PACIFIC FISHERY MANAGEMENT COUNCIL
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

CHAIRMAN
Donald K. Hansen

EXECUTIVE DIRECTOR
Donald O. McIsaac

Telephone: 503-820-2280
Toll Free: 866-806-7204
Fax: 503-820-2299
www.pcouncil.org

MEMORANDUM

DATE: August 26, 2004

TO: Sacramento River Winter and Spring Chinook Workgroup

FROM: Salmon Technical Team

SUBJECT: Report on recommendations for developing fishery management plan (FMP) conservation objectives for Sacramento River winter Chinook and Sacramento River spring Chinook

Winter Chinook

Stock description. A brief description of spawn timing and freshwater juvenile life history should be added.

Red Bluff Diversion Dam Counts. The report should also note that the estimate of 15% passage after May 15 (range 3% to 48%) was based on passage through the ladders when the gates at Red Bluff Diversion Dam (RBDD) were in. Inadequate attraction flows at the ladders delayed passage by an average of approximately 20 days, so the spawner estimates based on expansion of post May15 dam counts are biased low, as well as inaccurate.

Carcass Surveys and Table 1. An explanation of the methods used to collect the data reported in Table 1 should be added to facilitate interpretation. For instance, how are fish identified as being jacks or adults or from the winter versus spring versus fall stocks? Table 1 indicates that from 2000 to 2003, females comprised from 64% to 82% of the total spawning population based on Jolly-Seber (J-S) estimates from carcass surveys. This wouldn't be surprising for some populations with older age structures because older, larger fish, primarily females, are more readily recovered from spawning grounds than males. However, for this stock, the fish are believed to spawn predominantly as three-year-olds, so the uneven sex structure is a bit puzzling. Do the carcass survey estimates for total population include jacks or only adults? RBDD data indicate a very high proportion of jacks in the population (17% to 69% of the run in the same

years)– if this is indeed the case, then there would be very few adult males in the spawning population if the J-S estimates are accurate.

The data from the RBDD, J-S, and cohort analyses do not seem to be consistent – e.g., estimated maturation rates from the coded-wire tag (CWT) cohort analysis do not seem compatible with the RBDD or the J-S estimates. There appear to be problems in estimating age-sex structure for spawning escapements for this stock. Perhaps data collected at Keswick Dam could be used for estimating sex-age structures rather than RBDD or the J-S approach. At the very least, scales taken from naturally produced fish should be aged and compared with CWT data for consistency with interpretations of maturation and return rates. Additionally, if males and females have vastly different maturation and growth rates, a sex-specific cohort analysis and model should be employed for evaluating fishery impacts on this stock

Cohort Analysis. A list of specific tag codes included in the analyses should be provided. Appendix IV seems to list all recoveries of winter chinook releases, but the purpose for this listing is unclear. The number of fish released for the biennial year (BY)1998-2000 cohort analysis is relatively small (Table 10), so its not surprising that recoveries would be few (especially for the 1999 BY with a release of 30,000). The data available from the CWT recoveries are insufficient to provide a basis for estimation of length distributions and growth patterns, yet these factors are obviously integral parts of cohort analysis. An explanation of the source of the length data should be included in the report.

Age-2 maturation rate of 1998 brood year is suspiciously low given the high proportion of jacks typically seen in the RBDD counts. These jacks would have returned in 2000, and that is also the first year that J-S estimates, based on carcass surveys, are presented. There were apparently no recoveries of CWTs from this brood year in the spawning escapement or in freshwater catch either. The appendix IV lists no age-2 freshwater recoveries for the 1998 brood year at all. The cohort reconstruction shows an age-2 escapement of 8 fish. Where did that number come from? How was the maturation rate estimated, and could the lack of inland recoveries be due to a lack of data rather than an observation of zero tags?

General Considerations. While we generally concur with these comments, the framework for evaluation should include specific proposals for monitoring methodologies and incorporating risk averse approaches into predictive models. Given that all production from Livingstone Stone Hatchery is already CWT'd, it seems unlikely the number of CWTs recovered from fisheries for this stock could be substantially increased. The only opportunity to increase tagging would be to initiate a wild smolt tagging program, but this would require a means to positively identify the stock-origin of wild smolts.

Management Framework. The general frameworks are fine as theoretical bases for management. However, further work is necessary to develop details for implementation. The framework should present an evaluation of expected performance in terms of stock (escapement?) recovery trajectories and economic repercussions of implementing the proposed policy. Issues pertaining to length (size at age distributions) and aging (natural population) need to be addressed before the proposed impact rate conservation objective can be evaluated. While uncertainty is considered in developing the frameworks, the issue of uncertainly also arises in assessing compliance with the conservation objective. A postseason assessment could be expressed as a probability that the objective was met (or a probability of observing the post –season point estimate if the objective was met) rather than as a point estimate.

The feasibility of developing usable methods to project marine survival rates and monitor impact rates should be fully explored – the framework without the means to implement it does little good. Additionally, constraints on allowable impact rates could be developed and presented to provide bounds for policy decisions – e.g., given estimates of variability fecundity and fresh water survival, it should be possible to determine the allowable upper limit for exploitation rates for given assumptions for marine survivals.

Contact rate-effort estimators are not terribly compelling. With the possible exception of June, the contact-rate, effort relationships depicted in Figures 2 and 3 are not very informative or useful as a basis for prediction. The paucity of recovery data reflect patterns that would be expected from rare events representing recovery of small numbers of CWTs, and it will take a long time to improve them given current CWT numbers being released. Given the reliance on CWTs to estimate impact rates, evaluating a management objective expressed as an impact rate and linked to population dynamics will also be problematic.

Spring Chinook

Stock Description. A brief description of freshwater juvenile life history should be added. This spring stock is believed to have a markedly different life history pattern than more northerly spring stocks in that most of the juvenile production is believed to migrate as fingerlings rather than yearlings, although fishery recovery rates of the few yearling fish that were tagged appears to be much higher.

Spawning Surveys. The footnotes to Table 9 regarding inclusion of prespawning mortalities are somewhat ambiguous.

The reference on page 12 should be to Table 9 instead of Table 5.

Spawning escapement. The cohort analyses indicate very high exploitation rates on this stock; substantially higher than for winter run (cohort analysis presented in the report) and fall run fish from the Sacramento (Central Valley Index). This suggests there may be a substantial problem in estimating CWT recoveries from spawning escapements for this stock. High pre-spawning mortalities were reported for 2002 and 2003, but it is unclear whether CWT recovery estimates for escapements have been expanded to reflect these losses; if not, this could well explain ocean contact rates that appear excessive.

Recommendations - Cohort Analysis. A list of specific tag codes included in the analyses should be provided. It is doubtful that available CWTs from Butte Creek provide an adequate basis to perform a useful cohort analysis. Although there are doubts regarding the use of Feather River releases of spring chinook, recovery data for this stock should be examined for consistency in distributions with available Butte Creek CWT releases. Relatively large numbers of fish identified as spring chinook have been released from the Feather River Hatchery. Due to the paucity of CWT data from the Butte, it could well be that data from the Feather River releases would comprise the best available information to evaluate fishery distribution patterns and exploitation rates, despite potential issues regarding brood stock selection. Additionally, the source of information relied upon to estimate length distributions should be disclosed.

Management Framework. Age-4 Ocean Impact Rate. The STT is not completely convinced that CWT recoveries of fish from Butte Creek would provide a sufficient basis for monitoring and evaluation. The number of recoveries in ocean fisheries will be so small, and uncertainty surrounding escapement so great, that it is doubtful that useful estimates of ocean age-4 impacts could be generated.

All three spring stocks appear to be approaching historic levels of spawning escapements. However, information is lacking as to whether these escapement levels are appropriate as management objectives. Given the lack of estimates of total production, it may be useful to employ the approach developed by Mr. Chuck Parken of the Canadian Department of Fisheries and Oceans, to obtain estimates of maximum sustainable yield escapement levels for Deer, Mill, and Butte stocks based on accessible watershed area.

The difficulty of monitoring fishery impacts on this stock complex, and the belief that spawning escapements are approaching historic levels, suggests there may not be an urgent need to establish rebuilding targets. Instead, some consideration should be given to focusing attention on identification of threshold values based on surrogate measures – e.g., monitoring exploitation rates for fall or Feather River spring fish and establishing a framework containing values for escapements that would trigger broad scale management action.