UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

FEB 27 2004

In Reply Refer to:
SWR-01-SA-5667:BFO

Mr. Frank Michny
Regional Environmental Officer
U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, California 95825-1898

Dear Mr. Michny:

The National Marine Fisheries Service (NOAA Fisheries) has completed its review of the Central Valley Project (CVP) and State Water Project (SWP; hereinafter referred to as the Project) operations proposed by the Bureau of Reclamation (Reclamation) for the period from April 1, 2004, to March 31, 2006. Pursuant to your request for an extension of the existing biological opinion, issued September 20, 2002, NOAA Fisheries has re-assessed the impacts of Project operations on threatened Central Valley spring-run Chinook salmon (CV spring-run Chinook salmon; *Oncorhynchus tshawytscha*) and threatened Central Valley steelhead (CV steelhead; *O. mykiss*) in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

This document transmits a supplemental biological opinion (Enclosure) to the September 20, 2002 spring-run/steelhead Operating Criteria and Plan biological opinion (2002 SR/S OCAP opinion) in order to provide ESA take exemption for Project operations and the issuance of interim water contracts by February 2004, while work on the long-term consultation continues. NOAA Fisheries is hereby amending the 2002 SR/S OCAP opinion for two years, or until the 2002 SR/S OCAP opinion is superceded by the long-term CVP-OCAP biological opinion scheduled for completion on or about June 30, 2004.

SR/S OCAP opinions covering one to two years of Project operations were issued on March 27, 2000, May 3, 2001, and on September 20, 2002. The CALFED Bay-Delta Program (CALFED) Record of Decision (ROD) issued on August 28, 2000, describes a 30-year program for increasing water supply reliability to California water users and restoration of the Central Valley ecosystem. Since the issuance of the CALFED ROD, Reclamation, the California Department of Water Resources (DWR), and NOAA Fisheries have worked together through various management groups to develop appropriate Project operating rules. Considerable modeling and other analyses relative to Project operations and the CALFED Program have been continually updated in order to evaluate the effects of the rapidly changing Project.

This supplemental biological opinion is based in part on our review of information referenced in Reclamation's letters to NOAA Fisheries dated September 22, 2003, and December 10, 2003,

requesting an extension of the 2002 SR/S OCAP opinion. In these letters, Reclamation concluded that:1) Project operations would not change over the next two years, with the exception of flows received from the Trinity River Division and Central Valley Project Improvement Act (CVPIA) section 3406 (b)(2) water program; and 2) existing protections and enhancements in freshwater habitats and the Delta were sufficient to protect CV spring-run Chinook salmon and CV steelhead.

Additional information used to complete the consultation included: (1) information from Reclamation received by FAX on January 21, 2004, concerning the two-year renewal of interim CVP water contracts; (2) a draft OCAP biological assessment dated June 2003; (3) draft responses from Reclamation dated December 4, 2003, to NOAA Fisheries letter dated December 19, 2002, concerning long-term CVP and SWP operations; (4) the Trinity River Mainstem Fishery Restoration Administrative Draft Supplemental Environmental Impact Statement/Report dated November 2003; and 5) weekly meetings with agency staff between September 2002 and February 2004, concerning the long-term CVP-OCAP project description.

NOAA Fisheries has reviewed the updated description of the Project and has analyzed its effects on CV spring-run Chinook salmon and CV steelhead due to: (1) the two-year time extension; and (2) the two changes described by Reclamation (*i.e.*, flow changes related to compliance with the Trinity River ROD and CVPIA b(2) program). Based on the best available scientific and commercial information, the supplemental biological opinion concludes that the effects of proposed Project operations, during the period from April 1, 2004, to March 31, 2006, are not likely to jeopardize the continued existence of CV spring-run Chinook salmon or CV steelhead. Currently, no critical habitat is designated for either species.

NOAA Fisheries also has updated and modified the incidental take statement from the 2002 SR/S OCAP opinion, which identifies the amount or extent of incidental take expected from the Project as well as the reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to minimize the take. The modified incidental take statement is included in its entirety in the Enclosure, and supercedes the original. Finally, we have determined that although Essential Fish Habitat (EFH) for Pacific salmon will continue to be adversely affected by the Project, no additional EFH conservation recommendations pursuant to the Magnuson-Stevens Fishery Conservation and Management Act are necessary; the EFH conservation recommendations provided to Reclamation on September 20, 2002, will continue to apply.

If you have any questions concerning this consultation, please contact Mr. Bruce Oppenheim in our Sacramento Area Office, 650 Capitol Mall, Suite 8-300, Sacramento, California 95814. Mr. Oppenheim may be reached by telephone at (916) 930-3603 or by FAX at (916) 930-3629.

Sincerely,

for Rodney R. McInnis
Acting Regional Administrator

Enclosure

cc:

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SUPPLEMENTAL BIOLOGICAL OPINION

ACTION AGENCY: U.S. Bureau of Reclamation, Mid-Pacific Region

ACTIVITY: Central Valley Project and State Water Project Operations, April 1, 2004 through March 31, 2006

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, Southwest Region

DATE ISSUED: FEB 27 2004

FILE NUMBER: SWR-01-SA-5667

I. CONSULTATION HISTORY

On September 20, 2002, the National Marine Fisheries Service (NOAA Fisheries) issued a biological opinion (SWR-01-SA-5667) on the Operating Criteria and Plan (OCAP) for the Central Valley Project (CVP) and State Water Project (SWP; hereinafter referred to as the Project) between April 1, 2002, through March 31, 2004, which assessed Project impacts to threatened Central Valley spring-run Chinook salmon (CV spring-run Chinook salmon; *Oncorhynchus tshawytscha*) and threatened Central Valley steelhead (CV steelhead; *O. mykiss*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This biological opinion (hereinafter referred to as the 2002 spring-run/steelhead [SR/S] OCAP opinion; NOAA Fisheries 2002a) concluded that the proposed operation of the Project by the Bureau of Reclamation (Reclamation) was not likely to jeopardize the continued existence of CV spring-run Chinook salmon or CV steelhead. NOAA Fisheries anticipated that the action likely would result in take of these listed species; therefore, an incidental take statement was attached to the biological opinion. Because NOAA Fisheries also determined that the proposed Project was likely to adversely affect Essential Fish Habitat (EFH) for Pacific salmon managed under the Pacific Coast Salmon Fishery Management Plan, pursuant to section 305(b)(2) of the Magnuson-Stevens Fisheries Conservation and Management Act (MSA), EFH recommendations were provided with the biological opinion on September 20, 2002. Reclamation responded to NOAA Fisheries concerning the adoption of these EFH conservation recommendations by letter dated October 29, 2002.

In letters to NOAA Fisheries dated September 22 and December 10, 2003, respectively, Reclamation requested a two-year extension (*i.e.*, from April 1, 2004, to March 31, 2006) of the 2002 SR/S OCAP opinion and provided clarification of the updated description of proposed

Project operations. On January 21, 2004, Reclamation provided additional information requested by NOAA Fisheries on December 22, 2003, concerning the two-year renewal of interim CVP water contracts. Information obtained from weekly meetings involving Reclamation, California Department of Water Resources (DWR), NOAA Fisheries, U.S. Fish and Wildlife Service (FWS), and California Department of Fish and Game (DFG) staff between September 2002 and February 2004 concerning the long-term CVP-OCAP project description has contributed to the consultation.

This consultation is intended to allow sufficient time (*i.e.*, up to two years) for Reclamation to issue interim water contracts and complete the long-term modeling and cumulative effects analysis of Project operations, at which time NOAA Fisheries anticipates a subsequent ESA section 7 consultation to assess the effects of the long-term CVP-OCAP and completion of a biological opinion (scheduled for June 30, 2004). NOAA Fisheries hereby amends the 2002 SR/S OCAP opinion for two years or until the 2002 SR/S OCAP opinion is superceded by the long-term CVP-OCAP biological opinion.

II. DESCRIPTION OF THE PROPOSED ACTION

As stated in the 2002 SR/S OCAP opinion, Project operations alter the quantity, timing, and quality of water passing through the Central Valley into the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta), thereby affecting the conditions under which juvenile and adult salmonids migrate through the river reaches and spawn and rear downstream of Project dams. Reclamation proposes to continue Project operations for an additional two years from April 1, 2004, to March 31, 2006. This consultation assumes that the baseline hydrologic conditions underlying Project operations identified in the 2002 SR/S OCAP opinion will continue, which include Reclamation's continued efforts to negotiate with water rights holders for long-term CVP contracts. Dependant on these long-term contracts is a flow augmentation program, which includes the use of 800 thousand acre feet (TAF) of Central Valley Project Improvement Act (CVPIA) section 3406(b)(2) water (hereinafter referred to as CVPIA b[2]) and 380 TAF from the CALFED Bay-Delta Program (CALFED) Environmental Water Account (EWA) to benefit salmon and steelhead.

Operational simulations for each of five water year types (*i.e.*, wet, above normal, below normal, dry, and critical) were prepared using a joint Reclamation and DWR planning model called CALSIM II, which is based on a monthly time step for water years 1922 to 1994. These simulations are intended to quantify the outcomes of the proposed operations of the Project in accordance with existing operational criteria, which are described in the 2002 SR/S OCAP opinion. Additional CALSIM II model runs incorporating the two Project changes described below are contained in the June 2003 draft biological assessment.

Reclamation proposes to operate the Project between April 1, 2004, and March 31, 2006, in a manner similar to the previous two years and consistent with the 2002 SR/S OCAP opinion,

except for two changes identified in a letter dated December 10, 2003 (MP-150, ENV-7.00), from Frank Michny of Reclamation to Mr. Michael Aceituno of NOAA Fisheries:

> "Reclamation's proposed action for this extension request is the continued operation of the CVP/SWP essentially as it has been operated in the last few years, and as described in 2001. This continued operation includes some operational changes that have occurred since 2001, such as increased Trinity flows and changes to b(2) implementation. Reclamation will continue to coordinate CVP/SWP operations, planning and implementation through the CALFED Ops process, the B2 Interagency Team (B2IT), the Environmental Water Account Team (EWAT), and other forums that NOAA Fisheries participates in."

Specifically, the two changes to Project operations that are addressed in this supplemental biological opinion include the following:

> 1) implementation of Trinity River Mainstem Fishery Restoration (TRMFR) flows equivalent to 369-453 TAF, as specified in the TRMFR Record of Decision (Trinity River ROD; signed December 19, 2000); and
>
> 2) changes in the delivery of CVPIA b(2) water, as specified in the May 9, 2003, Decision on Implementation by the Department of Interior (hereinafter referred to as the May 9, 2003, Decision on Implementation).

A. Trinity River Mainstem Fishery Restoration Flows

In 2001, Reclamation began implementing the Trinity River ROD, which calls for increased flows down the mainstem Trinity River ranging from 369-453 TAF; a shift in timing of Trinity River water diverted to the Sacramento River Basin from spring to summer and early fall; and maintenance of a minimum carryover storage of 600 TAF in Trinity Reservoir. Since that time Federal court orders have mandated the following required flows on the Trinity River based on water year and inflow to Trinity Reservoir:

2001	369 TAF
2002	369 TAF + 100 TAF (dry year flows)
2003	369 TAF + 33 TAF (fish flows for Klamath River)
2004	369 - 453 TAF

The latest Federal court ruling on December 9, 2002, set the Trinity River flows at 369 TAF in critical Trinity River inflow years and 452 TAF for all other conditions. The overall effect is that less water is diverted to the Sacramento River and CVP. Previous modeling and forecasts were based on 369 TAF of flows down the Trinity River. The amount of water for 2004 has yet to be

determined (awaiting Federal court decision), but based on current inflows (Trinity Reservoir at 1.933 million acre feet (MAF), or 80 percent of capacity) the Trinity River flows should be between 369-453 TAF.

In the past, Reclamation has relied on water being diverted from the Trinity River to maintain water temperatures in the upper Sacramento River for listed salmonids, primarily for Sacramento River winter-run Chinook salmon (*O. tshawytscha*). The effects of this changed operation were analyzed in NOAA Fisheries biological opinion on TRMFR dated October 12, 2000 (NOAA Fisheries 2000). That opinion concluded that increasing flows on the Trinity River was not likely to jeopardize the continued existence of CV spring-run Chinook salmon or CV steelhead. Additionally, no incidental take was anticipated. However, these determinations were dependant in part on the availability of CVPIA b(2) water (see below), which has diminished since 2001. The Trinity River biological opinion will be reviewed in light of these changes after the final Supplement EIS/EIR for the TRMFR is completed. The present evaluation is based on the description of the Project provided in the TRMFR Administrative Draft Supplemental Environmental Impact Statement/Report (Trinity River Administrative Draft SEIS/R) dated November 13, 2003, which in general shows greater water temperature impacts than originally anticipated from the Project.

B. Implementation of CVPIA (b)(2) Flows

In the 2002 SR/S OCAP opinion, Reclamation was assumed to operate the CVP using the October 1999 Federal court decision on implementation of CVPIA b(2) flows. Beginning in 2001, however, Federal court rulings have eliminated the cap on Water Quality Control Plan Decision 1641 costs and disallowed the use of offset and reset rules (*i.e.*, crediting) on reservoir storage and Sacramento-San Joaquin Delta pumping. Compliance with these rulings has had the effect of diminishing the fish protection flows from CVPIA (b)(2) by approximately 400 TAF (Derek Hilts, FWS, pers. comm., January 2004).

These latest court-mandated changes were formally adopted in the May 9, 2003, Decision on Implementation, which set aside 200 TAF of the 800 TAF available in the OCAP b(2) yearly budget to specifically provide for fish protection in upstream areas from October through January. However, in doing so, the amount of CVPIA b(2) water available in the Delta has diminished for water quality control plan costs and export curtailments during the Vernalis Adaptive Management Program (VAMP; April 15 through May 15). To a certain extent the CALFED-EWA has been used to make up for some of the 600 TAF reduction in fish protection in the Delta. In the last year-and-a-half, the fish management agencies have proposed to increase EWA to make up for this shift in fish protection under the CALFED Record of decision (ROD).

C. Action Area

For the purposes of this opinion, the action area includes the following: Shasta Dam and the reaches of the Sacramento River downstream to San Francisco Bay that may be affected by the

operation of Reclamation facilities; Whiskeytown Dam and the reaches of Clear Creek downstream to the confluence with the Sacramento River that may be affected by the operation of Reclamation facilities; Oroville Dam and the reaches of the Feather River downstream to the San Francisco Bay that may be affected by the operation of DWR facilities; Folsom Dam and the reaches of the American River downstream to San Francisco Bay that may be affected by the operation of Reclamation facilities; New Melones Dam and the reaches of the Stanislaus River downstream to the Delta that may be affected by the operation of Reclamation facilities; and the entire Delta that may be affected by the operation of CVP and SWP facilities.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

The following listed threatened species occur in the action area and may be affected by proposed operations of the Project:

CV spring-run Chinook salmon–threatened
CV steelhead–threatened

Critical habitat for these species has not been designated.

A. Species Life History, Population Dynamics, and Likelihood of Survival and Recovery

The life history and population trends of CV spring-run Chinook salmon and CV steelhead are discussed in the 2002 SR/S OCAP opinion, and are incorporated here by reference. The information has been updated as necessary below.

1. CV spring-Run Chinook Salmon

Since 1969, the CV spring-run Chinook salmon evolutionary significant unit (ESU) has displayed broad fluctuations in abundance, ranging from 1,403 in 1993 to 25,890 in 1982 (DFG unpublished data). The average abundance for the ESU was 12,590 for the period of 1969 to 1979, 13,334 for the period of 1980 to 1990, and 6,554 from 1991 to 2001. Evaluating the abundance of the ESU as a whole, however, complicates trend detection. For example, although the mainstem Sacramento River population appears to have undergone a significant decline, the data are not necessarily comparable because coded wire tag information gathered from Central Valley fall-run Chinook salmon (CV fall-run Chinook salmon; *O. tshawytscha*) returns since the early 1990s has resulted in adjustments to ladder counts at Red Bluff Diversion Dam (RBDD) that have reduced the overall number of fish that are categorized as spring-run Chinook salmon (Colleen Harvey-Arrison, DFG, pers. comm. 2002).

Sacramento River tributary populations in Mill, Deer, and Butte Creeks are probably the best trend indicators for spring-run Chinook salmon abundance. These streams have shown positive escapement trends since 1991, yet recent escapements to Butte Creek, including 20,259 in 1998,

9,605 in 2001 and 8,785 in 2002, are responsible for the magnitude of tributary abundance (DFG 2002 and DFG unpublished spring-run Chinook salmon data 2002). Although recent tributary production is promising, annual abundance estimates display a high level of fluctuation and the overall number of CV spring-run Chinook salmon remains well below estimates of historic abundance.

The initial factors that led to the decline of spring-run Chinook salmon were related to the loss of upstream habitat behind impassible dams. Since this initial loss of habitat, other factors have contributed to the decline of Chinook salmon and affected the ESU's ability to recover. These factors include a combination of physical, biological, and management factors such as climatic variation, water management, hybridization, predation, and harvest (DFG 1998).

Weather and ocean conditions in California can vary substantially from year to year. During the drought of 1984 to1992, spring-run Chinook salmon populations declined substantially. Reduced flows resulted in warm water temperatures and impacted adults, eggs, and juveniles. For adult spring-run Chinook salmon, reduced instream flows delayed or completely blocked access to holding and spawning habitats. Water management operations, including reservoir releases, and unscreened and poorly screened diversions in the Sacramento River, its tributaries, and in the Sacramento-San Joaquin Delta compounded drought-related problems by reducing river flows, warming river temperatures, and entraining juvenile spring-run Chinook salmon.

Hatchery practices as well as spatial and temporal overlaps of habitat use and spawning activity between CV spring-run Chinook salmon and CV fall-run Chinook salmon led to the hybridization and homogenation of some subpopulations (DFG 1998). As early as the 1960s, Slater (1963) observed that early fall-run adults were competing with spring-run adults for spawning sites in the Sacramento River below Keswick Dam, and speculated that the two runs may have hybridized. Feather River hatchery spring-run Chinook salmon have been documented as straying throughout Central Valley streams for many years, and in many cases have been recovered from the spawning grounds of fall-run Chinook salmon (Colleen Harvey-Arrison and Paul Ward, DFG, pers. comm. 2002), which is an indication that Feather River Hatchery spring-run Chinook salmon may exhibit fall-run life history characteristics. Although the degree of hybridization has not been comprehensively determined, it is clear that the populations of spring-run Chinook salmon spawning in the Feather River and counted at RBDD contain hybridized fish.

Accelerated predation also may be a factor in the decline of spring-run Chinook salmon. Although predation is a natural component of spring-run Chinook salmon life ecology, the rate of predation likely has greatly increased through the introduction of non-native predatory species such as striped bass (*Morone saxatilis*) and largemouth bass (*Micropterus salmoides*), and through the alteration of natural flow regimes and the development of structures that attract predators, including dams, bank revetment, bridges, diversions, piers, and wharfs (Stevens 1961, Vogel *et al.* 1988, Garcia 1989, Decato 1978). The FWS found that more predatory fish were found at rock revetment bank protection sites between Chico Landing and Red Bluff than at sites

with naturally eroding banks (Michny and Hampton 1984). High rates of predation are known to occur at water diversion structures associated with RBDD, Anderson-Cottonwood Irrigation District, and Glenn-Colusa Irrigation District on the mainstem Sacramento River, and in the South Delta (DFG 1998). From October 1976 to November 1993, DFG conducted ten mark/recapture experiments at the SWP's Clifton Court Forebay to estimate pre-screen losses using hatchery-reared juvenile Chinook salmon. Pre-screen losses ranged from 69 to 99 percent. Predation from striped bass is thought to be the primary cause of the loss (DFG 1998, Gingras 1997).

Spring-run Chinook salmon are harvested in ocean commercial, ocean recreational, and inland recreational fisheries. Coded wire tag returns indicate that Sacramento River salmon congregate off the coast between Point Arena and Morro Bay. Ocean fisheries have affected the age structure of spring-run Chinook salmon through targeting large fish for many years and reducing the number of four and five year olds (DFG 1998). An analysis of six tagged groups of Feather River Hatchery spring-run Chinook salmon by Cramer and Demko (1997) indicates that harvest rates of three-year-old fish ranged from 18 to 22 percent, four-year-olds ranged from 57 to 84 percent, and five-year-olds ranged from 97 to 100 percent. Reducing the age structure of the species reduces its resiliency to factors that may impact a year class. In-river recreational fisheries historically have taken fish throughout the species' range. During the summer, holding adult spring-run Chinook salmon are easily targeted by anglers when they congregate in large pools. Poaching also occurs at fish ladders, and other areas where adults congregate. However, the significance of poaching on the adult population is unknown.

Several actions that have been taken to improve habitat conditions for spring-run Chinook salmon, include improved management of Central Valley water (*e.g.*, through use of CALFED EWA, CVPIA (b)(2) water, and DCC gate operations), habitat restoration, new and improved fish screens at major water diversions along spring-run Chinook salmon tributaries (*i.e.*, Clear, Battle, Mill, and Butte Creeks) and the mainstem Sacramento River, and changes in ocean and inland fishing regulations to minimize harvest. Although protective measures likely have led to recent increases in spring-run Chinook salmon abundance, the ESU is still below levels observed from the 1960s through 1990. Threats from hatchery production, climatic variation, predation, and water diversions persist. Because the CV spring-run Chinook salmon ESU is confined to relatively few remaining streams and continues to display broad fluctuations in abundance, the population is at a moderate risk of extinction.

2. CV steelhead

Existing wild steelhead stocks in the Central Valley are mostly confined to upper Sacramento River and its tributaries, including Antelope, Deer, and Mill Creeks and the Yuba River. Populations may also exist in Big Chico and Butte Creeks (McEwan and Jackson 1996). The American River steelhead population has declined from 19,583 in the early 1970's to less than 500 fish naturally produced in-river (Hannon *et al.* 2003). The Feather River population has declined from an average of 582 adults per year (*i.e.*, 1963-1966 pre-Project counts) to 163

in-river spawners (DWR 2003). However, the American and Feather River populations are most likely derived from hatchery descendants.

Steelhead were thought to be extirpated from the San Joaquin River system, but recent monitoring has detected self-sustaining populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other streams previously thought to be void of steelhead (McEwan 2001). In 2003, researchers conducting spawning surveys for salmon on the Mokelumne River counted 50 steelhead redds; however fish ladder counts for that year indicated all were of hatchery origin (Setka and Bishop 2003). It is possible that naturally spawning populations exist in many other streams but are undetected due to lack of monitoring programs (Interagency Ecological Program [IEP] Steelhead Project Work Team 1999).

Reliable estimates of steelhead abundance for different basins are not available (McEwan 2001). Steelhead counts at the RBDD have declined from an average of 11,187 for the period of 1967 to 1977, to an average of approximately 2,000 through the 1990s, with an estimated total annual run size for the entire Sacramento-San Joaquin system, based on RBDD counts, to be no more than 10,000 adults (McEwan and Jackson 1996, McEwan 2001). Steelhead escapement surveys at RBDD ended in 1993 due to changes in dam operations. More recent population estimates are based on three years of trawl data at Chipps Island collected since 1998 when all hatchery fish have been clipped (NOAA Fisheries 2003). Using the ratio of hatchery (*i.e.*, clipped) to wild fish, the adult CV steelhead population estimate averaged 3,628 fish over three years (1998-2000). From this estimate, assuming 1 percent survive to the smolt stage, approximately 181,000 smolts annually are being produced and entering the Delta.

The factors affecting the survival and recovery of CV steelhead are similar to those affecting CV spring-run Chinook salmon and are primarily associated with habitat loss (McEwan 2001). McEwan and Jackson (1996) attribute this habitat loss and other habitat problems primarily to water development resulting in inadequate flows, flow fluctuations, blockages, and entrainment into diversions. Other habitat problems related to land use practices and urbanization have also contributed to steelhead declines (Busby *et al.* 1996). Although many of the factors affecting salmon are common to steelhead, some stressors, especially warm summer water temperatures, cause greater effects to steelhead because juvenile steelhead rear in freshwater for more than one year. Suitable steelhead conditions primarily occur in mid- to high-elevation streams. Because 95 percent of suitable habitat has been lost to dam construction (McEwan 2001), juvenile rearing is generally confined to lower elevation stream reaches where water temperatures during late summer and early fall can be too warm for adequate growth or survival.

Many of the habitat improvements that have benefitted spring-run Chinook salmon, including water management through the CVPIA (b)(2) water supply and the CALFED EWA, improved screening conditions at water diversions, and changes in inland fishing regulations (there is no ocean steelhead fishery) benefit steelhead. However, many dams and reservoirs in the Central Valley do not have water storage capacity or release mechanisms necessary to maintain suitable water temperatures for steelhead rearing through the critical summer and fall periods, especially

during critically dry years (McEwan 2001). The future of CV steelhead is uncertain because of the lack of trend data.

The NOAA Fisheries Biological Review Team conducted a status review in February 2003 of West Coast Salmon and steelhead, which concluded that CV steelhead were "in danger of extinction" or "likely to become endangered" in the near future (NOAA Fisheries 2003). The review, although based on limited new data, concluded that total abundance was continuing to decline.

IV. ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species within the action area. The environmental baseline "includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR § 402.02). Because the Project action area is so large, many factors affecting the species in the action area are similar to those contributing to the status of the species.

For a full discussion of the environmental baseline for these species in the action area, the reader is referred to the 2002 SR/S OCAP opinion. In the approximate year-and-a-half since the issuance of the 2002 SR/S OCAP opinion, the status of CV spring-run Chinook salmon and CV steelhead within the action area is unlikely to have changed to any significant extent based on NOAA Fisheries knowledge of habitat conditions in the action area and the effects of ongoing projects. Some improvements to spawning habitat have occurred (*e.g.*, Clear Creek restoration activities benefitted spring-run Chinook salmon and CV steelhead), salvage of steelhead at the Delta pumps has remained low, and monitoring efforts have increased, detecting the presence of steelhead below dams which were unknown at the time of listing (*e.g.*, in the American, Calaveras, and Mokelumne Rivers).

The Clear Creek dam removal and restoration project represents a small increase (less than one percent) in the adult population of both species based on estimates for the Central Valley (NOAA Fisheries 2003). Low steelhead salvage numbers at the Delta pumping facilities could indicate a downward trend in the wild population consistent with upstream monitoring, but may be more of an indicator of year class strength associated with hydrology. No steelhead population assessment is conducted in the Central Valley, but from the limited available information the Biological Review Team concluded CV steelhead have a strong negative population growth rate and small population size (NOAA Fisheries 2003).

The action area functions as a migratory corridor for adult and juvenile spring-run Chinook salmon and steelhead, and provides juvenile rearing habitat and adult spawning habitat for these

species. The majority of CV spring-run Chinook salmon spawn in Sacramento River tributaries that are outside of the Project action area (*i.e.*, Butte, Mill, and Deer Creeks), but a large part of CV steelhead spawning habitat is within the action area (*i.e.*, Feather River, American River, Stanislaus River and Clear Creek) and a majority of the CV steelhead ESU is contained within the action area. Because new information (NOAA Fisheries 2003) suggests that the CV steelhead ESU is continuing to decline, CV steelhead in the action area likely are also continuing to decline.

V. EFFECTS OF THE ACTION

The purpose of this section is to identify effects to CV spring-run Chinook salmon and CV steelhead that would result when Reclamation extends Project operations for two years, from March 31, 2004, to March 31, 2006. Since Project operations will remain essentially the same as those previously analyzed in the 2002 SR/S OCAP opinion, only the changes that have occurred since that biological opinion was issued are discussed in detail.

NOAA Fisheries generally approaches "jeopardy" analyses in a series of steps. First, we evaluate the available evidence to identify the direct and indirect physical, chemical, and biotic effects of proposed actions and interrelated and interdependent actions on individual members of listed species or aspects of the species' environment (these effects include direct, physical harm or injury to individual members of a species; modifications to something in the species' environment - such as reducing a species' prey base, enhancing populations of predators, altering its spawning substrate, altering its ambient temperature regimes; or adding something novel to species' environment - such as introducing exotic competitors or disruptive noises). Once we have identified the effects of an action, we evaluate the available evidence to identify an individual's probable response (including behavioral responses) to those effects. We then determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution (for example, by changing birth, death, immigration, or emigration rates; increasing the age at which individuals reach sexual maturity; decreasing the age at which individuals stop reproducing; among others). Finally, we use the evidence available to determine if these reductions, if there are any, could reasonably be expected to appreciably reduce a species' likelihood of surviving and recovering in the wild.

A. Approach to the Assessment

1. Information Available for the Assessment

To conduct this assessment, NOAA Fisheries examined information provided by Reclamation in the draft June 2003 biological assessment for the Project and in Reclamation's letters to NOAA Fisheries dated September 22, 2003, and December 10, 2003. Additional information regarding interim contracts was provided by Reclamation to NOAA Fisheries by FAX on January 21, 2004.

For effects from changed Trinity River operations, NOAA Fisheries examined the CALSIM II modeling contained in the Trinity River Administrative Draft SEIS/R dated November 2003.

CALSIM is a long term model that uses monthly time steps based on a 72 year record (1922-1994) of hydrological information. Various layers are added on to the model starting with water quality control runs, biological opinion requirements, CVPIA b(2) water, and finally an EWA run. The results of these combined model runs are then fed into second order models such as water temperature models, mortality models, and economic models. The best use of such a model to estimate likely effects is to use the information produced from CALSIM in an incremental trend analysis (*i.e.*, as the assumptions are changed in the model the overall trend of changes to the environment should become apparent due to the effects of the changes). The use of such a model to predict absolute values (*i.e.*, flow regimes or temperature control capability) has significant uncertainty. Therefore, predicting environmental effects based on CALSIM results requires knowing the limitations of these absolute values and a good degree of expert knowledge to determine the significance of changes likely to effect fish species.

2. Assumptions Underlying This Assessment

As stated in Reclamation's letter of December 10, 2003, most Project operations are expected to remain as described and analyzed in the 2002 SR/S OCAP opinion. Therefore, only the operational changes that have occurred since that biological opinion was issued and the effect of continuing operations for two years will be analyzed here. These changes are: (1) the operation of the Trinity River Division of the CVP; and (2) implementation of the CVPIA b(2) water program. The effects considered are related to maintaining adequate flows and temperature for CV spring-run Chinook salmon and CV steelhead, except at diversion points where direct effects (*i.e.*, entrainment) can be quantified.

B. Continuing Project Effects

In general, the adverse effects to CV spring-run Chinook salmon and CV steelhead from Project operations as described in the 2002 SR/S OCAP opinion will continue. In the upper river areas anticipated adverse impacts consist primarily of changes in the magnitude and duration of peak flow events below Project reservoirs and elevated water temperature. High flow events (*i.e.*, related to flood control, meeting Delta standards, Federal Energy Regulatory Commission [FERC] requirements, pulse flows) will continue in the next two years and may result in areas of stranding, isolation and redd dewatering. Low flows and flow fluctuations during critical spawning periods may increase mortality of eggs and newly emerged fry as well as subject adults to increased sport fishing pressure. Through the use of adaptive management groups such as the Water Operations Management Team (WOMT), B(2) Interagency Team (B2IT), and Sacramento Temperature Task Group, stabilization of flows below Project reservoirs and adjusting ramping rates for individual high flow events should reduce and minimize these adverse impacts to less than significant levels.

In the Delta, mortality due to entrainment at the CVP, SWP, and Rock Slough Diversions will continue to reduce the survival of CV spring-run Chinook and CV steelhead. However, as described in the 2002 SR/S OCAP opinion, existing protective fish actions such as export curtailments, the use of CVPIA b(2) water, the use of EWA water, and early Delta Cross Channel (DCC) gate closures are expected to reduce and minimize the loss associated with the Delta pumping plants. In addition, operational flexibility through the different adaptive management groups will reduce the likelihood of significant losses occurring during critical periods of entrainment. A Salmon Decision Process has been developed based on sampling sites that follow fish movement downstream to guide these groups in managing these fish actions that will protect outmigrating older juveniles.

Other continuing measures to protect and restore spring-run Chinook salmon habitat such as the Four Pumps Agreement Program, Tracy Direct Loss Mitigation, CVPIA-Anadromous Fish Restoration Program (AFRP), and CALFED Ecosystem Restoration Plan will generally benefit steelhead as well. However, adequate habitat conditions must be maintained all year below Project reservoirs for all life stages to benefit. The life history differences between Chinook salmon and steelhead may lead to conflicting flow requirements for each species (*e.g.*, in the American River). While steelhead need cold water for over summering below Project dams, increased flows for Chinook salmon typically are scheduled for spring emigration and fall spawning.

C. Clear Creek

1. Adult Migration, Spawning and Incubation

Since the 2002 SR/S OCAP opinion was issued, NOAA Fisheries believes that the changes in Project operation (*i.e.*, due to the Trinity River ROD and May 9, 2003, Decision on Implementation of CVPIA b[2]) have not adversely affected either CV spring-run Chinook salmon or CV steelhead in Clear Creek. The terms and conditions of the 2002 SR/S OCAP opinion contain temperature criteria to protect over-summering juveniles and adult spawning. In 2003, Reclamation was able to meet these temperature requirements by managing CVPIA b(2) water to increase releases below Whiskeytown Reservoir on Clear Creek. Predicted operations for the next two years are expected to meet temperature requirements established in the 2002 SR/S OCAP opinion that will benefit adult holding, spawning, and incubation for both species. Implementation of the CVPIA b(2) water actions and re-operation of CVP reservoirs is anticipated to increase the survival and spawning success of adult spring-run Chinook and steelhead in Clear Creek.

2. Fry, Juveniles, and Smolts

Predicted monthly flows and temperatures are expected to provide adequate juvenile rearing habitat for both species based on CALSIM II modeling results from the draft 2003 biological assessment. In addition, a more stable flow pattern than the pre-dam condition, and the use of

CVPIA b(2) water in the summer and fall months to augment minimum flows will substantially increase the likelihood of survival for all salmonids. The small chance that flows and temperatures will be affected by Trinity River ROD flows into Whiskeytown Reservoir is not expected to occur in the next two years because reservoir storage should be sufficient under the current baseline conditions. Predicted flows in Clear Creek are expected to provide suitable depths and velocities for juvenile spring-run Chinook salmon rearing and emigration between October and March. Predicted water temperatures in all cases are expected to be within, or below, preferred temperatures (*i.e.*, 50 °F to 60 °F) for juvenile spring-run Chinook salmon rearing and emigration between October and March. These conditions will minimize adverse effects to listed juveniles, therefore no take is anticipated.

D. Sacramento River

1. Adult Migration, Spawning and Incubation

The changes in Project operations are not expected to adversely affect adult life stages of CV spring-run Chinook salmon or CV steelhead in the Sacramento River. The extent of spring-run Chinook salmon and steelhead spawning in the mainstem Sacramento River is unknown at this time. However, existing criteria contained in the Water Quality Control Standards (D-1641, 90-5) are sufficient based on flow studies (DWR 1993, USFWS 2003) to provide adequate flows and temperatures for adults. In addition, the May 9, 2003, Decision on Implementation of CVPIA b(2) should benefit upstream spawning and incubation by providing higher flows and lower temperatures for steelhead in September, when Reclamation is typically ramping down to minimum flows required by the California State Water Quality Control Board. Keswick Dam minimum releases of 3,250 to 3,800 cubic feet per second (cfs) combined with tributary accretions are expected to provide adequate depths and velocities for upstream passage and for spawning based on CV fall-run Chinook salmon habitat criteria developed by DFG for this area (DWR 1993). Predicted average monthly temperatures are within the range of preferred spawning temperatures for steelhead; therefore, adverse effects on adult survival and spawning success are not anticipated beyond the level evaluated in 2002 for adults.

2. Fry, Juveniles, and Smolts

The ramping criteria for Keswick Dam releases to the Sacramento River established in the February 12, 1993, biological opinion that assessed the effects of Project operations on Sacramento River winter-run Chinook salmon biological opinion remain in effect through March 31 of every year. These ramping criteria are expected to avoid or minimize impacts to spring-run Chinook salmon and steelhead fry and juveniles from stranding and dewatering resulting from flow fluctuations.

Steelhead juveniles and smolts may emigrate from the upper Sacramento River over a prolonged period (*i.e.*, October through early July) (McEwan and Jackson 1996, DWR and Reclamation 2000). Spring-run yearlings may emigrate from the upper Sacramento River beginning in

October and extending through February, while sub-yearlings may begin in December and continue through May. Predicted monthly average temperatures in the upper Sacramento River are within the preferred temperature range for steelhead and spring-run Chinook salmon smolts from November through June. Also, predicted flows within the upper Sacramento River are expected to provide suitable depths and velocities for emigrating juvenile steelhead and spring-run Chinook salmon due to the high summertime flow pattern. Flows are not predicted to drop below the minimum instream flow requirements during the low flow period (*i.e.*, November through February).

The Trinity River SEIS/R CALSIM II modeling indicates that implementing the Trinity River ROD flows will adversely affect upper Sacramento River water temperatures and thereby increase early life stage mortality for CV spring-run Chinook by two percent and CV steelhead by one percent above that currently attributed to the Project. However, these effects are within the confidence level of the model's ability to predict mortality, and therefore are not considered significant. In addition, operational flexibility through the use of management groups like the B2IT have minimized adverse impacts from CVP operations during critical ramp down periods in the fall and winter. The short-term impact of extending proposed Project operations is not expected to have significant effects on populations of spring-run Chinook salmon and steelhead. based to a large degree on the high level of available storage in Shasta Reservoir (currently at 4.1 MAF), which will carry over into the following year (2005). Predicted average monthly temperatures are within the range of preferred rearing temperatures for spring-run Chinook salmon and steelhead juveniles, and temperature is a key component affecting the quality of juvenile salmonid rearing habitat. Therefore, adverse effects on juvenile feeding, growth, and survival rates are not anticipated beyond the level evaluated in the 2002 SR/S OCAP opinion.

E. Feather River

The changes in Project operations (*i.e.*, flow changes due to the Trinity River ROD and May 9, 2003, Decision on Implementation of CVPIA b[2]) that will occur over the next two years are expected to have a minimal effect on the operation of the Feather River and Oroville Dam Complex because they are part of the SWP; therefore, CVPIA b(2) water is not used to augment flows for this project. Implementation of the Trinity River ROD is not anticipated to affect Feather River flows or temperature control. Consequently, no adverse effects to listed salmonids in the Feather River are expected.

The impact of continuing SWP operations as they occur today for the next two years is expected to result in some losses of spring-run juveniles and steelhead from stranding and isolation resulting from flow fluctuations in the low flow channel. These operations can be controllable (*i.e.*, by management decisions; *e.g.*, as with pulse flow studies or FERC inspections) or implemented quickly and with few options, as is the case for flood control releases. Through the adaptive management groups (*i.e.*, WOMT and B2IT) it is anticipated that controllable flow fluctuations will be timed to occur during non-critical spawning and incubation periods. Flood control releases are not likely to occur in the next two years due to low storage levels and low

refill potential of Oroville Reservoir. Therefore, the anticipated level of take is not expected to be greater than that evaluated in the 2002 SR/S OCAP opinion.

F. American River

1. Adult Migration, Spawning and Incubation

The changes to Project operations may adversely affect steelhead in the American River through the more frequent use of Folsom Reservoir releases to compensate for losses in storage at Shasta Reservoir due to less Trinity River water being diverted to the Central Valley. The resultant reduction in Folsom Reservoir storage will reduce the ability to control temperatures in the lower American River for over-summering steelhead. The population of steelhead in the action area is likely to experience a decline in recruitment if persistent dry conditions occur. However, this is unlikely to occur in the next two years given the present rate of storage in Folsom Reservoir. In addition, the May 9, 2003, Decision on Implementation of CVPIA b(2) should benefit steelhead spawning by providing higher flows from October through January. No effects to spring-run Chinook salmon will occur because they are no longer present in the American River.

2. Fry, Juveniles, and Smolts

The loss in fish protection associated with water available through the CVPIA b(2) flows is most apparent for juvenile steelhead. Less CVPIA b(2) water equates to lower releases in the summer and higher temperatures which can physiologically stress juveniles and reduce feeding and growth rates, or create more suitable habitat for predators such as largemouth bass (*Micropterus salmoides*, DFG 1998, Gingras 1997). Also, the American River will be operated to meet Delta water quality standards more often because of its closer proximity to the Delta. Therefore, Folsom Reservoir releases are expected to fluctuate to a greater degree than those of other reservoirs to meet the Delta standards.

Recent steelhead redd surveys conducted for the last three years indicated that 243 to 486 adult steelhead spawn naturally in the American River (Hannon 2003). In 2003, approximately 26 steelhead redds were dewatered during February, due to flow changes to meet a Delta water quality standard (*i.e.*, the X2 salinity standard at Roe Island). Based on the redd surveys, up to 12 percent of the 2003 juvenile steelhead production from the American River experienced mortality or adverse effects. However, not all of the redds were completely lost due to this dewatering event (Bruce Oppenheim, NOAA Fisheries, pers. obs., March 5, 2003). Some of the fry from the affected redds survived through below surface flows, salvage efforts, or higher flows in April (Hannon 2003).

NOAA Fisheries expects that some reduction in juvenile steelhead numbers will occur in the next two years due to flow fluctuations which may strand juveniles and lead to mortality from dessication or predation, reductions in rearing habitat which may cause increased competition for food, and higher summer water temperatures which may cause physiological stress and reduce

growth rates or result in direct mortality. The actual loss in juveniles from dewatered redds was likely less than 12 percent in 2003, due to subsurface flows preventing complete dessication of eggs. In the next two years, reoperation of Folsom reservoir, the flexibility of the American River Operations Group, and a wetter hydrology in the American River basin are expected to reduce or minimize the impact of flow fluctuations. However, it is expected that flow fluctuations for non-flood control releases will continue over the next two years, reducing the likelihood of survival and recovery of steelhead in the American River.

G. Stanislaus River

Changes to Project operations as a result of reduced diversions due to compliance with the Trinity River ROD and May 9, 2003, Decision on Implementation of CVPIA b(2) are not expected to adversely affect CV steelhead on the Stanislaus River because adequate flow and temperature criteria already are in place. The use of CVPIA b(2) water may diminish in the next two years due to the court-mandated changes that have occurred since 2001, however, an adequate amount of purchased water (*i.e.*, CVPIA b[3] and DFG water [see the New Melones Interim Plan of Operations (NMIPO) discussed in the 2002 SR/S OCAP opinion]) is expected to be available to augment minimum streams flows and maintain adequate temperatures for CV steelhead.

Annual pulse flow releases in April and May for the VAMP experiments also are expected to increase the likelihood of survival of CV steelhead. New Melones Reservoir releases of 125 cfs to 300 cfs are expected to provide adequate depths and velocities for steelhead spawning and incubation based on instream flow incremental methodology (IFIM) studies (Aceituno 1993) and the NMIPO fishery flow objectives. Water quality control releases to meet the Vernalis flow (*i.e.*, San Joaquin River) objective are expected to increase flows above the minimum criteria and improve smolt emigration during the spring.

Less Trinity River water and less CVPIA b(2) water diverted to the upper Sacramento River will put greater demands on New Melones Reservoir releases to meet Delta water quality control criteria. New Melones Reservoir is already over-allocated and cannot meet the needs of both fish and water users in the Central Valley (McAfee 2000). Reclamation failed to meet the Vernalis flow standard in the last two years and, based on low storage in New Melones Reservoir, is not expected to meet the standard again in 2004. This impact will not affect the Stanislaus River due to adequate flow minimums, but will affect the San Joaquin River downstream of Vernalis from February to June. By not meeting the flow standard at Vernalis, Reclamation frees up more CVPIA (b)2 water to be used elsewhere in the CVP, which may sometimes benefit steelhead. In February 2004, through the adaptive management process (i.e. WOMT) Reclamation decreased pumping at the Tracy Pumping Plant in response to not meeting the Vernalis Flow Standard for that month. Also, the Data Analysis Team recommended not to relax the Export to Inflow (E/I) ratio as a result of not meeting the standard. These two actions resulted in less take of steelhead and spring-run Chinook at the Delta pumping plants.

The impacts to CV steelhead in the San Joaquin River are difficult to quantify, but may include degraded habitat conditions from lower flows, which may reduce the quantity of rearing habitat and cause increased competition for food, higher temperatures and lower dissolved oxygen levels which may lead to physiological stress and impair growth rates, and higher contaminant concentrations which may impair reproductive success. However, these effects are likely to be minimal because the San Joaquin River is used primarily as a migratory corridor by CV steelhead, and their residence time is expected to be brief. No effects to CV spring-run Chinook salmon are expected since they are no longer present in the Stanislaus River or San Joaquin River.

H. Sacramento-San Joaquin Delta

It is difficult to quantify the effects of Project changes on flow and temperature as salmonids migrate through the Sacramento-San Joaquin Delta. Historically, Trinity River water never entered the Delta. The operational changes resulting from the Trinity River ROD flows and availability of CVPIA b(2) water may reduce Delta inflow by a small amount in the next two years, causing some indirect effects above what was previously evaluated in the 2002 SR/S OCAP opinion. However, the use of CVPIA b(2) water in the Delta to meet water quality control plan requirements is considered beneficial to spring-run Chinook salmon and steelhead. These flows are intended to increase survival of yearling spring-run Chinook salmon and steelhead by reducing export levels at the CVP Tracy pumping plant when monitoring efforts indicate juveniles are present. Therefore, indirect effects should be lessened by the benefits of reduced pumping.

The decreased amount of CVPIA b(2) water available in the Delta has been replaced to a certain extent by the use of EWA water to provide spring-time reductions in export pumping. This change in the use of protective fish actions (*i.e.*, pre- and post-VAMP actions, and June ramping rates) should provide benefits to outmigrating CV steelhead from the San Joaquin River.

CVP and SWP Delta export pumps will be operated significantly below the maximum export-to-inflow (E/I) standards from April through September and slightly below these standards from November through March. At any time there is an opportunity to relax the E/I ratio when fish salvage densities are low, the three fish agencies (NOAA Fisheries, FWS and DFG) have the flexibility to pump water for the EWA after agreement with Reclamation and DWR. Any difference in the E/I ratio due to the changes in Project operations (*i.e.*, due to compliance with the Trinity River ROD and May 9, 2003, Decision on Implementation of CVPIA b[2]) should be offset by this flexibility to increase the size of EWA.

Concerns about diminished attraction of adult salmon and steelhead to their home streams from excessive CVP and SWP exports have been expressed by Delta Fisheries researchers (Mesick 2001), and may account for the trend of low adult returns in some rivers. However, since 2001 the three fish agencies have used early DCC Gate closures to improve yearling spring-run

Chinook salmon emigration. These early DCC gate closures in November and December should also improve adult attraction flows for steelhead on the Sacramento River.

New information from the CVP Tracy Fish Collection Facility and the SWP Skinner Fish Protection Facility indicate that an average of 100 adult steelhead (> 350 mm) are salvaged each year at the facilities (DFG, 2003 unpublished data). These adult steelhead had not been previously reported due their size (note: salvage data has traditionally only included juveniles measuring less than 350 mm). Based on timing at capture, these fish were most likely "run-backs," or adults returning to the ocean after spawning. This repeat spawner life history trait (usually females) represents a very small fraction of the CV steelhead population, but can account for larger production upon return, due to their increased size and fecundity. Adult steelhead from the Delta Fish Collection Facilities are combined with all other salvaged fish, held for up to 24 hours, trucked to the confluence of the Sacramento and San Joaquin Rivers and then released. Unlike Chinook salmon, no loss rate has been calculated for steelhead or for salvaged fish post-release. NOAA Fisheries assumes that due to their poor condition, most post-spawning adult steelhead do not survive the handling and trucking process.

Juvenile spring-run Chinook salmon and steelhead will be entrained at the CVP and SWP fish facilities due to Project operations. Mortality is expected to occur due to predation in front of the facilities, entrainment through the primary and secondary louvers, stress associated with handling, trucking and post-release. Because CV spring-run Chinook salmon are not distinguishable from other juvenile Chinook salmon at the fish salvage facilities, it is difficult to assess any change in salvage or loss associated with the changes in Project operations.

Mortality of juvenile steelhead is difficult to quantity since no loss is calculated from salvaged fish at the Delta Fish Collection Facilities. This has been a term and condition of previous SR/S OCAP opinions that has not been met. In the absence of this data, NOAA Fisheries must use a more conservative approach an apply the loss calculation used for Chinook salmon to steelhead. Since annual steelhead (wild only) salvaged between1998 and 2003, ranges from 2,214 to 4,239 juveniles, using the Chinook loss equation, steelhead loss would have been three to six times the salvage rate, or between 6,000 and 24,000 juveniles each year.

The proposed use of CVPIA b(2) Delta fish actions for December and January are expected to reduce Project impacts to emigrating spring-run Chinook salmon and smolts in the Delta. These actions are designed to increase the survival of yearling spring-run Chinook salmon by reducing export levels at the CVP Tracy Pumping Plant and potentially the SWP Banks Pumping Plant when Delta Fisheries monitoring detects periods of increased abundance and consequently, increased vulnerability to entrainment. Past monitoring efforts and Delta fish salvage records indicate juvenile spring-run Chinook salmon and steelhead presence in the Delta often is episodic during December and January. Carefully timed periods of export curtailments or upstream releases of EWA and CVPIA b(2) water are expected to improve Delta hydrodynamics for emigrating smolts to successfully pass through the Delta into San Francisco Bay. Therefore, the loss of 300-400 TAF of CVPIA b(2) water is expected to decrease the ability to implement

protective fish actions at the Delta export pumps. The effect of this loss in CVPIA b(2) water is expected to be offset by the dedication of 200 TAF of CVPIA b(2) water for upstream actions (*i.e.*, improved fall flows for spawning spring-run Chinook salmon in the Sacramento River and temperature control in Clear Creek and the American River) and to a lesser extent by the increased EWA use in the Delta.

The decrease in water being diverted to the Sacramento River from implementing the Trinity River ROD will increase demands on Shasta and Folsom Reservoirs. The effect of this change on either downstream flows or temperature control will be most apparent in "below normal" to "critical" water years. Based on modeling in the draft 2003 OCAP biological assessment and Project description, these effects are not anticipated to be problematic in the next two years because of sufficient reservoir storage.

I. Suisun Marsh Salinity Control Structure

The operation of the Suisun Marsh tidal gates is not expected to be altered by the proposed changes due to the recent modifications to the flashboards designed to improve passage of adult salmon and steelhead when the facility is operated. Studies to determine the best operation of these gates to improve adult passage are expected to continue in 2004 and 2005. These studies were a condition of the NOAA Fisheries1993 biological opinion on Project effects on Sacramento River winter-run Chinook salmon (NOAA Fisheries 1993). Adult spring-run Chinook salmon and steelhead may be blocked or delayed in their passage to the upper Sacramento River. Specific avoidance measures (*e.g.*, lifting facility flashboards and gates out of the water) are already in place to minimize effects during months when specific conductance is below standards by more than 2 mS/cm. Measures to improve passage for adult spring-run Chinook and steelhead are being implemented through the use of boat lock openings and full flashboards when gates are operational. Based on these modifications and previous studies conducted for winter-run Chinook salmon, the improvements made in the operation of the Suisun Marsh tidal gates are not expected to increase take of spring-run Chinook salmon or steelhead over that evaluated in the 2002 SR/S OCAP opinion.

J. Rock Slough

The operation of this unscreened diversion is not expected to be altered by the proposed Project changes due to the small size of this diversion. Since the 2002 SR/S OCAP opinion was issued, use of this diversion by Contra Costa Water District has decreased considerably during the winter when juvenile CV spring run Chinook salmon and CV steelhead are present in the Delta. Monitoring of this unscreened diversion has not been continuous; therefore it is difficult to determine if any change in losses would occur. NOAA Fisheries anticipates that the loss rate will be no greater than that analyzed in the 2002 SR/S OCAP opinion.

From March 2004 through March 2006, operation of the unscreened Rock Slough intake at the Contra Costa Canal is expected to entrain some juvenile steelhead and spring-run Chinook

salmon. Based on DFG sampling during the period from1994 through 1996, mortality from entrainment is estimated to be from 50 to 100 juvenile steelhead per year. The extrapolated numbers of juvenile Chinook salmon (all races) entrained at Rock Slough between 1994 and 1996 ranged from 262 to 646 per year. Additional losses due to predation in the canal and fish being killed passing through the intake also are likely to occur. According to draft responses from Reclamation dated December 4, 2003, to NOAA Fisheries letter dated December 19, 2002, survival estimates based on marked hatchery fall run Chinook salmon ranged from 0 to 51 percent and averaged about 18 percent. Assuming a 20 percent survival rate, the estimated numbers of juvenile Chinook salmon entrained between 1994 and 1996 would be 1,695; 3,210; and 1,310 respectively. Of these fish, 50 percent are conservatively estimated to be in the spring-run Chinook size category, which would mean that mortality due to entrainment would range from 655 to 1605 juveniles. However, given the location of the intake in the southern portion of the Delta, juvenile Chinook salmon are most likely to be fall-run fish. Since most of the water diverted through this facility occurs during the summer months when salmon and steelhead are not present, very few listed fish species have been captured during monitoring since 1997.

K. Interrelated and Interdependent Actions

1. Interim Water Contract Renewals

The renewal of interim water contracts for the next two years is not expected to result in any additional water being diverted beyond what previously was considered in the 2002 SR/S OCAP opinion. Reclamation provided additional information to NOAA Fisheries on these interim contracts by FAX and draft letter of January 21, 2004. All of the diversions covered by the interim water contracts except for two, are upstream of impassable barriers or diverted through screened diversions. Therefore, except for two (see below), these diversions are not expected to have any effect on CV spring-run Chinook salmon or CV steelhead beyond those already covered in the 2002 SR/S OCAP opinion.

The two exceptions not previously considered by the 2002 SR/S OCAP opinion are the Tehama-Colusa Canal Unit and the Feather River Unit, in which deliveries are made through unscreened diversions. A portion of the Tehama-Colusa diversion is delivered through Stony Creek which adversely affects CV steelhead. However, NOAA Fisheries issued a biological opinion for Lower Stony Creek Water Management in 2002 (NOAA Fisheries 2002b) assessing the effects of this diversion and exempting incidental take for CV spring-run Chinook salmon and CV steelhead.

The other exception is the Feather River Water District's diversion, in which CVP water released from Shasta Reservoir stays in the Sacramento River and is replaced by water removed just one mile upstream of the confluence with the Feather River. NOAA Fisheries believes that due to the due to the proximity of the diversion to the Sacramento River, it its highly likely that some CV spring-run Chinook salmon juveniles and CV steelhead will be entrained and killed. Based

on similar sized diversions, NOAA Fisheries estimates that 200 to 600 juvenile Chinook salmon (all races combined) and 50 to 100 steelhead will be lost each year from this diversion.

2. Hatchery Operations and Practices

Interrelated to the operation of the proposed Project is the operation of five hatcheries in the Central Valley that were established as mitigation for the loss of Chinook salmon and steelhead resulting from construction of dams. One of these hatcheries produces spring-run Chinook salmon, and four produce steelhead. Releasing large numbers of hatchery fish can pose a threat to wild Chinook salmon and steelhead stocks through genetic impacts, competition for food and other resources between hatchery and wild fish, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs in the Central Valley primarily are caused by the straying of hatchery fish and the subsequent hybridization of hatchery fish with their wild counterpart.

Hatchery steelhead juveniles dominate in Chipps Island trawl catches and Delta fish salvage, suggesting that hatchery production is large relative to natural production. In comparing hatchery adult returns since 1955 to adult counts at RBDD, there is an inverse relationship between declining wild fish abundance and increasing hatchery production. This trend is expected to continue to occur over the next two years until the operation of these hatcheries can be reviewed under individual section 7 consultations.

3. Urban Growth and Land Use Conversion

Historically the Sacramento River was bordered by up to 500,000 acres of riparian forest, with bands of vegetation literally spreading out four or five miles from the river (Resources Agency, State of California 1989). By 1979, riparian habitat along the Sacramento River diminished to 11,000 to12,000 acres or about two percent of the historic levels (McGill 1979). The degradation and fragmentation of riparian vegetation has resulted mainly from flood control and bank protection projects, together with the conversion of riparian land for agriculture and urban development.

Increasing sedimentation resulting from agricultural and urban development within the Central Valley is a primary cause of salmonid habitat degradation. Sedimentation can adversely effect salmonids during all freshwater life stages by clogging, or abrading gill surfaces; adhering to eggs; inducing behavioral modifications; burying eggs or alevins; scouring and filling in pools and riffles; reducing primary productivity and photosynthetic activity; and affecting intergravel permeability and dissolved oxygen levels. Embedded substrates can reduce the production of juvenile salmonids and hinder the ability of some over-wintering juveniles to hide in the gravels during high flow events.

Land use activities associated with urban development and agriculture are expected to continue in the next two years action interrelated with indirect effect of Project operations (*i.e.*, water contract renewals). These activities can significantly alter fish habitat quantity and quality through alteration of the stream bank and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of gravel and large woody debris; and removal of riparian vegetation resulting in streambank erosion. Ongoing CALFED and CVPIA restoration efforts (*i.e.*, Clear Creek restoration, and yearly gravel augmentation on Sacramento, American, and Stanislaus Rivers) are anticipated to offset some of these adverse effects associated with Federal actions. However, rapid urban growth in such areas as Placer County, which are supplied by CVP contracts, is expected to adversely affect steelhead spawning and rearing in Dry Creek, Dotty Creek and Auburn Ravine. These steelhead populations are very small, usually ten to fifty adults per stream and at risk since critical habitat has not yet been designated.

VI. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR 402.02 as those effects of future State, tribal, local or private actions, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

As with the environmental baseline, NOAA Fisheries does not believe that the cumulative effects in and near the action area have changed in any appreciable way since the issuance of the 2002 SR/S OCAP opinion. Therefore, the review of cumulative effects included in the 2002 SR/S OCAP opinion is incorporated here by reference. These include State angling regulation changes, voluntary State or private sponsored habitat restoration activities, ongoing agricultural and urban activities that likely will continue to affect stormwater runoff patterns and water quantity and quality in the action area, and future population growth that will result in new urban development and increased disturbance of waterways and riparian areas, as well as stormwater and water quality impacts.

State angling regulations are generally moving towards greater restrictions on sport fishing to protect listed fish species. Habitat restoration projects may have short-term negative effects associated with in-water construction work, but these efforts are temporary and localized, and the outcome is a benefit to these listed species. State hatchery practices may have negative effects on naturally produced salmonids through genetic introgression, competition, and disease transmission resulting from hatchery introductions. It is expected that in the next two years significant production of hatchery steelhead originating from outside of the Central Valley (*i.e.*, from non-Federal hatcheries on the Feather, American and Mokelumne Rivers), will contribute

to the monotonic decline in total abundance and in the proportion of wild fish in the ESU (NOAA Fisheries 2003).

Farming activities within or adjacent to the action area may have negative impacts on Sacramento and San Joaquin River water quality due to runoff laden with agricultural chemicals. Unscreened water diversions may result in entrainment of individuals and may result in depleted river flows that are necessary for migration, spawning, rearing, flushing of sediment, gravel recruitment, and transport of large woody debris. Ongoing urban development in the action area may adversely affect water quality, riparian function, and stream productivity.

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

CV spring-run Chinook salmon and CV steelhead stocks have declined dramatically from historical numbers. CV spring-run Chinook salmon have been reduced to a few remaining tributaries that contain suitable habitat and CV steelhead have been extirpated from many areas they once inhabited. The majority of natural production of both species in the Central Valley continues to be adversely affected by hybridization with hatchery fish and may not be self-sustaining in some rivers (*e.g.*, Feather, American, and Mokelumne Rivers). However, a large portion of CV spring-run Chinook salmon spawning and rearing occurs in large streams outside of the Project action area (*e.g.*, in Mill, Deer, and Butte Creeks), and there is a relatively broad distribution of CV steelhead that spawn and rear in small streams outside the action area that may contribute to the Central Valley population.

All CV spring-run Chinook salmon and CV steelhead must pass through the action area at least twice in their life span. The effects of the two changes in Project operations, Trinity River ROD flows and decreased availability of CVPIA b(2) water are expected to be minor over the next two years, in part because reservoir storage is expected to be sufficient over the short term. However, some increased take is anticipated on the American River and Feather River that was not previously considered in the 2002 SR/S OCAP opinion.

The proposed continued operation of the Project until March 2006, is likely to result in both adverse and beneficial impacts to spawning, rearing and migration habitat for CV spring-run Chinook and CV steelhead. These habitats are critical to the survival and recovery of the species, and consist of the water, substrate, and adjacent riparian zones.

As described in the 2002 SR/S OCAP opinion, adverse effects from Project operations in general are expected to continue. In the upper river areas, anticipated adverse impacts consist primarily of changes in the magnitude and duration of peak flow events below Project reservoirs and elevated water temperature. High flow events (*i.e.*, related to flood control, meeting Delta standards, FERC requirements, pulse flows) will continue in the next two years and may result in areas of stranding, isolation and redd dewatering. Low flows and flow fluctuations during critical spawning periods may increase mortality of eggs and newly emerged fry as well as

subject adults to increased sport fishing pressure. These effects may be avoided and minimized by decisions made by various adaptive management groups.

NOAA Fisheries anticipates that the resilient and opportunistic nature of the steelhead life history will decrease the significance of short-term effects from flow fluctuations or temperature changes. Steelhead and spring-run Chinook salmon respond favorably to wet year hydrology and could re-establish populations through straying or other means. To date, no policy on re-introductions has been developed by NOAA Fisheries in the Central Valley, but natural re-colonization has been well documented in the literature and could occur in newly opened areas such as Clear Creek or Battle Creek. Examples of this opportunistic trait exist in California, such as San Mateo Creek (San Diego County), which had not contained a steelhead run for 40 years due to extended drought and water withdrawal, and is now supporting a persistent population. In the Central Valley, the Calaveras River was recently found to contain four different life-history patterns for steelhead based on otolith work by DFG (Titus 2001, DFG memo). This suggests the importance of resident rainbow trout populations that may function as a genetic refuge for steelhead during dry years (McEwan 2001).

In the Delta, mortality due to entrainment at the CVP, SWP, and Rock Slough Diversions will continue to reduce the likelihood of both survival and recovery of CV spring-run Chinook and CV steelhead. However, as described in the 2002 SR/S OCAP opinion existing protective fish actions such as export curtailments, the use of CVPIA b(2) water, the use of EWA water, and early DCC gate closures are expected to reduce and minimize the loss associated with the Delta pumping plants.

The salvage and potential loss of adult steelhead at the Delta Fish Collection Facilities was not considered in the 2002 SR/S OCAP opinion. The loss of approximately 100 adult fish per year is considered biologically significant since the spawning population in the Central Valley is estimated to be about 3,628 naturally spawning females (NOAA 2003).

NOAA Fisheries has determined that extending Project operations for an additional two years with the described changes will not appreciably reduce the likelihood of survival and recovery of CV steelhead or CV spring-run Chinook salmon, because: (1) the loss in CVPIA b(2) water is expected to be offset by new criteria that sets aside 200 TAF to be used upstream in the fall/winter months (October through January); (2) both spring-run Chinook salmon smolts and steelhead emigrating through the Delta will benefit from increased use of CALFED EWA to curtail Delta pumping during critical emigration periods; (3) implementation of the VAMP will benefit steelhead emigration within the San Joaquin River and Delta region; and (4) the small increase in mortality of early life stages attributed to the reduction of Trinity River water diversions in to the upper Sacramento River is not expected to impact species likelihood of survival and recovery because impacts will be offset by the use of CVPIA b(2) water to increase flows in September, which will improve adult spawning success and egg incubation.

The impacts described above are limited to the period of operation covered under this biological opinion (April 1, 2004 through March 31, 2006) and are not expected to result in significant impacts to or loss of spawning and rearing habitat for these species. The effects of the actions will impact every stage of the species life history except for ocean survival. However, the duration of these effects for the interim period are considered to be short-term single events whose effects can be overcome by changes in operations such as those that Reclamation undertakes when recommended by the various advisory groups. Other impacts are expected to occur that may result in long-term impacts to spawning and rearing habitat (see the 2002 SR/S OCAP opinion). These additional impacts are primarily upstream and include the increased deposition of fine sediments in spawning gravels, decreased recruitment of spawning gravels, reduced transport of large woody debris, and encroachment of riparian and non-endemic vegetation into spawning and rearing areas resulting in reduced available habitat. The overall effects of these additional long-term impacts would be reduced spawning and rearing habitat.

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of CV spring-run Chinook salmon and CV steelhead, the environmental baseline for the action area, the effects of the proposed Project operation changes and two-year extension, including interrelated and interdependent actions, and the cumulative effects, it is NOAA Fisheries' biological opinion that the Project, as proposed, is not likely to jeopardize the continued existence of CV spring-run Chinook salmon or CV steelhead. The action area has not been designated as critical habitat for the affected species.

Notwithstanding this conclusion, NOAA Fisheries anticipates that some actions associated with these operations may result in incidental take of the species. Therefore, an incidental take statement is provided with this biological opinion for these actions.

IX. INCIDENTAL TAKE STATEMENT

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary and must be implemented by Reclamation and DWR, for the exemption in section 7(o)(2) to apply. Reclamation and DWR have a continuing duty to regulate the activity covered in this incidental take statement. If Reclamation and/or DWR 1) fail to assume and implement the terms and conditions of the incidental take statement, and/or 2) fail to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Reclamation and DWR must report the progress of the action and its impact on the species to NOAA Fisheries as specified in this incidental take statement (50 CFR 402.14(i)(3)).

This incidental take statement is applicable to all activities related to the operation of the CVP and SWP described in this opinion. Unless modified, this incidental take statement does not cover activities that are not described and assessed within this opinion.

A. Amount or Extent of Take

NOAA Fisheries anticipates that threatened CV steelhead and CV spring-run Chinook salmon will be taken as a result of this proposed action. The incidental take is expected to be in the form of death, injury, harm, capture, and collection. Death, injury, and harm to juvenile and adult steelhead and spring-run Chinook salmon are anticipated from the depletion and storage of natural flows at CVP and SWP reservoirs. Reservoir operations are expected to significantly alter the natural hydrological cycle in the Sacramento River downstream of Shasta Dam, Clear Creek downstream of Whiskeytown Dam, the Feather River downstream of Oroville Dam, the American River downstream of Folsom Dam, and the Stanislaus River downstream of New Melones Dam.

Reservoir releases to downstream areas during flood control operations may result in the take of steelhead eggs and pre-emergent fry through the scouring of redds. The potential amount and extent of take of steelhead eggs and pre-emergent fry is difficult to predict, because it is directly dependent on precipitation patterns during the upcoming winter and spring months. Heavy rainfall is likely to trigger flood control operations at Central Valley reservoirs and result in short-term high flow events in the upper Sacramento River, Clear Creek, Feather River, American River and/or Stanislaus River. Extremely high flow events may scour steelhead redds and result in the injury and mortality of steelhead eggs and sac-fry. Incidental take of steelhead due to flood control operations will be difficult to detect, because any dead or injured fish will be within the gravel substrate of the streambed.

Flood control operations can also lead to the incidental take of fry and juvenile steelhead and spring-run Chinook salmon through stranding and isolation. Isolation may occur in areas that are not connected to the river or creek except during periods of high flows. Heavy rainfall is likely to trigger flood control operations at Central Valley reservoirs and result in short-term high flow events in the upper Sacramento River, Clear Creek, Feather River, American River and/or

Stanislaus River. During periods of high flows, juvenile steelhead and spring-run Chinook salmon may enter into areas that become isolated when flows recede. If additional high flow events do not follow within a short period of time, these isolated fish may be lost to predation, lethal water temperature conditions, or desiccation. Incidental take of fry and juvenile steelhead is anticipated if precipitation patterns result in flood control operations. However, the extent of isolation will be difficult to detect and quantify due to the large geographic area that will be affected and because finding a dead or injured specimen is unlikely without a systematic survey immediately following the flood event. Take of adult steelhead is unlikely to occur as a result of flood control operations and no take of adult spring-run Chinook salmon is anticipated.

Capture and collection of juvenile steelhead in the Stanislaus River by screw traps is anticipated through fisheries studies to evaluate New Melones Reservoir operations on anadromous salmonids. Based on past sampling by screw trap at the Oakdale sampling site, up to 60 steelhead smolts and pre-smolts may be captured and released below the trapping site. Steelhead fry have not been captured in previous years and none are expected to be captured in 2004-2006. Previous sampling experience with screw traps in the Stanislaus River indicates that all captured steelhead will be maintained in good physical condition and released unharmed back into the river.

A resistance board weir funded by CALFED was installed in 2002 on the Stanislaus River (S.P. Cramer and Associates 2002). In order to meet it's monitoring goals the weir will subject migrating adult steelhead to temporary delays, confinement, and stress from handing and tissue sampling. However, based on similar weirs in Alaska and Northern California adult mortality is expected to be less than five percent and no juvenile mortality is expected. After a year-and-a-half of operations no adult steelhead have been identified passing the weir. Therefore, assuming that at the most 100 adult steelhead will pass through the weir, based on the low number of adults caught by anglers and observed in snorkel surveys, is anticipated that adult mortality will be less than five fish.

Harmful effects from trapping adult steelhead will be minimized by: (1) conducting daily snorkel surveys above and below the weir to identify any migrational delays, (2) coordinating with NOAA Fisheries and the steering committee regarding any problem resolution, (3) ensuring that the confinement structure will not abrade scales or fins, and (4) frequent monitoring of the confinement area to avoid stress. In addition, at least one trained and qualified fisheries technician (minimum 2 years experience with sampling and handling anadromous salmonids) will be onsite during each day of sampling. From previous sampling experience with this type of weir, the expected capture and release of no more than 100 adult steelhead is expected to have little, if any effect, on the Stanislaus River population due to adherence to sampling/handling protocols that minimize stress and harm.

Capture and collection of juvenile steelhead and spring-run Chinook salmon in the Feather River by rotary screw traps, fyke traps, and seines is anticipated through fisheries studies to evaluate the effect of flow fluctuations. Based on past monitoring by screw traps in the low flow channel

and seining below the Thermolito outlet, fewer than 600 juvenile steelhead/rainbow trout; 3,000 spring-run young-of-the-year (YOY); and 10 spring-run Chinook salmon yearlings; are expected be captured and released below the trapping site. It is not expected that steelhead or spring-run Chinook salmon fry will be captured, due to timing of emergence occurring before the start of the sampling period. Capture and collection of adult steelhead and spring-run Chinook salmon may also occur during sampling. Based on previous sampling no adult spring-run Chinook salmon and fewer than 25 adult steelhead are expected to be captured and released. Experience with trapping and seining in the Feather River indicates that all captured steelhead will be maintained in good physical condition and released unharmed back into the river.

In the Delta, death, injury, and harm to juvenile and adult steelhead and spring-run Chinook salmon are anticipated due to unnatural flow patterns created by the operation of the Delta Cross Channel and CVP/SWP export pumping. This take includes that incurred by salvage activities, predation associated with physical structures, losses due to entrainment at water diversions, elevated water temperatures, poor water quality, reverse flow conditions and straying of adult upstream migrants. Additional take of juvenile steelhead and spring-run Chinook salmon is expected at the Rock Slough intake at the Contra Costa Canal. Incidental take through the capture and collection of juvenile and adult steelhead, and juvenile spring-run Chinook salmon at the Tracy and Skinner Fish Facilities is anticipated. At the Suisun Marsh Salinity Control Structure delays in fish passage from tidal operations and collection of adults in fisheries studies to evaluate passage are expected to be minimal due to modifications in operations involving use of the boat lock gates.

Coded wire-tagged (CWT) late fall-run Chinook salmon from the Coleman National Fish Hatchery (NFH) will serve as a surrogate for losses of CV spring-run Chinook yearlings, because juvenile spring-run Chinook salmon may not be distinguishable from other Central Valley Chinook salmon races in the Delta, and there is no juvenile production estimate available for CV spring-run Chinook salmon. These late fall-run Chinook salmon should serve as an appropriate surrogate for spring-run Chinook salmon losses because NOAA Fisheries expects that these fish, which begin their emigration and smoltification passage through the Delta at approximately the same time and size as wild spring-run Chinook salmon, and will be taken at the same rate as wild spring-run Chinook salmon. Therefore conditions which result in the loss of one percent of the late fall-run Chinook salmon are likely to have resulted in the loss of one percent of the spring-run Chinook salmon population.

Operations of the Delta Cross Channel gates and export pumping plants are expected to cause mortality in the central Delta. In most years these losses will be minimized by intermittent gate closures from October through January and mandatory closures from February 1 to May 20 (SWRCB, D-1641). However, the survival of spring-run Chinook salmon and steelhead juveniles that are diverted into the central Delta will be reduced by high rates of predation, elevated temperatures, unscreened diversions, poor water quality, reverse flow conditions, and entrainment at the Delta pumping facilities. Losses can be quantified at the Tracy and Skinner fish facilities based on observations of salvaged fish, but the remaining mortality can not be

easily quantified, because dead or injured juvenile fish (e.g., as a result of altered flow patterns and the resulting exposure to degraded habitat conditions in the central Delta) are not likely to be detected. These indirect mortalities of juvenile spring-run Chinook salmon and steelhead in the Delta are generally attributed to increased residence time, length of migration route, reverse flows, altered salinity gradient, predation, elevated water temperatures, contaminants, and reduced food supply (DFG 1998, McEwan 2001).

Although most losses in the Delta cannot be quantified, some losses of spring-run Chinook salmon yearlings and steelhead smolts will be monitored at the Tracy and Skinner fish facilities. Based on adherence to the CALFED Operations, Fall/Winter Salmon Decision Process, it is anticipated that the incidental take of juvenile spring-run Chinook salmon will not exceed one percent of the Central Valley population. Take of YOY spring-run Chinook salmon is expected in the Delta between December and May. Juvenile spring-run Chinook salmon arriving in the Delta as sub-yearlings will be subject to mortality within the Delta and at the pumps as mentioned previously. Due to their overlap in size with fall-run Chinook salmon, losses of YOY spring-run Chinook salmon are not easily quantified or monitored through observations of salvaged fish. However, a mixed stock analysis using combined fall-run and spring-run Chinook salmon YOY losses at the facilities from 1994 to1998, showed spring-run fish represented less than one percent of the total loss, whereas Sacramento River fall-run fish accounted for 7.4 percent and San Joaquin River fall-run fish made up the majority at 92.5 percent (DWR 1999). The total combined YOY loss from 1994 to1998 ranged from 11,258 to 124,816, with an average loss of 74,087 per year. This average is the anticipated total combined loss of YOY spring- and fall-run Chinook salmon from the proposed Project operations, and the anticipated take of YOY spring-run chinook salmon is calculated to be 741 individuals per year.

The level of take for steelhead can be anticipated from salvage (non-lethal take) estimates in prior years. Based on salvage data from 1993-2003, the number of wild steelhead salvaged from both facilities has ranged from 416 to 17,713 (average = 3,771) juveniles during the migration season (December through June). Therefore, the number of wild (non-clipped) steelhead salvaged (note: these are returned alive to the Delta by trucking to release sites) during the proposed Project is expected to be less than 3,500 individuals per year. At Rock Slough, based on recent monitoring since 1996, fewer than 15 juvenile steelhead and 50 juvenile spring-run Chinook salmon per year are expected to be killed through entrainment in the Contra Costa Canal.

Loss or mortality of juvenile steelhead is difficult to quantity since no studies have been conducted to determine the loss rate at the Delta Fish Collection Facilities. This has been a term and condition of previous SR/S OCAP opinions that has never been met. In the absence of this data, NOAA Fisheries must use a more conservative approach and apply the loss calculation used for Chinook salmon to expand steelhead salvage. Since annual steelhead salvage between1998 and 2003 (note: 1998 was the first year that all hatchery steelhead were marked thereby making identification of wild fish in the Delta possible) ranged from 2,214 to 4,239 juveniles, using the Chinook salmon loss equation, steelhead losses would have been three to six times the salvage

rate, or between approximately 6,000 and 24,000 juveniles each year. However, since most steelhead smolts are 200 to 250 mm in length at the time of salvage, the loss rate is expected to be at the lower end of the range, because steelhead are larger than Chinook salmon juveniles; therefore, steelhead survival is higher through the Delta export pumps.

NOAA Fisheries anticipates that take of juvenile CV spring-run Chinook salmon will remain approximately the same as that considered in the 2002 SR/S OCAP opinion, but for CV steelhead will increase from what was previously considered, due to changes in upstream CVP operations on the American River and issuance of interim contracts on the Feather River Unit. NOAA Fisheries estimates that approximately 6 percent of the annual juvenile steelhead production will be killed on the American River due to flow changes to meet water quality standards in the Delta. On the Feather River, approximately 200 to 600 juvenile Chinook salmon (all races combined) and 50 to 100 steelhead will be killed each year through entrainment into an unscreened diversion. Based on recent information , an average of 100 adult steelhead (> 350 mm) may be salvaged each year at the CVP and SWP Delta fish collection facilities.

Reclamation and DWR have proposed to operate CVP and SWP facilities in accordance with either plans, agreements, or specific criteria outlined in this biological opinion. Deviations from these plans, agreements, or criteria may result in adverse impacts to CV spring-run Chinook salmon and CV steelhead that have not been analyzed in this opinion. In this event, formal consultation shall be reinitiated immediately to analyze the effects to spring-run Chinook salmon and steelhead and determine if the changes are likely to jeopardize these species or result in additional incidental take.

B. Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of essential habitat.

C. Reasonable and Prudent Measures

NOAA Fisheries has added one additional reasonable and prudent measure (No. 8 [in brackets]) to the incidental take statement of the 2002 SR/S OCAP opinion, which we believe is necessary and appropriate to minimize take of CV steelhead and CV spring-run Chinook salmon. New language is underlined, in **bold** type, and *italicized*:

NOAA Fisheries believes the following reasonable and prudent measures are necessary and appropriate to minimize take of CV steelhead and CV spring-run Chinook salmon:

1. Reclamation and DWR shall minimize the adverse effects of flow fluctuations associated with upstream reservoir operations on the incubating eggs, fry, and juvenile steelhead and spring-run Chinook salmon.

2. Reclamation and DWR shall gather information regarding the effects of flow fluctuations on spring-run Chinook salmon and steelhead downstream of CVP and SWP reservoirs, develop long-term ramping criteria, and operate to the extent possible to meet temperature objectives that will avoid or minimize adverse effects.

3. Reclamation and DWR shall operate to temperature objectives to the extent possible below Project Dams that will avoid or minimize adverse effects to spring-run Chinook salmon and steelhead.

4. Reclamation shall minimize the adverse effects of Delta Cross Channel gate operations on juvenile steelhead and spring-run Chinook salmon.

5. Reclamation and DWR shall minimize the adverse effects of Delta exports on juvenile steelhead and spring-run Chinook salmon.

6. Reclamation and DWR shall collect additional data at the fish salvage collection facilities for improving facility operations and incidental take monitoring with regard to steelhead and spring-run Chinook salmon.

7. Reclamation in coordination with DWR shall submit weekly Data Analysis Team (DAT)reports and annual written reports to NOAA Fisheries regarding the results of monitoring and incidental take of spring-run Chinook salmon and steelhead associated with operations of Project facilities (50 CFR 402.14[I][3]).

[*8. Reclamation and DWR shall work with NOAA Fisheries staff to minimize take from unscreened diversions that are a part of interim water contract renewals.*]

D. Terms and Conditions

NOAA Fisheries has changed two terms and conditions (Nos. 5.b. and 5.d. [in brackets]) and added two terms and conditions (Nos. 6.d. and 8.a. [in brackets]) to the incidental take statement of the 2002 SR/S OCAP opinion, to implement the reasonable and prudent measures and minimize take of CV spring-run Chinook salmon and CV steelhead. These changes and additions in part reflect the availability of new information on sources of Project incidental take and the CV steelhead population trend (NOAA Fisheries 2003), as well as the changes and two-year extension to Project operations. New language is underlined, in **bold** type, and *italicized*:

Reclamation and DWR must comply or ensure compliance by their contractor(s) with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. Reclamation and DWR shall minimize the adverse effects of flow fluctuations associated with upstream reservoir operations on the incubating eggs, fry, and juvenile steelhead and spring-run Chinook salmon.

a. Reclamation and DWR shall coordinate with NOAA Fisheries before reducing releases downstream of Keswick Dam, Whiskeytown Dam, Nimbus Dam, Oroville Dam, and/or Goodwin Dam to a monthly average flow less than the levels identified in the CVPIA b(2) forecast or the AFRP revised flow matrix.

b. Clear Creek-Reclamation shall assist in developing a Fisheries Management Plan (FMP) in coordination with DFG, FWS and NOAA Fisheries that will balance upstream flow and temperature requirements of spring-run Chinook salmon, steelhead and fall-run Chinook salmon with the impact of operations on other CVP objectives, including water supply, power, and temperature control for winter-run Chinook salmon.

c. Feather River-During periods outside of flood control operations and to the extent controllable during flood control operations, DWR shall ramp down releases to the low flow channel as presented in the table below:

Feather River Low-Flow Channel Releases (cfs)	Rate of Decrease (cfs)
5,000 to 3,501	1,000 per 24 hours
3,500 to 2,501	500 per 24 hours
2,500 to 600	200 per 24 hours

d. American River - During periods outside of flood control operations and to the extent controllable during flood control operations, Reclamation shall ramp down releases in the American River below Nimbus Dam as presented in the tables below. From January 1 through March 31, Reclamation must insure fisheries monitoring is conducted during ramp down of stream flows below 1500 cfs to minimize dewatering of steelhead redds or adverse effects to incubating eggs. During any 24-hour period, Reclamation must not decrease the river release from Nimbus more than the range in each row of the table. To the extent possible, Reclamation must make at least three separate equal release changes during each 24-hour period and separate the changes by equal time periods. Below 5,000 cfs, Reclamation must not reduce more than 500 cfs during any 24-hour period, or decrease flows more than 50 cfs per hour. For reductions below 1,500 cfs, Reclamation must coordinate with NOAA Fisheries (or DFG and/or FWS if NOAA Fisheries is not available).

Lower American River Daily Rate of Change (cfs)	Amount of Decrease in 24 hrs (cfs)
20,000 to 16,000	4,000
16,000 to 13,000	3,000
13,000 to 11,000	2,000
11,000 to 9,500	1,500
9,500 to 8,300	1,200
8,300 to 7,300	1,000
7,300 to 6,400	900
6,400 to 5,650	750
5,650 to 5,000	650

The following table gives the individual desired flow rates for the lower American River (3 changes per day) in more detail.

Initial Flow 20,000 (cfs)	First Flow Change (cfs)	Second Flow Change (cfs)	Third Flow Change (cfs)
Day 1	18,650	17,300	16,000
Day 2	15,000	14,000	13,000
Day 3	12,300	11,600	11,000
Day 4	10,500	10,000	9,500
Day 5	9,100	8,700	8,300
Day 6	7,950	7,600	7,300
Day 7	7,000	6,700	6,400
Day 8	6,150	5,900	5,650
Day 9	5,400	5,200	5,000

e. Stanislaus River - During periods outside of flood control operations and to the extent controllable during flood control operations, Reclamation shall ramp down

releases in the Stanislaus River below Goodwin Dam as presented in the table below:

Existing Release Level (cfs)	Rate of Increase (cfs)	Rate of Decrease (cfs)
at or above 4,500	500 per 4 hours	500 per 4 hours
2,000 to 4,499	500 per 2 hours	500 per 4 hours
500 to 1,999	250 per 2 hours	200 per 4 hours
300 to 499	100 per 2 hours	100 per 4 hours
150 to 299	75 per 2 hours	50 per 4 hours

2. Reclamation and DWR shall gather information regarding the effects of flow fluctuations on spring-run Chinook salmon and steelhead downstream of CVP and SWP reservoirs, develop long-term ramping criteria, and operate to temperature objectives that will avoid or minimize adverse effects.

   a. Reclamation and DWR shall participate in the design and implementation of a monitoring program for CV steelhead and CV spring-run Chinook salmon that will include adult and juvenile direct counts, redd surveys, and escapement estimates on CVP and SWP controlled streams during 2002 through 2004. The program shall include identification and evaluation of steelhead and spring-run Chinook salmon rearing and spawning habitat along with areas of potential stranding and isolation. This information shall serve as a basis for establishing long-term ramping rate criteria and temperature compliance points. The monitoring proposal and schedule for implementation must be submitted to NOAA Fisheries for review and approval by November 30, 2002. If appropriate, authorization for any incidental take associated with the implementation of these monitoring programs will be provided to Reclamation, DWR, or their agent, after NOAA Fisheries review and approval of the study plans.

   b. All monitoring programs that involve the intentional taking of spring-run Chinook salmon or steelhead must be conducted by a person or entity that has been authorized by NOAA Fisheries. Reclamation will establish a contact person for these activities.

   c. Stanislaus River-Reclamation shall provide an annual report regarding results of the 2002-2004 fisheries monitoring studies to the following address by September 30 of each year:

Supervisor, Sacramento Area Office
NOAA Fisheries
650 Capitol Mall, Suite 8-300
Sacramento, California 95814-4706

The report shall include: (1) the number of steelhead captured; (2) fork length; (3) condition (*e.g.*, alive, injured, dead, and life stage characterization); (4) number of steelhead released back into the river; and (5) other information collected (*e.g.*, water velocity, temperature, and turbidity measurements). Life stage characterization guidelines are available in the Steelhead Life-Stage Assessment Protocol developed by the IEP Steelhead Project Work Team (December 1998).

d At least one trained and qualified fisheries technician (*i.e.*, minimum of 2 years experience with sampling and handling of juvenile anadromous salmonids) shall be onsite during each day of sampling throughout the duration of the fisheries monitoring program to insure full adherence to the sampling and handling protocols identified in the Stanislaus River Sampling Plan submitted by Reclamation to NOAA Fisheries on May 14, 1999.

e. Incidental take of juvenile steelhead in the Stanislaus River by rotary screw traps may not exceed 60 steelhead smolts in one sampling season.

f. Incidental take associated the CALFED funded resistance board weir for adult Chinook salmon escapement may not exceed 100 adult steelhead (with 5 percent mortality) and 50 tissue samples (scales, fin clips or Deoxyribonucleic acid [DNA] samples) for the year.

g. Feather River - DWR shall provide a written report containing the results of rotary screw traps, fyke traps, snorkel surveys, creel census and tissue sampling for 1999 through 2002 monitoring studies to:

Supervisor, Sacramento Area Office
NOAA Fisheries
650 Capitol Mall, Suite 8-300
Sacramento, California 95814-4706

In addition, DWR will continue with the stranding and isolation study as proposed in its August 7, 2000, report to NOAA Fisheries. Additional studies are needed to determine:1) in-river abundance, 2) spawning habitat utilization, and 3) suitability of current flow pattern (600 cfs) for all life-stages of CV spring-run Chinook salmon and CV steelhead. Incidental take associated with Feather River monitoring studies may not exceed the following:

spring-run size Chinook salmon (YOY): 3,000
spring-run size Chinook salmon (juveniles): 10
steelhead juveniles : 600
steelhead adults: 25

h. At least one trained and qualified Fisheries technician (*i.e.*, minimum of 2 years experience with sampling and handling of juvenile anadromous salmonids) shall be onsite during each day of sampling throughout the duration of the Fisheries monitoring program to insure full adherence to the sampling and handling protocols identified in the Stranding and Redd De-watering Study Plan submitted by DWR on August 7, 2000.

3. Reclamation and DWR shall operate to temperature objectives, to the extent possible, below Project dams that will avoid or minimize adverse effects to spring-run Chinook salmon and steelhead. Reclamation shall work with the Sacramento River Temperature Task Group and the American River Workgroup to ensure compliance with other obligations of the Project. NOAA Fisheries will not consider reinitiating of consultation necessary if the temperature objective is exceeded by 0.5 °F or less provided the Bureau or DWR has promptly implemented measures to reduce the temperature to the objective and the exceedence lasts no more than 3 days. Reclamation and DWR must provide written notification to NOAA Fisheries after 3 days of temperature exceedence.

a. Clear Creek - In the absence of a FMP, Reclamation shall, to the extent possible, control water temperatures by flow releases from Whiskeytown Dam to the Igo gage between June 1 through September 15, to a daily average temperature of 60 °F, to protect over-summering juvenile steelhead from thermal stress and from warm water predators. In addition, from September 15 through October 30, Reclamation shall reduce water temperatures to 56 °F to protect spring-run Chinook salmon spawning and egg incubation.

b. American River - Reclamation shall, to the extent possible, control water temperatures in the lower river between Nimbus Dam and the Watt Avenue Bridge (River Mile [RM] 9.4) from June 1 through November 30, to a daily average temperature of less than or equal to 65 °F to protect rearing juvenile steelhead from thermal stress and from warm water predator species. The use of the cold water pool in Folsom Reservoir should be reserved for August through October releases.

c. Stanislaus River - Reclamation shall, to the extent possible, control water temperatures by flow releases to the lower river between Goodwin Dam (RM 58.5) and Orange Blossom Road bridge (USGS gage) during June 1 through November 30, to a daily average temperature of less than or equal to 65 °F to protect over-summering steelhead from thermal stress and from warm water

predator species. If temperature releases are required, Reclamation must coordinate with DFG and FWS to use fishery release water consistent with NMIPO, D-1641, and CVPIA.

d. Feather River-DWR shall, to the extent possible and consistent with SWP requirements, control water temperatures between the Fish Barrier Dam and RM 61.6 (Robinsons Riffle) from June 1 through September 30 to a daily average temperature of less than or equal to 65 °F to protect over-summering steelhead from thermal stress and from warm water predator species. This term is not intended to preclude pump-back operations at the Oroville Complex that are needed to assist the State of California with supplying energy during periods when the California Independent Service Operator has anticipated Stage 2 or higher alerts.

4 Reclamation shall minimize the adverse effects of DCC gate operations on juvenile steelhead and spring-run Chinook salmon.

a. During the period from April 1, 2004, through March 31, 2006, Reclamation shall operate the gates of the DCC consistent with the CALFED OPS (*i.e.*, stakeholder water operations group), Water Quality Control Plan D-1641 and the *Provisional Fall/Winter Juvenile Salmon Decision Process (October 1-March 31)*. Reclamation and NOAA Fisheries, in coordination with the DAT will monitor water quality conditions within the Delta. Gate openings for water quality improvements shall be coordinated with NOAA Fisheries (Sacramento Area Office), DFG, and FWS and openings shall be minimized if fisheries monitoring results indicate juvenile Chinook salmon and steelhead are emigrating in the vicinity of the DCC.

b. To address the potential competing objectives of water quality improvement and fisheries protection, Reclamation and DWR shall develop specific water quality criteria, operational rules, and decision making process for operation of the DCC gates during the period between October 1 and March 31. This effort shall include investigation of whether hydrodynamic models can be used to predict potential water quality problems and alternative operations scenarios for the DCC gates and the Delta export pumps. Updated water quality criteria, operational rules, and the decision-making process shall be provided to NOAA Fisheries for review and concurrence as revisions occur.

5. Reclamation and DWR shall minimize the adverse effects of Delta exports on juvenile steelhead and spring-run Chinook salmon.

a. Based on observations of juvenile steelhead, juvenile spring-run size Chinook salmon (70 mm to 150 mm), or late-fall Chinook salmon surrogates (CWT fish

from Coleman NFH) in:1) lower Sacramento River Fisheries monitoring stations (Knights Landing, Sacramento Trawl, beach seine program); 2) Delta Fisheries monitoring stations (beach seine program, Chipps Island); or 3) Tracy or Skinner fish salvage facilities; Reclamation and DWR shall reduce CVP and SWP pumping levels to improve the survival of steelhead and spring-run Chinook smolts in the Delta for periods extending from five to ten days. These export reductions to a combined CVP/SWP pumping rate of 4,000 to10,000 cfs, depending on Delta inflow conditions, will be implemented based on the protocol and water quality criteria established in the *Salmon Decision Process* and initiated by NOAA Fisheries. The decision to implement these export curtailments, their duration, and specific export level will be made by Reclamation and DWR. This decision will be based on discussions within the WOMT after receiving recommendations from the DAT. NOAA Fisheries will provide Reclamation and DWR, at minimum, 72 hours notice prior to the initiation of the target CVP/SWP export rates. NOAA Fisheries will make every effort possible to ensure that recommendations combine these export curtailments with the currently proposed (b)(2) actions FWS. Curtailments pursuant to this term and condition are not constrained by the Department of Interior's (b)(2) water budget.

[b. Incidental take of yearling spring-run Chinook salmon at the CVP and SWP Delta export facilities will be based on observations of CWT late-fall Chinook salmon uniquely marked at Coleman NFH and released in the upper Sacramento Basin. Loss at the CVP and SWP Delta export facilities may not exceed one percent of any ***surrogate*** release group ***(determined by NOAA Fisheries and the CALFED DAT each year before November)*** of CWT late fall Chinook ***salmon*** released in the upper Sacramento Basin from April 1, 2002, through March 31, 2004. Take will be calculated with the standard loss estimation procedures applicable at the respective fish collection facilities. At the one percent cumulative loss level, Reclamation and DWR must take actions to avoid further loss and reinitiate consultation.]

c. Incidental take of YOY spring-run Chinook salmon from December to May shall determined using mixed stock analysis of CWT recoveries at the Delta Fish Facilities and applied to the adult escapement estimates for each drainage. Therefore, the estimated YOY spring-run Chinook salmon loss may not exceed one percent of the total YOY Chinook salmon loss at the Delta Fish Facilities in any one year.

[d. Incidental take of steelhead at the CVP ***(Tracy)*** and SWP ***(Skinner)*** export facilities will be based on seasonal yearly observations of unmarked steelhead at the Tracy and Skinner fish collection facilities from October through September. Combined cumulative salvage of ***juvenile and adult*** unmarked steelhead at the

CVP and SWP export facilities may not exceed ***3,500*** fish during this period, based on the salvage estimation procedures described in the Four Pumps Agreement at the respective collection facilities. If cumulative salvage of unmarked steelhead reaches ***3,500*** fish for the water year (October through September), Reclamation and DWR must take actions to avoid further collection and salvage of steelhead and reinitiate consultation.]

e. Incidental take for the Rock Slough Old River Intake will be based on current DFG monitoring until a fully screened intake is built. Loss of juvenile spring-run Chinook salmon and steelhead shall be combined with Tracy and Banks fish facilities and reported in an annual monitoring report (see 7 [a]).

f. Incidental take for the Suisun Marsh Salinity Control Gates shall be based upon DFG monitoring studies associated with gate operations. It is anticipated that some adult steelhead may be caught during these studies, therefore up to 10 adult steelhead may be tagged to determine their migratory patterns.

6. Reclamation and DWR shall collect additional data at the fish salvage collection facilities for improving facility operations and incidental take monitoring with regard to steelhead and spring-run Chinook salmon.

a. DNA tissue samples and CWT samples from juvenile spring-run Chinook salmon and steelhead at the Tracy and Skinner fish collection facilities shall be collected by DWR or DFG for genetic analysis or tag removal/reading pursuant to the sampling protocols established by the IEP Salmon Genetics Project Work Team. Tissues shall be stored at the DFG tissue bank at Rancho Cordova for subsequent analysis by Oregon State University or similar lab approved by NOAA Fisheries. Whole fish or heads for CWT processing/identification shall be stored at the FWS Bay/Delta Office in Stockton. All samples shall be clearly marked according to office protocol and a log maintained at each storage facility. Unclipped steelhead samples for DFG otolith studies may be collected and stored at the above facilities after providing NOAA Fisheries, Sacramento Office with a detailed study plan.

b. For the period from October 1 through June 30, Reclamation and DWR must calculate a daily loss estimate for juvenile steelhead through the Tracy and Skinner Fish Facilities, which includes predation through Clifton Court (*i.e.*, prescreen loss), louver efficiencies, and trucking and handling loss, on a real-time basis similar to how Chinook salmon loss is calculated.

c. Reclamation and DWR must use personnel for monitoring at the fish salvage facilities that are experienced in the sampling and handling of juvenile anadromous salmonids. This experience should include instruction in at least one course in juvenile fish identification that includes both salmon and steelhead.

[*d.* ***Reclamation shall implement the expanded fish monitoring plan developed by the California Department of Fish and Game for the Rock Slough pumping plant and Contra Costa Canal by May 1, 2004. This monitoring effort shall include yearly CV spring-run Chinook salmon and CV steelhead loss estimates.***]

7. Reclamation in coordination with DWR shall submit weekly DAT reports and annual written reports to NOAA Fisheries regarding the results of monitoring and incidental take of spring-run Chinook salmon and steelhead associated with operations of Project facilities (50 CFR 402.14[I][3]).

   a. Reclamation in coordination with DWR shall provide a written annual data report to be submitted by September 30 of each year. This report shall summarize the results of CV spring-run Chinook salmon and CV steelhead monitoring and incidental take associated with the operation of the Delta Fish Facilities (including the Rock Slough Pumping Plant). All juvenile mortality must be minimized and reported, including those from special studies conducted during salvage operations. This report should be sent to:

      Supervisor, Sacramento Area Office
      650 Capitol Mall, Suite 8-300
      Sacramento, California 95814-4706

[*8.* ***Reclamation and DWR shall work with NOAA Fisheries staff to minimize take from unscreened diversions that are a part of interim water contract renewals.***

   a. ***Reclamation and DWR shall work with NOAA Fisheries engineers to assist Feather Water District in the design of a fish screen for the diversion located on the Feather River . This fish screen must be in place and fully functional by February 1, 2005, or one year from issuance of this opinion.***]

X. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. These "conservation recommendations" include discretionary measures that Reclamation and DWR can take to minimize or avoid adverse effects of a proposed action on a listed species or critical habitat or regarding the development of information. In addition to the terms and conditions of the Incidental Take Statement, the NOAA Fisheries provides the following conservation recommendations that would reduce or avoid adverse impacts on the listed species:

1. Reclamation and DWR should support and expand anadromous salmonid monitoring programs throughout the Central Valley to improve understanding of the life history of these listed species and improve the ability to provide Fisheries protection through real-time management of CVP/SWP facilities.

2. Reclamation and DWR should participate in watershed planning efforts, and support measures to protect adequate instream flows, and equitable approaches to increasing stream flows and water available for flow augmentation.

3. Reclamation and DWR should support and promote aquatic and riparian habitat restoration downstream of CVP/SWP reservoirs with special emphasis upon the protection and restoration of shaded riverine aquatic cover and increase the existing stream meander zone.

4. Reclamation and DWR should continue to provide benefits to spring-run Chinook salmon and steelhead to mitigate losses associated with CVP/SWP Delta Facilities on spring-run Chinook salmon and steelhead.

a. DWR shall continue to implement and/or fund projects pursuant to the 4-Pumps Agreement, including the four projects listed herein (Durham Mutual/Parrott-Phelan screens and ladders, Mill Creek water exchange, Deer Creek water exchange, and warden overtime).

b. Reclamation and DWR shall work with NOAA Fisheries, FWS and DFG to implement and/or fund any other projects that are deemed necessary and appropriate to provide for the protection and/or recovery of CV spring-run Chinook salmon or steelhead.

5. Reclamation and DWR should work with NOAA Fisheries, FWS and DFG to implement and fund any monitoring associated with projects that Reclamation, DWR, DFG, FWS or NOAA Fisheries agree are necessary and appropriate to determine incidental take levels or provide for the protection and/or recovery of CV spring-run Chinook salmon or steelhead.

6. An adaptive management approach (through WOMT, DAT, and B2IT groups), including monitoring of salmon and steelhead status and response to flow fluctuations, if they occur, should be established for each river to minimize the loss associated with isolation and stranding events. If inadequate water resources are anticipated, Reclamation and DWR should expedite the purchase of water from willing sellers through EWA or (b)(3) to ensure meeting their environmental responsibilities.

7. Reclamation and DWR should pursue opportunities to conserve water and manage water more effectively, including but not limited to: improving water measurement, accurate water accounting, minimizing conveyance losses, and minimizing environmental impacts to instream resources.

8. Reclamation should maintain a target carryover storage in Folsom Reservoir of 600 TAF during Wet Years with a minimum end-of-September storage in Dry Years of 450 TAF, in order to conserve cold water for use during the summer and provide suitable spawning flows in the fall and winter.

XI. REINITIATION NOTICE

This concludes formal consultation on Reclamation's proposed two year extension of Project operations between April 1, 2004, and March 31, 2006. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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