BAY-DELTA WATER RIGHTS HEARINGS
BEFORE THE STATE WATER RESOURCES CONTROL BOARD

PHASE 6: THE PETITION OF THE UNITED STATES BUREAU OF RECLAMATION AND THE CALIFORNIA DEPARTMENT OF WATER RESOURCES FOR JOINT POINTS OF DIVERSION IN THE SOUTHERN DELTA

STATE OF CALIFORNIA DEPARTMENT OF FISH AND GAME
TESTIMONY OF JIM WHITE

Submitted November 23, 1998

A. INTRODUCTION AND QUALIFICATION AS EXPERT WITNESS

My name is Jim White. I am providing this testimony on behalf of the State of California Department of Fish and Game (DFG). I have worked for the DFG since 1978 in several capacities. The majority of my experience has focused on fishery and water issues in the Central Valley and Bay-Delta. Currently, I am an Environmental Specialist in DFG's Environmental Services Division. In that capacity, I have represented the DFG on the CALFED No-Name Group, Data Assessment Team, and as the DFG's back-up representative at the CALFED Operations Group. A statement of my qualifications as an expert witness in this matter has been provided to the State Water Resources Control Board (Board) as DFG Exhibit 8. (For the convenience of the Board, a copy of DFG Exhibit 8 is attached hereto.)

I have reviewed the Board's Draft Environmental Impact Report (DEIR) for this proceeding dated November 1997 (Board Staff Exhibit 1) and participated in the preparation of DFG's comment letter dated April 1, 1998. (DFG Exhibit 23, previously submitted to the Board as part of Phase 3.)

B. PURPOSE OF TESTIMONY AND EXHIBITS

My testimony addresses Phase 6 of the Bay-Delta Water Rights Hearings as described in the Board's Revised Notice of Public Hearing: the petition of the United States Bureau of Reclamation (USBR) and the California Department of Water Resources (DWR) for joint points of diversion (Joint Points) in the southern Delta.

My testimony has been revised from that which I submitted on July 13, 1998 because DFG and other CALFED agencies, specifically the U.S. Bureau of Reclamation (USBR), Department of Water Resources (DWR), and U.S. Fish and Wildlife Service (USFWS), have agreed to collectively approach the petition for Joint Points of Diversion in a new way.

My testimony addresses the following points:

1. The revised proposal for Joint Points of Diversion approval.

2. Overview of Joints Points of Diversion Pursuant to WR 95-6.

3. Concerns with respect to salmon, particularly Spring Run chinook salmon related to use of Joints Points of Diversion in the fall and winter.

1. DFG support for new proposal for approving petition for Joint Points of Diversion

The main purpose of my testimony is to confirm the DFG's support for the approach described by Mr. Thabault for Board approval of the petition of the Bureau of Reclamation and Department of Water Resources for joint use of their respective points of water diversion in the south Delta. To reiterate the proposal, we recommend that the Board authorize joint points of diversion for USBR and DWR, with such use commencing only upon presentation to the Board's Executive Officer of an operations plan developed, evaluated and adopted under the CALFED Bay-Delta Program process. The proposal is made on behalf of USBR, DWR, USFWS and DFG.

The DFG is a full participant in the CALFED Diversion Effects on Fisheries Team (DEFT) and DEFT/No-Name Group Coordination Team (DNCT) activities described by Mr. Thabault. As he stated, use of joint points of diversion has been a component of most of the alternatives that CALFED has been considering and is expected to be part of CALFED's preferred alternative. We believe the CALFED forum can produce an operations plan, including the use of joints points of diversion, that will both facilitate the goals of improved fish survival and ecosystem function in the Delta and provide water users with opportunities to achieve goals related to water supplies from the Delta.

As Mr. Thabault states in his written testimony (DOI Exhibit __), a wide range of options has been considered for dealing with the fishery concerns in proposed operations plans for Stage 1 of CALFED Bay Delta Program implementation. At the time this testimony is being written, the relative advantages and disadvantages of different approaches are still being examined. No decisions have been made. These options vary in the degree to which they rely on completely rigid rules applied to specific times, fixed rules whose implementation is triggered by real-time information, or less structured methods of adapting operations to hydrologic and fishery resource conditions as they occur and are identified through various monitoring activities. It is premature to describe the outcome of this deliberative process. However, it appears as if a combination of these methods may be the most effective way to deal with complex interactions among the highly variable hydrology, operations capabilities and limits, and the inter-annual variation in the timing and extent of vulnerability of the numerous fish species to adverse effects of CVP/SWP operations.

2. Overview of Joints Points of Diversion Pursuant to WR 95-6.

In 1995, through its issuance of WR 95-6, the Board temporarily authorized coordinated operations of the State Water Project (SWP) and the Central Valley Project (CVP)

through use of Joint Points with certain limitations. WR 95-6 constrains the use of Joint Points so that (1) it can be used only when coordinated operations will benefit fish resources in the Estuary, (2) there are no increases in annual exports, and (3) there are no adverse effects on prior rights, water quality or other beneficial uses. WR 95-6 also provided that the CALFED Operations Group would play a continuing role in the implementation of Joint Points relative to those constraints. Accordingly, through the CALFED Operations Group, DFG participated in the development and implementation of a monitoring and response approach to minimize fishery impacts of Joint Points. In 1996, this approach was applied only to the increment of CVP "make up pumping" made possible by Joint Points. In 1997, this approach was the basis for the Spring-run Chinook Salmon Protection Plan (Spring Run Plan). A copy of the 1997 Spring Run Plan is provided to the Board as DFG Exhibit 29. This Plan was revised for 1998 to incorporate the SWP/CVP operations plan specific to the fall of 1998 and early 1999 and to use tagged salmon released in the Delta to act as surrogates in assessing the loss of yearling spring run salmon in the Delta. DFG suggests this same concept will be useful in the future to avoid or to minimize Delta fishery impacts, with adjustments of monitoring locations and frequency, revisions of the so-called triggering criteria, refinements to the use of surrogate fish, improved capability to discriminate among runs of salmon and to differentiate wild salmon from all hatchery salmon at all monitoring locations, and increased specificity of the operational responses.

3. Potential Effects on Juvenile Salmon, Including Spring Run Chinook Salmon, from Joint Points Use in the Fall and Winter.

At its August 28, 1998 meeting, the California Fish and Game Commission voted to list the Sacramento River spring run chinook salmon as a threatened species under the California Endangered Species Act (CESA). The regulatory process for addition of spring run salmon to the list of threatened species is expected to be completed in February 1999. The National Marine Fisheries Service will also be deciding whether to list the spring run salmon under the federal Endangered Species Act in 1999.

Salmon smolt survival studies conducted by the USFWS show that survival of smolts migrating through the Delta from the Sacramento River basin is inversely related to the following factors: (1) the portion of the Sacramento River flow diverted into the Delta at the Delta Cross Channel; (2) water temperature in the Sacramento River; and (3) CVP/SWP exports during the migratory period. Potential effects of Joint Points on three races of salmon (fall, late fall and winter run) were analyzed in the DEIR (Board Staff Exhibit 1, IV-12) using survival models generated by the Dr. Kjelson and his colleagues based on the results of these smolt survival studies. (Board Staff Exhibit 177, USFWS (1995) Draft Anadromous Fish Restoration Plan: A Plan to Increase Natural Production of Anadromous Fish in the Central Valley of California.) All Joint Points alternatives show Delta survival improvements compared to Alternative 1 and small differences among Alternatives 3 through 8. (Board Exhibit 1, Vol.4, page XIII-35.) However, effects on salmon spawning and rearing habitat and salmon survival in these river reaches resulting from Joint Points effects on reservoir storage and the temperature of water released from reservoirs were not evaluated.

In commenting on the Board's DEIR, DFG noted that the DEIR did not evaluate the project's potential effects on spring run salmon using the same analytical approach applied to the other races of salmon. To assist the Board and its staff in completing that analysis, DFG has provided a copy of its recent "Report to the Fish and Game Commission: A Status Review of the Spring-run Chinook Salmon (*Oncorhynchus tshawytscha)* in the Sacramento River Drainage, June 1998, Candidate Species Status Report 98-01." (Spring Run Status Report, DFG Exhibit 28.) DFG hopes that the information contained in the Spring Run Status Report will be useful to the Board and its staff in their analysis of the project's potential impacts to spring run salmon. The Spring Run Status Report covers a broad range of topics including habitat necessary for survival, abundance and population trends, factors affecting the ability to survive and reproduce, the influence of existing management efforts and suggestions for future management. It was compiled by a team of DFG scientists with various expertise and reviewed by independent scientists with relevant expertise. It is based on the best available scientific information. The following is a brief overview of some information from that report relevant to the Bay-Delta Hearings.

The Spring Run Status Report describes the life history patterns of spring run. The migration of juvenile spring run salmon to and through the Delta can occur in the Delta over many months due in large part to the range of environmental conditions in spawning and rearing habitats. Spring run spawn and rear in the very cold water of the higher elevation reaches of Mill and Deer Creeks and in the lower elevation reaches of streams such as Butte and Big Chico creeks where water temperature is typically somewhat warmer. Egg incubation and juvenile growth are more rapid in the warmer water relative to colder water conditions. This difference in early development rate leads to two juvenile spring run migration patterns, which, in turn, define the periods of concern in the Delta for spring run from each stream type. Because they hatch later and grow slower, juvenile spring run in Mill and Deer creeks tend to remain in the natal stream through the first summer and to migrate downstream to the ocean in the fall, more than a year after their parents spawned, thus the term "yearlings". In the lower elevation spring run streams, eggs hatch sooner and juvenile fish grow more rapid rapidly, hence, juveniles tend to migrate from the natal stream as 6-8 month old fish in the spring. Consequently, spring run salmon migration may occur in the Delta anytime from October through June. Yearling migration may begin in October, usually peaks in November and December, and ends in January or February. Spring run fry may appear in the Delta under extremely high flow conditions as early as January. Spring run smolt migration through the Delta occurs throughout the spring and essentially is completed by the end of June. (DFG Exhibit 28, section III, p. 7.9.) In the late winter and spring months the 1995 Bay-Delta Plan includes measures to reduce adverse effects on winter run salmon and delta smelt. These measures also tend to concurrently provide favorable conditions for spring run salmon. DFG is particularly concerned about potential effects on the survival of yearling salmon emigrating in the fall and early winter because a high proportion of the Delta inflow can be exported during this time period.

The USFWS has documented through field experiments that Sacramento Basin salmon moving from the Sacramento River into Georgiana Slough are less likely to survive than those that migrate out of the Delta through the lower reach of the Sacramento River. Because the

distance is greater, migration through Georgiana Slough and the interior Delta likely would take longer and, therefore, expose salmon to greater risk of mortality. The shortest distance from the test fish release location in Georgiana Slough, through the Delta to the Chipps Island recovery location (approximately 37 miles) is 37 percent greater than the Sacramento River migration distance (Ryde to Chipps Island, approximately 27 miles). All other factors being equal, we would expect mortality of salmon on the Georgiana Slough migration to be about 37 percent greater than the Sacramento route. However, in the USFWS studies described in Board Staff Exhibit 177, recoveries of tagged salmon at Chipps Island in the western Delta indicate mortality of salmon in the interior Delta at least 3.5 times (350 percent) and in one trial as much as 25 times higher than in the Sacramento River. These observations suggest factors other than the longer migration distance substantially influence survival during migration through the interior Delta. Mortality of salmon in the lower Sacramento River and Delta may be caused by many factors, including but not limited to predation, entrainment in local agricultural diversions, entrainment in the CVP/SWP diversions, high water temperatures particularly in the late spring, and disease. The exact causes of the higher mortality of salmon migrating through the interior Delta are difficult to establish through field experiments.

The exposure of salmon to mortality factors may be influenced by the amount of water flowing through or exported from the Delta during periods of salmon migration. Exports of water from the Delta at times produce net upstream (reverse) flows in some western and southern Delta channels. If juvenile salmon become disoriented and confused about which direction is downstream due to altered flow patterns in the Delta and, as a consequence, their migration through the Delta is prolonged, more of them may die from the causes mentioned above before finding their way out of the Delta. We do not have a comprehensive understanding of what factors have the greatest influence salmon survival in the Delta. Nevertheless, it is likely that modifications to flow patterns related to the export of water from the southern Delta by the CVP and SWP contribute to the adverse modification of habitat and to mortality of juvenile salmon in the Delta.

The Board's DEIR indicates that compared to Alternative 2 with no Joint Points, average Delta exports will increase in October, November, December, January, and, for some alternatives, in April, May and June. (Board Staff Exhibit 1, vol. 4, p. XIII-18.) Compared to Alternative 2, Qwest is reduced (reverse flows are increased) in all other alternatives in October through January. (Board Staff Exhibit 1, vol. 4, p. XIII-39: Table XIII-15, p. XIII-42.) DFG has established that spring run may be in the Delta from October through June. When the Delta Cross Channel gates are closed, salmon are prevented from leaving the Sacramento River through the Cross Channel. However, even with the Delta Cross Channel gates closed part of November-January, all of February-April, most of May and part of June as provided by the 1995 Bay-Delta Plan, some salmon still enter the Delta through Georgiana and Three Mile Sloughs, where, as the USFWS data indicate (Board staff Exhibit 177), survival is consistently lower than in the river. The salmon survival experiments planned for December 1998 and January 1999 with very low export rates will fill a significant data gap and should yield results to help us determine if the rate of water export from the Delta influences juvenile salmon survival during emigration through the interior Delta. If the evidence suggests exports contribute to salmon mortality it will be incumbent on us to ensure that adequate operational

discretion is available in the fall to reduce losses if substantial project-related mortality of salmon, including spring run salmon, occurs.

Another concern arises, particularly in wet years, when San Joaquin River Basin salmon fry can appear in the Delta in February and March. If utilized during that period, Joint Points could increase losses of this life stage of San Joaquin River Basin salmon. In addition, Sacramento River juvenile late fall run and winter run also may appear in the Delta in the fall months, and thus may be adversely affected by Joint Points pumping.

The challenge in developing an operations plan within CALFED is to define how Joint Points can be used to advantage while avoiding or minimizing adverse environmental effects, particularly to species listed for protection under the CESA and the federal Endangered Species Act. We recognize that it is difficult to balance operational restrictions necessary to address environmental impacts and retain operational flexibility necessary achieve water supply benefits by reacting to changing hydrologic conditions. In DFG's view, it will be possible to strike a reasonable balance between those competing concerns.

C. CONCLUSION

DFG recognizes that Joint Points provides opportunities to export water with minimal impacts to fisheries and that in so doing, benefits for both fisheries and water supplies dependent on the Delta can be generated. We believe the best venue to determine how the Joint Points can fit into the overall Bay-Delta solution is to integrate it into planning of the CALFED Bay-Delta Program. DFG further recognizes it is difficult to define criteria which completely describe in advance all opportunities for use of joint points without adverse environmental effects. For this reason, we believe it is most appropriate to rely on some combination of fixed criteria and variable criteria dependent on real time assessment of environmental and fishery conditions as the basis for operations of project facilities in the Delta, including Joint Points use. It is also important to continue to improve our understanding of factors influencing fish survival in the Delta and to focus our remedial efforts appropriately. Based on the current level of our collective knowledge, it is my opinion that operations criteria to limit impacts to juvenile salmon in the Delta in fall and early winter (November through January) are needed and any acceptable CALFED operations plan must address this need in some way.

DFG intends to work with its CALFED partners to develop an operations plan that will both facilitate improvements to fish survival in the Delta and provide water users with opportunities for achieving their water supply and water quality goals, through a variety of means including use of Joint Points of diversion. It is DFG's clear understanding, shared by the USBR, DWR and USFWS with whom we present this proposal, that if the Board authorizes Joint Points of Diversion in a decision based on this hearing, that use of Joint Points, except under the conditions in WR 95-6 related to Joint Points, would not commence until an acceptable operations plan that incorporates Joint Points, including operational criteria for fishery protection, is developed, evaluated and adopted through the CALFED process. In my opinion, such a plan is an essential prerequisite to expanded use of Joint Points of

Diversion to assure protection of public trust fishery resources.

Thank you for your consideration of DFG's testimony and other exhibits regarding Phase 6 of the Bay-Delta Water Rights Hearings.

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Environmental Water Account

The following are DFG staff's initial input on how an Environmental Water Account (EWA) should be organized, how it should operate, how assets are collected and used, and other features. DFG staff believes that the underlying foundation of an EWA is the establishment of a set of operation measures or default criteria that are defined to fundamentally protect the ecological processes and functions of the Bay-Delta and to reduce environmental stressors such as entrainment. Any change in the criteria should reduce impacts and provide net benefits to the aquatic resources of the Bay-Delta and its watershed.

Plan Scope

The EWA plan should address the next 10 years or the length of Stage 1, estimated to be 7 to 10 years. The plan should include two phases; EWA mechanisms that apply prior to the development of any new surface storage or groundwater storage (BNS) and mechanisms that apply after these storage facilities are developed (ANS). The EWA plan may be extended beyond Stage 1.

Before New Storage

Prior to the development of any new surface storage or groundwater storage the EWA shall be provided storage space in any SWP or CVP storage facility selected by the Environmental Water Account Manager (EWAM) at no charge to the EWA. The EWA shall be allowed to rent storage space in other non-SWP or non-CVP storage facility at a cost to be negotiated between the entity controlling the storage facility and the EWAM.

After New Storage

After the development of any new surface storage or groundwater storage the EWA shall be provided one third of the storage space at no charge to the EWA.

Accounting Structure

DFG staff recommends the following accounts and approach to collecting and crediting the EWA.

Number of Accounts

There should be two environmental water sub-accounts; an upstream account and a downstream account. Those accounts will hold assets that consist of water resources and option contracts for water. There should also be two environmental water sub-accounts that contain funds in an upstream account and a downstream account. Other accounts may be considered but we recommend avoiding too many separate accounts.

Initial Deposit

Each year by October 1, an initial deposit of _____ TAF of water shall be deposited by the SWP and CVP into both the upstream and downstream sub-accounts. In addition, funds in the amount of _____ dollars (in January 1999 dollars adjusted for inflation using an index acceptable to the EWAM) shall be deposited into the EWA. Any water from the initial deposit remaining on September 30 of the following year shall revert back to the SWP or CVP.

Other Deposits

If the EWAM elects to modify the default operational rules in a manner that results in additional water supplies, those additional water supplies shall be dedicated to the EWA. If the water released from upstream storage is identified as being available for export and is in fact exported by the SWP or CVP, the EWA shall be reimbursed at the rate of $____ per acre-foot.

When additional water supplies are developed the EWA shall be provided with ___ percent of those new supplies.

Relationship Between Accounts

The EWAM shall, subject to the transfers provisions below, manage the upstream accounts separately from the downstream accounts. The relationship between the water and funding sub-account shall be managed according to the asset allocation provisions described below.

Transfer Provisions

The EWAM may chose to transfer assets between the upstream and downstream accounts. The amount of these transfers shall be limited to 10 percent of the sub-account balance.

Asset Reallocation

The EWAM may chose to convert water to funding or shift from funding to water when, in its judgement, there is an advantage to do so to improve the ecological health of the Bay-Delta. Water may be converted to funds at the rate of $___ per acre-foot in January 1999 dollars, adjusted for inflation as specified above. The amount of these conversions shall be limited to 50 percent of the sub-account water balance.

Funds may be converted to water in the form of option contracts, acquisition of water rights, short term spot market purchases, funding of water conservation measures linked to a specified water return, purchasing a share of a drought water bank, pre-bank water, or other mechanisms deemed appropriate by the EWAM to improve the flexibility in using the EWA to

benefit aquatic resources in the Bay-Delta and its watershed.

Carryover of Assets

Assets shall be carried over in the following manner:

In the event environmental water provided in a water year is not used by September 30, the EWAM shall, if requested by DWR or the USBR, release its hold on any remaining environmental water in surface storage. Such released water shall be immediately dedicated in an equal amount in a groundwater facility or alternative surface storage acceptable to the EWAM.

Use of Account Assets

Water in the EWA shall be used by the EWAM in two principle ways. First, water may be released from storage in areas upstream of the Delta when such flow augmentations are deemed appropriate by the EWAM to benefit aquatic resources. If the water released is identified as being available for export and is in fact exported by the SWP or CVP, the EWA shall be reimbursed at the rate of $____ per acre-foot.

Second, water stored in surface or ground water storage downstream of the Delta may be released for use by the SWP or CVP in exchange for reduced exports below the default criteria when such reductions are deemed appropriate by the EWAM to benefit aquatic resources.

Funds may also be used to rent storage under conditions described above. The EWAM may use funds in the EWA to acquire and develop habitat that can contribute to improving the ecological health of the Bay-Delta.

Other Uses of Ecosystem Assets

Sharing of pumping above default rules

Carryover of Debits

A carry over of debits against the EWA will be allowed under two conditions. First, the debit carry over shall apply to water only and not funding. Second, the debit carryover shall not exceed 50 percent of the yearly initial deposit of water.

Conveyance

Water shall be wheeled by the SWP or CVP at no cost to the Environmental Water Account
EWA shall be given the highest priority for conveyance by the SWP or CVP
extra capacity now could gradually diminish later as demand increases (e.g., 2020 demand)
moving environmental water should not conflict with AG urban users otherwise it reduced yield

Storage

Storage of water upstream of the Delta and downstream of the Delta will be addressed differently. Upstream storage may be available for export subject to the default criteria when the EWAM determines that the principle benefits of a release of environmental water are instream an in the tributaries. The EWAM must make this determination in writing prior to the export of the environmental water by the SWP or CVP.

The EWA shall not result in a dedication of more than 10 percent of any upstream of Delta reservoir or more than 20 percent of any downstream of Delta reservoir in any given water year. There shall be a limit of 50 percent on the percent of storage dedicated for the EWA in a ground water storage facility.

Decision Making Process- EWAM

The EWAM shall consist of the directors of the Department of Fish and Game, the U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Each of these agencies shall dedicate technical staff to provide recommendations on how and when the EWA should be used.

Agency representatives of the EWAM shall be responsible for the following:

- negotiations
- providing rapid decisions using CMARP Real-time data
- developing longer range decision triggers
- developing and implementing a long range strategy for EWA uses
- priority setting
- integrating EWA funds with ERPP habitat
- ensuring adaptive management of the EWA

The EWAM will use the existing Operations Group structure with the addition of a scientific advisory group. The EWA Plan should provide specific examples to illustrate how the EWA works and how the Desision making body works. These illustrations could help to avoid potential future disagreements about interpreting how the EWA operates.

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