# United States Department of the Interior

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Contingency Release Strategies for Coleman National Fish Hatchery Juvenile Fall Chinook Salmon due to Severe Drought Conditions in 2014

**Background**

Juvenile fall Chinook salmon from the U.S. Fish and Wildlife Service's (Service) Coleman National Fish Hatchery (NFH) are typically released directly into Battle Creek, a tributary to the Sacramento River. This strategy of releasing fish on-site balances the hatchery's multiple objectives, including: 1) contribution to ocean harvest, 2) contribution to in-river harvest (particularly in the upper Sacramento River), and 3) adequate returns of broodstock to Battle Creek to promote program perpetuation. Standard protocols for releasing juvenile salmon on-site also reduce straying, consistent with recent Scientific Hatchery Reviews as well as the 2014 National Marine Fisheries (NMFS) Biological Opinion for Coleman NFH Operations, which place an emphasis on reducing impacts on natural-origin salmonids. Under typical conditions, on-site release practices used at the Coleman NFH have been successful at achieving the multiple hatchery objectives while minimizing impacts on natural-origin salmonids.

Continuing severe drought in the Central Valley of California is expected to produce conditions in the Sacramento River and Delta detrimental to the survival of juvenile salmon. The conditions being anticipated in 2014 could lead to the loss of an entire year class of juvenile fall Chinook salmon following their release from the Coleman NFH, thereby compromising the ability to achieve any of the hatchery's objectives including mitigation responsibilities. To circumvent unacceptably high levels of juvenile fish mortality that may result in 2014, the Service is considering an alternative strategy for releasing juvenile fall Chinook, involving transportation to acclimation net pens in the west Delta. This strategy is consistent with that used to release a large portion of Chinook salmon from Central Valley hatcheries operated by the California Department of Fish and Wildlife (CDFW).

Substantial data are available to show that transporting Coleman NFH fall Chinook salmon to the west Delta would likely produce substantial increases in ocean harvest opportunity but will also result in a significant increased rate of straying as they mature and return to freshwater. The levels of straying anticipated are likely to compromise some of the hatchery objectives, including contributions to harvest in the upper Sacramento River and the ability to collect adequate broodstock at the Coleman NFH in future years, particularly 2016. Although the levels of straying anticipated from releasing fish into the West Delta are unfavorable, this release strategy may in fact represent the best possible option when faced with the possibility of losing the entire 2013 production year. In future years, under less extreme conditions, the standard protocol for releasing Chinook from the Coleman NFH will continue to be on-site releases into Battle Creek.

**Criteria and Contingencies**

In coordination with the National Marine Fisheries Service (NMFS) and the CDFW, the Service has developed the following criteria and triggers that will be used to inform decisions on the release strategy to be implemented in 2014. These criteria and triggers were developed based on

review of water temperature, river flow, Delta Cross Channel Gate operations (see attachment 1) and salmon return data from 1988-1992 (Niemela 1996). The 1988-1992 period represents the most recent extended severe drought in the Central Valley. At that time the Service released nearly the entire production of fall Chinook to off-site locations to circumvent poor conditions in the lower Sacramento River and Delta. Conditions in the river and Delta were poorest during the spring of 1992 emigration season. Releases from the Coleman NFH into the West Delta in 1992 survived at a rate nearly 18 times higher than releases into Battle Creek, with a commensurate increase in ocean harvest. Owing to their markedly improved survival, West Delta releases from that same year also outperformed on-site releases in regards to returns to the hatchery. More than twice as many adult returns to the Coleman NFH in 1994 resulted from West Delta releases as compared to releases conducted into Battle Creek. If the Coleman NFH had released all production on-site in 1992 the hatchery would not have had sufficient returns of adults to meet production targets in 1994.

The criteria identified below are designed to minimize the risk of exposing Coleman-NFH produced salmon to river conditions that could result in extremely low survival. Each of the criteria indicated below are intended to be independent of the others, meaning that if any one or more of the criteria are anticipated to be met then Coleman NFH-produced salmon should be transported to the acclimation net pens for release into the west Delta. If none of the triggers are forecast to be met, then juveniles will be released into Battle Creek, as per standard operational protocol at the Coleman NFH and as a term and condition requirement of the (NMFS) 2014 Biological Opinion for Coleman NFH Operations.

**Delta Cross-channel Gates operations** – Survival of juvenile salmon is significantly reduced when gates are open and increased numbers of fish are diverted into the interior Delta.

- Cross-channel gates are forecast* to be open within 21 days** days of the date when the hatchery salmon are ready to be released.
- Cross Channel gate operations are forecast* to be modified per the "Matrix of Triggers for DCC Gate Operations" developed for the protection of natural origin spring-run. This trigger is designed to avoid rendering the triggers ineffective because unmarked CNFH-produced fall run would preclude the ability to discern natural origin spring run from hatchery fall run.

**North Delta Emergency Salinity Barriers** – Survival of juvenile salmon would be significantly reduced since additional fish would be diverted back into the mainstem Sacramento River and then have an increased risk of being diverted into the interior Delta.

- Salinity Barriers are forecast* to be operational within 21** days of the date when the hatchery salmon are ready to be released.

**Water Temperature** – Increased water temperatures above 70 degrees has been shown to be detrimental to juvenile survival.

- Sustained Daily Average Water temperatures are expected to be greater than 70 F at Wilkins Slough within 21** days of the date when the hatchery salmon are ready to be released.
- Sustained Daily Average Water temperatures are expected to be greater than 70 F at Freeport within 21** days of the date when the hatchery salmon are ready to be released.

**Flow** – Decreased flows in the Sacramento River lead to significantly reduced survival of juvenile salmon because of reduced travel times exposing the fish to increased predation and

increased risk of diversion into the interior Delta where survival is significantly reduced.

- A Sacramento River flow at Wilkins Slough of less than 3,500 cfs is forecast* to occur within 21** days of the date when the hatchery salmon are ready to be released.
- A Sacramento River Flow of less than 6,000 cfs at Freeport is forecast* to occur within 21** days of the date when the hatchery salmon are ready to be released.
- Delta Outflow is forecast* to be less than 3,000 cfs within 21** days of the date when the hatchery salmon are ready to be released.

*The most recent Bureau of Reclamation 90% hydrology operations forecast and underlying modeling assumptions will be used to assess potential future flow conditions, Delta Cross Channel gate operations, and North Delta Emergency Salinity Barrier configuration.
** 21 days is the time period in which the vast majority of the hatchery fall run are expected to have moved out of the Sacramento River and the Delta"

**Implementation and Contingencies**

The Service and California Department of Fish and Wildlife (CDFW) have coordinated a schedule for the delivery (trucking) of hatchery production from the five state and federal hatcheries to acclimation net pens in the west Delta. However, if a precipitation event occurs in March or April, environmental conditions/criteria may be re-assessed and if none of the criteria above are forecast to occur, then groups of Coleman NFH fall Chinook salmon juveniles meeting appropriate size criteria for an on-site release (i.e., at or about 90/lb) may be released into Battle Creek per usual procedures. Further, criteria are expected to be assessed during the three following periods: mid-March, first of April, and mid-April. If criteria above are not met or expected to be met within a three week window, then on-site releases of appropriately sized fish will also occur shortly thereafter. Criteria may also be re-assessed one to two weeks prior to scheduled trucking dates and, again, if criteria above are not met or not predicted to be met within a three week window, then on-site releases of those groups of fish will be considered to instead occur on-site shortly thereafter. If during any of these assessments, existing/predicted conditions are expected to meet the criteria triggering consideration of the alternative release strategy, then preparations will begin, continue, or be implemented to truck appropriate groups of fish to the acclimation net pens in the west Delta as scheduled.

Attachment 1. Flow, Water Temperatures, and Cross Channel gate operations during April and May for the years 1988-1992. April and May are when Coleman NFH fall Run smolt production were released in 1988-92