

## **Incidence of age-2 Sacramento River winter Chinook in ocean fisheries**

Current evidence suggests that natural-origin Sacramento River winter Chinook salmon (SRWC) from brood year 2014 experienced poor survival during the rearing and outmigration period in the Sacramento River. This SRWC brood will be considered ocean age-2 in 2015, and could potentially be contacted by 2015 ocean salmon fisheries. NMFS has examined the available data to evaluate the incidence of age-2 SRWC in California ocean salmon fisheries.

Harvest of age-2 SRWC, identified by coded-wire tag (CWT) recoveries, is extremely rare in ocean salmon fisheries. Since marking and tagging of SRWC began at Livingston Stone National Fish Hatchery in 1998, only two age-2 SRWC CWTs have been recovered in ocean fisheries. Both of these CWT recoveries occurred in the recreational fishery during August of 1999 in the San Francisco management area. For this fishery, at that time and location, there were no minimum size limit restrictions in place. The fish recovered were between 12 and 13 inches total length, well below the customary minimum size limits of 20 or 24 inches in the recreational fishery.

The SRWC stock assessment uses a length-at-age model to determine what proportion of a cohort would be of legal size for retention given information regarding the minimum size limit in the fishery, the cohort's age, and the month. The length-at-age model was estimated with length data from all available ocean CWT recoveries in recreational and commercial ocean fisheries. Given these data, the model produces estimates of the mean and standard deviation length-at-age by month (see O'Farrell et al. 2012, Appendix A, for a complete description). The length-at-age model does not extend to age-2 fish owing to the near lack of data. However, the model estimates a mean length of 20.8 inches total length for age-3 fish in March. If a 20 inch minimum size limit were in effect, the model would project that 67% of age-3 SRWC in March would be of legal size for retention. Extrapolating the monthly growth rate of approximately 1 inch per month backward from age-3 in March to the latest dates which age-2 SRWC could be contacted by fisheries (the previous October or November) results in a mean size of 15.8 inches in October and 16.8 inches in November, both of which are well below the typical recreational minimum size limits of 20 or 24 inches. Given these plausible mean lengths for age-2 SRWC in the fall, it is unsurprising that no CWTs from age-2 fish have been recovered in ocean fisheries when minimum size limit regulations were in effect.

While available data suggest that age-2 SRWC are too small to be retained in ocean fisheries with the customary minimum size limit regulations, they can potentially be encountered and released in ocean fisheries. The California Department of Fish and Wildlife monitors the

number of sublegal Chinook released in ocean fisheries by conducting fishermen interviews. However, this information is not available on a stock-specific basis and CWTs cannot be recovered from released fish. As a result, these data do not allow for estimation of age-2 SRWC encounter rates.

**Reference**

O'Farrell, M.R., Mohr, M.S., Grover, A.G., and W.H. Satterthwaite. 2012. Sacramento River winter Chinook cohort reconstruction: analysis of ocean fishery impacts. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-491. 68p.