# Columbia River Salmon and Steelhead Recreational Anglers Board

## Evaluating the Post-Release Survival of Yakima River Spring Chinook Salmon Associated with a Mark-Selective Fishery

**Project Description:** The primary objective of this study was to determine the mortality of spring Chinook salmon caught and released from a recreational mark selective fishery in the Yakima River, Washington. The spring Chinook population in this river system are not listed or protected under the ESA, and therefore provide a unique opportunity to evaluate the mortality of Chinook salmon caught and released during a mark selective fishery outside of the constraints of the ESA. However, the location, regulations, management, and enforcement of this fishery are typical of inland recreational spring Chinook salmon mark selective fisheries in the region that are managed under the constraints of the ESA. Therefore, by providing post-release mortality of Chinook salmon caught and released in inland fisheries in eastern Washington, this study can be used by managers to balance recreational/sport harvest opportunity and conservation of at-risk wild Chinook salmon stocks.

**Methods:** During the spring of 2012, 2013, and 2014 spring Chinook salmon captured in the Yakima River at the terminus of the mark-selective fishery adjacent to Roza Dam were tagged after being hooked and played by volunteer [public] anglers and WDFW staff using gear and methods generally used in this fishery. A similar number of hatchery fish were tagged at the Roza Dam trap to serve as a control group to compare to the treatment group. Both groups of fish were tracked through the summer and fall to determine survival to spawning. The treatment group was anchor tagged at capture during 2012 and later gastrically radio-tagged at the Roza trap. Since angling mortality was confounded with anchor tag loss and migration to alternate areas, we could not provide an unbiased estimate of hooking mortality in 2012 and considered 2012 as a pilot year that helped us refine our sampling design for 2013 and 2014. During 2013 and 2014, spring Chinook were gastrically radio-tagged after being hooked and played to allow tracking below Roza Dam. The majority (99%) of the upper Yakima spring Chinook population spawn upstream of the city of Ellensburg and generally begin spawning in early September. We therefore used a fixed telemetry site near Ellensburg to estimate mortality to the spawning area and September 1 to estimate mortality to spawning.

**Results:** We tagged 70 treatment fish during the 2013 fishery and 115 during 2014. The majority of the treatment fish (81%) used in this study were caught and played by recreational anglers who allowed us to tag the fish if it turned out to be unmarked and thus not legal for retention. Twelve treatment fish were excluded from the analysis of survival to the spawning grounds because of either tag regurgitation (11) or the origin of the fish (i.e. “hatchery control group”) didn’t allow for passage upstream of Roza Dam (1). A similar proportion of the control group was excluded because of tag regurgitation. Survival estimates for both years combined are

presented in Table 1. Based on the two years of study, we estimate the post-release hooking mortality of spring Chinook to the spawning area and to the onset of spawning were 10.0% (95% CI 2.9% – 17.0%) and 12.2% (95% CI 1.7% – 22.6%) respectively. Potential factors affecting recapture rates were recorded at the time of tagging with hook location and bleeding severity explaining the most variation in detection probability.

Table 1. Adult spring Chinook survival estimates based on a modification of the Ricker-Two-Release model for 2013 and 2014 combined. Treatment survival is calculated as the proportion of treatment fish recaptured divided by the proportion of control fish recaptured.

| **Survival from fishery to spawning grounds** | | | | |
|---|---|---|---|---|
| Group | Released | Recaptured | Survival | 95% CI |
| Control | 195 | 179 | | |
| Treatment | 173 | 143 | 0.900 | (0.830 - 0.971) |
| | | | | |
| **Survival from fishery to spawning** | | | | |
| Group | Released[a] | Recaptured | Survival | 95% CI |
| Control | 194 | 155 | | |
| Treatment | 171 | 120 | 0.878 | (0.774 - 0.983) |

[a]Numbers released for the survival to spawning estimate differ due to three tags that are assumed to have malfunctioned or battery life exceeded between migration to the spawning grounds and spawning in 2014.

A draft full report is nearly complete and will be distributed to the CRSSRAB after internal and external review.