Enclosure 1

Issue Paper for the San Joaquin River spring-run Chinook experimental population – Delta impacts

7/23/13
National Marine Fisheries Service

This issue paper will focus on the considerations for accounting of incidental take and triggers at the Delta Federal and State export facilities of reintroduced San Joaquin River spring-run Chinook salmon

Introduction

A settlement was reached on the San Joaquin River in 2006 which is currently being implemented through the San Joaquin River Restoration Program (SJRRP). The Federal Implementing Agencies are authorized to carry out the Settlement by the San Joaquin River Restoration Settlement Act (Restoration Act) (Pub. L. 111-11, 123 Stat. 1349 (2009)). This legislation also mandates that spring-run Chinook salmon (spring-run) be reintroduced into the San Joaquin River under the SJRRP shall be as an experimental population pursuant to section 10(j) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1539(j)). The Restoration Act further requires NOAA's National Marine Fisheries Service (NMFS) to prepare a rule pursuant to 4(d) of the ESA so that reintroduction will not impose more than "*de minimus*: water supply reductions, additional storage releases, or bypass flows on unwilling third parties." Consequently, in order to release spring-run into the wild under the SJRRP, NMFS is required to complete the rulemaking necessary to designate an experimental population for the San Joaquin River and promulgate (ESA) section 4(d) rules for that reintroduction. The proposed rule to implement these requirements was posted to the Federal Register on January 15, 2012.

NMFS recognizes that incidental take of the reintroduced spring-run population may occur in the Delta and the San Joaquin River and its tributaries due to: 1) elevated water temperatures and poor water quality, 2) entrainment at unscreened diversions, 3) predation associated with diversion waterways and facilities, 4) reverse flow conditions in the Delta as a result of CVP/SWP pumping, and 5) direct loss at the CVP/SWP South Delta pumping facilities only if actions pursuant to the avoidance, minimization or mitigation for take would result in more than a *de minimus* impact to third party activities as described above. These sources of incidental take will be addressed through conferencing for specific projects. This technical memorandum specifically considers and analyzes the potential impacts at the State [State

Water Project (SWP)] and Federal [Central Valley Project (CVP)] Delta pumping facilities from the spring-run reintroduction and provides resolution to each potential impact to achieve the required "*de minimus*" effect. This document is intended to facilitate communication between NMFS and potentially affected entities by identifying methods to implement the ESA section 4(d) provisions of the proposed regulations for the reintroduction of spring-run under the Restoration Act. If the current methods of accounting for "take" and operational triggers at the Delta pumping facilities change, the accounting for San Joaquin River spring-run will be incorporated to maintain the "*de minimus*" effect.

Approach

NMFS intends to achieve the "*de minimus*" effect at the export facilities by first uniquely identifying and/or accounting for all juvenile spring-run that originate from the reintroduction, and then adapting the existing, or any future, incidental take allowances or operational triggers at the SWP/CVP delta facilities such that the impact of reintroduced spring-run will have a nominal effect on water supply. Prior to adult spring-run returning to the San Joaquin River and spawning in the wild, all spring-run reintroduced to the San Joaquin River will be marked and directly identifiable. So, for the first 3 or more years after reintroduction has begun, all juvenile releases will be coded-wire-tagged. If these fish are captured at the pumping facilities they can then be identified as San Joaquin River fish and eliminated from the "take" and trigger estimates.

Once natural production is occurring, unmarked juvenile spring-run from the San Joaquin River will not factor into the take and trigger estimates unless they reach an "older juvenile" size. Juvenile monitoring in the San Joaquin River will help us determine whether the naturally produced migrants will reach that size limit. Sentinel groups of marked juveniles could be released to track with the natural production if necessary to estimate the numbers of natural spring-run reaching the Delta. Table 1 summarizes the issues, resolutions and potential impacts.

Table 1. Summary of issues, resolution and potential impacts of reintroduced San Joaquin River spring-run Chinook salmon at the Delta pumping facilities

ISSUE	RESOLUTION	IMPACT	ACTION
#1: CVP/SWP spring-run incidental take	Coded wire tagged production; Natural production not marked or tagged	No short-term; No long-term	
#2: Spring-run surrogate trigger for reduced Old/Middle River flows	Coded wire tagged production; Natural production not marked or tagged	No short-term; No long-term	
#3: Spring-run surrogate trigger for reduced exports	Coded wire tagged production; Natural production not marked or tagged	No short-term; No long-term	
#4: Older juvenile Chinook trigger for reduced Old/Middle river flow	Coded wire tagged production; Monitoring to determine size and migration timing	No short-term; Some potential long-term dependent on monitoring outcome	If monitoring determines that San Joaquin spring-run fit the older juvenile category, sentinel tagged juvenile Chinook could be released to estimate loss at Delta facilities
#5: Older juvenile Chinook triggers for reduced exports	Coded wire tagged production; Monitoring to determine size and migration timing	No short-term; Some potential long-term dependent on monitoring outcome	If monitoring determines that San Joaquin spring-run fit the older juvenile category, sentinel tagged juvenile Chinook could be released to estimate loss at Delta facilities
#6: CVP/SWP winter-run Chinook salmon incidental take	Coded wire tagged production; Monitoring to determine size and migration timing	No short-term; Some potential long-term dependent on monitoring outcome	If monitoring determines that San Joaquin spring-run juveniles fit the winter-run size category, sentinel tagged juvenile Chinook could be released to estimate loss at Delta facilities; adjust the non-genetic winter-run fraction counted as incidental take

The specifics of this approach are described in greater detail under each “take” and/or operational trigger issue below.

Issue #1 – CVP/SWP spring-run Chinook salmon incidental take:

Spring-run incidental take is specified on p. 746 of the Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (Operations Opinion): "Spring-run loss at the Federal and State fish facilities, combined, is not expected to exceed 1 percent based on marked late fall-run as surrogates that enter the Delta throughout the cohort-year."

RESOLUTION: This method of establishing the spring-run incidental take limit should not be affected in the short- or long-term by the San Joaquin River experimental spring-run population, assuming that juvenile late-fall run Chinook salmon (late-fall run) from Coleman National Fish Hatchery (CNFH) continue to be used as surrogates for spring-run incidental take at the Delta pumps. Prior to natural production of spring-run occurring in the San Joaquin River Restoration Area (Restoration Area), all spring-run released into the San Joaquin River will be coded wire-tagged. If these fish are captured at the CVP/SWP fish facilities, their coded wire tags will demonstrate that they are not part of the late-fall run surrogate releases and, as such, will not count against the spring-run incidental take limit. Once natural production of experimental population spring-run occurs and the juveniles can no longer be marked with a coded-wire tag, the fact that they are not adipose-fin clipped automatically leaves them out of counting towards the incidental take limit. If new information results in a different method to determine incidental take of spring-run at the CVP/SWP fish facilities than the current use of coded-wire tagged hatchery late-fall run as a surrogate, then accounting for incidental take of spring-run at the CVP/SWP fish facilities resulting from reintroduction under the SJRRP would need to be resolved in another manner.

Issue #2 – Spring-run surrogate trigger for reduced Old/Middle River (OMR) flows in Action IV.2.3:

The third trigger in the "first stage trigger" row of the table on p. 76 of the 2009 Reasonable and Prudent Alternative (RPA) with 2011 amendments calls for a change in operations when the "Coleman National Fish Hatchery coded wire tagged late fall-run Chinook salmon (CNFH CWT LFR) or Livingston Stone National Fish Hatchery coded wire tagged winter-run Chinook salmon (LSNFH CWT WR) cumulative loss [is] greater than 0.5% for each surrogate release group." The coded-wire tagged late-fall run from CNFH refer to the same spring-run surrogates used to measure incidental take; these fish are also used for in-season management of OMR flows.

RESOLUTION: Because this trigger is solely based on the coded-wire tagged late-fall run surrogate releases, spring-run reintroduced to the San Joaquin River will not affect pumping curtailment in the short- or long-term for the same reasons described in the resolution of Issue #1. The resolution for Issue #1, above, is incorporated here, by reference.

Issue #3 – Spring-run surrogate trigger for reduced exports in Action IV.3:

One of the triggers in the table on p. 80 of the 2011 RPA amendments calls for a change in operations when the "CNFH CWT LFR or LSNFH CWT WR cumulative loss greater than 0.5%." The coded-wire-tagged late fall-run from CNFH refer to the same spring-run surrogates used to measure incidental take.

RESOLUTION: Because this trigger is solely based on the coded-wire tagged late-fall run surrogate releases and winter-run Chinook salmon (winter-run), spring-run reintroduced to the San Joaquin River will not affect pumping curtailment in the short- or long-term for the same reasons described in the resolution of Issue #1. The resolution for Issue #1, above, is incorporated here, by reference.

Issue #4 – Older juvenile Chinook salmon triggers for reduced Old/Middle River (OMR) flows in Action IV.2.3:

The first and second triggers in both the "first stage trigger" and “second stage trigger” rows of the table on p. 76 of the 2009 RPA with 2011 amendments calls for a change in operations when “(1) Daily SWP/CVP older juvenile Chinook salmon loss density (fish per taf) is greater than incidental take limit divided by 2000 (2 percent WR JPE ÷ 2000), with a minimum value of 2.5 fish per taf, or (2) daily SWP/CVP older juvenile Chinook salmon loss is greater than 8 fish/taf multiplied by volume exported (in taf)…” “Older juvenile Chinook salmon" is defined as any unclipped (naturally-produced and unmarked hatchery fish) Chinook salmon that is above the minimum length for winter-run Chinook salmon, according to the "Delta Model" length-at-date table (Figure 1) used to assign individuals to race. Unclipped yearling and/or young-of-the-year spring-run from the San Joaquin River that meet the older juvenile Chinook salmon size category could, therefore, increase the loss density, and the frequency of the triggers being met.

RESOLUTION: In the short-term, prior to natural production of spring-run in the Restoration Area, all juvenile spring-run will be tagged and could be distinguished from the other salmon juveniles within the older juvenile category, thus not contributing to this trigger.

In the long-term, when spring-run are reproducing naturally and juvenile production will not be marked, any experimental population spring-run fish that fit within the size range of unclipped older juvenile Chinook salmon will likely be included in the density calculation. When

discussing and evaluating this issue it is important to consider projected natural San Joaquin River spring-run production over time and the monitoring necessary to track juvenile migration as follows:

1. The number of juvenile spring-run that are expected to be released or produced over time can help us predict how many of those fish would reach the south Delta and possibly become entrained in the Delta pumping facilities. The current U.S. Fish and Wildlife Service (USFWS) ESA section 10(a)(1)(A) research permit, which covers years 2012 – 2017, calls for Feather River Hatchery spring-run to be used in the San Joaquin River Salmon Conservation and Research Facility (conservation facility) for captive broodstock development. An additional section 10(a)(1)(A) permit application for translocation or release of spring-run to the San Joaquin River, when allowed by regulation, has been submitted by the USFWS. The numbers and life stages for these permitted or proposed collections are summarized in Table 1. All the fish released from the conservation facility and from translocation would be coded wire tagged and so would not contribute to this trigger.

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

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

Spring-run population targets for the San Joaquin reintroduction have been developed in the 2010 SJRRP Fisheries Management Plan (Table 2). Using these targets, we can develop a framework for the number and size of juvenile spring-run we can expect to see in the Delta. Future permits may request different numbers of fish from different life stages and varying collection sources. Those numbers will be used as appropriate within the described framework.

The 10(j)/4(d) rule (Rule) scheduled for completion in late 2013 must be in place prior to the release of spring-run into the San Joaquin River. If the final Rule is in place in 2013, then releases of spring-run juveniles could occur in spring 2014. Let's assume that 54,400 juveniles are released through translocation in 2014, as proposed through a 2011 USFWS 10(a)(1)(A) permit application. Using the average smolt to adult survival estimate from the Merced and Stanislaus rivers of 1.3 percent, we can estimate that 707 adults would return to spawn in 2017. Assuming half of these adults are females that successfully spawn, they would optimally produce 53,000 eggs, and ultimately 1033

juveniles (65% survival from egg to emergence and 3% survival of fry to smolt). Using 5 percent survival to the Delta, we would expect about 52 juveniles to reach the Delta. Consequently, we could see naturally produced unmarked spring-run from the SJRRP reintroduction at the Delta pumping facilities beginning in 2017 if reintroduction plans proceed as described. The numbers of juveniles produced would increase as increasing numbers of spring-run adults return to spawn in the San Joaquin River. We can use this calculation each year to predict the number of juveniles we might expect from the San Joaquin River in the Delta.

Table 2. Potential Adult and Juvenile Restoration Targets (Preliminary Targets in Bold) for Chinook Salmon Populations in the San Joaquin River Restoration Area (SJRRP FMP 2010)

Performance Period	Annual Average Target	Period of Average	Annual Minimum/ Maximum	SR[1]	FR[2]	Source
Adult						
n/a	833	5 years	500/none	X	X	Lindley et al. (2007)
by Dec. 31, 2019	**n/a**	**n/a**	**500/none**	**X**	**X**	**Meade (2007, 2008)**
Jan. 1, 2020 – Dec. 31, 2024	**2,500**	**5 years**	**500/5,000**	**X**	**X**	**Meade (2007, 2008)**
Jan. 1, 2025 – Dec. 31, 2040	**Spring-run: 30,000**	**5 years**	**500/none[3]**	**X**		**Meade (2007)**
Jan. 1, 2025 – Dec. 31, 2040	**Fall-run: 10,000**	**5 years**	**500/none[3]**		**X**	**Meade (2008)**
Juvenile						
n/a	n/a	n/a	Spring-run: 44,000[4]/1,575,000 Fall-run: 63,000[4]/750,000	X	X	Various sources

Notes:
[1] Spring-run Chinook salmon
[2] Fall-run Chinook salmon
[3] Acknowledges potential annual fluctuations of up to 50 percent for each run and corresponding annual maxima and minima
[4] Derived from the annual average adult target of 833 (Lindley et al. 2007) and based on estimates of fecundity and life stage-specific survival

The number of juveniles that would be recovered at the Delta facilities is difficult to predict due to the variation in hydrologic conditions in the lower San Joaquin River during different water year types and subsequent levels of Delta pumping. The question remains whether these fish would fall into the older juvenile Chinook salmon category and contribute to the trigger. Monitoring data of naturally produced San Joaquin

spring-run fish will provide system specific juvenile size at emigration to either confirm or refute this conclusion. If monitoring indicates that San Joaquin River spring-run juveniles are larger at Delta entry then reevaluation of their potential contribution to the size category of "older juvenile Chinook salmon" will be necessary.

2. Juvenile salmonid migration will be tracked through the San Joaquin River by the SJRRP and other sampling programs in the basin, in order to predict when and what size these fish would arrive in the Delta. Rotary screw traps within the Restoration Area would indicate when juveniles are migrating out of that area. Trawling at Mossdale on the mainstem San Joaquin River would indicate when juveniles are nearing the Delta.

3. Groups of tagged juvenile Chinook salmon (fall-run or spring-run) could be used as sentinel groups for determining what fraction of naturally-produced spring-run from the San Joaquin are expected to arrive at the pumping facilities. Expected natural spring-run production would be estimated based on adult holding numbers and escapement surveys. Real-time estimates of migrating spring-run juveniles would be made from rotary screw trap operations in the Restoration Area, which would activate a tagged release group. Fall-run juvenile releases in the years leading up to the spring-run releases will help us determine how many juveniles to release to ensure that a representative sample reach the Delta pumping facilities. Expected juvenile survival would be factored in to the equation. Coded wire tags would need to be processed as quickly as possible so that the San Joaquin spring-run contribution to the older juvenile Chinook salmon size category could be subtracted out of the loss density calculation.

4. The development of a juvenile production estimate (JPE) for the San Joaquin spring-run Chinook salmon population could aid in determining the "share" of San Joaquin fish at the Delta pumping facilities. Data on adult escapement and juvenile survival would need to be collected for a number of years to complete an accurate JPE, which mean the development of a JPE would not occur until we have several years of naturally producing spring-run in the San Joaquin River.

5. The California Department of Water Resources (DWR) is currently evaluating the correspondence of race assignment by length versus genetics. Spring-run reintroduced to the San Joaquin River will be genetically typed, and local crosses in the conservation facility will have parentage specific to the SJRRP. However, even if DWR were able to use genetics in determining whether the juvenile salmon captured at the facilities were a listed species or from the experimental population, the length of time necessary to process the genetic tissues means that a tool that depends on genetic analysis is unlikely to be a useful tool for real-time management.

Issue #5 – Older juvenile triggers for reduced exports in Action IV.3:

In rows one and two of the table on p. 80 of the 2011 RPA amendments, an export reduction is called for when "Daily SWP/CVP older juvenile loss density [is] greater than 8 fish/thousand acre feet (taf), or daily loss is greater than 95 fish per day,…"and "Daily SWP/CVP older juvenile loss density [is] greater than 15 fish/thousand acre feet (taf), or daily loss is greater than 120 fish per day,…", respectively. As described for Issue #4, yearling and/or young-of-the-year spring-run Chinook salmon from the San Joaquin River that meet the older juvenile Chinook salmon size category could therefore increase the loss density, and the frequency of the trigger being met.

RESOLUTION: As described in the resolution to Issue #4, juvenile migration monitoring and the use of sentinel marked juvenile release groups would help manage the potential that San Joaquin River fish would contribute to this trigger after natural production is occurring.

Issue #6 – CVP/SWP winter-run Chinook salmon incidental take:

Winter-run Chinook salmon incidental take is specified on p. 737 of the Operations Opinion: "Winter-run loss at the Federal and State fish facilities, combined, is not expected to exceed 2 percent of the annual JPE that enters the Delta throughout the cohort-year." [which is actually approximately 1 percent genetically determined winter-run]. Similar to issue #4, but specific to the winter-run size range rather than the "older juvenile" size range, young-of-year spring-run produced in the San Joaquin River that meet the winter-run size category could count towards the incidental take of winter-run at the export facilities.

RESOLUTION: As described in the resolution to Issue #4, juvenile migration monitoring and the use of sentinel marked juvenile release groups would help manage the potential that San Joaquin River fish would contribute to this trigger after natural production is occurring. Additionally, it may be possible to adjust the estimate of the fraction of non-genetic winter-run that are assigned as winter-run based on the length-at-date table to account for any increase in young-of-year spring-run from the experimental population.

Figure 1. Observed Chinook Salvage at the Delta fish facilities with Delta hydrology, August 1, 2011 through July 31,2012.