

## HABITAT COMMITTEE REPORT ON WORK GROUP REPORT ON CAUSES OF THE 2008 SALMON FAILURE

The Habitat Committee (HC) has reviewed the draft report “Work Group Report on Causes of the 2008 Salmon Failure,” and highlights the following points for the Council:

In general, the report and its appendix provide excellent information regarding the challenges faced by Sacramento River fall Chinook (SRFC) brood years 2004 and 2005. The report suggests that anomalous conditions in the coastal environment in 2005 and 2006 resulted in poor survival of 2004 and 2005 broods of SRFC. Both broods entered the ocean during periods of weak upwelling, warm sea surface temperatures, and low densities of prey items for the Central California nearshore area even though ocean productivity was improved for the more northern area in 2006. Freshwater factors in the 2005 and 2006 outmigration years were ruled out as primary factors in the stock collapse due to observations of near-normal freshwater conditions during residency, near-normal numbers of juveniles entering the estuary, and typical numbers released from basin hatcheries.

It is clear that degraded freshwater habitat is a chronic problem for Central Valley salmonids as specified in the jeopardy determination in the Draft Central Valley water operations Biological Opinion. While the workgroup implicated losses during the early marine life phases as most impacting 2004 and 2005 brood SRFC, the HC is more concerned about long-term degradation of freshwater and estuarine habitat and loss of early life history diversity. The report provides a good discussion of this loss of life history diversity and the subsequent loss of resilience against variations in environmental conditions. Clearly, there is a need to increase the resilience of both natural and hatchery fall Chinook. This will require a suite of actions to improve hatchery production and spawning, rearing and migration corridor habitat that supports life history diversity, and to monitor habitat conditions and effects on fish in order to determine adaptive management measures. HC highlights the following issues:

### **Hatchery Practices and Review**

Due to large-scale hatchery production, originally-diversified early life histories of SRFC have been simplified. Central Valley hatcheries most commonly rear fall Chinook to the fingerling stage; some are released in the estuary, and some are released within the upper Sacramento River. Under natural conditions, a variety of early life histories are exhibited by Chinook, and these strategies allow migrants to enter the marine environment at different times. This kind of temporal migration diversity provides a buffer against unusual or extreme environmental conditions. Clearly, lack of this temporal diversity puts SRFC at much higher risk when conditions reach extremes like those experienced by the 2004 and 2005 broods.

The estuary net pen acclimatization program has been found to increase survival in juvenile Chinook. These facilities were not utilized in 2006 due to state budget constraints. Juvenile

Chinook were instead released directly into Carquinez Strait and San Pablo Bay. This change may have had a significant effect on survival of state hatchery 2005 brood releases. There needs to be broader support, including consistent state and Federal funding, for programs that help improve survival for Central Valley salmonids throughout the migration corridor. In addition, the level of straying caused by estuary releases should be further investigated.

The HC believes a basin-wide programmatic hatchery review is necessary in order to define scientific principles and make recommendations on how to ensure life history diversity of hatchery fish, minimize effects of artificial production on natural fish, and establish adult goals that meet both harvest and broodstock return objectives. The review should include all species to ensure fall Chinook hatcheries do not adversely impact other listed fish, and vice-versa.

## **Habitat Improvements**

Although ocean conditions seem to be the most tangible cause of the recent collapse, modifications to freshwater habitat in the Sacramento River basin and shallow-water rearing habitat in the delta have also played a significant role in the chronic degradation of the freshwater habitat and indirectly contributed to the collapse of the fall Chinook stocks. As stated in the paper, this has made the Central Valley salmon ecosystem more vulnerable to periodic shifts in the ocean environment.

Water management in the California Central Valley needs to be recrafted to the degree possible such that flows return to a more natural hydrograph that aligns with the needs of anadromous species. Also, it appears that screening of water diversions is inadequate to prevent entrainment of migrating juveniles. Either adequate exclusion measures need to be implemented or pumping needs to be curtailed during active juvenile migration periods.

Habitat complexity is important in maintaining salmonid life history diversity. In particular, access to shallow wetland and floodplain habitats needs to be improved. Habitat restoration activities that improve marine and freshwater habitat quality, complexity, and quantity should be supported and strengthened.

Moreover, increased attention should be placed on the effects of non-native species and their role in salmon decline. Encroachment of non-native fishes can play a key role in reducing habitat productivity for salmonids and altering predator/prey interactions (e.g., the non-native striped bass); management of these predator stocks should be modified to reduce impacts to native salmonids.

Mixtures of pesticides that have been commonly reported in salmon habitats may pose a more important challenge for species recovery than previously anticipated.<sup>1</sup> Several analyses could be performed to determine the possible effects of pesticides on salmonids rearing and migrating in the Sacramento River. A juvenile sample protocol could be developed for juvenile releases from

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<sup>1</sup> *Cathy A. Laetz,<sup>1</sup> David H. Baldwin,<sup>1</sup> Tracy K. Collier,<sup>1</sup> Vincent Hebert,<sup>2</sup> John D. Stark,<sup>3</sup> and Nathaniel L. Schol. March 2009. The Synergistic Toxicity of Pesticide Mixtures: Implications for Risk Assessment and the Conservation of Endangered Pacific Salmon. Environmental Health Perspectives 117:3.*

Coleman National Fish Hatchery that traversed the river and the juveniles that were trucked from California State hatcheries to the Delta in an attempt to determine relative effects from pollutants. Also, yearling populations such as Sacramento winter and spring Chinook and late fall Chinook could be compared to Fall Chinook for relative effects of pollutants, including immediate mortality and reduced fitness/survival. To the extent data are currently available to do this analysis, the HC suggests incorporating it into the report. If it cannot be done for this report, it should be done in the future. The report contains a specific reference to pesticides in the Appendix on page 15 and appears on the one hand to discount this stressor (because of transport of fish), while on the other hand acknowledges that contaminants could be an issue downstream of the release point and in the Bay. The HC believes that chronic or possibly acute impacts from chemical contamination is an issue that warrants further scrutiny.

The report mentions components of freshwater habitat and shallow-water rearing Delta habitat that limit salmonid production and survival (pages 38-41); those elements should be called out in the report's recommendations to emphasize the importance of freshwater habitat improvements to improving resilience of SRFC.

### **Strengthen Analyses**

In Section 5.1 (page 45, line 1062), the report states "Observations of growth and energetic condition of Chinook in the estuary and ocean provided valuable evidence for the 2004 brood, but were unavailable for the 2005 and later broods, due to funding limitations." The 2004 brood was adequately addressed, but as pointed out in the report, the 2005 brood was not. When sufficient information on ocean conditions is unavailable for Central Valley Chinook, coastal stocks that do not have significant hatchery populations (e.g., the Russian and Smith Rivers) may provide insight into ocean influences.

The effect of river flows on juvenile survivals should also be more fully investigated. For example, comparisons in natural stock survival for high water years such as 1984 can improve evaluation of the potential effect of "wet year" flows acting on the 2005 brood. Factors such as migration timing, redd scouring, and screen failures should be evaluated to determine the potential impacts of a range of instream flows on Central Valley salmonids.

### **Monitoring**

There is a clear need for a comprehensive, basin-wide monitoring program that allows assessment of all life history stages for all Sacramento River species. Such a program needs broad support and stable funding. Components of a comprehensive monitoring strategy should also be implemented as part of Reasonable and Prudent Alternatives (RPA) and terms and conditions within the Central Valley Water Operations Biological Opinion (BO), since many of the factors limiting SRFC production likely affect listed stocks as well. Components of such a program should include:

- improved creel surveys for SFRC and other Sacramento salmonid stocks,

- improved monitoring of escapement, distribution and abundance of SFRC wild stocks, and stray rates of hatchery fish,
- long-term monitoring of effects of toxins on anadromous fish in the Central Valley, and
- development and continuation of near-shore ocean indicators to measure the condition and survival of fish after they enter the ocean.

The HC supports the concept of moving towards an ecosystem-based management and ecological risk assessment approach for Central Valley Chinook management, and developing the necessary databases to implement this approach. Examples of data needs for implementation include cohort run reconstruction, indices of ocean productivity such as local seabird nesting success, and measures of oceanographic variability, systematic trawling near Chipps Island to monitor smolt migration timing and abundance, condition factor of sampled juveniles, and other estuarine and near-shore ocean factors.

The HC recommends that actions identified in the Central Valley Water Operations BO RPAs for Sacramento winter and spring Chinook be developed and implemented in a manner that is inclusive of fall Chinook. It is especially important that measures implemented pursuant to that BO not be implemented to the detriment of fall Chinook stocks.

Finally, if the conservation objective is not met for a third consecutive year, an overfishing concern will be triggered for these stocks. This is a particularly delicate situation since the most restrictive salmon fishing regulations in the history of the west coast occurred in 2008 and will in all likelihood occur again 2009 – two of the three years leading to an overfishing concern.

In summary, while the HC in general supports the information in the report, we believe that the report should very clearly state that while the most significant portion of the mortality on these two broods likely occurred after the fish entered the ocean, the real problems impacting these fish are in the freshwater and estuary areas and that is where the focus for solving the problem should be.

PFMC  
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