

UNITED STATES OF AMERICA 65 FERC ¶62,265
FEDERAL ENERGY REGULATORY COMMISSION

Pacific Gas and Electric Company Project No. 1333-001
California

ORDER ISSUING NEW LICENSE
(Major Project)
(Issued December 30, 1993)

Pacific Gas and Electric Company (PG&E) filed a license application under Part I of the Federal Power Act (FPA) for a new license to continue the operation and maintenance of the existing Tule River Project, located on the North Fork of the Middle Fork Tule River, Hossack Creek, and Doyle Springs, in Tulare County, California. The project occupies lands of the Sequoia National Forest.

Notice of the application has been published. The motions to intervene that have been granted and the comments filed by agencies and individuals have been fully considered in determining whether to issue this license.

On November 14, 1986, the California Department of Fish and Game (CDFG) filed a motion to intervene. CDFG expressed concern that the operation of the project could adversely affect the trout and wildlife resources. The concerns raised by CDFG have been addressed in the Wildlife Resources, and Fishery Resources sections of the attached environmental assessment (EA).

The U.S. Department of the Interior, U.S. Fish and Wildlife Service (FWS), U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Forest Service (FS), National Marine Fisheries Service, and the Resources Agency of California filed comments that also have been considered in determining whether to issue this license.

PROJECT DESCRIPTION

The project consists of the 6-foot-high and 98-foot-long Tule diversion dam, the 7.5-foot-high and 17-foot-long Hossack diversion dam, a 98-foot-long pipe and a 8-foot-long flume from Hossak Creek to the Tule River conduit, the 4-foot-high and 70-foot-long Doyle Springs diversion dam, a 1,250-foot-long pipe from the diversion to the Tule River conduit, the 3.2-mile-long Tule River conduit, the 3,600-foot-long Tule River penstock, a powerhouse with a combined capacity of 6,400 kilowatts (kW) to be upgraded to 7,900 kW, a tailrace, and a 15.27-mile-long transmission line. A more detailed project description can be found in ordering paragraph B(2) and in the EA.



APPLICANT'S PLANS AND CAPABILITIES

PG&E's Record as a Licensee

In accordance with Sections 10 and 15 of the FPA, the staff evaluated PG&E's record as a licensee for these areas: (1) conservation efforts; (2) compliance history and ability to comply with the new license; (3) safe management, operation, and maintenance of the project; (4) ability to provide efficient and reliable electric service; (5) need for power; (6) transmission line improvements; and (7) project modifications. I accept the staff's findings in each of these areas.

Here are the findings:

1. Conservation Efforts

The staff reviewed PG&E's efforts to conserve and help its customers to conserve electricity and finds that: (1) PG&E has made extensive efforts to promote the conservation of electric energy and to reduce the peak demand for generating capacity; and (2) the California Public Utilities Commission, which rated the conservation efforts of the largest California utilities, says PG&E has been a leader in carrying out effective energy conservation programs. Therefore, PG&E is making a good faith effort to conserve electricity.

2. Compliance History and Ability to Comply with the New License

The staff reviewed PG&E's record of compliance with the terms and conditions of the existing license, and plans to comply with the conditions of a new license. The staff found that PG&E's compliance record shows a good faith effort to comply with all license conditions; therefore, PG&E has the ability to comply with the terms of a new license.

3. Safe Management, Operation, and Maintenance of the Project

The staff reviewed PG&E's plans to manage, operate, and maintain the project safely. PG&E proposes no change in project operation that would adversely affect project safety. Based on PG&E's public safety records, the plans are adequate.

In March 1981, PG&E was exempted from filing an emergency action plan (EAP) for the diversion dams at Tule River, Hossack Creek, and Doyle Springs diversion dams. As required in section 12.21(c)(1) of our regulations, PG&E continues to review the conditions that allow them the exemption.

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Section 12.21(c)(2) of our regulations also requires PG&E to promptly notify the Commission of any changes that might cause a project emergency endangering life, health, or property and requiring PG&E to prepare and file an EAP if such a change occurs.

PG&E practices safe management, operation, and maintenance of the Tule River Project.

4. Ability to Provide Efficient and Reliable Electric Service

The staff reviewed PG&E's operating plans and its ability to provide efficient and reliable electric service. From PG&E's record of forced outages, the staff concludes that the generation lost generation was not significant compared to the total annual

generation for this project.

To make efficient use of project power, PG&E delivers any energy they generate at the Tule River powerhouse in excess of local needs, to the Southern California Edison Company (SCE) under a 1968 exchange agreement. SCE makes an equal amount of energy available to PG&E at mutually agreed-upon times and delivery rates.

PG&E has the ability to provide efficient and reliable electric service with the Tule River Project.

5. Need for Power

The staff considered the short- and long-term need for the power generated by the Tule River Project and the cost of alternative power if PG&E does not receive a new license for the project. The staff concluded that: (1) PG&E needs the power from the existing Tule River Project; and (2) over the 40-year term of a new license, replacing project power would cost PG&E about \$2.6 million annually.

In the 1986, 1988, 1990, and the 1992 Electric Reports (ER), the California Energy Commission (CEC) strongly supports the need to continue operating existing hydroelectric facilities. The CEC and the California Public Utility Commission (CPUC) also support the need for economic improvements of existing hydroelectric facilities.

The staff's conclusions are in complete accord with the state regulatory position that existing hydroelectric projects and their improvements are, respectively, nondisplaceable and nondeferrable resources in the state's resource core (1986 ER), the state's basic system (1988 ER), the state's competitive processes (1990 ER), and the state's environmental and other concerns in resource planning (1992 ER).



The CEC also says, in the 1988 ER, that the California Public Utility Commission (CPUC) has included hydro relicensing improvements in the nondeferrable resource category. In its

Order Instituting Rulemaking-2 proceeding, the CPUC says that a hydroelectric improvement is "generically unavoidable" by qualifying facilities (QF).

The 1990 ER long range outlook shows no growth in QF development, which is primarily determined by the level and degree of certainty of avoided energy and capacity costs. The only contract available in California is Standard Offer 1 (S01). Under S01, financing cost and investor hurdle rates are high and would preclude any significant QF development. Therefore, QF's may not bid to defer or replace PG&E's proposed economic improvement of existing hydroelectric projects that are up for relicense.

The 1992 ER focuses on these issues and their possible effects on future resource needs: environmental concerns in resource planning; problems with the state's resource planning and acquisition process; potential changes in long-term trends in electricity demand; natural gas supply and price risks; the future role of energy efficiency; the potential benefits of advanced and noncommercial generation options; and the effects of changes in transmission system regulation and long-run electricity planning.

PG&E has had a past need and has now a future need for power. Therefore, the Tule River Project provides a necessary source of power for PG&E.

6. Transmission Line Improvements

Whether the Commission issues a license for the project or not, PG&E doesn't see any need to change the transmission network affected by project operation.

7. Project Modifications

PG&E proposes to increase the operating capacity from 6.4 MW to 7.9 MW by replacing the existing turbine runners. The new turbines would be more efficient and increase the rated hydraulic flow to 73 cfs, although the maximum monthly average flow through the Tule conduit would remain at 66 cfs. The average annual generation would increase by 3.4 GWh.

Since the existing turbines are nearing the end of the normal replacement period for this type of equipment, and since the value of the additional energy produced by the new turbines would exceed the cost of replacement over the new license period, the proposed modification would be cost-effective.



WATER QUALITY CERTIFICATION

PG&E applied to the California State Water Quality Resources Control Board (WRC) for water quality certification on November 14, 1985. On December 30, 1985, the WRC waived water quality certification of the project under Section 401 of the Clean Water Act.

RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

Section 10(j)(1) of the FPA, 16 U.S.C. §803(j)(1), requires the Commission to include license conditions based on recommendations of federal and state fish and wildlife agencies submitted pursuant to the Fish and Wildlife Coordination Act for the protection, mitigation, and enhancement of fish and wildlife. The EA (December 10, 1991) and this order address these concerns. This license provides conditions consistent with these recommendations, with one exception, as discussed below.

Summary

In the EA, staff determined that minimum flow and screening recommendations of CDFG and FWS were inconsistent with sections 4(e) and 10(a) of the FPA. Staff wrote a letter to the agencies and held a meeting in an attempt to resolve the inconsistencies. Since FS's requirement for passive modifications to the existing diversion facilities must be included in any license issued, the inconsistency dealing with the screening issue no longer exists. With respect to minimum flow, staff was unable to resolve the inconsistency; thus appropriate findings are made under section 10(j)(2). A detailed discussion of the section 10(j) process follows.

Recommendations in the EA

Minimum flow

In the EA, the staff did not recommend adopting FWS's and CDFG's recommended minimum flow release downstream of the Tule

and Doyle Springs diversion dams (set out in table 1). Instead, staff recommended that PG&E release the flows required by FS.

The FS flow would substantially improve the fishery and would provide 20 percent more adult trout habitat than PG&E's proposal at a cost of \$50,000 per year. The agencies' flow recommendation would increase adult trout habitat by 13 percent at a cost of \$150,000 per year as compared to the FS flow requirement.

Staff did not believe that the increased cost of the agencies' recommendation would be justified by the small increases in fish habitat and the expected recreation benefits.



Table 1. PG&E and resource agencies alternative flow recommendations (in cfs) below the Tule River diversion dam and the Doyle Springs diversion dam.

Month	TULE RIVER DIVERSION DAM		
	PG&E normal year and FS dry year ¹	FS wet year	CDFG and FWS
January	4	4	8
February	4	4	8
March	4	4	10
April	4	4	12
May	4	72	12
June	4	7	10
July	4	7	10
August	4	7	10
September	4	7	10
October	4	4	8
November	4	4	8
December	4	4	8

Month	DOYLE SPRINGS DIVERSION DAM			
	PG&E ³	FS	CDFG ⁴	FWS

P-1333.txt

January	4	2	2	3
February	4	2	2	3
March	4	2	3	3
April	4	2	4	4
May	4	2	4	4
June	4	2	3	4
July	4	2	2	4
August	4	2	2	4
September	4	2	2	4
October	4	2	2	3
November	4	2	2	3
December	4	2	2	3

- 1 PG&E proposes a dry-year release of 2 cfs.
- 2 May 15 to September 15.
- 3 Proposed dry-year release is 2 cfs.
- 4 CDFG recommends that if the results of a water temperature verification study shows that their thermal criteria can't be achieved on a long-term basis, the 2 cfs between July and September should be increased.



Staff concluded that the FS flow recommendation provides a better balance of fishery and power benefits. Thus, the staff concluded in the EA that the FWS and CDFG's recommended flow releases were inconsistent with the public interest standard of section 4(e) and comprehensive planning standard of section 10(a) of the FPA.

Fish screens

Staff also did not recommend installing screens to prevent fish entrainment. Unless PG&E could show that other measures would prevent entrainment-related fishery losses, CDFG recommended that screens be installed that meet their standard fish screening criteria. FWS commented that they would not object to a site-specific, post-relicensing entrainment study to evaluate the passive modifications developed during post-application consultations between PG&E and the agencies. The results of the evaluation would be used to determine the need for a positive screen and bypass system at the Tule River diversion.

To mitigate for fish entrainment losses, the staff examined the following options in the EA: (1) stocking catchable size rainbow trout; (2) constructing agency-recommended passive modifications to the existing diversion facilities--followed by a post-monitoring study; and (3) installing positive fish screens. Because water temperatures a short distance below the project are too high to sustain trout during the summer months, the staff believes that stocking catchable trout provides the best balance because: (1) stocking provides comparative fishery numbers at substantially less cost than the other alternatives; (2) screening would only provide additional juvenile seeding to a 4- to 5-mile-long section of stream; (3) the expected recreation benefits would not justify the costs. Thus, the staff concluded in the EA that the FWS and CDFG's recommended fish screens were inconsistent with the public interest standard of section 4(e) and comprehensive planning standard of section 10(a) of the FPA.

Preliminary Determination of Inconsistency Letter

Under section 10(j)(2) of the FPA, whenever the Commission believes that any recommendations of federal and state fish and wildlife agencies may be inconsistent with the FPA or other applicable law, the Commission shall attempt to resolve such inconsistencies.

By letters dated December 10, 1991, (attached to copies of the EA) the staff asked FWS and CDFG to consider other options that would (1) be agreeable to FWS and CDFG, (2) adequately protect resident trout and their habitat, and (3) be consistent with other project purposes. The staff requested that FWS and CDFG submit these options to the Commission within 45 days of the date of the letters.

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FWS commented on the EA by letter dated January 13, 1992, and offered no alternative flow recommendation, but recommended that PG&E install and operate the passive modifications designed during post-application consultations.

CDFG commented on the EA by letter dated January 23, 1992,

P-1333.txt

and offered to concur with the FS-recommended minimum flows, provided the flows maintain a water temperature less than 21è C in the entire bypass reach below Doyle Springs diversion dam. They said their earlier offer of agreeing to the installation of passive modifications designed during post-application consultations, was acceptable, provided monitoring and evaluation is conducted.

10(j) Meeting

On March 3, 1992, the staff held a 10(j) meeting, via telephone conference call, with the FWS and CDFG to discuss the minimum flows and fish screening inconsistencies. The CDFG proposed an alternative streamflow recommendation of 8 cubic feet per second (cfs) yearlong below the Tule River diversion dam for a 6-year study period. The FWS supported this study-flow proposal, and suggested an additional 6-year period be studied at flows between 10 cfs and 12 cfs during the spring spawning months.

Minimum flow

The agencies did not provide any information to dispute our balancing call, but instead recommended a long-term research project. The agency 6-year study recommendation is similar to a study PG&E is currently conducting. As part of an ongoing instream flow study, PG&E is evaluating minimum flows up to 4 to 5 cfs--compared to its historic voluntary flow release of 1 to 2 cfs--below the Tule River diversion dam for a 3- to 4-year period starting in 1993. 1/ The study is designed to test the relationship between fish habitat (weighted useable area) and fish production in the Tule River, which is a premise of the Instream Flow Incremental Methodology.

We believe the current study will provide valuable information and would help advance the state-of-the-science and may be useful in evaluating other projects. We see no reason for additional studies at this time. If the results of PG&E's study show that there is a need to increase flows or to conduct further studies, the agencies can request that the Commission reopen the license in the future.

1/ Letter from Shan Bhattacharya, Manager, Hydro Generation, PG&E, San Francisco, California, to Lois Cashell, Secretary, FERC, Washington, D.C., March 4, 1993.

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Screening

Following the 10(j) conference call meeting, CDFG provided an updated cost estimate of \$2.97 per pound to stock catchable-sized trout in the North Fork Tule River. 2/ In the EA, the staff used a value of \$2.60 per pound. The new information would only change the cost of our recommended annual stocking mitigation measure from \$3,100 to \$3,550.

Also following the 10(j) conference call, PG&E provided revised estimates for the cost of both passive modifications and fixed fish screening alternatives. 3/ Based on these revised estimates, the levelized annual cost to the ratepayers would be \$62,300 and \$103,000, respectively, for the two screening options.

These cost changes are not great enough to change the staff's recommendation from stocking catchable-sized trout to requiring: (1) installation of screens; or (2) making modifications to the existing diversion structures to passively divert fish away from the intakes, which is required by the FS. However, since we must include the FS 4(e) condition requiring modifications to the diversion, the license will require screening measures that are consistent with the agencies' recommendation for passive modifications. Articles 105 and 404 require PG&E to construct and monitor passive fish passage modifications. Our recommendation for PG&E to fund stocking of fish is no longer necessary because we will require passive modifications of the diversion.

Section 10(j)(2) Findings

In accordance with section 10(j) of the FPA, if the Commission, after attempting to resolve inconsistencies, does not adopt a recommendation of a fish and wildlife agency, the Commission is required to publish findings that: (1) an agency recommendation is inconsistent with the purposes and requirements of Part I of the FPA or other applicable law [section 10(j)(2)(A)]; and (2) conditions selected by the Commission comply with the requirements of section 10(j)(1) of the FPA (i.e., that the license conditions will adequately and equitably

- 2/ Letter from George Nokes, Regional Manager, CDFG, Fresno, California, to Dean Shumway, Director, Division of Project Review, FERC, Washington, D.C., May 1, 1992.
- 3/ In a letter dated April 26, 1992, PG&E says the cost for modifications to the intake needed to provide passive screening for downstream fish passage is \$398,000; for a conventional fixed screen, PG&E estimates the cost would be \$663,000.

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protect, mitigate damages to, and enhance fish and wildlife) [section 10(j)(2)(B)]. Our findings are as follows.

10(j)(2)(A) finding

As discussed in the EA, the North Fork of the Middle Fork Tule River already receives annual stocking allotments of catchable-sized rainbow trout. The flows recommended by the FWS and the CDFG are designed to promote naturally sustaining populations of rainbow trout in and below the project area. With the high amount of angler use the area receives, natural production can't provide enough fish to sustain the current hatchery-dependent catch rates under any streamflow regime. Based on our analysis, the FS flow recommendation is the least expensive of the three flow alternatives, in terms of cost per additional rainbow trout habitat unit, and would provide enhanced angling and visual quality.

In light of the above, I find that the FWS's and the CDFG's flow recommendations are inconsistent with the provisions of section 4(e) and 10(a) of the FPA.

10(j)(2)(B) finding

Pursuant to section 10(j)(2)(B), I find that the conditions included in this license comply with the requirements of section 10(j)(1).

This license (specifically Articles 401 and 402) requires PG&E to release the FS-recommended streamflows below the project diversion dams and monitor the temperatures in the North Fork Tule River below the Doyle Springs diversion dam. These flows would substantially increase existing trout habitat. Articles 105 and 404 require PG&E to modify the diversion structure to passively divert fish away from the intake. These protection measures provide enhanced flows and protect downstream migrating trout.

Thus, I conclude that our recommendations adequately and equitably protect, mitigate damage to, and enhance fish and wildlife affected by the project.

I conclude that the fish and wildlife measures required in this license are consistent with the requirements of section 10(j) of the FPA.

FOREST SERVICE CONDITIONS

The FS filed 6 conditions under the provisions of section 4(e) of the FPA. PG&E appealed the FS's conditions alleging that section 4(e) does not apply to relicensing. The Commission has

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ruled that the 4(e) mandatory conditioning authority applies to new licenses. 4/

The FS conditions under appeal are:

- Condition 1 (Article 101) requires the licensee to obtain a special use authorization from the FS for the occupancy and use of National Forest Service System lands.
- Condition 2 (Article 102) requires the licensee to consult annually with the FS with regard to measures needed to ensure protection and development of the natural resources in the project area.
- Condition 3 (Article 103) requires the licensee to get

P-1333.txt

written approval from the FS prior to making any project changes.

- Condition 4 (Article 104) specifies that before any construction occurs on National Forest System land the licensee will get written approval from the FS.
- Condition 5 (Article 105) requires a specific minimum flow regime and passive fish screening with downstream passage. PG&E does not object to the minimum flows required and requests that FS submit them as recommendations under section 10(a).
- Condition 6 (Article 106) requires PG&E to pay for the operation and maintenance expense associated with project-related recreation use. PG&E does not object to the requirements under this condition and requests that FS submit them as recommendations under section 10(a).

FS appeal is not likely to be resolved any time soon. Furthermore, PG&E does not have any problems with the requirements of conditions 5 and 6, only the 4 standard conditions (conditions 1 through 4) are subject to possible modifications. Because the standard conditions are not flow related, any potential change in these conditions would not substantially affect project economics. Therefore, issuance of this license will not be delayed pending resolution of the FS appeal. If any of the FS conditions are modified, under the appeal, the licensee must file an application for amendment of license to reflect the changes.

4/ City of Pasadena, January 5, 1989, 46 FERC ¶61,004.



Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project.

Under Section 10(a)(2), federal and state agencies filed 31 plans that address various resources in California. Of these, the staff identified 4 plans relevant to this project. 5/ No conflicts were found.

Based on our review of agency and public comments filed in this proceeding and on our independent analysis, the Tule River Project is best adapted to a comprehensive plan for the North Fork of the Middle Fork of the Tule River.

COMPREHENSIVE DEVELOPMENT

Sections 4(e) and 10(a) of the FPA state that in deciding whether to issue a license, the Commission, in addition to the power and developmental purposes of the project, shall give equal consideration to: (1) energy conservation, (2) the protection, mitigation or damage to, and enhancement of fish and wildlife, (3) the protection of recreational opportunities, and (4) the preservation of other aspects of environmental quality. These purposes are fully considered in the attached EA for the Tule River Project.

In the EA, staff analyzed the following three alternatives for the Tule River Project: (1) the project as proposed by PG&E; (2) the project as proposed by PG&E with staff-recommended enhancement measures; and (3) the no-action alternative. Staff recommended the second alternative -- the project as proposed by PG&E with staff-recommended enhancement measures, which includes the FS's recommended instream flows-- as the preferred alternative. The reasons for their recommendation are explained below.

In order to protect and enhance environmental resources at the project, staff recommended adoption of the following 3 measures proposed by PG&E:

- 5/ The California Water Plan: projected use and available water supplies to 2010, 1983, California Department of Water Resources; California water: looking to the future, 1987, California Department of Water Resources; Water Quality Control Plan Report, 1975, California State Water Resources Control Board; and Recreation needs in California, 1983,



- (1) make an agreement with the FS to fund 10 percent of the cost of operation and maintenance of the Wishon Campground, estimated at \$3,800 annually;
- (2) protect the three identified populations of the plant species Springville farewell-to-spring (*Clarkia springvillensis*) by fencing with barbed wire to prevent livestock grazing and inadvertent impacts from routine maintenance activities, and inform project personnel of the location and importance of the sites;
- (3) paint all buildings in the powerhouse complex to blend with the surrounding landscape.

The staff also recommended implementation of the following five additional measures:

- (1) release of 7 cfs (4 cfs in a dry year) from May 15 to September 15 and 4 cfs from September 16 to May 14 below Tule River Diversion Dam; and 2 cfs year round below Doyle Springs Diversion Dam;
- (2) a plan to monitor water temperature in the North Fork Tule River between the Doyle Springs Diversion Dam and the Project tailrace;
- (3) ramping rates below the dams of not more than 30 percent per hour;
- (4) monitor and record the continuous streamflows at gaging stations located: (a) above the Tule River Diversion Dam; (b) below the Tule River Diversion Dam; and (c) below the Doyle Springs Diversion Dam;
- (5) build a passive fish screen and bypass at the Tule diversion dam.

P-1333.txt

The total effect of the environmental enhancements required by FS 4(e) conditions and recommended by Commission staff in its environmental analysis, would reduce the net annual benefits by about \$270,000. About \$183,000 of this total is for minimum flows; \$62,300 is for downstream fish passage (passive screens); \$20,900 for streamflow monitoring and temperature monitoring; and \$3,800 for helping maintain the Wishon Campground.

The minimum flows, which are two-thirds of the total cost, would nearly double the available habitat for adult rainbow trout in the North Fork of the Middle Fork Tule River between the Tule River diversion and Doyle Springs. The cost per unit of additional habitat is the lowest of 3 minimum flow proposals staff considered. The 0.7-mile-long reach enhanced by this

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measure is used by recreationists visiting the nearby Wishon Campground.

I agree with the staff's recommendation that the significant environmental benefits derived from these enhancement measures outweigh the cost to PG&E. Therefore, I agree that PG&E should adopt these measures.

PG&E's plan to replace the turbine runners-- thereby increasing project generation-- produces economic benefits exceeding the estimated costs. This proposal would increase the installed capacity to 7.9 MW, the average annual generation by 3.4 GWh to 31.8 GWh, and the dependable capacity by 0.1 MW to 0.5 MW.

The project would continue to provide 29.6 gigawatthours (GWh) annually. The clean energy that would be produced by the project would continue to displace fossil-fuel power generation, thereby conserving nonrenewable energy resources and reducing the emissions of noxious gases that contribute to atmospheric pollution and global warming.

Based on our review of agency and public comments filed in this proceeding and on the staff independent analysis, the Tule River Project is best adapted to a comprehensive plan for the

North Fork of the Middle Fork of the Tule River.

PROJECT RETIREMENT

The Commission has issued a Notice of Inquiry (NOI), dated September 15, 1993, requesting comments that address the decommissioning of licensed hydropower projects 6/. The NOI states that the Commission is not proposing new regulations at this time, but is inviting comments on whether new regulations may be appropriate. Alternatively, the Commission may consider issuing a statement of policy addressing the decommissioning of licensed hydropower projects, or take other measures. The Tule River Project may be affected by future actions that the Commission takes with respect to issues raised in the NOI. Therefore, I have included Article 204, which reserves authority to the Commission to require the licensee to conduct studies, make financial provisions, or otherwise make reasonable provisions for decommissioning the project.

TERM OF LICENSE

Section 15 of the FPA specifies that any license shall be for a term that the Commission determines to be in the public

6/ Notice of Inquiry, Project Decommissioning at Relicensing, Docket No. RM93-23-000, September 15, 1993.

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interest, but not less than 30 years, nor more than 50 years.

There are two licensed projects downstream of the Tule River Project, the Lower Tule Project No. 372, immediately downstream of Tule, with license expiration date of June 2000 and the Success Project No. 3038, with license expiration date of July 31, 2033. The Success Project is about 15 miles downstream of Tule. It is in the public interest to issue this license to expire on July 31, 2033, to coincide with the expiration date of the Success Project license. This will give the Commission the opportunity to consider and analyze these projects at the same time.

SUMMARY OF FINDINGS

Background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment are contained in the EA. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if constructed, operated, and maintained in accordance with the requirements of this license. Related issues are analyzed in the Safety and Design Assessment (S&DA) prepared by the staff, which is part of the public record.

I conclude that the project would not conflict with any planned or authorized development and would be best adapted to comprehensive development of the waterway for beneficial public uses.

THE DIRECTOR ORDERS:

(A) This license is issued to Pacific Gas and Electric Company (licensee) effective the first day of the month in which this order is issued to expire on July 31, 2033, to continue to operate and maintain the Tule River Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, enclosed by the project boundary shown by exhibit G:

Exhibit G-	FERC Drawing No. 1333-	Showing
1	7	General Map



P-1333.txt

2	8	Tunnel, Pipeline, Diversions, 12-kV Pole Line, Assess Road
3	9	Pole Line and Tunnel
4	10	Tunnel, Penstock, Spillway, 12-kV Pole Line & Access Road
5	11	70-kV Transmission Line and Powerhouse
6	12	70-kV Transmission Line
7	13	70-kV Transmission Line
8	14	70-kV Transmission Line
9	15	70-kV Transmission Line

(2) Project works consisting of: (a) the 6-foot-high, 98-foot-long Tule diversion dam; (b) the 7.5-foot-high, 17-foot-long Hossack diversion dam; (b) a 98-foot-long, 12-inch-diameter pipe and a 8-foot-long, 12-inch by 13-inch flume; (c) the 4-foot-high, 70-foot-long Doyle Springs diversion dam; (d) a 1,250-foot-long, 18-inch-diameter pipe; (e) the 3.2-mile-long Tule River conduit, consisting of an open channel, a 2.7-mile-long tunnel, and a 3,600-foot-long, 30-inch- to 48-inch-diameter penstock; (f) a powerhouse containing two generating units with a combined capacity of 6,400 kilowatts (kW) to be upgraded to 7,900 kW; (g) a tailrace; (h) a 70-kilovolt (kV) transmission line, 15.27 miles long; and (i) appurtenant facilities.

The project works generally described above are more specifically described in exhibit A, section 3, titled "Turbine-generator," page A-4, and section 5, titled "Additional Equipment" of the application and shown by the following exhibits:

Drawing	FERC No. 1333-	Showing
F- 1	1	diversion works
F- 2	2	diversion works details

following the filing date of such authorization, unless the Director, Office of Hydropower Licensing, prescribes a different commencement schedule.

Notwithstanding the authorizations granted under the Federal Power Act, National Forest System lands within the project boundaries shall be managed by the Forest Service under the laws, rules and regulations applicable to the National Forest System. The terms and conditions of the Forest Service special use authorization are enforceable by the Forest Service under the laws, rules and regulations applicable to the National Forest System. The violation of such terms and conditions also shall be subject to such sanctions and enforcement procedures of the Commission at the request of the Forest Service. In the event there is a conflict between any provisions of the license and Forest Service special use authorization, the special use

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authorization shall prevail on matters which the Forest Service deems to affect National Forest System resources.

Article 102. Each year during the 60 days preceding the anniversary of the license, the Licensee shall consult with the Forest Service with regard to measures needed to ensure protection and development of the natural resource values of the project area. Within 60 days following such consultation, the Licensee shall file with the Commission, evidence of the consultation with any recommendations made by the Forest Service. The Commission reserves the right, after notice and opportunity for hearing, to require changes in the project and its operation that may be necessary to accomplish natural resource protection.

Article 103. Notwithstanding any license authorization to make changes to the project, the Licensee shall get written approval from the Forest Service prior to making any changes in the location of 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 at least 60 days prior to initiating any such changes of departure, the Licensee shall file a report with the

Commission describing the changes, reasons for the changes, and showing the approval of the Forest Service for such changes. The Licensee shall file an exact copy of this report with the Forest Service at the same time it is filed with the Commission. This article does not relieve the Licensee from the amendment or other requirements of Article 102 or any article of this license.

Article 104. Before any construction of the project occurs on National Forest System land, the Licensee shall obtain the prior written approval of the Forest Service for all final design plans for project components which the Forest Service deems as affecting or potentially affecting National Forest System resources. The Licensee shall follow the schedules and procedures for design review and approval specified in the Forest Service special use authorization. As part of such prior written approval, the Forest Service may require adjustments in final plans and facility location to preclude or mitigate impacts and to assure that the project is compatible with on-the-ground conditions. Should such necessary adjustments be deemed by the Forest Service, the Commission, or the Licensee to be a substantial change, the Licensee shall follow the procedure of Article 102 of the license. Any changes to the license made for any reason pursuant to Article 102 or Article 103 shall be made subject to any new terms and conditions of the Secretary of Agriculture made pursuant to section 4(e) of the Federal Power Act.



Article 105. Instream Flows

Location	May 15-Sept.15 7/ (cfs)	Sept.16-May 14 3/ (cfs)
Tule River Diversion Dam	7/4 8/	4
Doyle Springs Diversion Dam	2	2

The above "target" minimum instream flow criteria is defined as the daily average flow. Compliance with this flow criteria

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shall include variations of not more than 10% less than the target minimum flows listed above. Temporary departures from the provisions of this criteria may occur: (1) during emergencies (including unplanned pump outages); (2) in the interest of public safety; (3) upon request of CDFG, FS, or FWS; or (4) for scheduled maintenance work, as regulated below. During emergencies, PG&E shall notify the manager of Region IV, CDFG, FS District Ranger or their authorized representatives as soon as possible.

If during a designated dry year, the February 1 or March 1 Department of Water Resources forecast indicates that dry year conditions no longer prevail, normal year flow releases will resume within 30 days of the forecast date.

For scheduled maintenance work which will either affect flow release or result in deviation from the criteria herein set forth, PG&E shall notify the manager of Region IV CDFG, District Ranger or their authorized representatives, at least seven days prior to conducting the work. It is the intent that, to the extent possible, such scheduled maintenance work shall not interrupt or diminish the quality or quantity of flow releases.

Fluctuations in flow vary widely, from high spring runoff to "dry years", such as this past year. Upping the flow from its present state to 4 and 7 cfs will increase fish habitat and provide anglers with a greater opportunity to catch fish.

- 7/ Or the total natural instream flow, whichever is less.
- 8/ Dry year flow - a dry year flow is any 12-month period beginning May 1 in which the inflow to Lake Success for the water year, as forecast on April 1 by the State of California Department of Water Resources, and as may be adjusted by the State on May 1 or June 1, will be 50 percent or less of the average for such water year, as computed by the State for the 50-year period used at the time.

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Recreationists in the Wishon Campground area will benefit from the increased water flow because of its greater attractiveness.

A structural screening device is not required if:

1. The bypass release structure is located where fish have a viable avenue of escape back to the stream.
2. The walls and floor are painted only on the side of the sand trap nearest the fish bypass structure with a disruptive pattern to provide visual cover and attract fish away from the intake side. Cover the painted area to provide shade attraction.
3. A longitudinal overspill weir (divider) is constructed in the downstream 1/2 of the sand trap to increase the likelihood that fish will not swim in close proximity to the conduit intake.
4. The diversion side of the sand trap is clear of cover and has lighting provided in order to repel fish to the bypass side.
5. The sand trap is maintained free of sand and other deposition to prevent the obscuring of the painted "cover pattern".

Article 106. PG&E shall, upon acceptance of the license, commence payment of funds to the Forest Service, in the initial amount of \$3,800 (1985 cost base, escalated annually by the Gross National Product Deflator) to cover the operation and maintenance expense associated with the project-related recreation use at the Wishon Campground recreation facility, through the term of the license.

PG&E will enter into a collection agreement with the Forest Service which will set forth the details of the payment.

Article 201. The licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

- a. For the purpose of reimbursing the United States for the cost of administration of Part I of the FPA, a reasonable amount, as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 10,500 horsepower.
- b. For the purpose of recompensing the United States for

the use, occupancy, and enjoyment of 71.8 acres of its lands, a reasonable amount as determined in accordance with the provisions of the Commission's regulations, in effect from time to time.



- c. For the purpose of recompensing the United States for the use, occupancy, and enjoyment of 50.7 acres of its lands for transmission line right-of-way, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time.

Article 202. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and water for which the licensee may grant permission without prior

Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the

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proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of

support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of

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the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, OHL, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K

map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land : (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed

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under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

Article 203. Pursuant to Section 10(d) of the FPA, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee shall maintain the amounts established in the project amortization reserved account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includible in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall

be the interest rate on 10-year government bonds (reported as the Treasury Department's 10 year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 204. The Commission reserves authority to require the licensee, in the context of a rulemaking proceeding, a statement of policy, or a proceeding specific to this license, to



conduct studies, make financial provisions, or otherwise make reasonable provisions for decommissioning the project.

Article 301. Within 6 months after finishing construction, the licensee shall file for the Commission approval revised exhibits A and F to describe and show the project as built.

Article 401. The licensee shall release from the project diversion dams the following continuous minimum streamflows, or inflow to the project, whichever is less, as measured at the gages required by Article 403 for enhancement of the river's resident trout fishery resources:

	Flow Release Period, in cubic feet per second (cfs)	Below the Tule River Diversion Dam	Below Doyle Springs Diversion Dam	Normal
YearDry Year 1/				
	May 15 - September 15	7 cfs	4 cfs	2 cfs
	September 16 - May 14	4 cfs	4 cfs	2 cfs

1/ Dry year definition: any 12-month period beginning May 1 in which the inflow to Lake Success for the water year, as forecast on April 1 by the State of California Department of Water Resources (DWR), and as may be adjusted by the State on May 1 or June 1, will be 50 percent or less of the

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average for such water year, as computed by the State for the 50-year period used at the time. If during a designated dry year, the February 1 or March 1 DWR forecast indicates that dry year conditions no longer prevail, normal year flow releases will resume within 30 days of the forecast date.

These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement among the licensee, the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident.

Article 402. At least 6 months from issuance of the license, the licensee shall file with the Commission, for approval, a plan to monitor the water temperature in the North Fork Tule River between the Doyle Springs diversion dam and the project tailrace.

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26

The purpose of the monitoring plan is to verify the relationship between the streamflow release required by Article 401 and the downstream water temperature.

The monitoring plan shall include a schedule for:

- (1) implementation of the program;
- (2) consultation with the appropriate federal and state agencies concerning the results of the monitoring; and
- (3) filing the results, agency comments, and licensee's response to agency comments with the Commission.

The licensee shall prepare the plan after consultation with the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. The licensee shall include with the plan, documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific

descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 403. Within 6 months from issuance of the license, the licensee shall file with the Commission, for approval, a plan to install, operate, and maintain streamflow gages necessary to monitor the minimum flow releases and ramping rate required in Articles 401 and 405. The plan shall include the method of collecting and recording the minimum flows and ramping rate data, and a provision for providing the information to the agencies.

The licensee shall prepare the plan after consultation with the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

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The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 404. Within 6 months of the issuance of the license, the licensee shall file with the Commission, for approval, a plan to construct and monitor the passive fish passage measures at the project as required by article 105.

The monitoring plan shall include a schedule for: (1) implementation of the plan; (2) consultation with the appropriate federal and state agencies; and (3) filing the results, agency comments, and licensee's response to agency comments with the Commission.

The licensee shall prepare the plan after consultation with the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 405. The licensee shall limit the maximum rate of change in river flow (ramping rate) below the project diversion dams to no more than 30 percent per hour of each project-related flow change for the protection of the fish resources in the North Fork of the Middle Fork Tule River.

This ramping rate may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon agreement between the licensee and the California Department of Fish and Game. If the rate is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 406. Within 6 months of the issuance of the license, the licensee shall fence the three populations of *Clarkia springvillensis* known to occur in the project area and shall inform project personnel of the location and importance of the sites. A qualified biologist shall be present to ensure that the construction of the fences do not destroy any of the plants.

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In the event that future land-clearing or land-disturbing activities are planned at or near the sites or additional populations of Clarkia are identified in the project area, the licensee shall file with the Commission, for approval, at least 60 days before the start of land-disturbing activities, a plan to protect the Clarkia populations from planned activities. Agency comments shall be included in the filing.

The licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service, the Forest Service, and the California Department of Fish and Game. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 407. If archeological or historic sites are discovered during project operation, the licensee shall: (1) consult with the California State Historic Preservation Officer (SHPO) and the Forest Service, Sequoia National Forest (FS); (2) prepare a cultural resources management plan and a schedule to evaluate the significance of the sites and to avoid or mitigate any impacts to any sites found eligible for inclusion in the National Register of Historic Places; (3) base the plan on the recommendations of the SHPO and the FS and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; (4) file the plan for Commission approval, together with the written comments of the SHPO and the FS on the plan; and (5) take the necessary steps to protect the discovered sites from further impact until notified by the Commission that all of these requirements have been satisfied.

The Commission may require cultural resources survey and changes to the cultural resources management plan based on the

filings. The licensee shall not implement a cultural resources management plan or begin any land-clearing or land-disturbing activities in the vicinity of any discovered sites until informed by the Commission that the requirements of this article have been fulfilled.

Article 501. If the licensee's project was directly benefitted by the construction work of another licensee, a

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permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

(E) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to the Commission filing. Proof of service on these entities must accompany the filing with the Commission.

(F) This order is issued under authority delegated to the Director and constitutes final agency action. Request for rehearing by the Commission may be filed within 30 days of the date of this order, pursuant to 18 C.F.R. § 385.713.

Fred E. Springer
Director, Office of
Hydropower Licensing

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ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSE

Tule River Project

FERC Project No. 1333-001

California

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
825 North Capitol Street, NE
Washington, DC 20426

December 10, 1991



ii

TABLE OF CONTENTS

	Page
SUMMARY	v
I. APPLICATION	1
II. PURPOSE AND NEED FOR ACTION	
A. Purpose	2
B. Need for Power	2
III. PROPOSED PROJECT	
A. Project Description	3
B. Proposed Enhancement Measures	5
C. Federal Land Management Conditions	6
IV. CONSULTATION AND COMPLIANCE	
A. Agency Consultation	6
B. Water Quality Certification	7
V. ENVIRONMENTAL ANALYSIS	
A. General Description of the Locale	
1. Tule River Geographic Region	7
2. Proposed Projects and Existing Hydroelectric Development	9
3. Target Resources	9
4. Cumulative Impacts	9
B. Proposed Project	
1. Geology and Soils	10
2. Water Resources	10
3. Fishery Resources	13
4. Terrestrial Resources	30
5. Recreation and Land Use	32

6. Visual Resources	33
7. Cultural Resources	33
C. Alternative of No Action	35
D. Comprehensive Development	35
VI. FINDING OF NO SIGNIFICANT IMPACT	36
VII. PRELIMINARY DETERMINATION OF CONSISTENCY OF FISH AND WILDLIFE RECOMMENDATIONS WITH THE FEDERAL POWER ACT AND APPLICABLE LAW	36
VIII. LITERATURE CITED	37
IX. LIST OF PREPARERS	40
APPENDIX A: INSTREAM FLOW NEEDS ANALYSIS	A-1

↑

iii

LIST OF FIGURES

Figure	Page
1. Location of the Tule River Project, FERC No. 1333, California, and other hydroelectric projects in the Tule River Basin.	2
2. Location of the project features of the Tule River Project, FERC No. 1333, California.	4
3. Changes in Tule River stream width with changes in flow.	29

LIST OF TABLES

Table	Page
1. Average monthly flows (cfs) in the North Fork	11

of the Middle Fork Tule River.

2. Water quality parameters measured in stream segments of the Tule River Project.	12
3. Tule River water temperatures (°C) recorded during 1984.	13
4. Low flow habitat values (WUA) and fall electrofishing data from the R&D study sites, located above and below the Tule River Diversion Dam.	15
5. PG&E and resource agencies alternative flow recommendation (in cfs) below Tule River Diversion Dam.	18
6. Rainbow and brown trout WUA habitat values for the North Fork of the Middle Fork Tule River.	19
7. Change in summer WUA for three life stages of rainbow trout with alternative minimum flows below the Tule River Diversion Dam.	20
8. PG&E and resource agencies alternative flow recommendations (in cfs) below Doyle Springs Diversion Dam.	22



9. Percent change of temperature usable habitat in the North of the Middle Fork Tule River under different minimum flow regimes, during extreme summer conditions.	24
10. Tule River creel census data.	26
A-1. Effect of flow alternatives on power benefits and WUA.	A-2
A-2. Data used to estimate economic value of	A-3

nonpower benefits.

ATTACHMENTS

1. Letter from Paul F. Barker, Regional Forester, Forest Service, Pacific Southwest Region, San Francisco, California, October 26, 1989.
2. Letter from Gordon H. Small, Director of Lands, Forest Service, Washington, D.C., May 25, 1990.

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v

SUMMARY

The applicant, Pacific Gas and Electric Company (PG&E), proposes to continue operation of the existing Tule River Project facilities, and to increase the installed capacity of the powerhouse from 6.4 to 7.9 MW by replacing the existing turbine runners. PG&E also proposes certain enhancement measures, including: (1) the enhancement of trout habitat by increasing minimum flows below Tule River Diversion Dam; (2) the reimbursement of the California Department of Fish and Game's (DFG) costs of stocking trout and 10 percent of the Forest Service's (FS) costs of maintaining Wishon Campground; and (3) the protection of a rare plant species. This proposal, including the loss in generation from raising instream flow, would increase the average annual generation of the existing project about 1.2 gigawatthour (GWh) from 28.4 to 29.6 GWh.

In addition to PG&E's proposal, we consider two alternative actions: (1) PG&E's proposal with our environmental recommendations, or (2) no action. Under our alternative, we consider the tradeoff of reducing the power value of the proposed project by providing higher minimum flows recommended by the FS, the DFG, and the U.S. Fish and Wildlife Service to further enhance the trout fishery. Under the no action alternative, PG&E would stop operating the project for power generation, and find other sources of capacity and energy they could develop to meet

P-1333.txt

their existing and forecasted load growth.

Based on our review of the proposed action and the alternatives under sections 4(e) and 10(a) of the Federal Power Act (Act), we recommend the proposed action with our environmental measures, which includes the FS's recommended minimum flows. These measures would enhance fishery habitat more than PG&E's proposal, and reduce the average annual generation a small amount, by about 0.9 GWh, from 29.6 to 28.7 GWh. If PG&E must replace the capacity and energy of the project as proposed under the no-action alternative, our estimate of the levelized annual impact on PG&E's ratepayers would be substantial, specifically about \$1.6 million or about 56 mills per kilowatthour. We conclude that the proposed action, with the environmental measures we recommend, would best adapt the project to a comprehensive plan for the Tule River Basin.

Based on our independent environmental analysis, issuance of an order approving the proposed action with our recommendations is not a major federal action significantly affecting the quality of the human environment.

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ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING, DIVISION OF PROJECT REVIEW

Tule River Project

FERC Project No. 1333-001--California

December 10, 1991

I. APPLICATION

On February 26, 1986, the applicant, Pacific Gas & Electric Company (PG&E), filed an application for a new license for the existing Tule River Project. The project is located on the North Fork of the Middle Fork Tule River in Tulare County, California, on the western slope of the Sierra Mountains, approximately 25

miles northeast of the town of Porterville. The project, with the exception of the western half of the transmission line, is located on lands of the Sequoia National Forest (figure 1).

II. PURPOSE AND NEED FOR ACTION

A. Purpose

The Tule River Project, which has a dependable capacity of 0.4 megawatts (MW), historically produces about 28.4 gigawatthours (GWh) of energy. As in the past, PG&E would use the power to meet its system load needs. Because of PG&E's proposed project changes and enhancements, the project's energy output over the next license period would probably differ from the historical output.

B. Need For Power

We conclude that power from the Tule River Project--including PG&E's proposed improvements--would be needed.

To consider the need for power in California, we reviewed the California Energy Commission's (CEC) Electricity Reports (ER's) for 1988 and 1990.

In the ER's, CEC projects the state's expected electrical needs for the next 20 years and evaluates: (1) air pollutant emissions; (2) fuel use; (3) diversity and system operating cost; and (4) cost-effectiveness to reduce adverse environmental or social impacts.

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In the ER's, CEC says existing hydropower projects and their improvements are "nondisplaceable and nondeferrable resources" in the state's "Basic resource system"--which includes all existing hydro facilities and proposed improvements. CEC also says the California Public Utility Commission classifies hydro relicensing improvements as nondeferrable resources.

CEC says existing hydro facilities should continue operating and be improved economically.

CEC's forecasts:

- è The Basic system's capacity--committed resources--would meet projected statewide capacity needs only until 1993.
- è Adding uncommitted resources to the Basic resources means the Basic system wouldn't need more capacity until 1996.
- è Adding uncommitted resources to the Basic system would meet statewide energy needs until after 1999--but only if producers continue to use displaceable portions of existing oil-fired and gas-fired power plants to supply energy.

III. PROPOSED PROJECT

A. Project Description

The proposed project (figure 2) consists of:

- (1) Tule River Diversion Dam, 6 feet high and 98 feet long, that diverts water from the North Fork of the Middle Fork Tule River into the Tule River Conduit;
- (2) Hossack Creek Diversion Dam, 7.5 feet high and 17 feet long, that diverts water through a 12-inch-diameter, 98-foot-long pipe and a 12-inch by 13-inch 8-foot-long flume from Hossack Creek into the Tule River Conduit;
- (3) Doyle Springs Diversion Dam, 4 feet high and 70

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feet long, with the Wishon plant, that pumps water through an 18-inch-diameter, 1,250-foot-long pipe from Doyle Springs and the North Fork of the Middle Fork Tule River into the Tule River Conduit;

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- (4) Tule River Conduit, 3.2 miles long, that consists of an open channel, tunnel, and pipe connecting to a surge tank;
- (5) Tule River Penstock, with a length of 3,600 feet;
- (6) Tule River Powerhouse on the North Fork of the Middle Fork Tule River, with an installed capacity of 6.4 MW to be upgraded to 7.9 MW, under a gross head of 1,544 feet;
- (7) a tailrace that returns flow to the North Fork of the Middle Fork Tule River;
- (8) a 70-kilovolt (kV) transmission line 15.27 miles long; and
- (9) appurtenant facilities.

PG&E proposes to increase the installed capacity of the powerhouse to 7.9 MW by replacing the existing turbine runners. This proposal, including an allowance for the loss in generation from their instream flow enhancement, would increase the average

annual generation of the project by about 1.2 GWh to 29.6 GWh.

The project facilities were constructed between about 1902 and 1914 and have operated continuously since this period. The project diverts water from the North Fork of the Tule River and Hossack Creek, a North Fork tributary, into the Tule River Conduit where the water flows to the Tule River Powerhouse and then returns to the North Fork. The transmission line transports the electric power generated at the powerhouse to another transmission line at PG&E's Springerville substation located immediately northwest of Lake Success and about 3 miles northeast of Porterville. The project is operated in a run-of-river mode.

B. Proposed Enhancement Measures

PG&E proposes the following:

- (1) increase its 1 to 2 cubic feet per second (cfs) voluntary minimum streamflow below the Tule River Diversion Dam to 4 cfs in a normal water year and 2 cfs in a dry year;
- (2) make structural modifications designed to guide fish to the dam's minimum bypass releases;
- (3) make an agreement with the Forest Service (FS) to fund 10 percent of the cost of operation and maintenance of the Wishon Campground, estimated at \$3,800 annually;



6

- (4) protect the three identified populations of the plant species Springville farewell-to-spring (*Clarkia springvillensis*) by fencing with barbed wire prevent livestock grazing and inadvertent impacts from routine maintenance activities, and inform project personnel of the location and importance of the sites;
- (5) paint all buildings in the powerhouse complex to blend with the surrounding landscape.

C. Federal Land Management Conditions

As authorized under section 4(e) of the Federal Power Act, the FS is completing license conditions for the proposed project. The FS originally filed license conditions on June 22, 1988. PG&E appealed these conditions and subsequently the FS withdrew the conditions in a filing on October 26, 1989. The FS states in the October 26, 1989, filing that the FS and PG&E are cooperating to finalize a revised set of license conditions. The filing contains six draft conditions based on this work (attachment 1). In a filing dated May 25, 1990, the FS filed another set of draft conditions 1-4, and recommended that these conditions together with conditions 5 and 6 of the October 26, 1989, filing be included in any license issued for the project (attachment 2).

The draft license conditions are summarized as follows. Condition 1 is a standard condition requiring PG&E to obtain a special use permit. Conditions 2, 3, and 4 are standard conditions that would involve obtaining FS approval on final project design and project changes, and yearly consultation with the FS to ensure the protection and development of natural resources. Condition 5 requires a specific minimum flow regime. Condition 6 requires PG&E to pay for the operation and maintenance expense associated with project-related recreation use.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The Commission's regulations require prospective applicants to consult with appropriate resource agencies before filing an application for license. This is the first step in compliance with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other federal statutes. Prefiling consultation must be complete and must be documented in accordance with the Commission's regulations.

After the Commission accepts an application, concerned entities may submit formal comments during a public notice



period. In addition, organizations and individuals may petition to intervene and to become a party in any subsequent proceedings. The Commission makes the comments provided by concerned entities part of the record, and the staff considers the comments during the review of the proposed project. After the Commission issued a public notice of the initial application for the Tule River Project on November 14, 1986, the following entities commented on the application or filed petitions to intervene.

Commenting entities	Date of letter
California Department of Fish and Game	November 14, 1986 January 16, 1987 August 31, 1989
California Resources Agency	November 17, 1986 January 20, 1987
Department of the Interior	December 5, 1986 August 22, 1989
Department of the Army, Sacramento District Corps of Engineers	December 9, 1986
Environmental Protection Agency	January 21, 1987
Forest Service	October 26, 1989; May 25, 1990
Motion to intervene	Date of intervention
California Department of Fish and Game	November 14, 1986

PG&E did not respond to the comment letters or to the motion to intervene.

B. Water Quality Certification

PG&E applied for water quality certification on November 14, 1985. On December 30, 1985, the California State Water Quality Resources Control Board (WRC) waived water quality certification of the project under Section 401 of the Clean Water Act.

V. ENVIRONMENTAL ANALYSIS

A. General Description of the Locale

1. Tule River Geographic Region

The project is located in the upper portion of the Tule River drainage basin (figure 1). The Middle Fork Tule River is the principal tributary of the Tule River. The Middle Fork and South Fork of the Middle Fork Tule River merge immediately



8

downstream of the project powerhouse. The Middle Fork Tule River is impounded at Lake Success about 2 miles east of Porterville, at its confluence with the South Fork Tule River.

The Tule River basin has a drainage area of 393 square miles above Lake Success. Lake Success provides flood control and irrigation service for the valley floor lands. From Lake Success the Tule River drains into Tulare Lake. Tule River flows from the Lake Success dam are normally depleted for irrigation purposes before reaching Tulare Lake, except during periods of flooding. Lake Success was constructed and is currently operated by the Army Corps of Engineers.

Elevations in the project area range from about 700 feet above mean sea level (msl) at PG&E's Springville substation to about 4,000 feet msl at the Tule River Diversion Dam. Elevations rise to over 10,000 feet msl near the crest of the Sierra Nevada mountains east of the project.

The terrain in the upper basin is rugged and heavily incised by streams and rivers. Lake Success marks the point where rugged mountainous terrain of the higher elevations changes into a more gentle foothills environment of the lower elevations. Granite rock outcrops, bushes and trees, and rugged steep slopes dominate the visual landscape of the upper project area. The project facilities follow the course of the North Fork of the Middle Fork Tule River and the Middle Fork Tule River through the steep terrain until approximately the town of Springville, north of Lake Success, where the transmission line crosses more gentle topography comprised of low hills and valleys.

Mean annual precipitation in the project vicinity is approximately 40 inches. About 80 percent of this amount occurs

between November and March. Mean annual snow fall is about 73 inches, with nearly the entire amount falling between December and March. Mean annual high and low temperatures are 65 and 40 degrees Fahrenheit (°F), respectively. The warmest temperatures occur in July and August, while the coolest temperatures occur in December through February.

The basin has a low population density--the largest towns in the basin are Springville and Porterville with populations of approximately 9,000 and 23,000, respectively. The principal recreational attractions are Sequoia National Forest, Sequoia and Kings Canyon National Parks, and the Golden Trout Wilderness. Agriculture is the most important component of the basin's economy (Federal Power Commission, 1966; Pacific Gas and Electric Company, 1986a).

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2. Proposed Projects and Existing Hydroelectric Development

Besides the Tule River Project, as of November 1, 1991, there are two licensed hydropower projects within the Tule River Basin--the Lower Tule River Project (FERC No. 372) and the Success Power Project (FERC No. 3038) (figure 1). The Lower Tule River Project, with an installed capacity of 2 MW, is located downstream of the Tule River Project on the Middle Fork Tule River and has been in operation essentially unchanged since 1909. The Success Power Project, with an installed capacity of 1.4 MW, consists primarily of a powerhouse and short transmission line at the Lake Success dam. Construction of the project was completed in 1989.

There are three hydropower projects in the basin which have been exempted from licensing--the Tule River Indian Hydro Plant #1 Project (FERC No. 5067), the Old Oak Ranch Water Power Project (FERC No. 6136), and the Sequoia Ranch Project (FERC No. 8679) (figure 1). The projects are constructed and operating except for the Sequoia Ranch Project which is under construction.

As of November 1, 1991, there are no other projects proposed for licensing in the Tule River Basin.

3. Target Resources

For this assessment, a target resource is defined as an important resource that could be affected cumulatively by two or more proposed hydropower projects.

In assessing cumulative hydroelectric effects on this river basin, we identified two target resources: (1) resident trout, including brown trout and rainbow trout; and (2) outdoor recreation.

We selected these resources because the California Department of Fish and Game (DFG) stocks catchable-sized trout in these waters and the FS operates campgrounds adjacent to the river. Both target resources are directly affected by streamflows in the project reach of the North Fork of the Tule River. These resources would be enhanced by our recommended measures.

4. Cumulative Impacts

A cumulative impact is the impact on the environment that results when the effects of an action are added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually



minor but collectively significant actions taking place over a period of time (40 CFR, section 1508.7).

The Tule River Project would cause cumulative beneficial impacts to the target resources in the Tule River Basin within the project reach. Both resident trout and outdoor recreation would be enhanced by the staff's recommended measures. As discussed in section V.B.3, our recommendations for increased flow releases and fish stocking would benefit trout populations and associated fishing activities. PG&E's partial funding of the FS campground would further benefit recreation in the project area.

B. Proposed Project

1. Geology and Soils

Affected Environment: The project vicinity is located in the south-central portion of the Sierra Nevada geomorphic province, which is composed of granitic rocks and older, structurally-complex metamorphic rocks. The granitic terrain along the tributaries of the Middle Fork Tule River has been deeply incised by the streams; slopes are steep with bold outcrops, talus, and decomposed granite exposures. Talus and decomposed slopes have developed soil which supports bushes and trees. Slopes have developed primarily from decomposed granite.

Environmental Impacts and Recommendations: Erosion and sedimentation would not be a problem because no land-disturbing construction activities would occur.

Unavoidable Adverse Impacts: None.

2. Water Resources

Affected Environment:

a. Streamflow

The streams in the project area are fed by rain and melting snow. Streamflows gradually increase from January through February and rapidly increase from March through May--followed by rapid decreases after June (table 1). The lowest monthly flow occurs between August and December.

Under existing operating conditions, a total of 66 cfs can be diverted into the Tule River conduit. However, in normal years, PG&E tries to maintain a voluntary flow of 1 to 2 cfs below the Tule River Diversion Dam--helping to dilute the 5 to 7 cfs flow from Doyle Springs (RM 3.2), which contains dissolved travertine minerals.



Hossack and Meadow Creeks are small tributaries located below the Tule River and Doyle Springs Diversion Dams, respectively; neither provide substantial flow to the North Fork of the Middle Fork Tule River during the dry season. During the high flow months, the North Fork of the Middle Fork Tule River often exceeds the Tule River conduit's capacity, resulting in spills at both dams.

Table 1. Average monthly flows (cfs) in the North Fork of the Middle Fork Tule River (Source: Pacific Gas and Electric, 1988). 1/

Month	Tule River Diversion Dam		Below Doyle	Below
	above RM 4.8	below RM 3.8	Springs RM 3.2	Meadow Ck. RM 1.5 to 2.2 2/
January	23.5	1.1	3.3	6.2
February	30.0	1.3	3.3	7.5
March	47.4	1.4	5.9	14.1
April	66.3	7.5	12.0	18.9
May	120.2	62.1	66.0	70.8
June	63.1	7.0	9.8	12.0
July	25.6	2.2	2.7	3.6
August	15.0	2.2	2.9	3.4
September	12.0	1.7	2.5	2.7
October	12.9	2.1	3.3	3.2
November	13.7	1.7	2.5	3.2
December	16.8	1.7	3.1	4.0

1/ Fifteen year median.

2/ RM=at river mile.

b. Water Quality

The water quality of the project reach of the North Fork of the Middle Fork Tule River is generally good; however, below Doyle Springs the water quality is characterized by increased levels of hardness, total dissolved solids, calcium, bicarbonate, total alkalinity, and electrical conductivity compared to other segments of the project area (table 2). Deposits of calcite have accumulated on the stream bottom below the Doyle Springs diversion dam.

Lower project reaches, below Doyle Springs Diversion Dam, are also characterized by elevated water temperatures. Water temperatures generally increase from Tule River Diversion Dam to the powerhouse (table 3). The temperature in the vicinity of

Doyle Springs is somewhat moderated by the addition of 5 to 7 cfs of cooler water from the springs.



WRC has established a maximum electrical conductivity objective of 450 $\mu\text{mho/cm}$ for the water in the project area (California State Water Quality Resources Control Board, 1975). This objective is being met, except for a short distance below the Doyle Springs diversion dam where the applicant measured 570 $\mu\text{mho/cm}$ (table 2).

Table 2. Water quality parameters measured in stream segments of the Tule River Project (Source: Pacific Gas and Electric Company, 1985).*

	Tule River Diversion Dam		Below Doyle Springs	Powerhouse	
	Above	Below		Above	Below
pH, field	7.80	7.55	7.36	8.13	7.84
pH, laboratory	7.90	8.11	7.58	8.25	8.27
Hardness (as CaCO ₃)	40.1	39.5	316	126	71.5
Total dissolved solids	79	76	388	217	150
Calcium	12.4	12.1	107	37.7	22.3
Bicarbonate	82.4	85.4	437	212	128
Total alkalinity (as CaCO ₃)	67.5	70.0	358	174	105
Electrical conductivity ($\mu\text{mhos/cm}$)	170	140	570	350	200
Dissolved oxygen	9.04	8.96	8.50	8.66	9.0
(% saturation)	84%	83%	85%	90%	86%

* Recorded as milligrams per liter unless otherwise indicated. Data collected on June 19, 1984.

Environmental Impacts and Recommendations:

The bypassed reach is characterized by elevated water temperatures during the summer months. Increasing the existing minimum flow releases would improve the water temperatures for trout, especially in the reach below Doyle Springs. This issue is addressed in section V.B.3.

Diverting flows at the Tule River Diversion Dam reduces the river flow near Doyle Springs. Consequently, the high levels of calcium carbonate that characterize Doyle Springs are no longer diluted and more readily precipitate out of solution. PG&E estimates that a flow of 100 to 250 cfs below the dam is necessary to reduce the downstream calcium deposits-- the existing lowest average monthly flow above the dam is 12.0 cfs



(table 1). We conclude that the calcium deposits would not be reduced significantly by increasing flow unless the current minimum flow releases are increased substantially (i.e., 100 to 200 cfs).

Unavoidable Adverse Impacts: None.

Table 3. Tule River water temperatures (°C) recorded during 1984 (Source: Woodward-Clyde Consultants, 1985a).

Date		Tule River Diversion Dam	Wishon Pump	Below Doyle Springs	Above Tule River Powerhouse
7/1	mean	15.79	16.23	16.48	20
	maximum	19	17.5	17	22.5
7/15	mean	16.67	16.58	16.77	21.04
	maximum	18	17	17	23
8/1	mean	16.46	16.48	16.69	21.25
	maximum	19.5	17.5	17	23
8/15	mean	16.66	16.54	16.54	19.79
	maximum	19.2	17	17	20.5
9/1	mean	15.25	15.78	15.98	17.76
	maximum	17.2	17.1	17.1	19.6

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9/15 mean	15.38	16.01	16.19	18.86
maximum	17.4	16.8	16.4	20.6
10/1 mean	10.88	13.8	14.84	14.3
maximum	11.9	14.2	15.2	15.8

3. Fishery Resources

Affected Environment:

a. Fish species and populations

Tule River, Meadow Creek, and Hossack Creek contain reproducing populations of rainbow trout and brown trout. Of the 1,176 fish sampled from the North Fork of the Middle Fork Tule River in 1984, PG&E found the following: (1) rainbow trout comprised 83 percent of the number sampled and 72 percent of the biomass; (2) brown trout comprised 11 percent of the number and 27 percent of the biomass; (3) California roach comprised 6 percent of the number and 1 percent of the biomass; and (4) a greater abundance of trout occurred in some of the less accessible portions of the river.

Earlier field surveys and stocking practices indicate that Sacramento squawfish and brook trout have been found in the North

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Fork of the Middle Fork Tule River, but were not observed during the 1984 samples.

Since 1950, DFG has stocked about 3,500 pounds of catchable-sized rainbow trout per year in the North Fork of the Middle Fork Tule River at points with vehicular access--historically between Camp Four Road (RM 1.2) and Doyle Springs Housing Development (RM 4.4). Since about 1983, DFG has not planted fish in the river below the Wishon Campground (personal communication, Gilbert Banuelos, Kern River Hatchery, July 16, 1991). Currently, four locations are accessible--one at the Doyle Springs Housing Development and three at the Wishon Campground. Between 100 and

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200 pounds of fish (at 2 fish/pound) are distributed between these locations once a week between April through August. Stocking is discontinued when the yearly allotment has been reached or when the DFG fish stocking criteria are no longer met.

PG&E is conducting a research and development program (R&D) at several of their project streams, including the North Fork of the Middle Fork Tule River, to determine the relationship between base streamflow and fish standing crops (Pacific Gas and Electric Company, 1988). Between 1986 and 1989, in addition to the 1984 Tule River Project application studies, PG&E collected summer and fall electrofishing data, streamflows, and stream flow modeling data for the U.S. Fish and Wildlife (FWS) Instream Flow Incremental Flow Methodology (IFIM) (Bovee, 1982; Milhous et al., 1989; Stalnaker et al., 1976; Trihey, 1979). Study sections were selected in the North Fork of the Middle Fork Tule River above and below the Tule River Diversion Dam, at RM 4.8 and RM 3.8, respectively.

We did the following: (1) simulated the hydraulics of the R&D study's monthly low flows using the FWS's Physical Habitat Simulation Model; (2) generated rainbow and brown trout weighted usable area (WUA) habitat values (Raleigh et al., 1984; Raleigh et al., 1986) at the sampled flows; and (3) compared the adult habitat values with each study sites' fall electrofishing adult numbers (table 4). The mean adult rainbow and brown trout WUA values and total adult trout numbers of the upper R&D study section, where flows were greater, were approximately twice as great as those below the Tule River Diversion Dam. Rainbow trout were much more numerous than brown trout.

From 1984 through 1987, DFG electrofished 66 sections from 30 major west slope Sierra Nevada stream reaches. The streams are located over a 400-mile-long range between Sonora and Bakersfield, California--the North Fork of the Middle Fork Tule River is located about 100 miles north of this range's southern boundary. The surveys show that the Tule River project area is a productive trout section. The R&D study sites' mean of 803 adult-sized fish per mile (table 4) is more than the 638 per mile

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Table 4. Low flow habitat values (WUA) and fall electrofishing data from the R&D study sites, located above and below the Tule River Diversion Dam (Source: the staff generated from Pacific Gas and Electric Company, 1990).

ABOVE THE TULE RIVER DIVERSION DAM (RM 4.8)

Year	Rainbow Trout WUA				Electrofishing data	
	Flow (cfs)	Fry	Juvenile	Adult	Adults/mile	lbs/ac*
1986	15	7,111	7,363	10,569	193	7.80
1987	9	7,451	6,817	8,858	209	8.14
1988	4	7,388	5,685	6,729	193	7.88
1989	6	7,504	6,245	7,675	177	6.83
Mean		7,364	6,528	8,458	193	7.66

Year	Brown Trout WUA				Electrofishing data	
	Flow (cfs)	Fry	Juvenile	Adult	Adults/mile	lbs/ac
1986	15	1,091	2,322	2,904	853	49.20
1987	9	752	1,938	2,378	596	45.20
1988	4	434	1,433	1,658	1,143	48.80
1989	6	565	1,668	1,985	1,223	50.78
Mean		711	1,840	2,231	954	48.50

Combined Means (Total trout) 1,147 56.16

-----BELOW THE TULE RIVER DIVERSION DAM (RM 3.8)-----

Year	Rainbow Trout WUA				Electrofishing data	
	Flow (cfs)	Fry	Juvenile	Adult	Adults/mile	lbs/ac
1986	1	4,858	3,226	4,103	306	17.37
1987	1	"	"	"	97	5.77
1988	1	"	"	"	97	4.21
1989	1	"	"	"	137	6.85
Mean		4,858	3,226	4,103	159	8.55

Year	Brown Trout WUA				Electrofishing data	
	Flow (cfs)	Fry	Juvenile	Adult	Adults/mile	lbs/ac
1986	1	171	690	928	563	52.52
1987	1	"	"	"	153	25.02
1988	1	"	"	"	193	31.73
1989	1	"	"	"	290	24.56
Mean		171	690	928	300	33.46

Combined Means (Total trout) 459 42.01

Mean of both sections (Total trout)	803	49.09
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* Pounds per acre.

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found in other west slope Sierra Nevada streams (Dienstadt et al., 1987). In addition, the R&D sites produced a mean biomass of 49.09 pounds per acre, compared with 51.2 pounds per acre for other west slope Sierra Nevada streams.

b. Fish habitat

Above Doyle Springs Diversion Dam: This section is characterized as pool-riffle habitat with an average channel gradient of three percent. Much of this section's habitat is comprised of pools, estimated to be 60 percent of the total area. The substrate in this section is dominated by small boulders and rubble. Spawning habitat, consisting of small pockets of gravel behind boulders in pools, is located sporadically throughout the reach.

With a flow release of 1 cfs at the Tule River Diversion Dam, daily mean water temperatures increase downstream toward the Doyle Springs diversion dam, but remain less than 20°C in the 0.7-mile-long section--even during a very hot and dry July.

Below Doyle Springs Diversion Dam: The basic habitat characteristics in this section are similar to those in the upstream section; however highly mineralized inflow from Doyle Springs has considerable influence on its habitat. Mineral deposits (travertine) cover rock and sediments, and commonly form benches at the lower end of pools. In late June 1984, benthic algal production was substantial below Doyle Springs, and commonly formed dense mats on the stream bottom that tended to bind fine sediments and small debris.

Doyle Springs helps cool the water below the Doyle Springs Diversion Dam (RM 3.2), but temperatures can exceed 20°C in the 1.1-mile-long section above the powerhouse in normal temperature years (table 3). During extreme temperature conditions, the 2.8-mile-long section above the powerhouse can exceed 20°C.

c. Recreational fishing

During the 1984 summer recreation season, PG&E conducted a recreational user survey to obtain recreational use patterns and levels in the immediate project vicinity. Visitor interviews were conducted at six sites throughout the project area to determine recreational visitor use and experience in the project area.

The total recreational use in the project vicinity is estimated at 12,660 visitor days annually. In the recreational user survey, a visitor-day is defined as any portion of a day that one visitor recreated in the area (personal communication, Tom Studley, Fishery Biologist, Pacific Gas and Electric Company,

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San Francisco, California, May 6, 1991). Participation in recreational fishing accounts for 14 percent of this use; we calculate recreational fishing use in the project area at 1,772 visitor days annually. Recreational use is expected to increase by 41 percent in the project area by the year 2020.

The local DFG biologist says that the current demand for recreational fishing in the project area is high (personal communication, Alice Low, Fishery Biologist, California Department of Fish and Game, Fresno, California, May 2, 1991). She said that most campgrounds near the project are full on summer weekends and many campers go to the area to fish for trout.

Environmental Impacts and Recommendations:

a. Instream flows

There are currently no minimum flow requirements for the project, although PG&E provides a voluntary 1 to 2 cfs release at the Tule River Diversion Dam. Increasing the streamflow between the dam and the powerhouse would increase the amount of trout habitat and reduce the water temperatures in the 3.7-mile-long project section of the North Fork of the Middle Fork Tule River.

These enhancements would be most pronounced during the summer low flow period--especially July--when the existing flow-related habitat values are low and water temperatures are high.

Streamflow release below Tule River Diversion Dam: The stream section affected by this release is located between Tule River Diversion Dam and Doyle Springs Diversion Dam, a distance of 0.7 miles (figure 2).

The various minimum streamflow release proposals for below the Tule River Diversion Dam are presented in table 5.

Proposed and agency recommended streamflows for below the Tule River Diversion Dam (table 5) would enhance both trout species. The degree of enhancement would vary for the species' four life stages. Generally, as flows increase, predicted WUA also increase for all life stages except rainbow trout fry. Rainbow trout fry habitat peaks at 7 cfs; WUA peaks above 12 cfs for all other life stages for both species', the lowest mean natural monthly flow (table 6). No spawning habitat is provided at the existing flow of 1 cfs.

The FS's recommendation (table 5) is based on increased fish habitat and aesthetics during the recreation season. FS states the following: (1) increasing the present minimum releases to 4 and 7 cfs would increase fish habitat and provide anglers with a greater opportunity to catch fish; and (2) campers and other recreationers in the Wishon Campground area would benefit from

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the increased water flow because of its greater attractiveness (attachment 1).

The DFG's and FWS's recommendation (table 5) is designed to increase the habitat for wild trout by providing added: (1) spawning habitat for rainbow trout during March and April--when the Tule River Diversion Dam is not spilling; (2) incubation and rearing habitat for juvenile trout during the summer months; (3) summer adult holding habitat; and (4) a somewhat reduced winter maintenance flow.

Table 5. PG&E and resource agencies alternative flow recommendation (in cfs) below Tule River Diversion Dam (Source: the staff).

Month	PG&E normal year and FS dry year 1/	FS wet year	DFG and FWS
January	4	4	8
February	4	4	8
March	4	4	10
April	4	4	12
May	4	7 2/	12
June	4	7	10
July	4	7	10
August	4	7	10
September	4	7	10
October	4	4	8
November	4	4	8
December	4	4	8

1/ PG&E proposes a dry-year release of 2 cfs.
 FS dry year definition: any 12-month period beginning May 1 in which the inflow to Lake Success for the water year, as forecast on April 1 by the State of California Department of Water Resources (DWR), and as may be adjusted by the State on May 1 or June 1, will be 50 percent or less of the average for such water year, as computed by the State for the 50-year period used at the time.
 If during a designated dry year, the February 1 or March 1 DWR forecast indicates that dry year conditions no longer prevail, normal year flow releases will resume within 30 days of the forecast date.

2/ May 15 to September 15.

Excluding dry year flow regimes, the various alternatives would increase existing rainbow trout adult habitat by 47.1 to 100.9 percent and juvenile habitat by 38.8 to 69.7 percent; increases in fry habitat would be similar under each alternative



20.4 to 22.1 percent (table 7). PG&E's dry year recommendation would increase habitat of all life stages by a small amount (less than 20 percent). All the flow regimes would provide the greatest percent increase for adult habitat, followed by juvenile habitat, and then fry habitat.

Table 6. Rainbow and brown trout WUA habitat values for the North Fork of the Middle Fork Tule River (Source: Staff generated from Pacific Gas and Electric Company, 1990).

RAINBOW TROUT

Discharge	Adult	Juvenile	Fry	Spawning
1.00	4574	4096	6136	0
2.00	5476	4806	6844	0
3.00	6158	5303	7202	0
4.00	6728	5684	7387	0
5.00	7224	5990	7474	0
6.00	7675	6245	7504	7
7.00	8100	6469	7509*	22
8.00	8497	6659	7489	28
9.00	8858	6817	7451	32
10.00	9191	6950	7397	39
11.00	9499	7064	7342	54
12.00	9788*	7162*	7287	70
13.00	10065	7242	7231	80
14.00	10325	7307	7171	87
15.00	10570	7363	7111	109

BROWN TROUT

Discharge	Adult	Juvenile	Fry	Spawning
1.00	823	865	148	0
2.00	1219	1119	280	12
3.00	1465	1294	364	31
4.00	1658	1433	434	50
5.00	1830	1557	501	66
6.00	1985	1668	565	83
7.00	2124	1764	626	109
8.00	2254	1854	689	149
9.00	2378	1938	752	188
10.00	2494	2016	813	224
11.00	2600	2089	873	258
12.00	2696*	2156*	931*	294
13.00	277	2217	987	356
14.00	2844	2272	1041	420
15.00	2904	2322	1091	481

* Maximum habitat between 0 and 12 cfs, the lowest mean natural monthly flow.

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In addition to the WUA changes for the rainbow trout life stages shown in table 7, 45.22 sq ft/1000 ft more rainbow trout spawning habitat would be available in April with a flow of 12 cfs--compared to the median monthly flow of 7.5 cfs (table 1). No improvement in habitat would occur in May since existing spills yield a median monthly flow of 62.1 cfs below the Tule River Diversion Dam in May, exceeding all recommended flows.

Table 7. Change in summer WUA for three life stages of rainbow trout with alternative minimum flows below the Tule River Diversion Dam (Source: the staff generated from Pacific Gas and Electric Company, 1990).

Proponent	Weighted usable area below the North Fork diversion dam for each alternative and the increase or decrease in WUA between proposals.			
	Flow (cfs)	Adult	Juv	Fry
Existing flow	1	4574	4096	6135
PG&E's normal year flow	4	6728	5685	7388
Change in WUA between the existing flow and PG&E's proposal		2154	1589	1253
FS's normal year flow	7	8100	6469	7509
Change in WUA between FS's and PG&E's flow proposals		1372	784	121
DFG/FWS summer flow	10	9190	6950	7397

Change in WUA between DFG/FWS's and FS's flow proposals	1090	481	-112
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Brown trout spawning habitat would increase from the existing 11.69 sq ft/1000 ft (spawning habitat at 2 cfs--October through December) to 49.99 under PG&E's proposal, to 108.96 under the FS recommendation, and to 294.29 under the FWS and DFG recommendations.

All of the recommendations for flows downstream of the Tule River Diversion Dam would result in habitat enhancement for rainbow and brown trout over existing conditions. Each of the

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recommendations assume the continued operation of the project at some level; for our purposes, we consider that the recommendations represent the range of reasonable alternatives. However, the FS and PG&E proposals are directed more at enhancement of the fishery under current management alternatives, while the FWS/DFG proposal envisions a change in fisheries management towards creating conditions for self-sustaining trout populations.

Under section 4(e) of the Federal Power Act, the FS recommendations are mandatory unless we determine that a higher flow is needed. The IFIM analysis shows that trout habitat continues to improve with more flow well beyond the upper limit of the range of alternatives. As indicated earlier, however, the range of alternatives really represents a range of management options. As such, these options should be balanced with other uses of the water.

The primary values of the river downstream of the Tule River Diversion Dam are the aesthetic and recreational fishery contributions to public use of the area. In order to determine the level at which these values would provide public benefits, considering both power and nondevelopmental values, we did an analysis of power benefits in relation to the value of the

fishery based primarily on willingness-to-pay techniques. The results of the analysis (see appendix A), indicate that the willingness-to-pay value of the fishery that corresponds to the FS recommended minimum flows exceeds the value for trout fishing derived from surveys in California. Accordingly, we conclude that the FS recommended minimum flows for the reach of the river downstream of the Tule River Diversion Dam are adequate.

Streamflow regime below the Doyle Springs Diversion Dam: This stream section is located between the Doyle Springs Diversion Dam and the powerhouse (figure 2). The various minimum streamflow release proposals for this section are presented in table 8.

In this section, water temperature is more limiting to trout production than flow related habitat. At one time, DFG stocked fish in this reach at the Camp Four Road crossing. Currently, all fish are stocked at or above the Wishon Campground where water conditions are more favorable.



Table 8. PG&E and resource agencies alternative flow recommendations (in cfs) below Doyle Springs Diversion Dam (Source: the staff).

Month	PG&E*	FS	DFG	FWS
January	4	2	2	3
February	4	2	2	3
March	4	2	3	3
April	4	2	4	4
May	4	2	4	4
June	4	2	3	4
July	4	2	2	4
August	4	2	2	4
September	4	2	2	4
October	4	2	2	3
November	4	2	2	3
December	4	2	2	3

* Proposed dry-year release is 2 cfs.

DFG uses their standard temperature and flow criteria for determining if catchable trout stocking will be permitted in streams. 9/

The relationship between streamflow and water temperature was modeled by PG&E to determine how much flow is necessary during the months of July through September to provide usable trout temperature conditions (Woodward-Clyde Consultants, 1985a). Two temperature criteria were used for this evaluation: (1) daily mean temperatures based on criteria for acceptable long-term growth--criteria selected was 20°C; and (2) daily maximum temperatures based on upper incipient lethal temperatures--criteria selected was 25°C and 27°C for rainbow and brown trout,

9/ DFG's standards are:

Catchable trout shall not be stocked in streams when water temperatures reach 75° F (23.88°C) and it appears that such temperatures will continue to occur regularly or when streamflows drop below 10 cfs. The exception is that suitable streams with flows between 2 and 10 cfs may be planted if water temperatures do not exceed 70° F (21.11°C) and other conditions are satisfactory. Stocking shall be discontinued if conditions are unsuitable because of shallow water, lack of pools, growth of algae, poor water quality, or other reasons (California Department of Fish and Game Operations Manual, Section 5355).

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respectively. Literature citations, other than those used by PG&E, indicate that adult lake rainbow trout select temperatures between 7 and 18°C (Fast, 1973; May, 1973), and avoid permanent residence in temperatures above 18°C (May, 1973). Adult stream rainbow trout select temperatures between 12 and 19.3°C (Bell, 1973; Cherry et al., 1977; Garside and Taft, 1958; McCauley et al., 1977). We believe that PG&E's water temperature criteria are reasonable.

Water temperatures were simulated for normal and extreme meteorological and hydrological conditions. Normal conditions were based on the 50 percent exceedance hydrology and the meteorology associated with the historical median monthly air temperature. Extreme conditions were defined as 90 percent exceedance for hydrology and 10 percent exceedance for air temperature conditions (dry and warm, respectively).

Longitudinal water temperature simulations for flows between 0 and 50 cfs were conducted for five stream reaches between the Tule River Diversion Dam and the powerhouse. The percentage of the distance for each stream reach which satisfied the usable criteria was determined. During normal conditions, 1 cfs provides usable trout water temperatures for the entire project reach, except in July for the 1.1-mile-long section above the powerhouse. A flow simulation of 5.2 cfs provides 100 percent usability during a normal July. In an extreme July, a release of 10.3 cfs would be required to produce 100 percent usability of the project section (table 9).

The FS and DFG recommendation of 2 cfs would provide complete protection throughout the project area during an extreme September, but in an extreme July and August much of the habitat below Doyle's Spring Diversion Dam would not be usable (table 9). The PG&E and FWS recommendation of 4 cfs would provide some improvement compared to 2 cfs, but the lower two study reaches (river miles 1.9 to 0.2) would still not be 100 percent usable in July and August (table 9).

DFG commented that PG&E's temperature model should be verified before adopting a permanent flow regime below the Doyle Springs Diversion Dam. If the thermal criteria can't be achieved on a long-term reliable basis, PG&E would request increased flows for the period between July to September.

Although FWS doesn't plan to recommend an increase in their flow recommendation based on a post-relicensing temperature monitoring study, FWS still believes that temperature monitoring is necessary below the Doyle Springs Diversion Dam to clarify the relationship between instream flows and water temperature, and to determine project impacts.

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Table 9. Percent of temperature usable habitat in the North Fork of the Middle Fork Tule River under different minimum flow regimes during extreme summer conditions between Tule River and Doyle Springs Diversion Dams (Source: Woodward-Clyde Consultants, 1985a, as modified by staff)

Month	River Mile (RM)	Streamflow (cfs)				
		1	2	4	7	10.3
July	3.9-3.2	100	100	100	100	100
	3.2-3.0	100	100	100	100	100
	3.0-1.9	90	90-100	100	100	100
	1.9-1.3	0	0-72	72-100	100	100
	1.3-0.2	0	0	0-32	84	100
August	3.9-3.2	100	100	100	100	100
	3.2-3.0	100	100	100	100	100
	3.0-1.9	100	100	100	100	100
	1.9-1.3	54	54-100	100	100	100
	1.3-0.2	0	0-64	64-100	100	100
	September	3.9-3.2	100	100	100	100
	3.2-3.0	100	100	100	100	100
	3.0-1.9	100	100	100	100	100
	1.9-1.3	100	100	100	100	100
	1.3-0.2	100	100	100	100	100

We recommend a year-long flow in this section of 2 cfs because: (1) the agencies' decreased resource management

emphasis in this section; (2) the lesser amount of recreational fishing pressure below the Doyle Springs Diversion Dam; and (3) the resource balance between fishery enhancement and power production.

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PG&E should also conduct a post-relicensing temperature monitoring study to verify the temperature relationships shown in table 9.

b. Intake screening

Downstream migrating fish are subject to entrainment at the project intakes. Unless protected by diversion systems, downstream migrating fish can suffer injury or death by passing through turbines at hydroelectric plants (Eicher Associates, Inc., 1987).

Project relicensing provides an opportunity to lessen the existing entrainment impacts. The following options were examined:

1. Stocking catchable-sized rainbow trout.
2. Constructing agency recommended passive modifications at the existing diversion facilities--followed by a post-monitoring study.
3. Installing positive fish screens.

Stocking catchable trout: In the relicensing application, PG&E proposed to reimburse CDFG for stocking catchable trout to replace an estimated 2,385 fish--an estimated number of fish which might be lost annually at the project's intakes. This estimate was based on the results of a fish diversion study conducted at another PG&E project located north of the Tule River, the Mokelumne River Project, FERC No. 137 (Woodward-Clyde Consultants, 1987).

The agencies are concerned that the Mokelumne River results are not site-specific to the North Fork of the Middle Fork Tule

River, noting that differences in the projects' facilities may result in inaccurate estimates of fish losses at the Tule River Project.

Since its initial relicensing application, PG&E conducted creel census surveys throughout the project area to determine catch statistics for wild versus hatchery-origin trout. The project area was divided into four surveys sections: (1) A, above Tule River Diversion Dam; (2) B, below Tule River Diversion Dam; (3) C, below Doyle Springs Diversion Dam; and (4) D, below Meadow Creek. During the 1987 planting season, about 7,550 fish were stocked in the project area, with the majority (over 90 percent) planted above the Doyle Springs Diversion Dam (sections A and B). DFG reported that 1,780 rainbow trout were stocked in the project area after the creel census was initiated.



During the four-month 1987 study, PG&E estimated that 1,078 rainbow and brown were caught from the study area's four sections. Of these fish, 68 percent (728 fish) were rainbow trout of hatchery origin, caught at an average rate of 0.73 fish/hour.

Approximately 68 percent of all hatchery-origin rainbow trout and 78 percent of the wild trout were caught in the study sections A and B, where most of the plantings occurred. These study segments are close to the FS campground and received 93 percent of the project area's fishing use between 1987 and 1990 (table 10).

Table 10. Tule River creel census data (Source: Pacific Gas and Electric Company, 1991; updated by personal communication, Tom Studley, Fishery Biologist, Pacific Gas and Electric Company, San Francisco, California, July 26, 1991).

Year	Tule River Creel Census Data	
	Number of Anglers Observed	Hours Fished

Section	P-1333.txt							
	A	B	C	D	A	B	C	D
1987	26	34	8	6	49	42	9.5	7.5
1988	165	155	15	10	375.5	159.7	7.6	23
1989	96	135	9	6	332.7	296.1	15.6	7.3
1990	76	87	3	2	203.8	140.9	2.3	2.5
TOTALS	363	411	35	24	961	638.7	35	40.3

The 728 hatchery trout caught during the 1987 survey represents 41 percent of the fish stocked following the start of the survey. DFG reports that they expect a return of about 50 percent from most of their stocked trout (personal communication, Tim Farley, Fishery Biologist, California Department of Fish and Game, Sacramento, September 27, 1991). Using these percentages, 978 to 1,193 hatchery trout would be caught with this enhancement measure. At a catch rate of 0.73 fish/hour, the average catch per hour of hatchery trout in the project area, would provide 1,340 to 1,634 hours of recreational fishing.

The average length of an angler day in the project area during 1989 and 1990 was 3.33 hours (personal communication, Marty Geslax, Entrix Consultants, October 3, 1991). Between 406 and 495 (451 average) recreational fishing days would be provided by PG&E's stocking proposal.



The value of a recreational day of fishing has been estimated at between \$38.00 to \$48.00/day (Brown and Hay, 1987). So PG&E's stocking proposal has an estimated recreation economic benefit between \$17,138 and \$21,648 per year.

Passive modifications and a post-monitoring study: During post-application consultation, PG&E agreed to (1) make certain passive modifications to the sand trap below the Tule River Diversion Dam, and (2) provide a minimum flow release structure from the Doyle Springs Diversion Dam. Both modifications were designed to enhance the downstream movement of trout at the two

dams without physically screening the intakes. PG&E does not believe that the expense of full screening is warranted, based on new juvenile fishery data they collected during the R&D studies. Their fish sampling studies show that the reach below the Tule River Diversion Dam is not as dependent on recruitment from upstream areas as previously speculated.

The FS states that screening would not be required if identified structural modifications, designed to attract fish away from the intake, were implemented. These modifications involve: (1) painting the walls of the sand trap with a disruptive pattern to provide visual cover and attract fish away from the intake; (2) keeping the diversion side of the sand trap clear; and (3) providing lighting in the sand trap to repel fish to the bypass area.

FWS states that PG&E's proposed sand trap modifications: (1) depend on fish behavior response; (2) are unproven; and (3) may be unsatisfactory.

Literature on entrainment indicates that above a specific threshold velocity, a fish in flowing water will often orient itself into a current, even when moving with it, to facilitate respiration and feeding (Stone and Webster, 1986). To control its movement, the fish relies on visual and tactile stimuli. It is known that under conditions of adequate light intensity, fish utilize visual points, such as bottom topography, aquatic vegetation, and other objects in or above the water, to guide them in their movement (Pavlov, 1969). When ambient light conditions are low, such as at night or under highly turbid conditions, visual response is not elicited and fish must rely mainly on the movement of the flow for guidance. With the loss of visual reference points, fish can become susceptible to entrainment in artificially created currents, such as those encountered in water intakes. Therefore, use of lighting and visual stimuli have the potential to be effective in guiding fish away from the intakes.

While the results of installing artificial reference points in conjunction with illumination have been encouraging, additional research has not been conducted. Further, it is

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likely that visual keys would be effective only under illuminated conditions in relatively clear water (Stone and Webster, 1986).

PG&E estimated the cost of completing the FS's passive modifications at \$70,000 (1988 dollars).

Installing positive screens: Screens offer the most protection for downstream migrating fish. DFG's final recommendation was to have screens installed at the project intakes. If it can be shown that other measures can acceptably prevent fishery losses or that significant losses are not occurring, they would be willing to reconsider this requirement.

The literature indicates that fish passage survival at stationary perforated plate screens is reasonably high but does not approach the 100 percent values found with some rotary screens (Stone and Webster, 1986). Perforated plates can also require significant maintenance. PG&E estimated the cost of screening the project intakes at \$179,000 (1988 dollars).

Our analysis and recommendation: We believe the stocking alternative offers the best enhancement, considering the enhancement that would be obtained by the increased flows. Most of the existing fishing use (93 percent) occurs in the stream section upstream of the Doyle Springs Diversion Dam, where the catchable trout would be planted. The mitigation measure would cost \$3,100 annually, based on the cost of raising catchable trout at \$2.60 per pound (personal communication, Ron Camacho, California Department of Fish and Game, Sacramento, California, May 14, 1991). As we have said, we estimate the recreational benefit of the proposal to be \$17,138 to \$21,648 per year.

We cannot justify screening the project intakes with passive or positive screening facilities. The project is located in the lower reaches of the basin, where water temperatures within a few miles below the powerhouse become too high during the summer. Therefore, screening the project intakes would only provide additional juvenile seeding to a 4- to 5-mile-long section--with adequate year-round temperatures for trout.

c. Ramping rates

Project operation affects the rate which flow releases are increased or decreased below the diversion sites. Ramping rates that rapidly decrease water levels downstream from the diversion dams can strand fish in pockets of water along the stream

margins.

FWS recommends that the licensee be required to limit ramping to a rate that does not exceed 30 percent of the existing flow per hour. PG&E does not object.

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Based on experience with other small hydroelectric projects in similar California foothill streams, we believe the recommended ramping rate would provide adequate protection against the minor expected changes in wetted perimeter. As shown in figure 3, generated from the IFIM data, the 30 percent per hour ramping rate would change the width of riffle sections between 1 and 5 feet per hour. The total change in stream width, including pool and run habitats, would be less. Therefore, PG&E should implement the recommended ramping rate.

Figure 3. Changes in Tule River stream width with changes in flow (Source: the staff, generated from Pacific Gas and Electric Company, 1990).

d. Stream gaging stations

Gaging is necessary to ensure compliance with our recommended minimum instream flows and ramping rates.

PG&E has monitored the flows at the Tule River Diversion Dam headworks and at two locations in the Tule River conduit for a long time (personal communication, Tom Studley, Fishery

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Biologist, Pacific Gas and Electric Company, San Francisco, California, May 6, 1991). In 1987, they installed a permanent, continuously recording stream gaging station below the Doyle Springs Diversion Dam for the R&D study. In addition, a staff gage was installed below the Tule River Diversion Dam, which is currently read once a day by a local project operator. PG&E would continue monitoring flows at these gaging stations.

We recommend that PG&E monitor and record the continuous streamflows, for the duration of the license, at gaging stations located: (1) above the Tule River Diversion Dam; (2) below the Tule River Diversion Dam; and (3) below the Doyle Springs Diversion Dam.

Unavoidable Adverse Impacts: None

4. Terrestrial Resources

Affected Environment:

a. Vegetation

The project area is characterized by the following habitat types (Woodward-Clyde Consultants, 1985b):

Habitat type	Dominant species
chaparral	chamise, yerba santa, buckbrush
blue oak woodland	blue oak, canyon oak, California bay
mixed conifer	ponderosa pine, incense cedar, canyon oak
riparian	white alder, bigleaf maple, thimbleberry
grassland	wild oat, ripgut grass, filaree, wild fescue

Three of the five known populations in the United States of *Clarkia springvillensis*, a candidate for federal listing as threatened or endangered species, are found in the project area. Two populations (30 and 150 plants) are found along the transmission line right-of-way and a third population (150 plants) is found along Camp Four Road (Woodward-Clyde Consultants, 1985b).

b. Wildlife

The project area provides summer and winter habitat for the Tule River mule deer . Upland game species include mountain quail, blue grouse, and band-tailed pigeons. The red-tailed hawk, barn owl, American kestrel, and red-shouldered hawk nest



along the transmission line right-of-way (Woodward-Clyde Consultants, 1985c).

There are no endangered species known to occur in the project area (letter from Bruce Blanchard, Director, Environmental Project Review, Department of the Interior, Washington, D.C., December 5, 1986). The bald eagle, however, is commonly observed during the winter at Lake Success (5 to 10 individuals), located southeast of the project. The peregrine

falcon has been sighted in the Lake Success area, but nesting has not been confirmed (Woodward-Clyde Consultants, 1985c).

Environmental Impacts and Recommendation:

The existing populations of *Clarkia springvillensis* are vulnerable to land disturbance such as road-clearing and maintenance of the existing 70-kV transmission line. FWS recommends that all identified populations be staked and marked, and if potentially disturbing activities would be located close to the populations then fencing is recommended.

PG&E's proposal to fence the three populations of *Clarkia* and to inform project personnel of the location and importance of the populations would be more stringent than the FWS's recommendation.

Since only five populations of *Clarkia* are known to exist in the United States, the loss or degradation of any plants would be a significant loss. Therefore, PG&E should fence the known populations of *Clarkia*, as proposed, and should also fence any populations that may be located in the future. A qualified biologist should be present to ensure that fence construction does not destroy any of the plants. In addition, PG&E should prepare site-specific construction plans, after consultation with the appropriate agencies, in the event future land-disturbing activities would be located near the *Clarkia* populations. With implementation of these measures, the populations would be protected.

FWS also recommends that a qualified biologist be on site during construction to ensure protection of the *Clarkia* populations. This measure does not appear necessary because all construction activities, consisting of replacing turbine runners and increasing the capacity of the pipeline from the Doyle Springs diversion to the project conduit, would be located more than 1 mile from the *Clarkia* populations. FWS subsequently commented that fencing, as proposed by PG&E and recommended by staff, would preclude the need for on-site monitoring (personal communication, Roger Guinee, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Sacramento, California, Sacramento, California, February 13, 1990).

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Unavoidable Adverse Impacts: None.

5. Recreation and Land Use

Affected Environment: The Sequoia National Forest, surrounding the project site, provides numerous recreational opportunities including camping, picnicking, boating, swimming, and viewing Giant Sequoia trees. Although no developed recreational facilities are located at the project, a 36-unit FS campground (Wishon Campground) is located within 500 feet of the project's Wishon pump pool on the North Fork of the Middle Fork of the Tule River. The pool is popular with Wishon Campground users for swimming. Campground users also visit other portions of the stream near this site to hike, hunt, fish and swim. The project reach of the North Fork is extremely rugged with steep slopes and rocky, erodible soil, limiting recreational development. The North Fork supports significant resident and migratory trout that provide significant angling opportunities (letter from Denis Smaage, California Department of Fish and Game, Sacramento, California, November 13, 1986).

Areas in the immediate project vicinity receive dispersed recreation use with swimming being the most popular activity. In 1984, approximately 12,660 visitor days were recorded in the project area (5,170 visitor days of dispersed recreation and 7,490 visitors days related to the Wishon Campground). Recreationists park along the shoulder of the county road and walk to the North Fork of the Middle Fork Tule River via undeveloped trails.

Land in the project vicinity is used primarily for rural residential development and recreation. The main access route into the area is State Route 190.

Environmental Impacts and Recommendations: Our recommended minimum flows to protect the trout fishery would enhance fishing opportunities and therefore could lead to an increase in recreational use of the project area, including the nearby Wishon Campground. According to PG&E's 1984 recreational use survey, recreational use in the project area could increase by 41 percent over the next 30 years resulting in a total of 12,660 visitor days by the year 2020. The survey results, however, indicate that this increase in use would not exceed the carrying capacity of existing recreational facilities in the project area. This information is based on projected county

population growth and the assumption that existing recreational use patterns would not change significantly. The FS concurs with PG&E's carrying capacity estimates (personal communication, Bill Deisman, Resource Officer, Sequoia National Forest, Porterville, California, December 4, 1989).



According to the 1984 survey results, about 10 percent of the Wishon Campground use can be attributed to the presence of the Wishon pump pool. To ensure that existing recreational facilities are adequately operated and maintained to accommodate project-related use, PG&E proposes to enter into an agreement with the FS to fund 10 percent of the cost of operation and maintenance of facilities at Wishon Campground. This would translate to \$3,800 annually given a 1985 cost base. FS 4(e) condition No. 6 would require PG&E to make an agreement with the FS to fund 10 percent of the operation and maintenance of Wishon Campground facilities. By providing such funding, PG&E would help accommodate project-related recreation at the Wishon Campground.

Unavoidable Adverse Impacts: None.

6. Visual Resources

Affected Environment: The existing project is located in a natural appearing broad canyon with steep slopes. The slopes are mostly vegetated with trees and shrubs and contain bold rock outcroppings, talus, and decomposed granite exposures. County Road 190, a heavily used recreation route, follows the canyon bottom and is the main platform from which the project facilities are viewed.

Environmental Impacts and Recommendations: The diversions, conduit, and penstock are mostly hidden from view. However, the powerhouse, surge structure, and transmission line are visible. The surge structure is nearly 1/2 mile away from the road. At this distance, it is inconspicuous. The powerhouse complex is near the road and is obvious. PG&E proposes to paint the buildings to blend with the surrounding landscape. The transmission line, although visible, has become established in

the landscape over the years and is not a strong adverse visual element.

PG&E, after consulting with the FS on colors, should paint the powerhouse complex buildings and roofs to blend with the surrounding landscape.

Unavoidable Adverse Impacts: None.

7. Cultural Resources

Affected Environment: The Tule River Project is one of two components of the Tule River Hydroelectric Complex, a historic property determined eligible for inclusion in the National Register of Historic Places. The second component is the Lower Tule Hydroelectric Project, FERC Project No. 372, operated by Southern California Edison Company approximately 5 miles downstream along the Middle Fork Tule River. The Complex was

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constructed in the early 1900's, and is significant primarily for its contribution, as a provider of electric power, to the local economic development of Tulare County and the San Joaquin Valley.

Cultural resources surveys have been conducted at the project (Pacific Gas and Electric Company, 1989). The California State Historic Preservation Officer (SHPO) and the National Park Service (NPS) have stated, and the staff concurs, that no historic or archeological sites listed or eligible for inclusion in the National Register would be affected, including the Tule River Hydroelectric Complex (letters from Kathryn Gualtieri, State Historic Preservation Officer, California Department of Parks and Recreation, Sacramento, California, November 18, 1985; and Garland Gordon, Chief, Interagency Archeological Services-National Park Service, San Francisco, California, October 29, 1985). The FS did not specifically comment on the effect of the project on cultural resources, but did indicate that cultural resources investigations and consultation with the SHPO have been completed (letter from Paul Barker, Regional Forester, Forest Service, Pacific Southwest Region, San Francisco, California, June 22, 1988).

Environmental Impacts and Recommendations: The SHPO's, the FS's, and the NPS's comments on the proposed project are based on the premise that the project would require no new construction and would be operated as described in the application without significant changes. Changes to the project are occasionally found to be necessary after a license has been issued. Under these circumstances, whether or not an application for amendment of license is required, the SHPO's, the FS's, and the NPS's comments would no longer reliably depict the cultural resources impacts that would result from operating the project.

Therefore, before starting any future land-clearing, land-disturbing, or spoil-producing activities associated with the project, PG&E should consult with the SHPO and the FS about the need to conduct a cultural resources survey and to implement avoidance or mitigative measures and should conduct any necessary survey. PG&E should file for Commission approval a report containing the results of any survey work and a cultural resources management plan for avoiding or mitigating impacts to inventoried cultural resources, along with copies of the SHPO's and the FS's written comments on the report. The survey and the report should be based on the recommendations of the SHPO and the FS and adhere to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservations. PG&E should not implement any cultural resources management plan or begin any land-clearing, land-disturbing, or spoil-producing activities until informed by the Commission that the requirements discussed above have been fulfilled.

Unavoidable Adverse Impacts: None.



C. Alternative of No Action

Carrying out the no-action alternative would not change the existing physical, biological, and cultural components of the area that have developed with the project. Under the no-action alternative, annual licenses would be issued until another entity takes the facility over for nonpower use.

Denying the license would force PG&E to do the following:

(1) stop operating the project for power generation.

PG&E would have to replace the project's output of 28.4-GWh electrical energy by consuming fossil fuels in their existing power plants. Burning fossil fuels emits air pollutants that may contribute to (a) acid rain, (b) global warming (the greenhouse effect), and (c) depletion of the ozone layer. Using fossil-fueled alternatives to generate energy equal to the project's generation would consume about 50,000 barrels of oil or 12,000 tons of coal annually.

(2) find other sources of capacity and energy they could develop to meet their existing and forecasted load growth.

Other possible resource options include:

- . Building cogeneration facilities that use biomass fuels, if the fuels are available
- . Taking part in projects that use geothermal, wind, and solar power
- . Using combustion turbines for peaking, though the turbines consume nonrenewable fossil-fuels and pollute the air

D. Comprehensive Development

Based on our review of the proposed action and the alternatives under sections 4(e) and 10(a) of the Act, we recommend the proposed action with our environmental measures, which include the FS's recommended instream flows. We recommend the FS flows based on a consideration of the effects raising instream flow has on both fishery habitat and the power and nonpower value of the project (see appendix A).

With the instream flows we recommend and PG&E's proposed improvement in the generation equipment the project would generate about 28.7 GWh annually--a net increase over the historical annual generation of 28.4 GWh.



We prefer the proposed action with our environmental recommendations over the proposed action and the no-action alternatives because: (1) trout habitat and recreational fishing would be enhanced in the North Fork of the Middle Fork Tule River; and (2) electricity would continue to be generated by the project, potentially lessening the need for and use of fossil fuels.

VI. FINDING OF NO SIGNIFICANT IMPACT

Licensing the proposed project, with our environmental recommendations, would not result in any unavoidable adverse impacts on environmental resources. The project with protective measures would not affect federally listed or proposed endangered and threatened species within the project area. The project would not affect archeological or historic sites listed on or eligible for inclusion in the National Register of Historic Places.

On the basis of this independent environmental analysis, issuance of a license for the Tule River Project as proposed with staff environmental recommendations would not constitute a major federal action significantly affecting the quality of the human environment.

VII. PRELIMINARY DETERMINATION OF CONSISTENCY OF FISH AND WILDLIFE RECOMMENDATIONS WITH THE FEDERAL POWER ACT AND APPLICABLE LAW

Under the provisions of the Federal Power Act (Act), as amended by the Electric Consumers Protection Act of 1986, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of such resources affected by the project.

Section 10(j) of the Act states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the Act or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Under section 10(j) of the Act, we are making a preliminary determination that certain of the recommendations of the federal and state fish and wildlife agencies are inconsistent with the purpose and requirements of Part 1 of the Act or other applicable law.



As we discussed in section V.B.3, we did not recommend adopting the DFG's and FWS's recommendations concerning minimum flow releases downstream of the Tule River diversion dam and downstream of the Doyle Springs diversion dam. We believe that our minimum flow recommendation provides a better balance of fishery and power benefits, as discussed in section VI.D of this EA. Thus we believe the agencies' flow recommendations are inconsistent with the public interest standard of section 4(e) and comprehensive planning standard of section 10(a) of the Act.

We also did not recommend the installation of fish screens at the project. Due to the abundance of stocked fish and the cost of screens, we believe that increased stocking is preferred over the construction of fish screens based on cost. Therefore, we believe the agencies' recommendations are inconsistent with the provision of section 4(e) and section 10(a) of the Act.

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P-1333.txt

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APPENDIX A

INSTREAM FLOW NEEDS ANALYSIS

In our environmental analysis, we found that recreational trout fishing is the principal resource competing with power for the water resources of the North Fork of the Middle Fork Tule River. We considered the effects of the project on this resource, as well as the effects of alternative instream flows recommended by FS, DFG, FWS, and PG&E.

Using data developed from habitat simulation models, we looked at how the available habitat for rainbow and brown trout varies with streamflow. For the purposes of analysis, the instream flows represented by the existing conditions and the agency recommendations provide a reasonable range of fishery enhancement alternatives. We didn't consider it necessary to develop other instream flow alternatives.

We know from studies that a moderately healthy population of trout exists under the current flow conditions. All of the instream flows recommended would increase the habitat area and enhance the existing trout fishery. We conclude that the increase in habitat provided by the FS instream flow proposal will substantially improve the fishery and provides the most balanced use of the available resources.

To reach this conclusion, we did the following: (1) a power value analysis, comparing the increase in WUA between alternatives to the corresponding decrease in power value; and (2) a nonpower value analysis, comparing the economic value of the potential increase in fishery benefits for each alternative to the corresponding value of the power loss.

Power value analysis

By computing the energy the project would have produced from stream flows released for fishery enhancement purposes, the lost power benefits can be readily estimated as the difference between the cost of generation by the project and the cost of generation using alternative sources. Table 11 gives our estimate of the economic value of lost power benefits for each minimum flow alternative with the corresponding increase in WUA. We also show: (1) the percent reduction in total project power as compared to current project operation; and (2) the cost, in terms of reduced power value, per unit of additional habitat.

As table A-1 shows, the marginal cost per unit of additional habitat is significantly higher for the DFG/FWS alternative than for either the FS or PG&E proposal. Going from the current flows to the PG&E recommended flows produces the biggest increase in

habitat area--2,154 WUA units; and going from PG&E's



Table A-1. Effect of flow alternatives on power benefits and WUA (Source: the staff).

Flow Alternative	Current	PG&E	FS	DFG/FWS
Minimum normal year summer flow, cfs	0-1	4	7	10
Total generation,GWh/yr	28.4	26.2	25.3	22.9
Percent reduction	0	7.7%	10.9%	19.7%
Lost energy value,\$/yr	0	\$130,000	\$180,000	\$330,000
Total adult rainbow trout habitat*	4,574	6,728	8,100	9,191
Change in habitat area between alternatives	NA	2,154	1,372	1,091
Cost/unit of additional rainbow trout habitat, \$/WUA unit**	NA	\$60	\$36	\$137

* WUA units. Adult life stages were analyzed due to DFG's catachable-trout management emphasis.
 ** Change in cost between alternatives divided by change in habitat area between alternatives.

recommendation to the FS alternative gives the most increase per dollar of lost generation. All alternatives would result in a loss of project power benefits over the life of the new license but the DFG/FWS recommendation reduces power value benefits the most.

Nonpower value analysis

Besides using the attribute of WUA to show how each instream flow proposal changes both the quality and quantity of fish habitat, we also looked at how raising instream flow could change the economic value of nonpower benefits.

As we have said, the nonpower benefits of raising instream flow below the Tule River Diversion Dam are mainly from the use of the river for recreational trout fishing. We identify resident trout--both rainbow and brown--and outdoor recreation as target resources. DFG stocks catchable sized trout in the river and FS operates campgrounds next to the river.

We used available information to estimate the economic value of trout and recreational trout fishing in the project waters.



For the fish, we assigned an existence value of \$2.80 each for adult brown trout and \$3.80 each for adult rainbow trout. We searched the literature for information on the economic value of recreational fishing and found several references citing the results of surveys designed to arrive at an estimate of peoples' willingness-to-pay for recreational fishing. Using values reported by Brown and Hay (1987) for trout fishing in California and escalating these values through the license period, we arrived at a range in willingness to pay of from \$38 to \$48 per fishing-day.

Also, for each instream flow proposal, we estimated how the existing conditions would change--the change in the number of fish, and in the number of recreational fishing days. Table A-2 shows the data we used to estimate the change from current conditions for each of the alternative enhancement proposals.

Table A-2. Data used to estimate economic value of nonpower benefits (Source: the staff)

	Alternative		
	PG&E	FS	DFG/FWS
% Increase in brown			

	P-1333.txt		
trout population	100%	200%	300%
% Increase in rainbow trout population	10%	15%	25%
% Increase in number of fishing days/yr	50%	75%	100%

We arrived at the fish population increase values shown in Table A-2 by considering the electrofishing population data above and below the Tule River Diversion Dam (table 4) as representative of maximum and current condition fish population respectively.

We estimated the increase in fishing days to attribute to each alternative--considering the level of existing use and the 41% projected increase in overall recreational use reported in the applicant's recreational survey. As we've said, the total existing condition recreational fishing use is estimated at 1,772 fishing days per year.

Using the above values, we find that none of the alternative instream flow management proposals has a positive value--the value to fish and recreational fishing exceeds the power cost. But we find that our results are sensitive to the value we use



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for a recreational fishing day. So we tested the sensitivity of the results by looking at a range of willingness to pay for recreational fishing values.

The PG&E proposal gives the highest total benefits for recreational fishing values up to about \$100 per fishing day; but for values between \$100 to \$250 the FS proposal gives the greatest total economic benefit.

Recommendation

Since (1) our instream flow recommendation of 4 cfs from

P-1333.txt

October through April and 7 cfs from May through September provides a significant enhancement in trout habitat, and (2) the nonpower economic benefits using values reported in the literature for recreational trout fishing do not support a higher fish enhancement flow alternative, we conclude that the FS flow recommendation is the best comprehensive use of the project waters.

