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**GRANDE RONDE ENDEMIC SPRING CHINOOK SAMON  
SUPPLEMENTATION PROJECT**

**LOSTINE RIVER  
OPERATIONS AND MAINTENANCE**

**2005 SMOLT ACCLIMATION AND ADULT RETURN REPORT**

**Period Covered: January 2005 through December 2005**

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## EXECUTIVE SUMMARY

The Nez Perce Tribe (NPT), through funding provided by the Bonneville Power Administration (BPA), has implemented a Chinook salmon supplementation program (250,000 smolts) on the Lostine River, a tributary to the Grande Ronde River of Oregon. The Grande Ronde Endemic Spring Chinook Salmon Supplementation project, which involves supplementation of the Upper Grande Ronde River and Catherine Creek in addition to the Lostine River, was established to prevent extirpation and increase the number of threatened Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*) returning to the Grande Ronde River.

This report covers the the ninth season (1997-2005) of adult Chinook salmon broodstock collection in the Lostine River and the seventh season (1999-2005) of acclimation of resulting Lostine River progeny. Production of Lostine River spring Chinook salmon smolts currently occurs at Lookingglass Fish Hatchery (LGH). The Lostine River supplementation program utilizes two strategies to obtain egg source for production of smolts for supplementation: captive broodstock and conventional broodstock. The captive broodstock strategy involves 1) capture of natural juvenile spring Chinook salmon smolts from the Lostine River, 2) rearing those to adult and spawning them, and 3) rearing the resultant progeny for eventual acclimation and release back into the Lostine River. The conventional broodstock strategy involves 1) capture of natural and hatchery origin adults returning to the Lostine River, 2) holding those adults and spawning them, and 3) rearing the resultant progeny for acclimation and release back into the Lostine River.

This report focuses on 1) the trapping and collection of adult spring Chinook salmon that return to the Lostine River, which provides the broodstock source for the conventional strategy and 2) the acclimation and release of juvenile spring Chinook salmon produced from the captive broodstock and conventional broodstock strategies

In 2005, acclimation of Lostine River spring Chinook salmon smolts occurred from 2/28/05 through to 4/1/05 and a total of 164,779 smolts were acclimated and released. These smolts were produced from the brood year (BY) 2003 egg source and included captive brood (62,124) and conventional (102,655) origin smolts that were all progeny of Lostine River spring Chinook salmon.

Operation of the Lostine River adult monitoring and collection facility in 2005 began May 10<sup>th</sup>, the first Chinook was captured on June 6, 2005 and the last Chinook was captured on September 16, 2005. The weir and trap were removed on October 1, 2005.

A total of 824 adult Chinook, including jacks, were captured during the season. The composition of the run included 193 natural origin fish and 631 hatchery supplementation fish. There were no identified “stray” hatchery fish from other programs trapped. Of the fish captured, 34 natural and 70 hatchery supplementation adults were retained for broodstock and transported to LGH for holding and spawning, 506 adult Chinook were passed or transported above the weir to spawn naturally, and 214 hatchery origin adult Chinook were transported and outplanted in the Wallowa River and Bear Creek to spawn in underseeded habitat.

Of the 104 adults retained for broodstock at Lookingglass Hatchery, 17 natural females and 39 supplementation females were represented in spawning. These females produced a total of 234,218 eggs at fertilization. Eye-up was 88.50% which yielded a total of 207,291 conventional program eyed eggs. The fecundity averaged 4,182 eggs per female. These eggs will be incubated and reared at Lookingglass Hatchery until they are smolts in the spring of 2007. Captive brood program eggs/fish will be added to the conventional program eggs to make up the entire juvenile release for the Lostine River program in 2007.

## **1.0 INTRODUCTION**

The Nez Perce Tribe Department of Fisheries Resource Management is implementing a supplementation program for Lostine River spring Chinook salmon in Northeast Oregon. This project is part of a larger effort to restore Endangered Species Act listed salmon in the Grande Ronde Subbasin known as the Grande Ronde Endemic Spring Chinook Salmon Supplementation Project (GRESP).

The GRESP is a cooperative project between the Nez Perce Tribe (NPT), Oregon Department of Fish and Wildlife (ODFW), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and United States Fish and Wildlife Service (USFWS). This program was initiated in 1994 as a conservation measure in response to severely declining runs of Chinook salmon in the Grande Ronde Subbasin. The GRESP utilizes supplementation with conventional and captive broodstock techniques to prevent extirpation and begin rebuilding of ESA listed spring Chinook. The Nez Perce Tribe is responsible for implementation, coordination, and facilitation of the Lostine River component of the GRESP.

This report contains the results of activities performed under this project associated with 1) the trapping and collection of adult spring Chinook salmon that returned to the Lostine River in 2005 and 2) the acclimation and release of juvenile spring Chinook salmon in 2005 produced from the captive broodstock and conventional broodstock strategies from broodyear (BY) 2003. This report covers the the ninth season (1997-2005) of adult Chinook salmon broodstock collection in the Lostine River and the seventh season (1999-2005) of acclimation of resulting Lostine River progeny.

Funding for this project is provided by Bonneville Power Administration (BPA Project 199800702).

Monitoring and Evaluation (M&E) activities associated with this project for 2005 are provided in a separate report (BPA Project 199604400) (Cleary 2006).

### **1.1 BACKGROUND**

Prior to the 1900s, returning adult Chinook salmon were estimated to number more than 1.5 million in the Snake River Basin (NMFS 1995). However, numerous stock assessments and review literature have documented the contemporary demise of these Snake River populations (Horner and Bjornn 1979; Howell et al. 1985; Nehlsen et al. 1991). In recognition of this decline, the National Marine Fisheries Service (NMFS 1992) listed Snake River spring and summer Chinook as threatened under the federal Endangered Species Act (ESA) in 1992. The Lostine River/ Wallowa River population of spring/summer Chinook experienced significant declines over the past several decades with redd counts in the Lostine River declining from a high of 893 redds in 1957 to 11 redds in 1995 (Ashe et al. 2000). This stock faced a high demographic risk of extirpation due to low escapement levels prior to 1999 (Mundy 1999).

In 1994, fisheries co-managers, ODFW, NPT, CTUIR, and USFWS implemented the Grande Ronde Basin Endemic Spring Chinook Supplementation Program in the Lostine River, Catherine Creek and the upper Grande Ronde River. The goal of this program is to prevent extinction of spring Chinook in the three tributaries, provide a future basis to reverse the decline in stock abundance, and ensure a high probability of population persistence. The GRESP proposes to increase the survival of spring Chinook salmon in the Grande Ronde River by increasing egg to smolt survival through hatchery incubation and rearing (80% survival as compared to 12% survival for wild/natural). An increase in adult returns and natural spawners would likewise increase the number of listed offspring. Artificial propagation under this program utilizes conventional and captive broodstock sources. The captive broodstock strategy involves 1) capture of natural juvenile spring Chinook salmon smolts from the Lostine River, 2) rearing those to adult and spawning them, and 3) rearing the resultant progeny for eventual acclimation and release back into the Lostine River. The conventional broodstock strategy involves 1) capture of natural and hatchery origin adults returning to the Lostine River, 2) holding those adults and spawning them, and 3) rearing the resultant progeny for acclimation and release back into the Lostine River.

The NPT is responsible for operating supplementation facilities (adult collection and holding and juvenile acclimation and release) on the Lostine River, while the CTUIR is responsible for operating supplementation facilities on the upper Grande Ronde River and Catherine Creek. ODFW is responsible, in coordination with the Tribes, NOAA Fisheries, and USFWS for production and activities occurring at Lookingglass Fish Hatchery, Irrigon Fish Hatchery, Bonneville Fish Hatchery, and Manchester Marine Laboratory. Co-managers cooperatively develop an Annual Operation Plan that outlines activities, coordination, and planning associated with the implementation of the GRESP.

The facilities and activities associated with the GRESP have been authorized under Endangered Species Act (ESA) Section 10 and Section 7 Permits and Biological Opinions. These documents include ESA Section 10 Permit No. 973, Permit No. 1011 (ODFW 1996), Modification of Permit No. 1011 and Permit No. 1164, FWS Section 7 Biological Opinion 501.1100, 1-4-98-F4 (bull trout), ESA Section 10 Applications: (ODFW 1998, BIA 1998), and NMFS Section 10 Biological Opinion (1998).

Production occurring under the GRESP is authorized under the Lower Snake River Compensation Plan (LSRCP) Program. LSRCP currently provides the facilities, equipment, and personnel to assist production, evaluations, and fish health monitoring of juveniles produced for release in the acclimation facilities funded by this project.

The goals and objectives of this monitoring and evaluation proposal are consistent with and/or recommended by the Columbia River Basin Fish and Wildlife Program (NPPC 1994 and 2000), the Grande Ronde Subbasin Plan (Watershed Professionals Network 2004), the Federal Columbia River Power System Biological Opinions (NMFS 2000 and USACE et al. 2004), 2005-2007 Implementation Plan for the Updated Proposed Action (USACE et al. 2005), and Wy-Kan-Ush-Mi Wa-Kish-Wit (CRITFC 1995).

BPA and NOAA Fisheries determined this project fulfilled RPA #177 (Safety Net Projects) in the 2000 FCRPS Biological Opinion (NMFS 2000). The Final Updated Proposed Action

(USACE et al. 2004) states that, “BPA will continue to fund safety-net programs for this ESU, including the captive broodstock programs for the ...Grande Ronde River (Upper Grande Ronde, Catherine Creek, and Lostine River populations) ...as long as NOAA Fisheries determines these programs to be an essential and effective contribution to reducing the risk of extinction for this ESU [Snake River].”

## **1.2 DESCRIPTION OF PROJECT AREA**

The Lostine River is located within the Grande Ronde Subbasin in northeast Oregon (Figure 1). The river is a major tributary to the Wallowa River. The Lostine watershed encompasses an area of 70.9 sq. miles and is approximately 30 miles long (USGS, 1998). The upper section of the river is within national forest and is designated as a National Wild and Scenic River (Palmer, 1993). Mean annual flow is 200 cfs. Peak flows occur in late spring and early summer and average 800 cfs. Low flows occur in August and September and correspond to the latter part of the dry season and the demand for irrigation withdrawals. Average low flow is 50 cfs but extreme conditions can occur on dry years with flows dropping below 10 cfs in the area of the adult trapping facility (see Weir location on Figure 1) which is roughly 1 mile above the confluence of the Lostine River and the Wallowa River. Water quality in the Lostine River is considered good to excellent, however, the lower portion of the Lostine River is presently on the 303(d) list because of stream flow, habitat channelization and sediment impacts (GRESF 1998).

Figure 1 illustrates where the majority of Lostine River spring/summer Chinook activities covered in this report occur.

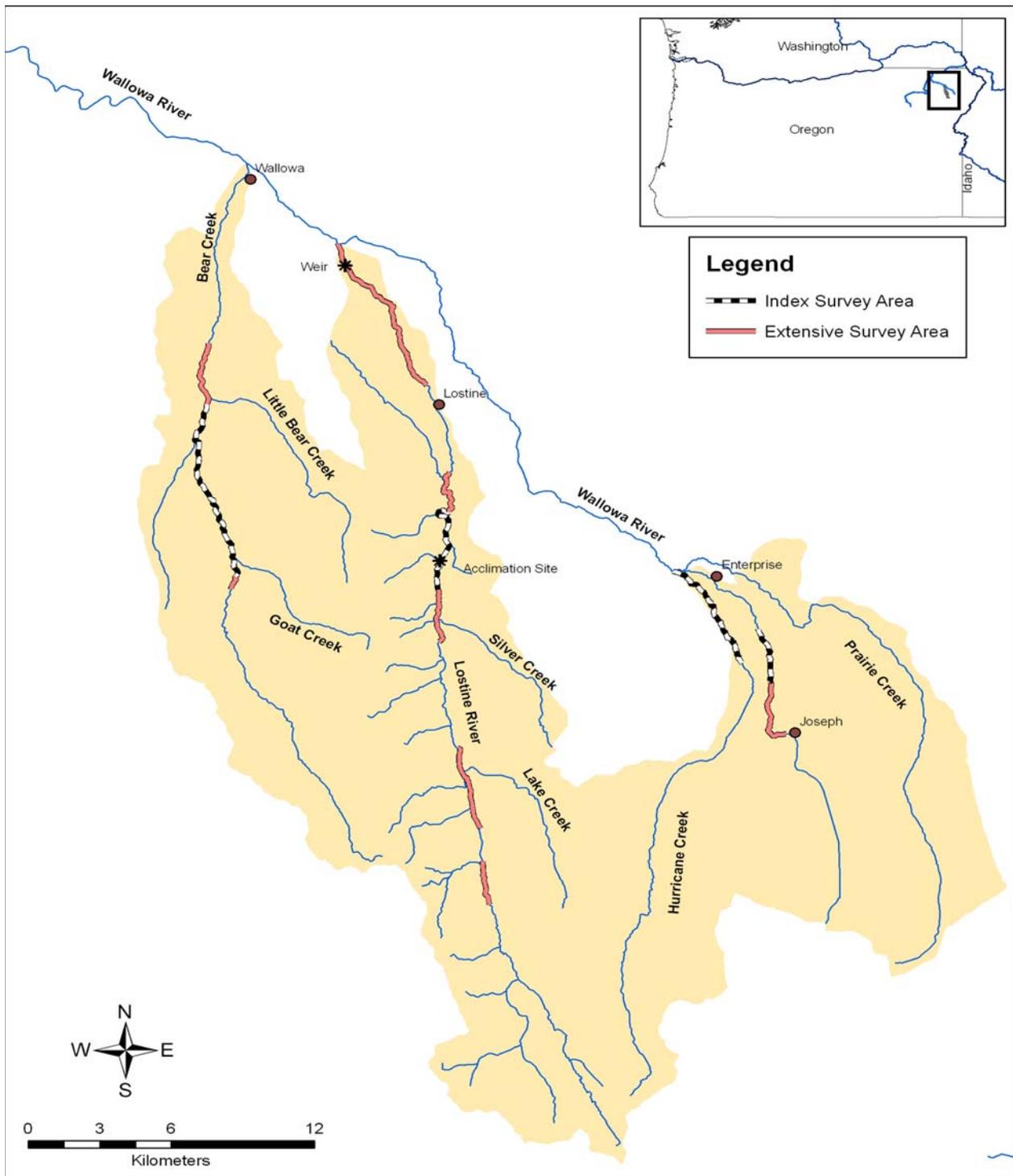


Figure 1. Map of Lostine River drainage in Northeast Oregon and location of acclimation and release facility and adult weir and trapping facility.

## 2.0 LOSTINE RIVER SMOLT ACCLIMATION 2005

The Lostine River Acclimation Facility (Figure 2) was constructed in 1998 at approximately river mile 12 of the Lostine River (Figure 1). Access to the site is via Granger Road. The acclimation facility is located on private property and operation of the facility is provided through an agreement between Bonneville Power Administration and the property owners.

The facility consists of four 2,000 cubic foot raceways that are constructed of metal frames that have plywood bottoms and are lined with a dark PVC pond liner. The water for the facility is pumped from the Lostine River via submersible pumps that are powered by diesel generators. The water supply system has the ability to provide 5.8 cfs for fish culture to the facility. The intake location is variable with the maximum distance between intake and outfall of about 300 feet. The outfall pipes are routed through a PIT tag detection system that records and time stamps all PIT tagged fish as they leave the facility.



Figure 2. Lostine River Acclimation Facility.

### 2.1 OPERATIONS

The total number of smolts acclimated and released in 2005 was 164,779 with a total weight of 7,176 for an average size of 23.0 f/lb. Originally, there were approximately 30,000 more smolts that were anticipated for release in 2005, however, one raceway of captive broodstock progeny fish (approximately 30,000) had to be terminated at Lookingglass Fish Hatchery due to an outbreak of bacterial kidney disease (BKD).

The acclimation of Lostine River spring Chinook salmon in 2005 occurred in two groups. The first group of 95,501 smolts was acclimated from 2/28/05 to 3/20/05. The second group of 69,278 was acclimated from 3/22/05 to 4/1/05. Each of the groups were allowed a period of

opportunity to volitionally start migration. After several days of volitional release any remaining fish were forced to leave the facility into the Lostine River. The 2005 release data for the Lostine River is provided in Table 1 and Table 2. More detailed information on each release group can be found in Appendix A.



Figure 3. Transfer of spring Chinook salmon smolts to Lostine River Acclimation facility.

Juvenile spring Chinook salmon for the first acclimation group were received from Lookingglass Fish Hatchery on 2/28/05 and 3/1/05 (Table 1). Volitional release started on 3/11/05 and final force out was on 3/20/05. Losses were low, but showed the influence of IHN: A = 5, B = 4, C = 5, D = 7. Feeds were low as well due to fish leaving well volitionally: A = 35 lbs, B = 35 Lbs, C = 31 lbs, D = 31 Lbs (2.0 Moore Clark). Assumed feed conversion of 1.2. In addition, maggots were fed for live diet training.

Table 1. Summary of the first group of fish acclimated and released at the Lostine River Acclimation Facility, 2005. AD = adipose fin clip, CWT = coded wire tag, VIE = visual implant elastomer.

Raceway ID at Lookingglass Hatchery – broodstock origin	Raceway ID at Lostine Acclimation Facility	No. Fish	Size (f/lb)	Weight (lbs.)	Length (in.)	Mark/ Broodstock source
Raceway 9	Raceway A	25,921	23.56	1,101	5.22	AD CWT, VIE Left/ Conventional
Raceway 9	Raceway B	25,923	23.56	1,101	5.22	AD CWT, VIE Left/ Conventional
Raceway 10	Raceway C	21,829	22.01	992	5.33	AD CWT/ Captive
Raceway 10	Raceway D	21,828	22.01	992	5.33	AD CWT/ Captive
<b>Total</b>		95,501	22.82	4,186	5.33	

Juvenile spring Chinook salmon for the second acclimation group were received from Lookingglass Fish Hatchery on 3/21/05 (Table 2). Volitional release started on 3/28/05 and final force out was on 4/1/05. Losses were low, but showed the influence of IHN: A = 10, B = 6, C = 23, D = empty. Feeds were low as well due to fish leaving well volitionally: A = 16 lbs, B = 16 Lbs, C = 12 lbs, D = empty (2.0 Moore Clark). Feed conversion rate was assumed at 1.2. In addition, maggots were fed for live diet training. The original schedule for acclimation was adjusted for the second release group. The plan allowed for fish to remain in the raceways until 4/14/05, however, it was determined that 95% of the fish had left the facility by 4/1/05 which prompted a decision by co-managers to finalize acclimation releases on 4/1/05.

Table 2. Summary of the second group of fish acclimated and released at the Lostine River Acclimation Facility, 2005. AD = adipose fin clip, CWT = coded wire tag, VIE = visual implant elastomer.

Raceway ID at Lookingglass Hatchery – broodstock origin	Raceway ID at Acclimation Facility	No. Fish	Size (f/lb)	Weight (lbs.)	Length (in.)	Mark/ Broodstock source
Raceway 8	Raceway A	25,403	24.87	1,022	4.86	ADCWT/ VIE Left Conv
Raceway 8	Raceway B	25,408	24.87	1,022	4.86	ADCWT/ VIE Left Conv
Raceway 11	Raceway C	18,467	19.52	946	5.28	AD CWT
None	Raceway D	None	None	None	None	None
<b>Total</b>		69,278	23.17	2,990	23.17	

All release information including tagging and marking for this 2005 release can be obtained from the Lostine River M&E Annual Report (BPA Project 199604400).

## **2.2 MAINTENANCE**

The maintenance of the acclimation facility prior to fish transfer included snow removal, pond liner repairs, water line cleaning, repair of volitional release hoses, and access road maintenance. The yearly maintenance of the grounds included set-up of irrigation system, road maintenance and weed control.

## **2.3 MAJOR PROBLEMS OR CHALLENGES**

There is a continual concern regarding the shifting river channel near the acclimation site where pumps are placed to provide the water source for the facility. The dynamic nature of the river has also caused concerns over bank erosion at the location of the facility. These elements are monitored to aid in management of the facility.

## **3.0 LOSTINE RIVER ADULT WEIR AND TRAP 2005**

The Lostine River adult trapping facility is located at approximately river mile 1 of the Lostine River on the Wolfe Ranch property (Figure 1). Access to the site and the operation of the site is provided through an agreement with the owners of the property. The water conditions vary seasonally with a historic flow range of 2,550 cfs to less than 10 cfs. Either extreme in river

flow causes problems with operation of the facility and adaptations are made on an as needed basis.

The original weir and trap was first constructed in 1997 and consisted of an array of tripods and pickets. This weir was fished from 1997 through 2000 with capture rates below 20% of the Chinook salmon adults returning to the Lostine River. The poor collection rate and cumbersome structure prompted changes designed and constructed by the project staff.

Starting in 2001, a new design of the weir was installed. The new design allowed for quick removal of the weir in response to high flows that generally occur during the spring runoff. This new weir spans the entire river (about 75') and is composed of 10' tall linked panels that are attached to cables on the top and bottom (Figure 4). The bottom cables are fixed to the river bottom by a steel rail that in turn is anchored into the river bottom. The top of the weir panels are attached to another cable strung across the river that allows for the raising or lowering of the panels through the use of a large winch. The new weir system allows for easier and faster installation of the weir panels which permits a more certain date to begin trapping operations. The new system has also increased the catch rate for adult salmon returning to the Lostine River to an average of 75-80% of the run.

In addition to the new weir, a new trap and holding box was added in 2002. The new trap box measures 8' X 24' X 2.5' for a total holding space of 480 cubic feet. This new trap box increased holding space by nearly 4 times over the old holding box. This adaptation allows for greater numbers of fish to enter the holding area safely. The added space and adaptations were critical because the return of adult Chinook salmon to the Lostine River and the number of fish trapped and handled has increased substantially in the past nine years.



Figure 3. Technician J.T. Williams cleaning Lostine River weir during average flows.

### 3.1 ADULT TRAPPING

The adult trapping facility is staffed seven days a week and all fish trapped are sampled and removed daily to prevent damage to the fish and limit disruption of fish migrations. Protocols for operation of the Lostine River trapping facility follow basic adult trapping and handling procedures consistent with IHOT guidelines (1995), the Annual Operating Plan developed by co-managers, and Endangered Species Act Section 10 Permit #1149. All adult Chinook are netted, transported in water to a small (300 gallon) freshwater holding tank in the area where sample information is collected. One at a time fish are netted and placed in a 100 gallon anesthetizing container that contains 75 gallons of Tricane Methane Sulfonate (MS-222) solution at a concentration of 90 mg/l. Once anesthetized, each fish is examined for fin clips, punches, external tags, radio tags, PIT tags and VIE tags (Figure 5). Each fish is examined to determine sex and length, evaluated for physical condition and a record is made of injuries and their probable cause. An opercle punch is also applied so the fish can be identified later to evaluate run timing and release disposition. Opercle punches are retained for genetic samples to be used for genetic pedigree analysis (BPA Project 198609600). Fish that are retained for broodstock are also tagged with uniquely numbered Tyvek tags to allow for tracking while at LGH.



Figure 4. Technician Rusty Eschler examines an adult Chinook salmon captured at the Lostine River weir.

The Lostine River adult facility was operated May 10, through October 1, 2005. There were a few interruptions (5 days total) in operations due to high spring run-off and there were a total of 138 active trapping days. The maximum water flow 963 cfs and the minimum was 9.3 cfs. During 2005 operations, water temperatures ranged from 39.0 F on May 23, 2005 to 67.9 F on August 8, 2005.

The first adult was captured on June 6, 2005, twenty seven days after the initial start of the facility operations. The last adult was captured on September 16, 2005. The adult trapping facility was closed on October 1, 2005.

A total of 824 adult Chinook were captured in 2005, with the composition being 194 (23.5%) natural unmarked adults and 630 (76.5%) hatchery supplementation adults (Table 3). The hatchery origin fish were composed of 286 from conventional broodstock and 344 from captive broodstock parents. No “stray” adults from other hatchery programs were captured at the Lostine River adult facility in 2005. The efficiency of the weir in collecting returning adults to the Lostine River was determined to be 94.85% by mark recapture data; the highest efficiency rate to date.

Table 3. Number of natural and hatchery spring Chinook salmon adults collected at the Lostine River adult trapping facility in 2005.

	Natural Adults	Hatchery Adults	Total
Jacks	11	72	83
Males	112	220	332
Females	71	338	409
Total	194	630	824

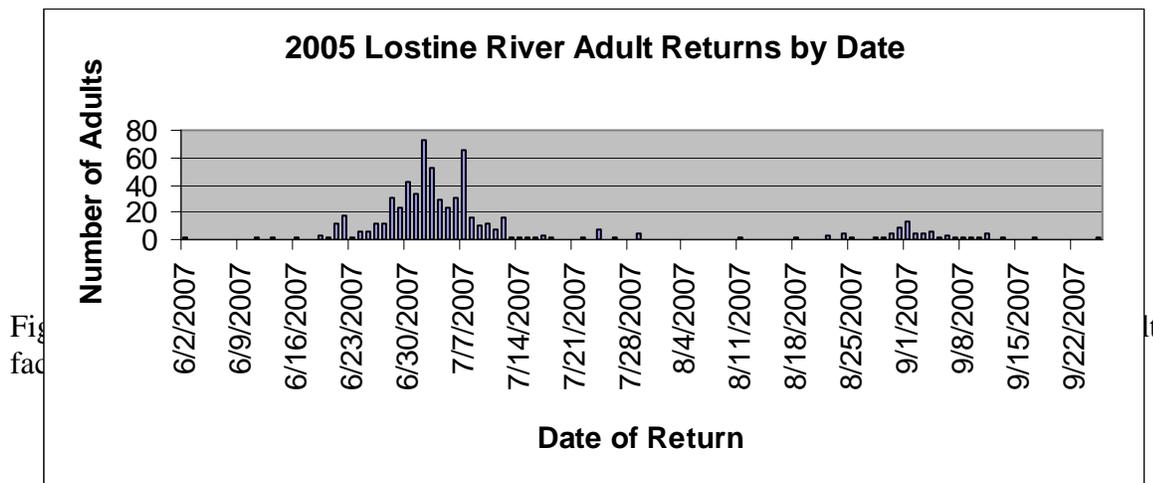
In addition to the target species, spring/summer Chinook salmon, the Lostine River adult facility also captured adult steelhead (*Oncorhynchus mykiss*), bull trout (*Salvelinas confluentus*), mountain whitefish (*Prosopium williamsoni*), rainbow trout (*Oncorhynchus mykiss*) and suckers (*Catostomus sp.*). The total number of each non-target species is captured during Lostine river weir/trap operations in 2005 is presented in Table 4.

Table 4. Number of non-target species of fish that were captured at the Lostine River adult trapping facility in 2005.

	Steelhead	Bull Trout	Whitefish	Rainbow	Sucker
Total	47	72	489	2	392

### **3.2 RUN TIMING**

The first adult Chinook was captured on June 5, 2005 and the last was captured September 16, 2005 (Figure 7). Run timing of spring Chinook salmon to the Lostine River in 2005 was similar to run timing observed in previous years that the Lostine trapping facility has been operated (1997-2004). The largest portion (90%) of the fish returned in June and July and a smaller number returned during the end of August to mid September (Figure 7). The days with the largest number of fish captured occurred on July 3, 2005 with 77 fish and July 15, 2005 with 74 fish. The arrival timing of hatchery adult Chinook salmon was slightly ahead of the natural adult Chinook salmon for the Lostine River. More detailed information on run timing is provided in the 2005 Lostine River M&E Annual Report (Cleary 2006).



### 3.3 LENGTH AND AGE SUMMARIES

Age class designation of spring Chinook salmon that are captured at the Lostine River weir is done by comparing fish length to average historical length/age class data for Northeast Oregon spring Chinook salmon. The length-to-age correlation is: fish less than 630 mm are age 3 adults, fish that range from 630-850 mm are age 4 adults, and fish larger than 850 mm are age 5 adults. Length-to-age correlations will be developed specifically for the Lostine River spring Chinook salmon as more data is acquired for the Lostine River population. Fish examined at the weir are also identified by origin through fin clips and VIE (visual implant elastomer). Fish that have no fin clips or external marks are identified as natural origin. In 2005, the hatchery origin fish returning to the Lostine River were marked with both a coded wire tag (CWT) and an adipose fin clip. Fish that were produced from the conventional broodstock program also had a visual implant elastomer (VIE) tag in their eye. Fish that were produced from the captive broodstock program did not have a VIE tag. A summary of age composition, sex, and broodstock origin from the 2005 returns to the Lostine River is displayed in Table 5.

Table 5. Age composition, sex, and broodstock origin of Lostine River adult Chinook salmon captured in 2005.

Age	Sex	Number Natural Adults	Number Hatchery Adults	Total
3 Year Olds	Male	11	72	83
3 Year Olds	Female	0	0	0
4 Year Olds	Male	100	198	304
4 Year Olds	Female	61	325	381
5 Year Olds	Male	12	22	28
5 Year Olds	Female	10	13	28
Total		194	630	824

For additional information concerning length frequency and tag retention of natural and hatchery fish based upon current data please review the 2005 M&E Annual Report (Cleary 2006).

### **3.4 INJURIES AND PRE-SPAWNING MORTALITY**

Upon collection at the Lostine River weir, all fish are examined for physical injuries. The determination of injury cause relies upon crew experience and has some subjectivity involved. For instance, injuries observed displaying large bites of flesh removed from the fish and/or associated claw marks (termed “Golden Arches”) generally are acknowledged as being caused by seals. The term “headburn” is applied to fish whose skin (predominately around the head and eyes region) appears to have been peeled away, often with fungus or signs of rejuvenating skin. Finding a fish hook imbedded in the fishes flesh would be listed as a wound associated with a fishery.

There were 106 (12.86%) fish observed with outward injuries during the 2005 trapping year. Of the 106 injured fish, 32 (30.19%) were determined to be attributable to seals, 17 (16.04%) were attributable to a condition called “headburn” (caused by high nitrogen levels in water around dams), 10 (9.43%) fish were attributed to fishery wounds and the remaining 47 (44.34 %) fish had injuries from miscellaneous events or whose injury indications were not determinable.

The rate of injury for 2005 was very similar to past return years with one notable exception, the increase in wounds inflicted by seals. In 2005, there were no pre-spawn mortalities recorded from handling, transportation and holding activities from this project. Any other pre-spawning mortality occurrences (i.e., during holding prior to spawn at Lookingglass Hatchery) are not recorded by this project.

### **3.5 FISH DISPOSITION AND ADULT HOLDING**

Chinook salmon adults that are collected at the Lostine River trapping facility are managed for natural spawning and contribution to the hatchery broodstock. Fish are allocated to one of three disposition options: 1) release above the weir to spawn naturally, 2) retain for broodstock and transfer to Lookingglass Hatchery for holding and spawning, or 3) outplant to adjacent Wallowa River underutilized habitat. The determination of which fish are selected for broodstock, released in the Lostine River or outplanted is made using a “sliding scale” management tool developed by the co-managers (BIA 1998) and permitted by ESA Section 10 permit 1149.

The sliding scale management tool (Table 6) has an underlying premise, that at low population levels the greatest risk to persistence is demographic risk of extinction. In the sliding scale, then, fewer constraints are placed on the number of hatchery fish spawning naturally and the number of naturally produced fish spawned in the hatchery when population levels are low. Thus, fish benefit from the survival advantage provided by the hatchery. As population levels increase, demographic risks are of less concern and greater constraints are placed on the hatchery program to control genetic risks associated with hatchery rearing.

Table 6. Sliding scale management tool utilized for managing disposition of Lostine River Chinook salmon adults.

Estimated escapement to mouth (1)	Hatchery / Natural Ratio	Percent Natural Retained	Percent of Hatchery Adults Retained (2)	Percent Hatchery Fish Above Weir	Percent Broodstock of Natural Origin
<250	Any	40	40	N/A	N/A
251-500	Any	20	20	70	20 or less
>500	Any	20	N/A	50	30 or less

Notes:

- (1) Pre-season estimate of total escapement (N+H+C)
- (2) Conventional hatchery adults only, all captive brood adults released to spawn naturally or out-planted.

N/A Not a decision factor for this level of escapement, percentages determined by other criteria

N = the number of naturally produced adults

H = the number of conventional hatchery produced adults

C = the number of captive brood origin adults (BIA 1998)

Adult collection, transportation, and holding details are worked out annually by co-managers through the Annual Operation Plan process. In 2005, the adult return projection was greater than 500 and therefore, up to 20% of the natural origin fish could be retained for hatchery broodstock, 50% of the fish released above the weir to spawn naturally could be of hatchery origin and 30% of the hatchery broodstock could be natural fish. Due to some uncertainty in the adult return estimate and an agreement between co-managers to ensure a minimum of 500 adult spawners in the Lostine River a decision was made to manage in the range of 70% of the fish released above the weir to spawn naturally could be of hatchery origin.

In 2005, based on the management strategy of the sliding scale tool, 104 adults were selected for hatchery broodstock (32.7% being natural origin and 67.3% being hatchery origin) and 506 adults were released or transported above the Lostine River weir (31.2% being natural origin and 68.8% being hatchery origin) (Table 7).

Table 7. Origin and composition of Lostine River spring Chinook released or transported above the Lostine River weir for natural spawning and retained for hatchery broodstock in 2005.

	Natural	Hatchery	Total	Natural Percent	Hatchery Percent
Hatchery Broodstock – Transported to Lookingglass Hatchery	34	70	104	32.7 %	67.3%
Natural Spawners – Released or transported above Lostine River weir	158	348	506	31.2%	68.8%
Total	192	418	610	31.5%	68.5%

Disposition of the spring Chinook adults collected at the Lostine River weir is summarized by age, sex, and broodstock origin in Table 8.

Table 8. Disposition of Lostine River spring Chinook based on age, sex, and origin composition for 2005.

	Adults Released Into Lostine River	Adults Retained & Transported to Lookingglass Fish Hatchery	Adults Out-planted to Wallowa River Tributaries	Total Adults
Natural Jacks	10	1	0	11
Natural Males	91	19	0	110
Natural Females	58	14	0	72
Hatchery Jacks	16	1	55	72
Hatchery Males	121	33	68	222
Hatchery Females	210	36	91	337
Total	506	104	214	824

Adults released to spawn naturally are carried upstream of the weir following recovery from anesthetic and gently returned to the Lostine River (Figure 6). Due to low flows in the Lostine River from late July through September, fish that are released above the Lostine River weir typically must be transported by truck and released upstream. The low flows are a result of a naturally declining hydrograph exacerbated by withdrawal of water for irrigation from 14 different irrigation ditches. Figure 7 shows the Lostine River weir during the late summer months during low flow.

These low flow conditions typically constrain adult fish passage in a section of the Lostine River between the adult weir and good holding and spawning habitat. Some years during late summer the Lostine River is often essentially dry when it reaches the town of Lostine, roughly 5 miles above the location of the weir. Downstream of the town of Lostine, the river is recharged via the Cross Country Canal irrigation ditch that comes in from the Wallowa River. During these conditions fish that are released to spawn naturally have to be transported in a fish transport

vehicle by project staff upstream around an essentially dewatered section of the Lostine River and released in habitat with adequate water.

In 2005, a total of 119 (23.51%) of the 506 adult Chinook that were released above the Lostine River weir were transported past the dry zone.

Adults selected for broodstock are collected across the entire run of both hatchery and natural origin as described above. All captive broodstock origin adults are released to spawn naturally. Retained adults are given a uniquely numbered Tyvek tag that is attached to the gill plate. This provides a visual mark that allows for tracking of collection to spawn. Each retained adult is given injections under prescription of a veterinary doctor of oxytetracycline (at 10 mg/kg body weight) and erythromycin (at 20 mg/kg body weight) to maximize survival of the adults and the resulting progeny. Adults are then transferred to a fish transport tank/vehicle and transported 50 miles to Lookingglass Hatchery for holding and spawning.

In 2005, a total of 104 adults were selected for broodstock. These were composed of 34 natural origin and 70 hatchery origin fish. The natural origin fish were one jack, 19 males and 14 females. The hatchery origin fish were one jack, 33 males and 36 females (Table 8).

Adults selected to be outplanted in under-utilized habitat within the Wallowa River drainage are transferred to a separate fish transport tank/vehicle and transported within approximately 7-25 miles of the Lostine River and released to spawn naturally.



Figure 6. Technician Shawn Sealey preparing to release 1<sup>st</sup> captured adult Chinook of 2005 back into the Lostine River.



Figure 7. Low flow conditions at Lostine River adult weir.

All adult fish are transported in 350 gallon fiberglass transport tanks that are fitted into the back of one ton, four-wheel drive pick-up trucks. The transport units provide supplemental oxygen and aeration to protect the safety of the fish. The tanks are filled with Lostine River water immediately prior to the start of removing fish from the holding area. To ensure the best possible survival of all transported fish, Poly-Aqua is added to the water in the transport tank. Poly-Aqua is a chemical which aides in recovery of the adult fish by protecting natural disease defense systems that are important to fish health. Typical transport time is less than an hour and ranges from 7-50 miles for a one way trip. Upon reaching the release destination, the fish are removed from the transport unit via nets and placed carefully into the water source.

In 2005, 214 adults were transported and released in Bear Creek or the Wallowa River to spawn naturally (Table 9), 119 fish were transported around the “dry zone” in the Lostine River and released to spawn naturally, and 104 fish were transported to Lookingglass Hatchery to be held for broodstock. No mortalities occurred during the transport of these 437 fish.

Table 9. Location of Lostine River adult Chinook outplanted for natural spawning in tributaries other than the Lostine River, 2005.

	Hatchery Adults
Bear Creek	120
Wallowa River	94
Total	214

### 3.6 ADULT HOLDING AND SPAWNING



Figure 8. Lostine River adult female being spawned at Lookingglass Hatchery.

Adults that are selected for broodstock and transported to Lookingglass Hatchery (LGH) for holding are netted from the transport truck units into the holding tanks at LGH. These tanks are circular, 20 foot in diameter and made of fiberglass construction with netting stretched over the top to help prevent adults from jumping out.

Adult care at LGH is provided by the ODFW crew and primarily consists of regular formalin treatments. All retained adult Chinook held at LGH are handled in early August to provide a second injection of antibiotics and examined for maturity. Fish are thereafter handled on a weekly basis to determine maturity and spawned once they are ripe. Spawning for the Lostine River program occurs through mid to late September.

The spawning sequence starts with the selection of ripe females and removal their eggs. After egg removal, the eggs are placed in Zip-lock bags and stored in climate controlled coolers. Next, males are selected, spawned into storage cups and placed inside the cooler next to the eggs. The coolers are then transported to the egg room for fertilization.

Fertilization occurs via a spawning matrix that is designed to include a natural fish in every mating. Most matrices are 2 X 2 crosses, where two females are spawned and fertilized with two males. In the process, each female has her eggs split into two equal subgroups and two different males are applied to each subgroup. Thus each female has the opportunity to have two separate males as a mate. Of the four fish involved in this applied 2 X 2 matrix at least one has to be of natural origin.

Fertilized eggs are then placed in incubation trays filled with a disinfecting iodine solution during water hardening and then the tray is placed under continuous flow of pathogen free water.

### **3.7 FISH PATHOLOGY**

During spawning all adults have samples collected by fisheries pathologists. These samples are then examined and tested to determine the whether a fish is carrying bacterial, viral or parasitic diseases, such as bacterial kidney disease (BKD), infectious hematopoietic necrosis (IHN), infectious pancreatic necrosis (IPN), whirling disease (WHD), North American viral hemorrhagic septicemia (NAVHS). General physical condition of each adult is also recorded.

In samples collected from the 56 females spawned in 2005, the BKD testing resulted in low optical densities ranging from 0.056 to 0.161. No other pathogens were observed from samples taken in 2005. These results are comparable to previous results.



Figure 9. ODFW technician prepares eggs for insertion into incubators at LGH.

### **3.8 INCUBATION AND EYE-UP**

Eggs are incubated at LGH until they develop to a stage termed “eyed”. At this stage the eggs are developed enough to sort out dead eggs from the viable eggs and enumerate them. These activities are performed by the ODFW crew at LGH and the resulting data is reported by ODFW through an annual report to the Lower Snake River Compensation Plan office.

The 2005 spawn of Lostine River spring Chinook produced 234,218 green eggs that provided 207,291 eyed eggs after the 26,927 dead eggs were removed. The resulting percent eye-up for 2005 was 88.50% and the average fecundity was 4,182 eggs per female. This number of eyed eggs should produce approximately 200,000 smolts for acclimation and release back in the Lostine River in 2007.

## 4.0 SUMMARY

### 4.1 SMOLT ACCLIMATION

The acclimation and release of 164,779 smolts from the Lostine Acclimation facility in 2005 was the seventh year of operation for the facility (Table 10). Acclimation and release of both groups of fish from the facility went smoothly with no major problems.

The number of smolts released from the Lostine Acclimation facility in previous years is summarized in Table 10. In 1999, we released 11,378 conventionally produced smolts from the acclimation facility (the first artificially produced endemic Grande Ronde spring Chinook). The first release of captive broodstock progeny was 34,977 smolts in 2000 and a second release of 133,982 captive broodstock smolts occurred in 2001 (Table 10 and Figure 10). Combined releases of captive and conventionally produced smolts have occurred annually from 2002 to 2005; 109,015 in 2002, 242,776 in 2003, and 250,251 in 2004 (Table 10 and Figure 10).

Table 10. Summary of spring Chinook smolts acclimated and released from the Lostine River Acclimation facility in its seven years of operation, 1999-2005.

Release Year	Number of Captive Brood Smolts	Number of Conventional Smolts	Total Smolt Release
1999	0	11,738	11,738
2000	34,977	0	34,977
2001	133,822	0	133,822
2002	77,551	31,464	109,015
2003	141,860	100,916	242,776
2004	133,780	116,471	250,251
2005	62,124	102,655	164,779
<b>Total</b>	<b>584,114</b>	<b>363,244</b>	<b>947,358</b>
<b>Average</b>	<b>83,445</b>	<b>51,892</b>	<b>135,337</b>

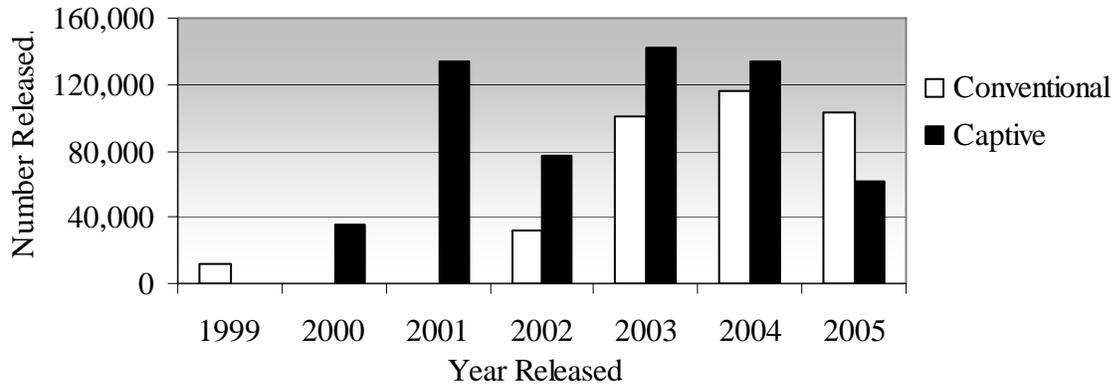


Figure 10. Composition of conventional and captive broodstock origin smolt releases in the Lostine River, 1999-2005.

Since 2003 there have been double releases, or a split period of acclimation from the facility, because the acclimation facility was not constructed large enough to hold the entire 250,000 smolt production all at the same time. In an effort to provide acclimation for all the fish prior to release there is an early acclimation period from late February to late March and a later acclimation period from early April to mid April. The Lostine monitoring and evaluation project will be evaluating these releases to determine effectiveness and whether there is a survival difference between the two groups.

Construction of the Northeast Oregon Hatchery on the Lostine River will alleviate the necessity to acclimate and release two groups of fish at different times. The new facility will rear these fish from egg to smolt and then release them into the Lostine River. The ponds will have capacity for the entire 250,000 smolt program. Until there is a decision to move forward with construction of the new facility we will be forced to utilize the split acclimation period approach.

## 4.2 ADULT WEIR AND TRAP

We have operated the adult trapping facility since 1997 for the collection of broodstock and baseline data on adult escapement to the Lostine River prior to supplementation. In 2005, a total of 824 adult Chinook captured, composed of 194 (23.5%) natural unmarked adults and 630 (76.5%) hatchery supplementation adults. The hatchery origin fish were composed of 286 (45.40%) from conventional broodstock and 344 (54.60%) from captive broodstock parents.

The number of adult natural and hatchery origin spring Chinook captured at the Lostine Adult Collection facility in previous years is summarized in Table 11 and Figure 11. A more detailed analysis on adult return and escapement to the Lostine River can be found in the 2005 Lostine Monitoring and Evaluation Report (Cleary 2006).

Table 11. Number of natural, conventional hatchery broodstock and captive hatchery broodstock origin spring Chinook salmon adults collected at the Lostine River adult trapping facility, 1997-2005.

	Natural Origin	Conventional Broodstock Origin	Captive Broodstock Origin	Total
1997	27	0	0	27
1998	23	0	0	23
1999	12	0	0	12
2000	64	27	0	91
2001	339	78	25	442
2002	265	14	264	543
2003	239	33	192	464
2004	299	261	531	1,091
2005	194	286	344	824
Total	1,462	699	1,356	3,517

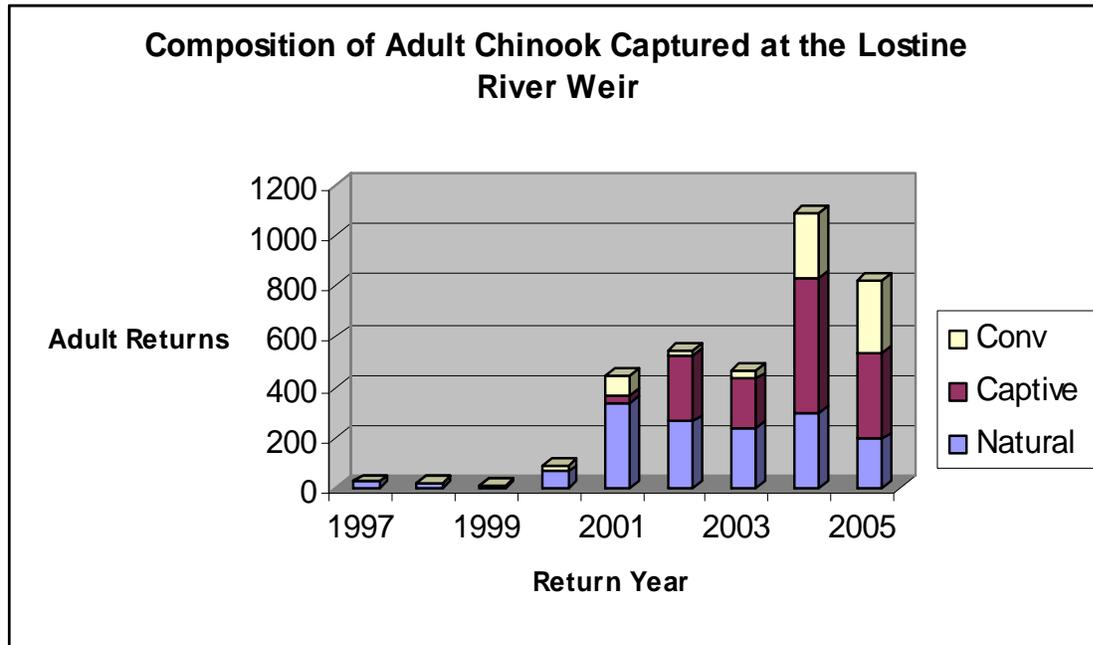


Figure 11. Composition of adult spring Chinook captured at the Lostine Adult Collection facility, 1997 - 2005.

The Lostine River weir was determined to be effective at capturing 95% of the adults that returned to the Lostine River in 2005. This efficiency rating is the best since the weir was first operated in 1997 (Figure 12). The improved efficiency rating was due to several factors including improved weir design, moderate river flows and run timing that aligned with manageable river conditions. With a fairly large return and an efficient weir there were days when the daily total of adults collected in the trap was near 80 fish per day. Having the new larger holding area made a big difference in being able to provide good fish handling and holding conditions.

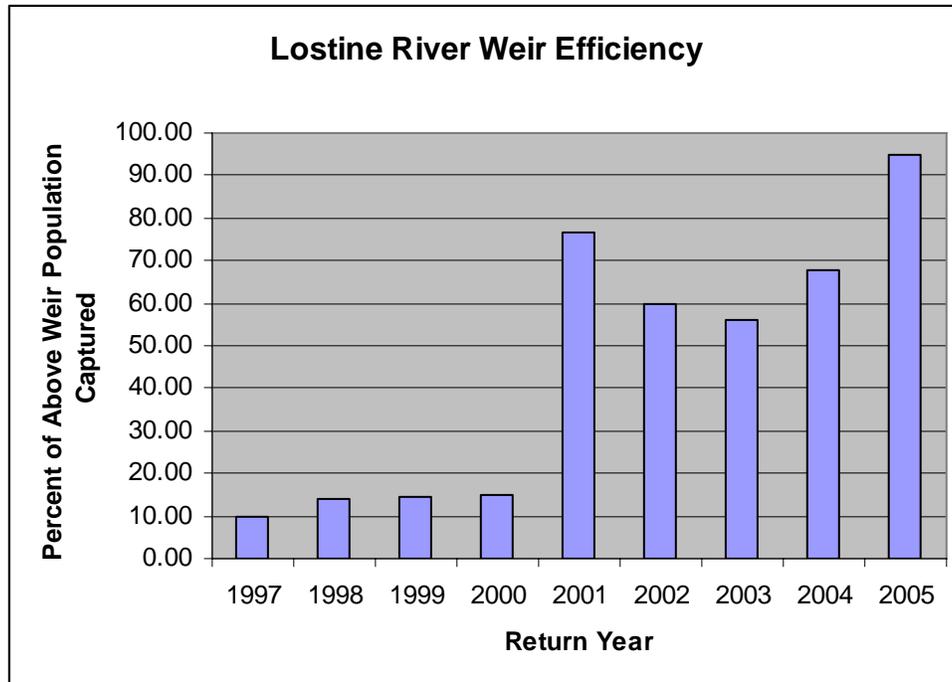


Figure 12. Lostine River weir efficiency at collecting returning adult spring Chinook salmon to the Lostine River.

In 2005, a total of 104 adults (34 natural origin and 70 hatchery origin) were collected for broodstock and transported to Lookingglass Hatchery for adult holding and spawning. This was the largest number of hatchery origin fish spawned since the beginning of the program in 1997 (Figure 13).

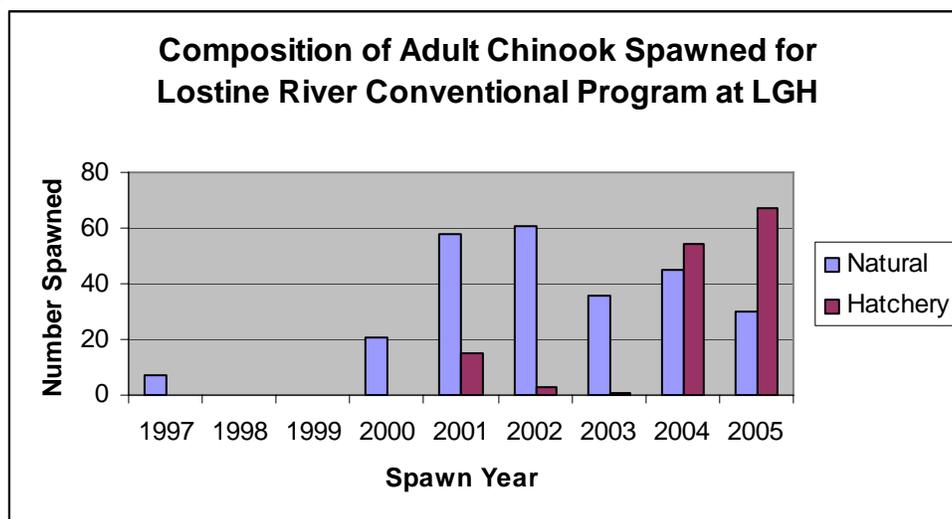


Figure 13. Natural and hatchery origin composition of Lostine River spring Chinook spawned for the conventional broodstock program, 1997 - 2005.

A total of 56 females were spawned to provide 234,218 green eggs. This was the most females spawned for conventional broodstock since the program began in 1997 (Table 12). A summary of females spawned, number of eggs, fecundity and eye up percentage is contained in Table 12.

Table 12. Summary of conventional broodstock and data on eggs produced in the seven years of operation of the Lostine River supplementation program.

	1997	2000	2001	2002	2003	2004	2005
Total Females Spawned	4	8	36	28	21	52	56
Total Eggs	17,540	38,900	156,260	133,447	106,609	221,889	234,218
Eggs per Female	4,385	4,863	4,341	4,766	5,077	4,267	4,182
Total Dead eggs	5,460	3,000	42,267	11,984	4,798	11,228	26,927
Total Live Eggs	12,080	35,900	113,993	121,463	101,811	210,661	207,291
Percent Eye	68.87	92.29	72.95	91.02	95.50	94.94	88.50

A complete summary of adult returns that have resulted from the juvenile releases of Lostine River supplementation program can be found in Table 13.

Table 13. Summary of Lostine River supplementation program releases and resultant adult returns, 1999-2005.

Brood Year	Total Smolts Released	3 Year Old Returns	4 Year Old Returns	5 Year Old Returns	Total Returns/ Release	Percent Return (SAR)	Total Non-jack Adults	Non-jack % (SAR)
1999	11,738	27	75	14	119	1.01	92	0.78
2000	34,977	25	246	49	319	0.91	294	0.84
2001	133,882	18	102	20	140	0.10	122	0.09
2002	109,015	73	579	37	689	0.63	616	0.57
2003	242,776	193	521	N/A	714	*0.29	*521	*0.21
2004	250,251	72	N/A	N/A	72	*0.029	N/A	N/A
2005	164,779	N/A	N/A	N/A	N/A	N/A	N/A	N/A

\* -- Incomplete data for the release, still have returning age classes in future.

N/A – No Adults for these return age classes yet.

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## APPENDIX A: 2005 Lostine River total spring Chinook salmon smolt releases

Dates of Acclimation	LGH Raceway ID	Lostine Raceway ID – Broodstock Source	Fish Numbers Starting	Mortality	Release Numbers	Size (f/lb) @ Release	Length @ Release	Wt @ Release	Density Index @ Release
2/28/05 – 3/20/05	R9	A – Conventional	25,926	5	25,921	23.56	5.22	1,101	0.11
2/28/05 – 3/20/05	R9	B – Conventional	25,927	4	25,923	23.56	5.22	1,101	0.11
3/1/05 – 3/20/05	R10	C – Captive	21,834	5	21,829	22.01	5.33	992	0.10
3/1/05 – 3/20/05	R10	D - Captive	21,835	7	21,828	22.01	5.33	992	0.10
<b>Total 1<sup>st</sup> Group</b>			<b>95,522</b>	<b>21</b>	<b>95,501</b>	<b>22.82</b>	<b>5.27</b>	<b>4,186</b>	<b>0.10</b>
3/31/05 – 4/1/05	R8	A – Conventional	25,413	10	25,403	24.87	4.86	1,022	0.11
3/31/05 – 4/1/05	R8	B – Conventional	25,414	6	25,408	24.87	4.86	1,022	0.11
3/31/05 – 4/1/05	R11	C – Captive	18,490	23	18,467	19.52	5.28	946	0.09
3/31/05 – 4/1/05	Empty	D - Empty	0	0	0	0	0	0	0
<b>Total 2<sup>nd</sup> Group</b>			<b>69,317</b>	<b>39</b>	<b>69,278</b>	<b>23.17</b>	<b>4.98</b>	<b>2,990</b>	<b>0.10</b>
Total Acclimated Release			164,839	60	164,779 99.96% survival	22.96	5.26	7,176	0.10



