

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

**LOSTINE RIVER
OPERATIONS AND MAINTENANCE**

2007 SMOLT ACCLIMATION AND ADULT RETURN REPORT

Period Covered: January 2007 through December 2007

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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 eleventh season (1997-2007) of adult Chinook salmon broodstock collection in the Lostine River and the ninth season (1999-2007) 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 2007, acclimation of Lostine River spring Chinook salmon smolts occurred from 3/5/07 through to 4/17/07 and a total of 230,010 smolts were acclimated and released. These smolts were produced from the brood year (BY) 2005 egg source and included captive brood (24,604) and conventional (205,406) origin smolts that were all progeny of Lostine River spring Chinook salmon.

Operation of the Lostine River adult monitoring and collection facility in 2007 began May 14th. The first Chinook was captured on June 2, 2007 and the last Chinook was captured on September 25, 2007. The weir and trap were removed on October 1, 2007.

A total of 637 adult Chinook, including jacks, were captured during the season. The composition of the run included 240 natural origin fish and 397 hatchery supplementation fish. There were no identified “stray” hatchery fish from other programs trapped. Of the fish captured, 41 natural and 81 hatchery supplementation adults were retained for broodstock and transported to LGH for holding and spawning, 403 adult Chinook were

passed or transported above the weir to spawn naturally, and only hatchery origin jack Chinook were transported and outplanted in the Wallowa River and Bear Creek in underseeded habitat.

Of the 122 adult fish retained for broodstock, 20 natural females and 40 supplementation females were represented in spawning. The eggs from these females produced a total of 267,350 eggs at fertilization. Eye-up was 86.73% which yielded a total of 231,882 conventional program eyed eggs. The fecundity averaged 4,456 eggs per female. These eggs will be incubated and reared at Lookingglass Hatchery until they are smolts in the spring of 2009. 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 2009.

Due to the success of the 2007 egg collection, the number of fish produced exceeded program needs and facility capabilities. As a result, there are plans to outplant fry in 2008 and parr in early 2009 to underseeded habitat in the Wallowa River.

ACKNOWLEDGEMENTS

The Nez Perce Tribal Executive Committee authorized implementation of this project by the Nez Perce Tribe Department of Fisheries Resources Management with funding provided by the Bonneville Power Administration (BPA). Many individuals and organizations contributed to this cooperative project, including BPA, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service Lower Snake River Compensation Plan Office, and National Oceanic Atmospheric Administration (NOAA) Fisheries.

The Lostine River Operations & Maintenance Project staff would like to give special thanks to the private landowners on the Lostine River where facilities are located: Stu and Sue Coleman, Woody Wolfe, and Dave Lundquist. The project staff also wish to acknowledge people that contributed to the success of this project; Dave Johnson, Ed Larson, Bruce McLeod, Tish Whitman, Michelle Wilson, Jim Harbeck, Peter Cleary, Jody Connor, Arleen Henry of NPT; Diane Deal and the staff at Lookingglass Fish Hatchery, Scott Patterson, Brad Smith from Oregon Department of Fish and Wildlife; Ken Kirkman from BPA, Scott Marshall and his staff at the U.S. Fish and Wildlife Service, Mike Delarm from NOAA Fisheries, and Mike Becker of Becker Construction.

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 (GRESPP).

The GRESPP 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 GRESPP 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 GRESPP.

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 2007 and 2) the acclimation and release of juvenile spring Chinook salmon in 2007 produced from the captive broodstock and conventional broodstock strategies from broodyear (BY) 2005. This report covers the tenth season (1997-2007) of adult Chinook salmon broodstock collection in the Lostine River and the eighth season (1999-2007) 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 2007 are provided in a separate report (Cleary 2008).

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), Hatchery and Genetic Management Plans (ODFW 2003, NPT 2003), and Lower Snake River Compensation Plan Biological Assessment (USFWS 2003).

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.

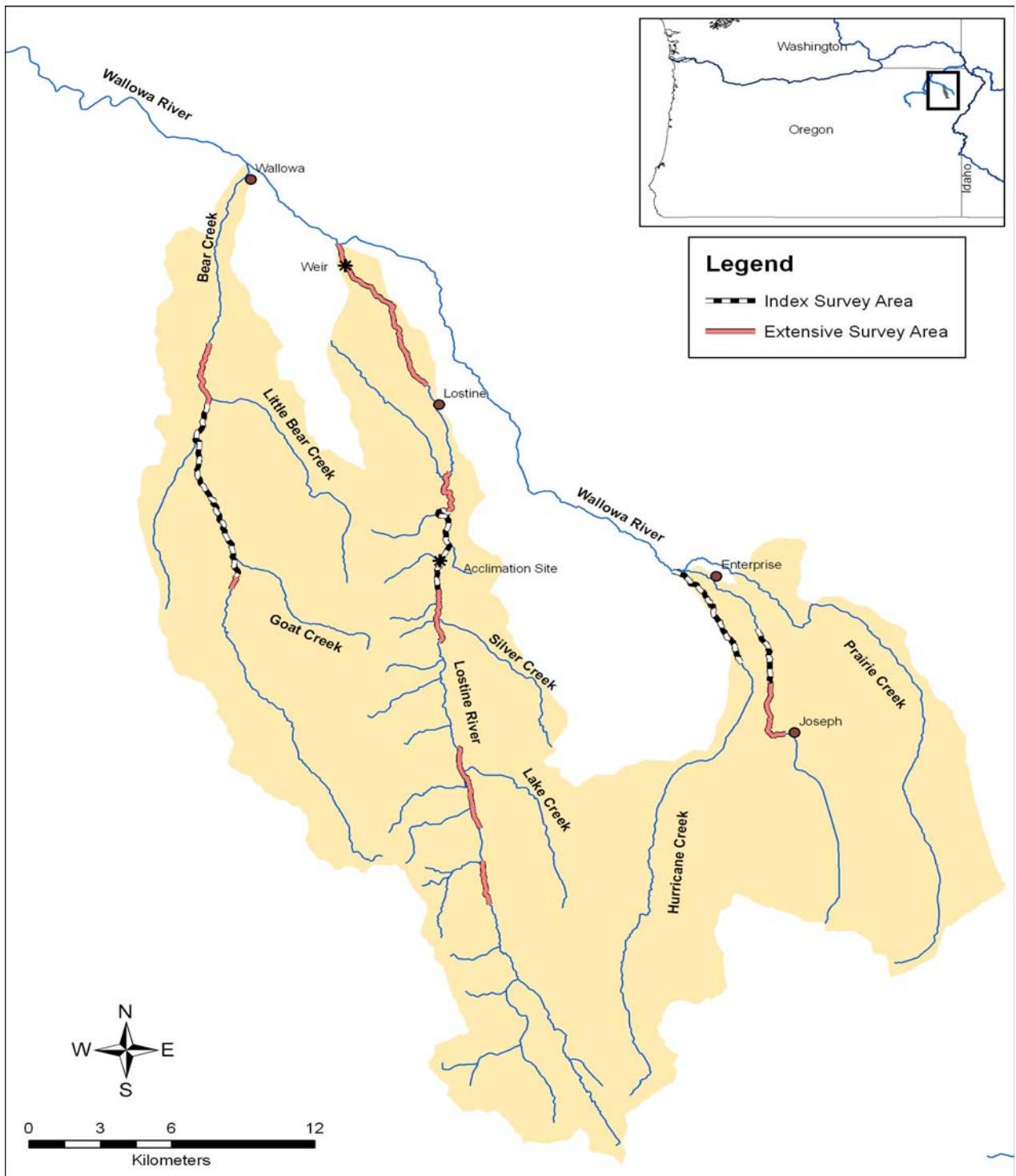


Figure 1. Map of Lostine River drainage in Northeast Oregon and location of acclimation and release facility and adult weir and trapping facility.

2.0 LOSTINE RIVER SMOLT ACCLIMATION 2007

The Lostine River Acclimation Facility 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 has the ability to provide 5.8 cfs for fish culture for the facility. The intake location is variable with the maximum distance between intake and outfall of about 300 feet. The outfall pipes (Figure 2) are routed through a PIT tag detection system that time stamps all PIT tagged fish as they leave the facility. This helps in determining migration timing and in managing the raceways.



Figure 2. Lostine River at the location where the outfall pipes return water to the river and acclimated fish are released.

2.1 OPERATIONS

The total number of smolts acclimated and released in 2007 was 230,010 with a total weight of 10,951 for an average size of 21.00 f/lb.

The acclimation of Lostine River spring Chinook salmon in 2007 occurred in two groups. Fish were transported from Lookingglass Hatchery, where they were incubated and

reared to the smolt stage, and released into the acclimation ponds (Figure 3). The first group of 105,109 smolts was acclimated from 3/5/07 to 3/26/07. The second group of 124,901 was acclimated from 3/26/07 to 4/17/07. 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 2007 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 3/5/07 (Table 1). Volitional release started on 3/16/07 and final force out was on 3/26/07. Losses were low: A = 9, B = 13, C = 10, D = 17. Feeds were moderate due to cold water temperatures and fish leaving well volitionally: A = 44 lbs, B = 44 lbs, C = 44 lbs, D = 44 lbs (2.0 Moore Clark) for an assumed feed conversion of 1.2. Due to budget and time constraints no live diet training was provided in 2007.

Table 1. Summary of the first group of fish acclimated and released at the Lostine River Acclimation Facility, 2007.

Raceway ID at Lookingglass Hatchery – broodstock origin	Raceway ID at Acclimation Facility	No. Fish	Size (f/lb)	Weight (lbs.)	Length (3500)	Mark
Raceway 10	Raceway A	25,900	24.03	1,078	4.99	AD CWT Conv
Raceway 10	Raceway B	25,896	24.02	1,078	4.99	AD CWT Conv
Raceway 8	Raceway C	26,660	20.62	1,293	5.16	AD CWT Conv
Raceway 8	Raceway D	26,653	20.61	1,293	5.16	AD CWT Conv
Total		105,109	22.17	4,742	5.04	

Juvenile spring Chinook salmon for the second acclimation group were received from Lookingglass Fish Hatchery on 3/26/07 and 3/27/07 (Table 2). Volitional release started on 4/7/07 and final force out was on 4/17/07. Losses were low: A = 14, B = 14, C = 25, D = 15. Feeds were moderate due unsettled weather and to fish leaving well volitionally: A = 50 lbs, B = 60 lbs, C = 45 lbs, D = 65 lbs (2.0 Moore Clark) for an assumed feed conversion of 1.2. Due to budget and time constraints no live diet training was provided in 2007.

Table 2. Summary of the second group of fish acclimated and released at the Lostine River Acclimation Facility, 2007.

Raceway ID at Lookingglass Hatchery – broodstock origin	Raceway ID at Acclimation Facility	No. Fish	Size (f/lb)	Weight (lbs.)	Length (3500)	Mark
Raceway 9	Raceway A	33,074	20.14	1,642	5.22	ADCWT Conv
Raceway 7 & 9	Raceway B	33,459	19.60	1,707	5.26	ADCWT Conv
Raceway 11	Raceway C	24,604	22.45	1,096	5.03	ADCWT/VIE Left CapBd
Raceway 7	Raceway D	33,764	19.14	1,764	5.30	ADCWT Conv
Total		124,901	20.12	6,209	5.22	

All release information including tagging and marking for this 2007 release can be obtained from the Lostine River M&E Annual Report (Cleary 2008).

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 with the shifting river channel that water is pumped from to provide a 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 were monitored in 2007 to aid in management of the facility.

3.0 LOSTINE RIVER ADULT WEIR AND TRAP 2007

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 4. The Lostine River weir structure being repaired by project staff.

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. Fish that are retained for broodstock are also tagged with uniquely numbered Tyvek tags to allow for tracking while at LGH.



Figure 5. Technician Rusty Eschler examines an adult Chinook salmon captured at the Lostine River weir.

The Lostine River adult facility was operated May 14, through October 1, 2007. There were very few interruptions (only 1 day was impacted) in operations due to high spring run-off and there were a total of 138 active trapping days. The maximum water flow was approximately 900 cfs and the minimum was 6.4 cfs. During 2007 operations, water temperatures ranged from 41.2 F in May to 66.8 F in late July.

The first adult was captured on June 2, 2007, eighteen days after the initial start of the facility operations. The last adult was captured on September 25, 2007. The adult trapping facility was closed on October 1, 2007.

A total of 637 adult Chinook were captured in 2007, with the composition being 240 (37.7%) natural unmarked adults and 397 (62.3%) hatchery supplementation adults (Table 3). The hatchery origin fish were composed of 298 from conventional broodstock and 99 from captive broodstock parents. No “stray” adults from other hatchery programs were captured at the Lostine River adult facility in 2007. The efficiency of the weir in collecting returning adults to the Lostine River was determined to be 100.00% by mark recapture data. This was largely in part due to persistent low flows in 2007.

Table 3. Number of natural and hatchery spring Chinook salmon adults collected at the Lostine River adult trapping facility in 2007.

	Natural Adults	Hatchery Adults	Total
Jacks	37	138	175
Males	93	113	206
Females	110	146	256
Total	240	397	637

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 2007 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 2007.

	Steelhead	Bull Trout	Whitefish	Rainbow	Sucker
Total	51	65	370	1	201

3.2 RUN TIMING

The first adult Chinook was captured on June 2, 2007 and the last was captured September 25, 2007 (Figure 7). Run timing of spring Chinook salmon to the Lostine River in 2007 was comparable to previous years at the Lostine trapping facility (1997-2007). The fish trapped in June accounted for 26.37% of the run. The largest portion (62.17%) of the fish returned in July. A small portion of the fish (11.46%) returned during the August to September period. The day with the largest number of fish captured occurred on July 2, 2007 with 73 fish. The arrival timing of hatchery adult Chinook salmon were similar to the natural adult Chinook salmon for the Lostine River. More detailed information on run timing is provided in the 2007 Lostine River M&E Annual Report (Cleary 2008).

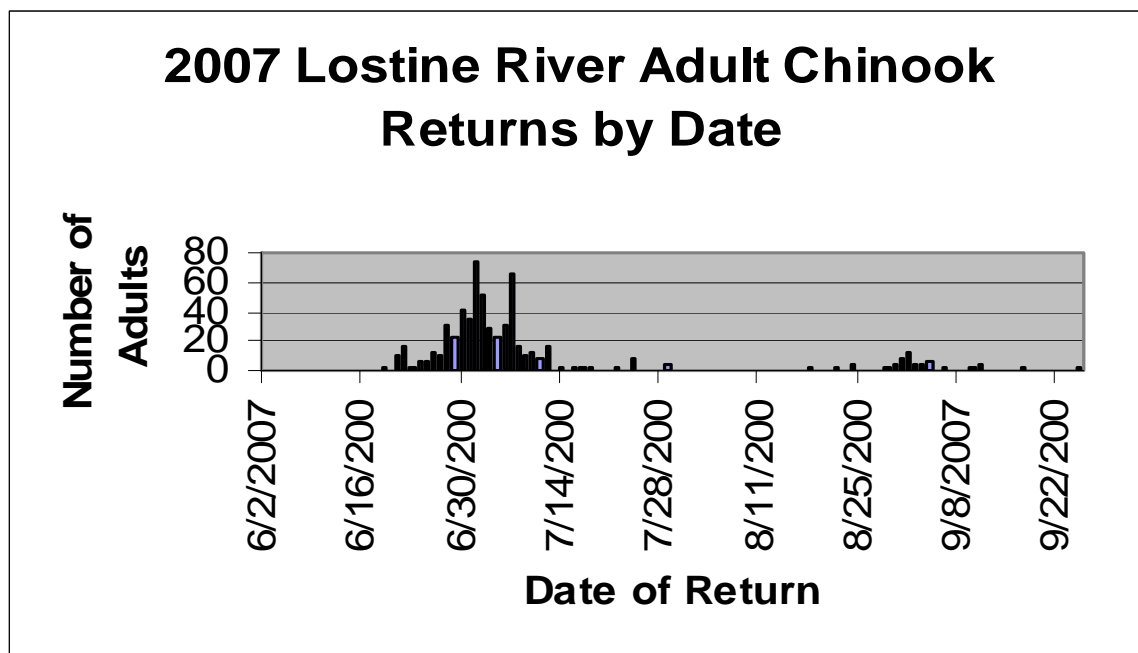


Figure 6. Run timing of spring Chinook salmon adults captured at the Lostine River adult facility in 2007.

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 2007, the returning hatchery origin adults all had adipose clips as well as coded wire tags. There were differentiating marks for captive broodstock and conventional broodstock fish. In 2007, the returning 4-year old and 5-year old adults with visual implant elastomer (VIE) marks were conventional broodstock fish, whereas 3-year old fish with VIE marks were captive broodstock fish. This change in marking protocol was the first time in the history of this program that the captive broodstock origin returning adults had a VIE tag. This change in tagging identification required additional attention from personnel handling the fish. A summary of age composition, sex, and broodstock origin from the 2007 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 2007.

Age	Sex	Number Natural Adults	Number Hatchery Adults	Total
3 Year Olds	Male	37	138	175
3 Year Olds	Female	0	0	0
4 Year Olds	Male	73	97	170
4 Year Olds	Female	91	130	221
5 Year Olds	Male	20	16	36
5 Year Olds	Female	19	16	35
Total		240	397	637

For additional information concerning length frequency and tag retention of natural and hatchery fish based upon current data please review the 2007 M&E Annual Report (Cleary 2008).

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 documented 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 57 (8.95%) fish observed with external injuries during the 2007 trapping year. Of the 57 injured fish, 16 (28.07%) were attributable to a condition called “headburn” (caused by high nitrogen levels in water around dams) and the remaining 41 (71.93 %) fish had injuries from miscellaneous events or whose injury indications were not determinable.

The rate of injury or mortality incurred as a result of trapping and handling at the Lostine River weir for 2007 was similar to past return years. In 2007, there were 2 natural and 2 hatchery pre-spawn mortalities that occurred as a result of equipment failure during transportation. The loss of these four fish was less than one percent (0.63%) of the 637 fish trapped and handled. In addition, holding activities at LGH produced a loss of 5 adults.

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 Willowa 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 2007, 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. It was determined that hatchery jacks would be over represented in the

spawning population. To manage for this it was determined that some (93 total) hatchery jacks would be for tribal consumption and some (15 total) hatchery jacks would be outplanted to underseeded areas of the Wallowa River.

In 2007, based on the management strategy of the sliding scale tool, 122 adults were selected for hatchery broodstock (33.6% being natural origin and 66.4% being hatchery origin) and 403 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 within the Lostine River for natural spawning and retained for hatchery broodstock in 2007.

	Natural	Hatchery	Total	Natural Percent	Hatchery Percent
Hatchery Broodstock – Transported to Lookingglass Hatchery	41	81	122	33.6 %	66.4%
Natural Spawners – Released or transported above Lostine River weir	197	206	403	48.9%	51.1%
Total	238	287	525	45.3%	54.7%

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 2007.

	Adults Released Into Lostine River	Adults Retained & Transported to Lookingglass Fish Hatchery	Tribal Consumption	Adults Out-planted to Wallowa River Tributaries	Adult Mortality	Total Adults
Natural Jacks	35	2	0	0	0	37
Natural Males	75	18	0	0	0	93
Natural Females	87	21	0	0	2	110
Hatchery Jacks	27	3	93	15	0	138
Hatchery Males	78	33	0	0	2	113
Hatchery Females	101	45	0	0	0	146
Total	403	122	93	15	4	637

Adults released to spawn naturally are carried upstream of the weir following recovery from anesthetic and gently returned to the Lostine River (Figure 7). 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 8 shows the Lostine River weir during flow conditions that occurred in 2007.

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 2007, a total of 328 (81.39%) of the 403 adult Chinook that were released above the Lostine River weir were transported above the dry zone. Typically the proportion of fish that must be transported is not so high but due to very low flow conditions and a drier than normal year transportation was necessary.

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 2007, a total of 122 adults were selected for broodstock. These were composed of 41 natural origin and 81 hatchery origin fish. The natural origin fish were 2 jacks, 18 males and 21 females. The hatchery origin fish were three jacks, 33 males and 45 females (Table 8).

A total of 108 jacks were identified as 'surplus' to broodstock needs and for release above the weir. Ninety-three of these were distributed to Nez Perce Tribal members for subsistence and 15 were selected to be outplanted to under-utilized habitat within the Wallowa River drainage.



Figure 7. Technician J.T. Williams preparing to release the 1st returning adult Chinook of 2007 back into the Lostine River.



Figure 8. 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.

3.6 ADULT HOLDING AND SPAWNING



Figure 9. Technicians Shawn Sealey (left) and Rusty Eschler spawn a Lostine River adult male Chinook 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), and North American viral hemorrhagic septicemia (NAVHS). General physical condition of each adult is also recorded.

In samples collected from the 60 females spawned in 2007, the BKD testing resulted in low optical densities ranging from 0.056 to 0.103. No other pathogens were observed from samples taken in 2007. These results are comparable to previous years.



Figure 10. Fish Health technician obtains an ovarian fluid sample from a Lostine River adult female Chinook spawned 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 2007 spawn of Lostine River spring Chinook produced 267,350 green eggs that provided 231,882 eyed eggs after the 35,468 dead eggs were removed. The resulting percent eye-up for 2007 was 86.73% and the average fecundity was 4,456 eggs per female. Due to a good spawn year for the captive broodstock component of the program there were more fish available than room in the program. Enough conventional broodstock eyed eggs were retained to produce approximately 200,000 smolts for acclimation and release back in the Lostine River in 2009.

4.0 SUMMARY

4.1 SMOLT ACCLIMATION

The acclimation and release of 230,010 smolts from the Lostine Acclimation facility in 2007 was the ninth year of operation for the facility (Table 9). 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 9. 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 9 and Figure 11). 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 9 and Figure 11).

Table 9. Summary of spring Chinook smolts acclimated and released from the Lostine River Acclimation facility in its nine years of operation, 1999-2007.

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
2006	40,982	199,586	240,568
2007	24,604	205,406	230,010
Total	649,700	768,236	1,417,936
Average	72,189	85,360	157,548

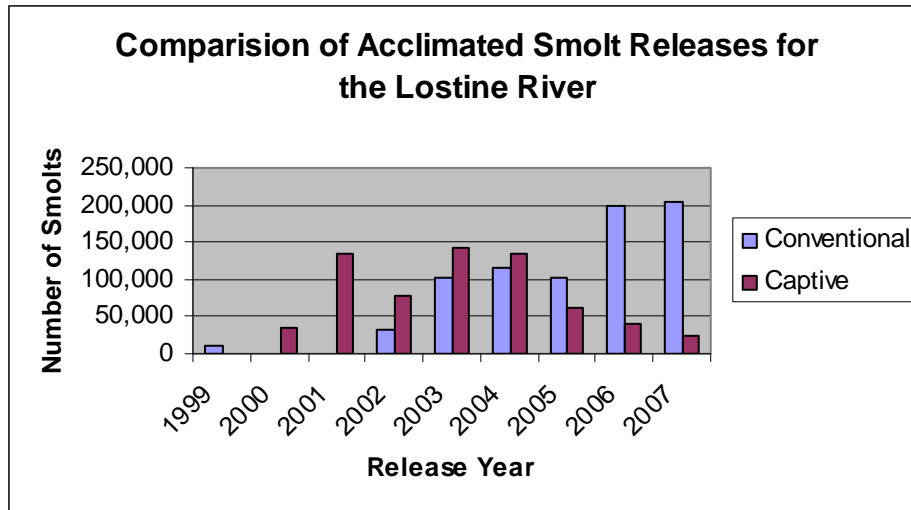


Figure 11. Composition of conventional and captive broodstock origin smolt releases in the Lostine River, 1999-2007.

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 2007, a total of 637 adult Chinook captured, composed of 240 (37.7%) natural unmarked adults and 397 (62.3%) hatchery supplementation adults. The hatchery origin fish were composed of 298 (75.1%) from conventional broodstock and 99 (24.9%) 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 10 and Figure 12. A

more detailed analysis on adult return and escapement to the Lostine River can be found in the 2007 Lostine Monitoring and Evaluation Report (Cleary 2008).

Table 10. Number of natural, conventional hatchery broodstock and captive hatchery broodstock origin spring Chinook salmon adults collected at the Lostine River adult trapping facility, 1997- 2007.

	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
2006	205	169	160	534
2007	240	298	99	637
Total	1,907	1,166	1,615	4,688

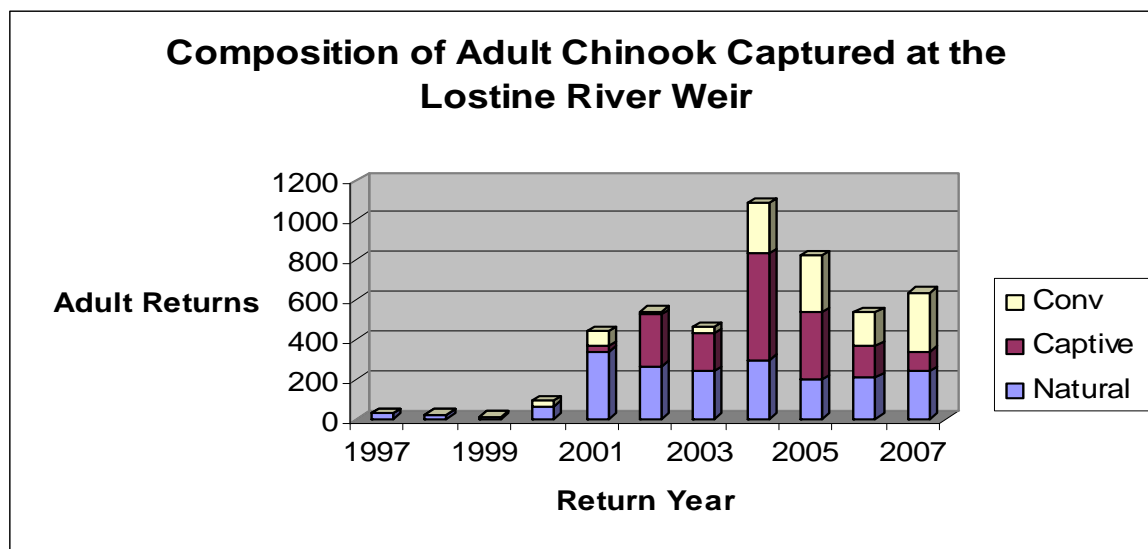


Figure 12. Composition of adult spring Chinook captured at the Lostine Adult Collection facility, 1997 - 2007.

The Lostine River weir was determined to be effective at capturing 100.0% of the adults that returned to the Lostine River in 2007. This efficiency rating is the best since the weir was first operated in 1997 (Figure 13). The improved efficiency rating was due to several factors including improved weir design; low 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 70 fish per day. Having the new larger holding area made a big difference in being able to provide good fish handling and holding conditions.

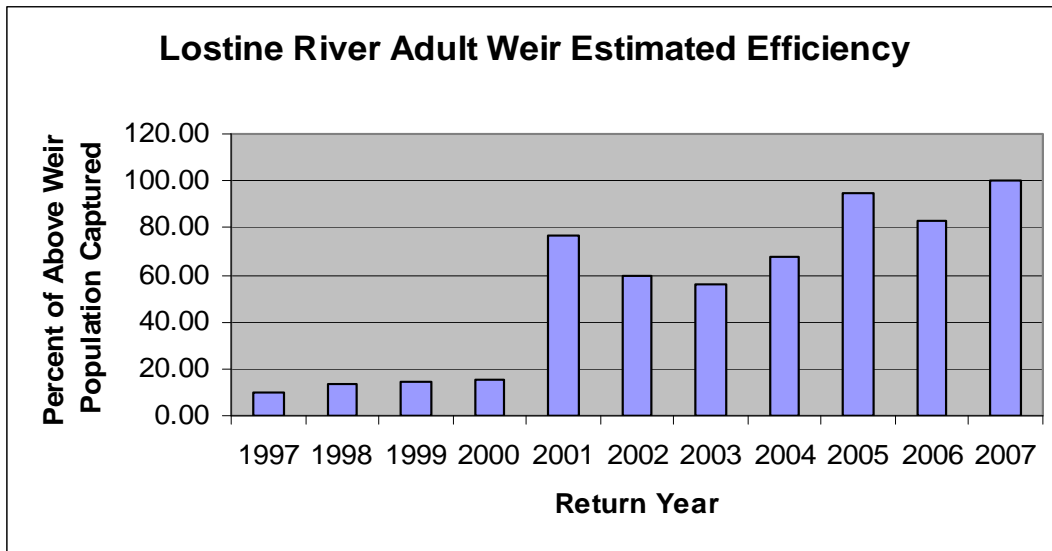


Figure 13. Lostine River weir efficiency at collecting returning adult spring Chinook salmon to the Lostine River.

In 2007, a total of 122 adults (41 natural origin and 81 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 14).

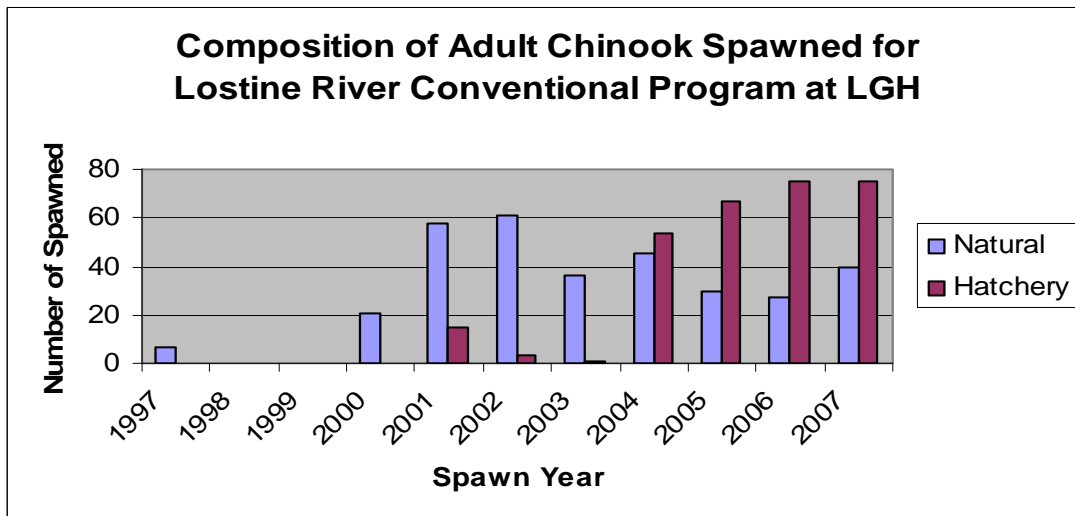


Figure 14. Natural and hatchery origin composition of Lostine River spring Chinook spawned for the conventional broodstock program, 1997 - 2007.

A total of 60 females were spawned to provide 267,350 green eggs. This was the most females spawned for conventional broodstock since the program began in 1997 (Table 11). A summary of females spawned, number of eggs, fecundity and eye up percentage is contained in Table 11.

Table 11. Summary of conventional broodstock and data on eggs produced in the eleven years of operation of the Lostine River supplementation program.

	1997	2000	2001	2002	2003	2004	2005	2006	2007
Total Females Spawned	4	8	36	28	21	52	56	57	60
Total Eggs	17,540	38,900	156,260	133,447	106,609	221,889	234,218	241,372	267,350
Eggs per Female	4,385	4,863	4,341	4,766	5,077	4,267	4,182	4,162	4,456
Total Dead eggs	5,460	3,000	42,267	11,984	4,798	11,228	26,927	35,063	35,468
Total Live Eggs	12,080	35,900	113,993	121,463	101,811	210,661	207,291	206,309	231,882
Percent Eye	68.87	92.29	72.95	91.02	95.50	94.94	88.50	85.47	86.73

A complete summary of adult returns that have resulted from the juvenile releases of Lostine River supplementation program can be found in Table 12.

Table 12. Summary of Lostine River supplementation program releases and resultant adult returns, 1999-2007.

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	16	730	0.30	537	0.22
2004	250,251	72	296	32	400	0.16	328	0.13
2005	164,779	17	227	N/A	*244	*0.15	*227	*0.14
2006	240,568	138	N/A	N/A	*138	*0.06	N/A	N/A
2007	230,010	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. 2007 Lostine River Total Releases

Dates of Acclimation	LGH Raceway ID	Lostine Raceway ID	Fish Numbers Starting	Mortality	Release Numbers	Size (f/lb) @ Release	Length @ Release	Wt @ Release	Density Index @ Release
3/5/07 – 3/25/07	R10	A –Conv	25,909	9	25,900	24.03	4.99	1,078	0.11
3/5/07 – 3/25/07	R10	B –Conv	25,909	13	25,896	24.02	4.99	1,078	0.11
3/5/07 – 3/26/07	R8	C - Conv	6,670	10	26,660	20.62	5.16	1,293	0.13
3/5/07 – 3/26/07	R8	D - Conv	26,670	17	26,653	20.61	5.16	1,293	0.13
Total 1 st Group			105,158	49	105,109	22.17	5.04	4,742	0.12
3/26/07 – 4/17/07	R9	A –Conv	33,088	14	33,074	20.14	5.22	1,642	0.16
3/26&27/07 – 4/17/07	R7 & R9	B –Conv	33,473	14	33,459	19.60	5.26	1,707	0.16
3/27/07 – 4/17/07	R11	C - CapBd	24,626	25	24,604	22.45	5.03	1,096	0.11
3/22/06 – 4/17/07	R7	D - Conv	33,779	15	33,764	19.14	5.30	1,764	0.17
Total 2 nd Group			124,969	68	124,901	20.11	5.22	6,209	0.15
Total Acclimated Release			230,127	117	230,010 99.95 % survival	21.00	5.13	10,951	0.13