UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Pacific Gas and Electric Company — Project No. 1403-004
California

ORDER ISSUING NEW LICENSE
(Major Project)

(Issued February 11, 1993)

The Pacific Gas and Electric Company (PG&E) filed a license application under Part I of the Federal Power Act (Act) for the continued operation and maintenance of the Narrows Project, located at the U.S. Corps of Engineers' (Corps) Upper Narrows debris dam on the Yuba River, in Nevada County, California.

Notice of the application has been published. No protests were filed in this proceeding, and no agency objected to issuance of this license. Comments received from interested agencies and individuals have been fully considered in determining whether to issue this license. A motion to intervene was filed by the Yuba County Water Agency to be a party to this proceeding.

The staff completed an environmental assessment (EA) for this project on February 21, 1992, which is attached to this order.

Comprehensive Development

Sections 4(e) and 10(a)(1) of the Act require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a proposed project, the recreational, fish and wildlife, and other nondevelopmental values of the involved waterway are considered equally with power and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must decide which tradeoffs among developmental and nondevelopmental values are warranted.

In the EA, staff evaluated three alternative actions: (1) PG&E's proposal; (2) PG&E's proposal with staff's environmental recommendations; and (3) no action. I selected PG&E's proposal with staff's recommendations.

I prefer licensing the project with staff's environmental recommendations because: (1) it will provide the best streamflow and fisheries enhancement available within the scope of this project; (2) it will not adversely affect the power produced; (3) it will preserve the valuable recreational resource opportunities at Englebright reservoir; and (4) electricity produced at the

project would continue to be generated from a renewable resource, lessening the potential use of fossil-fuels.

Section 10(a)(2) of the Act 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 33 comprehensive plans that address various resources in California. Of these, the staff identified and reviewed four plans relevant to this project.[1] No conflicts were found.

Based on a review of agency and public comments filed in this proceeding and on the staff's independent analysis, I conclude the Narrows Project is best adapted to a comprehensive plan for the Yuba River Basin.

When issuing new licenses, sections 10(a)(2)(c) and 15(a) of the Act require the Commission to evaluate PG&E's record as a licensee in these areas: (1) conservation, (2) complying with the present license, (3) safe operation, (4) providing efficient and reliable electric service, (5) need for power, (6) transmission line improvements, and (7) project modifications.

I accept the staff's conclusion in each of these areas.

Here are staff's findings:

Section 10(a)(2)(C); Conservation Efforts

PG&E is making a good faith effort to encourage and help its customers to conserve electricity. PG&E's plans and activities to promote and achieve conservation of electric energy and to reduce the peak demand for generating capacity have been extensive.

The California Public Utilities Commission (CPUC), which evaluated the conservation efforts of the largest California utilities, says PG&E has been a leader in carrying out effective energy conservation programs.

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[1] Recreation Needs in California, 1983, California Department of Parks and Recreation; 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.

Evaluation of the Project under Section 15

Section 15(a)(2)(A): Complying with the Present License

PG&E's plans to comply with the conditions of a new license and PG&E's compliance record show they've made a good faith effort to comply with all license conditions and made their filings and submittals on time.

PG&E would be able to perform in a competent manner if the Commission issues a new license for the project.

Section 15(a)(2)(B): Safe Operation

PG&E proposes no change in project operation and based on PG&E's public safety records, PG&E's plans to manage, operate, and maintain the project safely are adequate.

PG&E's project safety record shows they've maintained the project in a satisfactory manner. PG&E is expected cooperate with the Commission's requests and to comply fully with the terms and conditions of a new license.

Section 15(a)(2)(C): Providing Efficient and Reliable Electric Service

PG&E's record of forced outages shows that the outages don't represent a significant number of occurrences.

PG&E uses the project's power to serve loads in its service area. The service area includes 47 of California's 58 counties and encompasses about 94,000 square miles of northern and central California.

A review of PG&E's operating plans and its ability to provide efficient and reliable electric service show that PG&E is operating the project in an efficient and reliable manner.

Section 15(a)(2)(D): Need for the Power

Staff considered the short-term and long-term need for the power generated by the Narrows Project and the cost of alternative power if PG&E doesn't receive a new license for the project.

Staff's conclusions:

- Power from the existing Narrows Project is needed.
- Replacing project power would cost PG&E about $ 4 million annually.

The California Energy Commission (CEC) issues yearly Electricity Reports (ER's). Staff agrees with CEC's finding in the 1988 and the 1990 ER's regulatory position that existing hydroelectric projects and their improvements are nondisplaceable and nondeferrable resources in the state's Basic resource system, and the state's competitive processes--which includes all existing hydro facilities and proposed improvements. CEC also says the CPUC classifies hydro relicensing improvements as nondeferrable resources.

In the 1988 and 1990 ER's, CEC strongly supports the need to continue operating existing hydroelectric facilities. CEC and CPUC also support the need for economic improvements of existing hydroelectric facilities.

In the 1988 ER, CEC says that on a total statewide basis the Basic system's capacity (nondisplaceable existing and nondeferrable committed resources) would meet projected statewide capacity needs only until 1993. Adding nondeferrable uncommitted resources (preferred uncommitted resource additions) to the Basic system defers the need for more capacity in the Basic system until 1996.

Statewide energy needs could be met until after 1999 by adding nondeferrable uncommitted resources to the Basic system--if producers keep using displaceable portions of existing oil- and gas-fired power plants to supply energy.

Staff studied the financial impact on PG&E's ratepayers, considered collectively, that would result from the loss of the output of the project if the Commission denies a new license or issues a nonpower license. Staff assumed PG&E would replace the project's dependable capacity with combustion turbines and replace the project's energy by increasing the operation of the present oil- and gas-fueled, steam-electric generating units.

Historically, the project has produced about 51.2 million kilowatthours of energy annually and has a dependable capacity of 2.7 megawatts. If PG&E must replace the capacity and energy, staff's estimate of the levelized annual impact on PG&E's ratepayer's is about $ 4 million, or about 78 mills per kilowatthour.

Section 15(a)(2)(E): Transmission Line Improvements

Whether or not the Commission issues a license for the project, PG&E doesn't see any need to change the transmission network affected by project operation. Staff examined the network and conclude that changes would be not be necessary.

Section 15(a)(2)(F): Project Modifications

PG&E doesn't propose any modifications to the Narrows project. PG&E is continuing to evaluate its hydroelectric projects, and if further development appears feasible, it will propose to amend its license accordingly. Staff agrees that no changes are needed.

Recommendations of Federal and State Fish and Wildlife Agencies

Section 10(j)(1) of the Act, 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.

In the EA, the staff did not recommend adopting California Department of Fish and Game's (CDFG's)[2] and U.S. Fish and Wildlife Service's (FWS's)[3] recommendations for minimum flow releases for the Narrows Project. Staff believed that an alternative flow regime[4] provided a better balance of fisheries resources, recreational resources, and power benefits. Therefore, the staff concluded that CDFG's and FWS's recommendation were inconsistent with the public interest standard of section 4(e) and the comprehensive planning standard of section 10(a) of the Act.

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

By letters dated February 25, 1992, the staff requested CDFG and FWS to consider other options that would be agreeable to both agencies and would adequately protect fish and wildlife

[2] In addition to temperature requirements at Daguerre Point dam and Marysville gage, CDFG recommended the following minimum flows at the Marysville gage: October 1 to March 31, 700 cfs; April, 1,000 cfs; May, 2,000 cfs; June, 1,500 cfs; July 1 to September 30, 450 cfs.

[3] FWS recommended that PG&E use its 45,000 acre-feet of storage in Englebright reservoir by maintaining flows of 2,000 cfs at Marysville gage during May and 1,500 cfs during June.

[4] Staff recommended PG&E release 700 cfs from the project during May and June and 450 cfs during July through April. The flows were designed to use PG&E's storage at Englebright reservoir and to minimize recreational impacts at the lake.

consistent with other project purposes. The staff requested that CDFG and FWS submit these options to the Commission within 45 days of the date of staff's letter.

CDFG's response to the EA

By letter dated April 3, 1992, CDFG said that they continue to recommend their original flow and temperature regimes[5]. However, they suggested an alternative of releasing 5,000 acre-feet per month from the project, from October through June, to supplement flows in the Yuba River.

CDFG also reiterated recommendations that were not adopted or addressed in the EA:

- Annual stocking of 20,000 rainbow trout in Englebright reservoir
- Partial funding of a habitat improvement program for the protection and enhancement of anadromous fish habitat in the lower Yuba River
- A license term to coincide with the expiration of the license for the Yuba River Project (less than 30 years)
- Prohibition of discharge of sediments or other materials at levels deleterious to aquatic life downstream of Englebright reservoir
- Maintenance of dissolved oxygen levels of at least 7 parts per million downstream from the Narrows powerhouse
- Temperature gaging

FWS's response to the EA

By letter dated April 9, 1992, FWS offered an additional flow alternative of 450 cfs, September 1 through October 15; 700 cfs, October 16 through February 28; and maintaining constant reservoir elevation, March 1 through August 31.

FWS also reiterated recommendations that were not adopted or addressed in the EA:

- Candidate species surveys
- Bald eagle survey plan
- A license term of less than 30 years
- Transmission line modifications to protect raptors

Staff's response to CDFG and FWS

Based on the above agency comments, staff reconsidered its analysis of PG&E's ability to enhance fisheries habitat in the

[5] CDFG revised their original recommendation, now recommending 700 cfs for the entire month of June.

Yuba River below Englebright dam. On May 15, 1992, staff provided the agencies with a summary of its findings.

In this letter, staff explained how, in the EA, they had limited their definition of the water resources of the Narrows Project to the direct diversion and storage rights associated with the Narrows powerhouse at Englebright reservoir. As a result of agency comments, staff had revised this definition of the project's resources to include the storage in New Bullards Bar reservoir that's available to PG&E through its power purchase agreement with YCWA, since releases of this storage are used for power generation at the Narrows powerhouse. Staff made a new recommendation that PG&E should use its New Bullards Bar storage, in addition to storage in Englebright reservoir, to supplement the releases from YWCA's project 2246 to maintain the flows recommended in CDFG's lower Yuba River fisheries management plan, subject to several restrictions that would limit impacts to other resources.

The 10(j) meeting

In a further attempt to resolve the issues raised in the agency letters, the staff held a 10(j) meeting with CDFG and FWS on May 20, 1992. Table 1 shows a summary of the resolutions reached on the issues, and a discussion of each issue follows.

Minimum flow

At the 10(j) meeting, staff explained in greater detail the new recommendation outlined in the May 15, 1992, letter. Staff recommended that PG&E supplement the releases from YCWA's Project No. 2246 to maintain the flows recommended by CDFG[4] given the following restrictions:

- Flows would be measured at the Smartsville gage, not at Marysville
- Releases from Englebright reservoir would occur when storage in Englebright exceeds 60,000 acre feet (elevation 514 feet)
- Releases from New Bullards Bar reservoir would occur when storage in New Bullards Bar exceeds the "storage index" described in the power purchase agreement between PG&E and YCWA

[4] October 1 to March 31 . . . . . 700 cfs
April 1 to April 30 . . . . . 1,000 cfs
May 1 to May 31 . . . . . 2,000 cfs
June 1 to June 30 . . . . . 1,500 cfs
July 1 to September 30 . . . . . 450 cfs

- The annual volume of releases from PG&E storage would not exceed 45,000 acre feet

Staff determined that its new recommendation would provide greater fish habitat benefits than the recommendation in the EA without significantly adversely affecting other resources.

Table 1. Resolution of 10(j) issues.

Recommendation	Agency	Within scope of 10(j)?	Resolution
Minimum flow	CDFG FWS	Yes	CDFG and FWS agreed with new staff recommendation
Stocking 20,000 fish	CDFG	Yes	CDFG agreed with stocking 5,000 fish
Fish enhancement fund	CDFG	No	Staff agreed with need for enhancement
Candidate species surveys	FWS	No	FWS agreed with post-licensing surveys
Bald eagle enhancement	FWS	Yes	FWS agreed with post-licensing enhancement potential studies
30 year license term	CDFG FWS	No	Agencies withdrew recommendation
Sediment and dissolved oxygen content of reservoir releases	CDFG	Yes	CDFG withdrew recommendation
Temperature gaging	CDFG	No	CDFG withdrew recommendation
Raptor protection	FWS	No	FWS withdrew recommendation

In support of the new recommendation, staff described and provided copies of their analysis of monthly flow and reservoir content records for the project. Staff calculated the extent to which PG&E (not YCWA) could have altered historic operations to meet instream flow targets at the Smartsville gage under the restrictions listed above. The analysis showed that PG&E could

have substantially increased the frequency of meeting the CDFG recommended flows in April, May, and June. The analysis showed that historic winter flows frequently exceeded the CDFG recommended flows, and could have been used to replenish storage. Flows in the summer months were unchanged.

Because staff's new recommendation wasn't included in the EA, staff distributed two draft license articles addressing the minimum flows issue for all parties to review and comment upon. Draft article 401 required PG&E to develop a plan for quantifying the amount of water used to supplement instream flows. Draft article 402 required PG&E to maintain the schedule of daily average flows using up to 45,000 acre feet of water per year, as quantified under article 401, with the conditions described above. The Commission received comments from the CDFG, FWS, PG&E, and YCWA.

CDFG's comments on staff's draft minimum flow articles

By letter sent to the Commission by facsimile machine on July 1, 1992, CDFG agreed with the two draft license articles with one qualification. When storage is available under certain conditions, draft article 402 requires PG&E to maintain flows that "at no time drop below a minimum of 90 percent" of the flows listed in a schedule of average daily instream flows measured at the Smartsville gage. CDFG instead recommended that when storage is available, PG&E maintain the schedule of flows as instantaneous minimum flows.

I'm not adopting CDFG's recommendation to modify article 402 for the following reasons. Inflows to Englebright reservoir may vary considerably during the course of a day due to daily peaking operations at New Bullards Bar reservoir. These variations make continuous precise control over outflows from Englebright reservoir impractical. In order to maintain the schedule of flows as instantaneous minimum flows, as CDFG recommends, PG&E would have to release more water than the schedule requires, which would sooner exhaust the limited amount of stored water available to augment instream flows. The operating flexibility and water conservation provided by staff's "90 percent" requirement would result in fish habitat enhancements over a longer period of time with a limited water supply.

FWS's comments on staff's draft minimum flow articles

By letter dated June 30, 1992, FWS agreed with the two draft license articles with one qualification: FWS recommended that PG&E notify FWS in the event that the minimum flow regime is modified for emergencies or per agreement between PG&E and CDFG. I've modified article 402 accordingly.

PG&E's comments on staff's draft minimum flow articles

By letter dated June 29, 1992, PG&E commented:

- PG&E said it must consult with the U.S. Geological Survey (USGS) in addition to the other agencies listed in draft article 401.

- PG&E recommended revising the phrase "as measured at the gage near Smartsville" to "as measured at the gage near Smartsville or substitute measurement facilities as approved by the U.S. Geological Survey". PG&E described plans for installing acoustic velocity flowmeters on the Narrows and Narrows 2 penstocks that might serve as these "substitute measurement facilities".

- Draft article 401 mentioned quantifying diversions "at or below Daguerre Point dam", but PG&E noted that diversions occur above Daguerre Point dam. PG&E suggested deleting the requirement to quantify "any other designated downstream use" because it's vague and would be impossible to comply with.

- PG&E said that Englebright reservoir is normally drawn down in the winter months to provide flood storage, which reduces the maximum release capacity of the Narrows powerhouse to about 600 cfs. The Narrows 2 powerhouse is also shut down for maintenance periodically during this time period. Under these circumstances, PG&E could not independently release the 700 cfs specified for October 1 through March 31 in article 402.

I've modified articles 401 and 402 to either adopt the recommendations listed above or otherwise recognize the problems that PG&E noted in its comments. PG&E had several other recommendations, however, that I do not adopt, which I discuss below.

- **Comment** - PG&E requested 6 months rather than 90 days to file the plan for quantifying the amount of water released from storage to accomplish the purposes of article 402.

  Response - I don't agree that six months is required to file this plan. The sole purpose of the article 401 plan is to specify the combination of physical measurements that PG&E will use to account for up to 45,000 acre-feet of water annually released from Englebright dam to implement article 402. Article 401 will simply apportion the flow of the Yuba River near Smartsville into: 1) water released to implement article 402; and 2) water released for all other purposes, such as YCWA's instream flow requirements and irrigation deliveries.

Although 90 days is sufficient to file the article 401 plan, I recognize that PG&E should not be required to implement article 402 until the Commission approves the article 401 plan, since this plan will define one of the conditions in article 402. Therefore, I have modified article 402 accordingly.

- **Comment** - The schedule of flows in draft article 402 includes flows that exceed the maximum capacity of the Narrows project; therefore, the Commission should not require PG&E to maintain these flows.

  Response - Under article 402, PG&E must release some or all of the water to satisfy flow requirements that exceed the maximum capacity of the Narrows project from the Narrows 2 powerhouse. PG&E currently coordinates operations with YCWA's Narrows 2 powerhouse and applied to continue to "operate in tandem .... for maximum efficiency" (Application for New License, Exhibit B). Frequently, YCWA releases water that it controls through the Narrows project to meet its minimum flow requirements. Likewise, PG&E is able to release water that it controls through the Narrows 2 powerhouse.

- **Comment** - PG&E objected to the requirement in draft article 402 to file an annual report that accounts for releases under the article. PG&E contended that it would be too difficult to prepare in the time allowed and that it would not be useful. If the Commission requires it, PG&E suggested that they address its preparation and submittal in the plan prepared for Commission approval under article 401.

  Response - The annual report will be useful because compliance under article 402 is a matter of water volume accounting, not just an examination of streamflow records. However, since PG&E must develop the accounting procedures under article 401, it is appropriate that PG&E also develop the reporting procedures under article 401. Articles 401 and 402 are revised accordingly.

- **Comment** - PG&E said the provision in draft article 402 to replenish storage that is released under the article is unclear and should be deleted. PG&E said this provision either violates water rights laws or is unnecessary, since they operate with YCWA to conserve stored water anyway.

  Response - The purpose of this provision is to require PG&E to store inflows that are in excess of the instream flow requirements and are not required for other uses downstream. Since the upper limit of PG&E's obligation to supplement instream flows is equal to PG&E's storage right -- 45,000 acre feet -- and PG&E will replenish this storage with

inflows that are not appropriated for other downstream uses, PG&E will not violate water laws. Nevertheless, PG&E's point is correct, that PG&E and YCWA act to optimize storage levels without a requirement to do so. Enforcing this provision, which PG&E has every interest to implement anyway, would prove complicated; therefore, I remove it from article 402.

- **Comment** - PG&E said the instream flow requirements in draft article 402 exceed the physical capabilities of the Narrows project. Also, reliance on the power purchase agreement with YCWA involving storage in New Bullards Bar reservoir "destroy's the Licensee's [PG&E's] ability to independently operate." When YCWA's license for Project No. 2246 expires in 2016, the power purchase agreement also expires, so PG&E will not be able to comply. "If PG&E cannot independently provide the minimum flows necessary to comply with the license terms PG&E cannot be held independently accountable for violation of those terms."

  Response - I reiterate that in its application for new license, PG&E proposed to operate in cooperation with YCWA's project. The Narrows and Narrows 2 projects are necessarily not independent operations because they are on the same dam. The Commission has already recognized the dependency of the two projects by ordering minimum instream flows as part of YCWA's license that are impractical to release from the Narrows 2 powerhouse, i.e., if these releases are not accompanied by additional releases for other purposes, YCWA would uses this facility's generating capability at very low efficiencies. Article 402 requires only more of the same coordination between the two Licensees that is already occurring and necessary.

  However, PG&E is correct in noting that when YCWA's license expires, or when the power purchase agreement between PG&E and YCWA is terminated, PG&E will lose its contractual right to draft storage from New Bullards Bar reservoir. This is one reason why staff recommends a limited reopening of the Narrows license when the license for YCWA's project expires, is reopened or amended regarding instream flows in the lower Yuba River. To make it explicit that PG&E isn't expected to comply with impossible requirements, I have modified article 402. If PG&E loses its contractual ability to dispatch storage from New Bullards Bar, PG&E shall maintain the flows that staff recommended in the EA -- 700 cfs in May and June, and 450 cfs the rest of the year.

<u>YCWA's comments on staff's draft minimum flow articles</u>

By letter dated June 30, 1992, YCWA had several comments on draft articles 401 and 402, to which I respond below:

- **Comment** - YCWA said that staff's new recommendation appears to be based on CDFG's incorrect biological analyses and could adversely affect fisheries or adversely affect other water uses without providing substantial fisheries benefits. YCWA requested reducing the instream flow requirements.

  Response - Staff's new recommendation draws upon CDFG's findings and recommendations in its Lower Yuba River Fisheries Management Plan, but not exclusively. Staff adopted CDFG's instream flows for the reach of the Yuba River downstream of Englebright dam and upstream of Daguerre Point dam, but not downstream of Daguerre Point dam as the plan recommends. In the reach upstream of Daguerre Point dam, releases under current operations exceed CDFG's flows most of the time. Staff finds that releasing up to 45,000 acre feet of water per year, when normal operations don't exceed CDFG's flows, would enhance fish habitat. The conditions given in article 402, which curtail PG&E's releases for instream flows when reservoir levels drop below certain elevations, protect other water uses such as irrigation and recreation.

- **Comment** - YCWA made the same point as PG&E that when Narrows 2 is shut down for maintenance, Narrows may not be able to deliver the instream flows required in article 402.

  Response - I have revised article 402 to acknowledge this limitation.

- **Comment** - YCWA requested that the Commission clearly state that an order regarding PG&E's Narrows powerhouse is not applicable to YCWA's project.

  Response - Any Commission order applicable to YCWA's Project No. 2246 would be addressed to YCWA as Licensee. This order applies only to project No. 1403. However, the two projects operate jointly and both affect the fish resources of the lower Yuba River. Therefore, this order includes article 411, which reopens PG&E's license for the limited purpose of considering the role of Project 1403 in maintaining instream flows in the lower Yuba River whenever the license for Project 2246 expires, is reopened, or is amended regarding instream flows in the lower Yuba River.

- **Comment** - YCWA said that staff's new recommendation may cause impacts not addressed in the EA and that a new environmental analysis may be required.

  Response - Staff's new recommendation is entirely consistent with the findings in the EA. As in the EA, staff still recommends using a limited amount of storage, when available without adverse impacts to other resources, to increase the

frequency of meeting instream flows that are beneficial to fish in the lower Yuba River. The primary difference with the recommendation in the EA is that the new recommendation includes some additional storage and provides some additional fish benefits. Staff provided all interested parties with the methods and results of its analysis of the new recommendation. I disagree that a new environmental analysis is required.

Stocking trout in Englebright reservoir

CDFG recommended that PG&E assume the responsibility for CDFG's annual stocking of 20,000 rainbow trout in Englebright reservoir. PG&E offered to supply 5,000 fish annually. Since operation of the project affects operation of Englebright reservoir and PG&E is only partly responsible of the operation of the reservoir, staff believes that 5,000 fish would be adequate. CDFG agreed.

Article 403 requires PG&E to provide 5,000 fish per year after coordination with CDFG.

Fisheries enhancement fund

CDFG recommended that PG&E partially fund the cost of a salmon habitat improvement program in the lower Yuba River ($100,000 every 5 years). In its letter commenting on the draft minimum flow license articles, CDFG also described several habitat improvement projects, including creation of new shallow, low velocity side channels and shallow, sloping backwaters. These areas would provide habitat for chinook salmon and steelhead fry and juveniles.

Funding a program is not a specific measure for the protection, mitigation, or enhancement of fish and wildlife resources; therefore, this recommendation is outside the scope of section 10(j) of the Act. However, staff considered this recommendation under section 10(a).

The salmonid resource in the Yuba River has been negatively affected by loss of habitat from dam construction and stream channelization; unfavorable flow and water temperature regimes; and loss of fish at unscreened diversions. The development of a habitat improvement plan would help the state of California meet its goal of improving anadromous fish habitat in the Sacramento River basin at a small project cost.

Article 404 requires PG&E to consult with CDFG and FWS in developing a plan to provide fry and juvenile habitat in the lower Yuba River.

Candidate species surveys

FWS recommended surveys for the California red-legged frog and the Sacramento valley tiger beetle, candidates for federal listing under the Endangered Species Act.

Surveys are not specific measures for the protection, mitigation, or enhancement of fish and wildlife resources; therefore, this recommendation is outside the scope of section 10(j) of the Act. However, staff considered this recommendation under section 10(a).

Staff and FWS agreed that post-licensing surveys would be adequate to determine if protective measures are needed. The surveys would aid the Commission in complying with the Endangered Species Act should these species become listed.

Article 406 requires PG&E to survey suitable habitats, if any, affected by operation of the project (within the project boundary and around the perimeter of Englebright reservoir).

Bald eagle enhancement

FWS recommended that the Licensee prepare a survey plan for determining the extent of occurrence and use by bald eagle in the areas affected by the project. Staff concluded in the EA that there did not appear to be any suitable enhancement measures. At the meeting, FWS described several possible measures.

Although it is not clear whether enhancement measures are available or are needed at Englebright reservoir, I believe that PG&E should further evaluate reasonable bald eagle enhancement measures. I believe that this measure would fulfill the Commission's responsibilities under section 7(a)(1) of the Endangered Species Act--to carry out programs to conserve threatened species.

Article 407 requires PG&E to consult with FWS to evaluate the enhancement potential at Englebright reservoir.

Other recommendations

Both CDFG and FWS recommended a short license term in order to synchronize the license terms of both projects located at Englebright dam -- the Narrows and Narrows 2 projects. The Act requires the Commission to issue new licenses for not less than 30 years. Both agencies withdrew this recommendation at the meeting.

CDFG also withdrew its recommendations dealing with sediment and dissolved oxygen content of releases, and temperature gaging. FWS also withdrew its recommendation concerning raptor protection

because the transmission lines in question aren't part of the project.

I conclude that the fish and wildlife measures required in this license are consistent with the recommendations of the fish and wildlife agencies.

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 attached to this order. The EA concludes 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. Further, the EA concludes that issuance of this license is not a major federal action significantly affecting the quality of the human environment.

I concur with the findings in the EA and am issuing this license adopting the staff-recommended alternative.

Term of the License

Section 15 of the Act specifies that any license issued shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more than 50 years. The Commission's pre-ECPA policy, which establishes 30-year terms for those projects which propose no new construction or capacity, 40-year terms for those projects that propose a moderate amount of new development, and 50-year terms for those projects that propose substantial new development, is consistent with the provision.

PG&E does not propose new construction or capacity; therefore, the new license will be issued for 30 years.

The Director orders:

(A) This license is issued to Pacific Gas and Electric Company (Licensee) for a period of 30 years, effective the first day of the month in which this order is issued, to operate, and maintain the Narrows Project. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and to the regulations the Commission issues under the provisions of the Act.

(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-1 FERC No. 1403-24 Showing - Project Map

(2) Project works consisting of: (a) a 1,077-foot-long concrete tunnel located at the end of the U.S. Corps of Engineers' Englebright dam tunnel and outlet works; (b) a 266-foot-long, 8-foot-diameter steel penstock; (3) a powerhouse containing one generating unit with a rated capacity of 12 MW; (4) a substation which is the point of interconnection with the Licensee's transmission system; and (5) other appurtenances.

The project works generally described above are more specifically described in exhibit A of the application, section 3, entitled "Turbine Generator", and section 4, entitled "Substation", and shown by exhibit F:

Exhibit F-	FERC Drawing No. 1403-	Showing
1	19	Plan, Profile and Section of Tunnel and Penstock
2	20	Elevation Plan
3	21	Section of Powerhouse
4	22	Elevations at Powerhouse
5	23	Substation

(3) All of the structures, fixtures, equipment, of facilities used to operate of maintain the project and located within the project boundary, all portable property that may be employed in connection with the project and located within or outside the project boundary, and all riparian or other rights that are necessary of appropriate in the operation or maintenance of the project.

(C) Those sections of exhibit A and exhibits F and G described above are approved and made part of the license.

(D) This license is subject to the articles set forth in Form L-1 (October 1975), entitled "TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MAJOR PROJECT AFFECTING LANDS OF THE UNITED STATES", except article 20, and the following additional articles (Articles 101 through 104 are provided by the Corps under section 4(e) of the Act).

Article 101. The Licensee shall enter into an agreement with the Secretary of the Army or his designated representative, Pursuant to 33 U.S.C. 683 and the Water Resources Development Act of 1986 (33 U.S.C. 661) with respect to supplying storage for water in the Corps' Englebright reservoir for power development at the Narrows No. 1 power plant upon such conditions of delivery, use and payment as agreed upon with such payments to be deposited to the credit of the Englebright reservoir. Should the Licensee and the Secretary of the Army or his designated representative fail to reach agreement within 120 days from the issuance date of the license, the Licensee and the Corps shall meet with the Commission for resolution.

Article 102. The Licensee shall within 120 days from the issuance date of the license, enter into an operating Memorandum of Agreement (MOA) with the Department of the Army, Sacramento District Corps of Engineers (Corps) describing the detailed operation of the powerhouse acceptable to the Corps. The MOA shall specify any restrictions needed to protect the primary purposes of the Corps' project for navigation, recreation, water quality, and flood control. The Regional Director shall be invited to attend meetings regarding the agreement. The MOA shall be subject to revision by mutual consent of the Corps and the Licensee as experience is gained by actual project operation. Should the Licensee and the Corps fail to reach an agreement, the matter will be referred to the Commission for resolution. Three copies of the signed MOA between the Corps and the Licensee and any revision thereof shall be filed with the Commission and one copy submitted to the Regional Director.

Article 103. The Licensee shall have no claim under this license against the United States arising from the effect of any changes made in the operation of reservoir levels of the Department of the Army, Sacramento District Corps of Engineers' project.

Article 104. The operation and maintenance of project works that, in the judgement of the Department of the Army, Sacramento District Corps of Engineers (Corps) may affect the structural integrity of operation of the Corp's project shall be subject to periodic or continuous inspections by the Corps. Any operation and maintenance deficiencies or difficulties detected by the Corps' inspection shall be immediately reported to the Regional Director. Upon review, the Regional Director shall refer the matter to the Licensee for appropriate action. In cases when operation or maintenance practices or deficiencies may create a situation posing imminent danger to the structural integrity and safety of the Corps' project, the responsible Corps official or employee has the authority to stop the operation or maintenance while awaiting the resolution of the problem.

Article 201. The Licensee shall pay the United States the following annual charges as determined by the Commission, effective the first day of the month in which this license is issued for the purposes of:

a. Reimbursing the Unites States for the cost of administration of Part I of the Act. The authorized installed capacity for that purpose is 16,000 horsepower.

b. Recompensing the United States for utilization of surplus water or water power from a government structure.

Article 202. If the Licensee's project was directly benefitted by the construction work of another Licensee, a 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 reimburee the owner of the headwater improvement for those benefits, at such time as they are assessed. The benefits will be assessed in accordance with Subpart B of the regulations.

Article 203. Pursuant to Section 10(d) of the Act, 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. (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 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 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, Office of Hydropower Licensing, 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 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 401. Within 90 days of the issuance date of this license, the Licensee shall file with the Commission, for approval, a plan for quantifying the amount of water that the Licensee releases from storage to accomplish the purposes of Article 402.

The plan shall describe the measurements and calculations necessary to apportion the average daily discharge of the Yuba River, as measured at the gage near Smartsville or substitute measurement facilities approved by the U.S. Geological Survey, into water released under Article 402 and water released for all other purposes.

The plan shall provide for annually reporting a daily accounting of water released under the requirements of article 402 during the previous water year (October 1 to September 30).

The Licensee shall prepare the plan after consulting with the California Department of Fish and Game, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the Yuba County Water Agency (the Licensee for Project No. 2246). The Licensee shall include with the plan documentation of consultation and 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 prior to 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 402. Upon Commission approval of the plan filed under article 401, the Licensee shall supplement the releases of FERC Project No. 2246 from Englebright dam into the Yuba River to maintain the following schedule of daily average flows, as measured at the gage near Smartsville, or substitute measurement facilities approved by the U.S. Geological Survey, for the conservation and development of fish resources in the Yuba River.

Table 1. Schedule of Daily Average Flows

October 1 to March 31	700 cfs[1]
April 1 to April 30	1,000 cfs
May 1 to May 31	2,000 cfs
June 1 to June 30.	1,500 cfs
July 1 to September 30 . . .	450 cfs

[1] cubic feet per second

The Licensee shall maintain the schedule of daily average flows when the conditions listed in Table 2 are satisfied.

When the conditions listed in Table 2 are satisfied, the flow release from Englebright dam shall at no time drop below a minimum of 90 percent of the daily average flows specified in Table 1.

When the conditions listed in Table 2 are satisfied, and when the Narrows No. 2 powerhouse (a facility of FERC Project No. 2246) is shut down for maintenance and cannot be used to make releases from Englebright dam, the Licensee shall maintain the flows in Table 1 or 600 cfs, whichever is less, until the Narrows No. 2 powerhouse is returned to service.

When the conditions listed in Table 2 are satisfied, but the Licensee's contractual ability to dispatch releases of water from New Bullards Bar reservoir expires or terminates, the Licensee shall maintain average daily flows of 700 cfs during May and June and 450 cfs during other months, instead of the flows in Table 1.

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

Table 2. Conditions Defining When the Licensee Shall Maintain the Schedule of Daily Average Flows

(a) When the total volume of water released to maintain the schedule of daily average flows during the water year (October 1 to September 30), as quantified by the plan approved under article 401, is less than 45,000 acre feet; and

(b) When the content of Englebright reservoir exceeds 60,000 acre feet (elevation 514 feet); or when the Licensee is entitled to dispatch releases of water from New Bullards Bar reservoir under the terms of the Licensee's power purchase agreement with the Licensee of FERC Project No. 2246, i.e., when the content of New Bullards Bar reservoir exceeds the following volumes (interpolation between tabulated dates is linear).

Date	Volume, in Thousand Acre Feet
October 31	660
November 30	645
December 31	645
January 31	600
February 28/29	600
March 31	685
April 30	825
May 31	930
June 30	890
July 31	830
August 31	755
September 30	705

Article 403. The Licensee shall provide annually 5,000 rainbow trout (half pound each) to be stocked in Englebright reservoir. The timing and location of the stocking shall be coordinated with the California Department of Fish and Game.

Article 404. Within 180 days of the date of issuance of this license, the Licensee shall file with the Commission, for approval, a plan to enhance fisheries habitat in the Yuba River downstream of the project.

The plan shall include, but shall not be limited to, the following:

(1) provisions to fund fisheries enhancement projects, not to exceed $100,000 every 5 years, selected after consultation with the California Department of Fish and Game and U.S. Fish and Wildlife Service; and

(2) detailed design drawings and map locations of the fisheries enhancement measures.

The Licensee shall prepare the plan after consultation with 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 and recommendations 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. Within 180 days from the date of issuance of this license, the Licensee shall file with the Commission, for approval, a plan to establish limits on the maximum rate of change in river flow (ramping rate) from the project powerhouse for the protection of fish resources in the Yuba River.

The Licensee shall prepare the plan after consultation with 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.

A courtesy copy of the plan shall be filed with the Commission's Regional Office. 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.

Until the Commission approves the ramping rate plan, the Licensee shall not alter streamflow downstream of the powerhouse at a rate greater than 30 percent per hour or 200 cubic feet per second per hour, whichever is less.

Article 406. Within 180 days from the date of issuance of this license, the Licensee shall file with the Commission, for approval, a plan to protect the California red-legged frog (Rana aurora draytoni) and the Sacramento valley tiger beetle (Cicindela hirticollis abrupta), candidates for federal listing under the Endangered Species Act.

The plan shall include, but shall not be limited to, the following:

(1) the results of a survey by a professional biologist of all areas affected by operation of the project (within the project boundary and around the perimeter of Englebright reservoir);

(2) measures to protect the candidate species; and

(3) an implementation schedule for the protective measures.

The Licensee shall prepare the plan after consultation with 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 and recommendations 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. Within 180 days of the date of issuance of this license, the Licensee shall file with the Commission, for approval, a plan to evaluate the potential to enhance the federally listed endangered bald eagle at Englebright reservoir. The plan shall include, but shall not be limited to, the following:

(1) a description of bald eagle use of Englebright reservoir;

(2) an evaluation of the potential to enhance use of Englebright reservoir by eagles, including an identification of factors that would limit bald eagle use of the reservoir;

(3) measures to enhance the bald eagle; and

(4) an implementation schedule for any enhancement measures.

The Licensee shall prepare the plan after consultation with 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 and recommendations 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 408. Within 90 days from the date of issuance of this license, the Licensee shall file with the Commission, for approval, a report that documents whether the existing 400-foot-long, 11-kilovolt aerial transmission line located within the project boundary conforms to raptor protection guidelines described in Suggested practices for raptor protection on power lines: the state of the art in 1981.

If any potential hazards are identified, the report shall describe how the Licensee would modify the lines to eliminate or minimize the hazards. When the report is filed, the Licensee shall provide copies to the U.S. Fish and Wildlife Service and the California Department of Fish and Game. The Licensee shall complete the modifications described in the report and file as-built drawings of the modified transmission line within 1 year of the issuance date of this license.

Article 409. The Licensee, after consulting with the U.S. Army Corps of Engineers (Corps) and Yuba County Water Agency (YCWA), and within 180 days from the date of issuance of this license, shall file for Commission approval a cooperative funding agreement between the Licensee, YCWA, and the Corps for construction and installation of (1) signs at the two boat launching ramps and at the marina at Englebright Lake, showing times and areas where caution should be taken when mooring a boat for extended periods of time and (2) an interpretive display near the Corp's headquarters at Englebright Lake, describing the Yuba river watershed and the river's hydroelectric system and operation.

The Licensee shall contribute one-third of the total cost of construction and installation of the signs and display. Construction and installation of the signs and display shall be completed within 1 year from the date of issuance of this license. Design, wording, and specifications shall follow standards in the Corp's Sign Standards Manual, EP 310-1-6 A&B.

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

Article 410. The Licensee, before starting any future land-clearing, land-disturbing, or spoil-producing activities associated with the project, shall consult with the California State Historic Preservation Officer (SHPO), and shall conduct a cultural resources survey of the affected areas. Further, the Licensee shall file a report containing the survey results; for Commission approval a cultural resources management plan to avoid or mitigate impacts to any significant archeological or historic sites identified during the survey; and, the written comments of the SHPO on the report and the plan. If the Licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing project works or other facilities at the project, the Licensee shall stop all land-clearing, land-disturbing, or spoil-producing activities in the vicinity of the sites, shall consult with the SHPO, and shall file for Commission approval a cultural resources management plan to avoid or mitigate impacts to significant resources, together with the written comments of the SHPO on the plan. Upon Commission approval the Licensee shall implement the plan. The survey and the plan shall be based on the recommendations of the SHPO, shall be conducted and prepared by a qualified cultural resources specialist, and shall adhere to the Secretary of the Interior's Guidelines for Archeology and Historic Preservation.

The report and plan shall contain the following: (1) a description of each discovered site, indicating whether it is listed or eligible to be listed on the National Register of Historic Places; (2) a description of the potential effect on each discovered site; (3) proposed measures for avoiding or mitigating the effects; (4) documentation of the nature and extent of consultation with the SHPO; and (5) a schedule for mitigating effects and conducting additional studies. The Commission may require changes to the plan.

The Licensee shall not implement a cultural resources management plan or begin any land-clearing, land-disturbing, or spoil-producing activities until informed by the Commission that the requirements of this article have been fulfilled.

Article 411. The Licensee shall, for the limited purpose of coordinating operations with FERC Project No. 2246 for the

development of fish resources in the Yuba River downstream of Englebright dam, comply with such reasonable modifications of project operations, as may be ordered by the Commission upon the relicensing or amendment of the license for FERC Project No. 2246, after notice and opportunity for hearing.

(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 that 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. Requests for rehearing by the Commission may be filed within 30 days from the issuance date of this order, pursuant to 18 C.F.R. 385.713. Failure to request rehearing shall constitute acceptance of the license.

Fred E. Springer
Director, Office of
Hydropower Licensing

ENVIRONMENTAL ASSESSMENT FOR HYDROPOWER LICENSE

Narrows Project

FERC Project No. 1403-004

California

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
825 N. Capitol Street, NE
Washington, D.C. 20426

February 21, 1992

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

Pacific Gas & Electric Company (PG&E) proposes to continue present operation of the existing Narrows Project, with the exception of providing 7,000 acre-feet (ac-ft) per year from storage in Englebright reservoir for release at the request of the resource agencies. In addition to PG&E's proposal, we evaluated three alternative actions: PG&E's proposal with our environmental recommendations, the recommendations of the resource agencies, and no action.

Our alternative is to require PG&E to use a portion of their storage in Englebright reservoir (up to 10,000 ac-ft) to meet target flows of between 450 and 700 cubic feet per second (cfs). The California Department of Fish and Game (CDFG) recommended minimum flow releases between 450 and 2,000 cfs. The U.S. Fish and Wildlife Service (FWS) recommended an alternative that would require PG&E to use their entire storage allotment for minimum flows. Under the no-action alternative, PG&E would stop operating the project for power generation.

Based on our review of the proposed action and the alternatives, we selected the proposed action with our environmental measures. Our recommendation: (1) would provide the best streamflow and fisheries enhancement available within the scope of the project; (2) would not adversely affect the power produced; (3) would preserve the valuable recreational resource opportunities at Englebright reservoir; and (4) would allow electrical generation from a renewable resource to continue, lessening the potential use of fossil-fuels.

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

ENVIRONMENTAL ASSESSMENT

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

Narrows Project

FERC Project No. 1403-004--California

February 21, 1992

I. APPLICATION

On June 29, 1989, Pacific Gas and Electric Company (PG&E) applied for a new license, greater than 5 megawatts (MW), for the existing Narrows Project. The project was first licensed on August 1, 1941.

The project is located at the U.S. Corps of Engineers' (Corps) Upper Narrows debris dam on the Yuba River, near Mooney Flat, in Nevada County (figure 1).

II. PURPOSE AND NEED FOR POWER

A. Purpose

The Narrows Project generates about 51.2 gigawatthours (GWh) of energy. As in the past, PG&E would use the power to meet its system load needs.

B. Need for Power

We (the staff) conclude that PG&E needed the power in the past and will need the power in the future. The power output from the Narrows Project is useful in supplying a small part of PG&E's need for power.

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 10 years.

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 should be improved economically.

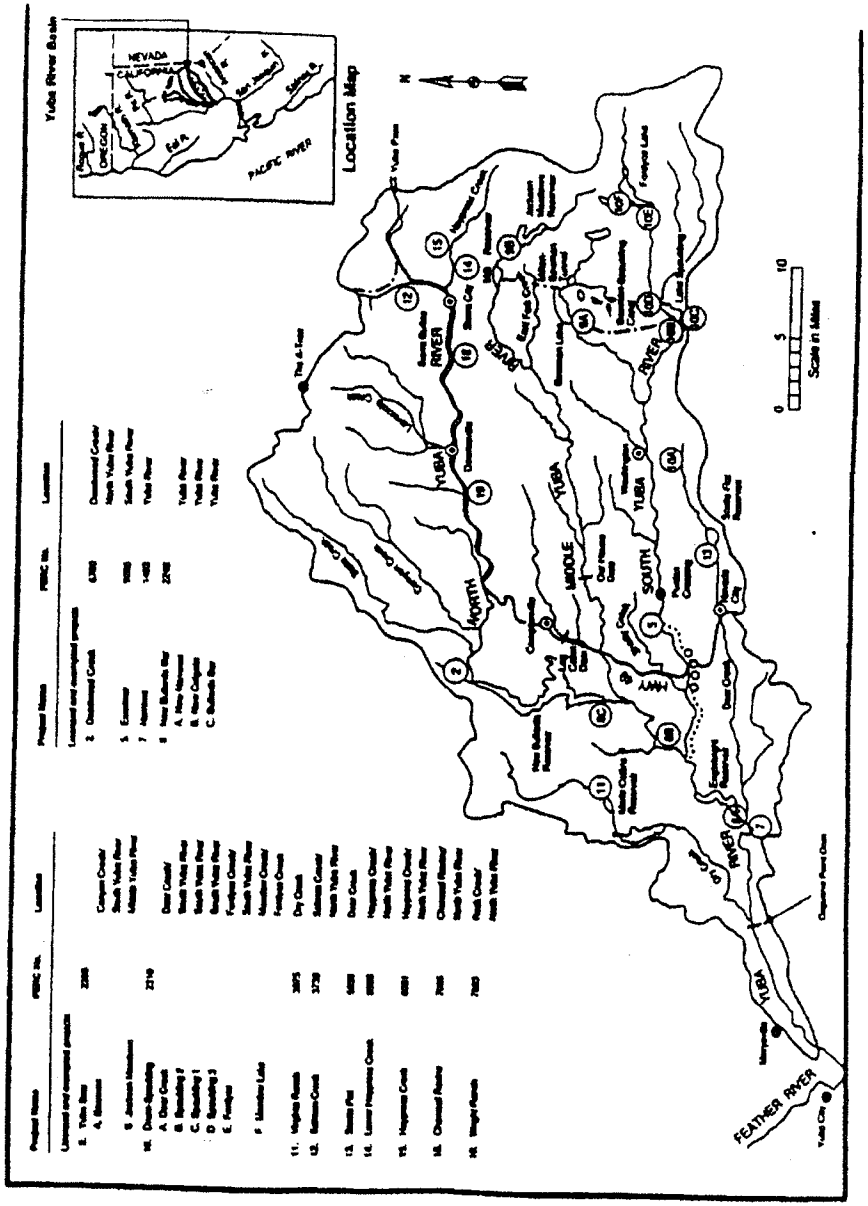

Figure 1. Yuba River Basin and Location of Licensed and Exempted Projects. (Source: the Staff)

CEC's forecasts:

- The Basic system's capacity--committed resources--would meet projected statewide capacity needs only until 1993.
- Adding uncommitted resources to the Basic resources means the Basic system wouldn't need more capacity until 1996.
- 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 project uses releases from the Corps' Englebright reservoir. Project features include a penstock, which connects to the dam's outlet works, and a powerhouse containing a single generating unit with a total rated capacity of 12.0 MW. Yuba County Water Agency (YCWA) operates a powerhouse (New Narrows) directly across the Yuba River from this project (figure 2). YCWA's project also uses releases from the Corps's Englebright reservoir.

B. Proposed Enhancement Measures

PG&E proposes to make available 7,000 acre-feet (ac-ft) of its storage in Englebright reservoir to assist in maintaining suitable water temperatures and streamflows for salmonid migration, spawning, incubation, rearing, and smolt emigration.

To better inform reservoir recreationists of lake surface fluctuations at Englebright reservoir, PG&E proposes a cooperative funding agreement with the Corps and Yuba County Water Agency (YCWA) for informational signs at the two boat launching ramps and the marina and an interpretive display describing the Yuba river watershed and the river's hydroelectric system and operation.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The Commission requires prospective applicants to consult with the appropriate resource agencies before filing an application for license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the

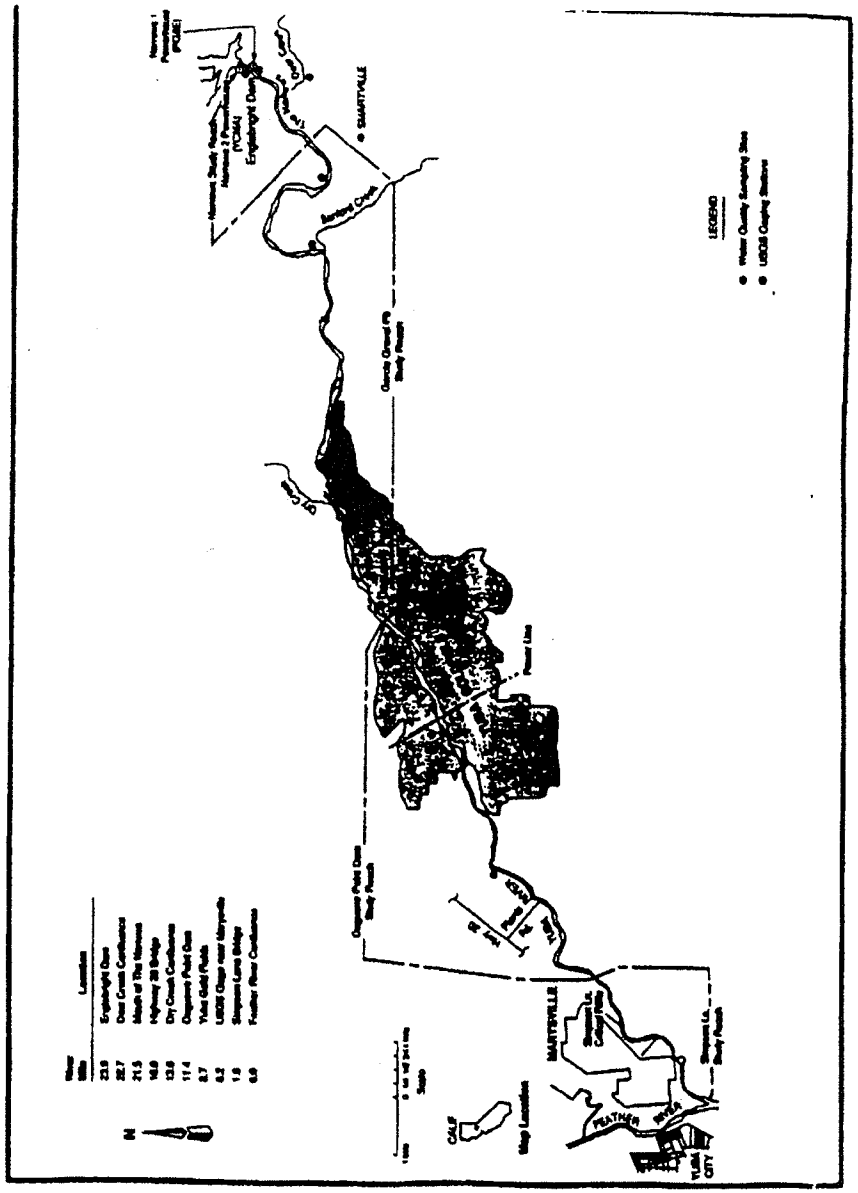

Figure 2. Lower Yuba River Study Area, California. (Source: California Dept. of Fish & Game 1991, as Modified by Staff)

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 the application and issues a public notice of it, concerned entities may submit formal comments. Organizations and individuals also may petition to intervene and to become a party to the proceeding. The Commission makes the comments of the entities part of the record and we consider the comments when we review the application. After the Commission issued a public notice of the application on March 2, 1990, the following groups filed comments.

Commenting Entity	Date of Letter
U.S. Army Corps of Engineers	June 1, 1990
U.S. Fish & Wildlife Service	July 3, 1990
Resources Agency of California	May 8, 1990

Intervenors	Date of Motion to Intervene
Yuba County Water Agency	May 15, 1990

B. Water Quality Certification

In a letter to the California State Water Resources Control Board (WRCB), received on April 10, 1989, PG&E asked for a water quality certificate, as required by section 401 of the Clean Water Act. The WRCB did not act on the request for certification. Therefore, since WRCB did not act on the request within 1 year, under Commission Order 464, we deem water quality certification waived.

V. ENVIRONMENTAL ANALYSIS

A. General Description of the Locale

The project lies a quarter of a mile downstream of Englebright reservoir on the eastern bank of the Yuba River (figure 1). The North, Middle, and South Yuba Rivers converge to form the mainstem Yuba River upstream of the reservoir. The YCWA owns and operates the New Narrows powerhouse which is on the west bank of the river (figure 2).

The Yuba River Basin is predominantly mountainous, with steep canyons and narrow ridges in the eastern portion, but gradually changes to foothills in the western portion.

1. Description of the Yuba River Basin

The Yuba River originates near the crest of the Sierra Nevada Mountains, and drains about 1,340 square miles of the western slope before entering the Feather River at Marysville. The principal tributaries are the North Yuba, the Middle Yuba, and the South Yuba Rivers (figure 1). The North Yuba and the Middle Yuba Rivers converge below the New Bullards Bar reservoir, and the South Yuba joins the mainstem as it flows into Englebright reservoir. All of the principal tributaries and the mainstem Yuba River flow southwest toward the Feather River, south of the basin.

The Yuba River Basin is about 75 miles from Sacramento and about 150 miles from the San Francisco-Oakland population centers. The sparsely populated basin is primarily rural or covered by forests. Portions of the Plumas National Forest, Tahoe National Forest and some lands managed by the Bureau of Land Management (BLM) lie within the basin.

2. Proposed and Existing Hydroelectric Development

At present, there are no pending applications for proposed hydropower projects in the Yuba River Basin.

Existing Licensed Developments

Project #	Project Name	Project #	Project Name
2310	Deer creek	2246	New Colgate
2310	Spaulding 2	2246	Bullards Bar
2310	Spaulding 1	9086	Excelsior
2310	Spaulding 3	2266	Bowman
2310	Fordyce	2266	Jackson Meadows
2310	Meadow Lake	6780	Deadwood Creek
2246	New Narrows		

Existing Exempted Developments

Project #	Project Name	Project #	Project Name
3075	Virginia Ranch dam	7006	Charcoal Ravine
5930	Scotts Flat	6028	Lower Haypress Creek
7893	Wright Ranch	6061	Haypress Creek
3730	Salmon Creek		

3. Target Resources

We define a target resource as an important resource that could be adversely affected by multiple projects. Based on public and agency comments, we identified anadromous fish (spring and fall chinook salmon, steelhead trout, and American shad) as

the target resource because of their scarcity, regional importance, and economic value.

Cumulative impacts on target resources are discussed in section V.B.3.

B. Proposed Project

1. Geology and Soils

Affected Environment: The project is located in the north-central portion of the Sierra Nevada geomorphic province. Within the project area, bedrock is mostly greenstone and amphibolite. Rocky exposures characterize the river bed and canyon walls around the powerhouse. There are no known mineral resources in the project area. Soils are residual clayey silts that developed on weathered bedrock or upon colluvium (material that accumulates at the base of slopes). The reservoir shoreline is rocky and stable.

Environmental Impacts and Recommendations: No new construction is proposed, and project operations would only be slightly modified from existing conditions. No existing erosion or slope stability problems have been identified; no agency has raised a question of erosion or slope instability at the project.

Since there is no existing erosion or slope instability at the project and no land-disturbing activities are proposed, continued project operation would have no effect on geologic and soils resources.

Unavoidable Adverse Impacts: None.

2. Water Resources

Affected Environment:

Streamflow

The Narrows Project is located at river mile (RM) 25 on the Yuba River.

The size of the Yuba Basin is about 1,339 square miles of which about 1,108 square miles is upstream of the project site. Elevation in the basin ranges from about 45 feet above sea level at the mouth of the Yuba River, to over 7,000 feet mean sea level (msl) in the headwater areas in the Sierra Nevada mountains; the project powerhouse is at 300 ft mean sea level (msl). Most precipitation in the basin occurs in the months of November through March. The higher elevations receive a majority of this precipitation as snow.

Streamflow in the Yuba River is regulated by several reservoirs that collectively have a capacity to store about 1,400,000 ac-ft of water (California Department of Fish and Game 1991). The powerhouse of the Narrows Project is located a quarter mile below the Corps's Englebright dam and reservoir, the downstream-most storage facility on the Yuba River. Englebright has a storage capacity of 70,000 ac-ft.

To achieve maximum efficiency of power generation, the operation of Narrows is coordinated with the operation of the New Narrows powerhouse, which is located a short distance upstream of Narrows on the opposite bank of the river. New Narrows is a part of FERC Project No. 2246, which includes New Bullards Bar dam and reservoir on the North Yuba River and other facilities upstream of Englebright dam on the Middle Yuba River and Oregon Creek. YCWA is the licensee for Project No. 2246.

New Bullards Bar is the largest reservoir in the basin with a capacity of 966,000 ac-ft. Since the completion of New Bullards Bar in 1969, Englebright reservoir has been kept nearly full most of the time. Figure 3 shows end-of-month reservoir elevation for water years 1970-89. The median end-of-month elevation during this period was 522.1 feet msl, which corresponds to a volume of 66,100 ac-ft. In normal and wet years, Englebright is drawn down in the fall and winter to provide storage for the spring snowmelt. The typical drawdown from July to December is about 9 feet. In dry years, however, winter storage may exceed summer storage.

Water is released from Englebright either through the Narrows powerhouse (capacity 730 cubic feet per second [cfs]), the New Narrows powerhouse (capacity 3,425 cfs), or, if Englebright is full, the dam spillway. The releases from Englebright contribute most of the flow of the lower Yuba River, which receives flow from only two significant tributaries below Englebright -- Dry Creek and Deer Creek.

PG&E holds rights to use up to 700 cfs year-round by direct diversion and rights to accumulate 45,000 ac-ft of storage in Englebright reservoir from October through February. PG&E's 45,000 ac-ft of storage amounts to about 1 month of operation at full capacity and about 2.5 percent of the average annual volume of releases from Englebright dam.

Table 1 summarizes the daily flows of the Yuba River in the years since the completion of New Bullards Bar as measured immediately below the Narrows powerhouse (hereafter referred to as the Englebright gage) and near the mouth of the river at Marysville. At Englebright and Marysville, the greatest volume of water flows during January, February, and March and the lowest volume during October. Flows are higher at Marysville during December through April but lower during May through November due

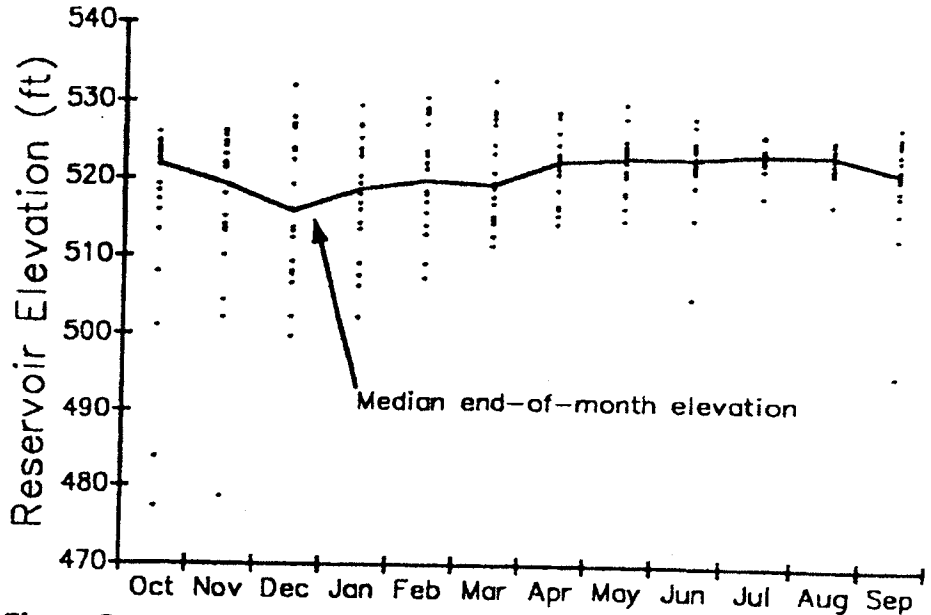

Figure 3. End-of-month elevations in Englebright reservoir during water years 1970-89 (source: staff analysis of U.S. Bureau of Reclamation records [1991]).

Table 1. Statistics of the daily flows of the Yuba River below Englebright Dam and at Marysville, by month and by year, for water years 1970-1990 (Source: the staff's analysis of the Geological Survey's mean daily discharge records).

Yuba River below Englebright Dam								
		Percent of time daily flow (cfs) exceeded						
No.	100%	90%	50%	10%	2%	Mean (cfs)	Mean Volume (acre-feet)
Oct	241	471	1,060	2,720	3,160	1,385	85,161
Nov	313	610	1,130	3,560	20,900	1,730	104,114
Dec	315	595	1,850	6,280	42,600	2,590	159,249
Jan	250	630	1,830	5,370	76,400	3,367	207,003
Feb	148	562	1,910	5,470	87,200	3,452	191,718
Mar	181	563	2,490	7,830	44,300	3,511	215,964
Apr	238	544	1,580	6,830	32,100	2,774	165,208
May	319	696	1,450	5,430	11,200	2,263	139,133
Jun	455	696	1,200	4,310	11,900	2,199	130,871
Jul	609	678	1,796	3,100	7,410	1,797	110,145
Aug	502	561	1,950	2,873	3,230	1,947	119,694
Sep	140	378	1,870	3,120	3,760	1,689	100,513
Year	140	564	1,720	4,310	87,200	4,737	1,730,304

Yuba River at Marysville								
		Percent of time daily flow (cfs) exceeded						
No.	100%	90%	50%	10%	2%	Mean (cfs)	Mean Volume (acre-feet)
Oct	73	292	877	2,910	3,240	1,227	76,059
Nov	102	343	961	3,328	22,100	1,675	99,713
Dec	148	435	1,690	5,490	53,000	2,725	167,573
Jan	144	654	1,990	6,760	90,200	3,676	226,335
Feb	148	630	2,720	7,630	101,000	4,268	238,673
Mar	143	598	2,670	8,940	63,000	4,305	264,682
Apr	170	388	1,980	8,510	38,200	2,961	176,209
May	134	284	1,870	6,440	10,500	1,829	114,316
Jun	121	249	781	4,230	11,400	1,729	102,866
Jul	69	128	1,130	2,480	7,020	1,283	78,914
Aug	62	122	1,480	2,540	3,690	1,498	92,090
Sep	67	262	1,480	2,896	3,760	1,514	90,076
Year	62	294	1,420	4,840	101,000	4,766	1,741,534

to irrigation diversions near the Corps's Daguerre Point dam (figure 1). The diversion capacity of these canals is 1,085 cfs. Although the mean annual volume measured at Marysville is slightly greater than at Englebright, the median (50th percentile) monthly flows during the irrigation season are 169 (November) to 660 cfs (August) lower.

The additional storage provided by New Bullards Bar in 1969 changed the pattern of flows in the lower Yuba River. Before the completion of New Bullards Bar, peak flows were associated with the spring snowmelt in April and May rather than in January through March. The operations of New Bullards Bar have somewhat stabilized flows, reducing volumes in high-flow months and increasing volumes in low-flow months.

The operations of Narrows have also changed since 1969 due to the coordination of operations with New Narrows. Before New Bullards Bar Dam was completed, PG&E annually released an average of about 440,000 ac-ft (water years 1943-69); since then, 248,000 ac-ft (water years 1970-88). PG&E says: (1) Narrows presently. operates when total releases from Englebright are within or below the range of 630 cfs to 730 cfs; (2) New Narrows operates when releases are between 630 and 2,560 cfs; and (3) both operate when releases are greater than 2,560 cfs. Both powerhouses are usually operated as base load plants, but Narrows is sometimes operated as a peaking plant.

For water years 1970-90 at the gage at Englebright dam, we compute that daily average flows of 630, 730, and 2,560 cfs were exceeded about 84.5, 74.4, and 33.4 percent of the time, respectively. These calculations suggest that Narrows operates alone between 15.5 and 25.6 percent of the time, and together with New Narrows less than 33.4 percent of the time, for a total of less than 59.0 percent. Given exclusive use of releases from Englebright, Narrows could operate almost continuously. By coordinating operations with New Narrows, Narrows uses about 56 percent of the water that it used prior to water year 1970.

YCWA makes sure minimum flows are met in the lower Yuba River. YCWA must maintain the following minimum flows immediately below Daguerre Point dam:

January - June	245 cfs
July - September	70 cfs
October - December	400 cfs

Except during floods, YCWA must also ensure that releases from Englebright dam are within the following ranges during the fall and early winter:

October 16 to October 31	600	-	1,050 cfs
November	600	-	700 cfs
December	600	-	1,400 cfs
January 1 to January 15	1,000	-	1,850 cfs

During critical dry years, the requirements are reduced according to a streamflow forecast; forecasts of 50, 45, and 40 percent of normal prompt 15, 20, and 30 percent reductions in the minimum flows, respectively. Under the coordinated operations of Narrows and No. 2, these flows are sometimes provided entirely by releases from Narrows.

Water quality

The water quality of the Yuba River is generally excellent. The river in the vicinity of the project is classified as soft, containing low concentrations of calcium, magnesium, and iron. PG&E reports total dissolved solids and total suspended solids are generally low, ranging from 40 to 85 milligrams per liter (mg/l) and 0 to 60 mg/l, respectively. Dissolved oxygen (DO) levels generally range between 9.5 and 12.8 mg/l.

Since the completion of the New Bullards Bar reservoir, water temperatures in Englebright reservoir and the Yuba River have been slightly reduced (California Department of Fish and Game 1991). Water temperature in the Yuba River is affected by irrigation diversions and is often beyond the preferred range of salmonid life stages. Reduced streamflow has caused water temperature increases and decreases, which have affected salmon and steelhead reproduction, growth, and migration, and American shad attraction, passage, and spawning (California Department of Fish and Game 1991).

Water temperatures between Englebright dam and Marysville range from 55 degrees Fahrenheit (°F) to 75°F, but seldom exceed 73°F. Temperatures increase downstream (table 2), primarily because of irrigation diversions at Daguerre Point. During May to October of a normal year, differences in temperatures between Englebright dam and Marysville, a distance of 26 miles, can be as great as 4.4°F (July 1975). During a dry year, the difference in water temperature can be as much as 12.6°F (July 1977, table 2). As we discuss in the fishery resource section, these temperatures are often above the preferred range for salmonids.

Table 2. Simulated water temperatures from the lower Yuba River based on USGS gages 4180, 4208, and 4210 data from 1975 and 1977[1] (Source: Bookman-Edmonston Engineering, Inc., unpublished data).

Month	Location of Simulated Water Temperature					
	Midpoint ED to DP[2]		Daguerre Point Dam		Near Marysville	
	1975[3]	1977[4]	1975	1977	1975	1977
May	55.3	55.3	57.3	57.9	59.5	61.7
June	57.3	59.8	58.9	63.7	60.6	70.0
July	60.5	62.2	62.6	66.5	64.9	74.8
August	64.9	62.8	66.1	66.2	67.4	73.8
September	59.5	63.0	60.0	66.2	61.9	70.2
October	47.8	57.4	50.1	60.6	50.9	62.3

1 Simulated water temperatures were within 2°F of actual temperatures for May, 1°F for June and October, and less than 1°F difference for July and September.
2 ED=Englebright dam; DP=Daguerre Point dam.
3 Normal water year.
4 Dry water year.

Environmental Impacts and Recommendations:

a. Streamflow

The central issue regarding the proposed relicensing of Project No. 1403 is how its operations affect streamflow in the lower Yuba River and how PG&E might alter those operations, if at all, to enhance the important anadromous fisheries resources dependent upon streamflow in the lower Yuba River.

In this section we examine PG&E's proposed operations, the fisheries agencies streamflow and operations recommendations, PG&E's responses to the agency recommendations, and our operations alternative, and make recommendations based on an analysis of these proposals.

PG&E's Proposed Operations

In its application for a new license, PG&E proposes to continue the current operation of Narrows, which is coordinated with Project No. 2246. Operations of Narrows are run-of-river

except for the use of up to 45,000 ac-ft of storage in Englebright reservoir. Since the completion of Project No. 2246, reservoir levels in Englebright have become relatively stable; therefore, it appears that PG&E no longer uses its storage right in Englebright. Narrows now uses less than 20 percent of the average annual flow released from Englebright dam and operates less than about two thirds of the year.

CDFG Recommendation and PG&E's Response

The CDFG, through the Resources Agency of California, recommends seasonal flows and temperatures in the Yuba River as measured at Marysville for anadromous fish (letter dated May 8, 1990). CDFG slightly modified these recommendations in the lower Yuba River Fisheries Management Plan, filed May 14, 1991. Table 3 presents CDFG's final recommendation.

PG&E responded to CDFG's recommendations by letters to CDFG and the U.S. Fish and Wildlife Service (FWS) dated February 28, 1991, saying that the recommended temperatures and the flows required to achieve them are excessive but they could be modified to a more reasonable amount and still provide a limited benefit to the fish populations. PG&E says that its 45,000 ac-ft of storage in Englebright would not satisfy CDFG's flows, which would amount to an annual volume of 599,600 ac-ft. PG&E plans to coordinate with YCWA to equitably share any fishwater releases agreed upon, following the completion of YCWA's current water temperature and fishery studies scheduled for completion in mid 1992.

FWS Recommendation and PG&E's Response

FWS recommends that PG&E use its 45,000 ac-ft of storage in Englebright reservoir to enhance fishery resources by maintaining flows of 2,000 cfs at Marysville during May and 1,500 cfs during June (letter to the Commission dated July 3, 1990). These flows are the same that CDFG recommends for May and June (table 3).

PG&E agrees with FWS that the months of May and June would require the greatest amount of water in enhancing the lower Yuba River fisheries. However, PG&E does not support FWS's recommendation to commit its 45,000 ac-ft of storage to release during May and June (letter dated February 28, 1991). PG&E says that a drawdown of this magnitude would eliminate recreation on Englebright reservoir, expose the intake to the New Narrows powerhouse, and cause a loss of 6 GWh of generation at Narrows. PG&E offers instead to make 7,000 ac-ft of storage available to the resource agencies, in addition to its normal releases, which PG&E says would not adversely affect recreation or power generation. PG&E would provide the 7,000 ac-ft until PG&E, YCWA, and the resource agencies can reach a new agreement on instream flows.

Table 3. Mean daily discharges and volumes of the Yuba River as measured at Marysville and below Englebright dam, water years 1970-90, compared to the flow recommendations of the California Department of Fish and Game (source: the staff's analysis of the Geological Survey's mean daily discharge records).

Month	CDFG recommended flow		Marysville			Englebright dam		
			Volume (kaf) of instream flow		Frequency CDFG flow exceeded (%)	Volume (kaf) of instream flow		Frequency CDFG flow exceeded (%)
	(cfs[1])	(kaf[2])	shortage[3]	surplus[4]		shortage	surplus	
Oct 1-14	450	12.5	1.1	28.1	77.6	0.6	31.1	96.9
Oct 15-31	700	23.6	4.4	17.9	52.4	1.3	20.1	66.1
Nov	700	41.7	6.0	64.1	63.5	2.3	64.8	70.8
Dec	700	43.0	3.6	128.2	77.0	2.0	118.3	75.7
Jan	700	43.0	1.7	197.1	86.6	1.8	165.8	85.3
Feb	700	38.9	1.9	203.4	83.0	2.8	157.0	70.3
Mar	700	43.0	2.5	224.2	82.5	3.2	176.1	68.2
Apr	1,000	59.5	14.9	131.7	55.1	10.1	115.9	55.2
May	2,000	123.0	53.8	45.2	30.0	36.3	52.6	35.6
Jun	1,500	89.3	36.5	50.1	34.9	18.3	60.0	42.9
Jul	450	27.7	4.2	55.6	71.0	0.1	82.6	96.2
Aug	450	27.7	3.1	67.5	79.9	0.3	92.3	94.2
Sep	450	26.8	2.7	66.1	70.3	1.1	74.9	86.8
Annual Total		599.6	136.4	1279.8	66.4	80.0	1211.3	71.8

[1] Cubic feet per second.
[2] Thousands of acre-feet.
[3] Mean annual volume of the difference between CDFG-recommended flows and recorded flows that are less than the recommended flows.
[4] Mean annual volume of the difference between CDFG-recommended flows and recorded flows that are greater than the recommended flows.

Staff Analysis and Recommendations

CDFG acknowledges that its recommendations pertain to management of the lower Yuba River as a whole, and not strictly to the Narrows Project. Because the CDFG recommended minimum flows and temperatures are set for the river as measured at the confluence with the Feather River near Marysville, which is downstream of major irrigation diversions that are not controlled under the Narrows license, we cannot directly relate these recommendations to Narrows operations. However, we examined CDFG's recommendations for the reach of the Yuba River above these irrigation diversions and relative to the water resources that are controlled under the Narrows license.

Table 3 lists: (1) the CDFG minimum flow recommendations; (2) our calculations of how often these flows were equalled or exceeded on a daily basis at Englebright and Marysville for water

years 1970-90; and (3) our calculations of the average annual volume of the shortages and surpluses relative to these flows. CDFG's minimum flows were exceeded 66.4 percent of the time at Marysville and 71.8 percent of the time at Englebright. CDFG's flows were met least often in May and June as measured at both stream gages. The average annual volume of instream flow shortages are substantial -- 136,400 ac-ft at Marysville and 80,000 ac-ft at Englebright -- but the surpluses are far greater; 1,279,000 ac-ft and 1,211,300 ac-ft, respectively. The size of the differences between the shortages and the surpluses suggests that alternative management of the 1,400,000 ac-ft of storage in the basin could alleviate the shortages.

Using PG&E's 45,000 ac-ft of storage in Englebright, the operations of Narrows could potentially relieve slightly more than half (45,000/80,000) of the CDFG instream flow shortages as measured immediately below the project at the Englebright gage. To do so, however, would require routine withdrawal of much or all of the 45,000 ac-ft, drawing the reservoir down from normal operating levels of above 520 feet to 450 feet. This drawdown would adversely affect reservoir recreation (see recreation section) and expose the intake to the New Narrows powerhouse (located at 478 feet).

FWS's recommendation to apply the 45,000 ac-ft towards maintaining flows of 2,000 cfs in May and 1,500 cfs in June would have the same adverse effect on recreation and power generation as attempting to meet CDFG's year-round flows with storage in Englebright. FWS revised this recommendation saying that PG&E should use the 45,000 ac-ft beginning in April instead of May (White 1991a). FWS says that the reservoir would then more likely refill before the summer recreation season.

PG&E says its right to accumulate Yuba River flows in Englebright is restricted to the months October through February; therefore, any drawdown in April, May, or June would persist throughout the summer. We examined the storage and releases records and found that in many instances since 1970, reservoir levels have increased for two or more successive months during March through September when releases were less than the capacity of the Narrows and New Narrows powerhouses combined. Evidently, flows are stored in Englebright outside of the authorized storage period. Nevertheless, reservoir inflows during the summer may or may not be sufficient to replenish a drawdown of 45,000 ac-ft in May and June.

We agree with PG&E that releases of 45,000 ac-ft from storage would cause excessive impacts to recreation and power generation and that given a full or nearly full reservoir, releases of 7,000 ac-ft would not. However, because the reservoir may not be full when a need for releases from storage occurs, we find it more appropriate to identify a reservoir elevation above which recreation and power generation are not

significantly affected by drawdowns rather than an available volume regardless of the reservoir elevation.

We determined that the intakes to both powerhouses are submerged with sufficient head and that most recreational values are protected when Englebright reservoir is maintained above a elevation of 514 ft (see the recreation section). This elevation corresponds to a total volume of about 60,000 ac-ft. In water years 1970-89, the end-of-month elevation in Englebright exceeded 514 ft in 205 out of 240 months. At some time during all but 2 of the 20 years, the volume available above 514 ft exceeded 7,000 ac-ft. The potential storage available above 514 ft is 10,000 ac-ft.

We calculated from the Englebright gage records that the daily average flows released from Englebright dam were less than 700 cfs in May and June and less than 450 cfs during other months about 7.5 percent of the time in water years 1970-90. We determined that maintaining these flows as continuous minimum flows below the project would enhance fish habitat in the lower Yuba River (see the fisheries section). Table 4 shows the volume of water that would have been necessary to meet these minimum flows for water years 1970-90. In 10 of the 21 years, the releases from Englebright always exceeded these minimums. In 7 of the 11 years with shortages, the shortages amounted to less than 7,000 ac-ft, suggesting that use of storage in Englebright above the elevation of 514 ft could maintain the minimum flows in most years when releases for other purposes do not.

Therefore, when the stage of Englebright reservoir exceeds 514.0 ft, PG&E should use its storage in Englebright reservoir to maintain minimum continuous flows of 700 cfs during May and June and 450 cfs during other months in the Yuba River as measured at the Englebright gage. Use of PG&E's storage to maintain instream flows should supplement, not substitute for, the releases from Englebright dam of water controlled by YCWA, whose license for Project No. 2246 includes minimum flow requirements.

We agree with the statements by PG&E, CDFG, and FWS that PG&E and YCWA should share responsibility for managing instream flows in the lower Yuba River, because operations for other purposes are coordinated. YCWA is presently studying streamflow and temperature relationships in the Yuba River. We support PG&E's consultations with YCWA and the resource agencies to reach a new agreement on instream flows. Therefore, recognizing the studies and consultations importance in resolving the fishery resource issues, we recommend that any new license issued for the Narrows Project include an article that reopens the license for the limited purpose of considering the project's role in maintaining appropriate instream flows in the lower Yuba River whenever the license for Project 2246 expires, is reopened, or is amended regarding instream flows in the lower Yuba River.

Table 4. Historic monthly and yearly shortages compared to the staff's alternative minimum flows for the Yuba River flows as measured below Englebright dam (source: the staff's analysis of the Geological Survey's mean daily discharge records).

The staff's proposed minimum flows (in cubic feet per second) below Englebright dam:

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
450	450	450	450	450	450	450	700	700	450	450	450

Volume (in acre-feet) of historic shortage compared to the staff's proposal minimum flows:

Water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1970	6,595	4,594	2,832	0	0	0	0	0	0	0	0	1,492	15,513
1971	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	1,476	0	0	0	0	0	0	0	0	0	0	3,384	3,384
1976	0	0	0	0	0	0	0	0	0	0	0	0	1,476
1977	0	0	637	10,257	13,287	15,420	2,860	20,452	11,853	1,456	5,300	14,785	96,385
1978	2,144	3,374	3,786	0	0	0	0	0	0	0	520	3,473	19,837
1979	0	0	0	0	0	0	0	182	0	0	0	0	9,304
1980	0	0	0	0	0	0	0	0	0	0	0	0	182
1981	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	641	641
1987	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	2,344	0	0	0	0	0	2,344
1989	0	0	0	0	0	0	0	799	204	0	0	0	1,004
1990	0	0	0	0	0	0	1,382	0	0	0	0	0	1,382

Unavoidable Adverse Impacts:

There would be no adverse impacts to streamflow or water quality from the continued operation of this project.

3. Fisheries Resources

Affected Environment:

a. Yuba River Fish Populations

The Yuba River supports 28 species of resident and anadromous fishes. However, most of the public interest is focused on the four anadromous species: fall and spring chinook, steelhead trout, American shad, and striped bass. The Yuba River is a significant contributor of chinook salmon to the Sacramento

River Basin. CDFG management strategies emphasize development of chinook salmon, steelhead trout, and American shad populations (California Department of Fish and Game 1991). We summarize when the various life stages of the target species are present in the Yuba River in table 5.

Water resources projects have substantially decreased the amount of anadromous fish habitat in California from increased water temperatures and reduced streamflow. The Feather and Yuba River Basins produce most of the salmon and a large percentage of the steelhead for the Sacramento River Basin. Available spawning habitat in the Central Valley area of California has been reduced from 6,000 miles of river to about 300 miles (California Advisory Committee on Salmon and Steelhead Trout 1988), which is about 5 percent of the original habitat.

The Governor of California directed CDFG to provide a plan for significantly increasing California's salmonid populations by the year 2000. Many programs are underway to improve salmonid spawning and rearing habitat in the Sacramento basin. In addition to these programs, CDFG recommends upgrading and installation of effective fish screens on all irrigation diversion intakes to reduce mortality and predation at these intakes.

b. Chinook salmon

The Sacramento River supports four distinct races of chinook salmon, named for the season they first enter fresh water: (1) spring run, (2) fall run, (3) late-fall run, and (4) winter run (California Department of Fish and Game, 1990). The Yuba River supports only two of these races: the fall and spring runs.

Fall chinook--The fall chinook salmon run is the largest and most important anadromous fishery in the lower Yuba River according to CDFG. Although total numbers of fall chinook have decreased from historic levels, the Yuba River still supports up to 15 percent of the annual run of fall chinook in the Sacramento River system (California Advisory Committee on Salmon and Steelhead Trout 1988). The salmon resource of the Yuba River is estimated at an annual value of $2,525,000 by the U.S. Fish and Wildlife Service (Beak Consultants 1986-1988 Summary Report).

Since completion of Englebright dam in the 1940's, fall chinook runs have varied from 1,000 to 39,000 fish (table 6). CDFG estimates that, the fall run averages about 13,800 spawners. Construction of New Bullards Bar reservoir in 1969 has resulted in slightly lower water temperatures in the Yuba River, and although the average fall run is less than the 38,000 fish CDFG projected in the 1950's and 1960's (California Department of Fish and Game 1991), the run has apparently stabilized in the Yuba River in the last 10 years, with the exception of run year 1982 (table 6).

Table 5. Life history periodicity for fall and spring chinook salmon, steelhead trout, and American shad in the lower Yuba River (Source: California Department of Fish and Game 1991*).

Fall Chinook Salmon

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning migration	X								X	X	X	X
Spawning	X									X	X	X
Egg incubation	X	X								X	X	X
Emergence	X	X	X									X
Fry rearing/emigration	X	X	X									X
Juv rearing/emigration				X	X	X						X

Spring Chinook Salmon

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning migration			X	X	X	X	X					
Summer holding						X	X	X				
Spawning									X	X	X	
Egg incubation									X	X	X	X
Emergence	X											
Fry Rearing/emigration	X	X	X								X	X
Juv rearing/emigration			X	X	X	X						X

Steelhead Trout

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning migration	X	X	X					X	X	X	X	X
Spawning	X	X	X	X								
Egg incubation	X	X	X	X	X							
Emergence		X	X	X	X	X						
Fry & Juvenile rearing	X	X	X	X	X	X	X	X	X	X	X	X
Emigration			X	X	X	X						

American Shad

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spawning migration				X	X	X						
Spawning					X	X	X					
Egg incubation & hatching					X	X	X					
Rearing & emigration					X	X	X	X	X	X	X	

* The life history information is based on review of the literature and opinions of CDFG fishery Biologists familiar with the anadromous fish species of the lower Yuba River. The periods shown are believed to represent the time of occurrence of an unknown but large majority of a life stage population; consequently, exceptions may commonly occur.

Table 6. Estimated fall chinook salmon runs in the Yuba River, 1953-1989 (Source: California Department of Fish and Game 1991).

YEAR	NUMBER	YEAR	NUMBER	YEAR	NUMBER
1953	6,000	1966	8,000	1979	12,000
1954	5,000	1967	24,000	1980	13,000
1955	2,000	1968	7,000	1981	13,000
1956	5,000	1969	5,000	1982	39,000
1957	1,000	1970	14,000	1983	14,000
1958	8,000	1971	6,000	1984	9,665
1959	10,000	1972	9,000	1985	13,041
1960	20,000	1973	24,000	1986	19,558
1961	9,000	1974	18,000	1987	18,510
1962	34,000	1975	5,880	1988	10,760
1963	37,000	1976	3,800	1989	9,840
1964	35,000	1977	9,000		
1965	10,000	1978	7,000		

Fall chinook enter the Yuba River from September through January, although most of the migration occurs in October and November, depending upon water temperatures and streamflow. Spawning occurs from October through January, peaking in October and November in the Yuba Goldmine Fields, both above and below Daguerre Point dam. Eggs incubate from October through February, juvenile rearing and outmigration of fry and smolts occurs from December through June (table 5).

Spring chinook--The spring chinook population virtually disappeared by 1959, presumably because of water diversion and hydropower developments on the river (California Department of Fish and Game 1991). A remnant population of spring chinook persists, spawning at the base of Englebright dam, wherever suitable spawning gravel can be found. The population is maintained by natural production in the Yuba River, fish straying from the Feather River, and infrequent stocking of hatchery-reared fish by CDFG (California Department of Fish and Game 1991).

Englebright dam blocks spring chinook from their higher elevation, historical spawning grounds where water temperatures cool earlier than at lower elevations. Therefore, spring chinook holding below Englebright dam must wait to spawn (Wooster and Wickwire 1970) until water temperatures cool to their preferred temperature range (table 7). Spawning gravel at the base of Englebright dam is limited because the dam also blocks gravel recruitment. Therefore, some spring chinook may spawn in the same areas as the fall chinook, making it difficult to

distinguish one race from the other without electrophoresis data to confirm or deny the possibility.

Table 7. Preferred water temperatures (°F) ranges for the various life stages for target anadromous fish species in the Lower Yuba River.

Chinook Salmon Fall	Chinook Salmon Spring	Steelhead Trout	American Shad
Spawning migration:			
49.0-57.5[1] 44.1-55.9[2]	37.9-55.9[1]	46.0-52.0[2]	57.2-66.2[4] 48.9-54.0[1] 61.0-64.9[2]
Spawning:			
41.0-56.0[4] 44.1-55.9[2] 42.1-57.0[8]	40.0-55.0[4] 42.1-57.0[8]	39.0-48.9[1,8] 46.0-52.0[2]	59.9-70.0[1] 60.1-70.0[7] 61.0-64.9[2]
Egg incubation and emergence:			
41.0-57.9[8] 46.0-54.0[2] 40.1-55.0[3]	41.0-57.9[8] 42.6-57.6[3]	50.0[1] 48.0-52.0[2]	60.8-65.3[6] 57.9-66.0[1] 61.0-64.9[2]
Fry rearing:			
44.6-57.2[3] 53.1-55.9[2]	**	55.0-60.1[2]	59.9-69.8[6]
Juvenile rearing:			
45.1-58.3[8] 53.1-55.9[2]	**	45.1-58.3[8] 55.0-60.1[2]	59.9-69.8[6]

1/ Bell (1986)
2/ Rich (1987)
3/ Raleigh et al. (1986)
4/ Seymour (1956)
5/ Chambers (1956)
6/ Painter et al (1979)
7/ Painter et al (1977)
8/ Reiser and Bjornn (1979)
**Specific data not available.

Spring run chinook enter the Yuba River from March through July, and hold in the deep, coolwater pools at the base of Englebright dam. Spawning and egg incubation occurs from September through November. Rearing and outmigration of fry and smolts begin in November and continue through the following June (table 5).

c. Steelhead trout

Steelhead trout is an anadromous form of rainbow trout, generally spending 1 to 3 years in fresh water before migrating out into the ocean during spring and early summer. The steelhead spend 2 to 3 years at sea, then return to their natal stream to spawn.

Environmental factors influencing the steelhead trout population in the Yuba River are similar to those affecting chinook salmon. However, because steelhead rear in the Yuba River for a year or more, high water temperature and low flow may have a greater impact on steelhead when these conditions occur during critical life stages. Consequently, their numbers have increased to an estimated 2,000 fish.

Steelhead spawning migration begins as early as August, peaks in October and February, and may extend through March (California Department of Fish and Game 1991; Painter et al 1977). Spawning occurs in the Yuba Goldmine fields, both above and below Daguerre Point Dam, from January through April, and incubation extends into May. Fry and juvenile rearing occurs over 1 to 3 years prior to smolting. Outmigration occurs from March through June (table 5).

d. American shad

American shad populations have dwindled since the 1950's due to water diversions (reduced streamflow), water temperature, and harvest. American shad migration and spawning is triggered by streamflow and water temperature. Frequently, when water temperatures have been suitable for shad spawning and rearing, sufficient attractant flow was lacking from the Yuba River. CDFG says suitable spawning habitat for shad exists at the confluence of the Yuba and Feather rivers. However, spawning surveys over the past few years have failed to indicate significant numbers of spawning adult shad (Dunn et al 1992).

American shad spawning migration occurs from April through June, and spawning extends through July (table 5). Egg incubation is temperature dependent, and generally, eggs hatch within 3 to 6 days. Rearing and outmigration occurs from May through November.

Environmental Impacts and Recommendations:

a. Anadromous Salmonids

Salmon and steelhead populations have decreased to 35 to 40 percent and 20 percent, respectively, from their historic numbers, largely as a result of reduced streamflow and increased water temperatures from the combined operation of dams,

irrigation diversions and hydroelectric projects in the Yuba River system. Between 1942 and 1969, late summer and fall water temperatures consistently caused significant mortality to rearing steelhead trout and early spawning and incubating salmon. Between 1963 and 1969, for example, mean daily water temperatures at or near Marysville ranged between 70°F and 81°F from mid-July to mid-September and exceeded 60°F throughout October. CDFG and FWS believe that high water temperatures and low flows during critical life stages limit chinook salmon and steelhead trout production (California Department of Fish and Game 1991) in the Yuba River. Preferred migration water temperatures (table 7) for steelhead and spring chinook do not occur in most years in the Yuba River until late October, and in some years, not until November (California Department of Fish and Game 1991).

Agency Recommendations and PG&E Response

To meet the life history needs of the salmonid species and American shad in the Yuba River, CDFG recommends that projects affecting the lower Yuba River, including Narrows, operate to maintain temperatures less than the daily average temperatures shown below:

1 April - 31 May	60°F (Marysville)
1 June - 30 June	65°F (Marysville)
1 July - 30 August	65°F (Daguerre Pt. dam)
1 September - 30 September	65°F (Marysville)
1 October - 15 October	60°F (Marysville)

In addition, CDFG recommends that daily maximum water temperatures should not exceed the daily average temperatures recommended above, by more than 2°F for more than 8 hours in any 24-hour period during any month of the year.

CDFG also recommends specific streamflow releases of 1,000, 2,000, and 1,500 cfs, as measured at the Marysville gage, in April, May, and June, respectively, to improve water temperature conditions, and increase the number and rate of smolt emigration. CDFG recommends flow releases of 450 cfs as measured at the Marysville gage from July 1 through October 14, and 700 cfs from October 15 through March 31, for suitable water temperature and habitat conditions for salmonid spawning, incubation, and rearing.

As we discussed in the streamflow section, FWS recommends that PG&E use their entire storage of 45,000 ac-ft in Englebright reservoir to provide higher streamflow releases to expedite smolt emigration from the Yuba River, into the Feather River, Sacramento River, and Sacramento/San Joaquin Delta.

PG&E proposes to make available 7,000 ac-ft of its storage in Englebright reservoir to maintain suitable water temperatures

and streamflows for salmonid migration, spawning, incubation, rearing, and smolt emigration.

Staff Analysis and Recommendations

Requiring PG&E to release a minimum streamflow would stabelize flows in the upper 12 miles of the Yuba River (the Narrows and Garcia Gravel Pit reaches) which would benefit fishery resources in two ways: 1) increase in useable habitat; and 2) cooler and more consistent water temperatures. By requiring a minimum flow within PG&E's ability to provide, impacts to Englebright reservoir's recreational activities (see recreation section) would be minimized.

CDFG's flow recommendations would reduce water temperatures in the Yuba River by an unknown amount, and would drain Englebright Reservoir as discussed previously in the streamflow section. Requiring PG&E to maintain any water temperature continuously from Englebright to Marysville is more than PG&E can do with only 45,000 ac-ft of storage. Further, maintaining any water temperature or streamflow downstream of Daguerre Point Dam is beyond PG&E's control because of irrigation diversions that occur at Daguerre Point Dam. Therefore, we looked for more realistic enhancement possibilities that PG&E could provide without significant impacts to recreation, power, and YCWA's project.

We started with evaluating CDFG and FWS's recommendations, using their maximum and minimum flows as bounderies. We then compared those flows to the frequency of occurrence in the Yuba River and with WUA at various flows from CDFG's IFIM to come up with the following alternatives. By referring to salmonid life history information (table 5), which shows the time of year each critical life stage is present in the Yuba, and to the IFIM study results, we identified four minimum flow regimes that are within the capacity of the Narrows Project (flows less than 730 cfs) and that would be favorable to salmonids. They are as follows:

1.	700 cfs	year-round
2.	700 cfs	October through June
	450 cfs	July through September
3.	700 cfs	May through June
	450 cfs	July through April
4.	450 cfs	year-round

None of these flow regimes were met all of the time in the past 21 years by joint operations of the Narrows and New Narrows projects, but if met in the future, would enhance fishery resources over existing conditions. We eliminated flow regimes 1 and 2 from further consideration because they would routinely require the release of more than 10,000 ac-ft of storage in Englebright annually, which would significantly adversely affect recreation and power generation (see Recreation section). We

discuss the benefits of flow regimes 3 and 4 on water temperature and habitat below.

Temperature

Results of temperature modeling conducted by CDFG (1991) for the months of April, May, June, October and November indicated that flows of 3,000 cfs must be released from Englebright dam to maintain water temperature within the preferred range (below 61 °F) for salmonids at Marysville (table 8, line 7). Since CDFG did not account for tributary inflow or irrigation diversions in their model, their conclusions may not accurately represent conditions in the Yuba River. We considered these conclusions as worse case scenario. According to CDFG's model, cooler water temperature, however, would be available at the Marysville gage at most flows.

At flows that PG&E can provide (less than 730 cfs), increased releases from Englebright dam relative to historic operations would mostly benefit the 12 miles between Englebright dam and Daguerre Point dam. The lower reach wouldn't benefit as much because of increased heat transfer in that reach and because of diversions at Daguerre Point. For example, an increase in flow of 245 (table 8, line 1) to 745 cfs (table 8, line 3) from Englebright dam in June would decrease temperatures by 8°F at Daguerre Point dam but only by 1°F at Marysville. Therefore, we limit our evaluation to the 12 miles above Daguerre Point dam.

As we discussed before, PG&E does not control enough storage to independently satisfy the CDFG recommendations for temperature and streamflow below Daguerre Point dam. We believe, however, that PG&E would be able to use its storage capacity to supplement releases up to 700 cfs, as discussed in the streamflow section.

We believe that maintaining target flows of 450 and 700 cfs, depending on the month, which is within the operational constraints of the project, would improve water temperature conditions, particularly in the upper 12 miles between Englebright and Daguerre Point dams. However, these flows would not be sufficient to maintain water temperatures within the preferred range for all life stages of salmonids (table 7) at all times. For the five months modelled, a release of 450 cfs from Englebright dam would maintain temperatures below 60°F at Daguerre Point dam in April, October, and November (table 8, line 2), while a flow of 700 cfs would maintain temperatures below 60°F in those three months plus May (table 8, line 3).

We reviewed the 21 year period of record (1970 to 1990) to determine the average flow (cfs) from Englebright dam needed to supplement historic releases to meet flow regimes 3 and 4. The worst case scenario, water year 1977, shows that the average annual flow needed to meet flow regime 3 was 190 cfs, and varied between 0 and 333 cfs (table 9) on an average monthly basis.

Table 8. Simulated water temperatures (°F) for months of April, May, June, October, and November, at Englebright dam (ED), Daguerre Point dam (DP), and resulting temperatures at Marysville gage (M), from simulated flow discharges from Englebright dam and irrigation diversions at Daguerre Point dam (Source: CDFG, as modified by the staff).

	FLOW		MONTH															
			APRIL			MAY			JUNE			OCTOBER			NOVEMBER			
	ED	DP	ED	DP	M	ED	DP	M	ED	DP	M	ED	DP	M	ED	DP	M
1	245	245	49	58	62	54	68	74	58	73	77	56	64	68	49	55	56
2	400	400	49	55	60	54	64	70	58	69	75	54	59	64	49	52	55
3	745	245	49	53	60	54	60	70	58	65	76	54	57	64	49	51	55
4	1245	245	49	51	59	54	57	70	58	62	75	54	55	64	49	50	55
5	1500	500	49	51	56	54	55	65	58	62	70	54	54	59	49	49	51
6	2000	1000	49	50	52	54	55	60	58	59	65	54	54	55	49	49	50
7	3000	2000	49	49	51	54	54	56	58	59	61	54	54	55	49	49	50

* No diversions occur at flows of 245 and 400 cfs discharged from Englebright Reservoir, while 500 to 1000 cfs is diverted at Daguerre Point Dam at a simulated discharge flows greater than 745 cfs.

Releases from storage would have increased flow in the river at most about 7.5 percent of the time under flow regime 3; based on the past 21 years of record, supplemental flows would have been needed in 11 of the 21 years. The amount of time that the Narrows project could have fully met these needs would have depended upon the amount of storage made available for supplemental releases.

The resulting decreases in water temperature under flow regime 3 would benefit salmonids. For example, the release of an additional 333 cfs in May of 1977 (driest year at the Englebright gage since 1943) to increase flows to 700 cfs would have decreased water temperature in the reach between Englebright dam and Daguerre Point from 64 to 60°F (table 8). In 1987, another dry year, additional flow would have been needed only in April, where an increase in flow from about 300 cfs to 450 cfs, would have decreased water temperature from roughly 58°F to 55°F. The cooler water would reduce stress on salmonids and improve growth

Table 9. Average flows needed to meet staff's flow regime 3 at the Englebright gage for each day when flows were less than the targets by month and for each year (Source: the staff's analysis of the Geological Survey's mean daily discharge records).

Target flows (cfs):
650. 450. 650. 450. 650. 450. 650. 700. 700. 450. 450. 650.

Avg. daily deficits (cfs) relative to the target flows:

Water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1970	107.	77.	71.	0.	0.	0.	0.	0.	0.	0.	0.	150.	91.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	106.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.	100.
1976	0.	0.	0.	0.	24.	80.	125.	86.	94.	0.	37.	135.	97.
1977	0.	0.	80.	167.	239.	251.	103.	333.	199.	29.	86.	248.	190.
1978	64.	65.	119.	0.	0.	0.	0.	0.	0.	0.	0.	0.	80.
1979	0.	0.	0.	0.	0.	0.	0.	92.	0.	0.	0.	0.	92.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18.	18.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	148.	0.	0.	0.	0.	0.	148.
1989	0.	0.	0.	0.	0.	0.	0.	40.	17.	0.	0.	0.	32.
1990	0.	0.	0.	0.	0.	0.	87.	0.	0.	0.	0.	0.	87.

and survival. In most years, releases from both PG&E's and YCWA's projects would meet the target flows of 450 and 700 cfs without drawing upon storage from Englebright reservoir.

Under flow regime 4, increased flow in the river would have been supplemented at most about 6.2 percent of the time. Releases from storage would have been needed in 9 of the 21 years of record. Flow regime 4 would have similar benefits compared to flow regime 3 (table 9), except during May and June. Under flow regime 4, additional flow would have been necessary during 4 percent and 0 percent of the days in May and June, respectively, compared to 10 percent of the days for both months under flow regime 3.

Fish Habitat

Most of the time streamflow in the Yuba River provides suitable spawning, incubation and rearing conditions for salmonids, due to the current integrated operation of the Narrows and New Narrows powerhouses, and YCWA's minimum flow requirements at New Narrows, which maintains cooler water temperatures above Daguerre Point Dam. CDFG's recommended flows are met at Marysville on a year-round basis, 66.4 percent of the time (table 3, water years 1970 to 1990, and the streamflow section).

CDFG conducted an IFIM study to determine what streamflow maximized weighted useable area (WUA) for all life stages of salmonids in the lower Yuba River (figure 2). CDFG reached their streamflow recommendations by combining the results from different study sites in the lower Yuba River to determine the total amount of habitat resulting from specific releases from Englebright dam. However, CDFG did not account for canal diversions which may divert up to 1,000 cfs near Daguerre Point dam, or tributary inflows between Englebright and the confluence with the Feather River (figure 2). Utilizing CDFG's analysis, a release of 2,000 cfs from Englebright was evaluated as 2,000 cfs in all river reaches, when in reality, the reaches below Daguerre Point dam may receive only 1,000 cfs. For this reason, CDFG's recommendations are misleading.

Because no diversions occur between Englebright dam and Daguerre Point dam, we believe the IFIM results for the Garcia Gravel Pit reach, which is above Daguerre Point dam, (figure 2) are relatively reliable for weighted useable area. Further, this is the reach where the majority of salmonid spawning occurs (California Department of Fish and Game 1991). Therefore, we focused on the benefits to the upper 12 miles of stream that would result from regulating flow from PG&E's project. Figure 4 shows the percent of maximum available habitat (MAH) for salmonid spawning, incubation, and rearing, that is available at selected flows between 100 and 1,000 cfs in the Garcia Gravel Pit reach (California Department of Fish and Game 1991).

A year round flow of 450 cfs (flow regime 4) would provide: 75 percent of MAH for steelhead fry; 50 percent MAH for chinook fry; 98 percent MAH for steelhead juveniles; 88 percent MAH for chinook juveniles; 77 percent MAH for steelhead spawning; and 92 percent MAH for spawning chinook salmon (figure 4). Increasing flows to 700 cfs during May and June (flow regime 3) would provide additional flows that would enhance salmonid spawning migration and smolt emigration, but would provide substantially less habitat for two life stage present in the Yuba River: steelhead fry (50 percent MAH at 700 cfs) and chinook juveniles (58 percent MAH at 700 cfs) for the two-month period (figure 4). Although some decrease in MAH in the Yuba River for some life stages is indicated, we believe that the stabilized riffle areas of the Garcia Gravel Pit reach would provide refuge and nursery areas for the relatively small number of salmonids using this type of habitat with maintenance of these recommended flows. To support this belief, we point out that most of the time these flows are met as the Yuba River continues to support the number of salmonids listed in table 6 in relation to the MAH under the current flow regime.

Recommendation

Both flow regime 3 and 4 would provide minor enhancement to the anadromous salmonid population in the 12-mile-long section of the Yuba River between Englebright dam and Daguerre Point dam. Water temperatures may be decreased by as much as 4°F in some months. Neither flow regime would result in drawing down Englebright reservoir below 514 ft, thereby protecting recreational use of the reservoir.

Specifically, flow regime 3 (450 cfs year-round, except 700 cfs in May and June) would provide slightly more benefits than flow regime 4 (450 cfs year-round). As we discussed previously, under flow regime 3, flows would be supplemented 7.5 percent of the time compared to 6.2 percent of the time under flow regime 4. In addition, flow regime 3 would make use of PG&E's storage for fisheries benefit in 11 years (out of 21 years of record) instead of 9 years for flow regime 4. Based on the above, we recommend that PG&E implement flow regime 3.

We recommend that PG&E use its storage in Englebright reservoir above 514 ft, instead of a recommended acre-foot allotment, to maintain flow regime 3 in the Yuba River as measured at the USGS Englebright gage. We recognize that higher streamflows may be needed to flush out smolts or to optimize other habitat conditions; however, our analysis shows this flow regime is beneficial and is within the capabilities of the PG&E's Narrows project, if operated to supplement the releases of YCWA's New Narrows Project.

b. American shad

American shad migrate from the Sacramento and Feather Rivers into the Yuba River, but are confined to the area between the confluence with the Feather River and Daguerre Point dam. Although fish ladders exist at Daguerre Point dam, they provide insufficient passage for shad, except at extremely high streamflow. These ladders were repeatedly damaged by floods, and several years lapsed between damage and repair, thus further contributing to reduced shad passage and blockage of upstream habitat. During the years when May and June Yuba River streamflow was low (166-367 cfs), American shad runs were virtually non-existent (Dunn et al 1992). A result of limited access to suitable habitat, reduced streamflow, and poor water temperature conditions, populations have decreased, with virtually no shad present in the Yuba River during 1987 and 1988 (California Department of Fish and Game 1991).

All life stages for American shad are driven by water temperature (figure 4). Preferred water temperatures for migration and spawning of American shad (table 7) occurred in the Yuba River in 1973, 1974, and 1978, in the first 1 mile of stream, at or near Marysville (Dunn et al 1992). For spawning

and rearing, on a daily basis, minimum water temperatures were within the preferred range, but maximums were exceeded. The canal diversions at Daguerre Point dam result in warmer water temperatures below it, which benefit American shad.

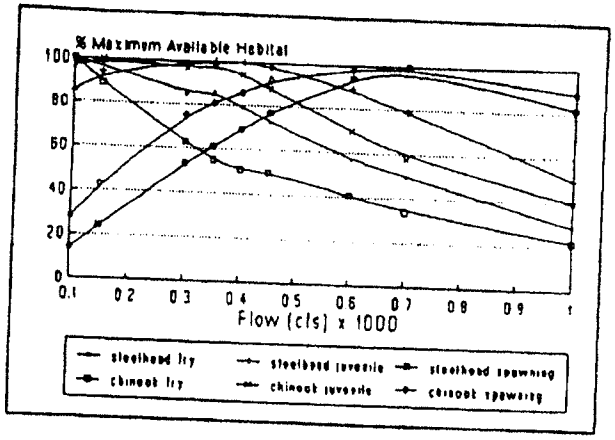

Figure 4. Percent of maximum habitat available for fish species life stages under varying flows for the Yuba River in the Garcia gravel pit reach (between Englebright reservoir and Daguerre Point dam) (Source: California Department of Fish and Game 1991, as modified by the staff).

As we said, providing the CDFG flows is beyond the capacity of the Narrows Project. In addition, PG&E doesn't have the ability to control streamflow 26 miles downstream at the confluence of the Yuba and Feather River because of YCWA's water right diversions at Daguerre Point dam. Although we agree that higher streamflow from the Yuba River would be necessary to attract American shad, it is beyond the resources of the Narrows No.1 project to do this. Our recommendations are instead directed to the upper 12 miles of river below Englebright dam and above Daguerre Point dam for salmonid species, as discussed in the streamflow and fisheries sections.

c. Ramping Rates

Increasing and suddenly decreasing streamflow releases as a result of changing project operation, would suddenly decrease the

amount of water in the Yuba River below the two powerhouses and could strand some fish, especially juveniles, in small, shallow pools. Once trapped in these pools, fish are subjected to warmer water temperatures and predators. In addition, these pools could quickly dry up, killing the fish in the river.

As we noted, the salmonid populations of the Yuba River comprise a valuable fishery. CDFG and FWS have not recommended, nor has PG&E suggested, a rate of change of streamflow from the Narrows powerhouse.

We are recommending PG&E use its storage in Englebright reservoir, to maintain flows at Englebright of 700 cfs and 450 cfs at various times of the year. This regulated streamflow would improve fish habitat over existing conditions when streamflow would otherwise be less than the designated flow schedule. YCWA's licensed Narrow No. 2 powerhouse currently operates with a ramping rate of 500 cfs per hour. Although this ramping rate is probably appropriate for higher flows (New Narrows operates from 750 cfs to 2560 cfs), we believe a slower ramping rate for flows less than 700 cfs from Narrows No. 1 powerhouse is needed. At lower streamflows, changes in water surface elevation can be more critical in the riffle areas below the Narrows canyon. A slower ramping rate would reduce impacts in these riffle areas to salmonid eggs, rearing juveniles, and benthos.

Therefore, we believe PG&E should reduce the rate of change in streamflow to prevent stranding fish when altering the volume of streamflow discharged from the Narrows powerhouse. We recommend PG&E implement a conservative, interim ramping rate that would not alter streamflow downstream of the powerhouse at a rate greater than 30 percent of the existing streamflow or 200 cfs per hour, which ever is less. Experience at other projects has shown this rate to be acceptable in most cases. PG&E should conduct a site-specific study that would determine if the amount of water discharged from Narrows No. 1 powerhouse is ramped at a rate sufficient to allow fish to move to protected areas of deeper pools. PG&E should also include in their ramping rate study an analysis of how the stranding of fish in the Yuba River would be affected by the coordinated operation of the 2 powerhouses. PG&E should maintain and operate streamgages to monitor ramping rates during project operations.

d. Cumulative Impacts

The Council on Environmental Quality defines cumulative impacts as impacts on the environment that result from adding the effects of an action to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. The Council says cumulative impacts can result from individually minor but collectively

significant actions taking place over a period of time (40 CFR, part 1508.7). The geographical area included in the cumulative impact analysis is limited to the Feather and Yuba River Basins.

Anadromous fish resources of the Feather and Yuba River basins are adversely affected by: (1) loss of habitat from construction of impassable dams; (2) unfavorable flow and water temperature regimes; (3) reduced recruitment of spawning gravels; (4) loss of fish cover and food production from channelization; (5) loss of fish at irrigation diversions; (6) increased predation; and (7) over-harvesting.

We recommended in section B.2.a. that PG&E use its storage above elevation 514 to maintain an increased minimum flow from Narrows powerhouse. This increased streamflow would enhance the aquatic habitat over existing conditions, by providing a small increase in useable fish habitat for salmonids (figure 4) and reduce water temperature by as much as 4°F in some months between Englebright and Daguerre Point dams. Therefore, licensing of the project would not add to cumulative impacts to target resources (anadromous fish) in the basin.

4. Vegetation

Affected Environment: The project is located within the steep-walled canyon of the Yuba River immediately below Englebright dam. The penstock and powerhouse are in a rock outcrop plant community, and the upper parts of the tramline and substation are in an oak and pine woodland. The dominant species in the rock outcrop areas is Selaginella hansenii, a moss-like vascular plant. The dominant trees in the woodland are blue oak and digger pine. Other tree species include valley oak interior live oak and California buckeye.

Beak Consultants (1986-1988) described vegetation in and along the Yuba River below Englebright dam. Vegetation in the first 2.0 miles below the dam is mostly oak and pine woodland (97 percent), with some riparian forest (3 percent). The dominant species of the riparian forest are Fremont cottonwood, white alder, and various willows. Vegetation in the next 10.3 miles of the river downstream to Daguerre Point dam is mostly riparian forest (44 percent), with smaller amounts of oak and pine woodland (35 percent), hydraulic mine tailings (16 percent), and urban and agricultural areas (5 percent).

Environmental Impacts and Recommendations: PG&E does not propose any new construction at the project site, and we do not foresee any potential impacts to upland vegetation from continued operation of the project. Beak Consultants (1986-1988) reported how past flow releases from Englebright dam, including releases from the project, have influenced the riparian community of the lower Yuba River. In this section we address how continued

operation of the project could affect downstream riparian vegetation.

Beak Consultants (1986-1988) concluded that riparian vegetation along the Yuba River below Englebright dam has expanded since the completion of New Bullards Bar dam, located about 6 miles above Englebright. The additional storage capacity above New Bullards Bar is used to capture high spring flows, which has stabilized flows below Englebright and reduced the scouring forces that formerly maintained the riparian community of the lower Yuba River in an early successional stage.

We discuss the streamflow proposals of PG&E and the agencies and present our own recommendations in the Water Resources, and Fisheries sections. None of the alternatives we examined would significantly alter the annual volume of flows released from the Narrows powerhouse or increase the frequency or magnitude of high flow events, which are factors that limit the riparian community of the lower Yuba River. FWS says that flows adequate to protect fish populations in the lower Yuba River would protect riparian vegetation and wetlands adjacent to the river (letter to PG&E dated May 29, 1990). Because riparian vegetation has expanded under current operations and we recommend only a slight modification of current operations, we believe our recommended operations would adequately protect the riparian community of the lower Yuba River.

Unavoidable Adverse Impacts: None.

5. Wildlife Resources

Affected Environment: About 38 commercially and recreationally important wildlife species may occur in the project vicinity, including 20 waterfowl, 4 upland game birds, 8 furbearers, and 6 game mammals. Because the actual project area is relatively small (26 acres), few of these would occur in the project area at any given time.

Ducks and geese use Englebright reservoir, but are more common in the Yuba Goldfield wetlands located adjacent to the Yuba River approximately 9 miles downstream of the project. The several furbearers that may occur in the vicinity are not trapped for commercial purposes. Game animals, including mule deer turkey, California quail, and western gray squirrel are abundant in the oak and pine woodland that surrounds the project.

Environmental Impacts and Recommendations: As we said in section 4, we do not expect any change to either upland or riparian vegetation under continued operation of the Narrows Project. Wildlife populations are highly dependent upon vegetation conditions; therefore, we also do not expect any adverse impacts to terrestrial animals. Birds and mammals that

depend on fish, such as the bald eagle (Haliaeetus leucocephalus) might benefit from changes to the pattern of releases from the project that would enhance fishery resources in the lower Yuba River. These flow-related issues are discussed in sections 2 and 3.

PG&E says no transmission lines are associated with the project; however, aerial transmission lines (about 400 feet long, shown as 11-kV lines in Exhibit F-5) connect the powerhouse to the substation within the project boundaries. FWS reports that several species of raptors, including golden eagles and bald eagles, occur in the project area, and recommends that PG&E inspect and, if necessary, modify these lines to prevent raptor electrocutions. Although records of project-specific raptor mortality are unavailable, we agree that the existing lines may present a minor electrocution hazard to raptors, including the endangered bald eagle, and that PG&E should investigate the need for modifications of the lines.

We recommend that PG&E modify the lines as necessary to ensure that the lines conform to raptor protection guidelines described in Suggested practices for raptor protection on power lines: the state of the art in 1981 (Raptor Research Foundation, Inc. 1981). Because of the short length of the lines, any modifications would have negligible cost.

Unavoidable Adverse Impacts: None.

6. Threatened and Endangered Species

Affected Environment: FWS advised PG&E by letter dated April 18, 1986, that the bald eagle, which is federally listed as endangered, may occur in the project area. FWS also said that 2 candidate plant species may occur in the project area; cedar crest allocarya (Plagiobothrys glyptocarpus var. modestus), and Scadden Flat checkerbloom (Sidalcea stipularis). By letter to the Commission dated July 3, 1990, FWS said that the federally-designated threatened valley elderberry longhorn beetle (Desmocerus californicus dimorphus), and two additional candidate species, the California red-legged frog (Rana aurora draytoni) and the Sacramento Valley tiger beetle (Cicindela hirticollis abrupta) may also occur near the project.

PG&E says bald eagles are present along the Yuba River and at Englebright reservoir during October through April. PG&E surveyed the project area and nearby Englebright reservoir in February, 1987, and observed a single immature bald eagle at the upper end of the reservoir. PG&E describes the reservoir as marginal habitat for bald eagles due to a lack of perch sites and a lack of fish and waterfowl to eat. This characterization is supported by the results of the National Wildlife Federation's mid-winter bald eagle surveys of Englebright reservoir between

1979 and 1986. At least 11 bald eagles were observed in January, 1979, but less than 2 were observed in all subsequent years.

On three occasions in April and June, 1987, PG&E surveyed the project area for cedar crest allocarya and Scadden Flat checkerbloom and did not find any plants of either species. The population status in the project area of the California red-legged frog and the Sacramento Valley tiger beetle is unknown.

Environmental Impacts and Recommendations: Because the project would not adversely affect riparian or wetlands vegetation or potential upland perch sites (see section 4 - Vegetation), continued operation of the Narrows project would not adversely affect these habitat types used by bald eagles. Bald eagles might benefit from changes to the pattern of releases from the project that would enhance fishery resources in the lower Yuba River (see sections 2 and 3 - Water Resources and Fisheries), because bald eagles prey upon fish.

FWS agrees that continued operation of the project would not adversely affect the bald eagle, but because the eagle is expanding its use of the project vicinity, FWS recommends a comprehensive survey of the project vicinity and studies to determine potential habitat enhancement measures. Beyond our recommendation to modify the transmission line to prevent electrocution, we do not recognize any reasonable means for enhancing bald eagle habitat within the project boundaries and we consider the FWS recommendation for further bald eagle surveys and studies inappropriate.

In July 1991, PG&E surveyed the project area and the shoreline of Englebright reservoir for the valley elderberry longhorn beetle and found no evidence of this species presence. Reviewing the survey results, FWS concluded that licensing the Narrows project would not affect the continued existence of the beetle (White 1991b).

The two plant species that are candidates for the endangered species list, cedar crest allocarya and Scadden Flat checkerbloom, do not occur in the project area. FWS reviewed the results of the PG&E surveys for these species and says it is no longer concerned about potential impacts to these species as a result of project operations.

Unavoidable Adverse Impacts: None.

7. Recreation and Land Use

Affected Environment: The project is located along the steep walls of the Yuba River canyon, approximately a quarter of a mile downstream from Englebright reservoir. The terrain here is extremely rugged: the steep slopes and rocky soils limit

recreational development, and the steep topography of the project area prevents public access to the project site.

Along the canyon below the project, dispersed recreational activities occur--hiking, hunting, fishing, recreational mining, and rafting--but access is limited by steep topography, lack of public roads and hike-in access, and private property.

The Corps has developed Englebright reservoir extensively. Along the 24 miles of shoreline are developed facilities including: (1) 75 campsites and 4 picnic sites--all accessible only by boat; (2) 11 picnic sites accessible by road; (3) 2 boat launching ramps maintained by the Corps, and (4) a private marina operated by a concessionaire. The reservoir has a water surface area of about 800 acres at the normal lake surface elevation of 522 feet.

Englebright reservoir's two boat ramps, Headquarters and Joe Miller Ravine, are usable down to lake surface elevations of 500 feet and 517 feet, respectively. The Corp has recently scheduled new surfaces for both ramps, and the Joe Miller Ravine ramp will be extended to a usable elevation of 513 or 514 feet in the near future (personal communication, Doug Grothe, Park Manager, Englebright reservoir, U.S. Army Corps of Engineers, Smartville, California, October 17, 1991).

In 1985, the Corps's estimated annual use at Englebright reservoir was 190,000 visitor days. Since then, recreational use at Englebright reservoir has increased substantially. Although most California reservoirs have had severe drops in total water surface area, the operators at Englebright reservoir have kept water levels near normal the past several years--making it one of the more popular recreational reservoirs in the region (personal communication, Doug Grothe, Park Manager, Englebright reservoir, U.S. Army Corps of Engineers, Smartville, California, March 20, 1991).

Except for the Corps's recreational facilities at Englebright reservoir, there's little development near the project. The project and all the lands next to it are designated for low intensity uses--agriculture, recreation, and open space.

Environmental Impacts and Recommendations:

Sign and Interpretive Display

Relicensing the proposed project would provide opportunities for enhancing public use at the Corps Englebright reservoir.

As we said, PG&E has proposed a cooperative funding agreement with the Corps and YCWA for: (1) signs at the two boat launching ramps and at the marina at Englebright reservoir,

showing times and areas where caution should be taken when mooring a boat for extended periods of time; and (2) an interpretive display near the Corps's headquarters at Englebright reservoir, describing the Yuba river watershed and the river's hydroelectric system and operation.

Signs and an interpretive display would enhance public use of Englebright reservoir. We therefore recommend that the proposal for a cooperative funding agreement between PG&E, YCWA, and the Corps be approved. Design, wording, and specifications should follow standards in accordance with the Corps's Sign Standards Manual, EP 310-1-6 A&B. The total estimated cost for constructing and installing the signs and interpretive display is $16,000.

Reservoir Drawdown

The majority of recreational activities on Englebright reservoir are boat related. These activities are adversely impacted when drawdowns occur during the recreation season. For example, if lake levels drop to an elevation below 514 feet msl the soon-to-be-lengthened boat ramp would no longer be usable. Drawdowns also reduce the amount of usable reservoir surface. If lake levels are dropped from 522 to 514 feet msl, total surface acreage is reduced from 800 acres to 725 acres.

To enhance the Yuba River fishery, FWS and CDFG recommend minimum flows for May and June (see Water Resources section) that would draw Englebright reservoir's surface elevation down to approximately 450 feet msl--2 out of every 3 years (table 4). Since PG&E has no storage rights to refill from May through September, both boat ramps would be unusable during the recreation season. Further, the total surface acreage would be reduced to 400 feet.

Our recommended minimum flows should have little to no effect on recreation since Englebright reservoir has already maintained these flows 92.5 percent of the time from 1970 to 1990. Since 1980, Englebright reservoir's end-of-month elevations for May through August were all above 520 feet and the lowest September elevation was 516 feet.

Unavoidable Adverse Impacts: None.

8. Visual Resources

Affected Environment: The aesthetic character of the project area is dominated by both the Yuba River Canyon, cutting through the Sierra Nevada foothills, and the Corps's Englebright reservoir. The project's elevations range from 900 feet msl at the substation to 280 feet msl in the canyon at the base of the powerhouse.

Rocky exposures characterize the river bed and canyon walls around the powerhouse. Many of the steep slopes have no vegetation; where thin soils exist, there's herbaceous vegetation. The substation is just below the top of a hill, in a grass clearing, surrounded by a dense oak woodland.

An overlook above the east side of the Englebright dam gives hikers a downstream view of the Yuba River Canyon, but the canyon walls obscure the powerhouse. Because of topography and vegetation, the powerhouse and substation can't be seen from Englebright Lake. Relatively few recreationists ever see the powerhouse, penstock, or transmission line to the substation--they are not visible from public access roads.

Environmental Impacts and Recommendations: Since no project improvements or changes in facility operations are proposed and existing project facilities are hidden by the existing topography and vegetation, no visual mitigation is required. However, recommended minimum flows from Englebright reservoir could reduce the amount of water stored in the reservoir. If not replenished, once submerged shoreline would be exposed, which in turn reduces the aesthetic quality of the reservoir. The significance of this impact depends on amount of shoreline exposed and time of year the exposure occurs, in other words, how many people see it.

FWS and CDFG recommended minimum flows for May and June would reduce the surface elevation of Englebright reservoir from an average of 522 feet to approximately 450 feet, given PG&E's storage rights and refill constraints (see Water Resources, streamflow section). This drawdown would occur during peak recreational use--May through September. Our recommended flows would require only minor changes in current operation, resulting in negligible impacts upon reservoir surface levels.

Unavoidable Adverse Impacts: None.

9. Cultural Resources

Affected Environment: 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 of Historic Places would be affected by the project (letters from Ms. Kathryn Gualtieri, State Historic Preservation Officer, California Department of Parks and Recreation, Sacramento, California, May 1, 1986; and Dr. Stephanie Rodeffer, Chief, Interagency Archeological Services, National Park Service, San Francisco, California, April 13, 1989).

Environmental Impacts and Recommendations: The SHPO'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 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, the licensee should consult with the SHPO about the need to conduct a cultural resources survey and to implement avoidance or mitigative measures, and conduct any necessary survey. The licensee 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 written comments on the report. The survey and the report should be based on the recommendations of the SHPO, and adhere to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservations. The licensee 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

Under this alternative, the Commission would deny the license.

Denying the license would force PG&E to: (1) stop operating the project for power generation; and (2) find other sources of capacity and energy they could develop to meet their forecasted load growth.

Other possible resource options:

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