

Interim Actions to Protect Anadromous Fisheries
in the Lower American River

Presented to the State Water Resources Control Board
Interim Water Rights Actions Phase
Bay-Delta Estuary Proceedings

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WRINT-DFG Exhibit No. 15

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Summary

The lower American River supports runs of fall- and late fall-run chinook salmon, steelhead trout, American shad, and resident fisheries. Nimbus Hatchery, which is located on the lower American River, is operated by the Department of Fish and Game (DFG) and produces fall-run salmon and steelhead trout. The U.S. Bureau of Reclamation (USBR) operates Folsom Reservoir on the American River to meet a number of water demands including water quality in the Delta and export needs from the Delta. These operations to meet needs in the Delta adversely impact the lower American River by causing:

- * Flow fluctuations especially during the spring and summer
- * Inadequate flows during critical time periods
- * Flow decreases during salmon spawning and incubation
- * Reductions in storage in Folsom Reservoir and resulting increased temperatures during critical time periods.

The DFG has prepared a set of interim recommendations to protect fisheries of the lower American River including flows, carryover storage, and flow fluctuation criteria. These recommendations are as follows:

- * A minimum of at least 500,000-acre feet (AF) carryover storage as of October 1 in dry and critical dry years should be maintained. Additional carryover storage in normal years would be desirable.
- * There should be an instream flow goal in cubic feet per second (cfs) of:

October 15 to February 28	2,000 cfs
March 1 to June 30	3,000 cfs
July 1 to October 14	1,750 cfs
- * There should be no reduction of flow from November 1 or when mean daily water temperature reaches 60 degrees fahrenheit at Nimbus Hatchery through the spawning and incubation period until the end of February.
- * Flow fluctuations from March 1 to July 1 should not be greater than 10 percent per day when flows are below 2,000 cfs and should not be greater than 30 percent per day when flows are above 2,000 cfs. Flows should not drop below 1,000 cfs during this period.

These interim recommendations may be refined pending results of the on-going studies conducted as directed by the Alameda

County Superior Court (Court) and through the State Water Resources Control Board's (SWRCB) Work Plan to review the water rights on the lower American River. These interim recommendations should protect the lower American River from further impacts caused by USBR operations of Folsom Reservoir to meet water quality standards in the Delta and exports needs from the Delta on an interim basis.

Fisheries Resources of the Lower American River

Chinook Salmon

The lower American River supports a natural spawning run of fall- and late fall-run chinook salmon. In recent years, the population has declined and the run size in the last five years has averaged well below the run size in the previous ten years (DFG, 1992). The run in the fall of 1990 was the smallest run in the last twenty years. Nimbus Hatchery has a spawning escapement goal of 6,000 adults. Returns to the hatchery have been below this goal in 1986, 1987, and in 1990 (PFMC, 1992).

The adult salmon migrate up the lower American River in the fall as water temperatures become suitable. If water temperatures exceed 60 degrees fahrenheit, the ripening eggs in the female salmon may be affected. Fall-run salmon spawning begins in October and continuous through January. Late-fall run salmon spawn through March. The eggs incubate for approximately 45 days and then the fry remain in the gravel for another two weeks. During this period, if the water level over the redds drops, it decreases survival of the eggs and fry. If the redd is dewatered, the redd will be lost. A mean daily water temperature of 56 degrees fahrenheit or less is also needed to prevent temperature induced egg mortality. As the fry emerge from the gravel, a portion may emigrate from the river but many rear in the lower American River until they emigrate downstream in the spring. During the rearing period, rapidly fluctuating flows can strand fry and juvenile salmonids. Flows below 1,000 cfs will cause stranding of fry and juveniles. Inadequate flows can reduce the quality of the rearing habitat, resulting in poor growth and survival rates (Snider, 1986).

Steelhead Trout

Relatively little is known about the native steelhead populations in the American River. There is some evidence that the original run consisted primarily of spring-run steelhead which migrated upstream in May, June, and July. In 1950, the fish ladder at Old Folsom Dam was destroyed by a flood and then the new Folsom Dam was constructed which probably eliminated spring-run steelhead.

After Nimbus Hatchery was constructed, DFG began to spawn

steelhead in the hatchery. Because of the low numbers of native steelhead returning to spawn, steelhead eggs were imported periodically from 1957 through 1990 into the hatchery from a number of sources.

The present day steelhead run in the lower American ascends the river beginning in late summer and continuing through March. The hatchery takes adults to spawn from December through March, and natural spawning takes place from December through April. Fry emergence is usually in April and May and can extend through June.

Currently, in-river production is extremely poor. The exact size of the run is unknown but there is good evidence that the run has declined. Possible reasons for this decline include elevated summer and fall temperatures, rapid flow fluctuations, and problems associated with conditions in the Delta (McEwan, 1991). All of these conditions have been exacerbated by the current drought.

Water Development Projects on the Lower American River

The American River watershed has numerous water storage, hydroelectric, and diversion facilities which have changed the flow regimes. There are 14 major reservoirs with a total storage capacity of almost 1.9 million acre feet. The major storage facility is Folsom Dam which was completed in 1955 and has a capacity of 1.01 million acre feet. Releases from Folsom Lake are reregulated by Lake Natoma which also serves as a diversion point for the Folsom South Canal. These facilities are controlled by the USBR (McEwan, 1991).

Instream Flows and Project Operations

Currently, instream flows in the lower American River are regulated by the SWRCB's Decision 893 which requires a minimum flow release of 500 cfs from September 15 through January 1 and a minimum release of 250 cfs for the remainder of the year (Somach, 1990). During normal water years, flows are significantly above these required minimums.

If Auburn Dam had been constructed, then the flows specified in Decision 893 for the lower American River would have been superseded by the SWRCB's Decision 1400 which requires a fisheries release of 1,250 cfs from October 15 to July 14 and a release of 800 cfs from July 15 to October 14 with reductions below these flows made in the same proportion as deficiencies imposed on customers of the Central Valley Project (Somach, 1990). The USBR has operated to meet a modified D-1400 schedule in most normal water years.

In 1986, the DFG issued a stream evaluation report titled

Instream Flow Requirements, Lower American River, Sacramento County which is WRINT-DFG Exhibit No. 18 (Snider, 1986). This report presented a range of flows which encompass optimum habitat conditions. The ranges are:

October 15 to March 1	1,750 to 4,000 cfs
March 1 to July 1	3,000 to 6,000 cfs
July 1 to October 15	1,500 cfs

The report also identified future study needs to refine these flow ranges.

In the case Environmental Defense Fund v. East Bay Municipal Utility District, the court issued a decision which established a Physical Solution which is further explained in WRINT-DFG Exhibit No. 17 (Somach, 1990). The Physical Solution established a minimum flow criteria of:

October 15 to February 28	2,000 cfs
March 1 to June 30	3,000 cfs
July 1 to October 15	1,750 cfs

The Physical Solution also included an additional 60,000 AF to be maintained in Folsom Reservoir from mid-October through June for release upon the recommendation of the DFG in response to specific fishery requirements.

These flows are an absolute requirement that must be met before East Bay Municipal Utility District (EBMUD) may divert water from Folsom South Canal. However, the court stated that "The instream flow conditions set forth above are not intended to constitute operational flows that are to be met in every month of every year without regard to the hydrologic conditions that might prevail at any given time. The court anticipates that operational criteria will need to be established based upon the various hydrologic year types (critically dry, dry, below normal, and above normal, etc.) to ensure that Folsom Reservoir is not emptied and that there are flows available in the river whenever possible. However, the court intends that the instream flow requirements set forth above remain the standard that should be maintained to the fullest possible extent".

At this time, the DFG is working with other parties to develop operations studies which would determine how these flows could be implemented and modified to protect instream uses and maintain adequate carryover storage in Folsom Reservoir in different year types. These operations studies will be evaluated in conjunction with a reservoir temperature model and a stream temperature model to determine operations needed to balance reservoir elevations needed to maintain an adequate cold water pool and instream flows in the lower American River.

Water level in Folsom Reservoir can impact the quality of habitat in the lower American River. Folsom Dam was outfitted with temperature control shutters to provide some degree of temperature control in 1961. The two upper shutters operate separately and the lower seven shutters are connected and move as one unit. In normal water years, these shutters are operated to provide cold water for the fall salmon spawning period (October to December). Releases are made from the upper levels from January through September to conserve cold water for the spawning period. Once the release is switched to the lower outlet at the start of the spawning season, the temperature drop is not large and does not last beyond a couple of weeks (Ron Ducey, personal communication).

If Folsom Reservoir falls below 400,000 AF, releases must be made through the lower shutters (USACE, 1992). If this happens prior to the spawning season, the cold water pool can be quickly depleted or the reservoir can turn over and lose its thermal stratification. If this occurs, the temperature control shutters are no longer effective and suitable spawning temperatures cannot be attained until the weather cools off in the late fall. During the current drought, Folsom Reservoir has been drawn to very low levels and this has resulted in undesirable temperatures in October and November.

Maintaining at least 500,000 AF in storage on October 1 during drought periods should alleviate some of these temperature impacts as long as the reservoir does not turn over in the late summer. It will not guarantee a mean daily water temperature of 56 degrees fahrenheit throughout the lower American River. For example, in November 1984 there were 3 days when the daily maximum water temperature exceeded 60 degrees fahrenheit even though September end-of-month storage in Folsom Reservoir was 685,500 AF. The U.S. Fish and Wildlife Service, in the Draft Fish and Wildlife Coordination Act Report on Reoperation of Folsom Dam, identified improvement of the temperature control shutters as a measure which would improve the ability to control water temperatures in the lower American River (USACE 1992).

Until additional work is completed, the DFG recommends that a carryover storage target of 500,000 AF as of October 1 in dry and critical dry years be used to provide some protection from adverse temperatures during the first part of the spawning season.

The USBR operates Folsom Reservoir to meet needs of many water users including Delta water quality standards and Delta export needs. Because Folsom Reservoir is closest to the Delta, it is regularly relied upon to provide the balance of the flow to maintain water quality standards. This causes rapid flow fluctuations in the lower American River, especially during the spring and summer months (USACE, 1992). Flows also have been

stepped down during the winter months and there have been flow fluctuations during this fall period if releases were needed for Delta water quality.

During the current drought, the magnitude and frequency of these fluctuations has increased. This can impact redds during the winter and cause stranding of fry and juvenile salmonids, particularly during the spring months and is believed to be an important factor in recent declines in salmon and steelhead population levels. For example, flows fluctuated widely in November 1991 and December 1992. When the flows stabilized at 1,000 cfs in December, many salmon redds were dewatered. Flows were further reduced in January to 900 cfs which dewatered still more salmon redds (DFG 1992). This loss of redds, coupled with the late start to the spawning season, has likely impacted the strength of the year class.

To protect against this type of impact on an interim basis, the DFG recommends that flows be stabilized in the fall once mean daily water temperatures reach 60 degrees fahrenheit or November 1 which ever is first. This flow should be maintained through the end of February. In March, April, May, and June, flow fluctuations should be restricted to not more than 10 percent per day when flows are less than 2,000 cfs and not more than 30 percent per day when flows are greater than 2,000 cfs. This dual recommendation is necessary because flow changes are more likely to strand fish when flows are less than 2,000 cfs due to channel configuration. In addition, the flow should not drop below 1,000 cfs in years when there is insufficient water to meet the Physical Solution flows.

Future Actions

As part of the Court's Physical Solution, the parties to the litigation, including DFG, are cooperating to conduct scientific studies to better understand how fish and wildlife are affected by changes in flow and temperature in the lower American River. The DFG is also working with other entities who affect the river to implement measures to improve the conditions in the lower American River to protect fish and wildlife habitat. The SWRCB has committed to a review of the water rights of the lower American River which will consider the information developed through these studies and ultimately reconsider protection for instream uses in the lower American River.

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ERRATA SHEET
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Page 1. The first sentence of the first paragraph.

In addition to the species of anadromous fishes listed, striped bass are also found in the lower American River.

Page 1. The third starred recommendation.

The restriction on flow reductions should begin November 1 or when the mean daily water temperature reaches 60 degrees fahrenheit at Nimbus Hatchery, whichever comes first. In addition, this restriction would not be placed on operations necessary to maintain flood control storage.

Page 1. The last starred recommendation.

The flow fluctuation criteria only applies to flow reductions.

Page 2. The second paragraph, third sentence should read:

Fall-run salmon spawning begins in October and continues through January.