



Contingency Release Strategies for Juvenile, Feather River Hatchery Spring-Run Chinook Salmon due to Severe Drought, 2014.

March 5, 2014

To date, the culmination of exceptionally low precipitation, snow pack and water storage for the last 3 years have required the present consideration of alternate release strategies for juvenile, hatchery-produced anadromous salmonids in California's Central Valley. The emergency measures described in this Contingency Strategy may be required to ensure the survival and eventual return (escapement) of 2013 brood year, Feather River Hatchery, spring-run Chinook salmon (*Oncorhynchus tshawytscha*).

Central Valley Spring-run Chinook salmon (CVSCS) were listed as threatened under both the state and federal endangered species acts in 1999. Feather River Hatchery Spring-Run Chinook Salmon stock (FRH SCS) is genetically divergent from other CVSCS populations (e.g. Mill Creek, Deer Creek, Butte Creek, Battle Creek, Clear Creek, Yuba River,) which implores minimizing straying of the FRH SCS into other CVSCS watersheds where genetic introgression would be possible and unfavorable. In a worst-case scenario where water availability and biological and environmental criteria* in the Feather and Sacramento rivers and the Delta are unlikely to support salmonid survival at time of FRH SCS release, the use of net pens for receiving, acclimating and releasing of juvenile fish may be the only opportunity for encouraging survival and eventual escapement of FRH SCS 2013 brood year fish. Currently FRH releases half (approximately 1 million) of their FRH SCS juvenile production into the Feather River (at Boyds Pump Ramp) and the other half (approximately 1 million) FRH SCS juveniles into net pens (San Pablo). Both releases are 100% marked and coded-wire tagged. If river and Delta water conditions during the spring result in the worst-case scenario, it may prove necessary that 100% of FRH SCS be trucked and released into Bay Area net pens.

Off-site release of anadromous fish generally result in higher straying of adults from their natal waters as compared to on-site or in-river releases, and results from the 2010 and 2011 analysis of the proportion of hatchery-origin CVSCS have shown that the stray rate for both release types has been similar (<2%) throughout the Central Valley (Kormos *et. al.* 2012, Palmer-Zwahlen and Kormos 2013). Additionally, the straying into Butte Creek during 2010 and 2011 was found to be less than 0.9% and 0%, respectively, suggesting that straying as a result of prior net pen acclimation for FRH SCS is relatively minimal and in fact represent the lowest proportion of hatchery-origin fish straying in CV escapement. Therefore in accordance with the draft FRH SCS Hatchery and Genetics Management Plan (HGMP) and the California Hatchery Science and Review Group Report (HSRG), upon returning to "normal" river and water conditions, the Department intends to proceed with investigation and implementation of in-river releases for FRH SCS as the potential effects of straying could be substantial in

non-natal watersheds during some years. In the current water and drought scenario, it is possible that in-river releases could result in extremely high or the total mortality of outmigrating juvenile FRH SCS.

A best-case scenario this year would result in continuing the current program (i.e., half of FRH SCS production is released in-river while the other half trucked and released into Bay Area net pens). This would avoid subjecting all FRH SCS to one set of risks and an increased probability of 2013 brood year population survival (would not “put all eggs in one basket”).

The target release size for FRH SCS is 60 fish per pound (fpp) but in recent years, FRH was able to release SCS in-river at sizes larger than 60 fpp in mid- and late-April. It is plausible that FRH can grow SCS to 60 fpp (or larger) by April 1st (or earlier) when river and Delta conditions would be more favorable to FRH SCS survival if released at an earlier date. This timing of outmigration may mirror natural-origin CVSCS more closely (Cranford, personal communication, February 27, 2014).

An on-going acoustical tag telemetry study (collaboration between CA Department of Water Resources, National Marine Fisheries Service, UC Davis and CDFW) is investigating “mortality hot spots” of FRH SCS outmigrants. The investigators (Kurth, personal communication, February 27, 2014) expressed that zero in river releases of FRH SCS this year would jeopardize the effort and miss the opportunity to record actual survival or mortality of released fish in the current conditions (possible low flows, sub-optimal aquatic environment). The investigators have proposed that 200K juvenile FRH SCS receive a unique coded-wire tag number, and if in-river conditions are even marginally suitable, that these 200K be released in-river (with 500 individuals also fitted with the acoustic telemetry transmitters-300 for release in the Feather River and 200 upstream of the delta). In the worst-case scenario where no FRH SCS can be released in-river, the 200K uniquely coded-wire tagged fish could be released to net pens along with the rest of the population. If the unique coded-wire tags are available, FRH managers have agreed that this arrangement would not pose a problem. In the best-case scenario where at least half FRH SCS are released in-river, these 200K uniquely coded-wire tagged fish would contribute to the ongoing investigation.

* WATER AVAILABILITY, BIOLOGICAL AND ENVIRONMENTAL
CRITERIA UNSUITABLE TO FRH SCS IN-RIVER RELEASE

- River temperatures above 20°C (70°F) at Freeport
- Delta Cross Channels (DCC) Gates open¹
- Increased risk of predation²
- Sacramento River flows below 6,000 cfs at Freeport
- Feather River flows below 800 cfs

¹DCC should be closed for 2014 in-river release of FRH SCS and the matrix of triggers for DCC Gate Operations (DCC Subgroup of DOSS, March, 2014) for Winter-Run Chinook and Natural-Origin Spring-Run Chinook should be expanded temporarily to include FRH SCS. Matrix includes monitoring (rotary screw traps, trawls) and the adequacy and efficiency of the outmigrant trapping will be addressed. DCC Subgroup Report states that “providing protection of (FRH SCS, should they be released in-river) is crucial”, however, fish will be trucked to net pens if DCC Gates cannot be guaranteed closed.

² Consolidation/ increased density of piscivorous fish due to low flows

References

Kormoros B, Palmer-Zwahlen M, and Low A. 2012. Recovery of Coded-Wire Tags from Chinook Salmon in California’s Central Valley Escapement and Ocean Harvest in 2010. Fisheries Administrative Report 2012-02, The California Department of Fish and Game.

Matrix of Triggers for DCC Gate Operations, DCC Subgroup of DOSS, March 2014. Unpublished.

Palmer-Zwahlen M, and Kormoros B. 2013. Recovery of Coded-Wire Tags from Chinook Salmon in California’s Central Valley Escapement and Ocean Harvest in 2011. Fisheries Administrative Report 2013-02, The California Department of Fish and Wildlife.