



OCT 9 2012

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

**TITLE:** Final Environmental Assessment for 10(a)(1)(A), Enhancement of the Species Permit Issuance for the Collection and Transport of Spring-run Chinook for the San Joaquin River Restoration Program

**LOCATION:** Sacramento River and San Joaquin River Basins of California. More specifically, the Feather River Fish Hatchery in the Feather River sub-basin of the Sacramento River and the San Joaquin Fish Hatchery located on the San Joaquin River below Friant Dam near the City of Fresno.

**SUMMARY:** The National Marine Fisheries Service (NMFS) is issuing a permit to the United States Fish and Wildlife Service (USFWS) an Endangered Species Act section 10(a)(1)(A) permit. The section 10(a)(1)(A) permit application requested the collection of surplus FRFH spring-run Chinook that would be used for broodstock. As permitted during the first three years, 560 juveniles or "eyed" eggs would be collected for the use by the San Joaquin Fish Hatchery or Interim Facility. In the fourth year until the ending of the permit period, USFWS would collect 2,760 juveniles or eggs for the Conservation Facility. The proposed permit will allow the USFWS to collect and develop broodstock and test culturing methods.

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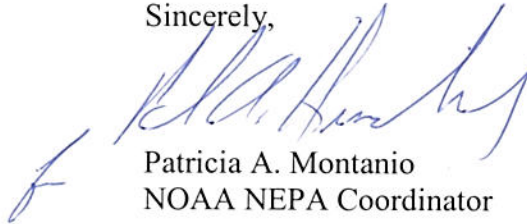


UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
PROGRAM PLANNING AND INTEGRATION  
Silver Spring, Maryland 20910

The environmental review process led us to conclude that this action will not have a significant effect on the human environment. Therefore, an environmental impact statement will not be prepared. A copy of the finding of no significant impact (FONSI) including the supporting environmental assessment (EA) is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,



Patricia A. Montanio  
NOAA NEPA Coordinator

Enclosure



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OCTOBER 2012

TITLE OF ENVIRONMENTAL REVIEW

Final Environmental Assessment for  
10(a)(1)(A), Enhancement of the Species Permit  
Issuance for the Collection and Transport of  
Spring-run Chinook for the San Joaquin River  
Restoration Program

RESPONSIBLE AGENCY  
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LOCATION OF PROPOSED ACTIVITIES

The Feather River Fish Hatchery, the San  
Joaquin Fish Hatchery and Salmon Conservation  
Hatchery Facility, the Silverado Fisheries Base  
and the Center for Aquatic Biology and  
Aquaculture

PROPOSED ACTION

Issuance of an Endangered Species Act section  
10(a)(1)(A) permit to US Fish and Wildlife  
Service to collect Central Valley spring-run  
Chinook salmon eggs and juveniles from the  
Feather River Fish Hatchery and transport to the  
San Joaquin Fish Hatchery and Salmon  
Conservation Hatchery Facility for captive  
broodstock.

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## **ACRONYMS**

BMP	Best Management Practices
CABA	Center for Aquatic Biology and Aquaculture
CDFG	California Department of Fish and Game
CDWR	California Department of Water Resources
cfs	cubic feet per second
CO <sub>2</sub>	Carbon dioxide
CVP	Central Valley Project
DO	dissolved oxygen
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FRFH	Feather River Fish Hatchery
FWA	Friant Water Authority
GHG	greenhouse gas
HGMP	Hatchery and Genetics Management Plan
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NRDC	Natural Resources Defense Council
°F	Degrees Fahrenheit
PEIS/EIR	Program Environmental Impact Statement/Environmental Impact Report
RWQCB	Regional Water quality Control Board
SFB	San Francisco Air Basin

SJFH	San Joaquin Fish Hatchery
SJRRP	San Joaquin River Restoration Program
SJVAB	San Joaquin Valley Air Basin
spring-run Chinook	Central Valley spring-run Chinook salmon ( <i>Oncorhynchus tshawytscha</i> )
SVAB	Sacramento Valley Air Basin
SWP	State Water Project
USFWS	United States Fish and Wildlife Service



## SECTION 1 PURPOSE AND NEED

### 1.0 Purpose and Need

#### 1.1 Background

The Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) (spring-run Chinook) Evolutionarily Significant Unit (ESU) is listed as threatened under the Federal Endangered Species Act (ESA). The ESU includes all naturally spawned populations of spring-run Chinook in the Sacramento River and its tributaries in California, including the Feather River, as well as the Feather River Hatchery spring-run Chinook program (June 28, 2005, 70 FR 37160). Critical habitat was established on September 2, 2005, and became effective on January 2, 2006 (September 2, 2005, 70 FR 52488).

Over the past two centuries, development of water resources transformed the San Joaquin River. Since the 1880s, large areas of valley floor were converted to agricultural production whose supporting irrigation activities modified the natural flow patterns. With the construction of Friant Dam on the San Joaquin River and the completion of the Friant-Kern Canal and Madera Canal, the Friant Dam diverted San Joaquin River water supplies to over 1 million acres of highly productive farmland along the eastern portion of the San Joaquin Valley. Operation of the dam ceased flow for a portion of the approximately 153 miles of the river and extirpated salmon runs in the San Joaquin River upstream from its confluence with the Merced River.

In 1988, a coalition of environmental and fishing groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, challenging renewal of long-term water service contracts between the United States and Central Valley Project Friant Division contractors. After more than 18 years of litigation of this lawsuit, a stipulation of settlement (Settlement) was reached. On September 13, 2006, the Settling Parties, including NRDC, Friant Water Users Authority [now the Friant Water Authority (FWA)], and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement, which was subsequently approved by the District Court for the Eastern District of California on October 23, 2006. Implementation of the Settlement is accomplished through the San Joaquin River Restoration Program (SJRRP).

The Implementing Agencies of the SJRRP are the Bureau of Reclamation (Reclamation) and the United States Fish and Wildlife Service (USFWS) from the Department of Interior, the National Marine Fisheries Service (NMFS) from the Department of Commerce and, by Memorandum of Understanding, from the State of California, the Department of Fish and Game (CDFG) and the Department of Water Resources (CDWR).

The Settlement establishes two primary goals:

**Restoration Goal** – To restore and maintain fish populations in “good condition” in the mainstem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

**Water Management Goal** – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim flows and Restoration Flows provided for in the Settlement.

Paragraph 14 of the Settlement states that the Restoration Goal “shall include the reintroduction of spring-run and fall-run Chinook salmon to the San Joaquin River between Friant Dam and the confluence of the Merced River”. To accomplish this, Paragraph 14 of the Settlement also requires the USFWS to submit an ESA section 10(a)(1)(A) permit application to the NMFS for the reintroduction of spring-run Chinook.

Section 10 of the ESA allows for the issuance of permits for direct take (section 10(a)(1)(A)) and “incidental take (section 10(a)(1)(B)).” Under section 10(a)(1)(A), the Secretary may permit, under such terms and conditions as he shall prescribe- any act otherwise prohibited by section 9 for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations.

The Federal Implementing Agencies are authorized to carry out the Settlement by the San Joaquin River Restoration Settlement Act (Settlement Act) (Pub. L. 111-11, 123 Stat. 1349 (2009)). This legislation also mandates that spring-run Chinook reintroduced into the San Joaquin River under the SJRRP shall be as an experimental population pursuant to section 10(j) of the ESA of 1973 (16 U.S.C. 1539(j)). The collection of spring-run Chinook for use in establishing the experimental population will require one or more 10(a)(1)(A) permits to be issued.

The issuance of this 10(a)(1)(A) permit would also further the goals of the Draft “Central Valley Recovery Plan for the Evolutionarily significant units of Sacramento River Winter-run Chinook Salmon and Central Valley spring-run Chinook Salmon, and the Distinct Population Segment of California Central Valley Steelhead” (Draft Recovery Plan) (NMFS 2009a) which has the overarching aim of recovering listed salmonids in the Central Valley. More specifically, the Draft Recovery Plan stresses actions that improve the viability of these species, including the spring-run Chinook ESU, such that they can be removed from Federal protection under the ESA.

The SJRRP has prepared an analysis of the potential environmental effects in accordance with the National Environmental Policy Act and the California Environmental Quality Act. The San Joaquin River Restoration Program Program Environmental Impact Statement /Environmental Impact Report (SJRRP PEIS/EIR (Reclamation, 2011)) evaluated the potential direct, indirect, and cumulative impacts on the environment at a program level that could result from implementing the Settlement consistent with the Settlement Act. The PEIS/EIR discusses the reintroduction of spring-run Chinook to the San Joaquin River and the affected environment at a programmatic level. Information from the PEIS/EIR was used in the preparation of this Environmental Assessment (EA) for the discussions of air quality, climate change and the fish populations that currently exist in the San Joaquin River that could be affected by the proposed action. The analyses of potential impacts in this document were compared to the programmatic analyses in the PEIS/EIS. Where appropriate, the analyses of the final PEIS/EIR were incorporated by reference into this document under CEQ NEPA Regulations 40 CFR 1502.21.

## 1.2 Purpose and Need Statement

The proposed action is to issue a permit under section 10(a)(1)(A) of the ESA to USFWS, for a period of five years, to collect surplus spring-run Chinook eggs or juveniles from the Feather River Fish Hatchery (FRFH) in order to establish broodstock propagation, handling and cultivation methods. Propagation and broodstock culture methods include the use of off-stream holding and rearing facilities in a salmon conservation hatchery facility. The proposed action does not include activities that would release spring-run Chinook into the San Joaquin River. This EA will analyze the potential impacts of the proposed action focusing on the transport and broodstock culture methods. As noted above, the Settlement Act specifies that any spring-run Chinook released into the San Joaquin River shall be as an experimental population established under ESA section 10(j) experimental population designation (10(j) rule). Until such time as the 10(j) rule is in place, no fish collected under this permit may be released to the San Joaquin River. The 10(j) rule will require its own NEPA analysis, including an analysis of the potential impacts on the human environment of releasing spring-run Chinook into the San Joaquin River.

The purpose of this action is to contribute to fulfilling some requirements of the Settlement by allowing an initial step in the process to re-establishing spring-run Chinook in the San Joaquin River and to further the enhancement of the species and its potential for recovery by increasing knowledge regarding transport and captive broodstock methods. It is necessary to issue this permit to allow collection of spring-run Chinook because they are listed as a threatened species under the ESA.

## 1.3 Action Area

The Action Area of the proposed action is the Sacramento River and San Joaquin River Basins of California. More specifically, the Feather River Fish Hatchery (FRFH) in the Feather River sub-basin of the Sacramento River and the San Joaquin Fish Hatchery (SJFH) located on the San Joaquin River below Friant Dam. Proposed action activities may also occur at the Silverado Fisheries Base (Silverado) near Yountville, California or the Center for Aquatic Biology and Aquaculture (CABA) in Davis, California. See Figure 1-1 for a map of the Action Area.

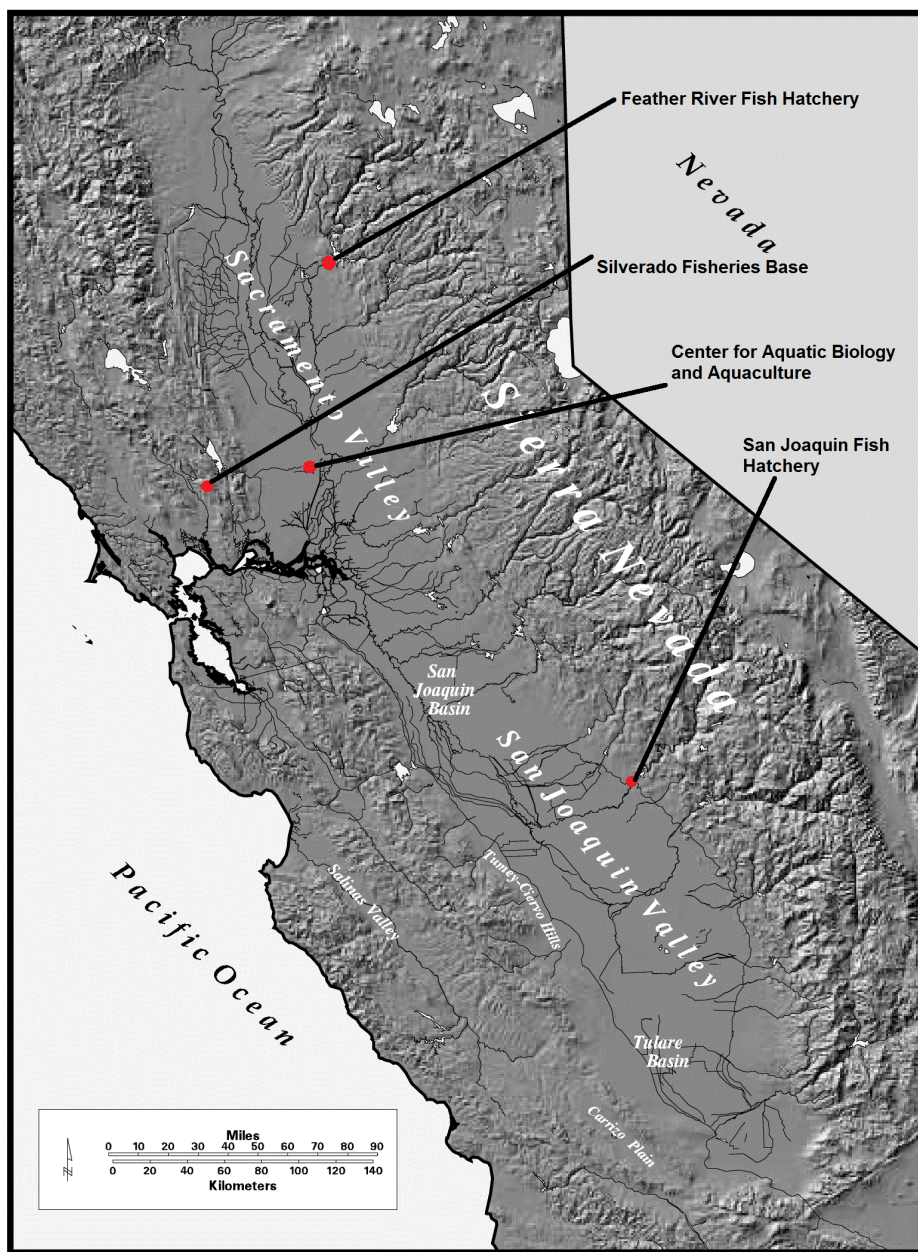
## 1.4 Public Involvement

### 1.4.1 Scoping

On September 29, 2010, the USFWS submitted the application, “§10(a)(1)(A), *Enhancement of the Species Permit Application for the Reintroduction of Central Valley Spring-run Chinook into the San Joaquin River Restoration Program*,” to NMFS. As part of the scoping process the following events occurred:

- November 15, 2010, NMFS sent 10 NEPA notification letters to federally recognized tribes in accordance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, to inform them that NMFS had begun planning for the preparation of an environmental assessment and public scoping process regarding the permitting and rule-making for actions necessary to the reintroduction of spring-run Chinook to the San Joaquin River and to request comment.

- November 15, 2010, NMFS sent 74 letters to non-federally recognized tribes requesting them to comment and/ or participate in the public scoping process as interested parties.
- November 17, 2010, NMFS sent the USFWS a 30-day Response letter requesting additional clarification on the application.
- January 20, 2011, the Service sent NMFS a letter to clarify the Donor Stock Collection decision process and the finalized Hatchery and Genetic Management Plan (HGMP).



Note: Location displayed for San Joaquin Fish Hatchery includes area of San Joaquin River from hatchery to the Willow Unit.

Figure 1-1 Action Area Locations

- 1 • February 2011, NMFS released the section 10(a)(1)(A) permit application for public comment  
2 from February 4 to March 7, 2001, and held public workshops in Chico on February 3, Fresno on  
3 February 7, and Los Banos, on February 8, for the section 10(a)(1)(A) permit application and the  
4 experimental population process.
- 5 • April 7, 2011, NMFS met with the Southern Sierra Miwuk Tribe to discuss the spring-run  
6 Chinook reintroduction process.
- 7 • May 26, 2011, NMFS sent a letter to the USFWS providing them with the 113 public comments  
8 and the 4 NMFS comments that resulted from the public comment period for the 10(a)(1)(A)  
9 permit application.
- 10 • November 4, 2011, the USFWS submitted the “Final §10(a)1(A), *Enhancement of the Species*  
11 *Permit Application for the Reintroduction of Central Valley Spring-run Chinook into the San*  
12 *Joaquin River*” to NMFS.
- 13 • December 2011, the USFWS revised the November 4, 2011, application to reflect changes in  
14 collection methods and donor sources. It then re-submitted the Final §10(a)1(A), *Enhancement of*  
15 *the Species Permit Application for the Reintroduction of Central Valley Spring-run Chinook into*  
16 *the San Joaquin River* to NMFS.

17  
18 Letters were sent to 84 federally and non-federally recognized tribes and a presentation was made to the  
19 Southern Sierra Miwuk Tribe. Beyond one response made in support of the plan to restore salmon, no  
20 specific tribal interests were expressed regarding reintroduction. There are no tribal treaty or fishing rights  
21 affected by the proposed action. As a result, no further discussion of tribal interests will be part of this  
22 document.

#### 23 **1.4 Public Comment on EA**

24 The Draft of this EA was released on April 19, 2012 with a Notice of availability published in the Federal  
25 Register / Vol. 77 No. 76 / Thursday, April 19, 2012 / Notices. The public comment period closed on  
26 May 21, 2012. NMFS received five letters containing 51 comments. The comments ranged from editorial  
27 comments to questions on whether the EA was violating NEPA by analyzing only a segment of the  
28 action. Many of the comments regarding segmentation where directed at the PEIS/EIR prepared by the  
29 SJRRP. Those comments not directed at the EA were not responded to. The comments have been  
30 summarized and they along with the associated response are included in the Final EA as Appendix 2,  
31 Response to Comments Table.

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## SECTION 2 Alternatives

### 2.1 Introduction

As submitted to NMFS by the USFWS, the section 10(a)(1)(A) permit application requested the collection of surplus FRFH spring-run Chinook that would be used for broodstock and direct river reintroductions. As proposed in the permit during the first three years, 560 juveniles or “eyed” eggs would be collected for the use by the San Joaquin Fish Hatchery or Interim Facility and either 54,400 juveniles or 80,000 eyed eggs would be collected for translocation to the San Joaquin River. In the fourth year until the ending of the permit period, USFWS would collect 2,760 juveniles or eggs for the Conservation Facility along with juveniles or eggs (54,400 and 80,000 respectively) that would be for translocation.

Since the final rulemaking to establish the experimental population under section 10(j) has not been completed, NMFS has set the condition that no juveniles or eggs will be collected for translocation and release to the San Joaquin River. The alternatives that are to be analyzed are set forth below.

### 2.2 Alternatives to be Analyzed

Two alternatives are considered in this EA: (1) to not issue the permit (no action), and (2) to issue the permit with conditions (proposed action/preferred alternative).

*Alternative 1: Do Not Issue the Permit (No Action Alternative):* Under a No Action Alternative, NMFS would not issue the ESA section 10(a)(1)(A) permit to USFWS authorizing take of ESA-listed species associated with the requested activities. For the purpose of this analysis, this alternative would not allow the activities necessary for successful reintroduction of spring-run Chinook to the San Joaquin River, in the manner called for in the Settlement. Under the No Action Alternative, the re-establishment of spring-run Chinook populations within the Southern Sierra Nevada Diversity Group, as identified in the Draft Recovery Plan, would require volitional recolonization from existing populations of spring-run Chinook. While occasional individuals would potentially stray into the San Joaquin River when river conditions may be suitable, it is unlikely that sufficient numbers would concurrently stray in order to establish a naturally reproducing and self-sustaining population by the year 2025 as required by the Settlement.

*Alternative 2: Issue the Permit with Conditions (Proposed Action/Preferred Alternative):* The proposed action is to issue a permit under section 10(a)(1)(A) of the ESA to USFWS, for a period of five years to collect eggs or juveniles, annually, from the FRFH. Individuals collected will be surplus spring-run Chinook eggs or juveniles from the FRFH.

The 10(a)(1)(A) permit applicant is proposing in the first three years of the permit up to 560 eggs or equivalent number of juveniles will be collected, annually – and 2,760 eggs or equivalent juveniles in years four and five, from the FRFH, to establish broodstock in a CDFG salmon conservation hatchery facility (Conservation Hatchery Facility) following the Hatchery and Genetics Management Plan (HGMP) incorporated into this 10(a)(1)(A) application and permit. The collected eggs will be trucked, using best management practices (BMP), from the FRFH located in Oroville, CA, first to a quarantine facility at either Silverado or the CABA. During quarantine, 60 eggs will be used for terminal pathology



assays each year. The 10(a)(1)(A) permit requires that any individual eggs or juveniles collected that are to go to the interim or final Conservation Hatchery Facility must go through quarantine. No direct transfers from hatchery to hatchery are allowed. After the appropriate quarantine time the eggs would then be trucked to the Conservation Hatchery Facility located on the grounds of the existing SJFH. At present a smaller interim salmon hatchery facility (Interim Facility) exists on the site where CDFG plans to build the Conservation Hatchery Facility. This would be used for broodstock cultivation activities until the larger Conservation Hatchery Facility construction is completed. The number of eggs collected annually will be constrained by the available facilities at the time. Broodstock activities would include holding, handling, and rearing of fish in the Conservation Hatchery Facility. No release to the San Joaquin River is permitted.

As discussed in Section 1, this EA will not analyze the potential impacts of release to the San Joaquin River because at this time any release is not allowed and would be subject to a separate NEPA analysis.

The permit application and HGMP are included in Appendix 1 of this document. The following conditions are included in the permit:

- In keeping with the requirements of the Settlement Act, no spring-run Chinook will be released to the San Joaquin River unless designated as an experimental population under section 10(j) of the ESA;
- A process to establish a numeric limit to the number of eggs or juveniles that could be collected from the Feather River Fish Hatchery annually (as shown in Table 2 (Section 5.5) of the application);
- Eggs or juveniles collected will be demonstrably second generation spring-run phenotype (as described on page 11 (Section 5.2.1) of the application);
- Limits on the number or proportions of spring-run Chinook that could be incidentally taken as a result of carrying out the program, as shown in Appendix B, Table 2 of the application
- Operating guidelines for all hatchery facilities will be based on widely accepted best management practices. These would include, but are not limited to: maintenance of water quality discharges to those set forth in any hatchery discharge permit, and, any equipment associated with the holding broodstock;
- Monitoring of the activities that occur in the hatchery facilities is required, and;
- Regular reports on the activities authorized by the permit are required.

NMFS' conditions would ensure that no spring-run Chinook are released to the San Joaquin River under the SJRRP, until an experimental population can be designated pursuant to section 10(j) of the ESA. NMFS' conditions also would ensure that the annual take of ESA-listed anadromous fish would be for the propagation and enhancement of the ESA-listed spring-run Chinook population and the associated monitoring activities. The conditions imposed by NMFS would also ensure that the annual take would not appreciably reduce the likelihood of the survival and recovery of the species in the wild. Therefore, the Proposed Action would include terms and conditions necessary to the propagation or survival of listed spring-run Chinook pursuant to ESA section 10, including reporting requirements for determining whether such terms and conditions are being complied with.



**2.3 Alternatives Considered and Eliminated from Further Consideration**

*Issue a Permit Without Conditions:* NMFS considered issuing a permit without terms and conditions. However, that would not meet the statutory requirements of the Settlement Act or ESA section 10. Therefore, the action of issuing an ESA permit without terms and conditions was not analyzed.

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## **SECTION 3 AFFECTED ENVIRONMENT**

### **3.1 Background**

The alternatives identified in Section 2 can potentially affect the physical and biological resources within the action area. The following is a summary of the major components of the environment that would be affected by any of the alternatives and the current baseline condition organized by the type of environment.

### **3.2 Hatchery Facilities: Feather River Fish Hatchery (FRFH), Silverado Fisheries Base and the Center for Aquatic Biology and Aquaculture (CABA), and San Joaquin Fish Hatchery with Interim Facility**

#### **3.2.1 Feather River**

The Feather River is a major tributary to the Sacramento River located at the north end of the western slope of the Sierra Nevada, with a watershed encompassing 5,900 square miles (FERC 2007, NMFS 2009b). Figure 3-1 shows the location of the FRFH and general features of the Feather River.

#### **3.2.2 Feather River Fish Hatchery**

The spring-run Chinook salmon mitigation program for Oroville Dam commenced with initial operation of the FRFH in 1967. In 2004 new spring-run Chinook hatchery operations went into effect, which were designed to protect this important component of the Sacramento Valley spring-run Chinook salmon ESU as defined by NMFS (CDWR. 2011).

The goals of the FRFH spring-run Chinook salmon program are accomplished through carefully planned trapping, artificial spawning, rearing, and release of spring-run Chinook salmon while conserving the phenotypic and genotypic characteristics of the population and minimizing impacts to other listed stocks (CDWR. 2011). These protocols used by the FRFH include, but are not limited to, rigorous selection of broodstock to manage run timing, genetics, percent natural origin, refinement of smolt release strategies, and monitoring of harvest and escapement (CDWR. 2011). Since these would likely be in use during the life of the permit, these protocols were used in the analyses of the effect on spring-run Chinook shown in this EA.

##### **3.2.2.1 Holding and Spawning**

Upstream migration of Chinook salmon (Chinook) is blocked by a Fish Barrier Dam located one kilometer below the Oroville Dam. Adult spring-run Chinook are found holding at the Thermalito Afterbay Outlet and the Fish Barrier Dam as early as April (FERC 2007, NMFS 2009b) and begin spawning in September, usually 2-3 weeks earlier than the fall-run Chinook salmon (fall-run Chinook) (Jason Kindopp cited in SJRRP, 2010). Spring-run Chinook are spawned artificially in the FRFH and also spawn naturally in the river during late September to late October (Reynolds et al 1993, Yoshiyama 2001). Fall-run Chinook and steelhead are also produced by the FRFH.

### 3.2.2.2 Population Size

In most years the FRFH has met its production goal of two million spring-run Chinook smolts (Anna Kastner cited in the 10(a)(1)(A) permit, USFWS, 2011). To reach this target, the hatchery typically mates approximately 750 pairs to produce three million eggs (Figure 3-2). Once the production goal has been met, spring-run Chinook typically continue to enter the hatchery. In past years, these “surplus” fish have either been released back to the river, euthanized (designated as “killed, not spawned”); or allowed to die on site (designated as “Died in Tank”). The “Died in Tank” adults die while waiting to be spawned, or were allowed to die over time once production goals were met.

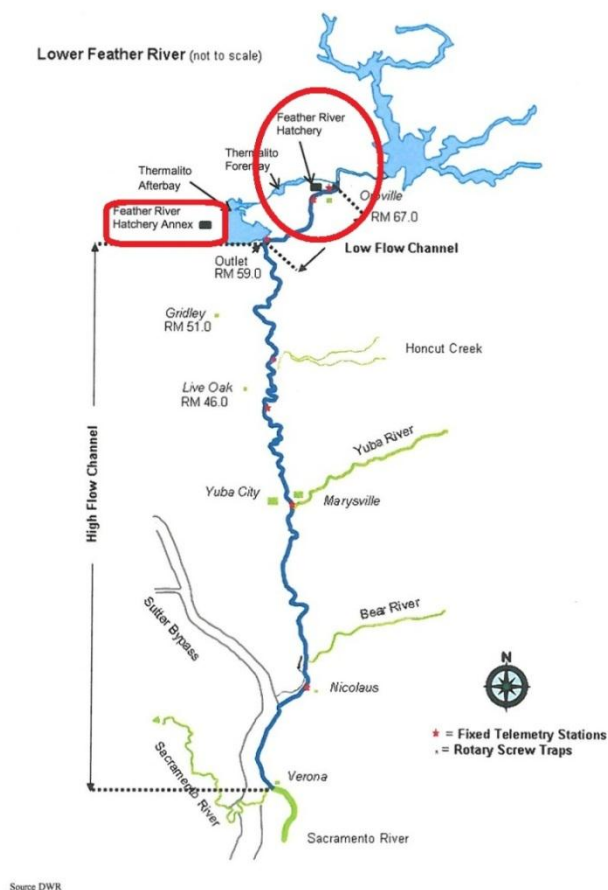
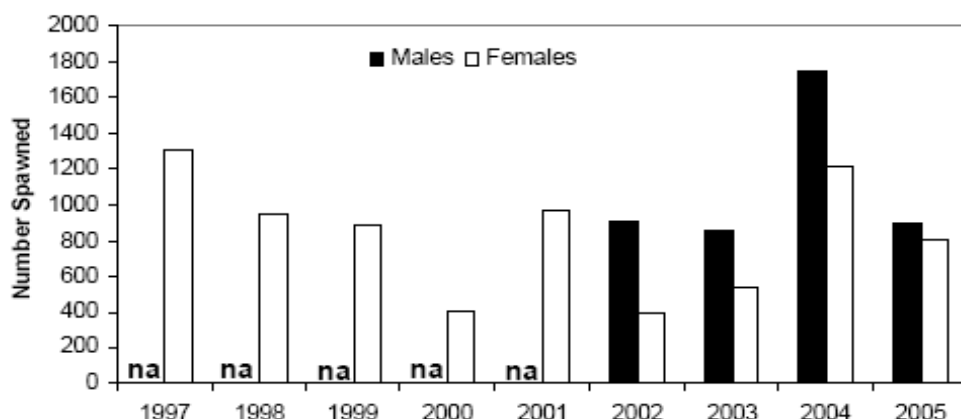


Figure 3-1 Feather River and Feather River Fish Hatchery Facilities (Circled)

The number of the “surplus” fish varies from year to year. During the current 2011 spawning season at FRFH, the number of surplus adults was particularly large. Counts from 2008 to 2011, indicated that 486 surplus adults (231 males and 255 females) entered the hatchery in 2011 (Table 3-1). Based on typical

1 fecundity rates, these fish were capable of producing an additional one million eggs in 2011.



2  
3 Figure 3-2. Number of spring-run Chinook adults spawned at the FRFH (Source: CDWR  
4 2009).  
5

	Female	Male	Jack	Died in Tank
<b>2011</b>	255	231	No data	No data
<b>2010</b>	154	23	6	256
<b>2009</b>	0	2	34	76
<b>2008</b>	47, unknown gender		No data	240

6 Table 3-1. Surplus Fish Observed at Feather River Fish Hatchery in  
7 Recent Years (Anna Kastner, cited in 10(a)(1)(A) permit).  
8

9 Between 1967 and 2008, the highest annual hatchery spring-run Chinook escapement was 8,662,  
10 occurring in 2003 (CDFG 2009). Between 1986 and 2007, the average number of spring-run Chinook  
11 returning to the FRFH was 3,992, compared to an average of 12,888 spring-run Chinook returning to the  
12 entire Sacramento River Basin (NMFS 2009a), and an average of 1,700 fish before the construction of  
13 Oroville Dam (Reynolds et.al. 1993, Yoshiyama 2001). More recently, FRFH spring-run Chinook  
14 escapement from 2005 through 2008 was 1,774, 2,061, 2,674, and 1,418, respectively (CDFG 2009)  
15 (NMFS 2009). The increase in numbers since the completion of the dam is attributed to the consistent  
16 supply of cold water to both the hatchery and the LFC and the contribution of hatchery fish (Reynolds et.  
17 al. 1993, Yoshiyama 2001).

### 18 3.2.2.3 FRFH Water Source

19 FRFH receives raw water from the Feather River at the Thermalito Diversion Dam and distributes it to  
20 the hatchery buildings and fish rearing areas. Overall raw water intake approximates 110 cubic feet per  
21 second (cfs). This water use is permitted as a non-consumptive use under a water right issued by the  
22 California State Water Resources Control Board to the State Water Project (SWP) Oroville facilities.  
23 The Thermalito Annex, near the Thermalito Afterbay, uses about 12 cfs of well water that have percolated  
24 through Thermalito Afterbay soils.

#### 3.2.2.4 FRFH Water Quality

When the Oroville Facilities underwent its FERC licensing, the FRFH requested that CDWR supply daily mean water temperatures during specific time periods. Table 3-2 shows the temperature requirements and objectives agreed to by CDWR (CDWR, 2006).

Table 3.2. Temperature requirements and objectives (°F) at the FRFH

Temperature requirements and objectives (°F) at the FRFH			
Period	Minimum Temperature Requirement	Proposed Maximum Mean Daily Temperature Objective	Maximum Allowable Temperature (measured hourly at FRFH intake/aeration tower)
April 1 – May 15	51	55	55
May 16 – May 31	51	55	59
June 1 – June 15	None	60	60
June 16 – August 15	None	60	64
August 16 – August 31	None	60	62
September 1 – September 30	None	56	56
October 1 – November 30	None	55	55
December 1 – March 31	None	55	55

Source: Article A107.2, Feather River Fish Hatchery Improvement Program, of the Settlement Agreement (CDWR, 2006)

Studies indicate that average quality of the water entering the FRFH has been quite good, with no constituents that are likely to adversely impact cold water fish culture or human health (CDWR 2004).

The discharge of FRFH effluent is by sub-surface percolation back to the Feather River from a large settling pond. Currently, much of this water re-enters the Feather River through a river side channel adjacent to FRFH called “Hatchery Ditch”. Quality of the discharge water is regulated by National Pollution Discharge Elimination System (NPDES) permit number CA0004570 issued by the California Regional Water Quality Control Board. The permit regulates the discharge of constituents identified in Table 3-3. Discharged water has consistently met these requirements. Additional discharge information is presented in Table 3-4.

Table 3-3. FRFH Discharge Effluent Limitations

Effluent Limitations					
Parameter	Units	Average Monthly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Flow <sup>1</sup>	mgd	--	47.3	--	--
pH	standard units	--	--	6.0	9.0
Total Suspended Solids <sup>2</sup>	mg/L	5	15	--	--
	lbs/day <sup>3</sup>	1,972	5,917	--	--
Settleable Solids <sup>2</sup>	ml/L	0.1	0.2	--	--
Copper (Total Recoverable)	µg/L	1.99	4.0	--	--
Formaldehyde	mg/L	0.1	--	--	--
Chloride	mg/L	106	--	--	--

<sup>1</sup>Total of PND-001, PND-002 and EFF-003.

<sup>2</sup>Effluent limitations are net values (increase over source water).

<sup>3</sup>Based on a design flow of 47.3 mgd.

### 3.3 Silverado Fisheries Base and the Center for Aquatic Biology and Aquaculture (CABA)

Silverado and CABA are proposed as locations to be used to quarantine the juveniles/eggs collected at FRFH. Silverado is located in Napa County, California, near Yountville. Silverado takes its water from Rector Reservoir on Rector Creek, a tributary of the Napa River. Silverado is permitted 1.6 million gallons of water per day. Unlike most of the hatcheries run by CDFG, Silverado does not have a NPDES permit because the quantity of fish they produce is less than the biomass limit or flow limit that would require an NPDES permit for a cold-water concentrated aquatic animal production facility.

The Center for Aquatic Biology and Aquaculture (CABA) was established to provide support to University of California Davis researchers in addressing problems associated with California's cultured and wild aquatic biological resources.

The CABA consist of two facilities. The first is a five-acre facility that has numerous tanks and tank systems that are available both inside and outside. Tank sizes range from small 2 ft. diameter tanks to a 24 ft. diameter tank. The second is the Putah Creek facility consisting of two buildings for inside work with an office trailer and tool room. This facility has mainly large diameter tank systems (7' to 20' dia.) suitable for large species of fish or for use in mesocosm studies. CABA also has on site an array of four artificial streams. There is research and student training space for a wide range of programs in aquatic vertebrate and invertebrate ecology, reproduction, behavior, nutrition, genetics, endocrinology, disease and pathology, aquaculture engineering, aquatic toxicology, and general aquatic biology (CABA, 2012).

Both CABA facilities receive well water at 63 to 66 °F throughout the year. The Putah Creek facility has an additional source of ground water that varies in temperature from 50 to 68 °F during the year (CABA, 2012). The university has all the appropriate water use and discharge permits.

## **3.4 San Joaquin River**

### **3.4.1. Introduction**

Although no fish are to be released until the establishment of the 10(j) rule, because the Proposed Action will be placing broodstock at the Interim Facility and later at the Conservation Hatchery Facility which are/will be located adjacent to the San Joaquin River, a brief description of the river basin has been included. The San Joaquin River basin, which encompasses about 7,017,000 acres, is the primary drainage in the San Joaquin Valley. The San Joaquin River flows northward toward the Delta, draining the central southern portion of the San Joaquin Valley. Major tributaries to the San Joaquin River include the Stanislaus, Tuolumne, and Merced rivers, as well as the smaller Chowchilla, and Fresno Rivers, all of which originate in the Sierra Nevada mountain range. The PEIS/EIR for the SJRRP divides the San Joaquin River into five reaches starting from Friant Dam. Reach 1 is from Friant Dam to (RM 267) to Gravelly Ford (RM 229). The SJFH is in Reach 1.

### **3.4.2. San Joaquin Fish Hatchery (SJFH) and Salmon Conservation Hatchery Facility**

As part of the Proposed Action, the collection of eggs or juveniles to be used for broodstock will need a place to be held. As proposed, an existing Interim Facility will first be used. Later a larger Conservation Hatchery Facility will be constructed by CDFG and eggs and broodstock would be kept there.

The CDFG operates the SJFH for trout near the town of Friant, California, located approximately one mile downstream of Friant Dam, and about 20 miles northeast of Fresno (Fresno County). Water for the hatchery and the Interim Facility is supplied from Millerton Lake, impounded by Friant Dam, and then aerated at the hatchery. The existing SJFH has used this water source to successfully hatch and raise trout at the site since 1955 due to favorable water temperature and water quality conditions.

The source water for the SJFH is a continuous 35 cfs supply gravity-fed directly from Friant Dam. Prior to reaching the hatchery, the water passes through the Fishwater Release Hydropower Plant, which is owned by the Orange Cove Irrigation District. The flows are delivered to the power plant through two different pipelines: a 24-inch diameter pipeline from two Friant Dam penstocks, and a 30-inch diameter pipeline that takes water from the Friant Kern Canal penstock near the left dam abutment. CDFG is currently in negotiations with Reclamation to secure additional water for the Conservation Hatchery Facility. Once additional water is secured, the water supply is anticipated to be equally as reliable as the SJFH.

The small-scale, Interim Facility is located on the grounds of SJFH and will be operational until the full-scale Conservation Hatchery Facility is constructed. The full-scale Conservation Hatchery Facility is anticipated to be operational in 2014, at which time both facilities would be integrated together. Construction funding for the Interim Facility and the long-term Conservation Hatchery Facility is provided by the State of California. The CDFG started to build the Interim Facility in 2010 and has been expanding and testing the system since then. Planning and permitting activities for the full-scale Conservation Hatchery Facility are in process with CDFG as the lead agency.



The pathogen and quarantine procedures for transporting eggs from the Feather River to another watershed may require holding at the CDFG holding facility at Silverado. This facility is operated on an ongoing basis to serve the needs of its hatchery system. An approved alternative facility is at the CABA.

### **3.4.3 Water Quality**

#### **3.4.3.1 San Joaquin Fish Hatchery and Salmon Conservation Hatchery Facility**

The temperature of the water in each pipeline that services the SJFH and Interim Facility varies throughout the year; valves are used to control the flows to create favorable temperature conditions at the hatchery. Temperatures at the SJFH are typically maintained between 45-55°F throughout the year, occasionally dipping as low as 42°F or peaking as high as 58°F. Hatchery water and the adjacent river water are of the same origin and fairly similar in quality and temperature; however, the temperatures of the hatchery water are moderated due to the ability to adjust water temperatures at the mixing valves located at the Fishwater Release Hydropower Plant. If the planning process for the construction and operation of the Conservation Hatchery Facility reveals that changes to the water supply may be needed, the effects of that action will be analyzed at a later time. The Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement (Hatchery EIR/EIS) included water quality data for the FRFH, and SJFH which is shown on Table 3-4 (ICF Jones & Stokes. 2010).

Four exceedances of the dissolved oxygen (DO) objective (i.e., less than 7.0 mg/L) occurred at the San Joaquin River Hatchery over the course of 28 months, indicating a frequency of about two events per year (ICF Jones & Stokes. 2010). While there have been exceedances, the number and/duration were minor and no enforcement action was taken. Since the completion of the Hatchery EIR/EIS the Central Valley Regional Water Quality Control Board has not taken any enforcement action against any of the hatcheries that might be used in the Proposed Action (RWQCB, 2012). The discussion of water quality for Reach 1 of the San Joaquin River is from the SJRRP PEIS/EIR

#### **3.4.3.2 San Joaquin River Reach 1 Water Quality**

The SJRRP PEIS/EIR describes the water quality in Reach 1 as being influenced by releases from Friant Dam, with minor contributions from agricultural and urban return flows. The PEIS/EIR goes on to state that water quality data collected from the San Joaquin River below Friant Dam demonstrate the generally high quality of water released at Friant Dam from Millerton Lake to Reach 1. Temperatures of San Joaquin River water releases to Reach 1 are dependent on the cold-water volume available at Millerton Lake.

Table 3-4. Summary of Conventional and Routine Parameters Monitored in Hatchery Discharge Water and Receiving Water

		<b>Number of Monitoring Reports <sup>a</sup></b>	<b>Net Total Suspended Solids <sup>b</sup></b>	<b>Net Turbidity <sup>c</sup></b>	<b>pH <sup>d</sup></b>	<b>Dissolved Oxygen <sup>e</sup></b>	<b>Electrical Conductivity <sup>f</sup></b>	<b>Total Dissolved Solids <sup>f</sup></b>
Objective			<5 <sup>g</sup>	<1 <sup>h</sup>	>6.5, <8.5 <sup>i</sup>	>7.0 <sup>j</sup>	700 <sup>k</sup>	450 <sup>k</sup>
Units			mg/L	NTU	–	mg/L	µS/cm	mg/L
Feather River Hatchery	January 2004–November 2008	46	3.1	–	7.1	8.3	136	43
Feather River Hatchery Thermalito Annex	January 2004–December 2008	51	5.1	0.5	8.7	8.1	960	–
San Joaquin Hatchery	January 2006–July 2008	28	1.6	0.5	6.6	6.4	65.4	–
Silverado Fisheries Base	No data	–	–	–	–	–	–	–

Source: ICF Jones &amp; Stokes, 2010

Notes:

Mg/L = milligrams per liter.

NTU = nephelometric turbidity unit.

µS/cm = microsiemens per centimeter. N/A = not applicable.

<sup>a</sup> Number of monitoring reports within the period of record; number of samples varies depending on monitoring frequency.<sup>b</sup> Net total suspended solids (TSS) calculated as hatchery discharge concentration minus hatchery source water concentration, with maximum value in the period of record displayed.<sup>c</sup> Net turbidity calculated as downstream (R2) minus upstream (R1) receiving water concentration, with maximum value in the period of record displayed.<sup>d</sup> Values shown as minimum pH at downstream (R2) site; if a sample exceeded one of the objectives (i.e., minimum <6.5 or maximum >8.5), the reported largest exceedance is displayed note these are not continuous levels between the monitoring reports.<sup>e</sup> Values shown as minimum downstream (R2) dissolved oxygen (DO) concentration; R2-R1 difference in parentheses for hatcheries with R2 <7.0 mg/L guidance value.<sup>f</sup> Maximum hatchery discharge concentration.<sup>g</sup> Lowest effluent limitation in NPDES permits for DFG hatcheries expressed as an average monthly effluent limitation (AMEL).<sup>h</sup> Screening value based on lowest applicable basin plan objective expressed as the allowable increase downstream of a discharge.<sup>i</sup> Basin plan objective.<sup>j</sup> Screening based on most restrictive basin plan dissolved oxygen (DO) objective for Cold Freshwater Habitat (COLD) designated use; data also reviewed for more restrictive objectives for applicable spawning (SPWN) beneficial uses and applicable seasonal conditions.<sup>k</sup> Agricultural goal used by Central Valley Regional Water Quality Control Board for interpretation of chemical narrative water quality objective; expressed as a long-term annual average in NPDES permits. Based on Water Quality for Agriculture, Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29 Rev. 1 (Ayers and Westcot 1985).<sup>l</sup> Hatchery total dissolved solids (TDS) not measured on a routine basis; maximum hatchery discharge concentration in two samples from November 2007 and May 2008.<sup>m</sup> Value measured at downstream receiving water (R2) site; no data available for the hatchery discharge.<sup>n</sup> Value measured in hatchery discharge only.<sup>o</sup> Value measured at downstream receiving water (R2) site only; effluent concentration not apparently contributing to reduction (i.e., higher concentration).<sup>p</sup> Value measured at downstream receiving water (R2) site; no data available for the upstream site.

### 3.5. Fish

Although fish would not be released into the San Joaquin River as part of this action, some of the proposed activities including collection of broodstock could potentially generate impacts to the existing fish populations in either the Sacramento River or San Joaquin River basins. Potential impacts to fish will be discussed in Section 4, Environmental Consequences. The section below discusses the existing fish populations.

#### 3.5.1 Spring-run Chinook

Spring-run Chinook is listed as a threatened species under the ESA. The Sacramento River Basin supports the remaining extant Central Valley spring-run Chinook populations. Sacramento River tributary watersheds that have runs include the Feather River, Yuba River, Deer Creek, Mill Creek, Butte Creek, Clear Creek and Battle Creek (SJRRP, 2010). While there is a wild river spawning population, a component of the Feather River spring-run Chinook population is spawned at the FRFH. Spring-run Chinook have been extirpated from the San Joaquin basin with occasional occurrences in the Stanislaus and Mokelumne Rivers. Spring-run Chinook have been extirpated from 14 watersheds throughout the Central Valley of California. The Recovery Plan calls for reintroduction of spring-run Chinook to some of the formerly occupied watersheds including some watersheds of the San Joaquin River Basin. The proposed collection of surplus eggs and juveniles from FRFH will refine methodologies for handling and propagating spring-run Chinook. The refinement of handling, propagating and transportation techniques could be an initial step in preparation for reintroduction of spring-run Chinook to other watersheds to further Recovery Plan Goals.

#### 3.5.2 San Joaquin River Reach 1-Fish

Fish assemblages currently found in the San Joaquin River are the result of substantial changes to the physical environment, combined with more than a century of nonnative species introductions. Areas where unique and highly endemic fish assemblages once occurred are now inhabited by assemblages composed primarily of introduced species.

Of the approximately 21 native fish species historically present in the San Joaquin River, at least 8 are now uncommon, rare, or extinct, and an entire fish assemblage – the deep bodied fish assemblage (e.g., Sacramento splittail, Sacramento blackfish) has been largely replaced by nonnative warm-water fish species (e.g., carp, catfish) (Moyle 2002). Warm-water fish assemblages, comprising many nonnative species such as black bass species and sunfish species, appear better adapted to current, disturbed habitat conditions (slightly higher gradient, cooler water temperatures, and higher water velocities) and seem to have restricted many other introduced species from colonizing sections of the river. Table 3-5 lists the occurrence of fish species within Reach 1.

Table 3-5 Native and non-native fish found in the San Joaquin River in Reach 1

Native Fish	rainbow trout, Sacramento sucker, threespine stickleback, lamprey species, sculpin species (rifle and prickly), and Sacramento pikeminnow hardhead tule perch
Non-Native	green sunfish, western mosquitofish, largemouth bass, redear sunfish, brown bullhead, black crappie, bluegill, channel catfish, common carp, goldfish, golden shiner, kokanee, spotted bass, striped bass

List Compiled from SJRRP Draft EIS/EIR 2011

### 3.6 Air Quality

#### 3.6.1 Air Basins and Attainment Status

This section provides a description of the air basins in which the Proposed Action are located and a summary table of the Attainment Status within each air basin. Description of individual pollutants and the regulatory setting are found in the SJRRP PEIS/EIR and are incorporated by reference.

The 10(a)(1)(A) application details the activities of collecting eggs and juveniles from the FRFH and includes pathogen and quarantine procedures for transporting eggs from the Feather River to another watershed. These procedures require holding at Silverado or at CABA. The final holding area for eggs or broodstock would be at the Interim/Conservation Hatchery Facility located on the San Joaquin River at Friant.

The FRFH and CABA are located within the Sacramento Valley Air Basin (SVAB). Silverado is in Napa County which is within the San Francisco Bay Area Air Basin (SFB). Lastly the Interim/Conservation Hatchery Facility is within the San Joaquin Valley Air Basin (SJVAB).

The SVAB consists of northern portion of the Central Valley of California. The SVAB contain all or part of 11 counties (Shasta, Tehama, Butte, Glenn, Colusa, Yuba, Sutter, Yolo, Placer, Sacramento, and eastern Solano). The basin is ringed by tall mountains with the Coast Range to the west, Cascade Range to the north, the Sierra Nevada to the east. Seasonally the winters in the SVAB are cool and wet with the summers being hot and dry. The SFB consists of the nine counties that surround the San Francisco Bay (Napa, western Solano, Contra Costa, Alameda, Santa Clara, San Mateo, San Francisco, Marin, and southern Sonoma). The San Francisco and San Pablo bays are surrounded by low hill and mountains of the Coast Range. While cooler than the SVAB the eastern portions of the basin can still be very warm in the summer months.

The Conservation Hatchery Facility is located in Fresno county, which is part of the SJVAB. The SJVAB also includes all of Madera, Merced, Kings, San Joaquin, Stanislaus, and Tulare counties and the valley portion of Kern County. The SJVAB occupies the southern half of the Central Valley. The SJVAB is a well-defined climatic region with distinct topographic features on three sides. The Coast Range is located on the western border of the SJVAB. The Tehachapi Mountains are located on the south side of the SJVAB. The Sierra Nevada Range forms the eastern border of the SJVAB. The northernmost portion of the SJVAB is San Joaquin County. No topographic feature delineates the northern edge of the basin. The SJVAB can be considered a “bowl” open only to the north and connected to the SVAB and SFB.

Like the SVAB the inland Mediterranean climate type of the SJVAB is characterized by hot, dry summers and cool, rainy winters.

Table 3-6 summarizes the Attainment Status Designations for the counties of the three air basins.

Table 3-6 Summary of Attainment Status Designations for the Sacramento, San Joaquin and San Francisco Bay Area Air Basins

Pollutant	Averaging Time	Attainment Status
Ozone	1-hour	Nonattainment- Severe: San Joaquin Valley  Moderate: Butte, Colusa, Yuba, Glenn, Tehama, and Shasta Counties  Serious: Napa, Yolo, Sacramento, Sutter Counties
	8-hour	–
Carbon Monoxide (CO)	1-hour	Attainment Kern, Tulare, Fresno, Stanislaus, San Joaquin, Sacramento, Napa, Yolo, Sutter, Butte Counties
	8-hour	Unclassified Madera, Merced, Yuba, Colusa, Glenn, Tehama, and Shasta Counties
Nitrogen Dioxide (NO <sub>2</sub> )	Annual Arithmetic Mean	-
	1-hour	Attainment
Sulfur Dioxide (SO <sub>2</sub> )	Annual Arithmetic Mean	-
	24-hour	Attainment
	3-hour	-
	1-hour	Attainment
Respirable Particulate Matter (PM <sub>10</sub> )	Annual Arithmetic Mean	Nonattainment
	24-hour	
Fine Particulate Matter (PM <sub>2.5</sub> )	Annual Arithmetic Mean	Nonattainment: San Joaquin Valley, Sacramento, Butte, and Napa Counties.  Attainment: Sutter, Yuba, Colusa, and Shasta Counties.  Unclassified: Yolo, Glenn, and Tehama Counties
	24-hour	-
Lead	30-day Average	Attainment
	Calendar Quarter	-
Sulfates	24-hour	Attainment
Hydrogen Sulfide	1-hour	Unclassified
Vinyl Chloride	24-hour	Unclassified/ Attainment
Visibility Reducing Particle Matter	8-hour	Unclassified

Sources: ARB 2012, (SJVAPCD 2008b; ARB 2008c, 2008d; EPA 2008c as cited in SJRRP PEIS/EIR (Reclamation, 2012))

### 3.6.2 Odors

In addition to the discussion of the SJVAB and its air quality, the air quality section of the PEIS/EIR also included a discussion regarding odors. That discussion is presented below.

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, headache).

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another. It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Potential existing sources of odor include various agricultural activities in the vicinity (e.g., dairy operations, livestock operations, fertilizer use). It should be noted that the PEIS/EIR does not identify the existing SJFH as being an odor source.

### 3.7 Climate Change and Greenhouse Gas Emissions

Chapter 7 of the SJRRP PEIS/EIR describes the environmental setting for climate change and greenhouse gas (GHG) emissions. The discussion of climate change and the potential impacts of the program alternatives on climate change encompasses the San Joaquin River from Friant Dam to the Merced River, the San Joaquin River from the Merced River to the Delta, and the Delta.

Scientific evidence suggests that many climatic conditions are already changing and will continue to change in the future. Therefore, expected future climate changes that have the potential to affect implementation and performance of the program were also considered in the PEIS/EIR. These included changes in snowpack and the timing and magnitude of snowmelt runoff and flood flows, which would in turn influence storage, and delivery. Furthermore, sea level rise could affect San Francisco Bay and

conditions in the Delta. However, the considerations in the PEIS/EIR were associated with future CVP/SWP operations.

The affected environment for climate change analysis is global, with State and local implications. The PEIS/EIR discussion provided a background overview of global climate change (which has been incorporated by reference), and climate trends and associated impacts at the global and State levels are then described, followed by an overview of GHG emissions sources in California and in SJVAB.

### **3.7.1 Global Climate Trends and Associated Impacts**

The rate of increase in global average surface temperature over the last hundred years has not been consistent; the last three decades have warmed at a much faster rate – on average 0.32°F per decade. Eleven of the 12 years from 1995 to 2006, rank among the warmest years in the instrumental record of global average surface temperature (going back to 1850) (IPCC 2007a).

During the same period over which this increased global warming has occurred, many other changes have occurred in other natural systems. Sea levels have risen on average 1.8 mm/year; precipitation patterns throughout the world have shifted, with some areas becoming wetter; while other areas become drier. Tropical cyclone activity in the North Atlantic has increased. Peak runoff timing of many glacial and snow-fed rivers has shifted earlier, as well as numerous other observed conditions. Though it is difficult to prove a definitive cause and effect relationship between global warming and other observed changes to natural systems, there is high confidence in the scientific community that these changes are a direct result of increased global temperatures (IPCC 2007a).

### **3.7.2 California Climate Trends and Associated Impacts**

Maximum (daytime) and minimum (nighttime) temperatures are increasing almost everywhere in California but at different rates. The annual minimum temperature averaged over all of California has increased 0.33°F per decade during the period 1920 to 2003, while the average annual maximum temperature has increased 0.1°F per decade (Moser et al. 2009 as cited in the SJRRP PEIS/EIR, Reclamation, 2012).

With respect to California's water resources, the most significant impacts of global warming have been changes to the water cycle and sea level rise. Over the past century, the precipitation mix between snow and rain has shifted in favor of more rainfall and less snow (Mote et al. 2005, Knowles 2006) and snow pack in the Sierra Nevada is melting earlier in the spring (Kapnick and Hall 2009). The average early spring snowpack in the Sierra Nevada has decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage (CDWR 2008). These changes have significant implications for water supply, flooding, aquatic ecosystems, energy generation, and recreation throughout the state. During the same period, sea levels along California's coast rose seven inches (CDWR 2008). Sea level rise associated with global warming will continue to threaten coastal lands and infrastructure, increase flooding at the mouths of rivers, place additional stress on levees in the Sacramento-San Joaquin Delta, and will intensify the difficulty of managing the Sacramento-San Joaquin Delta as the heart of the state's water supply system.

These trends in California's water supply could impact the SJRRP by further straining the scarce resources needed to implement appropriately-timed Restoration Flows, while balancing the need to irrigate cropland and supply drinking water to large numbers of Californians. Increased surface temperatures may affect stream quality for fish and their prey, changing the biological conditions under which the SJRRP operates. In addition, increased frequency and severity of flood events could negatively or positively impact fragile or restored areas such as gravel bars and riparian habitat by either breaking down gravel bars in one area and building up in another.

### **3.7.3 Greenhouse Gas Emissions Sources and Inventory**

Human activities contribute to climate in many ways, but primarily by causing changes in the atmospheric concentrations of GHGs and aerosols. The largest anthropogenic contribution to climate change is the burning of fossil fuels, which releases Carbon dioxide (CO<sub>2</sub>) and other GHGs to the atmosphere. Since the start of the industrial era (about 1750), the use of fossil fuels has increased through activities such as transportation, building heating and cooling, and the manufacture of cement and other goods. Land use changes, such as wide-scale deforestation, the use of fertilizers, and draining of wetlands also contribute to GHG emissions worldwide. The rate of increase in GHG concentrations has increased during the last century, with an increase of 70 percent between 1970 and 2004 alone (IPCC 2007a). During this period, the two largest sectors of GHG emissions were the energy supply (with an increase of over 145 percent) and transportation (with a growth of over 120 percent) sectors. The slowest growth during the 1970 to 2004 period was in the agricultural sector with 27 percent growth and the residential/commercial buildings sector at 26 percent (IPCC 2007b).

California is the 12th to 16th largest emitter of CO<sub>2</sub> in the world (CEC 2006). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (CEC 2006). California produced 484 million gross metric tons (mt) of CO<sub>2</sub> equivalent in 2004. Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2004, accounting for 35 percent of total GHG emissions in the State (CEC 2006). This sector was followed by the electric power sector (including both in-State and out-of-State sources) (22 percent) and the industrial sector (21 percent) (CEC 2006). No GHG emissions inventory has been conducted for the SJVAB at this time.



## **SECTION 4 ENVIRONMENTAL CONSEQUENCES**

The Proposed Action potentially can affect the physical or biological resources within the action area. The following is an analysis of the potential environmental consequences on the major components of the environment based on the current affected environment conditions described in Section 3 (Affected Environment), above, organized by the alternatives considered in Section 2 (Alternatives Including the Proposed Action). This analysis considers that the life of this permit requested is five years, and would allow collection of a limited number of eggs or juveniles. No spring-run Chinook will be released to the San Joaquin River until an experimental population designation is completed. The analysis of that designation will include evaluation of the environmental effects of a fully implemented spring-run Chinook reintroduction.

### **4.1 Hatchery Facilities: FRFH, Silverado, CABA and SJFH with Conservation Hatchery Facility**

#### **4.1.1 No Action Alternative.**

The FRFH, Silverado, CABA and SJFH with the Interim Facility are all existing facilities as discussed in Section 3. Under the No Action Alternative there would be no changes to the current operations of the FRFH, Silverado, or CABA. Within the San Joaquin River, the San Joaquin Fish Hatchery would continue operations with trout. The Interim Facility would be used to support existing hatchery operations or activities related to the re-establishment of fall-run Chinook under the SJRRP. It is unclear whether the Conservation Hatchery Facility would not be built or operated because it could have importance for the reintroduction for fall-run Chinook under the SJRRP. Therefore, there would be no change to either the Feather River or the San Joaquin Fish Hatchery operations or the environment.

#### **4.1.2 Proposed Action**

The Proposed Action would mean that there would be some operational changes regarding the handling of eggs or juveniles at each of the facilities including the possible use as back-up facilities with options for holding fish for periods of time up to several months. While the holding of fish at Silverado and CABA are alternative locations, the holding of fish would not require any physical changes to these facilities. Therefore no impacts are anticipated to occur at these facilities. The Conservation Hatchery Facility is to be funded and constructed by the State of California and will require its own environmental analysis. Potential cumulative impacts from construction and operation of the Conservation Hatchery Facility are discussed in Section 5, Cumulative Impacts.

### **4.2 Water Quality**

#### **4.2.1 No Action Alternative.**

Under the No Action Alternative there would be no changes to the current operations of the FRFH or the SJFH. Therefore there would be no change to water quality of either the Feather River or the San Joaquin River.

#### 4.2.2 Proposed Action

Under the proposed action the FRFH operations would not change and would remain subject to its current discharge permit. Therefore the proposed collection of surplus eggs from the FRFH would not affect the water quality of the Feather River.

Similarly, the operations would not change at the existing Silverado Base or CABA as a result of the proposed Action, so that there would be no change in their permitted discharge. No impacts to water quality from the operations of the Silverado Base and CABA are anticipated.

With the exception of occasional low dissolved oxygen levels in the discharge from the SJFH, there are no water quality issues along Reach 1 of the San Joaquin River where the Interim Facility is located and the subsequent Conservation Hatchery Facility will be located. As discussed in the 2010 Hatchery and Stocking Program EIR/EIS (Hatchery EIR/EIS) prepared for all of CDFG's hatchery operations, the discharge of lowest DO level detected of 6.4 mg/L is not optimal for coldwater fish conditions, but is not a significant impact (ICF Jones & Stokes. 2010). The analyses of the Hatchery EIR/EIS are incorporated by reference into this document under CEQ NEPA Regulations 40 CFR 1502.21. Operations of the subsequent Conservation Hatchery Facility would require discharge permits that require monitoring and reporting to assure that discharged water would not impact water quality of the San Joaquin River. The discharge permit conditions established for the hatchery activities would require that discharges from either facility will not adversely affect ambient water quality including discharges effecting DO levels. Any variance in the discharge from those levels established by the permit would have to be addressed by the hatcheries and confirmed by RWQCB. Therefore, under the proposed action the operation of the facilities would not have a significant effect on water quality.

### 4.3 Fish

#### 4.3.1 No Action Alternative

Under the No Action Alternative, no eggs or juvenile spring-run Chinook would be collected. However, the improvement projects of the SJRRP would be carried out; therefore, existing barriers to salmon migration would be removed as part of the SJRRP. While it is expected that under improved conditions, spring-run Chinook would find their way into the San Joaquin River, it is likely that there would be no large scale change from the existing fish populations, based on comparison of fish assemblages in the Merced, Tuolumne, and Stanislaus rivers (SJRRP PEIS/EIR, 2012).

#### 4.3.2 Proposed Action

The potential impacts from the issuance of the permit to fish populations in the Feather River are discussed in detail below.

##### 4.3.2.1 Feather River Effects

As proposed, the 10(a)(1)(A) permit will allow the annual collection of up to 2,760 (560 in years 1-3, and 2,760 in years 4-5) surplus eggs for the development of broodstock methods and transportation studies. The eggs and juveniles are surplus and would not have otherwise been cultured and placed into the Feather River. As such there is no reduction in the number of hatchery spawned fish entering the Feather River so there would be no impact to the spring-run Chinook population on the Feather River, nor to the

ESU. The proposed action could also have a beneficial impact to the species by increasing the understanding of handling, transport and broodstock culture methods. The refinement of handling, propagating and transportation techniques could be an initial step in preparation for reintroduction of spring-run Chinook to other watersheds to further Recovery Plan goals.

#### **4.3.2.2 San Joaquin River Effects**

Under this action fish would not be released into the San Joaquin River; however, some of the proposed activities could potentially generate impacts to the river and the existing fish populations. Potential impacts include changes to water quality from discharges to the river from the hatchery or from possible exposure to disease. The potential impact to the San Joaquin River from the accidental release of fish from the Interim facility resulting from flooding is considered unlikely. Such an event is rare and the HGMP includes a containment and evacuation plan that reduces the potential impact further to a discountable level.

As discussed in Section 4.2.2, with the exception of occasional low dissolved oxygen levels there are no existing water quality issues associated with operations of the SJFH or the Interim Facility and any future use of these facilities for holding eggs or broodstock would not alter the operations as to the discharge of water. Analysis presented in Chapter 4 of the Hatchery EIR/EIS showed that discharges from CDFG hatcheries into waters of the state cause a less-than-significant impact on DO levels. DO changes were evaluated against the most stringent basin plans, which contain specific numeric water quality objectives for the protection of aquatic life. The Hatchery EIR/EIS identified four times when low DO level was detected (i.e., 6.4 mg/L instead of 7.0 mg/L) at the SJFH. The findings of the Hatchery EIR/EIS were that these levels, while not considered optimal for cold water fish, were not lethal to the aquatic communities. In addition the levels of low DO were of short duration, so the potential impact is less than significant. Given the small number of fish that would be held, the potential for an increase in the amount of waste materials being discharged is considered minimal (ICF Jones & Stokes. 2010).

Furthermore the Hatchery EIR/EIS goes on to state that discharges at the level found at SJFH would not represent significant impacts with regard to suspended solids, pH or Aquaculture Chemicals and Drugs (ICF Jones & Stokes. 2010). Over the five years of the permit up to 7,080 fish could be held as broodstock. This number comes from having 560 fish collected each year during the first three years (1680 fish) and 2700 fish collected in each of the remaining two years (5,400 fish). The maximum number of broodstock held, assuming no mortality, would be 7,080 fish. This is a very small number of fish, in comparison to the 750,000 fish cultured annually at SJFH (CDFG, 2012). The addition of this broodstock would not represent an increase in the amount of waste being discharged that would be detectable. Thus, it is anticipated that the proposed action would cause no impacts resulting from discharges from the SJFH or Interim Facility. It is reasonable to expect that the Conservation Hatchery Facility would be required to operate to similar standards. The specific analysis for the Conservation Hatchery Facility will be done by CDFG. The Proposed Action would not have any significant impacts to water quality that would impact fish populations.

Since eggs will be collected from outside of the San Joaquin River basin there is the potential for eggs or hatched juveniles being sent to the Interim Facility or the Conservation Hatchery Facility to increase the potential for disease transmission. However, the proposed action includes methodologies for collection and quarantining any eggs and fish prior to locating the eggs or fish to the San Joaquin facilities. In addition, standard operational practices of the hatchery would reduce the possibility of the eggs or

hatched juveniles becoming diseased at the San Joaquin facilities. Therefore, the potential effects related to the introduction of disease to the existing populations will not be significant.

Populations with low genetic diversity are generally at a higher risk of extinction. The Permit includes methodology to enhance the genetic diversity of the hatchery crosses collected and to ensure that the crosses are from adults who are phenotypic spring-run Chinook. As part of the Permit the Proposed Action includes a HGMP to monitor the genetics of the successful stocks to document founding individuals. The plan is to establish a Conservation Facility broodstock using the preferred method of selecting for genetic diversity. Both the NMFS and USFWS would not be interested in establishing a broodstock that doesn't maximize genetic diversity. The preferred method for collections is taking crosses from adults who are second generation phenotypic spring-run Chinook. If the preferred method of collection targeting genetic diversity is not attainable, then alternative collecting will be done that best gathers a genetically diverse set of individuals. Random selection as proposed in the application is the next best available method for collections.

Even if the 10(j) and 4(d) rules were delayed or not approved, the Conservation Hatchery Facility could maintain the broodstock up to five years. If it were decided that the 10(j) rule would not be established, any collected fish could be retained at the Conservation Hatchery to live out their lives. Although not in the 10(a)(1)(A) HGMP, these fish could be spawned to produce another generation for use in additional testing, or die naturally un-spawned. If these fish are large enough, they would be donated for appropriate uses (e.g. Native American ceremonial use). Since these fish were collected as excess production, their loss would not have any impact on the existing spring-run Chinook population.

#### **4.4 Air Quality**

##### **4.4.1 No Action Alternative**

Under the No Action Alternative, spring-run Chinook donor stock would not be collected. Therefore under the No Action Alternative there would be no air emissions from vehicles used in collecting and transporting eggs. There would be no impacts to air quality under the No Action Alternative.

##### **4.4.2 Proposed Action**

Since existing facilities would be used until the Conservation Hatchery Facility is built by the State of California, and for which a separate environmental analysis would be done, there would be no new operational emissions associated with the 10(a)(1)(A) permit. The proposed action would generate air emissions from vehicles used to collect and transport the fish (or eggs) to a holding area. However, given that there would be only a small number of trips (e.g. less than 25 trips per year) that would be generated to collect and transport the collected fish or eggs, the resulting emissions would have no significant impacts to air quality.

While the SJRRP PEIS/EIR discusses potential odors associated with construction of river restoration projects, the potential of significant odor impacts associated with the construction and operation of the Conservation Hatchery Facility related to the hatchery was too speculative for meaningful consideration. Any impacts of constructing a new hatchery or expanding an existing hatchery would need to be addressed during environmental review of the proposed hatchery. It should be noted that the current hatchery is not identified as being a source for odors and it is likely that future analysis for the proposed

Conservation Hatchery Facility would likely determine that with proper maintenance or operation odors would not be significant.

## 4.5 Climate Change

### 4.5.1 No Action Alternative

Under the No Action Alternative there would be no collection of eggs that would be transported to the San Joaquin River facilities for propagation. Therefore, there would be no additional emissions beyond those already associated with the operations of the FRFH, Silverado Base, CABA and the Interim Facility on the San Joaquin River.

### 4.5.2 Proposed Action

On September 22, 2009, EPA released its final Greenhouse Gas Reporting Rule (Reporting Rule). The Reporting Rule is a response to the fiscal year (FY) 2008 Consolidated Appropriations Act (House of Representatives 2764; Public Law 110-161), that required EPA to develop "... mandatory reporting of GHGs above appropriate thresholds in all sectors of the economy...." The Reporting Rule would apply to most entities (such as a manufacturing plant, a power plant, or trucking operation) that emit 25,000 mtCO<sub>2</sub>e or more per year. Starting in 2010, facility owners are required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. The Reporting Rule would also mandate recordkeeping and administrative requirements in order for EPA to verify annual GHG emissions reports. If the proposed action of collecting and transporting eggs and juveniles are considered and "entity" then, as shown in Table 4-1, the amount of CO<sub>2</sub> generated by the transportation of fish over the five-year term of the permit would be approximately 2/10<sup>th</sup> of one percent of the yearly reporting level of 25,000 mtCO<sub>2</sub>e. Even adding the CO<sub>2</sub> emitted by electrical generation used in the operations of the hatcheries would not bring the amount of greenhouse gas emitted near the yearly threshold. Since the emissions of GHGs for the Proposed Action would be substantially lower than the 25,000 mtCO<sub>2</sub>e threshold, the impacts to Climate Change from GHG emissions of the Proposed Action would be less than significant.

Table 4-1 Calculated CO<sub>2</sub> emissions for transportation of fish between various locations

Trip	mtCO <sub>2</sub> e per trip	Number of trips per year	Total mtCO <sub>2</sub> e per year	Total mtCO <sub>2</sub> e for 5 years
FRFH to Silverado	0.178	22	3.934	19.668
Silverado to SJFH	0.271	22	5.972	29.861
FRFH to SJFH	0.311	3	0.932	4.659
Total	0.760	25	10.838	54.189
Percentage of 25,000 mtCO <sub>2</sub> e threshold			0.04%	0.22%

Calculation based on the following:

Mileage (determined by Google Maps): FRFH to Silverado Fisheries Base = 137 miles:

Silverado Fisheries Base to SJFH = 208 miles

FRFH to SJFH = 238 miles

CO<sub>2</sub> emissions 10180 grams per gallon of diesel fuel (source EPA 2011)

Fuel usage mile/gallon: 7.8 (personal com. Scott Hamelberg, Coleman National Fish Hatchery Complex, 2012)

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## Section 5 Cumulative Impacts

NEPA defines cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7). For the most part, the potential Cumulative Impacts of the Proposed Action of itself would be negligible on spring-run Chinook or on the other resources discussed in this document. However, there are current and reasonably foreseeable future actions whose future cumulative impacts require discussion.

As discussed in Section 1, the Settlement established Restoration and Water Management goals. As partial fulfillment of these goals, a number of projects are proposed that will make physical changes to the San Joaquin River that will be part of the restoration of the San Joaquin River. These projects and their potential impacts were analyzed in the SJRRP PEIS/EIR. Potential Cumulative Impacts were identified for the SJRRP in the PEIS/EIR and they are included here by reference. There is one specific impact discussion that is reproduced herein. That discussion is the analysis of Climate Change and the possible impacts of Climate Change on the fish population of the Proposed Action.

Climate change is predicted to bring profound changes to California’s natural environment. Hayhoe et al. (2004) describe the results of four climate change models: compared with 1960–1991, by 2070–2099 statewide average annual temperatures will be 2.3°C–5.8°C higher, average annual precipitation will be reduced by >100 millimeters, sea level will have risen 19.2–40.9 centimeters, snowpack will have declined by 29%–89%, and change in annual inflow to reservoirs will decline by >20%. (One model predicted slight increases in precipitation, snowpack, and reservoir inflow.)

Changes in vegetation are also predicted (e.g., substantial decreases in the extent of alpine/subalpine forest, evergreen conifer forest, mixed evergreen woodland, and shrubland; and increases in mixed evergreen forest and grassland ([Hayhoe et al. 2004] as cited in EIS/EIR). Climate change is likely to cumulatively affect native fishes and amphibians by increasing water temperatures (hence reducing dissolved oxygen), reducing stream flows, and increasing the likelihood of drought-related fires. A rise in sea level would lead to increasing rates of erosion, sedimentation, flooding, and inundation of low-lying coastal ecosystems. With reductions in snowmelt runoff, peak flows may come earlier as rainfall contributes more, which could affect species such as Central Valley spring-run Chinook that have evolved their life history based on predictable runoff patterns (Williams 2006). Increasing temperatures may increase metabolic needs of fish predators and increase predation (Lindley et al. 2007). Moyle et al. (2008) qualitatively assessed the potential for climate-related impacts on California’s native salmonids (Table 5-1). Their analysis indicated that the majority of taxa (18 of 29, 62%) were vulnerable in all or most of the watersheds inhabited; no taxon was invulnerable to climate change.

1 Table 5-1. Qualitative Assessment of California Salmonids' Vulnerability to Climate Change

Vulnerability	Taxon
Vulnerable in all watersheds inhabited	Klamath Mountains Province summer steelhead <sup>SSC</sup> ; northern California coastal summer steelhead <sup>FT, SSC</sup> ; central California coast steelhead <sup>FT</sup> ; south-central California coast steelhead <sup>FT, SSC</sup> ; southern steelhead <sup>FE, SSC</sup> ; upper Klamath–Trinity Rivers spring-run Chinook salmon <sup>SSC</sup> ; Central Valley late fall–run Chinook salmon <sup>SC, SSC</sup> ; Sacramento winter-run Chinook salmon <sup>FE, SE</sup> ; Central Valley spring-run Chinook salmon <sup>FT, ST</sup> ; southern Oregon– northern California coastal Coho salmon <sup>FT, ST</sup> ; central California coast Coho salmon <sup>FE, SE</sup> ; McCloud River redband trout <sup>SSC</sup> ; Eagle Lake rainbow trout <sup>SSC</sup> ; Lahontan cutthroat trout <sup>FT</sup>
Vulnerable in most watersheds inhabited (possible refuges present)	Central Valley steelhead <sup>FT</sup> ; upper Klamath–Trinity Rivers fall-run Chinook salmon; California coast Chinook salmon <sup>FT</sup> ; Goose Lake redband trout <sup>SC</sup> ; coastal cutthroat trout <sup>SSC</sup>
Vulnerable in portions of watershed inhabited (e.g., headwaters and lowermost reaches of coastal streams)	Northern California coastal winter steelhead <sup>FT</sup> ; Central Valley fall-run Chinook salmon <sup>SC</sup> ; California golden trout <sup>SC, SSC</sup> ; Little Kern golden trout <sup>FT</sup> ; Kern River rainbow trout <sup>SC, SSC</sup> ; Paiute cutthroat trout <sup>FT</sup> ; mountain whitefish
Low vulnerability due to location, cold water sources, or active management	Klamath Mountains Province winter steelhead; resident coastal rainbow trout; southern Oregon–northern California coastal Chinook salmon
Not vulnerable to significant population loss due to climate change	None
<b>Notes:</b> <sup>FE</sup> = endangered (federal). <sup>FT</sup> = threatened (federal). <sup>SE</sup> = endangered (state). <sup>ST</sup> = threatened (state). <sup>SC</sup> = species of concern (federal). <sup>SSC</sup> = species of special concern (state). Source: Moyle et al. 2008.	

2 The PEIS/EIR takes a programmatic approach to the discussion of impacts. The PEIS/EIR does not  
3 specifically analyze the potential impacts of specific actions such as the issuance of the 10(a)(1)(A)  
4 permit. Incremental impacts on the environment are included in the resource analyses in Section 4,  
5 Environmental Consequences.



The potential cumulative effects from the issuance of the 10(a)(1)(A) permit would be as follows. As a result of future activities associated with the reintroduction effort it is anticipated that additional vehicle trips (on the order of 100 trips per year) will be required to gather donor stock and transport eggs and hatched fish to various locations. Additional vehicle trips will result in additional emissions. Likewise the holding of broodstock at the Interim Facility and later at the Conservation Hatchery Facility could increase the amount of waste products being discharged into the San Joaquin River. However, it is anticipated that these increased emissions and discharges would be minimal and it is anticipated that impacts to water quality or air quality, would be cumulatively not significant.

The designation of an experimental population pursuant to Section 10(j) is considered a likely event. Cumulatively, with the establishment of the experimental population, the fish collected under the 10(a)(1)(A) permit may be used beyond studying propagation and handling methods. In the unlikely event that an experimental population is not designated for the San Joaquin River within the five year life of the permit, the fish collected and maintained under this permit could be allowed to naturally die out or be harvested for charitable purposes. Alternatively, an additional 10(a)(1)(A) permit may be requested in order to continue studies on these fish. Furthermore, as part of the analysis of the 10(j) rule, consideration should be given to the potential founders effects (e.g. loss of genetic variation that occurs when a new population is established by a very small number of individuals from a larger population) of using FRFH fish.

The 10(a)(1)(A) permit has a condition that before any release occurs under the permit, an experimental population, as defined under section 10(j) of the ESA must be completed. This condition is directly from the Settlement Act that mandates that spring-run Chinook “shall be reintroduced in the San Joaquin River below Friant Dam pursuant to section 10(j) of the ESA of 1973 (16 U.S.C. 1539(j)) and the Settlement, provided that the Secretary of Commerce finds that a permit for the reintroduction of California Central Valley Spring Run Chinook salmon may be issued pursuant to section 10(a)(1)(A) of the Endangered Species Act of 1973 (16 U.S.C. 1539(a)(1)(A))” (PL 111-11 section 10011 (b)). While this permit is intended to facilitate the reintroduction process, it is a small step, with minimal impact because of the low numbers and surplus fish being used. The actions will provide important information on methods for transporting and culturing spring-run Chinook in other watersheds. Re-introduction of spring-run Chinook to habitats historically occupied by spring-run Chinook is a key element of the spring-run Chinook ESA recovery strategy. The outcomes from practices to be used under this 10(a)(1)(A) permit may benefit reintroduction efforts for spring-run in the San Joaquin River or other former spring-run Chinook habitat. Although the Proposed Action would not reintroduce spring-run Chinook, the cumulative effect of reintroduction of spring-run Chinook to the San Joaquin River could be beneficial given the vulnerability of the existing populations of spring-run Chinook. In addition to the benefit of a new population, a population on the San Joaquin River may be protected from climate change impacts because the waters of the San Joaquin River start at higher elevations. It is therefore possible that even with reduced snow pack the waters generated would be cooler for longer periods than the existing spring-run Chinook bearing streams in the Sacramento River Basin. Recovery of the species is necessary for delisting under the ESA. Delisting of species ensures that the species is likely to continue to exist for human uses, including aesthetic, ceremonial, and, as appropriate, consumptive uses. This is a beneficial impact to the human environment

The establishment of the experimental population and other SJRRP projects would work in concert with other ongoing recovery and reintroduction efforts for spring-run Chinook. Additional populations of spring-run Chinook would enhance NMFS’ flexibility and discretion in managing listed Central Valley

1 salmon. Monitoring and adaptive management will help ensure that the experimental population of  
2 spring-run Chinook is adequately protected and supported by restoration actions implemented through the  
3 SJRRP.

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## Section 6 References

- Bureau of Reclamation, California Department of Water Resources. (SJRRP/ Draft PEIS/EIR) 2011. Draft San Joaquin River Restoration Program Environmental Impact Statement/Environmental Impact Report.
- Bureau of Reclamation, California Department of Water Resources. (SJRRP/ Final PEIS/EIR) 2012. Final San Joaquin River Restoration Program Environmental Impact Statement/Environmental Impact Report. July 21012.
- California Air Resources Board (ARB) 2008c. Community Health Air Pollution Information System. Available: [http://www.arb.ca.gov/gismo/chapis\\_v01\\_6\\_1\\_04/](http://www.arb.ca.gov/gismo/chapis_v01_6_1_04/). Accessed March 2008. Cited in Draft PEIS/EIR.
- California Air Resources Board (ARB). 2008d. State Implementation Plan. Available: <http://www.arb.ca.gov/planning/sip/sip.htm>. Accessed March 2008. Cited in Draft PEIS/EIR
- California Department of Fish and Game (CDFG). 2009. Grandtab Chinook Census Database compiled by Jason Azat February 18, 2009. Available at <http://nrm.dfg.ca.gov/documents/>. Cited in Stock Selection Strategy.
- California Department of Fish and Game (CDFG). 2012. About the San Joaquin Hatchery Facility. DCFG website: <http://www.dfg.ca.gov/fish/hatcheries/SanJoaquin/Facility.asp> . Viewed September 20, 2012
- California Department of Water Resources (CDWR). 2011. Hatchery and Genetic Management Plan for Feather River Fish Hatchery Spring-run Chinook Salmon. Prepared for NOAA National Marine Fisheries Services. December 2011. In Review.
- California Department of Water Resources (CDWR). 2006. Settlement Agreement for Licensing of the Oroville Facilities. FERC Project No. 21 00
- California Department of Water Resources (CDWR). 2004. SPW1 Project Effects on Water Quality Designated Beneficial Uses for Surface Waters Oroville Facilities P-2100 Relicensing
- Center for Aquatic Biology and Aquaculture. Home page. <http://caba.ucdavis.edu>, and Facilities pages <http://caba.ucdavis.edu/facilities>. Visited on August 6, 2012.
- Federal Energy Regulatory Commission (FERC). 2007. FERC Project 2100, May 2007 Draft Environmental Impact Report Oroville Facilities Relicensing—FERC Project No. 2100. Cited in Draft PEIS/EIR
- Federal Register / Vol. 64, No. 179 / Thursday, September 16, 1999 / Endangered and Threatened Species; Threatened Status for Two Chinook Salmon Evolutionarily Significant Units (ESUs) in California. Final Rule.

- 1 Federal Register /Vol. 76, No. 157 /Monday, August 15, 2011 / Endangered and Threatened Species;  
2 5-Year Reviews for 5 Evolutionarily Significant Units of Pacific Salmon and 1 Distinct Population  
3 Segment of Steelhead in California. Pages 50447-50448.
- 4 Federal Register Vol. 77 April 19, 2012 / Notices. Endangered and Threatened Species: Take of  
5 Anadromous Fish. Notice of availability. Page 23463
- 6 Hamelberg, Scott. 2012. Coleman National Fish Hatchery Complex, 2012. personal communication.
- 7 Hayhoe et al. 2004. Emissions Pathways, Climate Change, and Impacts on California. *Proceedings of the*  
8 *National Academy of Sciences of the United States of America* , Vol. 101, No. 34 (Aug. 24, 2004), pp.  
9 12422-12427 Cited in Draft PEIS/EIR
- 10 ICF Jones & Stokes. 2010. Hatchery and Stocking Program Environmental Impact Report/Environmental  
11 Impact Statement. Final. January. (ICF J&S 00264.08) (SCH #2008082025). Sacramento, CA.
- 12 Intergovernmental Panel on Climate Change (IPCC). 2007a. Climate Change 2007. The physical Science  
13 Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Geneva.  
14 Switzerland. Cited in Draft PEIS/R
- 15 Intergovernmental Panel on Climate Change (IPCC). 2007b. Climate Change 2007. Synthesis Report.  
16 Contributions of Working Groups I, II, III to the Fourth Assessment Report of the Intergovernmental  
17 Panel on Climate Change, Geneva, Switzerland. Cited in Draft PEIS/EIR
- 18 Lindley, S.T., R.S. Schick, E. Mora, P.B. Adams, J.J. Anderson, S. Grene, C. Hanson, B.P. May, D.  
19 McEwan, R.B. MacFarlane, C. Swanson, and J.G. Williams. 2007. Framework for Assessing Viability of  
20 Threatened and Endangered Chinook Salmon and Steelhead in The Sacramento-San Joaquin Basin. San  
21 Francisco Estuary and Watershed Science 5(1): article 4. February. Cited in Draft PEIS/EIR
- 22 Moser, Susan, et al. 2009. The Future is Now: An Update on Climate Change Science, Impact, and  
23 Response Options for California. Prepared for the California Energy Commission, PIER. CEC-500-2008-  
24 071. Cited in Draft PEIS/EIR
- 25 Moyle, P.B. 2002. Inland Fishes of California. University of California Press, Berkeley. 502 pp. Cited in  
26 Fisheries Management Plan and Draft PEIS/EIR.
- 27 Moyle, P.B., J.A. Israel, and S.E. Purdy. 2008. Salmon, steelhead, and trout in California. Status of an  
28 emblematic fauna, a report commissioned by the California Trout. Center for watershed sciences. 316pp  
29 Cited in Stock Selection Strategy.
- 30 National Marine Fisheries Service. Endangered and Threatened Species: Final Listing Determinations for  
31 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs  
32 (Final Rule). Federal Register 70:123 (June 28, 2005) p. 37160

- 1 National Marine Fisheries Service (NMFS). 2009a. Draft Central Valley Recovery Plan for the  
2 Evolutionarily Significant Units of Sacramento River Winter-run Chinook salmon and Central Valley  
3 Spring-run Chinook salmon, and the Distinct Population Segment of California Central Valley Steelhead.  
4 Sacramento Protected Resources Division. October 2009.
- 5 National Marine Fisheries Service (NMFS). 2009b. National Marine Fisheries Service. Public Draft  
6 Central Valley Recovery Plan. Appendix A: Watershed Profiles.
- 7 Central Valley Regional Water Quality Control Board (RWQCB). Enforcement actions. Results of web  
8 search. <http://www.swrcb.ca.gov/centralvalley/ssi/serp.shtml?q=Enforcement+of+hatchery+discharge>.  
9 visited on July 24, 2012.
- 10 Reynolds FL, Mills TJ, Benthin R, Low A. 1993. Restoring Central Valley streams; a plan for action.  
11 Sacramento (CA): California Department of Fish and Game. 129 p Cited in Stock Selection Strategy
- 12 San Joaquin River Restoration Program (SJRRP, FMP), Fisheries Management Work Group (FMWG).  
13 March 2010. Fisheries Management Plan.
- 14 San Joaquin River Restoration Program (SJRRP), Genetics Subgroup of the Fisheries Management Work  
15 Group (FMWG). November 2010. Stock Selection Strategy: Draft Spring-run Chinook salmon.
- 16 San Joaquin Valley Air Pollution Control District (SJVAPCD). 2008b. Ambient Air Quality Standards &  
17 Valley Attainment Status. Available: <http://www.valleyair.org/aqinfo/attainment.htm>. Accessed February  
18 2008. Cited in Draft PEIS/EIR
- 19 U.S. Environmental Protection Agency (EPA). 2008b. Air Data. Available: <http://www.epa.gov/air/data/>.  
20 Accessed March, 12 2008. Cited in Draft PEIS/EIR
- 21 U.S. Environmental Protection Agency (EPA). 2011. Greenhouse Gas Emissions from a Typical  
22 Passenger Vehicle. Office of Transportation and Air Quality EPA-420-F-11-041 December 2011.
- 23 U.S. Fish and Wildlife Service (USFWS). 2011. Final §10(a)(1)(A), Enhancement of Species Permit  
24 Application for the Reintroduction of Central Valley Spring-Run Chinook into the San Joaquin River.
- 25 Williams, J.G. 2006. Central Valley salmon, a perspective on the Chinook and Steelhead in the Central  
26 Valley of California. San Francisco Estuary & Watershed Science 4(3): article 2. December 2006. Cited  
27 in Draft PEIS/EIR
- 28 Yoshiyama, R. M., Gerstung, E. R., Fisher, F. W., and Moyle, P. B. 2001 Historical and Present  
29 Distribution of Chinook Salmon in the Central Valley Drainage of California in Fish Bulletin 179 -  
30 Contributions to the Biology of Central Valley Salmonids, Volume 1 of 2.

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1   Appendix 1   §10(a)(1)(A), Enhancement of the Species Permit Application for the Reintroduction of  
2                   Central Valley Spring-Run Chinook into the San Joaquin River and Genetics  
3                   Management Plan

4

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FINAL  
§10(a)1(A), ENHANCEMENT OF SPECIES  
PERMIT APPLICATION  
for the  
Reintroduction of Central Valley  
Spring-Run Chinook into the San Joaquin River



Submitted by the U.S. Fish and Wildlife Service

In Cooperation with:  
National Marine Fisheries Service  
U.S. Bureau of Reclamation  
California Department of Fish and Game



December 2011

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## 1. APPLICATION PURPOSE

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This §10(a)1(A), *Enhancement of Species Permit Application for the Re-Introduction of Central Valley Spring-Run Chinook into the San Joaquin River* (application) proposes specific criteria, guidelines, and measures that the U.S. Fish and Wildlife Service (Service), and their sub-grantees will follow during the implementation of the proposed action.

Due to capacity restrictions of the on-line component of the application process (through the National Marine Fisheries Service's [NMFS] Authorization and Permits for Protected Species site) this application should be considered the Service's full application and the information included on the on-line site as summarized sections.

## 2. USE OF THE DOCUMENT

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This document is intended to be used within the interagency process as set in the Program Management Plan (PMP). This document provides the overall framework underlying the implementation process to be facilitated through the Implementing Agencies and via the San Joaquin River Restoration Program (SJRRP). Additionally, this document is intended to be used in its entirety; meaning that the individual sections and appendices are not intended to stand alone. Using the document as a whole, rather than in part, provides the reader with the appropriate perspective in which to assess this application. We anticipate further technical discussion and refinement of specific components presented within this application—both through the upcoming National Environmental Policy Act (NEPA) process NMFS is undertaking for the reintroduction action, and through an annual adaptive process for program collection and reporting activities.

### 2.1 Consultation History

September 29, 2010, the Service submitted a §10(a)1(A), *Enhancement of Species Permit Application for the Re-Introduction of Central Valley Spring-Run Chinook into the San Joaquin River* to NMFS.

November 17, 2010, the Service received a 30-day Response letter from NMFS requesting additional clarification on two points of the application.

January 20, 2011, the Service sent NMFS a letter to clarify the Donor Stock Collection decision process and the finalized Hatchery and Genetic Management Plan (HGMP).

February 2011, NMFS released the §10(a)1(A) permit application for public comment from February 4 through March 7, 2001 and held public workshops in Chico, Fresno and Los Banos for the §10(a)1(A) permit application and the reintroduction process.

May 28, 2011, the Service received a letter from NMFS asking that we address the 113 public comments and the 4 NMFS comments that resulted from the public scoping period. This Revised Application addresses both the public comments and Implementing Agency discussions that have occurred since the original permit application was submitted on September 29, 2010.

November 4, 2011, the Service submits the *Revised §10(a)1(A), Enhancement of Species Permit Application for the Re-Introduction of Central Valley Spring-Run Chinook into the San Joaquin River* to NMFS.

December 2011, the Service revised the November 4, 2011, *§10(a)1(A), Enhancement of Species Permit Application for the Re-Introduction of Central Valley Spring-Run Chinook into the San Joaquin River* to NMFS to reflect changes in collection methods and donor sources.

### 3. INTRODUCTION

---

#### 3.1 San Joaquin River Restoration Settlement

The SJRRP was formed to execute a legal settlement from the lawsuit, NRDC et al. v. Kirk Rodgers et al. In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and California's Central Valley Project Friant Division contractors. After years of litigation, the Settling Parties reached a Stipulation of Settlement Agreement (Settlement). The Settling Parties, including NRDC, Friant Water Users Authority, and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement, which was subsequently approved on October 23, 2006. The Settlement established two primary goals:

- Restoration Goal – To restore and maintain fish populations in “good condition” in the mainstem San Joaquin River downstream of Friant Dam to the confluence with the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.
- Water Management Goal – To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for a combination of channel and structural modifications along the San Joaquin River downstream of Friant Dam, releases of water from Friant Dam to the confluence of the Merced River, and the reintroduction of Chinook salmon (Chinook),

1 *Oncorhynchus tshawytscha*. In response to the Settlement, the implementing agencies, consisting of  
2 the Service, Bureau of Reclamation (Reclamation), NMFS, California Department of Fish and Game  
3 (CDFG), and California Department of Water Resources (DWR) organized a Program Management  
4 Team (PMT) and associated Technical Work Groups to begin work implementing the Settlement.  
5 For additional information related to the Implementing Agency approach, the reader is referred to  
6 the PMP, available on the SJRRP Website at [www.restoresjr.net](http://www.restoresjr.net).  
7

8 The Settlement specified the roles and responsibilities for a Restoration Administrator (RA) who is  
9 supported by a Technical Advisory Committee. The SJRRP management structure integrates these  
10 resources to obtain timely input on technical issues related to the Restoration Goal.  
11

12 Paragraph 14 of the Settlement indicates that the Restoration Goal shall include the reintroduction of  
13 spring-run and fall-run Chinook to the San Joaquin River between Friant Dam and the confluence of  
14 the Merced River. In addition, Paragraph 14 of the Settlement requires the Service to submit an  
15 Endangered Species Act (ESA) §10(a)1(A) permit application to the NMFS for the reintroduction of  
16 spring-run Chinook. The San Joaquin River Restoration Settlement Act (SJRRS Act; Public Law  
17 (PL) 111-11) indicates that spring-run Chinook shall be reintroduced into the San Joaquin River  
18 pursuant to §10(j) of the ESA, provided that the Secretary of Commerce “finds that a permit for the  
19 reintroduction of California Central Valley spring-run Chinook may be issued pursuant to  
20 §10(a)1(A) of the Endangered Species Act.” This document fulfills the Paragraph 14 Settlement  
21 requirement that the Service submit a §10(a)1(A) enhancement of species permit application.  
22  
23

## 24 3.2 Project Overview

25  
26 The overall objective of the proposed action (Reintroduction Program) is to collect and reintroduce  
27 multiple life stages of Central Valley ESU spring-run Chinook to develop a naturally-reproducing,  
28 self-sustaining population of spring-run Chinook in the San Joaquin River. The intent is to  
29 ultimately include the range of genetic and phenotypic characteristics identified in existing  
30 populations of the fish, and therefore increase the likelihood that the reintroduction of spring-run  
31 Chinook to the San Joaquin River will be successful.

32 Another clear objective within the proposed action is that these collections not have an adverse  
33 impact on the survival and recovery of the Central Valley ESU and/or of the populations within each  
34 potential source stream. Finally, in keeping with the requirements of PL111-11, no spring-run  
35 Chinook will be released to the San Joaquin River as part of the proposed action unless designated as  
36 an experimental population under section 10(j) of the Endangered Species Act.

37 As a result of consultation with the RA and technical deliberation within the Implementing  
38 Agencies, we are proposing a stepwise, iterative approach to implement the reintroduction. This  
39 approach would begin with collecting spring-run Chinook from the Feather River Fish Hatchery  
40 (FRFH) to use as donor stock. Ultimately, approval may be sought to diversify donor stock by



utilizing spring-run Chinook from other streams, if and when the spring-run Chinook populations in those streams can sustain the collection of some fish for this purpose.

This application is for the collection of surplus Feather River Fish Hatchery (FRFH) spring run Chinook salmon which will be used for broodstock and direct river reintroductions for the SJRRP. The Service is requesting a 5 year permit be issued for this action. Future donor stock collections will depend on the status of Central Valley spring-run Chinook, the condition and status of anticipated San Joaquin River channel improvements and Conservation Facilities and would require an amendment to this permit or a subsequent permit application to NMFS.

Given the goal of the SJRRP to achieve a naturally-reproducing and self-sustaining spring-run Chinook population in the Restoration Area, several options have been considered in the development of this Application.

### 3.3 Project Location

The San Joaquin River from Friant Dam near the town of Friant, California, to the confluence of the Merced River is considered the Restoration Area for the purposes of the SJRRP. San Joaquin River conditions including riparian vegetation, geomorphology, and channel morphology are highly variable throughout the Restoration Area. The Restoration Area is about 153 miles long, and includes an extensive flood control bypass system (bypass system). See Figure 1 for a map of the project area. The bypass system consists of a series of dams, bifurcation structures, flood channels, levees, and portions of the main river channel; and is managed to maintain flood-conveyance capacity. The basic features of the bypass system include: Fresno Slough (also known as James Bypass), the Chowchilla Bypass and Bifurcation Structure, and the Eastside and Mariposa Bypasses.

Sections of the 153 mile area are dry most of the year except during periods of agricultural or flood flows. The Restoration Area has been significantly altered by changes in land and water use over the past century. Several structures such as the Chowchilla Bypass, Mendota Dam, Sack Dam, Eastside Bypass, and many smaller private structures may impede fish movements through the system until the restoration of the San Joaquin River is completed.

The Service, in accordance with the Settlement, is proposing to reintroduce Central Valley spring-run Chinook to the San Joaquin River upstream of the mouth of the Merced River in the Central Valley of California (Merced, Madera, and Fresno counties).

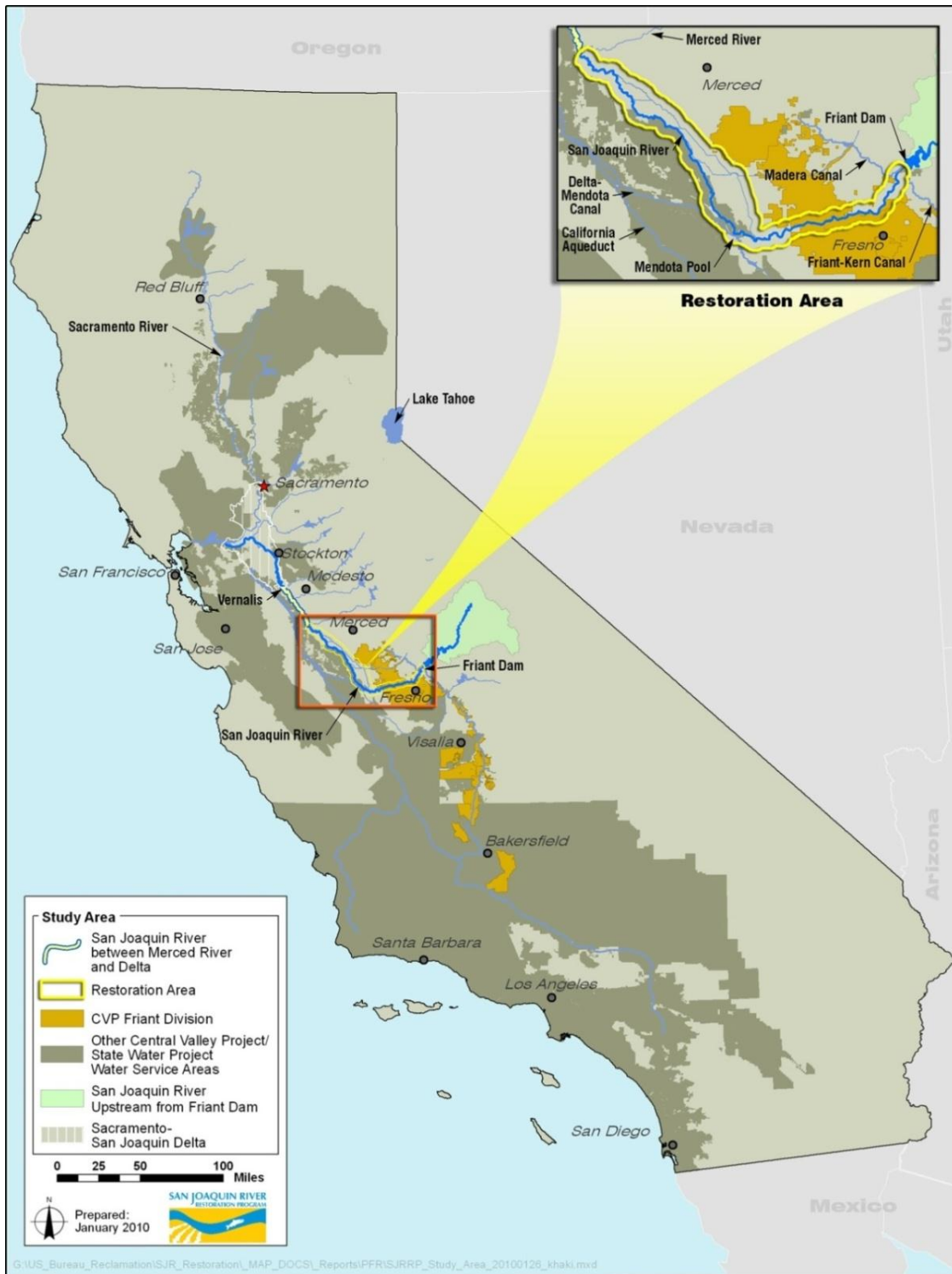


Figure 1. Project Location.

1 The Central Valley spring-run Chinook is listed as threatened under the Federal Endangered Species  
2 Act (ESA) and is listed as threatened under the California ESA (CESA). The Evolutionarily  
3 Significant Unit (ESU) includes all naturally spawned populations of spring-run Chinook in the  
4 Sacramento River and its tributaries in California, including the Feather River, as well as the Feather  
5 River Hatchery spring-run Chinook program (NOAA 2005). Critical habitat was established on  
6 September 2, 2005, and became effective on January 2, 2006 (NOAA 2005a). In accordance with  
7 the San Joaquin River Restoration Settlement Act (SJRRS Act) the fish reintroduced under the  
8 SJRRP would be considered an experimental population under §10(j) of the ESA.

#### 11 4. CONSERVATION STRATEGY FOR THE SAN JOAQUIN RIVER SPRING-RUN 12 CHINOOK

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13 Historically, the Central Valley spring-run Chinook ESU spanned four ecoregions, known as  
14 Diversity Groups (Northern Sierra Nevada, Northwestern California, Basalt and Porous Lava, and  
15 Southern Sierra Nevada). Spring-run Chinook have been almost entirely extirpated from both the  
16 Basalt and Porous Lava region and the Southern Sierra Nevada region. The current lack of viable  
17 populations makes the Central Valley spring-run Chinook ESU vulnerable to catastrophic  
18 disturbance.

19  
20 To be viable, an ESU needs a wide distribution of natural spawners sufficient to accomplish the  
21 following: avoid the loss of genetic and/or life history diversity during short-term losses in  
22 abundance that are expected parts of environmental cycles; fulfill key ecological functions that are  
23 attributable to the species, such as nutrient cycling and food web roles; and provide for long-term  
24 evolutionary adaptability to changing environmental conditions.

25  
26 For the Central Valley spring-run Chinook ESU to achieve recovery, as outlined in the Recovery  
27 Plan, each Diversity Group must be represented, and population redundancy within the groups must  
28 be met to achieve Diversity Group recovery. Therefore, Diversity Group criteria include a minimum  
29 of two viable populations of spring-run Chinook within each of the four spring-run Chinook  
30 Diversity Groups. Viability of the ESU is also more likely if: 1) populations are geographically  
31 widespread but some are close enough together to facilitate connectivity; 2) populations do not all  
32 share common catastrophic risks; and 3) populations display diverse life-histories and phenotypes  
33 (McElhany et al. 2000).

34  
35 Addressing the primary threats and risk factors for the ESU will require reintroducing populations to  
36 historic and currently unoccupied habitats. Candidate areas for reintroduction are identified and  
37 prioritized in the NMFS Recovery Plan. The spring-run of the San Joaquin River, within the  
38 Southern Sierra Nevada Diversity Group, is listed as a “primary” focus of recovery within the  
39 Recovery Plan.  
40

1 The FMWG (and subgroups) collaborated on development of the three foundational technical  
2 documents: Stock Selection Strategy; San Joaquin River Salmon Conservation and Research  
3 Program (Conservation Program) Hatchery and Genetic Management Plan (HGMP); and  
4 Reintroduction Strategies documents. They comprise the initial framework of the Reintroduction  
5 Program within this application.  
6

7 The foundational technical documents (Stock Selection, HGMP, and Reintroduction Strategy)  
8 identify the extant Central Valley spring-run stocks as the most appropriate stocks for reintroduction  
9 to achieve success in the San Joaquin River. This determination is based on the premise that the  
10 donor stocks should be selected from currently existing stocks inhabiting the Central Valley to  
11 maximize the likely success of local adaptation to the San Joaquin River, and that incorporating all  
12 of the existing genetic diversity found in the Central Valley spring-run stocks provides the most  
13 opportunity for successful establishment of a naturally reproducing, self-sustaining population of  
14 spring-run Chinook in the San Joaquin River. Therefore, populations that may be considered for  
15 future actions in the Reintroduction Program are the independent spring-run Chinook populations on  
16 Butte, Deer and Mill creeks, and the spring-run Chinook population in the Feather River, along with  
17 opportunistic collection of other spring-running Chinook from the Stanislaus, Mokelumne, and Yuba  
18 rivers and Battle and Clear creeks.  
19

20 Studies mentioned in the various foundational technical documents are important aspects of the  
21 overall adaptive management planning process of the SJRRP. These studies will include monitoring  
22 that is essential for reporting requirements and meeting performance measures of this permitted  
23 activity; but also include research and further investigations necessary to improve the performance  
24 of underlying methodology, or assist in improving the efficacy of implementation within the overall  
25 adaptive management framework. It is important to recognize the segregation of these activities  
26 within the programmatic framework of this application.  
27

28 We intend this application will serve as the official project description, effects and take analysis.  
29 However, the three foundational documents are attached as supporting technical documents and can  
30 provide additional explanation and clarity for overarching concepts recommended for the  
31 Reintroduction Program. Unless specifically prioritized and defined in this Application, we do not  
32 explicitly intend to include studies listed in the foundational technical documents as part of the  
33 project description. Beyond the data required to implement the donor stock collection planning  
34 process, and the monitoring and reporting necessary to ascertain programmatic performance during  
35 management of the conservation stock at the Conservation Facility or the experimental stock during  
36 and following reintroduction, we do not intend this application to include all aspects of additional  
37 research or restoration monitoring. These are part of the larger programmatic operations and the  
38 adaptive management of the experimental stock of spring-run Chinook and their habitat in the  
39 restored mainstem San Joaquin River, and should be captured in the further evolution of the SJRRP  
40 implementation.  
41

## 5. PROJECT DESCRIPTION

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### 5.1 Multiple Strategy Approach

To implement the Settlement, this Application outlines the process needed to evaluate and approve the collection, propagation, and reintroduction of spring-run Chinook into the San Joaquin River. It takes into consideration the NMFS Recovery Strategy for the species and the genetic needs for a robust reintroduced population (as discussed in the Stock Selection Strategy document), and the current condition of spring-run Chinook in potential donor areas.

Following consultation with the RA and technical deliberation within the interagency technical working groups, we are proposing multiple strategies to implement the reintroduction. More than one reintroduction method at a time would be implemented to maximize learning opportunities and the potential for success. Given the Restoration Goal of the SJRRP to achieve a naturally-reproducing and self-sustaining spring-run Chinook population in the Restoration Area, several options have been considered.

One option is the use of temporary propagation facilities (hatcheries). Propagation facilities can generally be classified as supplementation facilities or conservation facilities. Traditional supplementation facility models have a low likelihood of achieving the restoration goals without detrimental genetic impacts to the reintroduced population. Conservation facility models emphasize not only producing desired numbers of fish for release, but also reducing genetic and ecological impacts of release on wild fish (Flagg and Nash, 1999).

Another option is translocation-- moving fish directly from one stream for immediate release into the San Joaquin River. However with the exception of donor stock derived from the FRFH, it is probable that the numbers of donor fish needed to support in-river reintroductions (translocation) is too high to be currently supported by other potential donor populations. Although minimizing hatchery influence is genetically a desirable strategy, the translocation option must take into account the reality of population-level impacts to the donor streams (in this case, to a listed species).

The third option is to allow natural re-colonization following the time course of habitat restoration. However, allowing only natural re-colonization of the San Joaquin River is problematic for spring-run Chinook, given the lack of geographically proximal populations. For all intents and purposes, the population has been extirpated from the entire watershed (Yoshiasma et.al. 1998).

Based upon the evaluation of options above, the Service believes that the long-term goals of the program would be best met utilizing a multi-strategy approach--1) reintroduction of donor stock of various lifestages directly from donor streams into the San Joaquin River Restoration Area, if and when spring-run populations in potential donor streams can sustain the collection of fish for this purpose, and 2) reintroduction of cultured fish (Conservation Stock) at different lifestages originally

collected from natural production donor stocks (also at various lifestages only when donor populations can sustain collection) to various San Joaquin River locations. However, due to the status of the species and the availability of potential donor stock, the Service believes that the use of FRFH donor stock for both direct translocation and the development of Conservation Stock is the most appropriate course of action at the present time due to concerns about the ability of spring-run populations from other potential stream sources to sustain fish collections.

### **Conservation Strategy Design Plan**

It is anticipated that a portion of collected individuals will be used as broodstock for annual supplementation into the San Joaquin River from the Conservation Facility (or Interim Facility in years 1-3; 2012-2014). Reintroduction would be provided via direct releases of eggs and juveniles and/or Conservation Stock from the Facility. This includes the use of surplus eggs or juveniles obtained from the FRFH. The number of years and/or seasons that collecting would occur is dependent on the propagation needs and available supply of donor stock, however we propose to begin collections around April 30, 2012 and to continue through April 2017.

During the initial years (Years 1-3), the goal would be to collect sufficient numbers of broodstock, per broodyear, to provide a maximum of 100 unrelated gravid adult females and an equal number of fertile males for the Interim Facility. For example: during brood years 2012 to 2014 we would collect enough eggs/juveniles to produce 150-200 adults (100 pairs) from each broodyear. Therefore, we will have multiple age classes at the Facility (3 year olds, 2 year olds, 1 year olds, and current broodyear). These fish, produced from eggs and juveniles would be reared in the Interim Facility, and their offspring would be released to the San Joaquin River in sufficient numbers to meet the targets (see section 5.9 for release methods).

Assuming the survival rates and enhanced rearing conditions in the Facility, it is anticipated that 300-500 eggs or juveniles would be needed to produce 50-100 adult pairs in the facility. Therefore in years 4-5, based on the anticipated availability of the full Conservation Facility, the goal would be to propagate sufficient numbers of broodstock to provide up to 150-450 unrelated adults, per year for the subsequent years of the proposed action.

## **5.2 Collection Methods by Lifestage**

To simultaneously maximize flexibility for collections (and therefore Reintroduction Program success), we are proposing to collect from multiple life stages. Donor stock collection of eggs and juveniles is proposed from the Feather River Fish Hatchery. The collection and processing methods, including genetic testing are described here, and are subject to an adaptive process.



### 5.2.1 Eggs—Feather River Fish Hatchery

#### *Collection and Processing*

Eggs would be obtained from the FRFH in association with the hatchery's standard procedures as outlined in the FRFH draft HGMP (DWR 2009). All eggs collected would be surplus, defined as eggs that are not needed to meet the production goals/targets of the FRFH (described below). Eggs are preferred for collection because of the ability to target genetically diverse individuals and collect spatial and temporal diversity, while maintaining low risk to the donor population. Furthermore, collection at this life stage provides greater survival to adulthood in a controlled environment when compared to rearing in the wild, thereby reducing population level impacts. Additionally, eggs provide the least amount of risk associated with disease transfer to the Restoration Area due to their ability to withstand disinfection and the fact that many pathogens are not vertically transmitted from parent to ova.

The FRFH offers the opportunity for a consistent source of eggs for the Conservation Program. The FRFH HGMP protocols (DWR 2009, or most current version) would be followed for the collection, fertilization and incubation of eggs at the FRFH, and for the testing of ovarian fluid and kidney/spleen for pathology testing. Eggs would be taken at the eyed stage for both broodstock and direct translocation. After following the specific mating scheme outlined in the FRFH draft HGMP (DWR 2009), a small number of eggs from a minimum of 50 crosses will be segregated for use by the Program. Due to space availability, the FRFH is unable to segregate all crosses, even in subdivided trays. Therefore, the maximum number of crosses segregated may change each year. A minimum of 50 crosses will be selected by FRFH personnel for segregation throughout the spawning season to maximize genetic diversity.

In accordance with their permit the FRFH will segregate a small number of eggs from individual crosses into sub-divided egg trays that the Program will later target for collections. Egg trays will be subdivided into four sections, each section would hold approximately 10-20 ounces (oz) of eggs, up to 80 oz. per tray. An equal number of eggs by weight will be segregated per cross. Once disease status and run timing are known (see criteria below), and once eggs have eyed, the Program will select eyed eggs from segregated lots up to the maximum allowed. This is the preferred method, since the Program will have the opportunity to select from individual preferred crosses. The Program will first randomly select eggs from preferred crosses for the broodstock program, then select eggs for direct translocation.

If the FRFH is unable to segregate enough green eggs for both broodstock and direct translocation from preferred crosses (see criteria below), then the Program would also select eyed eggs, up to the maximum allowed, from the FRFH spring-run egg trays. Since the FRFH does not have the space to segregate all crosses, two to three different crosses may be in one tray. Selecting eyed eggs using this method will reduce the number of available preferred crosses since a non-preferred cross (i.e. BKD or IHNV positive female parent) may be mixed with a preferred cross, thus requiring rejection

of the entire tray. This will be a backup method that will only be used to collect eggs for direct translocation.

Individuals will be randomly selected from preferred crosses/trays for both broodstock and for direct translocation. Corresponding individual fish data will be collected for each cross; including Hallprint tag number, adipose fin status, head tag number, coded wire tag (CWT) number, gender, weight, fork length, ovarian fluid sample number, tissue sample number and corresponding genetic analysis data. These data will be used to select preferred crosses for the Program (for both broodstock and direct translocation) guided by the following criteria:

- Disease Status - Parents of juveniles test negative for major virulent pathogens and in particular, Infectious Hematopoietic Necrosis Virus (IHNV) and Bacterial Kidney Disease (BKD).
- Genetic Variability – The collections accurately represent the genetic diversity of the donor population. Siblings should comprise less than 2 percent of the total collection [base on the goal of 50 crosses from unrelated individuals (i.e. non-siblings)].
- Run Timing – preferably two-generations of spring-run phenotype are identified using CWT data, parentage based tagging (PBT) or otolith microchemistry. Generation-one would be the spawning adults (i.e. parents of the eggs), and generation-two would be the parents of the spawning adults (i.e. grandparents of the eggs).
- Age of Maturing – Two year old males and females (based on length data) will comprise less than 5 percent of the parental crosses.

Hatchery versus wild origin (i.e. adipose fin status) by itself will not be a sole determining factor for selection; but rather, there must be a clear identification of a two-generation expression of a spring-run phenotype (i.e. adult migration during the spring). On the Feather River, run timing ancestry is most easily demonstrated in FRFH origin fish which possess a clear data trail from CWT and PBT data which is not associated with wild origin fish. Therefore, particularly in the near term, collections will be primarily comprised of hatchery origin fish unless run timing ancestry is identified in wild origin fish (i.e. by using otolith microchemistry (i.e. strontium isotopes)).

After fertilization, eggs would be disinfected with iodophore during water hardening and placed in compartmentalized hatching trays. Individual crosses would be kept separate at FRFH for approximately 30 days until corresponding genetic and coded wire tag data and pathogen data are compiled for selection criteria. This allows FRFH to determine whether annual production goals have been met. In the event production goals are not met, all proposed egg collections from FRFH for the Program will be terminated.

The FRFH in most years has met its production goal of two million spring-run Chinook smolts (personal communication with Anna Kastner, Hatchery Manager, October 13, 2011). To reach this target, the hatchery typically mates approximately 750 pairs to produce three million eggs (Figure 2).



Once the production goal has been met, spring-run Chinook typically continue to enter the hatchery. In past years, these “surplus” fish have either been released back to the river, euthanized (designated as “killed, not spawned”); or allowed to die on site (designated as “Died in Tank”). The “Died in Tank” adults died while waiting to be spawned, or were allowed to die over time once production goals were met.

The number of the “surplus” fish varies from year to year. During the current 2011 spawning season at FRFH the number of surplus adults was particularly large. To date, 486 surplus adults (231 males and 255 females) have entered the hatchery (Table 1). Theoretically, these fish were capable of producing an additional one million eggs.

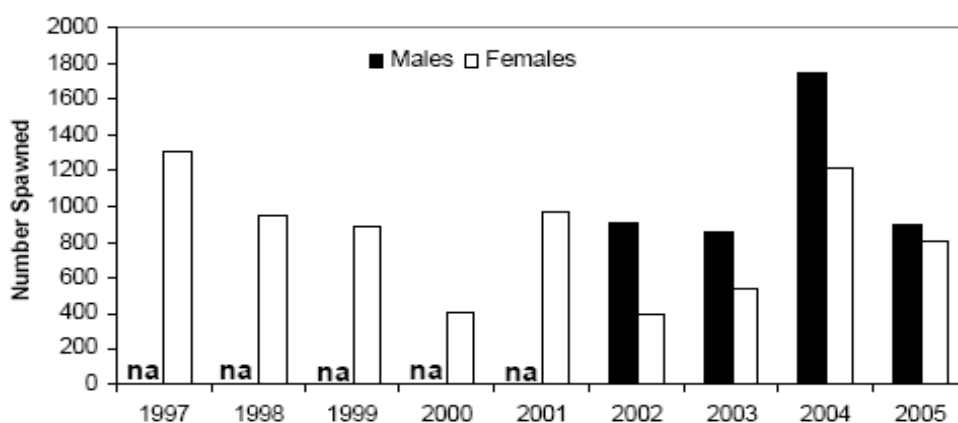


Figure 2. Number of spring-run Chinook adults spawned at the FRFH (Source: DWR 2009).

	Female	Male	Jack	Died in Tank
2011	255	231	No data	No data
2010	154	23	6	256
2009	0	2	34	76
2008	47, unknown gender		No data	240

Table 1. Surplus Fish Observed at Feather River Fish Hatchery in Recent Years (based on personal communication with Anna Kastner, 10/13/11).

### Transport

All eggs destined for direct translocation to the San Joaquin River or the quarantine facility will be transported when the eggs are the most shock resistant. All eggs transported to the quarantine facility will be hatched and transported to the San Joaquin River or Conservation Facility as fry or juveniles (following methods described in *Section 5.3.2 Juveniles—Feather River Fish Hatchery, subsection Transport*).

Eggs will be placed in a specialized shipping container (e.g. Styrofoam cooler) to reduce excessive movement and limit damage to the egg membrane. Eggs will be segregated in wet cheesecloth and securely tied, then placed in the shipping container, kept cool and moist using non-chlorinated ice, and transported in a dark environment. Ice will be in a separate compartment of the shipping container, so as not to be in direct contact with the eggs. The ideal temperature for transport is between 5 – 10° C. A standard vehicle will be used to transport eggs.

### ***Quarantine and Pathology***

Health inspection data for IHNV and BKD are collected from ovarian fluid of returning adult females annually during spawning. Eggs destined for the Conservation Facility will first go to a quarantine facility (see *Sections 5.3 Quarantine and Pathology* and *5.4 Quarantine Facilities*) for health screening at which time eggs will hatch. After hatching, 60 individuals will be sacrificed for pathology testing, and upon health certification the remaining individuals will be transferred to the Conservation Facility for the captive rearing program (see *Section 5.8 Rearing Facilities*).

Most of the collected eggs will be reserved for direct translocation to the San Joaquin River. Eggs from IHNV and BKD negative females will be properly disinfected at FRFH and transported for direct translocation to the San Joaquin River for injection into the gravels, or streamside or in-stream incubation. Eggs for direct translocation will not be taken to the Conservation Facility.

## **5.2.2 Juveniles—Feather River Fish Hatchery**

The FRFH offers the opportunity for a consistent source of juveniles for the Conservation Program. Juveniles would be produced on site from eggs as described in the FRFH HGMP (DWR 2009) and in the above section (see *Section 5.2.1 Eggs—Feather River Fish Hatchery*). All juveniles collected would be surplus, defined as fish that are not needed to meet the production goals/targets of the FRFH (as described in *section 5.2.1 Eggs—Feather River Fish Hatchery*).

### ***Collection and Processing***

Preferably, fish selected for the Reintroduction Program would be segregated as eggs in individual vertical egg incubator trays for hatching (see *Section 5.2.1 Eggs – Feather River Fish Hatchery*) and later transferred to a segregated raceway section for outdoor rearing at the main FRFH facility or at the nearby FRFH Annex facility. If the FRFH is unable to rear eggs to the juvenile stage, then individuals will be transferred to the Silverado Fisheries Base, as eggs, for rearing and quarantine. If the Program is unable to segregate fish during the egg lifestage, then the Program will collect spring-run juveniles from all available raceways. To capture the temporal and spacial diversity of the parents, random collections would occur guided by the number of fish in each raceway, the size of the fish, and the number of different families (i.e. crosses) in each raceway. Each concrete raceway section is 100 feet long x 10 feet wide x 2.5 feet deep, with a water flow rate of 3-5 cubic feet per second. When juveniles reach the appropriate length for transfer to the Conservation Facility, or for

translocation to the San Joaquin River, the Program will follow the FRFH's standard procedures to corral and collect the juveniles. Once collected, the juveniles would be placed in buckets for further processing. Adipose-fin clipping and CWTs would be required for any juveniles reared in the facility and released into the San Joaquin River. Prior to collections, the Program will coordinate with FRFH staff and work closely with them during collections. The Program will follow FRFH standard procedures and practices. Coordination will occur with FRFH and will be done with close collaboration with hatchery staff, process and procedures.

### Quarantine and Pathology

Between December and March, juveniles would be quarantined for the minimum 30-day health evaluation (see *Sections 5.3 Quarantine and Pathology* and *5.4 Quarantine Facilities*). After quarantine and pathology testing, juveniles would be transported to the Conservation Facility for use as broodstock or translocated to the San Joaquin River. For individuals translocated to the San Joaquin River, short-term confinement is required for sufficient imprinting, which may occur either in or alongside the San Joaquin River or at the Conservation Facility.

### Transport

Any juveniles requiring transport, either to the Conservation facility or directly to the San Joaquin River, would be moved utilizing a 500-gallon transport tank and trailer. The tank would be filled with water from the FRFH (for transport from FRFH to Silverado, SJR, or Conservation Facility) or from the Silverado Fisheries Base (for transport from the Silverado Fisheries Base to SJR or the Conservation Facility) just prior to transport. Transport times would depend on the location, but may be as long as 4 hours. Before transferring fish, the water would be tempered to within two degrees Celsius of the water temperature at the receiving facility.

## 5.3 Quarantine and Pathology

The need for the Program to transfer out-of-basin fish to the Restoration Area and to the proposed Conservation Facility requires preventative measures to avoid introduction of infectious disease. Some fish pathogens found in California are capable of severely impacting wild fish populations and disease issues can, and have, threatened captive rearing programs (Kline 2010).

Fish in hatcheries are particularly susceptible to disease due to high fish densities and the added stressors of the hatchery environment. The Conservation Facility lies in close proximity to the San Joaquin Fish Hatchery, a major producer of rainbow trout for regional recreational fishing. This requires strict bio-security measures to prevent disease transfer between the facilities. The three pathogens of highest concern are IHNV, BKD and *Myxobolus cerebralis* [Whirling Disease (WD)]. Transfer of a virulent pathogen to the trout hatchery or Conservation Facility such as IHNV, which is commonly found in wild Chinook, could result in the need to destroy the entire fish inventory for facility disinfection.

Therefore, fish health inspections of the highest degree are necessary before all fish transfers. These inspections include quarantining fish to investigate all instances of moribund and dead animals in an attempt to immediately identify the cause of the problem. All eggs or fish collections from a given lot will be destroyed when these pathogens are identified during health assessment to prevent introduction of pathogens to the Conservation Facility or the San Joaquin River.

Risk assessments for fish transfers will be conducted and based on the FWS Aquatic Health Policy (713 FW 5). Fish health assessments will be conducted through the CDFG Fish Health Lab (Rancho Cordova, CA) and based on procedures described in the American Fisheries Society blue book: *Suggested procedures for the detection and identification of certain finfish and shellfish pathogens* (AFS-FHS 2010).

A fish health assessment is performed by sacrificing and analyzing a sufficient number of fish from a given lot to provide a 95 percent confidence level that at least one infected fish will be collected. The health assessment and necropsy is conducted on fish that are 40 mm in length or greater and is based on the assumption that the prevalence of the pathogens in the population is 5 percent or greater (i.e. assumed pathogen prevalence level (APPL) of 5 percent).

The general process for fish health assessment involves first transferring eyed eggs or juveniles to a quarantine facility, whose water supply is free from virulent fish pathogens (see *Section 5.5 Quarantine Facilities* for further details). For eyed eggs, this would typically occur sometime in mid-October and for juveniles would occur sometime between November and April of each year. After all fish or eggs from a similar group or lot have entered quarantine and have hatched and reached a minimum size of 40 mm, approximately 60 fish will be sacrificed for pathogen testing which takes approximately 30 days. In cases where fish from the same lot enter quarantine over a period of time, pathogen testing begins after the last fish from the lot enters quarantine. After fish health clearance has been received, “cleared fish” may be transferred to the Conservation Facility, or to the San Joaquin River for direct release.

## 5.4 Quarantine Facilities

The CDFG Silverado Fisheries Base is the standard quarantine facility for all fish transfers. All eggs and fish going to the Conservation Facility, and all juveniles for direct translocation will be sent to the Silverado Fisheries Base for quarantine and pathology. However, if the Silverado Fish Base is unable to receive the collections (i.e., temperatures not conducive), then collections will either stay at the FRHF and be quarantined onsite at the FRFH Annex Facility or be transferred to the Center for Aquatic Biology and Aquaculture (CABA) facility located on the UC Davis Campus (Davis, CA) as a backup system for quarantine. The Program will work with CDFG Pathology to determine which backup quarantine facility is appropriate for use. If sufficient quarantine cannot be provided by any of the backup facilities or another appropriate site, then proposed fish collections will be terminated.

Quarantine facilities may also be used for short term holding and potentially longer-term holding, if the need arises. Under such circumstances, 6ft, 10ft, or 16ft circular fiberglass culture tanks would be made available at the facilities for that specific purpose.

#### ***Silverado Fisheries Base***

CDFG operates the Silverado Fisheries Base (Yountville, CA) for the purpose of juvenile fish and egg quarantine. All fish and egg transfers to the Conservation Facility and for direct transfer to the San Joaquin River will first require quarantine and fish health inspection. The Silverado has a capacity for hatching and rearing 100,000 Chinook eggs and juveniles to approximately 5 grams; however, fewer salmon may be reared to a larger size. Typically, salmon can be housed at the facility between mid-November through mid-May of each year. CDFG is currently working to extend this holding period by installing appropriate water refrigeration systems.

#### ***Center for Aquatic Biology and Aquaculture***

The Reintroduction Program intends to use the CABA facility located on the UC Davis Campus (Davis, CA) as a backup system for quarantine. CABA's fish culture tanks utilize a secure source of well water which is generally considered free of fish pathogens. CABA has a capacity for hatching a minimum of 40,000 Chinook eggs at one time and is capable of rearing them to approximately 5 grams.

#### ***Feather River Fish Hatchery Annex***

The Program intends to use the Feather River Fish Hatchery Annex located on the FRFH grounds, when feasible. The FRFH Annex uses about 12 cfs of well water (whereas the main FRFH uses river water), all raceways are 100-ft long and 10-feet wide. The FRFH Annex is part of the FRFH operations, and is located downstream from the FRFH on the west side of the Thermalito Afterbay. The FRFH Annex provides additional rearing capacity for 2.5 million fingerling salmon. The operation of the FRFH Annex is covered under the FRFH HGMP.

### **5.5 Donor Stock Collection Numbers**

The annual maximum collection targets representing the maximum numbers the Reintroduction Program could collect in any given year are displayed in Table 2. The maximum collection targets are needed by NMFS to permit the proposed project but also enable the Reintroduction Program to achieve its goals concerning lifestage variability, genetic diversity, and facility capacity. Working within these maximum numbers also provides the flexibility for the Reintroduction Program to adaptively manage collections, which will be reflected in the annual Donor Stock Collection (DSC) Plan submitted to NMFS for annual incidental take approval and DFG for concurrence. That is, the maximum number the Program could collect in any given year.

To determine a maximum number of individuals that could be collected as donor stock, the capacity of the Conservation Facility was used as a threshold. In years 1-3, the Interim Facility capacity will be 100-200 individual adults (50-100 adult pairs), per broodyear. Upon completion of the full scale Conservation Facility (around year 4), the capacity will increase to 300-900 individual adults (150-450 adult pairs) per broodyear.

The Reintroduction Program is targeting the collection of 80,000 eyed eggs for direct translocation into the San Joaquin River as this number of eggs and resulting outmigrating juveniles would be expected to result in a returning adult population of about 10 pairs (see Appendix B, Table 2). It is recognized that early returns of adult may not reach this goal until river restoration efforts and removal or modification of migration barriers have been achieved. However, it is anticipated that this number of eggs and resulting juveniles will provide returning adults for the program to assess the river's condition and further identify any constraints to restoring spring-run Chinook to the San Joaquin River pursuant to the Settlement.

During Years 1-3 as a primary source of donor stock, we are proposing a maximum annual collection of 80,560 eyed eggs ("surplus eggs" see section 5.2.1 for definition) from the FRFH (80,000 for translocation and 560 for broodstock development). Alternatively, we may utilize juveniles produced at the FRFH which have been determined to meet donor stock criteria. The number of juveniles which we may collect is based on the number of fish an equivalent number of eggs would produce at that age. For example on average, 80,000 eyed eggs would produce about 54,400 fingerling juveniles (based on an average 32 percent mortality from eyed to fingerling stage, Cavallo et al 2009).

During years four and five a maximum annual collection of 82,760 eyed eggs would be collected from the FRFH (80,000 for translocation and 2,760 for broodstock). Again, we may elect to utilize FRFH juvenile fish instead of eggs (see Table 2 below)

Collection Type	Collection Source	Targeted Lifestage	Disposition Location	Max Years 1-3	Max Years 4-
Primary	Feather River Fish Hatchery	Juveniles	Conservation Facility	560	2,760
	Feather River Fish Hatchery	Eyed Eggs	Conservation Facility	560	2,760
	Feather River Fish Hatchery	Juveniles	Translocation to SJR	54,400 @ fingerling	54,400 @ fingerling
	Feather River Fish Hatchery	Eyed Eggs	Translocation to SJR	80,000	80,000

Table 2. Maximum collection targets by year, location, lifestage and disposition.

## 5.6 Donor Stock Collection Planning and Reporting

As a condition of the §10(a)1(A) permit, an annual report on the status of collections and summary of the coming years proposed collection will be submitted to NMFS and CDFG. *Appendix A*

1 outlines the annual decision making process and the information to be contained in the Donor Stock  
2 Collection Plan (DSC Plan).

3  
4 Other considerations may also arise through further monitoring and research. These include:  
5 recovery criteria, new understanding about genetics and improved understanding regarding  
6 survivability of donor stock. In addition, we need to be sure about donor stock disposition with  
7 respect to the Conservation Facility's operational status and/or habitat conditions in the mainstem  
8 San Joaquin River for reintroduced individuals.

9  
10  
11 The Service will develop two reporting documents each year to be submitted to NMFS and CDFG.

- 12  
13 1) **DSC Plan.** Annual DSC Plans will be developed by a multi-agency technical team to  
14 describe the collection plan for each year. This document will be developed prior to any  
15 collections and will include all the expected collection actions for the year. The annual  
16 DSC Plan will be submitted to NMFS and CDFG for approval.  
17  
18 2) **Year-End Report.** A year-end report will be developed by December 31 of each year.  
19 This document will summarize any differences between the anticipated actions and what  
20 occurred, and any adaptive processes under review.  
21  
22

## 23 Donor Stock Collection Criteria

24

25 The donor stock collection planning and implementation will be driven by interagency collaboration  
26 and based on real time information. The criteria below will evaluate FRFH donor stock each year  
27 and the number of individuals targeted by life stage:

- 28  
29 • Facility status and capacity available to rear broodstock;  
30 • Resources available to collect donor stock;  
31 • Donor stream status and population viability;  
32 • San Joaquin River instream conditions for reintroductions;  
33 • Genetic considerations  
34

35 See *Appendix A* for a template of what would be contained in the annual plan.  
36  
37



## 5.7 Rearing Facilities

The Conservation Facility (and Interim Facility in the early years), will be used as the primary rearing facility for broodstock. However, in the event the currently proposed Interim Facility is unavailable for holding fish (e.g. CEQA permitting is not complete, lack of sufficient flow, etc.), the contingency plan is to: 1) focus on the direct transfers to the San Joaquin River (as described elsewhere in this document) without use of the Interim Facility; 2) utilize the Center for Aquatic Biology Aquaculture facility at University of California at Davis or; 3) allow fish to remain at the Feather River Fish Hatchery facilities (as described in *Section 5.4 Quarantine Facilities*) in accordance to their permitted authority. These decisions would be based on conditions on the ground at the time and agreement between the State and Federal Fisheries Agencies. Fish would remain at the alternative facilities until conditions improve at the Interim Facility or until conditions become unsuitable at the alternative facilities. If the latter occurs, fish would be transferred in an appropriate manner to the San Joaquin River for reintroduction (as described elsewhere in this document). Prior to temporarily utilizing any of these facilities for rearing and propagation of spring-run Chinook we would ensure that this is consistent with State and Federal Regulations.

### 5.7.1 Conservation Facility

The Interim Facility will be located on the grounds of the CDFG San Joaquin Fish Hatchery (SJFH) until 2014, when the construction of the permanent Conservation Facility is expected to be completed on the SJFH property. The full scale Conservation Facility would be located along the San Joaquin River adjacent to the SJFH in Friant, California about 20 miles northeast of Fresno (Fresno County) and one mile downstream of Friant Dam.

Individuals may be brought into either facility relatively briefly and released; while others would be reared to adulthood. These adults would either be spawned upon reaching sexual maturity after 2-5 years, or be released to the river to spawn naturally. Salmon resulting from eggs and juveniles planted directly into the San Joaquin River should begin returning as adults in 2015. Likewise, initial Conservation Facility broodstock should reach adulthood by 2015. The adult offspring of these fish would be expected to return to the San Joaquin River and the Conservation Facility in 2019.

For the short-term (Years 1-3; 2012-2014), the goal of the Conservation Facility Program would be to collect sufficient numbers of broodstock to provide a minimum of 50 and a maximum of 100 unrelated gravid adult females (and an equal number of fertile males), per broodyear, for the Conservation Facility. These fish, produced from donor stock eggs and juveniles, would be the first broodstock reared in the Interim Facility and their offspring would be released to the San Joaquin River.



1 In Year 4 and beyond (2015-2017), based on genetic considerations, the goal would be to propagate  
2 sufficient numbers of broodstock annually to provide a minimum of 150 and a maximum of 450  
3 unrelated gravid adult females (and an equal number of fertile males) from each donor population.  
4 The permanent Conservation Facility will be designed to accommodate the maximum broodstock  
5 size of 900 fish per broodyear.  
6

7 Some of the source stock may be reared for a shorter period of time in the Conservation Facility and  
8 released directly to the San Joaquin River as juveniles, provided habitat restoration activities have  
9 restored suitable conditions in the San Joaquin River. However, since in-stream survival to  
10 adulthood in the wild is less, relative to hatcheries, additional eggs and juveniles would be required  
11 for direct release to the “wild.”  
12

13 Incubation and rearing operations would occur at an Interim Facility until 2014, at which time  
14 operations would transition to the full-scale Conservation Facility. Eggs and juveniles collected  
15 from the FRFH would be transported to the Facility, after quarantine and pathology testing, and  
16 reared under controlled hatchery conditions to sufficient age and size to improve their probability of  
17 survival to reproduction. Each year, a portion of this production would be withheld in the hatchery  
18 to provide the source for the next generation of broodstock.  
19

20 The first introductions from the hatchery-reared, adult broodstock are expected to occur in 2015.  
21 This is the preferred near-term strategy to attain numeric fish goals until such time that the  
22 Conservation Program completes habitat restoration to provide sufficient in-river survival rates. All  
23 hatchery juveniles would be adipose fin-clipped and coded wire tagged prior to release; therefore  
24 releases from the Conservation Facility would be 100 percent marked. The broodstock would be  
25 genotyped for parental-based tagging, and would be intraperitoneal Passive Integrated Transponder  
26 (PIT) tagged for tracking and identification in the hatchery.  
27

28 The Conservation Facility’s funding source, physical design and operation are described below.  
29

### 30 ***Funding***

31 The State of California is anticipating funding for the capital budget for the Conservation Facility  
32 and the O&M costs would be covered by the Bureau of Reclamation. The proposed estimate for the  
33 capital improvement costs for the Conservation Facility is \$14.64 million. The State has an  
34 approved budget allocating the funding and spending authority. Immediate funding is secure but  
35 owing to past bond sale challenges and an uncertain economy, the current status could change.  
36

### 37 ***Physical Infrastructure***

38 The small-scale, Interim Facility would be located on the grounds of SJFH and be operational until  
39 the full-scale Conservation Facility is constructed. The Interim Facility holding tanks would include  
40 twelve 3-foot diameter circular tanks, three 6-foot diameter circular tanks, three 16-foot diameter  
41 circular tanks, and two 20-foot diameter circular tanks. It would be designed to spawn about 50-100  
42 adult salmon annually. Interim facility incubators would include two, 12-tray vertical flow

incubators (Marisource®, Fife, WA); two deep matrix incubators (ARED, Inc., Wrangell, Alaska); and one moist air Incubator (ARED, Inc., Wrangell, Alaska).

The full-scale Conservation Facility is anticipated to be operational in 2014, at which time both facilities would be integrated together. Additional facilities for the Conservation Facility would include three 20-foot by 5-foot high circular tanks for holding, quarantine and acclimation of all wild fish entering the hatchery. Eight 12-tray vertical egg incubators would be obtained as well. A pre-engineered metal shell spawning shed, equipped with spawning tables, egg processing equipment and associated plumbing, would be installed.

Rearing facilities would be organized into three main areas: fry production, smolt production, and captive rearing. Fry production would occur in the main hatchery building and involve rearing fish from the unfed fry stage to about 3 grams each (in 72 small, circular culture tanks measuring 3 feet in diameter by 30 inches high with a volume of 106 gallons). Smolt production of fish from 3 grams to 7.5 grams, and yearling production from 7.5 grams to 75 grams, would occur outdoors in the exterior hatchery area. Twenty, 16-foot diameter tanks would be used for smolt production.

Captive rearing of fish for adult production from yearlings (75 grams) to adults (greater than 1 kilogram) also would occur outdoors in the exterior hatchery area using four banks of culture tanks, with one 30-foot tank and three 20-foot tanks in each bank. All outdoor tanks would be equipped with automatic feeders, include netted or solid-roof bird enclosures, and feature a flow-through water system. A 3-foot wide volitional release channel would be installed between fish culture tanks to be used both for volitional release and transporting fish to the adjacent spawning shed.

#### ***Water Source and Discharge***

Water for the Conservation Facility would be supplied from Millerton Lake, located at the base of Friant Dam. The water supply would be micro-screened (with a minimum pore size of 80 microns to reduce pathogen loads) and aerated. The water supply (for egg incubation, hatching and early rearing) would be further treated with ultraviolet filtration. The existing CDFG SJFH uses the same water source, and has successfully hatched and raised trout at the site since 1955 due to favorable water temperature and water quality conditions.

The source water for the hatchery is a continuous 35 cubic foot per second (cfs) supply gravity-fed directly from Friant Dam. Prior to reaching the hatchery, the water passes through the Fishwater Release Hydropower Plant, which is owned by the Orange Cove Irrigation District. The flows are delivered to the power plant through two different pipelines: a 24-inch diameter pipeline from two Friant Dam penstocks, and a 30-inch diameter pipeline that takes water from the Friant Kern Canal penstock near the left dam abutment.

The temperature of the water in each pipeline varies throughout the year, and valves are used to control the flows to create favorable temperature conditions at the hatchery. Temperatures are typically maintained between 45-55°F (7.2-12.8°C) throughout the year, occasionally dipping as low as 42°F (5.6°C) or peaking as high as 58°F (14.4°C). Hatchery water and the adjacent river water are

1 of the same origin and fairly similar in quality and temperature; however, the temperatures of the  
2 hatchery water are moderated due to the ability to adjust water temperatures at the mixing valves  
3 located at the Fishwater Release Hydropower Plant.  
4

5 The water flowing from the Hydropower Plant is delivered to a 44-inch diameter pipeline for  
6 delivery to the fish hatchery (about 1 mile from the dam). The pipeline has been calculated to have  
7 the capacity to convey an additional 30 cfs to the hatchery. Planning is currently in progress to  
8 convey a portion of the unused capacity to the Conservation Facility, therefore water flow is  
9 anticipated to be equally as reliable.  
10

11 The Conservation Facility would have a separate discharge from the existing hatchery and would  
12 operate under an independent National Pollutant Discharge Elimination System (NPDES) permit.  
13 Effluent from the hatchery building and bottom drains from fish culture tanks would be directed via  
14 gravity flow to micro-screen drum filters. Filtered water would be directed to a common discharge  
15 point on the river. Sludge from drum filters would be directed to a drying pond for disposal.  
16 Existing settling ponds would be lined, refurbished, and used for additional effluent treatment as  
17 required.  
18

19 Because of the high flow rates intended at the hatchery to provide sufficient flushing and to provide  
20 optimal conditions, temperature increase in the San Joaquin River from Conservation Facility  
21 effluent water is anticipated to be minimal and would remain within the guidelines provided by the  
22 Regional Water Quality Control Board.  
23

### 24 *Spawning*

25 All male and female broodstock would be examined weekly during the spawning season to  
26 determine readiness for spawning. Mating pairs would be determined according to molecular  
27 relatedness estimates, as described in the draft HGMP, with consideration given to increasing  
28 genetic diversity and effective population size, and decreasing inbreeding and outbreeding  
29 depression.  
30

31 Eggs from the female would be divided into five groups and each group would be fertilized by a  
32 different male. Each male would be used with five different females. Fish to be spawned would be  
33 euthanized by pneumatic knife inserted into the spinal cord posterior to the head. The ventral wall of  
34 the abdominal cavity of each female Chinook would be slit open and eggs allowed to freely flow  
35 into a metal spawning pan (Leitritz and Lewis 1976). Sperm from males would then be expressed  
36 into the pan by stroking the vent area.  
37

38 The flaccid eggs would be put into incubation trays. Eggs and fry from each cross would be kept  
39 separately until the swim-up stage to allow for evaluation of the success of the cross. As available,  
40 and as governed by the recommendations of the hatchery and river monitoring technical teams,  
41 precocious males and jacks would be used to ensure representation of alternative life history  
42 strategies.  
43

## **Egg Incubation**

Each vertical flow incubator (consisting of 12 trays) would be operated at the manufacturer's recommended flow rate of 30-60 gallons per minute, depending on the loading density. Loading densities would not exceed 8,000 eggs per tray, although egg tray capacity is 10,000 eggs. Individual family lots would be segregated into three or four sections per egg tray using segregation dividers (providing segregation for up to 48 parental crosses). Opaque side panels would be added to the incubators to produce a darkened environment for incubation. All egg incubation would occur in darkened conditions.

Deep matrix incubators are hatch boxes that provide a substrate (i.e., plastic rings) for hatching to mimic in-river conditions by requiring "emergence." The units would be single pass through flow systems, and would be operated at the manufacturer's recommended flow rate. Each unit has a recommended loading rate of 200,000 salmon eggs.

Each egg tray would hold 2,700 eggs, with a total capacity of almost 600,000 eggs per unit. The unit would recirculate 40 gallons of filtered water, with 5 gallons of water replaced daily. Filtration would consist of 1 and 50 micron particle filters, a 10 micron carbon filter and ultraviolet sterilization.

Moist air incubation produces a fine mist for incubation to inhibit fungal growth. The moist air incubator would have 220 individual egg trays to allow isolation and tracking of individual parental crosses. The moist air unit would incubate green eggs through the eyed stage in a dark environment, after which the eggs would be transferred to deep matrix or vertical tray incubators for hatching.

The deep matrix incubators and the vertical tray incubators would utilize ambient water temperatures, anticipated to be between 45-55°F. As the moist air incubator would allow for temperature control, hatching temperatures would be based on the objectives of the Conservation Program, and may include: mimicking San Joaquin River temperatures, slowing or speeding egg development, and/or utilizing temperature to produce thermal marks on otoliths. Dissolved oxygen levels would be maintained near saturation. Eggs would be monitored twice daily, and dead eggs would be removed. Siltation is not anticipated to be a problem because the water supply comes from Lake Millerton (i.e., the reservoir would allow sediments to settle out before reaching the hatchery intake).

## **Rearing**

The rearing facility would utilize circular rearing tanks. Circular rearing tanks have been shown to have several advantages over plug-flow raceway designs, and are the design of choice for many salmon captive rearing programs. The benefits of circular tanks include the following:

- the ability to adjust water velocities to target optimal swimming speeds for salmonids, which has been shown to improve growth rates, feed efficiency, oxygen utilization, swimming performance and stamina, and to reduce aggression;
- the ability to self-clean, allowing improved water quality and minimizing human to fish contact;

- improved waste management characteristics;
- the ability to efficiently and evenly add supplemental oxygen; and
- easily modified for water recirculation, if needed.

Three-foot circular tanks (106 gallons) would be used for early feeding and for juvenile segregations, and would be monitored for early mortality. After about 2 weeks, family groups would be combined in larger circular holding tanks. Sixteen-foot circular tanks would be used for rearing fish up to age 2, and 20-foot tanks would be used for rearing fish from age 2 until maturity. During captivity, tank flushing rates would be less than one turnover per hour and the maximum allowable fish density index would be 0.15 lb/ft<sup>3</sup>/in, as proposed by Banks (1994) and Ewing and Ewing (1995) for spring-run Chinook.

The Conservation Facility would utilize high quality slow sinking salmon feed from a reputable fish feed manufacturer. Dietary protein and energy levels may vary in order to modulate fish growth rates according to The Conservation Program requirements. Feeding charts would be used to guide the number of feedings and feed amount per day (by percent body weight).

Live feeds and other natural feeds would be investigated, with the goal of mimicking natural conditions. Feed conversion efficiencies would vary depending on the feed type, feed rate, and the age of the fish. Automated feeders would be used and feeding regimes and timing would attempt to mimic natural conditions, particularly for smolt production.

Growth rates would be modulated by manipulating the feed rate and/or the energy density and protein content of the feed. Growth of captive reared fish would be modulated to minimize precocity. Growth during smolt production would be modulated to meet the Conservation Program goals for release size, release timing and strategies for avoiding possible impacts to the wild population.

Fish health would be monitored by CDFG pathologists. Treatment methods prescribed by fish pathologists for disease outbreaks and treatment protocols would be carried out by hatchery staff. Depending on the nature of an outbreak, treatment methods may vary. However, chemical treatments for external pathogens may include the use of salt, KMnO<sub>4</sub>, formalin or hydrogen peroxide (as allowed by the hatchery discharge permit). Bacterial infections could include the use of oxytetracycline, florfenicol or other approved antibiotic.

All treatment would follow veterinary guidance and would be used and monitored according to NPDES wastewater discharge requirements. Diagnostic procedures for pathogen detection would follow American Fisheries Society professional standards, as described in the American Fisheries Society Bluebook (Thoesen 2007).

### **Tagging**

The entire population of captive reared broodstock would be genotyped for parental based tagging. A small fin clip would be collected from spawned fish and either dried on blotter paper or stored in

1 ethanol. In the lab, the fish would be genotyped, and this information stored in a parent database.  
2 When suspected offspring are sampled subsequently, they too would be genotyped, their parents  
3 located in the database and the stock and cohort of origin recorded.  
4

5 All ESA-listed Central Valley salmonids tissue samples would be preserved as voucher specimens  
6 and sent to: Dr. Robert Titus, California Department of Fish and Game, Tissue Archive Lab, 1875  
7 Alpine Avenue Suite F, Sacramento, California 95814, (916) 227-6844. Preservation protocol  
8 would be confirmed with the appropriate contact person.  
9

10 Broodstock reared at the Conservation Facility also would be tagged using PIT tags and Visual  
11 Implant (VI) tags after reaching a minimum length of 55 mm (Harvey 1987). Sterilized PIT tags  
12 would be injected into the peritoneum using an implant gun or syringe-style implant. PIT tags  
13 would be used for monitoring individual fish throughout captivity. Sterilized VI tags would be  
14 inserted into the clear tissue behind the eye using a sterilized syringe. VI tags would be used as a  
15 “duplicate” tag, since fish may expel PIT tags.  
16

17 Prior to spawning, adult fish would be tagged intra-muscularly with Petersen disc tags for easy  
18 visual identification (Harvey 1987). The tag would consist of two plastic buttons that are held to the  
19 sides of the fish by a stainless steel pin passed through the muscle tissue beneath the dorsal fin. The  
20 discs would be colored or marked with letters or numbers. Adult fish would be anesthetized during  
21 all tagging activities using MS-222, CO<sub>2</sub>, or Tricaine-S. The dosage of the anesthetics would be  
22 adjusted to avoid fish mortality.  
23

24 All hatchery juveniles would be adipose fin clipped and coded wire tagged prior to release (Harvey  
25 1987). Coded wire tags are small (less than 1 mm) lengths of wire implanted into the snout of each  
26 juvenile fish using specialized automated equipment. The tags (visually indicated by the removed  
27 adipose fin) would allow fish to be identified as belonging to a particular Conservation Facility  
28 cohort when it is either captured as an adult (commercial or sport fishery harvest), or when it returns  
29 to the San Joaquin River to spawn and the carcass is recovered. Some adipose fin clips would be  
30 used for additional genetic analysis.  
31  
32

## 33 **5.8 Reintroduction & Experimental Stock Release**

34

35 The third component of our proposed action includes the release of donor stock and/or conservation  
36 stock to the mainstem of the San Joaquin River.  
37

38 The prospective elements of the §10(j) ruling include direction by the permitting agency to provide  
39 coverage for all collected donor stock (and their progeny) through to release into the San Joaquin  
40 River—at which time the §10(j) experimental designation is expected to be in effect. Therefore, we  
41 anticipate activities associated with release to be categorized into two broad categories.  
42



1) Fish Relocation—“cleared fish” (at different lifestages) will be available *from the Conservation Facility* and transported for either direct release and/or exposure and acclimation at in-stream facilities (incubators or cages) into different areas of the river (see Reintroduction Strategies document, and below); and

2) Fish Translocation—“cleared fish” (at different lifestages) may be directly introduced *from a donor stream source* to the San Joaquin River. This is from riverine donor source (or associated holding facility) to riverine San Joaquin River habitat (including direct release and/or in-stream facilities).

In regulatory terms, “cleared fish” relocation refers to transport of covered individuals from one facility to another, all under the proposed §10(a)1(A) provisions pursuant to this application. Fish translocation involves transport of fish for eventual direct release to the San Joaquin River. Reintroduction into in-stream or streamside facilities would entail either relocation or translocation, depending on the fish source. Upon completion of transfer to riverine habitat (direct release or in-stream facility), the experimental §10(j) designation would commence.

#### 5.8.1 Adaptive Management of the Reintroduction

The Reintroduction Strategy document will guide future adaptive management methods for reintroduction of our donor source stock and progeny. The adaptive management process is discussed in the *Fisheries Management Plan* (SJRRP 2010) which emphasizes “learning by doing,” and ideally follows a technically rigorous process. That process includes: articulating what is known about the ecological dynamics of the system; predictive (quantitative, where possible) modeling to relate management actions to expected outcomes; monitoring, assessment and reporting of observed results; followed by successive reiterations of the entire process—revisiting our revised understanding through adaptive actions and further observations, etc.

A number of monitoring tools are necessary to evaluate the reintroduction strategies employed. Genetic evaluation and other methods will be used to evaluate the relative fitness and success of fish from the different stocks at various life stages following the reintroduction, and these evaluations will inform progress in the reintroduction effort. A monitoring framework that includes static sites, which will remain identical throughout the term of the SJRRP, for collecting biological data and genetic samples (e.g., fin clips), would allow identification of individuals and their biological status (e.g. growth, weight, condition factor). This pedigree information and biological information can be combined with genetic study of adaptive traits to demonstrate selection for specific traits and local adaptation to the San Joaquin’s environment.

#### 5.8.2 Direct Releases

This activity includes transport of various lifestages (“cleared fish” relocation and translocation) for direct reintroduction to the San Joaquin River. For all such transport activities (regardless of

destination), proper protocol must be followed to minimize stress and mortality. Transport of spring-run Chinook eggs, juveniles or adults from the Conservation Facility to the San Joaquin River for release/reintroduction would occur as described above for donor stock collections, by lifestage.

Transport water would be tempered to within 2° C of the river location receiving the fish before transferring fish. When possible, fish would be moved in and out of the transport truck using a water filled vessel and without netting to minimize stress and loss of slime. In particular, fish would be transferred to and from transport tanks using “in-water” purse-style stretchers that hold both fish and water (i.e., water-to-water transfer). Direct netting of fish would be minimized to the greatest extent possible to reduce injury and fish stress. When possible, releases would occur at night to minimize predation. Juvenile and adult fish would be transported to the release site using the following general guidelines (Carmichael et al. 2001):

- reduce the number of stressors;
- reduce the severity of stressors;
- minimize the duration of stressors;
- minimize plasma ion disturbances; and
- minimize increases in metabolic rate.

Up to 250,000 spring-run Chinook eggs per year may be reintroduced to the San Joaquin River, the source of which could be the Conservation Facility or directly from translocated fish collected in the donor streams. Upon arrival at the release site, eggs would be tempered to the receiving water by increasing the egg temperature 1°C per hour until matching the receiving water temperature. Eggs then would be reintroduced to the San Joaquin River as described below using streamside incubators, instream incubation boxes, or egg injection into the gravel. Timing of egg releases would occur in direct correspondence to their availability from the Conservation Facility, typically from August 20 through November 10.

Preferred release sites would be near the hatchery and predicted spawning ground; however, releases may occur much farther downstream to avoid migratory hazards and predator conditioning, and transport time may be as long as 2 hours.

San Joaquin River egg or juvenile spring-run Chinook release locations may include, although are not limited to, the following locations:

- Conservation Facility, RM 254.2
- Lost Lake Park, RM 264.5
- Ball Ranch Access Point RM 262.2
- San Joaquin River Ecological Reserve, Willow Unit, RM 260.6
- Fort Washington Access Point, RM 257
- Vulcan Access Point/Rank Island RM 258.5
- Sycamore Island, RM 253.3



- Scout Island, RM 250
- Highway 99 Bridge Crossing, RM 243.2
- San Joaquin River Ecological Reserve, Millburn Unit, RM 247.2
- Bifurcation Structure Access Point, RM 216.1
- Mendota Pool Access Point, RM 205
- Sack Dam, RM 182
- Firebaugh, RM 195
- San Luis Wildlife Area, RM 147.2
- Highway 165 Bridge, RM 132.9
- Highway 140 Bridge, RM 125.1
- Hills Ferry Barrier, RM 118.2

### 5.8.3 Reintroduction Methods

Depending on the lifestage targeted for each reintroduction, several direct or indirect methods are proposed. These methods were chosen to allow the best chance of survival for each lifestage and will be monitored to address additional unforeseen factors and improvements that may be needed. All fish (eggs and juveniles) will be quarantined based on DFG's Fish Health Assessment recommendations (see *Section 5.3 Quarantine and Pathology*). After fulfilling pathology/quarantine requirements, fish collected for direct translocation to the San Joaquin River may be held at the Conservation Facility or in net pens in the river (to facilitate imprinting, tagging/marketing, etc.) before release. Eggs for direct translocation will not be sent to a quarantine facility. Health inspection data for IHNV and BKD are collected from ovarian fluid of returning adult females annually during spawning. Eggs from IHNV and BKD negative females will be properly disinfected at FRFH and transported for direct translocation to the San Joaquin River. Eggs for direct translocation will not be taken to the Conservation Facility.

#### *Direct Release*

##### *Egg injection into the gravel*

This method would involve injecting eyed eggs into the gravel using a hydraulic redd pump/egg injector (ARED, Inc., Wrangell, Alaska (<http://www.ared.net>)) to simulate incubation in a natural redd within the gravel. Egg injection would occur in areas of the river with suitable spawning habitat characterized by appropriate water depth, velocity, and substrate, and low sedimentation. Egg injection sites also would be selected to be adjacent to areas with appropriate water depth, velocity, and substrate, and cover characteristics to promote fry growth and survival. A simulated redd would be prepared by first inserting a water pump pipe into the gravel and pumping water through to remove fine material, as would occur with natural salmonid spawning, prior to egg injection. Fine sediments would be "pumped" out to improve permeability. About 50 eggs would then be poured into the open top of the pipe and pumped into the gravel along with the stream water

1 from the pump. The site would then be left alone for the eggs to incubate and fry to emerge  
2 naturally. If the reintroduction of eggs would occur entirely using the hydraulic redd pump/egg  
3 injector, the activity would occur in about 4,000 locations.  
4

### 5 *Juvenile Releases*

6 Juveniles are expected to be available for release into the San Joaquin River at various ages and sizes  
7 from the FRFH and Conservation Facility. Juveniles may be released over the same temporal  
8 window as collection or availability occurs, or placed in temporary holding pens for imprinting and  
9 additionally for acclimation prior to release into the San Joaquin River. Release sites would be  
10 selected to provide appropriate water depth, velocity, substrate, and cover characteristics to promote  
11 juvenile growth and survival. The use of temporary holding pens would allow the juveniles to  
12 acclimate before release, and thereby reduce the risk of predation (Fisheries Foundation 2009).  
13 Juvenile salmon outmigrate in groups, which may reduce mortality due to predation. Temporarily  
14 holding juveniles and releasing them in a series of groups may more closely resemble natural  
15 densities experienced during rearing and outmigration and increase their survivorship.  
16

17 Finally, if smolt-sized juveniles from the FRFH are released in the Restoration Area, holding the fish  
18 in pens temporarily may increase the likelihood that they imprint on the San Joaquin River and  
19 return to the Restoration Area to spawn as adults. Juvenile salmon learn odors associated with their  
20 home stream before seaward migration and use these odor memories for homing as adults (Dittman  
21 1995). Numerous studies from the Pacific Northwest point to the value in developing olfactory cues  
22 for juvenile salmonids released outside of their natal streams, to improve homing to the river of  
23 release (Slatick et al 1988).  
24  
25

### 26 *Indirect Release*

#### 28 *Streamside Incubators*

29 This method would entail using portable incubators erected alongside the San Joaquin River. The  
30 incubators would be Whitlock-Vibert (WV) boxes (Federation of Flyfishers, Livingston, Montana;  
31 [www.fedflyfishers.org](http://www.fedflyfishers.org)) contained in 5-gallon buckets or large tubs. The WV boxes would be plastic  
32 and measure 6in x 2in x 4in ([www.kawanobooks.com/html/En/e083.html](http://www.kawanobooks.com/html/En/e083.html)). Fifty eyed eggs would  
33 be placed in one of two chambers in the box. Once they hatch, fry would exit the egg chamber  
34 through slots and enter a rearing chamber. Fry would be released into the river immediately upon  
35 absorption of their yolk sac and swim through slots in the outer sides of the boxes. Release would  
36 occur volitionally onsite, or fry would be transported to specific locations for release. Release sites  
37 would be selected so as to provide appropriate water depth, velocity, and substrate, and cover  
38 characteristics to promote fry growth and survival. This method essentially involves piping a river  
39 water source, using gravity, through an incubator of incubating eggs. The water is piped into the  
40 bottom of the incubator and allowed to flow out the top. Sites would be selected to provide the best  
41 conditions to successfully incubate the eggs. If the re-introduction of eggs would occur entirely

1 using streamside incubators, up to 8000 WV boxes may be required. These would be housed in 5-  
2 gallon buckets (2 WV boxes per bucket) or 534 large tubs (15 WV boxes per tub).

### 3 *Instream Incubators*

4 This method would involve incubating freshly fertilized or eyed eggs contained in wire or plastic  
5 boxes directly in the stream gravel of the San Joaquin River. Incubators would be buried in the  
6 streambed in a likely spawning area with appropriate water depth, velocity, and substrate, and low  
7 sedimentation. Sites also would be selected adjacent to areas with appropriate water depth, velocity,  
8 and substrate, and cover characteristics to promote fry growth and survival. WV boxes may be used  
9 as described above, except that they would be buried in the stream gravel and fry would complete  
10 their swim through the stream gravel. Additionally, an incubator design described by Donaghy and  
11 Verspoor (2000) may be used. Their design is an about 7-inch square box that includes lidded trays  
12 for holding eggs, a basket for retaining the trays, and a lidded frame for securing the basket in the  
13 streambed. This incubator would accommodate 4,000 eggs, and as with the Whitlock-Vibert boxes,  
14 would allow eggs to mature within the streambed and the fry to emerge naturally. If the  
15 reintroduction of eggs would occur entirely using instream incubators, 8000 WV boxes or 100  
16 incubators of the type described by Donaghy and Verspoor (2000) would be required.

### 18 **5.8.4 Reintroduction Timeline**

21 With the acceptance of the Settlement by the Court in October 2006, work immediately began on  
22 planning needed to implement the SJRRP consistent with the NEPA and the California  
23 Environmental Quality Act (CEQA). During the drafting of the Settlement, it was assumed that  
24 legislation would be quickly forthcoming. However, the legislation (SJRRS Act) was not signed  
25 until March 2009, which then authorized the implementation of the Settlement. As a result, progress  
26 on channel improvements has been delayed past that which was anticipated and scheduled within the  
27 context of the Settlement.

29 To fully achieve the Restoration Goal, a combination of channel and structural improvements along  
30 the San Joaquin River below Friant Dam and releases of additional water from Friant Dam to the  
31 confluence of the Merced River will be required. The near-term channel and structural  
32 improvements are outlined in Paragraph 11(a) of the Settlement. The near-term release of additional  
33 water from Friant Dam is outlined in Paragraph 15 of the Settlement. However, realizing that  
34 quality fish habitat must be present to optimize the success of the proposed action, the implementing  
35 agencies have also considered the current habitat conditions of the San Joaquin River in light of the  
36 Settlement timeline.

38 The anticipated short residency time of spring-run during the initial introduction and the several year  
39 lag prior to the initial adult returns provide greater flexibility in the completion of the restoration  
40 activities, despite delays in implementing channel improvements.

Furthermore, prior to the completion of stream restoration activities, the various habitat components required by different life history stages of salmonids are generally available in the upper mainstem San Joaquin River, although it is not yet clear if the extent and quality of existing habitat is sufficient to support long-term population needs. There are still holding pools below Friant Dam suitable for adult spring-run Chinook; moderate quantities of salmonid spawning habitat still remain in Reach 1A; and the river channel in Reach 1 seems capable of providing instream rearing habitat for juvenile salmonids in certain months. Furthermore, the interim releases can provide adequate flow and temperatures in the upper reaches. The increase in flows in certain reaches could enhance dispersal and germination of riparian vegetation in the absence of restoration efforts, via natural colonization. Even if the amount and quality of existing habitat is initially inadequate to achieve the long-term objectives, the amount and quality of existing habitat seem sufficient to at least initiate the process of restoring salmonid populations (McBain and Trush 2002).

#### 5.8.5 Settlement Paragraph 11(a), Phase 1 Improvements

##### *Mendota Pool Bypass and Reach 2B Channel Improvements Project*

- Creation of bypass channel around Mendota Pool to ensure conveyance of at least 4,500 cfs from Reach 2B to Reach 3. (Requires completion of a structure capable of directing flow down the bypass and allowing deliveries of San Joaquin River water into Mendota Pool when necessary.)
- Channel capacity modifications (incorporating new floodplain and riparian habitat) to ensure conveyance of at least 4,500 cfs in reach 2B between Chowchilla Bifurcation Structure and new Mendota Pool bypass channel.

The actions described in Paragraph 11(a)(1) and 11(a)(2) have been combined because of their related functions, the project planning has begun and construction is estimated to start in 2013, and be completed in 2015.

##### *Reach 4B, Eastside Bypass and Mariposa Bypass Low Flow Channel and Structural Improvements Project*

- Modifications in San Joaquin River channel capacity, if necessary, to ensure 475 cfs through Reach 4B.
- Modifications at Reach 4B headgate on the San Joaquin River channel for fish passage and to enable flow routing of between 500 cfs and 4,500 cfs into Reach 4B.
- Sand Slough modifications to ensure fish passage.
- Modifications to structures in the Eastside and Mariposa Bypass channels to the extent needed to provide anadromous passage on an interim basis until completion of Phase 2 improvements.
- Modifications in the Eastside and Mariposa Bypass channels to establish a suitable low flow channel (if Secretary, in consultation with RA, determines necessary).

Work on combined projects 3, 4, 5, 8, and 9 began in September 2009; construction is anticipated to start in 2013 and be completed in 2015.

#### *Arroyo Canal Fish Screen and Sack Dam Fish Passage Improvements Project*

- Screening of Arroyo Canal water diversion upstream of Sack Dam to prevent entrainment of anadromous fish.
- Modifications at Sack Dam for fish passage.

Planning began in 2009, and construction is anticipated to start in 2012 and be completed in 2014.

#### *Salt and Mud Slough Seasonal Barriers*

- Modifications to enable deployment of seasonal barriers to prevent adult anadromous fish from entering false migration pathway in the area of Salt and Mud Sloughs.

Planning is anticipated to begin for this project in early 2012, with construction estimated to start and be completed in 2014

#### *Additional Actions Identified in the draft Fisheries Management Plan (SJRRP 2010)*

- Minimize in-river harvest, unlawful take, and disturbance;
- Augment and clean gravel to improve spawning habitats;
- Construct settling basins to reduce sedimentation;
- Restore floodplain habitat;
- Create off-channel Chinook rearing areas; and
- Increase invertebrate production.

Planning and construction timelines have not been established for these actions.

#### *Interim Flows*

Paragraph 15 of the Settlement calls for a program of Interim Flows that includes releases of additional water from Friant Dam to start no later than October 1, 2009, and continue until full Restoration Flows begin. The purpose of the Interim Flows is to collect relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture and reuse to facilitate the larger project planning.

Paragraph 14 of the Settlement identifies that the Restoration Goal of the Settlement shall include the reintroduction of spring run and fall run Chinook salmon to the San Joaquin River between Friant Dam and the confluence with the Merced River by December 31, 2012. Given the schedule for fish reintroduction outlined in the Settlement, the implementation of interim flows, the channel improvements and the biology of salmon, the following timeline for the reintroduction of Chinook salmon is anticipated.

## 2012 - 2017

Initial reintroduction encompasses direct in-river Chinook releases, the use of an Interim Facility, and the construction and operation of a full scale Conservation Facility. In the Reintroduction and Interim population phases (Meade 2007, 2008), genetic pedigree analyses (parentage based tagging, Anderson and Garza 2005) and well-designed propagation experiments will/should be conducted to evaluate which reintroduction methods are/will have the greatest success in returning adult spawners. Monitoring of the effectiveness of artificial propagation and management actions on the demographics of the natural re-establishing populations is essential for adaptive management. This population will require monitoring during all periods of the restoration program to ensure that the planned level of segregation/integration of hatchery fish is occurring.

## 2017 - 2022

During this time period, strategies with the greatest success should be continued. It is anticipated that San Joaquin River spring-run Chinook returns will be high enough so collection of fish from source stocks will not be necessary. The Conservation Facility will also start ramping down hatchery operations during this time.

## 2022- 2040

The settlement calls for salmon populations to be self-sustaining on the San Joaquin River between Friant Dam and Merced River by December 2025. It is anticipated that the Conservation Facility will be phased out during the beginning of this period; however, the research component of the Conservation facility will be ongoing. The Conservation Facility may be brought back online in certain circumstances, such as but not limited to, during periods of low returns, low water year types, and rescue operations.

### 5.8.6 Trap and Haul

In the early years of the Reintroduction Program, it is anticipated that a number of major passage impediments will still be in place in the Restoration Area. In order to meet the Settlement mandated reintroduction date, December 31, 2012, there may be a need to utilize trap and haul procedures to move reintroduced fish through the river system. This would require moving juveniles downstream of structures, or unscreened diversions/bypasses, and may require moving returning adults upstream around passage barriers, including structural or biological barriers, (e.g., temperature or DO migration barriers). The locations of these impediments may vary both temporally and spatially as they are subject to river conditions and flows, as well as depend on the state of proposed restoration projects.

For out migrating juveniles, one method to assist with trap and haul operations may be to utilize holding pens as described above (in the *Experimental Stock Release/Reintroduction, Juvenile Releases section*). Holding pens serve to both acclimate, and also allow imprinting of fish. If transporting significant distances, fish would be put into pens in more than one location in the river

1 to increase the likelihood that they are able to imprint successfully. It is anticipated that both the  
2 holding pens and trap and haul may be used in conjunction.  
3

4 Fish would be collected from the holding pens in the San Joaquin River and transferred to a transport  
5 tank. The tank would be filled with stream water immediately prior to transport using a portable,  
6 screened pump. The transport water would be oxygenated using bottled oxygen with oxygen stones  
7 and/or impellor driven aerators. Dissolved oxygen levels would be monitored and maintained near  
8 saturation during transport. When necessary, transport water would be supplemented with sodium  
9 chloride to provide a physiologically isotonic concentration to minimize ionic disturbances. When  
10 possible, fish would be moved in and out of the transport tank using a water filled vessel (i.e., water  
11 to water transfer) and without netting to minimize stress and loss of slime. Transport times may be  
12 as long as 4 hours. Water would be tempered to two degrees Celsius of the receiving water at the  
13 release location before transferring fish.  
14

15 The same general guidelines used to minimize impacts during the collection and relocation or  
16 translocation of fish from the donor and conservation stocks to the Conservation Facility and/or San  
17 Joaquin River can be utilized to minimize impacts of Trap and Haul Procedures.  
18  
19

## 20 **6. EXISTING CONDITIONS**

---

### 21 **6.1 Current Conditions by Reach**

22  
23  
24 The San Joaquin River from Friant Dam to the confluence of the Merced River (Restoration Area) is  
25 approximately 153 miles long, and includes an extensive flood control bypass system (bypass  
26 system). The Restoration Area has been significantly altered by changes in land and water use over  
27 the past century. During flood flows there is connectivity from Friant Dam to the Merced River and  
28 ultimately to the Delta by way of the bypass system. This connectivity occurs on average every 2.5  
29 years. While most the San Joaquin River channel will have water in it during these conditions,  
30 Reach 4B remains dry, as water is routed around this river section and into the Eastside Bypass.  
31



Five river reaches have been defined to address the great variation in river characteristics throughout the Restoration Area. Table 3 describes the various attributes of the 5 river reaches.

Reach	Substrate	Geo-morphology	Water present/ source	Land use	Vegetation	Other impacts
1A	Gravel	Incised	Yes/ Friant	Gravel mining/ Ag	Invasive woody spp.	Sediment limited
1B	Gravel	narrow/ levees	Yes/ Friant	Gravel mining/ Ag	narrow riparian zone; Invasive woody spp.	Sediment limited
2A	sand	narrow/ levees	No/ Intermittent/ Delta Mendota Canal	Ag	sparse; grassland; non- native	seepage loss; ground water overdrafting; backwater effects
2B	sand	sandy channel/ levees	No/ Intermittent/ Mendota pool	Ag	narrow riparian zone; native	limited conveyance; perennial
3	sand	narrow/ canals	Yes/ DMC	Ag/ urban	narrow riparian zone	flow diverted to Arroyo canal
4A	sand	narrow canals	No/	Ag	sparse	lowest ratio of vegetation to river in the entire Restoration Area
4B1	sand	poorly defined	No/ water by passed	Ag	dense vegetation	Dry for >40 years except Ag water return
4B2	sand	wider floodplains	Yes	Ag	vast area natural vegetation	Ag water returns
5	sand	side channels/ levees/ floodplain	Yes	public ownership/ wildlife habitat	large expanses of grassland and woody riparian veg.	Extensive bypass system

Table 3. Reach Specific Restoration Area Conditions

Reach 1 begins at Friant Dam and continues approximately 37 miles downstream to Gravelly Ford. This reach conveys continuous flows through an incised, gravel-bedded channel. Reach 1 typically has a moderate slope, and is confined by periodic bluffs and terraces. The reach is divided into two subreaches: 1A and 1B. Reach 1A, which extends down to State Route (SR) 99, supports continuous riparian vegetation except where the channel has been disrupted by gravel mining and other development. Reach 1A also contains potential holding pool habitat that would support adult spring-run holding, and the majority of available spawning habitat. Reach 1B continues from SR 99 to Gravelly Ford where it is more narrowly confined by levees. Reach 1 has been extensively mined for instream gravel and is sediment limited. Gravel mining and agriculture are the primary land uses in Reach 1B.

Reach 1 is the only reach that contains potential holding pool habitat to support adult spring run holding from late spring through the summer. Draft data compiled by California Department of Fish and Game (Matt Bigelow, pers. comm. 09/01/2011 email to Michelle Workman) delineated holding



pool criteria and area available for suitable adult holding. Preliminary estimates suggest that there is enough holding habitat (based on temperature, depth, velocity and cover) to support 120,000-360,000 adult fish. At this time, holding pool habitat does not appear to be a limiting factor in the San Joaquin River.

Reach 2 starts at Gravelly Ford, extends downstream to Mendota Dam, and is a meandering, low-gradient channel. During most months of the year, the Reach 2 channel is dry with the exception of flood release conditions from Gravelly Ford to Mendota Dam. Mendota Pool is formed by the Mendota Dam at the confluence of the San Joaquin River and Fresno Slough. The primary source of water to the Mendota Pool is conveyed from the Delta through the Delta-Mendota Canal (DMC).

Reach 2 is subdivided at the Chowchilla Bypass Bifurcation Structure into two subreaches, Reach 2A and Reach 2B, which have confining levees protecting adjacent agricultural land. Reach 2A and Reach 2B are intermittent and sand-bedded. Reach 2A is subject to extensive seepage losses and accumulates sand due to backwater effects of the Chowchilla Bypass Bifurcation Structure and the low gradient of the reach. Riparian vegetation in Reach 2A is sparse or absent due to the usually dry conditions of the river and groundwater overdrafting (McBain and Trush 2002). Reach 2A vegetation has abundant grassland/pasture and large stands of nonnative plants (Moise and Hendrickson 2002). Reach 2B has a sandy channel with limited conveyance capacity and a thin strip of riparian vegetation, primarily native species, which borders the channel. A portion of Reach 2B is perennial because of the backwater of Mendota Pool.

Reach 3 extends from Mendota Dam at the upstream end to Sack Dam at the downstream end and receives continuous flows from the DMC. At Sack Dam, flow releases are diverted into the Arroyo Canal. The river is confined by local dikes and canals on both banks. The sandy channel meanders through a predominantly agricultural area, except where the City of Firebaugh borders the river's west bank. The river at this location has a low stage but is perennial and supports a narrow riparian corridor along the edge of the river channel.

Reach 4, located between Sack Dam and the confluence with Bear Creek and the Eastside Bypass, is sand-bedded and usually dewatered because of the diversion at Sack Dam. The upstream portion of Reach 4 is bounded by canals and local dikes down to the confluence with the Mariposa Bypass at the San Luis National Wildlife Refuge. Levees that begin at the Mariposa Bypass continue downstream on both banks (McBain and Trush 2002). Reach 4 is subdivided into three distinct subreaches: 4A, 4B1, and 4B2.

Reach 4A, from Sack Dam to the Sand Slough Control Structure, is confined within a narrow channel. This subreach is dry in most months with any existing flows being diverted at Sack Dam. The floodplain of Reach 4A is broad, with levees set back from the active channel. The subreach is sparsely vegetated, with a thin and discontinuous band of vegetation along the channel margin. This subreach has the fewest functioning stream habitat types and the lowest ratio of natural vegetation per river mile in the Restoration Area.

1 Reach 4B1 extends from the Sand Slough Control Structure to the confluence with the Mariposa  
2 Bypass. All flows reaching the Sand Slough Control Structure are diverted to the bypass system.  
3 Because of this, Reach 4B has been perennially dry for > 40 years, except when agricultural return  
4 flows are put through the channel, leaving standing water in many locations. As a result, the Reach  
5 4B1 channel is poorly defined with dense vegetation and other fill material. The riparian corridor  
6 upstream of the Mariposa Bypass is narrow, but nearly unbroken.

7  
8 Reach 4B2 begins at the confluence of the Mariposa Bypass, where flood flows in the bypass system  
9 rejoin the mainstem of the San Joaquin River, and extend to the confluence of the Eastside Bypass.  
10 Reach 4B2 contains wider floodplains than upstream reaches and vast areas of natural vegetation.

11  
12 Reach 5 extends from the confluence of the Eastside Bypass downstream to the Merced River  
13 confluence. Reach 5 is perennial because it receives varying amounts of agricultural return flows  
14 from Mud and Salt sloughs. Reach 5 is more sinuous than other reaches and contains oxbows, side  
15 channels, and remnant channels (McBain and Trush 2002). Reach 5 is bounded on the west by  
16 levees downstream to the Salt Slough confluence and on the right bank to the Merced River  
17 confluence. Reach 5 has a broad floodplain; however, levees generally dissociate the floodplain  
18 from the mainstem San Joaquin River (McBain and Trush 2002). Less agricultural land conversion  
19 has occurred in Reach 5, with a majority of the land held in public ownership and managed for  
20 wildlife habitat.

21  
22 The bypass system consists of a series of dams, bifurcation structures, flood channels, levees, and  
23 portions of the main river channel. The bypass system is managed to maintain flood-conveyance  
24 capacity. Descriptions of primary components of the bypass system follow:

25  
26 Fresno Slough, also known as James Bypass, conveys flood flows regulated by Pine Flat Dam from  
27 the Kings River system in the Tulare Basin to Mendota Pool. Under current flood flow operations,  
28 Kings River flows take precedence for channel capacity in the system, so when Kings River flows  
29 enter Mendota Pool at least some portion of Friant releases must be routed down the Chowchilla  
30 Bypass to make space for the Kings River flows in the downstream reaches (reaches 3-5).

31  
32 The Chowchilla Bifurcation Structure, at the head of Reach 2B, regulates the flow split between the  
33 San Joaquin River and the Chowchilla Bypass. The Chowchilla Bypass extends to the confluence of  
34 Ash Slough, and is approximately 22 miles long, leveed, and 600 to 700 feet wide. Sand deposits  
35 are dredged from the bypass, as needed, and vegetation is periodically removed from the channel.  
36 The Chowchilla Bypass contains a number of bridge crossings, road crossings and drop structures  
37 that may inhibit successful fish passage. In order for flow connection from the lower Chowchilla  
38 Bypass through the Eastside Bypass system, an approximate 2,000 cfs needs to enter at the head of  
39 the Chowchilla Bypass. In general flows less than 2000 cfs will not connect due to channel losses  
40 along the length of the Chowchilla Bypass.

41  
42 The Eastside Bypass bypasses 32.5 miles of river and extends from the confluence of Ash Slough  
43 and Chowchilla Bypass to the confluence with the San Joaquin River at the head of Reach 5 and is

subdivided into three reaches. Eastside Bypass Reach 1 extends from Ash Slough to the Sand Slough Bypass confluence and receives flows from the Chowchilla River at RM 136. Eastside Bypass Reach 2 extends from Sand Slough Bypass to the head of the Mariposa Bypass at RM 147.2. Eastside Bypass Reach 3 extends from the head of the Mariposa Bypass to the head of Reach 5, at RM 168.5 and receives flows from Deadman, Owens, and Bear creeks. There is a bifurcation structure at the junction of the Eastside Bypass and the Mariposa Bypass. Flood flow operations call for the water to be released down the Mariposa Bypass first, then the Eastside Bypass reach 3, but elevationally water must inundate the Eastside Bypass reach 3 to attain an elevation that will then send it down the Mariposa Bypass. The Eastside Bypass contains a number of bridge crossings, road crossings, drop structures, sloughs and side channels that may inhibit fish passage both upstream and downstream.

## 6.2 Riparian Habitat

Previous vegetation surveys were conducted on the San Joaquin River by Jones and Stokes Associates, Inc. (1998), Science Applications International Corporation (SAIC 2002) and California Department of Water Resources (Moise and Hendrickson 2002). A summary of the current acreages of various riparian vegetation types by Reach is shown in Table 4.

Category	Vegetation type	Reach								
		1A	1B	2A	2B	3	4A	4B	5	Total
Riparian forest	Cottonwood riparian forest	167	79	31	48	441	16	32	41	855
	Cottonwood riparian forest, low density	27	114	41	1	23	4	4	0	214
	Willow riparian forest	205	119	43	112	116	65	508	590	1758
	Willow riparian forest, low density	28	0	4	6	8	14	118	308	486
	Mixed riparian forest	400	260	0	0	0	6	0	32	698
	Mixed riparian forest, low density	56	19	2	0	0	0	0	17	94
	Valley oak riparian forest	265	0	0	0	0	0	23	46	334
Riparian scrub	Willow scrub	216	113	76	38	190	38	119	73	863
	Willow scrub, low density	74	32	124	15	41	10	13	10	319
	Riparian scrub (non-willow)	47	48	126	87	61	61	58	81	569
	Elderberry savanna	2	0	3	63	0	0	0	0	68
Invasive Exotics	Exotic tree	55	22	9	0	0	0	0	12	98
	Giant reed	3	4	6	0	0	0	0	0	13
Wetland	Wetland	233	5	11	64	16	41	290	336	996
Other	Grassland	2582	300	491	226	174	201	2730	3969	10673
	Agriculture	1915	3167	4554	2047	5361	2702	4189	1445	25380
	Disturbed	2244	381	184	259	743	372	658	182	5023
	Urban	365	0	0	0	623	0	0	0	988
Total		8884	4663	5705	2966	7797	3530	8742	7142	49429

Table 4. Area of vegetation types (in acres) in 1998 (adapted from Moise and Hendrickson 2002).

Reach 1A presently supports nearly continuous riparian vegetation, except where the channel has been disrupted by instream aggregate removal and aggregate pits (JSA and MEI 1998). In Reach

1B, mature vegetation is scarce; which may be due to extensive removal of riparian vegetation for floodway clearing from 1968 through 1970 (JSA 1998). These two reaches (1A and 1B) currently provide potential spawning and rearing habitat for salmonids.

In Reach 2, agricultural grading has eliminated much of the floodplain, and the remaining riparian zone is confined between levees and bordered by agricultural lands. Riparian vegetation in the upper 10 miles of Reach 2A is sparse or nearly absent. The lower few miles of Reach 2B support narrow, patchy, but nearly continuous vegetation where backwater forms upstream of Mendota Pool. Reach 3 is similar, in that most of the floodplain has been agriculturally graded and leveled, however, nearly continuous riparian vegetation of various widths occurs on at least one side of the channel within this reach (JSA and MEI 1998). Reach 4A is only sparsely vegetated, with a very thin band of vegetation along the channel margin. Several narrow bands and patches of willow scrub and marsh vegetation occur (JSA and MEI 1998). Reach 4B upstream of the Mariposa Bypass supports a nearly unbroken, dense, but narrow corridor of willow scrub or young mixed riparian vegetation on most of the reach, with occasional large gaps in the canopy. In Reach 5, the San Joaquin River is surrounded by upland grassland with some woody riparian vegetation within the floodplain. The floodplain and basin are generally disassociated from the mainstem of the river due to levees.

### 6.3 Aquatic Habitat

Recent surveys have provided estimates of the quantity of spawning gravel in the upper San Joaquin River. In 1996, Cain (1997) estimated a total of 303,000 ft<sup>2</sup> of spawning gravel between Friant Dam (RM 267) and Gravelly Ford (RM 229) (Table 5). In 2000, Jones and Stokes Associates, Inc. (JSA and Mussetter 2002) and Entrix (in McBain and Trush 2002) delineated spawning areas and estimated 773,000 ft<sup>2</sup> of spawning habitat available between Friant Dam and Skaggs Bridge (RM 234). In spring 2002, a second survey was conducted to map suitable spawning gravel in the reach from the Friant Dam to Highway 99 (RM 243) (Stillwater Sciences in McBain and Trush 2002). Over 357,000 ft<sup>2</sup> of suitable spawning gravel was delineated, of which approximately 281,400 ft<sup>2</sup> of suitable spawning gravel occurred between Friant Dam and Lanes Bridge.

Source	Date of survey	Extent of survey	Estimate (ft <sup>2</sup> )
Cain 1997	1996	Friant Dam to Gravelly Ford	303,000
Jones and Stokes Assoc./Entrix, cited in McBain and Trush 2002	2001	Friant Dam to Skaggs Bridge	773,000 <sup>a</sup>
Stillwater Sciences, cited in McBain and Trush 2002	2002	Friant Dam to Highway 99 Bridge	357,000 <sup>b</sup>

<sup>a</sup> included gravel beyond the base flow channel (e.g., on point bars, etc.), probable over-estimate

<sup>b</sup> incorporated hydraulic suitability at potential spawning baseflows

Table 5. Summary of salmonids spawning habitat estimates on the upper San Joaquin River (adapted from McBain and Trush 2002).

## 7. EFFECTS ANALYSIS AND PROPOSED CONSERVATION MEASURES

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### 7.1 Effects of Donor Stock Collection

#### *Individual-Level Effects*

The life-history stage selected for broodstock and translocation from the FRFH would vary based on several factors, including: the status of the donor population, the potential impact to the donor population for the particular choice of lifestage and method utilized, the accessibility of each life-stage, stipulations of collection permits, and guidance from the adaptive management process. Final collection targets would depend on broodstock availability and guidance from the NMFS and CDFG through the annual donor stock collection planning process.

#### *Feather River Fish Hatchery Egg Collection*

Adult spring-run Chinook are currently spawned onsite at the FRFH to meet existing hatchery production goals and targets. Surplus fertilized eggs and juveniles would be collected for the Reintroduction Program. This collection technique would require the sacrifice of adult salmon and the artificial incubation of the fertilized eggs and the artificial rearing of juveniles.

After fertilization, the eggs are unlikely to be disturbed until the eyed-egg stage when they would be added (bounced) to separate the live and dead eggs. It is unlikely that the jostling of the embryos could elicit a “shock” response because the embryos are fairly resistant to jostling by this stage of development (Billard and Jensen 1996, ADFG 2010). The protocols set forth in the HGMP for the FRFH spring-run Chinook (DWR 2009) would be followed to minimize any additional adverse effects.

To reduce disease and egg mortality, iodine would be flushed through the incubators on a daily basis. During times that increased mortality may be anticipated, fish health would be monitored by CDFG Fish Health Laboratory personnel and diagnostic procedures for pathogen detection would follow American Fisheries Society professional standards as described in Thoesen (1994).

Appropriate treatments would be recommended or prescribed by a CDFG Fish Pathologist/Veterinarian and follow-up examinations would be performed as needed (Cavallo et al. 2009). The use of these protocols has resulted in a 72 percent survival to hatching rate, with survival rates reaching 85 percent in recent years (Cavallo et al. 2009).

Preferably, juveniles selected for the Reintroduction Program would be segregated as eggs in individual vertical egg incubator trays for hatching and later transferred to a segregated raceway section for outdoor rearing at the main FRFH facility or at the nearby FRFH Annex facility. If the Program is unable to segregate fish during the egg lifestage, then the Program will collect spring-run juveniles from all available raceways. When juveniles reach the appropriate length for transfer to

the Conservation Facility, or for translocation to the San Joaquin River, the Program will follow the FRFH's standard procedures to corral and collect the juveniles. Once collected, the juveniles would be placed in buckets for further processing. Adipose-fin clipping and CWTs would be required for any juveniles reared in the facility and released into the San Joaquin River.

### *Quarantine and Pathology*

Eggs destined for the Conservation Facility will first be quarantined. After hatching, 60 individuals will be sacrificed for pathology testing, and upon health certification the remaining individuals will be transferred to the Conservation Facility for the captive rearing program (see *Section 5.8 Rearing Facilities*). For direct translocation to the San Joaquin River, eggs from IHN and BKD negative females will be properly disinfected at FRFH and transported for direct translocation to the San Joaquin River for injection into the gravels, or streamside or in-stream incubation.

Between December and March, juveniles raised at the FRFH would be quarantined on-site for the minimum 30 day health evaluation (see *Sections 5.3 Quarantine and Pathology* and *5.4 Quarantine Facilities*). If fish cannot be quarantined on-site, then the fish will be sent to another quarantine facility (e.g. Silverado Fisheries Base). Sixty individuals will be sacrificed for pathology testing, however these 60 fish may be fall run as they would have experienced similar conditions in the rearing facility. After quarantine and pathology testing, juveniles would be transported to the Conservation Facility or the San Joaquin River for translocation. For individuals translocated to the San Joaquin River, short term confinement is required for sufficient imprinting, which may occur either in or alongside the San Joaquin River or at the Conservation Facility.

The transport of eggs or juveniles between FRFH and the San Joaquin River Conservation facilities or release site on the San Joaquin River is not expected to result in more than a 1 percent decrease in survival of eggs or juveniles (Sharpe et al 1998, Schreck et al 2006, Achord et al 1996).

### *Transport Effects—Eggs*

Possible adverse effects to the collected eggs could occur in the transport process, including ionic and respiratory disturbance of the egg membrane, the spread of disease to other eggs, injury due to jostling, or death if the membrane is ruptured or punctured (ADFG 2010, Thedinga et al. 2005). To minimize these effects, eggs would be placed in a specialized shipping container to reduce excessive movement and limit damage to the egg membrane. An iodine bath would be administered during transport to disinfect eggs and to limit the spread of disease to other embryos. The eggs would also be disinfected again upon arrival to the rearing facility or prior to being placed in the river.

### *Transport Effects—Juveniles*

The transfer and holding of fish could cause adverse effects to juveniles including, stress, injury and mortality. Juveniles can easily become stressed if the ionic balance, pH, dissolved oxygen concentration, or the water temperature in the transfer tank differs greatly from the source water (NMFS 2003). Also, a high stocking density of juvenile salmonids could elicit a stress response

(increased cortisol levels) in individual fish, leading to reduced fitness, vulnerability to additional stressors, and possible mortality (Barton et al. 1980).

To minimize the potential effects of transporting juveniles, transfer protocols would be followed that would monitor and maintain dissolved oxygen and isotonic water concentrations, temper the water temperature to within two degrees Celsius of the receiving facility, and maintain an appropriate stocking density. The maximum allowable density index would be 0.15 lb/ft<sup>3</sup>/in as proposed by Banks (1994) Ewing and Ewing (1995) for spring-run Chinook.

## Ecosystem (Indirect) Effects

### *Marine Derived Nutrients and Carbon Availability*

It is widely accepted that marine derived nutrients (via adult salmon carcasses) are vital for the growth of juvenile salmonids (Bilby et al. 1998, Bilby et al. 1996). Removal of broodstock from donor streams may limit the number of returning adults and thus decrease the availability of marine derived nutrients and carbon in the stream system. However, the broodstock collected from the donor streams would be limited to a number that would not have an adverse impact on the population (see *Donor Stock Collection: Population level effects* section). There should be virtually no impact of broodstock collection on the marine derived nutrients or carbon availability in the donor stream systems.

## Population Level Effects

One federally-listed population would be directly affected by the Reintroduction Program, the Feather River Hatchery production. Eggs and juveniles that would be collected are considered surplus, and therefore not part of the effective population and in turn have no effect on the donor populations.

### *Climate Change*

Spring-run Chinook are particularly vulnerable to climate change because adults migrate during spring runoff periods, and reside in freshwater for the summer before spawning in the fall. Climate projections suggest that temperatures throughout both the Sacramento and San Joaquin basins may increase steadily during the 21st century. High altitude basins like the San Joaquin exhibited less decrease in spring runoff than lower elevation watersheds such as the Sacramento. From a life history perspective, spring-run Chinook use the spring run off period to migrate into freshwater to reach holding habitat. While climate change will translate into warmer summer temperatures overall, the projected lower decrease in spring runoff in the San Joaquin River could translate into maintenance of suitable migratory conditions to holding habitat in the San Joaquin Basin below Friant Dam.

## 7.2. Effects of Conservation Stock Rearing

### Individual-Level Effects

Incubation and rearing operations would occur at an Interim Facility until 2014, at which time operations would transition to the full-scale Conservation Facility. All activities and minimization measures mentioned in the subsections below would be implemented at both the interim and full-scale Conservation Facilities.

### *Egg and Juvenile Introduction into the Facility*

It is possible that various pathogens from the donor stocks could be introduced to the rearing facility and cause disease in the other introduced stocks. To minimize this risk, all out-of-basin eggs and fish brought into the facility will be quarantined and 60 individuals sacrificed for pathology testing. The Conservation Facility would also implement specific fish health maintenance and sanitation procedures similar to those used at the FRFH (Cavallo et al. 2009).

### *Incubation*

After disinfection, eggs would be placed in incubation trays, which may jostle the eggs and elicit a “shock” response. If eggs are water-hardened they have not reached their most sensitive stage (gastrulation) and remain slightly resistant to disturbance and “shock” (Jensen and Alderdice 1983). Similarly, the jostling or heavy movement of eggs in the eyed-stage is unlikely to result in mortality, as the embryos are fairly resistant to disturbance by this stage of development (Billard and Jensen 1996, ADFG 2010). However, care would be taken to ensure that the eggs are moved only when necessary and would follow the FRFH HGMP (DWR 2009).

Once hatched, eggs incubated in the deep matrix boxes would volitionally swim from the incubator into a holding tank, whereas the eggs in the vertical tray incubators would require hand transfer into a holding tank. The latter would require further handling, which could elicit stress or induce injury (NMFS 2003). The adverse effects of handling would be minimized by using water-to-water transfer rather than direct netting to reduce injury and stress, and further minimized by following the FRFH HGMP protocols (DWR 2009). Once fish enter the holding tanks, they would remain there for the duration of their rearing.

### *Rearing*

Juveniles would either be reared from eggs or directly introduced to the facility as juvenile broodstock. Donor stock juveniles (non-FRFH stock) would be transported to a quarantine facility (e.g. Silverado Fish Base) for a 30 day quarantine period, after which 60 individuals will be sacrificed for pathology testing. Upon fish health certification fish would be transported to the Conservation Facility. Fish will be transported from the transport trucks into the holding tanks. The



potential adverse effects to the juveniles during the transfer process are similar for the fry (see *Incubation* subsection above), and the effects would be minimized following the same protocols.

The biggest threat to the broodstock in the rearing facilities is exposure to diseases and other pathogens. To minimize the likelihood of infections, all fish would be monitored by CDFG pathologists, and treatment methods and protocols prescribed for disease outbreaks would be implemented.

Depending on the cause of an outbreak, treatment methods may vary. Chemical treatments for external pathogens may include the use of salt,  $\text{KMnO}_4$ , formalin or hydrogen peroxide, and bacterial infections may require the use of oxytetracycline, florfenicol or other approved antibiotics. All treatment would follow veterinary guidance. Sanitation procedures would be implemented, and include the following:

- All cleaning equipment and nets would be disinfected in iodine-based disinfectant prior to use and separate cleaning instruments would be kept for each culture tank.
- Routine pathology health assessments would be carried out to maintain the health of all hatchery stocks. Fish would be monitored daily for behavior and physical abnormalities. Fish exhibiting abnormal behavior would be screened for pathogens. Sick fish would be promptly examined by the California Department of Fish and Game State Fish Health Lab.
- Feeding practices would be continuously monitored to avoid uneaten feed at the bottom of the rearing tanks and feed would be stored according to manufacturer recommendations to avoid fish health problems related to mycotoxins and rancidity, and feed would be used within the time recommended by the manufacturer.
- Water flushing rate would be maintained at a minimum of one turnover per hour and rotational water velocities would be elevated daily to improve water quality and tank sanitation.
- Sidewall viewing windows would be installed on all large tanks for increased fish health and tank sanitation monitoring.
- Dead or dying fish would be removed promptly from each rearing tank and necropsied. Dying fish would be humanely euthanized immediately after removal from rearing tank.
- The water supply would be micro-screened with a minimum pore size of 80 microns to reduce pathogen loads, and the water supply for early rearing would be further treated with ultraviolet filtration.
- Weekly prophylactic salt flushes would be administered throughout the duration of captive broodstock holding.

A high stocking density of juveniles could elicit a stress response (increased cortisol levels) in individual fish, leading to reduced fitness, lower growth rates, a vulnerability to additional stressors and possible mortality (Barton et al. 1980). To minimize density induced effects, the maximum-allowable-density index would be  $0.15 \text{ lb/ft}^3/\text{in}$ , as proposed by Ewing and Ewing (1995) and Banks (1994) for spring-run Chinook.

Human-induced disturbance could also invoke a stress response in rearing juveniles. To reduce the likelihood of this effect, human-fish contact would be minimized and culture tanks would be cleaned no more than once per month, unless required by sanitary conditions. Additionally, flushing rates would be maintained at a minimum of one turnover per hour to reduce stress and disease potential. The tanks would be designed with the ability to self-clean, allowing improved water quality and minimized human to fish contact.

To avoid any adverse effects of water quality on the fish, specific parameters would be monitored. Dissolved oxygen levels would be generally maintained between 80-100 percent saturation and not allowed to drop below 70 percent saturation. Studies indicate the benefits of high dissolved oxygen levels in fish culture (Westers 2001). Both total suspended solids (Timmons and Ebeling 2007) and carbon dioxide levels would be maintained at or below 10 mg/L (Piper et al. 1982).

There is growing concern that reared fish could exhibit hatchery induced selection due to rearing conditions. The use of natural rearing methods is a relatively new phenomenon (Flagg and Nash 1999), but the Conservation Facility Program would institute natural rearing techniques to provide the most promise for increasing the reproductive fitness of fish for the Conservation Program. The methods to be employed include the following:

- Promote development of body camouflage coloration in juvenile fish by creating more natural environments in hatchery rearing vessels, for example, overhead cover, and in-stream structures and substrates.
- Condition young fish to orient to the bottom rather than the surface of the rearing vessel by using appropriately positioned feed delivery systems.
- Exercise young fish by altering water-flow velocities in rearing vessels to enhance their ability to escape predators (the ability to adjust water velocities to target optimal swimming speeds for salmonids has been shown to improve growth rates, feed efficiency, oxygen utilization, swimming performance and stamina, and to reduce aggression).

### *Tagging, Marking, Measuring of Juveniles During Rearing*

Reared juveniles would be measured and weighed, marked with adipose fin-clips, Coded Wire Tags (CWT), Visual Implant and PIT tags, and tissue would be collected for genetic analysis. All measuring and marking activities would require netting, removal and handling. Such activities could induce stress or result in the removal of beneficial mucous lining, scale loss, or cause damage to fins (Gadomski et al. 1994, NMFS 2003). To minimize the likelihood of such effects, anesthesia would be administered to juveniles during measuring and weighing activities and PIT tag implantation. Dosage and administration would follow protocols outlined in the FRFH HGMP (DWR 2009). An automated system that is quick and efficient would be used for adipose-fin clipping and CWT implantation. All processed fish would be allowed to recover before returning to the rearing tanks. Although physical damage from tag implementation is likely, the stress associated with the injury

1 may subside after 12 hours (Gadomski et al. 1994). It should be noted however that Dare (2003),  
2 found less than 1 percent mortality had occurred in Chinook salmon 10 days after being PIT tagged.  
3

#### 4 *Alternative Incubation Methods*

5 If the Interim Facility or Conservation Facility is unable to house additional donor stock eggs from  
6 collected adults, or it is not appropriate to do so, alternative methods to facility incubation are  
7 proposed. In such cases, in-stream incubator boxes, streamside incubators, or egg planting options  
8 would be utilized (see *Donor Stock Release/Reintroduction section, Eggs subsection* for specific  
9 details).  
10

#### 11 *Instream Incubation Boxes*

12 The instream incubation box method involves incubating eggs in flow-through containers buried in  
13 the stream bed. There is a risk that the water temperature and velocity in the stream could be too  
14 high and cause egg damage or mortality. In some cases, the boxes may fill with fine sediment,  
15 which could suffocate incubating eggs. However, this is largely dependent on the specific stream  
16 conditions, and instream incubation boxes would not be used where sedimentation poses a risk. As  
17 in natural redds, there is also risk of disease and fungus outbreaks. Whitlock-Vibert slotted boxes  
18 would likely be used, which would facilitate the examination and removal of dead eggs to minimize  
19 the likelihood of pathogen outbreaks.  
20

#### 21 *Streamside Incubators*

22 Streamside incubators would be erected along the stream banks and filled with freshly fertilized or  
23 eyed eggs. Similar to instream incubation, there is a risk that the stream water temperature could be  
24 too high or water quality could be poor and cause egg damage or mortality. However, there is little  
25 risk of sedimentation because the box would be placed on the bank rather than in-river. Vandalism  
26 and tampering could occur, so placement of the boxes in less accessible areas would generally be  
27 required.

28 Venditti et al. 2000 reported a 78-90 percent hatching rate from eyed eggs placed in stream side or  
29 in-stream rearing boxes on the Salmon River in 1999 and 2000. These methods appear to compare  
30 well with natural stream production in which only 30 percent or less of eggs hatch and survive to  
31 emergence (Healey, M. C. 1991).

#### 32 *Egg Planting*

33 Eggs would be injected into suitable spawning habitat to simulate natural incubation. The process of  
34 injecting the eggs into the gravels may cause damage or “shock” to the embryo. For eggs injected  
35 into the gravels, fine sediments may limit permeability and suffocate eggs. Similar to other stream  
36 incubation methods, temperature and water quality are concerns. However, these would be natural  
37 conditions and could not be altered. To minimize the likelihood of these effects, egg injection would  
38 not occur until the eggs were fairly resistant to “shock” (at the eyed egg stage), and the gravels

would be thoroughly “pumped” with an injector to remove the fine sediments before egg planting. Risk of vandalism and tampering would be low because the planted redds are rather inconspicuous.

## Population-Level Effects

### *Survival Rates*

Although there is inherent risk and likelihood of mortality associated with hatchery rearing, the survival rates are significantly higher in a rearing facility than under natural conditions. Following the FRFH HGMP (DWR 2009), the FRFH has had a 72 percent survival to hatching rate for their facility, with survival rates reaching 85 percent in recent years. Survival rates under natural conditions usually do not exceed 40 percent (EA 1992). The use of instream incubation, streamside incubation and egg planting may result in higher survival rates as well, but no research has been conducted to date.

### *Catastrophic Events*

There is inherent risk of catastrophic events or disasters occurring during rearing facility operations, and such events could have devastating consequences for the broodstock. Such events could range from water shortages to electrical outages.

Water deliveries have been very reliable in the existing adjacent trout hatchery which receives water from the same major supply line as the interim and Conservation facilities. In the past 55 years, there was one major interruption to water flow that occurred in 1992 when a work crew accidentally ruptured the main line. For the Conservation Facility, the water delivery system would be gravity fed, thereby reducing risk of interruption to flow by eliminating the use of electric pumps that are susceptible to failure by power outages. In addition, each tank would contain a water monitoring and alarm system that would alert culturists to low dissolved oxygen levels, interruption to water flow, high or low water temperatures, or high or low water levels. The monitoring system would be integrated with a backup oxygen system that would trigger a solenoid for the supply of gaseous oxygen from compressed oxygen cylinders in the event of low oxygen conditions.

Flooding occurred at least once in recent history, when in 1997 the trout hatchery raceways were inundated by floodwater due to high river flows. At that time, many fish from the trout hatchery escaped to the adjacent San Joaquin River. In the event of future flooding, it is likely that fish from both facilities would again be released to the river. In a case such as this, it is unlikely that it would result in 100 percent mortality (since fish would be able to escape to the San Joaquin River), but depending on the time of occurrence and stage of development, fish may be less likely to survive in the mainstem river. Measures would be taken to prevent fish loss during a flood event by netting the tops of fish tanks.

### 7.3 Experimental Stock

The goal of the Conservation Program is to restore naturally reproducing, viable spring and fall-run Chinook populations, and so its success is marked by the ability to ultimately phase out hatchery production of fish. This will reduce the negative influences that continued hatchery supplementation can have on the re-established spring- and fall run Chinook populations. Modification of spring-run Chinook hatchery production should be determined by an adaptive management approach given the likely uncertainty of initial restoration phases. Genetic accommodation of the natural population, quantitative natural population targets (e.g. effective population ( $N_e$ ), census size, genetic diversity), and other community and ecosystem indicators of reintroduction success will be derived and periodically evaluated to phase out hatchery production. Hatchery production phase out is further detailed in the draft HGMP (Appendix 9.4). Additionally, uncertainties such as local habitat change, climate change, and others, should be given consideration in phase out determinations.

Density-dependent mechanisms contribute to predator avoidance, feeding behavior, migration patterns, and survival in juvenile salmonids, so care needs to be taken to translocate enough individuals to minimize alteration of natural behaviors and to achieve a detectable level of adult returns from the effort.

#### Individual-Level Effects

##### *Transport to San Joaquin River*

Several life stages of fish would either be transported from the Interim or Conservation Facilities or transported directly from the Feather River Hatchery to the San Joaquin River. Disease transmission could occur since equipment would be shared from these different sources. To minimize the introduction of pathogens, transport tanks, containers and equipment would be properly disinfected (e.g. iodophore) prior to use and between sources.

The transport of various life stages has different risks and effects. Possible adverse effects to eggs include: ionic and respiratory disturbance of the egg membrane, injury due to jostling, or death if the membrane is ruptured or punctured (ADFG 2010, Thedinga et al. 2005). To minimize these effects, eggs would be placed in a specialized shipping container to reduce excessive movement and limit damage to the egg membrane. The eggs would not be transported until they are fairly resistant to “shock,” at the eyed-egg stage. For juveniles, the transferring process could cause stress, injury and mortality.

Juveniles can easily become stressed if the ionic balance, pH, dissolved oxygen concentration or the water temperature in the transfer tank differs greatly from the source water (NMFS 2003). Also, a high stocking density of juvenile salmonids could elicit a stress response (increased cortisol levels) in individual fish, leading to reduced fitness, vulnerability to additional stressors and possible mortality (Barton et al. 1980). To minimize the potential effects of transporting of juveniles, transfer protocols would be followed that would monitor and maintain dissolved oxygen and isotonic water

1 concentrations, temper the water temperature to within two degrees Celsius of the receiving stream,  
2 and maintain an appropriate stocking density.  
3

#### 4 *Effects of Release*

5 The reintroduction of fish collected from spring-run donor populations for direct release into the San  
6 Joaquin in the near-term has some challenges. Specifically, river restoration projects are not  
7 anticipated to be completed until 2016, yet salmon reintroduction would begin in 2012.  
8

9 Eggs would be introduced into the San Joaquin River either in in-stream or streamside incubation  
10 boxes or by egg planting in the river gravels. Juveniles could be either directly released or placed in  
11 temporary holding cages for imprinting prior to release.

#### 12 *Eggs*

13 The effects of incubating eggs outside of the rearing facility are discussed in *Donor Stock Rearing:*  
14 *Individual-level effects* section, *Alternative rearing methods* subsection. There are few ways to  
15 minimize the effects, as they are largely affected by stream conditions. However, acclimation stress  
16 could be minimized, and eggs would be tempered to the receiving water by increasing the egg  
17 temperature 1 °C per hour until matching the receiving water temperature.  
18

19 Incubating in-stream or streamside would allow for imprinting opportunities and information on egg  
20 survival in the San Joaquin River, which would inform decisions for future stocking and provide  
21 estimates of survival during natural spawning events.  
22

#### 23 *Juveniles*

24 Direct release of juveniles collected from donor stocks into the San Joaquin River could be achieved  
25 on the same schedule as they are collected. This would simulate the same temporal distribution of  
26 rearing and outmigration observed by the donor source. Holding pens could be used for one to two  
27 hours to allow the fish to acclimate prior to release to reduce the risk of predation (Fisheries  
28 Foundation 2009). Additionally, holding pens could be used to cue fish to different reaches of the  
29 river by simulating downstream migration. Slatik et al (1988) showed sequential exposure  
30 imprinting techniques that significantly improved homing to release location. Since all passage  
31 improvements to the river may not be complete by the time reintroduction is mandated, this  
32 staggered holding pen approach may be one option to move fish through the river system and move  
33 them around passage impediments while improving imprinting. One disadvantage may be releasing  
34 too few fish at a given time, disrupting densities and schooling behaviors. The transportation and  
35 release of fish as they are collected on a daily or weekly basis also increases the frequency and  
36 logistics in transporting and releasing fish to the San Joaquin River.  
37

38 An alternative to direct release into the San Joaquin River is to temporarily hold juveniles in a net  
39 pen with recirculating San Joaquin River water to assist with imprinting, acclimation, and natural  
40 schooling behaviors. Quinn et al (1989) linked homing to changes in thyroid hormone levels during

1 smoltification and the onset of migration in salmonids. The temporary use of holding pens may  
2 provide time during the smolting process for fish to imprint on the San Joaquin River and maximize  
3 their likelihood of successfully navigating back to their reintroduced location to spawn. Smolt  
4 survival studies with juvenile salmon from the Feather River and Merced River hatcheries that  
5 released smolts with coded-wire-tags near Mossdale and Dos Reis in the San Joaquin River Delta  
6 indicate that the out-of-basin juvenile salmon returned at low rates to the San Joaquin Basin  
7 compared to the Merced River Hatchery smolts. Only a mean of 37 percent of the FRFH smolts  
8 returned to the San Joaquin Basin from 1995 to 2000 compared to 83 percent of the Merced River  
9 Hatchery smolts from 1998 to 2000 (DFG CWT database, methods described in Mesick et al. 2009).  
10 Smolts released at Mossdale probably only spent about 2 days before they encountered Sacramento  
11 River flows via the Mokelumne River.

12  
13 It is possible that by holding juveniles in pens in the Restoration Area for several days, imprinting  
14 and adult returns to the Restoration Area would be improved. In addition, keeping juveniles in  
15 holding pens for at least one to two hours allows the fish to acclimate prior to release and reduces the  
16 risk of predation (Fisheries Foundation 2009). The use of temporary holding cages would also allow  
17 collection of juveniles from donor stocks over a period of time until a group of fish have been  
18 amassed and released together. Juvenile salmon outmigrate in groups, which are thought to occur  
19 primarily to reduce mortality due to predation. Temporarily holding fish and releasing them in a  
20 series of groups may therefore more closely resemble the densities experienced during rearing and  
21 outmigration and increase their survivorship.

## 22 *Predation*

23 The initial reintroduced juvenile spring-run Chinook will likely benefit from a period of depressed  
24 predation because of the current conditions in the San Joaquin River. The periodic reduction and  
25 elimination of flow in some reaches of the restored mainstem of the San Joaquin River should limit  
26 the establishment of large piscivore predators within those reaches. This would likely be a  
27 temporary situation, and would not extend beyond those reaches that have until recently been  
28 without consistent flows of water. In addition, fish that are ultimately released culminating any trap  
29 and haul effort would be released at a number of different locations over time to limit the  
30 establishment of large piscivore predators within the areas of release.

31  
32 Further evaluation of the size, location, and potential for predation within the pools and at the in-  
33 river gravel excavation sites in the Restoration Area is anticipated. The acoustic telemetry study  
34 with fall-run juveniles completed in the spring of 2011 is currently being evaluated and will provide  
35 further insight into the current predation risks in the San Joaquin River. Subsequent studies will  
36 further evaluate this issue.

37 The restoration of channel structures and fish barriers will be key in limiting the number of predator  
38 pools. This challenge will be thoroughly considered in the design of the structural modifications.

39 If the timing of outmigrating juveniles from the San Joaquin River matches those of the outmigrating  
40 fall-run juveniles from the San Joaquin River tributaries (Merced, Stanislaus, etc.), the high prey



density may induce a ‘swamping’ effect on the predators, thus enhancing the likelihood of higher individual survival.

To minimize predation under current conditions, the use of the Interim and Restoration flow scheduling could provide pulse flows to displace non-native predatory fishes in the Restoration Area and also increase water turbidity during juvenile downstream migration to reduce detection and predation by piscivorous fishes.

### *Habitat Conditions*

Restoration of the mainstem of the San Joaquin River is anticipated to begin several years following the introduction of fish. Before restoration is completed, the in-stream conditions may limit the growth potential and the survival rates of the introduced eggs and juveniles.

The water temperature modeling has not been completed, but it is likely that in the summer months the stream temperatures may reach lethal limits, especially with the lack of a riparian zone to shade the stream. If adequate pools and in-stream cover are available, they could serve as refugia from the high summer temperatures. However, it is unknown how many pools may be available. The flows during these warmer months may also be limited and are based on the releases from Friant Dam. If the flows are inadequate, they would create limiting reaches that are impassible by both adults migrating upstream and juveniles emigrating downstream. The limited flows may also create low dissolved oxygen concentration conditions which would also be problematic for juveniles.

### *Food Availability*

Food availability is a concern in the San Joaquin River. The flows are anticipated to be rather high during the winter and spring months which would result in inundation of floodplain habitat; a rich source of food for juvenile salmonids. However, it is unclear if the seasonal spates (flood pulses) would inundate these floodplains for long enough to supply this food source.

Food availability in Reach 1 is considered of high importance as this reach is expected to support most life-history stages of Chinook for the greatest period of time. Food conditions in Reaches 2 through 5 are considered to be of moderate importance to accommodate other life-history requirements, though likely for a shorter temporal period.

Species composition of invertebrates affects prey availability for juvenile salmonids (i.e., some invertebrate taxa are highly vulnerable to salmonid predation while others are not). The current state of invertebrate production and conditions for growth and development are unknown. It will be necessary to evaluate and monitor food conditions, growth, and development to provide a measure of what effect in-river conditions may have on the fishery and measure SJRRP restoration success. Although the food availability within the San Joaquin River is not fully understood, it is anticipated that the hydraulic and digital terrain models used to evaluate relationships between flow and floodplain inundation will be updated.



## Water Quality

The upper San Joaquin River has been, and will continue within the foreseeable future to be, greatly influenced by the surrounding agriculture. A certain amount of agricultural waste water will likely influence the water chemistry of the San Joaquin River during the time that salmon are occupying the river. To meet the SJRRP Restoration Goal, water quality should meet minimum standards for protection of aquatic resources. Because of the lack of information on the effects of many water quality constituents on Chinook and other fishes, the water quality objectives for beneficial uses defined by the Central Valley Regional Water Quality Control Board (Regional Board) are used to establish water-quality goals. The main beneficial uses for the enhancement of fisheries resources within the Restoration Area are: (1) cold, freshwater habitat, (2) migration of aquatic organisms, and (3) spawning, reproduction, and early development.

The temperature objectives are based on a CDFG proposal to assess temperature impairment (DFG 2007b), U.S. Environmental Protection Agency (EPA) guidelines (EPA 2003), and a report on temperature impacts on fall-run Chinook and steelhead (Rich and Associates 2007).

Water-quality objectives are “the limits or levels of water quality constituents or characteristics established for the reasonable protection of beneficial uses of the water or the prevention of a nuisance in a specific area” (California Water Code Section 13050(h)). Water-quality standards consist of the designated beneficial uses and water quality objectives set forth by the State Water Resources Control Board (SWRCB) and the Regional Board and are contained in the Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin (Basin Plan). For the San Joaquin River system, including the Restoration Area, the SWRCB has set a goal to be free from toxic substances in surface water (CVRWQCB 1998). Selenium, dissolved oxygen, and ammonia objectives are based on the Regional Board and SWRCB standards described above. Additional water quality criteria are defined in Exhibit A and B of the Fisheries Management Plan (FMP 2010).

Water quality objectives are listed below. The recommended objectives should be treated as preliminary recommendations, recognizing they will very likely be revised as more is learned about the habitat needs and the response of reintroduced fish populations to flows and other physical factors.

- Water temperatures for spring-run Chinook adult migrants should be less than 68 °F in Reaches 3, 4, and 5 during March and April, and less than 64°F in Reaches 1 and 2 during May and June (Exhibit A, Table A-1).
- Water temperatures for spring-run Chinook adult holding should be less than 59°F in holding areas between April and September (Exhibit A, Table A-1).
- Water temperatures for spring-run Chinook spawners should be less than 57°F in spawning areas during August, September, and October (Exhibit A, Table A-1).
- Water temperatures for spring-run Chinook incubation and emergence should be less than 55°F in spawning areas between August and December (Exhibit A, Table A-1).
- Water temperatures for spring-run Chinook juveniles should be less than 64°F in the Restoration Area when juveniles are present (Exhibit A, Table A-1).

- Selenium levels should not exceed 0.020 milligrams per liter (mg/L) or a 4-day average of 0.005 mg/L in the Restoration Area (Exhibit B, Table B-3).
- DO concentrations should not be less than 6.0 mg/L when Chinook are present (Exhibit B, Table B-3).
- Total ammonia nitrogen should not exceed a 30-day average of 2.43 milligrams nitrogen per liter (mg N/L) when juvenile Chinook are present or exceed a 1-hour average of 5.62 mg N/L when adult Chinook are present (Exhibit B, Table B 9).

The current water quality monitoring throughout the Restoration Area, includes real-time telemetry with continuous measurements of physical conditions, including flow, depth, temperature, specific conductance (salinity), pH, dissolved oxygen, turbidity, and chlorophyll.

The data is averaged every 15 minutes and reported to the California Data Exchange Center. In addition, bacteria, trace elements and pesticides sampling is also conducted in accordance with the Interim Flow Water Quality Monitoring Plan (SJRRP 2010a).

Increasing flows in the San Joaquin River from Friant Dam to the Merced River and downstream reaches has the potential to improve water quality conditions under various hydrologic conditions in some reaches of the river. Opportunities to improve water quality in the San Joaquin River will be identified and evaluated to the extent that they are consistent with actions that address the Restoration and Water Management goals.

### ***Restoration Schedule***

The schedule for the channel and structural improvements is outlined in Paragraph 11(a) of the Settlement. The implementing agencies are weighing the current habitat conditions of the San Joaquin River in light of the Settlement timeline. The anticipated short residency time of spring-run during the initial introduction and the several year lag prior to the initial adult returns provide greater flexibility in the completion of the restoration activities.

Prior to the completion of restoration activities, the various habitat components required by different life history stages of salmonids are generally available in the upper mainstem San Joaquin River, although it is not yet clear if the extent and quality of existing habitat is sufficient to support long-term population needs. There are holding pools below Friant Dam suitable for adult spring-run Chinook; moderate quantities of salmonid spawning habitat still remain in Reach 1A; and the river channel in Reach 1 seems capable of providing instream rearing habitat for juvenile salmonids in certain months. Furthermore, the Interim Flow releases can continue to provide adequate flow and temperatures in the upper reaches. The increase in flows in certain reaches could enhance dispersal and germination of riparian vegetation in the absence of restoration efforts, via natural colonization. Even if the amount and quality of existing habitat is inadequate to achieve the long-term objectives, the amount and quality of existing habitat seems adequate to initiate the process of restoring salmonid populations (McBain and Trush 2002).

Spring-run Chinook are required, per the Settlement, to be reintroduced into the Restoration Area by December 31, 2012, which is prior to the completion of the first and second phases of channel and habitat improvements. The first phase of channel and habitat improvements is scheduled to be completed by December 31, 2013. These improvements include: (1) creating a bypass channel around Mendota Pool; (2) modifying channels in Reaches 2B and 4B to increase flow capacity; (3) modifying Eastside and Mariposa bypasses to create a low-flow channel; (4) modifying Reach 4B headgate and Sand Slough control structures to provide fish passage and convey flows up to 4,500 cfs into Reach 4B; (5) installing screens at the Arroyo Canal Water Diversion; (6) providing fish passage at Sack Dam; (7) modifying Eastside Bypass structures and Mariposa Bypass structures to provide fish passage; and (8) installing seasonal barriers at Salt and Mud sloughs (SJRRP 2010).

The second phase of improvements is scheduled for completion by December 31, 2016. These Phase 2 improvements include: (1) restoration of Chinook spawning habitat; (2) actions to minimize in-river harvest, unlawful take, and disturbance, and (3) targeted studies of potential problems (e.g., entrainment at Chowchilla Bifurcation Structure and impacts of in-river mining pits) (SJRRP 2010).

Before the Phase 1 and Phase 2 improvements have been made, fish passage barriers, entrainment, and in-stream conditions likely will limit the survival of eggs and juvenile fish, particularly in the reaches that are upstream from the planned improvement sites. It is anticipated that the FMWG will consider the level of completion of the planned channel and habitat improvements when determining the best location, timing, and number of fish and/or eggs to be reintroduced into the Restoration Area. In addition, monitoring will be conducted to determine whether passage is blocked by inadequate flow or unimproved flow control structures. If these targeted studies indicate that fish passage is impaired, trap-and-haul operations would be implemented to move the salmon to suitable habitats (SJRRP 2010).

Several of the planned studies have begun prior to the reintroduction, for instance, the first juvenile survival and acoustic telemetry study was conducted in the spring of 2011 using fall-run Chinook and the spawning gravel study (egg survival) was implemented in the fall of 2011.

### ***Trap and Haul***

It is anticipated that a number of major passage impediments will still be in place in the Restoration Area in the first years of the reintroduction. Likewise, returning adults would encounter these structural and biological barriers and would also require collection and transport upstream, thus encountering similar stressors and adverse effects as the adults collected in the donor streams. Early reintroductions would be maintained in cages and under the control of agency personnel during movement (which may include sequential *in-situ* residence periods along the stream course at locations chosen to test survival and provide limited selection pressure specific to the San Joaquin River while imprinting the smolts).

The transport of juveniles and adults would follow optimal handling protocols to minimize the adverse impacts of these actions. The transport water would be oxygenated using bottled oxygen

1 with aerators, and dissolved oxygen levels would be monitored and maintained near saturation  
2 during transport. When possible, fish would be moved in and out of the transport truck using a water  
3 filled vessel (i.e., water to water transfer) and without netting to minimize stress and loss of mucous  
4 lining. Adult fish would be transferred to and from transport tanks using purse-style stretchers that  
5 hold both fish and water (i.e., water-to-water transfer).  
6

## 7 **Ecosystem (Indirect) Effects**

8

### 9 ***Marine Derived Nutrients and Carbon Availability***

10 The reintroduction of Chinook to the San Joaquin River will likely result in adults returning and  
11 carcass deposition. It is widely accepted that marine derived nutrients (via adult salmon carcasses)  
12 are vital for the growth of juvenile salmonids (Bilby et al. 1998, Bilby et al. 1996). Bilby et al.  
13 (1998) found increased densities, body weight and improved condition factor of juvenile salmonids  
14 in stream reaches where salmon carcasses were added. Therefore, the presence of carcasses in the  
15 San Joaquin River would increase the availability of marine derived nutrients and carbon in the  
16 stream system and thus have a positive effect on rearing juveniles, possibly increasing the weight  
17 and condition factor of the fish, which may positively influence their survival rates.  
18

### 19 ***Introduction of invasive Species or Pathogens***

20 Reintroduction efforts could increase the potential for invasive species, such as New Zealand mud  
21 snail (*Potamopyrgus antipodarum*) and freshwater asian clam (*Corbicula fluminea*) to be transferred  
22 from one stream system to another (for a full list of potential non-target species, which could be  
23 transferred see Appendix D). Transfer of invasive species could occur in a number of ways,  
24 including nets and other equipment not appropriately decontaminated prior to use. All equipment  
25 will be properly cleaned and decontaminated to reduce the spread of invasive species and pathogens.  
26

## 27 **Population-Level Effects**

28

29 The reintroduced spring-run Chinook (i.e., experimental stock) in the mainstem San Joaquin River  
30 would also be a population affected by the proposed action. This stock does not yet exist, so no  
31 detailed review is possible at this time.  
32

33 However, the San Joaquin was once home to the largest run of spring-run Chinook in the Central  
34 Valley. Spring-run persisted in large numbers below Friant Dam for years until the flows were  
35 curtailed and the river was disconnected. This supports the premise that spring-run can persist over  
36 time in a connected San Joaquin River.  
37

38 A primary goal of the Settlement is to develop a naturally reproducing and self-sustaining population  
39 of Chinook in the main stem of the San Joaquin River. The Settlement gives preference to spring-

run because of the historic populations that used to exist. The restoration hydrographs in the Settlement are also intended to benefit spring-run.

The Service and Implementing Agencies are working to address challenges to survival through studies during the interim flow period. This will help inform decisions we make during reintroduction efforts. We are currently conducting and proposing studies during interim flows to better refine true survival for juvenile salmonids through the Restoration Area, and egg survival studies. Studies are planned to assess the effects of a trap and haul program on salmon survival. Studies would also address areas that represent potential losses due to predation among other issues. We are also proposing to collect predator population information to use as a management tool. Since the Donor Stock Collection Plan will be assessed annually we will have the opportunity to incorporate any new information in the annual request each year.

#### ***Hybridization—Run Separation within the San Joaquin***

The Service and other Resource agencies recognize the risk of fall and spring run hybridization in the San Joaquin River. The Fish Management Plan recommends installation of a separation weir as an implementation action for the Program. Several studies are currently under way, utilizing the interim flows to assess potential holding pool and spawning habitat conditions and will provide information that will aid in identifying the appropriate placement of the separation weir. The risk of hybridization between the runs can be reduced through the operation of a separation weir below the spring run spawning habitat. However, historically both spring-run and fall-run Chinook spawned in the San Joaquin River, with spring run being the larger and more successful run.

#### ***Potential Donor Stock Hybridization within the San Joaquin***

Currently there are no plans to segregate natural spawning between different donor spring-run stocks in the San Joaquin River. The Program recognizes that spring-run donor stocks may mix on the spawning grounds, which may add to the genetic diversity of the reintroduced population, and could provide better local adaptation through genetic diversity; as populations with low genetic diversity are generally at a higher risk of extinction. The Program will plan to monitor the genetics of the successful stocks to document actual outcomes. However, this will not be an issue early in the reintroduction effort as all reintroduced fish will be obtained from the FRFH.

#### ***Outmigration Effects***

The reintroduced salmon occupying the lower reaches of the San Joaquin River, where populations of salmon of the San Joaquin/Sacramento River system are currently present, will experience the same effects as those already existing populations. This includes effects in the lower San Joaquin River, the Sacramento/San Joaquin Delta, San Francisco Bay and the marine habitat off the central coast of California.

## 7.4 Critical Habitat

The final ruling for Central Valley spring-run Chinook critical habitat was published February 2, 2005 (50 **CFR** Part 226), and includes much of the Sacramento River Valley, its tributaries and the Sacramento-San Joaquin River Delta. After recovery and threshold criteria have been established, the Program may request in the subsequent permits to collect donor stock from Mill Creek, Deer Creek and Butte Creek, all of which are within critical habitat units and sub-areas. The locations proposed for reintroduction of fish are not within critical habitat. Central Valley Chinook critical habitat is also considered critical habitat for Central Valley steelhead (*O. mykiss*).

The proposed action, as described, will not destroy or adversely modify any designated critical habitat.

## 7.5 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined by NMFS as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat, “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” means habitat required to support a sustainable fishery and a healthy ecosystem. “Spawning, breeding, feeding, or growth to maturity” covers all habitat types used by a species throughout its life cycle. The proposed effort would not have adverse effects on any Chinook EFH.

## 7.6 Evolutionarily Significant Unit

An evolutionarily significant unit, or ESU, of Pacific salmon is considered to be a “distinct population segment” and thus a “species” under the Endangered Species Act. There are established two criteria for ESUs: 1) the population must show substantial reproductive isolation; and 2) there must be an important component of the evolutionary legacy of the species as a whole.

It is anticipated that the Conservation Program would expand the range and distribution of the ESU with the addition of a self-sustaining natural San Joaquin River population. The addition of these fish would increase the number of key populations within the ESU that could buffer the risk of extinction from environmental fluctuations, stochastic events and human, land and water use impacts.



## 8. STATUS OF THE SPECIES

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### 8.1. General Life History of Chinook

Chinook exhibit two generalized freshwater life history types (Healey 1991). “Stream-type” Chinook, enter freshwater months before spawning and reside in freshwater for a year or more following emergence, whereas “Ocean-type” Chinook spawn soon after entering freshwater and migrate to the ocean as fry or parr within their first year. Adequate instream flows and cool water temperatures are more critical for the survival of Chinook exhibiting a stream-type life history due to over-summering by adults and/or juveniles.

Chinook typically mature between 2 and 6 years of age (Myers et al. 1998). Freshwater entry and spawning timing generally are thought to be related to local water temperature and flow regimes. Runs are designated on the basis of adult migration timing. However, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and the actual time of spawning (Myers et al. 1998). Both winter-run and spring-run exhibit a “Stream-type” life history and tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months. Fall-run exhibit an “Ocean-type” life history and enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991).

During their upstream migration, adult Chinook require streamflows sufficient to provide olfactory and other orientation cues used to locate their natal streams. Adequate streamflows are necessary to allow adult passage to upstream holding habitat. The preferred temperature range for upstream migration is 38°F to 56°F (Bell 1991, CDFG 1998). Boles (1988) recommends water temperatures below 65°F for adult Chinook migration, and Lindley et al. (2004) report that adult migration is blocked when temperatures reach 70°F, and that fish can become stressed as temperatures approach 70°F.

Information on the migration rates of adult Chinook in freshwater is scant and primarily comes from the Columbia River basin, where information regarding migration behavior is needed to assess the effects of dams on travel times and passage (Matter and Sanford 2003). Keefer et al. (2004) found migration rates of Chinook ranging from about 10 kilometers (km) per day to greater than 35 km per day and to be primarily correlated with date, and secondarily with discharge, year, and reach, in the Columbia River basin. Matter and Sanford (2003) documented migration rates of adult Chinook ranging from 29 to 32 km per day in the Snake River. Adult Chinook inserted with sonic tags and tracked throughout the Delta and lower Sacramento and San Joaquin rivers were observed exhibiting substantial upstream and downstream movement in a random fashion, for several days at a time, while migrating upstream (CALFED 2001). Adult salmonids migrating upstream are assumed to make greater use of pool and mid-channel habitat than channel margins (Stillwater Sciences 2004),

1 particularly larger salmon such as Chinook, as described by Hughes (2004). Adults are thought to  
2 exhibit crepuscular behavior during their upstream migrations, meaning that they are primarily  
3 active during twilight hours. Recent hydroacoustic monitoring conducted by LGL Environmental  
4 Research Associates showed peak upstream movement of adult spring-run in lower Mill Creek, a  
5 tributary to the Sacramento River, occurring in the 4-hour period before sunrise and again after  
6 sunset.

8 Spawning Chinook require clean, loose gravel in swift, relatively shallow riffles or along the  
9 margins of deeper runs, and suitable water temperatures, depths, and velocities for redd construction  
10 and adequate oxygenation of incubating eggs. Chinook spawning typically occurs in gravel beds  
11 that are located at the tails of holding pools (USFWS 1995). The range of water depths and  
12 velocities in spawning beds that Chinook find acceptable is very broad. The upper preferred water  
13 temperature for spawning Chinook is 55°F to 57°F (Chambers 1956, Smith 1973, Bjornn and Reiser  
14 1991, and Snider 2001).

16 Incubating eggs are vulnerable to adverse effects from floods, siltation, desiccation, disease,  
17 predation, poor gravel percolation, and poor water quality. Studies of Chinook egg survival to  
18 hatching conducted by Shelton (1995) indicated 87 percent of fry emerged successfully from large  
19 gravel with adequate subgravel flow. The optimal water temperature for egg incubation ranges from  
20 41°F to 56°F [44°F to 54°F (Rich 1997), 46°F to 56°F (NMFS 1997), and 41°F to 55.4°F (Moyle  
21 2002)]. A significant reduction in egg viability occurs at water temperatures above 57.5°F and total  
22 embryo mortality can occur at temperatures above 62°F (NMFS 1997). Alderdice and Velsen (1978)  
23 found that the upper and lower temperatures resulting in 50 percent pre-hatch mortality were 61°F  
24 and 37°F, respectively, when the incubation temperature was held constant. As water temperatures  
25 increase, the rate of embryo malformations also increases, as well as the susceptibility to fungus and  
26 bacterial infestations. The length of development for Chinook embryos is dependent on the ambient  
27 water temperature surrounding the egg pocket in the redd. Colder water necessitates longer  
28 development times as metabolic processes are slowed. Within the appropriate water temperature  
29 range for embryo incubation, embryos hatch in 40 to 60 days, and the alevins (yolk-sac fry) remain  
30 in the gravel for an additional 4 to 6 weeks before emerging from the gravel.

32 During the 4 to 6 week period when alevins remain in the gravel, they utilize their yolk-sac to  
33 nourish their bodies. As their yolk-sac is depleted, fry begin to emerge from the gravel to begin  
34 exogenous feeding in their natal stream. Fry typically range from 25 mm to 40 mm at this stage.  
35 Upon emergence, fry swim or are displaced downstream (Healey 1991). The post-emergent fry  
36 disperse to the margins of their natal stream, seeking out shallow waters with slower currents, finer  
37 sediments, and bank cover such as overhanging and submerged vegetation, root wads, and fallen  
38 woody debris, and begin feeding on zooplankton, small insects, and other micro-crustaceans. Some  
39 fry may take up residence in their natal stream for several weeks to a year or more, while others are  
40 displaced downstream by the stream's current. Once started downstream, fry may continue  
41 downstream to the estuary and rear, or may take up residence in river reaches farther downstream for  
42 a period of time ranging from weeks to a year (Healey 1991). Fry then seek nearshore habitats  
43 containing riparian vegetation and associated substrates important for providing aquatic and



1 terrestrial invertebrates, predator avoidance, and slower velocities for resting (NMFS 1996). The  
2 benefits of shallow water habitats for salmonid rearing have been found to be more productive than  
3 the main river channels, supporting higher growth rates, partially due to higher prey consumption  
4 rates, as well as favorable environmental temperatures (Sommer et al. 2001).

5  
6 When juvenile Chinook reach a length of 50 to 57 mm, they move into deeper water with higher  
7 current velocities, but still seek shelter and velocity refugia to minimize energy expenditures (Healey  
8 1991). Catches of juvenile salmon in the Sacramento River near West Sacramento exhibited larger-  
9 sized juveniles captured in the main channel and smaller-sized fry along the margins (USFWS  
10 1997). When the channel of the river is greater than 9 to 10 feet in depth, juvenile salmon tend to  
11 inhabit the surface waters (Healey 1982). Migration cues, such as increasing turbidity from runoff,  
12 increased flows, changes in day length, or intraspecific competition from other fish in their natal  
13 streams, may spur outmigration of juveniles when they have reached the appropriate stage of  
14 maturation (Kjelson et al. 1982, Brandes and McLain 2001).

15  
16 As fish begin their emigration, they are displaced by the river's current downstream of their natal  
17 reaches. Similar to adult movement, juvenile salmonid downstream movement is crepuscular. The  
18 daily migration of juveniles passing Red Bluff Diversion Dam (RBDD) is highest in the 4-hour  
19 period prior to sunrise (Martin et al. 2001). Juvenile Chinook migration rates vary considerably,  
20 presumably depending on the physiological stage of the juvenile and hydrologic conditions. Kjelson  
21 et al. (1982) found Chinook fry to travel as fast as 30 km per day in the Sacramento River, and  
22 Sommer et al. (2001) found travel rates ranging from about 0.5 miles up to more than 6 miles per  
23 day in the Yolo Bypass. As Chinook begin the smoltification stage, they prefer to rear further  
24 downstream where ambient salinity is up to 1.5 to 2.5 parts per thousand (Healey 1980, Levy and  
25 Northcote 1981).

26  
27 Fry and parr may rear within riverine or estuarine habitats of the Sacramento River, San Joaquin  
28 River, the Delta, and their tributaries (Maslin et al. 1997, Snider 2001). Within the Delta, juvenile  
29 Chinook forage in shallow areas with protective cover, such as intertidal and subtidal mudflats,  
30 marshes, channels, and sloughs (McDonald 1960, Dunford 1975, Meyer 1979, Healey 1980).  
31 Cladocerans, copepods, amphipods, and larvae of diptera, as well as small arachnids and ants are  
32 common prey items (Kjelson et al. 1982, Sommer et al. 2001, MacFarlane and Norton 2002).  
33 Shallow water habitats are more productive than the main river channels, supporting higher growth  
34 rates, partially due to higher prey consumption rates, as well as favorable environmental  
35 temperatures (Sommer et al. 2001). Optimal water temperatures for the growth of juvenile Chinook  
36 in the Delta are between 54°F to 57°F (Brett 1952). In Suisun and San Pablo Bays, water  
37 temperatures reach 54°F by February in a typical year. Other portions of the Delta (i.e., South Delta  
38 and Central Delta) can reach 70°F by February in a dry year. However, cooler temperatures are  
39 usually the norm until after the spring-runoff has ended.

40  
41 Within the estuarine habitat, juvenile Chinook movements are dictated by the tidal cycles, following  
42 the rising tide into shallow water habitats from the deeper main channels, and returning to the main  
43 channels when the tide recedes (Levings 1982, Levy and Northcote 1982, Levings et al. 1986,

Healey 1991). As juvenile Chinook increase in length, they tend to school in the surface waters of the main and secondary channels and sloughs, following the tides into shallow water habitats to feed (Allen and Hassler 1986). In Suisun Marsh, Moyle et al. (1989) reported that Chinook fry tend to remain close to the banks and vegetation, near protective cover, and in dead-end tidal channels. Kjelson et al. (1982) reported that juvenile Chinook demonstrated a diel migration pattern, orienting themselves to nearshore cover and structure during the day, but moving into more open, offshore waters at night. The fish also distributed themselves vertically in relation to ambient light. During the night, juveniles were distributed randomly in the water column, but would school up during the day into the upper 3 meters of the water column. Available data indicate that juvenile Chinook use Suisun Marsh extensively both as a migratory pathway and rearing area as they move downstream to the Pacific Ocean. Juvenile Chinook were found to spend about 40 days migrating through the Delta to the mouth of San Francisco Bay and grew little in length or weight until they reached the Gulf of the Farallones (MacFarlane and Norton 2001). Based on the mainly ocean-type life history observed (i.e., fall-run Chinook), MacFarlane and Norton (2001) concluded that unlike other salmonid populations in the Pacific Northwest, Central Valley Chinook show little estuarine dependence and may benefit from expedited ocean entry.

## 8.2. Central Valley Spring-Run Chinook ESU

Historically, spring-run occupied the upper and middle reaches (1,000 to 6,000 feet) of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud and Pit Rivers, with smaller populations in most tributaries with sufficient habitat for over-summering adults (Stone 1874, Rutter 1904, Clark 1929). Because of alterations to the system, the upper San Joaquin River, from Friant Dam downstream to the confluence with the Merced River, no longer supports spring-run Chinook. The last documented run of spring-run Chinook in the upper San Joaquin River, consisting of only 36 individuals, was observed in 1950 (Warner 1991). Since the 1950s, the remaining Chinook in the San Joaquin basin consist only of fall-run populations found in major tributaries to the lower San Joaquin River.

## 8.3. Spring-Run Exhibit a Stream-Type Life History

Adults enter freshwater in the spring, hold over the summer, spawn in the fall, and the juveniles typically spend a year or more in freshwater before emigrating. Adult spring-run leave the ocean to begin their upstream migration in late January and early February (CDFG 1998) and enter the Sacramento River between March and September, primarily in May and June (table 4-4; Yoshiyama et al. 1998, Moyle 2002). Lindley et al. (2007) indicate adult spring-run enter tributaries from the Sacramento River primarily between mid-April and mid-June. Typically, spring-run utilize mid- to high-elevation streams that provide appropriate temperatures and sufficient flow, cover, and pool depth to allow over-summering while conserving energy and allowing their gonadal tissue to mature (Yoshiyama et al. 1998). Reclamation reports that spring-run holding in upper watershed locations

1 prefer water temperatures below 60°F, although salmon can tolerate temperatures up to 65°F before  
2 they experience an increased susceptibility to disease.

3  
4 Spring-run spawning occurs between September and October depending on water temperatures.  
5 Between 56 and 87 percent of adult spring-run that enter the Sacramento River basin to spawn are 3  
6 years old (Calkins et al. 1940, Fisher 1994).

7  
8 Spring-run fry emerge from the gravel from November to March (Moyle 2002) and the emigration  
9 timing is highly variable, as they may migrate downstream as young-of-the-year (YOY) or as  
10 juveniles or yearlings. The modal size of fry migrants at about 40 mm between December and April  
11 in Mill, Butte, and Deer creeks reflects a prolonged emergence of fry from the gravel (Lindley et al.  
12 2007). Studies in Butte Creek (Ward et al. 2002, 2003; McReynolds et al. 2005) found the majority  
13 of spring-run migrants to be fry occurring primarily from December through February; and that these  
14 movements appeared to be influenced by flow. Small numbers of spring-run remained in Butte  
15 Creek to rear and migrated as yearlings later in the spring. Juvenile emigration patterns in Mill and  
16 Deer creeks are very similar to patterns observed in Butte Creek, with the exception that Mill and  
17 Deer Creek juveniles typically exhibit a later YOY migration and an earlier yearling migration  
18 (Lindley et al. 2007).

19  
20 Once juveniles emerge from the gravel, they seek areas of shallow water and low velocities while  
21 they finish absorbing the yolk sac and transition to exogenous feeding (Moyle 2002). Many also  
22 will disperse downstream during high-flow events. As is the case in other salmonids, there is a shift  
23 in microhabitat use by juveniles to deeper, faster water as they grow larger. Microhabitat use can be  
24 influenced by the presence of predators, which can force fish to select areas of heavy cover and  
25 suppress foraging in open areas (Moyle 2002). The emigration period for spring-run Chinook  
26 extends from November to early May, with up to 69 percent of the young of the year fish  
27 outmigrating through the lower Sacramento River and Delta during this period (CDFG 1998).  
28 Spring-run juveniles have been observed rearing in the lower reaches of non-natal tributaries and  
29 intermittent streams in the Sacramento Valley during the winter months (Maslin et al. 1997, Snider  
30 2001). Peak movement of juvenile spring-run in the Sacramento River at Knights Landing occurs in  
31 December, and again in March and April. However, juveniles also are observed between November  
32 and the end of May (Snider and Titus 2000). Based on the available information, the emigration  
33 timing of spring-run appears highly variable (CDFG 1998). Some fish may begin emigrating soon  
34 after emergence from the gravel, whereas others over summer and emigrate as yearlings with the  
35 onset of intense fall storms (CDFG 1998).

36  
37 Historically, spring-run were the second most abundant salmon run in the Central Valley (CDFG  
38 1998). The Central Valley drainage as a whole is estimated to have supported spring-run runs as  
39 large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). Before the construction of  
40 Friant Dam, nearly 50,000 adults were counted in the San Joaquin River alone (Fry 1961).  
41 Construction of other low elevation dams in the foothills of the Sierras on the American,  
42 Mokelumne, Stanislaus, Tuolumne, and Merced Rivers extirpated spring-run from these watersheds.  
43 Naturally-spawning populations of spring-run currently are restricted to accessible reaches of the

upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998).

On the Feather River, significant numbers of spring-run, as identified by run timing, return to the FRFH. From 1986 to 2007, the average number of spring-run returning to the FRFH was 3,992, compared to an average of 12,888 spring-run returning to the entire Sacramento River Basin. However, CWT information from these hatchery returns indicates substantial introgression has occurred between spring-run and fall-run populations within the Feather River system due to hatchery practices. Because Chinook have not always been temporally separated in the hatchery, spring-run and fall-run have been spawned together, thus compromising the genetic integrity of the spring-run and early fall-run stocks. The number of naturally spawning spring-run Chinook in the Feather River has been estimated only periodically since the 1960s, with estimates ranging from 2 fish in 1978 to 2,908 in 1964. However, the genetic integrity of this population is questionable because of the significant temporal and spatial overlap between spawning populations of spring-run and fall-run (Good et al. 2005).

The spring-run ESU has displayed broad fluctuations in adult abundance, ranging from 1,403 in 1993 to 25,890 in 1982 (CDFG 2007, PFMC 2004, CDFG 2004, Yoshiyama 1998, GrandTab 2009). Sacramento River tributary populations in Mill, Deer, and Butte creeks are probably the best trend indicators for the spring-run ESU as a whole because these streams contain the primary independent populations within the ESU. Escapement numbers are dominated by Butte Creek returns, which have averaged over 7,000 fish between 1995 and 2007. During this same period, adult returns on Mill Creek have averaged 778 fish, and 1,463 fish on Deer Creek. Although recent trends are positive, annual abundance estimates display a high level of fluctuation, and the overall number of spring-run remains well below estimates of historic abundance. Additionally, in 2002 and 2003, mean water temperatures in Butte Creek exceeded 21°C for 10 or more days in July (Williams 2006). These persistent high water temperatures, coupled with high fish densities, precipitated an outbreak of columnaris disease (*Flexibacter columnaris*) and ichthyophthiriasis (*Ichthyophthirius multifiliis*) in the adult spring-run over-summering in Butte Creek. In 2002, this contributed to the pre-spawning mortality of about 20 to 30 percent of the adults. In 2003, about 65 percent of the adults succumbed, resulting in a loss of an estimated 11,231 adult spring-run in Butte Creek.

The Butte, Deer, and Mill Creek populations of spring-run are in the Northern Sierra Nevada diversity group. Lindley et al. (2007) indicated that spring-run populations in Butte and Deer creeks had a low risk of extinction in Butte and Deer Creek, according to their Population-level Viability Assessment (PVA) model and the other population viability criteria (i.e., population size, population decline, catastrophic events, and hatchery influence). The Mill Creek population of spring-run Chinook is at moderate extinction risk according to the PVA model, but appears to satisfy the other viability criteria for low-risk status. However, the spring-run ESU fails to meet the “representation and redundancy rule,” since the Northern Sierra Nevada is the only diversity group in the spring-run ESU that contains demonstrably viable populations out of at least 3 diversity groups that historically contained them. Independent populations of spring-run only occur within the Northern Sierra Nevada diversity group. The Northwestern California diversity group contains a few ephemeral

1 populations of spring-run that are likely dependent on the Northern Sierra Nevada populations for  
2 their continued existence. The spring-run populations that historically occurred in the Basalt and  
3 Porous Lava, and Southern Sierra Nevada, diversity groups have been extirpated. Over the long  
4 term, the three remaining independent populations are considered to be vulnerable to catastrophic  
5 events, such as volcanic eruptions from Mount Lassen or large forest fires due to the close proximity  
6 of their headwaters to each other. Drought is also considered to pose a significant threat to the  
7 viability of the spring-run populations in the Deer, Mill, and Butte Creek watersheds due to their  
8 close proximity to each other. One large event could eliminate all three populations.

9  
10 The Central Valley Project Improvement Act (CVPIA), implemented in 1992, requires that fish and  
11 wildlife get equal consideration with other demands for water allocations derived from the CVP.  
12 From the CVPIA arose several programs that have benefited listed salmonids: the Anadromous Fish  
13 Restoration Program (AFRP), the Anadromous Fish Screen Program (AFSP), and the Water  
14 Acquisition Program (WAP). The AFRP is engaged in monitoring, education, and restoration  
15 projects geared toward recovery of all anadromous fish species residing in the Central Valley.  
16 Restoration projects funded through the AFRP include fish passage, fish screening, riparian  
17 easement and land acquisition, development of watershed planning groups, instream and riparian  
18 habitat improvement, and gravel replenishment. The AFSP combines Federal funding with State  
19 and private funds to prioritize and construct fish screens on major water diversions mainly in the  
20 upper Sacramento River. The goal of the WAP is to acquire water supplies to meet the habitat  
21 restoration and enhancement goals of the CVPIA and to improve the DOI's ability to meet  
22 regulatory water quality requirements. Water has been used successfully to improve fish habitat for  
23 spring-run by maintaining or increasing instream flows in Butte and Mill creeks and the San Joaquin  
24 River at critical times.

25  
26 For spring-run, the construction of high dams for hydropower, flood control, and water supply  
27 resulted in the loss of vast amounts of upstream habitat (i.e., about 80 percent, or a minimum linear  
28 estimate of over 1,000 stream miles), and often resulted in precipitous declines in affected salmonid  
29 populations. For example, the completion of Friant Dam in 1947 has been linked with the  
30 extirpation of spring-run in the San Joaquin River upstream of the Merced River within just a few  
31 years. The reduced populations that remain below Central Valley dams are forced to spawn in lower  
32 elevation tailwater habitats of the mainstem rivers and tributaries that were previously not used for  
33 this purpose. This habitat is entirely dependent on managing reservoir releases to maintain cool  
34 water temperatures suitable for spawning, and/or rearing of salmonids. This requirement has been  
35 difficult to achieve in all water year types and for all life stages of affected salmonid species.  
36 Spring-run have also been negatively affected by the production of hatchery fish associated with the  
37 mitigation for the habitat lost to dam construction (e.g., from genetic impacts, increased competition,  
38 exposure to novel diseases, etc.).

39  
40 Land-use activities such as road construction, urban development, logging, mining, agriculture, and  
41 recreation are pervasive and have significantly altered fish habitat quantity and quality for Chinook  
42 through alteration of streambank and channel morphology; alteration of ambient water temperatures;  
43 degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available

habitats; elimination of downstream recruitment of LWD; and removal of riparian vegetation resulting in increased streambank erosion. Human-induced habitat changes, such as: alteration of natural flow regimes; installation of bank revetment; and building structures such as dams, bridges, water diversions, piers, and wharves, often provide conditions that both disorient juvenile salmonids and attract predators. Harvest activities, ocean productivity, and drought conditions provide added stressors to listed salmonid populations. In contrast, various ecosystem restoration activities have contributed to improved conditions for listed salmonids (e.g., various fish screens). However, some important restoration activities have not yet been implemented and benefits to listed salmonids have been less than anticipated.

Current natural production estimates, relative to historic baselines and AFRP production targets for spring-run Chinook are presented in Table 6 and Figure 4. These are derived from the Comprehensive Assessment and Monitoring Program (CAMP); Assessment of Anadromous Fish Production in the Central Valley of California between 1992 and 2008 (2009).

<b>Chinook group</b>	<b>1967-1991 average production</b>	<b>1992-2008 average production</b>	<b>AFRP fish production target</b>	<b>Percent change in average production 1967-1991 vs. 1992-2008</b>
Spring-run	34,374	15,446	68,000	- 55%

Table 6. Summary statistics of the average natural production of spring-run of adult Chinook from the Central Valley, 1967-2008. (CAMP, 2009)

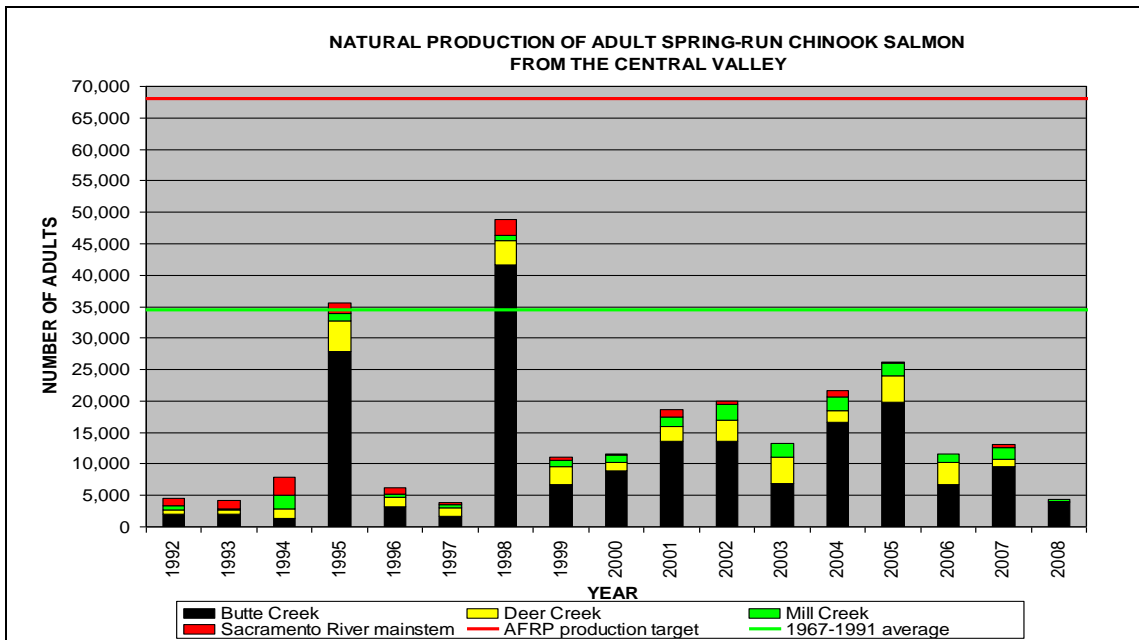
The graph in Figure 4 show the watershed's AFRP production target, estimated annual natural production of Chinook between 1992 and 2008, and average natural production of Chinook between 1967 and 1991 (CAMP, 2009). Table 7, identifies the percent changes over that time and the number of years in which AFRP goals were exceeded.

1

Watershed/Run	Number of years the AFRP production target was exceeded /number of years monitoring occurred since 1991	Change in average production between the 1967-1991 and 1992-2008 time periods
Butte Creek spring-run	14/17	+ 976% **
Deer Creek spring-run	0/17	- 29%
Mill Creek spring-run	0/17	- 40%
Sacramento River spring-run	0/16	- 97% **

2 Table 7 Overall assessment of changes in natural production of spring-run adult Chinook from the Central Valley, 1967-  
3 2008.; \*\* P values <0.05 reflect a statistically significant change (CAMP, 2009).  
4

5 All Central Valley spring-run Chinook ESU are federally-listed as threatened, and of the potential  
6 donor stocks considered, only one (Butte Creek) has exceeded the AFRP goal (CAMP 2009), but  
7 this may be a result of anomalously low population numbers used for the 1967 through 1991 mean  
8 baseline. The three genotypic spring-run donor sources (Butte, Deer, and Mill creeks) have all  
9 shown declines since 2005 (CAMP 2009).  
10



11 Figure 4. Estimated natural production of adult spring-run Chinook from the Central Valley, 1992-2008. Annual  
12 estimates reflect the combined contributions from Butte Creek, Deer Creek, Mill Creek, and the Sacramento River  
13 mainstem. The AFRP spring-run Chinook production target is 68,000 Chinook, and the 1967-1991 baseline average is  
14 34,374 Chinook. (CAMP, 2009)  
15  
16

## 9. DIRECT AND INCIDENTAL TAKE

---

For purposes of defining the relevant project activities, we are segregating affected individuals (or populations) into three distinct categories: Donor Stock, Conservation Stock, and Experimental Stock.

Donor Stock refers to the individuals actually collected from their native (or currently resident) stream source. In permit terms, we reference these numbers to their donor population. All fish collected and managed as part of this proposed activity will be recognized as Conservation Stock for the entire duration while in the possession of the responsible parties for each specified activity. For example, transport during relocation and during residence in the Conservation Facility (during the pre-emergence phase for eggs). Once fish are introduced to the San Joaquin River proper (at the moment that fish are no longer in possession of the responsible personnel during direct release activities), these fish transition to Experimental Stock, under the anticipated §10J designation. All eggs located streamside or in-stream are considered part of the Experimental Stock, though they technically remain in the possession of responsible entities.

The proposed action would result in both direct and incidental take to the donor stock populations and losses to the Conservation Stock. Donor Stock direct take consists of all collections (one for one numeric debits to the donor population). Donor stock (population) incidental take consists of effects to the remnant populations from collection activities. Transport and rearing activities also involve mortality to the Conservation Stock incidental to the Conservation program activity.

Total direct and indirect take of donor stock was calculated by using the sum of the maximum collection number for each lifestage and watershed.

### 9.1 Direct Take of Donor Stock

Direct take would result from the capture of donor stock and the removal of the donor stock from the FRFH. Direct take would affect those fish or eggs that were captured, collected and fish that will be used for pathology. Those numbers would vary year to year depending on the allowable quotas set for each year's collection and outlined in the annual DSC Plan and would not exceed the annual maximum collection targets presented in Table 2 (page 17).



## 9.2 Incidental Take to Donor Population from Collection

Incidental take to the donor population would be considered that associated with collection activities and would include harassing, injuring, or killing any spring-run Chinook during the permitted collection activities. Incidental direct take would include any take that occurred during the actual collection or capture activities, e.g., any mortality or injury that may occur to individual fish during the capture process or eggs during collection (see Effects Analysis for a description of possible causes). Incidental indirect take would also result from the collection activities, but would occur at a later time as a result of the proposed activity (e.g., fungal infection caused by removal of protective slime), and will by definition be unobserved.

The Service anticipates that tangible numeric figures for indirect take of donor stock may be difficult to fully ascertain. The small size of eggs and juvenile fish inherently make mortality detection difficult within a hatchery or within in-stream rearing facilities.

All take incidental to the activities covered under this permit will be avoided and minimized based on the mitigation measures outlined in the Project Description and Effects Analysis, above.

## 9.3 Conservation Stock Losses and Facility Performance Measures

Losses at the Conservation Facility are anticipated to be similar to other CDFG hatcheries currently in operation. Using current literature searches and local experts, the Service has projected mortalities for various activities associated with the management and rearing of the Conservation Stock. Appendix B presents the effect details for various project activities. The program will maintain performance standards deemed necessary by the permitting agency for mortality rates of captured donor stock and broodstock of a species under the current conservation status (threatened under the ESA).

## 10. REFERENCES

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- Alderdice, D.F. and F.P.J. Velsen. 1978. Relation between temperature and incubation time for eggs of Chinook (*Oncorhynchus tshawytscha*). Journal of the Fisheries Research Board of Canada 35(1):69-75.
- Allen, M.A. and T.J. Hassler. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates. (Pacific Southwest), Chinook. U.S. Fish and Wildlife Report 82 (11.49). April 1986.
- Allendorf, F.W., D. Bayles, D.L. Bottom, K.P. Currens, C.A. Frissell, D. Hankin, J.A. Lichatowich, W. Nehlsen, P.C. Trotter, T.H. Williams. 1997. Prioritizing Pacific salmon stocks for conservation. Conservation Biology 11:140-152
- Anderson, E.C. and J.C. Garza. 2005. The Power of Single Nucleotide Polymorphisms for Large-Scale Parentage Analysis. Genetics Vol. 172, 2567-2582.
- Banks, J.L. 1994. Raceway density and water flow as factors affecting spring Chinook during rearing and after release. Aquaculture 119:201-217.
- Barton, B. A. 2002. Stress in fishes: A diversity of responses with particular reference to changes in circulating corticosteroids. Integrative and Comparative Biology 42:517–525.
- Barton, B.A., R.E. Peter and C.R. Paulencu. 1980. Plasma cortisol levels of fingerling rainbow trout (*Salmo gairdnei*) at rest, and subjected to handling, confinement, transport and stocking. Canadian Journal of Fisheries and Aquatic Sciences 37:805-811.
- Bell, M. C. 1991. Fisheries handbook of engineering requirements and biological criteria. Third edition. U.S. Army Corps of Engineers, Office of the Chief of Engineers, Fish Passage Development and Evaluation Program, North Pacific Division, Portland, Oregon.
- Bilby, R.E., R.R. French, P.A. Bisson, and J.K. Walter. 1998. Response of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead (*O. mykiss*) to the addition of salmon carcasses to two streams in southwestern Washington, USA. Canadian Journal of Fisheries and Aquatic Sciences 55:908-1918.

- 1  
2 Bilby, R.E., B.R. Fransen and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from  
3 spawning coho salmon (*Oncorhynchus kisutch*) into the trophic system of small streams:  
4 evidence from stable isotopes. Canadian Journal of Fisheries and Aquatic Sciences 53:164-  
5 173.  
6  
7 Billard, R., and Jensen, J.O.T. 1996. Gamete removal, fertilization and incubation. Pages 291- 363  
8 in W. Pennell and B.A. Barton, Editors. Developments in Aquaculture and Fisheries Science  
9 Vol. 29: Principles of Salmonid Culture. Elsevier, Amsterdam, Netherlands.  
10  
11 Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of anadromous salmonids. In W.R.  
12 Meehan (editor), Influences of forest and rangeland management on salmonid fishes and  
13 their habitats, pages 83-138. American Fisheries Society Special Publication 19. American  
14 Fisheries Society, Bethesda, Maryland.  
15  
16 Boles, G. 1988. Water temperature effects on Chinook (*Oncorhynchus tshawytscha*) with emphasis  
17 on the Sacramento River: a literature review. Report to the California Department of Water  
18 Resources, Northern District, 43 pages.  
19  
20 Brandes, P. L. and J. S. McLain. 2001. Juvenile Chinook abundance, distribution, and survival in  
21 the Sacramento-San Joaquin Estuary. In: R.L. Brown, editor. Contributions to the biology  
22 of Central Valley salmonids. Volume 2. California Department of Fish and Game Fish  
23 Bulletin 179:39-136.  
24  
25 Brett, J.R. 1952. Temperature tolerance of young Pacific salmon, genus *Oncorhynchus*. Journal of  
26 the Fisheries Research Board of Canada 9:265-323.  
27  
28 California Department of Fish and Game (CDFG). 1998. A status review of the spring run Chinook  
29 in the Sacramento River drainage. Report to the Fish and Game Commission. Candidate  
30 species status report 98-1. June 1998. Sacramento, California. 394 pages.  
31  
32 CDFG. 2007. GrandTab spreadsheet of adult Chinook escapement in the Central Valley. February  
33 CDFG. 2008. GrandTab winter-run Chinook population estimates. March 7.  
34  
35 CDFG. 2004. Sacramento River winter-run Chinook 2002-2003 biennial report. Prepared for the  
36 California Fish and Game Commission. Habitat Conservation Division, Native Anadromous  
37 Fish and Watershed Branch. Sacramento, California. 22 pages.  
38  
39 Calkins, R.D., W.F. Durand, and W.H. Rich. 1940. Report of the Board of Consultants on the fish  
40 problem of the upper Sacramento River. Stanford University, Stanford, California. 34 pages.  
41

1 Carmichael, G.J., J.R. Tomasso, and T.E. Schwedler. 2001. Fish transportation. Pp 641-660 in  
2 Wedemeyer, G. A. (Ed.). Fish hatchery management. 2nd ed. American Fisheries Society,  
3 Bethesda, Maryland.  
4

5 Chambers, J. 1956. Fish passage development and evaluation program. Progress Report No. 5.  
6 U.S. Army Corps of Engineers, North Pacific Division, Portland, OR.  
7

8 Clark, G. H. 1929. Sacramento-San Joaquin salmon (*Oncorhynchus tshawytscha*) fishery of  
9 California. California Fish and Game Bulletin 17:1-73.

10 CVRWQCB. 1998. Amendments to the Water Quality Control Plan for the Sacramento River and  
11 San Joaquin River Basins for the Control of Agricultural Subsurface Drainage Discharges.  
12 Staff Report. March 1998.

13 Dare, MR. 2003. Mortality and long-term retention of passive integrated transponder tags by spring  
14 chinook salmon. North American Journal Of Fisheries Management. Volume: 23 Issue: 3  
15 Pages: 1015-1019. AUG 2003

16 Dittman, A.H., T.P. Quinn, and G.A. Nevitt. 1995. Timing of imprinting to natural and artificial  
17 odors by coho salmon (*Oncorhynchus kisutch*). Can. J. of Fish. Aquat. Sci. 53:434-442.  
18

19 Donaghy, M.J, and E. Verspoor. 2000. A new design of instream incubator for planting out and  
20 monitoring Atlantic salmon eggs. North American Journal of Fisheries Management  
21 20:521–527.  
22

23 Dunford, W.E. 1975. Space and food utilization by salmonids in marsh habitats in the Fraser River  
24 Estuary. M.S. Thesis. University of British Columbia, Vancouver, B.C., 81 pages.  
25

26 DWR. June 2009. Hatchery and Genetic Management Plan for Feather River Fish Hatchery Spring-  
27 run Chinook Program.  
28

29 EA Engineering, Science and Technology (EA). 1992. Lower Tuolumne River spawning gravel  
30 studies report. Appendix 6 to Don Pedro Project Fisheries Studies Report (FERC Article 39,  
31 Project No. 2299). In Report of Turlock Irrigation District and Modesto Irrigation District  
32 Pursuant to Article 39 of the License for the Don Pedro Project, No. 2299.  
33 Vol. IV. Lafayette, California.  
34

35 EPA 2003. U.S. Environmental Protection Agency. 2003. EPA Region 10 Guidance for Pacific  
36 Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002.  
37 Region 10 Office of Water. Seattle, Washington.

38 Ewing, R.D., and S.K. Ewing. 1995. Review of the effects of rearing density on survival to  
39 adulthood for Pacific salmon. Progressive Fish Culturist. 57:1-25.

- 1  
2 Fisher, F. W. 1992. Chinook salmon, *Oncorhynchus tshawytscha*, growth and occurrence in the  
3 Sacramento-San Joaquin River system. California Department Fish and Game, Inland  
4 Fisheries Division, Draft Office Report, June 1.
- 5  
6 Fisher, F. W. 1994. Past and present status of Central Valley Chinook. *Conservation Biology*  
7 8(3):870-873.
- 8  
9 Flagg, T. A., and C. E. Nash (eds). 1999. A conceptual framework for conservation hatchery  
10 strategies for Pacific salmonids. U.S. Dep. Commer., NOAA Tech. Memo. NMFS -  
11 NWFSC-38
- 12  
13 Fry, D.H. 1961. King salmon spawning stocks of the California Central Valley, 1940-1959.  
14 *California Fish and Game* 47:55-71.
- 15  
16 Gadomski, D.M., M.G. Mesa, and T.M. Olson. 1994. Vulnerability to predation and physiological  
17 stress responses of experimentally descaled juvenile Chinook, *Oncorhynchus tshawytscha*.  
18 *Environmental Biology of Fishes* 39(2):191-199.
- 19  
20 Good, T. P., R. S. Waples, and P. Adams (editors). 2005. Updated status of Federally listed ESU of  
21 West Coast salmon and steelhead. U.S. Department of Commerce, NOAA Technical Memo.  
22 NMFS-NWFSC-66. 598 pages.
- 23  
24 GrandTab. 2009. California Department of Fish and Game. 2009. Copy  
25 Permitted\_Grandtab.2009.02.18.pdf. Unpublished spreadsheet providing Chinook data.  
26 [http://www.fws.gov/stockton/afpr/documents/CopyPermitted\\_GrandTab.2009.02.18.pdf](http://www.fws.gov/stockton/afpr/documents/CopyPermitted_GrandTab.2009.02.18.pdf)  
27
- 28 Harvey, B.H. 1987. Tagging and marking fish for IDRC research projects. MTL Marine  
29 Technology Ltd. Victoria, BC. 22 pages.
- 30  
31 Healey, M. C. 1980. Utilization of the Nanaimo River Estuary by juvenile Chinook, *Oncorhynchus*  
32 *tshawytscha*. *U.S. Fisheries Bulletin* 77:653-668.
- 33  
34 Healey, M.C. 1982. Juvenile Pacific salmon in estuaries: the life support system. *In* V.S. Kennedy  
(editor), *Estuarine Comparisons*, pages 315-341. Academic Press. New York, N.Y.
- 35  
36 Healey, M. C. 1991. Life history of Chinook (*Oncorhynchus tshawytscha*). *In* C. Groot and L.  
37 Margolis, editors, *Pacific Salmon Life Histories*, pages 396-445 [check. Another reference  
38 said Pages 313-393]. University of British Columbia Press, Vancouver, British Columbia.  
39 564 pages.

- 1 Hughes, N. F. 2004. The wave-drag hypothesis: an explanation for sized-based lateral segregation  
2 during the upstream migration of salmonids. *Canadian Journal of Fisheries and Aquatic*  
3 *Sciences* 61:103-109.
- 4
- 5 Keefer, M. L., C. A. Perry, M. A. Jepson, and L. C. Stuehrenberg. 2004. Upstream migration rates  
6 of radio-tagged adult Chinook in riverine habitats of the Columbia River basin. *Journal of*  
7 *Fish Biology* 65:1126-1141.
- 8
- 9 Kjelson, M. A., P. F. Raquel, and F. W. Fisher. 1982. Life history of fall-run juvenile Chinook,  
10 *Oncorhynchus tshawytscha*, in the Sacramento-San Joaquin estuary, California. In V.S.  
11 Kennedy (editor), *Estuarine comparisons*, pages 393-411. Academic Press, New York, New  
12 York.
- 13
- 14 Jensen, J.O.T. and D.F. Alderdice. 1983. Changes in mechanical shock sensitivity of coho salmon  
15 (*Oncorhynchus kisutch*) eggs during incubation. *Aquaculture* 32 :303-312.
- 16
- 17 Jones and Stokes Associates, Inc. (JSA), 1998. *Historical riparian habitat conditions of the San*  
18 *Joaquin River*, Sacramento, CA, Prepared for U. S. Bureau of Reclamation, Fresno, CA.
- 19 JSA and Mussetter Engineering Inc. (MEI), 1998. *Analysis of physical processes and riparian*  
20 *habitat potential of the San Joaquin River – Friant Dam to the Merced River*, Sacramento,  
21 CA, with technical assistance from Ayers Associates, Prepared for U. S. Bureau of  
22 Reclamation, Fresno, CA.
- 23 JSA and Mussetter Engineering Inc. (MEI), 2002. *San Joaquin River Pilot Project 2000 Final*  
24 *baseline vegetation and physical variable data collection summary*, Sacramento, CA.
- 25
- 26 Levings, C.D. 1982. Short term use of low-tide refugia in a sand flat by juvenile chinook,  
27 (*Oncorhynchus tshawytscha*), Fraser River estuary. *Canadian Technical Reports of Fisheries*  
28 *and Aquatic Sciences*, Number 1111. 7 pages.
- 29 Levings, C.D., C.D. McAllister, and B.D. Chang. 1986. Differential use of the Campbell River  
30 estuary, British Columbia, by wild and hatchery-reared juvenile Chinook (*Oncorhynchus*  
31 *tshawytscha*). *Canadian Journal of Fisheries and Aquatic Sciences* 43:1386-1397.
- 32 Levy, D. A. and T. G. Northcote. 1981. The distribution and abundance of juvenile salmon in  
33 marsh habitats of the Fraser River Estuary. Westwater Research Centre, University of  
34 British Columbia, Technical Report no. 25. Vancouver, British Columbia, Canada.
- 35
- 36 Levy, D.A. and T.G. Northcote. 1982. Juvenile salmon residency in a marsh area of the Fraser River  
37 estuary. *Canadian Journal of Fisheries and Aquatic Sciences* 39:270-276.
- 38

- 1 Lindley, S.T., R. Schick, E. Mora, P. B. Adams, J. J. Anderson, S. Greene, C. Hanson, B. P. May, D.  
2 R. McEwan, R. B. MacFarlane, C. Swanson, and J. G. Williams. 2007. Framework for  
3 assessing viability of threatened and endangered Chinook and steelhead in the Sacramento-  
4 San Joaquin Basin. San Francisco Estuary and Watershed Science 5(1), Article 4: 26 pages.  
5 Available at: <http://repositories.cdlib.org/jmie/sfews/vol5/iss1/art4>.  
6
- 7 Lindley, S.T., R. Schick, B.P. May, J.J. Anderson, S. Greene, C. Hanson, A. Low, D. McEwan, R.B.  
8 MacFarlane, C. Swanson, and J.G. Williams. 2004. Population structure of threatened and  
9 endangered Chinook ESU in California's Central Valley basin. Public review draft. NMFS  
10 Southwest Science Center. Santa Cruz, California.  
11
- 12 MacFarlane, B. R., and E. C. Norton. 2001. Physiological ecology of juvenile Chinook  
13 (*Oncorhynchus tshawytscha*) at the southern end of their distribution, the San Francisco  
14 Estuary and Gulf of the Farallones, California. Fisheries Bulletin 100:244-257  
15
- 16 MacFarlane, B. R., and E. C. Norton. 2002. Physiological ecology of juvenile Chinook  
17 (*Oncorhynchus tshawytscha*) at the southern end of their distribution, the San Francisco  
18 Estuary and Gulf of the Farallones, California. Fisheries Bulletin 100:244-257  
19
- 20 Martin, C. D., P. D. Gaines and R. R. Johnson. 2001. Estimating the abundance of Sacramento  
21 River juvenile winter Chinook with comparisons to adult escapement. Red Bluff Research  
22 Pumping Plant Report Series, Volume 5. U.S. Fish and Wildlife Service, Red Bluff,  
23 California.
- 24 Maslin, P., M Lennox, and W. McKinney. 1997. Intermittent streams as rearing habitat for  
25 Sacramento River Chinook (*Oncorhynchus tshawytscha*). California State University, Chico,  
26 Department of Biological Sciences. 89 pages.  
27
- 28 Matter, A. L. and B. P. Sandford. 2003. A comparison of migration rates of radio and PIT-tagged  
29 adult Snake River Chinook through the Columbia River hydropower system. North  
30 American Journal of Fisheries Management 23:967-973.  
31
- 32 McBain & Trush, Inc. (eds.), 2002. *San Joaquin River Restoration Study Background Report*,  
33 prepared for Friant Water Users Authority, Lindsay, CA, and Natural Resources Defense  
34 Council, San Francisco, CA.
- 35 McDonald, J. 1960. The behavior of Pacific salmon fry during the downstream migration to  
36 freshwater and saltwater nursery areas. Journal of the Fisheries Research Board of Canada  
37 17:655-676.  
38

- 1  
2 McReynolds, T. R., C. E. Garman, P. D. Ward, and M. C. Schommer. 2005. Butte and Big Chico  
3 Creeks spring-run Chinook, *Oncorhynchus tshawytscha* life history investigation, 2003-2004.  
4 California Department of Fish and Game, Inland Fisheries Administrative Report No. 2005-  
5 1.  
6
- 7 Meade, R. J. 2007. Recommendations on restoring spring-run Chinook to the upper San Joaquin  
8 River. Prepared for San Joaquin River Restoration Program Restoration Administrator  
9 Roderick J. Meade Consulting, Inc. Prepared by San Joaquin River Restoration Program  
10 Technical Advisory Committee. October 2007.
- 11 Meade, R. J. 2008. Recommendations on restoring fall-run Chinook to the upper San Joaquin River.  
12 Prepared for San Joaquin River Restoration Program Restoration Administrator Roderick J.  
13 Meade Consulting, Inc. Prepared by San Joaquin River Restoration Program Technical  
14 Advisory Committee.
- 15 Mesick, C.F., D. Marston, and T. Heyne. 2009. Estimating the total number of coded-wire-tagged  
16 adult fall-run Chinook (*Oncorhynchus tshawytscha*) in California's Central Valley rivers. El  
17 Dorado, California. Report produced for the California Department of Fish and Game,  
18 Fresno, California.  
19
- 20 Meyer, J. H. 1979. A review of the literature on the value of estuarine and shoreline areas to  
21 juvenile salmonids in Puget Sound, Washington. U.S. Fish and Wildlife Service. Fisheries  
22 Assistance Office, Olympia, Washington.  
23
- 24 Moise, G. W. and B. Hendrickson, 2002. *Riparian Vegetation of the San Joaquin River, State of*  
25 *California*, Department Of Water Resources, Division of Planning and Local Assistance, San  
26 Joaquin District, Technical Information Record SJD-02-1.
- 27 Moyle, P. B. 2002. Inland fish of California, 2nd edition. University of California Press, Berkeley,  
28 California.
- 29 Myers, J. M., R. G. Kope, G. J. Bryant, D. Teel, L. J. Liehr, T. C. Wainwright, W. S. Grant, F.  
30 W. Waknitz, K. Neely, S. T. Lindley, and R. S. Waples. 1998. Status review of Chinook  
31 from Washington, Idaho, Oregon, and California. Technical Memorandum NMFS-NWFSC-  
32 35. United States Department of Commerce, National Oceanic and Atmospheric  
33 Administration, National Marine Fisheries Service. 443 pages.
- 34 National Marine Fisheries Service (NMFS). 1996. Factors for decline: a supplement to the notice of  
35 determination for west coast steelhead under the Endangered Species Act. National Marine  
36 Fisheries Service, Protected Resource Division, Portland, Oregon and Long Beach,  
37 California.



1 NMFS. 1997. National Marine Fisheries Service Proposed Recovery Plan for the Sacramento River  
2 Winter-run Chinook. NMFS, Southwest Region, Long Beach, California. 217 pages with  
3 goals and appendices.

4 NMFS. 2003. Endangered species Act section 7 programmatic biological opinion on the issuance  
5 of section 10(A)1(a) scientific research permits on endangered Sacramento River winter-run  
6 Chinook, threatened Central Valley spring-run Chinook, and threatened central Valley  
7 steelhead. September 5, 2003. Sacramento, California.

8

9 Pacific Fishery Management Council (PFMC). 2004. Review of 2003 Ocean Salmon Fisheries.  
10 Available: [www.pcouncil.org](http://www.pcouncil.org)

11 Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, and J.R. Leonard. 1982. Fish  
12 Hatchery Management. United States Department of the Interior Fish and Wildlife Service,  
13 Washington, D.C.

14

15 Quinn, T.P., E.L. Brannon, and A.H. Dittman. 1989. Spatial Aspects of Imprinting and Homing in  
16 Coho Salmon, *Oncorhynchus kisutch*. Fishery Bulletin. 87, No.4, 1989.

17

18 Rich, A.A. 1997. Testimony of Alice A. Rich, Ph.D., regarding water rights applications for the  
19 Delta Wetlands Project, proposed by Delta Wetlands Properties for Water Storage on Webb  
20 Tract, Bacon Island, Bouldin Island, and Holland Tract in Contra Costa and San Joaquin  
21 Counties. July 1997. California Department of Fish and Game Exhibit CDFG-7. Submitted  
22 to State Water Resources Control Board.

23 Rich A.A. and Associates. 2007. Impacts of Water Temperature on Fall-Run Chinook, *Oncorhynchus*  
24 *tshawytscha*, and Steelhead, *O. mykiss*, in the San Joaquin River System. San Anselmo,  
25 California.

26 Rutter, C. 1904. Natural history of the quinnat salmon. Investigations on Sacramento River, 1896-  
27 1901. Bulletin of the U.S. Fish Commission. 22:65-141.

28 San Joaquin River Restoration Program (SJRRP). Mar 2010. Draft Fisheries Management Plan.

29

30 SJRRP. 2010a. 2009 – 2013 Interim Flow Release Program, Water Quality Monitoring Plan,  
31 January 8, 2010. [http://www.restoresjr.net/activities/if/20100108SJRRPWQMP2010-](http://www.restoresjr.net/activities/if/20100108SJRRPWQMP2010-2013.pdf)  
32 [2013.pdf](http://www.restoresjr.net/activities/if/20100108SJRRPWQMP2010-2013.pdf)

33 Science Applications International Corporation (SAIC), 2002. *San Joaquin River Pilot Project 2001*.

34 Shelton, J. M. 1995. The hatching of Chinook eggs under simulated stream conditions. *Progressive*  
35 *Fish-Culturist* 17:20-35.

- 1 Slatik, E. , L.G. Gilbreath, J. R. Harmon, T. C. Bjornn, R.R. Ringe, K. A. Walch, A. J. Novotny And  
2 W.S. Zaugg. 1988. Imprinting hatchery reared salmon and steelhead trout for homing, 1978  
3 – 1983 Volume I of III: Narrative Final Report of Research. Bonneville Power  
4 Administration. Contract No. DE-AI79-84BP39646.
- 5
- 6 Smith, A.K. 1973. Development and application of spawning velocity and depth criteria for Oregon  
7 salmonids. Transactions of the American Fisheries Society 10:312-316.
- 8 Snider, B. 2001. Evaluation of effects of flow fluctuations on the anadromous fish populations in  
9 the lower American River. California Department of Fish and Game, Habitat Conservation  
10 Division. Stream Evaluation Program. Tech. Reports No. 1 and 2 with appendices 1-3.  
11 Sacramento, California.
- 12 Snider, B. and R. G. Titus. 2000. Timing, composition, and abundance of juvenile anadromous  
13 salmonid emigration in the Sacramento River near Knights Landing, October 1996-  
14 September 1997. California Department of Fish and Game, Habitat Conservation Division,  
15 Stream Evaluation Program Technical Report No. 00-04.
- 16 Sommer TR, Nobriga ML, Harrell WC, Batham W, Kimmerer WJ. 2001. Floodplain rearing of  
17 juvenile Chinook: evidence of enhanced growth and survival. Canadian Journal of Fisheries  
18 and Aquatic Sciences 58:325-333.
- 19
- 20 Stillwater Sciences. 2004. Appendix H: conceptual models of focus fish species response to  
21 selected habitat variables. In: Sacramento River Bank Protection final Standard Assessment  
22 Methodology. July.
- 23 Stone, L. 1874. Report of operations during 1872 at the U.S. salmon-hatching establishment on the  
24 McCloud River, and on the California Salmonidae generally; with a list of specimens  
25 collected. Report to U.S. Commissioner of Fisheries for 1872-1873, 2:168-215.
- 26 Thedinga, J.F., M.G. Carls, J.M. Maselko, R.A. Heintz, and S.D. Rice. 2005. Resistance of  
27 naturally spawned pink salmon eggs to mechanical shock. Alaska Fishery Research Bulletin  
28 11(1):37-43.
- 29
- 30 Thoesen, J.C. 1994. Suggested Procedures for the Detection and Identification of Certain Finfish  
31 and Shellfish Pathogens. Blue Book 4th Edition. Fish Health Section, American Fisheries  
32 Society. Bethesda, Maryland.
- 33
- 34 Thoesen, J.C. 2007 Suggested Procedures for the Detection and Identification of Certain Finfish  
35 and Shellfish Pathogens, Blue Book 2007 edition. American Fisheries Society Fish Health  
36 Section, Bethesda, Maryland.
- 37
- 38

- 1 Timmons, M., and J. Ebeling. 2007. Recirculating Aquaculture, Cayuga Aqua Ventures, Ithaca,  
2 New York.
- 3
- 4 U.S. Fish and Wildlife Service (USFWS). 1995. Sacramento-San Joaquin Delta Native Fishes  
5 Recovery Plan. Portland, Oregon.
- 6 USFWS. 1997. Abundance and survival of juvenile Chinook in the Sacramento-San Joaquin  
7 Estuary. 1994 Annual Progress Report. Stockton, California.
- 8 USFWS. 2008. Draft rotary screw trap protocol for estimating  
9 production of juvenile Chinook. Document prepared by the U.S. Fish and Wildlife Service,  
10 Comprehensive Assessment and Monitoring Program. Sacramento, California. 44 pp.
- 11
- 12 USFWS. 2009. Assessment of anadromous fish production in the Central Valley of California  
13 between 1992 and 2008. Report prepared by the U.S. Fish and Wildlife Service and Bureau  
14 of Reclamation, Comprehensive Assessment and Monitoring Program. Sacramento,  
15 California. 84 pp.
- 16
- 17 USFWS AFRP. 1996. Effects of Pulse Flows on Juvenile Chinook Migration in the Stanislaus  
18 River 1996 Annual Report. Prepared by S.P. Cramer & Associates, Inc.
- 19
- 20 USFWS AFRP. 1997. Outmigrant Trapping of Juvenile Salmonids in the lower Stanislaus River,  
21 Caswell State Park Site 1996. Under subcontract to CH2M Hill and prepared by S.P. Cramer  
22 & Associates, Inc.
- 23
- 24 USFWS AFRP. 1998. Effects of Pulse Flows on Juvenile Chinook Migration in the Stanislaus  
25 River 1998 Annual Report. Prepared by S.P. Cramer & Associates, Inc.
- 26
- 27 USFWS AFRP. 1998b. Outmigrant Trapping of Juvenile Salmonids in the lower Stanislaus River,  
28 Caswell State Park Site 1997. Under subcontract to CH2M Hill and prepared by S.P.  
29 Cramer & Associates, Inc.
- 30
- 31 USFWS AFRP. 1999. Juvenile Chinook Migration Characteristics in the Stanislaus River 1999  
32 Annual Report. Prepared by S.P. Cramer & Associates, Inc.
- 33
- 34 USFWS AFRP. 1999b. Outmigrant Trapping of Juvenile Salmonids in the lower Stanislaus River,  
35 Caswell State Park Site 1998. Under subcontract to CH2M Hill and prepared by S.P.  
36 Cramer & Associates, Inc.
- 37
- 38 USFWS AFRP. 2001. 2001 Stanislaus River Data Report Final Data. Prepared by S.P. Cramer &  
39 Associates, Inc.
- 40

- 1 USFWS AFRP. 2002. 2002 Stanislaus River Data Report Final Data Supplement. Prepared by S.P.  
2 Cramer & Associates, Inc.  
3
- 4 USFWS AFRP. 2003. 2003 Stanislaus River Data Report Final Data. Prepared by S.P. Cramer &  
5 Associates, Inc.  
6
- 7 USFWS AFRP. 2004. 2004 Stanislaus River Data Report Final Data. Prepared by S.P. Cramer &  
8 Associates, Inc.  
9
- 10 USFWS AFRP. 2005. 2005 Stanislaus River Data Report Final Data. Prepared by S.P. Cramer &  
11 Associates, Inc.  
12
- 13 USFWS AFRP. 2006. 2006 Stanislaus River Data Report Final Data. Prepared by S.P. Cramer &  
14 Associates, Inc.  
15
- 16 USFWS AFRP. 2007. 2007 Stanislaus River Data Report Final Data. Prepared by FISHBIO  
17 Environmental.  
18
- 19 USFWS AFRP. 2007b. Out-migrant Abundance Estimates and Coded Wire Tagging Pilot Study for  
20 Juvenile Chinook at Caswell Memorial State Park in the Lower Stanislaus River, California  
21 2007. Prepared by S.P. Cramer & Associates, Inc.  
22
- 23 USFWS AFRP. 2008. Outmigrant Trapping of Juvenile Salmonids in the lower Stanislaus River,  
24 Caswell State Park Site 2008. Prepared by S.P. Cramer & Associates, Inc.  
25
- 26 USFWS AFRP. 2009. Juvenile Salmonid Out-migration Monitoring at Caswell Memorial State Park  
27 in the Lower Stanislaus River, California; 2009 Annual Data Report. Prepared by Cramer  
28 Fish Sciences, Oakdale, CA.  
29
- 30 Venditti, David, Catherine Willard, Chris Looney, Paul Kline, Peter Hassemer, "Captive Rearing  
31 Program for Salmon River Chinook Salmon", 2000 Annual Report, Project No. 199700100,  
32 42 electronic pages, (BPA Report DOE/BP-00004002-2)  
33
- 34 Ward, P. D., T. R. McReynolds, and C.E. Garman. 2002. Butte and Big Chico Creeks spring-run  
35 Chinook, *Oncorhynchus tshawytscha* life history investigation, 2000-2001. California  
36 Department of Fish and Game, Inland Fisheries Administrative Report.
- 37 Ward, P. D., T. R. McReynolds, and C.E. Garman. 2003. Butte and Big Chico Creeks spring-run  
38 Chinook, *Oncorhynchus tshawytscha* life history investigation, 2001-2002. California  
39 Department of Fish and Game, Inland Fisheries Administrative Report.  
40  
41

1 Warner, G. 1991. Remember the San Joaquin. Pages 61-69 in A. Lufkin, ed. California's salmon  
2 and steelhead: the struggle to restore an imperiled resource. Berkely: University of  
3 California Press.  
4  
5 Westers, H. 2001. Production. Pp 31-91 in G. A. Wedemeyer, ed. Fish hatchery management,  
6 second edition. American Fisheries Society, Bethesda, Maryland.  
7  
8 Williams, J.G. 2006. Central Valley salmon: a perspective on Chinook and steelhead in the Central  
9 Valley of California. San Francisco Estuary and Watershed Science 4(3): Article 2. 416  
10 pages. Available at: <http://repositories.cdlib.org/jmie/sfew/vol4/iss3/art2>.  
11  
12 Yoshiyama, R. M., F. W. Fisher, and P. B. Moyle. 1998. Historical abundance and decline of  
13 Chinook in the Central Valley Region of California. North American Journal of Fisheries  
14 Management 18:487-521.

## 17 11. PERSONAL COMMUNICATION

18  
19 J. Hannon, USBR. August 25, 2010  
20  
21 Colleen Harvey-Arrison, CDFG. April 28, 2010  
22  
23 C. Mesick, USFWS. September 15, 2010  
24  
25 John Rueth USFWS August 9, 2011  
26  
27 Anna Kastner- CDFG Hatchery Manager, October 13, 2011

## **12. APPENDIX A – DONOR STOCK COLLECTION PLAN**

### **12.1 Donor Stock Collection Annual Decision Process**

A suite of collection methods across life stages are proposed subject to permit approval and an adaptive process that includes assessment of current population conditions, habitat characteristics, fish distribution, and spawning phenology. The donor stock collection decision process will be an interagency process, and will receive technical input from technical teams, such as the FMWG. The objective of this process is to adaptively manage annual collections to assure no detrimental effects to the viability of donor stream populations. In addition, this process will ensure that specific collection locations and methods will follow best available practices to minimize take within the umbrella of the Collection Program.

The technical team will use real time information for planning and implementation. This information will include, but not be limited to: population status, life stage(s) present, physical availability of donor stock, ease of capture method and its associated impact to individual (stress, injury, survival), Conservation Program status, benefits to the Conservation Program, and other pertinent information. Potential impacts to donor populations will be assessed based on, but not limited to: induces stress on non-targets, negative effects from habitat disturbance, absolute numbers taken from donor populations, and the genetic implications for each method utilized. Other considerations may arise through further monitoring and research, and these may influence future planning.

This information, along with further data made available from genetic studies, monitoring and method refinement (based in part as learning follows implementation of this reintroduction) will be critical to inform the specific details for future collections within refined stock selection strategies.

In addition, the interagency team will consider any updated numeric guidelines provided by NMFS to determine allowable collection limits with respect to current population.

Upon reviewing the available information, the team will confer and make a formal recommendation to the Service SJRRP Program Manager for stock selection for that year. The SJRRP Program Manager, or designated staff, will compile the information provided into an annual Donor Stock Collection Plan (DSC Plan), which will be submitted to NMFS and DFG in the form of a formal request for approval.

### **12.2 Donor Stock Collection Plan**

The annual DSC Plan will be developed by a multi-agency technical team and will describe and evaluate the entire year's field activities, which include, at a minimum: the project impact to stocks, take totals, the full collection request (specific numbers, by lifestages, by collection method, by donor source), and the proposed annual timing for reporting the collection methods. Collection requests will include the rationale and justification for the specified numbers, sources, lifestages, and collection methods.

The DSC Plan will also include a summary of data evaluated by the interagency team, summaries of the group's deliberation from development to recommendations, and the Service's rationale underlying the conditions of the permit and the FMWG technical recommendations through the permitting guidelines established through the 10(j) ruling. In addition, the DSC Plan will include any additional information requested by NMFS or CDFG.

The DSC Plan will be submitted to NMFS and DFG for approval. Since the Program is utilizing a multi-strategy approach, an interim/subsequent DSC Plan may be necessary at times to include request not submitted in the original plan, or to change requests based on real time information.

### **12.3 Details of Donor Stock Collection Plan**

The sections below describe and list the information the Program anticipates NMFS or CDFG will require being included in the DSC Plan. It is anticipated that the DSC Plan will include the following: collection targets (as a total, by donor stream, and by life stage), collection methods, collection locations, transportation methods, disposition of fish, and monitoring plan. Additional information may be included during the development of this document or if deemed necessary by State or Federal fishery jurisdictional agencies.

### **12.4 Collection Targets**

The initial basis for collection targets will be the numbers presented in Table 2 (section 5.5). These numbers may be modified on an annual basis based on opportunities and/or constraints at various collection points, hatchery limitations, etc.

### **12.5 Collection Method(s)**

Collection protocols will be developed prior to collections and included in the DSC Plan. Collection methods may be implemented differently in each donor stream, or within each donor stream, and those differences will be clearly identified and included in the collection protocols. The DSC Plan will only contain collection protocols the Program anticipates using that year. Collection protocols may change or be refined in future DSC Plans as data, from future studies and monitoring, is made available. It is anticipated that the collection protocols will include detailed information on the following:

- Capture methods and gear that will be used.
- All samples and measurements that will be taken.
- Disposition of tissues (if tissue samples are taken).
- How species will be handled, including any anesthesia to be used.
- Measures to minimize effects to species.
- How species will be cared for after capture.
- Indirect mortality, percentage of indirect mortality expected due to action.
- Effects of research on the behavior and physiology of the fish, including probability of mortalities.

- Emergency Contingency Plans.

Collection protocols may include additional information as deemed necessary by the Program or by State or Federal fishery jurisdictional agencies. During the course of collection, the Program will monitor and report the progress of collection activities to the Service.

## 12.6 Collection Location(s)

Collection locations will be identified by coordinating with fishery agency staff and managers who work on the donor systems. These locations will be included in the DSC Plan. It is anticipated that NMFS will require the following information:

- Describe location(s) of collection, and what collection method will be used.
- Fill out “Take Location #1 Description,” for each take location. See Table 11-1.
- Fill out “Detailed Take Table, Location #1,” for each take location. See Table 11-2.
- Map of collection locations

**Table 11.1. Take Location Table**

Take Location #1 Description	
State/Territory:	
Basin (4 <sup>th</sup> Field HUC):	
Begin Mile:	
End Mile:	
Township, Range, Section, Latitude, Longitude, UTM Northing, and UTM Easting:	
Location Description:	



Table 11.2 Detailed Take Table

Detailed Take Table												
SPECIES	LISTING UNIT/STOCK	PRODUCTION/ORIGIN	LIFESTAGE	SEX	EXPECTED TAKE	INDIRECT MORTALITY	TAKE ACTION	OBSERVE/COLLECT METHOD	PROCEDURES	RUN	BEGIN DATE	END DATE

## **12.7 Contingency Planning**

Central to our reintroduction strategy is recognition that our plans (e.g. logistics, monitoring) will need to evolve as we implement and learn from our actions. We will rely on continued guidance from our technical team to make decisions to accommodate unforeseen circumstances. Here we outline some scenarios (not exhaustive) that have been formulated to build in flexibility to our reintroduction strategy to accommodate these possibilities.

### **12.7.1 Availability of Donor Stock**

The Genetic Subcommittee Group recommends the use of multiple Chinook salmon spring-run stocks from the Sacramento River basin to re-establish a population on the San Joaquin River. Since spring-run salmon are listed as ‘threatened’ under the federal and state endangered species act, removing individuals from their native populations may cause demographic impacts to populations already at low abundances. We will rely on guidance from NMFS to determine the demographic parameters necessary for a putative donor stock to be used in our reintroduction program. These conditions may be satisfied in some, but not all years. As such, the specific donor stock(s) (or life stages) used in a given year will vary as a function of their availability. In future years, we aim to have information on the specific stock(s) or combination of stocks that successfully establish in the restoration area which may also influence our stock selection for future broodstock or releases into the river. The Service recognizes that collection of donor stock from other than the Feather River Hatchery would require the development of a new permit application.

### **12.7.2 Condition of River**

Some of the restoration actions associated with the Settlement will not be fully implemented prior to reintroduction of fish to the San Joaquin River in 2012. An assessment will be made regarding the likelihood of survival for introduced fish below Friant Dam. In the event that the river is not deemed hospitable by the technical team (Fisheries Management Work Group), alternate release locations (or release of fall-run fish) may be considered. This may involve trucking fish below areas that are deemed to be high risk to fish (to below barriers) or to downstream locations with temperatures or flows conducive to survival.

In some drier years, flows in the river may be limited and create challenges to fish migration and/or holding. In these cases, efforts may be made to trap and haul migrating adults upstream to more favorable spawning or holding habitat including the Conservation Facility.

### **12.7.3 Mortality of In-River Spawners (Adult Rescues)**

Once spring-run Chinook salmon return and spawn in-river (putatively a small initial population), efforts will be made to minimize prespawn mortality. If temperatures during the summer months are above physiological tolerance for adults or if fish health is determined to be compromised, these in-river adults may be retrieved from the river and brought in to the Conservation Facility to spawn.

### **12.7.4 No Spring-Run Return**

In the event that the abundance of spring-run fish to the San Joaquin River does not reach sustainable levels after several generations of reintroduction efforts, Program efforts may shift to establishing viable fall-run Chinook salmon populations (fall-run ESU included in Settlement).

All efforts would be made to determine the cause(s) of mortality that are preventing the success of spring-run recruitment to the restoration area. If the technical team (Fisheries Management Work Group) determines that the stressors may not apply to the successful establishment of fall-run (determined by the apparent success of fall-run), then the reintroduction efforts may shift focus to fall-run populations.

#### **12.7.5 Availability of Conservation Facility**

The Conservation Facility will be initiated in phases. While the Program works to construct the full-scale conservation facility, an interim facility will be developed for practice captive rearing of non-ESA listed Chinook prior to working with spring-run Chinook in 2012 and be used to initiate spring-run Chinook captive rearing. The interim facility will be operated between 2012-2014, during the construction of the full-scale conservation facility. In the event that the interim facility development is delayed, other facilities, such as UC Davis may be used temporarily to hatch and captive rear fish for one to two years. Fish at UC Davis would be held at the Center for Aquatic Biology and Aquaculture. Once facility development is complete, the fish would be transferred and temporarily quarantined at the interim facility.

#### **12.7.6 Mortality of Hatchery Brood (Cohort Failure)**

Hatchery protocols minimize the spread of disease and several detailed procedures are outlined on how the hatchery anticipates reducing these risks. However, to the extent possible or feasible, we may consider rearing some individuals at an alternate facility in the event that failure of a(n) entire broodyear(s) occurs at the primary facility. This strategy has its tradeoffs. Not only can this be costly to maintain, but other conservation hatchery programs that have employed this back-up strategy have had difficulty in raising fish at the same developmental rate as the primary hatchery. This has limited the usefulness of the surrogate broodstock for use in the primary hatchery. Alternatively, in years where entire broodyears fail, juvenile spring-run Chinook salmon from the Feather River hatchery could be released in-river in the relevant year to defray the impacts of the failed brood(s).

#### **12.7.7 Flood Conditions as it Relates to Hatchery Brood**

Flooding occurred at least once in recent history at the proposed hatchery grounds when in 1997 San Joaquin State Trout Hatchery was inundated by floodwater. At that time, many fish from the trout hatchery escaped to the adjacent San Joaquin River. However, approximately 20 percent of the trout remained in the uncovered raceways throughout the flood. In the event of future flooding, it is possible that fish from both facilities will again be released to the river. Measures will be taken to prevent fish loss during a flood event by netting the tops of fish tanks to prevent escape.

#### **12.7.8 Funding**

All of the restoration activities related to the reintroduction strategy require funds to implement. This includes funding for hatchery operations and all monitoring related activities. All primary responsibilities necessary to achieve the Settlement goals are contingent on funding availability (allocation). This poses the greatest challenge in anticipating what components of the reintroduction strategy, and fisheries management plan will be implemented.

### 13. APPENDIX B - DIRECT AND INCIDENTAL TAKE

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The tables presented below represent the maximum direct take that may occur during all annual activities required for donor stock collection. Again, these represent population level losses to the donor source population, but it is emphasized that this permit is for the use of “surplus” eggs or juveniles only and will not represent a loss in production to the donor population (i.e. the FRFH)

Additionally, we have provided loss estimates that the permitting agency may use for reference purposes associated with the Conservation Stock and Experimental Stock reintroduction of the Reintroduction Program. Conservation Stock losses will include losses to the donor stock individuals while in possession of the collecting party (collection, handling, tagging, genetic testing and transport during relocation or translocation), pathology, and losses to their progeny during Conservation Facility operation. Experimental Stock losses will vary according to the life stage released, but will involve losses to individuals following reintroduction and/or placement of the individuals at stream-side or in-stream facilities (i.e., infrastructure other than the Conservation Facility).

#### Collection - Direct Take of Donor Stock

As described in the *Project Description*, of the permit donor stock individuals will be collected the FRFH. Individuals of varying life stages will be collected from the donor sources and used for conservation stock rearing, remote-site egg collection, or direct transplant into the San Joaquin River (translocation). Table 1 below summarizes the maximum numbers to be collected at each location and life stage. Table 2 summarizes the maximum percent of mortality/take due to collection method, handling, transport, quarantine, and rearing fish stock to various life stages.

Collection Type	Collection Source	Targeted Lifestage	Disposition Location	Max Years 1-3	Max Years 4-
Primary	Feather River Fish Hatchery	Juveniles	Conservation Facility	560	2,760
	Feather River Fish Hatchery	Eyed Eggs	Conservation Facility	560	2,760
	Feather River Fish Hatchery	Juveniles	Translocation to SJR	54,400 @ fingerling	54,400 @ fingerling
	Feather River Fish Hatchery	Eyed Eggs	Translocation to SJR	80,000	80,000

Table 1. Maximum collection targets by year, location, lifestage and disposition.

**Table 2 Donor Stock Collections**

Source	Lifestage	Number collected	Collection method	Reason for loss	Expected mortality-based in percent	Number of fish lost/taken	References	Number remaining
FRFH	eggs	Max.: 80,000 eyed eggs*.  For translocation to SJR	Surplus eggs from about 20 adult females at the FRFH, based on average of 4,000 eggs per female	Collections from FRFH	N/A	N/A	Losses would be associated with existing operations under FRFH HGMP	80,000
				Transport to San Joaquin River	1%	800	Schreck et al. 2006	79,200
				Eyed to emergence. In San Joaquin River  Start of Sec 10j rule	35%***	27,720	Percent mortality extrapolated from several sources***	51,480
				Fry to smolt	97%	49,935.6	Carl Mesick** pers. com. 9/15/10	1,544.4

				Smolt survival to returning adult	97.5%	1,505.79	Carl Mesick** pers. com. 9/15/10 (Stanislaus River)	38.61
					99.91%	1,543	Carl Mesick pers. com. 9/15/10 (Merced River)	1.4
					98.7%	1,524.3	Average of Stanislaus and Merced	20.1
FRFH	egg	Max 560 (years 1-3) or 2,760 (years 4- 5) for Conservation Facility	Surplus eggs from FRFH	Collections of eggs from FRFH	N/A	N/A	Losses would be associated with existing operations under FRFH HGMP	560 (year 1-3)  2,760 (year 4-5)
				Transport (to quarantine and from quarantine)	1%	5.6 (year 1-3)  27.6 (year 4-5)	Schreck et al. 2006	554.4 (year 1-3)  2,732.4 (year 4-5)
				Eyed to fingerling	32%	177.4 (year 1-3)  874.4 (year 4-5)	Cavallo et al 2009	377 (year 1-3)  1,858 (year 4-5)

				Pathology	100% of the 60 fish required for pathology	60	AFS-FHS 2010; per comm. Mark Adkinson	317 (year 1-3) 1,798 (year 4-5)
				Fingerling to smolt in conservation facility	22%	69.7 (year 1-3) 395.6 (year 4-5)	Cavallo et al 2009	247.3 (year 1-3) 1,402.4 (year 4-5)
				Smolt to adult in conservation facility	50%	123.6 (year 1-3) 701.2 (year 4-5)	Pollard and Flaggs 2004	123.6 (year 1-3) 701.2 (year 4-5)
FRFH	juveniles	54,400 juveniles based on average mortality to 80,000 eggs in hatchery conditions.  For translocation	Surplus juveniles from FRFH	Collections from FRFH	N/A	N/A	Losses would be associated with existing operations under FRFH HGMP	54,000
				Transport (to and from quarantine)	1%	544	Schreck et al. 2006	53,856
				Pathology	100% of the 60 fish required for pathology	60	AFS-FHS 2010; per comm. Mark Adkinson	53,796

		to SJR		Placed in in-stream facility and released	97%	52,182.1	Carl Mesick** pers. com. 9/15/10	1,613.9
				Fry to smolt in river				
				Start of Sec 10j rule				
				Smolt to returning adult	97.5%	1,573.5	Carl Mesick** pers. com. 9/15/10 (Stanislaus River)	40.3
					99.91%	1,612.4	Carl Mesick pers. com. 9/15/10 (Merced River)	1.5
					98.7%	1,592.9	Average of Stanislaus and Merced	21
FRFH	juveniles	Max 560 (years 1-3) or 2,760 (years 4-5) for Conservation Facility	Surplus juveniles from FRFH	Collections of juveniles	N/A	N/A	Losses would be associated with existing operations under FRFH HGMP	560 (year 1-3) 2,760 (year 4-5)
				Transport (to quarantine and from quarantine)	1%	5.6 (year 1-3)  27.6 (year 4-5)	Schreck et al. 2006	554.4 (year 1-3)  2,732.4 (year 4-5)



				Pathology	100% of the 60 fish required for pathology	60	AFS-FHS 2010; per comm. Mark Adkinson	494.4 (year 1-3) 2,672.4 (year 4-5)
				Fingerling to smolt in conservation facility	22%	108.8 (year 1-3) 587.9 (year 4-5)	Cavallo et al 2009	385.6 (year 1-3) 2,084.5 (year 4-5)
				Smolt to adult in conservation facility	50%	192.8 (year 1-3) 1042.2 (year 4-5)	Pollard and Flagg 2004	192.8 (year 1-3) 1042.2 (year 4-5)

\*Assumes all 80, 000 eyed eggs are raised to juveniles for release or are released as eggs to the San Joaquin River.

\*\*Assumes similar mortality on the San Joaquin River as the low end survival rate for fish released on the Stanislaus River

\*\*\*

- Carl Mesick Consultants and KDH Environmental Services. 2009. 2004 and 2005 Phase II Studies: Knights Ferry gravel replenishment project. Prepared for USFWS Anadromous Fish Restoration Program. Stockton, California. 43 p.
- Reiser DW, White RG. 1988. Effects of two sediment size-classes on survival of steelhead and chinook salmon eggs. North American Journal of Fisheries Management 8:432-437.
- Tapple PD, Bjornn TC. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. North American Journal of Fisheries Management 3: 123-135.

## **Justification of Mortality Estimates for Incidental Take Table**

### **Egg Collection**

#### **Feather River Fish Hatchery Collections**

Collections of eyed eggs from Feather River Fish Hatchery (FRFH) should result in minimal to no mortality following established protocols developed in the by their respective Hatchery and Genetics Management Plans.

### **Egg Transportation**

One percent mortality was assigned to Transportation effects, it is anticipated that this is conservative estimate of loss. Transport may consist of two trips: from donor system to quarantine facility and from quarantine facility to the conservation facility or San Joaquin River.

### **Juvenile Collection**

#### **Feather River Fish Hatchery Collections**

Collections of juveniles from Feather River Fish Hatchery (FRFH) should result in minimal to no mortality following established protocols developed in the FRFH Hatchery and Genetics Management Plan.

#### **Transport of Donor Stock Juveniles**

Handling and transport procedures have an associated mortality of less than one percent based on Shreck et al (2006). In these cases, one percent mortality was assigned to that activity to create a more conservative estimate of loss. Transport would consist of two trips: from donor system to quarantine facility (Silverado Fisheries Base in Yountville, California) and from quarantine facility to the Conservation Facility or San Joaquin River.

### **Quarantine and Pathology**

All donor stock juveniles are subject to quarantine and pathology protocols as outlined in Section 5.3 of the Application and would be held in quarantine for a minimum of 30 days. A maximum of 60 juveniles would be utilized for pathology per collection group as determined by CDFG pathologists.

### **Rearing**

While in the Conservation Facility/Interim Facility eggs and juveniles will be reared according to the HGMP and would have similar results as stated in Cavallo et al 2009 and Pollard and Flagg 2004. Instream rearing mortality was based on personal communications with Carl Mesick (9/15/10).

If eggs cannot be collected from FRFH and therefore hatch while at FRFH, we would collect them as juveniles and would lose egg collections for that season. Eggs reared at the FRFH would be reared as stated in the FRFH HGMP (Cavallo et al 2009).

## REFERENCES

- Achord, S., G.M. Matthews, O.W. Johnson, and D.M. Marsh. 1996. Use of passive integrated transponder (PIT) tags to monitor migration timing of Snake River Chinook smolts. *North American Journal of Fisheries Management* 16:302-313.
- AFS-FHS (American Fisheries Society-Fish Health Section). 2010. FHS blue book: suggested procedures for the detection and identification of certain finfish and shellfish pathogens, 2010 edition. AFS-FHS, Bethesda, Maryland.
- Becker, C. D., D. A. Neitzel, and D. W. Carlile. 1986. Survival data for dewatered rainbow trout (*Salmo gairdneri* Rich.) eggs and alevins. *Journal of Applied Ichthyology* 3:102–110.
- Cavallo, B., R. Brown, and D. Lee. 2009. Hatchery and genetic management plan for Feather River Hatchery spring-run Chinook program. Prepared for California Department of Water Resources. June 2009.
- Collins, K.M., and E.L. Brannon. 2000. Hydraulic sampling protocol to estimate natural embryo mortality of pink salmon. *Transactions of the American Fisheries Society* 129:827-834.
- Dare, MR. 2003. Mortality and long-term retention of passive integrated transponder tags by spring chinook salmon. *North American Journal of Fisheries Management*. Volume: 23 Issue: 3 Pages: 1015-1019. AUG 2003
- Jensen, J. O. T., and E. P. Groot. 1991. The effect of moist air incubation conditions and temperature on chinook salmon egg survival. Pages 529–558 in J. Colt and R. J. White, editors. *Fisheries bioengineering symposium*. American Fisheries Society, Symposium 10, Bethesda, Maryland.
- Mesick, Carl Consultants and KDH Environmental Services. 2009. 2004 and 2005 Phase II Studies: Knights Ferry gravel replenishment project. Prepared for USFWS Anadromous Fish Restoration Program. Stockton, California. 43 p.
- Pollard, H.A., and Flagg, T.A. 2004. Guidelines for Use of Captive Broodstocks in Recovery Efforts for Pacific Salmon. *American Fisheries Symposium* 44:333-345.
- Reiser, D. W., and R. G. White. 1981. Incubation of steelhead trout and spring chinook salmon eggs in a moist environment. *Progressive Fish-Culturist* 43: 131–134.

Schreck, C.B., T.P. Stahl, L.E. Davis, D.D. Roby, and B.J. Clemens. 2006. Mortality estimates of juvenile spring-summer Chinook in the Lower Columbia River and Estuary, 1992-1998: Evidence for delayed mortality? Transactions of the American Fisheries Society 135:457-475.

Sharpe, D.A., D.A. Thompson, H.L. Blankenship, and C.B. Schreck. 1998. Effects of routine handling and tagging procedures on physiological stress responses in juvenile Chinook. The Progressive Fish-Culturist 60:81-87.

Thedinga, J.F., M.G. Carls, J.M. Maselko, R.A. Heintz, and S.D. Rice. 2005. Resistance of naturally spawned pink salmon eggs to mechanical shock. Alaska Fishery Research Bulletin 11:37-43.

Venditti, David, Catherine Willard, Chris Looney, Paul Kline, Peter Hassemer, "Captive Rearing Program for Salmon River Chinook Salmon", 2000 Annual Report, Project No. 199700100, 42 electronic pages, (BPA Report DOE/BP-00004002-2)

## PERSONAL COMMUNICATIONS

Carl Mesick, 9/14/10: Summary of trap and haul methods form winter-run Chinook, Word document included in 9/14/10 email.

Carl Mesick, 9/15/10: Juvenile salmon survival rates in 9/15/10 email.

## 14. APPENDIX C- INVASIVE SPECIES

Non-Targets That May Potentially Be Moved/Introduced
<p>Vertebrates: Non-indigenous fish (20 species), bull frog (<i>Rana catesbeiana</i>), northern water snake (<i>Nerodia sipedon</i>), and red-eared slider turtle (<i>Trachemys scripta</i>).</p>
<p>Invertebrates: New Zealand mudsnail (<i>Polamophyrgus antipodarum</i>), zebra mussel (<i>Dreissena polymorpha</i>), quagga mussels (<i>Dreissena bugensis</i>), and freshwater asian clam (<i>Corbicula fluminea</i>), crawdads <i>Procambarus clarkii</i> and <i>Orconectes rusticus</i>, mitten crab (<i>Eriocheir sinensis</i>), Siberian prawn (<i>Exopalaemon modestus</i>), exotic zooplankton spp.</p>
<p>Plants: <u>Aquatic:</u> Canadian waterweed (<i>Elodea canadensis</i> and <i>E. nuttallii</i>), Brazilian waterweed (<i>Egeria densa</i>), curly pondweed (<i>Potamogeton crispis</i>), hydrilla or waterhyme (<i>Hydrilla verticillata</i>), water hyacinth (<i>Eichhornia crassipes</i>), Eurasian watermilfoil or parrot's feather (<i>Myriophyllum spicatum</i>), floating primrose-willow or water primrose (<i>Ludwigia</i> spp.), lens-podded white-top (<i>Cardaria chalepensis</i>) and harmful algae such as <i>Didymosphenia geminata</i>. <u>Terrestrial:</u> yellow starthistle (<i>Centaurea solstitialis</i>), Himalayan blackberry (<i>Rubus discolor</i>), tree-of-heaven (<i>Ailanthus altissima</i>), perennial pepperweed (<i>Lepidium latifolium</i>), yellow flag iris (<i>Iris pseudacorus</i>), Scotch broom (<i>Cytisus scoparius</i>), Spanish broom (<i>Spartium junceum</i>), pampas grass (<i>Cortaderia selloana</i>), medusa-head (<i>Taeniatherum caput-medusae</i>), leafy spurge (<i>Euphorbia esula</i>), black locust (<i>Robinia pseudoacacia</i>), purple loosestrife (<i>Lythrum salicaria</i>), giant arundo (<i>Arundo donax</i>), salt cedar or tamarisk (<i>Tamarix</i> spp.), Italian thistle (<i>Carduus pycnocephalus</i>), Canada thistle (<i>Cirsium arvense</i>), tansy ragwort (<i>Senecio jacobaea</i>), spotted knapweed (<i>Centaurea maculosa</i>) and red sesbania (<i>Sesbania punicea</i>).</p>
<p>Other Biologics (pathogens, parasites, etc.): Various fish diseases and parasites including but not limited to: furunculosis (<i>Aeromonas salmonicida</i>), <i>Ambiphyra</i>, <i>Ceratomyxa shasta</i>, <i>Dactylogyridiasis</i> spp., <i>Epistylis</i>, columnaris (<i>Flavobacterium columnare</i>), <i>gyrodactylus</i> spp., <i>Hexamita</i> spp., costia (<i>Ichthyobodo</i> spp.), (<i>Ichthyophthirius multifiliis</i>), anchor worm (<i>Lernaea</i> spp.) whirling disease (<i>Myxobolus cerebralis</i>), <i>Nanophyetus salmincola</i>, <i>Pseudomonas</i> spp., bacterial kidney disease (<i>Renibacterium salmoninarum</i>), rosette agent (<i>Sphaerothecum destruens</i>), <i>Trichodina</i>, cestodes, enteric redmouth disease (<i>Yersinia ruckeri</i>), various fungi, and infectious hematopoietic necrosis virus (IHNV)</p>

## 15. APPENDIX D—RESPONSE TO COMMENTS

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### 15.1 Introduction

In February 2010, the National Marine Fisheries Service (NMFS) circulated the Fish and Wildlife Service's (Service) §10(a)1(A), *Enhancement of Species Permit Application for the Reintroduction of Central Valley Spring-Run Chinook into the San Joaquin River* (Application), dated September 29, 2010. The purpose of the Application is to gain approval from NMFS to engage in the collection, propagation and reintroduction of spring-run Chinook. The Application has a planning horizon beyond this initial permit request.

### 15.2 Comment Period

The 30-day public comment period for the Application began on February 4, 2011. During the comment period the Application was available for review through the Federal Register and on the NMFS website. Additionally NMFS held public workshops in Chico, Los Banos, and Fresno, California during the public comment period. The Service presented an outline of the Application during the public workshops and NMFS followed with a presentation on their rule making processes (§4d and §10J) for the SJRRP.

Written comments were submitted by the public organizations, individuals, and by NMFS itself. The Service received copies of the written comment on May 28, 2011. The comments, along with the responses from the Service in collaboration with NMFS, California Department of Fish and Game and the Bureau of Reclamation, are presented in the table below.

## 15.3 Response to Comments Table

Item	Comments	Response
1	Under NEPA the agencies must consider alternatives to the proposed action. One good alternative for fish is to have a river with water. The salmon will colonize it just fine.	NEPA and CEQA are the responsibility of the governmental agency which has discretionary authority over a project. In this instance NMFS has discretionary authority over the issuance of the §10(a)1(A) permit so NMFS is responsible for the NEPA and will develop alternatives through that process.
2	The stocks targeted for transfer have pathogens that kill dogs that eat of them.	The California Department of fish and game has developed fish health screening criteria that the SJRRP will follow during implementation. These draft criteria include quarantine procedures and testing for bacteria, viruses and parasites prior to the transfer of any fish from or to the San Joaquin Basin.
3	If you want a good salmon run on the San Joaquin River, you will need a permanent hatchery.	A requirement of the Settlement and one of the primary goals of the SJRRP is to achieve a naturally-reproducing and self-sustaining spring-run Chinook population in the Restoration Area. A permanent propagation facility could not meet this requirement or goal.
4	Prove that you can fix the habitat and then reintroduce the fish. Your mandate calls for fish in 2012 and water flows to support them in 2014.	The Settlement calls for full Restoration Flows to begin in 2014 however, Interim Flows began in 2009 and will continue until full Restoration Flows can occur.
5	The one person who is an authority on Mill and Deer Creek's Spring-Run was never consulted by your interagency team of experts.	In the process of preparing the background information for the Application, the Service contacted Ms. Colleen Harvey- Arrison with CDF&G who is very knowledgeable on both Mill and Deer creeks. Many of Ms. Harvey-Arrison's annual reports of Deer and Mill creek monitoring have been included in the development of the technical documents to support the Application. The Service can not speculate as to who the commenter believes is the "one person."
6	These fish are at risk of extinction; your scheme will guarantee it. Is this a legitimate taking?	This comment addresses an action specific to the NMFS therefore the response will be prepared by the NMFS.
7	Rhonda Reed of NOAA/NMFS stands by her public comment: "above all, there is a clear mandate that works to reintroduce salmon in the San Joaquin and cannot harm existing populations elsewhere". I will hold her and her agency to that standard.	This comment addresses an action specific to the NMFS therefore the response will be prepared by the NMFS.
8	15% of Mill Creek spawners is a big number and will certainly harm the population.	Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
9	How do you address the Delta survival of these fish?	Through the current protections that already exist for the San Joaquin River fishery in the NMFS Long-term Central Valley Project Operations Criteria and Plan biological opinion.
10	How do you guarantee the separation of spring-run and fall-run in such a confined area at 800 feet elevation below the Friant Dam or is your scheme content with hybridization?	The Fish Management Plan identifies the placement of a separation weir as an implementation action for the program. Current studies underway during Interim Flows are assessing holding pool and spawning habitat capacity and location and will provide information on the appropriate placement of this separation weir.
11	This proposed implementation of the Settlement would have a materially severe effect on our wild Mill Creek spring-run Chinook and therefore should not be considered for use in this project.	Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.

12	Why are there no CEQA or NEPA documents with the Enhancement of Species Permit Application? How can you have a Permit Application prior to the preparation of a NEPA document?	NEPA and CEQA are the responsibility of the governmental agency which has discretionary authority over a project. In this instance NMFS has discretionary authority over the issuance of the §10(a)1(A) permit so NMFS is responsible for the NEPA. The CDFG is currently working on their needs for the CEQA.
13	It is disturbing that the “Reintroduction Strategies” has only a draft outline and is not available for public review at this time. These documents should be included in your permit process.	The three foundational technical documents (Stock Selection Strategy, Hatchery and Genetic Management Plan, and Reintroduction Strategy) were used as the framework for the project description presented in the §10(a)1(A) permit application. The §10(a)1(A) application is a stand-alone document and does not tier off of the foundational technical documents.
14	The current fish population is well below any level that could even conceivably justify any “donation or taking” of our wild Mill Creek spring-run Chinook.	Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
15	The Draft Stock Selection Strategy, 2010 should also be completed prior to any decision being made regarding this important topic.	The three foundational technical documents (Stock Selection Strategy, Hatchery and Genetic Management Plan, and Reintroduction Strategy) were used as the framework for the project description presented in the §10(a)1(A) permit application. The §10(a)1(A) application is a stand-alone document and does not tier off of the foundational technical documents.
16	How will late arriving spring-run Chinook be separated from early arriving fall-run?	Operations of Hills Ferry barrier and the placement of a separation weir will be used to address hybridization.
17	How will the donor stocks be protected from hybridization?	Hybridization between fall-run and spring-run will be addressed through the placement of a separation weir and the continued operation of Hills Ferry Barrier. These devices will continue to be evaluated during Interim Flow periods. Currently there are no plans to segregate natural spawning between different donor spring-run stocks. The Service recognizes that spring-run may mix on the spawning grounds and that would add to the genetic diversity of the reintroduced population, and may provide better local adaptation through genetic diversity.
18	What measures are being proposed to ensure that the reintroduced San Joaquin salmon will survive in the Delta?	Measures to ensure survival in the Delta are provided through the current protections that already exist for the San Joaquin River fishery in the NMFS Long-term Central Valley Project Operations Criteria and Plan biological opinion.
19	Have any studies been performed to determine the potential impacts from climate change on the proposal?	Not specifically, however, studies to evaluate the current conditions, modeling analysis and scientific literature searches on species needs are all occurring. Climate change is an aspect of both NEPA and CEQA and will be part of those environmental analyses for the reintroduction. Although no specific studies focused on climate change are planned at this time, studies addressing the effects of climate change on this project may be conducted in the future.
20	When will habitat restoration of proposed spring-run Chinook habitat be completed?	The date of habitat restoration completion within the entire Restoration Area is currently unknown.



21	Has a survey been completed to ascertain if adequate spawning gravel exists in the river bed?	Several recent surveys have provided estimates of the quantity of spawning gravel within the Restoration Area of the San Joaquin River. In 1996, Cain (1997) estimated the amount of spawning gravel between Friant Dam and Gravelly Ford. In 2000, Jones and Stokes Associates, Inc. and Entrix (in McBain and Trush 2002) delineated spawning areas and estimated the spawning habitat available between Friant Dam and Skaggs Bridge. In spring 2002, a second survey was conducted to map suitable spawning gravel in the reach from the Friant Dam to Highway 99 (Stillwater Sciences in McBain and Trush 2002). See the 'Existing Conditions' section for new and clarifying text regarding gravel surveys.
22	Has funding been secured for continual gravel supplementation, even after full restoration has been completed? How much shaded riparian habitat is being proposed?	Future planning and environmental work necessary for improvements to habitat, including gravel supplementation, is ongoing and will continue to occur. Concern over funding for future needs is speculative and not considered in the context of addressing the technical merits of channel improvements and salmonid reintroduction.
23	How will interfacing with humans be minimized when the proposed spawning area is in a flat exposed area?	There is a need to estimate how harassment, harm or poaching may impact the distribution, abundance and the health of spring-run Chinook spawning and holding in the upper Reaches. The lands adjacent to the spawning reaches are primarily San Joaquin River Parkway parcels, held under public ownership. Although the river is not accessible from all the Parkway lands, there will likely be some interaction. The best methods to minimize the interactions and limit the disturbance to spring-run adults are currently being evaluated.
24	Mill Creek's spring-run Chinook population has declined from historic runs above 2,500 to such low levels that even 400 fish are now deemed a "good" year. But putting "good" in context, geneticists would quickly define a spawning population of such small size as one in imminent danger of extinction. Consequently the taking of even 1% of Mill Creek's fish for the San Joaquin experiment would be highly irresponsible—much less the potential taking of up to 15% as stipulated in the current plan.	Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
25	The current San Joaquin plan mandates reintroducing salmon prior to reestablishing appropriate water flows and other conditions critical for salmon survival. Any fish introduced under these circumstances will inevitably experience extremely high mortality rates. It would be totally unacceptable to expose Mill Creek's already threatened stock to this risk.	Initial reintroduction efforts will focus on development of a captive broodstock. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application. The fish authorized for collection under this permit would be used to develop the captive broodstock and would be held in the captive rearing program and used to develop progeny that would be released in out years when progress has been made in the channel modifications mandated by the Settlement.
26	Mill Creek's wild spring-run Salmon have adapted over the millennia to entering Mill Creek in the spring, passing immediately through the low elevation valley floor and climbing to their spawning grounds at altitudes ranging from 2,500 feet to 5,400 feet. The yearlong cold, spring fed water, abetted by protective canyon walls and forest-shaded watershed, enables the fish to hold throughout the summer, spawning	Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.

	in the fall. The fact that virtually the entire spawning area is within the road less Ishi Wilderness area also protects from poaching and/or other human disturbances. Mill Creek's fish are genetically unsuited for survival in the San Joaquin's diametrically opposite environment, where the fish will be unable to climb higher than 800 feet in search of cold water, where there will be few if any shaded pools in which to hold over the summer, and where road access will expose them to poaching and other human/suburban hazards.	
27	Hybridization: Existing conditions in the lower San Joaquin watershed will lead to swift hybridization of Spring and fall-run Chinook due to overlapping spawning grounds. On Mill Creek, thermal conditions create an impenetrable natural barrier between Spring and Fall Run fish. Fall-run fish spawn immediately upon entering Mill Creek, at elevations below 800 feet. Mill Creek's spring-run fish spawn only at altitudes above 1,200 feet, and mainly above 2,500 feet. This guarantees lack of interaction between the two species.	Hybridization risk will be addressed through operations of the Hills Ferry barrier and operation of a separation weir in the spawning/holding habitat. Please note that historically both spring-run and fall-run spawned on the San Joaquin River before Friant Dam was constructed, with spring-run being the larger and more successful run.
28	There are no CEQA or NEPA documents with the enhancement of species permit application.	Normally no, but in this case NMFS and CDFG are currently working through the NEPA and CEQA processes that might be needed for the entire reintroduction.
29	The granting of an Enhancement of Species Permit Application for this project will have an adverse impact to any endangered species.	NMFS has jurisdiction over spring-run Chinook and will evaluate the Application for affect to the individuals and the population.
30	The "Reintroduction Strategies" contains only a draft outline and is not available for public review at this time.	Draft documents are internal documents and not available for public comment. However, all necessary portions of the Reintroduction Strategies document have been incorporated into the Application itself. The Reintroduction Strategies document was completed February 2011.
31	The 2010 Draft Stock Selection Strategy should be completed prior or any final decision being made regarding this topic.	The Stock Selection Strategy document is one of three foundational technical documents which were the frame work for the development of the project description in the Application. The Stock Selection Strategy document was in draft form when the September 29, 2010, Application was submitted to NMFS, however, it was finalized in November 2010.
32	There are no protections for the donor stocks regarding hybridization	Hybridization risk will be addressed through operations of the Hills Ferry barrier and operation of a separation weir in the spawning/holding habitat. Please note that historically both spring-run and fall-run spawned on the San Joaquin River before Friant Dam was constructed, with spring-run being the larger and more successful run.
33	There are no protections to ensure that the reintroduced San Joaquin salmon will survive the Delta	Protections include the current protections that already exist for the San Joaquin River fishery in the NMFS Long-term Central Valley Project Operations Criteria and Plan biological opinion.

34	There are no studies of which I am aware that demonstrate if adequate spawning gravel or shaded riparian habitat exists.	Several recent surveys have provided estimates of the quantity of spawning gravel in the upper San Joaquin River. In 1996, Cain (1997) estimated the amount of spawning gravel between Friant Dam and Gravelly Ford. In 2000, Jones and Stokes Associates, Inc. and Entrix (in McBain and Trush 2002) delineated spawning areas and estimated the spawning habitat available between Friant Dam and Skaggs Bridge. In spring 2002, a second survey was conducted to map suitable spawning gravel in the reach from the Friant Dam to Highway 99 (Stillwater Sciences in McBain and Trush 2002). Recent vegetation surveys were conducted on the San Joaquin River by Jones and Stokes Associates, Inc. (1998), Science Applications International Corporation (SAIC 2002) and California Department of Water Resources (Moise and Hendrickson 2002). See the 'Existing Conditions' section for new and clarifying text regarding gravel and riparian surveys.
35	No document that I have seen give me a level of comfort of when spring-run Chinook habitat restoration will be complete	Studies are on-going to better understand the habitat restoration needed for the Restoration Area, specifically habitat restoration that will support the reintroduction and development of a naturally producing, self-sustaining Chinook population.
36	I am aware of no studies that compare and contrast the differences in the physical, biological, and chemical make ups of these two, very different, systems regarding habitat for the spring-run Chinook.	The physical and biological similarities are discussed in detail in the Stock Selection Strategies Document, under Environmental Conditions. No chemical analyses in the donor streams have been conducted aside from water quality monitoring in the San Joaquin River.
37	The permit application fails to include a provision that ensures the reintroduction of spring-run Chinook to the San Joaquin River will have no adverse impacts to CVP contract allocations.	This comment addresses an action specific to the NMFS therefore the response will be prepared by the NMFS.
38	FWS and NMFS must ensure that the SJRRP's impact on donor populations will not result in adverse impacts to CVP operations.	This comment addresses an action specific to the NMFS therefore the response will be prepared by the NMFS.
39	Inadequate Habitat: Currently, the program is not being implemented in the sequence or on the schedule that was foreseen in 2006 when the stipulated settlement was crafted. At the time, it was believed that the necessary infrastructure would be in place to reintroduce fish and release full Restoration Flows down the San Joaquin River by 2014, a schedule as discussed below that is no longer achievable. As a result, the issuance of the §10(a)(1)(A) Permit for the salmon reintroduction program with the goal of spring-run Chinook reintroduced to the San Joaquin River by December 21, 2012, is far in advance of (a) the establishment of Restoration Flows and (b) necessary structural and channel improvement, both of which are critical to providing habitat conditions and the full restoration flow hydrographs essential for the successful reintroduction of spring-run Chinook to the San Joaquin River.	The schedule for the channel and structural improvements is outlined in Paragraph 11(a) of the Settlement. The implementing agencies are evaluating the current habitat conditions of the San Joaquin River as well as the Settlement timeline. The anticipated short residency time of spring-run during the initial reintroduction and the several year lag prior to the initial adult returns provide greater flexibility in the completion of the restoration activities. The amount and quality of existing habitat may be sufficient to initiate the process of restoring salmonid populations.

40	<p>Currently, the Bureau of Reclamation (Reclamation) is conducting the interim flow program described in paragraph 15 of the stipulated settlement, the purpose of which is to collect data regarding flows, temperatures, fish needs, seepage losses, and recirculation, recapture and reuse of water in advance of full Restoration Flows. Restoration Flows are scheduled to commence no later than January 1, 2014. However, the scheduled Restoration Flows will not be achievable in the time period contemplated for salmon reintroduction due to the requirements on Reclamation to first mitigate adverse impacts on third parties, including damage from levee and groundwater seepage, complete necessary channel capacity improvements, or install screens and other fish protection measures – none of which have occurred or are likely to timely occur due to a lack of funding.</p>	<p>Chapter 19(b) of the Settlement states, “The Secretary, with cooperation of the other Parties, shall provide appropriate opportunities for input from third parties who have an interest in measures to be undertaken pursuant to this Settlement, and for coordination with third parties who own or control facilities or property affected by implementation of such measures. Further, the Secretary, with cooperation of the other Parties, shall provide appropriate opportunities for public participation regarding implementation of this Settlement.” In May 2007, Reclamation prepared and provided for public distribution the Public Involvement/Public Outreach Plan (PIP). The PIP outlines the public involvement process for sharing SJRRP information and identifies target audiences, including signatories to the Third Party Memorandum of Understanding (MOU), dated February 26, 2007. The PIP further identifies mechanisms to inform the public and stakeholders about information. These mechanisms include briefings, workshops, reach-by-reach coordination meetings, stakeholder subgroups, websites, publication, e-mail, media, and other public involvement opportunities. The SJRRP will continue to operate in accordance with the Settlement, the Third Party MOU, and the PIP, as appropriate, to disseminate information to the Exchange Contractors and the RMC as well as other interest groups, stakeholders, elected officials, landowners, and the general public.</p>
41	<p>i. Pursuant to both the stipulated settlement and the San Joaquin River Settlement Act, restoration of the San Joaquin River must not have a material adverse impact on any third parties. Specifically with regards to Interim Flows, the Secretary is required to mitigate impacts on adjacent and downstream water users and landowners under section 10004(d)(2) of the San Joaquin River Settlement Act and to reduce Interim Flows to the extent necessary to address impacts to third parties caused by seepage under section 10004(h)(3). Growers within the Service area of the Exchange Contractors experienced serious damage to crops and the levee system from seepage that resulted from the first year’s Interim Flows, even though Interim Flows was limited to only 10 to 25% of the full flow ultimately planned. Such damage has neither been addressed adequately nor mitigated by Reclamation. Before continuing with the Interim Flows, Reclamation must complete plans and work needed to mitigate against this type of damages from the flow program.</p>	<p>The comment provided is beyond the scope of the action analyzed in the permit application. Reclamation is coordinating with landowners and stakeholders to avoid potential downstream impacts associated with Interim Flows by releasing flows consistent with the current channel capacities and making real-time adjustments as necessary. Interim Flows will be reduced and seepage projects would be implemented, as needed, to address material seepage impacts as identified through groundwater monitoring and the Seepage and Conveyance Technical Feedback Group, which consists of landowners, stakeholders, agencies, and interested parties.</p>
42	<p>Section 10004(h)(2)(B) of the San Joaquin River Settlement Act: the Secretary is prohibited from releasing flows that exceed existing downstream channel capacities. For example, existing channel capacity is zero in Reach 4B. Current channel capacity in Reach 4A, without causing seepage impacts, is only 500 cfs. All necessary channel modifications to address capacity identified as Phase 1 improvements in paragraph 11(a) of the stipulated settlement and contemplated to be completed by December 31, 2013, are significantly behind schedule. All are in the planning/permitting stage with no established planning and construction timelines.</p>	<p>Statements related to channel capacities and seepage are beyond the scope of the analysis that would be performed to prepare and submit a sufficient permit application for the reintroduction of Chinook to the San Joaquin River. Activities related to channel capacity improvements and groundwater elevation concerns are being addressed through the larger SJRRP projects, including site-specific channel improvement projects identified in the Settlement, and through information gathered from the Seepage and Conveyance Technical Feedback Group, landowner coordination, and regular monitoring efforts along the San Joaquin River. Reclamation will continue to coordinate with landowners, stakeholders, agencies, and the Settling Parties to develop timelines and implement the project.</p>

43	<p>Successful reintroduction of spring-run Chinook to the San Joaquin River cannot be achieved if the reintroduction occurs years in advance of necessary in-river, near-river, and facilities/infrastructural improvements to provide quality fish habitat, a concern also raised by the Service in the Permit Application at page 43. Habitat conditions in reaches of the San Joaquin River are severely degraded. To achieve the restoration goal, a combination of channel and structural improvements, described in paragraph 11 of the stipulated settlement, along the San Joaquin River below Friant Dam are required. “Phase 1” improvements, listed in paragraph 11(a), are to be completed no later than December 31, 2013 and “Phase 2” improvements, listed in paragraph 11(b), are to be completed no later than December 31, 2016. On page 43, the Permit Application acknowledges that these projects have been delayed beyond that which was anticipated within the context of the Settlement. The just released Reintroduction Strategy for spring-run Chinook dated February 2011 also raises this significant concern stating that the Phase 1 projects scheduled for completion by December 31, 2013 are still in the planning permitting stages and are considered significantly behind schedule with no established planning and construction timelines. The reintroduction of spring-run Chinook in advance of necessary restoration projects on the San Joaquin River calls into question whether the restoration goal of the SJRRP, as described in the Permit Application can be successfully accomplished.</p>	<p>Paragraph 14(a) of the Settlement states “The Secretary, through the Fish and Wildlife Service (Service), and in consultation with the Secretary of Commerce, the Department of Fish and Game (CDFG), and the Restoration Administrator, shall ensure that spring and fall-run Chinook are reintroduced at the earliest practical date after commencement of sufficient flows and the issuance of all necessary permits.” Reclamation, CDFG, Service, and NMFS will continue to coordinate on aspects of salmon reintroduction to ensure meeting habitat and flow requirements for fish survival in the San Joaquin River. Further, Sec. 10011(c)(3) of Public Law (PL) 111-11 explains that the 4(d) rule issued “shall provide that the reintroduction will not impose more than de minimus water supply reductions, additional storage releases, or bypass flows on unwilling third parties due to such reintroduction.” Reclamation is coordinating and will continue to coordinate with third parties to meet this need. PL 111-11, Sec. 1004(g)(3) also says “The Secretary shall reduce Interim Flows to the extent necessary to address any material adverse impacts to third parties from groundwater seepage caused by such flows that the Secretary identifies based on the monitoring program of the Secretary.” Reclamation is currently undertaking efforts to identify and manage potential groundwater concerns with adjacent landowners, as stipulated in PL 111-11 and will continue to monitor and address these concerns. Planning and environmental work necessary for the construction of channel capacity improvements and the installation of fish screens is ongoing and will continue to occur. Concern over lack of funding is speculative and not considered in the context of addressing the technical merits of channel improvements and salmonid reintroduction.</p>
44	<p>Reintroduction of spring-run Chinook to the existing system would be deadly to the fish. In addition to the poor habitat conditions described above, due to the existing flow limitations and flow paths relative to the Mendota Pool, these fish will become entrained in the diversions in the Mendota Pool. When spring interim pulse fish flushing flows occur starting in May, existing flow limitations come into play. With current capacity limitations, Interim Flows are limited to about 1300 cfs into the Mendota Pool and only about 50 cfs out of the Mendota Pool and into river Reach 4A. To the extent that out migrating juvenile salmon follow the flow, then at least 96% of these fish will be entrained in the 3000 cfs of total irrigation diversions drawing from the Mendota Pool. Internal flow issues in the Mendota Pool will cause the take percentage to be higher. The settlement envisioned construction of the Mendota Pool Bypass, the Reach 2B improvements, and the Arroyo Canal Fish Screens projects to solve and mitigate this specific issue at a cost estimated at \$225 million by Reclamation. The Exchange Contractors estimates indicate the costs will be significantly more than the Reclamation estimate.</p>	<p>Investigations for the needs of fish to successfully meet the goals of the Settlement and the timeline are currently being planned and implemented. Concern over lack of funding is speculative and not considered in the context of addressing the technical merits of channel improvements and salmonid reintroduction.</p>

47	<p>Inadequate Funding: Most significantly, the current lack of assured and adequate funding for the SJRRP will prevent the achievement of the program’s goals. When the San Joaquin River Settlement Act was enacted in 2009, four sources of funds were identified to provide some of the monies needed to carry out the Restoration Program amounting to hundreds of millions of dollars for the necessary channel and structural improvements; to operate the salmon reintroduction program; to prevent damage (via flooding and seepage) to downstream lands and infrastructure (such as those owned by the Exchange Contractors); and to accomplish the goal of “reducing or avoiding an adverse water supply impact” to Friant water users. However, absent additional appropriations, only \$88 million is currently available until October 1, 2019 from the federal government (due to “Pago” rules). In light of President Obama’s announced freeze on discretionary spending for the next five years, the funding issue appears to be highly problematic. Moreover, it is believed that some \$40 million has already been spent by the Federal implementing agencies. The remaining funds, over the next 8 years, are grossly inadequate to carry out the fishery and restoration program that was envisioned at the time of the enactment of the Act.</p>	<p>Concern over lack of funding is speculative and not considered in the context of addressing the technical merits of channel improvements and salmonid reintroduction.</p>
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48	<p>Inadequate Environmental Review: Ad hoc environmental review that improperly “piecemeal” or “segments” review of individual programs without a consideration of the larger SJRRP will result in unnecessary planning delays, uninformed decision-making and deprives the public and stakeholders of the opportunity to meaningfully comment on the SJRRP. The Settlement and the San Joaquin River Settlement Act specifically state that the Secretary must comply with National Environmental Policy Act (NEPA) and other laws and the Settlement provides in paragraph 28 that the Secretary is to “expeditiously complete applicable environmental documentation and consultations as may be necessary to effectuate the purposes of this Settlement.” To date, no Programmatic Environmental Impact Statement (PEIS) has been issued to review the SJRRP initiated by the stipulated settlement. From the outset, Reclamation has claimed that it would prepare a PEIS prior to project specific NEPA documents. A large-scale program such as the SJRRP, which is composed of many individual but interconnected programs that have a significant cumulative impact on each other and the program as a whole, compels programmatic review prior to project specific review.</p> <p>With the Interim Flows, Reclamation has released Environmental Assessments (EA) with a Finding of No Significant Impact (FONSI) for each of the first two years of the Interim Flow program. However, each year represent an integral and necessary part of the overall restoration on flows and the water management agreement of the SJRRP and are not separable or of utility in and of themselves, despite Reclamation’s contentions to the contrary. Such segmenting of annual Interim Flows is inappropriate and improper under NEPA. Moreover, the EA/FONSI’s done to date for the annual Interim Flows willfully ignore the fact that a PEIS is being prepared by Reclamation for the entirety of the SJRRP and fail to address and provide mitigation measures for current and future damage to land and levees from seepage. Similarly, a project-specific environmental assessment of the reintroduction of spring-run Chinook to the San Joaquin River is expected to be released by NMFS. It remains to be seen to what degree the environmental review performed by NMFS is coordinated with the PEIS in preparation by Reclamation. However, it is not proper to contend that the permitting for the spring-run Chinook is an action independent of the SJRRP or that it has “independent utility.” We expect a unit feed approach to the entire restoration program. Finalization of the PEIS/PEIR is essential so that the public and interested parties will have an opportunity to comment on the overall restoration program and the alternatives to restoring flows to the San Joaquin River. By failing to develop an integrated and comprehensive approach to restoration, the public and stakeholders are being deprived of the opportunity to consider and comment on the proposed SJRRP.</p>	<p>NEPA analysis shall be performed by NMFS for the approval of the actions identified in the permit application for the reintroduction of Chinook to the San Joaquin River. The San Joaquin River Restoration Draft Programmatic Environmental Impact Statement/Report (PEIS/R) was released for public comment and review on April 11, 2011, with the comment period closing on September 21, 2011. The PEIS/R includes a programmatic analysis of the implementation of the SJRRP, as called for in the Settlement and Act. This programmatic analysis outlines the broad environmental impacts that could occur as a result of the reintroduction of Chinook. The NEPA analysis that will be performed by NMFS, based on their approval of the actions identified in the permit application submitted by USFWS, will identify specific impacts that would occur as a result of this action and will tier off or incorporate by reference the information provided in the PEIS/R related to reintroduction actions. As specified in previous responses to comments for WY 2010, 2011, and 2012 Interim Flows, these actions constitute a complete project under NEPA because they have independent utility and provide useful information on flows, temperatures, fish needs, seepage losses, shallow groundwater conditions, recirculation, recapture, and reuse conditions, channel capacity, and levee stability regardless of the future implementation of actions called for in the Settlement and the Act. These data are useful independent of the SJRRP, particularly with respect to understanding the flood management system and seepage. While WY 2010, 2011, and 2012 Interim Flows is one of the first several steps in implementing the SJRRP, they can be implemented successfully in meeting their purpose and need without any prior or subsequent SJRRP activities.</p>
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50	<p>Due Process Concerns: The public participation procedures utilized by NMFS for the review of the USFWS §10(a)(1)(A) Permit Application potentially raise due process concerns. Paragraph 14(a) of the stipulated settlement required the USFWS to submit the Permit Application by September 30, 2010. However, at the time the 10(a) (1) (A) Permit Application was finalized on September 29, 2010, the three foundational documents that comprise the initial technical framework for the Permit Application’s project description (the Stock Selection Strategy, the Hatchery and Genetic Management Plan and the Reintroduction Strategies document) were all in draft form. The Permit Application acknowledged that “some discrepancies may exist between draft documents and our application.” Subsequently, the Stock Selection Strategy document was finalized in November 2010 and the Hatchery and Genetic Management Plan was finalized on December 17, 2010. However, the Reintroduction Strategies document remained in draft form for all but a few days of the comment period making a complete and informed assessment of the technical underpinning of thee §10(a)(1)(A) Permit Application difficult. A final Reintroduction Strategies document dated February 2011 was placed on the restoresjr.net website, but not the NMFS website, sometime between March 2 and 4, 2011, a few days before the comment period deadline of March 7, 20011. The URL for the document seems to indicate that it was finalized on February 28, 2011. To enable thorough and well-informed comments from the public on the Permit Application, NMFS should have postponed review and comments on the Permit Application pending finalization and release of all foundational technical documents. Moreover, NMFS issued the “Notice of receipt for application for a new scientific research and enhancement permit, notice of public meetings, and request for comment” regarding USFWS §10(a)((1)(A) Permit Application on February 4, 2011 ((Federal Register vol. 76, no. 24). Due to the short review period for such a comprehensive and technical program encompassing numerous background documents and citations to scientific studies, there was insufficient time to thoroughly review the Permit Application in detail. As a result of these concerns, the Exchange Contractors and RMC reserve the right to make additional comments to the SJRRP, in particular to the reintroduction of spring-run Chinook to the SJR, as more information from the implementing agencies becomes available and the SJRRP progresses.</p>	<p>The need for adaptive management for the SJRRP, and for fish reintroduction, is clear, we also have worked diligently to produce the ‘well thought out strategy’ the commenter describes as necessary. This strategy is evident in the supporting documents (Stock Selection, Reintroduction Strategy and HGMP) developed along with this permit. The SJRRP does provide the avenue for peer review. Both the Restoration Technical Feedback Group and Fisheries Technical Feedback Group are convened by the program to solicit technical input and review by scientists outside the program. This comment addresses an action specific to the NMFS therefore the comment will be addressed by the NMFS.</p>
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51	<p>The donor fish collection efforts as well as the reintroduction program are proposed to be guided by an adaptive management approach. While necessary to a degree, it is no substitute for a well thought out initial strategy. An undertaking as large as the SJRRP should not be rushed by arbitrary deadlines. The product of such a rushed effort is the sacrifice of science to the avoidance of confronting an unrealistic schedule. This approach could lead to a never ending cycle of studies and costly enhancement attempts while realistically it may never be possible to establish a self-sustaining population of spring-run Chinook in the San Joaquin River. The long list of uncertainties identified throughout all of the documents and the known extreme variability affecting survival (see page 5-12 of Fisheries Management Plan) attest to this concern. We believe that the use of a quantitative life cycle model rather than only a qualitative model as now proposed would allow the question of biological feasibility of the program to be assessed and periodically updated. Additionally, we recommend the establishment of an independent scientific review process whereby objective scientific assessment can be made of some of the tough issues that the vested parties may be reluctant to address. A similar process has been very effective on the Columbia River system. This is a particularly strong need in this effort where the program was dictated by secret negotiations that compel a course of action without the benefit of scientific peer review, environmental analysis, feasibility studies or public participation.</p>	<p>The need for adaptive management for the SJRRP, and for fish reintroduction, is clear, we also have worked diligently to produce the ‘well thought out strategy’ you describe as necessary. This strategy is evident in the supporting documents (Stock Selection, Reintroduction Strategy and HGMP) developed along with this permit. The SJRRP does provide the avenue for peer review. Both the Restoration Technical Feedback Group and Fisheries Technical Feedback Group are convened by the program to solicit technical input and review by scientists outside the program.</p>
53	<p>Whether the application was applied for in good faith; (50 CFR § 222.308(c)(1)), whether permit, if granted and exercised, will not operate to the disadvantage of the endangered species; (50 CFR § 222.308(c)(2)), • Whether the permit would be consistent with the purposes and policy set forth in section 2 of the Act; (50 CFR § 222.308(c)(3)), Whether the permit would further a bona fide and necessary or desirable scientific purpose or enhance the propagation or survival of the endangered species, taking into account the benefits anticipated to be derived on behalf of the endangered species; (50 CFR §222.308(c(4))), • The status of the population of the requested species and the effect of the proposed action on the population, both direct and indirect; ( 50 CFR§ 222.308(c)(5)), whether alternative non-endangered species or population stocks can and should be used; 50 CFR§ 222.308(c)(7)), Whether the expertise, facilities, or other recourses available to the applicant appear adequate to successfully accomplish the objectives stated in the application; and (50 CFR §222.308(c)(11)), Opinions or views of scientists or other persons or organizations knowledgeable about the species which is the subject of the application or of other matters germane to the application. (50 CFR § 222.308(c)(12)).</p>	<p>50 CFR § 222.308 states, “The Assistant Administrator may issue permits for scientific purposes or for the enhancement of the propagation or survival of the affected endangered or threatened species in accordance with the regulations in parts 222, 223, and 224 of this chapter and under such terms and conditions as the Assistant Administrator may prescribe, authorizing the taking, importation, or other acts otherwise prohibited by section 9 of the Act.” The sub-sections the commenter has highlighted are part of the issuance criteria for NMFS to evaluate.</p>

54	<p>As noted above as a general overall comment concerning due process concerns, the short review period provided for such a comprehensive and technical program encompassing numerous background documents and citations to scientific studies provided insufficient time to thoroughly review the Permit Application in detail. In addition, the finalization of foundational technical documents after the 10(a)1(A) Permit Application itself was finalized, most recently the Reintroduction Strategies document, made a complete and informed assessment of the technical underpinning of the 10(a)1(A) Permit Application difficult. Again, review and comments on the Permit Application should have been postponed pending finalization and release of all foundational technical documents in order to provide a meaningful opportunity to consider the program as a whole.</p>	<p>The foundational technical documents (Stock Selection Strategy, HGMP and Reintroduction Strategy) set the framework for the proposed action in the Application. However, the Application is a stand-alone document so the finalization of the founding technical documents was not needed before the Application was submitted.</p>
55	<p>As discussed above as an overall comment, the issuance of the §10(a)1(A) Permit for the salmon reintroduction program with the goal of spring-run Chinook to be reintroduced to the San Joaquin River by December 31, 2012, is far in advance of (a) the establishment of Restoration Flows and (b) necessary structural and channel improvements, both of which are critical to the San Joaquin River. The Fisheries Management Plan (FMP) identifies biological targets such as fry/juvenile/adult salmon survival, minimum juvenile growth rates, and minimum annual production. Whether these targets can be successfully met will in large part depend on the implementation of appropriate habitat improvements, structural modifications, and restoration measures in the San Joaquin River to support salmon survival and growth before reintroduction of spring-run Chinook, as discussed on pages 63-65 of the Permit Application. Such a serious disregard for the habitat necessary to sustain the experimental population within the San Joaquin calls into question the objectives concerning the SJRRP as described in the Permit Application, as well as whether the expertise, facilities, or other resources available to the applicant appear adequate to successfully accomplish the objectives stated in the application, and each of the other issues raised in the regulations highlighted in the bullets above.</p> <p>The Exchange Contractors recommend that the reintroduction of spring-run Chinook be coordinated with priority mitigation, habitat and structural improvement work that has to be completed. We recognize that there could be value in collecting a smaller number of fish for study purposes in the San Joaquin River, for example to estimate downstream migration behavior and survival, but to go beyond that at this time would be an unwarranted taking of individuals from a listed population that is already at high risk of extinction.</p>	<p>Investigations for the needs of fish to successfully meet the goals of the Settlement and the timeline are currently being planned and implemented. Concern over lack of funding is speculative and not considered in the context of addressing the technical merits of channel improvements and salmonid reintroduction. Additional new and clarifying language has been added to the Application which discusses existing conditions and habitat evaluations.</p>
56	<p>The Permit Application and HGMP discuss a range of initial in-stream conditions that may limit growth potential and survival rates of introduced eggs and juveniles such as contaminant levels, temperature levels and food availability in the early years of the reintroduction program. However, the Permit Application does not provide details concerning actions to address these issues other than to say that intense restoration work several years after the introductions begin will include establishment of floodplain habitat, creation of in-stream cover, providing shaded streamside riparian habitat and minimizing the limiting reaches.</p>	<p>Several evaluations of the existing habitat conditions and studies are on-going and will continue to provide updated information. Additional new and clarifying language has been added to the Application in the Effects Analysis section.</p>

57	<p>The Permit Application does not acknowledge and sufficiently address the potentially significant impact of predation on juvenile spring-run Chinook survival, in particular predation by bass and other nonnative piscivorous species, in both the lower and upper stretches of the San Joaquin River. It also does not address the actions off the SJRRP Interim Flows in establishing the presence of bass near the Hills Ferry Barrier. There are reports of a substantially increased population in the area of the Hills Ferry Barrier and no measures have been identified to address this predation. Further, bass will migrate to the upper San Joaquin River with similar impacts. Again, the Permit Application and supporting documents fail to address this significant problem.</p>	<p>We are currently conducting and proposing studies during Interim Flow Periods to better refine true survival for juvenile salmonids through the Restoration Area. These studies also address what we believe are the areas that represent potential losses due to predation. The incidental take associated with this Project will be assessed and reported annually, thus allowing the opportunity to incorporate any new information in the request submitted to NMFS for review each year.</p>
58	<p>On pages 46 through 47 and 65 through 66, the Permit Application discusses the possibility of using a trap and haul program to move reintroduced spring-run Chinook around passage impediments still in place in the restoration area in the early years of the program, but does not address the impact of implementing the trap and haul program on projected or assumed spring-run Chinook survival rates.</p>	<p>Studies are planned to assess the effects of a trap and haul program on spring-run Chinook survival.</p>
59	<p>Although we have not had time to adequately assess the current status (extinction risk) of the donor stock, we are aware that returns of adult spring-run Chinook to the Sacramento River system have declined in recent years. Taking additional fish from these at-risk stocks and placing them into the San Joaquin River system, where they assuredly would suffer extremely high mortality, makes little sense under these conditions. If the donor stocks were in healthier condition and the San Joaquin River system habitat considerably improved, it might make sense to initiate the reintroduction effort, but that is not the current situation.</p>	<p>The reintroduction of spring-run Chinook is part of a legal settlement. The Service is the lead agency on the reintroduction as dictated in the Settlement and has responsibility to make a good faith effort to restore Chinook (giving priority to spring-run) to the San Joaquin River. Additionally the Service, as a natural resource agency, has responsibility to not harm existing populations of spring-run Chinook in the process of implementing the Settlement. The Application addresses the necessity of using viability criteria to evaluate any and all potential donor stock collections annually and to submit the request to NMFS for approval.</p>
60	<p>The very fact that the Sacramento spring-run Chinook returns have been so variable over the last couple of decades highlights two additional concerns. First, the Sacramento River Basin stocks have not recovered enough to allow fish to be removed on a yearly basis. This is important because the reintroduction program would likely fail in the long term to establish a self-sustaining run if donor fish were not available every year for the next couple of decades. Second, the fact that the Sacramento spring-run Chinook do not appear to be recovering very fast raises the question of why one would expect the same fish to do any better in the much more highly degraded San Joaquin River.</p>	<p>The Conservation Facility is proposed as the basis for the initial population development for reintroduction. Initial collections of donor stock will be used to produce a broodstock in the Conservation Facility. If collections could only be made opportunistically, those individuals would continue to be added to the broodstock and Conservation Best Management Practices, as outlined in the HGMP for the San Joaquin River, would be used to make the appropriate crosses of available stocks.</p>

61	<p>Donor stock from which the experimental spring-run Chinook for the San Joaquin River will be sourced from drainage systems includes Feather River, Butte Creek and Deer/Mill creeks (preferred alternative chosen by the Genetics Subcommittee of the SJRRP). Out of these, the Feather River spring-run Chinook population appears to be significantly hybridized with fall-run Chinook (FRC), as evidenced by the high level of introgression with FRC genes, and acknowledged in the HGMP. It is also unclear whether the practices recently adopted by the Feather River Fish Hatchery (FRFH) to reduce hybridization between spring-run and fall-run Chinook are having any measurable benefits. Recent genetic analyses (Garza et al. 2008) suggest that Feather River spring-run Chinook are heavily introgressed with FRFH genes and essentially are not genotypically distinguishable as spring-run fish in the way that Butte and Mill/Deer Creek salmon are. Furthermore, the Feather River spring-run stock consists of both hatchery-spawned and naturally-spawned salmon. In contrast, the Butte Creek and Deer/Mill Creek populations show little evidence of introgression and apparently no hatchery influence.</p> <p>As noted in the Stock Selection Strategy document dated November 2010, the genetic risks posed by the Feather River fish due to hatchery fish influence and hybridization of FRFH with spring-run Chinook, prompted the Technical Advisory Committee (TAC) of the San Joaquin Protected Resources Division River Restoration Program to recommend against the use of the Feather River Hatchery stock or any other hatchery origin stock for use in reintroduction (Meade 20007). However, the SJRRP still included the Feather River stock in the preferred alternative (along with Butte and Mill/Deer Creek stocks). The rationale that the Genetics Subcommittee provided for using Feather River spring-run Chinook as part of the donor stock includes the fact that this stock appears to retain remnants of the phenotype and ancestry of the Feather River spring-run, and that through careful management of the broodstock, it may be possible to preserve some component of the ancestral Central Valley spring-run genomic variation.</p>	<p>Feather River Spring-Run stock has the highest genetic diversity of the three primary runs discussed in the foundation technical documents. However, this stock is known to have been affected by hybridization with fall-run Chinook at the Feather River Hatchery (Garza et al. 2008) and hybridization is ongoing (M. Lacy, pers. comm.). It is also likely that hybridization occurs in the spawning grounds of the lower Feather River. So, at least some of the additional genetic diversity seen in the Feather River stock is likely due to the addition of fall-run genes. It is also important to point out that, while this may be unfavorable for the maintenance of phenotypic differentiation, it also reduces the risk of inbreeding in a reintroduction project and the consequent reduction in fitness from inbreeding depression. The Application has been developed both to address the genetic goals, but also ensure consideration for feasibility of donor stock collections. The genetic integrity goal is valid, but the realities of the donor stock status must be taken into account when developing each annual Donor Stock Collection Plan.</p>
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62	<p>However, the Genetics Subcommittee acknowledges in the HGMP that there is no reasonable way to predict the outcome in terms of genetic variation and diversity. Overall, given the substantial degree of uncertainty and risk involved with hybridization and hatchery influence in Feather River fish, we recommend that the HGMP further consider the pros and cons of excluding this population from the donor stock. This may include conducting more studies on bloodstock selection before reintroducing spring-run Chinook in the San Joaquin River. Further, the Permit Application and underlying foundational documents do not adequately address the impacts on the assumptions and targets of the reintroduction program of a scenario in which the FRFH is the only or primary source of donor stock.</p>	<p>Feather River Spring-Run stock has the highest genetic diversity of the three primary runs discussed in the foundation technical documents. However, this stock is known to have been affected by hybridization with fall-run Chinook at the Feather River Hatchery (Garza et al. 2008) and hybridization is ongoing (M. Lacy, pers. comm.). It is also likely that hybridization occurs in the spawning grounds of the lower Feather River. So, at least some of the additional genetic diversity seen in the Feather River stock is likely due to the addition of fall-run genes. It is also important to point out that, while this may be unfavorable for the maintenance of phenotypic differentiation, it also reduces the risk of inbreeding in a reintroduction project and the consequent reduction in fitness from inbreeding depression. Each of the three spring-run lineages has biological characteristics that might be favorable for a successful reintroduction project and each also has unfavorable characteristics. The Application has been developed both to address the genetic goals, but also ensure consideration for feasibility of donor stock collections. The genetic integrity goal is valid, but the realities of the donor stock status must be taken into account when developing each annual Donor Stock Collection Plan.</p>
63	<p>As identified in Permit Application, the Conservation Program's target for the experimental population of spring-run Chinook is a minimum annual return of 500 adults by 2019. Although the basis for this target is not identified in the Permit Application, support for the numbers is presented in the Recommendations on Restoring spring-run Chinook to the Upper San Joaquin River (Recommendations Report) prepared by the San Joaquin River Restoration Program Technical Advisory Committee (Meade 2007).</p>	<p>The minimum annual return of 500 adults was developed from the Lindley population criteria. However, the goal of the Conservation Program is to meet the Restoration Goal as stated in the Settlement (naturally producing and self-sustaining population).</p>
64	<p>Discussion presented in the Recommendation Report indicates that the Technical Advisory Committee is aware that an annual run size of greater than 500 adults, perhaps at least 2,500 adults, may be necessary for a viable self-sustaining population. Our reading of the Recommendation Report is that the minimum population size is based on work related to identifying extinction risk of existing salmonid populations and may not be directly related to the minimum population size necessary to provide a viable (self-sustaining) salmonid population for a restoration (i.e., reintroduction) project. We agree with this general concern and further suggest that the 2012-2019 reintroduction period target of 500 adult spawners annually based on one or more of the criteria used to assess the risk of extinction is likely to be too low to provide for a viable salmon population for the following reasons:</p>	<p>The minimum annual return of 500 adults was developed from the Lindley population criteria. However, the goal of the Conservation Program is to meet the Restoration Goal as stated in the Settlement (naturally producing and self-sustaining population).</p>
65	<p>a. Total population size per generation (N) is not the annual run size, but is approximated by multiplying the annual run size by the generation length, which for Chinook is assumed to be 3 (Allendorf et al. 1997). Using this calculation, the annual run size to satisfy the 2,500 total population criterion should be approximately 830 (2,500 divided by 3).</p>	<p>Allendorf and Lindley's definition of population size as pertaining to generation of 3 years is correctly stated on page 98 of the September 29, 2010, Application. However, Appendix A, and the criteria used to determine donor stock availability has been reconsidered in the Revised Application.</p>

66	b. Conversely, calculating the total population size per generation based on a target annual run size off 500 yields an estimated total population size (NN) of 1,500 ((500 times 3). Using this single criterion would suggest that the population would be at a very high risk of extinction.	Allendorf and Lindley have two population criteria: one based on population size of 2,500 fish over 3 generations and the other based on a minimum of 500 spawners in a given year. There is no basis in either Allendorf or Lindley to change the population criterion to either 500 or 5,000 from 2,500 fish. Furthermore, the example analysis correctly suggests that for fall 2009 escapement estimates, Mill, Deer, and the Feather River Hatchery population all were at a high risk of extinction. The example analysis indicated that in the example given, stock collections would have been proposed for Butte Creek if collections were to have been made in 2010. The level of collection would have been developed using the Donor Stock Collection Plan approach. Appendix A, and the criteria used to determine donor stock availability, have been reconsidered in the Revised Application.
67	c. Similarly, using the calculated total population size per generation (N) based on the 5000 fish target (N = 1,500) and the assumed Ne/NN ratio of 0.2 would provide an estimate of the effective population size per generation (Ne) of 300 (1,500 times 0.2). Using this single criterion would suggest that a population with an effective population size of 3000 would be at a very high risk of extinction.	Allendorf and Lindley have two population criteria: one based on population size of 2,500 fish over 3 generations and the other based on a minimum of 500 spawners in a given year. There is no basis in either Allendorf or Lindley to change the population criterion to either 500 or 5,000 from 2,500 fish. Furthermore, the example analysis correctly suggests that for fall 2009 escapement estimates, Mill, Deer, and the Feather River Hatchery population all were at a high risk of extinction. The example analysis indicated that in the example given, stock collections would have been proposed for Butte Creek if collections were to have been made in 2010. The level of collection would have been developed using the Donor Stock Collection Plan approach. Appendix A, and the criteria used to determine donor stock availability, have been reconsidered in the Revised Application.
68	In summary, the 2012-20019 Reintroduction Period target of 500 adult Chinook annually seems to be based on criteria used to estimate extinction risk (using genetic concerns) that may not be entirely applicable to a reintroduction project. Even if the assumptions underlying the criteria used to identify the target value are valid, the actual target itself may be too low to provide a truly viable population of spring-run Chinook in the San Joaquin River. We recommend that NMFS, USFWS and the Technical Advisory Committee reconsider these assumptions and means for arriving at the target number of adults.	Several interagency technical teams are working to study and evaluate the needs for successful reintroduction.

69	<p>Of the various anadromous salmonid races, spring-run Chinook are probably the most sensitive to environmental modification. They have the most demanding requirements for cool water for all of their life history stages from adult migration, extended pre--spawn holding, spawning, egg incubation, rearing, and outmigration. This is why they historically were confined to higher elevation reaches above about 1500 ft. (NMFS 1998). So, the notion of trying to reintroduce the most environmentally sensitive salmon to the highly altered San Joaquin River appears far-fetched. In general, it would seem highly unlikely to expect a transplanted out-of-basin spring-run Chinook stock to develop into a viable population in the much-altered San Joaquin River even assuming that many of the poor habitat conditions could be improved.</p>	<p>One of the Settlement goals is to develop a naturally reproducing and self-sustaining population of Chinook in the San Joaquin River from Friant Dam to the Merced River. The Settlement also gives preference to spring-run Chinook due to their historical population numbers in the San Joaquin River. The agreed upon restoration hydrographs in the Settlement are also intended to benefit spring-run. Please note that historically, the San Joaquin River had the largest run of spring-run in the system and that run continued in large numbers after Friant Dam was completed.</p>
70	<p>For the reintroduction program to be successful, it must lead to the establishment of a viable self-sustaining population over the long term. Self-sustainability clearly is the goal of the reintroduction program as identified in the stipulated settlement and other program documents. And yet we have not seen in any of the documents a real assessment of the biological feasibility of establishing a sustainable population of spring-run Chinook in the San Joaquin River. The numerous documents highlight uncertainties and challenges associated with the program but only treat them as things to study and address in the future under the “adaptive management” umbrella.</p>	<p>Investigations for the needs of fish to successfully meet the goals of the Settlement and the timeline are currently being planned and implemented.</p>
71	<p>In searching for some notion of whether the reintroduction program would be successful, none of the reports directly address the question of whether the program would be biologically feasible (i.e. sustainable runs). There is much mention of how reintroduction would not be successful now under existing conditions (of course that’s why the fish became extirpated), and some optimistic views that it might work if all the major problems were corrected, but does not indicate any prognosis for conditions with the new “Restoration Flows” plus the various structural and channel modifications projects prescribed in the settlement and NMFS recovery plan. Absent a rational strategy, we have an experimental program that will likely cost in excess of \$1 billion with little guarantee that it will be successful.</p>	<p>Investigations for the needs of fish to successfully meet the goals of the Settlement and the timeline are currently being planned and implemented.</p>
72	<p>In order to produce a viable population, regardless of the population size, the total survival rate from egg to returning adult spawner must exceed that necessary to replace the parent population in the long term. All of the documents seem to avoid this topic. The discussion of likely survival rates is only briefly discussed on pages 12-13 in the Permit Application. These rates are extremely optimistic and likely unrealistic. Even using the indicated rates, the total survival rate from egg to returned adult (0.0004) is not enough to achieve sustainability (1:1 return ratio)). Our comments on the specific life stage survival estimates cited in the Application are presented below.</p>	<p>Survival studies on eggs and juveniles are currently being planned and conducted that will improve the accuracy of these estimates. The survival estimates presented in the Application represent the best available science at the time it was submitted.</p>



73	<p>Egg-to-fry: The report cites 40% as the estimated survival rate from deposited egg to emergent fry. Yet on page 60 of the Permit Application, it is cited that “survival rates under natural conditions usually do not exceed 40%.” So the average expected survival rate would have to be something less than 40%. There is little discussion to support this estimate except to note that it was obtained from studies done on the Tuolumne River under optimal water temperature conditions. There is no discussion of how conditions might differ in the expected spawning area of the San Joaquin River. However, a brief review of existing maximum daily water temperatures recorded 1.5 miles below Friant Dam revealed that temperatures are often suboptimal and sometimes critical for both Chinook spawning and incubation life stages. Implementation of the Restoration Flow schedule may improve conditions somewhat, but still would leave frequent periods of suboptimal conditions. Therefore, the 40% egg-to-fry survival rate cited in the Permit Application is likely an overestimate for application to the San Joaquin River. Furthermore, this estimate does not include any consideration of the anticipated warmer conditions associated with climate change, which would make temperature conditions even worse. Although climate warming impacts are discussed generally in several of the program documents (e.g. Lindley et al. 2007), the expected consequences specific to the success or failure of the reintroduction of spring-run Chinook to the San Joaquin River is not revealed. An accounting of the anticipated warming conditions should be included in the modeling efforts used to project future population growth in the restored spring Chinook runs to the San Joaquin River.</p>	<p>The estimate is based on the best available science from the San Joaquin River Basin. The estimate of 40% egg to emergent survival rates is based on the assumption that the spawning habitat will be enhanced in the Restoration Area to provide optimum survival rates. Adding clean gravel to construct spawning beds in the Project Area is a high priority action. The observed egg survival rate in newly placed gravel should be about 70% during the first few years and then decline to about 40% over time, so the estimate of 40% that was used in the application is conservative.</p>
75	<p>b. Fry-to-smolt: A 5% rate is quoted for fry to migratory smolt. It is difficult to assess this rate because the definition of what is migratory smolt versus a dispersing parr is necessarily vague. Nevertheless, while the rate seems to be supported with references, the applicability to the San Joaquin River is questionable given that migratory conditions in the San Joaquin River are likely much worse than those in the stream(s) from which the rate estimate was derived. Although there are plans to study and address many of the rearing and migratory problems (e.g. predation) in the lower SJR, there certainly will be realistic limits of what can be done in such an altered environment. The likelihood of extremely high predation rates from the known populations of nonnative fish species (e.g. striped, largemouth, and smallmouth bass) occurring in the lower San Joaquin River is especially of concern. Effectively controlling populations of such predatory fish has always been a challenge for fish management agencies.</p>	<p>The fry-to-smolt and the smolt-to-adult survival rates are based on rotary screw trap catch data of naturally produced fall-run Chinook from the Stanislaus River at Oakdale (fry estimates) and Caswell State Park (smolt out-migrant estimates) collected by Cramer Fish Sciences. The preliminary trap efficiency models were developed by Dr. Alan Hubbard, Professor of Biostatistics at UC Berkeley. The smolt-to-adult survival estimates are based on the CDFG GrandTab escapement estimates for the Stanislaus River. The Stanislaus River data were used for three reasons: 1) the data represents the survival of naturally produced fish; 2) the Stanislaus River is similar to the San Joaquin River in terms of gravel mining degradation and high water temperatures in the lower reaches during late spring; 3) the Stanislaus River smolts must migrate through the Delta as would San Joaquin River smolts. The Stanislaus River estimates are useful because they indicate that if fish are transferred directly from donor streams, collection numbers would need to be high, supporting the recommendation for rearing broodstock in the planned Conservation Facility.</p>



76	<p>c. Smolt-to-adult: The cited 2.5% rate for smolt-to-adult survival is simply unrealistically high for sub yearling Chinook smolts even for a river system in good shape. The Permit Application contains no source citation for this rate other than a personal communication, so it was not possible to check the actual data. Although we did not have time to assemble and present alternative data in this comment submittal, our previous reviews of smolt-to-adult survival data for ocean-type Chinook suggest rates that rarely exceed 11.0% and usually average about 0.5%. The Permit Application, in apparent support of their 2.5% rate, cites a reference for the Snake River that indicates a range of 1-5%. However, these rates were taken out of context and are clearly not applicable to the San Joaquin River. Snake River spring Chinook smolts are yearlings, which are much larger than the sub yearling smolts that typify Central Valley spring Chinook smolts. Smaller smolts naturally have lower survival rates.</p>	<p>The fry-to-smolt and the smolt-to-adult survival rates are based on rotary screw trap catch data of naturally produced fall-run Chinook from the Stanislaus River at Oakdale (fry estimates) and Caswell State Park (smolt out-migrant estimates) collected by Cramer Fish Sciences. The preliminary trap efficiency models were developed by Dr. Alan Hubbard, Professor of Biostatistics at UC Berkeley. The smolt-to-adult survival estimates are based on the CDFG GrandTab escapement estimates for the Stanislaus River. The Stanislaus River data were used for three reasons: 1) the data represents the survival of naturally produced fish; 2) the Stanislaus River is similar to the San Joaquin River in terms of gravel mining degradation and high water temperatures in the lower reaches during late spring; 3) the Stanislaus River smolts must migrate through the Delta as would San Joaquin River smolts. The Stanislaus River estimates are useful because they indicate that if fish are transferred directly from donor streams, collection numbers would need to be high, supporting the recommendation for rearing broodstock in the planned Conservation Facility.</p>
77	<p>Applying the life cycle survival rates (<math>0.4 \times 0.05 \times 0.025 = 0.0004</math>) presented in the Application to the stated (elsewhere) fecundity of 500 eggs/female curiously results in exactly a 1:1 adult return ratio. This raises suspicion that the survival rates were not derived from a sound review of the scientific data but rather arbitrarily selected to give the desired answer. We note too that the fecundity assumption of 500 eggs/female was not supported by references and that a more realistic number is closer to 400 eggs/female (DWR 2003).</p>	<p>We assumed a mean number of 4,200 eggs per spring-run female, which is based on Central Valley data (CDFG 2008; CDFG 1998a) as cited in the Application. In order to reach 500 adult returns in the San Joaquin River, we needed to determine how many individuals of each life stage would be needed for that minimum target of 500 adults. We used the survival estimates provided in the text (with accompanying references), in order to calculate the numbers of individuals at each lifestage for that target.</p>

78	<p>Another factor that was not considered regarding the feasibility of both the reintroduction program and the broodstock collection program is the widely varying natural survival occurring from year-to-year on all Chinook life stages. Some of these variability factors are described on page 5.112 of the draft FMP. These include (1) up to a 40-fold variability in smolt production from the river systems; (2) a 25-fold range in smolt survival as they pass through the Delta; and (3) a 2.4-fold range in marine survival. In addition, the factors that cause these high rates of variability, such as ocean conditions and droughts, are widely cyclical. Attesting to the cumulative effect of this cyclical variability is the history of run sizes and escapements of Chinook in Central Valley river systems observed since the 1960s. The cyclical nature of these runs is depicted graphically in Figures 2, 3, and 5 in the San Joaquin River Technical Advisory Committee's 2007 report on Recommended Goals, Stocks, and Reintroduction Strategies. Differences in the peaks and valleys are approximately 20-fold for fall-run Chinook, 440-fold for winter-run Chinook, and 20-fold for spring-run Chinook. The important message seen in these cyclical patterns is that they will have a tremendous influence in determining the success or failure of the San Joaquin River spring-run Chinook reintroduction effort. The program to date has not appropriately taken this into account. In the Recommendation Report cited above, Figure 1 shows a potential population growth trajectory with fluctuations for the reintroduced spring-run Chinook out to and beyond year 2040. The graph indicates very minimal variability and basically an increasing trend line. While this may represent a hopeful outcome of the reintroduction program, it certainly is not very realistic in light of the natural cyclical variability that undoubtedly will continue to affect all Chinook stocks in the Central Valley. Consideration of such wide variability provides yet another question mark to the biological feasibility of the reintroduction program. Accounting for this variability can and should be incorporated into a stochastic quantitative life cycle model that would provide a more realistic projection of fish population growth in future years.</p>	<p>The recommended number of fish to be reintroduced into the Restoration Area is based on the minimum number required to sustain a viable population. The Service recognizes the regulatory and biological constraints associated with the reintroduction of a listed species and the Application compares the ideal numbers with what is realistic. The San Joaquin River Restoration Program (SJRRP) will provide habitat conditions suitable for survival and passage that result in the opportunity for a self-sustaining, naturally producing population to develop. The SJRRP is planning to use the Ecosystem Diagnosis and Treatment model in combination with other models and information to predict fish population trends and adapt the process to achieve the SJRRP goals.</p>
79	<p>In light of the above concerns we suggest that the program authors provide a more thorough and accurate account of expected life stage survival rates for spring-run Chinook reintroduced into the San Joaquin River. Furthermore, we recommend that the reintroduction program develop a quantitative life cycle model using realistic life stage survival estimates to address the biological feasibility question. This should provide a good means upon which to measure program success and progress. It could be used in conjunction with the Ecosystem Diagnostic and Treatment (EDT) model that is currently being used to help identify limiting factors and prioritize future actions.</p>	<p>The recommended number of fish to be reintroduced into the Restoration Area is based on the minimum number required to sustain a viable population. The Service recognizes the regulatory and biological constraints associated with the reintroduction of a listed species and the Application compares the ideal numbers with what is realistic. The San Joaquin River Restoration Program (SJRRP) will provide habitat conditions suitable for survival and passage that result in the opportunity for a self-sustaining, naturally producing population to develop. The SJRRP is planning to use the Ecosystem Diagnosis and Treatment model in combination with other models and information to predict fish population trends and adapt the process to achieve the SJRRP goals.</p>

80	<p>The Conservation Facility (i.e., fish hatcheries, both interim and final) will operate under a National Pollution Discharge Elimination System (NPDES) permit. Conservation Facility effluent will be micro-screened and returned to the San Joaquin River. The NPDES permitting process and analyses required by the Regional Water Quality Control Board (RWQCB) during the application processing phase must be protective of San Joaquin River water quality and quantity.</p>	<p>We agree that the water quality in the San Joaquin River watershed must be protective for several reasons including to facilitate meeting the Restoration Goal and protection of wildlife and their habitats.</p>
81	<p>Finally, NMFS regulation 50 C.F.R. § 222.308(b) provides a list of the information required in a §10(a)(1)(A) permit, some of which appear to be missing from the USFWS Permit Application.</p> <ul style="list-style-type: none"> <li>• 50 C.F.R. § 222.308(b) (5) (iii)) requires as part of a description of the proposed acts, a copy of the formal research proposal or contract if one has been prepared. A finalized Reintroduction Strategies document, which “details the elements of reintroduction and the management of fish and their progeny in the mainstream of the” SJR, should have been released prior to putting the §10(a)(1)(A) Permit Application out for public comment.</li> <li>• The Permit Application does not provide the names, qualifications and information concerning the persons or entity which will capture or otherwise take the animals or who will supervise such actions as required by 50 C.F.R. § 222.3008(b) (6) (vi)-(vii).</li> <li>• The Permit Application does not provide all the information required concerning the qualifications and experience of the staff at facilities at which the fish will be maintained; does not provide a written certification from a licensed veterinarian or expert regarding the adequacy of the transport and maintenance of the fish; and does not provide information concerning the availability in the future of such an expert as required by 50 C.F.R. § 222.3088(b) (8) (v-vi)).</li> <li>• The Permit Application does not provide the information required in 50 C.F.R. §222.3008(b) (11) regarding the past experience and practices of the applicant concerning endangered species and/or the species affected by the application.</li> <li>• Finally, the Permit Application appears to be lacking the applicant certification required by 50 C.F.R. § 222.3308(b) (12).</li> </ul>	<p>The on-line application process was not well suited for the needs of this project. NMFS advised the Service to enter summary information into the on-line program as appropriate and to submit a complete project description and effects analysis to them directly.</p>
82	<p>The HGMP, a foundational document for the §10( a)(1)(A) Permit Application, is a technical document that provides guidance on the management and operation of the Conservation Facility that will be used to propagate spring-run Chinook as part of the reintroduction effort on the San Joaquin River. The basis for establishing the Conservation Facility and thus the HGMP, is the recognition that natural re-colonization alone is not sufficient to achieve the goal of establishing a self-sustaining population of spring-run Chinook in the San Joaquin River. NMFS evaluates Hatchery and Genetic Management Plans for threatened anadromous fish under the criteria provided in 550 C.F.R. § 2223.203(b) (55).</p>	<p>Additional new and clarifying language has been added to the Application; see the Section titled Conservation Strategy for the San Joaquin River Spring-Run Chinook.</p>

83	<p>The Hatchery and Genetic Management Plan (HGMP) and decisions made under this plan will be guided by the adaptive management strategy described in the Fisheries Management Plan FMP, which recognizes and plans for the myriad sources of uncertainty associated with a project as large and complex as the SJRRP. As such, the HGMP recognizes that all plans for the development and operation of the Conservation Facility would be subject to revision based on this adaptive management approach. Paragraph 19 (b) of the stipulated settlement requires the Secretary to engage with the Exchange Contractors and RMC in a more in-depth manner than through the public process required by regulation. As such, the Exchange Contractors and RMC must be notified in the event of any substantial revisions to the HGMP and must be provided the opportunity to review such revised plans as they become available so that we may better understand how proposed changes to the HGMP may affect water system operations, water supply and land use on the San Joaquin River.</p>	<p>Chapter 19(b) of the Settlement states, “The Secretary, with cooperation of the other Parties, shall provide appropriate opportunities for input from third parties who have an interest in measures to be undertaken pursuant to this Settlement, and for coordination with third parties who own or control facilities or property affected by implementation of such measures. Further, the Secretary, with cooperation of the other Parties, shall provide appropriate opportunities for public participation regarding implementation of this Settlement.” In May 2007, Reclamation prepared and provided for public distribution the Public Involvement/Public Outreach Plan (PIP). The PIP outlines the public involvement process for sharing San Joaquin River Restoration Program (SJRRP) information and identifies target audiences, including signatories to the Third Party Memorandum of Understanding (MOU), dated February 26, 2007. The PIP further identifies mechanisms to inform the public and stakeholders about information. These mechanisms include briefings, workshops, reach-by-reach coordination meetings, stakeholder subgroups, websites, publication, e-mail, media, and other public involvement opportunities. The SJRRP will continue to operate in accordance with the Settlement, the Third Party MOU, and the PIP, as appropriate, to disseminate information to the Exchange Contractors and the RMC as well as other interest groups, stakeholders, elected officials, landowners, and the general public.</p>
84	<p>The HGMP Program timeline (Figure ES.1, page viii) has several milestones, commencing with submission of permit applications in September 2010, and ending in 2025 with the planned phase-out of the Conservation Facility pending establishment of self-sustaining spring-run Chinook populations in the San Joaquin River. NMFS must set forth a plan that addresses delays in meeting these milestones and disclose the effect the delays would have on the Program’s ability to meet its specific goals, especially within the proposed timeline. For example, what measures are specifically built into the Program’s timeline to accommodate for any delays in getting the appropriate permits, in procuring funding or the unavailability of the required level of funding for the conservation facilities, and various uncertainties associated with the salmon bloodstock collection, rearing and reintroduction components (mentioned within the body of the HGMP) that could potentially delay the overall Program’s timeline?</p>	<p>There are no measures specifically built into the Program. Any delays that may develop due to funding, permitting, or construction, and would result in conditions which would not support successful reintroduction, will be taken into account before reintroduction continues.</p>
85	<p>NMFS must also clarify what are the ramifications of any delays in the Program’s proposed timeline on water system operations on the San Joaquin River. For example, the HGMP states that if the return target of 500 “wild” spring-run Chinook is not met in 2019 or any year thereafter, the monitoring data will be reviewed and restoration strategies assessed to recommend refinements in management actions to improve returns. What types of revisions and refinements in proposed management action could be prescribed that would potentially affect water system operations and water supply and land use on the SJR?</p>	<p>This comment addresses an action specific to the NMFS therefore the response will be prepared by the NMFS.</p>

86	<p>A breakdown of the long--term operational and monitoring costs and sources of funding for the full-scale Conservation Facility is provided. What is the approximate capital cost of this facility? What are the sources of funding? Further, what are the prospects for successfully procuring this funding in a timely manner, so that the full-scale Conservation Facility may begin its operations as proposed in the summer of 2014?</p>	<p>Paragraph 14(a) of the Settlement states “The Secretary, through the FWS, and in consultation with the Secretary of Commerce, the CDFG, and the Restoration Administrator, shall ensure that spring and fall-run Chinook are reintroduced at the earliest practical date after commencement of sufficient flows and the issuance of all necessary permits.” Reclamation, CDFG, FWS, and NMFS will continue to coordinate on aspects of salmon reintroduction to ensure meeting habitat and flow requirements for fish survival in the San Joaquin River. Further, Sec. 10011(c)(3) of Public Law (PL) 111-11 explains that the 4(d) rule issued “shall provide that the reintroduction will not impose more than <i>de minimus</i> water supply reductions, additional storage releases, or bypass flows on unwilling third parties due to such reintroduction.” Reclamation is coordinating and will continue to coordinate with third parties to meet this need. PL 111-11, Sec. 1004(g)(3) also says “The Secretary shall reduce Interim Flows to the extent necessary to address any material adverse impacts to third parties from groundwater seepage caused by such flows that the Secretary identifies based on the monitoring program of the Secretary.” Reclamation is currently undertaking efforts to identify and manage potential groundwater concerns with adjacent landowners, as stipulated in PL 111-11 and will continue to monitor and address these concerns. Planning and environmental work necessary for the construction of channel capacity improvements and the installation of fish screens is ongoing and will continue to occur. Concern over lack of funding is speculative and not considered in the context of addressing the technical merits of channel improvements and salmon reintroduction.</p>
87	<p>It appears that the operational and monitoring (O&amp;M) funds currently available to the State are insufficient to support the full-scale Conservation Facility, and that cost sharing is being explored between California Department of Fish and Game (CDFG) and others to procure the appropriate level of funding. Has CDFG identified alternate strategies for procuring O&amp;M funds in case the cost sharing measure proves to be unsuccessful for any reason?</p>	<p>The State of California is anticipating funding for the capital budget for the Conservation Facility and the O&amp;M costs to be covered by the Bureau of Reclamation.</p>

88	<p>In the discussion on pages 73-74 regarding the total number of broodstock to be collected from each source population, it was stated that collection goals are based on the number of fish necessary to capture the genetic diversity of the source stocks. Further, it was stated that all three populations (Feather River, Butte Creek, Deer/Mill Creek populations) should be used in roughly equal proportion, as using one population at a much higher level than the other would overwhelm the genetic diversity in the other smaller populations. The HGMP fails to properly consider the consequences if the Feather River populations is the only one available for sourcing broodstock at the time of collection? As previously discussed, the Feather River spring-run population has significant levels of hybridization with fall-run Chinook and also likely consists of both hatchery-spawned and naturally-spawned fish which could prove problematic for adhering to the goal of maintaining the genetic integrity of spring-run Chinook stock and inclusion of non-hatchery fish in the broodstock, especially if the Feather River population is the only one from which the broodstock could be sourced.</p>	<p>Feather River spring-run stock has the highest genetic diversity of the three primary runs discussed in the foundation technical documents. However, this stock is known to have been affected by hybridization with fall-run Chinook at the Feather River Hatchery (Garza et al. 2008) and hybridization is ongoing (M. Lacy, pers. comm.). It is also likely that hybridization occurs in the spawning grounds of the lower Feather River. So, at least some of the additional genetic diversity seen in the Feather River stock is likely due to the addition of fall-run genes. It is also important to point out that, while this may be unfavorable for the maintenance of phenotypic differentiation, it also reduces the risk of inbreeding in a reintroduction project and the consequent reduction in fitness from inbreeding depression. Each of the three spring-run lineages has biological characteristics that might be favorable for a successful reintroduction project and each also has unfavorable characteristics. The Application has been developed both to address the genetic goals, but also ensure consideration for feasibility of donor stock collections. The genetic integrity goal is valid, but the realities of the donor stock status must be taken into account when developing each annual Donor Stock Collection Plan.</p>
89	<p>The Conservation Facility program has planned several studies to fill data gaps that will help better inform the program on salmon conservation, reintroduction strategies. Some of these planned studies will be conducted in off-site laboratories, and others in-situ in the San Joaquin River. Four out of these ten listed studies will be conducted in the San Joaquin River (Acoustic Telemetry, Juvenile Predation, Egg Survival, and Juvenile Migration Survival). What are the implications of these studies on the water system operations, water supply and land use in the San Joaquin River during the course of these studies?</p>	<p>Effects to the existing water system operations, water supply and land use along the San Joaquin River, is not anticipated during the course of these studies. These studies will be implemented in accordance with all applicable environmental regulations including NEPA.</p>
90	<p>That the well-being of “donor stocks” be placed above that of the experimental populations in the San Joaquin River. Deer Creek is home to the last pure strains of wild spring-run Chinook and contains confirmed functional spring-run habitat that has not been used to capacity for some time. The salmon’s stability should not be jeopardized to establish an experimental population in experimental habitat. We recommend that fish from hatchery systems be used until the system is functionally supporting all life stages of spring-run salmon and then only when Deer Creek stocks can sustain the loss of donor fish should these fish be introduced into the program.</p>	<p>The Service has the responsibility to and will thoroughly investigate potential stock sources to ensure our activities do not have a significant negative impact to the donor stock populations. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.</p>
91	<p>That life stages and methods of collection/transportation be best fitted to each system with practical elements such as access, weather, and timing be given full consideration before any recommendation is made. Deer Creek is largely a rugged and remote watershed and needs to be considered on an individual basis. Previous attempts at collection and transportation of fish from outside watersheds should be referenced when making decisions.</p>	<p>The Service agrees it is important that all potential donor stock populations be evaluated annually, and that the criteria are sound before developing the annual Donor Stock Collection Plan. These elements are included in the Application. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.</p>

92	That local landowners, agencies, and conservation groups be included in the decision making process that affects their watershed and be kept apprised of the proceedings throughout the duration of the project. These groups are by far the most familiar with the Deer Creek watershed and have strong working relationships. It is critical to the success of this project and to any other projects in the watershed that you utilize this local knowledge and expertise.	The Service agrees it is critical to the success and evolution of the SJRRP that everyone with a stake be involved if they choose to be. Therefore the Service and the SJRRP is continuing to do outreach to the local stakeholders and are participating in discussions to gather input and disseminate information as the process moves forward. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
93	While it appears that Mill and Deer Creek fish are effectively treated as one population for donor requirements, it is unclear whether or not they will be evaluated for having stocks stable enough to sustain donor losses on an individual or group basis. For example, if the minimum population is determined to be 500 fish for a number of years to be considered eligible to donate fish, these minimums need to be met for each creek rather than for both combined.	Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
94	That collection and distribution of donor fish be done in such a way that it minimizes or eliminates the waste of fish and funds. That donor fish and/or their offspring be released into a system that has adequate flows and habitat to facilitate their migration, spawning, and the rearing of juveniles. Until the system has met these requirements, wild stocks should not be used.	Any plans to use wild stocks of Chinook will incorporate risk assessment and appropriate mitigating measures to maximize survival and success.
95	Proposed quota criteria and collection methods are not protective enough of the donor stock since two of the primary proposed donor spring-run populations (Butte Creek and Mill/Deer Creek Complex) are within a federally Threatened ESU and, along with the third primary donor population (Feather River Hatchery), have recently declined to high risk of extinction.	If granted, the §10(a)1(A) permit will be held by the Service, and thus the responsibility to provide NMFS with assurance that the process proposed in the Application is adequate to determine donor stock populations are not negatively impacted. Also, the Interagency technical workgroups are made up of experts from the Service, NMFS, CDFG, Reclamation and DWR as well as local experts. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
96	Existing conditions in the San Joaquin River Restoration Area and areas downstream will not support the experimental population, and, until restoration is completed, even the proposed transport, culture, and release methods will not compensate for inadequate existing conditions.	The schedule for the channel and structural improvements are outlined in Paragraph 11(a) of the Settlement. The implementing agencies are evaluating the current habitat conditions of the San Joaquin River as well as the Settlement timeline. The anticipated short residency time of spring-run during the initial reintroduction and the several year lag prior to the initial adult returns provide greater flexibility in the completion of the restoration activities. The amount and quality of existing habitat may be sufficient to initiate the process of restoring salmonid populations.
97	Non-native predators, extant in the SJR, will predate juveniles from the experimental population and their progeny—the SJRRP should consider identifying/quantifying predators and implementing predator control strategies before introducing eggs and juvenile spring-run fish.	Further evaluation of the size, location, and potential for predation within the pools and at the in-river gravel excavation sites in the Restoration Area is anticipated. The acoustic telemetry study with fall-run juveniles completed in the spring of 2011, is currently being evaluated and will provide further insight into the current predation risks in the San Joaquin River. Subsequent studies will further evaluate this issue.



98	<p>Predation on juvenile salmonids, including the experimental population and their progeny, can be exacerbated by poor existing conditions in the San Joaquin River. If not predated prior to exiting the Restoration Area, juveniles from the experimental population and their progeny will be susceptible to high rates of predation in the lower San Joaquin River and Delta.</p>	<p>Further evaluation of the size, location, and potential for predation within the pools and at the in-river gravel excavation sites in the Restoration Area is anticipated. The acoustic telemetry study with fall-run juveniles completed in the spring of 2011, is currently being evaluated and will provide further insight into the current predation risks in the San Joaquin River. Subsequent studies will further evaluate this issue. The restoration of channel structures and fish barriers will be key in limiting the number of predator pools. This challenge will be thoroughly considered in the design of the structural modifications. If the timing of out-migrating juveniles from the San Joaquin River matches those of the out-migrating fall-run juveniles from the San Joaquin River tributaries (Merced, Stanislaus, etc.), this may induce a ‘swamping’ effect on the predators with a high prey density, thus enhancing the likelihood of higher individual survival.</p>
99	<p>Expected egg mortality rates are grossly underestimated, and water temperatures in the spawning reach will not support spring-run spawning or egg incubation.</p>	<p>Survival estimates are based on the best available science from the San Joaquin River Basin. Survival estimates were developed using available data and literature on extant populations of fall run in the San Joaquin Basin. A range of survival is given for each life stage to represent the variability present in those estimates. The program is an adaptive management framework and we will adjust our estimates as we receive new information. The estimate of 40% egg to emergent survival rates is based on the assumption that the spawning habitat would be enhanced in the Restoration Area to provide optimum survival rates. Adding clean gravel to construct spawning beds in the Project Area is a high priority action. The observed egg survival rate in newly placed gravel should be about 70% during the first few years and then decline to about 40% over time. So the estimate of 40% that was used in the application is conservative. Restoration flow releases during the fall (spawning and incubation) are anticipated to be of adequate temperature and volume to support these activities.</p>
100	<p>The possibility that high water temperatures, in combination with other factors such as poor survival through the Delta and in the ocean, may entirely preclude establishing a viable salmon population, has not been adequately addressed.</p>	<p>The hydrograph agreed to within the Settlement will mimic the historical flows of the San Joaquin River under which the historic San Joaquin River population of spring-run Chinook existed and thrived. The Service will continue to study and evaluate the flows regimes outlined in the hydrograph for successful reintroduction.</p>
101	<p>Climate change models have predicted scenarios of increased water temperatures in Central Valley rivers over the next 10 years; the reintroduction plan does not sufficiently consider the implications of these climate change scenarios on the experimental population or its progeny.</p>	<p>Climate change is an aspect of both NEPA and CEQA and will be part of that environmental analysis for the reintroduction. Although no specific studies focused on climate change are planned at this time, studies addressing the effects of climate change on this project may be conducted in the future.</p>



<b>102</b>	It has been proposed that salmon will adapt over time, but existing populations in the Stanislaus, Tuolumne, and Merced Rivers have had the opportunity to adapt over successive generations and are still struggling to persist.	The San Joaquin River was once home to the largest run of spring-run Chinook in the Central Valley of California. Spring-run persisted in large numbers below Friant Dam for years until the flows were curtailed and the river was disconnected. This supports the premise that spring-run can persist over time in a connected San Joaquin River.
<b>103</b>	Fall-run populations in the lower San Joaquin River are already experiencing declines for multiple reasons—and fish from these populations are not exposed to the additional challenges that spring-run will experience. Spring-run survival is expected to be even lower than fall run and would be unsustainable under the proposed reintroduction methods.	The Service is working to address challenges and concerns of fish survival through studies during the Interim Flow periods. Data from these studies will help inform future decisions. Additional text on on-going studies has been added to the Application.
<b>104</b>	Survival estimates used to predict potential returns are too high for every life-stage considered, and lack confidence intervals, and therefore the numbers being stocked will not produce the desired conservation goal.	Survival estimates were developed using available data and literature on extant populations of fall run in the San Joaquin Basin. A range of survival is given for each life stage to represent the variability present in those estimates. The program is an adaptive management framework and we will adjust our estimates as we receive new information.
<b>105</b>	Proposers are aiming for an eventual spring-run population of 500 fish in the SJR, but a population consisting of 500 fish still represents a moderate extinction risk.	The Service agrees a population of 500 fish still represents a moderate extinction risk. For our purposes the 500 returning adults is a minimum number but the overall Conservation Program goal is a naturally producing and self-sustaining population.
<b>106</b>	The extent and exact nature of much of the existing conditions in the San Joaquin River have not been quantified, and restoration is planned for after re-introductions have occurred. There are 37 studies planned to address unknown conditions in the San Joaquin River. We suggest that these studies, and adequate restoration actions to address needs identified in these studies, be conducted before introducing spring-run salmon.	Several of the planned studies have already begun prior to the reintroduction, for instance, the first juvenile survival and acoustic telemetry study was conducted in the spring of 2011, and the spawning gravel study (egg survival) will be begin in the fall of 2011.
<b>107</b>	Reintroduction of spring-run Chinook to the SJR, as well as SJRRP Restoration Flows, may negatively affect fall-run Chinook (FRCS) Essential Fish Habitat (EFH) in nearby tributaries, FRCS populations in the San Joaquin River and its tributaries, and federally Threatened Central Valley steelhead in the San Joaquin River or in proposed donor streams.	The hydrograph agreed to within the Settlement will mimic the historical flows of the San Joaquin River under which the historic San Joaquin River population existed and thrived.

<b>108</b>	Feather River hatchery (FRFH) introgression has been found to be a major threat to the genetic integrity of wild stocks, yet the SJRRP still included these stocks as an option for reintroduction.	Feather River Spring-Run stock has the highest genetic diversity of the three primary runs discussed in the foundation technical documents. However, this stock is known to have been affected by hybridization with fall-run Chinook at the Feather River Hatchery (Garza et al. 2008) and hybridization is ongoing (M. Lacy, pers. comm.). It is also likely that hybridization occurs in the spawning grounds of the lower Feather River. So, at least some of the additional genetic diversity seen in the Feather River stock is likely due to the addition of fall-run genes. It is also important to point out that, while this may be unfavorable for the maintenance of phenotypic differentiation, it also reduces the risk of inbreeding in a reintroduction project and the consequent reduction in fitness from inbreeding depression. Each of the three spring-run lineages has biological characteristics that might be favorable for a successful reintroduction project and each also has unfavorable characteristics. The Application has been developed both to address the genetic goals, but also ensure consideration for feasibility of donor stock collections. The genetic integrity goal is valid, but the realities of the donor stock status must be taken into account when developing each annual Donor Stock Collection Plan.
<b>109</b>	There is no consideration given to the potential for broodstock (mixed from various populations) to stray and spawn with natural populations (Butte, Mill, and Deer creeks) resulting in hybridization of the last remaining spring-run populations in the Central Valley.	Hybridization is defined as introgression of two species. The mixing of genetic material from the donor stocks may aid in the persistence of some donor stocks by increasing the genetic diversity of the population. A good example is the Butte Creek population which has gone through bottlenecks in its history and has very low genetic diversity. This low genetic diversity puts the population at a higher risk of extinction. Straying may lower extinction risk in some populations. However, Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
<b>110</b>	Document is not clear about how many fish or from where they will be taken.	Based on our continued interagency technical workgroups discussions and documentation, additional new and clarifying language has been added to the Application. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
<b>111</b>	The donor stock collection plan is not specific enough for 30 day response time.	Based on our continued interagency technical workgroups discussions and documentation, additional new and clarifying language has been added to the Application.
<b>112</b>	In the life of the permit the Appendix A criteria will prohibit take of Mill Creek and Deer Creek fish. So, why include them? If important for genetics, develop different criterion or take approaches, (e.g. eggs for broodstock maybe at year 6-7.)	The criteria listed in the permit application were cited to highlight that the populations under consideration are highly imperiled and that consideration of that will be used to determine numbers for collection from the stock to both meet the Conservation Facility goals and be protective of existing stocks. However, Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.

<b>113</b>	Donor stock collection plan process and Appendix A need to be tested. Then re-written for something that can be applied.	The Service and other Implementing Agencies are in the process of further refining and studying the criteria to aid in the annual donor stock collection decision. The Service has requested participation from many of the donor stream experts. Additional new and clarifying language has been added to the Project Description section within the Application. We agree and will test the validity of the process prior to implementation of the process. However, Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
<b>114</b>	The take criteria needs to be reworked, more justification and documentation is needed to justify the take levels. Why 15% of the population? How will you prove that it's 15% of populations when you don't know the pop. numbers before the run is over?	The September 29, 2010, Application stated that "If all of the above criteria are met, then the total approved numbers for collection will be scaled to no greater than 15 percent of the run. The percentage was based on the 2001, Broodstock Collection Plan for winter-run Chinook, as was permitted when winter-run numbers were extremely low and there were serious concerns about the viability of run. During recent discussion with NMFS the Service has agreed to remove this criterion from the Revised Application and Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
<b>115</b>	Make sure that all of the population numbers match up and are pertinent to the proposed study. The amount of numbers in the document are confusing.	Based on our continued interagency technical workgroups discussions and documentation, additional new and clarifying language has been added to the Application.
<b>116</b>	Put language into the document to exclude watersheds that cannot or will not be used due to your own exclusion criteria.	The Decision Matrix criteria suggested in Appendix A, of the September 2010, Application has been reevaluated and now outlines the importance of following the donor stock collection criteria to ensure there is minimal or no effect on the donor populations. Butte, Mill and Deer creeks are no longer being considered donor stock collection sources in the Revised Application.
<b>117</b>	The project description needs to be clearer, perhaps the project overview should be moved to the project description area.	Based on our continued interagency technical workgroups discussions and documentation, additional new and clarifying language has been added to the Application.

## 16. DEFINITIONS AND ACRONYMS

**AFRP:** Anadromous Fish Recovery Plan; The Central Valley Project Improvement Act (CVPIA) directed the Secretary of the Interior to develop and implement a program that makes all reasonable efforts to double natural production of anadromous fish in Central Valley streams. The program is known as the Anadromous Fish Restoration Program (AFRP).

**CDFG:** California Department of Fish and Game

**Conservation Stock:** Any individual Chinook, at any life stage which is physically in the possession of the salmon reintroduction team, (i.e. the fish has been collected from donor stock and is being transported to a hatchery or for direct release into the San Joaquin River, or is being held within a hatchery facility for rearing or for use as broodstock).

**Direct Release:** The release of any fish from any source directly into the San Joaquin River Restoration area.

**Donor Stock:** Includes any individual Chinook collected at any life stage, from any particular donor source stream.

**DSC Plan:** Donor Stock Collection Plan; The proposed annual formal request made to NMFS via the Service for donor stock collections then sent to DFG for concurrence.

**Broodstock:** Fish derived directly from Donor Stock which are raised to maturity from eggs, juveniles or unripe adults, and reared at the Conservation Facility. Offspring from the broodstock would eventually be released to the San Joaquin River.

**ECPMG:** Environmental Compliance and Permitting Working Group

**ESA:** Endangered Species Act. The law is administered by the Interior Department's U.S. Fish and Wildlife Service and the Commerce Department's National Marine Fisheries Service.

**ESU:** Evolutionarily Significant Unit: A sub-portion of a species that is defined by substantial reproductive isolation from other conspecific units, and represents an important component of the evolutionary legacy of the species.

**Experimental Population:** A geographically described group of reintroduced plants or animals that is isolated from other existing populations of the species. For the purposes of the SJRRP, any spring run Chinook released into the San Joaquin River restoration area is anticipated to be considered part of the experimental population.

**Experimental Stock:** Any group of salmon upon release into the San Joaquin River Restoration Project area is identified as experimental stock. These can be from Donor Stock (for translocations) or Conservation Stock (if transported or indirectly released from the hatchery)

**FMP:** Fisheries Management Plan

**FMWG:** Fish Management Working Group

**FRFH:** Feather River Fish Hatchery

**GrandTab:** A compilation of sources estimating the late-fall, winter, spring, and fall-run Chinook populations for streams surveyed. Estimates are based on counts of fish entering hatcheries and migrating past dams, carcass surveys, live fish counts, and ground and aerial redd counts. Estimates are provided by the California Department of Fish and Game, the US Fish and Wildlife Service, the California Department of Water Resources, the East Bay Municipal Utilities District, the Pacific Gas and Electric Company, and the Fisheries Foundation of California.

**HGMP:** Hatchery and Genetics Management Plan

**IEP:** The Interagency Ecological Program; a consortium of nine State and Federal agencies, has been monitoring aquatic organisms and water quality in the San Francisco estuary since about 1970.

**Indirect Release:** Refers to the release of fish from any rearing facility or structure into the San Joaquin River Restoration area. This may include the use of instream incubators like Whitlock-Vibert boxes.

**NMFS:** United States Department of Commerce, National Marine Fisheries Service.

**PMP:** (SJRRP) Program Management Plan

**PMT:** (SJRRP) Program Management Team

**RA:** (SJRRP) Restoration Administrator

**Relocation:** Any transport of Conservation Stock where the source and destination locations are fully protected pursuant to §7 of the ESA.

**Reintroduction:** Re-establishing a population or species to an area previously occupied by the species.

**RST:** Rotary Screw Trap

**SJRRP:** San Joaquin River Restoration Program

**Spring-running other:** Spring or summer in migrating adult fish found in streams or tributaries without an existing spring-run Chinook population.

**Surplus:** Fish remaining after the FRFH has met their production goals. Currently these surplus fish have been released back into the river, euthanized or allowed to die on site.

**Take:** A regulatory term within the ESA, as defined to mean: harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.

**Translocation:** The transport of Donor Stock directly to a release site within the San Joaquin River Restoration area.

**Service:** United States Department of the Interior, Fish and Wildlife Service



## Appendix 2: Responses to Comments on the Draft EA Table

The table below shows the response to comments received by NMFS. Comment letters are available for viewing at the SJRRP website: <http://www.restoresjr.net>

PC No.	Date Received	Sender	Type	Comments Addressed	Page No. of their correspondence	Response
PC01	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	The draft EA is dated April 2011	1	This is a typographical error which should have read April 2012. Final EA will be corrected to indicate date of issue.
PC02	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	The EA Evaluates Only Part of the Project Proposed by the USFWS in its 10(a)(1)(A) Permit Application in Violation of NEPA.	4	NMFS did not violate NEPA. The EA analyzes the possible impacts of the Proposed Action, which is to issue the permit with conditions. The proposed 10(j) and 4(d) rules are a separate action and are being analyzed in a different NEPA document. Since the 10(j) and 4(d) rules are not in place, NMFS has placed a condition on the permit that until these rules are promulgated, no salmon may be released. The EA only analyses the effects of the actions to be permitted under the proposed 10(a)(1)(A) permit.
PC03	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	NMFS Improperly Tiers off the Draft PEIS/EIR for the SJRRP	5	The proposed action of issuing the permit with conditions is not dependent on the SJRRP. The purpose of the proposed action will support the SJRRP, but also will fulfill recovery objectives for the species. The EA does not tier off of the Draft PEIS/EIR for the SJRRP. The EA incorporates by reference information from the Draft PEIS/EIR for the SJRRP per CEQ NEPA Regulations 40 CFR 1502.21. There is nothing in NEPA that states a draft document cannot be used as a source of information. The EA does use the Draft PEIS/EIR especially for descriptions of the affected environment. This information has been updated in the



						<p>Final EA based on the changes and responses to comments in the Final PEIS/EIR. NEPA section 1502.21 states that: “Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data which is itself not available for review and comment shall not be incorporated by reference.. Thus, because the Final PEIS/EIR is completed and the ROD has been signed, the Final EA is consistent with NEPA.</p>
PC04	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	<p>NMFS Has Made an Irretrievable Commitment of Resources in Violation of NEPA</p> <p>The issuance of the 10(a)(1)(A) permit authorizing the USFWS to begin collecting SRC salmon eggs and juveniles to establish broodstock methodologies and to initiate release of SRC salmon to the San Joaquin River is an irretrievable commitment of resources...</p>	8	<p>The issuance of the permit is not an irretrievable commitment of resources. As developed the proposed action is the collection of eggs and juveniles to develop broodstock of spring-run Chinook. The issuance of the permit is a scientific action, independent of the SJRRP. The collection of, and movement of eggs and fish over long distances will gather useful information that can be used in NMFS implementation of the Draft Recovery Plan for spring-run Chinook (NMFS 2009a).</p> <p>While the information will also be beneficial to the reintroduction efforts of the SJRRP the issuance of the permit is valuable whether the SJRRP</p>

						<p>goes toward or not. Per 40 CFR 1503.2(f) NMFS did not commit resources that would prejudice making a final decision on issuance of the 10(a)(1)(A) permit.</p> <p>It is appropriate to focus environmental analyses on discrete actions where, as here, the authorizing statute calls for clearly delineated and limited steps. <i>See, e.g. Tribal Village of Akutan v. Hodel</i> 869 F.2d 1185 (9th Cir. 1989), <i>Conner v. Burford</i>, 848 F.2d 1441 (9th Cir. 1988), <i>Village of False Pass v. Clark</i>, 733 f.2d 605 (9th Cir. 1984). The relevant question for the required scope of analysis is whether an action is at the go/no go threshold. <i>See</i> 40 C.F.R. 15025(a); <i>Conner v. Burford</i>, 848 F.2d at 1446. This proposed permit issuance will not authorize release of spring run Chinook into the San Joaquin River. The only irretrievable commitment of resources at this point is for the gathering and management of captive broodstock. Testing or perfecting broodstock management methods is a stand-alone action that does not require release of the fish. Release will not be authorized until an experimental population is designated and after evaluation of criteria required under Section 10(j), at which point any necessary supplemental analysis will be undertaken.</p>
PC05	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	NMFS Has Improperly “Segmented” the Environmental Analysis of the Reintroduction of Spring-Run Chinook Salmon to the San Joaquin River in Violation of NEPA.	10	NMFS has not segmented the analysis of the reintroduction of spring-run Chinook salmon to the San Joaquin River. The proposed 10(a)(1)(A) permit is to specifically address brood

					<p>stock development and testing of transportation, handling, and rearing techniques. These actions have conservation value for spring-run Chinook, whether or not the fish are released. CEQ regulations at 40 CFR 1508.25(a)(1) describe connected actions, which “are closely related and therefore should be discussed in the same impact statement. Actions are connected if they</p> <ul style="list-style-type: none"> <li>(i) Automatically trigger other actions which may require environmental impact statements.</li> <li>(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.</li> <li>(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.”</li> </ul> <p>Furthermore “Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement” (40 CFR 1502.4(a)).</p> <p>We may use these criteria for connected actions to determine whether the issuance of the 10(a)(1)(A) permit and the 10(j) and</p>
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					<p>4(d) rules can be construed a single major Federal action.</p> <p><u>Does either action “automatically trigger” implementation of the other?</u> Nowhere in either proposal is there a mechanism that triggers implementation of the other action.</p> <p><u>Would it be impossible to implement either action if the other were not implemented? NMFS can issue the 10(a)(1)(A) permit without the 10(j) and 4(d) rules. If the 10(a)(1)(A) permit was not issued, NMFS could still designate an experimental fish population under 10(j) and establish a 4(d) rule.</u></p> <p><u>Are the two actions so interdependent as to rely on each other for their justification?</u> The issuance of the 10(a)(1)(A) permit does not flow from the fact that the 10(j) or 4(d) rules would be established. The proposed 10(a)(1)(A) permit is to specifically address brood stock development and testing of transportation, handling, and rearing techniques. These actions have conservation value for spring-run Chinook, whether or not the fish are released. Furthermore, NMFS may establish the 10(j) and 4(d) rules without issuance of the 10(a)(1)(A) permit. The issuance of the 10(a)(1)(A) permit would meet some of the goals of the Settlement agreement and also further the goals of the Draft Recovery Plan (NMFS 2009a). Although NMFS does not have its own specific NEPA</p>
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					<p>regulations on this subject the issuance of this permit if the test used by the U.S. Army Corps of Engineers for Nation Wide permits (Federal Register / Vol. 67, No. 10 / Tuesday, January 15, 2002 / Notices) the Proposed Action meets the criteria for “independent utility” the test for which is “Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.” The Proposed Action meets this criterion in that the permit as conditioned by NMFS could be issued and carried out absent the implementation of other projects in the project area (i.e. the SJRRP).</p> <p>It is appropriate to focus environmental analyses on discrete actions where, as here, the authorizing statute calls for clearly delineated and limited steps. <i>See, e.g. Tribal Village of Akutan v. Hodel</i> 869 F.2d 1185 (9th Cir. 1989), <i>Conner v. Burford</i>, 848 F.2d 1441 (9th Cir. 1988), <i>Village of False Pass v. Clark</i>, 733 f.2d 605 (9th Cir. 1984). The relevant question for the required scope of analysis is whether an action is at the go/no go threshold. <i>See</i> 40 C.F.R. 15025(a); <i>Conner v. Burford</i>, 848 F.2d at 1446. This proposed permit issuance will not authorize release of spring run Chinook into the San Joaquin River. The only irretrievable commitment of resources at this point is for the gathering and management of captive broodstock. Testing or perfecting broodstock management methods is a</p>
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						stand-alone action that does not require release of the fish. Release will not be authorized until an experimental population is designated and after evaluation of criteria required under Section 10(j), at which point any necessary supplemental analysis will be undertaken.
PC06	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	The EA Fails to adequately assess the potential impacts of accidental or volitional releases of SRC salmon to the San Joaquin River from Incubators and Holding Pens.	16	This EA is not permitting the volitional release of spring-run Chinook salmon. The permit conditions as proposed in the Final EA have been revised and no longer include the use of net pens placed in the river or stream side incubators. This permit is strictly for collection, transport, rearing, and actions associated with off-stream hatchery facilities and the HGMP.
PC07	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	The EA Fails to Assess the Potential Impacts on Collected Spring-run Chinook Salmon if the Issuance of the 10(j) Rule is Delayed.	17	Given the condition that no salmon could be released until the 10(j) Rule is in place the number of eggs collected would be limited to the broodstock. As set out in the 10(a)(1)(A) permit, broodstock could be held at the Conservation Hatchery Facility up to five years. In addition the proposal is for collection of only hatchery fish, and collections will only take place if and when the Feather River Hatchery has determined that they have enough to reach their production goals. No wild fish will be collected so there is no impact to wild spring-run Chinook. Since the broodstock could be held up to five years it is more than likely that the 10(j) rule would be in place before any holding problems would occur to the collected fish. Therefore the potential impacts to the collected spring-run Chinook would not be

						significant.
PC08	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	The EA Fails to Take Into Account the Inadequate Funding for the Activities Authorized by the 10(a)(1)(A) permit.	17	<p>Funding has been clearly outlined as being provided by the Department of Interior and the California Department of Fish and Game in the permit application.</p> <p>The collection of spring-run Chinook from the FRFH are surplus fish and eggs. As surplus these do not “exist” in the FRFH’s population. If funding for the SJRRP or the Conservation Hatchery Facility were for some reason not to proceed, these fish could die, or if large enough, be donated for charitable consumption. However, as they are surplus they have no impact on the population of spring-run Chinook in the Sacramento River Basin. There would be no significant effect to the spring-run Chinook if there were a change in funding.</p>
PC09	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	Letter	Page 1-2. The EA states that “prior to implementation of the restoration program for the San Joaquin River, an analysis of the potential environmental effects was prepared in accordance with the National Environmental Policy Act and the California Environmental Quality Act.” The EA goes on to state that a “Program Environmental Impact Statement/Environmental Impact Report (Draft PEIS/EIR (Reclamation, 2010)) was prepared that evaluated the potential direct, indirect, and cumulative impacts on the environment at a program level that could result from implementing the Settlement consistent with the Settlement Act.” These statements are incorrect. First, the draft PEIS/EIR was issued in April 2011, not April 2010. To date, a final EIS/EIR for the SJRRP has not been certified. Second,	18	<p>The text of the Final EA will be changed from April 2010 to April 2011.</p> <p>Text in the Final EA has been edited and is shown in response PC19.</p> <p>As to the listing of other activities prior to the certification of the PEIS/EIR the comment refers to topics outside of the scope of this EA.</p> <p>The proposed 10(a)(1)(A) permit is to collect and transport broodstock as a pilot and methods program. It is not dependent on the SJRRP. While the permit can and likely will provide valuable information that would benefit the SJRRP, the information</p>

				implementation of the SJRRP began prior to preparation of an analysis of the potential environmental effects of the restoration program in violation of NEPA. Examples of such actions to implement the SJRRP include the release of interim flows during Water Years 2010, 2011 and 2012; the recapture and recirculation of these flows to Friant contractors; the drilling of monitoring wells; and the release of fall-run Chinook salmon into the San Joaquin River.		gathered will also benefit the activities of NMFS's Draft Recovery Plan for spring-run Chinook. See response PC05 on the independent utility of the Proposed Action.
PC10	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	Page 1-3. The EA states "until such time as the 10(j) rule is in place, no fish collected under this permit or placed in any pens may be released to the San Joaquin River. The 10(j) Rule will require its own NEPA analysis, including an analysis of the potential impacts on the human environment of reintroducing spring-run Chinook into the San Joaquin River." The EA consistently but incorrectly refers to issuance of a "10(j) rule," when, in fact, the Act intends the designation of the SRC salmon reintroduced to the San Joaquin River pursuant to section 10(j) of the ESA and the subsequent promulgation of a rule pursuant to section 4(d) of the ESA governing the incidental take of the reintroduced SRC salmon.	19	Section 10 (j)(2)(B) of the ESA requires that the designation of an experimental population is done by regulation and therefore is a rule. The action pursuant to 10(j), designating an experimental population, is achieved by the rulemaking process. The action of developing take exemptions pursuant to ESA section 4(d) is also a rulemaking process.
PC11	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	Pages 4-1–4-2. Sections 4.1 and 4.2 of the EA contains the analysis of environmental consequences on hatchery facilities and water quality associated with the use of the FRFH, the Silverado Fisheries Base near Yountville, California or the Center for Aquatic Biology and Aquaculture ("CABA") in Davis, California. As background, Section 3.3 states that the Silverado and CABA facilities are proposed to be used to quarantine juveniles and eggs collected from the FRFH. However, the 10(a)(1)(A) Permit	19	NMFS has established the condition for this permit that no fish will be placed in the San Joaquin River. So the plan for direct translocation to the San Joaquin River will not occur. Under the conditions established the number of fish collected will be for broodstock only.  The conditions will limit the amount of eggs or juveniles Silverado and CABA may hold as an alternative site.



				<p>Application states that if the FRFH is unable to rear eggs to the juvenile stage that individual fish will be transferred to the Silverado facility for rearing and quarantine. In a later section (Section 5.7 Rearing Facilities), the 10(a)(1)(A) permit application states that “in the event the currently proposed Interim Facility is unavailable for holding fish, the contingency plan is to: (1) focus on the direct transfers to the San Joaquin River (as described elsewhere in this document) without use of the Interim Facility; (2) utilize the Center for Aquatic Biology Aquaculture facility at University of California at Davis or; (3) Allow fish to remain at the Feather River Fish Hatchery facilities.” From these pages it appears that under the USFWS’ proposed action, Silverado, CABA and the FRFH might be used as backup facilities to rear juvenile SRC salmon for the reintroduction program under the 10(a)(1)(A) permit. Because the EA does not mention the use of these facilities as potential rearing facilities, it is unclear whether the analysis in Sections 4.1 and 4.2 of the EA assess the potential impacts on hatchery operations and water quality of using these facilities for rearing.</p>		<p>The two facilities will not require any changes to their structures or operations so there will be no impact to the facilities or water quality.</p>
PC12	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	<p>Pages 4-2–4-3. Instead of actually analyzing the potential effects of the Interim Facility, the Conservation Facility (sic) or the use of holding pens in and adjacent to the river on water quality in the San Joaquin River, the EA circularly concludes that the proposed action would not have a significant effect on water quality because the discharge permits issued for the facilities and holding pens would contain permit conditions requiring that discharges from either the facility or holding pens will not adversely affect ambient water quality. Without further evidence or analysis, the EA fails to provide</p>	19	<p>NMFS has established as part of conditions of approval of the 10(a)(1)(A) that fish will not be placed in the San Joaquin River so the use of holding pens will not occur. Therefore no impacts to water quality from the use of pens will occur.</p> <p>Additional information from the 2010 Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement has been incorporated into the Final EA. This document includes</p>

				<p>sufficient evidence and analysis for determining whether the proposed action will have a significant impact on water quality in the San Joaquin River.</p>		<p>data as to the discharges that have occurred and determined the potential impacts to water quality. Based on the findings in the Hatchery and Stocking EIR/EIS the potential impacts to water quality will be less than significant. (Section 4.2 Water Quality page 4-2 and Section 4.3.2.2 San Joaquin River Effects page 4-3)</p> <p>In addition, NMFS checked with the Regional Water Quality Control Board about enforcement actions for the hatcheries that may be used and found that none of these hatcheries has been in any enforcement action.</p> <p>As to whether the issuance of discharge permit would result in less than a significant impact to water quality the commentor is correct: the issuance of the permit does not reduce the potential impact, it is the hatchery's adherence to those permits that would insure water quality. The Final EA will clarify that: discharge permit conditions established for the hatchery activities would require that discharges from either facility will not adversely affect ambient water quality. Any variance in the discharge from those levels established by the permit would have to be addressed by the hatcheries and confirmed by RWQCB. Therefore, under the proposed action the operation of the facilities would not have a significant effect on water quality.</p>
PC13	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	<p>Page 4-3. Section 4.3.2.2 analyzes the effects of the proposed action on the San Joaquin River. Regarding genetic diversity, the EA states "[t]he Permit includes methodology to</p>	19	<p>The plan is to establish a conservation hatchery facility broodstock using the preferred method of selecting for genetic diversity. The intent of the</p>

				<p>enhance the genetic diversity of the hatchery crosses collected and to ensure that the crosses are from adults who are second generation phenotypic spring-run Chinook.” While this is the method laid out generally in section 5.2.1 of the 10(a)(1)(A) Permit Application, with regard to collection of juveniles, the permit application also states “if the Program is unable to segregate fish during the egg lifestage, then the Program will collect spring-run juveniles from all available raceways” by random collections “guided by the number of fish in each raceway, the size of the fish, and the number of different families (i.e., crosses) in each raceway.” This methodology does not appear to preferentially select for juveniles who meet the criteria of second generation phenotypic SRC salmon. The EA does not analyze the potential impacts of the collection and use of such juveniles on the population in the program to reintroduce SRC salmon to the San Joaquin River, and in particular as founding broodstock.</p>		<p>application is to establish a broodstock that maximizes genetic diversity. The preferred method for collection is taking crosses from adults who are second generation phenotypic spring-run Chinook. If the preferred method of collection is not attainable, then USFWS proposes random selection from spring-run crosses as the next best available method for collections.</p> <p>Although the alternative method of selection would not meet the two generation criteria, these eggs would still be categorized as spring-run Chinook by FRFH definition. They can also be genetically typed when the fish that hatch from the eggs have grown large enough. As conditioned, the permit in hand is for a captive broodstock, transport, and handling methods program. This permit does not permit release of fish.</p> <p>Analysis of use of this broodstock as the founding stock for the San Joaquin River population will be included in the documentation on the release of spring-run Chinook, if and when that action is allowed.</p>
PC14	5/21/2012	Thomas Berliner (DuanneMorris Law Firm)	letter	<p>Page 4-4. There is no evidence or analysis supporting the conclusion that since the emissions of greenhouse gases (“GHG”) for the Proposed Action would be substantially lower than the 25, 000 mtCO<sub>2</sub>e threshold, the impacts to Climate Change from GHG emissions of the Proposed Action would be less than significant.</p>	19	<p>The Final EA includes a table showing the likely CO<sub>2</sub> emissions generated by transportation of fish over the five year period would be approximately 2 10<sup>th</sup>s of one percent of the yearly 25,000 tMCO<sub>2</sub>e threshold.</p> <p>Even considering the operational emissions of the hatcheries the impact of the Proposed Action would be less than significant.</p>
PC15	5/21/2012	Thomas Berliner	letter	<p>Pages 5-1–5-3 (Cumulative Impacts</p>	19	<p>Text has been added discussing the</p>

		(DuanneMorris Law Firm)		Analysis). NEPA and CEQ regulations require an analysis of cumulative impacts. “Cumulative Impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” The EA tiers off of the assessment of the broader programmatic potential cumulative impacts analysis in the Draft PEIS/EIR. However, it provides no analysis of the potential cumulative impacts in light of the USFWS’ actual proposed action as described in the 10(a)(1)(A) Permit Application. Instead, the EA summarily states that “[f]or the most part the potential Cumulative Impacts of the Proposed Action itself would negligible on spring-run Chinook or on other resources discussed in this document.” For example, it makes no analysis of the cumulative impact on water quality, air quality, fisheries or the San Joaquin River of the proposed action in light of the planned development of Interim Facilities at the San Joaquin State Fish Hatchery and construction and operation of the Conservation Facility on the San Joaquin River.		potential cumulative impacts of the Proposed Action to water quality, air quality and fisheries. Since the Proposed Action does not include any release of fish into the San Joaquin River the discussion of potential future impacts resulting from the release of spring-run Chinook may have impacts but are subject to specific environmental review at the time that the 10(j) and 4(d) rules are established. The EA does not tier off of the Draft PEIS/EIR for the SJRRP. The EA incorporates by reference information from the Draft PEIS/EIR for the SJRRP per CEQ NEPA Regulations 40 CFR 1502.21.
PC16	5/21/2012	San Luis & Delta-Mendota Water Authority	Letter	The Authority is concerned that NMFS, and the other federal agencies involved, have not yet addressed how they will ensure that the reintroduction of Spring-Run Chinook Salmon (SRCS) to the San Joaquin River does not adversely affect operations of the Jones Pumping Plant located in the south Delta	2	The comment is related to the reintroduction of spring-run Chinook. Since no salmon will be reintroduced until the 10(j) and 4(d) rules are in place the comment is beyond the scope of this EA.
PC17	5/21/2012	San Luis & Delta-Mendota	letter	The Authority is very concerned that the 4(d) rule will not cover Delta pumping operations	2	This EA does not analyze the potential impacts of the 4(d) rule, and does not

		Water Authority		and reintroduction will expose diversions at the Jones Pumping Plant to even greater restrictions than exist currently		permit the release of spring-run Chinook. A separate EA is being prepared by NMFS to analyze the impacts of implementing both 10(J) and 4 (d) rules for the reintroduction of spring-run Chinook to the San Joaquin.
PC18	5/21/2012	Friant Water Authority	letter	Page 1-1, line 22: indicate that the Friant Water Authority has assumed the obligations of FWUA in the Settlement. [FWUA no longer exists.]		Final EA reads: On September 13, 2006, the Settling Parties, including NRDC, Friant Water Users Authority [now the Friant Water Authority (FWA)], and ...
PC19	5/21/2012	Friant Water Authority	letter	Page 1-2, lines 24 – 26: This sentence is not accurate. Implementation of the Settlement by the Implementing Agencies began in FY 2007. See the SJRRP 2007 Annual Report ( <a href="http://www.restoresjr.net/program_library/01-General_Outreach/Annual%20Report_Final2_012808.pdf">http://www.restoresjr.net/program_library/01-General_Outreach/Annual%20Report_Final2_012808.pdf</a> ). To our knowledge, there was no analysis under NEPA or CEQA prior to these initial implementation activities.		Final EA changes the sentence FROM: Prior to implementation of the restoration program for the San Joaquin River, an analysis of the potential environmental effects was prepared in accordance with the National Environmental Policy Act and the California Environmental Quality Act. TO: The SJRRP has prepared an analysis of the potential environmental effects in accordance with the National Environmental Policy Act and the California Environmental Quality Act
PC20	5/21/2012	Friant Water Authority	letter	Page 2-1, lines 13-14 (“...order to establish a viable population by the year 2025 as required by the Settlement.”): The term “viable” is not used in the Settlement to describe the population of spring run Chinook salmon that is to be established. Rather, the Settlement establishes certain parameters (“self-sustaining naturally reproducing” etc.). It is not clear to us whether “viable” and other new terms used in this permit are intended to have the same meaning as the terms the Parties (including NMFS) agreed to when they signed the Settlement. To the extent there is any		Final EA changes the sentence FROM: While occasional individuals would potentially stray into the San Joaquin River when river conditions may be suitable, it is unlikely that sufficient numbers would concurrently stray in order to establish a viable population by the year 2025 as required by the Settlement. TO: While occasional individuals would potentially stray into the San Joaquin River when river conditions may be

				conflict between what the parties agreed to in the Settlement and what is proposed in the permit, the terms of the Settlement must prevail.		suitable, it is unlikely that sufficient numbers would concurrently stray in order to establish a naturally reproducing and self-sustaining population by the year 2025 as required by the Settlement.
PC21	5/21/2012	Friant Water Authority	letter	Page 5-3, second full paragraph (line numbers are not provided): "...an experimental population designation could lead to improved conditions for fish habitat more quickly because of the incentive for public and private entities to implement the conservation measures during a period of limited take liabilities, when compared to conservation efforts without such a designation." The use of the terms "conservation measures" and "conservation efforts" should be explained. Those terms do not seem to be used elsewhere in the document.		This paragraph has been removed from the Final EA.
PC22	5/21/2012	State Water Contractors	e-mail	The EA contains an inadequate analysis of the potential effects of the collection of eggs and juveniles from the FRFH on Feather River SRC salmon and the Central Valley spring-run Chinook salmon Evolutionarily Significant Unit ("ESU").	2	As stated in the EA the collection of eggs and juveniles would be from eggs and/or juveniles in excess of their hatchery production goals. Their collection will not have a negative impact to the Feather River spring-run population because those fish would not contribute to the population. The Feather River Fish Hatchery typically disposes of excess adult salmon by releasing them back into the river, euthanizing them or allowing them to die on site (page 3-2 lines 4-7 of Final EA).
PC23	5/21/2012	State Water Contractors	e-mail	The analysis does not appear to consider is the amount of "surplus" fish that meet the more rigorous collection criteria of the 10(a)(1)(A) permit which includes, among other criteria, a preference for eggs and juveniles that are two-generation spring-run phenotypes. <sup>10</sup>	2	For clarification, the permit allows collection of eggs that are in excess of FRFH production goals. The amount of eggs to be collected for broodstock will be 2,760 eggs. This amount is very small when considering that one female spring-run Chinook produces an average of approximately 4,000

						eggs and the FRFH propagates over 2 million eggs annually. The criteria include a preferred selection process and another process if the preferred method is not available for use. Please refer to the response to comment PC13 that addresses the preference criteria. All eggs collected under this permit will be in excess of FRFH production goals. These fish are not needed to meet the Feather River Fish Hatchery's production numbers or the Feather River spring-run Chinook population.
PC24	5/21/2012	State Water Contractors	e-mail	The EA never actually applies the general discussion of climate change impacts to fish populations in California or specifically to the cumulative impacts on SRC salmon and the ESU	3	On page 5-3, the Final EA includes the following to discuss climate change impacts to fish populations: Although the Proposed Action would not reintroduce spring-run Chinook the cumulative effect of reintroduction of spring-run Chinook to the San Joaquin River could be beneficial given the vulnerability of the existing populations of spring-run Chinook. In addition to being beneficial to the species as a whole, with the potential impacts to spring-run Chinook from climate change, reintroduction to the San Joaquin River could be beneficial as refugia. The waters of the San Joaquin River start at higher elevations and it therefore possible that even with reduced snow pack the waters generated would be cooler for longer periods than the existing spring-run Chinook bearing streams in the Sacramento River Basin.
PC25		CA Department of Fish and Game	excel e-mail	Clarification is needed on this section: Eggs would not be sent to the Interim/Conservation Facility. Eggs would be sent to quarantine, where they will be hatched. Hatched fish would then be moved	Chapter 2.1, page # 2-1, line# 24	The 10(a)(1)(A) permit final EA will show that any eggs or juveniles that are to go to the interim or final Conservation Hatchery Facility must go through quarantine. No direct

				to the Interim/Conservation Facility. If the broodstock 'take' (i.e. 560 eyed eggs) will be used for streamside investigation prior to being used as potential broodstock, then the eyed eggs would not have to go through quarantine IF they are taken from virus/pathogen free females. Before fish are brought into the Interim/Conservation Facility they MUST go through quarantine.		transfers from hatchery to hatchery are allowed.
PC26		CA Department of Fish and Game	excel e-mail	It should be noted that eggs to be collected for broodstock and translocation will be eggs in the eyed stage or "eyed eggs".	Chapter 2.1, page # 2-1, line# 24	This change will be made for broodstock only. No translocation will occur with this permit as proposed in the Final EA.
PC27		CA Department of Fish and Game	excel e-mail	Replace "net pen" with "holding pen"	Chapter 2.1, page # 2-1, line# 31	The Permit as proposed in the Final EA does not include the use of net or holding pens. This reference has been removed from the Final EA.
PC28		CA Department of Fish and Game	excel e-mail	The quarantine/pathology for eggs and juveniles for direct translocation should be clarified. Direct translocations of eyed eggs do not have to go through quarantine IF they are taken from virus/pathogen free females. If we are using juveniles for direct translocation then they HAVE to go through quarantine. Even if the 'take' occurred as eyed eggs from virus/pathogen free females, but movement of the individuals occurred at the juvenile life stage (i.e. hatched and reared at FRFH/Silverado) then the fish will still have to go through quarantine.	Chapter 2.1, page # 2-1 & 2-2 line# 38/1	This comment is not pertinent for the permit as proposed in the Final EA will not allow direct translocation of fish.
PC29		CA Department of Fish and Game	excel e-mail	Fry should be replaced with juvenile for clarification.	Chapter 2.1, page # 2-2, line# 11-13	The reference to fry will be changed to juvenile.
PC31		CA Department of Fish and Game	excel e-mail	Replace "net pens" with "holding pens"	Chapter 2.1, page # 2-2, line# 24	The Permit as proposed in the Final EA does not include the use of net or holding pens. This reference has been removed from the Final EA.
PC31		CA Department of Fish and Game	excel e-mail	2014 should be replaced with 2015	Chapter 3.4.2, page # 3-6, line# 11	This comment is incorrect. The original text is not changed.
PC32		CA Department	excel	We recommend changing the language of the	Chapter 4.3.2.1,	Permit as proposed in the Final EA



		of Fish and Game	e-mail	referenced section to: As proposed, the 10(a)(1)(A) will permit the collection of 80,000 surplus <b>eyed</b> eggs or 54,400 surplus juveniles from the FRFH <b>for direct translocation</b> , along with up to 2,760 (560 in years 1-3, and 2,760 in years 4-5) surplus juveniles or eyed eggs <b>for broodstock</b> .	page # 4-2, line# 30-32	will not permit translocation to the river. This reference to translocation has been removed from Final EA.
PC33		CA Department of Fish and Game	excel e-mail	Delete "80,000" from sentence.	Chapter 4.3.2.1, page # 4-2, line# - 32-33	Deleted.
PC34		CA Department of Fish and Game	excel e-mail	We recommend the language in the referenced section be re-written to reflect that this document will not analyze the release of these fish, but they may be released at some point into the San Joaquin River.	Chapter 4.3.2.1, page # 4-3, line# 4-5	Final EA reflects this change.
PC35		CA Department of Fish and Game	excel e-mail	We recommend changing the language in the referenced section to: However, given the methodologies for collection, handling, transporting, and fish health inspections for eggs or fish prior to relocation to the Conservation/Interim Facility, the potential effects related to the introduction of disease to the existing populations would not be significant. All eggs will be collected from Infectious Hematopoietic Necrosis Virus (IHNV) and Bacterial Kidney Disease (BKD) negative females. All transfers to the Conservation/Interim Facility must go through quarantine.	Chapter 4.3.2.1, page # 4-3, line# 18-26	No relocation will occur. Deleted from EA.
PC36		CA Department of Fish and Game	excel e-mail	Benessa Espino should be added to CDFG's list. She is our Environmental Compliance and FRRT lead.	Section 8.1, page # 1/8 - 1	Ms. Espino has been added.
PC37		CA Department of Fish and Game	excel e-mail	The deep matrix is a streamside incubator not an in stream egg chamber. Move the deep matrix incubator language to the streamside incubator section.	Appendix 8.1, A-1 -A -2	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC38		CA Department of Fish and	excel e-mail	All "net pen/s" should be changed to "holding pen/s," since net pens sound like we	Appendix 8.1, General	Since the use of pens, streamside or in stream will not be permitted Appendix

		Game		be using a net material, but that won't always be the case.		1 Incubator and holding pen types has been deleted from EA.
PC39		CA Department of Fish and Game	excel e-mail	Second to last sentence, change to: "Eggs will be placed on top of the <b>perforated</b> screen plate."	Appendix 8.1, A-3	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC40		CA Department of Fish and Game	excel e-mail	Last sentence should read: "be 6 to <b>12</b> inches deep."	Appendix 8.1, A-3	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC41		CA Department of Fish and Game	excel e-mail	Insert "perforated" in front of both references to "screen plate."	Appendix 8.1, A-4	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC42		CA Department of Fish and Game	excel e-mail	Section "Net Pen Operations" should be replaced with "In stream Holding Pen Operations"	Appendix 8.1, A-4	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC43		CA Department of Fish and Game	excel e-mail	Under Net Pen Operations section, add "rear fish large enough to tag" to first sentence.	Appendix 8.1, A-4	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC44		CA Department of Fish and Game	excel e-mail	Under Net Pen Construction, first sentence, add "or be constructed of other suitable material" to end of sentence.	Appendix 8.1, A-4	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC45		CA Department of Fish and Game	excel e-mail	Under Net Pen Construction, second sentence, change "39 inches" to "36 inches," and change "1m by 1m by 1m" to "1 yd by 1 yd by 1 yd" (the guys used a yard stick to measure/build the holding pens)	Appendix 8.1, A-4	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.
PC46		CA Department of Fish and Game	excel e-mail	Under Net Pen Construction, last full sentence, add "or solid screen material" to end of sentence.	Appendix 8.1, A-4	Since the use of pens, streamside or in stream will not be permitted Appendix 1 Incubator and holding pen types has been deleted from EA.

**Finding of No Significant Impact for Issuance of a Section 10(a)(1)(A) Permit for Collection and Transport of Spring-run Chinook Salmon for the San Joaquin River Restoration Program**

The National Oceanic and Atmospheric Administration Administrative Order 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. §1508.27 state that the significance of an action should be analyzed both in terms of “context” and “intensity.” Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQs context and intensity criteria. These include:

1) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?

Response: No. The proposed action is the issuance of a permit to the US Fish and Wildlife Service (USFWS) to collect eggs and/or juvenile spring-run Chinook salmon (spring-run Chinook) from the Feather River Fish Hatchery (FRFH), located near Oroville, California, for use in testing methods of collection, handling, transportation, rearing, and developing a broodstock program in a facility located on the San Joaquin River, near Friant Dam. The conditions placed on the permit include that no fish will be released into the San Joaquin River unless an experimental population is established on the San Joaquin River in accordance with section 10(j) of the Endangered Species Act (ESA) and associated take exceptions are established under a 4(d) rule. NMFS has determined that the proposed action will not cause any damage to ocean and coastal habitats or to any essential fish habitats as defined under the Magnuson-Stevens Act and identified in FMPs.

2) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: No. Although spring-run Chinook are listed as a threatened species, the collection of eggs or juveniles will be from excess hatchery stock. These fish are not needed to meet the FRFH’s production numbers or the Feather River spring-run Chinook population. The use of hatchery fish reduces the possibility of having any impact to other spring-run Chinook, or to other fish within the Sacramento River Basin. (Note: please see response to question 4) Therefore, the proposed action will not have a substantial impact on biodiversity. As conditioned, the proposed action will not permit the release of the collected fish and the interaction with the San Joaquin River Basin will be primarily limited to the non-consumptive use of San Joaquin River water at the San Joaquin Fish Hatchery. Hatchery discharges will incur no impacts to water quality. Disease prevention methods are included in the permit. Therefore, the proposed action will not have a substantial impact ecosystem function within the affected area.

3) Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?

Response: No. The proposed action does not concern or address human public health and safety issues.

4) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

Response: No. NMFS has reviewed the potential adverse effects of the proposed action on endangered and threatened species and their critical habitat through consultation under Endangered Species Act section 7. This consultation resulted in a biological opinion (Opinion), in which NMFS determined, after reviewing the best available scientific and commercial information, the current status of Central Valley spring-run Chinook salmon, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects that the issuance of Permit 14868, as amended, is not likely to jeopardize the continued existence of the aforementioned listed species and is not likely to destroy or adversely modify designated critical habitat. Critical habitat for this species has been designated in the Sacramento River, however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated. The permit allows collection of fish that would not otherwise contribute to existing spring-run Chinook populations. The permit does not allow release of these fish, and discharges from the hatchery facilities will not degrade water quality or impose adverse disease risk, so there will be no effect on endangered or threatened species, their critical habitat, marine mammals, or other non-target species

5) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: There are no significant social or economic impacts interrelated with natural or physical environmental effect.

6) Are the effects on the quality of the human environment likely to be highly controversial?

Response: No. Although the proposed action is controversial in that it can support the larger San Joaquin River Restoration Program (SJRRP) which would have effects on the quality of the human environment, the proposed action itself is a separate and independent action not thought to be highly controversial.

7) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

Response: No. The proposed action would not impact cultural or historic resources, park land, prime farmlands, wetlands, or ecologically critical areas.

8) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: No. NMFS determined that the effects of the proposed action would not have any effect on the human environment and that none of these effects would be highly uncertain or involve unique or unknown risks.

9) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: No. The proposed action is the collection of eggs and/or juveniles for study on culturing and transportation methods which is a separate independent action from the projects of the SJRRP. Cumulatively, the issuance of the permit could play a part in the reintroduction efforts to return spring-run Chinook to the San Joaquin River within the SJRRP. The proposed action would not permit the release of spring-run Chinook so does not have any impact on the human environment. NMFS concludes the proposed action will not result in individual or cumulative significant impacts to the human environment over the five years of the permit's life.

10) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

Response: No. NMFS has determined that there would be no adverse effects to districts, sites, highways, structures or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources.

11) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

Response: No. The proposed action does not involve the introduction, removal, or movement of any non-indigenous species into or out of the action area. While egg or juveniles of spring-run Chinook will be removed from the FRFH, these fish are not needed to meet the production goals of the FRFH. The permit conditions are that no fish are to be released into the San Joaquin River so there will be no introduction of non-indigenous. While the proposed action will not introduce or spread non-indigenous species, the long term goal of the San Joaquin River Restoration Program is the reintroduction of spring-run Chinook to San Joaquin River where these fish have been extirpated.

12) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Response: No. NMFS received public comment during the EA process that the issuance of the 10(a)(1)(A) "segmented" the environmental analysis of the reintroduction of spring-run Chinook. The reasoning for the comment was that the issuance of the 10(a)(1)(A) permit was part of the overall SJRRP effort and that the EA needed to include analysis of the 10(j) and 4(d) rules and the release of salmon into the San Joaquin River. The response to this comment was that the proposed 10(a)(1)(A) permit is to specifically address broodstock development and testing of transportation, handling, and rearing techniques. These actions have conservation value for

spring-run Chinook, whether or not the fish are released. While, the issuance of the 10(a)(1)(A) permit would meet some of the goals of the Settlement agreement and also further the goals of the draft recovery plan for Central Valley spring-run Chinook (NMFS 2009a). The Proposed Action meets the criteria for "independent utility". The test for independent utility is: "Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility." (Federal Register / Vol. 67, No. 10 / Tuesday, January 15, 2002 / Notices) The Proposed Action meets this criterion in that the permit, as conditioned by NMFS, could be issued and carried out absent the implementation the SJRRP. Since the issuance of the 10(a)(1)(A) permit is a separate, single, and complete act, it does not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.

13) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?


Response: No. Issuance of the 10(a)(1)(A) permit is not expected to result in violations of Federal, state, or local requirements for protection of the environment. NMFS believes the issuance of the 10(a)(1)(A) permit to USFWS will be in compliance with all federal, state, or local laws or requirements imposed for the protection of the environment. In response to comments received in the public comment period on the Draft Environmental Assessment for issuance of the 10(a)(1)(A) permit, NMFS addressed public comments asserting the proposed action would threaten violation of any laws or requirement imposed for the protection of the environment.

14) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: No. The restoration program that the proposed action supports would have a cumulative beneficial effect on spring-run Chinook. In addition, cumulative effects resulting from the restoration of the San Joaquin River would have beneficial effects on other non-target species that could use the San Joaquin River.

## DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for issuance of the 10(a)(1)(A) permit to collect and transport spring-run Chinook for the San Joaquin River Restoration Program and the conclusion reached in the NMFS Biological Opinion for the proposed action, it is hereby determined that the issuance of the 10(a)(1)(A) permit will not significantly impact the quality of the human environment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

  
for Rodney R. McInnis, Regional Administrator

10/03/2012  
Date