By fax, e-mail and mail

February 5, 2004

Gita Kapahi, Chief
Bay-Delta/Special Projects Unit
State Water Resources Control Board
P.O. Box 2000
Sacramento, CA 95812-2000

RE: REVIEW OF 1995 BAY-DELTA PLAN

Dear Ms. Kapahi,

This letter is submitted as the comments of the Bay Institute regarding review of the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (1995 WQCP). For the most part, we agree that the issues identified by the State Water Resources Control Board (SWRCB) in its December 10, 2003, public workshop notice are the primary ones that should be addressed during this review.

In summary, we recommend the following actions to review and amend the 1995 WQCP:

(1) The SWRCB should take steps to measure and ensure compliance with the narrative salmon protection objective, including stream-specific, run-specific doubling targets; stream flow objectives; screening diversions; curtailment of export operations during fish migration periods; and a state user fee to support doubling programs.

(2) The SWRCB should consider interim and long-term changes to the Vernalis flow objective; and,

(3) The SWRCB should revise the current "three ways to win" methodology for measuring compliance with the Delta outflow objective for the February – June period in order to eliminate upstream migration of X2 from its assumed position in drier years.

<u>1. Additional criteria to measure and ensure compliance with the narrative salmon protection objective</u>

The 1995 WQCP narrative salmon protection objective states "water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve a doubling of natural production of chinook salmon from the average production of 1967-1991, consistent with the provisions of State and federal law." The primary water conditions at issue for the SWRCB review include (1) flow and export criteria in the Delta; (2) water quality (e.g., dissolved oxygen concentrations, toxic contaminants) in the Delta; and, (3) flow, temperature, water quality. and diversion criteria in areas upstream of the Delta.

In its review, the SWRCB must first determine what conditions should be maintained to achieve the narrative salmon protection objective; second, adopt more specific criteria – quantitative where possible – to ensure that those necessary conditions that are within its authority, such as flows and diversion rates, are attained; and, finally, identify measures that others must implement to help achieve the objective (such as removing barriers to fish passage and restoring spawning gravels).

There is no doubt that sufficient information is available to the SWRCB to identify specific methods and metrics to measure the status of chinook salmon populations and compliance with the narrative salmon protection objective. These methods and metrics can and should be used by the SWQRCB to determine whether salmon doubling has been achieved, and if not the degree of non-attainment. The most developed and defensible body of scientific knowledge regarding salmon doubling is the Central Valley Project Improvement Act (CVPIA) Anadromous Fish Restoration Program (AFRP)[1], which has identified specific production targets for each basin, each run, and each salmon producing river in each basin. It is important to note that the AFRP recognized that doubling goals must be specific for each run of chinook salmon,

[1] U.S. Fish and Wildlife Service. 1995. *Working paper on restoration needs: habitat restoration actions to double natural production of anadromous fish in the Central Valley of California*. Portland, OR.

and that that salmon doubling must be sustainable through varying hydrological and biological conditions. The Delta Native Fishes Recovery Plan has also recommended criteria including use of median population numbers; multi-year running averages; and/or minimum allowable population numbers[2].

Using these types of evaluation criteria and based on current monitoring information, the evidence suggests that salmon doubling is not being achieved. For most runs other than fall-run, little or no improvement has been observed. Fall-run has come closest to achieving doubling in recent years, but a larger proportion of production has shifted from mainstem rivers to smaller tributaries. In addition, fall-run Chinook salmon production is heavily supported by hatcheries in both basins. Furthermore, most runs did show some positive response to wet years, highlighting the importance of adequate flow conditions for improved production. This information is presented in Table 1, below, and in Figures 1 and 2 in Attachment 1.

Table 1. Recent Chinook salmon escapement in the Sacramento-San Joaquin watershed compared to salmon doubling goals

	Fall-run		Late fall-run	Winter-run	Spring-run
	Sacramento basin	San Joaquin basin			
Status* (2000-2002 average escapement)	534,429	28,157	16,225	5,672	10,764
Doubling Goal** (2 x 1967-1991 escapement)	401,640	45,518	30,158	46,218	25,980
% of Goal	133%	62%	54%	12%	41%
Trends (10-year)	Increase	variable	variable	increase	variable

[2] U.S. Fish and Wildlife Service. 1995. *Sacramento-San Joaquin Delta Native Fishes Recovery Plan*. Portland, OR.

* Data are in-river escapement provided by CDFG (last updated 12/03). Data for 1999-2002 are preliminary and subject to change. Data for 1967-1971 for spring- and late fall- run Chinook salmon are from the USFWS Working Paper on Restoration Needs, Vol. 3, 1995.

** To facilitate comparison with measured escapement numbers, the salmon doubling goals presented here are estimated based on twice the average in-river escapement for the period 1967-1991, rather than the "production" goals (which include harvest estimates) presented in the USFWS Working Paper on Restoration Needs, Vol. 3, 1995.

Note: The approach taken in Table 1 and Figures 1 and 2 for measuring status (escapement) and doubling goal (estimated as 2 x 1967-1991 average escapement, rather than published CVPIA production goal, which includes average harvest for 1967-1991) is conservative because escapement overestimates true spawning population size, as many adult fish die before spawning, usually because of poor river conditions (recent examples include near 80% mortality of fall-run chinook in the American River due to low-flow related elevated water temperature, and loss of ~10,000 spring-run chinook in Butte Creek due to elevated water temperature); and because ocean harvest of chinook salmon has generally declined from 1960-1970s levels but CVPIA production goals are based on historic harvest rates, and thus that goal is higher than the one used above.

Based on information from the AFRP and the Delta Native Fishes Recovery Plan, the SWRCB should adopt multiple measurement criteria for salmon population size that incorporate inter-annual variability of populations and production; establish acceptable levels for variability around the specific doubling goal; and ensure sustainable, long-term production.

There is no doubt that sufficient information is available to the SWRCB, that has been identified by the AFRP, the Delta Native Fishes Recovery Plan, and the California Bay-Delta Authority Ecosystem Restoration Program[3], to identify those water quality conditions that prevent attainment of the objective. Inadequate flow, diversion and water quality conditions in both the Delta and riverine habitats upstream of the Delta are limiting factors for salmon survival, reproduction, and passage.

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[3] CALFED Bay-Delta Program. 2000. *Ecosystem Restoration Program Plan. Volume 2: Ecological Management Zone Visions*. Sacramento, CA.

Inadequate flows on a number of Central Valley tributary streams block fish migration, impair spawning habitat quality, and create lethal water quality conditions, as evidenced by recent fish kills in Butte Creek and the American River. Direct and indirect mortality of chinook salmon from exports and diversions continues to be significant. (For instance, survival of juvenile chinook salmon migrating through the Delta is reduced when the Delta Cross Channel is open during a significant portion of the outmigration periods for the three runs with the most depressed populations). Low flows to the lower San Joaquin River result in low dissolved oxygen levels near Stockton that block upstream and downstream passage of salmon and that can be lethal for juvenile salmon transported into these areas. Unscreened or inadequately screened diversions kill large numbers of juvenile salmon. (Numerous studies indicate that high percentages (>75%) of the juvenile chinook salmon entrained into the SWP are lost to predation in the unscreened diversion forebay, and few of the remaining fish survive to be successfully released to the Delta. In addition, nearly all of the >3500 water diversions on Central Valley streams and in the Delta remain unscreened). The cumulative impact of numerous unscreened diversions has been identified by both the AFRP and the California Bay-Delta Authority (CBDA) Ecosystem Restoration Program (ERP) as a significant source of mortality of juvenile downstream migrant chinook salmon. Operational decisions relating to various water transfers, and to flood control or water quality constraints may also impair upstream conditions. (In 2003, these operational decisions dewatered large proportions of steelhead redds and lethally stranded juvenile chinook salmon in rivers upstream of the Delta).

There is no doubt that sufficient information is available to the SWRCB to identify those actions necessary to secure the water quality conditions that will help achieve the objective. The AFRP – the best available assessment of salmon doubling needs – identified, in a series of working papers, numerous flow, diversion and export criteria necessary to achieve the objective. Similar actions are identified in the Delta Native Fishes Recovery Plan, the CBDA ERP, and the Biological Opinions for winter-run and spring-run chinook salmon.

For virtually all salmon-producing rivers and streams in the watershed, specific stream flow targets to improve flow and habitat conditions upstream of the Delta are identified in the AFRP and/or ERP. These stream flow objectives were specifically developed to address habitat and passage issues identified as critical salmon needs. The AFRP identified flow and export improvements in Delta conditions necessary to improve survival and passage of adult and juvenile chinook salmon, in addition to those criteria contained in the 1995 WQCP, including: reduction of Delta exports to 35% of inflow during November - January when the Delta Cross Channel (DCC) is closed; maximizing DCC closure May 21 - June 15 when juvenile salmon are abundant in the lower Sacramento River; and limiting combined April 15 – May 15 exports to 1500 cfs (or a Vernalis flow:export ratio of 5:1) when the Head of Old River Barrier is not in place. Screening or reducing diversion rates by the >3500 water diversions in or upstream of the Delta, nearly all of them unscreened, has been identified by both the AFRP and ERP as an important mechanism to eliminate or reduce mortality of juvenile downstream migrant chinook salmon. Other non-flow conditions also have a significant effect on salmon doubling, but it is important to note that implementing the non-flow measures recommended in the 1995 WQCP will not significantly contribute to salmon doubling if flow, diversion and water quality conditions in and upstream of the Delta preclude fish survival, reproduction or passage.

We urge the SWRCB to take the following steps (or in some cases direct the Central Valley Regional Water Quality Control Board to take steps) to measure compliance with, augment, and amend the narrative salmon protection objective:

(1) Amend the Sacramento and San Joaquin Basin Plans to incorporate the narrative objective.

(2) Set stream- and run-specific numeric salmon doubling targets for all major salmon-producing Central Valley rivers and tributaries in order to measure compliance with the narrative objective.

(3) Set stream-specific flow objectives and flow ramping criteria to achieve salmon doubling for specific chinook runs on all major salmon-producing Central Valley river and tributaries. Priority in establishing these objectives should be given to Sacramento River reaches and tributaries that can support spring-run chinook populations (spring run are restricted to a very few streams, and are highly vulnerable to catastrophic loss due to inadequate flow or water quality conditions); to San Joaquin River reaches and tributaries supporting fall-run chinook populations (inadequate spring flows have a significant effect on juvenile outmigration); and to Sacramento Basin tributaries that release significant amounts of water to meet downstream operational needs for water quality control, water transfer capacity and other purposes (e.g., American, Feather and Yuba Rivers) and are therefore subject to major fish kill, redd dewatering and stranding events.

(4) Require screening and/or curtail diversions and exports during periods of risk to juvenile salmon in and upstream of the Delta. Priority upstream of the Delta should be given to those areas identified above; priority within the Delta should be given to the export operations of the State Water Project (SWP) and CVP. The reasonableness of unscreened diversions and high diversion rates is questionable, and many if not all diversions are subject to SWRCB regulation.

(5) Establish a fee on SWP and non-project water users to fund implementation of actions to achieve doubling (as a state equivalent of the federal CVPIA Restoration Fund).

<u>2. Changes to the Vernalis flow objective</u>

We generally concur with the SWRCB's prior finding that the combination of the April 15 – May 15 Vernalis flow targets and Delta export limits contained in the San Joaquin River Agreement provides equivalent protection to the April 15 – May 15 Vernalis flow objective in the 1995 WQCP. We would not oppose replacement of the April 15 – May 15 1995 WQCP Vernalis flow objective with the combined April 15 – May 15 Vernalis flow targets and Delta export limits, provided that the new Vernalis flow objective and Delta export limits be identical to those in the Agreement.

There are at least two important reasons to consider making additional changes to the Vernalis flow objective outside the April 15 – May 15 period. First, as noted above in the discussion of salmon doubling, low flows in the lower San Joaquin River exacerbate the occurrence of low dissolved oxygen levels near Stockton, and solving the Stockton dissolved oxygen problem and overcoming its adverse impact on fish migration and other beneficial uses will likely require, among other things, improved flow conditions. Second, the current flow objective does not provide an adequate level of protection for the entire three-month (April – June) period of juvenile fall-run chinook salmon outmigration.

The adoption of a Vernalis flow objective must be based on the best available science regarding protection of the fish and wildlife beneficial uses; it is not appropriate for the SWRCB to base these objectives on perceived constraints on the amount of CVP water available to meet in-stream flow requirements,

especially since the Bureau of Reclamation has refused to release any water from Friant Dam for meeting water quality or environmental objectives. The Bureau's decision to dewater the river below Friant to the confluence with the Merced River is irrelevant to the SWRCB's legal obligation to adopt and enforce fully protective water quality objectives.

As it happens, there is simply no reason why the Bureau could not re-operate the CVP to include the release of water from Friant Dam. Indeed, it bears noting that the failure to maintain flows in the river below Friant contravenes the original purposes of the CVP generally, and Friant Dam specifically. For example, California Water Code § 11226 lists "improvement of navigation" as a first-order purpose for Friant Dam. It is hard to imagine how dewatering 60 miles of the San Joaquin River could be deemed an "improvement of navigation." Further, the California Court of Appeals has held that "salinity control was an integral part" of Congress' intent in authorizing the CVP, and that requiring the Bureau to "release . . . water in order to maintain *necessary consistency in the stream flows*" to help control salinity downstream at the San Joaquin River's confluence with the Delta is perfectly consistent with the primary purposes of the CVP. (United States v. State Water Resources Control Board, 182 Cal. App. 3d 82, 136 (Cal. Ct. App. 1986). *See also* 81 Cong. Rec. 6704 (July 1, 1937) (Rep. Gearhart) (stating that operation of Friant Dam would help to "insure a steady pressure of water against the salt water of San Francisco Bay"); 81 Cong. Rec. 6712 (July 1, 1937) (Rep. Elliott) (stating that Friant and Shasta Dams were needed to alleviate "the draft on . . . the Sacramento and San Joaquin Rivers for irrigation," which "so reduces the flow of these rivers that their combined outflow into upper San Francisco Bay through the delta channels becomes too weak to hold back the salt waters creeping up those delta channels.").

Finally, it is important to note that the 60 miles of dry river below Friant Dam does not reflect a permanent state of affairs. As the SWRCB may be aware, proceedings before the U.S. Northern District Court may soon result in an order requiring the U.S. Bureau of Reclamation to release flows below Friant Dam in order to comply with Fish and Game Code Section 5937 and other legal mandates. Other factors, including severe water quality problems upstream of Vernalis that cannot be solved without some contribution of clean water from Friant Dam, point inexorably toward the restoration of flows in the mainstem San Joaquin River. The SWRCB should therefore proceed to adopt more protective Vernalis flow objectives during the April – June juvenile chinook outmigration period, and at other times when fish and wildlife resources are being adversely impacted, without compromising these objectives by assuming the Bureau will continue to de-water the upper San Joaquin River.

3. Compliance with the Delta outflow objective for the February – June period

The Delta outflow objective for the February – June period is based on a set of statistically significant correlations between the location of X2 (the 2 ppt salinity isohaline) and the abundance of numerous estuary-dependent aquatic species. No new information has emerged since the adoption of the 1995 WQCP to contradict the rigorous analyses that established the X2 – abundance relationships, and the scientific literature, presentations at CALFED science conferences and similar venues, and other analyses in the intervening years have supported the continuing validity of these relationships.

The Delta outflow objective is uncontrovertibly a fundamental and necessary protection for estuarine habitat. Our concern here is therefore not with the objective itself but with the methodology used to measure compliance with the objective. The original environmental documentation assumed that the minimum ecologically beneficial X2 location could be maintained using either minimum calculated Delta outflows or maximum daily average electrical conductivity. Our preliminary analysis suggests that the so-called "three ways to win" approach for compliance with this objective has resulted in drier years in significant upstream migration of X2 from its assumed position, and therefore significantly less protection for estuary-dependent species[4]. The actual X2 results by water year since adoption of the 1995 WQCP are as follows:

1995 wet, actual X2 (Feb-June) @ 51 km, 13.3 km downstream of assumed position

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[4] Assumed X2 position was calculated using the Eight River Index (available at http://cdec.water.ca.gov/cgi-progs/reports); the monthly Delta outflow requirements specified in Footnote 14 for Table 3 in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 95-1WR, May 1995, and the monthly X2 equation from Jassby et al., 1995. *Ecol. Appl*. 5:272-289. Alternative compliance metrics, including antecedent and concurrent electrical conductivity conditions, were not incorporated into this calculation of assumed X2. Actual X2 conditions were calculated as springtime averages (February-June) and monthly averages using daily Delta outflow data from DAYFLOW (available at http://www.iep.water.ca.gov/dayflow/index.html) and the daily X2 equations in Jassby et al., 1995.

1996 wet, actual X2 (Feb-June) @ 57.5 km, 9.5 km downstream of assumed position

1997 wet, actual X2 (Feb-June) @ 63.6 km, 4.5 km downstream of assumed position

1998 wet, actual X2 (Feb-June) @ 50.2 km, 15.4 km downstream of assumed position

1999 wet, actual X2 (Feb-June) @ 60.2 km, 8.0 km downstream of assumed position

2000 above normal, actual X2 (Feb-June) @ 62.7 km, 6.3 downstream of assumed position

2001 dry, actual X2 (Feb-June) @ 74.1 km,), 0.4 km downstream of assumed position; <u>but, actual Feb X2 2.2 km upstream of assumed position and actual April X2 2.2 km upstream of assumed position</u>

2002 <u>dry, actual X2 (Feb-June) @ 73.6 km, 2.2 upstream of assumed position; see below for monthly X2</u>

2003 above normal, actual X2 (Feb-June) @ 66.7 km, 2.6 km downstream of assumed position; <u>but, actual March X2 0.3 km upstream of assumed position and actual April X2 -0.3 km upstream of assumed position</u>

In WY 2002, high flows during January lowered salinity in the Delta, allowing the assumed X2 position to be achieved (using other "ways to win") with less flow in subsequent months. Table 2, below, shows the monthly actual X2, showing the significant upstream migration of X2 in February – more than 7 km – and then the persistent actual X2 conditions that were upstream of the assumed position.

Table 2. Actual and assumed X2 location in 2002.

Year: 2002	Actual X2	Assumed X2	Difference	Level of protection
January	64.09	------		
February	72.14	64.48	<u>-7.66</u>	<u>Less than assumed</u>

March	71.62	68.11	-3.5	Less than assumed
April	73.37	71.15	-2.2	Less than assumed
May	73.85	74.78	0.9	Similar to assumed
June	76.92	78.34	1.4	Similar to assumed

Our preliminary finding is that in drier years the "three ways to win" method appears to result in less protective conditions, as measured by the location of the X2 isohaline, than intended in the 1995 WQCP. These less protective conditions in the recent drier water years have probably contributed to recent declines in population abundance of delta smelt and longfin smelt – two species whose abundance is significantly correlated to X2 location – after moderate improvements in the late 1990s. We therefore recommend that the SWRCB revise the methodology for measuring compliance with this objective to ensure that the assumed X2 position is maintained during the February – June period.

Thank you for your consideration of these comments. Please feel free to contact Gary Bobker at (415) 506-0150, or Dr. Christina Swanson at (530) 756-9021 if we can be of further assistance.

Sincerely,

Gary Bobker
Program Director

Christina Swanson, Ph.D.
Senior Scientist

Enc: Attachment 1 (Figures 1 and 2)

Cc: Ryan Broddrick, Diana Jacobs, CDFG
Wayne White, Dave Harlow, USFWS
Jim Lecky, Mike Aceituno, NOAA Fisheries
Patrick Wright, Dan Castleberry, CBDA
Environmental Water Caucus

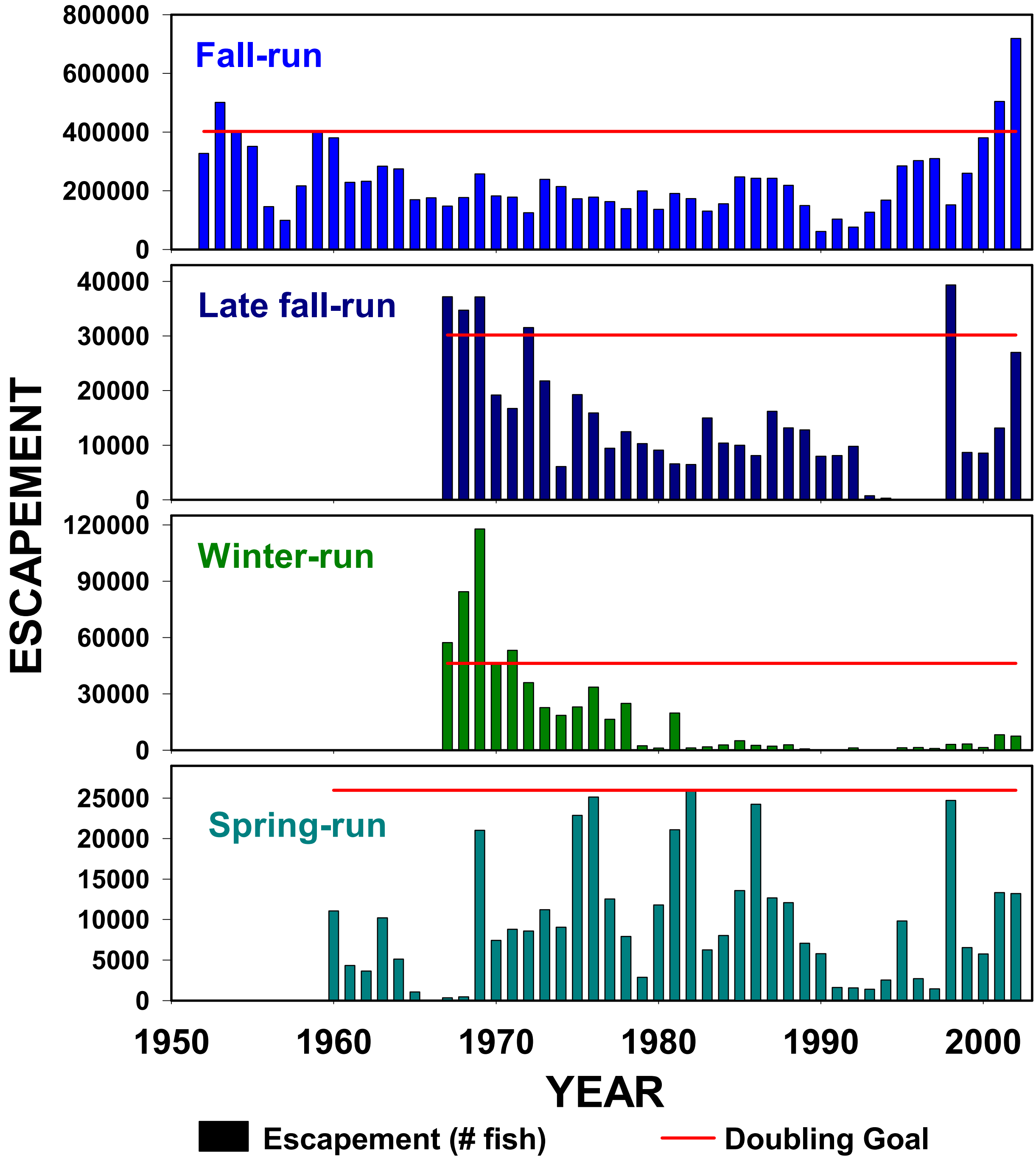

Figure 1. Escapement and salmon doubling goals for each of the four runs of Sacramento-Basin Chinook salmon.

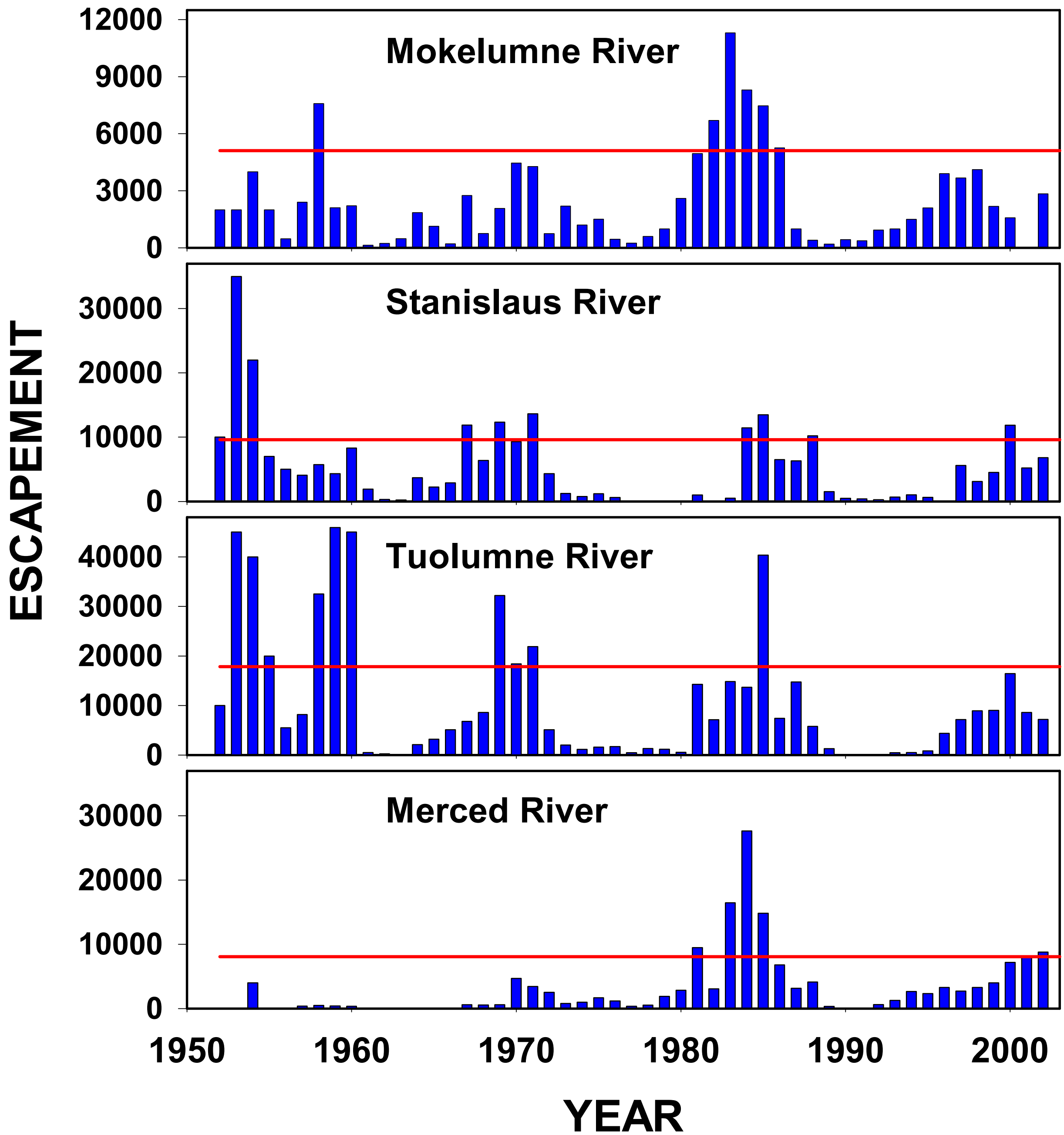

Figure 2. Escapement and salmon doubling goals for fall-run Chinook salmon in San Joaquin basin tributary rivers.