2008 ANNUAL REPORT OF HATCHERY EVALUATION ACTIVITIES FOR SPRING CHINOOK SALMON AT DWORSHAK AND KOOSKIA NATIONAL FISH HATCHERIES

Brood Years 2006, 2007, and 2008

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Introduction

Dworshak National Fish Hatchery (NFH) is located at the confluence of the North Fork and the main stem Clearwater River near Ahsahka, Idaho. Construction of the hatchery was included in the authorization for Dworshak Dam and Reservoir (Public Law 87-847, October 23, 1962) to mitigate for losses of steelhead (*Oncorhynchus mykiss*) caused by the dam and reservoir. The hatchery was designed and constructed by the U.S. Army Corps of Engineers and has been administered and operated by the U.S. Fish and Wildlife Service since the first phase of construction was completed in 1969. In 1982 thirty 8-ft by 80-ft raceways were constructed under the Lower Snake River Compensation Plan (LSRCP) to provide rearing facilities for spring Chinook salmon (*O. tshawytscha*). The production program is designed to return 9,135 adult spring Chinook salmon to Lower Granite Dam by rearing and releasing 1.05 million spring Chinook salmon smolts into the Clearwater River annually.

Kooskia NFH is located about 1.5 miles east of Kooskia, Idaho, 0.5 miles upstream of the confluence of Clear Creek and the Middle Fork Clearwater River. In 1978, Kooskia NFH was included as part of the Dworshak Fishery Complex. Kooskia NFH is a U.S. Fish and Wildlife Service hatchery constructed to mitigate for water development programs in the Columbia River basin. Currently, the program calls for the release of 600,000 spring Chinook salmon smolts annually to provide sport and Tribal harvest opportunities in the Clearwater River. Because of production constraints, temperature considerations, and other factors, Kooskia NFH brood stock are held and spawned at Dworshak NFH. Dworshak NFH provides initial incubation of eggs for Kooskia NFH until the eye-up stage at which point they are enumerated and transported to Kooskia NFH for final rearing.

This report includes the stock origin and history of the programs, the smolt releases and emigration performances for Brood Year 2006, marking and tagging for Brood Year 2007, and the age composition of the rack returns, estimates of the sport and Tribal harvest, and estimates of smolt to adult survival for Brood Year 2008 at each hatchery. The predictions made for the 2008 adult return to each hatchery are reviewed and pre-season predictions for the adult returns to each hatchery in 2009 are presented.

Brood Stock Origin and History

Dworshak NFH

The Dworshak NFH spring Chinook salmon program was initially started using spring Chinook salmon stock from the Leavenworth and Little White Salmon NFH programs. Eggs were transferred from these facilities to Dworshak NFH and made up the smolt releases from 1983 to 1986 (**Table 1**). Since these stocks were very strongly influenced by transfers from Carson NFH to Leavenworth and Little White Salmon NFHs, the early Dworshak spring Chinook salmon stock was considered a Lower Columbia River derivative. The spring Chinook salmon program for brood years 1985 and 1986 consisted entirely of eggs that had been transferred to Dworshak NFH from Rapid River State Fish Hatchery (SFH). Rapid River State Fish Hatchery used spring Chinook salmon trapped at Hells Canyon Dam (considered an upper Snake River stock) as an original parent stock. Thus, smolts released from Dworshak NFH in 1987 and 1988 were entirely Rapid River stock, shifting the program away from using the Lower Columbia River Chinook stock. Since 1988, Dworshak NFH has maintained its program from returns to its own rack, with the exception of two years when the program was below full production. In 1995, releases from Dworshak NFH were one third Kooskia stock. Then in 2001 about one third of the Dworshak release was Rapid River stock (Lookingglass Fish Hatchery adults collected at Lower Granite Dam). The recent returns to Dworshak NFH (1989 and later) are referred to as Dworshak stock, since they are progeny of returns to Dworshak NFH, rather than direct products of transfers of Rapid River stock.

Table 1. Brood stock history of Dworshak NFH spring Chinook salmon smolts directly released from the hatchery, 1983-2008. (RR = Rapid River, KK = Kooskia, DW = Dworshak, LE = Leavenworth, LW = Little White Salmon).

Release Year	Brood Stock Composition
1983	75% LW, 12% RR, 13% LE
1984	100% LE
1985	68% LW, 32% LE
1986	100% LE
1987 – 1988	100% RR
1989 – 1994	100% DW
1995	66% DW, 34% KK
1996 – 2000	100% DW
2001	64% DW, 36% RR
2002-2008	100% DW

Kooskia NFH

The Kooskia NFH spring Chinook salmon program was started using a wide variety of stocks from the Lower Columbia River and Rapid River SFH. However, from 1973 through 1980, smolt releases had a very strong Lower Columbia River stock influence. Egg transfers of Lower Columbia River stock from Dworshak NFH in 1985 and 1986 resulted in smolt releases in 1987 and 1988 that were a mixed stock, referred to as Clearwater stock (**Table 2**). Since the Kooskia NFH program already had stock made up primarily of Lower Columbia River derivatives, the resultant program (1989 and later) retained that lineage, but was referred to as Kooskia stock. Differences in length frequency, ocean age class at return, and allele frequencies all supported a distinction between Dworshak and Kooskia stocks (Elliot and Pascho 1994).

In April 2007, 178,678 Dworshak stock smolts (reared at Kooskia) were released from Kooskia NFH to fulfill the smolt release goal at that hatchery and to evaluate any differences in run timing between Kooskia and Dworshak stocks. All the Dworshak NFH stock were marked with either coded-wire or blank wire tags in order to identify them when they returned. The I-Ocean adults returned in the spring of 2008.

Table 2. Brood stock history of Kooskia NFH spring Chinook salmon smolts directly released from the hatchery, 1971-2008. (RR = Rapid River, KK = Kooskia, LE = Leavenworth, SS = South Santiam, CL = Clearwater, LW = Little White Salmon, CA = Carson, WR = Wind River).

Release Year	Brood Stock Composition
1971	86% RR,14% WR
1972	100% RR
1973 - 1974	100% CA
1975	58% RR, 42% CA
1976	100% SS
1977	84% CA, 11% KK, 5% LW
1978	75% RR, 25% CA
1979	69% KK, 31% CA
1980	31% KK, 69% CA
1981	64% CA, 19% KK, 17% RR
1982	100% CA
1983	65% KK, 35% LE
1984	89% KK, 11% RR
1985 - 1986	100% KK
1987 - 1988	100% CL
1989 - 2006	100% KK
2007	69% KK, 31% DW
2008	100%KK

[1] Powell stock are progeny from the IDFG LSRCP Program located on Walton Creek in the Lochsa River.

Brood Year 2006

Brood Year 2006 was established with the adult returns to Dworshak and Kooskia NFHs in 2006 (Dworkshak National Fish Hatchery 2006). Incubation and early rearing was completed in late spring 2007. Juveniles were coded-wire tagged for evaluation of adult contributions to future fisheries and brood stock collections and were re-stocked into raceways at final rearing densities in August, 2007. Final rearing was completed in early spring of 2008 and smolt releases were made in April, 2008.

Smolt Releases

The smolt release for BY06 was complicated by fish health issues that were first observed in January 2008 in light of a noticeable increase in daily mortalities by the production staff. Fish examined by the Idaho Fish Health Office had swollen gills and indications of bacterial gill disease. The Dworshak Complex HET met informally in late February to discuss the implications of deteriorating fish health to upcoming smolt releases potentially scheduled for late March or early April. Under the direction and recommendation of the Idaho Fish Health Office, several treatments with Chloramine-T were administered in February and March. In March 2008, the Idaho FRO began monitoring flows and river conditions in the main stem Clearwater River and at Lower Granite Dam to aid in determining the optimum time for smolt releases. By the last part of March, flows were well below the levels considered normal or optimal for smolt emigration, further complicating issue of timing the smolt releases at Dworshak. Despite the awkward circumstances, a final Chloramine-T treatment was administered March 24-26 and the HET decided to release the fish April 2 and 3, 2008.

Dworshak NFH released 939,000 spring Chinook salmon smolts during two separate early evening releases into the North Fork Clearwater River on April 2 and 3, 2008. Mean total length at release was 118 mm. Arrangements were made with the U.S. Army Corps of Engineers to increase flow in the North Fork Clearwater River from 1,200 cfs to 5,000 cfs on those days, to help move the fish into the main stem Clearwater River. Releases were made in the early evening to help avoid predation.

Kooskia NFH released 649,601 Kooskia stock spring Chinook salmon smolts into Clear Creek at 6:00 pm on April 7, 2008. Mean total length at release was 122mm.

Emigration Performance and Survival

Smolts outfitted with PIT-tags were used to evaluate the effectiveness of the production programs at both Dworshak and Kooskia NFH. Information is collected at the various dams throughout the lower Snake and Columbia rivers and is used to provide estimates on emigration time and survival. PIT-tag detection histories also provide real-time data on adult return timing and a means to assess total return as adult fish are detected at Columbia and Snake river dams.

Dworshak NFH - A total of 49,381 PIT-tagged smolts were released at Dworshak NFH as part of the Comparative Survival Study conducted by the Fish Passage Center (FPC). The Comparative Survival Study (CSS) evaluates the effectiveness of using barges for transporting smolts past the Snake and Columbia River dams as opposed to allowing them to emigrate in river through the Federal Columbia River Power System (FCRPS).

The migration time to Lower Granite Dam ranged from 5.6 days to 88.3 days with a mean travel time of 33.6 days (n= 6,812). Ten percent arrived at Lower Granite Dam within 18.3 days; 50% and 90% arrived within 34.6 days and 45.08 days, respectively. Smolts that migrated through the hydropower system arrived at Bonneville Dam on average 52.1 days after release. Survival probabilities through the FCRPS were calculated using SURvival under Proportional Hazards 2.1 (SURPH) (Lady *et al.* 2001). The estimated survival for BY06 spring Chinook smolts to Lower Granite Dam was 73.6%, a decline from previous years. Comparatively, survival estimates for release years 1998 through 2007 ranged from 71% to 85%. The overall estimated survival to Bonneville Dam was 51.2%.

Kooskia NFH - A total of 9,900 PIT-tagged smolts were released onsite as part of the hatchery evaluation program at Kooskia NFH. The migration time to Lower Granite Dam ranged from 6.9 days to 78.1 days with a mean travel time of 30.5 days (n=1,877). Ten percent arrived at Lower Granite Dam within 17.1 days; 50% and 90% arrived within 30.5 days and 44.1 days, respectively. Smolts that migrated through the FCRPS arrived at Bonneville Dam on average 47.3 days after release (n= 87). Survival probabilities through the FCRPS were calculated using SURvival under Proportional Hazards 2.1 (SURPH) (Lady *et al.* 2001). The estimated survival for BY06 spring Chinook smolts to Lower Granite Dam was 63%. The overall estimated survival to Bonneville Dam was 54.4%.

Adult Contribution and Survival

Coded-wire tags (CWT) are used to estimate the contribution of adults to various commercial, sport and Tribal fisheries in the ocean, in the lower Columbia River, in the lower Snake River, and in the Clearwater River. CWT groups are also used to represent treatment and control groups for both on- and off-station research projects and provide information on the effectiveness of alternative production methods to increase the numbers of returning adults.

Two tag codes were used to represent the BY06 smolt releases at Dworshak NFH. At Kooskia NFH, CWT groups included one tag code and agency only wire, which was used to represent the Dworshak stock reared and released from Kooskia NFH (**Table 3**).

Just prior to release, 250 fish from each tag code group were checked for CWT to estimate retention rates. The retention rates for Dworshak NFH and Kooskia NFHs were 99% and 96%, respectively.

Table 3. Coded-wire tag release information for Brood Year 2006 spring Chinook salmon released from Dworshak and Kooskia NFHs in 2008.

Hatchery	Tag Code	Number of Tags[1]	Number of Unmarked Fish[2]	Mark Rate[3]	Purpose
DNFH	054133	59250	403,228	0.13	Contribution, Raceways B26 and B27
	054132	58664	417,858	0.14	Contribution, Raceways A8 and A9
KNFH	053575	107945	524385	0.17	Contribution, Run Timing, BP02

[1] Final tagged smolt release number is reported in RY08MARKS.xls.

[2] Final tagged smolt release subtracted from total smolt release. Total smolt releases are reported in the Final Release Summary.

[3] Mark rate is calculated using the total number of CWTs divided by the total release (tagged and unmarked fish combined).

Brood Year 2007

Brood Year 2007 was established with the adult returns to Dworshak and Kooskia NFHs in 2007 (Dworshak National Fish Hatchery 2007). Incubation, early rearing and CWTing was completed in 2008. **Table 4** lists the tag codes, the number tagged, and the number of unmarked fish each tag code represents at each hatchery. Brood Year 2007 will be released in the spring of 2009.

Table 3. Coded-wire tag release information for Brood Year 2007 spring Chinook salmon released from Dworshak and Kooskia NFHs in 2009.

Hatchery	Tag Code	Number of Tags	Number of Unmarked Fish	Mark Rate	Purpose
DNFH	053572	67,690	437,350	0.13	Contribution, Raceways B23 and B24
	053573	65,226	444,482	0.13	Contribution, Raceways A8 and A9
KNFH	052987	113,406	442,030	0.20[2]	Contribution, Run Timing, BP05 and 06
	05[1]	47,277	442,030	0.10[2]	Contribution, Run Timing, BP 05

[1] Agency only wire.

[2] Mark rate is calculated using the total number of CWTs divided by the total release (tagged and unmarked fish combined).

Brood Year 2008

Brood Year 2008 was established with the adult returns to Dworshak and Kooskia NFHs in 2008 (Dworkshak National Fish Hatchery 2008).

Adult Returns to the Clearwater River

Estimating the numbers of Dworshak and Kooskia NFH origin adult spring Chinook salmon that returned to the Clearwater River in 2008 is challenging because of the uncertainties associated with the mixed stock fisheries and harvests that occur in the Clearwater River basin. The adults that entered the Clearwater River in 2008 originated from smolt release programs at Dworshak NFH, Kooskia NFH, Idaho Department of Fish and Game (IDFG) facilities at Powell, Red River, Selway River, and Crooked River, and Nez Perce Tribal Hatchery program releases in Lolo Creek, Newsome Creek, and the Selway River in 2005, 2006, and 2007. The estimated return of adults for Dworshak and Kooskia NFH stocks is based on the numbers of adults that enter the

racks at Dworshak and Kooskia NFHs, estimates of the contribution of these two stocks to the sport harvest, and the Tribal harvests. Currently, estimates of the number of fish that escape to the river are not made, giving estimates that are biased low. Methods for estimating escapement are being developed in conjunction with the Idaho Department of Fish and Game.

Estimates of the numbers of adults and jacks harvested in the sport fishery for Dworshak and Kooskia hatcheries are based on expanded numbers of coded-wire tags collected during sport fish harvest surveys by the IDFG. These tags are expanded by tagging and sample rates, across multiple creel survey river sections (Cassinelli, IDFG and Barrett, IDFG, personal communication). The Nez Perce Tribe provides estimates of tribal harvest, most of which occurs at the ladder at Dworshak NFH and in Clear Creek below the adult trap at Kooskia NFH. In 2008, the IDFG used expanded PIT-tag information from adults crossing Lower Granite Dam to estimate the total return of each spring Chinook salmon stock to the Clearwater River. Using the estimated total for each stock, the escapement of each stock (those fish not returning to a rack or harvested in a fishery) was calculated by subtracting the rack returns and harvest estimates. At this time, the methodology is still under development and evaluation, so any numbers reported are provisional and subject to change in future reports. It is understood that PIT tag expansions in adult returns are likely biased low due to possible tag loss and/or differential mortality from release to return. Currently, IDFG is analyzing the degree of any possible bias in hopes of being able to correct these expansions in the future (Personal Communication, John Cassinelli, Idaho Department of Fish and Game).

Dworshak NFH - The adult ladder at Dworshak NFH was opened on June 16 and was operated intermittently through August 12. On a weekly basis starting July 2, adults were moved from the collection pond to the spawning room where they were sexed, measured for length, checked for tags, and transferred to the adult holding ponds to mature for spawning. Seven inventories were conducted from July 2 through September 4. **Table 5** lists the numbers of adult spring Chinook inventoried on each date. **Table 6** lists the total number of adults that entered the rack at Dworshak NFH and the sport and Tribal harvests for the last five years. The historical numbers, from 1987 through 2008, are listed in **Appendix Table 1.**

Table 5. Ladder operation for BY08 SCS trapped at Dworshak NFH (Dworkshak National Fish Hatchery 2008).

Date of Inventory	Number of Fish
2 July	145
9 July	371
16 July	481
23 July	293
4 August	275
14 August[1]	276
4 September[1]	2
Trap Mortalities	14
Total	**1,857**

[1] Broodstock collection for NPT outplanting.

Table 6. Adult returns of Dworshak NFH adult spring Chinook salmon to the Clearwater River from 2004-2008.

Return Year	Rack Return	Sport Harvest	Tribal Harvest	Total Run
2004	2,356	3,608	419	6,383
2005	882	606	102	1,590
2006	1,354	589	392	2,335
2007	2,110	256	198	2,564
2008	**1,857**	**1,109**	**159[1]**	**3,125**
Mean	1,712	1,234	541	3,199

[1]Total number based on angler interview and is not an expanded estimate.

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Kooskia NFH - The adult trap at Kooskia NFH was opened May 15 and was operated continuously until it was closed on July 14. On a weekly basis starting June 18, adults were removed from the holding pond, sexed, measured for length, checked for marks and tags, and then transported to Dworshak NFH for holding until mature for spawning. Adults identified as natural fish were passed above the weir to spawn naturally as part of the ISS project. In addition, excess fish were provided to the Nez Perce Tribe for outplanting and subsistence purposes. Six inventories were conducted from June 18 through July 14. The total rack return was 816, including 15 fish passed above the weir to spawn naturally, 206 fish that were given to the Nez Perce Tribe for subsistence, and 19 trap mortalities. A total of 576 adults were transported to Dworshak NFH. **Table 7** lists the numbers of fish inventoried on each date. **Table 8** lists the total number of adults that entered the trap at Kooskia NFH and the sport and Tribal harvests.

Table 7. Ladder operation for BY08 SCS trapped at Kooskia NFH (Kooskia National Fish Hatchery 2008).

Date of Inventory	Transported to Dworshak	Passed Upstream	Tribal Subsistence	Trap Mortalities	Grand Total
18 June	204	0	0	0	204
24 June	42	1	0	0	43
30 June	173	4	0	0	177
1 July	55	2	0	0	57
7 July	102	6	0	0	108
14 July	0	2	206	19[1]	227
Total	**576**	**15**	**206**	**19**	**816**

[1] Date of trap mortalities is unknown.

Table 8. Adult returns of Kooskia NFH adult spring Chinook salmon to the Clearwater River from 2004-2008.

Return Year	Rack Return	Sport Harvest	Tribal Harvest	Total Run[1]
2004	718	2195	389	3,302
2005	270	53	173	496
2006	670	73	65	808
2007	589	128	166	883
2008	**816**	**623**	**132[2]**	**1,571**
Mean	613	614	423	1,412

[1] Does not include escapement.
[2] Actual harvest estimate not reported. Idaho FRO estimate

Age Composition of the Hatchery Rack Return

Adult spring Chinook salmon return after spending 1, 2, or 3 years in the ocean. A very small number of individuals return as 0's, having returned to the hatchery the same year as they were released as smolts, and in some very exceptional years, some fish return after 4 years in the ocean. The nomenclature used to describe the age at return is I-, II-, or III-Ocean, fish. Scales are commonly used to determine age, but with spring Chinook salmon at Dworshak and Kooskia NFHs, we have observed that scales are often re-absorbed and are severely degenerated by the time the adults enter the hatchery. Therefore, scale interpretation is very difficult if not impossible. In lieu of scales, our office has developed an alternative method based on the lengths of individuals of known age using coded-wire tag information accumulated over the past 20 years. Fork length categories for each class is as follows: I-Oceans are 56 cm or less, II-Oceans are 57 through 81 cm, and III-Oceans are larger than 81 cm, fork length. Males are generally larger than females on average but attempts to break down the run into age classes by sex have been discontinued because of the difficulty in distinguishing males and females at the time of inventory. Sexually distinguishing characteristics do not usually begin to develop until the time of sexual maturity and spawning.

Dworshak NFH - Age composition for spring Chinook salmon returning to the Dworshak NFH rack is listed in **Table 9**. The 2008 return year is typical of most years in that the percentages for the three age classes are very close to the five year average. The historical numbers, from 1984 to 2008, are listed in **Appendix Table 3.**

Table 9. Number and percent of I-, II-, and III-Ocean spring Chinook salmon adults returning to the Dworshak NFH rack, 2004-2008.

Return Year	I-Ocean	%	II-Ocean	%	III-Ocean	%	Unmeasured	Rack Return
2004	142	6	2077	88	137	6	0	2356
2005	74	8	686	78	122	14	0	882
2006	62	5	1,136	84	156	11	0	1,354
2007	702	33	809	39	599	28	0	2,110
2008	319	17	1,201	65	337	18	0	1,857
Mean	**260**	**14**	**1,182**	**71**	**270**	**15**	**0**	**1,712**

Kooskia NFH - Age composition for spring Chinook salmon returning to Kooskia NFH is listed in **Table 10.** The age composition for the 2008 return is typical of most years in that the percentages for the various age classes are close the five year averages. The historical numbers from 1972 to 2008 are listed in **Appendix Table 4**.

Table 10. Number and percent of I-, II-, and III-Ocean spring Chinook salmon adults returning to the Kooskia NFH rack, 2004-2008.

Year	I-Ocean	%	II-Ocean	%	III-Ocean	%	Unmeasured	Rack Return
2004	15	2	682	95	21	3	0	718
2005	29	11	202	75	39	14	0	270
2006	7	1	617	92	46	7	0	670
2007	257	44	148	25	184	31	0	589
2008	107	13	647	79	62	8	0	816
Mean	**83**	**14**	**459**	**73**	**70**	**13**	**0**	**612**

Smolt to Adult Survival

The ability of smolts to successfully migrate to the ocean and return as adults is an important and useful measure of smolt quality and program success. The measure is referred to as the Smolt-to-Adult-Return rate, or SAR. Spring Chinook salmon spend one, two, or three years in the ocean before returning as adults. Thus, estimating SAR for any given brood year requires determining the contribution of each age class within each respective adult return for the next three years. The adults that returned in 2008 were composed of I-Ocean adults that were released as smolts in 2007 (brood year 2005), II-Ocean adults that were released as smolts in 2006 (brood year 2004), and III-Ocean adults that were released as smolts in 2005 (brood year 2003). With the return of the III-Ocean adults in 2008, estimating the SAR for Brood Year 2003 can be completed. In addition we have the first I-Ocean returns for Brood Year 2005 and the II-Ocean adult returns for Brood Year 2004.

Estimating SAR is further complicated by having to account for the distribution of those age classes among various fishery programs that make up the total adult return; adults returning to

the respective hatchery rack, the harvest in sport and Tribal fisheries, research, other programs where adults may be accounted for, and the escapement in the Clearwater River. The estimated numbers of Dworshak and Kooskia NFH spring Chinook in the sport and Tribal harvest are not reported by age class. The age classes are estimated by applying the age class percentages in the hatchery rack, making the assumption that harvest was in direct proportion to the rack return.

Dworshak NFH - The IDFG reported 166 Jacks (I-Ocean), 846 II-Ocean, and 97 III-Ocean adults of Dworshak NFH stock harvested in the sport fishery. The Nez Perce Tribe reported a total of 21 Jacks, 138 adults (II- and III-Oceans adults combined) of Dworshak NFH stock harvested in the Tribal fishery in the North Fork Clearwater River. The percent of II and III-Ocean adults in the Dworshak NFH rack (I-Ocean adults excluded) was 78% and 22%, respectively. These percentages were applied to the Tribal harvest totals to estimate the II and III-Ocean ages classes in that fishery. **Table 11** lists the numbers of Dworshak NFH spring Chinook salmon of each age class in the hatchery rack, the sport fishery, and the Tribal fishery during 2008. The historical age compositions of the sport and Tribal harvests for the Dworshak stock, by return year, are listed in **Appendix Tables 7** and **8**, respectively.

Table 11. The estimated number of Dworshak NFH spring Chinook salmon adults of each ocean age class in the various fishery programs in the Clearwater River for the 2008 adult return.

Programs	**I-Ocean BY05**	**II-Ocean BY04**	**III-Ocean BY03**	**Total**[1]
Hatchery Rack	319	1201	337	1,857
Sport Harvest	166	846	97	1,109
Tribal Harvest	21	125	13	159
Total	**506**	**2,172**	**447**	**3,125**

[1] Includes 14 measured trap mortalities.

Table 12 lists the numbers of smolts released, and numbers and percent survival of adults returning by age class for Brood Years 2003 through 2006 (release years 2005 to 2008). The historical numbers, from Brood Years 1986 to 2006 (release years 1988 to 2008) are listed in **Appendix Table 5**. Estimated smolt-to-adult-return, or survival, for Brood Year 2003, released as smolts in 2005, was 0.1460%, much lower than the 18 year average of 0.43% for Brood Years 1984 to 2002.

Table 12. Brood Year, release year, number of smolts released, and the numbers and percent survival of adult returns to Dworshak NFH by age class for Brood Years 2003 to 2006.

Brood Year	Release Year	Smolts Released[1]	I-Ocean (% Return)	II-Ocean (% Return)	III-Ocean (% Return)	Total (% Return)
2003	2005	1,072,359	86 (0.008%)	1,035 (0.097%)	477 (0.044%)	1,568 (0.146%)
2004	2006	1,007,738	832 (0.083%)	2,171 (0.215%)		
2005	2007	963,211	506 (0.053%)			
2006	2008	939,000				

[1] Releases at hatchery only and does not include off-site releases or fry/fingerling releases.

Kooskia NFH - The Idaho Department of Fish and Game reported 623 fish of Kooskia NFH stock harvested, 566 that were adults (II and III-Ocean adults combined). The Nez Perce Tribe reported 17 jacks and 115 II and III-Ocean adults of Kooskia NFH stock harvested in the Tribal fishery in Clear Creek. The percent of II and III-Ocean adults in the Kooskia NFH rack (I-Ocean adults excluded) was 79 and 8%, respectively. These percentages were applied to the Tribal harvest to estimate the II and III-Ocean ages classes in that harvest. **Table 13** lists the numbers of Kooskia NFH spring Chinook salmon of each age class in the hatchery rack, the sport fishery, and the Tribal fishery during 2008. The historical age compositions of the sport and Tribal harvests for the Kooskia stock, by return year, are listed in **Appendix Tables 9** and **10**, respectively. No estimate of the escapement is provided for reasons mentioned above.

Table 13. The estimated number of Kooskia NFH spring Chinook salmon adults of each ocean age class in the various fishery programs in the Clearwater River for the 2008adult return.

Program	**I-Ocean BY05**	**II-Ocean BY04**	**III-Ocean BY03**	**Total[1]**
Hatchery Rack	107	647	62	816
Sport Harvest	57	546	20	623
Tribal Harvest	17	104	11	132
Total	**181**	**1,297**	**93**	**1,571**

[1] Includes 19 measured trap mortalities.

Table 14 lists the numbers of smolts released and the estimated survival of each returning age class for Brood Years 2003 to 2006 (Release Years 2005 to 2008). These data have been expanded to include harvest estimates from the sport and Tribal fisheries. The historical numbers, for Brood Years 1986 to 2003, are listed in **Appendix Table 6**. Estimated smolt-to-adult-return, or survival, for Brood Year 2003, released as smolts in 2005, was 0.054%, significantly lower than the 18 year average of 0.42% for Brood Years 1986 to 2003.

Table 14. Release year, number of smolts released, and the numbers and percent survival of adult returns to Kooskia NFH by age class for Brood Years 2003 to 2006.

Brood Year	Release Year	Smolts Released[1]	I-Ocean (% Return)	II-Ocean (% Return)	III-Ocean (% Return)	Total (% Return)
2003	2005	624,967	9 (0.001%)	233 (0.037%)	93 (0.015%)	335 (0.054%)
2004	2006	637,334	415 (0.065%)	1,297 (0.204%)		
2005	2007	569,565[2]	181 (0.032)			
2006	2008	649,601[3]				

[1] Releases at hatchery only and does not include off-site releases or fry/fingerling releases.
[2] 178,687 were of Dworshak NFH stock, all marked with coded-wire tags.
[3] 161, 649 were of Dworshak NFH stock; 111,138 were marked with coded-wire tags.

Coded-Wire Tag Recoveries

Dworshak and Kooskia NFHs have been participating in the Pacific States Marine Fisheries Commission's (PSMFC) Regional Mark Processing Center (RMPC) since it went into operation in 1977. The RMPC maintains the Regional Mark Information System (RMIS), the central database for all the coded-wire tagging programs in the Pacific Northwest, Canada, and Alaska. Data is taken from all the various research, commercial, sport, and Tribal fisheries activities in the Ocean and Columbia River basin.

All spring Chinook salmon returning to Dworshak and Kooskia NFHs are scanned for a coded-wire tag. Fish detected with coded-wire tags have their snouts removed after being spawned or before excess broodstock are removed from the hatchery for other management programs. Snouts are stored until the tags can be physically recovered and read. All the coded-wire tag information is assimilated into databases and reported to the Pacific States Marine Fisheries Commission (PSMFC) for inclusion into their Regional Mark Information System (RMIS) database. These data are used to estimate the contribution of Dworshak and Kooskia NFH stocks to various Ocean, Columbia River, Snake River, and Clearwater sport and Tribal fishery programs.

In 2008, a total of 209 coded-wire tags were recovered from Dworshak NFH stock (56 for BY05, 125 for BY04, and 28 for BY03). A total of 127 were recovered from Kooskia NFH stock (0 for BY05, 124 for BY04, and 3 for BY03). Brood year 2005 releases from Kooskia NFH consisted entirely of Dworshak stock reared at Kooskia NFH to evaluate the occurrence of differences in run timing between Kooskia and Dworshak stocks. Although the 2008 adult returns complete the life cycle for BY03, it will be at least two years before all the coded-wire tag information recovered from the various downriver commercial, sport, and Tribal fisheries has been submitted to RMIS. Therefore, the contribution of BY03 to those fisheries will not be reported until 2010.

Adult PIT Tag Interrogations

During the 2008 migration, 504 spring Chinook adults of Dworshak origin were interrogated at Bonneville Dam; 324 were subsequently interrogated at Lower Granite Dam resulting in a dam conversion rate of 0.64. The mean reach travel time was 18 days ranging from 9 to 58 days, Of the 324 interrogated at Lower Granite Dam, 67 were recovered at Dworshak NFH, a conversion rate of 0.21. The reduced conversion rate most likely results from the intermittent operation of the adult ladder at Dworshak; thereby, reducing the likelihood of collecting all PIT tagged adults. The first detection date for Dworshak origin spring Chinook at Bonneville was April 3rd. Ten, 50 and 90% of Dworshak adults passed Bonneville Dam on April 14th, April 30th and May 6th, respectively. Dworshak origin adult spring Chinook began passing Lower Granite Dam on April 27th. Ten, 50 and 90% of the run had passed Lower Granite on May 10, May 26 and June 11, respectively.

The dam conversion rate from Bonneville Dam to Lower Granite Dam for Kooskia spring Chinook was 1.0 (n=7). The mean reach travel time was 17 days ranging from 10 to 28 days. The first detection dates for Kooskia origin adults at Bonneville Dam was April 21st. Ten, 50 and 90% of the Kooskia orign adults passed Bonneville Dam on April 21st,May 8th and May 15th, respectively. The first detection at Lower Granite Dam occurred on June 13th with 10%, 50%

and 90% of adults passing on May 6, May 19th and May 31st. One PIT tagged adult was recovered at the Kooskia trap, a conversion rate of 0.14.

Early Rearing Container Evaluation

In September, 2008, the production staff at Dworshak NFH submitted a proposal to the Dworshak Complex Hatchery Evaluation Team for the evaluation of several different styles of early rearing containers for spring Chinook salmon in lieu of using raceways. The study was designed to continue for two to three years with the intention of making recommendations on the optimum container to use for early rearing. Eventually, plans call for the construction of a separate nursery for the spring Chinook salmon program. The study will be initiated in the spring of 2009 with Brood Year 2008. Fry will be stocked directly from the nursery into seven circular tanks, four stainless steel rectangular tanks, and into one raceway used as a control. Growth, mortality, and water quality will be monitored from March through June, 2009.

2008 Run Predictions

Dworshak NFH

Using regression models, predicted returns totaled 4,825. Actual number of Dworshak NFH Chinook salmon estimated to have returned to the Clearwater River was 3,125 (see **Table 11**). The predicted estimate over-estimated II- and III-Ocean returns and under-estimated the number of I-Ocean fish returning. **Table 15** lists the predicted returns, and the expanded actual returns of all three age classes of adults in 2008.

Table 15. Predicted and calculated returns of Dworshak NFH spring Chinook salmon by ocean age class, 2008. Includes sport and tribal harvest estimates.

Ocean Age Class	Prediction	Total Return
I-Ocean	457	506
II-Ocean	3,814	2,172
III-Ocean	554	447
Total	4,825	3,125

Kooskia NFH

Using regression models, predicted returns totaled 2,515. Actual number of Kooskia NFH Chinook salmon estimated to have returned to the Clearwater River was 1,571 (see **Table 13**). The predicted estimate significantly over-estimated the II-Ocean returns and under-estimated the

number of I-Ocean fish returning. **Table 16** lists the predicted returns, and the expanded actual returns of all three age classes of adults in 2008.

Table 16. Predicted and calculated returns of Kooskia NFH spring Chinook salmon by ocean age class, 2008. Includes sport and tribal harvest estimates.

Ocean Age Class	Prediction	Total Return
I-Ocean	114	816
II-Ocean	2,285	623
III-Ocean	116	132
Total	**2,515**	**1,571**

2009 Run Predictions

Our forecast for the 2009 spring Chinook salmon return to the Clearwater River from Dworshak and Kooskia NFHs is given in **Table 16**. Brood stock requirements are 1,000 adults at Dworshak NFH and 600 for Kooskia NFH. The Idaho Department of Fish and Game and the Nez Perce Tribe will likely open sport and tribal fisheries in the Clearwater River in the spring of 2009 after dam counts of PIT tagged adults provide actual estimates of returning adults.

Table 17. Predicted returns of spring Chinook salmon to the Clearwater River from the Dworshak Fishery Complex by ocean age class, 2009, including sport and tribal harvest as well as rack return.

Ocean Age Class	Dworshak NFH	Kooskia NFH
I-Ocean	819	424
II-Ocean	4,604	2,933
III-Ocean	42	0
Total	**5,465**	**3,357**

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Appendix Table 1. Adult returns of Dworshak NFH adult spring Chinook salmon to the Clearwater River from 1987-2008.

Return Year	Rack Return	Sport Harvest	Tribal Harvest	Escapement[1]	Total Run
1987	2,017	na	160	na	2,177
1988	1,972	na	240	na	2,212
1989	1,700	na	346	na	2,046
1990	2,042	na	514	na	2,556
1991	165	na	0	na	165
1992	370	na	160	na	530
1993	823	na	43	na	866
1994	74	na	0	na	74
1995	125	na	0	na	125
1996	963	na	24	na	987
1997	3,150	693	835	na	4,678
1998	915	99	182	na	1,196
1999	800	na	36	na	836
2000	3,202	4,095	1,173	na	8,470
2001	4,018	8,355	531	na	12,904
2002	2,157	3,542	794	na	6,493
2003	3,422	2,228	1,445	na	7,095
2004	2,356	3,608	419	na	6,383
2005	882	606	102	na	1,590
2006	1,354	589	392	na	2,335
2007	2,110	256	198	na	2,564
2008	1,857	1,109	159[1]	na	3,125

[1] Estimates of escapement are not available for years 1987 to 2008
[2] Total number based on angler interview and is not an expanded estimate.

Appendix Table 2. Adult returns of Kooskia NFH adult spring Chinook salmon to the Clearwater River from 1987-2008.

Return Year	Rack Return	Sport Harvest	Tribal Harvest	Escapement[1]	Total Run
1987	687	na	50	na	737
1988	595	na	72	na	667
1989	973	na	58	na	1,031
1990	1,141	na	130	na	1,271
1991	467	na	na	na	467
1992	312	na	na	na	312
1993	1,180	na	na	na	1,180
1994	232	na	na	na	232
1995	40	na	na	na	40
1996	202	na	na	na	202
1997	1,657	45	12	na	1,714
1998	408	0	20	na	428
1999	157	na	1	na	158
2000	1,581	21	10	na	1,612
2001	2,261	6,397	834	na	9,492
2002	1,037	1,544	683	na	3,264
2003	965	426	164	na	1,555
2004	718	2,195	389	na	3,302
2005	270	53	173	na	496
2006	670	73	65	na	808
2007	589	128	166	na	883
2008	816	623	132[2]	na	1,571

[1] Estimates of escapement are not available for years 1987 to 2008.
[2] Actual harvest estimate not reported. Idaho FRO estimate based on the average harvest reported for 2004, 2005, 2006, and 2008.

Appendix Table 3. Number and percent of I-, II-, and III-Ocean spring Chinook salmon adults returning to the Dworshak NFH rack from1987 to 2008. Percentages do not include unmeasured adults.

Return Year	I-Ocean	%	II-Ocean	%	III-Ocean	%	Unmeasured	Rack Return
1984	14	(17)	52	(63)	16	(20)	0	82
1985	13	(4)	281	(85)	35	(11)	5	334
1986	78	(15)	346	(67)	91	(18)	0	516
1987	25	(1)	1,604	(80)	376	(19)	12	2,017
1988	163	(8)	569	(29)	1,240	(63)	0	1,972
1989	156	(9)	1,322	(78)	221	(13)	1	1,700
1990	7	(0.3)	1,892	(93)	135	(6.7)	8	2,042
1991	16	(10)	77	(47)	72	(43)	0	165
1992	23	(6)	286	(82)	40	(12)	21	370
1993	9	(1)	452	(55)	359	(44)	3	823
1994	3	(4)	30	(41)	41	(55)	0	74
1995	83	(66)	36	(29)	6	(5)	0	125
1996	275	(28)	663	(69)	25	(3)	0	963
1997	12	(0.4)	2,380	(76)	740	(23.6)	18	3,150
1998	11	(1)	176	(19)	728	(80)	0	915
1999	670	(84)	78	(10)	52	(6)	0	800
2000	221	(7)	2,827	(90)	104	(3)	0	3,202
2001	36	(1)	3,235	(80)	747	(19)	0	4,018
2002	62	(3)	1,480	(69)	615	(28)	0	2,157
2003	580	(17)	478	(14)	2,364	(69)	0	3,422
2004	142	(6)	2,077	(88)	137	(6)	0	2,356
2005	74	(8)	686	(78)	122	(14)	0	882
2006	62	(5)	1,136	(84)	156	(11)	0	1,354
2007	702	(33)	809	(39)	599	(28)	0	2,110
2008	319	(17)	1,201	(65)	337	(18)	0	1,857

Appendix Table 4. Number and percent of I-, II-, and III-Ocean spring Chinook salmon adults returning to the Kooskia NFH rack from1972 to 2008. Percentages do not include unmeasured adults.

Return Year	I-Ocean	%	II-Ocean	%	III-Ocean	%	Unmeasured	Rack Return
1972	5	(100)	0	(0)	0	(0)	0	5
1973	5	(10)	45	(90)	0	(0)	0	50
1974	16	(30)	35	(66)	2	(4)	0	53
1975	15	(5)	284	(87)	27	(8)	0	326
1976	409	(51)	286	(36)	106	(13)	0	801
1977	333	(11)	2,539	(84)	154	(5)	0	3,026
1978	23	(1)	1,676	(82)	336	(17)	0	2,035
1979	11	(3)	100	(27)	264	(70)	0	375
1980	9	(13)	55	(82)	3	(5)	0	67
1981	1	(0.4)	168	(68)	78	(31.6)	0	247
1982	3	(1)	116	(45)	139	(54)	0	258
1983	1	(0.3)	231	(61.7)	141	(38)	0	373
1984	55	(16)	80	(23)	206	(61)	0	341
1985	26	(5)	449	(85)	54	(10)	0	529
1986	21	(7)	159	(56)	103	(37)	0	283
1987	16	(2)	607	(88)	64	(10)	0	687
1988	39	(7)	363	(61)	193	(32)	0	595
1989	107	(11)	717	(74)	142	(15)	7	973
1990	11	(1)	921	(81)	209	(18)	0	1,141
1991	10	(2)	98	(21)	350	(77)	9	467
1992	14	(5)	239	(82)	38	(13)	21	312
1993	11	(1)	749	(64)	409	(35)	11	1,180
1994	1	(0.4)	96	(41.6)	135	(58)	0	232

Appendix Table 4. Continued.

Return Year	I-Ocean	%	II-Ocean	%	III-Ocean	%	Unmeasured	Rack Return
1995[1]	21	(52)	7	(18)	12	(30)	0	40
1996	86	(43)	113	(56)	3	(1)	0	202
1997	7	(0.4)	1,523	(92)	127	(7.6)	0	1,657
1998	1	(0.3)	200	(49)	207	(51)	0	408
1999	72	(46)	28	(18)	57	(36)	0	157
2000	966	(61)	604	(38)	11	(1)	0	1,581
2001	28	(1)	2,137	(95)	96	(4)	0	2,261
2002	14	(1)	852	(82)	171	(17)	0	1,037
2003	97	(10)	71	(7)	797	(83)	0	965
2004	15	(2)	682	(95)	21	(3)	0	718
2005	29	(11)	202	(75)	39	(14)	0	270
2006	7	(1)	617	(92)	46	(7)	0	670
2007	257	(44)	148	(25)	184	(31)	0	589
2008	107	(13)	647	(79)	62	(8)	0	816

Appendix Table 5. Brood Year, release year, number of smolts released, and the numbers and percent survival of adult returns to Dworshak NFH by age class for Brood Years 1986 to 2003. Estimates include sport and Tribal harvest numbers for years when those fisheries occurred., and estimates of escapement, starting with returns in 2008.

Brood Year	Release Year	Smolts Released[1]	I-Ocean (% Return)	II-Ocean (% Return)	III-Ocean (% Return)	Total (% Return)
1986	1988	1,547,219	187 (0.012%)	2,370 (0.153%)	72 (0.005%)	2,629 (0.170%)
1987	1989	1,651,472	9 (0.001%)	77 (0.005%)	59 (0.004%)	145 (0.009%)
1988	1990	1,251,247	16 (0.001%)	417 (0.033%)	378 (0.030%)	811 (0.065%)
1989	1991	1,094,884	33 (0.003%)	476 (0.043%)	41 (0.004%)	591 (0.054%)
1990	1992	959,369	9 (0.001%)	30 (0.003%)	7 (0.001%)	46 (0.005%)
1991	1993	7,222	3 (0.042%)	36 (0.498%)	26 (0.360%)	65 (0.900%)
1992	1994	1,278,273	83 (0.006%)	679 (0.053%)	937 (0.073%)	1,699 (0.133%)
1993	1995	1,311,445	282 (0.022%)	3,708 (0.283%)	909 (.069%)	4,899 (0.374%)
1994	1996	102,903	15 (0.015%)	274 (0.266%)	56 (0.054%)	345 (0.335%)
1995	1997	53,078	13 (0.024%)	.82 (0.154%)	246 (0.463%)	341 (0.642%)
1996	1998	973,400	700 (0.072%)	7,649 (0.786%)	2,463 (0.253%)	10,812 (1.111%)
1997	1999	1,044,511	525 (0.050%)	10,372 (0.993%)	1397 (0.134%)	12,294 (1.177%)
1998	2000	1,017,873	69 (0.007%)	4,991 (0.490%)	5,299 (0.521%)	10,359 (1.018%)
1999	2001	333,120	105 (0.032%)	892 (0.268%)	269 (0.081%)	1,266 (0.380%)
2000	2002	1,000,561	904 (0.090%)	5,891 (0.589%)	1,545 (0.154%)	8,340 (0.834%)
2001	2003	1,033,982	223 (0.022%)	1,260 (0.122%)	199 (0.019%)	1,682 (0.163%)
2002	2004	1,078,923	85 (0.008%)	2,050 (0.190%)	762 (0.071%)	2,897 (0.269%)
2003	2005	1,072,359	86 (0.008%)	1,035 (0.097%)	477 (0.044%)	1,568 (0.146%)
2004	2006	1,007,738	832 (0.083%)	2,171 (0.215%)		

Appendix Table 5 (Cont.).

Brood Year	Release Year	Smolts Released[1]	I-Ocean (% Return)	II-Ocean (% Return)	III-Ocean (% Return)	Total (% Return)
2005	2007	963,211	506 (0.053%)			
2006	2008	939,000				

[1] Releases at hatchery only and does not include off-site releases or fry/fingerling releases.

Appendix Table 6. Brood Year, release year, number of smolts released, and the numbers and percent survival of adult returns for Kooskia NFH by age class for Brood Years 1986 to 2003. Estimates include sport and Tribal harvest numbers for years when those fisheries occurred.

Brood Year	Release Year	Smolts Released[1]	I-Ocean (% Return)	II-Ocean (% Return)	III-Ocean (% Return)	Total (% Return)
1986	1988	778,407	113 (0.015%)	1,026 (0.132%)	350 (0.045%)	1,489 (0.191%)
1987	1989	384,235	12 (0.003%)	98 (0.026%)	38 (0.010%)	148 (0.039%)
1988	1990	403,701	10 (0.002%)	239 (0.059%)	409 (0.101%)	658 (0.163%)
1989	1991	396,619	14 (0.004%)	749 (0.189%)	135 (0.034%)	898 (0.226%)
1990	1992	727,251	11 (0.002%)	96 (0.013%)	12 (0.002%)	119 (0.016%)
1991	1993	343,437	1 (0.0003%)	7 (0.002%)	3 (0.001%)	11 (0.003%)
1992	1994	305,813	21 (0.007%)	113 (0.037%)	128 (0.042%)	262 (0.086%)
1993	1995	722,906	86 (0.012%)	1,579 (0.218%)	217 (0.030%)	1,882 (0.260%)
1994	1996	333,794	7 (0.002%)	209 (0.063%)	57 (0.017%)	273 (0.082%)
1995	1997	16,598	2 (0.012%)	28 (0.169%)	11 (0.066%)	41 (0.247%)
1996	1998	76,846	73 (0.095%)	629 (0.819%)	1,366 (1.778%)	2,068 (2.691%)
1997	1999	684,165	978 (0.143%)	8,069 (1.179%)	531 (0.078%)	9,578 (1.400%)
1998	2000	449,454	57 (0.013%)	2,704 (0.602%)	1,304 (0.290%)	4,065 (0.904%)
1999	2001	80,430	29 (0.036%)	123 (0.153%)	97 (0.121%)	277 (0.344%)
2000	2002	549,861	128 (0.023%)	3,148 (0.573%)	73 (0.013%)	3,349 (0.609%)
2001	2003	597,063	57 (0.001%)	375 (0.063%)	70 (0.012%)	502 (0.084%)
2002	2004	643,503	67 (0.010%)	730 (0.113%)	235 (0.037%)	1,032 (0.160%)
2003	2005	624,967	9 (0.001%)	233 (0.037%)	93 (0.015%)	335 (0.054%)
2004	2006	637,334	415 (0.065%)	1,297 (0.204%)		

Appendix Table 6 (Cont.)

Brood Year	Release Year	Smolts Released[1]	I-Ocean (% Return)	II-Ocean (% Return)	III-Ocean (% Return)	Total (% Return)
2005	2007	569,565[2]	181 (0.032)			
2006	2008	649,601				

[1] Releases at hatchery only and does not include off-site releases or fry/fingerling releases.

Appendix Table 7. Historical age composition of the sport harvest of Dworshak NFH spring Chinook salmon by return year, 1997 to 2008.

Year	I-Ocean (BY)	II-Ocean (BY)	III-Ocean (BY)	Total Harvest
1997	0 (BY94)	693 (BY93)	0 (BY92)	693
1998	0 (BY95)	63 (BY94)	36 (BY93)	99
1999	0	0	0	0
2000	222 (BY97)	3,766 (BY96)	107 (BY95)	4,095
2001	28 (BY98)	6,712 (BY97)	1,615 (BY96)	8,355
2002	19 (BY99)	2,963 (BY98)	560 (BY97)	3,542
2003	78 (BY00)	212 (BY99)	1,938 (BY98)	2,228
2004	56 (BY01)	3,445 (BY00)	107 (BY99)	3,608
2005	3 (BY02)	494 (BY01)	1409(BY00)	606
2006	4 (BY03)	585 (BY02)	0 (BY01)	589
2007	0 (BY04)	148 (BY03)	108 (BY02)	256
2008	166 (BY05)	846 (BY04)	97 (BY03)	1,109

Appendix Table 8. Historical age composition of the Tribal harvest of Dworshak NFH spring Chinook salmon by return year, 1997 to 2008.

Year	I-Ocean (BY)	II-Ocean (BY)	III-Ocean (BY)	Total Harvest
1987	2 (BY84)	128 (BY83)	30 (BY82)	160
1988	19 (BY85)	70 (BY84)	151 (BY83)	240
1989	31 (BY86)	270 (BY85)	45 (BY84)	346
1990	2 (BY87)	478 (BY86)	34 (BY85)	514
1991	0	0	0	0
1992	10 (BY89)	131 (BY88)	19 (BY87)	160
1993	0	24 (BY89)	19 (BY88)	43
1994	0	0	0	0
1995	0	0	0	0
1996	7 (BY93)	16 (BY92)	1 (BY91)	24
1997	3 (BY94)	635 (BY93)	197 (BY92)	835
1998	2 (BY95)	35 (BY94)	145 (BY93)	182
1999	30 (BY96)	4 (BY95)	2 (BY94)	36
2000	82 (BY97)	1,056 (BY96)	35 (BY95)	1,173
2001	5 (BY98)	425 (BY97)	101 (BY96)	531
2002	24 (BY99)	548 (BY98)	222 (BY97)	794
2003	246 (BY00)	202 (BY99)	997 (BY98)	1,445
2004	25 (BY01)	369 (BY00)	25 (BY99)	419
2005	8 (BY02)	80 (BY01)	14 (BY00)	102
2006	20 (BY03)	329 (BY02)	43 (BY01)	392
2007	65 (BY04)	78 (BY03)	55 (BY02)	198
2008	21 (BY05)	125 (BY04)	13 (BY03)	159

Appendix Table 9. Historical age composition of the Sport harvest of Kooskia NFH spring Chinook salmon by return year, 1997 to 2008.

Year	I-Ocean (BY)	II-Ocean (BY)	III-Ocean (BY)	Total Harvest
1997	0 (BY94)	45 (BY93)	0 (BY92)	45
1998	0 (BY95)	0 (BY94)	0 (BY93)	0
1999	0	0	0	0
2000	0 (BY97)	21 (BY96)	0 (BY95)	21
2001	21 (BY98)	5,139 (BY97)	1,237 (BY96)	6397
2002	8 (BY99)	1,292 (BY98)	244 (BY97)	1544
2003	15 (BY00)	40 (BY99)	371 (BY98)	426
2004	34 (BY01)	2,096 (BY00)	65 (BY99)	2195
2005	0 (BY02)	43 (BY01)	10 (BY00)	53
2006	0 (BY03)	53 (BY02)	20 (BY01)	73
2007	85 (BY04)	43 (BY03)	0 (BY02)	128
2008	57 (BY05)	546 (BY04)	20 (BY03)	623

Appendix Table 10. Historical age composition of the Tribal harvest of Kooskia NFH spring Chinook salmon by return year, 1997 to 2008.

Year	I-Ocean (BY)	II-Ocean (BY)	III-Ocean (BY)	Total Harvest
1987	1 (BY84)	44 (BY83)	5 (BY82)	50
1988	5 (BY85)	44 (BY84)	23 (BY83)	72
1989	6 (BY86)	43 (BY85)	9 (BY84)	58
1990	1 (BY87)	105 (BY86)	24 (BY85)	130
1991	na	na	na	na
1992	na	na	na	na
1993	na	na	na	na
1994	na	na	na	na
1995	na	na	na	na
1996	na	na	na	na
1997	0 (BY94)	11 (BY93)	1 (BY92)	12
1998	1 (BY95)	9 (BY94)	10 (BY93)	20
1999	1 (BY96)	0 (BY95)	0 (BY94)	1
2000	6 (BY97)	4 (BY96)	0 (BY95)	10
2001	8 (BY98)	793 (BY97)	33 (BY96)	834
2002	7 (BY99)	560 (BY98)	116 (BY97)	683
2003	16 (BY00)	12 (BY99)	136 (BY98)	164
2004	8 (BY01)	370 (BY00)	11 (BY99)	389
2005	19 (BY02)	130 (BY01)	24 (BY00)	173
2006	1 (BY03)	60 (BY02)	4 (BY01)	65
2007	73 (BY04)	42 (BY03)	51 (BY02)	166
2008	17 (BY05)	104 (BY04)	11 (BY03)	132