

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the State Water)
Resources Control Board's Review)
On Its Own Motion of Order)
No. 88-043 of the California)
Regional Water Quality Control)
Board, Central Valley Region,)
)
UNITED STATES DEPARTMENT OF THE)
INTERIOR, BUREAU OF RECLAMATION,)
)
Real Party in Interest. Our File)
No. A-540.)

ORDER NO. WQ 89-18

BY THE BOARD:

On April 20, 1989, we granted review, on our own motion, of Order No. 88-043 of the California Regional Water Quality Control Board, Central Valley Region (Regional Board). Order No. 88-043, issued on March 24, 1988, to the United States Department of the Interior, Bureau of Reclamation (Bureau), sets waste discharge requirements for Shasta Dam, Keswick Dam, and the Spring Creek Power Plant. These waste discharge requirements include receiving water limitations for temperature, turbidity, and dissolved oxygen.

Releases from Shasta Dam and related facilities have a substantial impact on water quality and beneficial uses in the upper Sacramento River. Of greatest concern are the effects of temperature on salmon. We believe these issues can best be

resolved under our water rights authority. The State Water Resources Control Board (State Board) will conduct the appropriate water right proceedings necessary to address these issues.

I. BACKGROUND

The Bureau operates the Shasta Unit of the Central Valley Project. Shasta Dam impounds Shasta Lake, with a storage capacity of 4.5 million acre-feet. The Sacramento, Pit, and McCloud Rivers and a number of creeks within the 6,700 square-mile watershed feed the reservoir. Releases from Shasta Dam, as well as Trinity River diversions released through the Spring Creek Power Plant, are impounded briefly behind Keswick Dam, about nine miles downstream of Shasta Dam, before release into the upper Sacramento River.

The operation of Shasta Dam affects downstream water quality. In some years, during late summer and fall, releases from the upper levels of Shasta Lake, where the water has been heated by the sun during storage, have caused river water temperatures to exceed the level set by the water quality objective for temperature in the upper Sacramento River. The water quality objective provides, in pertinent part:

"[t]emperature shall not be elevated above 56°F in the reach from Keswick Dam to Hamilton City...."
(State Board and Central Valley Regional Board, Water Quality Control Plan Report: Sacramento River Basin (5A), Sacramento-San Joaquin Delta Basin (5B), San Joaquin Basin (5C) [hereinafter cited as the "Water Quality Control Plan"] at I-4-10.)

The Water Quality Control Plan also sets water quality objectives for turbidity and dissolved oxygen. (Id. at I-4-8, I-4-11.)

1. Chinook Salmon

Chinook salmon hatched in the upper Sacramento River spend most of their lives in the ocean (2-4 years), returning to the river to reproduce. Adult salmon die after spawning. There are four distinct races or runs of Chinook salmon in the upper Sacramento River. Each run is denominated by the time of year fish migrate from the ocean into the river system to spawn.

The fall run is the largest run, and the run most important for commercial fishing. Fall run Chinook salmon migrate into the Sacramento River from July through early December and spawn from early October through early January. The fall run has declined substantially since the late 1950s and early 1960s. The number of fall run Chinook has stabilized in recent years at about half of earlier levels.

Late-fall run Chinook migrate into the Sacramento River from mid-October through mid-March and spawn from January through April. The number of late-fall run Chinook has declined over the past twenty years to about one-third of earlier levels.

Winter run Chinook enter the Sacramento River from mid-December through mid-July. Many of these fish spend extended periods in the river before spawning, which occurs from mid-April to mid-July. Before construction of Shasta and Keswick Dams, the winter run spawned during June and July in the McCloud River, where water temperatures were cool enough for spawning. After

construction of the dams, the run was sustained by releases of stored water during the summer months, providing cool enough water for spawning below the dams. The run has severely declined over the past twenty years, however, to about one-twentieth of the number of fish observed in the late 1960s. The California Fish and Game Commission has listed the winter run Chinook salmon as endangered under the California Endangered Species Act.

(14 Cal. Code Reg. § 670.5(a)(2)(M).) On August 4, 1989, the National Marine Fisheries Service adopted an emergency rule listing the winter run as a threatened species under the federal Endangered Species Act, and designating the portion of the Sacramento River between Keswick Dam and the Red Bluff Diversion Dam as critical habitat. (National Marine Fisheries Service, Endangered and Threatened Species, Critical Habitat, Winter-run Chinook Salmon, 54 Fed. Reg. 32085 (1989).)

Spring run Chinook enter the Sacramento River from late March through early September. Like the winter run, these fish often spend an extended period in the river before spawning, which occurs in September or early October. Before construction of Shasta and Keswick Dams, these fish spawned in waters upstream of the Shasta Dam site.

Maintaining cool water temperatures is critical to the protection of Chinook salmon. Laboratory studies have observed abnormally high salmon egg and fry losses at temperatures in excess of 57.5°F, with 80-percent mortality if temperatures of 60-61°F continue for a prolonged period and 100-percent mortality

with prolonged exposure to temperatures over 62°F. In recent years, water temperatures below Keswick Dam have frequently reached levels damaging to salmon in their early life stages. During the period from 1970 through 1986, in normal water years, daily average water temperatures below Keswick Dam from July through October never exceeded 60°F, but were 56°F or greater approximately 40 percent of the time. In critically dry years, daily temperatures during these months exceeded 56°F nearly 80 percent of the time, and exceeded 60°F nearly 60 percent of the time. Higher water temperatures have contributed to the decline in the numbers of Chinook salmon.

The effect of Shasta Dam on downstream water temperatures varies by season. October water temperatures below Keswick Dam are about the same as occurred in that stretch of river before construction of Shasta Dam. Beginning in November, water temperatures below Keswick Dam are generally warmer than under natural conditions. From May through September the situation is reversed, with releases from Shasta Dam providing colder water than would otherwise occur.

The 56°F water quality objective for temperature below Keswick Dam, which is set at a level below that which would occur in the summer under natural conditions, serves to mitigate, in part, for the loss of upstream spawning habitat. Since 1942, Shasta Dam has formed an impassible barrier to upstream salmon migration, blocking access to over 187 miles of streams. Temperatures in these upper reaches are generally below 56°F.

Even during the 1977 drought, water temperatures were suitable for spawning in the reaches where winter run Chinook spawned before construction of Shasta Dam. The streams blocked by Shasta Dam provided almost all of the available habitat for the winter and spring runs, and nearly half of the total available habitat for all four runs. Fish which formerly spawned in the upstream reaches blocked by Shasta Dam are now dependent on maintenance of suitable temperatures below Keswick Dam.

2. Temperature Control and Shasta Dam¹

The temperature of releases from Shasta Dam can be controlled by controlling the depth from which the released waters are taken. Deeper waters are cooler. The difference in temperature between surface waters and deeper waters is greatest in the summer and early fall. Waters near the surface are heated by the sun, and these warmer, less dense waters stay on top. Shasta Lake is large and deep enough that it becomes thermally stratified -- with no mixing between the upper layer and cooler waters below. Later in the year, surface waters cool, the waters of the reservoir mix, and temperature differences between surface and deeper waters are not as great.

¹ The following discussion is based in part upon a Geological Survey report (Rettig, S. A. & G. C. Bortleson, *Limnological Study of Shasta Lake, Shasta County, California, With Emphasis on the Effects of the 1977 Drought*, U. S. Geological Survey, Water Resources Investigations 82-4081 (1983)), in addition to information in the record before the Regional Board. The State Board has also accepted additional evidence submitted by the Bureau and Trinity County, and responsive comments to those submittals. (See 23 Cal. Code Reg. § 2066(b).)

Shasta Dam has outlets at 742, 815, 842 and 942 feet above sea level. The spillway crests at 1,065 feet above sea level. Only the outlets at 815 feet are connected to the powerhouse. In a summer and fall of a normal year, waters drawn through these outlets comes from the middle layer of the reservoir, with temperatures ranging from about 46°F to 53°F. In some years, primarily during years of low precipitation, reservoir levels drop to the level where water drawn through the 815-foot elevation outlets comes from the upper, warmer layer, with temperatures in excess of 60°F.² Studies by the Bureau predict that as water deliveries increase, these warmer temperature conditions will occur more frequently. Shasta Dam could be modified to permit releases through the 815-foot elevation outlets to be drawn from colder waters at lower levels. The Bureau can also maintain cooler river temperatures before any modifications are designed and installed by releasing deeper waters through the lower, 742-foot level outlets, but making these releases results in a loss in power generation.

3. Order No. 88-043

Regional Board Order No. 88-043 sets waste discharge requirements for Shasta Dam, Keswick Dam and the Spring Creek Power Plant, including receiving water limitations, a schedule of compliance, and provisions relating to monitoring and reporting.

² *Extremely low lake levels also contribute to turbidity problems, with an increase in exposed shoreline resulting in resuspension of sediment.*

The receiving water limitations are based upon the water quality objectives for temperature, turbidity, and dissolved oxygen in the Water Quality Control Plan. The schedule of compliance sets deadlines for design and installation or construction of modifications to Shasta Dam to comply with the receiving water quality limitations. Regional Board Order No. 88-043 also requires the Bureau to evaluate the potential for modifications to the inlet structure for the Spring Creek Power Plant, which draws waters from Whiskeytown Reservoir, to determine if those modifications could reduce the temperature of waters drawn through the inlet structure. The order also requires construction of the modifications if the evaluation determines they would be effective.

4. Cooperative Efforts to Protect the Fishery

On May 20, 1988, the Bureau entered into a cooperative agreement with the National Marine Fisheries Service, the United States Fish and Wildlife Service, and the California Department of Fish and Game to undertake restoration actions to protect winter run Chinook salmon. (National Marine Fisheries Service, Winter-run Chinook Salmon, Notice of Determination, 53 Fed. Reg. 49722, 49723 (1988).) As part of this restoration plan the Bureau is committed to actions to control the temperature of releases from Shasta Dam. (Id. at 49726.) The Bureau has agreed to install a temperature control device, and to use cool, low-level releases from Shasta Dam as an interim measure when necessary to protect winter run Chinook salmon before the device

is installed. (Id.; Cooperative Agreement among California Department of Fish and Game, National Marine Fisheries Service, United States Bureau of Reclamation, and United States Fish and Wildlife Service to Implement Actions to Benefit Winter-Run Chinook Salmon in the Sacramento River Basin at 5-6 (May 20, 1988).) The Bureau made low level releases to protect the winter run in 1987, 1988, and 1989.

The cooperative agreement does not provide for low-level releases or other interim measures to protect other runs of Chinook salmon during the period required for installation of a temperature control device. For the fall of 1989, the Bureau is implementing an operational plan intended to achieve a temperature at Bend Bridge of 60°F between October 1 and October 15, and a temperature at Bend Bridge of 57.5°F between October 16 and December 31. The Bureau selected these temperatures in consultation with state and federal fishery agencies. In comments submitted September 15, 1989, the Bureau expressed its commitment to continuing a process of establishing water temperature requirements, to protect both the winter and fall runs.

The Bureau's comments also state that the Bureau is conducting an evaluation of alternative means of controlling the temperature of releases from the Spring Creek Power Plant, including operational changes and modification to the Spring Creek Power Plant inlet. The evaluation will be completed and made available to all interested parties by March 15, 1990.

At the September 21, 1989 State Board meeting, State Board staff presented a proposed order which, if adopted by the State Board, would have included specific conditions intended to provide water quality protection during the period required to conduct water rights proceedings. On October 16, 1989, the Bureau submitted a stipulation to the Board committing the Bureau to undertake the specific measures which would have been required by those conditions. These measures include implementation of the temperature control measures in the cooperative agreement, implementation of a program to protect spawning this fall by achieving the Sacramento River water temperatures set forth above, completion of an evaluation of alternative means of controlling the temperature of releases from the Spring Creek Power Plant, and reporting and monitoring requirements.

5. Trinity River Temperatures

The Bureau operates the Trinity River Division of the Central Valley Project in coordination with the Shasta Unit. Trinity Dam impounds Clair Engle Lake on the Trinity River, with a storage capacity of 2.4 million acre feet. Immediately downstream is Lewiston Lake, impounded behind Lewiston Dam, from where water is diverted through the Clear Creek Tunnel to Whiskeytown Reservoir on Spring Creek. From Whiskeytown Reservoir these waters pass through the Spring Creek Tunnel and are discharged from the Spring Creek Power Plant.

Over 80 percent of annual runoff of the Trinity River above Lewiston Dam is diverted through these facilities into the Sacramento River. Construction of Trinity and Lewiston Dams blocked access to 109 miles of salmon and steelhead spawning and rearing habitat on the Trinity River. After completion of these facilities salmon stocks dropped by 80 to 90 percent, and steelhead stocks dropped by 60 to 90 percent, although these stocks have recovered to some degree as a result of rehabilitation efforts by the Trinity River Task Force. (United States Department of the Interior, Fish and Wildlife Service, Environmental Impact Statement on the Management of River Flows to Mitigate the Loss of the Anadromous Fishery of the Trinity River, California at A-1 (1980).)

The anadromous fish on the Trinity River are spring and fall run Chinook salmon, coho salmon, and steelhead. Cool river water temperatures are necessary to protect spring and fall run Chinook salmon spawning beginning in September. Ordinarily, waters released from Trinity Dam in late summer and fall are very cold. If the reservoir is drawn down to a very low level, however, the reservoir may mix and lose its thermal stratification. In these conditions, releases through the powerhouse at Trinity Dam will not be drawn from a separate, deeper layer of cold water, and the temperature of waters below Lewiston Dam may be lethal to salmon eggs. This situation occurred in 1977, when river temperatures at Lewiston reached 70°F in August and September.

As part of its efforts to maintain temperatures in the upper Sacramento River, the Bureau has varied the proportion of releases from Shasta Dam and the Spring Creek Power Plant. At certain times of the year the Bureau has increased releases through the Spring Creek Power Plant and decreased releases from Shasta Dam, both to conserve more water behind Shasta Dam for later release and to reduce the need for releases which bypass Shasta Dam's hydroelectric generating facilities. The effect of these changes has been to change the timing of releases from Trinity Dam and Lewiston Lake, without any significant effect on the total amount diverted. The operational changes undertaken this year have not created a temperature problem on the Trinity River up to this point in the spawning season and will not significantly increase the risk of a temperature problem later this fall.

Decisions affecting the total amount diverted may substantially affect the risk of a temperature problem on the Trinity River. The Bureau has drawn down Clair Engle Lake this year to a point where the probability of the reservoir filling this winter is only 20 percent. Although the reservoir has been this low before without creating a temperature problem the following year, the possibility of a temperature problem on the Trinity River next year cannot be ruled out until precipitation and diversion levels are known. There is also a possibility that future changes in the timing of releases from the Spring Creek Power House could adversely affect Trinity River temperatures, particularly if residence time behind Lewiston Dam is increased.

II. CONTENTIONS AND FINDINGS

1. Contention: We raise on our own motion the issue whether the water quality aspects of releases from Shasta Dam, Keswick Dam and the Spring Creek Power Plant can best be regulated through modification of the Bureau's water right permits.

Finding: The water quality problems resulting from releases from Shasta Dam and related facilities should be addressed under our water rights authority. Accordingly, at our June 22, 1989 Board meeting, we directed the Division of Water Rights to schedule water right proceedings for the State Board to consider modifying the permits for Shasta Dam, Keswick Dam and the Spring Creek Power Plant to set appropriate conditions to maintain water quality in the upper Sacramento River.

The water rights and water pollution and water quality functions of state government in California are combined in the State Board. (Cal. Water Code § 174).

"The stated purpose of this merger was to ensure that 'consideration of water pollution and water quality' would become an integral part of the appropriative rights process." (United States v. State Water Resources Control Board, 182 Cal.App.3d 82, 125, 227 Cal.Rptr. 161, 184 (1986), quoting id.)

Where implementation of water quality objectives requires controls on water supply projects,

"[t]he principle enforcement mechanism available to the Board is its regulation of water rights to control diversions which cause degradation of water quality." (United States v. State Water Resources Control Board, 182 Cal.App.3d 82, 125, 227 Cal.Rptr. 161, 184 (1986) (emphasis in original).)

In particular, the State Board may modify the Bureau's permits to set conditions applying water quality objectives pursuant to its authority to prevent waste, unreasonable use or unreasonable method of diversion and to apply the public trust doctrine. (Id. at 127, 129-30, 149-52, 227 Cal.Rptr. at 185, 187-88, 200-02 (1986).)

If water quality control requirements are established as part of the Bureau's water right permits, those requirements can be better coordinated with any other requirements or authorizations made as part of other water rights proceedings. We note, for example, that we recently approved a temporary change order requested by the Bureau in connection with actions the Bureau is taking to maintain temperatures in the upper Sacramento River. (See State Board Order No. WR 88-18 at 3-4, 8-9.) The Bureau has pending petitions for changes in point of diversion and place of use which, by affecting deliveries from the Central Valley Project, could affect the frequency and severity of temperature and turbidity problems in releases from Shasta Dam and related facilities. The Bay-Delta proceedings may also result in modifications to the Bureau's permits. By including water quality control requirements for the upper Sacramento River in the Bureau's permits, we can more effectively assure that the interrelationships between those requirements and other water quality and water supply issues are fully considered.

Relying on our water right authority will also help promote cooperation with the Bureau. The Bureau is opposed to issuance of waste discharge requirements like those issued by the Regional Board. At an April 10, 1989, State Board workshop, however, Bureau assured the State Board that the Bureau would not contest the establishment of appropriate water quality control requirements, addressing the same issues as the waste discharge requirements issued by the Regional Board, if the State Board adopts those requirements pursuant to its water rights authority.

Many of the considerations which lead us to prefer use of our water rights authority to address the water quality impacts of Shasta Dam and related facilities also apply to other facilities which have water rights permits or licenses. These considerations apply with particular force for facilities in the Central Valley Project and the State Water Project. Because these facilities are operated in coordination, measures implemented to control temperature at one facility may affect storage and releases from other facilities. These interrelationships between water quality and water supply issues can best be addressed by using our water rights authority. If any of the Regional Boards is considering proceedings for issuing waste discharge requirements or a cleanup and abatement order for releases of water from a facility for which the State Board has issued a water rights permit or license, the Regional Board should instead refer the matter to the State Board's Executive Director for a determination regarding appropriate proceedings.

In deciding to rely on our water rights authority, we do not waive the water quality objectives set by the Water Quality Control Plan; we simply conclude that our water rights authority should be the principle means of implementing those objectives. The Bureau has committed to a process for establishing temperature requirements for the protection of the fishery. The Bureau has also agreed to submit the results of technical evaluations and monitoring, which the Bureau is already conducting. We anticipate that the Bureau's commitments will provide adequate protection for the fishery during the period required to conduct water rights proceedings, and adequate information for the State Board to evaluate what further actions are appropriate. If new information should become available indicating that additional interim measures are required to protect water quality during the period required to complete all necessary water rights proceedings, we can decide at that time what proceedings are appropriate.

In light of the State Board's decision to conduct water rights proceedings addressing the issue of water quality control on the upper Sacramento River, we remand Order No. 88-043 to the Regional Board for reconsideration.³

³ Because the Regional Board will be reconsidering Order No. 88-043, it is unnecessary for us to address the specific issues raised by the Bureau in its petition for review. The Bureau does not assert that the contentions raised in its petition are an obstacle to the State Board's exercise of its water rights authority. Of course, the Bureau may continue to raise those issues before the Regional Board, and this order does not constitute a determination on the merits of those issues. This order does not dispose of any issue not expressly addressed by this order.

2. Contention: We raise on our own motion the issue whether the scope of the proceedings before the State Board should be expanded to include consideration of the impacts of the Bureau's facilities on temperature in the Trinity River.

Finding: The State Board should conduct water right proceedings to consider whether the Bureau's permits should be modified to establish temperature limitations or other conditions to assure adequate water quality for protection of the fishery in the Trinity River.

We direct the Division of Water Rights to initiate proceedings to consider whether the Bureau's permits should be modified to set conditions relating to temperatures in the Trinity River. To the extent that setting conditions to maintain Sacramento River water quality would adversely affect temperatures in the Trinity River, the State Board must consider Trinity River temperatures as part of the proceedings being initiated by the Division of Water Rights for consideration of appropriate conditions to maintain water quality in the upper Sacramento River. (See Cal. Pub. Res. Code § 21000 et seq.) Trinity River temperature problems which are not the result of efforts to meet Sacramento River temperature limitations may also be considered as part of those proceedings, or as part of later proceedings. We do not here decide whether it would be better to conduct separate or combined proceedings. We are committed to conducting the necessary proceedings, either in a single proceeding or a series of proceedings, to consider the full range of Trinity River temperature issues.

III. SUMMARY AND CONCLUSIONS

The water quality aspects of releases from Shasta Dam and related facilities should be addressed using our water right authority. The State Board should conduct water right proceedings to consider whether the Bureau's permits should be modified to establish temperature limitations or other conditions to assure adequate water quality for protection of fisheries, for both the upper Sacramento River and the Trinity River.

IV. ORDER

IT IS HEREBY ORDERED that Regional Board Order No. 88-043 is remanded to the Regional Board for further proceedings consistent with this order.

IT IS FURTHER ORDERED that the Division of Water Rights shall initiate proceedings for the State Board to consider modifying the Bureau's permits for the Trinity River Unit of the Central Valley Project to set appropriate conditions to maintain water quality in the Trinity River. The State Board may review Trinity River water quality in the same water rights proceedings

as it reviews upper Sacramento River water quality, or in subsequent proceedings to the extent that the issues may properly be considered separately.

CERTIFICATION

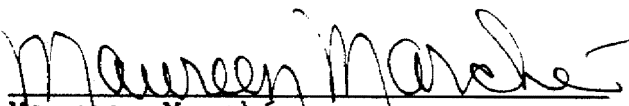
The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 19, 1989.

AYE: W. Don Maughan
 Darlene E. Ruiz
 Edwin H. Finster
 Eliseo M. Samaniego
 Danny Walsh

NO: None

ABSENT: None

ABSTAIN: None


Maureen Marché
Administrative Assistant
to the Board