



IN REPLY  
REFER TO:

## United States Department of the Interior

BUREAU OF RECLAMATION  
Central Valley Operations Office  
3310 El Camino Avenue, Suite 300  
Sacramento, California 95821

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GARWIN (COCAP)

OCT 20 2016

CVO-150  
ENV-7.00

Ms. Maria Rea  
Supervisor  
Central Valley Office  
National Marine Fisheries Service  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814



DOC #1087

Subject: Rapid Genetic Analysis of the Central Valley Project (CVP) and State Water Project (SWP) Salvaged Chinook Salmon in Water Year (WY) 2017

Dear Ms. Rea:

Please find enclosed a procedure for implementing rapid genetic analysis of CVP and SWP salvaged older juvenile Chinook salmon (*Oncorhynchus tshawytscha*). This procedure was used as a pilot effort during WY 2016 and described in a letter to the National Marine Fisheries Service (NMFS) dated April 13, 2016. In a letter dated May 6, 2016, NMFS agreed that the protocol for the rapid genetic analysis allowed for the identification of older juvenile Chinook salmon to race. Such identification aided in the more accurate estimation of loss at the CVP and SWP fish salvage facilities for the Sacramento River winter-run Chinook salmon, listed as endangered under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Rapid genetic analysis allows for the timely discrimination of different races of Chinook salmon that may overlap within the older juvenile size-at-date criteria used at the fish salvage facilities, some of which are listed under the ESA (e.g. winter-run Chinook salmon and Central Valley spring-run Chinook salmon) and some of which are non-listed races under the ESA (e.g., fall-run and late fall-run Chinook salmon).

The Bureau of Reclamation plans to implement the same procedure during WY 2017. Reclamation and the Department of Water Resources (DWR), in consultation with the California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service, and NMFS, developed this procedure to genetically identify ESA-listed fish species that fit within the older juvenile size-at-date criteria at the fish salvage facilities. The procedure describes a timeline for preliminary and final loss estimation based on updated genetic information, which may prove useful in achieving salmonid protection and water reliability during periods when ESA-listed species are present in the Sacramento-San Joaquin Delta.

The procedure will increase the accuracy of information utilized to implement Reasonable and Prudent Alternative (RPA) actions IV.2.3 and IV.3 in the NMFS 2009 Biological Opinion on the Coordinated Long-term Operation of the CVP and SWP. For WY 2017, Reclamation and DWR have contracts with the CDFW Central Valley Tissue Archive and Cramer Fish Sciences to carry out rapid archiving and genetic analysis of salvaged fish tissue. The genetic analysis will determine the run of each individual Chinook salmon from the tissue sent for analysis.

The procedure was based on a method used by NMFS for this purpose in WY 2015. However, the described procedure takes a more precautionary approach. Actions to reduce pumping at the CVP and SWP export facilities are executed once the older juvenile counts exceed the trigger threshold. If the salvaged older juveniles are genetically confirmed ESA-listed species, protective actions will continue. If the older juvenile Chinook salmon are not genetically an ESA-listed species and pumping reduction triggers are not met or exceeded, then export reductions will be rescinded.

Reclamation appreciates the assistance of members of the Delta Operation for Salmon and Sturgeon work team, who provided review of the enclosed procedure. Should you have Any questions or concerns, please contact Mr. Mike Hendrick with our Bay Delta Office at 916-414-2420 or by email at [mhendrick@usbr.gov](mailto:mhendrick@usbr.gov).

Sincerely,



Ronald Milligan  
Operations Manager

Enclosure

cc: Mr. John Leahigh  
Chief of Water Operations Office  
Department of Water Resources  
3310 El Camino Avenue, Suite 300  
Sacramento, CA 95821

Mr. Michael Jackson  
Area Manager  
South-Central California Area Office  
Bureau of Reclamation  
1243 N Street  
Fresno, CA 93721

Mr. Chad Dibble  
Environmental Program Manager 1  
California Department of Fish and Wildlife  
830 S Street  
Sacramento, CA 95811

Mr. Allen Lindauer  
Operations and Maintenance Division Manager  
Bureau of Reclamation  
Tracy Field Office  
16650 Kelso Road  
Byron, CA 94514

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Subject: Rapid Genetic Analysis of the Central Valley Project (CVP)

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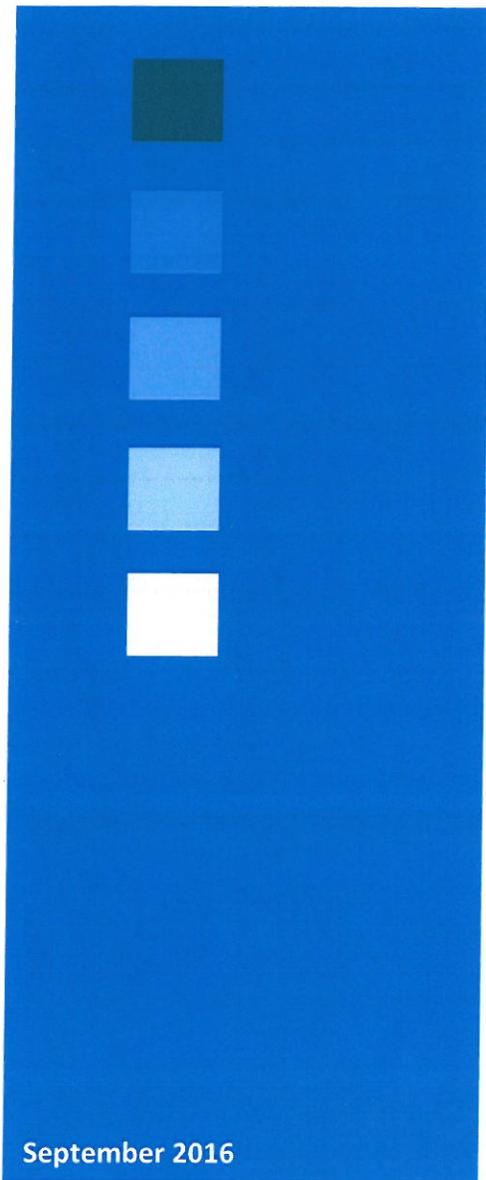
Mr. Harry Spanglet  
Program Manager II  
Department of Water Resources  
3500 Industrial Avenue  
West Sacramento, CA 95691

Ms. Kaylee Allen  
Field Supervisor  
Bay-Delta Fish and Wildlife Office  
650 Capitol Mall, Suite 8-300  
Sacramento, CA 95814

Mr. Garwin Yip  
Branch Chief  
Water Operations and Delta Consultations  
National Marine Fisheries Service  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814  
(w/encl to each)

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# PROCEDURES FOR RAPID ANALYSIS OF SALVAGED CHINOOK SALMON



## 1. OVERVIEW

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This process of rapid genetic analysis of salvaged older juvenile Chinook Salmon is for November 2016 through June 2017. These “older juveniles” are at or above the minimum winter-run size based on the length-at-date model at the fish collection facilities and below the maximum size considered by the length-at-date model, on a given date. This period is inclusive of the duration of actions IV.2.1, IV.2.3, and IV.3 in the NMFS Biological Opinion on the Coordinated Long term Operations of the Central Valley Project and State Water Project.

All references to a specific day includes weekend days and holidays, unless noted otherwise.

## 2. PROCEDURES

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### A. Salvage Data on Fax Sheet at Fish Facilities

#### 1. *Operations and Count Summary Data Sheet Previous 24 hours*

- a. Salvage data includes operational and count summary for 12:00am to 11:59 of the previous day.
- b. Salvage data sheets checked (for the previous day) and emailed by 9:00 am each day by fish collection facility staff.

### B. Preliminary Reporting of Loss through Laboratory Arrival (Day 1)

#### 1 *Preliminary LOSS*

- a. This happens by 9:00 am
- b. If fish are counted that meet size-at-date criterion for older juveniles and no loss density trigger or annual take limit is reached then DNA-based run assignment of fish will be determined later (accompanying the next set of rapidly analyzed samples). Under non-rapid analysis conditions the BOR contract manager may still request that the DNA-based run assignment be run anytime. This may be important if triggers are not being exceeded, a large number of samples are collected, and there is a desire for accurate genetic identification.
- c. Preferably by 8:00a and by no later than 9:00a, CDFW’s Central Valley Tissue Archive staff (CVTA) and Cramer Fish Sciences (CFS) staff will be notified by USBR staff as to whether or not rapid processing is needed for that day.
- d. If preliminary loss calculations indicate a trigger is reached then:
  - a. the preliminary loss calculation will be confirmed or corrected via a Quality Assurance/ Quality Control (QA/QC) process
    - i. If trigger is on weekday then CDFW does QA/QC.
    - ii. If trigger is on weekend then USBR does QA/QC.
- e. CVP/SWP operational contacts are notified of trigger exceedance.
  - a. Operational contacts notify NMFS and CDFW contacts.

- b. This step includes pre-amplification of samples, chip loading, and sample cycling.
- c. This step will use positive and no template controls on the standard west coast salmonid 96-SNP panel.
- d. This step will generate raw genotype and verification of positive control and no template controls.

#### **4. Genetic Identification (Day 2)**

- a. Laboratory will review raw genotypes and undertake data processing (R code for processing).
- b. Data will be used in Mixed Stock Analysis using ONCOR and NOAA reference database.
- c. CFS will generate report including at least the following information:
  - i. Sample number,
  - ii. size-at-date identity of each sample,
  - iii. genetic identity of each sample, and
  - iv. assignment scores (i.e. maximum likelihood) to each baseline population
- d. CFS will distribute to USBR Contracting Officer Representative and DWR Task Manager.

### **D. Genetically-identified LOSS**

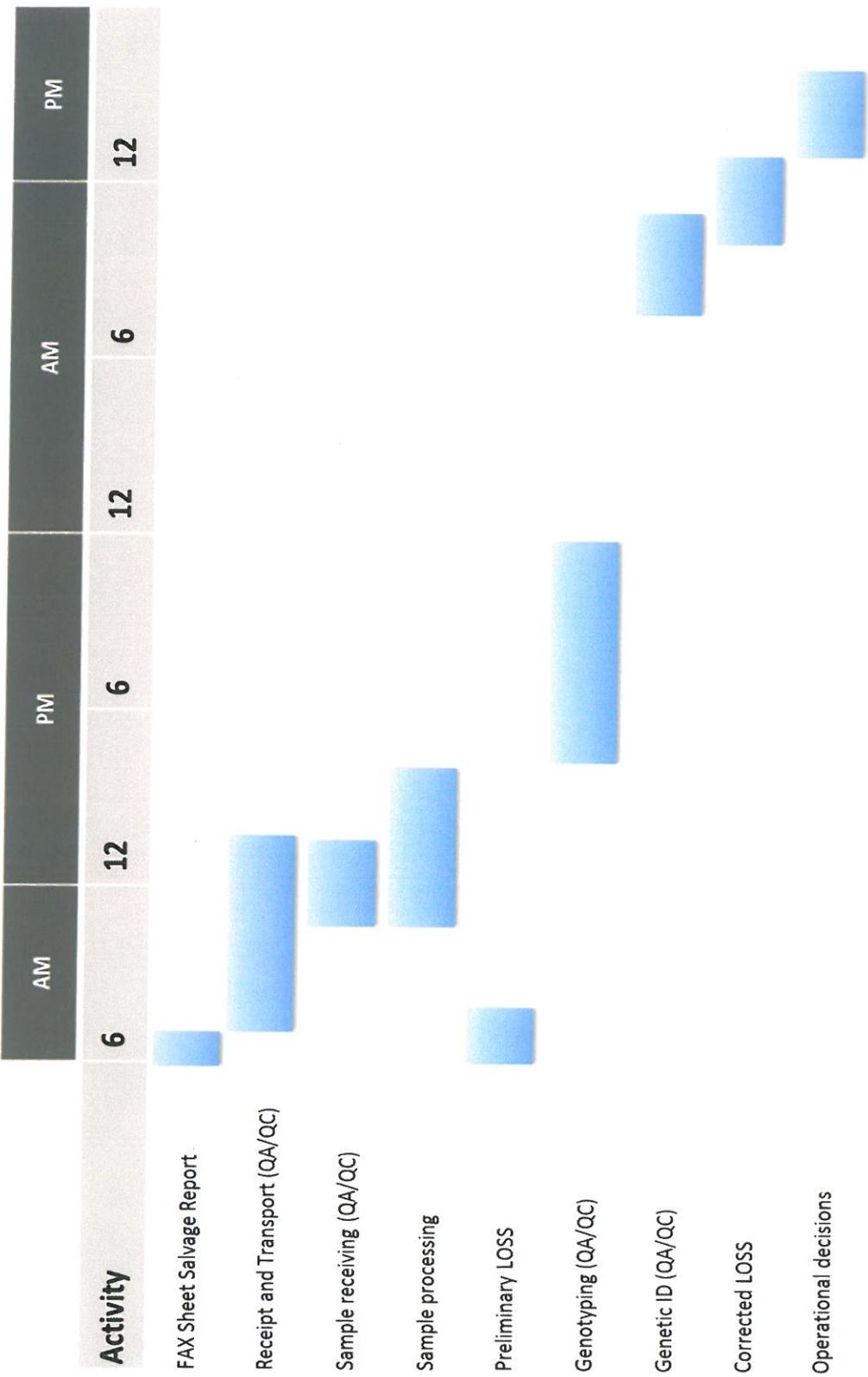
1. Results of genetically-identified LOSS estimate will be calculated by DWR (weekdays) or USBR (weekends) and sent to NMFS and DFW contacts.
2. Results will also be communicated to appropriate operations teams (DOSS, WOMT, other management team (TBD)).

### **E. Operational Decision**

1. Operational decision will be reviewed:
  - (a) If genetic-based run determination(s) matches size-at-date-based run determination(s), then no change in action is needed.
  - (b) If genetic-based run determination(s) does *not* match size-at-date-based run determination(s), genetically-identified loss used for implementing appropriate action (i.e. rescind action, shift to lower exceedance action).

### **F. Documentation**

1. Data records will be updated, as appropriate (CDFW salvage database).
3. Genetic assignment results and associated operational decisions will be reviewed at DOSS during the following week and captured in the DOSS notes.



**Figure 1.** Gantt chart for rapid salvage ID process