

80 FERC ¶ 62,171

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Pacific Gas and Electric Co. ) Project No. 803-038

ORDER APPROVING WATER TEMPERATURE STUDY REPORT  
AUG 21 1997

On January 31, 1994, Pacific Gas and Electric Company (licensee), filed a water temperature and stream flow monitoring study for the DeSabra-Centerville Project. The study was required under article 402 of the Order Amending License. <sup>1/</sup> Article 402 specifies that the Commission may direct the licensee to modify project structures or operations if the results of the study indicate that changes are necessary. The DeSabra-Centerville Project is located on Butte Creek and the West Branch Feather River (WBFR) in Butte County, California. Figure 1 shows the project dams, reservoirs, canals, and powerhouses.

The purpose of the study was to determine if changes in operation of the project storage reservoirs, canals, or upstream diversion dams could reduce summer water temperatures downstream of the Lower Centerville Diversion Dam (LCDD).

LICENSEE'S STUDY RESULTS

Different operational scenarios were identified and evaluated using data collected during the two-year monitoring program. Findings of the evaluation are:

- Round Valley Reservoir is too small and warms too early in the season to provide a significant supply of cool water to reduce temperatures at LCDD.
- Philbrook Reservoir has a limited supply of cool water. The combined effect of unregulated WBFR flows and Philbrook releases currently provide relatively cool water for diversion to Butte Creek.
- Increased diversion of the WBFR into Hendricks Canal would not lower temperatures in the canal but would reduce residence time and heating in DeSabra Forebay, which would reduce temperatures slightly at LCDD. However, increased diversion may negatively impact the amount of aquatic habitat in the WBFR downstream of Hendricks Head Dam because of reduced instream flow releases.

<sup>1/</sup> 58 FERC ¶ 62,093 (1992).

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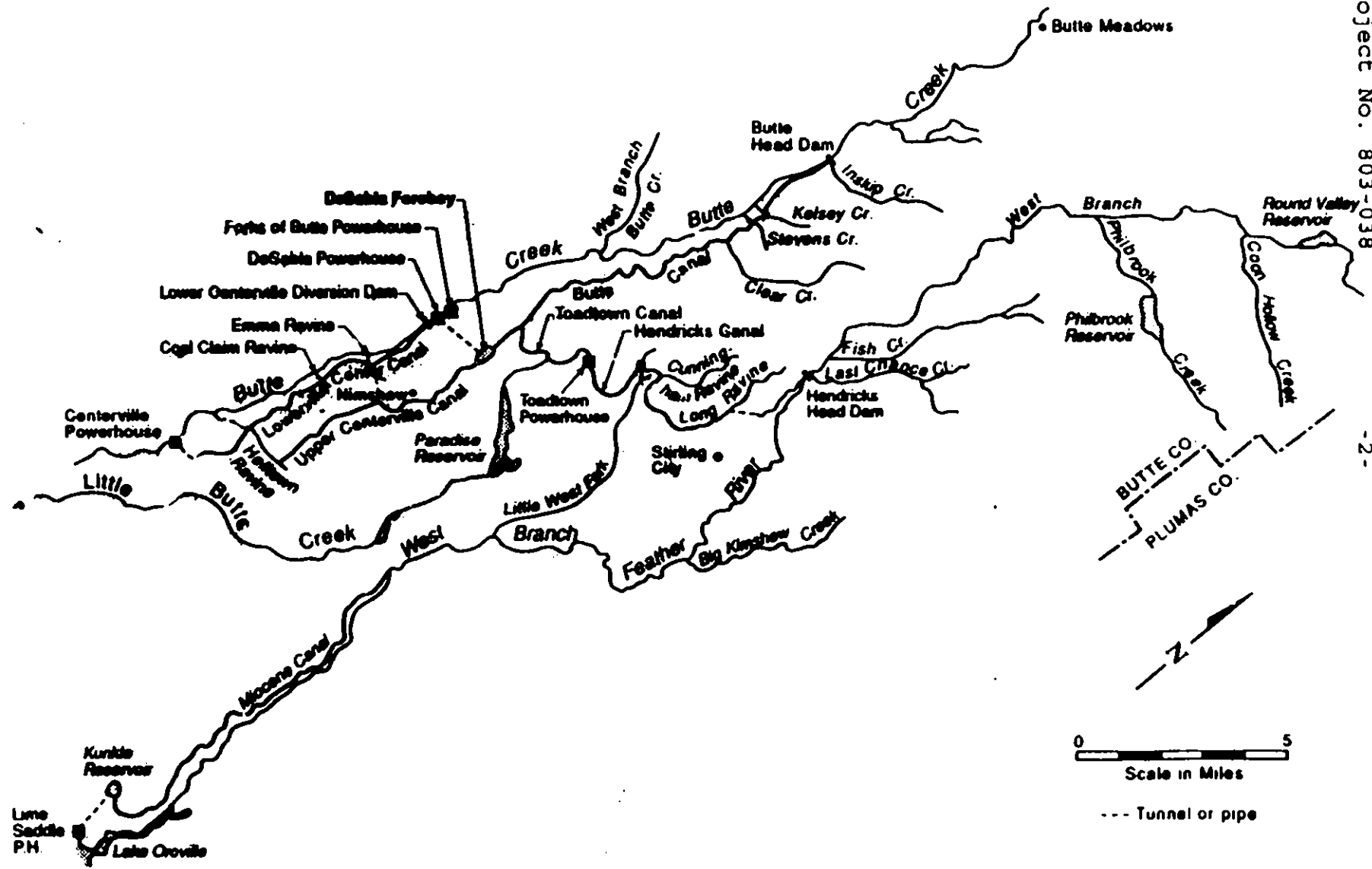


Figure 1. DeSable-Centerville project area.

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- Decreased diversion into Hendricks Canal would produce warmer temperatures at LCDD by reducing inflow and increasing residence time in DeSabra Forebay, and by reducing the amount of cool WBFR water delivered to LCDD. Increased diversion of Butte Creek into Butte Canal would not lower temperatures in the canal but would reduce residence time and heating in DeSabra Forebay, which would reduce temperatures slightly at LCDD. However, increased diversion may negatively impact the amount of aquatic habitat in Butte Creek downstream of Butte Head Dam because of reduced instream flow releases.
- Decreased diversion of Butte Creek into Butte Canal would produce warmer temperatures at LCDD by increasing residence time in DeSabra Forebay, and by leaving more water in the natural Butte Creek channel, which warms more quickly than Butte Canal.
- Eliminating DeSabra Forebay to reduce retention time is not recommended because of operational constraints associated with DeSabra Powerhouse. Channelizing inflow toward the intake to reduce mixing and indirectly reduce retention time would produce only incremental benefits for temperatures at LCDD. The resultant increased capacity would increase retention time during low inflow periods, and may increase temperatures arriving at LCDD.

## AGENCY COMMENTS

In a letter dated January 20, 1994, CDF&G requested that the licensee further evaluate the following measures to reduce downstream water temperatures: (1) releasing water from Round Valley reservoir prior to the period specified in the 1983 agreement with CDF&G; (2) the negative impacts on the aquatic habitat that might result from increasing diversions from the WBFR into the Hendricks canal; and (3) a separate channel around DeSabra reservoir to channelize flows, reduce temperatures, and maintain recreational benefits of the forebay. CDF&G states that the potential incremental temperature decreases that could result from these measures might provide a positive benefit to temperatures below the LCDD. CDF&G also recommends that minimum flows be maintained at 40 cfs until after the spring run chinook emergence, which may be as late as January 1.

The U.S. Fish and Wildlife Service (FWS), in a letter dated January 24, 1994: (1) agrees with the licensee's conclusion to release water from Round Valley reservoir earlier than the July 15 date stipulated in its agreement with CDF&G and recommends further study of this measure; (2) requests additional information and study on the value of June releases from Philbrook reservoir including any data that would identify the effect of early Philbrook releases on temperature control in the

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late summer months; (3) agrees with the licensee that additional diversion of WBFR or Butte Creek flows would not be an effective way to reduce warming of DeSabla discharges; (4) disagrees with the licensee's recommendation for reducing DeSabla forebay warming effects by increasing the canal flow rate and points to specific observations in the flow and temperature data that show high flow rates cannot be sustained in dry years and late in the summer when water temperatures are greatest; (5) agrees with the licensee that the DeSabla forebay dredging option is not a desirable alternative to reduce canal water warming; (6) requests a description of the role of the forebay in the DeSabla powerhouse operation and additional study of the possibility of modifying or eliminating the DeSabla forebay; and (7) requests a discussion of the possibility of maintaining the 40 cfs flow in dry years beyond the September 15 date specified in the license.

#### LICENSEE'S RESPONSE TO AGENCY COMMENTS

The licensee noted that releases from the Round Valley reservoir would potentially reduce temperatures downstream of DeSabla, but that the effect would be minor. An early release would require an amendment to its 1983 agreement with CDF&G. The licensee does not propose additional studies of these effects.

Relative to CDF&G's comments on additional WBFR and Butte Creek diversions, the licensee notes that the possible benefits are small. The licensee indicates that it has IFIM data collected in the 1970's to evaluate the effects of increased diversions from Hendricks Head dam on physical aspects of aquatic habitat on the lower WBFR. However, there is no data on the effect of additional diversions on water temperatures of the lower WBFR. The licensee states that the temperature data would be costly to collect. More importantly, the licensee notes FWS's negative comment on this alternative and expects that it would not be possible to negotiate reduction in flows downstream of Hendricks Head dam with all parties. The licensee states that unless both CDF&G and FWS agreed that it was more beneficial to provide cool flows below LCDD than to maintain habitat in the lower WBFR, it would not undertake additional studies of the effects of increasing diversion flows at Hendricks Head dam.

To address CDF&G's recommendation to channelize flows in the DeSabla forebay, PG&E pointed out that 14,435 trout are stocked annually in the forebay. If the forebay is cut off from canal inflow, temperatures in the forebay would increase beyond the tolerance of the trout.

In response to CDF&G's recommendation to increase flows below the LCDD, the licensee notes that the current minimum flows were recommended by CDF&G, FWS, and the licensee's biologists. The 30 cfs provided in normal water years was specifically considered for maintaining salmon redds. However, the licensee

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recognizes that the low water year flow reductions after September 15 may affect spawning success. Therefore, the licensee pledges to continue to work with the agencies and voluntarily provide extra flows in this period, as necessary.

In response to FWS's comment requesting additional data and study on the value of the Philbrook release, the licensee notes that this was not a part of the approved study plan implemented in 1992 and 1993. The licensee states that it is required to maintain a minimum pool until July 15 for recreational use and for downstream water users in late summer.

The licensee notes that FWS's analysis of the availability of water based on the 1992 and 1993 study results was misleading and did not take into account planned canal shutdowns for maintenance and testing. FWS's observations on specific low inflow conditions corresponded to canal maintenance and testing conditions. Although the licensee disagrees with FWS's analysis of the sustainability of canal flows, it now recommends that future canal maintenance be avoided in the period from July 1 through September 15 when temperature is critical.

In response to FWS's questions about the DeSabra forebay, the licensee explained the necessity of the forebay to project operations. In the event of an unplanned unit outage, the forebay absorbs the momentum of the canal flows to prevent spillage into the earthen ravine adjacent to the project. Repeated spills would cause erosion and have adverse effects on downstream water quality. Also, the forebay is used for recreational fishing.

#### DISCUSSION AND CONCLUSIONS

The reservoir waters of Round Valley warmed more quickly than WBFR flows at Hendricks Head dam in 1992 and 1993. In June, temperatures at Round Valley reservoir were more than 3°C greater than the WBFR. When flows were released in 1993, the reservoir temperatures had reached 20°C. The objective of the study is to identify sources of water and methods which would limit the maximum daily temperature in the chinook holding area, 3.8 miles downstream of the LCDD, to 20°C. Inflows from Round Valley in the 20°C temperature range tend to increase the water temperatures in the WBFR and in Butte Creek below the DeSabra powerhouse. Based on the figures in the report, we conclude that if Round Valley is not drafted by mid-June, water temperatures from this source would not enhance and may increase temperatures downstream of the LCDD.

We estimate that a 17°C outflow from Round Valley reservoir would achieve benefits at the DeSabra tailrace. This is based on travel times, ambient water temperatures, and estimates of the rate of water temperature rise associated with water travel

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routes. We expect Round Valley releases to increase by about 3°C before reaching the LCDD. Table 1 shows the estimated values for water temperature and travel times in four project segments.

Table 1. Time of Travel and Temperature Rise

Stream or Canal Reach	Travel Time	Temperature Rise
Through DeSabra Forebay	5 hours	1°C
Hendricks Head Dam to Butte Canal	5 hours	0.5°C
Philbrook Reservoir to Hendricks Head Dam	12 hours	1°C <sup>a</sup>
Round Valley Reservoir to Philbrook Confluence	8 hours	0.5°C <sup>a</sup>

<sup>a</sup> Estimated base on comparison to travel time and temperature rise measured from Hendricks Head dam to Butte canal.

Any Round Valley release greater than approximately 17°C would tend to increase the temperature at the LCDD beyond the 20°C goal for the chinook salmon. The licensee's plan provides flexibility to continue to draw water from Round Valley whenever canal capacity permits. However, we disagree with the licensee's plan because higher temperatures will result downstream of the LCDD. CDF&G and FWS request additional study on this issue even though FWS agrees with PG&E's concept. We disagree with the agencies on the value of additional study because this reservoir will have little effect on decreasing late summer temperatures below the LCDD. Therefore, the licensee should, to the extent possible under the 1983 Agreement with CDF&G, limit the discharge from Round Valley reservoir to the minimum flow whenever the average daily temperature of the discharge exceeds 17°C.

We also examined Philbrook reservoir temperatures and note that Philbrook water temperatures rise at a slower rate over the summer season. Water temperatures in Philbrook do not exceed temperatures at Hendricks Head dam until mid-July or August, depending on dry or wet water years. In addition, Philbrook temperatures remained in the range that is suitable for salmon through September, except for several short periods in 1992. In 1992 and 1993, the average daily temperature of the Philbrook reservoir discharge exceeded 17°C in August and September. Therefore, a release throughout the summer season, on a basis of filling available space in the canal would moderate temperatures below DeSabra throughout the season. As can be seen in Table 1, the expected temperature rise between Philbrook reservoir and the DeSabra forebay is approximately 2.5°C. Therefore, if the average daily discharge temperature at Philbrook exceeds 18°C, any water release will not contribute to the goal of maintaining temperatures below 20°C at the DeSabra tailwater. At

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temperatures exceeding 18°C, the Philbrook discharge should be limited to the minimum flow of 2 cfs.

We estimate that a suitable outflow temperature for the Philbrook reservoir to achieve benefits at the DeSabra tailrace is 18°C based on our estimate that releases from Philbrook would increase by about 2°C before these flows reached the LCDD. The licensee's plan to continue to release water from Philbrook whenever the canal space permits would result in suitable outflow temperatures in most water years. However, in drought years with high ambient air temperatures, Philbrook releases could exceed our recommended 18°C limit, and temperatures could increase below the LCDD. FWS seeks additional study of the effect of Philbrook releases. We do not agree that additional studies are warranted because current data are sufficient to determine a suitable outflow temperature for releases from Philbrook. However, implementation of our proposal to limit Philbrook releases to periods when outflow temperatures are 18°C or less would not preclude FWS's ability to conduct additional studies in the future. Therefore, the licensee should, to the extent possible under the 1983 Agreement with CDF&G, limit the discharge from Philbrook reservoir to the minimum flow whenever the average daily temperature of the discharge exceeds 18°C.

A more problematic issue in regulating the releases from both Round Valley and Philbrook is that the licensee is required to pass flows from these reservoirs into the WBFR and over Hendricks Head dam under an April 19, 1927 agreement with CWSC. This agreement could call for releases when the impounded reservoir waters are much warmer than the WBFR and could result in temperature increases to the diversion flows from Hendricks Head dam.

The impacts of additional diversion of WBFR flows to aquatic habitat and downstream water users are not well documented. In a normal water year, the maximum amount of additional diversion available is only 15 cfs, which corresponds to the required minimum flow release at Hendricks Head dam. The licensee's 1993 studies demonstrate that there are sufficient flows and cool enough water conditions in a normal year to provide sufficient flows and temperatures to sustain chinook in Butte Creek without the additional 15 cfs that might be diverted from the WBFR. Although in dry years the license requires a release of 7 cfs at Hendricks Head dam, the licensee is also obligated by an April 19, 1927 agreement with CWSC to deliver additional water beyond the 15 or 7 cfs minimum flow below Hendricks Head dam. Without this obligation, some cooler water flows could be diverted to Butte Creek below DeSabra powerhouse in the critical periods of dry water years. Although the licensee expressed skepticism that agreement could be negotiated on this issue, we agree with CDF&G that the licensee should further explore the option of increasing the diversion flows at Hendricks Head dam.

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Therefore, we recommend that the licensee consult with CWSC to develop an alternate agreement to limit the release of warm water from Round Valley and Philbrook reservoirs and releases from the WBFR at Hendricks Head dam.

Additional diversion from Butte Creek at Butte Creek diversion dam would have a positive effect on the water temperatures below the DeSabra powerhouse, because the canal transit time is shorter, and the canal is deeper than the natural stream channel in the upper portion of Butte Creek. However, the minimum flow release at Butte Creek diversion dam is only 16 cfs in a normal water year and 7 cfs in a dry year. The minimum flow in the bypass warms more in the natural river channel than in the diversion canal. This small quantity would have a very small incremental improvement on temperatures below the DeSabra powerhouse. On this issue, we are in agreement with the licensee's plan and FWS's comments. In addition, a smaller release at Butte Creek diversion dam would reduce aquatic habitat in the reach of the Butte Creek between Butte Creek dam and the DeSabra powerhouse.

The licensee's description of the purpose and continued need to maintain the DeSabra forebay is reasonable and consistent with practices employed at other hydroelectric projects with long intake canals. With the long canals feeding into this forebay, a loss of this storage capacity could reduce the operational flexibility the licensee uses to maintain canal structures. Other options, such as a spillway, would require a long canal or other large-sized structures, which would be more costly than the forebay. We also agree that any channelization of flow through the forebay to reduce warming would affect the ability of the current operation to maintain a stocked trout fishery at this location. However, if CDF&G and FWS agree that cool water temperatures below the LCDD are more important than maintaining stocked trout in the DeSabra forebay, some accommodation to decrease forebay warming could be achieved.

The licensee's report provides no new information to alter the conclusion reached in the EA that higher flows below the LCDD would not ensure cooler water for the salmon in the Centerville bypass. The agencies present no new information to dispute the conclusions in the EA. Therefore, we will not modify the required minimum flows required under article 39.

The Director orders:

(A) The licensee's report on the result of the temperature and streamflow monitoring study, filed pursuant to article 402 of the Order Amending License, as modified by ordering paragraphs (B) through (E) below, is approved.



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(B) Within 6 months of the issuance of this order, the licensee shall file with the Commission, for approval, a plan to identify sources of water for users downstream of Hendricks Head diversion dam other than the April 19, 1927, agreement with CWSC. The Licensee's plan shall include documentation of all flows and timing of all releases required by CWSC in the last 10 years. The plan shall also contain a proposal, for Commission approval, for eliminating or reducing the licensee's obligations to continue to provide downstream flows, beyond those specified in the license order, at Hendricks Head dam, and a schedule for implementation. The report will include a discussion of alternate sources of water for downstream users and any costs associated with implementing the plan. The plan shall be developed in consultation with FWS and CDF&G.

The licensee shall include with the plan documentation of agency 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 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 site-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.

(C) The licensee shall limit the discharge from Round Valley reservoir to the minimum flow whenever the average daily temperature of the discharge exceeds 17°C, to the extent possible under the 1983 Agreement with CDF&G.

(D) The licensee shall limit the discharge from Philbrook reservoir to the minimum flow whenever the average daily temperature of the discharge exceeds 18°C, to the extent possible under the 1983 Agreement with CDF&G.

(E) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.



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