

2016 Oregon Snake River Basin Spring Chinook Sport Fishery Report

The 2016 run year of spring/summer Chinook salmon to Oregon Snake basin tributaries provided recreational (sport) harvest opportunity on Lookingglass Creek, the Wallowa and Imnaha rivers (Table 1). In recent years the Grande Ronde River was open to spring chinook angling however, due to limited harvest allotments, managers declined to open this fishery in 2016. Daily bag limits for all fisheries were two adipose fin-clipped chinook adults and five adipose fin-clipped jacks per day, with two daily limits in possession. Anglers were required to cease angling if they had retained a daily limit of marked adults.

We conducted statistical creel surveys following methods generally described in the Fisheries Management and Evaluation Plans (FMEP's; ODFW 2011 and 2012) and the attached creel survey plan (Appendix A).

Lookingglass Creek – The sport fishery on Lookingglass Creek opened 28 May and closed 31 May (4 days). The area open to anglers extended from the mouth at the Moses Creek Lane Bridge upstream to the confluence of Jarboe Creek (RM 2). Angling was restricted to the use of artificial flies and lures to minimize impacts to bull trout. During 4 days of creel surveys, 95 anglers were contacted that had fished a total of 288 hours. Anglers reported an average catch of one adult Chinook for every 9 hours of fishing and one jack for every 144 hours of fishing. Total angler effort was estimated at 854 angler hours for the Lookingglass Creek fishery. Estimates provided from creel surveys indicated that the Lookingglass fishery accessed 66.7% (2 of 3) of allowed natural-origin (N-O) impacts (Table 2). Total recreational fishery impact resulting from handling and harvest was estimated at 80.0% (44 of 55) of the allowed limit for hatchery-origin (H-O) adults (Table 3). In addition, we estimated that four H-O jacks were harvested.

Wallowa River – The Wallowa River sport fishery was open from 2 Jul to 17 Jul (16 days) in 2016. The open area extended from Minam State Park (RM 8) upstream to the mouth of the Lostine River (RM 25). During 10 days of creel surveys, we contacted 43 anglers who had fished 82 hours. Effort was estimated at 544 angler hours. No chinook were reported caught during this fishery (Table 3). Therefore, we estimated that the fishery did not access any allowed H-O harvest nor N-O impacts (Table 2).

Imnaha River – The Imnaha River fishery opened 15 Jun and closed 3 Jul (19 days). The open area extended from the confluence with the Snake River to Summit Creek Bridge (RM 45). During 12 days of creel surveys, we contacted 135 anglers who had fished a total of 1,001 hours. Anglers reported an average catch of one adult Chinook caught for every 17 hours of fishing, and one jack salmon caught for every 362 hours of fishing. Effort was estimated at 2,401 angler hours for the entire Imnaha River fishery. Estimates provided from creel surveys indicated that the fishery accessed 33.33% (3 of 9) of the allowed N-O adult impacts (Table 2). Total recreational fishery harvest was estimated at 75.3% (113 of 150) of allowed H-O adults; in addition to 11 H-O jacks (Table 3).

References:

Oregon Department of Fish and Wildlife (ODFW). 2012. Fisheries Management and Evaluation Plan for Snake River Spring/Summer Chinook – Grande Ronde Subbasin (draft submitted to NOAA Fisheries, June 2012).

Oregon Department of Fish and Wildlife (ODFW). 2011. Fisheries Management and Evaluation Plan for Snake River Spring/Summer Chinook – Imnaha Subbasin (draft submitted to NOAA Fisheries, June 2012).

Table 1. Allowed Natural-origin (N-O) impacts and hatchery harvest in Northeast Oregon spring Chinook fisheries based on in-season run projections agreed upon by co-managers. Estimates for the upper Grande Ronde, Catherine Creek, and Wenaha reflect those provided pre-season.

Population	Critical Threshold (MAT)	Minimum Abundance Threshold (MAT)	2016 Run Estimate		Allowable Impact (N-O)	Sport Fishery Catch and Release ^a	Hatchery Adults available for Sport Harvest
			Natural	Hatchery			
Upper Grande Ronde	300	1000	153	817	0	– ^c	– ^c
Catherine Creek	300	1000	174	287	0	– ^c	– ^c
Lookingglass	150	500	151	345	3	40	55
Wallowa-Lostine	300	1000	560	700	8	80	100
Minam ^b	225	750	570	–	6	60	–
Wenaha ^b	225	750	508	–	5	50	–
Imnaha	300	1000	600	1000	9	90	150

^a Assumes hooking mortality of 10% except Lookingglass creek where hooking mortality is assumed at 7.5%.

^b According to FMEP, unsupplemented populations managed for a 1.0% impact rate at returns levels between 50% and 100% of MAT

^c Natural returns fell below minimum thresholds required to implement recreational fisheries

Table 2. Total estimated ESA impacts (incidental mortality) of natural-origin adult Chinook salmon, by population, in 2016 Oregon Snake Basin tributary sport fisheries. Estimates are rounded to the nearest whole fish.

Population	ESA Impacts (Incidental Mortality)		Percent limit used in fishery
	Season Estimate	Season Limit	
Upper Grande Ronde	–	0	–
Catherine Creek	–	0	–
Lookingglass Creek	2	3	66.7%
Minam River	0	6	0.0%
Wallowa-Lostine River	0	8	0.0%
Wenaha River	–	5	–
Imnaha River	3	9	33.3%

Table 3. Estimates of effort, catch, and harvest during the 2016 Lookingglass Creek (28 May to 31 May), Wallowa (2 Jul to 17 Jul), and Imnaha rivers (15 Jun to 3 Jul) fisheries. Ninety-five percent (95%) confidence limits are indicated in parentheses.

Fishery Parameter	Lookingglass Creek (95% CI)	Imnaha River (95% CI)	Wallowa River (95% CI)
Fishery Days	4	19	16
Total Estimated Angler	854 (550-1158)	2401 (1843-2959)	544 (324-764)
Marked Adults Harvested	44 (0-55)	113 (42-184)	0 (N/A)
Marked Jacks Harvested	4 (0-9)	11 (0-25)	0 (N/A)
Unmarked Adults Released	22 (0-55)	26 (15-37)	0 (N/A)
Unmarked Jacks Released	0 (N/A)	5 (0-15)	0 (N/A)
Marked Adults Released	2 (0-6)	0 (N/A)	0 (N/A)
Bull Trout Released	16 (0-28)	59 (44-74)	0 (N/A)

Appendix A. Spring Chinook Creel Survey Methods

Lookingglass Creek – The Lookingglass Creek fishery was surveyed using an access point design with a check station located at the point of entry/exit to the fishery (Figure 1). One creel clerk staffed the check station during all four days of the fishery. Typically the creel survey is stratified by weekends and weekdays, and survey dates were weighted to sample weekends at a higher rate than weekdays (both weekend days and two randomly-selected weekdays per week). However, due to the short nature of the 2016 fishery, all four days were surveyed and combined into a single strata. An approximate 8-hour shift was applied each day. AM shifts began at 0530 hours before and ended at 1330 hours. PM shifts began at 1330 hours and ended at 2130 hours. Shifts were selected randomly.

All anglers leaving the fishery area during survey shifts were interviewed by the creel clerk. Each interview determined: whether the angler (or anglers) completed fishing for the day, whether they were targeting Chinook salmon, their place of origin, the predominant gear type used, and how many hours the anglers spent actively fishing. Total angler hours for each party were determined by multiplying the number of anglers in the party with the number of hours spent fishing.

Catch information was also determined from interviews and/or visual inspection of harvested fish. Jack and adult salmon were differentiated by length, whereby jacks were considered equal to or less than 61 cm (24 inches) and adults exceeded 61 cm (24 inches). Total catch of adult and jack salmon were determined through angler interviews for each survey day. Adult and jack salmon harvested in the fishery were inspected by the creel clerk, measured for length, and scanned for the presence of a coded wire tag. If a coded wire tag was present, the snout was removed with the angler's consent. At the end of the season, snouts were forwarded to the ODFW laboratory in Clackamas, OR for tag retrieval.

Wallowa and Imnaha rivers – The Wallowa and Imnaha fisheries were surveyed using a roving survey design that was stratified into two sections on each river. The lower section on the Wallowa River extended from the downstream end of Minam State Park (RM 8) to the confluence with the Minam River (RM 10). The upper section extended from the Minam River upstream to the confluence with the Lostine River (RM 25, Figure 3).

For the Imnaha River, the lower survey section extended from the FR 4260 bridge (Cow Creek Bridge) at RM 5 upstream to Horse Creek at RM 13. The upper section extended from Fence Creek (RM 20) upstream to the terminus of the fishery area at Summit Creek (RM 48). A seven-mile section between Horse Creek and Fence Creek was not surveyed (Figure 4). Referred to as the 'Box Canyon' this section is very remote, mostly privately owned, and generally receives a negligible amount of fishing effort. In addition, the section downstream of the Cow Creek Bridge to the Imnaha River's confluence with the Snake River (lower terminus of the fishery area) is accessed only by foot and was not regularly surveyed. We describe methods used to incorporate this reach into the creel estimates below.

For both the Wallowa and Imnaha rivers, each reach was surveyed four days per week during the fishery. Creel surveys were stratified by weekends and weekdays, and survey dates were weighted to sample weekends at a higher rate than weekdays (both weekend days and two randomly-selected weekdays per week). An approximate 10-hour shift was applied each day that included drive time. Shifts were stratified into morning (AM) and evening (PM) shifts to capture variability in angling effort and catch rates. AM shifts began at 0500 or 0600 hours, and PM shifts began at 1300 or 1400 hours. Shifts were selected randomly within strata.

Roving surveys consisted of pressure counts and angler interviews. Three pressure counts were conducted every survey day, each beginning at two-hour intervals from the designated start time. Pressure counts consisted of driving along the river and counting anglers that were actively fishing (i.e., not those at their vehicles or walking to and from the river). Tying knots and baiting hooks counted as actively fishing. The starting location (either the upstream or downstream end of the fishery) of each day's first pressure count was selected at random, and subsequent counts alternated the direction of travel with the exception of the upper Imnaha River. Creel direction was not alternated here due to drive time restrictions that greatly reduced the creel clerk's ability to conduct interviews. Creel clerks were instructed to spend the same amount of time on each pressure count (i.e. travelling at the same rate of speed and stopping at the same vantage points) to equalize effort among counts.

Angler interviews were conducted between pressure counts, and clerks placed emphasis after counts were completed to record as many completed angler trips each day. Each interview determined: whether the angler (or anglers) completed fishing for the day, whether they were targeting Chinook salmon, the place of origin, the predominant gear type used, and how many hours the anglers spent actively fishing. Total angler hours for each party were determined by multiplying the number of anglers in the party by the number of hours spent fishing.

Catch information was determined by identical methods described above for the Lookingglass fishery.

Lookingglass Fishery Data Analysis – Total effort (\hat{E}), angler hours (e_i), catch (fish landed; \hat{C}), and harvest (fish kept; \hat{H}) were estimated using methods described by Pollock et al. (1994) for access point creel designs. Estimates were conducted within survey weeks and weekday/weekend strata, and summed across weeks during the fishery. Total effort was estimated for each stratum as follows:

$$\hat{E} = \sum_{i=1}^n (e_i / \pi_i)$$

where: \hat{E} = Total effort, e_i = angler hours for the i th sample day, and π_i = probability of encountering an angler on the i th sampling day. Angler-hours (e_i) were estimated for each stratum as:

$$e_i = \sum_{i=1}^n (m_i)(t_i)$$

where: e_i = angler hours for the i th sample day, m_i = number of anglers on the i th sampling day, t_i = time spent fishing on the i th sampling day. Total catch or harvest (\hat{C}) for each stratum was estimated by:

$$\hat{C} = \sum_{i=1}^n (c_i / \pi_i)$$

where: \hat{C} = Total catch; c_i = catch for the i th sample day, π_i = probability of encountering an angler on the i th sampling day. Consistent with guidelines established in the Grande Ronde Basin FMEP, a handling mortality rate of 7.5% was applied to the estimated catch (fish landed and released) of natural and hatchery-origin adults to estimate fishery impacts.

Within strata variance estimates for catch and effort estimates ($v(\hat{\theta}_i)$) were derived using methods described by Pollock et al. (1994):

$$v(\hat{\theta}_i) = \frac{N^2 \sum_{j=1}^n (\theta_j - \bar{\theta})^2}{n(n-1)}$$

Where N is the number of days in the strata, and n is the number of days surveyed. Season variance ($v(\hat{\theta})$) was estimated as the sum of the strata variance estimates. Ninety-five percent confidence intervals were estimated as (Cochran 1977):

$$\hat{\theta} \pm 1.96 \times \sqrt{v(\hat{\theta})}.$$

Estimates of catch and variance were conducted separately for each species, adults and jacks, and fish that were harvested and released.

Note: The 2016 Lookingglass Fishery consisted of only 4 days of open fishing, all of which were surveyed for creel. Therefore, all four days were combined into a single stratum.

Wallowa and Imnaha Fishery Data Analysis – Total angler effort (\hat{E}), catch and harvest (fish landed or kept, respectively, \hat{C}) were estimated using methods described by Scheaffer et al. (1979) for stratified cluster sampling. A three-stage method was used to stratify the temporal and spatial sample frame. Days were initially stratified by week of the season, then by day type (i.e., weekday, weekend day) and section.

The lower survey section on the Imnaha River incorporates a five-mile river section accessed only by foot between the FR 4260 Bridge (Cow Creek Bridge) and the Imnaha River mouth. Due to the remote nature, regular pressure counts could not be conducted in this reach. In addition, the upper section of the Wallowa River fishery also includes a 0.4 mile public access area near the confluence with the Lostine River that is difficult to access from the road. Therefore, regular pressure counts are not conducted in either of these reaches. To adjust pressure counts for anglers fishing in these areas, vehicles were counted at the parking areas used to access these stretches of river as a surrogate. Information collected during previous years suggested that each vehicle represented 1.6 anglers in these sections. Therefore, adjusted angler counts in the lower survey section were calculated as:

$$\hat{m}_i = m_i + 1.6v_i$$

where: \hat{m}_i = estimated number of anglers in the lower Imnaha and upper Wallowa survey reaches on the i th day, m_i = number of anglers observed during pressure counts on the i th day, and v_i = number of vehicles observed at the lower Imnaha trailhead on the i th day. For all other sections on the Wallowa and Imnaha rivers; m_i was not adjusted. Total angler effort (in hours) was estimated for each stratum as:

$$\hat{E} = \bar{m} \times d \times h$$

where: \bar{m} = the mean angler count during the stratum (as a function of m_i for the unadjusted reaches, and \hat{m}_i for adjusted reaches as described above), d = the number of survey days during the stratum, and h = hours of daylight for each survey day during the strata, assumed to be 16 hours during the fishery. Mean adjusted angler count during the stratum (\bar{m}) was calculated as:

$$\bar{m} = \frac{\sum m_i}{\sum p_i}$$

where: m_i = number of anglers counted during the i th sample day (or \hat{m}_i for adjusted sections, as described above), and p_i = total of all counts made on the i th sample day.

Total catch or harvest (\hat{C}) for each stratum was estimated as:

$$\hat{C} = \hat{E} \times \bar{r}$$

where: \hat{E} = total estimated angler hours during the stratum, and \bar{r} = the mean catch or harvest rate during the stratum. Mean catch or harvest rate (fish/angler hour) for the stratum was estimated as:

$$\bar{r} = \frac{\sum x_i}{\sum w_i}$$

where: x_i = the reported catch and/or harvest for the i th party interviewed, and w_i = total angler hours expended by the i th party when interviewed. Consistent with guidelines established in the Imnaha Basin FMEP, a handling mortality rate of 10.0% was applied to the estimated catch (fish landed and released) of natural and hatchery-origin adults to estimate fishery impacts.

Within-strata variance estimates for catch and effort estimates ($v(\hat{\theta}_i)$), season variance ($v(\hat{\theta})$) and Ninety-five percent confidence intervals were derived using methods described above (see: Lookingglass Fishery Data Analysis).

N-O adult estimates – Run projections for N-O adults in the Lostine River were provided during the LSRCF annual operating plan process by ODFW and NPT research staff (LSRCF 2016).

Since the Wallowa fishery is mixed-stock, estimates of N-O adults are required to determine fishery quotas for both stocks that may be intercepted. Estimates for N-O adults from the upper Wallowa Basin were derived based on the average proportion of total redds counted in the Lostine River, upper Wallowa River, Bear Creek and Hurricane Creek, and N-O estimates for the Lostine River. These estimates assume that N-O returns to the Lostine River are proportional to redd counts throughout the basin. Based on redd counts from 2001-2015, the amount of N-O adults returning to the Wallowa River Basin (outside the Lostine) was equivalent to 41% of the estimated Lostine River return. We estimate that N-O adults returning the Minam River were equivalent to 74% of the estimated Lostine River return.

The Wallowa River fishery was broken up into two creel sections, upstream and downstream of the Minam River confluence (Figure 3). The upper section is assumed to only intercept N-O and H-O adults from the Wallowa-Lostine stock. However, the lower section has potential to intercept N-O adults from the Wallowa-Lostine and Minam stocks. Therefore, catch of N-O adults was allocated proportionally based on return estimate of Wallowa-Lostine and Minam N-O adults in this fishery section.