LITTLE SALMON RIVER, IDAHO
SPRING CHINOOK SALMON
(Oncorhynchus tshawytscha)

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SPORT HARVEST REPORT

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Paul Janssen
Regional Fisheries Biologist

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ABSTRACT

A spring chinook salmon (*Oncorhynchus tshawytscha*) sport fishing season was held every Friday through Monday of each week from June 5 through June 22, 1998 on the Little Salmon River, Idaho. The fishery targeted spring chinook salmon of hatchery origin. Hatchery spring chinook salmon were the product of the Rapid River Fish Hatchery, which is operated by Idaho Department of Fish and Game and owned and funded by Idaho Power Company. We operated two mandatory check stations to determine total angler effort and harvest. During the 12 day spring chinook salmon season, there were 15,915 angler hours spent to catch 205 salmon, of which 172 adipose fin-clipped spring chinook salmon were harvested. There were 33 chinook salmon released, including 22 unmarked chinook salmon. We estimated that 3 of the 22 unmarked, released chinook salmon were of natural origin.

INTRODUCTION

A spring chinook salmon (*Oncorhynchus tshawytscha*) sport fishing season was held every Friday through Monday from June 5 through June 22, 1998 on the Little Salmon River (LSR), Idaho. The harvested salmon were the product of the Rapid River Fish Hatchery (FH), which is located on Rapid River, a tributary to the LSR. This hatchery is operated by Idaho Department of Fish and Game (IDFG) and it is owned and funded by Idaho Power Company (IPC). The Rapid River FH program is mitigation for the Brownlee, Oxbow, and Hells Canyon dams on the Snake River, which are owned and operated by IPC. Lowell et al. (1995) and Hassemer (1991) previously described the hatchery program. In addition to funding hatchery operations, IPC provided funds to monitor and evaluate the sport fishery. The purpose of this report is to describe the 1998 sport fishery. Tribal harvest and hatchery return information is also briefly discussed.

Salmon management in the LSR drainage emphasizes hatchery production to provide fish for sport and treaty harvest as the first priority. However, management actions must be consistent with the Endangered Species Act, because naturally produced salmon in the drainage are listed as threatened. An emphasis on hatchery produced salmon to provide harvest opportunity in the LSR is consistent with long-range goals, policies, and principles identified in the Anadromous Fish Management Plan, 1992-1996 (IDFG 1992) and the Fisheries Management Plan, 1996-2000 (IDFG 1996).

The 1998 sport fishery was limited to approximately 3.5 miles of the LSR from the mouth of Rapid River downstream to the Salmon River Road Bridge. Only adipose fin-clipped salmon, which were of hatchery origin, could be retained in the fishery. Daily fishing hours were 0600 hrs. to 2000 hrs. MDT. Only barbless hooks were allowed. The daily bag limit was one salmon and the possession limit was two salmon, including jacks. The season limit was two salmon.

A sport harvest quota of 200, adipose fin-clipped salmon was set prior to the season. The quota was based on the harvestable surplus of the predicted run of hatchery spring chinook to the Rapid River FH and equal harvest sharing with the Nez Perce Tribe.

METHODS

Run Prediction

A number of runsize predictors were utilized to shape the sport fishing season. These included simple and linear regressions of adult return, cohort analyses, and damcount proportions. Predictors were produced by IDFG, the Nez Perce Tribe, and the *U.S. v. Oregon* Technical Advisory Committee (TAC).

IDFG conducted regression analyses using jack return to predict adults by utilizing the SYSTAT statistical package (Wilkinson 1997). Criteria used to evaluate the fit of the model used were the coefficient of determination (R^2), F-statistic (ANOVA, $p \leq 0.05$), and the significance of regression coefficients in the linear equation (t-statistic, $p \leq 0.05$). In addition, IDFG made a cohort prediction based on: 1) known returns of the cohort components from previous years, which provide an indication of year class survival; 2) age composition data; and 3) an estimate of the jack return based on migration

conditions. This predictor relied on the "known" performance of the age classes of the cohort that had already returned. We assumed that jacks from broodyear (BY) 95 would return at the same rate as the BY94 jacks (D. Cannamela, IDFG, pers. comm.).

The TAC developed a prediction for the Biological Assessment of Impacts of Proposed 1998 Fisheries in the Snake River Basin on Snake River Salmon and Steelhead Listed Under the Endangered Species Act (TAC 1998). The prediction was based on preseason estimates of the upriver spring and summer chinook runs at the mouth of the Columbia River converted to Lower Granite Dam. For Rapid River FH, TAC used an independent estimate by IDFG adjusted to equal 80% of the Lower Granite Dam hatchery projection of spring/summer chinook.

The Nez Perce Tribe used a combination of regression models to predict the Rapid River FH run. One regression was based on the relationship between the number of total chinook forecast to cross Lower Granite Dam by August 17 and the number arriving at the Rapid River FH weir, and the other regression utilized the April 30 adult count at Ice Harbor to predict the number of spring chinook adults arriving at the weir (J. Mauney, Nez Perce Tribe, pers. comm.).

Creel Survey

We operated two mandatory check stations to determine angler effort and harvest. The upstream check station was located at the highway pullout on the west side of Highway 95 approximately 200 yds below the mouth of Rapid River. The downstream check station was located across the road from the Riggins rodeo grounds, on the main Salmon River Road (#1614), ¼ mile east of the Salmon River Road Bridge, which crosses the Little Salmon River.

The check stations were operated from 0600 to 2000 hrs each day the season was open. Data collected from daily angler interviews included number of anglers in each party, total fishing time, number of salmon harvested, number of adipose fin-clipped salmon released, number of unmarked salmon released, and number of bull trout (*Salvelinus confluentus*) caught and released. Angler interview data were then used to estimate fishing effort, catch, harvest rates, and total harvest.

Considerable biological information was collected at the check stations. Each salmon encountered was measured to the nearest cm in fork length and then assigned an age according to the following classification system. Spring chinook <59 cm were classified as "jacks" or age 3 (one year in the ocean), 59 cm to 77 cm fish were age 4 (two years in the ocean), and those 77 cm and greater fish were age 5 (three years in the ocean)(R. Steiner, IDFG, pers. comm.). Fish were sexed by using sexual dimorphic characteristics. Check station attendants examined gonads of fish not showing external sexual characteristics to determine sex. Spring chinook that were not sexed were listed as "unknown" in relation to sex. Check station attendants also used a portable, electronic coded wire tag (CWT) detector to examine each salmon snout for the presence of a CWT. When a CWT was encountered, the snout was removed if the angler allowed. Snouts were preserved for future tag removal and reading. Check station attendants also checked all fish for the presence of a passive integrated transponder (PIT) tag with a portable, electronic PIT tag detector. Tag numbers were recorded if detected.

Rapid River Fish Hatchery Rack Return

As described by Lowell et al. (1995) and Hassemer (1991), spring chinook were trapped at a weir on Rapid River approximately 1.5 miles downstream from the hatchery facility. Spring chinook were trapped from May 20 through August 31, 1998 (R. Lowell, IDFG, pers. comm.). Since 1994, presence of chinook salmon at the weir with an adipose fin and no other fin clip denoted naturally produced chinook salmon, which were defined as a summer chinook salmon, regardless of run timing. Summer chinook salmon were released upstream of the hatchery to spawn. Chinook salmon with any fin clip were defined as spring chinook, regardless of run timing. They were retained at the hatchery for spawning, fishery use, or carcass distribution.

RESULTS

Run Prediction

Preseason predictions for the number of adult chinook salmon that would be intercepted at the Rapid River FH weir were as follows: 1) 1,344 total adults were estimated by linear regression (G. Mauser, IDFG, pers. comm.); 2) 3,447 hatchery adults were predicted by cohort analysis (D. Cannamela, IDFG, pers. comm.); 3) 2,330 total adults were estimated by damcount proportion (TAC 1998); 4) 3,200 total adults was the midpoint estimated by the April 30, Ice Harbor Dam regression (J. Mauney, Nez Perce Tribe, pers. comm.). A prediction of 2,450 adults was the preseason agreement between IDFG and Nez Perce Tribal technical staffs.

Creel Survey

We estimated that 15,915 hours were spent in 1998 to catch 205 fish during the 12 day Little Salmon River spring chinook season. Of all fish caught, 172 adipose fin-clipped fish were harvested (Table 1.). There were 22 salmon released that were not adipose fin-clipped and 11 released that were adipose fin-clipped. A total of 33 bull trout were caught and released during the season.

We found that 45% of all salmon sexed were males and 55% were females. A total of 172 salmon were measured during the creel survey. Age class breakdowns for those fish were: 0 (0%) "jacks" or age 3 fish, 42 (24.4%) age 4 adults, and 130 (75.6%) age 5 adults.

Creel clerks detected 16 CWTs in salmon snouts of which 4 were not collected at the anglers request. All 12 collected snouts contained tags which originated from Rapid River FH. We found that 9 of the 12 originated from the 1993 releases (age 5) and the other 3 originated from the 1994 releases (age 4).

Table 1. Season totals of estimated angling pressure, catch and harvest during the 1998 spring chinook season on the Little Salmon River, Idaho.

Date	Number Hours	Number Anglers	Number Chinook Kept	Number Chinook Released		Number Bull Trout (Released)
				Adipose	W/O Adipose	
June 5	2,967	356	12	1	0	11
June 6	2,709	405	7	0	3	2
June 7	1,509	286	9	0	7	2
June 8	565	133	9	0	0	2
Total	7,750	1,180	37	1	10	17
June 12	971	174	19	3	3	3
June 13	1,660	230	12	1	0	0
June 14	1,368	234	30	3	5	0
June 15	613	116	20	0	0	5
Total	4,612	754	81	7	8	8
June 19	1,013	157	14	0	2	0
June 20	1,221	179	9	2	1	0
June 21	852	148	11	0	1	7
June 22	467	92	20	1	0	1
Total	3,553	576	54	3	4	8
Season Total	**15,915**	**2,510**	**172**	**11**	**22**	**33**

Rapid River Fish Hatchery Rack Return

The total chinook salmon run that could have arrived at the Rapid River FH was estimated to be at least 2,423 fish. This included 1,633 fish (1,626 adults) collected at the Rapid River trap, of which 42 were classified as naturally produced summer chinook because they lacked any fin clips and 1,591 were classified as hatchery spring chinook due to fin-clips. An additional 172 hatchery spring chinook were harvested by sport anglers in the LSR and 618 spring and summer chinook salmon were harvested by the Nez Perce Tribe in Rapid River. It is unknown if any chinook salmon were harvested by members of the Shoshone-Bannock Tribes. The estimated return of hatchery origin spring chinook to the LSR was 2,365, assuming a similar proportion of marked, hatchery spring chinook salmon in the Nez Perce Tribal harvest as collected at the Rapid River weir (97.4%), because the marked and unmarked components of the tribal fishery have not been reported. An unknown number of naturally produced and straying hatchery salmon may have bypassed Rapid River and spawned somewhere in the LSR.

DISCUSSION

Run Predictions

The range of preseason predictions encompassed the actual hatchery fish return to the LSR and Rapid River FH. The preseason forecast for the upriver run of spring chinook was 36,200 adults (Pettit 1997), of which the Snake River component comprised 34% (TAC 1998). The final number of hatchery spring chinook adults at Lower Granite Dam was estimated at 6,917 compared to the preseason prediction of 5,527 (TAC 1998). Based on our estimate, the spring chinook salmon escapement of hatchery adults to the LSR accounted for at least 34% of the adult hatchery spring chinook counted at Lower Granite Dam.

Creel Survey

The 1998 spring chinook sport fishery on the LSR was marked by high water conditions and slow fishing. Interest in the chance to catch a salmon was high apparently due to the success of the 1997 chinook season. There were 15,915 hours spent fishing for salmon on the LSR during the 1998 season. This compares to a total of 34,961 hours in the 58 days of the 1997 season (Janssen and Kiefer 1997), and 19,690 angler hours in nine days and 7,073 angler hours in 31 days of the 1992 and 1993 spring chinook salmon seasons, respectively (Janssen 1992, 1993).

Although the number of released, unclipped salmon was 22 or 10.7% of the total salmon catch, as many as nineteen of these fish may have been of hatchery origin. We estimated that about 10.8% of the BY93 (age 5) hatchery return did not possess a recognizable adipose fin-clip. Approximately 5% of the BY93 smolt release were missed by the fish marking crews (R. Lowell, IDFG, pers. comm.). Another 2-3% of the BY93 smolts had only partial clips of the adipose fin and we observed that a large portion of these fish were released by anglers as being unclipped fish. Another 3.8% of the BY93 smolts were only left pelvic fin-clipped and not adipose fin-clipped. Assuming the age composition of marked hatchery fish that were harvested was the same as marked hatchery salmon that were caught and released, 138 or

75.6% were age 5 chinook salmon from BY93. Expanding the marked hatchery component in the fishery to account for the unmarked hatchery fish (138/(1-0.108)) gives an expected component of 155 hatchery spring chinook salmon. Subtracting the marked component provides us with an estimate of 17 unmarked hatchery fish expected in the fishery. If all of these were harvested, then 17 of the 22 unmarked fish released were actually BY93 hatchery fish.

In addition to the BY93 unmarked hatchery fish, approximately 1.6% of the BY94 smolt release were missed by the fish marking crews (R. Lowell, IDFG, pers. comm.). There were no pelvic fin clips in BY94 and the number of partial clips was 2.7% for a total of 4.3% of the hatchery spring chinook not bearing adipose fin-clips. As with BY93, assuming the age composition of marked hatchery fish that were harvested was the same as marked hatchery salmon that were caught and released, 45 or 24.4% were age 4 chinook salmon from BY94. Expanding the hatchery component in the fishery to account for the unmarked hatchery fish (45/(1-0.043)) gives an expected component of 47 hatchery spring chinook salmon. Subtracting the marked component provides us with an estimate of 2 unmarked hatchery fish expected in the fishery. If all of these were harvested, then 2 of the 22 unmarked fish released were actually BY94 hatchery fish.

Similar to 1997, we expected more CWTs than we recovered in the creel survey (Janssen and Kiefer 1997). Approximately 14.7 % of the BY93 smolts and 16.7% of the BY94 smolts were marked with CWTs. We examined 172 salmon during the creel survey of which 75.6% or 130 were BY93 and 24.4% or 42 were BY94. Therefore we expected 26, (130*.147+ 42*.167), of those fish to have CWTs but detected only 16 (9.3%) CWTs. Reasons for the missing the tags are unclear. Previous return information for Idaho hatcheries indicates that salmon with a CWT and an adipose fin-clip return at a lesser rate than unmarked salmon. The difference between adipose fin-clipped salmon and adipose fin-clipped salmon with a CWT has not been fully evaluated at Rapid River FH. Also, this is the second year that portable CWT detectors were utilized in the chinook creel survey, although they have been used with a high rate of detection in the steelhead creel survey and in hatchery tests (K. Ball, IDFG, pers. comm.). The detection rate of CWTs in fish trapped at Rapid River FH was 12.1% (R. Lowell, IDFG, pers. comm.), which came closer to our expectation for detection.

Rapid River Fish Hatchery Rack Return

We anticipated the 1998 spring chinook run would be dominated by BY93 returns. The BY93 jack (age 3) return in 1996 was 751 whereas the BY94 jack return in 1997 was only 15. Because of very poor adult return in 1995 and subsequent low smolt release, we also expected few jacks as a harbinger of the 1999 return. Only 7 jacks returned in 1998. Unlike 1997, there was more difference between the adult age composition of harvested spring chinook salmon (24.4% age 4, 75.6% age 5) and the spring chinook trapped at Rapid River FH (16.5% age 4, 83.5% age 5). High water conditions during the fishery may have made smaller fish easier to land even though there were less of them in the run.

Using BY93 hatchery return information from Janssen and Kiefer (1997) and adding the estimated BY93 return to Rapid River FH of 1,322 spring chinook results in a smolt-to-adult survival of 0.45% to the hatchery weir and a total of 12,404 hatchery spring chinook accounted for. Adding in the 1997 harvest numbers (Kiefer 1998, Janssen and Kiefer 1997) and the 1998 sport and tribal harvest estimates for BY93 spring chinook of 130 BY93 spring chinook during the sport season and 513 BY93 spring chinook during the tribal season accounts for the composite of BY93 hatchery fish that returned to the LSR. This increases the survival estimate to 0.61% and accounts for 17,056 hatchery spring chinook

in the BY93 return.

Adding the BY94 jacks and age 4 fish returning to the Rapid River FH weir (262+15) indicates that the smolt to adult survival for BY94 spring chinook, through the age 4 return, was 0.07% for hatchery fish intercepted at the weir. Adding the BY94 sport (42) and estimated tribal (99) harvest during 1998 would increase the survival to 0.11% for hatchery spring chinook that returned to the LSR. For comparison, the smolt to adult survival of fish intercepted at the Rapid River FH weir for the 1964-68 broodyears averaged 0.64%. The smolt to adult survival of fish intercepted at the weir for the 1987-92 broodyears averaged 0.06%. The average smolt to adult survival of fish intercepted at the weir over 29 years of operation was 0.24% (R. Lowell et al. 1995).

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Submitted by:

Paul Janssen
Regional Fisheries Biologist

Sharon W. Kiefer
Anadromous Fishery Coordinator

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

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Virgil K. Moore, Chief
Bureau of Fisheries

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Bill Hutchinson
State Fishery Manager