



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

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## MEMORANDUM

October 30, 2006

To: Associate Manager, Columbia Basin Ecoregion  
Region 1, Portland, OR

From: Acting Complex Manager  
Dworshak-Kooskia NFH Complex

Subject: Dworshak NFH Spawning Report—Spring Chinook Salmon Brood Year 2006

Attached is the spawning report for Brood Year (BY) 2006 spring Chinook salmon as prepared from information collected by the Dworshak National Fish Hatchery Production Staff, Idaho Fishery Resource Office, and Idaho Fish Health Center. The report covers fish ladder operation, adult collection, spawning summary, spawning procedures, and egg and adult disposition.

cc: Dworshak NFH  
Kooskia NFH  
Dworshak Production (2)  
Idaho FRO  
IDFG - Boise  
IDFG - Lewiston  
Nez Perce Tribe - Lapwai

# **Spawning Report**

## **Brood Year 2006 Spring Chinook Salmon**

October 30, 2006

U.S. Fish & Wildlife Service  
Dworshak-Kooskia National Fish Hatchery Complex  
Ahsahka, Idaho

**Spawning Report  
Spring Chinook Salmon  
Brood Year 2006**

**Adult Collection**

The Dworshak fish ladder was opened June 1, 2006, and closed August 22. Table 1 illustrates the ladder opening and closing dates and the number of fish collected each period.

Table 1. Ladder operation for BY06 SCS at Dworshak.

Date Opened 2006	Date Closed 2006	Number of Fish Trapped
1-Jun	22-Aug	1,354

Source: DNFH - Monthly Activity Reports, Monthly Production Narratives, June–September 2006.  
IFRO - SCSent06.xls

Chinook began returning to Dworshak in June and were first examined on June 28, 2006. Adult SCS also began returning to Kooskia in May. The total Chinook returning in 2006 to Dworshak and Kooskia were 1,354 and 670 fish, respectively. During the season there were 62 jacks returning to Dworshak and 7 jacks to Kooskia. There were 640 fish transported from Kooskia to Dworshak for spawning along with 30 fish which were passed over the weir at Kooskia as part of the Idaho Supplementation Study (ISS). There were 253 excess males returning to Dworshak, 221 adults and 32 jacks, along with 193 excess females. These fish along with 78 males, one jack and 84 females from Kooskia stock were all outplanted from Dworshak on September 7, 2006 (see *Adult Disposition*). There were also 10 male and 10 female Brood Year 2006 (BY06) SCS adults which were spawned at Dworshak by personnel from the Nez Perce Tribe (NPT) from Cherry Lane Hatchery on September 7. The gametes from these fish were transported to Cherry Lane where they were mixed and the eggs put into incubators.

The number of adult SCS returns to Dworshak has varied greatly over the past several years. Figure 1 displays the SCS returns to Dworshak since 1990. There were sport fishing seasons and tribal harvest in 1990, 1997, 1998, and 2000-2006.

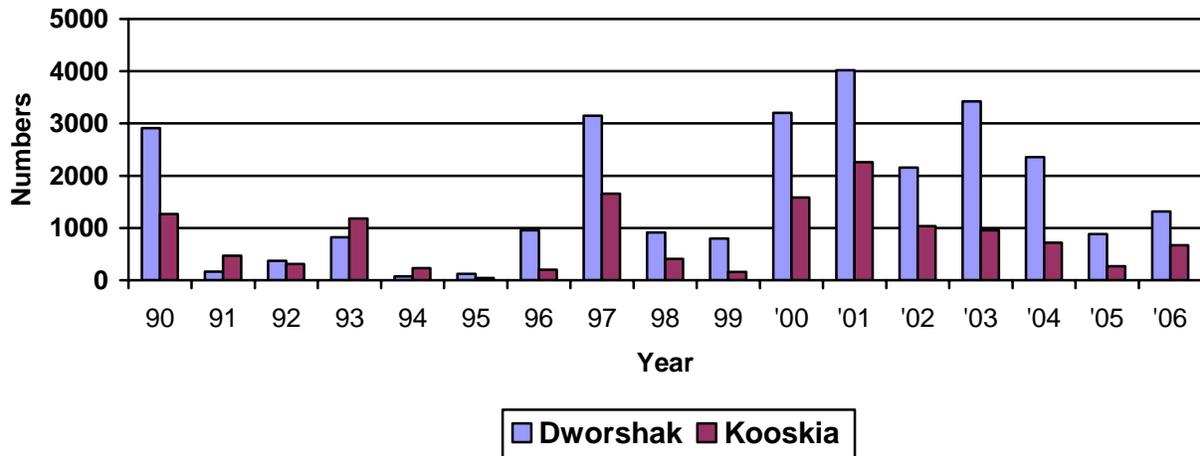


Figure 1. SCS returns to Dworshak/Kooskia 1990-2006  
 Source: DNFH BY06 SCS Spawning Activity Report – Final  
 IFRO SCS Rack Returns

### Spawning Season

The BY06 Dworshak/Kooskia SCS spawning season began August 15, 2006, and ended on August 29 for both stocks. Dworshak adults were held in Holding Ponds (HPs) 9, 2, and 1, and Kooskia fish were held in HP3. Fish from each HP were sorted and spawned once each week along with new fish coming up the ladder into HP9. Adults being held were treated with formalin three times per week to help control fungus. Treatments were recorded in the SCS BY06 log book.

### Spawning Numbers and Ratio

There were 329 males (including 24 jacks) and 440 females (1:1.3 ratio) of Dworshak stock spawned during the season. There were also 158 males (including 3 jacks) and 252 females (1:1.6 ratio) of Kooskia stock spawned during the season.

### Spawning Procedure

The spawning procedure was similar to past years. Tricaine methanesulfonate (MS-222) was used at a rate of 100 ppm (150g/400 gal) as an anesthetic for ease of handling of the fish. Adults were crowded from the holding ponds into a crowding channel, moved into a channel basket, and placed into an anesthetic bin. Pro-Polyaqua was added (250 ml/400 gal) to reduce stress and susceptibility to infection. Oxygen was provided at a rate of 1.5 L/minute.

Spinal columns of ripe females were severed using a pneumatic knife. The females were then placed on a table for approximately 3–15 minutes for blood drainage. The ventral side was then cut open using a spawning knife and eggs were collected in disinfected colanders. After ovarian fluid was drained, the eggs were poured into a clean bucket.

Ripe males were humanely slaughtered using a newly purchased fish-stunner from Seafood Innovations of Australia. The addition of the stunner greatly increased the safety of the operations of the male spawning crew by eliminating clubbing of the adult fish. This addition also enhanced relations with the public who were viewing spawning operations.

Milt from ripe males was stripped into Styrofoam cups, and a one-percent saline solution was added to assist in milt motility. The milt solution was poured onto the eggs and swirled for complete fertilization. After sufficient time had elapsed for fertilization to take place (one to two minutes), the eggs were rinsed of sperm, blood, and other organic matter.

After fertilization, eggs from one female were placed in Heath incubator trays. In the tray was a 75 mg/l iodophor solution buffered with sodium bicarbonate. Eggs were maintained in this solution for approximately 30 minutes as a precaution against disease transmission. The trays were then pushed into the incubator with a water-flow rate was approximately four gallons/minute.

### **Idaho Fish Health Center (IFHC)**

On July 25-26, personnel from IFHC injected all Dworshak and Kooskia stock females with erythromycin. This was done to help prevent vertical disease transmission of Bacterial Kidney Disease (BKD) to the egg.

During spawning, the IFHC took ovarian fluid for viral inspection from 150 of Dworshak stock and 150 of Kooskia stock females. They also took spleen samples from 60 Dworshak males and 60 Kooskia males for viral inspection (see IFHC Broodstock Assessment report for results). Kidneys were also sampled for BKD from all females spawned. As in 2005, Dworshak used an ELISA test for BKD which employed a base-line test to compare all samples to a given ELISA reading. The results of the testing for adult females were 0.7 percent (3/440) greater than 0.250 ELISA for Dworshak stock and 9.9 percent (25/252) for Kooskia stock. Eggs from females which were in the upper range of ELISA were culled for both stocks.

### **Research/University of Idaho**

Dworshak continued to coordinate with researchers from the University of Idaho. Rolf Ingermann, Professor of Zoology from the University of Idaho, is studying motility and fertility of SCS semen fertility under various chemical and mineral applications. Dworshak provided a total of 20 ml milt from 10 Kooskia males. All milt samples were from excess spawning requirements at Dworshak.

### **Incubation and Egg Survival**

Dworshak eggs were incubated in A, B, and C-banks. Kooskia eggs were incubated in A and D-banks. Chilled water temperature averaged 42.0°F for egg Takes 1-3 for Dworshak and Takes 1-2 for Kooskia stock. The water temperature of the non-chilled incubator stacks (C bank) averaged 44.5°F throughout the incubation cycle. These stacks contained eggs from Takes 4 of Dworshak stock and Take 3 of Kooskia stock. Water temperature was held at approximately

42°F in A/B banks until the SCS eggs were shipped to Kooskia, and then the temperature was reduced to 37-39°F for incubation of Dworshak stock over the winter.

Upon eye-up, the Dworshak and Kooskia eggs were shocked and enumerated using an electronic egg picker and counter (Van Gaalen Model-100). Tables 2 and 3 summarize the egg Take numbers and survival for both Dworshak and Kooskia BY06 SCS.

Table 2. Dworshak BY06 SCS Egg Take and Survival.

Take	Spawn Date 2006	# of Male <sup>1</sup>	# of Female	Female culled BKD <sup>2</sup>	Tray Culled Dead	Trays Culled Extra	Dead Eggs Enum	Eyed Eggs Enum	Eggs for Research	Total Eggs	Eggs/ Female	Percent Enum Eye-up
1	15-Aug	72	73	5	0	0	10,343	246,522	0	256,865	3,777	96.0
2	16-Aug	35	55	3	1	0	10,316	188,525	0	198,841	3,899	94.8
3	22-Aug	76	138	30	4	0	16,042	390,000	0	406,042	3,904	96.0
4	29-Aug	146	174	71	2	24	4,144	290,000	0	294,144	3,820	98.6
Tot/ Ave		329	440	109	7	24	40,845	1,115,047	0	1,155,892	3,853	96.5

1 Includes 24 jacks spawned during the season

2 BKD culling above 0.085 ELISA testing for all Takes

Percent enumerated eye-up does not include eggs/females culled before enumeration

Source: BY06 SCS Egg Enumeration and % Survival of Eggs Summary SC2006EggEnum.xls

IFHC BKD ELISA testing results BY06 SCS

Table 3. Kooskia BY06 SCS Egg Take and Survival.

Take	Spawn Date 2005	# of Male <sup>1</sup>	# of Female	Female culled BKD <sup>2</sup>	Tray Culled Dead	Trays Culled Extra	Dead Eggs Enum	Eyed Eggs Enum	Eggs for Research	Total Eggs	Eggs/ Female	Percent Enum Eye-up
1	15-Aug	56	98	1	0	0	19,190	302,714	0	321,904	3,319	94.0
2	22-Aug	44	82	12	3	0	7,114	206,364	0	213,478	3,186	96.7
3	29-Aug	58	72	12	1	0	4,569	193,103	0	197,672	3,350	97.7
Tot/ Ave		158	252	25	4	0	30,873	702,181	0	733,054	3,287	95.8

1 Includes 3 jacks spawned during the season

2 BKD culling above 0.250 ELISA testing for all Takes

Percent enumerated eye-up does not include eggs/females culled before enumeration

Source: BY06 SCS Egg Enumeration and % Survival of Eggs Summary SC2006EggEnum.xls

IFHC BKD ELISA testing results BY06 SCS

After the eggs were eyed-up and enumerated at Dworshak, there were 702,181 Kooskia stock eyed eggs shipped to Kooskia from October 16 through 20. Dworshak will incubate 1,100,000 eyed eggs of Dworshak stock for its program.

The use of chilled water at Dworshak all winter slows the rate of development in the eggs so that smolts will be a target size of 18–20 fpp at release in the spring of 2008. This delay in egg

development is being undertaken to effectively reduce the length of the Chinook feeding program from 17 months to 14 months. With this shortened feeding program, the fast/feed regime is greatly reduced or eliminated for the Chinook reared at Dworshak.

The females averaged 3,853 eggs/female for Dworshak stock and 3,287 eggs/female for Kooskia stock. Eyed eggs were transferred to Kooskia in lots of 5,000 after enumeration. Eggs were transferred inside Vexar tubes packed inside ice chests. Table 4 illustrates the egg shipments for BY06 SCS.

Table 4. BY06 SCS egg shipments from Dworshak to Kooskia.

Date Shipped 2006	Take # Kooskia Stock	Kooskia Eyed Eggs to Kooskia
16-Oct	1	302,714
20-Oct	2	206,364
19-Oct	3	193,103
Total		702,181

Source: DNFH - SC2006EggEnum.xls

### **Initial Pond Loading**

Final loading into the outside raceways (RWs) will be approximately 35,000 fish/RW. Once the yolk sac is absorbed in April 2007, the fish will be moved from Dworshak incubators to outside RWs. Coded-wire tagging and adipose fin clipping of BY06 SCS should begin the first week of August 2007.

### **Diet**

Due to BioOregon going out of business in the summer of 2006, the feeding regime for BY06 SCS has not been determined at the time of this writing.

### **Growth Projection**

The expected monthly growth rates and general target lengths for Dworshak stock BY06 SCS are presented in Table 5. This growth regime allows for producing smolts the targeted size of 18–20 fish per pound (fpp).

Table 5. Growth projection for SCS BY06, fish initially reared only at Dworshak NFH.

Date	Temperature	fpp	Length (in)	Length (mm)
1-Jun	47	425	2.0	50
1-Jul	48	250	2.4	60
1-Aug	47	145	2.8	72
1-Sep	48	110	3.1	79
1-Oct	47	80	3.5	88
1-Nov	48	60	3.8	97
1-Dec	45	45	4.2	107
1-Jan	43	35	4.6	116
1-Feb	42	29	4.9	123
1-Mar	41	25	5.1	130
1-Apr	41	20	5.5	140

Source: Monthly Inventory Summary, BY02-03 SCS.

### Smolt Disposition

All BY06 SCS smolts produced from the Dworshak stock will be released from Dworshak hatchery into the North Fork of the Clearwater River in the spring of 2008. All Kooskia stock smolts produced from Kooskia stock will be released from Kooskia hatchery into Clear Creek. This creek is a tributary to the Middle Fork of the Clearwater River.

### Program Objectives

Estimated release numbers for BY06 SCS program are summarized in Table 6.

Table 6. Projected release numbers for BY06 SCS, Dworshak Complex.

Rearing Location	Fish Stock	Number at Release	Release Site	Type of Release	fpp at Release	Date of Release
Dworshak	Dworshak	1,000,000	Dworshak	Smolt	18-20	Apr-08
Kooskia	Kooskia	600,000	Kooskia	Smolt	18-20	Apr-08
<b>Total Smolts</b>		<b>1,600,000</b>			<b>18-20</b>	

### Adult Mortality

There were 17 adult SCS of Dworshak stock and 32 of Kooskia stock which died before spawning on August 15 (prespawning mortalities). Table 7 depicts the mortality for BY06 SCS held at Dworshak.

Table 7. Mortality of adult BY06 SCS held at Dworshak.

Mortality	Dworshak		Kooskia	
	Number	Percent of total run at Dworshak	Number	Percent of run transferred to Dworshak
Prespawning	17	1.3	32	5.0
During Spawning	22	1.6	7	1.1
<b>Total</b>	<b>39</b>	<b>2.9</b>	<b>39</b>	<b>6.1</b>

Source: DNFH - Spawning Activity Report, BY065SCS

Tables 8 and 9 illustrate the adult mortality of both Dworshak and Kooskia stock SCS held at Dworshak since 2001.

Table 8. Mortality of adult SCS returns - Dworshak stock 2001–2006

Year	Prespawning %	During Spawning %	Total %
2001	4.2	2.6	6.8
2002	4.9	7.1	12
2003	4.9	2.7	7.6
2004	1.5	12.9	14.4
2005	3.1	4.1	7.1
<b>5 Year Ave</b>	<b>3.7</b>	<b>5.9</b>	<b>9.6</b>
2006	1.3	1.6	2.9

Source: DNFH - SCS Spawning Reports BY2001-05  
B06SCS Enumeration and % Survival of Eggs Summary.

Table 9. Mortality of adult SCS returns - Kooskia stock transferred to Dworshak 2001–2006.

Year	Prespawning %	During Spawning %	Total %
2001	3.1	0.7	3.8
2002	5.8	2.8	8.6
2003	23.9	7.8	31.7
2004	8.7	0.9	9.6
2005	4.8	4.8	9.6
<b>5 Year Ave</b>	<b>9.3</b>	<b>3.4</b>	<b>12.7</b>
2006	5	1.1	6.1

Source: DNFH - SCS Spawning Reports BY2001-05.  
DNFH - BY06 SCS Enumeration and % Survival of Eggs Summary.

## Adult Disposition

On August 24 and September 7, there were a total of 221 adult males, 32 jacks, and 193 females of BY06 SCS returning to Dworshak which were excess to spawning needs and outplanted. There were also 78 males, one jack and 84 females of Kooskia stock SCS which were excess to spawning needs were also outplanted from Dworshak on September 7. Dworshak and NPT personnel sorted and loaded NPT transport trucks with all but 12 of these fish for stocking in the lower Selway River. This outplanting was for supplementation purposes. The remaining 12 fish were stocked into the mainstem of the Clearwater River since the truck to the Selway was filled to capacity. Table 10 illustrates details of the outplants.

Table 10. Adult BY06 SCS outplants from Dworshak NFH.

Date 2006	Stock	Site	Adult Males	Adult Females	Jacks	Total Number
24-Aug	Dworshak	Lower Selway River	87	88	7	182
7-Sep	Dworshak	Lower Selway River	128	100	24	252
7-Sep	Dworshak	Mainstem Clearwater R.	6	5	1	12
<b>Total</b>	<b>Dworshak</b>		<b>221</b>	<b>193</b>	<b>32</b>	<b>446</b>
7-Sep	Kooskia	Lower Selway River	78	84	1	163
<b>Grand Total</b>			<b>299</b>	<b>277</b>	<b>33</b>	<b>609</b>

Source: DNFH- BY06 SCS Spawning Activity Reports  
IFRO- AdultOutplantBY06SCS.wk4

Tables 11 illustrate BY06 SCS adult disposition from both Dworshak and Kooskia stock held at Dworshak.

Table 11. Adult disposition of BY06 SCS held at Dworshak.

Location	Dworshak Number	Kooskia Number	Comments
Outplant	446	163	See Table 10
Outside Research Info/Education	0	10	NMFS, Univ of Idaho, School Prog
Pond morts/unknown losses	22	7	Carcasses deteriorated/not found
Landfill	886	460	Carcasses from spawning/ponds
<b>Total</b>	<b>1,354</b>	<b>640</b>	

Source: DNFH - BY06 SCS Spawning Activity Report

## Acknowledgments

The efforts of many individuals from several different projects went into spawning BY06 Chinook. Everyone involved is to be commended on a successful Chinook spawning season.