

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE SUPPLEMENTAL REPORT
SACRAMENTO RIVER WINTER CHINOOK – UPDATE ON CURRENT ACTIVITIES

The California Department of Fish and Wildlife (CDFW) is providing an additional update on Sacramento River winter-run Chinook salmon (SRWC) 2016 spawner escapement, broodstock collection and spawning at Livingston Stone National Fish Hatchery (LSNFH), and the number of SRWC coded-wire tags (CWTs) recovered in 2016 ocean fisheries to date. This report is intended as a follow up to the June 2016 Supplemental Report (Agenda Item H.1.a, Supplemental CDFW Report, June 2016 Council Meeting).

Spawning activity for SRWC in 2016 has largely come to an end and carcasses have mostly dissipated into the upper Sacramento River system. Though crews may encounter a handful of SRWC carcasses during the next couple of weeks, survey efforts are now focused on other species. A total of 297 SRWC carcasses have been encountered this season, representing the lowest number of carcasses observed on record (Table 1). The second lowest number observed was in 2011 (n=430), which resulted in a total SRWC escapement estimate of 824 fish.

Despite this year's low carcass count, CDFW's preliminary escapement estimate is 1,545 fish. At this time the data is not sufficient to break out the jacks and adults that contributed to this total. Difficulty finding carcasses as a result of unusually high summer turbidity in the survey area this year contributed to a larger than expected escapement total despite the low carcass count. The turbidity, and consequent poor visibility, led to the lowest carcass recapture rate on record and hampered the ability to observe redds and live fish during aerial surveys. Due to this season's challenging survey conditions, the Cormack-Jolly-Seber (CJS) model predicts a significantly greater number of fish actually escaped than what could be inferred by looking at carcass counts alone. CDFW has derived Central Valley Chinook escapement estimates for all stocks (including SRWC) using the CJS model since the implementation of the Central Valley Chinook Salmon In-River Monitoring Plan in 2012. Application of this model to determine escapement has been widely reviewed, discussed, and supported by National Marine Fisheries Service, the United States Fish and Wildlife Service, and the Council's advisory bodies among others.

In addition, male salmon comprised a significantly higher proportion of the population than normal, primarily due to a large number of precocious males returning at age-2. Because males are not detectable in carcass surveys at the same rate that they appear in the escapement, other information is needed to inform the contribution of males to the escapement. Sex ratios are derived from trap counts at Keswick Dam and applied to the escapement estimate for females after the survey season has come to an end. This high male proportion, coupled with the high turbidity and reduced visibility, are factors that contributed to the preliminary escapement estimate being higher than was initially predicted based solely on carcass counts. While CDFW believes the preliminary escapement estimate and use of the CJS model to be the best available science and fully supports use of the final output in upcoming management processes, CDFW notes that there is inherent uncertainty in the 2016 escapement estimate, and also notes the preliminary escapement estimate is subject to change as data are reviewed and finalized.

As described in the June 2016 Supplemental Report, changes to LSNFH broodstock selection criteria were implemented mid-season to bolster egg collection levels in an effort to reach the average production target of 200,000 juveniles (Agenda Item H.1.a, Supplemental CDFW Report, June 2016

Council Meeting). Spawning at the hatchery has since concluded and a total of 124 adults were utilized for broodstock. LSNFH projects a total production of roughly 150,000 brood year (BY) 2016 juveniles based on these broodstock levels. Though the target production of 200,000 juveniles will not be met, the most recent production estimate is a significant improvement over the 72,000 estimated prior to the June protocol changes.

Ten SRWC CWTs have been collected to date in California ocean salmon recreational and commercial fisheries. Eight of these recoveries occurred in the recreational fishery: two during mid-April in Princeton, two during mid-May in the SF Bay area (Point Reyes to Point San Pedro), three on July 28 in Bodega Bay (2) and the SF Bay area (1), and the most recent recovered in Berkeley on August 1. The remaining two SRWC recoveries were taken in the commercial fishery, with both CWTs recovered during the second half of June in the area south of Point Sur. Nine out of the ten recoveries are age-3 (BY 2014), which is most likely due to the three-fold increase in LSNFH production (600,000 SRWC) in 2014. One age-4 (BY 2013) recovery occurred in the commercial fishery. The number of SRWC recoveries during the 2016 ocean fisheries has greatly exceeded that observed last year when only one age-3 (BY 2013) and one age-4 (BY 2012) SRWC CWTs were recovered.

Table 1. Sacramento River Winter Run Chinook annual carcass counts and escapement totals since 2003.

Return Year	Carcass Count	Winter Run Escapement		
		Adults	Jacks	Total
2003	4,518	7,675	543	8,218
2004	3,280	5,786	2,083	7,869
2005	8,771	14,683	1,156	15,839
2006	7,698	16,764	385	17,149
2007	1,581	2,402	131	2,533
2008	1,409	2,521	204	2,725
2009	1,904	4,363	53	4,416
2010	908	1,555	41	1,596
2011	430	637	187	824
2012	1,348	2,527	144	2,671
2013	3,219	5,623	462	6,085
2014	1,389	2,688	327	3,015
2015	1,194	3,382	57	3,439
2016*	297	NA	NA	1,545

* 2016 carcass count totals and escapement estimates are preliminary and subject to change.