey and Manage (S&M), Management Indicator Species (MIS), or on the Shasta-Trinity National Forest Watch List) that might occur on NFS lands and waters in the Project and Project-affected area.

When a species is added to one or more of the lists, the Forest Service in consultation with the Licensee, shall determine if the species or un-surveyed suitable habitat for the species is likely to occur on such NFS lands and waters. For such newly added species, if the Forest Service determines that the species is likely to occur on such NFS lands and waters, the Licensee shall develop and implement a study plan in consultation with the Forest Service to reasonably assess the effects of the Project on the species. The Licensee shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, and a schedule of implementation, and shall provide a draft of the final report to the Forest Service for review and approval. The Licensee shall file the final report, including evidence of consultation with the Commission. Upon Commission approval, Licensee shall implement those resource management measures.

Invasive Aquatic Species

Consistent with Fish and Game code 2302, assess the threat from invasive mussels and develop and implement a prevention plan.

Provide fish passage at stream crossings

Within one year of license issuance, the Licensee will develop, in consultation with the Forest Service, the CDF&G, potentially affected tribes, and other interested parties, specific management actions and schedule for providing fish passage, including monitoring, into the following affected reservoir streams: Deadlun, McGill, Cedar Salt Log, Little Gap and Gap Creeks on Iron Canyon Reservoir, and Tarantula Gulch and Battle Creek on the McCloud Reservoir. Upon Forest Service and Commission approval of the actions, the Licensee will construct or correct fish passage structures on these streams within one year. These structures are to be maintained on an annual basis, if needed, concurrent with road condition surveys, such that they are able to pass the entire run of stream spawning fish. All of the named streams will be monitored every three years to determine fish passage structure effectiveness. Monitoring reports are due concurrent with Aquatic Monitoring Reports, in years conducted.

Condition No. 28 - Hazardous Substance Management

Within one year of license issuance, and at least 60 days before starting any activities the Forest Service determines to be of a land-disturbing nature on NFS lands, the Licensee shall file with the Commission, a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup.

At a minimum, the plan shall require the Licensee to:

- Maintain in the Project area, a cache of spill cleanup equipment suitable to contain any spill from the Project;
- Periodically inform the Forest Service of the location of the spill cleanup equipment on NFS lands and of the location, type, and quantity of oil and hazardous substances stored in the Project area;
- Inform the Forest Service immediately of the nature, time, date, location, and action taken for any spill on or affecting NFS lands.

Condition No. 29 - Road and Transportation Facility Management

Within one year of license issuance, Licensee shall file with the Commission a Road and Transportation Facility Management Plan, approved by the Forest Service, for protection and maintenance of Project and Project-affected roads that are on or affect NFS lands. The Licensee shall consult with the Forest Service and other affected parties in the development of this Plan. The Licensee shall take appropriate measures to meet appropriate Forest Service Maintenance Level, Traffic Service Level, and Road Management Objectives (RMOs). Upon Commission approval, Licensee shall implement the Plan and actions specified therein. At a minimum, the Road and Transportation Facilities Management Plan shall include the following components:

1. Planning & Inventory (Project and Project-affected roads):

- A map(s) compatible with Forest Service Travel Management Routes and GIS database showing all Project and Project-affected roads, culverts, bridges, drainages, watering sources, borrow and disposal sites for surplus rock and soil from road maintenance within and adjacent to the Project Boundary;
- Identification of uses (e.g. recreation, facility access) of the roads and season of operation;
- An inventory of road and road facility conditions including any construction or maintenance needs. Identify each Project and Project-affected road and identify how and when it will be addressed further. At a minimum, this inventory shall include the roads shown in Table 1-3, below;
- A Traffic Safety component, including an inventory and condition for all existing and proposed traffic/road signs (excluding recreation and interpretive signs) and schedule for sign maintenance;
- Any proposed changes to maintenance levels.

2. Operation, Maintenance, and Road-Associated Debris (Project and applicable Project-affected roads):

- Develop an annual road operation and maintenance (O&M) schedule for Project roads and applicable Project-affected roads on NFS lands to comply with Forest Service standards, RMOs, BMPs, and Travel Management guidelines.
- Complete normal maintenance activities on an annual basis including: road surface maintenance, repair and replacement of damaged culverts, cleaning debris and rockfall from drainage channels, vegetation removal to allow adequate sight distances, vegetation removal to maintain an open traveled way consistent with Forest Service standards, etc.

- Describe types of road-associated debris (e.g. native materials such as dirt, rocks, trees, etc.), any acceptable locations on NFS lands where this material can be stored (identify if temporary only or permanent), and measures to control erosion, weed infestation, etc. on these piles. Remove all road spoil piles not currently located at approved sites on NFS lands to a location either off the Forest, or to a Forest Service approved disposal site.
- Include any required limited operating periods (LOP's) for wildlife species and noxious weed prevention provisions in planning and performing maintenance activities.
- Comply with the following O&M guidelines:
 - Slope: Outslope roads where feasible; utilize long, gradual rolling dips to disperse runoff. For insloped roads, use sufficient drainage structures to minimize runoff in inside ditches.
 - Erosion/Sediment: Disconnect road sediment sources to watercourses and incorporate erosion control measures by/through the use of rolling dips, waterbars, filter strips, cross-drains, etc. Treat potential erosion or mass wasting sites.
 - Drainage: Assess cross-drain frequency, waterbars, rolling dips, and lead outs that minimize flow concentration.
 - Timing: Address timing use restrictions (winter period, wet weather, or other).
 - Design: Address need to upgrade surfacing to comply with RMO's. For Bridges: meet current AASHTO Standard specifications for Highway Bridges (latest edition) including guardrails, and pave 50 feet either side of approaches. For Gates: comply with Forest Service standards for construction and signing.
 - Decommissioning/closures: Address need and schedule for any road closures and decommissioning.
 - Snowplowing: Conduct plowing according to Forest Service procedures.
 - For road and stream crossings, implement the following:
 - Sidecast: Remove or minimize with particular care near streams.
 - Realign existing routes that pose risks to water quality.
 - Culverts: Replace "shotgunned" cross drains, armor inlets/outlets with rip-rap, utilize culvert diameters equal to or greater than the average active channel width, utilize extra cross drains, critical dips and road aggregate surfacing at connected crossings to decrease chronic and potential catastrophic delivery of sediment, upgrade crossings to reduce diversion potential.
 - Drainage: Treat roads to minimize erosion and sediment delivery to the watercourse. Include overflow dips/critical dips or other feature to minimize watercourse diversion potential at culvert crossings. Inslope roads at crossings, where feasible and safe, to prevent road runoff from discharging onto the downstream fill face. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

- Fish Passage: Provide for fish passage and proper stream function for all stream crossings that are identified as fish habitat areas.
- Intermittent and perennial stream crossings shall accommodate a 100-year storm event and associated bedload and debris unless an exception is allowed by the Forest Service. Provide hydrologic information to verify calculations where requested by Forest Service.

3. Construction and Reconstruction (Project and applicable Project-affected roads):

- Develop a road construction and reconstruction implementation schedule to bring existing roads and associated facilities (i.e. culverts, gates, bridges, crossings, crib-walls, etc.) into compliance with Forest Service standards that achieve Forest Service RMOs and Travel Management Guidelines for applicable roads in Table 1-3, below. The schedule shall bring existing roads into compliance within five years of Plan approval, with health and safety items as well as water passage/resource objectives within the second year of implementation, road surfacing items within the third year of implementation, and all lower priority projects in years four and five after implementation;
- During construction and reconstruction activities, comply with O&M guidelines provided in Item 2. Operation, Maintenance, and Road-Associated Debris, above.

Specific Construction & Reconstruction Items:

- Within two years following Plan approval, repair those road sites identified in Table 1-4 listed below, with greater than 75% erosion hazard.
- Implement any remaining or new Forest Service approved reconstruction mitigations resulting from McCloud Dam spillway flows undercutting Forest Service road 38N11 that were not completed under the existing license.
- Identify and close, after Forest Service review and approval, those user created roads accessing Iron Canyon Reservoir that generate water quality impacts or impacts to other resources. Closure methods may include: natural materials (i.e. boulders & fallen trees), barriers, gates, or signing.

4. Monitoring (Project and Project-affected roads):

- Conduct traffic use surveys scheduled on a six-year basis (coinciding with the Commission's recreation Form 80 schedule) at Forest Service specified locations, to determine the number and type of vehicles per day, describe study periods and reporting requirements, and determine use trends. Conduct a minimum of 60 survey days during survey years;
- Conduct a road capacity and use review every six years following completion of use surveys, to determine if the roads continue to meet current road management objectives. If the Forest Service determines roads no longer comply, define actions and timelines to correct deficiencies;

- Following annual or periodic monitoring, any roads or bridges found to not meet Forest Service standards and guidelines requiring work beyond normal O&M shall be identified. This list, along with proposed measures to bring the roads or bridges into compliance, shall be submitted to the Forest Service at least 30 days prior to the Annual Consultation Meeting required under License Condition 1, or as needed.

5. Licensee Road Memorandum of Understanding (Project-affected roads):

For applicable Project-affected roads (see Table 1-3) develop a Memorandum of Understanding (MOU) with the Forest Service and other affected parties to address shared road management responsibilities. The goal of the MOU shall be to define proportionate road share costs, address specific public safety needs, resource protection, and erosion control mitigations to be performed by the Licensee. Implement plan when agreement is reached between parties and upon Forest Service and Commission approval.

6. Road Use by Government

The United States shall have unrestricted use of any road over which the Licensee has control within the Project area for all purposes deemed necessary and desirable in connection with the protection, administration, management, and utilization of NFS lands or resources. When needed for the protection, administration, and management of NFS lands or resources the United States 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. The United States shall control such use so as not to unreasonably interfere with the safety or security uses, or cause the Licensee to bear a share of the costs disproportionate to the Licensee's use in comparison to the use of the road by others.

7. Road Use

The Licensee shall confine all vehicles being used for Project purposes, including but not limited to administrative and transportation vehicles and construction and inspection equipment, to roads or specifically designed access routes, as identified in the Road and Transportation Facility Management Plan. 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 Commission prior to road closures, except in an emergency, in which case notice will be provided as soon as practicable.

Table 1-3. Project and Project-Affected Roads

Road #	Name	Project Rd. or MOU	Start	End	Length	Other R/W	Current RMO
McCloud Reservoir Area Roads							
38N11	Hawkins Creek FA11 (Segment 1)	Project	Siskiyou MC1N01	Tunnel Spoil Pile	14.25	Hearst	4/3
38N81	Brown Trout	Project	38N11	Ramp	0.3	Hearst	4
38N53	Ah-Di-Na	See License Condition #30a	38N11	T37N, R2W, Sec 5, NE ¼, MDM	7.27	Hearst	3
38N04Y	Star City	Project	38N11	Bridge	5	Hearst	3
U38N11X	Dam Rd	Project	38N11	Base of McCloud Dam			N/A
U38N11Y	Ash Camp	MOU	38N11	Ash Camp	0.25		3
Iron Canyon Area Roads							
38N11	Hawkins Creek FA11 (Segment 2)	MOU	Shasta 7M01	North 37N78	6.6	SPI	3
37N78	Iron Canyon loop	Project	38N11	(Oak Mtn Rd) 37N34	8.54	SPI Co-op 3.36 mi	3
37N27Y (to be relocated)	Deadlun Campground	Project	37N78	Campground	0.34		3
37N66Y	Hawkins Landing	Project	38N11	Ramp	0.56		3

Table 1-3. Project and Project-Affected Roads (continued)

Road #	Name	Project Rd. or MOU	Start	End	Length	Other R/W	Current RMO
37N78A	MC-10 gage Rd	Project	37N78	NEW Sec. 28	0.28		2
37N34	Oak Mtn. 12kV line	Project	38N11	Pit 5 Bridge	7.71	SPI	3
37N93	Ridge Iron Canyon	Project	37N93A 37N93C	Oak Mtn Road	0.3		2
37N93A	Ridge	Project	37N93		0.6		2
37N33C	Willow	Project	37N93		0.5		2
Pit 6, Pit 7 and Afterbay Area Roads							
Pit 6 Powerhouse	Pit 6 Powerhouse	Project	Cove Road	Pit 6 Powerhouse			N/A
34N17	Fenders Ferry FA27	MOU	County Road 6L005	Hogback Turnoff	6.19	SPI Co-op	3
35N23	Pit 7 Road	Project	34N17	Pit 7 Dam & Powerhouse	1.79		3
35N66	Fenders Flat	Project	35N23	Afterbay Dam	0.57		3
35N46	Reynolds Basin (Fenders Ferry to Hogback)	MOU	34N17	35N93	11.93		3
35N93	Hog Back Mtn	Special Use Permit	35N46	Communication Site	5	SPI Co-op	2

Table 1-4. Roads with Currently Active High Erosion Potential Sites Requiring Repair

Site I.D. (T.M. 67)	Project Region	Road	Erosion Risk %	Description
McCloud Reservoir				
T7-A	MC Res.	38N81 (Segment 1)	79%	Rilling caused by concentrated runoff near parking lot area at McCloud Boat Ramp
T7-B	MC Res	38N81	93%	Gullying caused by concentrated runoff near parking lot area
MT-7A	MC Res	38N11	83%	Gullying caused by concentrated runoff
MT-7B	MC Res	38N11	85%	Shallow landslide caused by concentrated runoff
MT-7C	MC Res	38N11	79%	Gully caused by concentrated runoff
MT-4	MC Res	38N11	76%	Rilling caused by culvert design or condition
MT-3	MC Res	38N11	79%	Gully caused by culvert design or condition
MT-1	MC Res	38N11	85%	Surface erosion caused by concentrated runoff
MR-1B	MC Res	38N11	83%	Rock slide caused by road design or condition
MR-2	MC Res	38N11	90%	Rock fall caused by Project management
MR-3	MC Res	38N11	79%	Channel bank erosion caused by Project management
MR-7	MC Res	38N11	95%	Surface erosion caused by culvert design or condition
DRU-6	MC Res	38N04Y (Star City)	79%	Debris slide caused by road design or condition
Iron Canyon				
ICP-9	IC Res	37N78 (Loop Road)	85%	Gully caused by culvert design or condition
ICP-11	IC Res	37N78	89%	Debris flow torrent track caused by mass wasting
ICD-1	IC Res	37N78	85%	Gully caused by concentrated runoff
OM-1	IC Res	37N34	76%	Gully caused by concentrated runoff
MC-10A	IC Res	37N78A (Road to MC-10)	85%	Rilling caused by concentrated runoff
MC-10B	IC Res	37N78A	85%	Gully caused by concentrated runoff
ICD-3	IC Res	37N78A	95%	Shallow landslide caused by road design or condition
ICD-4	IC Res	37N78A	89%	Gully caused by concentrated runoff
Oak Mountain				
WCN-5	Oak Mtn	37N93	99%	Shallow landslide caused by road design or condition
WCN-1	Oak Mtn.	37N93	95%	Deep-seated landslide caused by road design or condition
WCN-4	Oak Mtn	37N93A (Road to 12kV)	97%	Shallow landslide caused by road design or condition
WCN-3	Oak Mtn.	37N93A	100%	Shallow landslide caused by road design or condition

Table 1-4. Roads with Currently Active High Erosion Potential Sites Requiring Repair (continued)

Site I.D. (T.M. 67)	Project Region	Road	Erosion Risk %	Description
Oak Mountain (continued)				
WCN-2	Oak Mtn.	37N93A	93%	Shallow landslide caused by road design or condition
WCS-3A	Oak Mtn.	37N93C (Road to siphon)	90%	Rilling caused by concentrated runoff
WCS-3B	Oak Mtn.	37N93C	85%	Rilling caused by concentrated runoff
WCS-3C	Oak Mtn.	37N93C	83%	Surface erosion caused by road design or condition
WCS-3D	Oak Mtn.	37N93C	97%	Gully caused by concentrated runoff
OM-6	Oak Mtn.	37N34 (Oak Mountain)	79%	Surface erosion caused by concentrated runoff
OM-10	Oak Mtn.	37N34	79%	Shallow landslide caused by road design or condition
OM-11	Oak Mtn.	37N34	83%	Gully caused by concentrated runoff
OM-12	Oak Mtn.	37N34	83%	Gully caused by concentrated runoff
OM-14	Oak Mtn.	37N34	97%	Gully caused by concentrated runoff
OMS3-2	Oak Mtn.	spur rd (Penstock)	100%	Shallow landslide caused by concentrated runoff
OMS3-4	Oak Mtn.	spur trail (Penstock)	85%	Shallow landslide caused by concentrated runoff
DRU-16	Oak Mtn.	37N34	93%	Gully caused by concentrated runoff
JBB-PH1	Oak Mtn.	37N34	93%	Channel bank erosion caused by concentrated runoff
Pit 6				
P6-1	Pit 6	Pit 6 Rd	76%	Gully caused by culvert design or condition
P6-8	Pit 6	Pit 6 Rd	95%	Gully caused by concentrated runoff
P6-16	Pit 6	Pit 6 Rd	90%	Surface erosion caused by concentrated runoff
P6-17	Pit 6	Pit 6 Rd	99%	Debris side slope caused by mass wasting
Pit 7				
P7-10	Pit 7	35N23 (Pit 7 Road)	76%	Gully caused by culvert design or condition

“Total index score is derived by summing points from the erosion potential, sediment delivery, and Project infrastructure components provides a relative measure of erosion severity. High index values represent erosion sites with a greater potential to cause future effects to Project infrastructure or water resources of concern by direct sediment delivery.” (McCloud-Pit Project, FERC No. 2106, Technical Memorandum; Erosion and Sediment Inventory (TM-67) Page 8.

Condition No. 30 - Recreation Development, Management and Monitoring

Within two years of license issuance, Licensee shall prepare a Recreation Development and Management Plan developed in consultation with the Forest Service, CDF&G, SWRCB, and other interested parties, and approved by the Forest Service, to address recreation resource needs associated with the Project. All new and reconstructed Project recreation facilities located on Licensee's lands will be designed to meet applicable Americans with Disability Act (ADA) and Architectural Barrier Act (ABA) Standards as currently written at the time of project design. New and reconstructed recreation facilities located on NFS lands will meet ADA/ABA Standards, Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) and Forest Service Trail Accessibility Guidelines (FSTAG), where applicable as currently written at the time of design. New and reconstructed recreation facilities on NFS lands will be approved by the Forest Service and meet all Forest Service laws, standards and policy, such as protecting sensitive resources (e.g. cultural, wildlife, etc.) and meet Forest Service recreation design guidelines. Where design or site analysis constraints preclude specific developments stipulated in this License Condition, the Forest Service will review and approve modifications that meet the intent of this Condition. All Project facilities will be designed to be consistent with the Recreation Opportunity Spectrum (ROS) class and Visual Quality Objective (VQO) where they are located. Upon Commission approval, Licensee shall implement the Plan. At a minimum, the Plan shall address the following components and additionally specify location, design, structures, and schedules for completion, as appropriate:

1. Project-Wide Measures

a. Operation and Maintenance:

Develop and implement an Operation and Maintenance (O&M) component (including fee collection) for all Project and Project-associated recreation facilities (i.e. all facilities identified in this License Condition). Operation and maintenance includes all annual, operational, and heavy maintenance, as well as any minor reconstruction or retrofits at existing facilities. These may be necessitated by exhaustion of usable life of facility, wear and tear, ecological/facility/social capacity needs, or others as determined through monitoring or compliance with laws, regulations, codes, and other legal direction (such as ADA/ABA compliance). Discussions of any needed actions shall be conducted at the annual consultation meeting following recognition of the need or following monitoring as addressed under the Recreation Survey and Monitoring component, below, as appropriate. Items to be addressed in this O&M component include: all existing Project recreation facilities, existing Forest Service-owned Project-affected recreation facilities, as identified under the heading of "Construction and Reconstruction" below, and new Project recreation facilities. This component shall include but is not limited to:

- Annual schedule and standard protocols for opening and closing recreation facilities, including primary season and shoulder seasons;
- Water testing protocols for potable water sources;
- List of routine maintenance items (e.g. campground road clearing, brush clearing, painting, debris removal, maintenance schedule, signing, etc.);
- Annual review and meeting;
- A percentage of fee retention by Forest Service if used on-site (e.g. interpretation, campfire programs, etc.);
- Maintenance of shaded fuel breaks around Project recreation facilities (to be addressed in the Fire and Fuels Management Plan).

b. Recreation Survey and Monitoring:

Develop and implement a Recreation Survey and Monitoring component with Report that is implemented on a six-year interval (concurrent with the Commission’s Recreation Form 80). A copy of the Report shall be provided to the Forest Service and 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 Section 4(e) conditions that require measures necessary to accomplish protection and utilization of National Forest resources identified as a result of the Report findings. The Survey and Monitoring component shall address the following:

- At facilities where fees or passes are issued or required, Licensee shall annually collect use data that includes use numbers by location, dates, occupancy, party size (if collected) and zip codes (if collected). Annual data will be included in the 6-year Report;
- Licensee shall conduct a Recreational Resource Survey once every 6 years (concurrent with the Commission’s Recreation Form 80) starting from license issuance. Survey methods shall be reviewed and approved by the Forest Service. The Recreation Survey shall include but not be limited to:
 - Occupancy of Project facilities over the entire recreation season, including (and breaking out) shoulder seasons;
 - Use and use patterns both on water surfaces and land;
 - Quality of recreational opportunities, including fishing success;
 - Kinds and sizes of vehicles (including boats);
 - Preferences of users, including day use vs. overnight;
 - Summary of any facility closures (campgrounds, roads, ramps, etc.).
- Licensee will conduct Recreation Monitoring once every six years (coinciding with the Commission’s recreation Form 80 schedule), which will include evaluation of resource impacts from developed and dispersed use;
- Licensee shall summarize the most current regional and statewide trends in recreation based on available surveys and reports;

- Licensee shall draft the Recreation Monitoring and Survey Report, that incorporates data from the Recreation Survey (see above), and addresses any changes in trends since previous reports (or initially from relicensing studies);
- Licensee shall, every six years (coinciding with the Commission’s recreation Form 80), consult with the Forest Service, appropriate agencies, and interested parties to review and adjust Project-wide recreation management objectives, if needed. Forest Service reserves the right, after consultation with Licensee, to extend the review of management objectives interval to every 8, 10 or 12 years depending on survey results. This review shall be based on findings in the periodic Recreation Monitoring and Survey Report, traffic counters, biological resource monitoring results, law enforcement input, Project Patrol reports, and other applicable study and monitoring results. The review shall address, at a minimum, the following factors:
 - Use, including volume, changes in use type, season, and duration of stay;
 - Capacity; including developed and dispersed sites, roads, trails, water bodies, and river reaches;
 - Condition of facilities, including roads, trails parking areas, directional/informational and interpretive signing;
 - Kinds, quality, quantity, and range of opportunities;
 - Health and safety;
 - User and resource conflicts;
 - Any mandated updated guidelines, such as ADA, etc.;
 - New or modified management actions (increased patrols, additional sanitation facilities, closure orders, etc.) as needed to address concerns identified in report;
 - Schedule to implement actions; and
 - All recreation facilities will be analyzed, redesigned and reconstructed, if necessary, utilizing the Recreation Monitoring and Survey Report information.

c. Project Patrol

Develop and implement a Project Patrol component for Project and Project-affected NFS land. Annually, the Licensee shall coordinate with the agencies and interested parties to review information from the prior season and plan any adjustments for the next high use season (April through November). This position may be either a Licensee employee or equivalent funding provided to an appropriate Federal, State, or local agency. This component shall outline duties of a seasonal (April – November) part time Project Patrol to implement, at a minimum, the following duties:

- Monitor and encourage compliance with fire safety regulations, closures, clearance, etc.;
- Monitor and encourage compliance with rules associated with camping, parking, and trail use;
- Install signs and adjust as seasonally needed;

- Disperse Project-related information to the public including appropriate OHV use, campfire safety, leave no trace, and other resource messages;
- Patrol dispersed public use areas within ¼ mile of all Project and Project-affected waterways (e.g. Hawkins Creek crossing, Lower McCloud River, etc.);
- Watch for and report looting/vandalism of cultural sites or other resource damage;
- Report illegal activities and cooperate with law enforcement agencies, as needed;
- Perform minor maintenance of Project recreation facilities and report larger maintenance needs to appropriate Licensee staff;
- Perform other duties that provide for the safety of the public and protection of Project-affected resources;
- Maintain a log of activities, key resource issues and public concerns to summarize in an annual report provided at least 30 days prior to the annual consultation meeting (License Condition No. 1).

d. Reservoir Water Surface Management

Develop and implement a Reservoir Water Surface Management component that addresses monitoring and management of recreation user safety, trespass on private lands by Project users, and County code compliance by Project users on each Reservoir surface (i.e. McCloud, Iron Canyon, Pit 6 & Pit 7). The component shall include, but may not be limited to the following:

- Surface Management: develop protocols for preventing/removing unapproved buoy courses, approved use of docks, and measures to prevent trespass on private lands;
- Speed Restriction Ordinance Request: In cooperation with the Forest Service, Licensee shall submit request to the Shasta County Boating Unit of the Sheriff's office for the establishment of a 5-mph restriction on McCloud Reservoir upstream from (and beginning at) the McCloud Bridge. Licensee will evaluate the need for a speed restriction on remaining reservoirs based on user conflicts or safety concerns on a six-year interval when monitoring other Project-affected recreation use;
- No Boating Buoy Line Request: Licensee shall, in cooperation with the CDF&G and private landowner, submit a request to the Shasta County Boating Unit of the Sheriff's office for establishment of a buoy line to be installed near Huckleberry Creek on McCloud Reservoir to prevent fishing boats from traveling upstream during the period from November 15 to the last Saturday in April each year to separate the year-round fishing access on the reservoir from the seasonally restricted stream fishing season on the stream above this point;
- Surface Debris Removal: Annual surface sweep of McCloud and Iron Canyon reservoirs and boat ramps to collect logs and other debris from the lake surface. Surface sweep shall be conducted a minimum of once prior to the start of the recreation season (April 27) and additionally during the season if late season storms create additional surface debris. Debris shall be removed and stockpiled. Large woody debris may be re-introduced to the Lower McCloud River as directed in the LWD Plan, smaller debris and trash shall be removed off of NFS lands;

- Every six years (coinciding with the Commission’s recreation Form 80) monitor boat use numbers, type, season, and activity type during the recreation season on the McCloud and Iron Canyon reservoir surfaces. Incorporate this information with monitoring from Recreation Monitoring and Survey Report and road traffic use from the Road and Transportation Facility Management Plan;
- Reassess any needed water surface management mitigations every six years (concurrent with the “Recreation Survey and Monitoring” component, above).

2. Construction and Reconstruction

Use Forest Service design standards (including applicable standards for providing access to users with all abilities, signage, etc) for facilities constructed on NFS lands. All new and reconstructed Project recreation facilities located on Licensee's lands will be designed to meet applicable Americans with Disability Act (ADA) and Architectural Barrier Act (ABA) Standards as currently written at the time of project design. New and reconstructed recreation facilities located on NFS lands will meet ADA/ABA Standards, Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) and Forest Service Trail Accessibility Guidelines (FSTAG), where applicable as currently written at the time of design. The following site capacities are general estimates only and will be refined during site design based on ROS class, laws, standards and policy for resource protection and recreation facility design. All Project and Project-related recreation facilities and infrastructure will be replaced in-kind or with an appropriate upgraded facility within 25 years of License issuance or the mid-point of the License term, whichever is greater. All replaced facilities will be constructed to the standards and regulations in place at the time of replacement.

McCloud Reservoir Facilities

- a. McCloud Reservoir Boat Ramp (Tarantula Gulch) – within three years of license issuance, Licensee shall, in consultation with the Forest Service:
 - Reconstruct the existing boat ramp to Cal Boating standards to provide for a 2-lane ramp with boarding dock and sidewalk. Ramp shall provide a minimum of 4-foot draft clearance below minimum pool;
 - Maintain in the current location, or relocate as necessary and maintain, a vault restroom to be open and serviceable when the ramp is operational;
 - Redesign the existing parking lot and day use area to maximize parking capacity (estimate 30 – 40 spaces). Develop a paved parking area and turnaround at the top of the ramp. Designate parking spaces for vehicles (both with and without trailers) using signs and/or asphalt markings;
 - Develop a day use site with up to 2 picnic tables and shade structure adjacent to the parking lot that overlooks the reservoir, and a short trail that connects the day use site to the shoreline for lake access;

- Develop a potable water source that can be accessed by recreationists at all times during the recreation season;
 - Provide security/safety lighting in the parking area that is visible from the courtesy dock;
 - Provide snow removal on the access road (from junction with 38N11) and parking area between April 1 and December 1, when access to the junction is available.
- b. Star City Campground – Within five years of license issuance, in order to provide overnight use on McCloud Reservoir, Licensee shall acquire rights, by any means necessary, but not including by condemnation pursuant to Section 21 of the Federal Power Act or any other law, for the purpose of overnight public recreational use, of a portion of the Star City Creek parcel located in the SE ¼ of Section 15, Township 38 North, Range 2 West, M.D.B.M. (included as a portion of APN’s 015-040-035, 015-190-002) and shall re-develop the existing dispersed use area as follows:
- Develop an overnight camping area with up to 10 campsites at Development Level 3. Each campsite shall include: site post with number, picnic table, animal resistant food locker, and campfire ring. Campground shall include a 2-vault accessible restroom facility, and potable water source for campground users that can be accessed at all times when campground is open to the public;
 - Develop a Day Use area near the shoreline with up to 5 sites, each with table and pedestal grill. The Day Use area shall also have animal resistant trash container with sufficient capacity to meet the needs of the visitors;
 - Develop a potable water source for Day Use area that can be accessed by recreationists at all times when the facility is open to the public. The water hydrants may be shared with the campground;
 - Develop water surface lake access with dock at the Day Use area where boaters may beach or moor vessels. Develop car-top boat access to the lake that is available to Campground and Day use visitors;
 - Develop a single-vault accessible restroom for the Day Use area and reservoir users;
 - Develop a surfaced parking area with striping that serves both the campground and day use area;
 - Designate swim/beach area to separate swimming and wading, from boat beaching and mooring;
 - Provide a Camp Host on site when campground is open to the public;
 - Licensee shall manage and maintain Star City campground to meet the Recreation Plan objectives of overnight use on McCloud Reservoir during the recreation season.
- c. New Day-Use Facilities - Within five years of license issuance, the Licensee shall construct new Day-Use areas at: Tarantula Gulch Boat Ramp (see Boat Ramp description in “a.” directly above), Tarantula Gulch inlet, Red Banks, and Star City Creek (see above). The Day use sites shall include paved parking for a minimum of 5 vehicles, up to 3 picnic tables with pedestal grills, vault toilet, animal resistant trash receptacles, and a pedestrian access trail to the high water line. Licensee shall ensure legal access from roadway to reservoir day use areas. Parking and vault toilet for Tarantula Gulch Boat ramp is included with Boat Ramp

capacity. Develop at one of these locations, or another designated recreation day use location around the reservoir, a fishing/swimming platform to accommodate a fluctuating water level.

- d. Reservoir Access Points – Within three years of license issuance, the Licensee shall construct reservoir access points at Battle Creek and on each side of the McCloud Dam. Access points shall include paved parking for 3 vehicles, and access trail to the shoreline. Picnic tables may be installed where space allows. Licensee shall ensure legal access from roadway to reservoir access areas.

Lower McCloud River

- a. McCloud Dam: Within five years of license issuance:
 - Construct and maintain a day use recreation site that includes access road (minimum Maintenance Level 3), paved parking for a minimum of 3 vehicles, vault toilet, animal resistant trash receptacle, signing, and trail from the base of McCloud Dam to a point past the in-stream flow valve release to the splash pool below the spillway. Trail shall be designed to accommodate both fishing and boating access. Access could be by road, if road is developed for other condition requirements.
- b. Upgrade, relocate where needed, and improve tread and drainage of existing user-created streamside river access trail along opposite side of river from Ash Camp Campground. Trail to begin at Ash Camp Bridge/PCT junction and travel downstream along the river's edge to Ah-Di-Na. Maintain to a standard approved by Forest Service.

Iron Canyon Reservoir

- a. General: Within three years of License issuance:
 - Allow use of at least one campground year-round when accessible (potable water not required during the winter months) with weekly servicing (as accessible) by Licensee;
 - Provide a minimum of 3 day-use parking areas around reservoir with paved parking for up to 3 vehicles each, and pedestrian-only access to shoreline;
 - Consistent with Shasta-Trinity Travel Management Plan and the Historic Properties Management Plan, evaluate road closures, trail closures and dispersed use closure around reservoir;
- b. Iron Canyon Dam Boat Ramp: Within five years of license issuance:
 - Construct a new single lane boat ramp to Cal Boating standards with boarding dock functional at 90% of operational lake levels (ramp design and placement should include option for 2-lanes if needed at mid-license facility review). Parking for a minimum of 15 vehicles shall be striped and include parking for 5 single vehicles and 10 vehicles with trailers. Parking area shall include single-vault toilet;

- Provide potable water, picnic tables, and trash receptacles, available during normal recreation season (April – November) and security lighting visible from the dock;
- Provide snow removal during shoulder seasons (March/April and December) at parking area when Oak Mountain access road and Iron Canyon boat ramp surface is passable;

c. Hawkins Landing Recreation Sites: Within three years of license issuance:

- Reconstruct Hawkins Campground to provide for a minimum of 11 campsites (10 plus host site) that meet Forest Service Recreation Level 3. Campground shall include entrance gate with signing, surfaced loop road, parking spurs, site posts, picnic tables, animal resistant food boxes, and fire rings. Campground will have vault restrooms, animal resistant trash receptacles, potable water available at all times when the campground is open to the public, camp host, and developed trail from the campground to the adjacent boat ramp and shoreline for pedestrian fishing access. Views of reservoir will be maximized by thinning and/or limbing trees and vegetation at campsites. Reconstruction to include a combination of single (5 PAOTs) and double sites (10 PAOT's);
- Reconstruct the Hawkins Landing Boat Ramp surface (length and width, but not grade) to meet Cal Boating standard for single lane. If possible under reservoir operations, ramp should be operable a minimum of 155 days during the recreation season (April 27 – November 15). Ramp shall include a surfaced parking lot above high water level for a minimum of 10 vehicles (minimum 5 with trailers). Parking lot shall be surfaced, striped, include a single-vault toilet, animal resistant trash receptacle, and informational sign board;

d. Deadlun Campground: Within five years of license issuance:

- Licensee shall re-locate the Deadlun campground to 1 or 2 Forest Service approved location(s) along the Iron Canyon shoreline. The new campground(s) will meet Forest Service Recreation Level 3 and have a mix of single (5 PAOT's) and group (10 or 15 PAOT's) campsites with no less than 200 PAOT's total. (More specific information should be available after the Forest Service/Licensee field review in 2010, and will be contained in the Final Section 4(e) document). Campground(s) shall have a host, entrance gate, surfaced loop road, parking spurs, site posts, picnic tables, animal resistant food lockers, and fire rings. Campground(s) will include two 2-vault restrooms, animal resistant trash receptacle, and potable water available at all times during the recreation season;
- Licensee will develop a trail from the campground(s) to the high water line of the reservoir shoreline for pedestrian-only access;

Pit 6 Reservoir

- Develop a shoreline trail if capacity or demand (based on six-year recreation use monitoring) indicates increased use of the reservoir for fishing or boating.

Pit 7 Reservoir

Within three years of license issuance Licensee shall:

- Construct one trailhead, with parking for a minimum of 3 vehicles, and develop a river access trail along one side of the reservoir for pedestrian fishing, and hand-launch boating access. Access point and trailheads should be located at the upper (Pit 6 dam access road) end of reservoir;
- Conduct feasibility assessment for providing a hand-launch boat put-in where Montgomery Creek enters the reservoir, with paved parking, vault restroom, tables, animal resistant trash receptacles and pedestrian access trail on public lands. If constructed, boating would be restricted from Project infrastructure for public safety reasons by installing buoy lines or other safety devices, at the upper and lower ends of the reservoir;
- If Montgomery Creek is not feasible, construct a second trailhead, with parking for a minimum of 3 vehicles, and develop a river access trail along one side of the reservoir for pedestrian fishing, and hand-launch boat access from the lower end of Pit 7 reservoir.

Pit 7 Afterbay (Fenders Flat)

Within three years of license issuance, Licensee shall:

- Re-construct boat launch and day-use site below the Pit 7 afterbay at Fenders Flat with single-vault toilet, animal resistant trash receptacles, picnic tables, pedestal grills (not campfire rings), and designated surfaced parking area for a minimum of 5 vehicles without trailers;
- Reconstruct the car-top boat launch with improved grooved concrete surfacing and minimum one-lane width. (Will not meet all of Cal Boating standards). Provide re-vegetation, in consultation with the Forest Service, and prevent vehicle access beyond the access road and parking area;
- If additional generation is developed at this location, construct surfaced parking area, single-vault toilet, trash receptacles, and river access trail on the opposite river bank from Fenders Flat day use area.

Condition No. 30a – Specific Recreation and Road Agreement

Until and unless the Forest Service and Licensee reach mutual, signed agreement outside of relicensing, under which Licensee will assume responsibilities described below for the three listed facilities (one road and two campgrounds), they will be incorporated into the road (#29) and recreation (#30) conditions in the Final 4(e) license filing.

1. Ah-Di-Na Road (FS road #38N53):

Currently, there is concurrence that road reconstruction, maintenance, and operation should be shared between the Forest Service, Licensee, and other affected parties. The Licensee has indicated they would prefer this agreement be outside of the license. This is acceptable in concept with the Forest Service as long as agreement on the terms can be reached. Should agreement not be reached, it will be included within the MOU discussed as a license term in Condition #29, Part 5, above.

2. Ash Camp:

The concept of the Licensee providing full reconstruction, operation and maintenance of this facility outside of the license is acceptable in concept with the Forest Service as long as agreement on the terms can be reached. Should agreement not be reached, this mitigation will be included in the Final 4(e) license filing as a component of, and with specificity similar to, other mitigations in Recreation Condition #30 above.

3. Ah-Di-Na Campground:

The concept of the Licensee providing full reconstruction, operation and maintenance of this facility outside of the license is acceptable in concept with the Forest Service as long as agreement on the terms can be reached. Should agreement not be reached, this mitigation will be included in the Final 4(e) license filing as a component of, and with specificity similar to, other mitigations in Recreation Condition #30 above.

Condition No. 31 – Informational Sign Plan

Develop and implement a Project Sign Plan which includes road and trail safety, directional and traffic signs and an Interpretive and Educational component. Sign locations will be identified as well as design elements such as size, layout, content and materials. Signage and locations are to be collaboratively developed.

Interpretive and Education Component:

Develop and implement an Interpretive and Education component, specific to Project-affected resources, to include, at a minimum, the following:

- Themes, design, audience, delivery methods, colors, locations, and schedule for implementation;
- Specific projects include:
 - Website with public information on:
 - Where to get information about recreation facilities (including size, season, fees, driving directions);
 - current and scheduled river flows (hourly average) measured at MC-1 or MC-7, and turbidity;
 - Where to get more information about fishing, boating, trails, trailheads, access points, put ins & take outs, maps;
 - Seasonal lake levels, fish stocking;
 - Scheduled repairs, outages, valve tests, or road work that would change flows or reservoir levels, close access, or close facilities (i.e. boat ramps);
 - Other information as needed to assist the public in finding and using the recreation opportunities.
 - Informational kiosks at all developed recreation facilities, including: McCloud Boat Ramp and Day Use, Star City Campground, Iron Canyon Dam Boat Ramp, Hawkins Creek Campground and Boat ramp, relocated Deadlun Campground(s), Pit 7 Afterbay, or other locations, as agreed. Informational kiosks will include at a minimum:
 - Locations of developed recreation sites;
 - Maps of the Project area;
 - Fee and regulation information, if appropriate;
 - Seasonal and safety information.

Condition No. 32 - Visual Quality Management

Within one year of license issuance, Licensee shall develop, for Forest Service approval and filing with the Commission, procedures and/or a timeline, to assure implementation of the following specific mitigation measures to provide for visual quality of Project and Project-affected NFS lands:

1. General:

- Identify the existing visual condition areas within ¼ to ½ mile from project lakes, rivers, developed recreation sites, Ah-Di-Na Road (38N53), the Pacific Crest Trail and any other socially sensitive viewpoints;

- Analyze and identify mitigations for existing facilities including buildings, fences, signs and gates, debris piles, miscellaneous related debris, transportation related features and utility lines within the above sensitive visual areas;
- Consult with Forest Service (within view of NFS lands-see above) for repairs/improvements that will blend with the environment;
- All proposed facilities will be approved by the Forest Service for compliance with scenery direction.

2. Mitigations:

- Paint or reconstruct facilities with natural looking materials and colors to help the facilities to visually blend with the surrounding natural environment;
- Vegetate, re-vegetate, or screen facilities, where appropriate;
- Re-contour spoil piles to blend with natural topography;
- Complete facility deferred maintenance, such as replacing window panes, weed removal, etc.;
- Transportation mitigations may include using colored gunnite, ‘black’ MSE wire walls, simulated rock, ‘corten’ traffic barriers, using rip rap that matches existing natural rock outcroppings or ‘staining’ rock to look aged, and colored, or stamped concrete;
- Where Project facilities cannot be modified to meet VQO’s, consider providing interpretive information and incorporate into the I&E Plan ;
- Maintain reservoir capacities at agreed upon elevation during peak recreation season;
- Assess Project and Project-affected NFS lands to develop ways to blend Project modifications with the natural surroundings; e.g. colored gunnite, plant screening, vegetation, natural landscaping, use natural materials (rock, wood, etc.) to achieve objectives;
- Evaluate Project-associated signs for visual appeal.

3. Project disposal piles (e.g. material from trash racks, reservoir build-up, etc.):

- Remove, burn, chip, or dispose of debris piles on NFS lands in a timely manner;
- Remove this material, as a minimum annually, prior to recreation season.

Condition No. 33 - Fire and Fuels Management

Within one year of license issuance, the Licensee shall file with the Commission a Fire and Fuels Plan that is approved by the Forest Service, and developed in consultation with appropriate State and local fire agencies. The plan shall set forth in detail the Licensee’s responsibility for the prevention, reporting, and emergency response to fires in the vicinity of the Project resulting from Project operations. At a minimum, the plan shall address the following categories.

Fuels Treatment

- Consistent with Visual Quality Objectives for recreation sites, reduce fuels in and around developed and dispersed recreation sites identified in the Recreation Management Plan. Treatment may include shaded fuel breaks, limbing, brush trimming, and selective clearing around the perimeter of the site. Select vegetation treatments within recreation sites to maintain screening between sites where possible. Size fuel treatment according to the size and capacity of the facility. The Licensee shall implement and maintain fuel treatments;
- Maintain vegetation clearing around all Project infrastructure (dams, gages, valve houses, etc.) to comply with CalFire requirements;
- Fuel treatment disposal methods may include chipping, off-site disposal, or lopping and scattering (only with Forest Service approval, in limited amounts and locations). These fuels treatment methods are applicable to the Licensee's annual, routine vegetation management within the Project area. Larger fuel treatment projects that include merchantable Forest Service timber shall be handled separately under Timber Sale Contract with specific provisions for fire and fuels;
- During annual coordination meetings with the Forest Service, provide the proposed annual vegetation treatment schedule (with a map) for all areas where fuel treatment is planned (including Project powerlines). Include known Limited Operating Periods or survey data for any areas with known sensitive resources;
- Standard protocols for Licensee compliance with the Forest Service Project Activity Level (PAL) during Project construction, reconstruction or maintenance.

Prevention and Response

- Access and Safety:
 - Identify Project sites potentially available for equipment staging, helispots, water drafting, Incident Command, safe zones, or other fire suppression strategies;
 - Include status of access roads, community road escape routes, helispots to allow aerial firefighting assistance, and water drafting sites;
 - Address fire danger and public safety associated with Project induced recreation, including fire danger associated with dispersed camping, existing and proposed developed recreation sites, trails, and vehicle access.
- Emergency Response Preparedness:
 - Include emergency contact list (updated annually) for Licensee Project operations, including operations personnel for power and dam operation, road maintenance contacts, transmission and distribution line staff, timber operations, and public affairs/website management.

- Reporting and Response:
 - Licensee shall report any Project related fires on National Forest System lands to Forest Service dispatch immediately but no later than 24 hours. Report shall include location, approximate size, fire activity, and nearest vehicle access routes;
 - Licensee shall, where possible, make equipment (including communications) and personnel available on-site during initial emergency response until relieved by State or Federal resources and shall take action as appropriate to suppress fires within or adjacent to Project, when possible.

Investigation of Project Related Fires

The Licensee agrees to fully cooperate with the Forest Service on all fire investigations. The Licensee shall produce upon request all materials and witnesses not subject to the attorney-client or attorney work product privileges, over which the Licensee has control, related to the fire and its investigation including:

- All investigation reports;
- All witness statements;
- All photographs;
- All drawings;
- All analysis of cause and origin;
- All other similar materials and documents regardless of how collected or maintained.

The Licensee shall preserve all physical evidence, and give custody to the Forest Service of all physical evidence requested. The Forest Service shall provide the Licensee with reasonable access to the physical evidence and documents the Licensee requires in order to defend any and all claims, which may arise from a fire resulting from Project operations, to the extent such access is not precluded by ongoing criminal or civil litigation.

Condition No. 34 - Heritage Resources Management and Monitoring

Within one year of license issuance, Licensee shall file with the Commission a Historic Properties Management Plan (HPMP) that is approved by the Forest Service. The HPMP is tiered to a Programmatic Agreement, to which the Forest Service will be a signatory, as defined by 36 CFR 800, and implements regulations of the National Historic Preservation Act. The Licensee shall consult with the State Historic Preservation Officer, applicable Native American Tribes, Forest Service, and other applicable agencies during the preparation of the Plan. Collaborative meetings for the development of the Final HPMP with the Licensee, Forest Service and potentially affected Tribes shall be facilitated.

The final HPMP shall include, but is not limited to, a complete integration of the CR-S1 and CR-S2 study results (including the currently incomplete CR-S2 ethnographic Winnemem Wintu study or equivalent data), detailed site monitoring and schedule, National Register determinations of eligibility for sites periodically inundated by reservoir fluctuations in Iron Canyon Reservoir, and expected and potential effects of current or proposed Project

operation effects on historic properties including specific detailed mitigations for those effects. Additionally, the Final HPMP is to include a study/evaluation of whether there is compelling evidence for a Historic archaeological and ethnographic District on the Lower McCloud River within the project expanded APE.

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 NFS lands or on Licensee's adjoining fee title property when heritage properties extend onto NFS lands, the Licensee shall immediately cease work in the area so affected. The Licensee shall then notify the Forest Service and shall not resume work on ground-disturbing activity until it receives written approval from the Forest Service. If it deems it necessary, the Forest Service may require the Licensee to perform recovery, excavation, and preservation of the site and its artifacts at the Licensee's expense through provisions of an Archaeological Resources Protection Act permit issued by the Forest Service. The Licensee shall implement the Plan upon approval by the Commission.

ENCLOSURE 2:
FOREST SERVICE RATIONALE
FOR
PRELIMINARY LICENSE TERMS AND CONDITIONS

General Comments:

This enclosure provides a detailed explanation of the Forest Service's reasoning for the preliminary Section 4(e) license terms and conditions (Enclosure 1), which are necessary for the adequate protection and utilization of the affected NFS lands. This rationale supplements the Licensee's Application For New License (July 2009) for consideration in the Federal Energy Regulatory Commission (FERC) staff's NEPA analysis.

Many of the preliminary conditions are consistent with those identified in the Final License Application (FLA or PG&E, 2009), and reflect detailed collaborative meetings between the Licensee and Relicensing Participants to develop new conditions that are protective of Forest Service resources.

While the Forest Service provides detailed supporting rationale below, general comments on the FLA are as follows:

The Executive Summary (ES, p. 2) notes that four study plans remain incomplete including CR-S2, Traditional Cultural Properties, for each of the represented tribes. While the Forest Service agrees that this study is incomplete, it should be noted that many of the sites identified in study CR-S1, Archeological and Historic-Era Properties, were given preliminary integrity ratings pending completion of CR-S2 which could show that current traditional cultural use will change these integrity ratings. For this reason, the Forest Service does not agree that study CR-S1 is complete, until results from study CR-S2 can be compared and incorporated into the final results.

The Executive Summary (ES, p. 5) also identifies several locations where the Licensee anticipates additions to the Project Boundary. In addition to those listed, the Forest Service believes that additions may be necessary in the additional locations:

- Area at Star City Creek where recreation facilities will be expanded and improved;
- Forest Service road 38N11 Segment 1, and the area between the road and the McCloud Reservoir water surface to include all new Project recreation sites and the parking areas and access roads that serve them;
- Forest Service road 37N78 and the area between the access road and any recreation sites along the Iron Canyon reservoir shoreline developed for the Project;

- Tunnel Spoil Pile at Hawkins Creek Crossing to accommodate the proposed Large Woody Debris and Gravel and Sediment stockpile sites proposed in the FLA and Preliminary Section 4(e) conditions.

Exhibit A, Project Description, includes a Project Description of Road Operations and Maintenance for Project Infrastructure. It does not appear that all current license maintenance responsibilities are included (e.g. road to MC-10 gage, road to McCloud Dam). These are current responsibilities that should be reflected, and will be carried into the new license.

The Licensee has proposed draft Resource Management Plans in Volume 1 of the FLA that propose monitoring and protection measures for Forest Service resources. The Forest Service concurs with many of these proposals with the following general comments:

Final License Application, Volume VI

Water Quality Monitoring Plan

The Forest Service has expanded water quality monitoring to all of the Project reservoirs (including Pit 6 and Pit 7) to monitor for possible Project effects over the term of the license.

Annual temperature monitoring is increased to a ten-year period to ensure that measurements are taken during all water-year types where temperatures may be affected by new Project flows and operations.

Turbidity concerns in the Lower McCloud River were raised throughout the study plan period both by the agencies and concerned anglers. The FLA notes that most of these events in the Lower McCloud are not Project induced, but do affect fishing quality along the Lower River. To address these concerns, the Forest Service has added a measurement location at MC-7 (just below the dam), and required that this information be posted on-line, real-time with flow information for the license term, to provide more useful information about turbidity events to the public.

Bacteriological testing requirements have been modified to also include dissolved oxygen testing in the Project reservoirs where impacts to aquatic biota are a concern. Best Management Practices (BMP's) should also be followed wherever impacts to Project waters is a concern.

Erosion and Sediment Monitoring and Control Plan

In addition to provisions for existing Project erosion sites, the Forest Service has added a requirement for site specific erosion control plans associated with any new construction or ground disturbing work as a result of the new license. These will include the appropriate BMP's for the work proposed, with follow-up monitoring and measures to control erosion.

In addition to the Erosion and Sediment Plan, the Forest Service has included a Gravel and Sediment Management Plan to reintroduce a portion of the historic gravel and sediment component that is currently blocked by McCloud Dam in order to meet the Aquatic Conservation Strategy objectives.

Wildlife Management Plan

The Forest Service has proposed some changes to the periodicity and term for wildlife surveys, and aquatic surveys have been included for fish, benthic macroinvertebrates (BMI's), and aquatic mollusks. Fish passage concerns are addressed in the Road and Aquatic Biological Management Plan.

Road and Transportation Facility Management Plan

The Forest Service has completed and signed the Road Management Objectives (RMO's) for the Project and Project-affected roads within the McCloud-Pit Project. These objectives will govern the road maintenance standards for those roads within the new license. Road Management Objectives have been designed to match the expected use of each road system (e.g. public recreation, Licensee facility maintenance, etc.).

Recreation Development and Management Plan

The Forest Service has included Visual Quality mitigations to ensure that project facilities meet the appropriate Visual Quality Objectives (VQO's) identified for each area of the Project.

As the FLA notes, both McCloud Reservoir and Iron Canyon Reservoir experience dispersed camping use around the shoreline. A decision to issue a Forest Order closing these areas to dispersed camping will be made pending the development of improved overnight camping facilities around each reservoir that can accommodate Project-induced demand for this type of use.

Additional car-top boat launch opportunities have been designated around McCloud and Pit 7 Reservoirs.

For the Lower McCloud River, the Forest Service provides substantial evidence of a Project nexus to the Lower River by way of several documents written at the time the Project was in development, and which point clearly to the need for additional recreation support facilities to accommodate the increased use along the Lower River corridor induced by Project changes to instream flows, etc.. As a result, the Forest Service has included recreation facilities, and the road system that serves it, to the license conditions as a part of the Project recreation need. While most of these facilities are oriented towards fishing use, they also include camping, hiking and boating. These additional sites include Ash Camp, Ah-Di-Na, trails, roads, and the dispersed areas along the Lower McCloud River on NFS lands. When Cultural studies are complete, additional sites or specific developments may be appropriate.

The Forest Service disagrees with the Licensee conclusion that Deadlun Campground on Iron Canyon Reservoir should remain at the existing location. Study evidence points to the need to relocate this facility to one or two sites that are closer to the water at all reservoir elevations, and the Forest Service will work with the Licensee to find alternative and improved locations prior to the Final 4(e) conditions.

The Forest Service proposes the addition of a pedestrian trail and car-top boat access from the Pit 7 Dam along the Pit 7 Reservoir in the event that the proposed Montgomery Creek site is not feasible.

Fire Response Plan

It is not clear that the Equipment and Preparedness portions of the Fire Plan have been useful in past Licenses. For fire emergencies, the Forest Service uses the Incident Command System (ICS) and federal contracting regulations to provide personnel and equipment to the fireline. A recent example is the 2009 Chalk Fire on the Shasta-Trinity National Forest. While the fire occurred within portions of the newly relicensed Pit 3, 4, 5 Project, the plan did not prove useful or effective during the initial emergency response. Thus, the Forest Service Fire and Fuels Management Plan condition does not include some of the previously standard language regarding emergency response preparedness (i.e. Part 2.3 in Licensee's Fire Response Plan Element). Reporting, investigation and documentation requirements were helpful and should remain in the license.

Fisheries and Aquatics

The most significant variation between the Final License Application and the preliminary 4(e) conditions is the absence in the FLA of any proposed monitoring of aquatic resources in the Project Reservoirs, or the Lower McCloud River as a result of the new license conditions. Roughly 1/3 of all the Study Plans, and a substantial amount of Project time and money, were devoted to measuring flow effects on the existing fishery, BMI, aquatic biota, and riparian habitat within these water bodies. Studies conducted included the Unimpaired Hydrology Model, Habitat Criteria Mapping (HCM), Individual Base Modeling (IBM), BMI and crayfish surveys, snorkel surveys, and the 1-D modeling effort,

in addition to riparian habitat and species surveys. Most of the public comments, and nearly all of the public controversy, have been devoted to concerns about flow effects on the Lower McCloud River fishery and fishing conditions.

As a result, the Forest Service has proposed a license condition to monitor, periodically survey, and report on impacts to aquatic species and riparian habitat over the term of the new license. This will provide data on any actual changes to these conditions as a result of the license changes. It will also provide factual data for any adaptive management changes needed during the license term, and provide new baseline in order to address public concerns regarding potential instream flow affects on the aquatic biota.

Historic Properties Management Plan

As discussed in more detail under the rationale for Forest Service Condition No. 33 below, the Forest Service still considers the Historic Properties Management Plan a draft. Until both CR-S1, CR-S2 and consultation is complete, the HPMP cannot be completed. The Forest Service, Tribes, and other interested parties will continue to collaborate on options for interpretation, avoidance, and the development of specific mitigations in support of a Final HPMP.

Standard Conditions 1-18

The preliminary Section 4(e) standard conditions include requirements that serve to address the statutory, resource protection, and administrative responsibilities of the Shasta-Trinity National Forest. While broad in nature, they provide the framework for the Project-specific conditions.

License condition No. 1 provides for consultation between the applicant and the Forest Service. During Annual Consultation Meetings, operational and planning information (e.g. planned valve testing, maintenance activities, monitoring, construction, vegetation treatments) can be discussed. The Forest uses this information to minimize user conflicts, particularly for recreation, and to schedule Forest personnel time to administer the ongoing Project.

Most of the standard conditions (No. 2-5, 12-14, 17) address the Forest Service's concerns for operation and maintenance of the Licensee's improvements as they may affect NFS lands. These address approval of changes, maintenance of improvements, review of existing valid claims and rights to the land occupied by the Project, compliance with Federal, State, county and municipal laws and regulations, access, crossings, signs, and landline surveys. The Forest Service is the federal agency responsible for assuring that management of these Project-affected NFS lands is in compliance with the Shasta-Trinity National Forests Land and Resource Management Plan (LRMP), as well as the numerous laws, regulations and agency policies. Including these standard conditions insures that Project operations are consistent with these mandates.

The Surrender of License condition (No. 6) would require the Licensee to restore NFS lands in the event that the license is ever surrendered. This condition minimizes the risk of the Project improvements being abandoned on NFS lands.

While unlikely, there is a possibility that Project features (transmission lines, dams, powerhouses, penstocks, and other appurtenant facilities) could be responsible for damage, injury, death or fires. Since these features are the property of the Licensee and not the Forest Service, license conditions that require the Licensee to indemnify the Forest Service and protect against damage, injury, death, risks and hazards associated with the use and/or occupation of NFS lands authorized by the Project license are appropriate. Project facilities or activities may pose a threat of fires and/or other destruction of habitat with resultant losses of resource values. Therefore, it is prudent that the Licensee is required to take measures to minimize this fire risk to federal land and human life. These standard conditions (i.e. No. 7-10 and Project-specific Condition No. 33 (Fire and Fuels Management Plan) provide an incentive to the Licensee to seek out and eliminate, or minimize risks associated with their structures and activities and thus protect the public interests.

The remaining standard license conditions (No. 11, 15-16, 18) provide protection for forest resources on NFS land by requiring consideration and limits to pesticide application, modifications if other agencies biological or water requirements change, protection of Special Status Species, and provisions for unanticipated ground disturbing activities. These conditions assist the Forest Service in managing the Federal lands occupied by the Project.

Project Specific Conditions 19-34

Project-specific license condition rationale (#19-34) consists of two parts:

- a. Guidance by resource area from Forest Service comprehensive land use planning and other documents;
- b. Specific Section 4(e) rationale by license condition (or grouping of similar conditions) applicable to this Project.

Hydrology/Streamflow Management, Water Quality, Erosion, LWD, Dredging, Gravel, and Aquatic Biology
Conditions No. 19, 20, 21, 22, 23, 24, and 27

Implementing the flow management and water resource conditions would achieve standards, goals, objectives, and direction for the Shasta-Trinity National Forest as provided for in the Land and Resource Management Plan (LRMP), which incorporates the Standards and Guidelines (including the Aquatic Conservation Strategy) from the Record of Decision (ROD) for the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (FEIS).

a. Guidance:
Shasta-Trinity Land and Resource Management Plan
Forest Goals

- Provide for continued use and new development of hydroelectric facilities (4-4.18).
- Provide for the protection, maintenance, and improvement of wild trout and salmon habitat (4-4.14).
- Maintain or improve riparian habitat (4-5.25).

Standards and Guidelines:

- Maintain riparian area values, particularly when locating and constructing new roads and trails (4-25.17b).
- Identify and treat riparian areas that are in a degraded condition (4-25.17c).

Management Prescriptions

Riparian Reserves: For fish-bearing Streams, Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest (4-53.1).

Aquatic Conservation Strategy Objectives:

- 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 (4-53.1).
- 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 (4-53.2)
- Maintain and restore the physical integrity of the aquatic system, including shorelines, banks and bottom configurations (4-53.3).
- Maintain and restore water quality necessary to support healthy riparian, aquatic, and wet-land 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 (4-53.4).
- 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 (4-53.5).
- 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 (4-53.6).
- Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands (4-53.7).
- 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 (4-53.8).
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrates, and vertebrate riparian dependent species (4-53.9).

Lands

- For hydroelectric and other surface water development proposals, give priority emphasis to instream flows and habitat conditions that maintain or restore resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. 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 (4-57.7b).

McCloud River/Pit Management Area Supplemental Management Direction:

- Continue to develop trail access to and along Squaw Valley Creek and the McCloud River (4-123.8).
- Evaluate whitewater boating opportunities (4-123.9).
- In cooperation with private landowners, Licensee and the DFG manage the Upper and Lower McCloud River and Squaw Valley Creek under a CRMP (4-123.11).
- Maintain or improve selected habitats for coldwater and warmwater resident fisheries (4-127.3).
- Manage the Pit River for dispersed, water-oriented recreation opportunities (4-127.5).

Water Quality Management for Forest System Lands in California (USDA Forest Service, Pacific Southwest Region, 2000) Best Management Practices (BMP's):

- Stabilization of Road Slope Surfaces and Spoil Disposal Areas (#2-4)
- Dispersion of Subsurface Drainage From Cut and Fill Slopes (#2-6)
- Control of Road Drainage (#2-7)
- Control of Sidecast Material During Construction and Maintenance (#2-11)
- Bridge and Culvert Installation (#2-17)
- Regulation of Streamside Gravel Borrow Areas (#2-18)
- Disposal of Right-of-Way and Roadside Debris (#2-19)
- Specifying Riprap Composition (#2-20)
- Maintenance of Roads (#2-22)
- Snow Removal Controls to Avoid Resource Damage (#2-25)
- Restoration of Borrow Pits and Quarries (#2-27)
- Surface Erosion Control at Facility Sites (#2-28)
- Water Quality Monitoring of Off Highway Vehicle (OHV) Use (#4-7)
- Watershed Restoration (#7-1)
- Protection of Wetlands (#7-3)
- Control of Activities Under Special Use Permit (#7-5)
- Water Quality Monitoring (#7-6)

b. Rationale to support license condition(s):

Minimum Instream Flow Analysis – Lower McCloud River

The preliminary flow prescription was developed to meet the aquatic and terrestrial ecosystem Goals and Objectives of the Forest Service’s Shasta-Trinity Land and Resource Management Plan. The Forest Service flow prescription integrates the findings of relicensing studies, collaborative input, compliance with applicable federal law, and staff recommendations while attempting to meet Forest Service objectives in balancing power production, ecosystem values, and the interests of Relicensing Participants in the development of the Lower McCloud River Section 4(e) Flow Proposal.

The Forest Service Section 4(e) Proposal can be divided into two predominant components: a stable summer/winter base flow of 200 cfs, and a variable base flow period that adjusts to rainfall and snowmelt runoff in the winter/spring to more closely mimic natural hydrologic conditions. The proposal also includes a ramping protocol to down-ramp spill events. The Forest Service flow schedule was predicated on the Shasta-Trinity Land and Resource Management Plan aquatic and terrestrial ecosystem objectives. Besides broad terrestrial and aquatic ecosystem goals to maintain healthy ecosystems, specific Riparian Reserve, Aquatic Conservation Strategy and McCloud River/Pit Management Area Supplemental Management Directions (described above) were also used to determine the Forest Service’s preliminary flow prescription.

Specific objectives used to craft the flow proposal include:

Continuity of flow from McCloud Dam to Shasta Reservoir: Currently the compliance point for the instream flow requirement for the Lower McCloud River is 3.6 miles downstream of McCloud dam at USGS gage 11367800 at Ah-Di-Na Campground commonly referred to as MC-1 by Licensee. This point is downstream of the confluence of the McCloud River with Hawkins Creek, Squirrel Creek, and Fitzhugh Creek. Hence flow from these tributaries is currently counted towards meeting the instream flow requirement. This allows Licensee to release flows as low as 40 to 50 cfs from the dam in some time periods since the accretion from Hawkins Creek alone can exceed 150 cfs. As a result, the 1.2 mile section above Hawkins Creek experiences a wider fluctuation of flows than the reaches below the gage. This also diminishes the “natural” variability of flow in the Lower McCloud by utilizing the variable flow of Hawkins Creek (and other tributaries) to meet the instream flow release requirement from McCloud Dam. The Forest Service proposal requires instream flow to be measured as the release from McCloud Dam. This will ensure more natural flow continuity for the entire reach below McCloud Dam and also allow the flows contributed by Hawkins Creek to contribute to the variability in flow rather than make up the difference in base flow.

Improve the duration, magnitude, and spatial distribution of flows: A review of the current flow patterns below McCloud Dam versus the inflow to McCloud Dam shows that not only has the magnitude of base flow been diminished, as would be expected, but the

magnitude and duration of high flow events has been modified. Specifically the duration of flood events has been significantly shortened, and the declining limb of the hydrograph for high flow events has been steepened. As discussed below in the section on Late Winter/Spring Snowmelt Period, these flows are a key component for most aquatic related biological processes. The flow regime generated by the “Flow Rule” was developed to address these concerns.

Flow Rule background:

The primary purpose of the flow rule is to introduce variability to the instream releases in the Lower McCloud River by keying late winter and spring releases to inflow to McCloud Reservoir. In many relicensing efforts, flow variability is managed via a concept of “Water Year Types” based on precipitation/runoff patterns. The McCloud River is strongly groundwater dominated (has a steady baseflow regardless of long term precipitation patterns) but also exhibits a snowmelt runoff characteristic.

In California, the Department of Water Resources (DWR) measures and predicts runoff on a monthly basis through the winter and spring, and has developed a “Water Year Indices” measure for the Sacramento Valley watershed which includes the McCloud River. However, closer inspection of the relationship between the “Indices” and actual McCloud runoff shows that in many years there is no sound correlation during the winter/spring runoff period. For example, in some years, intense precipitation in December and January leads to a classification of a “Wet” water year type, but the actual runoff in February through May is very low. Therefore, a flow rule based solely on the indices would require higher instream flows in the late winter and spring months than would be required if the flow was based on the actual runoff.

To circumvent this problem, the Forest Service developed a flow rule based on “real time” information to more accurately approximate actual runoff patterns. DWR publishes a monthly “Bulletin 120” from February through June each year that includes current snowpack, water content, and precipitation information and an April through July forecast of runoff. This bulletin includes a specific listing for the McCloud River at Lake Shasta. The Forest Service flow rule uses this monthly information to modify flow semi-monthly from February through April. This allows flows to more closely match actual runoff.

Table A-1 (Appendix 1) provides the historic data from Bulletin 120, and Table A-2 (Appendix 1) shows the resulting base flows from this data and application of the rule. Table A-2 provides the median monthly flows for the Forest Service flow proposal over the time frame of Water Years 1974 through 2009. The data for 1974-2006 was developed through the use of a spreadsheet model modifying data generated from the ResSim Model developed by Licensee (*Develop Project Operations Model, TM-47*). For comparison purposes, Table 2-1, below, also includes the monthly median flow for Licensee’s flow proposal from the FLA as produced by the ResSim Model, the monthly median flow from the USGS gage data from MC-1 for the period 1967 through 2006 (post dam), and the monthly median flow from the USGS gage data at the Upper McCloud (MC-3 above McCloud Reservoir) for the period of record, 1932 through 2006.

The Forest Service flow proposal generates higher median monthly flows in March and April and slightly higher flows in May and June than either Licensee’s FLA proposal or the existing releases. These higher base flows in concert with the slower down ramping of spill events act to buffer high flow events and improve the duration and spatial distribution of flow events.

A review of the Graphs (Appendix 1, Pages 4-36) for water years 1974 through 2006 generated by the Forest Service flow rule, shows that the driest years and very high spill events are nearly identical in results to Licensee’s proposed constant flow regime. It is the more moderate flow events when the effects of the Forest Service flow rule are apparent. The chart for WYs 1978 and 1998 shows the Forest Service flow provides both a higher base flow before and after spill events, and a flatter declining flow limb after the event as compared to either the existing flow regime or the FLA proposal. Similar results can be seen in the charts for Water Year (WYs) 1982, 1986, 1989, 1993, 1995, 1996, 1999 and 2000. The greatest difference in flow is seen in the charts for WYs 1980 and 1999 when moderate spills were encountered. Notably in 1999, the Forest Service flow rule provides a much more stable regime with less peaking than the other two (i.e. Licensee’s current and FLA proposed) regimes.

Further discussion of this data is provided in the Hydrologic Analysis section below.

Table 2-1. Median Monthly Flows as measured at MC-1 (Ah-Di-Na, 3.6 miles below McCloud Dam) for Forest Service and FLA proposals, compared to actual flows at MC-1 and MC-3 (Above McCloud Reservoir)

Month	FS Proposal	FLA Proposal	Actual MC-1 Gage	Actual MC-3 Gage
October	215	165	214	758
November	220	170	219	767
December	238	248	196	785
January	286	296	178	819
February	334	312	199	850
March	501	352	214	963
April	427	281	190	1065
May	265	191	209	1080
June	229	179	210	909
July	218	168	207	836
August	214	164	205	803
September	214	164	215	782

Fishery Considerations for Summer/fall/winter Base Flow:

The Forest Service summer/winter base flow schedule (July 1 to February 14) has been set at a release of 200 cfs from the McCloud Dam. Three main flow studies (Habitat Criteria Mapping (TM-56), Individual Base Modeling (TM-54), PHABSIM (TM-74) as well as the macroinvertebrate, fisheries, and riparian vegetation studies were considered to determine appropriate flows for aquatic and terrestrial biota.

Examination of the results of the *Habitat Criteria Mapping on Lower McCloud River (TM-56)* indicates that total available juvenile trout habitat for the Lower McCloud River *upstream* of the confluence with Squaw Valley Creek (Upper Reach) is maximized in the range of 190 to 250 cfs, while total available adult habitat is maximized at flows between 190 cfs and 280 cfs as measured at gage MC-1 (Ah-Di-Na).

The total estimated available juvenile habitat at 190 cfs ranges from $3067 \times 10^3 \text{ ft}^2$ to $4527 \times 10^3 \text{ ft}^2$ (90% Confidence Interval (CI) range), while the total available juvenile habitat at 308 cfs ranges from $2436 \times 10^3 \text{ ft}^2$ to $3036 \times 10^3 \text{ ft}^2$ (90% CI range). The results of *t*-tests for juvenile trout habitat show a significant difference ($\alpha=0.10$) between flows of 190 and 308 cfs for juveniles.

The total estimated available adult trout habitat in the Upper Reach at 190 cfs ranges from $3958 \times 10^3 \text{ ft}^2$ to $4676 \times 10^3 \text{ ft}^2$ (90% CI range), and at 308 cfs, $3195 \times 10^3 \text{ ft}^2$ to $3885 \times 10^3 \text{ ft}^2$ (90% CI range). The results of *t*-tests for available adult trout habitat show a significant difference ($\alpha=0.10$) between flows of 190 and 308 cfs.

Total available juvenile trout habitat for the Lower McCloud River *downstream* of the confluence with Squaw Valley Creek (Lower Reach) is maximized in the range of 215 to 330 cfs, while total available adult habitat is maximized in the range of 300 cfs to 420 cfs.

The total estimated available juvenile habitat at 273 cfs ranges from $1983 \times 10^3 \text{ ft}^2$ to $3299 \times 10^3 \text{ ft}^2$ (90% CI range), while total available juvenile habitat at 358 cfs ranges from $1892 \times 10^3 \text{ ft}^2$ to $2984 \times 10^3 \text{ ft}^2$ (90% CI range). The results of *t*-tests do *not* show a significant difference ($\alpha=0.10$) for juvenile trout habitat between flows of 273 and 358 cfs. Variance in the total available habitat area estimates was relatively large at 273 and 358 cfs compared with the other test flows.

The total estimated available adult trout habitat for the Lower Reach at 273 cfs ranges from $2281 \times 10^3 \text{ ft}^2$ to $3483 \times 10^3 \text{ ft}^2$ (90% CI range) and at 358 cfs $2448 \times 10^3 \text{ ft}^2$ to $3930 \times 10^3 \text{ ft}^2$ (90% CI range). Both the juvenile and adult predicted available habitat values overlap between measured flows of 273 and 358 cfs. Again, the results of *t*-tests do *not* show a significant difference ($\alpha=0.10$) between flows of 273 and 358 cfs (TM-56, p. 23).

Repeated habitat criteria mapping surveys associated with the McCloud River Instream Flow Study indicates further precision error of $\pm 9.3\%$ for the mean percent difference of suitable habitat areas between measurements by different sampling crews for adult and juvenile life stages (TM-56, p. 29).

Due to the lack of precision in these results, it is impossible to determine the precise flow value that would maximize trout habitat based solely on the HCM study results. This study would seem to indicate maximal trout habitat somewhere between 190 and 250 cfs in the Upper Reach, and between 250 and 450 cfs in the Lower Reach, but a precise estimate of flows that would provide maximal habitat cannot be accurately determined from this study.

Examining the *Individual-Based Model (IBM) Instream Flow Evaluation Technical Memorandum (TM-54)*, the results are considered uncertain at best. The Forest Service asked that the IBM modeling be performed to corroborate the proposed HCM and 1-D habitat models. The IBM model is still considered experimental but was considered ripe for use for development in understanding the relationship between habitat and bioenergetics, something that has not been possible with the use of purely habitat based models.

The results of the historic flow record (post-project) and synthesized unimpaired hydrology (pre-project, for years 1990 through 2007) “flow experiment” for IBM-01 and IBM-02 predict significantly lower numbers of both rainbow and brown trout under unimpaired than under the historic flow record “where unimpaired flows were predicted (at IBM-02) to produce near-extinction of trout.” A possible hypothesis for this apparent discrepancy, presented in the IBM study results, is the fact that inSTREAM did not include two kinds of movement that could allow adult trout to persist in a higher flow regime: “migration of adult trout up into the river from Shasta Lake, and spawning and rearing of juveniles in tributaries where hydraulics are more favorable.”

Information contained in the *Stage 2, Multiple Use Impact Report on the McCloud-Pit Project (Pacific Gas & Electric Company), Shasta-Trinity National Forest, Region 5, U.S. Department of Agriculture, Forest Service (USDA, 1963a)* seems to indicate that fish populations were extremely healthy before the project was built. The report states “The population density of rainbow trout at the time (pre-project) was so high that even by the primitive method of set line capture sufficient brood stock was obtained to supply the heavy demands of the early fish culturists.” It also indicates “The estimated total run of kokanee salmon into the McCloud and tributaries is 130,000 fish... The catchable trout fishery that has been developed in the upper section of the McCloud River is of major importance in Northern California ... At the present time, fish populations in the lower section of the McCloud River are entirely self-maintained and provide excellent fishing.”

Fishing pre-project was also known to be excellent in the Upper McCloud River (Campbell in 1882 claims to have caught one hundred *rainbow trout* in less than two hours at Big Springs on the McCloud River (Ballinger, 1998). While this information is qualitative and not quantitative, it suggests that the IBM study results that predict near-extinction of trout at higher historical flows are inaccurate and do not reflect the status of fish populations that were actually present during the pre-project unimpaired flow period.

The IBM study also contained several simulations (summer target flow, year-round target flow, winter flow experiment) which indicate age 1 and older rainbow and brown trout numbers were generally variable between 100 and 250 cfs as measured at the MC-1 gage. Even given the uncertainties described above, the IBM study does not allow for a precise determination of flow in the McCloud River that would maximize fish populations.

The conclusion the Forest Service draws from the IBM study results is that the IBM simulations did not incorporate processes that were probably important to pre-McCloud, post-Shasta fish population dynamics, specifically stream-network-scale movements of fish between Shasta Reservoir, the mainstem McCloud, and its tributaries. Because of this fact, this study and its results are unreliable for use.

We also considered the *Lower McCloud River 1-D PHABSIM Analysis (TM-74)* in determining summer/winter base flow recommendations. We have questions concerning the validity of the conversion of the three dimensional data collected with the Acoustic Doppler Current Profiler (ADCP) since 1-D models do not use vertical velocity data. This question makes the model as configured questionable as compared to a 1-D model which would have collected data in a two dimensional plane. There were further issues with large negative (upstream) flow velocities at margin habitats in many transects which normally are not seen in the usual 1-D study results. Even with these caveats, we examined the Lower McCloud River 1-D PHABSIM Analysis (TM-74) to see if it would further clarify the uncertainty associated with the *Lower McCloud River Instream Flow Study Technical Memorandum (TM-56)*.

This study (PHABSIM Analysis), also included habitat suitability curves (HSC) requested by the resource agencies that were used and approved by the resource agencies for use in the PG&E/NIDs Yuba Bear/Drum Spaulding Hydropower Relicensing Project (YBDS) as a comparison to the binary HCM criteria.

Results from this study show that adult trout habitat in the Upper Reach is maximized at approximately 225 to 250 cfs for HCM binary HSC, and between 175 to 200 cfs for YBDS HSC (TM-74, p. 27). Adult trout habitat in the Lower Reach is maximized at 275 cfs for HCM binary HSC (TM-74, p. 27).

Percent of total WUA varies from 79.95 to 79.28 percent at simulated discharges between 200 cfs and 300 cfs for HCM HSC. At historical base flows of 700 cfs, the total habitat equals 44.78% (TM-74, p. A6-3) using the HCM HSC. Adult trout habitat in the Lower Reach is maximized at 200 cfs for YBDS HSC (TM-74, p. 28).

These results from the 1-D study using the binary HCM HSC and the YBDS HSC show variability between the two data sets. They are also usually within the 90% CI of the HCM study results. Given the variability exhibited, the Forest Service concludes that the study results do *not* provide a more precise definition for optimal flow values in support of the LRMP objectives for aquatic and terrestrial resources.

The study results from *Fish Populations in Project-Affected Stream Reaches Technical Memorandum (TM-18)* describe fish population sampling data (using night snorkeling methods) gathered in the fall for study years 2007 and 2009. Fish sampling was conducted at 8 sites during 2007 and 9 sites in 2009 on the mainstem Lower McCloud River. One fish sampling site was added during 2009 to assess trout recruitment levels between Hawkins Creek and the McCloud Dam.

Trout densities and biomass increased at all but one sampling site (F-McR-19.7, Ad-Di-Na) on the Lower McCloud River mainstem from 2007 to 2009, and trout abundance and biomass was highest at the uppermost site below McCloud Dam (F-McR-23.4). Trout abundance at this site was estimated at 1043.3 fish and 57.6 kg/ac. The two most downstream sites (F-McR-6.0, Tuna Falls and F-McR-1.9, Shasta Lake) had the lowest trout densities and biomass of all nine sites during both years of sampling.

On September 19, 2008 the James B. Black Powerhouse was shut down for emergency penstock repairs. As a result, spill flows were released into the Lower McCloud River between September 22nd and November 5th, 2008, averaging 913 cfs (measured at MC-5) during this period. Peak flows of 1411 cfs were measured on November 2nd, 2008. While no direct correlation can be made between the higher flow releases into the Lower McCloud River from McCloud Dam and higher trout densities and biomass that were found in 2009, circumstantial evidence would seem to indicate that higher flows did not depress fish populations as predicted by the models developed for the relicensing, but instead may have had a positive effect on trout recruitment (especially brown trout in the 75 to 149 mm range (Young Of Year (YOY) length range)) and trout survival during the 2009 water year.

Because of the lack of specificity of the HCM and 1-D PHABSIM model results, the lack of confidence in the IBM for trout, and the possibility/likelihood that higher flows produced greater trout abundance and biomass, no “optimal” set of base flows for the Lower McCloud River could be determined. Consideration instead was given to the “optimal” ranges of flows provided by the models along with changes in power generation relative to current operations. Based on the models one could determine that flows in the range of 175 to 280 cfs in the Upper Reach are adequate. However, the historic record shows that base flows greater than 700 cfs also produced substantial trout biomass. The Forest Service chose to set the base flow for the project at 200 cfs as measured at McCloud Dam, although higher flows may be more protective of aquatic biota. These flows are being set to provide for growth and maintenance of trout abundance and biomass during the summer growth period, to maintain the Lower McCloud River ecosystem, while balancing power production with ecosystem values.

Late winter/spring Snowmelt Runoff Period Considerations:

The Natural Flow-Regime Paradigm” (Richter et al., 1996; Poff et al., 1997; Lytle and Poff, 2004 Poff et al., 2006a) has generally been considered appropriate for California streams (Brown and Bauer, 2009). There is also wide consensus among aquatic ecologists that alteration of natural flow regimes often results in negative effects on native biota (e.g. Williams et al., 1993; Webb et al., 1999; Pringle et al., 2000; Moyle and Mount, 2007). Richter and Thomas (2007) suggest that substantial ecological benefits can be derived by modifying dam operations to mimic key aspects of the natural flow regime in situations where the full natural flow regime cannot be restored.

The McCloud River had mean average base flows of approximately 800 cfs pre-project due to the region’s geology, which is characterized by high groundwater storage. Late-fall, winter and spring flows are characterized by large rainfall runoff events as well as a well-defined spring snowmelt recession. During this snowmelt recession period, predictable flow conditions coincide with high resource availability, resulting in high reproductive success, growth rates, and survivorship for species adapted to seasonal flow regimes (Gasith and Resh, 1999).

An important component of the February through June flow release schedule is the principle that the spring snowmelt pulse and recession has important effects on stream biota. For species adapted to the strong seasonality typical of California streams, “the spring snowmelt pulse and recession creates a predictable disturbance that not only resets riparian succession through scour, but provides timing cues for reproduction and growth” (Naiman et al., 2008). As a result, aquatic and semi-aquatic vertebrates often coincide their reproductive activities with the spring recession so that suitable habitat conditions, temperature regimes and abundant resources allow for optimal reproduction and growth (Freeman et al., 2001). These riparian and aquatic successional processes, coupled with elevated food resources, create conditions conducive to higher level trophism and niche space for species, such as spring spawning fish and river breeding amphibians (Yarnell, in Press). These cues are primary drivers in population dynamics such that shifts in the timing of the spring recession can alter aquatic community composition and diversity (Jager et al., 1999; Jowett et al., 2005; Marchetti and Moyle, 2001).

In addition to affecting the stream itself, flow alterations from dams affect adjacent riparian habitats, which are necessary for energy flow, nutrient cycling, water cycling, hydrologic function, and associated biotic communities. “The timing of flooding is important to the life cycle of many aquatics and some terrestrial species. A naturally occurring flood pulse enhances survivability of organisms within the riparian zone and promotes species diversity and biological productivity.” Additionally, riparian habitat composition, structure, and productivity are determined by these elements (timing, magnitude, duration) of flows (USDA NRCS, 1996).

While riparian habitats in general, as well as Project waterways (i.e. Lower McCloud River and Iron Canyon Creek) in particular, are limited in both lateral depth and aerial extent, they are extremely productive, and provide the most diverse habitat for wildlife. “This is demonstrated most visibly in the western United States, where riparian habitat comprises less than 1 percent of the total land area at some times of the year but supports most of the terrestrial wildlife” (USDA NRCS, 1996). Because the benefits of riparian habitat are so vital and yet so limited in quantity, the need to restore elements that have been degraded by Project operations becomes even more essential. Disturbing these critical areas has long-term adverse effects. “Building dams across channels, constructing levees, and the channelization of the streams may have the most adverse impact. These modifications significantly alter the movement and storage of water that is so important to the riparian system” (USDA NRCS, 1996).

This resetting of riparian succession, caused by the natural snowmelt pulse, no longer occurs downstream of McCloud Dam, according to study results from *Assess Potential Ongoing Project Effects on Riparian Vegetation Community Types in the Project Area* (BR-S4) (TM-65), which documents ongoing project effects on riparian vegetation community types in the Project area. Findings from this study show that white alder and blackfruit dogwood woody riparian vegetation, which formerly grew along the steeper canyon slopes, has encroached onto the gentler benches that were once under water as part of the McCloud River.

“Migration of species and/or vegetation types from steeper slopes to wider lower slopes in response to project related hydrologic changes have resulted in increases in cover of these species, which include white alder and blackfruit dogwood” (TM-65, p. 58, PG&E, 2009). The river channel, as a result, is narrower and the former shallow-water edge habitats have been colonized by woody vegetation that is no longer scoured away by seasonal flooding.

Among the species encroaching into McCloud River shallows are two very undesirable and aggressive woody species – black locust and Himalayan blackberry. TM-65 documents that black locust was found in 7 plots and 3 transects; Himalayan blackberry was found in 30 plots and 11 cross sections. This makes Himalayan blackberry more common in the study area than one of the dominant woody plants used in the analysis, blackfruit dogwood, which was found in 26 plots and 8 cross sections.

There is no analysis per se in TM-65 of changes in abundance or distribution of black locust or Himalayan blackberry; however the study findings do indicate that the greatest post-project increases are in wetland indicator species in the Facultative Wetland (FACW) and Facultative (FAC) categories:

The model indicates 5 to 10 ft² per linear foot of river increases of FACW and FAC species based on inundation frequency and much smaller increases based on post-Project changes in the flood recurrence interval. Thus, the overall analysis indicates expansion of FAC and FACW wetland indicator group species under post-Project conditions. (TM-65, p. 24-25, PG&E, 2009)

Black locust is categorized as a FAC species, and Himalayan blackberry as a FACW species, so these invasives are the kinds of plants whose habitats are documented in TM-65 to have increased under Project operation conditions.

Forest Service concerns associated with significant Project effects to the riparian community are additionally demonstrated by Attachment 3 (TM-65, PG&E, 2009), which shows large reductions in the average number of days flooded per year, as a direct result of constructing McCloud Dam. For example, the number of days of flooding/year for a white alder/mixed herbaceous plant plot (i.e. Plot 4A5) was reduced from 269 days to 27, following Project implementation. Most plant associations showed similar reductions, as summarized (averaged by plant association) in Figure 9 (TM-65).

The Northwest Forest Plan Aquatic Conservation Strategy, as incorporated into the Shasta-Trinity Land and Resource Management Plan (LRMP), provides the direction to restore natural processes adversely affected by the Project. One of the objectives states:

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 (LRMP 4-53.6).

These Aquatic Conservation Strategy (ACS) objectives provide the framework to develop necessary mitigations that address concerns identified in literature, and borne out by relicensing study results. Thus, flow values for the months of February through June were developed to satisfy this direction in the Aquatic Conservation Strategy, and support the ecological principles noted above.

Hydrologic Analysis

Hydroelectric relicensing provides a limited opportunity to restore functionality to these affected systems. The Shasta-Trinity LRMP recognizes the presence of hydroelectric facilities through inclusion of the following direction:

- For hydroelectric and other surface water development proposals, give priority emphasis to instream flows and habitat conditions that maintain or restore resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. 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 (4-57.7b).

To determine the type of flow impacts that have occurred in the Lower McCloud River reaches due to construction of the Project requires a review of the historic magnitude, timing, duration, and spatial distribution of pre-Project flows. Several tools were used to assist in this examination: the “inflow to McCloud Reservoir” data set created for the ResSim Model for Water (PG&E, 2009) Years 1974 through 2006; an unimpaired, synthetic hydrology data set for McCloud River flow at Ah-Di-Na (USGS gage 11367800 or MC-1) for the same time period; the long term (WYs 1932 though 2009) data set for the Upper McCloud River above the Reservoir (USGS gage 11367500 or MC-3) which was used to construct the other two data sets; and the actual “impaired” data set from MC-1 after the dam was constructed (WY’s 1967 through 2006). The “Indicators of Hydrologic Alteration” Version 7 Software package (The Nature Conservancy, 2005) was used to generate comparable statistics for each flow regime. Table 2-2 provides some of the results.

Table 2-2. Hydrologic Statistics for McCloud River (reported as mean daily cfs) Flow values represent the percentile value of flow for the entire record analyzed. That is, the “10%tile” value represents the flow value in the entire data record that is exceeded 90 percent of the time.

	Upper McCloud USGS Gage:	McCloud Res Model Inflow	Ah-Di-Na Unimpaired Synthetic data	Ah-Di-Na USGS gage post dam	FS Flow Proposal	FLA Proposal
2-year flood event	2,130	3,434	4,664	1,560	3,555	3,599
10-year flood event	5,290	8,153	9,745	8,865	8,954	8,499
Minimum flow	524	585	589	41	202	158
10%tile flow	626	699	714	170	209	159
25%tile flow	734	779	801	185	215	166
median flow	844	929	968	210	230	202
Average flow	920	1,078	1,161	296	369	321
75%tile flow	1,010	1,184	1,267	228	337	300
max flow	11,900	16,540	19,780	25,200	17,380	17,370

The McCloud Reservoir Inflow data includes the synthesis of accretion flows between the Upper McCloud gage (MC-3) and McCloud Dam. This accretion is generally small except with respect to the large flood events. Similarly, the Ah-Di-Na unimpaired synthetic data represents the synthesis of accretion flows between McCloud Dam and the Ah-Di-Na gage, (primarily the impact of Hawkins Creek), and this accretion is also generally low except for large events.

As would be expected, the mean and median or lower flows at Ah-Di-Na are reduced approximately 75 to 80 percent by diversion of the Lower McCloud River (LMR) into McCloud Reservoir and then to Iron Canyon Reservoir, for flows less than or equal to the average value. Similarly, the 10-year flood event and maximum flow are approximately

the same for the unimpaired and impaired flows at Ah-Di-Na. The minimum flow value reflects a change in flow requirements over the term of the last license; minimum instream flow at the Ah-Di-Na gage was increased from requiring 40 cfs at the Ah-Di-Na gage initially to the current level.

There is a greater difference between the 2-year flood events and the 75%tile flow values from the USGS data at the Ah-Di-Na gage and the two flow proposals than any of the other flow statistics. This reflects the ability of the project to transfer approximately 1400 cfs of inflow from the McCloud Reservoir to Iron Canyon Reservoir. Thus, the effect of the project has been to not only lessen daily instream flows, but to radically change the “moderate” flood events experienced in the Lower McCloud River. Historically a mean daily flow event of 4,600 cfs occurred every two years on average; now a flow of only 1,560 cfs occurs at that frequency. This change means that the riparian corridor and floodplain margins are much less frequently inundated. The 2-year flood value for the USGS data at Ah-Di-Na is a more than 6 times greater than the 75%tile value. While the two flow proposals tend to restore the 2-year flood, the 2-year flood event is now ten times greater than 75 percent of the flows. The unimpaired Ah-Di-Na data shows the 2-year flood is only 4 times greater and at Upper McCloud, the 2- year flood is just over 2 times greater. Another indicator is that the 75%tile flow for the existing flow and the two proposals is actually less than the average flow for the period of record. This implies that the existing flows are dominated by low flows which would not be expected if flows were not diverted.

Two-year flood events are generally considered “bankfull” events where the flow fills and may overtop the channel. The ecological benefit of these flows is generally associated with supplying organic material and nutrients from river margins to the channel. They can also provide access to shallow margin areas for aquatic biota, important as reproductive habitats. As noted above, the relicensing studies documented changes to the riparian habitat with respect to species composition (more invasive species) and a concomitant narrowing of the channel as riparian woody species now occupy channel margins.

To determine the extent of the change, the IHA statistical package can be used to look at the frequency, timing, magnitude, and duration of “small and large flood” events (flood events that occur at least every two to ten years for small events and events that occur at most every 10-years or more for large events). Since the Upper McCloud gage (MC-3) reflects the approximate inflow to the project and has a very long period of record, it was used to assess the historic statistics for flood events. Table 2-3 presents these results. The table presents the flood events that occurred during the period February 1 through June 30 to represent the most “biologically active” time period. Floods that occurred prior to this period and did not occur during this period are not included.

The analysis selected events that had a peak value of at least 2130 cfs, the two year flood event. Duration of the event is established by determining the first day prior to the event that the flow exceeded the 75% tile flow value (1010 cfs) and the event lasts until the flow drops below the 75%tile flow value. Over the 75 year record analyzed, small or large flood events occurred during the time frame of interest (February 1 through June 30) in 34 years.

The majority of events were “small floods” (had a recurrence interval of less than 10 years). Large floods with a recurrence interval greater than 10-years occurred in only 5 years of the record. The minimum duration of any event was 5 days, 75 percent of the events lasted longer than 73 days, 50 percent of the events lasted longer than 110 days (average duration was 118 days), 25 percent of the events lasted longer than 164 days, and one event lasted more than a year (from January 24, 1983 through June 28, 1984).

The final column in the table shows the “rate of change” for the event, defined as the difference in flow from the flood base of 1010 cfs to the peak divided by the time span of the event. For example, this shows that the 1936 flood event rose and fell at an average rate of 264 cfs per day. This is a very “gross” statistic since the rising limb of the hydrograph is often much steeper than the descending limb, but it gives one an idea of the magnitude of rise and fall of these events. The median and mean values are not similar: the median value is 18 cfs per day, the mean value is 51 cfs per day. This implies that the data is “skewed” towards a slower daily change and is not distributed evenly around the mean value.

This data illustrates that the aquatic environment of the Lower McCloud River experienced much longer periods of consistently high flow than occur today from February 1 through June 30. The flood events were “buffered” by originating at a higher base flow and returning to a higher base flow. The current flow regime rises to peak values exceeding 1560 cfs every two years on average, but returns more quickly to base flows of 200 cfs.

Tables 2-4 through 2-6 show the flood events that currently occur as measured at the Ah-Di-Na gage, the flood events that would have occurred if the Licensee’s Flow Proposal in the FLA was in place, and the flood events that would have occurred if the Forest Service flow proposal was in place during the period starting February 1 (that is floods prior to February 1 are not included). To provide consistency of analysis, a minimum flow value of 1550 (the current 2 year event at the Ah-Di-Na gage) was used as the minimum peak flood flow, and the flood “base” value was set at 740 cfs which provides a flow range comparable to the Upper McCloud flood flows. Thus, the rate of change for these flows was calculated by determining the difference between the peak flow and 740 and then dividing by the time span of the event.

The summary statistics in Tables 2-4 through 2-6 show that none of these flow regimes retain the “persistence” characteristics of flood events exhibited by the Upper McCloud flows shown in Table 2-3. The duration of flow events is much shorter and the flow change per day is much greater. The Forest Service flow proposal tends to provide slightly longer durations and “lower flow changes” per day than the either the existing flow regime or FLA proposal. The FLA flows which are generated by a constant release from the McCloud dam, still exhibit “pulsing”; peaks separated by a return to a lower flow while the Forest Service proposal dampens some of that by both downramping spills and setting a higher base flow which results in a longer duration event.

Table 2-3. Upper McCloud Gage (MC-3) “Flood” Events above 1010 cfs (from IHA)

WY	Beginning Date	End Date	Type*	Duration (Days)	Peak Flow	Flow change cfs/day
36	2/21/1936	2/25/1936	S	5	2330	264
38	4/4/1938	7/30/1938	S	118	2890	16
40	2/25/1940	5/16/1940	L	82	7540	80
41	2/8/1941	8/5/1941	S	179	3050	11
42	1/23/1942	7/29/1942	S	188	2670	9
53	3/28/1953	7/9/1953	S	104	2130	11
54	3/5/1954	6/27/1954	S	115	3530	22
56	2/20/1956	7/28/1956	S	160	2750	11
57	2/23/1957	3/26/1957	S	32	3650	83
58	1/29/1958	10/8/1958	S	253	4980	16
59	1/8/1959	6/23/1959	S	167	3830	17
63	3/28/1963	6/30/1963	S	95	2690	18
65	4/5/1965	6/13/1965	S	70	2250	18
67	3/16/1967	7/23/1967	S	130	2150	9
69	3/27/1969	7/14/1969	S	110	2250	11
70	1/13/1970	6/8/1970	L	147	10000	61
71	3/23/1971	7/10/1971	S	110	2130	10
74	1/13/1974	9/2/1974	L	253	10100	36
78	2/5/1978	2/16/1978	S	12	2,350	112
78	3/3/1978	6/9/1978	S	99	2390	14
80	2/17/1980	3/9/1980	S	22	3760	125
82	2/15/1982	7/3/1982	S	139	2910	14
83	1/24/1983	9/30/1983	S	250	4180	13
84	10/1/1983	6/28/1984	S	272	2130	4
86	2/14/1986	4/30/1986	L	76	6490	72
89	3/8/1989	3/20/1989	S	13	2920	147
93	3/16/1993	6/12/1993	S	89	3840	32
95	3/9/1995	4/15/1995	S	38	5050	106
96	2/17/1996	6/3/1996	S	108	3480	23
97	12/28/1996	3/13/1997	L	76	11900	143
98	1/12/1998	9/18/1998	S	250	4420	14
00	2/10/2000	5/31/2000	S	112	2150	10
03	3/14/2003	4/6/2003	S	24	3010	83
04	2/17/2004	3/5/2004	S	18	4070	170
06	2/27/2006	9/30/2006	S	216	2220	6
		min		5		4
		25%tile		73		11
		median		110		18
		mean		118		51
		75%tile		164		81
		max		272		264

*L = Large Flood Event, S = Small Flood Event

Table 2-4. Flood Events above 740 cfs at Ah-Di-Na (MC-1) gage from actual USGS data

WY	Beginning Date	End Date	Type*	Duration (Days)	Peak Flow	Flow change cfs/day
69	5/7/1969	5/20/1969	S	14	1550	58
74	3/26/1974	4/15/1974	L	21	11800	527
78	2/6/1978	2/16/1978	S	11	4320	325
78	3/2/1978	3/23/1978	S	22	4090	152
80	2/17/1980	2/23/1980	S	7	4190	493
82	3/1/1982	3/4/1982	S	4	1940	300
82	4/12/1982	4/19/1982	S	8	3910	396
83	2/9/1983	4/11/1983	S	62	5920	84
86	2/14/1986	2/26/1986	L	13	9110	644
86	3/8/1986	3/14/1986	S	7	2000	180
89	3/9/1989	3/13/1989	S	5	3410	534
93	3/17/1993	3/27/1993	S	11	3940	291
95	3/9/1995	3/24/1995	S	16	6978	390
95	4/6/1995	4/14/1995	S	9	5690	550
96	2/17/1996	2/23/1996	S	7	5280	649
96	5/17/1996	5/21/1996	S	5	3620	576
98	1/29/1998	2/10/1998	S	13	2650	147
98	3/22/1998	3/31/1998	S	10	6580	584
00	2/14/2000	2/17/2000	S	4	2720	495
00	2/24/2000	3/1/2000	S	7	1930	170
04	2/17/2004	2/21/2004	S	5	3890	630
06	2/28/2006	3/7/2006	S	8	1860	140
06	3/25/2006	6/1/2006	S	69	3030	33
		min		4		33
		25%tile		7		161
		median		9		390
		mean		15		363
		75%tile		14		542
		max		69		649

*L = Large Flood Event, S = Small Flood Event

Table 2-5. Flood Events above 740 cfs at MC-1 gage using Licensee's FLA Proposed Flow

WY	Beginning Date	End Date	Type*	Duration (Days)	Peak Flow	Flow change cfs/day
74	3/26/1974	4/3/1974	L	9	11950	1246
74	4/6/1974	4/24/1974	S	19	1710	51
78	2/6/1978	2/11/1978	S	6	3774	506
78	3/5/1978	3/13/1978	S	9	2658	213
80	2/17/1980	2/24/1980	S	8	6375	704
82	3/1/1982	3/4/1982	S	4	2062	331
82	4/11/1982	4/26/1982	S	16	4018	205
83	2/9/1983	4/12/1983	S	63	5734	79
84	3/16/1984	3/19/1984	S	4	1771	258
86	2/14/1986	2/26/1986	L	13	8751	616
86	3/8/1986	3/15/1986	S	8	1796	132
89	3/9/1989	3/14/1989	S	6	3816	513
93	3/17/1993	3/26/1993	S	10	4457	372
95	3/9/1995	3/24/1995	S	16	7005	392
95	4/6/1995	4/13/1995	S	8	5057	540
96	2/18/1996	2/24/1996	S	7	4735	571
96	5/17/1996	5/22/1996	S	6	3404	444
98	1/28/1998	2/16/1998	S	20	3658	146
98	3/23/1998	4/3/1998	S	12	5418	390
98	5/25/1998	6/16/1998	S	23	1557	36
00	2/14/2000	2/17/2000	S	4	3559	705
00	2/26/2000	3/2/2000	S	6	2713	329
04	2/14/2004	2/21/2004	S	5	5967	1045
04	2/22/2004	2/28/2004	S	4	2454	429
06	4/2/2006	5/28/2006	S	57	2633	33
		min		4		33
		25%tile		6		205
		median		8		390
		mean		14		411
		75%tile		16		540
		max		63		1246

L = Large Flood Event, S = Small Flood Event

Table 2-6. Flood Events above 740 cfs at MC-1 gage using Forest Service Proposed Flow

WY	Beginning Date	End Date	Type*	Duration (Days)	Peak Flow	Flow change cfs/day
74	3/11/1974	5/2/1974	L	53	12140	215
78	2/6/1978	2/17/1978	S	12	3524	232
78	3/4/1978	3/16/1978	S	13	2651	147
80	2/17/1980	3/1/1980	S	14	6069	381
82	3/1/1982	3/10/1982	S	10	2041	130
82	4/11/1982	4/25/1982	S	15	2935	146
83	1/26/1983	2/4/1983	S	10	6367	563
83	2/9/1983	6/12/1983	S	124	5737	40
86	2/14/1986	3/1/1986	L	16	8754	501
89	3/9/1989	3/20/1989	S	12	3821	257
93	3/17/1993	4/2/1993	S	17	3804	180
93	5/31/1993	6/8/1993	S	9	1884	127
95	3/9/1995	3/31/1995	S	23	6660	257
95	4/7/1995	4/17/1995	S	11	3575	258
96	2/18/1996	2/29/1996	S	12	4733	333
96	5/17/1996	5/25/1996	S	9	2682	216
98	2/1/1998	2/17/1998	S	17	3495	162
98	3/16/1998	5/20/1998	S	66	3986	49
98	5/25/1998	6/16/1998	S	23	1553	35
00	2/14/2000	2/24/2000	S	11	3555	256
00	2/26/2000	3/8/2000	S	12	2708	164
04	2/16/2004	2/28/2004	S	13	5717	383
06	3/28/2006	5/28/2006	S	62	2296	25
		min		9		25
		25%tile		12		138
		median		13		215
		mean		25		220
		75%tile		20		258
		max		124		563

L = Large Flood Event, S = Small Flood Event

Fishability/Boatability

Comparison of Forest Service Outfitter/Guide SUP Commercial Angling Data:

The data in the tables below compares actual (current) flows and FLA flows (both from PG&E FLA data) and the Forest Service Preliminary 4(e) flow proposal for dates actually fished during 2002 through 2006 by commercial outfitter and guides under Forest Service special use permits (SUPs). Data from Forest Service records are self-declared by Special Use Permit Holders. Since all commercial anglers are required to have a permit for their use of NFS lands, the SUP data below reflects when and where commercial operators fished the Lower McCloud River for the years indicated. (Non-commercial anglers are not required to have a permit, thus that use is not reflected in the data below). Special Use Permit Holders must supply the location of their angling, but some do so with greater specificity than others. When the specific location of the angling was provided (i.e. Ash Camp = AC, or Ah-Di-Na = ADN) it is indicated below. Otherwise the general Lower McCloud River (LMR) between McCloud Dam and The Nature Conservancy is assumed. Most permitted fishing typically occurs in the vicinity of Ash Camp and/or Ah-Di-Na, although some could have occurred on isolated Forest Service parcels within The Nature Conservancy (TNC) ownership. All of the flow data is provided from, or modeled from, the Ah-Di-Na Gage (MC-1). Further explanation and discussion of this data follows the tables.

Table 2-7. 2002 Fishing Season Data (Dry water year, flows shown in cfs):

Date	Location (per SUP)	Actual Flow (Current) cfs	FLA Flow Proposal cfs	FS Flow Proposal cfs	Fishability Rating by Flow Type		
					Actual	FLA	FS
May 21	ADN	200	189	239	BO -1	BA -2	
July 12	ADN	200	163	200	BO -1	BA -2	
October 12	ADN	221	161	211		BA -2	
October 21	ADN	222	162	212		BA -2	
October 31	ADN	222	162	212		BA -2	
November 1	ADN	222	162	212		BA -2	
November 2	ADN	222	162	212		BA -2	
November 3	ADN	222	162	222		BA -2	
TOTAL					-2	-16	0

Note: no SUP data available for 2003

Table 2-8. 2004 Fishing Season Data (Below normal water year):

Date	Location (per SUP)	Actual Flow (Current) cfs	FLA Flow Proposal cfs	FS Flow Proposal cfs	Fishability Rating by Flow Type		
					Actual	FLA	FS
April 28	LMR	170	288	578	BA -2		AA -2
May 2	LMR	170	213	513	BA -2		AA -2
May 19	Above ADN	200	194	394	BO -1	BA -2	AO -1
May 20	LMR	200	192	392	BO -1	BA -2	AO -1
May 29	LMR	200	186	286	BO -1	BA -2	
June 1	LMR	200	184	284	BO -1	BA -2	
June 4	ADN	200	183	233	BO -1	BA -2	
June 9	LMR	200	182	232	BO -1	BA -2	
June 25	LMR	200	176	225	BO -1	BA -2	
June 27	LMR	200	175	225	BO -1	BA -2	
July 13	LMR	200	170	219	BO -1	BA -2	
July 17	LMR	200	168	218	BO -1	BA -2	
July 22	ADN	200	166	216	BO -1	BA -2	
August 4	LMR	200	164	214	BO -1	BA -2	
August 11	LMR	200	162	212	BO -1	BA -2	
August 15	LMR	200	162	212	BO -1	BA -2	
August 27	ADN	227	167	217		BA -2	
Sept 17	LMR	225	165	215		BA -2	
Sept 18	LMR	225	165	215		BA -2	
Sept 24	ADN	225	165	215		BA -2	
Sept 25	LMR	224	164	215		BA -2	
October 2	LMR	225	165	215		BA -2	
October 3	AC	224	164	215		BA -2	
October 6	LMR	224	164	214		BA -2	
October 8	LMR	224	164	214		BA -2	
October 11	LMR	225	165	215		BA -2	
October 12	LMR	224	164	215		BA -2	
October 15	LMR	224	164	215		BA -2	
October 29	LMR	238	178	228		BA -2	
November 4	LMR	210	174	224		BA -2	
TOTAL					-18	-56	-6

Table 2-9. 2005 Fishing Season Data (above normal water year):

Date	Location (per SUP)	Actual Flow (Current) cfs	FLA Flow Proposal cfs	FS Flow Proposal cfs	Fishability Rating by Flow Type		
					Actual	FLA	FS
April 30	LMR	170	288	378	BA -2		AA -2
May 2	ADN	170	221	371	BA -2		
May 13	LMR	552	532	823	AA -2	AA -2	AA -2
May 20	LMR	1,114	1,116	1,159	AA -2	AA -2	AA -2
June 6	ADN	200	229	279	BO -1		
June 13	ADN	200	213	263	BO -1		
June 18	LMR	200	273	323	BO -1		
June 19	AC	200	256	306	BO -1		
June 24	LMR	200	215	265	BO -1		
June 25	LMR	200	214	264	BO -1		
July 1	LMR	200	204	254	BO -1	BO -1	
July 2	LMR	200	204	254	BO -1	BO -1	
July 8	LMR	200	200	249	BO -1	BO -1	
July 19	AC	200	192	242	BO -1	BA -2	
July 28	LMR	200	185	235	BO -1	BA -2	
July 29	AC	200	184	234	BO -1	BA -2	
August 12	LMR	200	177	227	BO -1	BA -2	
August 19	LMR	235	175	225		BA -2	
August 22	AC	235	175	225		BA -2	
Sept 7	LMR	233	173	223		BA -2	
Sept 8	LMR	234	174	224		BA -2	
Sept 11	LMR	235	175	225		BA -2	
Sept 12	LMR	235	175	225		BA -2	
Sept 30	LMR	232	172	222		BA -2	
October 6	LMR	234	174	224		BA -2	
October 7	AC	234	174	224		BA -2	
October 9	LMR	233	173	223		BA -2	
November 7	LMR	442	382	432	AO -1	AO -1	AO -1
November 15	AC	210	183	233		BA -2	
TOTAL					-22	-38	-7

Table 2-10. 2006 Fishing Season Data (Wet water year):

Date	Location (per SUP)	Actual Flow (Current) cfs	FLA Flow Proposal cfs	FS Flow Proposal cfs	Fishability Rating by Flow Type		
					Actual	FLA	FS
June 9	AC	583	585	589	AA -2	AA -2	AA -2
June 27	AC	267	270	262			
July 13	LMR	200	199	249	BO -1	BA -2	
July 28	LMR	200	185	235	BO -1	BA -2	
July 29	LMR	200	185	235	BO -1	BA -2	
July 30	LMR	200	186	235	BO -1	BA -2	
August 9	AC	200	179	229	BO -1	BA -2	
August 12	AC	200	178	227	BO -1	BA -2	
August 15	AC	200	176	226	BO -1	BA -2	
August 16	AC	200	176	226	BO -1	BA -2	
August 26	LMR	200	174	223	BO -1	BA -2	
August 27	LMR	200	173	223	BO -1	BA -2	
August 29	LMR	200	173	223	BO -1	BA -2	
Sept 8	LMR	210	171	221		BA -2	
Sept13	LMR	210	170	220		BA -2	
October 5	LMR	No data	No data	No data			
October 6	LMR	No data	No data	No data			
October 24	LMR	No data	No data	No data			
October 25	LMR	No data	No data	No data			
October 26	LMR	No data	No data	No data			
TOTAL					-13	-28	-2

Discussion and Summary:

Technical Memo 58 (PG&E, 2009, p. 5) defines fishability (the overall quality of fishing conditions as they relate to flows), based upon information from a 3-person focus group, an off-site survey of 12 experienced anglers, angler registration information from TNC, and reference materials. “Fishability” in this report is partially based on the ability of anglers and their clients to wade the LMR. Fly fishing by wading is the predominant angling technique on the LMR (TM-58, P. 15). Sections 5.4 and 5.5 of TM-58 discuss flow evaluations and flow ranges related to fishability. While this limited group of interviewees had differing opinions on the range of fishable flows, the median responses stated that flows between 200 and 475 cfs were “Acceptable” and flows between 210 and 375 cfs were “Optimal” in terms of fishability (Figure 7). These flow ranges were then used to rate the fishability of flows shown in the above tables. Values shown in the right hand columns of the tables are defined:

- A blank cell indicates that the flows are within the “optimum” flow range of 210-375 cfs
- -1 indicates the flows are either below the optimum (BO) flow of 210 cfs or above the optimum (AO) flow of 375 cfs, but still within the acceptable range of flows.. (This subjective ranking is based on the fact that not achieving “optimum” is less of a negative effect than not meeting the less stringent “acceptable” fishability flows.)
- -2 indicates the flows are either below the acceptable (BA) flow of 200 cfs or above the acceptable (AA) of 475 cfs. (This subjective ranking is based on the fact that not achieving the less stringent “acceptable” parameter is even further from the fishability goals).

Table 2-11. Summary of Fishability Ratings for three flow proposals (and days affected):

Rating	Actual Flows	FLA Flows	FS Proposed Flows
Below Acceptable	-8 (4 days)	-128 (64 days)	0
Below Optimum	-40 (40 days)	-3 (3 days)	0
Above Optimum	-1 (1 day)	-1 (1 day)	-3 (3 days)
Above Acceptable	-6 (3 days)	-6 (3 days)	-12 (6 days)
Total Score (& days)	-55 (48 days)	-138 (71 days)	-15 (9 days)

Forest Service Interpretation:

- The angling dates reviewed are understandably skewed. For example, anglers did not fish during the early season of wet years such as 2006 when flows were high. The first day commercially fished on NFS lands in 2006 was June 9th. This is supported in TM-58, P. 18, which states: “High flows in May and early June 2006 (ranging from 1,000 to 2,500 cfs as measured at Ah-Di-Na) substantially reduced the number of anglers and hours fished on the McCloud River Preserve (about one-third of the use level in 2005). This information suggests many anglers avoid high flows, but it does not help specify angler preferred flow levels.” (PG&E, 2009). This angler preference does not totally account for why in a dry year (i.e. 2002) the first guided angling trip was not until May 21st, when optimum fishability (flows between 210 and 375 cfs) was available from the opening day of angling season that year, almost a month earlier. Obviously factors other than spring flows are considerations in commercial guiding. Although skewed away from higher flows, this data is valuable in that it represents actual dates angled in the recent past by commercial guides; thus providing an ideal template for comparison of how both the FLA and Forest Service flow scenarios would have actually impacted commercial angling use had they been in place.

- If the Forest Service flows had been in place during the above years, it appears they may have affected the fishability by a rating of -15 (or 9 days) by being either above optimum or above acceptable. However, by looking at the data above (as well as data in TM-58 from Babcock and Fowler at TNC), it is also clear that both commercial and TNC anglers do fish flows that are both above optimum and acceptable. From the Forest Service data, in 2005 these flows and dates included: 552 cfs (May 13), 1,114 cfs (May 20), and 442 cfs (November 7), and for 2006 – 583 cfs (June 9). These four days are part of the nine days that do not meet either the Above Optimum or Above Acceptable criteria in the Forest Service flow proposal. Thus, only five days could have potentially affected fishability over four seasons of actual commercial angling days, had the Forest Service flow proposal been in place. Since each fishing season is 175 days long (TM-58), or 700 days for the four years of data, the five days would have amounted to less than a 1% impact (0.007) to commercial guiding fishability. Since some outfitter/guiders have chosen to fish on days that exceed both optimum and acceptable fishability, the actual impact may be even less.
- On the opposite end of the scenario spectrum, the FLA proposed flows impact the fishability of the LMR with a rating of -138 (71 days). The vast majority of these days (64) are below acceptable. TM-58 (Section 5.7) includes a discussion of anglers concern with low base flows in the summer under the actual (current) scenario where only 4 days are below acceptable, compared to 64 days in the FLA proposal: “There was some discussion about whether higher base flows would increase feeding activity (via lower temperatures or more dissolved oxygen). For ethical and conservation reasons, some anglers stop fishing the McCloud in late July or early August as temperatures rise. Some anglers noted that temperature or oxygen-stressed fish are listless and less fun to catch.” Additionally, other text (at 5.6.2) states: “Some interviewees and Ballinger (1998) suggested that lower dam releases may have biological effects (especially warmer temperatures), or diminish the amount of fishable water (due to rocks in drifts).” Although temperature and dissolved oxygen levels were not cited as Project-induced concerns by relicensing participants on the LMR, some anglers have modified summer fishing patterns and expressed concerns based on their observations while angling.
- The actual (current) flow scenario falls between the above two for impacts to fishability with an overall rating of -55 and 48 days being adversely affected. The greatest area of affect is 40 days of below optimum flows.
- It is difficult to assign a specific flow at which the McCloud River is no longer wadeable by anglers because it is dependent upon many factors including: flow velocity, river stage height, anglers height (above mid-thigh wading becomes more difficult), fitness, experience, etc. TM-58 makes no attempt to state a specific wadeable flow, but instead incorporates that factor (i.e. wadeability) into a broader discussion of fishability. For the same reasons, the Forest Service has not attempted to define “wadeable” flow.

- While the current preference for angling technique is wading based fly-fishing, it can, and has been different. Under pre-project conditions with base flows of approximately 800 cfs, the river contained more trout biomass than currently is present, and was also a world-renowned fishery (USDA, 1963a), as it still is today. However, angling techniques and technology pre-Project differ from today. There are ways to fish a river other than by wading, such as shore fishing, which could be utilized during higher spring flows. Additionally, many anglers today utilize small rafts and sophisticated float tubes to access portions of rivers that aren't easily accessible by foot. This is recognized in TM-58, where it addresses that higher flows may increase access-based boating use by anglers. There was also agreement among anglers that new fishing "hot spots" would emerge in response to new higher base flows, and that these might evolve over time (PG&E, 2009, TM-58).
- TM-58 appropriately recognizes and discusses that fishability (fishing conditions) and fish habitat (health) are not the same thing (Section 5.8). Only 25% of the respondents were willing to support improving fishing habitat over fishable flows. However, the majority (58%) agreed with a modified support that stated: "It depends on the flow increase – but I generally support balancing habitat improvement and good fishing conditions." In response to more detailed trade-off questions between higher base flows and habitat/fish population improvements, some conclusions were drawn:
 - Anglers did not support increased base flows if there was a decrease in fish habitat.
 - If higher flows produced fishery benefits, anglers generally supported them for flows that were slightly higher (e.g. flows of 250-300 cfs), but substantially higher base flows (e.g. 400-450 cfs) were less acceptable regardless if there was a 50% or 100% increase in habitat benefits.
 - There was very little difference in evaluation results between 50% and 100% benefits.
- Finally, it became clear during relicensing that since gage data has not been publicly available at MC-1 (Ah-Di-Na) until recently, many anglers do not know the actual flows which they have fished for years. TM-58 Section 5.3 discusses if anglers use the stream gages, and if so, which ones. However, it assumes that anglers know the correlation between the gage reading and the actual instream flow. Since this information was not available until past year or so, some anglers are now saying they had assumed that the flows they were fishing were what was released at the dam. However dam releases do not include tributary accretion, most significantly Hawkins Creek, which can exceed 100 cfs in the spring. Other anglers understand the correlation between dam releases and flows at Ah-Di-Na, while others just estimate flows based on personal knowledge. Therefore, angler survey data in TM-58 was provided from a variety of understandings and perspectives. This may account for the wide range of what mainly commercial anglers said provided the best flows for fishability in TM-58.

One commercial angler who sent the Forest Service several electronic messages concerning an early Forest Service flow proposal provided this comment about the flows at Ah-Di-Na:

“Without getting into too much analysis it is safe to say that the mean suggested flows for June through November (February if you wish to consider after the fishing season closes November 15th) are clearly much too low for optimum angling and habitat. Flows should be about 50% higher, somewhere between 300 & 400 cfs as I mentioned in my previous e-mail. I have fished it extensively this season at recent flows of 260 and 280 cfs at the Ah Di Na gage and it has made this crystal clear, as it is possible to cross at all the usual places but some pocket water that fishes well at higher flows no longer holds fish so we are losing habitat and angler carrying capacity. I would REALLY enjoy fishing flows at and around 400 cfs (and know what they were at the gage) to better refine the optimum flows for angling carrying capacity and habitat. Chris at the Nature Conservancy tells me that the difference between 200 & 400 cfs at their gage is only about 2”.

Previous McCloud recreational test flows were best suited for studying whitewater use and as a result were much too high to get meaningful data on fishing which is clearly the most important and popular recreational use on the McCloud” (Forest Service Project files).

One other concern of anglers is that the implementation of the Forest Service flow proposal would reduce the opportunity to fish on opening day since flows would be too high. The following table shows the differences in opportunity to fish assuming that flows at MC-1 need to be below 350 cfs to be fishable. The “Days Lost” column lists the number of days that fishing opportunities would have been foregone if the Forest Service proposed flows had been in place. The other two columns either report that flows were below 350 cfs at MC-1, hence fishing was available, or report the flow condition from opening day until flows drop to 350 cfs and fishing becomes available. The value of 350 cfs is arbitrary but appears to be near the upper limit of optimal fishing conditions in the vicinity of MC-1.

Table 2-12 below, shows that the Forest Service Flow Proposal would have affected the opportunity to fish by wading between 25 and 30 days in 3 years (1978, 1984, and 2004), between 10 and 20 days in four years (1980, 1986, 2000, and 2005), between 4 and 9 days in four years (1993, 1995, 1996, and 1997). In 22 years there would have been no loss of opportunity. It should be noted that all of the days shown as lost had flows less than 625 cfs, and most were less 450 cfs, which may actually be fishable according to the commercial guide reports. The other consistent factor is that the Forest Service proposed flows dropped to 350 cfs or less by Memorial Day weekend in all years when existing flows allowed fishing on Opening day of fishing season.

Table 2-12. Changes in Fishing Opportunities Relative to Opening Day based on 350 cfs at MC-1

WY Type	Year	Days Lost	Fishing Condition for Existing flow at MC-1	Fishing Condition if FS proposed flows had been in place at MC-1
W	1974	0	Flow high until June 20	Same conditions
W	1975	0	Flow high until June 11	Same conditions
C	1976	0	Fishing available opening day	Same conditions
C	1977	0	Fishing available opening day	Same conditions
AN	1978	30	Fishing available opening day	Flow high until May 25 (just before Memorial Day); Flow is 625 cfs on Opening day dropping down to 350 cfs on May 25
BN	1979	0	Fishing available opening day	Same conditions
AN	1980	16	Fishing available opening day	Flow high until May 10: Flow is 460 cfs on Opening day dropping down to 350 cfs on May 11
D	1981	0	Fishing available opening day	Same conditions
W	1982	0	Flow high until May 29	Same conditions
W	1983	0	Flow high until July 3	Same conditions
W	1984	27	Fishing available opening day	Flow high until May 24 (just before Memorial Day); Flow is 550 cfs on Opening day dropping down to 350 cfs on May 25
D	1985	0	Fishing available opening day	Same conditions
W	1986	12	Fishing available opening day	Flow high until May 7; Flow is 400 cfs on Opening day dropping down to 350 cfs on May 8
D	1987	0	Fishing available opening day	Same conditions
C	1988	0	Fishing available opening day	Same conditions
D	1989	0	Fishing available opening day	Same conditions
C	1990	0	Fishing available opening day	Same conditions
C	1991	0	Fishing available opening day	Same conditions
C	1992	0	Fishing available opening day	Same conditions
AN	1993	7	Fishing available opening day	Flow high until Apr 30; Flow is 430 cfs on Opening day dropping down to 350 cfs on May 1
C	1994	0	Fishing available opening day	Same conditions
W	1995	5	Flow high until May 13	Flow high until May 18
W	1996	4	Fishing available opening day; spill event occurs May 17 - 26	Same conditions but spill lasts until May 30 due to ramping
W	1997	6	Fishing available opening day	Flow high until May 1; Flow is 420 cfs on Opening day dropping down to 350 cfs on May 2
W	1998	0	Flow high until July 3	Same conditions

WY Type	Year	Days Lost	Fishing Condition for Existing flow at MC-1	Fishing Condition if FS proposed flows had been in place at MC-1
W	1999	0	Flow bounce but are generally high (400-500) until June 3 (10 days are fishable)	Flow consistently high until May 27; Flow is 663 cfs on Opening day dropping down to 350 cfs on May 28
AN	2000	19	Fishing available opening day	Flow high until May 17 - Flow is 500 cfs on Opening day dropping down to 350 cfs on May 18
D	2001	0	Fishing available opening day	Same conditions
D	2002	0	Fishing available opening day	Same conditions
AN	2003	0	Flow high until May 8	Same conditions
BN	2004	27	Fishing available opening day	Flow high until May 20 - Flow is 600 cfs on Opening day dropping down to 350 cfs on May 21
AN	2005	14	Fishing available opening day; spill event May 9 - 27	Flow is 380 cfs on Opening day; then same spill but lasts until May 30
W	2006	0	Flow high until June 20	Same conditions

In addition to fishability, there have been many opinions expressed about whitewater boating flows. According to TM-58, there are three primary opportunities for boating in the Lower McCloud River: Access Boating primarily for fishing access, technical whitewater boating, and big flow whitewater boating. The TM notes that access boating is difficult at flows less than 200 cfs and becomes difficult at flows above 500 cfs. Technical whitewater boating occurs at flows above 700 cfs but below 1000 cfs. Flows between 1000 cfs and 3000 cfs provide big whitewater flows. Flows above 3000 cfs are unsuitable and dangerous for boating. (Flows measured at MC-1). A consensus of boaters picked 800 cfs as the “optimum” flow. Table 2-13 below, compares the number of days available for access boating and whitewater boating under the current flow regime and the Forest Service proposed flows for the period April 1 through July 31. These flows are opportunistic; that is they are not “prescribed” in the Forest Service proposal but are generated as a consequence of the flow regime.

In terms of access boating, since the current regime (and the FLA) allows flows to drop below 200 cfs in some months, those days were scored as not available. The Forest Service proposal always has flows greater than 200 cfs at MC-1. Thus, if the value in the Forest Service access boating column is less than 122 (the number of days in the period reviewed), it implies flows are greater than 500 cfs and not suitable (too difficult) for access boating. The Forest Service proposed flow regime provides many more access boating days than currently exists, especially in drier years. In terms of whitewater boating, the Forest Service proposed flow regime is not significantly different than the current flow regime, however, it does provide a few more days in wetter years. In TM-24, (an earlier version of TM-58) (p. 25) it was noted that whitewater boating for kayaks begins around 500 cfs with optimal flows at 800 cfs. If flows in the range of 500 cfs to 700 cfs were included, there would be more whitewater boating days available in the moderate water years.

Table 2-13. Available Boating days between April 1 and July 31 as measured at MC-1

Year	WY Type	Number of <u>Whitewater Boating</u> days at flows between 700 cfs to 3000 cfs		Number of <u>Access Boating Days</u> at flows between 200 to 500 cfs	
		Forest Service Proposal	Existing Flows at MC-1	Forest Service Proposal	Existing Flows at MC-1
1974	W	32	27	59	62
1975	W	16	16	89	61
1976	C	0	0	122	0
1977	C	0	0	122	0
1978	AN	19	2	81	89
1979	BN	0	0	122	78
1980	AN	0	0	98	78
1981	D	0	0	122	76
1982	W	21	15	81	75
1983	W	73	67	42	42
1984	W	0	0	85	78
1985	D	0	0	122	76
1986	W	0	0	121	77
1987	D	0	0	122	76
1988	C	0	0	122	0
1989	D	0	0	122	79
1990	C	0	3	120	4
1991	C	0	0	122	76
1992	C	0	0	122	77
1993	AN	11	5	95	90
1994	C	0	0	122	0
1995	W	9	13	85	98
1996	W	8	5	109	73
1997	W	0	0	120	76
1998	W	70	54	36	41
1999	W	22	0	79	105
2000	AN	2	4	93	84
2001	D	0	0	122	76
2002	D	0	0	122	76
2003	AN	0	2	119	99
2004	BN	3	0	86	79
2005	AN	13	9	91	76
2006	W	59	58	49	50

A concern was expressed by some relicensing participants that the Forest Service flow proposal gave preference to the boating advocacy group over angling. Both angling and whitewater boating are appropriate uses of NFS lands and are allowed in the LRMP (USDA, 1995). (Commercial whitewater boating is not currently permitted on the LMR following a Forest Service review and decision to deny an application for that use some years ago. This prohibition of commercial whitewater boating was also adopted as a policy by the McCloud River Coordinated Resource Management Group).

As presented at the beginning of this section, the LRMP provides guidance that focuses the Forest Service's development of aquatic measures for the Lower McCloud River on the achievement of resource objectives outlined in the Aquatic Conservation Strategy. This has been the Forest Service objective throughout this relicensing. While the Forest Service flow proposal will provide for a limited number of whitewater boating opportunity days on the naturally descending spring limb of the hydrograph (slightly increased over current flows), it is by no means a whitewater boating flow proposal. Likewise, while the flow proposal should achieve improved fishability objectives, this is a consequence of the Forest Service goal to achieve improved resource conditions for the aquatic and aquatic-dependent biota. Thus, while this section of the rationale on fishability and boatability provides insight into the Forest Service perspective and considerations in developing the Preliminary 4(e) flow proposal, neither were used as a determining factor for setting the instream flow releases.

Minimum Instream Flow Analysis – Iron Canyon Creek

Iron Canyon Reservoir was constructed primarily to serve as the forebay for the JB Black powerhouse by storing water transferred from the McCloud River. The capture of local instream flow was not a primary purpose of Iron Canyon Reservoir. One could therefore argue that the flows below Iron Canyon Reservoir should be equal to the inflow to the reservoir. Table 2-14 compares the synthesized unimpaired mean monthly flows for Iron Canyon Creek constructed from local creek flow data that was provided in the FLA, with area corrected flow generated from data collected at the Iron Canyon Gage (PH 46) (located above the confluence of Iron Canyon Creek with the Pit River). There is a great discrepancy in this comparison in the winter and spring runoff values, but the low flow months of June through November are relatively similar. These values also show that prior to the construction of Iron Canyon Dam, winter flows were relatively high in Iron Canyon Creek. Anecdotal information from anglers indicate that the fishery was excellent prior to the construction of the dam, hence the flows required by the Forest Service flow proposal should have no deleterious effects on the fishery in the lower reaches where accretion from tributaries will substantially increase the minimum flow release.

Table 2-14. Licensee’s Gage PH 46 Mean Monthly Flows vs. Synthetic unimpaired flow for Iron Canyon Creek

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PH-46	11	13	62	96	153	94	81	39	20	11	7	7
Synthetic	6	21	42	67	78	79	46	26	14	8	6	5

The FLA documents that the upper reaches of Iron Canyon Creek are severely encroached by vegetation and also store large amounts of sediment. Much of this sediment is from a Project road (37N78A) eroding into the creek. The Licensee has worked with the Forest Service to implement erosion control measures to remedy the sediment introduction. However, the lack of high flows to move this sediment and the presence of Project-induced vegetation encroachment limits the ability of the creek to move the sediment.

Spill does not occur at Iron Canyon Dam. Flow out of Iron Canyon Reservoir is currently limited by the capacity of the instream flow control release valve, which according to the FLA may be able to release as much as 30 cfs when the reservoir is full. The only other mechanism to increase flows to mobilize sediment is during annual dam safety valve testing operations. The Forest Service flow proposal incorporates both mechanisms to assist with sediment mobilization and some vegetation removal by high flows. The Forest Service instream flow proposal requires the Licensee to fully open the instream flow release valve during March and April in Wet water years, which should release flows of at least 20 cfs up to flows of 30 cfs. The Forest Service instream flow proposal further requires that dam safety valve testing should only occur between March 5th and 15th when the highest instream flows are released to minimize impacts to reproductive success of spring breeding aquatic organisms. These flows should also be kept to the minimum level allowable (possibly in the range of 150 cfs) to minimize channel damage. Ramping rates are prescribed to minimize impacts to mobile aquatic biota.

Two other sources of information assisted in determining the minimum instream flow releases for Iron Canyon Creek: the “effective” habitat analysis of values generated by the PHABSIM model and the channel cross sections collected for the PHABSIM analysis.

The WUA Tables A-3 through A-5 (Appendix 1) show that when considering “effective” habitat (cells with a value of 0.4 or greater) that adult habitat is optimized at any flow greater than 45 cfs, spawning habitat is best at flows between 8 and 38 cfs, and juvenile habitat is optimized at 8 to 80 cfs (as highlighted in green on the tables). The other consideration is that there is no “most effective” adult habitat in the 0.8 to 1.0 range until flows exceed 6 cfs.

Figure A-1 (Appendix 1) shows channel cross-section 10, a low-gradient riffle generated from the Physical Habitat Simulation Model (PHABSIM) results. Review of all of the cross-sections show that flows need to exceed 8 cfs before the entire channel and its margins are filled to some extent. Flows in the range of 16 to 20 cfs provide some depth of flow in side channel areas.

There is a wide range of possibilities for an Iron Canyon flow regime. Base flow in the range of 7 to 10 cfs would be suitable for juveniles in the summer/fall period of July through October, and a spawning period flow in the range of 20 to 40 cfs is appropriate for March and April.

Minimum Instream Flow Analysis – Pit River

After completion of Shasta Dam, but prior to the completion of the facilities for the Pit 6 and Pit 7 Powerhouses, white sturgeon (*Acipenser transmontanus*) utilized these reaches of the Pit River for spawning. The construction of the Pit 7 Dam blocked this run, thereby preventing the recruitment of new individuals to the land locked sturgeon population residing in Shasta Lake. As the population can no longer spawn, augmenting this population with young fish, as discussed in Recommendation No. 2 (Enclosure 3, P. 2) would provide a continuing supply of sturgeon to the lake, and would improve this sport fishery over time.

For other fish species, the Pit River below the Pit 7 and afterbay dams are a highly modified environment that have altered the native fish assemblage. Allowing for the interbasin transfer of water from McCloud River to the Pit River for hydropower production limits options for restoring the pre-project aquatic environment through instream flow mitigations. Therefore, we support the Licensee's proposal to maintain the current 150 cfs minimum flows below the Pit 7 Dam.

Erosion Control and Monitoring

Inventory and Assessment of Erosion and Sediment from Project Construction, Operation, and Maintenance TM-67 included a comprehensive database of erosion sites and an associated index of erosion severity (i.e., erosion potential, sediment delivery potential, and potential to affect Project infrastructure) at each site. Fifty-six sites were ranked as having high erosion potential. These erosion sites, as well as erosion associated with natural processes and/or Project operation and maintenance, could affect water quality, aquatic habitat, and public health and safety within the Project Boundary. The primary purpose of this measure is to manage existing erosion and minimize future erosion and sediment delivery to stream channels.

The Clean Water Act of 1972, as amended, establishes goals, policies and procedures for the maintenance and improvement of the Nation's waters. The act addresses both point and nonpoint sources of pollution and establishes or requires programs for the control of both sources of pollution.³

The Forest Service must be responsive to the environmental intent, goals and objectives provided by the Clean Water Act, as amended.⁴ The Forest Service is directed to correct water quality problems on the National Forests and perpetually implement Best Management Practices (BMPs) for all management activities on NFS lands. Best Management Practices have been developed for water quality protection associated with all management activities. Practices particularly relevant to management of the McCloud-Pit Project include the following:

- All 28 BMPs for Road and Building Site Construction Practices. In addition to addressing all road/facility maintenance and construction activities this category also contains BMPs that address restoration of borrow pits and quarries;
- BMPs for Recreation Practices.

Turbidity Monitoring:

As noted in the FLA: "Project operations influence the volume, rate, and timing of downstream discharges of suspended sediments from McCloud Reservoir, including... (3) alteration of sediment transport characteristics through the reservoir and into the Lower McCloud River..." (PG&E, 2009, p. 3-109). The Licensee has indicated that existing turbidity monitoring at MC-5 fulfills the need for turbidity monitoring on the Lower McCloud River as identified in the Water Quality Monitoring Plan. The Forest Service feels that data from MC-5 could be improved upon by providing real-time turbidity data at or above Gage MC-7 in order to address concerns raised during studies that fishing quality was strongly affected by turbidity. While use of the multi-level gates and valves to manage turbidity from McCloud Reservoir may not be practical, adequate notification of turbidity events could help inform anglers. Adding a turbidity monitor just below the dam would provide real time turbidity information for the portion of the river most actively fished.

3 USDA Forest Service, Pacific Southwest Region, 2000. Water quality management for Forest System lands in California, p. 2.

4 USDA Forest Service, Pacific Southwest Region, 2000. Water quality management for Forest System lands in California, p. 3.

Using the October 2007 turbidity event as an example:

Turbidity travel time is 14 hours (20 hours to peak) from Gage MC-7 to MR4A (Claiborne Creek Confluence). Travel time is 32 hours (38 hours to peak) from MR4A to MC-5 (current gage location). Therefore total non-peak turbidity travel time from Gage MC-7 to MC-5 is 46 hours (14 + 32) indicating that an event could be moving through the McCloud River for 46 hours or almost 2 full days before the turbidity monitoring station at MC-5 alerts anglers that an event is occurring. Real-time turbidity data at MC-7 would provide an indication of maximum turbidity levels in the first reach of the River (MC-5 turbidity levels are diluted), and provide an alert of the start of an event (as opposed to 1.5 – 2 days after the event starts) allowing anglers to change their plans and improving the ability of the Forest Service to alert anglers as to the status, duration and intensity of turbidity events in the Lower McCloud River.

Figure 2-1. Lower McCloud River.

Photo taken on August 18, 2008 from the road above Gage MC-7 station looking upstream towards the dam. Turbidity: 271 NTU. (FLA Figure A2-21)



Gravel:

The rationale for gravel and coarse sediment augmentation in the Lower McCloud River below McCloud Dam is derived from Forest Service management direction, the Final License Application, and information from *Assessment of Channel Morphology and Fluvial Geomorphic Processes in the Lower McCloud River (GS-S2) TM-68*. The rationale is also supported by a practical approach to introducing gravel and coarse sediment to the river (see below).

This license condition is consistent with the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) and the Record of Decision (ROD) for the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (FEIS). The LRMP provides management direction as well as Standards and Guidelines for Riparian Reserve Management that supports replenishing gravel in the Lower McCloud River below McCloud Dam. Additionally, this condition would achieve Aquatic Conservation Strategy (ACS) Objective #5 from the LRMP, which directs the Forest Service to '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' (LRMP, 4-53).

Forest Standards and Guidelines for the Lands Program contain direction that applies to relicensing hydroelectric projects in non-Key watersheds (i.e. Lower McCloud River Watershed). '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' (LRMP, 4-57).

The rationale for the Forest Service to adhere to the aforementioned management direction is strengthened by the location of NFS lands along the Lower McCloud River. The majority of the lower river flows through private lands, however the largest river reach located on NFS lands extends downstream from approximately 0.2 miles above Hawkins Creek confluence to the Nature Conservancy property located less than 0.1 miles above Lady Bug Creek confluence for a total distance of approximately 4 ½ miles. Gravel and coarse sediment augmentation below the dam would have the greatest benefits to this reach of the McCloud River.

Volume II of the Final Application for New License for the McCloud-Pit Hydroelectric Project (PG&E, 2009) provides information that supports the rationale for augmentation of gravel and coarse sediment in the Lower McCloud River below McCloud Reservoir. The FLA provides the following information that characterizes the sediments that have accumulated in McCloud Reservoir. The FLA notes that 'Debris flows originating from the unconsolidated inner gorge slopes of Mud Creek Canyon high on the southeast flank of Mt. Shasta... historically delivered large quantities of fine sediment (sand and finer) to the Upper McCloud River during summer months, and sediment delivery from debris flows in Mud Creek constitutes a large fraction of the sediment currently stored in McCloud Reservoir' (PG&E, 2009, Vol. II, p. 3-3). The FLA also states that 'Tributaries draining steep topography in the Eastern Klamath Terrane and Western Cascades Terrane surrounding McCloud Reservoir (e.g., Angel, Lick, and Star City Creeks) historically delivered the majority of the coarse sediment to McCloud River upstream of McCloud Dam, and sediment delivery from these tributaries constitutes the majority of the coarse sediment (>2 millimeters) stored in McCloud Reservoir' (PG&E, 2009, Vol. II, p. 3-4). These statements indicate that tributaries to the McCloud Reservoir and not the remainder of the watershed area supplied the bulk of the coarse sediments to the lower river. The fact that the Mud Creek contribution constitutes the majority of the material (sand and finer) stored in the reservoir highlights the importance of Star City Creek and the other

reservoir tributaries as being the dominant suppliers of coarse sediment to the river in the first 7 to 8 kilometers (4.3 – 5 miles) below McCloud Dam, prior to the Project's inception. If the Star City Creek inlet was chosen as the gravel/sediment source, one of the largest sediment producing tributaries would again be contributing gravel and coarse sediment to the Lower McCloud River.

The FLA also notes that 'Similarity in the size of coarse sediment supplied by major tributaries and the size of mobile deposits in the mainstem Lower McCloud River emphasizes the importance of coarse sediment inputs from major tributaries in supplying the mobile sediment fraction (including spawning gravel size classes) to the McCloud River downstream of McCloud Dam. Bulk sampling results suggested that major tributary sediment inputs fine the bed, and that the mainstem channel bed coarsens with increasing distance from major tributaries' (PG&E, 2009, Vol. II, p. 3-6). Gravel and coarse sediment augmentation below McCloud Dam would likely have a similar effect on the channel bed below the dam and mimic patterns of sediment deposition created below downstream tributary confluences in the Lower McCloud River. Gravel introduction below McCloud Dam would have the effect of adding one more tributary (i.e. Star City Creek) to the Lower McCloud River as a gravel and sediment supplier to the most supply limited reach of the river.

The FLA notes that 'Under unimpaired conditions, the Lower McCloud River was likely supply- limited (i.e., annual bedload transport capacity exceeded annual coarse sediment supply) from McCloud Dam to at least Bald Mountain Creek. However, reaches with relatively low stream power and sediment transport capacity currently store mobile sediment in patches associated with large roughness elements (e.g., boulders and bedrock outcrops), local backwater effects from channel or valley width contraction, local flow expansion from channel or valley widening, and high local sediment supply relative to local bedload transport capacity. Mobile coarse sediment is also commonly distributed in thin, discontinuous, and transitory sheets within a bed of immobile framework grains' (PG&E, 2009, Vol. II, pgs. 3-10 and 3-15). These excerpts from the FLA suggest that, while the McCloud River is supply-limited, there are storage areas that could trap or temporarily hold a proportion of the introduced gravels and sediment.

While the Lower McCloud River would remain supply-limited, the reduced flow regime would likely result in longer retention times for introduced gravel and coarse sediment in the first several miles of the Lower McCloud River below the dam between spill events. Project operations have resulted in a reduction in sediment transport capacities below the McCloud Dam. The reduction in transport capacities is highest at sites near the dam (70% reduction above Hawkins Creek) (PG&E, 2009, Vol. II, p. 3-27). The project has also resulted in a 69% reduction in the 2-year flow immediately upstream of Hawkins Creek (PG&E, 2009, Vol. II, p. 3-27).

The FLA notes that while storage is lowest in the first 5.2 km (3.25 miles) downstream of McCloud Dam, where coarse sediment has been most reduced by impoundment in the McCloud Reservoir, the storage potential in this responsive reach is minimal and the relatively small quantity of coarse sediment supplied by larger tributaries (i.e., Hawkins Creek, Squirrel Creek, Fitzhugh Creek) is efficiently routed downstream (PG&E, 2009, Vol. II, p. 3-31). While it is true that the extent of response reaches below McCloud Dam are limited, it has been noted that there are opportunities for temporal storage of coarse sediment within the transport and response reaches (PG&E, 2009, Vol. II, pgs. 3-10 and 3-15). Study results from *Assessment of Channel Morphology and Fluvial Geomorphic Processes in the Lower McCloud River (TM-68)* also note that ‘longitudinal patterns in sediment storage and sediment storage potential (i.e. stream power) suggest that the Project forces or at least exacerbates supply limitation (deficit of coarse sediment supply relative to bedload transport capacity) in responsive reaches in the first 7 or 8 km (4.3 – 5 miles) downstream of McCloud Dam’ (TM-68, pg 48).

In addition to the reintroduction of gravels, the reintroduction of coarser sediments would provide some benefit in maintaining/restoring the sediment regime. The FLA notes that ‘...the reach from McCloud Dam to at least Hawkins Creek is potentially the most degradational due to low regulated sediment supply’ because ‘the reach is upstream of any significant tributary sediment inputs’ (PG&E, 2009, Vol. II, p. 3-31).

Degradation and bed-elevation lowering of the Lower McCloud River below the dam was documented in data collected at the U.S. Geological Survey (USGS) gaging station (1137760) (MC-7) located approximately one-half mile downstream of the dam. The USGS Water Data Report (see chart below) for this station states that the gage was installed and the datum established in 1966. By April 1972 the datum was lowered three feet. The USGS report notes further changes to the channel during water years 1975-1981, with 24 different rating relations (rating curves) developed for this station since its 1966 establishment.

USGS
Water-Data Report 2008
1136770 McCloud River below McCloud Dam, near McCloud, CA
Sacramento River Basin

LOCATION-Lat 41°07'31", long 122° 04'03" referenced to North American Datum of 1927, in SW ¼ NE ¼ sec 27, T.38N., R.2W., Shasta County, CA, Hydrologic Unit 18020004, Shasta National Forest, on left bank, 0.1 mi downstream from Lizard Creek, 0.6 mi downstream from McCloud Dam, and 9 mi southeast of McCloud.

DRAINAGE AREA. -404 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.—April 1966 to current year (operated as a low-flow station only).

GAGE.--Water-stage recorder. Datum of gage is 2,398.76 ft above NGVD of 1929 (levels by Pacific Gas and Electric Co.). Prior to Apr.7, 1972, at datum 3.00 ft higher.

COOPERATION.—Records were collected by Pacific Gas and Electric Co., under general supervision of the U.S. Geological Survey, in connection with Federal Energy Regulatory Commission project no. 2106.

REMARKS.—Low flow regulated by Lake McCloud (station 11367740) since November 1965. Most of McCloud River runoff is diverted from reservoir through tunnel to Iron Canyon Reservoir (station 11363920) in Pit River Basin. This station records fishwater release. The minimum requirement is 40 ft³/s at all times. Prior to water year 1974, flow was computed up to 400 ft³/s. During water years 1975 -81, because of channel changes, flow was computed up to 200 ft³/s. Currently, because of maximum required release, flow is computed to 220 ft³/s. See schematic diagram of Pit and McCloud Basins available from the California Water Science Center.

While station datums can be raised or lowered for different reasons, one of the more common reasons is due to channel bed elevation changes. The need to develop different rating curves is typically driven by channel changes that affect width, depth, and/or gradient. It is unlikely that a well-established boulder-step pool channel would change in response to a regulated flow regime. It appears more likely that this channel reach contained and transported a steady supply of mobile sediment (gravel) and that the regulated flow and sediment capture, scoured the stored gravel, degraded the channel, and in effect exhumed the boulder-step pool configuration. These effects may also be exacerbated by the relatively high spill frequency; the Licensee has indicated that McCloud Reservoir spills approximately four out of ten years (PG&E, 2009 p. B-3) which is atypical of many hydroelectric projects, but common on the Lower McCloud River. Due to reservoir size constraints, McCloud Dam is relatively small for the volume of flow in the river and often cannot capture larger events.

As reported in TM-68 (Table 4, p. 14), it is estimated that the pre-dam (unimpaired) McCloud River conveyed 25,028 tonnes (one metric tonne = 2,204.6 pounds) per year from the upper watershed to the mouth of Hawkins Creek located approximately 1.2 miles downstream from the dam. With the Hawkins Creek contribution of 179 tonnes, the unimpaired McCloud River below Hawkins Creek conveyed 25,225 tonnes of sediment annually (TM-68, p. 14).

It is reasonable to conclude that the McCloud River channel and its riparian/fluvial ecosystems below Hawkins Creek were appropriately sized and in dynamic equilibrium with that load of annual sediment. With the upper watershed sediment load captured by the dam, the McCloud River below Hawkins Creek conveys only the 179 tonnes per year or less than 1 percent of the unimpaired sediment load. Farther downstream past the Bald Mountain Creek confluence, the contemporary annual load of sediment conveyed is just 11.5 percent of the unimpaired system. Using sediment transport as an indicator of channel health and fitness in the conveyance of watershed products (i.e., energy and nutrients), a 99- to 88-percent reduction in the conveyance of a primary watershed product (sediment) should be recognized as a potentially significant adverse impact on the physical channel as well as the riparian/fluvial ecosystems that rely on the physical attributes of the channel. Given the long duration of the next license (30 – 50 years), it is appropriate to employ an adaptive management approach for augmenting gravel and course sediments in the Lower McCloud River.

Augmentation Proposal Benefits

The Forest Service recognizes that implementation of a gravel/coarse sediment augmentation plan may pose difficulties for the Licensee. The Forest Service proposes that the Licensee use the Star City Creek inlet of McCloud Reservoir as an initial source of gravel/coarse sediment for augmentation. The use of the Star City Creek inlet would reduce costs by increasing efficiency associated with augmentation operations and provide environmental and recreational benefits as well.

- The location of the gravel/coarse sediment source is approximately 2.5 road miles away from the proposed introduction site below the dam. A staging area for the gravel/coarse sediment may also be available at the tunnel spoils site located on Hawkins Creek approximately 2.25 miles below McCloud Dam. Storing gravel/coarse sediment at the tunnel spoils site could allow for a one time withdrawal of gravel from the Star City Creek inlet during the period of the license (i.e. all of the gravel/coarse sediment required for augmentation during the license period could be dredged from the inlet at one time or several intervals and stored at the tunnel spoils site.
- Dredging the Star City Creek inlet would provide for increased reservoir capacity in the inlet and provide for additional space to capture future sediment inputs from Star City Creek.
- The dredging could assist boat access to the recreation site to be reconstructed at Star City Creek inlet. Currently the gravel deposits (as seen in the photograph below) preclude boating access when reservoir elevations are lower.
- Using Star City Creek inlet as a gravel/coarse sediment source has the added benefit of supplying the Lower McCloud River with the actual sediment that is missing from the river. Moving this material around the dam has the effect of adding one small tributary with a broad range of coarse sediment size classes that would have been delivered to the Lower McCloud River prior to the Project's inception.

- If Star City Creek gravel/sediment is utilized, no washing of sediment would be required. This gravel source is effectively inundated by McCloud Reservoir every year by the same water that flows through the Lower McCloud River so further washing would provide no added benefits; once sorted, the stockpiled sediment could be deposited in the Lower McCloud River. If Star City Creek sediments are not utilized, the material would need to be sorted and washed to meet the license condition (i.e. clean, rounded and ranging in size from approximately 8-128 mm). The Licensee expressed concerns with having to obtain two separate Water Quality Certifications for the removal, washing and sorting of gravels, as was their experience on the Pit 3, 4, 5 project. The Water Board has indicated that this was an anomaly and that the gravel/coarse sediment removal and placement could be covered in the Project 401 Water Quality Certification process.
- The existing volume of sediment currently deposited in the Star City Creek inlet is expected to meet the minimum recruitment needs of 150 tonnes per year for the period of the license. While this estimate needs to be refined, it appears that the Star City Creek sediment delta is about 9,000 m². Assuming an average depth of one meter results in an estimated supply of 9,000 m³, or about 11,790 tonnes of sediment (assumes 1.31 tonnes river rock per m³). Additional recruitment of sediment in the Star City inlet would occur during the course of the license term.
- In order to remove sediment from the Star City Creek inlet, a dredging plan would be required (see Condition No. 24 - Reservoir Dredging).

Figure 2-2. Star City Creek Delta – McCloud Reservoir



Rationale for selecting 150 t yr⁻¹ gravel/coarse sediment introduction rate.

The amount of gravel/coarse sediment recommended for augmentation was determined based on data provided in the FLA as well as practical considerations.

Step 1: Determine unimpaired annual coarse sediment contribution to McCloud Reservoir.

The total estimated coarse sediment input from the Upper McCloud River including reservoir tributaries (but excluding Mud and Huckleberry Creeks) = **21,518 t yr⁻¹** (TM-68, p. 14). Adding in the small amount of coarse sediment generated from Mud and Huckleberry Creeks results in an unimpaired coarse sediment contribution of **25,028 t yr⁻¹** (TM-68, p. 14) to McCloud Reservoir. All of this sediment is presumed to originate from the total connected source area draining into McCloud Reservoir. This number compares well with information in the FLA that states that between 1964 and 2007, approximately 4,134,500 m³ of sediment accumulated in McCloud Reservoir, of which an estimated 937,400 tonnes is coarse sediment > 2 mm (PG&E, 2009, p. 3-4). The cited value of 937,400 tonnes of coarse sediment accumulation was derived by adjusting the estimated proportional volume by a density of 1.31 tonnes per m³ (PG&E, 2009, p. 3-538). Over this 43 year period the average annual input of coarse sediment equates to 21,800 m³ yr⁻¹.

Step 2: Adjust annual coarse sediment contribution to approximate total amount contributed by Star City Creek Watershed.

Because the Star City Creek delta is proposed as the gravel/coarse sediment source and the conceptual idea for gravel/sediment augmentation is based on adding one additional tributary to the Lower McCloud River below the McCloud Dam, the total amount was adjusted to determine the amount of gravel/coarse sediment sourced by the Star City Creek Watershed.

Star City Creek Watershed (Hydrologic Unit Code (HUC) 7) area = 8,344 acres or 13.04 square miles.

The total connected source area (Upper McCloud River including reservoir tributaries and Mud/Huckleberry Creeks) 300.8 km² = 116 mi².

Star City Creek accounts for 11.2% of connected source area.

11.2% of 25,028 t yr⁻¹ = **2,803 t yr⁻¹** of sediment is delivered to McCloud Reservoir assuming uniform contributions.

Step 3: Adjust Star City Watershed annual input by Project flow regime.

The estimate of $2,803 \text{ t yr}^{-1}$ is adjusted to reflect the current flow regime in the Lower McCloud River. The unimpaired average summer base flows in the McCloud River below the McCloud Dam in August were equal to 869 cfs (PG&E, 2009, p. 3-50).⁵ The total volume of gravel/sediment from the Star City drainage area calculation is then adjusted for the new flow regime, assuming that the post-license average August base flow will be near 200 cfs or 23 percent of the original August unimpaired flow.

Adjusting the Star City Creek input of $2,803 \text{ t yr}^{-1}$ by a factor of 0.23 equates to a proposed gravel introduction rate of **645 t yr^{-1}** . This number is comparable to the amount of gravel being introduced to each reach for the Pit 3, 4, & 5 Project (FERC No. 233). This amount was rounded down to 600 t yr^{-1} which represents the maximum amount of gravel/coarse sediment that could be introduced to the McCloud River in any given year.

Step 4: Practical adjustment to reflect small target reach and economic considerations.

The general concept is to add one tributary to the Lower McCloud River to augment gravel/sediment in the reach of river below the McCloud Dam. The Pit 3, 4, 5 Project requires introducing 600 t yr^{-1} to 3 different target reaches that total about 5 miles in length. Because the McCloud is a smaller river with a small contributing source area, the minimum introduction rate was adjusted downward to **150 t yr^{-1}** .

⁵ The month of August was chosen randomly from the unimpaired flow data.

Size Class	Size Range (mm)
Sand	<2
Very Fine Gravel	2-4
Fine Gravel	4-6
Fine Gravel	6-8
Medium Gravel	8-11
Medium Gravel	11-16
Coarse Gravel	16-22
Coarse Gravel	22-32
Very Coarse Gravel	32-45
Very Coarse Gravel	45-64
Small Cobble	64-90
Medium Cobble	90-128
Large Cobble	128-180
Very Large Cobble	180-256
Small Boulder	256-512
Medium Boulder	512-1024
Large Boulder	1024-2048
Very Large Boulder	2048-4096

From Wolman Pebble Count Protocol

Large Woody Debris:

Project effects on transport of LWD on aquatic habitats were identified as a potential resource management issue. Although this entire reach is heavily forested, existing LWD inventories show that little LWD is stored in the Lower McCloud River channel between McCloud Dam and Shasta Lake (CRMP 2001; personal communication, S. Bachmann, Hydrologist, USFS, McCloud, CA, and J. Fitzgerald, Engineering Geologist, North State Resources, Redding, CA, September 10, 2008). Given the existing and expected amounts of LWD in this portion of the river, LWD primarily functions as:

- Aquatic habitat along the channel margins;
- Riparian habitat where it rafts up onto surfaces above the low-flow channel;
- Aquatic habitat, in rare cases where wood is retained in the active portion of side channels.

The primary purpose of this measure is to provide a framework and guidelines for removal of LWD from McCloud Reservoir and placement into the Lower McCloud River to increase the amount of habitat in these areas.

Terrestrial Wildlife and Botany

Conditions No: 25, 26

a. Guidance:

Shasta-Trinity National Forest Land and Resource Management Plan Forest Goals

- Integrate multiple resource management on a landscape level to provide and maintain diversity and quality of habitat that support viable populations of plants, fish and wildlife (4-4.2).
- Monitor and protect habitat for federally listed threatened and endangered, (T&E) and candidate species. Assist in recovery efforts for T&E species. Cooperate with the State to meet objectives for State-listed species (4-5.32).
- Manage habitats for sensitive plant and animals in a manner that will prevent any species from becoming a candidate for T&E status (4-5.33).
- Cooperate with Federal, State, and local agencies to maintain or improve wildlife habitat (4-6.44).
- Maintain natural wildlife species diversity by continuing to provide special habitat elements within Forest ecosystems (4-6.45).

Standards and Guidelines

- Survey and Manage will provide benefits to amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens and arthropods (4-12).
- Manage known sites; Survey prior to ground disturbing activities; Extensive surveys (4-12).
- Manage Recreation Areas to minimize disturbance to species (4-13).
- Cliffs, Caves, Talus and Rock Outcrops. Manage these unique habitats on a site-by-site basis to protect their existing micro environments and the viability of dependant animal and plant species. Manage nearby water sources to perpetuate natural cave processes (4-14.2b).
- Provide connecting travel corridors for wildlife species, particularly late-successional dependent species, by using Riparian Reserves and silvicultural prescriptions (4-14.2h).
- Map, record, and protect essential habitat for known and newly discovered sensitive and endemic plant species until conservation strategies are developed (4-14.4a).
- Analyze the potential effects of all ground-disturbing projects on sensitive and endemic plants and their habitat. Mitigate project effects to avoid a decline in species viability at the Forest level (4-14.4b).
- Monitor the effects of management activities on sensitive and endemic plants. If monitoring results show a decline in species viability, alter management strategy (4-14.4c).

- Coordinate sensitive plant inventory and protection efforts with the CDF&G, the U.S. Fish and Wildlife Service, the Nature Conservancy, the California Native Plant Society, and other concerned agencies, organizations, and adjacent landowners (4-15.4e).
- Maintain riparian area values, particularly when locating and constructing new roads and trails (4-25.17b).
- Identify and treat riparian areas that are in a degraded condition (4-25.17c).
- Minimize accidental electrocution of raptors by ensuring that newly constructed overhead power lines meet safe design standards (4-29.25a).
- Manage habitat for neotropical migrant birds to maintain viable population levels (4-29.25c).
- Develop interpretive view/sites for wildlife viewing, photography, and study (4-29.25d).
- Maintain and/or enhance habitat for TE&S species consistent with individual species recovery plans (4-30.h).
- Survey and evaluate habitat for TE&S species at the project level in coordination with the USFWS. Place in Prescription VII or Prescription IX and/or require limited operating periods or other restrictions as appropriate (4-30.i).
- Manage and protect potential bald eagle and peregrine falcon sites for future occupancy (4-30.j).
- Require limited operating periods adjacent to active goshawk nesting sites until the young have fledged (4-30.k).

Management Prescriptions

Late-Successional Reserves

- Shasta salamander- this species is very narrowly distributed, occurring only in localized populations on the Shasta-Trinity National Forest. Only a small part of its range is included with Habitat Conservation Areas identified by the Interagency Scientific Committee. It occurs in association with limestone outcrops, protected by an overstory canopy. All known and future localities must be delineated and protected for timber harvest, mining, quarry activity, and road building within the delineated site, and a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, should surround the outcrop. Additional surveys conducted using a standardized protocol must be undertaken to identify and delineate all occupied sites within the species range (4-41).
- Evaluate impacts of nonnative species (plant and animal) currently existing within reserves, and develop plans and recommendations for eliminating or controlling nonnative species that are inconsistent with Late Successional Reserve objectives. These will include an analysis of the effects of implementing such programs to other species or habitats within Late Successional Reserve (4-41).

Bald Eagles

- Maintain and/or enhance the habitat necessary to provide for 32 pairs of bald eagle (4-4.6).
- Survey populations and habitat annually to determine status and trend (4-44.7).
- Update or develop and implement management plans for all known and newly discovered nesting and roosting sites. Such plans will have site specific management direction established for the benefit of the bald eagles and will be coordinated with the bald eagle Recovery Plan (4-44.8).

Peregrine Falcons

- Maintain and/or enhance the habitat necessary to provide for 9 pairs of peregrine falcons (4-44.9).
- Survey populations and habitat annually to determine status and trend (4-44.10).
- Develop and implement specific territory management plans for all known and future sites necessary for population viability. These plans will be coordinated with the Peregrine Falcon Recovery Plan (4-44.11).

Goshawks

- Exclude management activities within occupied nest stands during the nesting period (4-44.12).

Sensitive Plants

- Known sensitive plants and those identified in the future, will be afforded the protection necessary to maintain or increase populations. Suitable habitat will be maintained or increased at a level that will assure the successful survival of the species throughout their range (4-44.14).

Riparian Reserves and Key Watersheds Aquatic Conservation Strategy

- 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 (4-53.2).

- Maintain and restore the physical integrity of the aquatic system, including shorelines, banks and bottom configurations (4-53.3).
- Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands (4-53.7).
- 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 (4-53.8).
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrates, and vertebrate riparian dependent species (4-53.9).

Lands

- For hydroelectric and other surface water development proposals, give priority emphasis to instream flows and habitat conditions that maintain or restore resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. 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 (4-57.7b).

General Riparian Area Management:

- Herbicides, insecticides, and other toxicant, and other chemicals shall be applied only in a manner that avoids impacts that retard or prevent attainment of Aquatic Conservation Strategy Objectives (4-58.8c).

McCloud River/Pit Management Area Supplemental Management Direction:

- Maintain or improve selected habitats for black bear, spotted owls, deer, elk and turkey (4-123.12).
- Maintain or improve selected habitats for deer, elk, turkey, bear, bald eagles, peregrine falcons, and spotted owls (4-127.8).

Monitoring Action Plan:

- Evaluate Forest plant communities for botanical diversity and health including threatened, endangered and sensitive (TE&S) plants (5-5).
- Inland coldwater fish population surveys; Instream fish habitat improvement structures; warmwater fish habitat improvement structures (5-9).

- Effectiveness monitoring of management indicator assemblage populations: late seral stage, opening and early seral stage, multihabitat, snag and downed log, riparian, aquatic, hardwoods, and cliffs, caves, talus and rock outcrop assemblages (5-16).
- Determine trends of bald eagle breeding populations; Evaluate trends in habitat capability for nesting birds (5-17).
- Determine Goshawk population and habitat trends (5-17).
- Verify Peregrine Falcon nesting and reproductive success (5-17).
- Ensure compliance of Forest Projects with spotted owl standards; Determine population and habitat condition trends (5-18).
- Determine Furbearers population and habitat trends within designated fisher and pine marten habitat (5-18).

b. Rationale to support license condition(s):

Wildlife

While the Project lies within Late Successional and Administratively Withdrawn land prescriptions (LRMP Land Allocation map) and should experience less disturbance from many of the land management activities (wood-cutting, timber harvest, etc.) more common on Matrix lands, Project recreation use is expected to grow by as much as 350% (TM-37, Tables 17-20, p. 23-25) over the next license term, which could create additional noise and activities near roosting, foraging or nesting sites. As a result, the previously listed Peregrine Falcon and Bald Eagles will require monitoring to assure populations remain stable or continue to grow as recreation use increases. Regular monitoring and periodic survey throughout the new license period will capture any changes or trends in the populations or individual nest sites, and allow for modifications, if needed, to protect these species.

The Project facilities and reservoirs attract roosting bats, as documented in *Special Status Bats in Proposed Construction and Other Project Areas (TM-71)*. Study results indicate that 13 species of bats were identified during Study Plan surveys, including three species of Forest Service sensitive bats (pallid bat; *Antrozous pallidus*, Townsend's big-eared bat; *Corynorhinus townsendii townsendii*, and western red bat; *Lasiurus blossevillii*) (TM-71, p. 9). Key sites were located around the McCloud Reservoir and near the Pit 7 dam and Afterbay. Under the new license, existing and proposed recreation development and on-going maintenance and construction at the Project facilities will create disturbance at these sites (e.g. new recreation day-use sites around McCloud Reservoir, micro-hydro generation at Pit 7 dam), and could result in impacts to the existing populations. These areas will require regular monitoring and periodic survey both to avoid impacts to day and night roost sites and foraging patterns, and to map track any changes in populations and/or roosting locations. While natural roost sites will be protected, it is possible that facility modifications at the dams could

impact man-made roost sites. In these instances, new roosting locations may be required to provide alternate roost sites before existing facility can be changed or removed. Monitoring will ensure that alternate sites are adequate and occupied. Similar concerns exist for sites near roadways, powerlines and Project infrastructure that are maintained or replaced during the new license term.

Additional threatened, endangered, sensitive and special status species present with the Project area include: northern spotted owl, terrestrial mollusks, northern goshawk, northwestern pond turtle, shasta salamander, and habitat for willow flycatcher, valley elderberry long-horned beetle, and various forest carnivores. Recreation development, facility reconstruction, and road maintenance and reconstruction is proposed under the new license conditions near locations where shasta salamanders were found and goshawks were detected. Previous dispersed use has occurred in and near suitable willow flycatcher habitat around Iron Canyon reservoir, and other riparian species are subject to effects from erosion, sedimentation, recreation use, and flow changes.

As changes within the Project area occur (both construction and use increases) potential exists for unintended consequences to these species. Regular monitoring and periodic survey will allow impacts to be detected, and mitigations developed before species or habitat is affected. Laws and regulations require special mitigation measures for listed and special status species.

Botanical:

The Licensee and the Forest Service are required to comply with the Endangered Species Act, the National Environmental Policy Act, the National Forest Management Act, and current Forest Service policy direction when operating on NFS lands. There are a number of special status botanical species within the Project and Project-affected area, and potential Project effects on these species must be considered.

During the spring and summer of 2007 and 2008, multiple surveys were conducted to locate and map terrestrial plant populations potentially affected by the Project: *Data Summary for Special-Status and Special-Interest Plant, Lichen, and Fungi Species in the Study Area (TM-12)*, *Invasive Plant Species Data Summary (TM-13)*, *Summary of Vegetation Mapping Survey Results in the Project Area (TM-19)*, *Vegetation Mapping Survey Results in the Proposed New Construction Project Areas (TM-64)*, *Assess Potential Ongoing Project Affects on Riparian Vegetation Community Types in the Project Area (TM-65)*. The study found and mapped nine special-status plant species at 47 locations, including one newly described taxon: long-fruit jewelflower.

In addition to sensitive species, invasive and noxious species 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. Invasive species were those identified as “noxious” and have a pest rating by the California Department of Food and Agriculture (CDFA), those

species identified and rated on the California Invasive Plant Council list (Cal-IPC), and those identified as a Forest Service Species of Concern by the Shasta-Trinity National Forest (TM-13 p. 6). Licensee recorded and mapped 25 invasive plant species at 1,155 locations in the Project area during surveys in 2007 and 2008.

With the relicensing of the McCloud-Pit Project, ground disturbing activities (recreation developments, road maintenance, micro-hydro construction) and flow modifications will be on-going in the Project area creating potential impacts to the existing populations of special status species, and the possible introduction or spread of invasive species. While new impacts are possible, previously disturbed areas (borrow areas, tunnel spoil piles, etc.) are also a concern and have not received appropriate revegetation resulting in erosion, and colonization by invasive species that crowd out native plants and provide additional vectors for spread. Introduction of invasive species may occur through the use of inappropriate plant material during replanting efforts, or by inadvertent introduction on equipment and tires. Culturally significant plants should also be used to protect continued traditional use where these plants were historically found.

In addition, Licensee vegetation management under/along Project power and transmission lines has conflicted in the past with Forest Service direction for vegetation treatment (including fuels), and treatments in riparian reserves. It will be necessary for the Licensee to have an approved plan to address all construction, reconstruction and maintenance work.

Forest Service sensitive species found during the 2007-2008 surveys include:

- Shasta eupatory (*Ageratina shastensis*),
- Butte County morning glory (*Calystegia atriplicifolia* ssp. *buttensis*),
- Northern clarkia (*Clarkia borealis* ssp. *borealis*),
- Butte County fritillary (*Fritillaria eastwoodiae*),
- English Peak greenbriar (*Smilax jamesii*);

Special interest species documented in the study area include:

- Howell's lewisia (*Lewisia cotyledon* var. *howellii*),
- woolly meadowfoam (*Limnanthes floccosa* ssp. *floccosa*),
- silvery false-lupine (*Thermopsis gracilis* var. *gracilis*)
- long-fruit jewelflower (*Streptanthus longisiliquus*),

High and Medium Priority Invasive species documented in the study area include:

- Yellow star-thistle (*Centaurea solstitialis*)
- Bull thistle (*Cirsium vulgare*)
- Perennial sweet pea (*Lathyrus latifolius*)
- Black locust (*Robinia pseudoacacia*)
- Himalayan blackberry (*Rubus discolor*)
- Pale yellow iris (*Iris pseudacorus*)

- Spreading hedgeparsley (*Torilis arvensis*)
- Puncturevine (*Tribulus terrestris*)
- Tree of heaven (*Ailanthus altissima*)
- Spotted knapweed (*Centaurea maculosa*)
- Field pepperweed (*Lepidium campestre*)
- Dyers woad (*Isatis tinctoria*)
- Cut-leaved blackberry (*Rubus laciniatus*)
- Cheat grass (*Bromus tectorum*)
- Canada thistle (*Cirsium arvense*)
- Wooley mullein (*Verbascum Thapsus*)
- Scotch broom (*Cytisus scoparius*)
- Common St. Johnswort (*Hypericum perforatum*)
- Gypsyflower (*Cynoglossum officinale*)
- Wild teasel (*Dipsacus fullonum*)
- Tall fescue (*Festuca arundinacea*)
- English ivy (*Hedera helix*)
- Purpleanther field pepperweed (*Lepidium heterophyllum*)
- Spanish broom (*Spartium junceum*)

For the 47 populations of Special-Status or Special Interest plant species within the Project or Project-affected area, monitoring and periodic surveys are necessary in order to meet Forest Service requirements to maintain viable populations and their habitat for the purpose of eventual de-listing. Mapping and monitoring will also provide information necessary to minimize or eliminate direct and indirect impacts from management activities on Special-Status or Special Interest 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.

The Forest Service is required to control the spread of invasive species by completing inventories based on Regional protocols, evaluate treatment options relative to the risk of spread, and monitor invasive species populations. Monitoring and periodic surveys will be needed to track the 25 known populations of invasive species and control their spread. Treatment options should be developed where populations can be eliminated. All projects activities involving ground disturbance and revegetation (planting or seeding) must adhere to regional native plant policies. The “Vegetation and Invasive Weed Management Plan” license condition will assist in meeting this requirement on NFS lands affected by the Project.

Roads, Facilities, Hazardous Substance

Conditions 28-29

a. Guidance:

Shasta-Trinity Land and Resource Management Plan

Forest Goals

- Manage the Forests' transportation system to facilitate resource management activities, protect wildlife, meet water quality objectives and provide recreational access (4-4.8).
- Maintain or improve soil productivity and prevent excessive surface erosion, mass wasting, and cumulative watershed impacts (4-5.29).
- Maintain or improve water quality and quantity to meet fish habitat requirements and domestic use needs (4-6.39).
- Maintain water quality to meet or exceed applicable standards and regulations (4-6.40).

Standards and Guidelines

- Perform road maintenance activities to meet a variety of management objectives. Schedule road maintenance activities according to the following priorities:
 1. to provide for user safety;
 2. to meet contractual and legal obligations;
 3. to protect natural resources; and
 4. to provide an efficient transportation system (4-16.7a).
- Assign road maintenance levels to each system road or road segment based on traffic management and use objectives. Maintain all roads to at least Maintenance Level 1(4-17.7b).
- 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 (4-17.7c).
- Use a full range of vegetative management techniques along roads, trails, and transmission corridors with emphasis on non-chemical means (4-17.7d).
- Coordinate road improvement and maintenance projects with other Forests, State and local agencies and cooperators as needed (4-17.7h).
- Upgrade the surfacing on the Forests' road system as necessary to protect the road and other resource values (4-17.7i).
- Use landslide hazard information, in addition to that obtained during necessary on-site geologic investigations, in the design and location of any facility or

structure (4-20.w).

- Implement Best Management Practices (BMP's) for protection or improvement or improvement of water quality, as described in "Water Quality Management for National Forest System Lands in California" for applicable management activities. Determine specific practices or techniques during project level planning using information obtained from on-site soil, water, and geology investigations (4-25.18c).
- Assess the potential impacts of vegetation management, road construction and related activities on slope stability and watershed condition for areas identified as moderately or highly unstable (4-25.18i).

Management Prescriptions Late Successional Reserves

- Road maintenance may include felling hazard trees along rights-of-way. Leaving material on-site should be considered as an alternative to felling (4-39).

Riparian Reserves and Key Watersheds Aquatic Conservation Strategy

- Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must retain 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 (4-53.4).
- 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 (4-53.5).
- For each existing or planned road, meet Aquatic Conservation Strategy objectives by:
 1. Minimizing road and landing locations in Riparian Reserves;
 2. Completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves;
 3. Preparing road design criteria, elements, and standards that govern construction and reconstruction;
 4. Preparing operation and maintenance criteria that govern road operation, maintenance, and management;
 5. Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow;
 6. Restricting sidecasting as necessary to prevent the introduction of sediment to streams;
 7. Avoiding wetlands entirely when constructing new roads (4-54, 55.2b).

- New culverts, bridges and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of a crossing failure (4-55.2.d).
- Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping will increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes (4-55.2.e).
- Provide and maintain fish passage at all road crossings of existing and potential fish bearing streams.
- Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy objectives. As a minimum, this plan shall include provisions for the following activities:
 1. Inspections and maintenance after storm events;
 2. Inspections and maintenance during storm events;
 3. Road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources;
 4. Traffic regulation during wet periods to prevent damage to riparian resources;
 5. Establish the purpose of each road by developing the Road Management Objective (4-55.2.g).

Monitoring Action Plan

- Cumulative impacts on stream channel condition and water quality (5-12)
- Implementation of best management practices (BMPs) (5-12).
- BMP's monitoring for effectiveness of BMPs for the protection of water quality, riparian areas, soil erosion, and slope stability (5-12).

Best Management Practices

Road and Building Site Construction

- 1.1 General Guidelines for the Location and Design of Roads
- 1.2 Erosion Control Plan
- 1.3 Timing of Construction Activities
- 1.4 Road Slope Stabilization (Preventative Practice)
- 1.5 Road Slope Stabilization (Administrative Practice)
- 1.6 Dispersion of Subsurface Drainage from Cut and Fill Slopes
- 1.7 Control of Road Drainage
- 1.8 Constraints Related to Pioneer Road Construction
- 1.9 Timely Erosion Control Measures on Incomplete Road and Stream crossing

Projects

- 1.10 Construction of Stable Embankments
- 1.11 Minimization of Sidecast Material
- 1.12 Servicing and Refueling Equipment
- 1.13 Control of Construction in Riparian Management Zones
- 1.14 Controlling in-channel Excavation
- 1.15 Diversion of Flows Around Construction Sites
- 1.16 Stream crossings on Temporary Roads
- 1.17 Bridge and Culvert Installation
- 1.18 Regulation of Riparian Gravel Borrow Areas
- 1.19 Disposal of Right-of-Way and Roadside Debris
- 1.20 Specifying Riprap Composition
- 1.21 Water Source Development Consistent with Water Quality Protection
- 1.22 Maintenance of Roads
- 1.23 Road Surface Treatment to Prevent Loss of Materials
- 1.24 Traffic Control During Wet Periods
- 1.25 Snow Removal Controls to Avoid Resource Damage
- 1.26 Obliteration of Temporary Roads
- 1.27 Restoration of Borrow Pits and Quarries
- 1.28 Surface Erosion Control at Facility Sites

Watershed Management

- 1.3 Protection of Wetlands
- 7.6 Water Quality Monitoring
- 7.7 Management by Closure to Use (Seasonal, Temporary, and Permanent).

Forest Service Traffic Levels:

	A	B	C	D
Flow	Free flowing with adequate parking facilities.	Congested during heavy traffic such as during peak logging or recreation activities	Interrupted by limited passing facilities, or slowed by the road condition.	Flow is slow or may be blocked by an activity. Two-way traffic is difficult and may require backing to pass.
Volumes	Uncontrolled; will accommodate the expected traffic volumes	Occasionally controlled during heavy use periods	Erratic; frequently controlled as the capacity is reached.	Intermittent and usually controlled. Volume is limited to that associated with the single purpose.
Vehicle Types	Mixed; includes the critical vehicle and all vehicles normally found on public roads.	Mixed; includes the critical vehicle and all vehicles normally found on public roads.	Controlled mix; accommodates all vehicle types including the critical vehicle. Some use may be controlled to vehicle type.	Single use; not designed for mixed traffic. Some vehicles may not be able to negotiate. Concurrent use traffic is restricted.
Critical Vehicle	Clearances are adequate to allow free travel. Overload permits are required.	Traffic controls needed where clearances are marginal. Overload permits are required.	Special provisions may be needed. Some vehicles will have difficulty negotiating some segments.	Some vehicles may not be able to negotiate. Loads may have to be off-loaded and walked in.
Safety	Safety features are a part of the design.	High priority in design. Some protection is accomplished by traffic management.	Most protection is provided by management.	The need for protection is minimized by low speeds and strict traffic controls.
Traffic Management	Normally limited to regulatory, warning, and guide signs and permits.	Employed to reduce traffic volume and conflicts.	Traffic controls are frequently needed during periods of high use by the dominant resource activity.	Used to discourage or prohibit traffic other than that associated with the single purpose.
User Costs	Minimize, transportation efficiency is important.	Generally higher than "A" because of slower speeds and increased delays	Not important; efficiency of travel may be traded for lower construction costs.	Not considered.
Alignment	Design speed is the predominant factor within feasible topographic limitations.	Influenced more strongly by topography than by speed and efficiency.	Generally dictated by topographic features and environmental factors. Design speeds are generally low.	Dictated by topography, environmental factors, and the design and critical vehicle limitations. Speed is not important.
Road Surface	Stable and smooth with little or no dust, considering the normal season of use.	Stable for the predominant traffic for the normal use season. Periodic dust control for heavy use or environmental reasons. Smoothness is commensurate with the design speed.	Many not be stable under all traffic or weather conditions during the normal use season. Surface rutting, roughness, and dust may be present, but controlled for environmental or investment reasons.	Rough and irregular. Travel with low-clearance vehicles is difficult. Stable during dry conditions. Rutting and dusting controlled only for soil and water protection.

Forest Service Road Maintenance Level Descriptions

Maintenance levels 1-5 (operational and objective) are described in the following paragraphs. Roads assigned to maintenance levels 2-5 are either constant service roads or intermittent service roads during the time they are open to traffic.

Level 1. Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are “prohibit” and “eliminate.”

Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Level 2. Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log-haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

Level 3. Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either “encourage” or “accept.” “Discourage” or “prohibit” strategies may be employed for certain classes of vehicles or users.

Level 4. Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is “encourage.” However, the “prohibit” strategy may apply to specific classes of vehicles or users at certain times.

Level 5. Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is “encourage.”

For the Project and Project-affected roads, the Forest Service has completed a review of the Road Management Objectives. Final Objectives were designated and signed on December 29, 2009

b. Rationale to support license condition(s):

At the time of Project development in 1961, much of the Project area (McCloud Reservoir, Lower McCloud River, Iron Canyon Reservoir, Pit 6, and Pit 7) was inaccessible to the public due to the checkerboard ownership with large private landholders, and the lack of cooperative roads serving the land base. In the 45+ years since the Project was built, the public has enjoyed recreation opportunities via the road system developed for Project construction. Much of the surrounding land is still held by large private landholders, and timber remains the primary focus for private land uses. In addition to the Rationale provided below, the Forest Service May 19, 2009, response to Licensee's Draft License Application provides substantial discussion on Project roads and the need for mitigations, and is incorporated here by reference.

Project and Project-affected roads itemized below are from Table 1-3 in the Road and Transportation Facility Management License Condition No. 29.

McCloud Reservoir Roads

General Road Information for McCloud Reservoir and Vicinity:

In these preliminary conditions, the Forest Service, in cooperation with the Licensee, has developed a proposal to increase the number of developed recreation sites around McCloud Reservoir to accommodate the dispersed use that has been occurring. The proposal includes three new day uses sites in addition to the Boat Ramp, and three additional water access sites. This should encourage those who currently travel to the Boat Ramp for non-boating use, to use other sites where amenities (toilets, parking, picnic tables) will be developed. This should help to balance traffic around the reservoir and reduce impacts from unmanaged use.

Roads 38N11 - Hawkins Creek (Segment 1), and 38N04Y - Star City:

In August of 1963, the Hearst Corporation granted permission to the Licensee to construct and/or relocate portions of the International Paper (IP) road down the west side of the McCloud River. This road was used for logging Hearst Corp. lands. Documents indicate that roughly six miles of the road would be inundated by the McCloud reservoir under construction at the time. In addition, Hearst granted permission to the Licensee to construct a second access road on the east side of the reservoir for Project development (see TM-63, documents 2439-02-0002, 2438-02-0012, and 2439-02-0005). Because alternate

access did not exist to the north, Hearst allowed temporary use of their private road #1 leading north to Highway 89, for Licensee construction and logging needs associated with the Project. While use of portions of the Eastside (now designated 38N04Y) and Westside (now designated 38N11) roads were perpetual, use of road #1 was temporary, until alternate access could be developed from Tarantula Gulch to the end of the County Road in Squaw Valley.

To the south, the Hearst Corporation granted permission to the Licensee to construct a connecting road from the end of the existing road near Hawkins Creek, to the junction of the eastside and westside roads at the top of McCloud Dam. This new segment of road provided access for the Licensee to their stream gage at MC-7, and connected the two road systems (north and south) for the first time.

Development of the reservoir coincided with a large Land-for-Land Exchange being negotiated with the Forest Service. In 1955, the Hearst Corporation and the Forest Service began negotiations to consolidate their respective ownerships to allow for ease of timber management. (USDA, 1963b) Because the Forest Service did not hold any legal road access to the McCloud River corridor, the Forest Service chose to select lands in the Lower McCloud River (below the future reservoir) and Squaw Valley Creek drainage where limited road access was possible from the Squaw Valley Creek road. As the timber appraisal for the land exchange noted: “There have been no public roads into this area in the past but, as a result of this exchange, rights of way are being obtained...”

With the filing of the FERC license, the planned land exchange would have eliminated all public land and the possibility of public access to the new reservoir. Because recreation was a condition of the license, the Hearst Corporation and the Forest Service agreed, in a 1963 Memorandum of Understanding (MOU,) that the Hearst Corporation would donate approximately 95 acres of land (with associated public road rights) around the newly formed reservoir to the Forest Service in order to provide for public access and recreation at the new reservoir. This MOU allowed the negotiated Land Exchange to proceed consistent with the license, and was included in the Exchange documentation (USDA, 1963b).

As a result of the land-exchange, all lands, except the donated 95-acre strip of NFS land surrounding the southern half of the reservoir, are privately held by the Hearst Corporation, who blocks public access with locked gates. Visitors entering the Reservoir area from the north have six options, five of which are Project destinations (Tarantula Gulch boat ramp and locations around the reservoir edge, Ah-Di-Na, Star City, the base of McCloud Dam, or Ash Camp). Surveys conducted for the re-license of Project 2106 recorded over 18,000 vehicles traveling to the Reservoir for the 2007/08 season, with less than 6% traveling beyond the Project to the south (TM-22, A5-5 to 9). While the McCloud Boat Ramp is by far the most popular destination, with as much as 68% of all use, Star City, Ah-Di-Na and Ash Camp have a roughly equal share of the remaining Project traffic.

The Final License Application notes that “roads are categorized consistent with FERC’s criteria that Project roads are only those used primarily for Project purposes” (PG&E, 2009 p. 3-404). The Forest Service agrees with this standard and believes that several additional roads meet this criteria based on the studies conducted for the relicense.

While the eastside road to Star City (38N04Y) is designated as a Project Road in the Final License Application, the Licensee asserts that the westside road (38N11 Segment 1) is only Project-related since visitors may only stop to view the Project on their way to other destinations. The study data does not support that conclusion, as less than 6% of the users travel or enters south of the Project. Because locked gates block access to the few remaining roads around the reservoir, and Hearst employees have alternate access to their lands, the vast majority (94%) of vehicles are traveling “primarily for Project purposes.”

For reasons above, the Forest Service has determined that the portion of Forest Road 38N11 (Segment 1) from the County road junction to the Tunnel Spoil Pile (14.25 miles) is a Project Road and should be designated as such. The Star City road (38N04Y) is currently designated a Project Road within the Project boundary and should remain as such.

Road 38N81 - Brown Trout (a.k.a. McCloud or Tarantula Gulch Boat Ramp)

When the Forest Service completed the final connecting segment from Tarantula Gulch to the end of County Road MC1N01, the public had road access to view the newly minted McCloud Reservoir. However, it was not until 1969 that the Hearst donation of 95 acres around the southern half of the reservoir was completed (Grant Deed, dated 5-29-1969, recorded Shasta County Book 991, p. 566), and legal access was available to the reservoir edge. In 1975 the Licensee granted an easement to the Forest Service to construct a Boat Ramp at Tarantula Gulch so the public could access the water surface (TM-63, #2438-02-0049). This road is currently designated a Project Road and within the Project boundary and should remain as such. Maintenance for this road may be shared between the Hearst Corporation (who has access beyond the ramp through a locked gate) and the Licensee, however the Forest Service believes that all public use is for Project purposes, and therefore the responsibility of the Licensee.

Road U38N11X – Road to Base of McCloud Dam

Although this access road has historically been strictly for Licensee use, study data has shown that the dam is a popular fishing location and occasionally used as a boating put-in for whitewater trips on the Lower McCloud River. As a result, the Licensee, in collaboration with the Forest Service and other parties, has agreed that this location will be developed for public recreation use under the new license. The road is currently designated a Project Road and will remain as such, but will be used as a public access road for recreation purposes in addition to facility maintenance needs.

Lower McCloud River Roads

General Road Information for Lower McCloud River and Vicinity:

The March 1963, MOU between Hearst and the Forest Service included the assurance of road easements across roads previously constructed by the Licensee, as well as the connecting route to the Lower McCloud River via Battle Creek and Skunk Hill.

By August 1963, the Hearst Corporation had granted rights-of-way to the Licensee to access stream gages along the McCloud River drainage near Big Springs, Angel Creek, the Wyntoon estate, and Ah-Di-Na. After acquiring lands along the Lower McCloud River in the land exchange, in 1966 the Forest Service issued a Special Use Permit to the Licensee for the Ah-Di-Na gage, and a fence to protect the site from the soon-to-be-developed campground.

With the completion of McCloud Dam and the development of public access below the reservoir to Hawkins Creek, and over Skunk Hill to Ah-Di-Na, the Forest Service understood that facilities would be needed to accommodate the new public use that would follow Project development. In 1963, the Forest Service completed the “Stage 2 Multiple Use Impact Report (MUIR) (USDA, 1963a) on Pit-McCloud Project” to evaluate and plan for the changes the Project would bring.

As noted above under the rationale for Recreation, the Forest Service identified Ah-Di-Na and Ash Camp as key recreation development sites for campgrounds to serve the Project recreation needs. Roads to both sites were developed by this time, and the proximity to the reduced flows of the McCloud River below the dam was anticipated to be a strong draw for fishing. As the document notes:

“Hawkins Creek would become accessible to anglers over the project access and maintenance roads.” “Access resulting from the construction of roads for the project will no doubt have the effect of increasing the recreational use of the area many fold” (USDA, 1963a, p. IV-C-3,4).

“This area includes the southern portion of the McCloud Reservoir, about three miles of the McCloud River and Hawkins Creek. All this area, previously closed to public access, is partially dependent for development upon completion of the pending land exchange with Hearst Corporation.”

“Initial development would consist of a 15-unit campground at Butcherknife Creek and a 15-unit Campground at Ah-Di-Na.”

Since the road over Skunk Hill to Ah-Di-Na will be a public road and connected to the west side road at Battle Creek, if the Hearst exchange is completed, excellent campground sites will become available for Forest Service development on the McCloud River. It would only be a three to four mile drive to the reservoir if the camper tires of the excellent river fishing.” (USDA, 1963a, p. IV-E-16 to 18).

Roads U38N11Y (Ash Camp) and 38N53 (Ah-Di-Na):

Both the Ash Camp (U38N11Y) and the Ah-Di-Na (38N53) roads end at the McCloud River. In addition to the campground, the Ash Camp road also serves as access to the Pacific Crest Trail which remains a non-Project feature that is Forest Service responsibility. For Ah-Di-Na, in addition to the campground and stream gage, the road also serves Hearst Corporation lands, and the Nature Conservancy. While most of the traffic use is Project-related according to traffic studies conducted for the relicense (TM-22, p. A5-7 and A5-9), the Forest Service has agreed to share maintenance of these two roads with the Licensee under a Road Maintenance Agreement to be developed prior to license issuance.

As requested by the Licensee, the Forest Service is willing to work with them outside of the licensing process and prior to development of our Final 4(e) License Conditions on a road agreement for the Ah-Di-Na road (FS road #38N53). This is because road maintenance responsibilities should also involve other parties such as the TNC, Hearst Corporation, and potentially others. Involvement of such a large group of people within the constraints of a FERC license issued solely to the Licensee can be cumbersome. However, should agreement not be reached, as discussed with the Licensee, this condition will be combined with other Project-affected roads in the Memorandum of Understanding (or other appropriate authorization) discussed in Road Condition No. 29, Part 5.

Iron Canyon Roads

General Road Information for Iron Canyon Area:

Documents developed at the time of the original Project license indicate that the main road from Big Bend north to the site of the new Iron Canyon Reservoir was a private road (now 38N11 Segment 2) constructed by Zamboni Lumber Company in cooperation with R.G. Watt and Rayner (USDA, 1963a, p. III-A-1).

Lands around the site of the proposed Iron Canyon Reservoir were mixed ownership with NFS land, R.G. Watt, Alice McCourt Lamm, and the estate of W.E. Lamm. Development of the reservoir inundated portions of the existing logging road used to log the R.G. Watt lands, and construction of a new road around the reservoir by the Licensee was necessary to replace landowner access. As a result, in 1963, the Licensee secured easements from both R.G.Watt et. al. and the Forest Service to construct connecting segments of a road leading from the Hawkins Creek Road (38N11) to the Oak Mountain Road (37N34).

This Iron Canyon Loop Road (37N78) provides access to the Hawkins Landing campground and boat ramp on Licensee lands, Deadlun Campground, 22 dispersed campsites on NFS lands, the Iron Canyon dam and MC-10 stream gage, the borrow pits for dam construction, and the dam control building. While the adjacent land owner is now Sierra Pacific Industries (SPI), private logging remains the only additional use served by this loop road around Iron Canyon Reservoir.

Road 38N11 - Hawkins Creek (Segment 2):

While it is clear that Segment 2 of the Hawkins Creek road (38N11) serves the Project, it also serves points north and south, and the private in-holdings on the east side of the reservoir. The Forest Service believes that this is a Project-affected road and will share maintenance with the Licensee under a MOU for the portion of this road from Kosk Creek Bridge, to the turn-off to the Iron Canyon Loop Road (37N78).

Road 37N78 – Iron Canyon Loop Road:

Traffic surveys conducted for the re-license, show fewer public visits to Iron Canyon Reservoir than McCloud Reservoir, with only 6,000 vehicles traveling up from the town of Big Bend (TM-22 p. A5-11). Unlike McCloud Reservoir, two un-gated roads lead from the loop-road to SPI lands to the west (see Figure A5-6, TM-22). Traffic entering the loop-road either from the north or south from 38N11, could be traveling to a non-Project destination. However, a review of both the traffic counter data and visual observation data indicates that for the matching dates, over 90% of the traffic is headed to Project facilities, while less than 10% travels up the two private SPI roads (TM-22, p. A5-13, March 2008 version*)⁶.

Because nearly all traffic (over 90%) that turns off the Hawkins Creek Road (38N11) to either the south or north shore of the reservoir is traveling to a Project facility, and for other Project reasons discussed above, the Forest Service has determined that the Iron Canyon loop road from the junction with Hawkins Creek road (38N11) to the junction with the Oak Mountain Road (8.54 miles) is a Project Road and should be designated as such.

37N27Y - Deadlun Road, 37N66Y -Hawkins Landing Road, 37N78A- MC-10 gage:

These roads are currently designated as Project roads and will remain as such. Contrary to the FLA (PG&E, 2009, Table 3.7.2-1, p. 3-405), maintenance responsibility for each of these roads will belong to the Licensee.

⁶ Note that the January 2009 version of table A5-5 appears to contain errors in traffic counter data for the Hawkins Landing and two SPI roads. While number of matching days and total vehicle counts remain the same for the three points of entry (Hawkins Creek Road, Oak Mountain Road, or the penstock road to James B. Black), the vehicle counts for several columns appear to more than double or triple between the 2008 DLA and the 2009 FLA documents.

Oak Mountain Roads and Vicinity

37N34- Oak Mtn. Road, 37N93, 37N93A, 37N93C- Ridge Road and spurs:

All of the roads serving this area of the Project were built by the Licensee for construction and operation of the Project infrastructure. They are currently designated as Project roads and will remain as such with maintenance responsibility by the Licensee. The Licensee currently and will continue to conduct snow removal on the Oak Mountain road throughout the year to access the Iron Canyon Dam operations. Because public comments and documented use from the study plan data show a strong public desire for a longer season of use at the reservoir, a new boat ramp is planned for the dam area that will provide access to the reservoir across Oak Mountain road during the fall and spring months when other access may be blocked by snow (see Recreation portion above).

Pit 6, Pit 7, Fenders Flat and Hogback Mountain

Road 34N17 – Fenders Ferry:

Traffic counters on the Fenders Ferry road leading into the Project recorded over 6,000 vehicles during the study period, with 29% heading past the Project facilities to points north (TM-22 Table A1-1, p. A1-4). While the Licensee notes that upgrades to Pit 7 Powerhouse and the Hogback Communication Site occurred during this period and therefore increased the volume, it is also true that these sites are Project facilities. The Forest Service proposes shared maintenance of this road with the Licensee under an MOU proportionate to the share of each parties use.

Roads 35N46 – Reynolds Basin, and 35N93 – Hog Back Mtn:

In 1963, a fire lookout was proposed on the Hogback Mountain site to provide visual fire detection in the newly developing Pit 6 and Pit 7 areas where Licensee's hydroelectric construction was occurring. The 1963 Multiple Use Impact Report states that:

“Little Round Mountain Lookout, although relatively close to the project area, is completely blocked out from viewing any of the critical areas by a ridge close to the lookout. Studies have been made of Hogback Mountain as a possible replacement site and results indicated this would be a highly desirable move to make. The U.S.F.S. and the State are in agreement that a lookout station should be built on Hogback Mountain as early as possible. A low standard road now exists to the proposed site” (USDA, 1963a, p. III-B-3).

Construction of the fire lookout was followed by installation of Communication equipment by the Licensee for regulation of the dams. Since Project construction in the 1960's, fire detection techniques have changed and lookouts have been abandoned, including the Hogback lookout. While the Licensee communication site remains, the Forest Service has

no further need for the site. Authorization for the Communication equipment is by Special Use Permit to the Licensee. The Forest Service proposes shared maintenance of these access roads (35N46 and 35N93) with the Licensee under an MOU proportionate to the share of each parties use.

Pit 6 Powerhouse Road, Road 35N23 – Pit 7 Road, Road 35N66 – Fenders Flat:

The road to Pit 6 and Pit 7 powerhouses are currently designated as Project roads and will remain as such with all maintenance by the Licensee. A limited amount of recreation development is planned for the Pit 7 reservoir (small parking area and trail) to allow for fishing access to the reservoir.

The access road to the Fenders Flat Afterbay dam (35N66) is a popular fishing access to the river and Afterbay below the dam, and new recreation facilities are proposed to manage this use. Improvement of the site with picnic tables, pedestal grills, vault toilet and trash receptacle and Project Patrol will improve the site and limit trespass onto the v-notch weir. This road is currently designated as a Project road and will remain as such with all maintenance by the Licensee.

Recreation, Signs, and Visual Quality Conditions

Conditions 30, 30a, 31 and 32

a. Guidance

Shasta-Trinity National Forest Land and Resource Management Plan **Forest Goals**

- Manage the Shasta-Trinity National Forest land base and resources to provide a variety of high quality outdoor recreation experiences (4-5.22).
- Encourage use of the Forests by the disadvantaged, physically challenged, and minorities (4-5.24).
- Develop or expand opportunities for scenic drives and vista points (4-5.37).
- Emphasize sport fisheries as a major recreation activity by expanding recreational fisheries opportunities (4-4.12).
- Maintain a diversity of scenic quality throughout the Forests, particularly along major travel corridors, in popular dispersed recreation areas, and in highly developed areas (4-5.38).

Standards and Guidelines:

- Trails will be maintained as needed for specific management objectives. Erosion control and primary access will receive priority (4-17.7j).
- Trails and trail bridges will be located, designed, constructed, and maintained so that they are suitable for the type of travel being served (4-17.7i).
- During licensing procedures, require Licensees to develop, operate, maintain, or replace recreational facilities. The need for these actions will be generated by the Project in proportion to its size (4-20.k)
- Bury penstocks and powerlines, where feasible and desirable, for resource mitigation. This mitigation will be determined by environmental analysis (4-20.o).
- Ensure that Environmental Impact Statements (EIS's) and/or Environmental Assessments (EA's) for hydroelectric projects evaluate and propose mitigation measures for secondary, and/or side effect of projects, such as crew housing, recreational needs, and law enforcement problems (4-20.p).
- During the project planning phase, consider the need for construction of trails, roads, and/or recreational facilities. The intent is to maintain or enhance current use and mitigate adverse impacts during construction (4-20.q).
- Licensee will adopt the Forests' design motif and standard details to coordinate recreational/visual standards (4-20.r).

- Manage activities and projects to meet adopted Visual Quality Objective (VQO's) of: (1) preservation (P); (2) retention (R); (3) partial retention (PR); (4) modification (M); or (5) maximum modification (MM). On rare occasions the adopted VQO may not meet management's objectives (i.e., catastrophic events). Any proposed modification to adopted VQO's must go through the NEPA process and be approved by the Forest Supervisor (4-27.21a).
- Manage developed recreation sites according to the Recreation Opportunity Spectrum (ROS) classes (4-23.a).
- Provide barrier free recreation facilities that are accessible to physically challenged individuals (4-24.c).
- Prepare objectives and prescriptions for managing vegetation in and around developed recreation sites (4-24.d).
- Provide interpretive services to direct visitors to their recreation destinations, to facilitate understanding of resource management activities, and to acquaint them with unique or special features on the Forests and the function of forest ecosystems (4-24.g).
- Continue to improve access to rivers, streams, and lakes for water-oriented recreation activities consistent with the Aquatic Conservation Strategy. Continue to provide access to hunting, fishing and wildlife viewing (4-24.m).
- Mitigate the physical impacts of increased, dispersed recreation use. Rehabilitation efforts should respond to resource damage to soils, water and vegetation (4-24.o).
- Encourage the private sector to help provide needed recreation sites, facilities, and services with a development level consistent with the environmental setting and appropriate studies (4-24.t).

Riparian Reserves and Key Watersheds:

- New Recreation facilities within Riparian Reserves, including trails and dispersed sites, should be designed to not prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impact to ensure that these do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives (4.56.a).
- Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities and/or specific site closures are not effective, eliminate the practice or occupancy (4-56.b).

McCloud River/Pit Management Area Supplement Management Direction:

- Where the opportunity arises, acquire public access along the McCloud River and Squaw Valley Creek (4-123.7).
- Continue to develop trail access to and along Squaw Valley Creek and the McCloud River (4-123.8).
- Evaluate whitewater boating opportunities (4-123.9).
- In cooperation with private landowners, Licensee and the DFG manage the Upper and Lower McCloud River and Squaw Valley Creek under a CRMP (4-123.11).
- Manage the Pit River for dispersed, water-oriented recreation opportunities (4-127.5).

Monitoring Action Plan (5-10, 11)

- Implementation of Recreation Opportunity Spectrum (ROS).
- Determine if recreation management direction meets expectations of visitors.
- Determine if critical recreation resource attributes for each ROS class are protected from degradation.
- Determine if actual use compares with projections.
- Condition of developed sites
- Recreation Management and facility costs.
- Determine effectiveness of off-highway vehicle plan in protecting Forest resources.

b. Rationale to support license condition(s):

Surveys and studies conducted for the relicensing of the McCloud-Pit Project support the Forest Service belief that an increasing number of Project users is translating into a strong demand for more and improved facilities with an extended season of use at the Project reservoirs and facilities. In addition to the Rationale provided below, the Forest Service May 19, 2009 response to Licensee's Draft License Application provides substantial discussion on Project nexus and the need for recreation mitigations, and is incorporated here by reference.

General

Many of the responses note the inadequate toilet facilities and lack of Project patrol. All day-use facilities should have restrooms, potable water, animal proof trash receptacles, and regular Project patrol to keep sites clean, safe and sanitary.

Fishing is the number-one use at the McCloud and Iron Canyon Reservoirs, much of it boat based. While the McCloud boat ramp is over capacity and the Hawkins Landing ramp lacks adequate slope, study results indicate that all reservoirs are still under capacity for surface use. For the McCloud Reservoir, results indicate that boat-based fishing concentrates in the upper arm of the reservoir (RL-S3, TM-23) while higher speed boating occurs in the main body of the reservoir. Occasional high-speed use on the upper reach of the McCloud Reservoir generates complaints from fishing boats, and several respondents requested slower speed limits in the upper reach to prevent conflicts and increase safety in the future. Higher speeds are not uncommon on Iron Canyon reservoir and conflicts may develop as facilities improve.

Winter storm debris on the reservoir surfaces accumulates at access points and at the boat ramps partially blocking access. Large floating debris also creates a boating hazard on reservoir surfaces.

Better management of reservoir surfaces with various access points, surface speed restrictions, and debris removal would allow surface use to continue to grow safely.

McCloud Reservoir

Surveys (RL-S1) indicate that nearly half of Project users are older (>55) day-use boaters who fish for over three hours at least twice a week. They are mostly from locations within Siskiyou County (McCloud, Mt. Shasta, Weed, etc.). While use was highest in the summer (80%), there is steady use during the spring (54%) and fall (44%), and even some winter use (10%). Several comments noted the congested ramp, limited parking, lack of potable water, lack of shoreline trails, and the need for a longer season of use. Results of the capacity study (TM-44, Table 1) confirmed this impression that the parking lot and boat ramp are over capacity in the summer months, and at or approaching capacity during the shoulder seasons.

Over-flights in 2007 and 2008 show boating use on McCloud Reservoir nearly every month of the year. Boats were observed all flight days from April – October and additionally on 50% of the flight days in February, and 60% of the flight days in March. Single flights were conducted in November and January and boats were recorded both days. If the season of available use is extended to include snow-free days in spring, fall and winter, it is clear that visitors will come.

Lack of facilities and limited access has also created conflicts at the single available dock. Several responses (RL-S1, TM-24) note the conflict between swimming, fishing, and boat launching at the McCloud Reservoir loading dock. Development of alternate day use sites, with access to the water, should alleviate the pressure and conflicts at the McCloud ramp from non-boating use.

In conjunction with fishing, camping is the next most desirable use for reservoir development. (RL-S1, TM-34). Despite the lack of facilities around McCloud Reservoir, the public still camps regularly at various dispersed sites, including Star City. Several sites receive steady use for both overnight camping and day use access for swimming and wading. Past use and comments received show a strong desire for an overnight facility at McCloud reservoir that is clean, safe and well maintained, as well as developed day use areas where visitors can swim or fish from shore or a dock.

Iron Canyon Reservoir

Iron Canyon Reservoir experiences fewer users than McCloud Reservoir and mostly from Shasta County (Redding, Burney, etc.). Congestion at Hawkins Landing boat ramp is less severe, however, very limited parking is available above the high water line. When vehicle travel below the high water mark is restricted by the Forest Service Travel Management Plan and License conditions, additional parking must be developed to accommodate both historic and anticipated future use. The shallow slope and large fluctuations of the reservoir do not lend themselves to improvements at this site. A new ramp must be developed where slope conditions are favorable and where the water does not recede so dramatically from the shoreline. A location near the Iron Canyon Dam would also allow for an expanded season of use since snow removal takes place by the Licensee all winter over the Oak Mountain road. When the ramp is snow-free, plowing the parking area at the new ramp would allow some recreation use of the reservoir outside of the peak spring/summer season. Lighting at both ramps (McCloud and Iron Canyon) would provide more safety for surveyed users who fish early or late in the day when fish are more active, especially in the shoulder seasons when daylight hours are limited.

Existing dispersed camping around Iron Canyon reservoir points to a demand for shoreline development near portions of the reservoir where drawdown is less dramatic. Although the two existing campgrounds (Deadlun and Hawkins) provide nearly 40 campsites, occupancy is at or below capacity during the recreation season (TM-44, p. 4). In contrast, recreation surveys found 22 dispersed use campsites around the shoreline of the reservoir (TM-16, p. 22). Many of these included signs, campfire rings, and hand-built toilets. The pattern indicates a need to relocate the camping opportunities away from the shallow fingers of the lake and towards the deeper areas where water remains accessible during most of the recreation season. When alternate facilities are available, closure of some or all areas to dispersed overnight use should be considered to alleviate on-going resource concerns including soil erosion and compaction, sanitation, visual, loss of vegetation, cultural impacts, etc. If current dispersed use is eliminated without providing desired shoreline facilities, public dissatisfaction, law enforcement issues, and additional resource damage would likely result.

Although exact locations to move Deadlun Campground need field verification next year (and prior to Final Section 4(e) conditions), past field reviews identified likely suitable locations along the north shoreline where deeper water is in close proximity to NFS land. These sites were identified in Licensee's 1972 "Revised Recreation Use Plan Iron Canyon Reservoir McCloud-Pit Project FPC No. 2106". These areas would best serve the recreating public because they are adjacent to the main reservoir where waters are deeper, rather than at the end of the arms where reservoir elevation fluctuates greatly. Deadlun Campground was only constructed beyond the terminus of the Deadlun Creek Arm because at the time of construction this was the only NFS land with topography that allowed construction of a campground. Since then, a land exchange around Iron Canyon Reservoir has resulted in much better sites for a campground(s), and are in fact locations the public currently uses for dispersed camping. Thus, reconstructing Deadlun Campground in its existing location, as proposed by Licensee, would result in continued under-utilization, not meet public demand, not achieve Forest Service recreation management objectives, nor address current resource concerns.

Pit River

Use on Pit 6 and Pit 7 reservoirs remains very light due to steep slopes and limited access. Options exist for expanded access to Pit 7 reservoir either from the Pit 6 access road or from the Pit 7 dam. If surveys show that use has grown at this site during the next license period, additional options (such as new trails or hand-launch boat access) may be considered. Because of the low Recreational Opportunity Spectrum on much of the two reservoirs, development would continue to be low and of a primitive nature.

Fishing is the primary use at the Pit 7 Afterbay site, both at the v-notch weir and as access to the Upper Pit River arm of Shasta Lake. Improvement of the small boat launch should help to move use below the v-notch and direct use to authorized areas. Trespass onto the v-notch weir remains a safety concern and the proposal to develop an alternate site near the base of the Pit 7 dam with development of the micro-hydro is intended to offer an alternate, safer opportunity to fish the Afterbay. Monitoring results during the next license will be used to evaluate other options if trespass continues and use remains high.

McCloud Reservoir Constraints

When the 2106 Project license was issued in 1961, the Forest Service and the Hearst Corp. were completing a land exchange to consolidate ownership in a checkerboard area of the Forest. The Forest Service did not intend to manage recreation in the McCloud River area, and was disposing of NFS lands around what would become McCloud reservoir. To provide for public access to the newly created reservoir, the Hearst Corp. donated roughly 95 acres of land around the southern shore to the Forest Service. While it is clear that the public has benefited from both the Project and the donation, the Project boundary and deed covenant have been problematic.

Public pressure to reach the water has grown and has led to site damage, trespass, and sanitation concerns, especially at Star City. The Hearst Corp. has raised concerns regularly about wildfires and unmanaged public use (correspondence Hearst Corp to District Ranger, various years). Closure of the Star City site to overnight camping would require constant policing, would be questionably successful, and would not meet the intent of managing Project-induced recreation. Alternate facilities are not available to McCloud recreation users. Results from the recreation inventory (RL-S2, TM-16) identified nine user-created dispersed recreation sites around this reservoir. The data confirmed information from Forest Service Law Enforcement and Recreation staff regarding popular dispersed locations around the reservoir. The Forest Service recommends redefining the Project (and private property) boundary to the outside edge of the two roads circling the south half of the reservoir (38N11 and 38N04Y roads). This would allow the Project to include all of the public recreation sites and their access roads, and reduce the potential for trespass. Development of overnight and day-use areas around the southern shoreline would provide a managed opportunity with resource protection on NFS land, and security for the adjacent private lands.

Project Nexus to Lower McCloud River

The Forest Service believes that a clear Project nexus exists to the Lower McCloud River based on documents developed at the time the Project was issued a license in 1961, and that the Project had a direct affect on access and use of the Lower McCloud River once the Forest Service acquired the land and associated access in the mid to late 1960's. Additionally, the Forest Service believes relicensing study results support the nexus, as does the anglers on-going concerns that changes to Project instream flow below McCloud Dam will adversely affect their angling experience. Thus, the Forest Service disagrees with Licensee's statements in the July 27, 2006 Pre-Application Document (PAD), February 2009 Draft License Application (DLA), and the July 2009 Application for New License (FLA), where Licensee concluded that no Project nexus exists with the Lower McCloud River, and concludes that Ash Camp and Ah-Di-Na Campground could become Project facilities within the new license. The Forest Service is willing to work on developing an alternate agreement outside of relicensing between the Forest Service and the Licensee, and approved by the Forest Service for rehabilitation and management of these facilities, as discussed in Condition No. 30a.

Specifically, on P. E1-11-12 of the July 2009 License Application their argument states:

“The road to the Ah-Di-Na area was originally constructed to access a homestead. Later the USFS improved the road (designated Forest Road 38N53) and built Ah-Di-Na Campground and Ash Camp to address the recreation that was occurring on the Lower McCloud River, long before the Project was constructed.”

The discussion of facts below shows why the above statement is incorrect.

FERC License 2106 was issued to Licensee in 1961 when the National Forest ownership did not include the Ah-Di-Na or Ash Camp areas, and public access to the lower river corridor did not exist. Contrary to the Licensee's assertion, acquisition and consequent Forest Service construction followed (not predated) license issuance. Historical records from the period of construction indicate that the campgrounds were built in order to accommodate increased and projected public use as a direct result of Licensee's McCloud-Pit hydroelectric Project.

Project Chronology:

- 1955: Initiation of Hearst Land for Land Exchange with U.S. Forest Service
- 1961: Federal Power Commission issues License 2106 to PG&E
- 1963: Forest Service prepares 5430 Hearst Exchange Report and MOU
- 1963: Forest Service prepares Multiple Use Impact Report for Pit-McCloud Project
- 1965: Deed recorded for Hearst/USA Land Exchange
- 1965: Date of Commission Unit No. 2 @ James B. Black Powerhouse
- 1966: Forest Service begins recreation developments at Ah-Di-Na
- 1966: Date of Commission Unit No. 1 @ James B. Black Powerhouse
- 1969: Hearst donation to USA for land around McCloud Reservoir

In 1955, the Forest Service and the Hearst Corporation began negotiating a land-for-land exchange in the McCloud River drainage that included lands below what would become McCloud Reservoir. The goal of the exchange was to “consolidate within the upper portion of the Hearst holdings for their land management, and to consolidate National Forest land in the southern portion.” (Chapter I. Introduction, Hearst Corporation Exchange Land for Land, USDA, 1963b).

During this period, the FPC issued license 2106 to Licensee for construction of the McCloud Pit Project. The land exchange package appraised both the offered and selected lands in light of the new McCloud reservoir and the opening of public access to the river below the dam. The exchange report states:

“Of impact on the exchange area, is the current development of the Pacific Gas & Electric Pit-McCloud hydroelectric power project. As a part of this project, the McCloud Reservoir is being constructed within the southern area of the selected lands. In order to protect the public's interest in this Reservoir, agreement has been reached with the Hearst Corporation on access to the Reservoir and the use of the Reservoir by the public. Of prime importance in consideration of the exchange are the recreational aspects. Currently all the area south of the town of McCloud, that is, along Squaw Valley Creek and along the McCloud River to where it enters Shasta Lake, for many years has been closed to public access.” (USDA, 1963 b).

“With development and completion of the McCloud Reservoir... this area, too, will provide fishing and boating recreation for the public. With the consummation of the exchange the area south of the Reservoir will also be open to public fishing. Because of the terrain, the area immediately adjacent to the McCloud Reservoir is considered unusable from a recreation development standpoint. However, an area south of the Reservoir offers one of the more desirable sites....This area, located at Ah-Di-Na, is immediately adjacent to the McCloud River” and “represents the bulk of the potential recreation land in the vicinity of the McCloud Reservoir.” (Chapter IV-3 Physical Description, USDA, 1963b. IV-3).

“Releases from the lake are fixed at a minimum of 160 cubic feet per second. This will result in considerably less flowage in the Lower McCloud River than currently exists....This in effect will enhance the value of the Lower McCloud River by reducing the volume of water and thereby the threatening nature of the McCloud River itself.” (Chapter IV-3, USDA, 1963b. IV-3).

“The area located at the junction of the McCloud River and Hawkins Creek consists of 96 acres, a portion of which is located on the opposite side of the McCloud River from the access. The accessible area would provide sufficient room for several overnight campsites.” (Chapter IV-3, USDA, 1963b. IV-3).

The land exchange appraisal established three separate values for the identified lands; 1) Timber value, 2) Natural land value, and 3) Special or Recreation land value. Of the total acres offered, 608 acres were appraised reflecting additional values by their location with respect to the McCloud Reservoir. Recreation lands included potential recreation land at Ash Camp and Ah-Di-Na. The 1963 Land Exchange report states:

“McCloud Reservoir will be a major attraction in this area and with its completion access to this area will be much improved. Development in the Ah-Di-Na area will benefit both by the reservoir and by the Lower McCloud River. The reduction in volume of the McCloud River from its existing volume to 160 cubic feet-per-second minimum will undoubtedly enhance the value of this river area. Many recreationists (sp) prefer to associate with a smaller, not so threatening stream, rather than the existing McCloud River” (Chapter IV-4, USDA, 1963b. IV-4).

The report concluded, “Offered Unit #7 is the most desirable site in the entire exchange area. It consists of 187 acres of excellent recreation land at Ah-Di-Na. Its proximity to the McCloud Reservoir dictates that it will ultimately serve the recreation pressures resulting from the construction of the Reservoir.” (Chapter IV-9-4, USDA, 1963b. IV-9)

With the land exchange, all public lands around the reservoir were traded. Under the terms of FPC license 2106, the project called for a “comprehensive plan for improving and developing the McCloud and Pit Rivers ...and for other beneficial uses, including recreational purposes.” (United States of America, Federal Power Commission, Project No. 2106, Order Consolidating Proceedings and Issuing License (Major). Issued August 18, 1961, Condition 9, P. 8).

In order to provide for these “recreational purposes,” in March of 1963, the Hearst Corporation and the Forest Service signed a Memorandum of Understanding identifying how this condition would be met. The two parties agreed that the Hearst Corporation would donate to the Forest Service roughly 95 acres of land in a strip between the 2680-foot contour (high water mark) and the Project boundary along the southern shore of the reservoir to provide for public recreation access. The MOU identified likely recreation sites (Star City and Tarantula Gulch) and the necessary road rights of way to access these sites. The MOU included provisions to lease additional areas of private land to the Forest Service for developed recreation facilities. The donation was contingent upon signature of the Patent Deed (signed June 10, 1965) and was consummated in 1969.

In a May 16, 1963, letter from Regional Forester Chas. A. Connaughton to the Chief of the Forest Service, the Regional Forester lays out the reasoning behind the Memorandum of Understanding and future donation between the Hearst Corp. and the USA:

“The exchange proposal was initiated before the F.P.C. license was issued to Licensee. At that time, COPCO’s application for license was still pending with Squaw Valley as the impounding reservoir and with a series of diversions and power plants down the river. With the change of the licensee and project plans, certain changes were made in the land adjustment or exchange proposal. The present plan is to provide for full public use of the south half of the reservoir by making available the project lands south of Star City and Tarantula Creeks... The parcels of non-project National Forest lands around the reservoir are in the exchange proposal. Thus, the public would be restricted to the water surface and to the National Forest land within the project boundaries south of the two Creeks. In effect, the “Understanding” is to provide two public access routes to the south half of the water body with access from the town of McCloud on the north as well as from the Pit River area to the south, and in addition, access to the lower McCloud. The campgrounds will be along the lower McCloud and Hawkins Creek, the nearest over a mile south of the dam.”

On December 12, 1963, the Shasta-Trinity Forest Supervisor signed the Pit-McCloud Project Multiple Use Impact Report (MUIR) (USDA, 1963a). The Impact Report identified: Project impacts to the National Forest; consistency with current management plans; and recommendations to limit or mitigate the McCloud-Pit Hydro Project impacts on each resource area, including recreation. The Impact Report states:

“In consequence of the nearly complete private control of the project area, no public recreation or fishing exists on or in the vicinity of the project area on the McCloud River from the [McCloud] Falls to Ah-Di-Na, a distance of approximately 15 miles....” (USDA, 1963a, p. I-5).

In 1963, the McCloud District Multiple Use Management Plan proposed that the area around the future McCloud Reservoir be dropped from further consideration for public use and be managed strictly for timber. All public permits were canceled in preparation for the change. (USDA, 1963a, p. I-6).

With development of the Project, the Forest Service made several recommendations in the Impact Report to modify the current management plans and protect resources within the Project area. The Impact Report states that a field survey was completed in the spring of 1963 to identify all sites suitable for recreation development. That inventory identified three general areas: A) Fenders Ferry Recreation Area, B) Iron Canyon Recreation Area and C) McCloud Lake Recreation Area, which is described as:

“... the southern portion of the McCloud Reservoir, about three miles of the McCloud River, and Hawkins Creek. All this area, previously closed to public access, is partially dependant for development upon completion of the pending land exchange with Hearst Corporation.” (USDA, 1963a, p. IV-E-16).

Estimated recreational development includes 16 specific sites (12 on the Lower McCloud River or Hawkins Creek) including the Ah-Di-Na and Ash Camp Campgrounds. (USDA, 1963a, p. IV-E-20-22).

The Impact Report describes the McCloud River as “one of the most famous trout streams in the world” (MUIR p. IV-C-1). The “Project is located in a relatively undeveloped section of the Shasta-Trinity National Forest...Private control of access in the McCloud and Iron Canyon areas, and the steep topography of the Pit have kept these areas remote to general public use” (USDA, 1963a, p. III-A-1).

Documents completed during Project planning in the 1960’s provide clear evidence of a nexus between the McCloud-Pit Hydro Project and recreation on the Lower McCloud River. The Forest Service (and other parties involved in these documents) clearly understood that Project impacts extended well beyond the inundation line of the reservoir and would significantly change the recreation use patterns in the Lower McCloud River. Because lands in the vicinity of the proposed McCloud Reservoir and lower McCloud River were in private hands at the time of License issuance (1961), the License did not

require the development of a Recreation Plan similar to the one created for the Iron Canyon Reservoir and Pit 7 Afterbay portions of this Project. It is clear, however, that with the impending land exchange, the immediate need for recreation facilities was expected and anticipated.

Appraisal rates were modified for the specific areas at Ah-Di-Na and Ash Camp to account for their increased recreation value. Reduced flows from Project operations were expected to draw fishing enthusiasts and create a demand for overnight use along the river once public access was open. The Forest Service modified the Multiple Use Management Plan in order to emphasize public recreation in these locations rather than timber management as previously expected. The 1963 Impact Report specifically addresses campgrounds to be constructed on the lower McCloud River as a result of the land exchange induced by the McCloud-Pit Hydro Project.

Current use of both Ash Camp and Ah-Di-Na Campgrounds, and the publically managed lands along the Lower River is high. The campgrounds are at or approaching capacity (TM-44, Tables 2 and 3) during popular periods of the stream fishing season (April – June, and October-November), and user-created trails have developed along the river corridor between the two sites. In addition, a small but steady amount of whitewater boating occurs on the river even without support facilities or specific access (RL-S3). Both the quality of the rapids and the clear, clean water draw boaters looking for more remote wilderness experiences. Existing facilities along the lower river are reaching or have reached their useful life and upgrades are needed to continue to serve the public demand.

Protection of significant Native American resources is a key component in management and maintenance of the developed sites and use of dispersed sites.

Fire Management and Response

Condition 33

a. Guidance

Shasta-Trinity Land and Resource Management Plan Forest Goals

- Restore fire to its natural role in the ecosystem when establishing the Desired Future Condition of the Landscape (4-4.10).
- Achieve a balance of fire suppression capability and fuels management investments that are cost effective and able to meet ecosystem objectives and protection responsibilities (4-4.11).

Standards and Guidelines

- All wildland fires, on or threatening private land protected by agreement with the State of California, will receive a “control” suppression response (4-17.b).
- Activity fuels that remain after meeting wildlife, riparian, soil, and other environmental needs will be considered surplus and a potential fire hazard. The amount and method of disposal will be determined in the ecosystem analysis (4-17.c).
- Plan and implement fuel treatments emphasizing those treatments that will replicate fires natural role in the ecosystems (4-18.d).
- Natural fuels will be treated in the following order of priority: (1) public safety; (2) high investment situations (structural improvements, powerlines, plantations, etc.); (3) known high fire occurrence areas; and (4) coordinated resource benefits, i.e., ecosystem maintenance for natural fire regimes (4-18.e).
- Consider fuelbreak construction investments when they compliment Forest health/biomass reduction needs, very high and extensive resource values are at risk and to protect Forest communities (4-18.f).
- Design the fire prevention efforts to minimize human-caused wildfires commensurate with the resource values-at-risk (4-18.g).

Management Prescriptions

Late Successional Reserves (4-40)

- Fuels management in Late-Successional Reserves will utilize minimum impact suppression methods in accordance with guidelines for reducing risks of large-scale disturbance. Plans for wildfire suppression will emphasize maintaining late-successional habitat.
- In Riparian and Late-Successional Reserves, the goal of wildfire suppression is to limit the size of all fires.

Riparian Reserves and Key Watersheds (4-56, 57)

- Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem function.
- In Riparian reserves, water drafting sites should be located and managed to minimize adverse effects on riparian habitat and water quality, as consistent with Aquatic Conservation Strategy objectives.

McCloud River/Pit Management Area Supplement Management Direction

- Utilize natural fuels reduction to protect special habitat areas and forest investments (4-127.2).

b. Rationale to support license condition(s):

The Fire Response and Prevention Plan license condition would provide protection for Forest resources by requiring the Licensee to plan and prepare for responding to wildland fires as well as implementing fuel treatments around recreation sites where potential fire risk is greater. If a fire occurs, the Licensee response would minimize damage to NFS land and resources, especially in Late Successional Reserves and Riparian Reserves.

Survey results from RL-S7 (Project Wildfire Hazards) did not find any documented fires within the Project boundary. Management in the Lower McCloud River and Iron Canyon regions must be consistent with the goals of Late Successional Reserves and Riparian Reserves while management in the Pit River Canyon must be consistent with the guidelines for Administratively Withdrawn Areas. Both designations favor low impact fire suppression tactics, and fuelbreak development around specific resources, recognizing that the limits to land management activities in the past may present higher fuel loading in the region surrounding the Project. The 4(e) condition is intended to provide for shaded fuel breaks, and fuel treatment where the risk from Project-induced human caused (recreation, vehicles, maintenance) fires may be higher, while protecting the late successional qualities of the surrounding landscape. The condition is also intended to facilitate communication between the Licensee, private landowners, and affected agencies in fire emergencies.

Heritage Resources

Condition 34

a. Guidance:

Shasta-Trinity Land and Resource Management Plan Forest Goals:

- Preserve and interpret significant historic and prehistoric sites for the benefit of Forest visitors (4-4.5).
- Provide archeological research opportunities for the professional community (4-4.6).
- Develop partnerships with Native American tribes and organizations to enhance those cultural resources that reflect their heritage (4-4.7).

Standards and Guidelines:

- Provide for Native American needs for collection and/or use of traditional resources (4.16.a).
- Protect traditional Native American rights and practices (cf. P.L. 95-341) to ensure that access to sacred sites will continue and use will not be impaired (4-16.b).
- Manage heritage resources, including “Archaeological Interest”- 36 CFR 296, not covered by Forest Standards and Guidelines or Prescription XI, according to the Shasta-Trinity National Forests’ Manual Supplement to Forest Service Manual (FSM) 2361(4-16.c).
- Evaluate heritage resources that might be effected by Project activities for eligibility to the National Register of Historic Places (NRHP). This will be done in consultation with the State Historic Preservation Office as well as interested parties (4-16.e).
- Identify sites that will require protection (e.g., by signing and/or flagging) prior to implementation of management activities adjacent to the site (4-16.f).
- Sign Heritage Resources in areas of recreation only if visitor use is impairing the site’s values or if the site is to be interpreted (4-16.g).
- Historic sites, unless assigned to Prescription XI, will not be enhanced or interpreted. They will be managed so that the site is not adversely affected and no hazard is caused to the public. Modifications to historic structures must be compatible with standards and guidelines issued by the Department of the Interior and the Advisory Council on Historic Preservation (ACHP) (4-16.h).
- Mitigate adverse effects to heritage resources that are eligible for the NRHP, according to direction issued by the Department of the Interior and the ACHP (4-16.i).

Prescription XI. Heritage Resource Management

- Heritage Resources will be protected primarily by locating trails and camp sites away from sensitive areas. Recreational activities and development will be limited in such a way that visitor use does not take place on or in the immediate vicinity of cultural resources, unless it is an interpretive activity (4-50.1).
- Archaeological and ethnographic surveys will be designed to inventory the area so that all cultural resources are located and recorded (4-50.2).
- All cultural resources associated with this prescription will have a protection plan that specifies the need for signing, patrolling, flagging, etc. Periodic monitoring of sites will also be conducted as needed, to determine success of protection efforts (4-50.3).
- Consult with Native Americans so that management direction can be developed for those areas having cultural importance and that they may participate in watershed/project planning to assure that Native American concerns are addressed as part of the process (4-50.4).
- No new road or trail construction will be allowed unless approved by the Forest Supervisor. Reconstruction will be allowed only if adverse effects are not created (4-51.6).
- Off-highway vehicle (OHV) use will be prohibited (4-51.8).
- Management activities should be compatible with Semi-Primitive Non-Motorized or Semi-Primitive Motorized Recreation Opportunity Spectrum (ROS) guidelines dependant on the level of interpretation proposed for the sites (4-51.10).
- All projects, proposals, and activities must proceed in full compliance with Section 106 of the National Historic Preservation Act, including Special Use Permits (4-51.12).

McCloud/Pit Management Area Supplemental Management Direction

- Conduct a thematic study of the archaeological sites representing the Native American uses of the McCloud River. Emphasize sites that are being disturbed by dispersed recreation activities such as Ash Camp, Camp 4, Four Mile Flat, and Ah-Di-Na. Pursue partnerships with Shasta College, California State University Chico, or other institutions (4-123.1).
- Interpret archaeological sites along the McCloud River in areas where visitors are already being directed (4-123.2).
- During project level planning, identify cultural and historical values. Manage significant sites under Management Prescription XI (4-127.9).

Monitoring Action Plan (Table 5-1)

- Investigate disturbances of Native American religious/sacred places (5-6).
- Investigate disturbances of Native American traditional resource areas (not religious) (5-6).
- Check adequacy of site protection measures (5-6).
- Determine thoroughness of field identification of sites; datum tagging (5-6).

b. Rationale to support license condition(s):

In developing the cultural resource terms and conditions, the Forest Service gave due consideration to the current condition of these resources as demonstrated by relicensing study results, other reasonably available data, and literature. Much of this information is contained in the McCloud-Pit Hydroelectric Project Application for New License (July 2009).

Since many of the historic properties are on lands managed by the Shasta-Trinity National Forest, the Forest Service retains legal responsibilities for management of those historic properties. Federal historic preservation laws and regulations include but are not limited to the National Historic Preservation Act (NHPA) and its implementing regulations 36 CFR 800, AIRFA (American Indian Religious Freedom Act), ARPA (Archaeological Resources Protection Act), and NAGPRA (Native American Graves Protection and Repatriation Act). Existing recreation use has created impacts to many of these sites and mitigations will be needed to further protect these resources as recreation use grows during the next Project license term.

Study results from CR-S1 have determined that there are approximately 33 archeological sites within the project APE, 22 of which lie on federal land managed by the Shasta-Trinity National Forest. Study results from CR-S2 for the Pit River Tribe have determined that there are approximately 22 ethnographic sites within the project APE, nine of which lie on federal land managed by the Shasta-Trinity National Forest. Completion of CR-S2 for the Winnemem Wintu Tribe is likely to reveal additional ethnographic places.

Many of these sites were previously known and recorded and three sites along the Lower McCloud River (Ash Camp, Ah-Di-Na, and Fitzhugh Gulch) are designated as Prescription XI sites (i.e. heritage resource management emphasis) in the Shasta-Trinity Land and Resource Management Plan. Existing recreation use has created impacts to many of these sites and mitigations will be needed to further protect these resources as recreation use grows.

Data collected for the relicense has included many areas along the Lower McCloud River that have not been evaluated in several decades and now benefit from the larger picture of known resources along the river. The high density and quality of these sites may support the consideration of a larger Historic District that would connect these sites in time and space to a distinct period of occupation. The prehistoric resources on public lands, combined with the resources on the McCloud River Club and Nature Conservancy give added weight to this discussion. In addition, new information suggests that there may have been up to four Indian Allotments near Claiborne Creek, within the expanded APE.

Pre-construction surveys, with routine monitoring, are necessary to determine if degradation is occurring at known sites, and to develop mitigations to protect these resources.

**Comments on Draft Heritage Properties Management Plan (HPMP) (PG&E, 2009
Volume IV, July 2009, Privileged)**

General Comments:

This draft document does not contain complete study results, fails to incorporate previous Forest Service input, has not yet included formal consultation with Tribal Governments, and does not include collaborative development of Project-specific mitigations based on study results and other necessary components. It therefore needs to be labeled as a “Draft” document until approved by the Forest Service, tribes, and the Commission.

The bound copy of CR-S1 Part 2 is not paginated nor are the sites grouped geographically. Though requested during a cultural meeting September 23, 2009 with the Pit River Tribe in Burney, no cross walk has been provided for Part 2.

Directions to many of the sites in Iron Canyon Reservoir and datum descriptions are inadequate. Standard protocol on the Shasta-Trinity National Forest is to provide approximate mileage to a site from a given point on a road, and walking directions to the site if the site cannot be reached solely by road. Likewise, site datum’s are usually described and their diameter (if a standing tree) is usually approximated.

ALB-12 (F.S. 05-14-61-601 (Old Bridge). Site record does not show location of bridge footings on new site map from 2009.

Specific Comments:

Page 1-8, Table 1.6-1. See also Page 7-1

There is no schedule for completion of the Draft HPMP for review by affected parties and approval by the Forest Service and the Commission. Collaborative meetings with the Forest Service and affected Tribes to complete the HPMP should continue during this period of license development until final completion of the document, as needed and should be facilitated. Changes should be made to the document on a laptop projected on a screen for collaborators to view. The Final HPMP must include complete and accurate site records as approved by the Forest Service on NFS lands, completion of the CR-S2 ethnographic Winnemem Wintu study or equivalent data, the identification of where current or proposed projects may affect historic properties, and specific mitigations to prevent impacts to these resources.

Page 3-2

See Forest Service rationale for Ah-Di-Na and Ash Camp as Project related recreation developments (Enclosure 2, p. 43-47), and Forest Service Section 4(e) conditions for Recreation Development and Management Plan (Enclosure 1, p. 42-43). Because both campgrounds contain Prescription XI sites, which are determined eligible to the National Register of Historic Places, the effects of the Section 4(e) conditions proposed and appropriate mitigations must be addressed. The Forest Service is proposing re-construction of these campgrounds to further enhance recreation while providing site protection through a recreation improvement strategy.

Page 3-3. Vandalism

Forest Service also provided this same comment in May 19, 2009, Forest Service response to Draft License Application. Change the word “only” to “major” in first sentence.

Page 4-2

First sentence at top of page, “All surveyed areas and areas that could not be surveyed are identified in Appendix C”, change to “on maps in Appendix C.”

Page 4-7, Table 4.1.2-1

Add FS number 05-14-61-39 to CA-SHA-969

Page 4-3

The Draft HPMP listed 55 sites within the APE. This list does not appear to include the new site found on the McCloud River. The Forest Service attempted to re-locate CA-SHA-969 (F.S. 05-14-61-39); during our search we found a new site and sent preliminary information, with a GPS location point, to Albion in an e-mail on June 5, 2009. The Forest Service also provided this same comment in the May 19, 2009 response to the Draft License Application. Change all figures accordingly for number of prehistoric sites, number of new sites, etc.

Page 4-7

Add Forest Service Number 05-14-61-39 to the Table underneath CA-SHA-969. In text description of sites on McCloud River Club property, add F.S. 05-14-61-601 after aka ALB-12. Based on site records, Draft HPMP should approximate which sites are within the Project APE.

Page 4-7 through 4-10. Section 4.1.2.

The number of sites potentially within the expanded APE is erroneous based on the information from site records obtained from the Northeast Center of the California Historical Resources Information System. There are approximately 10 sites (though this number should be double-checked within the project APE). It may be possible to determine potential eligibility of some of the prehistoric sites on McCloud River Club property based on site descriptions and impacts described.

Page 4-14: Resources Identified within the APE

Results of the correlation between TCP's and archaeological resources should be addressed in the Draft HPMP as a separate chapter.

Page 5-1 General Treatment Measures

A Table is needed to summarize all of the general treatment measures that could be applied to historic properties, ethnobotanical gathering areas, and ethnographic places. A sample Table is provided here:

Table 2-15. Sample General Treatment Table

Site Type	General Treatment Measure Options
Prehistoric and Historic Archaeological Sites	Annual Site Monitoring or Scheduled Monitoring Erosion Control/Stabilization Padding/Filter Cloth Road Closures/Barriers Restrictive Signage Interpretive Signage
Ethnobotanical Gathering Areas	Prohibit use of herbicides Use of ethnobotanical or native plants for revegetation
Ethnographic Places	Annual Monitoring Restrictive Signage Redesign or realignment of existing infrastructure Restrictive Signage Interpretive Signage Road Closures/Barriers

Page 5-1

Third paragraph: “Because the McCloud-Pit Project is located....” Add the word “partially.”

Page 5-2

Title of Section 5.2 should be changed to “Current and Proposed Recreation Development/Improvement.” Text already acknowledges proposed development or improvements.

Page 5-4

Another potential location for interpretive signs is at Ash Camp and Ah-Di-Na campgrounds.

Page 5-9: Management of Ethnobotanical Resources

CR-S2 dated September 2009, identified two gathering areas: ETH-50 and ETH-132. These should be addressed in the Draft HPMP, including proposed management of these areas since they are now documented. Because one area is on NFS lands, management should be in consultation with Forest Service. Forest Service requires that access is protected and herbicides are not used.

Page 5-13. Monitoring of Erosion/Siltation

The Forest Service supports the Licensee’s proposal for an erosion/monitoring program. This program should be part of an appendix in the Draft HPMP and a reference for these types of studies cited in the Draft HPMP.

Page 5-14. Monitoring and Reporting Protocols

Blank or master Monitoring Log should be included in an Appendix to the Draft HPMP.

Page 5-15. Site Specific Monitoring

After baseline conditions are established, the Draft HPMP should document (in tabular form) proposed monitoring frequencies for each site, after consultation with affected parties.

Page 5-22 Curation of Recovered Cultural Materials:

Licensee should provide additional funding for curation of artifacts from any archaeological sites within the Project APE from Project-related activities to the two curation facilities, where appropriate: Pit River Tribe curation facility and the Shasta College Laboratory.

Page 6-2

Second paragraph: Additional information and discussion is needed to determine if there is compelling evidence for an archaeological and/or ethnographic historic district along the Lower McCloud River. A District usually ties the sites and ethnographic places chronologically and contextually, and has a tangible/defined boundary. Since there is a cluster of sites that appear to have late period context with midden and house pits, and

there is a plethora of ethnographic information, and Indian allotment information from a new thesis, an in-depth examination and thorough review of all documentation for this area is warranted to determine if a Historic District is warranted.

Table 6.1.0-1 should list the sites below the McCloud dam for proposed management.

Section 6. Site Specific Treatment Measures

General comments –

Update tables to reflect proposed treatment measures in text. Example: Page 6-20- CA-SHA-252 includes bank stabilization in text but not in Table.

The Forest Service recently re-visited a majority of sites around the Iron Canyon Reservoir. It appears that the location of three sites on the west side of McGill Creek may have been incorrectly located on new documents based on the locations in the original site records. In addition to the comment the Forest Service provided in our May 19, 2009, response to the Draft License Application, the Forest Service additionally notes that all of the sites within the reservoir pool area around Iron Canyon are being eroded and are subject to artifact dispersal due to Iron Canyon Reservoir operational fluctuations. Site specific treatment measures should be based on their potential eligibility to the National Register. The Forest Service proposes that all of the sites directly in the pool area be evaluated for their potential significance to the National Register through test excavations.

Page 6-25, Table 6.1.0-5

ALB-12, F.S. 05-14-61-601 (Claiborne Creek) – Project related effects include boater pull out and use by the McCloud River Club. The Forest Service proposes long-term photographic monitoring of this site. The Forest Service will also require McCloud River Club to obtain a Special Use Permit for an unauthorized bridge and trails on NFS lands.

Page 6-27, Table 6.1.-0-5

CA-SHA-686/H F.S. 05-14-61-08 (Ah-Di-Na) – Project related effects include the Licensee's gaging station that was built on top of an archaeological site. Thus, maintenance of the gage station and road access to it has effects on the archaeological site that require mitigation(s) to be included in the Draft HPMP.

Page 6-46, Traditional Cultural Properties

The results of CR-S2 for the Pit River Tribe are now available and should be incorporated into the Draft HPMP and not an amendment.

Appendix F

Resource Location Maps should include the Ethnographic data. Isolated find data are not necessary in the Draft HPMP.

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ENCLOSURE 3:
PRELIMINARY 10 (a) LICENSE RECOMMENDATIONS AND
RATIONALE
IN CONNECTION WITH
THE McCLOUD PIT HYDROELECTRIC PROJECT
FERC NO. 2106,
PACIFIC GAS AND ELECTRIC COMPANY

Since the Forest Service authority does not extend to the entire Project, we are submitting terms where there are no direct or indirect effects to National Forest resources as 10(a) recommendations.

Recommendation No. 1 - Foothill Yellow Legged Frog Monitoring Plan

Within one year of license issuance the Licensee should develop and file with the Commission, a Foothill Yellow Legged Frog (*Rana boylei*) (FYLF) Monitoring Plan. At a minimum, the Plan should include: 1) An initial five-year study period to include both wet and dry season flows following initiation of the new flow regime. 2) Incremental monitoring of FYLF every four years (or period recommended by the CDF&G) after the completion of the initial study period. At a minimum, the study should include:

- Surveys for FYLF distribution within the McCloud River from Claiborne Creek to the intersection with Shasta Lake during the spring and summer to determine presence and life stage development.
- Descriptions of the physical features of all identified frog breeding sites including substrate, water temperatures at the onset of egg deposition, vegetative cover, water velocities at egg deposition sites, canopy categories, patch size, channel habitat type, evidence of predation, etc.
- Determination of whether changed instream flows result in breeding in newly inundated margins, or utilization of old sites that may now be deeper.
- Assessments of 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.
- 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).
- Estimates of the number of adults at the onset of breeding at each breeding site.
- Monitoring of the time from egg deposition to hatching.
- Monitoring of tadpole numbers and life stage development using K.L. Gossner (1960) life stage categories.

- Monitoring of water temperatures annually in March through May to determine at what temperature 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.
- Take advantage of non-planned spring/summer high flow events to determine any correlation between these spill events and changes in tadpole or metamorph numbers from years when these spill events did not occur.
- Take advantage of the naturally (or Project induced) receding spring hydrograph to determine flow vectors at known breeding sites and their changes with flows.
- Reporting of survey results.

Rationale:

In order to ensure that flows proposed under the new license are not detrimental to existing or potential Foothill Yellow Legged Frogs (*Rana boylei*, Forest Service sensitive species), the Forest Service concurs with Licensee's proposal for a FYLF monitoring plan.

Recommendation No. 2 – White Sturgeon Augmentation Plan

Within six months of license issuance Licensee should provide at least \$5,000 annually for a program that would augment the existing stock of white sturgeon within Shasta Lake with small/young fish. The means by which this is to be done is to be determined by the Dept. of Fish and Game.

When and if the moratorium on the release of cultured white sturgeon into state waters is lifted, and in lieu of the above annual funding, the Licensee shall enter into a partnership with the Forest Service and the Dept. of Fish and Game for the purpose of rearing white sturgeon for release into Shasta Lake. The Forest Service would provide up to 10 fish cages, the Licensee would provide yearling sturgeon (up to 350 fish per cage) and supply the fish food annually. The Dept. of Fish and Game would provide the fish culture and fish disease expertise as well as transportation for the sturgeon from the aquaculture facility to the cages. The sturgeon would be raised for a period of 6 months. The agreement would cover a ten-year period, after which it could be renegotiated or terminated as needed, as determined by the Dept. of Fish and Game and Forest Service.

Rationale:

After the completion of Shasta Dam, but prior to the completion of the facilities for the Pit 6 and Pit 7 Powerhouses, white sturgeon (*Acipenser transmontanus*) utilized these reaches of the Pit River for spawning. The construction of the Pit 7 Dam blocked this run, thereby preventing the recruitment of new individuals to the land locked sturgeon population residing in Shasta Lake. As the population can no longer spawn, augmenting this population with young fish would provide a continuing supply of sturgeon to the lake, and would improve this sport fishery over time.

APPENDIX 1

McCloud-Pit Hydroelectric Project FERC Project No. 2106 Pacific Gas and Electric Company

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Table A-1. Bulletin 120¹ Historic Data for McCloud River

Sac WY Index	McCloud River Forecasts - Unimpaired April-July Predicted Runoff Percent of Average, for months shown				
	Year	1-Feb	1-Mar	1-Apr	1-May
BN	1968	94	93	93	81
W	1969	120	130	120	120
W	1970	Missing	113	108	101
W	1971	132	97	109	102
BN	1972	104	84	78	83
AN	1973	95	107	104	92
W	1974	121	118	135	137
W	1975	79	93	110	114
C	1976	74	75	70	71
C	1977	64	57	54	44
AN	1978	107	112	119	138
BN	1979	74	81	82	81
AN	1980	98	102	99	95
D	1981	84	84	87	77
W	1982	103	100	112	144
W	1983	115	144	179	179
W	1984	105	103	98	91
D	1985	91	81	84	65
W	1986	84	108	103	84
D	1987	72	70	74	58
C	1988	84	72	58	53
D	1989	70	63	74	74
C	1990	67	63	53	49
C	1991	65	56	79	70
C	1992	54	66	75	58
AN	1993	97	97	97	107
C	1994	75	78	63	51
W	1995	112	92	131	141
W	1996	85	92	80	88
W	1997	102	94	84	71
W	1998	105	153	148	163
W	1999	102	122	125	125
AN	2000	94	117	117	117
D	2001	79	87	79	74
D	2002	95	93	90	78
AN	2003	95	85	83	120
BN	2004	100	115	103	91
AN	2005	98	93	98	103
W	2006	109	110	145	185
D	2007	76	87	74	66
C	2008	97	94	92	79
D	2009	64	76	84	79
	mean	91	94	96	96
	min	54	56	53	44
	25th	76	81	79	74
	median	95	93	93	89
	75th	103	108	109	117
	max	132	153	179	185

* C-critically dry, D=dry, BN=below normal, AN=above normal, W=wet

¹ Bulletin 120 provides data from snow pack measurements taken February through June each year, for developing runoff predictions for April through July

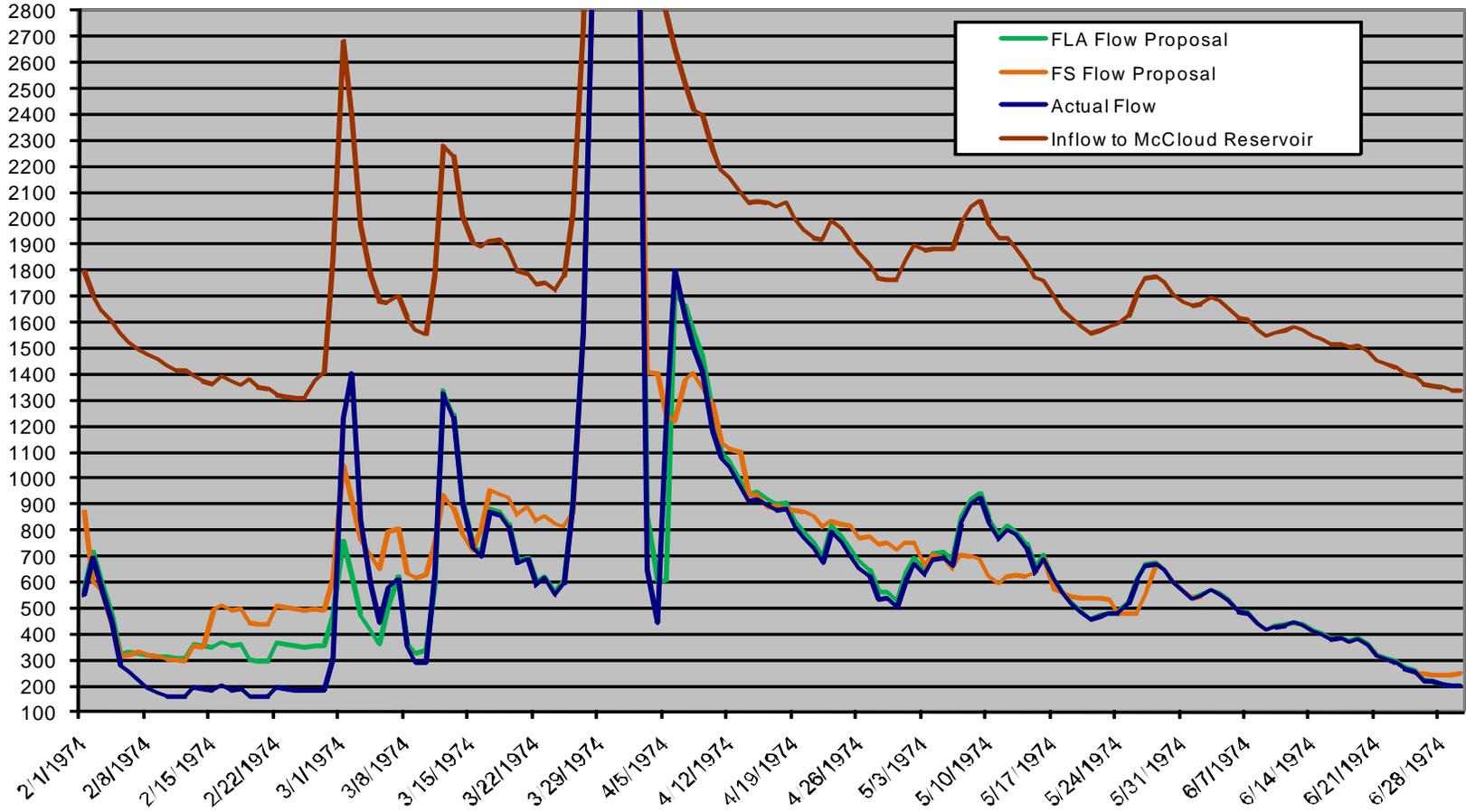
Table A-2. Forest Service Minimum Flow Releases at McCloud Dam for the Period 1974 through 2009 based on Flow Rule

Flow at MC-7 McCloud Dam (cfs): Date is based on Final Friday/Saturday Pair in April – flow drops 50 cfs from April 16 value each Friday starting on the Final Friday of pair until flow reaches 200 cfs															
W Y	July 1- Feb14	Feb 15-28	Mar 1-15	Mar 16-31	Apr 1-15	Apr 16-24	Apr 25 - May 1	May 2-8	May 9-15	May 16-22	May 23-30	May 31 - June 5	June 6-12	June 13-19	June 20-26
74	200	350	500	600	650	650	600	550	500	450	400	350	300	250	200
75	200	200	250	300	300	300	250	200	200	200	200	200	200	200	200
76	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
77	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
78	200	300	400	500	550	550	500	450	400	350	300	250	200	200	200
79	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
80	200	250	300	400	450	450	400	350	300	250	200	200	200	200	200
81	200	200	250	250	250	200	200	200	200	200	200	200	200	200	200
82	200	300	400	500	550	550	500	450	400	350	300	250	200	200	200
83	200	300	400	550	600	600	550	500	450	400	350	300	250	200	200
84	200	300	400	500	550	550	500	450	400	350	300	250	200	200	200
85	200	250	300	300	300	250	200	200	200	200	200	200	200	200	200
86	200	200	250	350	400	400	350	300	250	200	200	200	200	200	200
87	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
88	200	200	250	250	250	200	200	200	200	200	200	200	200	200	200
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90	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
91	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
92	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
93	200	250	300	350	350	350	300	250	200	200	200	200	200	200	200
94	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
95	200	300	400	450	450	450	400	350	300	250	200	200	200	200	200
96	200	200	250	300	300	250	200	200	200	200	200	200	200	200	200

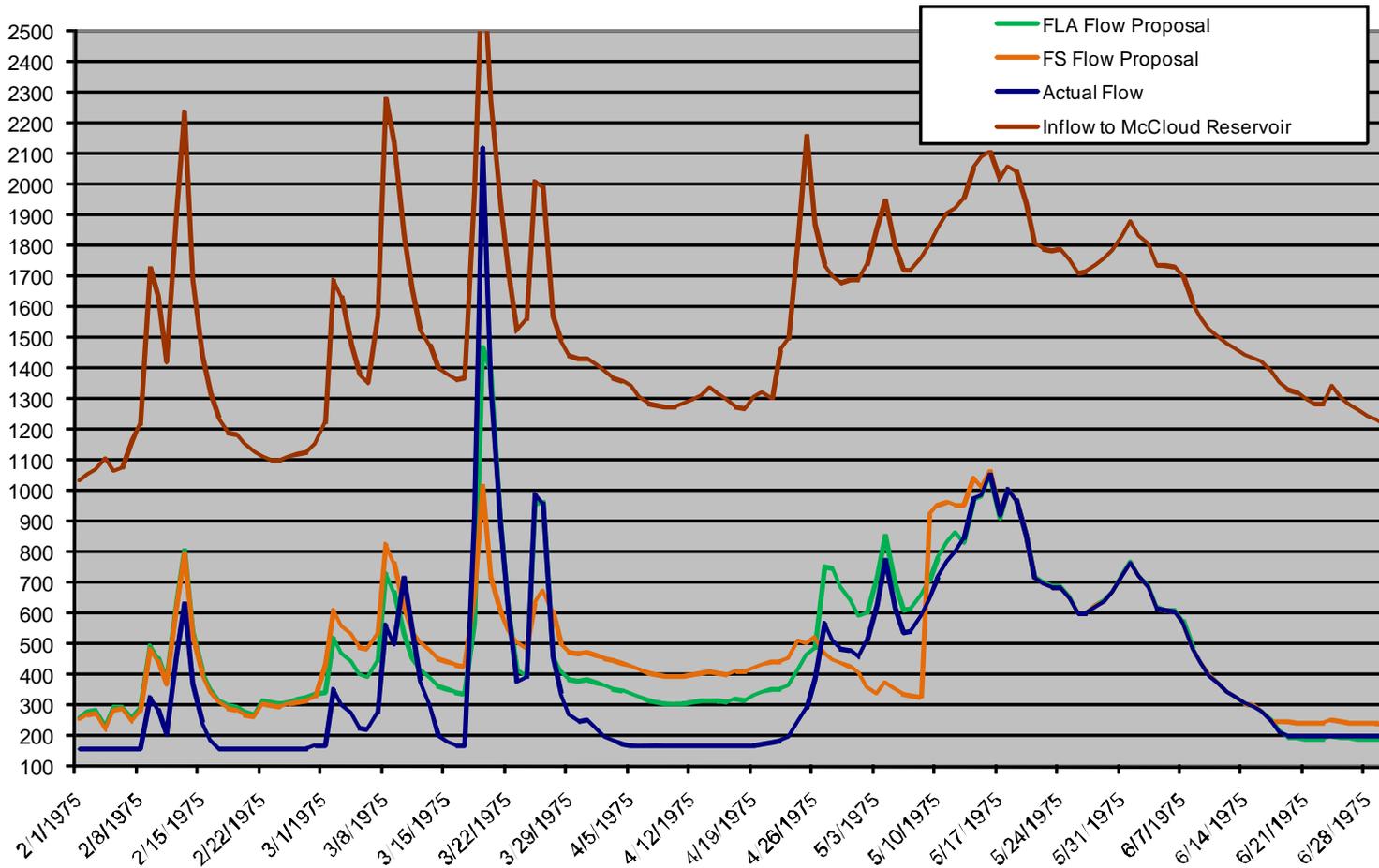
Flow at MC-7 McCloud Dam (cfs): Date is based on Final Friday/Saturday Pair in April – flow drops 50 cfs from April 16 value each Friday starting on the Final Friday of pair until flow reaches 200 cfs															
W Y	july 1- feb14	feb 15-28	mar 1-15	mar 16-31	apr 1-15	apr 16-24	apr 25 - may 1	may 2-8	may 9-15	may 16-22	may 23-30	may 31 - june 5	june 6-12	june 13-19	june 20-26
97	200	300	400	450	450	400	350	300	250	200	200	200	200	200	200
98	200	300	400	550	600	600	550	500	450	400	350	300	250	200	200
99	200	300	400	550	600	600	550	500	450	400	350	300	250	200	200
00	200	250	300	400	450	450	400	350	300	250	200	200	200	200	200
01	200	200	250	250	250	200	200	200	200	200	200	200	200	200	200
02	200	250	300	350	350	350	300	250	200	200	200	200	200	200	200
03	200	250	300	300	300	250	200	200	200	200	200	200	200	200	200
04	200	300	400	500	550	550	500	450	400	350	300	250	200	200	200
05	200	250	300	350	350	350	300	250	200	200	200	200	200	200	200
06	200	300	400	500	550	550	500	450	400	350	300	250	200	200	200
07	200	200	250	250	250	200	200	200	200	200	200	200	200	200	200
08	200	250	300	350	350	350	300	250	200	200	200	200	200	200	200
09	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200

GRAPHS: 1974 - 2006: Chronological comparison of flow proposals at Ah-Di-Na gage (MC-1)

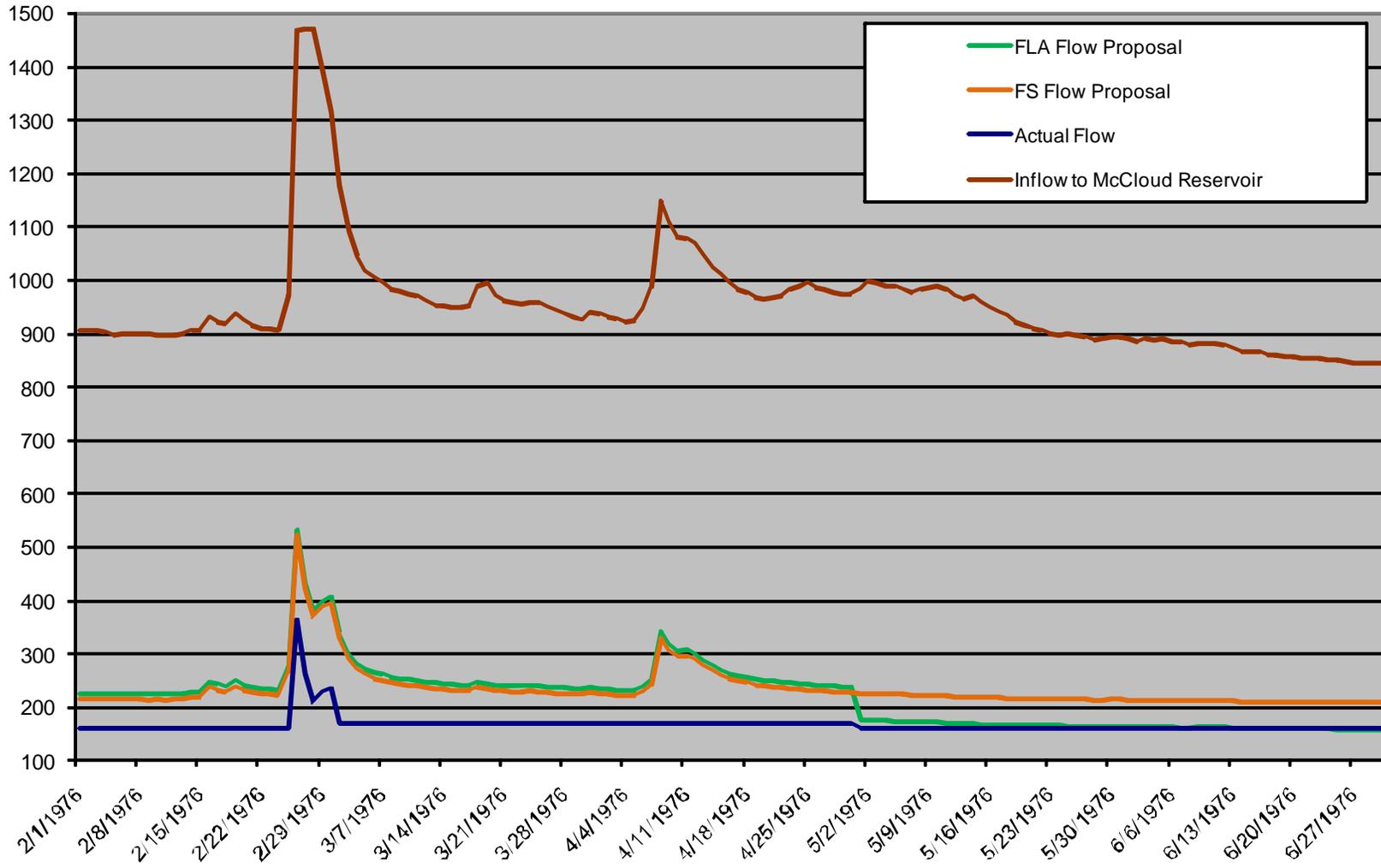
Flow at AhDiNa - 1974 - Wet



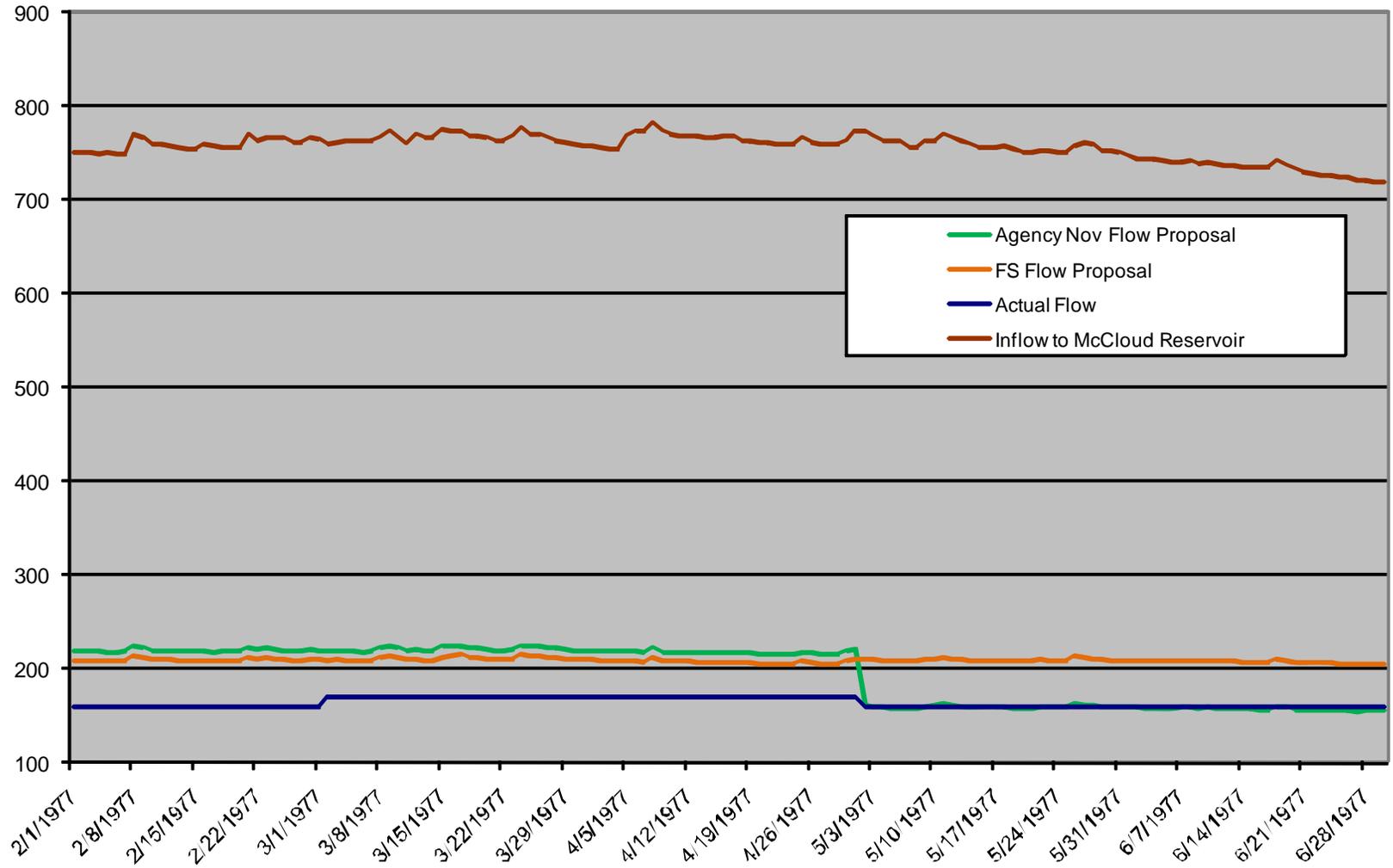
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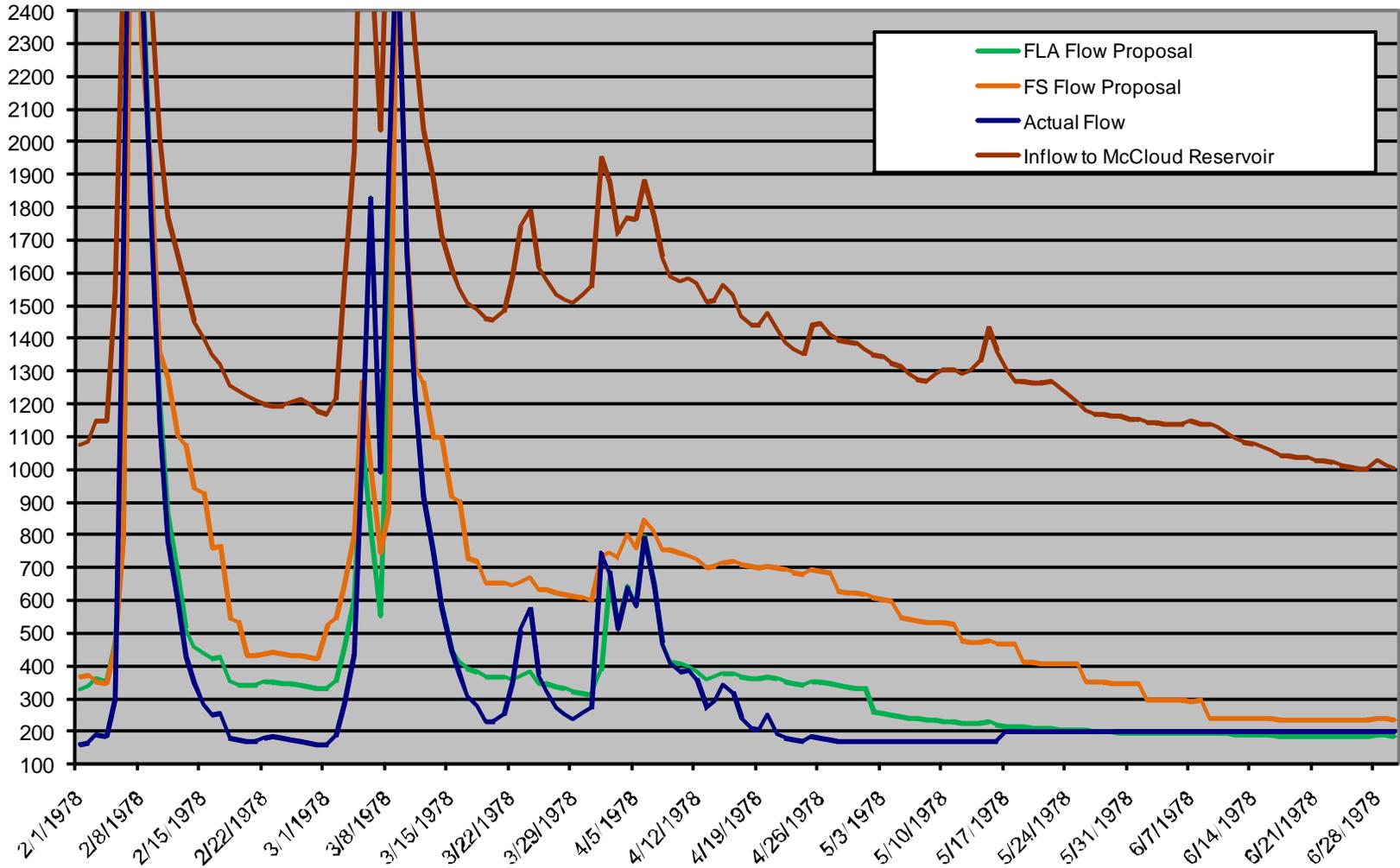
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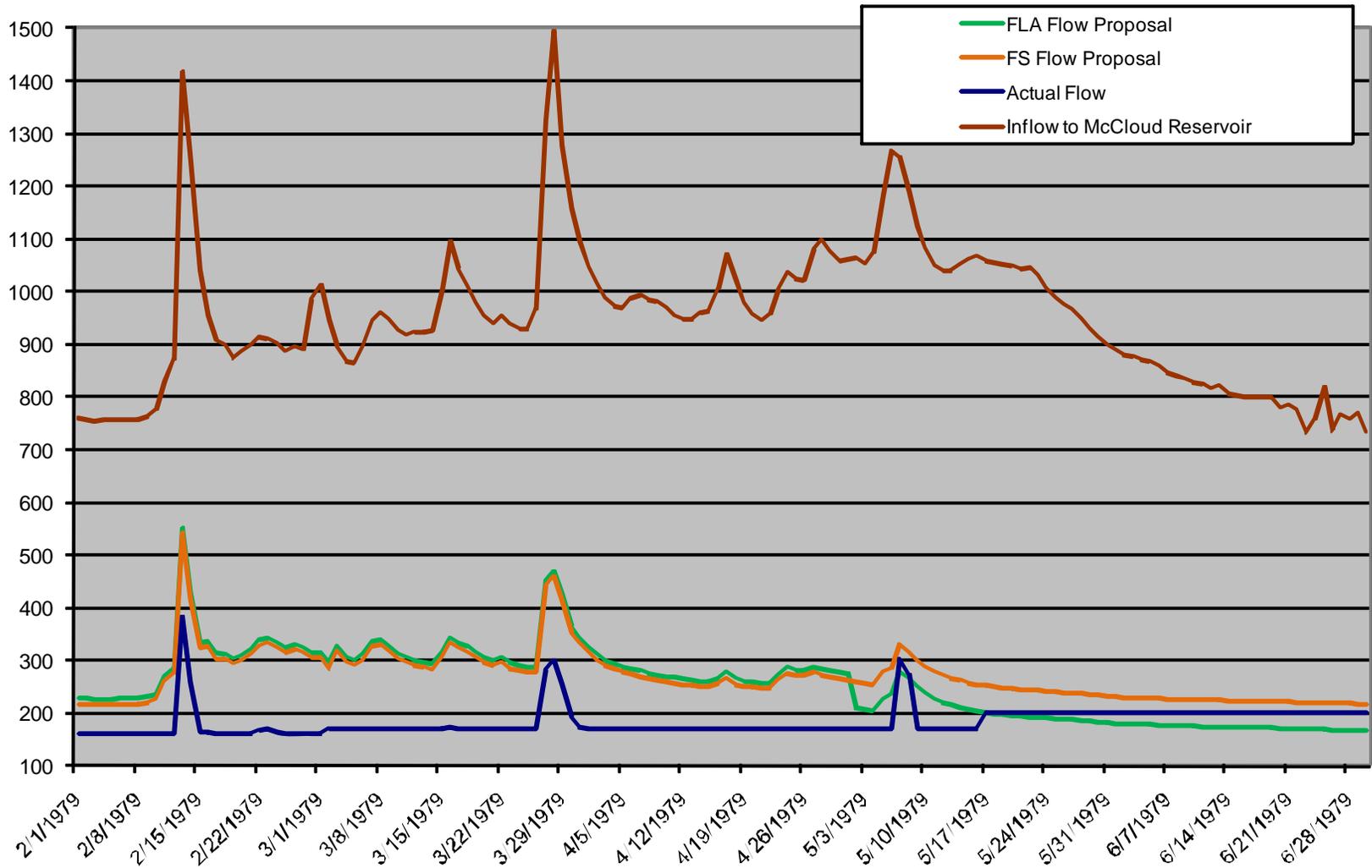
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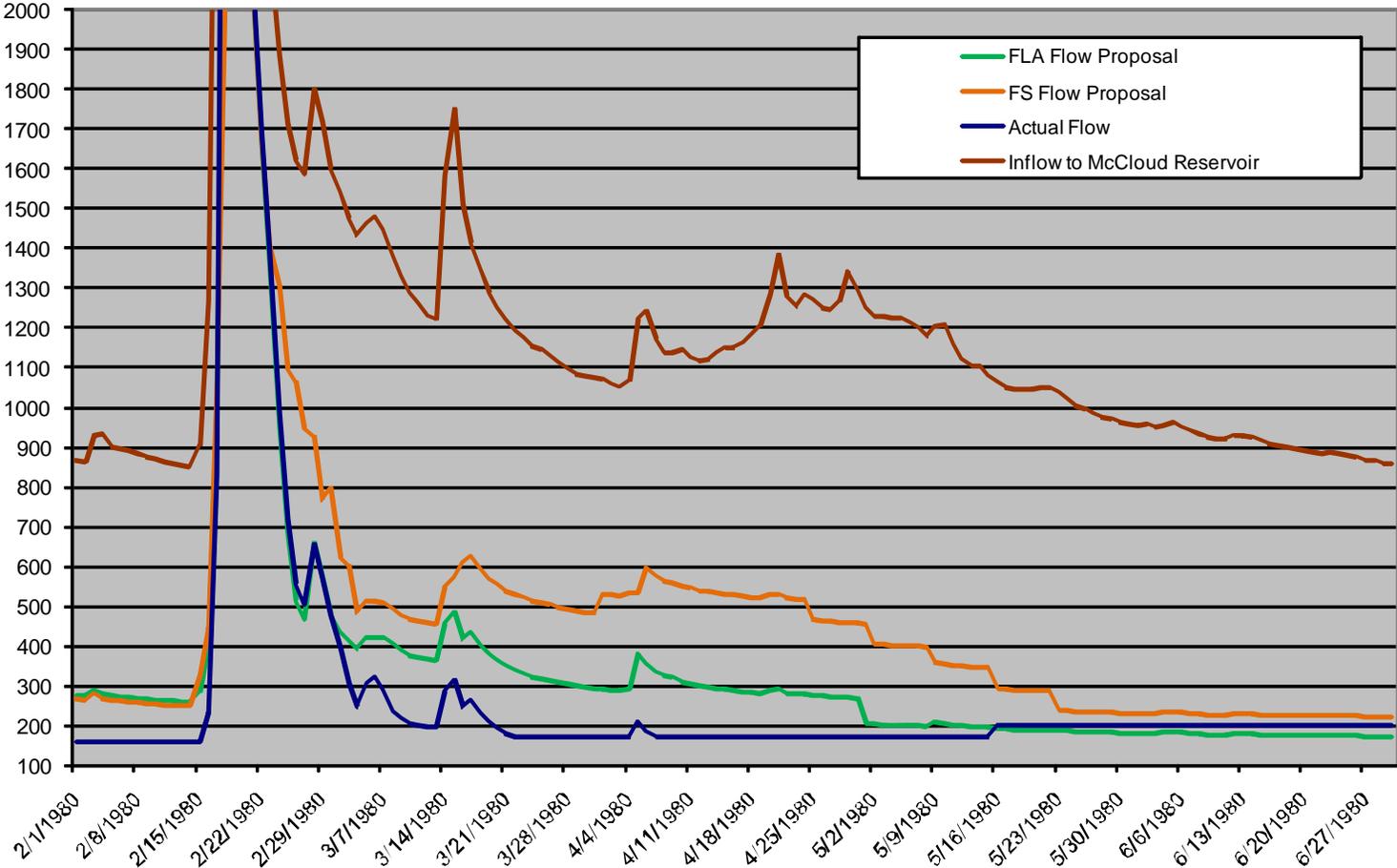
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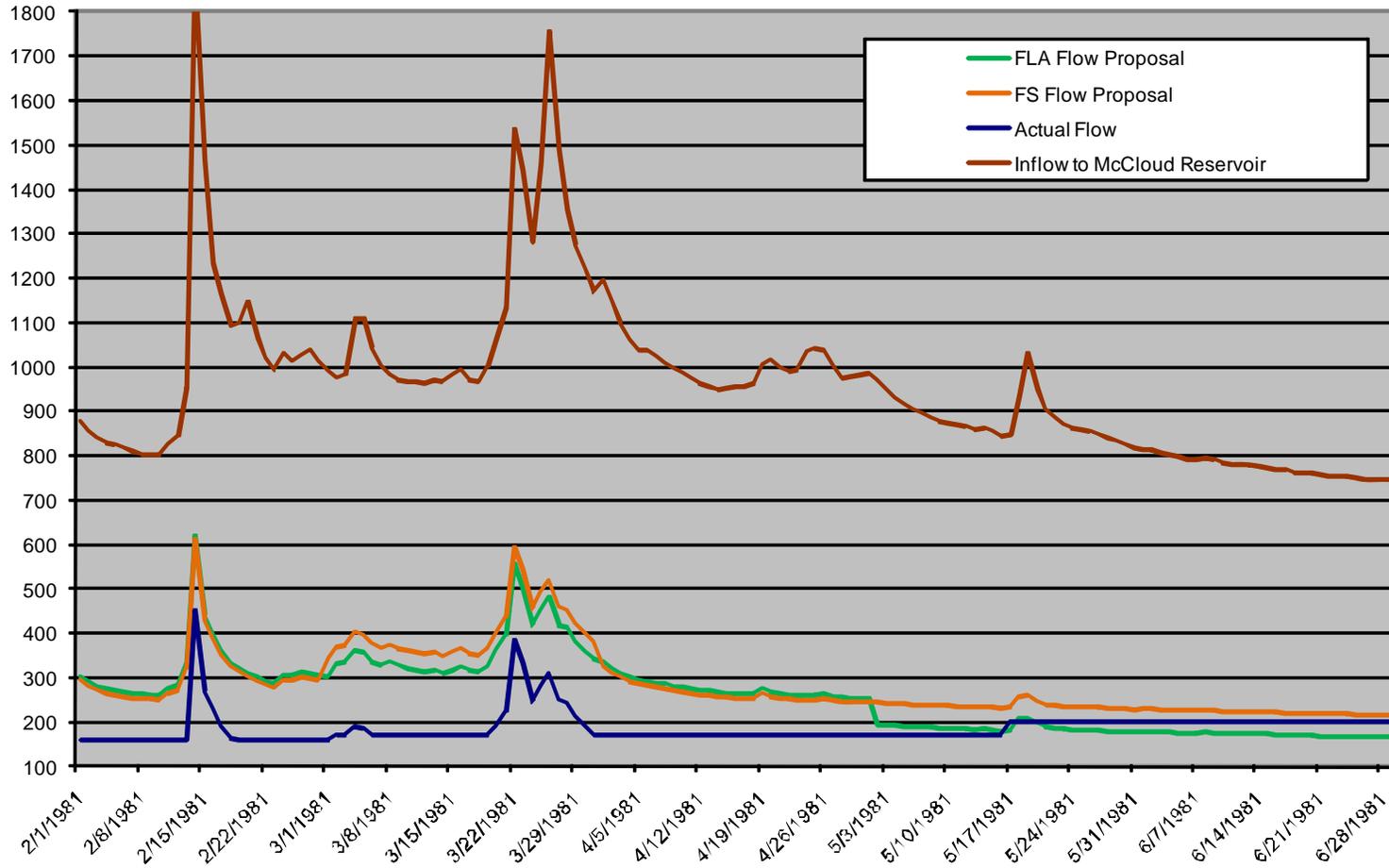
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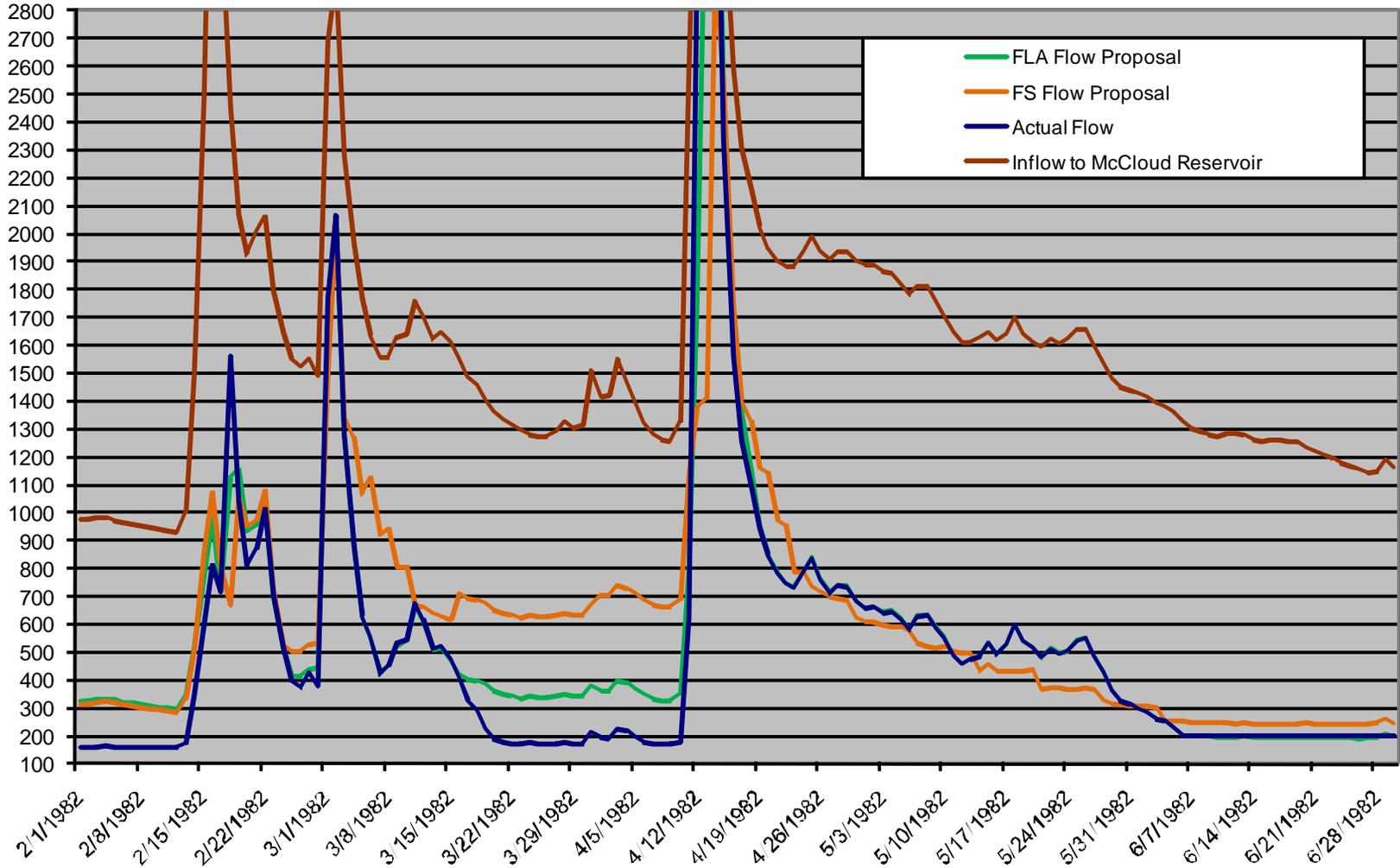
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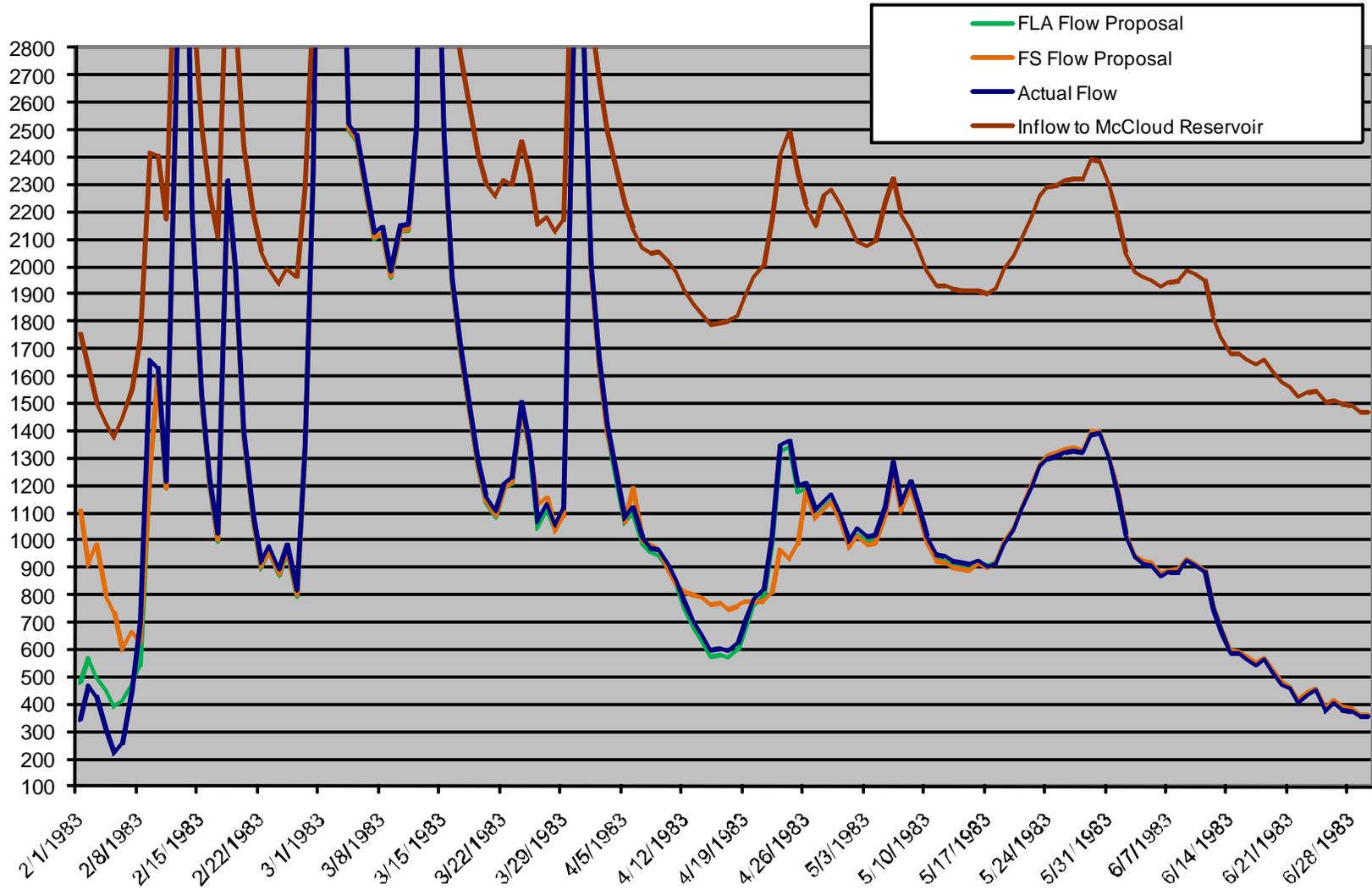
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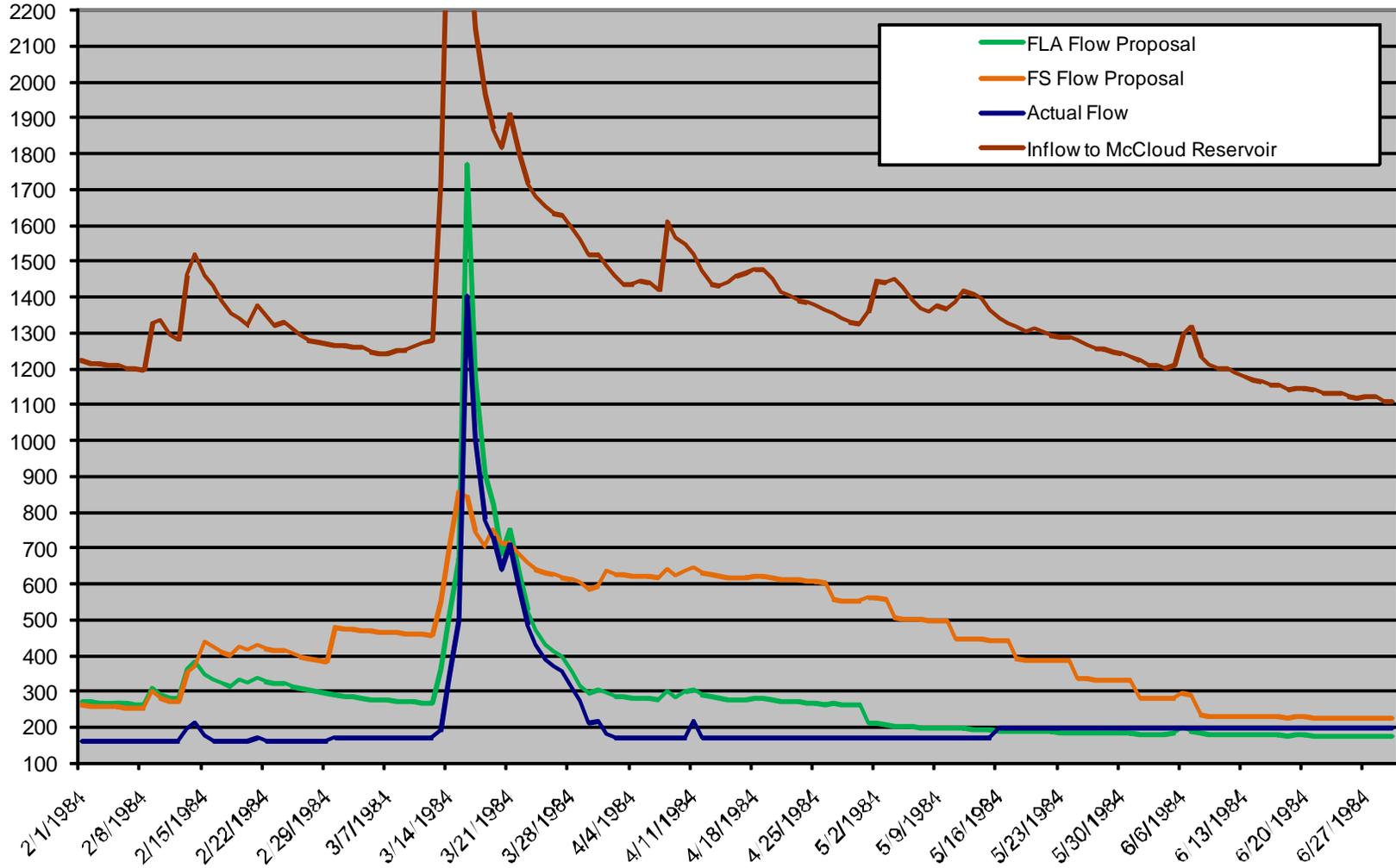
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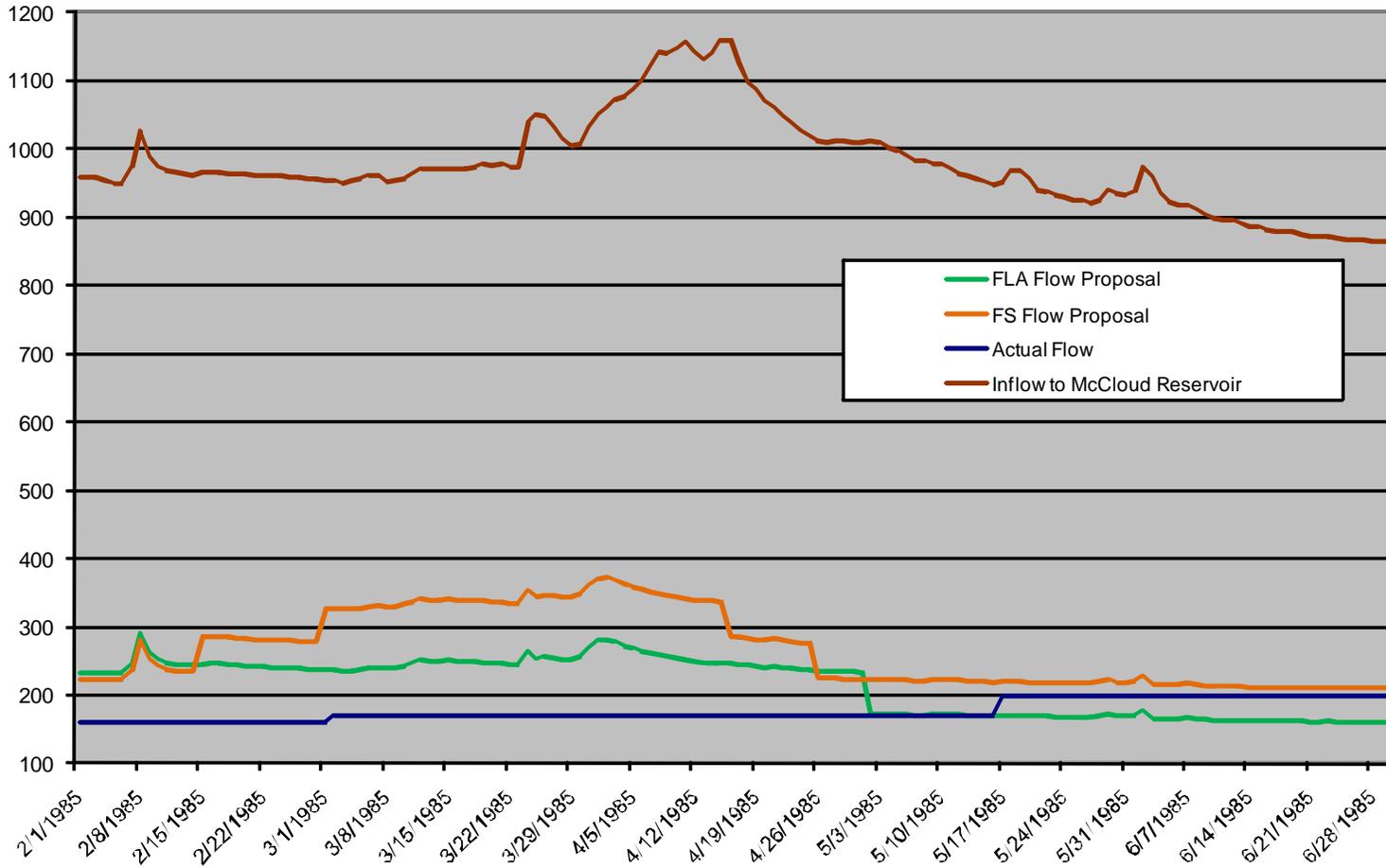
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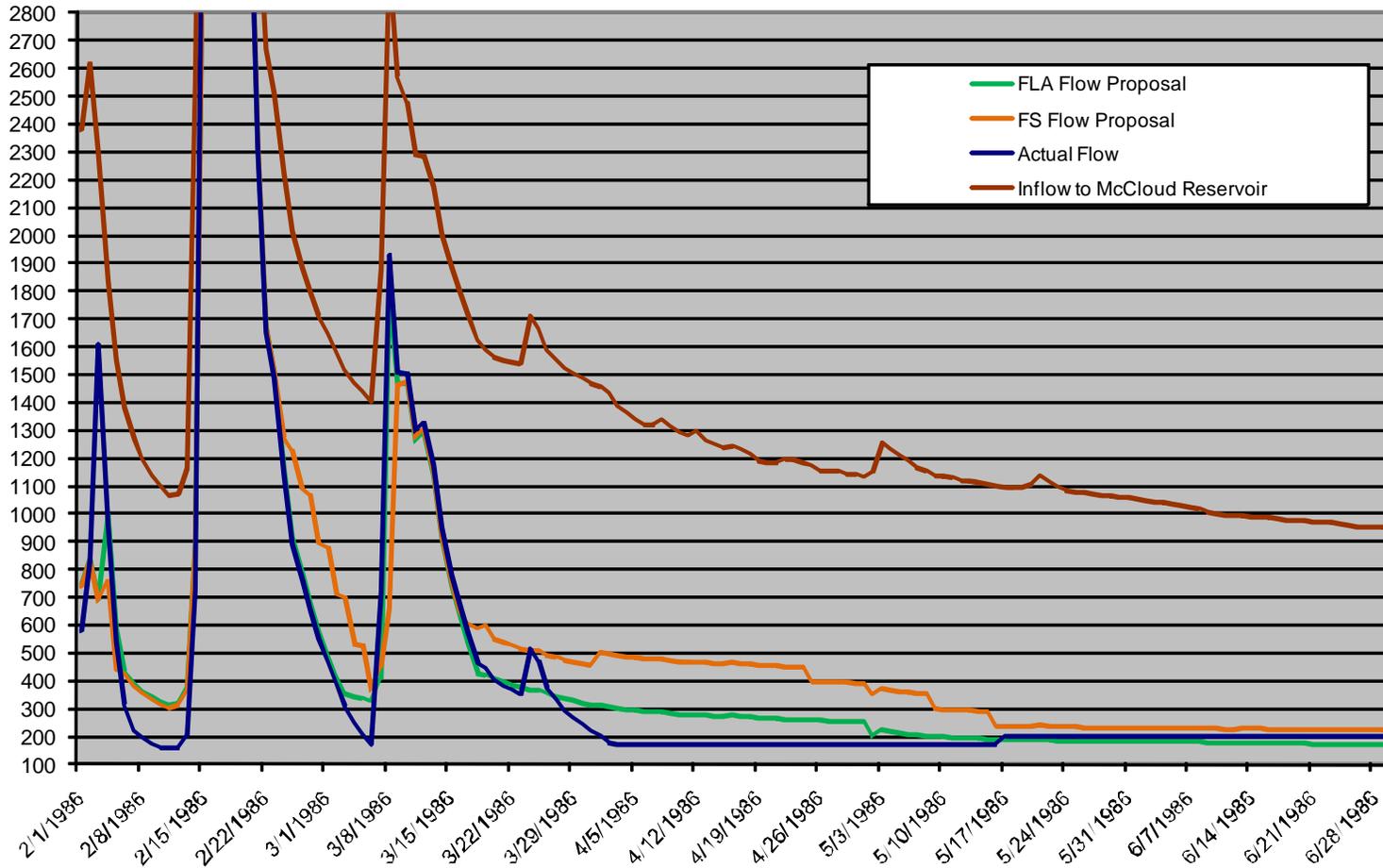
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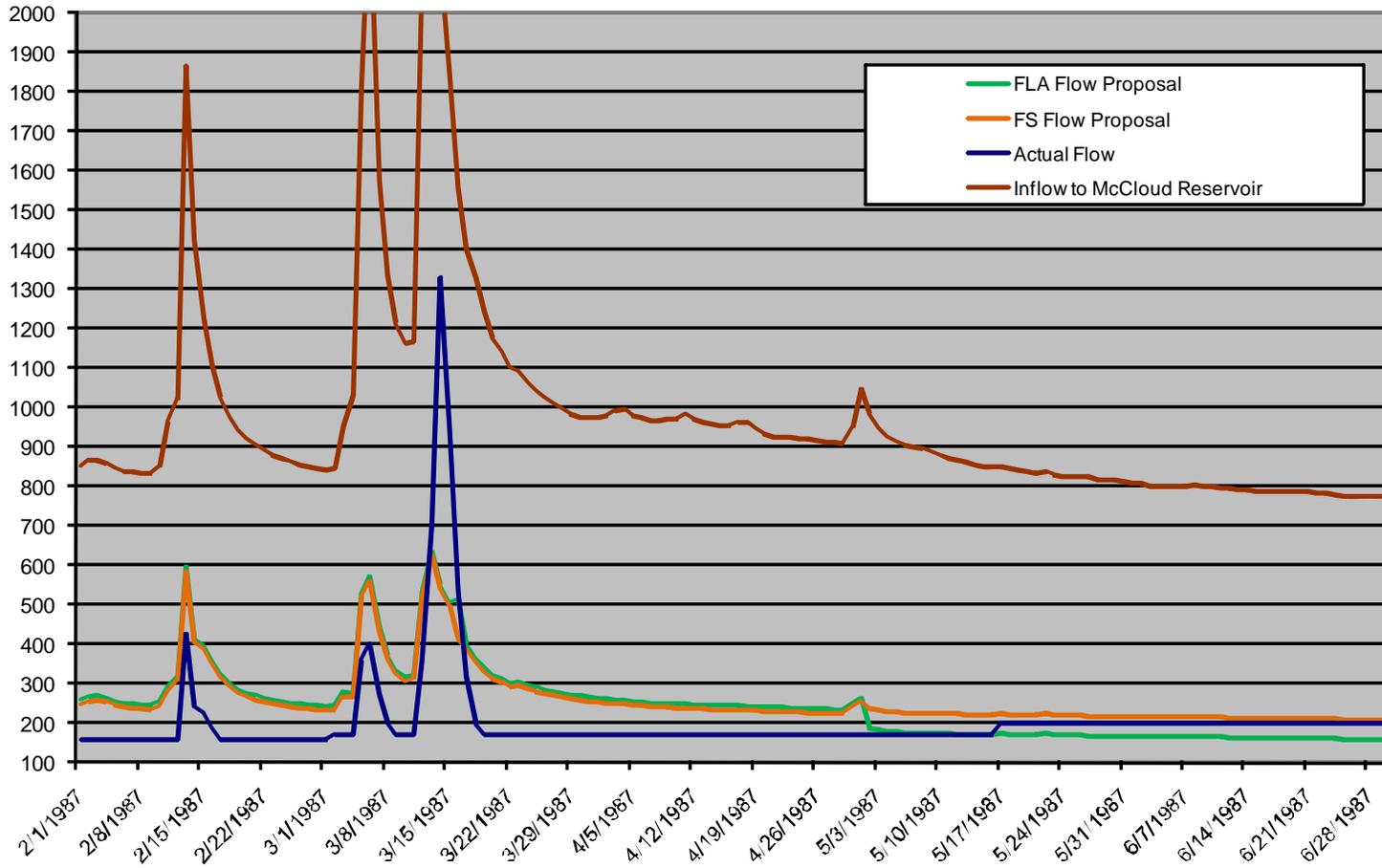
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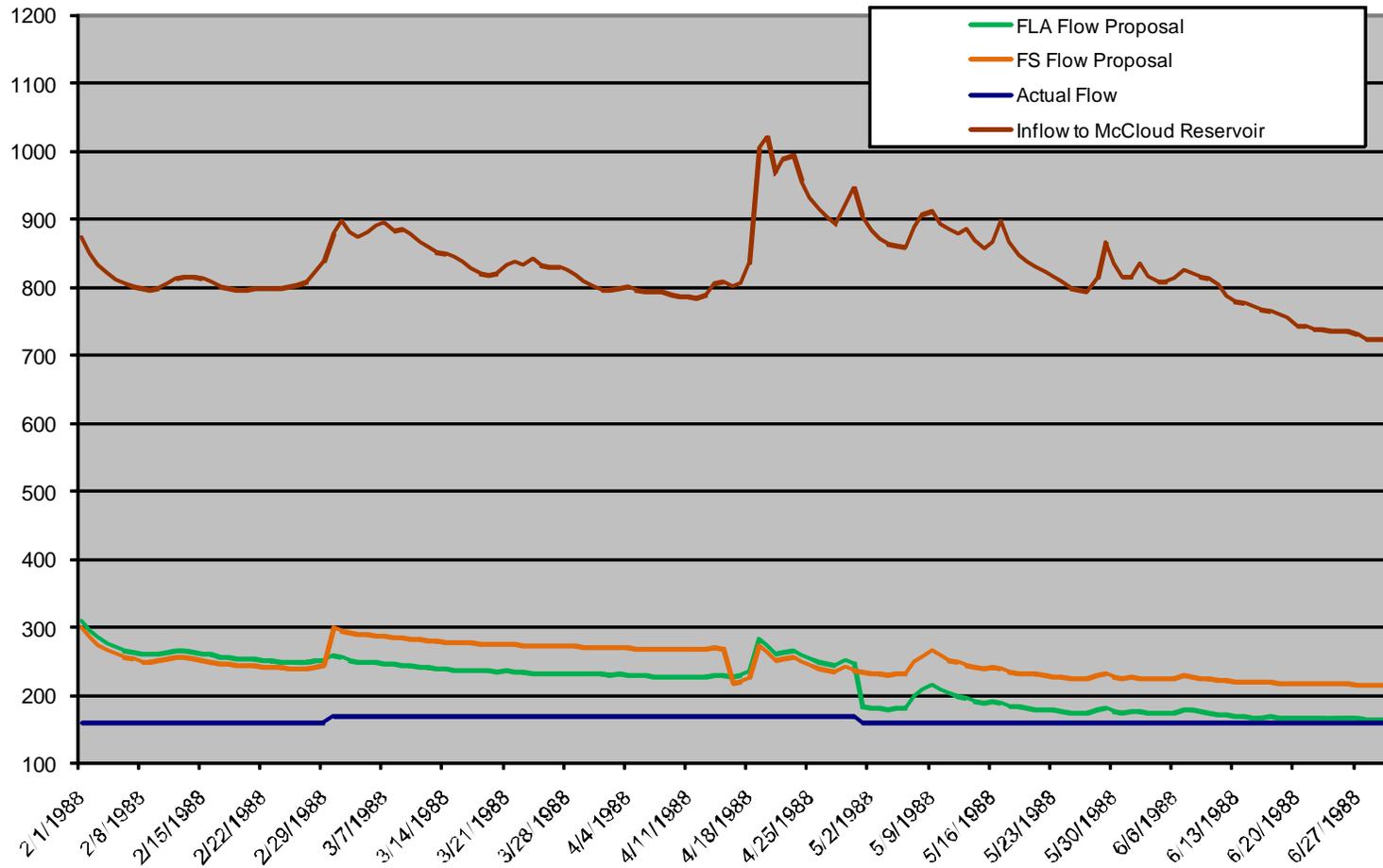
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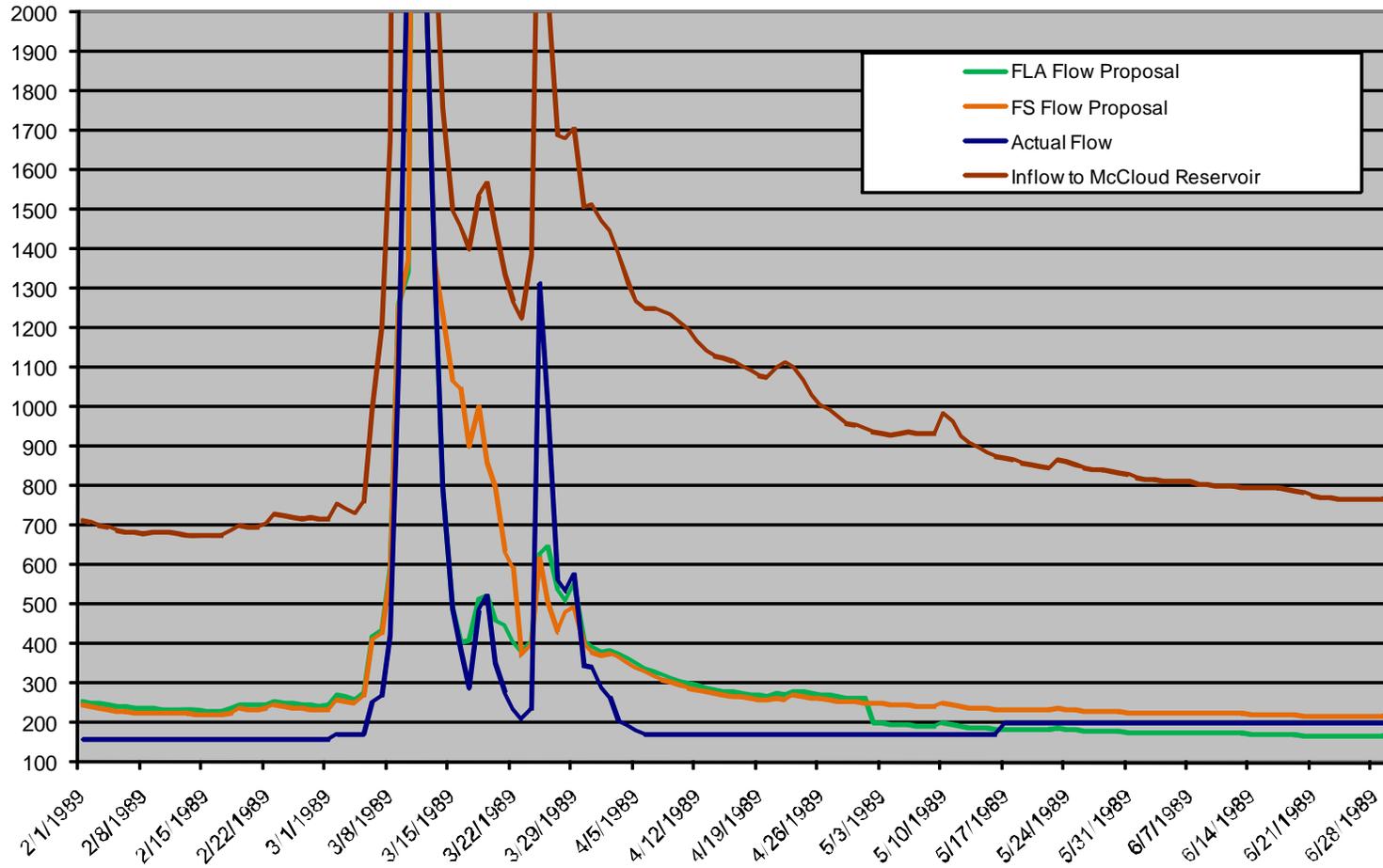
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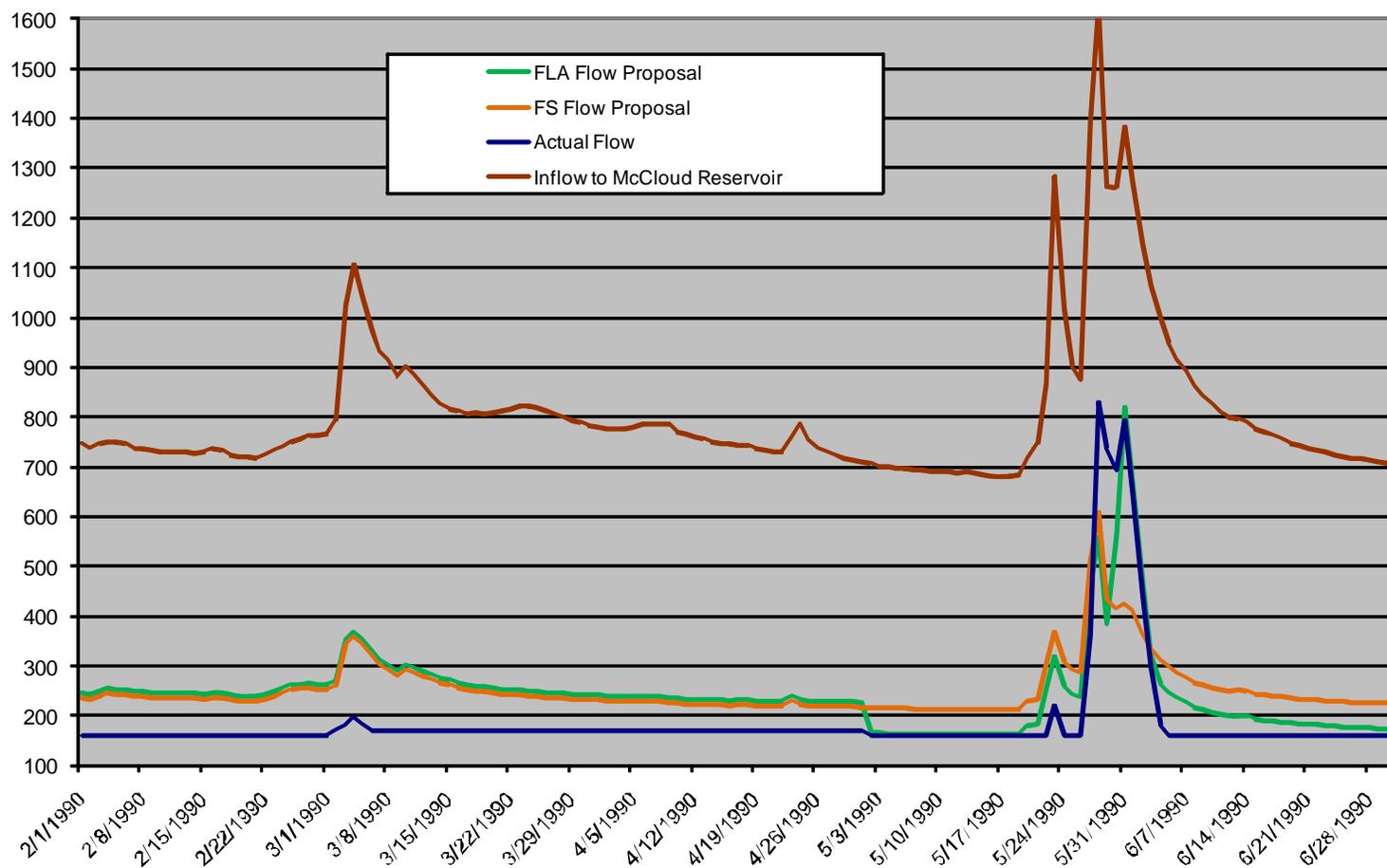
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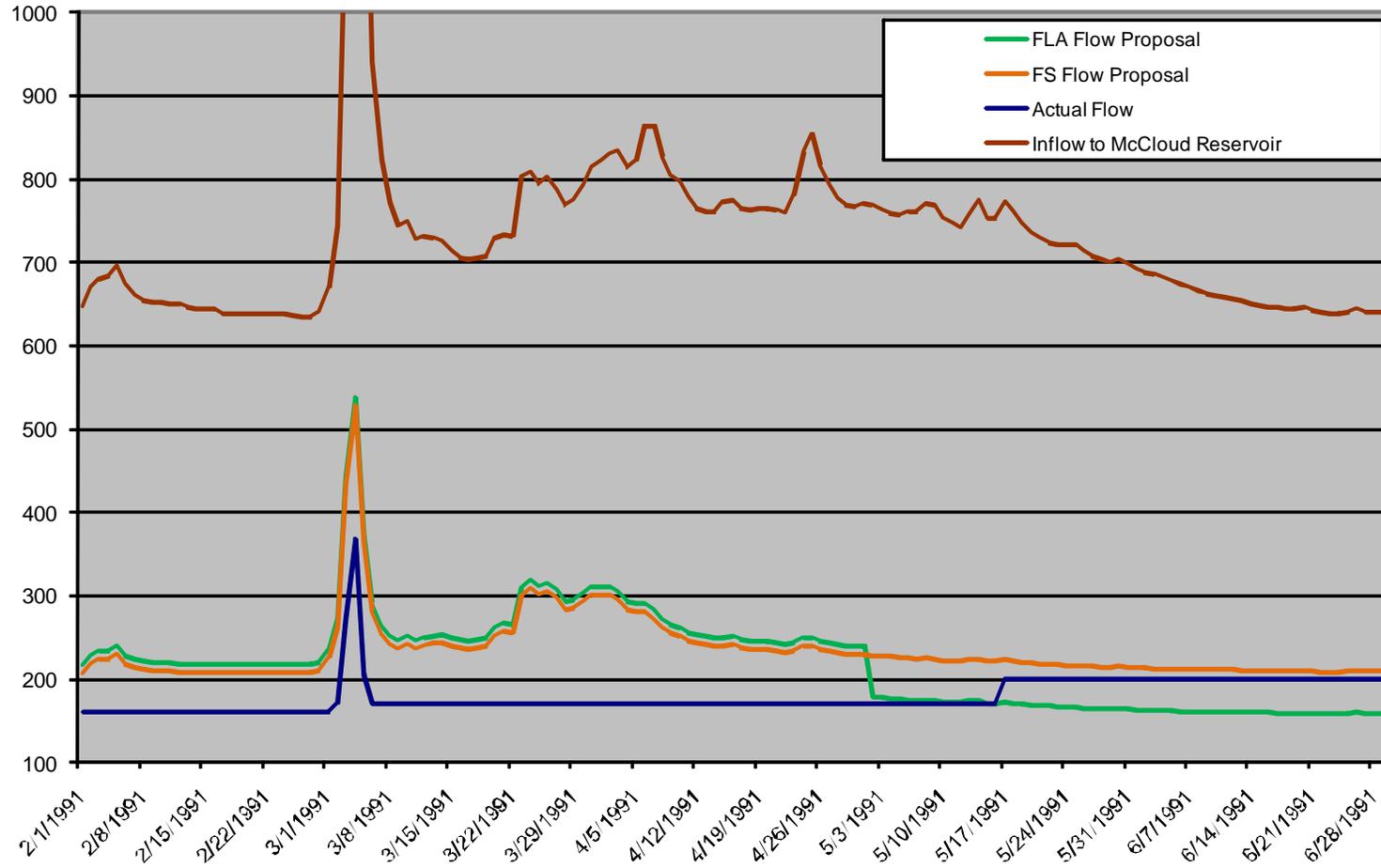
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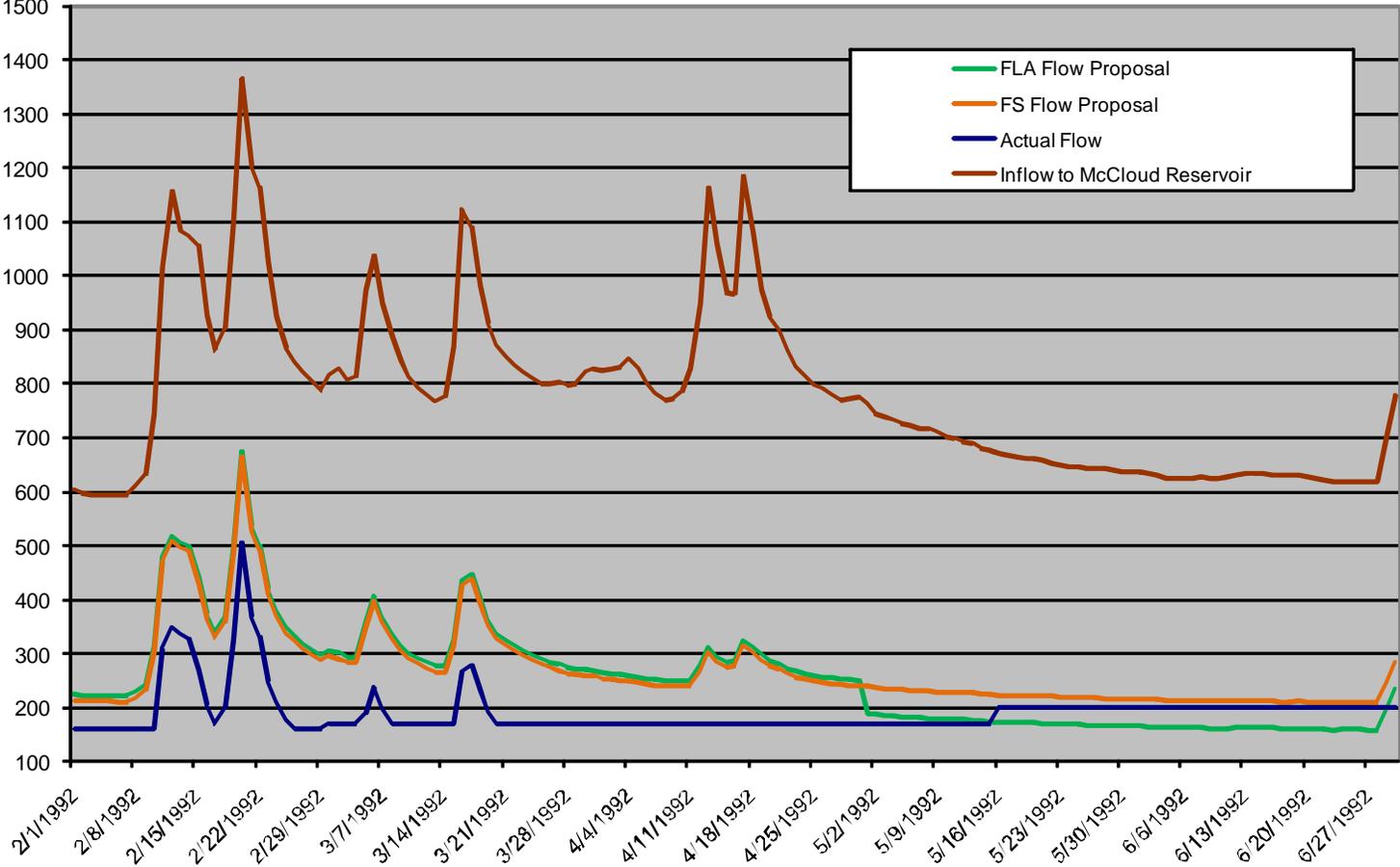
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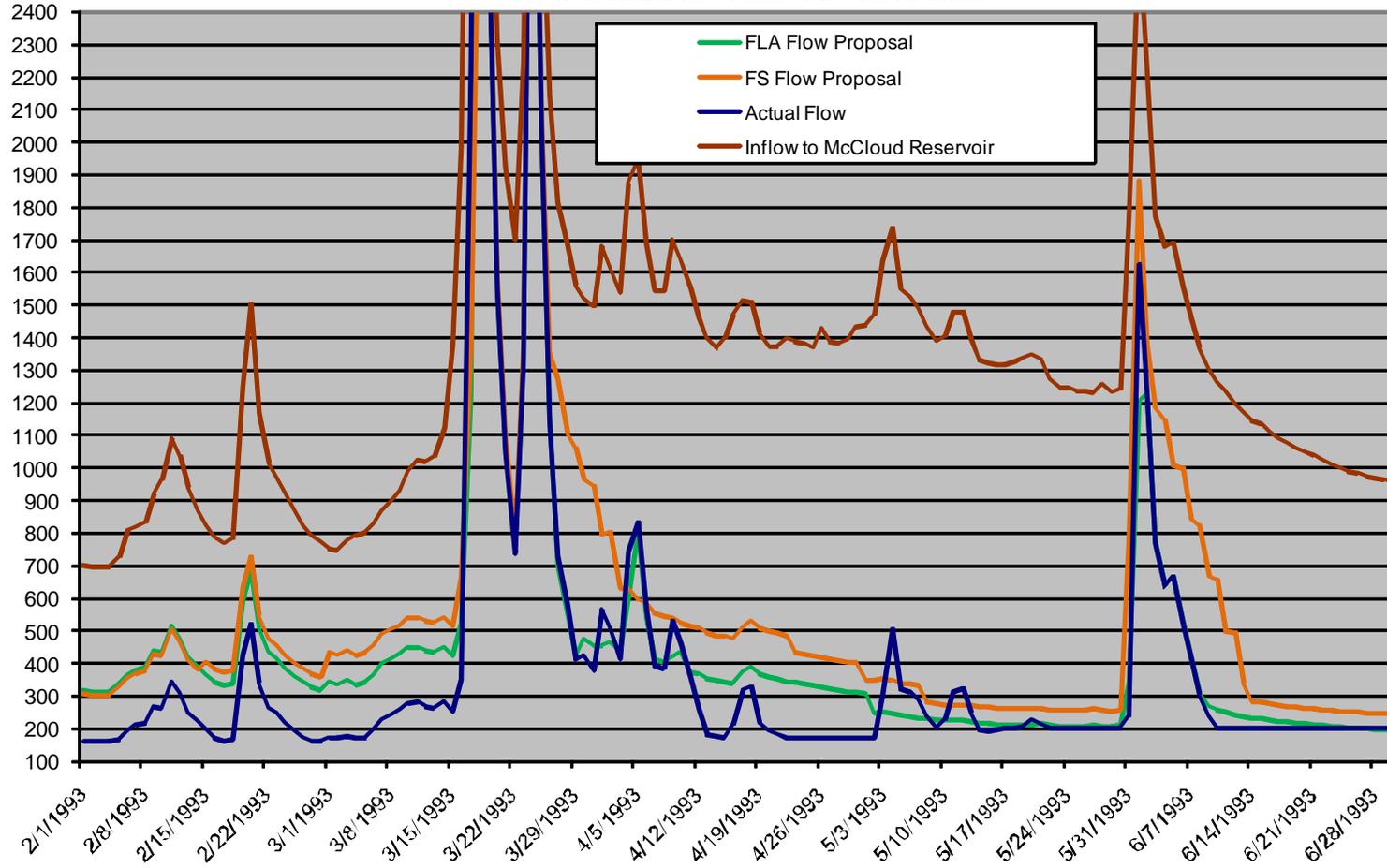
Flow at AhDiNa - 1991 - Critical



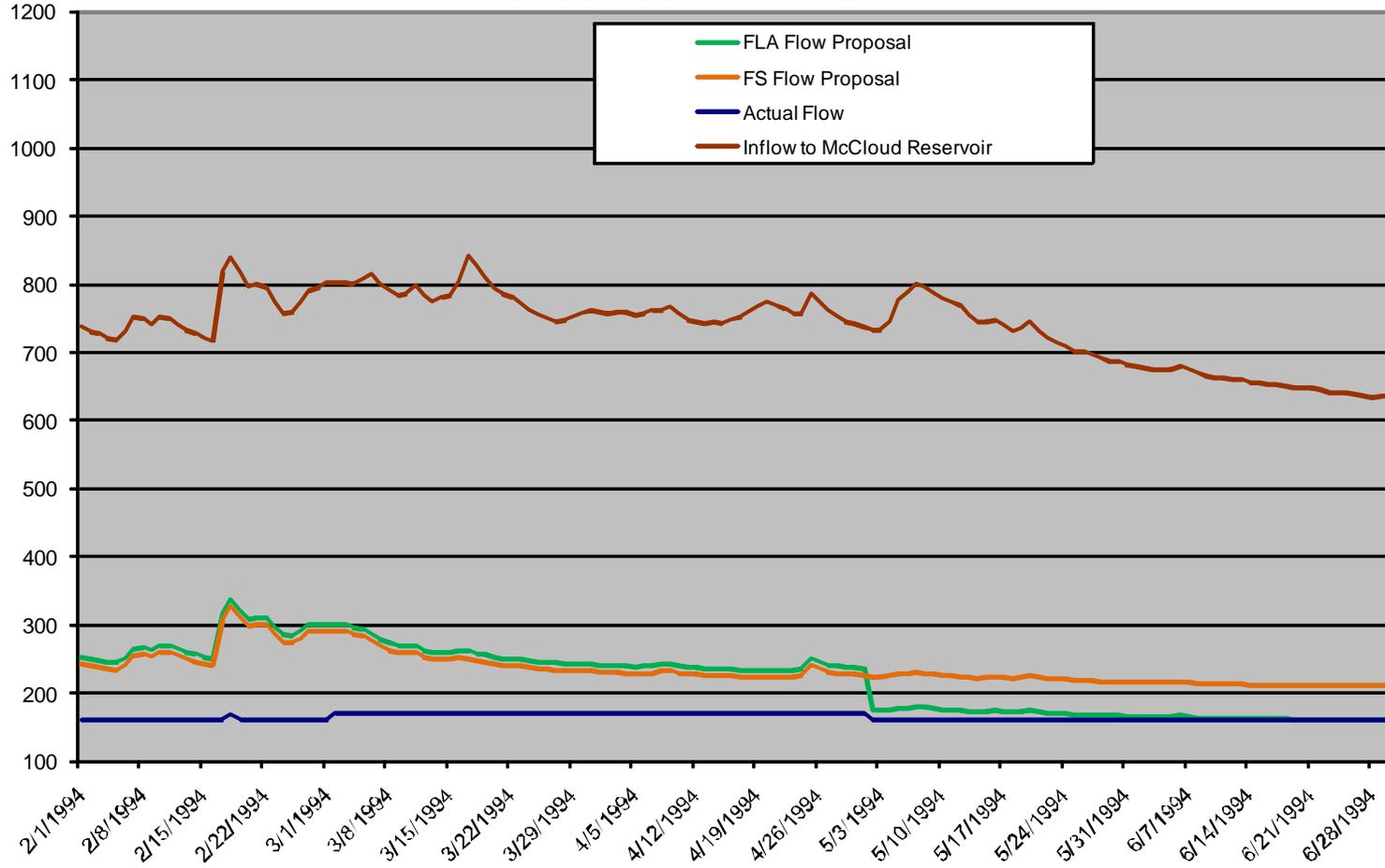
Flow at AhDiNa - 1992 - Critical



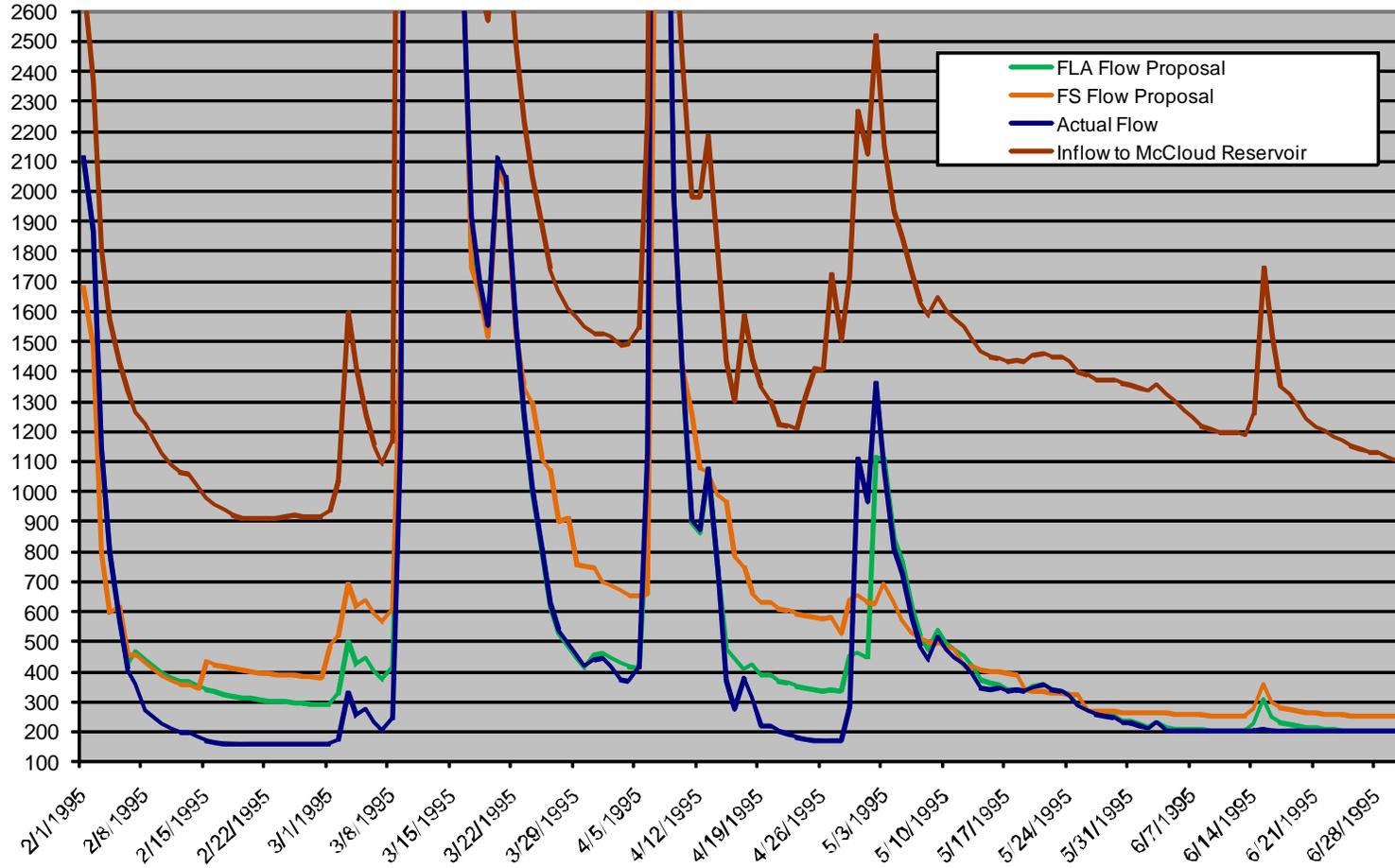
Flow at AhDiNa - 1993 - Above Normal

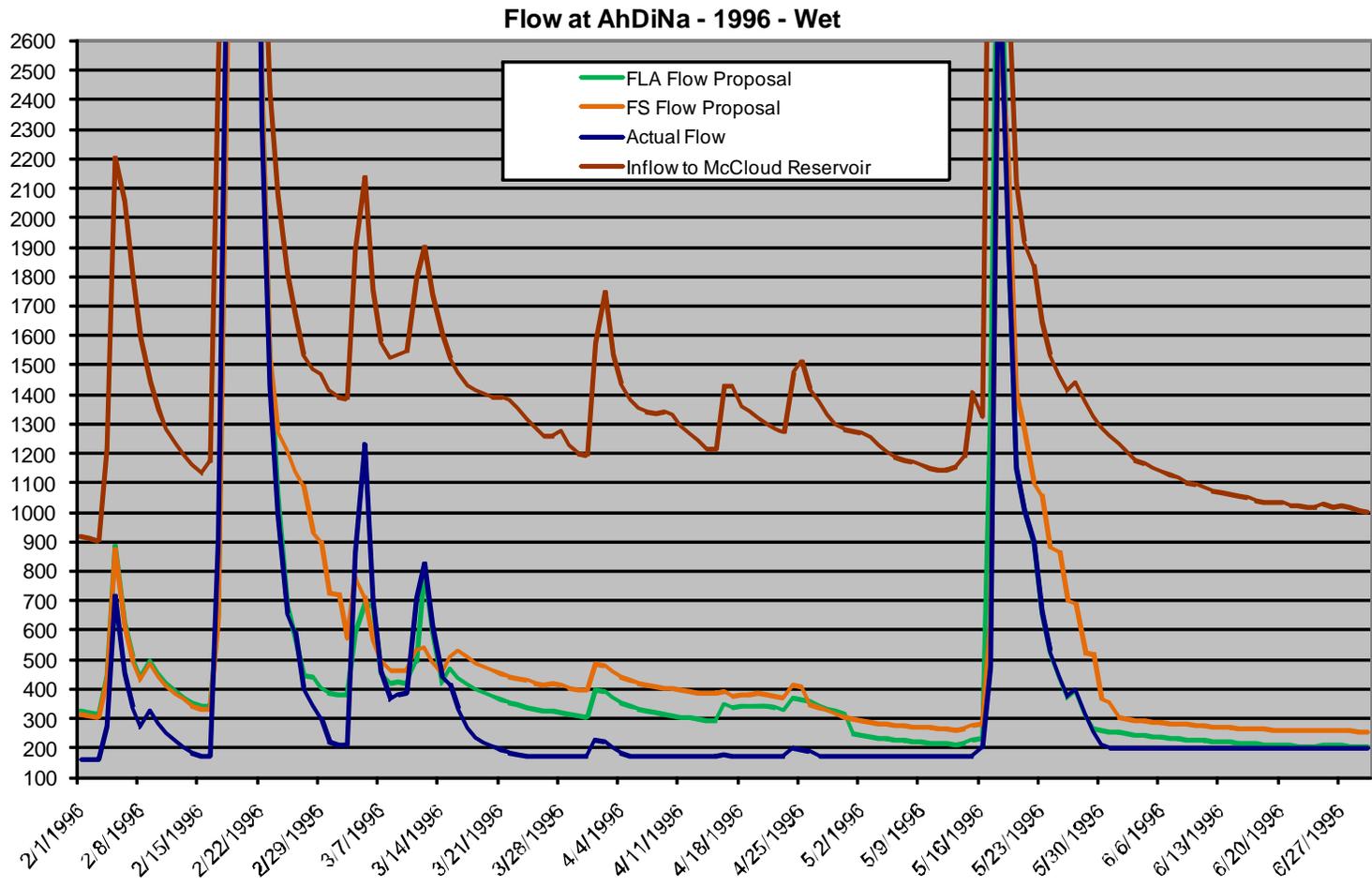


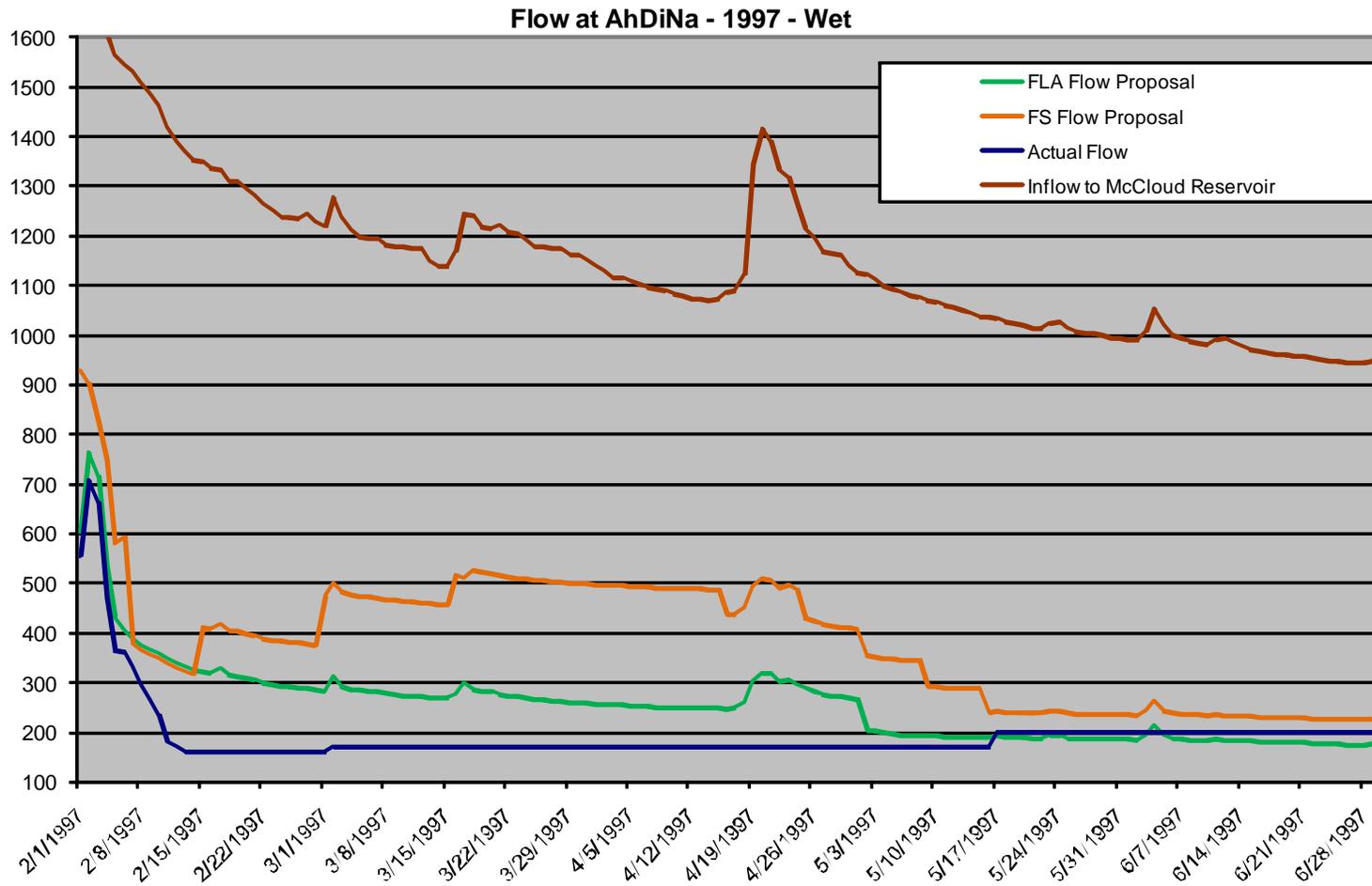
Flow at AhDiNa - 1994 - Critical

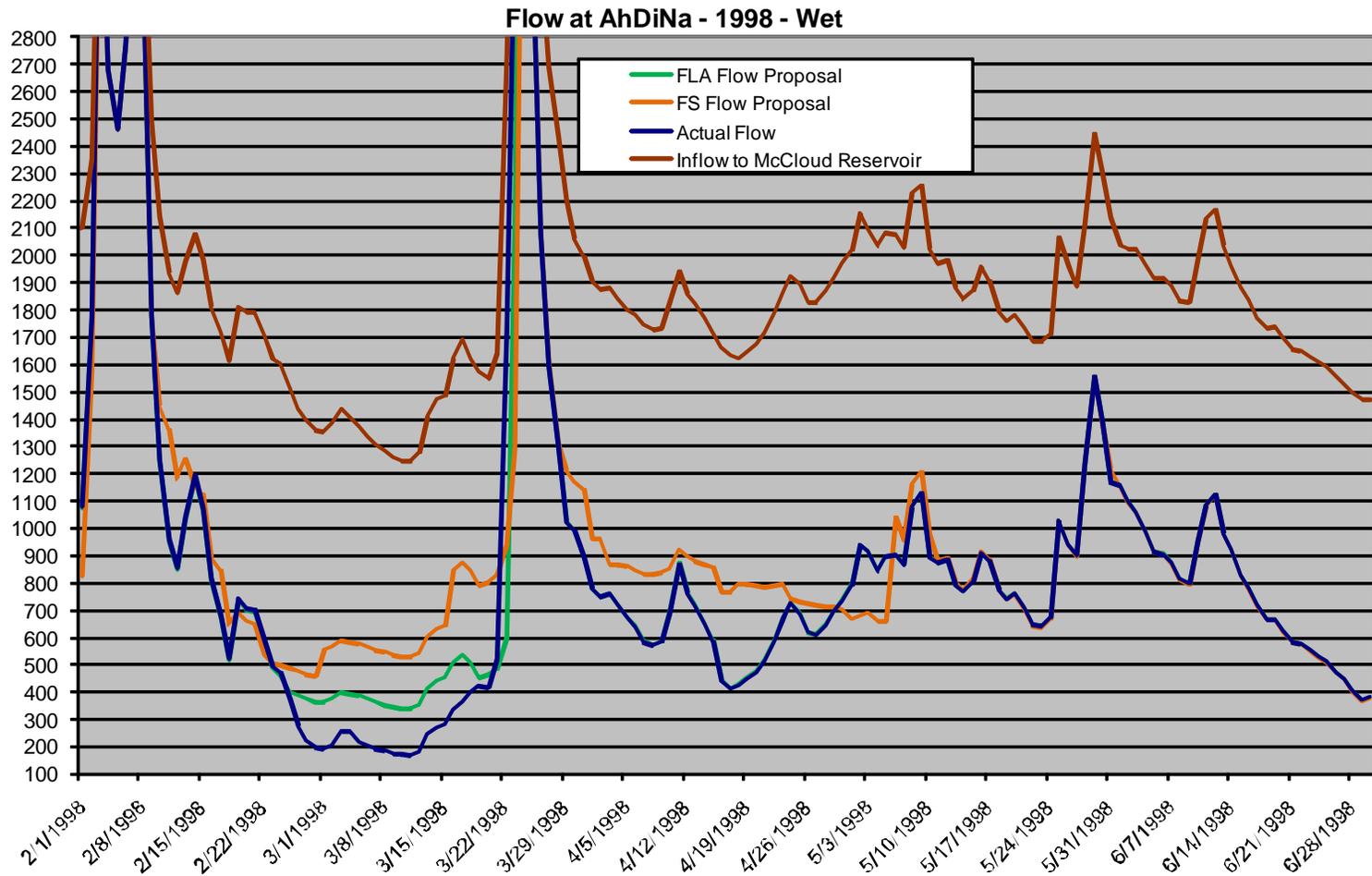


Flow at AhDiNa - 1995 - Wet

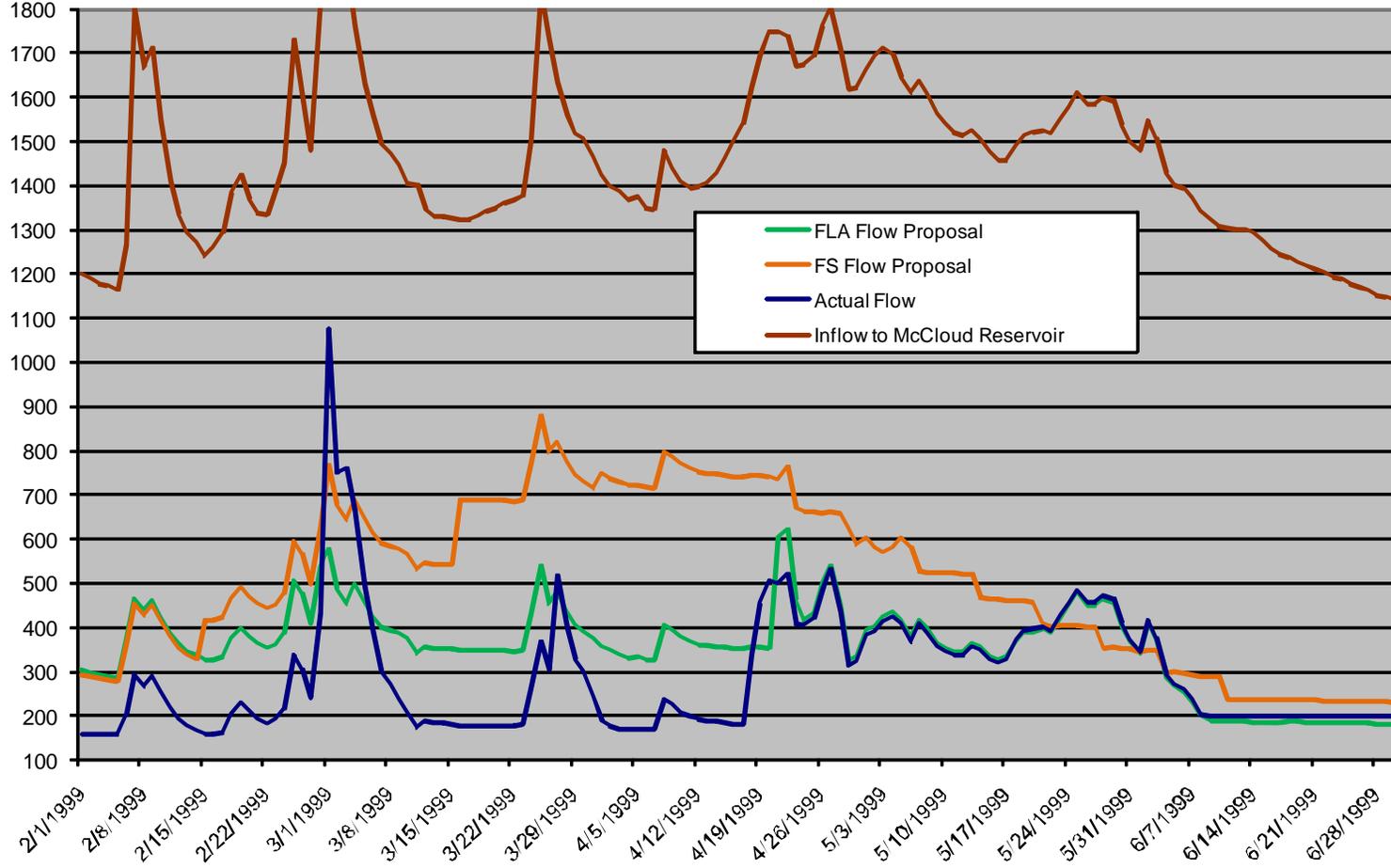




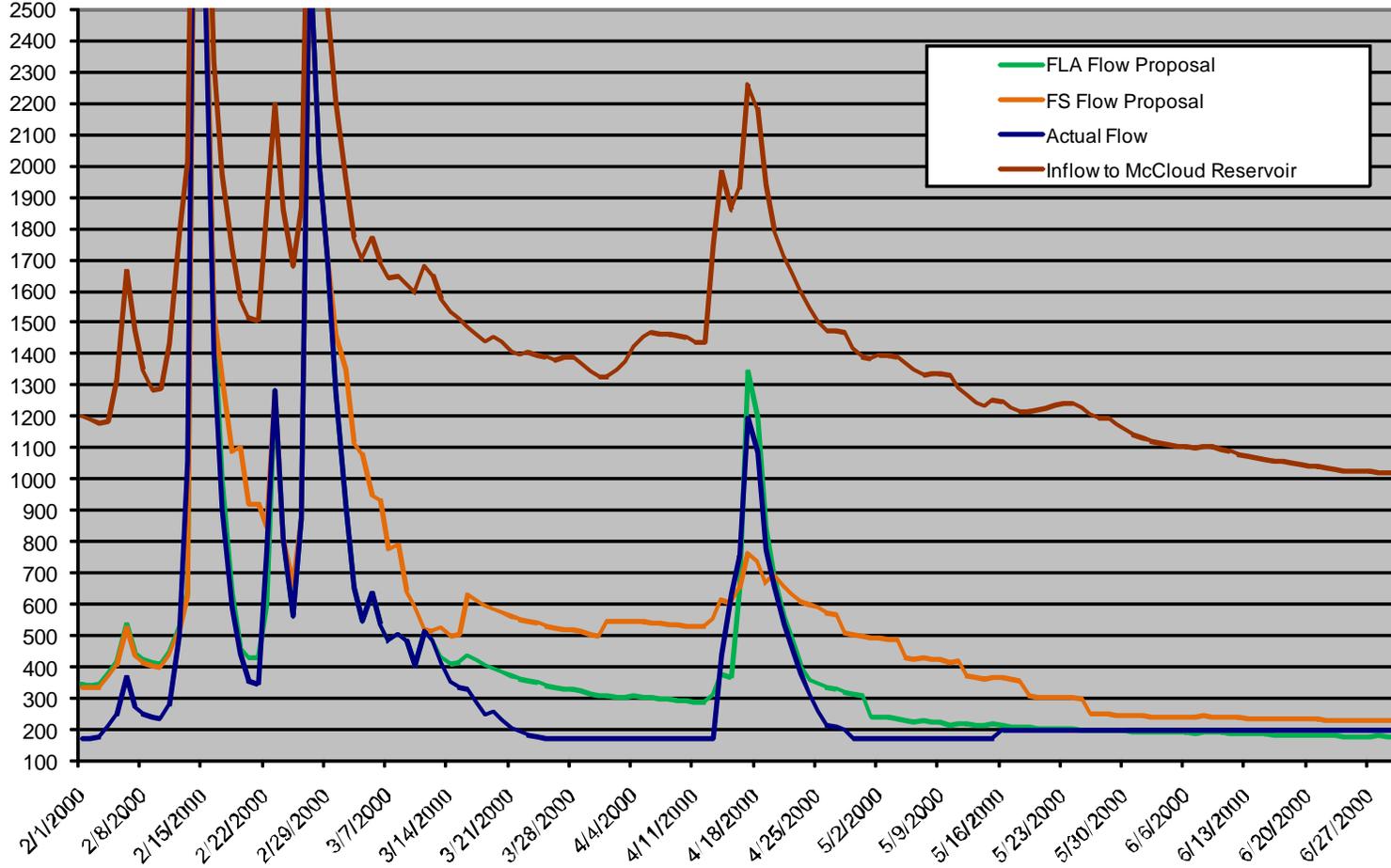




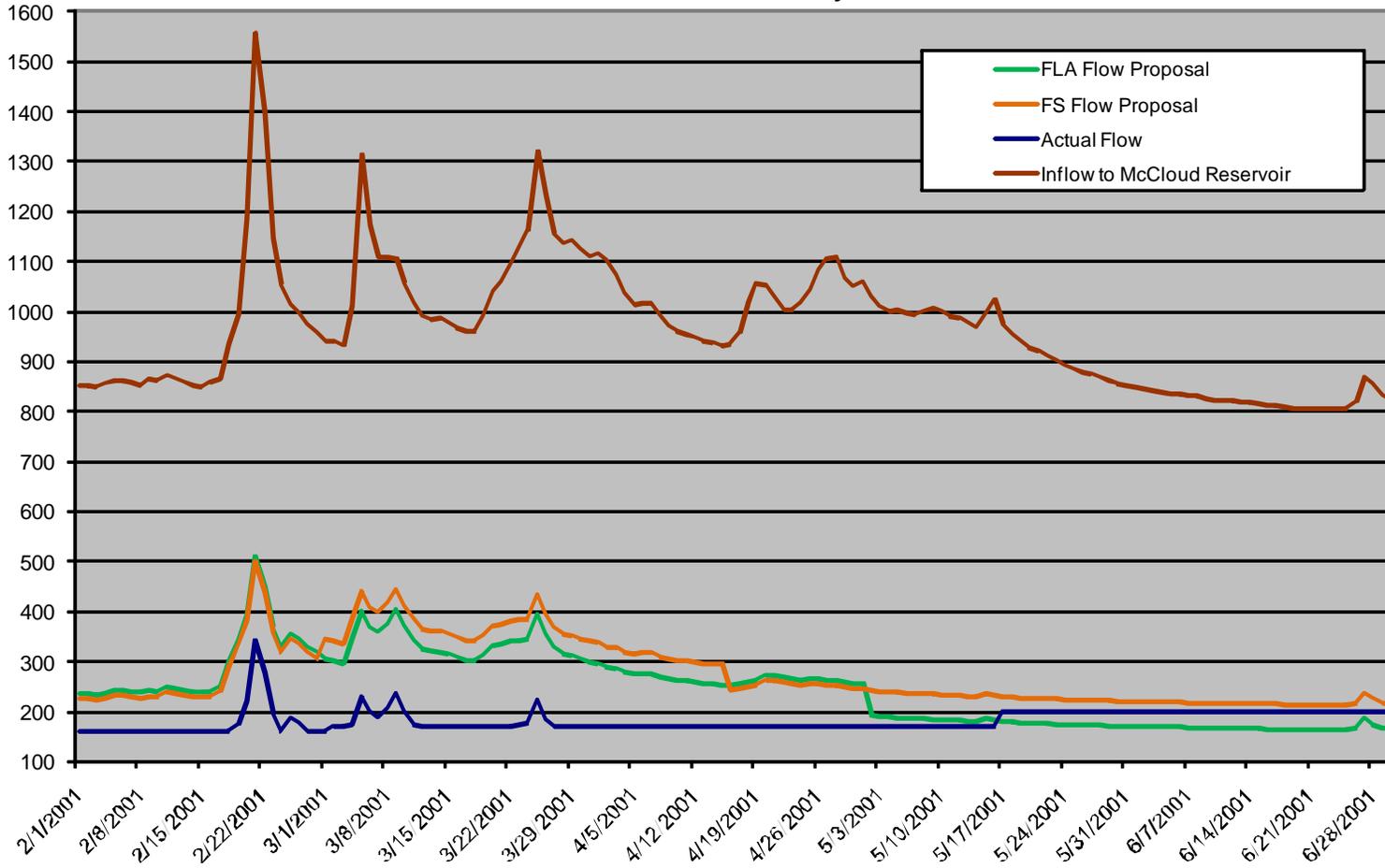
Flow at AhDiNa - 1999 - Wet

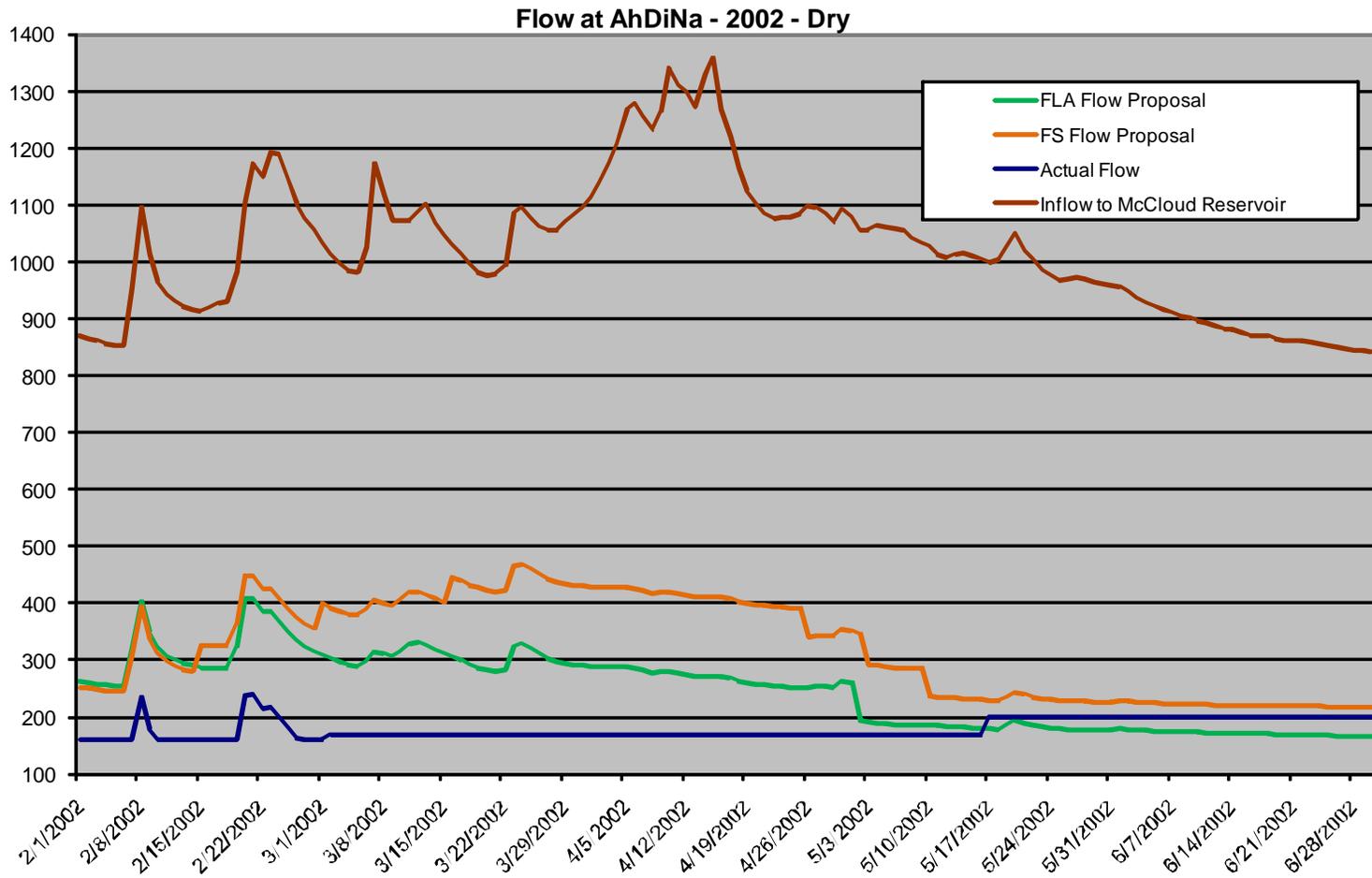


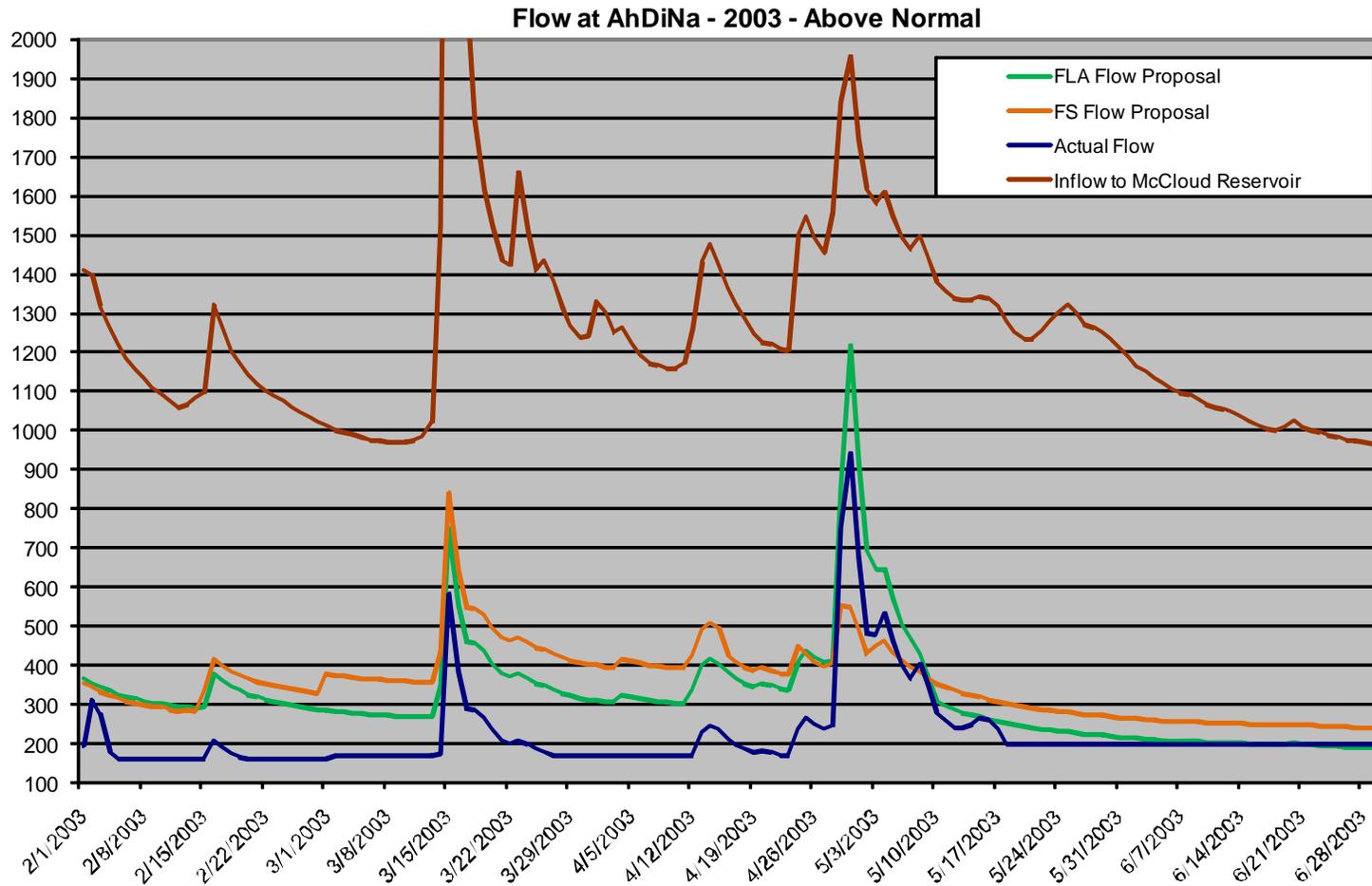
Flow at AhDiNa - 2000 - Above Normal



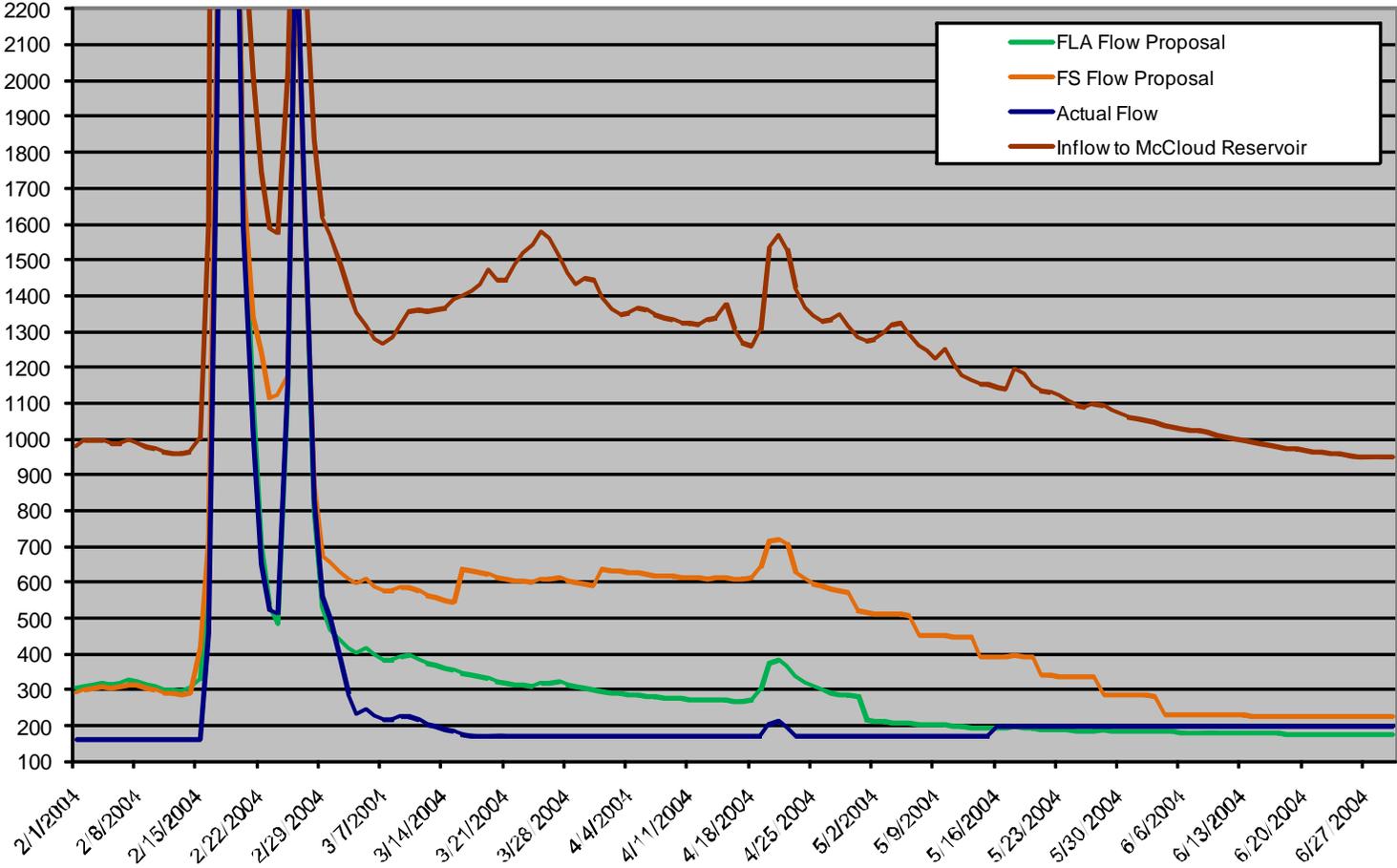
Flow at AhDiNa - 2001 - Dry



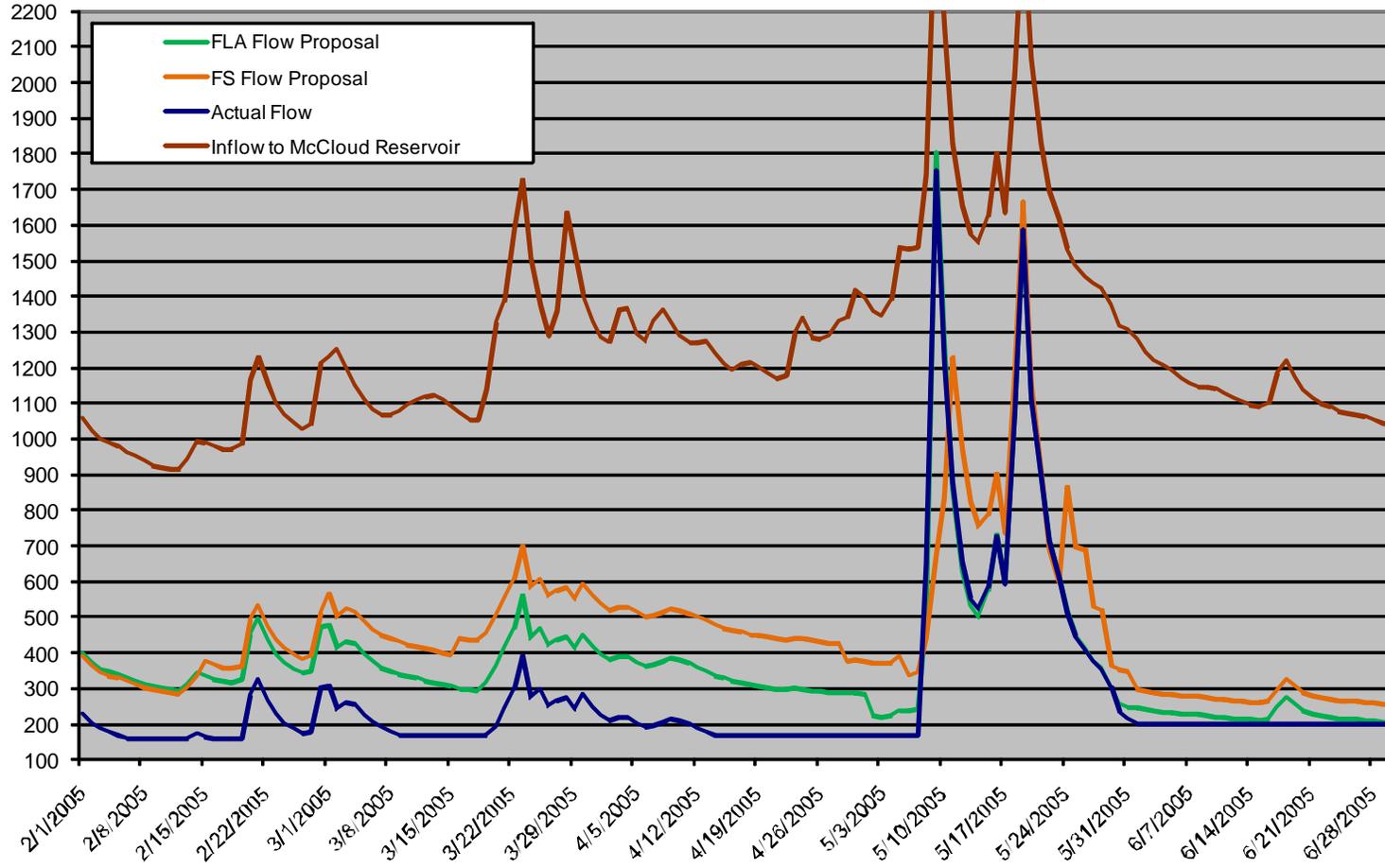




Flow at AhDiNa - 2004 - Below Normal



Flow at AhDiNa - 2005 - Above Normal



Flow at AhDiNa - 2006 - Wet

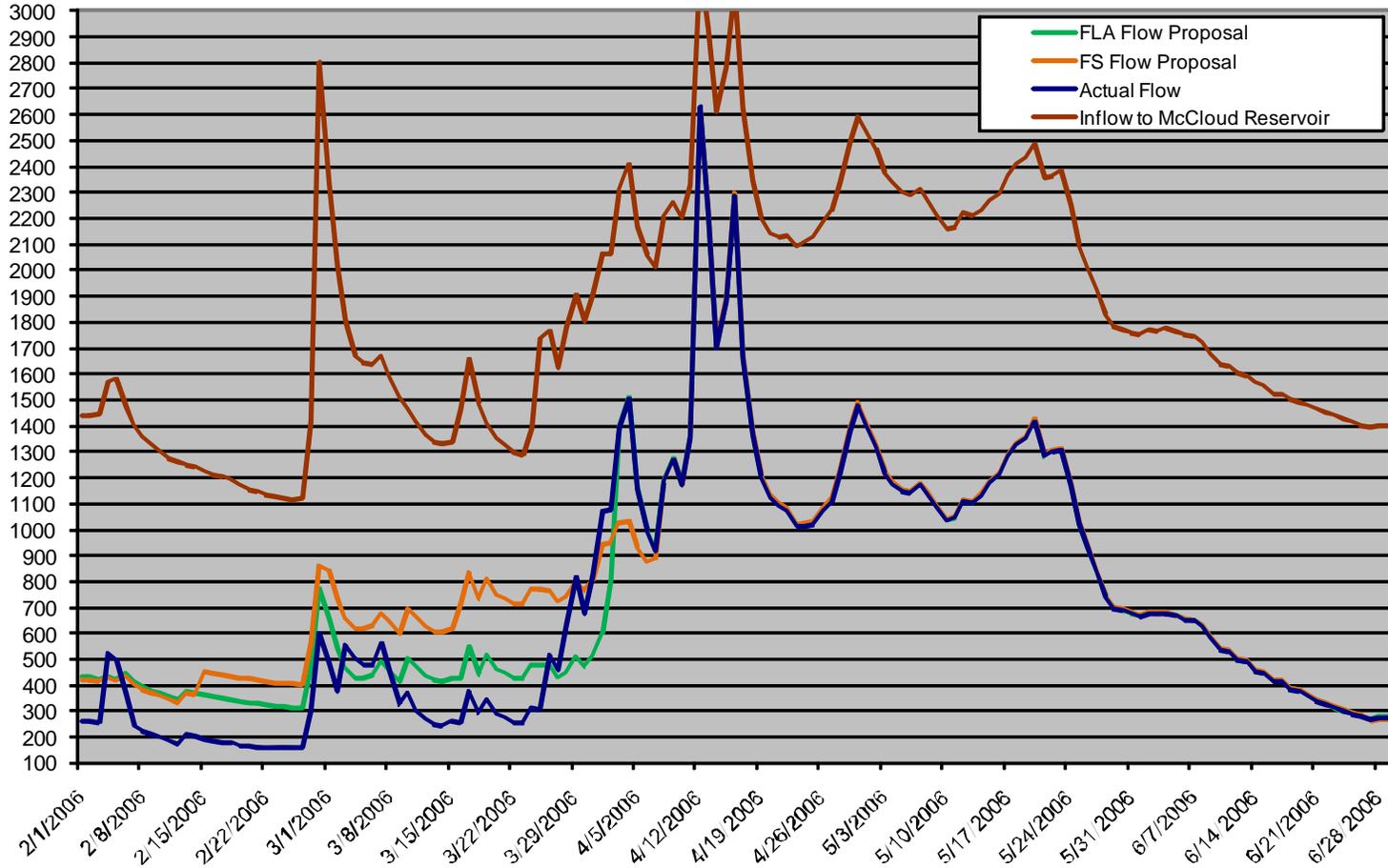


Table A-3. Adult Combined Trout WUA by Percent Maximum WUA

Simulated Discharge	CSF*	CSF	CSF	CSF	CSF
	0.0 to 1.0	0.2 to 1.0	0.4 to 1.0	0.6 to 1.0	0.8 to 1.0
	% Max				
	WUA	WUA	WUA	WUA	WUA
2	7.2%	3.5%	0.6%	0.0%	0.0%
3	11.1%	7.7%	2.8%	1.1%	0.0%
4	14.8%	11.5%	6.3%	1.8%	0.0%
5	18.3%	15.0%	10.5%	4.1%	0.0%
6	21.6%	18.3%	14.0%	7.8%	0.0%
8	27.9%	25.1%	21.5%	15.7%	3.5%
10	33.9%	31.7%	26.9%	17.5%	10.0%
12	39.4%	37.0%	30.2%	24.5%	17.7%
14	44.2%	41.7%	33.9%	27.9%	18.3%
16	48.5%	46.6%	38.6%	31.2%	21.3%
18	52.5%	51.6%	43.7%	35.0%	27.4%
20	56.2%	55.9%	48.2%	39.5%	29.1%
22	59.5%	58.3%	50.9%	42.8%	30.2%
24	62.6%	62.8%	53.8%	44.5%	36.0%
26	65.4%	65.2%	56.4%	45.6%	43.9%
28	68.0%	67.8%	58.4%	50.3%	43.4%
30	70.3%	70.1%	62.4%	54.2%	46.9%
32	72.5%	72.4%	68.8%	57.2%	50.8%
34	74.6%	74.4%	72.0%	59.9%	51.6%
36	76.6%	76.3%	75.7%	63.8%	52.3%
38	78.5%	78.0%	77.3%	65.3%	52.8%
40	80.3%	79.3%	77.9%	65.3%	54.3%
45	84.3%	84.3%	80.5%	72.4%	60.5%
50	87.8%	88.2%	86.3%	79.3%	71.3%
55	90.8%	91.8%	88.4%	86.4%	78.4%
60	93.0%	94.1%	90.4%	90.8%	76.9%
65	94.9%	96.2%	91.4%	94.8%	81.2%
70	96.5%	96.8%	95.6%	96.9%	87.4%
75	98.3%	98.2%	96.7%	100.0%	90.8%
80	100.0%	100.0%	100.0%	97.7%	100.0%

* CSF- Combined suitability factors

Table A-4. Spawning Combined Trout WUA by Percent Maximum WUA

Simulated Discharge	CSF	CSF	CSF	CSF	CSF
	0.0 to 1.0	0.2 to 1.0	0.4 to 1.0	0.6 to 1.0	0.8 to 1.0
	% Max				
	WUA	WUA	WUA	WUA	WUA
2	32.9%	27.2%	14.7%	10.9%	6.8%
3	47.0%	43.1%	32.0%	22.2%	16.2%
4	58.3%	55.0%	50.4%	43.2%	23.4%
5	67.6%	63.8%	61.0%	54.0%	33.5%
6	75.4%	73.8%	68.2%	70.1%	53.4%
8	86.6%	86.0%	82.7%	83.1%	68.7%
10	93.5%	92.2%	92.4%	95.4%	86.7%
12	97.6%	96.1%	97.5%	95.4%	90.2%
14	99.5%	98.6%	96.8%	100.0%	97.3%
16	100.0%	100.0%	96.2%	96.6%	92.8%
18	99.6%	99.5%	100.0%	98.0%	100.0%
20	98.7%	99.0%	97.7%	97.4%	94.4%
22	97.6%	98.1%	95.9%	97.8%	83.7%
24	96.1%	96.3%	95.0%	96.6%	85.1%
26	94.3%	93.8%	92.5%	96.5%	87.8%
28	92.1%	92.6%	91.9%	98.5%	86.1%
30	90.0%	91.3%	90.0%	93.5%	87.2%
32	87.7%	88.5%	84.1%	91.2%	83.0%
34	85.6%	86.3%	83.4%	88.9%	80.3%
36	83.5%	84.0%	80.9%	84.7%	71.6%
38	81.4%	81.0%	78.8%	81.1%	71.0%
40	79.2%	79.2%	77.8%	78.9%	66.1%
45	74.1%	74.6%	68.5%	72.8%	65.6%
50	69.9%	69.6%	66.8%	67.4%	60.0%

Table A-5. Juvenile Combined Trout WUA by Percent Maximum WUA

Simulated Discharge	CSF	CSF	CSF	CSF	CSF
	0.0 to 1.0	0.2 to 1.0	0.4 to 1.0	0.6 to 1.0	0.8 to 1.0
	% Max				
	WUA	WUA	WUA	WUA	WUA
2	44.0%	43.6%	42.0%	35.2%	30.0%
3	53.9%	53.6%	56.1%	47.5%	47.1%
4	61.0%	61.4%	66.3%	55.6%	54.8%
5	66.5%	67.4%	72.3%	62.4%	60.8%
6	70.8%	71.9%	76.3%	70.6%	67.9%
8	77.6%	79.0%	84.0%	80.2%	72.8%
10	82.5%	83.8%	90.1%	82.9%	82.8%
12	86.1%	87.1%	93.5%	87.6%	86.1%
14	88.7%	88.9%	94.4%	87.5%	86.9%
16	90.7%	91.3%	95.2%	89.8%	88.7%
18	92.3%	92.0%	95.9%	90.0%	89.1%
20	93.6%	92.7%	95.6%	88.9%	89.3%
22	94.5%	93.8%	95.9%	88.8%	89.9%
24	95.3%	94.7%	94.7%	89.1%	92.1%
26	96.0%	94.8%	95.0%	89.6%	87.1%
28	96.6%	95.7%	95.0%	89.9%	84.5%
30	97.2%	96.1%	95.4%	90.1%	83.5%
32	97.6%	96.2%	96.3%	88.5%	81.9%
34	97.8%	96.4%	96.5%	88.9%	80.0%
36	98.1%	96.9%	97.4%	89.9%	81.1%
38	98.2%	96.9%	98.0%	89.9%	82.8%
40	98.4%	97.0%	97.8%	87.6%	83.6%
45	98.6%	97.4%	98.1%	86.6%	84.6%
50	98.5%	97.2%	97.5%	89.9%	86.7%
55	98.6%	97.1%	96.6%	92.9%	92.5%
60	98.8%	97.9%	96.5%	94.7%	95.3%
65	99.2%	98.3%	96.8%	99.3%	99.8%
70	99.6%	99.4%	98.6%	98.2%	100.0%
75	99.8%	99.4%	100.0%	100.0%	96.9%
80	100.0%	100.0%	99.3%	99.4%	96.7%

**Figure A-1. Iron Canyon Creek Low Gradient Riffle Cross Section:
Increments are 3, 5, 8, 12, 16, 20, 24, 28, 32 cfs**

