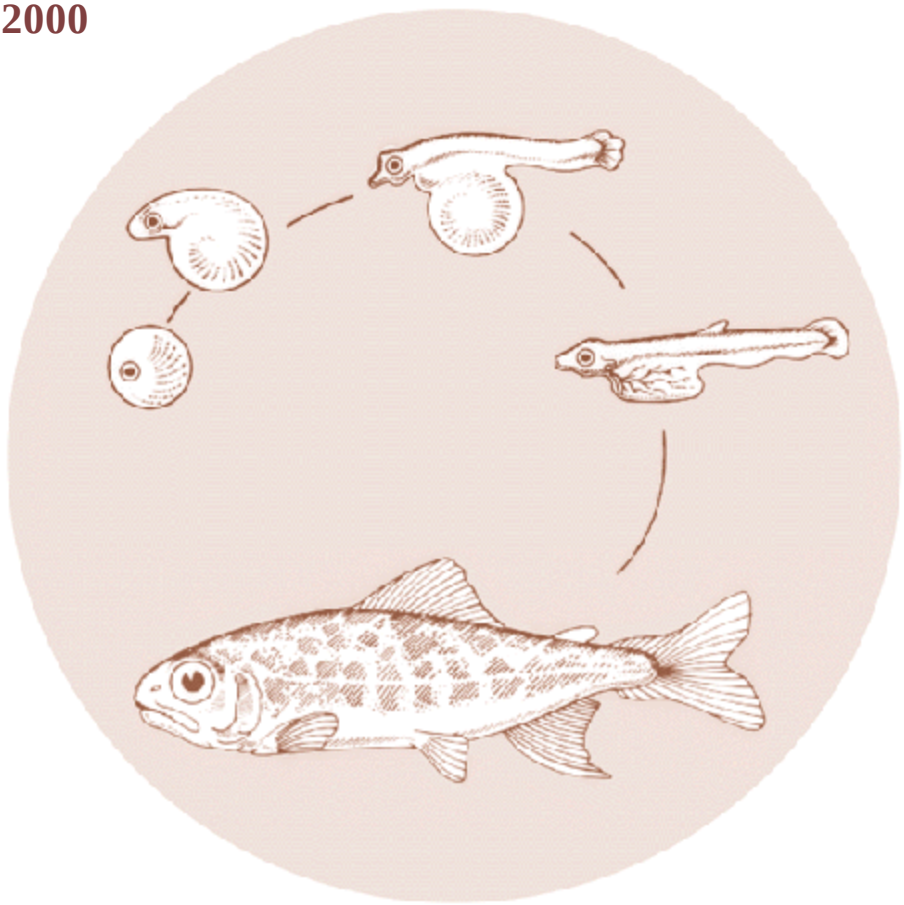
Grande Ronde Basin Supplementation Program

Lostine River

Annual Report
2000



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ANNUAL ESA REPORT

Project Title: Grande Ronde Supplementation Program: the Lostine River Component

Permit Holder: Mr. Robert C. Lothrop
Columbia River Inter-Tribal Fish Commission

Permit Number: Endangered Species Permit No. 1149

Permit Contact: Becky Ashe/ Jim Harbeck

Permit Period: January 1, 2000 through December 31, 2000

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Introduction

Permitted Program

The Northwest Power Planning Council (NPPC) identified supplementation as a high priority to achieve its goal of increasing runs of anadromous fish in the Columbia Basin. Supplementation activities in the Lostine River and associated monitoring and evaluation conducted by the Nez Perce Tribe relate directly to the needs addressed in the Columbia River Basin Fish and Wildlife Program (NPPC 1994). Measure 7.4L.1 of the Program mandates that appropriate research accompany any proposed supplementation. In addition, measure 7.3B.2 of the Program stresses the need for evaluating supplementation projects to assess their ability to increase production. Finally, Section 7.4D.3 encourages the study of hatchery rearing and release strategies to improve survival and adaptation of cultured fish.

In 1997, Oregon Department of Fisheries and Wildlife (ODFW) requested a modification of Permit 1011 to allow the take of adult spring chinook salmon. In 1998, the Nez Perce Tribe also requested a permit specific to activities on Lostine River. The permit was issued in 2000. A special condition in the permits required the development of a long term management plan for the spring chinook salmon of the Grande Ronde Basin. The Nez Perce Tribe, ODFW, and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) completed a formal long range plan entitled "Grande Ronde Basin Endemic Spring Chinook Salmon Supplementation Program". The program proposes to increase the survival of spring chinook salmon in the Grand Ronde Basin through hatchery intervention. Adult salmon from the Lostine River, Catherine Creek, and the Upper Grande Ronde River are used for a conventional supplementation program in the basin. The Nez Perce program currently operates under the ESA Section 10 Permit 1149.

Activities Conducted

The Nez Perce Tribe is responsible for supplementation activities and monitoring and evaluation on the Lostine River. ODFW's Fish Pathology Laboratory in La Grande, Oregon, provides fish health and disease monitoring. A weir and trap are operated on the Lostine River for the collection of chinook broodstock and the collection of biological data. Daily monitoring of the weir coincides with its operation along with the collection of environmental data. The Nez Perce Tribe also operates the Lostine River Acclimation Facility and monitors juvenile in-hatchery performance and emigration. Therefore, the performance of adult and juvenile hatchery fish is evaluated against the standards set by natural production. The Nez Perce Tribe also conducts spawning ground surveys with co-managers.

Weir Monitoring and Operation

WEIR MONITORING

Monitoring of the Lostine River weir and traps is coordinated between NPT research and production personnel. Information gathered includes both environmental and biological data. This data contributes to the assessment of weir impacts on fish passage. In addition, acquiring baseline information on the remnant stock of spring chinook salmon allows for the effective evaluation of supplementation. Monitoring of the weir coincides with its operation. Therefore, data collection associated with the weir occurred from May 8 to October 1 in 2000. *Figure 2* compares the 2000 adult weir catch and run timing with that of 1998 & 1999. However, estimating accurate run timing was likely compromised in 2000. Fishing at the weir and trap was interrupted on two occasions due to high flows. These interruptions occurred during times of likely salmon migration.

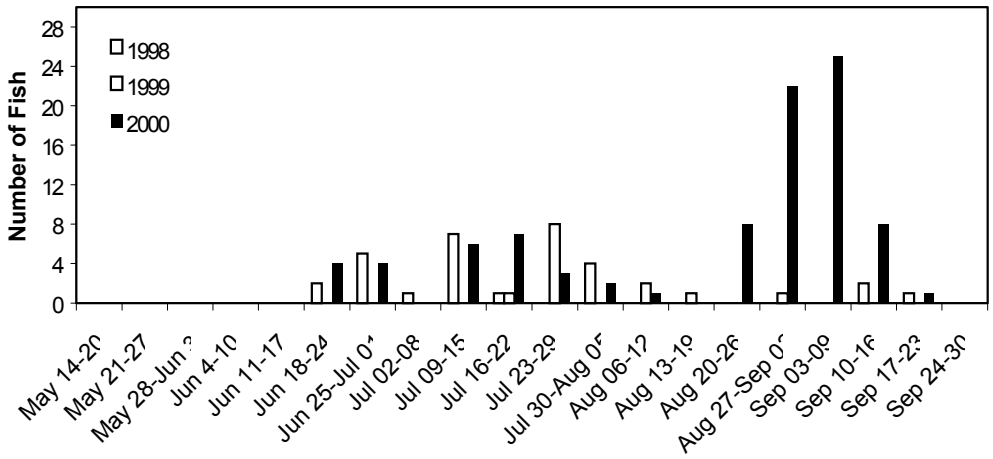

Figure 1. Number of chinook salmon returning to the Lostine River weir according to week – 1998, 1999, 2000.

Biological Data

Data were obtained from fish interrogated at the weir and during bank surveys above and below the weir**.** The weir trap is checked for fish each morning. All non-target fish are examined without anesthesia and passed above the weir. Chinook salmon are dip-netted using a net of knotless material and placed in an anesthetic tank. Captured chinook are anesthetized with a solution of tricaine methane sulfonate (MS-222).

Biological data are recorded for each salmon trapped at the Lostine River weir. This data allows comparisons of life history traits of the salmon population prior to supplementation and during the supplementation process. Age is delineated through length frequency analysis. Preliminary characteristics of the 2000 adult spring chinook population are summarized below (*Table 1*).

Table 1. Summary characteristics of Lostine River spring chinook salmon sampled at the weir, 2000.

Trait	Population Characteristic
Sex Ratio	70M / 21F (3.3:1)
Age Composition (number/percent)	age-3: 36 / 40% age-4: 42 / 46% age-5: 13 / 14%
Age Composition (according to sex)	Male: age-3 36; age-4 22; age-5 12 Female: age-4 20; age-5 1
Mean Length-at-Age (total sample)	age-3: ~ = 558mm; min: 471mm; max: 614 mm age-4: ~ = 750mm; min: 537mm; max: 798mm age-5: ~ = 850mm; min: 800mm; max: 953mm
Mean Length-at-Age (according to sex)	Male: age-3: ~ = 558mm; age-4: ~ = 764mm; age-5: ~ = 850mm Female: age-4: ~ = 736mm; age-5: ~ = 850mm
Origin	64 natural: no identifying fin clips or tags. 27 AD clips: likely Lostine origin
Migration Timing	See Figure 1

Incidental Catch

In addition to the ninety-one chinook salmon trapped and sampled at the weir, bull trout, *Salvelinus confluentus,* steelhead trout, *Oncorhynchus mykiss,* mountain whitefish, *Prosopium williamsoni,* and largescale suckers, *Catostomus macrocheilus* were also trapped and released upstream of the weir. Steelhead kelts were released downstream of the weir. Preliminary characteristics of captured bull trout steelhead, whitefish and largescale suckers are summarized below (*Table 2*).

Table 2. Summary of Lostine weir incidental catch, 2000.

Species	*n*	Mean length (mm)	Sex Ratio (M:F)	Migration Dates
bull trout	12	588	undetermined	5/4 – 8/3
steelhead	2	538	2:0	5/9 - 5/13
whitefish	5	380	undetermined	7/19 - 9/1
sucker	40+	undetermined	undetermined	6/22 - 7/25

Environmental Data

Water temperature and river flow are monitored to correlate migration timing with the physical conditions of the river. Water temperatures are also checked at the weir site 3 times daily to ensure that temperatures are within limits for safe fish handling. Within the time frame of weir operations temperatures ranged from a low of 34° Fahrenheight to a high of 69° Fahrenheight.

NPT personnel also read an onsite staff gauge located at the weir. Water levels recorded from the staff gauge ranged from a height of 6.0 ft. to below the bottom of the gage (unreadable). Flows from the Lostine River at the Krieger bridge are also available online from the USGS WEB site and are downloaded to complement the staff gauge data. Stream discharge according to the

USGS monitoring station ranged from a high of 1100 cfs to a low of 24 cfs during weir operations.

Weir Effect Monitoring

Although the weir is designed to guide immigrating fish to the traps, there is concern that it may negatively affect fish migrations. During weir operation, daily bank surveys are conducted to detect any negative impact on fish movement. Surveys on the Lostine River are conducted above and below the weir simultaneously. Over 245 fish observations were recorded during 94 bank surveys above and below the weir (*Table 3*). The majority of these observations were spawning largescale suckers. During June large numbers of post-spawn suckers congregated above the weir. It was apparent that these fish were hindered from further downstream movement by the weir and lack of downstream trap. Therefore, weir pickets were temporarily pulled and the fish were allowed to pass downstream of the weir.

There were 58 observations of chinook salmon below the weir. The majority of these observations can be attributed to the several redds and spawning adults which were noted in areas of suitable spawning substrates. Three salmon were seen directly above the weir over a test redd. Forty-nine salmonids other than chinook were observed below the weir while nine other salmonids were noted above. These results may be skewed in that sampling effort was higher downstream of the weir. Habitat below the weir is also of better quality than that immediately above the weir. Hence, fish would naturally be more abundant below the weir. Innumerable larval and juvenile fish were also noted on both sides of the weir.

The lower sections of the Lostine River provide 14 irrigation ditches with water resources. There is concern that the dewatering may impact salmon due to physical and/or thermal barriers to migration. NPT personnel snorkeled the Lostine River below the weir on August 7 to estimate the number of salmon holding in the lower river. An estimated 10 chinook adults were viewed holding in lower river pools. Based on this information, a voluntary closure of most of the irrigation ditches was negotiated in an effort to raise river levels and pass the holding salmon upstream. Irrigators closed their ditches from Aug 15 – 17. NPT personnel monitored river flows below the weir with handheld flow meters during this event. River levels increased over this 3 day period . Two fish entered the weir trap but were not secured due to the presence of 2 or more salmon located directly behind the weir. Subsequent snorkeling on Aug. 22 found 5 salmon that had responded by moving up closer to the weir.

Although several chinook spawned below the weir this is likely due to better habitat conditions rather than the weir blocking migrations. Spawning substrate is uncommon for at least 5 miles above the weir whereas redds have traditionally been found below the weir in suitable substrates (Thompson and Haas 1960). The lack of any other fish aggregations immediately below the weir suggests no adverse affect on upstream movements.

Table 3. Chinook salmon observations during foot and snorkel surveys below and above the weir in 2000.

Survey Type	Date Range		# of Surveys	Live Chinook Observed	Carcasses Observed
Foot (bank)	9-May	1-Oct	94	58 below / 3 above	5
Snorkel	7 -Aug	22-Aug	2	15 below	0

WEIR OPERATIONS

Because of the inability of the original picket weir to function effectively at high flows and our desire to fish across the entire chinook run, a new alternative panel weir was tried in 2000. The pickets or mesh are supported by preconstructed panel frames. A winch system allows the weir to be raised and lowered according to flow conditions and need. The panel type weir is described by Schroeder (1996) and Clay (1995). Installation was complete on May 8 at the Clearwater Diversion site prior to the spring thaw.

Fishing was interrupted several times during 2000 due to high water and malfunctioning of the panel weir. Increased flows caused a structural failure on one of the anchoring plates on May 22. Fishing resumed on May 26 after repairs were completed. Fishing was again interrupted on June 6 when the trap/weir interface connection failed. The weir was opened on June 20 to allow fish passage and dismantled by June 27.

The vertical picket style weir used in previous years was installed at the Willet site on June 21. This weir type is designed and manufactured by River Masters Engineering. The portable weir is composed of two horizontal railings or stringers attached to the single upstream leg of the tripods. The tripods are constructed of two inch galvanized steel pipe connected with Kee Klamp® pipe fittings. Aluminum conduit poles called pickets are inserted into one inch holes drilled into the stringers. The pickets are spaced with a two inch gap to allow juvenile fish passage. The top of the pickets are angled downstream to help diffuse head differential and transfer the force of water onto the rear two legs of the tripod (Schroeder 1996). A cable system attached to the tripods is anchored to a deadman on each bank to prevent the downstream movement of the weir structure during high flows.

Fishing commenced at the Willet site the afternoon of June 21and continued uninterrupted through October 1. Both sites were manned 24 hours a day throughout the tapping season when the weir was closed and fishing.

Adult Collections

Ninety one adult chinook salmon were collected, sampled and processed at the weir. No chinook mortalities occurred at the trap site in 2000. Fish were processed the day of their capture and either passed upstream or retained for broodstock (*Table 4*). All fish trapped were given an opercle mark (punch). Fish retained for broodstock were given 3 right opercle punches as a secondary mark to indicate tributary of origin and an opercle tag with a code to identify individual fish. Fish passed upstream were given a unique opercle punch indicating their week of capture. The mark was also used for the mark-and-recapture population estimates (carcass recoveries during spawning ground surveys).

Injuries

The trapped chinook generally appeared to be in good condition. Only 8% of the collected fish displayed any type of injury or physical abnormality (*Table 4*). Most of the injuries appeared to have occurred prior to entry into the trap. Evidence of gas supersaturation (headburn) was apparent on one of the fish collected. After the third week of August the majority of the fish trapped were in a ripened condition.

Steps Taken to Minimize Trap-related Problems and Disturbance

NMFS criteria for weir and trap facilities were followed in the development of the Lostine picket weir. The weir spans approximately 60 meters across the river channel at a 45 ° angle with tripods spaced 8 ft apart. The trap is designed with picket wings to guide fish into the trap and with a V-shaped fyke opening to inhibit escape.

The holding cage is placed in an area deep enough to maintain fish during minimum flows and where flow is sufficient to attract fish. Shade material covers the top of the trap and a solid panel on the upstream side of the trap provides an eddy for captured fish. Metal edges inside the trap are covered by foam pipe insulators. Processing of trapped fish occurs quickly to minimize their time out of water and their time under anesthetic. Activities that can be accomplished with the fish partially submerged are completed in that fashion.

Transportation

The Nez Perce Tribe provided transportation for 33 adult chinook retained for broodstock from the weir to Lookingglass Fish Hatchery. All fish were transported on the day of their capture. No mortalities occurred during transportation in 2000. The fish were "water-to water' transferred from the trap to the transport vehicle via a fish tube. The hauling water was treated with PolyAqua®, a water conditioner formulated to reduce disease outbreak and stress. Temperatures of the hauling water were also monitored and a NPT fish transport document was signed by the receiving facility manager for each transportation. Once at Lookingglass Fish Hatchery, the fish were transferred from the transport truck to the holding tank using a dipnet.

Derivation of Take Estimates

All estimates of take were made by direct count of fish at the trapping facility, during frequent surveys for a one-mile reach below the weir, or during six spawning ground surveys both above and below the weir.

Table 4. Spring chinook data collected from the weir and trap on the Lostine River, 2000. Ninety one salmon were sampled (P-passed, K-kept, KS-kept and spawned, M-mortality).

Fish ID #	Date	Fin Clip /Tag	Sex	Fork Length(mm)	Disposition (P,K,KS, M)	Inject Vol Ery/Oxy	Opercle Tag	Opercle Punch	Genetic sample	Comments
001	22-Jun	none	m	790	P			2 LOP	LR00-01	clean
002	23-Jun	none	m	472	P			2LOP	LR00-02	clean, jack
003	24-Jun	none	f	726	P			2 LOP	LR00-03	clean
004	24-Jun	none	m	487	P			2 LOP	LR00-04	clean
005	25-Jun	none	m	953	P			2 LOP	LR00-05	clean
006	26-Jun	none	f	537	P			2LOP	LR00-06	clean
007	28-Jun	none	m	950	P			2 LOP	LR00-07	injured maxillary
008	29-Jun	none	f	775	P			2 LOP	LR00-08	clean
009	13-Jul	none	f	850	KS	.71/.35	L11	3ROP	LR00-09	clean
0010	13-Jul	none	m	755	KS	.50 /.25	L12	3ROP	LR00-10	headburn
0011	13-Jul	none	f	740	KS	.46 /.23	L14	3ROP	LR00-11	clean
0012	14-Jul	none	f	780	P			1 LOP	LR00-12	laceration on occiput
0013	14-Jul	none	m	840	KS		L13	3 ROP	LR00-13	caudal abrasion
0014	15-Jul	none	m	841	P			1 LOP	LR00-14	laceration on occiput
0015	16-Jul	none	m	785	P			1 LOP	LR00-15	clean
0016	16-Jul	AD	m	597	P			1 LOP	LR00-16	clean
0017	17-Jul	none	m	471	KS		L15	3 ROP	LR00-17	clean
0018	19-Jul	none	f	705	P			1 LOP	LR00-18	clean
0019	20-Jul	none	m	804	P			1LOP	LR00-19	clean
0020	20-Jul	AD	m	603	KS		L16	3ROP	LR00-20	clean
0021	21-Jul	AD	m	591	P			1LOP	LR00-21	clean
0022	23-Jul	none	m	590	P			1ROP	LR00-22	clean
0023	29-Jul	AD	m	545	P			1ROP	LR00-23	clean
0024	29-Jul	AD	m	555	KS		L17	3ROP	LR00-24	clean
0025	31-Jul	none	m	775	KS	.54 /.27	L18	3ROP	LR00-25	clean
0026	3-Aug	AD	m	576	KS		L19	3ROP	LR00-26	clean
0027	4-Aug	none	m	798	KS		L20	3ROP	LR00-27	clean
0028	21-Aug	none	m	735	P			2ROP	LR00-28	clean, ripe
0029	21-Aug	none	f	720	P			2ROP	LR00-29	fungus on lateral line
0030	25-Aug	none	m	759	P			2ROP	LR00-30	fungus on peduncle

Table 4 cont.

Fish ID #	Date	Fin Clip /Tag	Sex	Fork Length(mm)	Disposition (P,K,KS, M)	Inject Vol Ery/Oxy	Opercle Tag	Opercle Punch	Genetic sample	Comments
0031	26-Aug	none	m	794	P			2ROP	LR00-31	clean, ripe
0032	26-Aug	none	m	808	KS		L21	3ROP	LR00-32	clean, ripe
0033	26-Aug	none	m	805	KS		L22	3ROP	LR00-33	clean, ripe
0034	26-Aug	AD	m	605	P			2ROP	LR00-34	clean, ripe
0035	30-Aug	AD	m	530	P			3ROP	LR00-35	clean, ripe
0036	30-Aug	none	m	753	P			3ROP	LR00-36	clean, ripe
0037	30-Aug	none	f	795	KS		L23	3ROP	LR00-37	clean, close to ripe
0038	31-Aug	none	f	703	KS		L24	3ROP	LR00-38	clean, not ripe
0039	31-Aug	AD	m	514	P			3ROP	LR00-39	clean ripe
0040	31-Aug	none	m	776	P			3ROP	LR00-40	clean ripe
0041	31-Aug	AD	m	561	P			3ROP	LR00-41	clean ripe
0042	1-Sep	AD	m	600	KS		L25	3ROP	LR00-42	clean ripe
0043	1-Sep	none	m	789	KS		L26	3ROP	LR00-43	clean ripe
0044	1-Sep	AD	m	575	KS		L27	3ROP	LR00-44	clean ripe
0045	1-Sep	none	m	831	KS		L28	3ROP	LR00-45	clean ripe
0046	1-Sep	none	f	766	P			3ROP	LR00-46	clean ripe
0047	1-Sep	none	f	781	P			3ROP	LR00-47	clean ripe
0048	1-Sep	none	f	778	P			3ROP	LR00-48	clean ripe
0049	1-Sep	none	f	772	KS		L29	3ROP	LR00-49	clean ripe
0050	1-Sep	none	m	545	P			3ROP	LR00-50	clean ripe
0051	1-Sep	AD	m	611	P			3ROP	LR00-51	clean ripe
0052	1-Sep	none	f	693	KS	.37 /.18	L30	3ROP	LR00-52	clean, not ripe, injected
0053	2-Sep	none	m	927	P			3ROP	LR00-53	clean, ripe
0054	2-Sep	none	m	798	P			3ROP	LR00-54	clean, ripe
0055	2-Sep	none	f	774	P			3ROP	LR00-55	clean, not ripe, injected
0056	2-Sep	none	f	705	P			3ROP	LR00-56	ripe, "porpoise" head
0057	2-Sep	AD	m	534	P			3ROP	LR00-57	clean
0058	3-Sep	none	m	790	P			3ROP	LR00-58	clean, ripe
0059	3-Sep	none	f	752	P			3ROP	LR00-59	clean, ripe
0060	3-Sep	AD	m	607	P			3ROP	LR00-60	clean, ripe
0061	3-Sep	none	m	534	KS		L31	3ROP	LR00-61	clean, ripe

Table 4 cont.

Fish ID #	Date	Fin Clip /Tag	Sex	Fork Length(mm)	Disposition (P,K,KS, M)	Inject Vol Ery/Oxy	Opercle Tag	Opercle Punch	Genetic sample	Comments
0062	3-Sep	none	m	835	KS		L32	3ROP	LR00-62	ripe
0063	3-Sep	AD	m	584	KS		L33	3ROP	LR00-63	ripe
0064	3-Sep	AD	m	675	P			3ROP	LR00-64	ripe
0065	3-Sep	none	m	777	KS		L34	3ROP	LR00-65	ripe
0066	4-Sep	none	m	528	P			3ROP	LR00-66	ripe, clean
0067	4-Sep	AD	m	584	KS		L35	3ROP	LR00-67	L-35 tag on backwards, ripe, clean
0068	4-Sep	AD	m	614	KS		L36	3ROP	LR00-68	ripe, clean
0069	4-Sep	AD	m	512	P			3ROP	LR00-69	ripe, clean
0070	4-Sep	AD	m	577	P			3ROP	LR00-70	ripe, clean
0071	5-Sep	none	m	730	P			3ROP	LR00-71	ripe, clean
0072	5-Sep	radio tag	m	806	KS		L37	3ROP	LR00-72	ripe, clean, radiotag G5/VI Tag
0073	5-Sep	none	f	704	KS		L38	3ROP	LR00-73	ripe, clean
0074	5-Sep	AD	m	539	P			3ROP	LR00-74	ripe
0075	5-Sep	AD	m	586	P			3ROP	LR00-75	ripe
0076	6-Sep	AD	M	585	KS		L39	3ROP	LR00-76	ripe
0077	6-Sep	AD	M	564	KS		L40	3ROP	LR00-77	ripe
0078	6-Sep	none	M	770	P			3ROP	LR00-78	ripe
0079	7-Sep	none	M	782	P			3ROP	LR00-79	ripe
0080	7-Sep	none	F	715	KS		L41	3ROP	LR00-80	ripe
0081	8-Sep	none	M	716	KS		L42	3ROP	LR00-81	ripe
0082	8-Sep	AD	M	542	P			3ROP	LR00-82	ripe
0083	10-Sep	none	M	551	P			3ROP	LR00-83	ripe
0084	10-Sep	AD	M	572	KL			3ROP	LR00-84	ripe
0085	13-Sep	none	F	795	P			3ROP	LR00-85	3ROP/ 2H,1L; RIPE, BELOW
0086	13-Sep	none	M	800	P			3ROP	LR00-86	3ROP/ 2H,1L; ABOVE
0087	13-Sep	none	M	785	P			3ROP	LR00-87	3ROP/ 2H,1L; BELOW
0088	13-Sep	none	M	700	P			3ROP	LR00-88	3ROP/ 2H,1L; BELOW
0089	13-Sep	none	M	534	P			3ROP	LR00-89	3ROP/ 2H,1L; BELOW
0090	13-Sep	none	M	530	P			3ROP	LR00-90	3ROP/ 2H,1L; BELOW
0091	20-Sep	none	M	775	P			3ROP	LR00-91	3ROP/ 2H,1L; BELOW

Maturity and Spawning

BROODSTOCK COLLECTION

As per the Annual Operating Plan (AOP), no more than 2 in 5 (40%) of the naturally-produced salmon returning to the Lostine River weir were retained for broodstock. Of the 91 chinook trapped at the weir, 33 were retained. Fish were selected for broodstock systematically according to sex and age (jack or 4/5 year old).

Fish selected for brood were injected with antibiotics at the weir site. Each fish was given a dorsal sinus injection of erythromycin 200 and a intraperitoneal injection of oxytetracycline 200 (200mg/mL). Injection volume for each antibiotic was according to fish specific length. The required prescriptions for the antibiotic treatments were obtained from a consulting veterinarian via ODFW Fish Pathology staff. Ripe fish were not injected.

Pre-spawning mortality

No Lostine brood fish died at the weir and trap, enroute to the hatchery or in the holding pond while at Lookingglass Fish Hatchery prior to spawning in 2000.

GAMETE COLLECTION

Spawning of the Lostine brood fish occurred September 9th and the 14th with NPT staff assisting ODFW crews. Spawning matrices were developed for 2 natural jacks, 12 natural males, 8 natural females and 11 hatchery jacks. From the 8 females spawned, 34,630 eggs were taken to Oxbow Hatchery for incubation. Egg loss amounted to 3.1% (1,084) of the take. An estimated 28,541 smolts will result from this spawn.

The Nez Perce Tribe also cryopreserved sperm from Lostine River fish collected under CRITFC Permit 1134 (*Table 5*). Half of the samples from each male are being stored at Washington State University and half at the University of Idaho.

Table 5. Collection of fish and disposition of semen collected from male spring chinook salmon from the Lostine River in 2000 (covered under associated CRITFC Permit 1134).

Collection Date	Site	Females Collected	Males Collected	Hatchery ID	Sperm sample #	Sample Disposition
23-Aug	Lostine R	0	1	none	NPT-27-00	Cryopreserved
9-Sept	LGH	0	1	L21	NPT-70-00	Cryopreserved
9-Sept	LGH	0	1	L20	NPT-71-00	Cryopreserved
9-Sept	LGH	0	1	L18	NPT-72-00	Cryopreserved
9-Sept	LGH	0	1	L12	NPT-73-00	Cryopreserved
9-Sept	LGH	0	1	L26	NPT-74-00	Cryopreserved
9-Sept	LGH	0	1	L13	NPT-75-00	Cryopreserved
14-Sept	LGH	0	1	L37	NPT-76-00	Cryopreserved
14-Sept	LGH	0	1	L13	NPT-77-00	Cryopreserved
14-Sept	LGH	0	1	L21	NPT-78-00	Cryopreserved

Table 5 continued

Collection Date	Site	Females Collected	Males Collected	Hatchery ID	Sperm sample #	Sample Disposition
14-Sept	LGH	0	1	L32	NPT-79-00	Cryopreserved
14-Sept	LGH	0	1	L27	NPT-80-00	Cryopreserved
14-Sept	LGH	0	1	L31	NPT-81-00	Cryopreserved
14-Sept	LGH	0	1	L20	NPT-82-00	Cryopreserved
14-Sept	LGH	0	1	L34	NPT-83-00	Cryopreserved
14-Sept	LGH	0	1	L22	NPT-84-00	Cryopreserved
14-Sept	LGH	0	1	L42	NPT-85-00	Cryopreserved
14-Sept	LGH	0	1	L15	NPT-86-00	Cryopreserved

Adult Health Monitoring and Disease

Eight Lostine River spring chinook salmon spawned females and 34 males were assayed for culturable viruses. All of these females and 22 of the males were assayed for *Renibacterium salmoninarum* (Rs) antigen (BKD) by the ELISA. Core samples of head cartilage were taken from one female, two wild jacks and nine other wild males for *Myxobolus cerebralis* (Whirling Disease) analysis. There were no adult mortality fish health examinations at Lookingglass Hatchery.

No virus or replicating agents were detected in eight individual female pyloric caeca/kidney/spleen tissue samples, ovarian fluid and 34 milt samples. Assay results for Rs antigen by the ELISA indicated that all eight females had negative or low infection levels. One of eight females (12.5%) had an ELISA value of 0.221 OD units and all other values were ≤ 0.172 OD units. No whirling disease spores were detected in any of the head cartilage core samples.

Veterinary prescriptions were obtained for prophylactic disease treatments. This allowed for injections of erythromycin (20 mg/kg body weight) and oxytetracycline (10 mg/kg body weight). Initial injections were given at the Lostine River weir at the time of transport to Lookingglass Hatchery. Second injections were given at Lookingglass Hatchery during the first week of August for fish that arrived before July 15th. All kept unripe fish arriving after July 15th were given one injection of both antibiotics. Formalin treatments were given to adults at Lookingglass Hatchery 5-7 days per week at 167 ppm to control external fungus.

Spawning Ground Surveys

NPT personnel attended survey methodology training in McCall, ID prior to chinook spawning ground surveys. The Nez Perce Tribe conducted Lostine River surveys in coordination with ODFW and the US Forest Service. The surveys are intended to bracket spawning time, provide an index for population estimates, and acquire biological data from recovered carcasses.

2000 RESULTS

Scheduled surveys occurred on August 25, September 1 and 8. A number of mature chinook salmon in pre-spawning condition as well as several new redds were noted below the weir after the last scheduled survey. In response NPT personnel conducted additional surveys below the weir on September 15, 20, and 29. We have no substantial evidence that the presence or operation of the Lostine weir has changed spawning distribution, timing or behavior. Changes in spawning distribution will be evaluated as a time series once sufficient data are available. Sixty four total redds were counted in the Lostine River in 2000. The results of both the scheduled and additional surveys are summarized below (*Table 6*).

Table 6. Summary of Lostine River chinook salmon spawning ground surveys, 2000.

	Scheduled Surveys				Additional Surveys Below the Weir			
Date	Total	Aug 25	Sept 1	Sept 8	Total	Sept 15	Sept 20	Sept 29
Redds	55	37	12	11	4	1	1	2
Live Fish	58	24	24	10	2	2	0	0
Carcass Recovery	41	12	15	11	16	9	6	2

Fish interrogated at the weir and passed upstream are given a unique mark. Therefore, mark-recapture methodology can be employed to determine abundance. However, biased mark-recapture estimates of population size often result when the number of fish sampled is low. Because of low salmon numbers in the Lostine River, we therefore calculate population abundance ($\hat{N}_a$) using the Bailey modification (1951) of the Peterson Index:

$$\hat{N}_a = \frac{(M+1)(C+1)}{(R+1)},$$

where M is the number of chinook marked and released above the weir, C is the number of chinook examined during the spawning ground survey, and R is the number of recaptures found during the spawning ground survey. The variance is estimated by:

$$Var(\hat{N}_a) = \frac{M^2(C+1)(C-R)}{(R+1)^2(R+2)}$$

Several assumptions are necessary for valid estimates when using the modified Peterson Index (Serber 1982): 1) there is no recruitment to the spawning population over the duration of the experiment 2) marked salmon are recognized as such during the survey 3) marked and unmarked salmon have the same probability of recovery during the survey and are randomly distributed 4) marked and unmarked salmon have equal mortality rates during the interval between marking and the recovery period.

The mark-recapture method can estimate only the population above the weir. The entire river population is then estimated with an annually determined fish-per-redd figure. Fish per redd

calculations are based on the assumptions of accurate population estimates and the complete redd enumeration during the spawning survey. Fish per redd ($\hat{N}_r$) is determined by:

$$\hat{N}_r = \frac{\hat{N}_a}{r},$$

where *r* is the total number of redds counted in the survey, and $\hat{N}_a$ is the number of salmon estimated from the Peterson Index. Total escapement is estimated by multiplying the fish-per-redd figure by the total number of redds counted during the annual survey. According to the fish per redd figure calculated in 2000 and the number of redds, the total estimated escapement into the Lostine River was 352 plus 33 taken for broodstock.

2001 ADULT RETURN PREDICTIONS

As is the case for escapement estimates, the reliability of run size forecasts is dependant on valid assumptions. There are also numerous areas for variability in this methodology. However, based on the particular predictive method used, Lostine run size may exceed over 1000 fish in 2001. These predictions are used when planning weir operation and broodstock take ratios for the following year.

The methods for Lostine River wild salmon predictions are as follows: the Regional TAC estimate for Snake River wild spring salmon entering the Columbia River is 39,300 fish (206,700 total forecast x 19% wild = 39,273). The Nez Perce conversion rate used to estimate escapement from the mouth of the Columbia River to Lower Granite Dam is 0.498. Therefore, 39,273 x 0.498 = 19,558 wild spring chinook predicted to return to the Snake River above Lower Granite Dam. Chinook run predictions particular to the Lostine River are detailed below.

A. Lostine run predictions based on redd count population estimate (3.2 fish per redd). The average proportion of Lostine fish that have made up the Snake River Run for the past 15 years (0.0410) times the number of wild spring chinook predicted to return to the Snake River above Lower Granite (19,558) equals the run projection for the Lostine River. **Therefore, 0.0410 x 19,558 = 802 wild chinook predicted to return to the Lostine River.**

B. Lostine run predictions based on Peterson-Bailey mark/recapture population estimates (since 1997 only). The average proportion of Lostine fish that have made up the Snake River Run for the past 3 years (0.0551) times the number of wild spring chinook predicted to return to the Snake River above Lower Granite (19,558) equals the run projection for the Lostine River. **Therefore, 0.0551 x 19,558 = 1,078 wild chinook predicted to return to the Lostine River.**

Hatchery adults from the conventional and captive broodstock programs will also return in 2001. Methods used to predict hatchery returns are based on prior experience and are explained below.

A. Jacks from the captive brood F1s (98 cohort) will return in 2001. Using the Lostine River conventional smolt-to-jack conversion rate from the 2000 return (jack returns divided by the number of smolts released) gives an equation and rate of: 27/12,000 = 0.00225. **Therefore, 0.00225 x 34,987 captive brood smolts = *79* CB jacks.**

B. Four year olds from the conventional F1s (97 cohort) will return in 2001. We have no Lostine 4 yr old hatchery salmon return data to determine a conversion rate particular to the Lostine system. So Imnaha hatchery rates are used as a surrogate. The most recent 5 year average of Imnaha jack-to-4 yr old conversion rate is 2.72572. **Therefore, 2.72572 x 27 conventional jack returns = *74* 4 yr old conventional hatchery salmon.**

The smolt to adult ratio (SAR) in the Lostine River would need to be very high for these predictions to be accurate. But if ocean conditions have improved recently perhaps we will see returns of this magnitude in 2001.

Juvenile Monitoring and Release

1998 BROOD YEAR

Monitoring of the Lostine juvenile chinook (98BY) reared at Lookingglass Hatchery occurred during 2000. The Nez Perce Tribe conducted sampling activities in coordination with ODFW. Crews from both agencies worked together during the week of February 20 to sample Lostine smolts just prior to their transfer to the Lostine River Acclimation Facility.

Adipose fin clip quality and coded wire tag (CWT) retention was evaluated on 500 fish. The coded wire tag was encountered on **99.2%** of the sample. The fin clip mark was evident on **99.8%** of the sample.

Biological data were also collected from the sampled parr. Fork length (mm) and weight (g) measurements were recorded from 300 fish. The length frequency was skewed slightly toward the larger lengths in the distribution with no apparent bimodal growth pattern. The modal length was **122** mm.

Descriptive statistics of length and weight are summarized in *Table 7*. Condition factors are included. Indices of condition were calculated according to the Fulton and Relative methods. Relative condition factors compensate for allometric growth as when a fish experiences smoltification. Therefore, it can be used to advantage when comparing the Lostine 98 cohort through time at several life stages. The Fulton condition factor is presented because of its prevalence in research and literature. Its also indicative of the change associated with smoltification. As expected, the Fulton condition factor was lower as the fish prepared to smolt. At this rearing juncture, the hatchery population was at an estimated **20.9** fish per pound.

Table 7. Summary data for the Lostine River chinook parr sampled at Lookingglass Hatchery on February 22-24, 2000.

Measurement	Sample Size (*n*)	Mean	Range	Std. Dev.
Length (mm)	300	121.2	67 – 187	11.9
Weight (g)	50	21.7	5.5 – 42.0	6.48
Fulton's C.F.(K)	50	1.2	0.75 – 2.4	0.166
Relative C.F. (K_n)	50	1.00	0.79 – 1.39	0.01

LOSTINE RIVER ACCLIMATION FACILITY

The Lostine F1 captives were transported to the Lostine River Acclimation Facility (*Figure 1*) on February 29 and March 1. Ten transportation morts were picked, scanned and sent to ODFW Fish Pathology in La Grande. OR. ODFW Fish Pathology crews also sampled 41 smolts (lethal sampling) during the week of March 26. No other mortalities occurred during the acclimation period.

Because the smoltification process is not only governed by growth, environmental data is also noted. Photoperiod, water temperatures, and stream discharge are cues that help synchronize smolting in wild salmonids (Clarke and Hirano 1995). Therefore, these data are collected and

correlated with the volitional migration of the Lostine hatchery smolts and compared with the migration of the wild smolts. Water temperatures ranged from 34.5° F to 46° F with an overall mean of 39.3° F. During the volitional release period flows in the raceways were increased to approximately 560 gpm.

The PIT Tag file submitted to *PTAGIS* was amended to account for the transportation mortalities and fish health sample that occurred during the acclimation period.

Downstream Migration

Monitoring of 35,039 Lostine chinook smolts (98 BY) released at the Lostine River Acclimation Facility occurred during this quarter. The volitional departure of the Lostine smolts was monitored through interrogations at the Lostine smolt trap located just 8 miles downstream from the release site (*Figure 1*). The Nez Perce Tribe conducted sampling activities with ODFW at the Lostine smolt trap during emigration. In addition, the *PITAGIS* database was also queried for information from interrogated smolts migrating through the Snake River hydroelectric system.

NPT staff worked with ODFW crews on the Lostine smolt trap during spring emigration. The volitional release began on April 1. The first hatchery smolt was captured by the Lostine trap on the night of April 1. Movement out of the acclimation facility seemed correlated with water temperatures (*Figure 2).* Based on trap efficiencies, approximately 17,000 hatchery smolts passed the trap site prior to the forced release on April 18. Hatchery smolt movement through the Lostine screw trap generally paralleled that of the wild smolts (*Figure 3*).

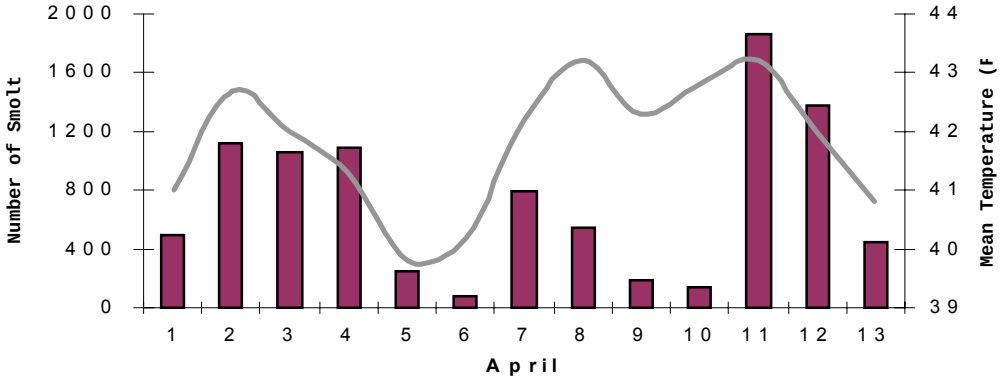

Figure 2. Hatchery smolt migration according to temperature

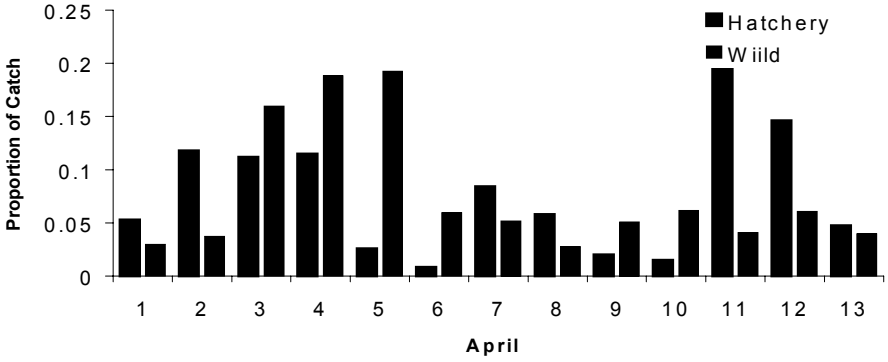

Figure 3. Proportion of wild and hatchery chinook smolt outmigration based on catch at the Lostine River screw trap, 2000.

Preliminary *PITAGIS* data indicates 41% (3262) of the pit tagged captive brood F1s were interrogated at one or more of the three monitored lower Snake River dams or at McNary Dam. Travel time to Lower Granite Dam ranged from 14 to 94 days. The median travel time was 38 days.

1999 BROOD YEAR

Monitoring of the Lostine chinook parr (99BY) reared at Lookingglass Hatchery occurred during 2000. The Nez Perce Tribe conducted sampling and PIT tagging activities in coordination with ODFW. Crews from both agencies worked together during the weeks of October 23rd to November 3rd.

Seven thousand nine hundred and thirty six (7936) fish were PIT tagged (6% of total production). Non-"bleeders" accounted for 97.35% of the tagged fish. Subsequent observations during the following 2 weeks indicated **no** mortalities associated with the PIT tagging operation. PIT tag retention proved to be high. Five tags were recovered from the raceway after tagging (0.06%). Biological data were also collected from the pit tagged parr. Fork length (mm) and weight (g) measurements were recorded along with an assessment of fin clip quality (AD). Fin clips were encountered on virtually 100% of the fish sampled. The length frequency was distributed normally with no apparent bimodal growth pattern. Descriptive statistics of length and weight are summarized in *Table 8.* At this rearing juncture, the hatchery population was at an estimated **24.4** fish per pound.

Table 8. Summary data for the Lostine River chinook parr sampled at Lookingglass Hatchery on February 22-24, 2000.

Measurement	Sample Size (*n*)	Mean	Range	Std. Dev.
Length (mm)	300	121.2	67 – 187	11.9
Weight (g)	50	21.7	5.5 – 42.0	6.48
Fulton's C.F.(K)	50	1.2	0.75 – 2.4	0.166
Relative C.F. (K_n)	50	1.00	0.79 – 1.39	0.01

Juvenile Health Monitoring and Disease

1998 BROOD YEAR

The 1998 captive broodstock F1s were released in April of 2000. La Grande fish pathology personnel monitored the progeny of Lostine River captive brood spawned in 1998 for fish health at Lookingglass Hatchery in January and February 2000 and at the acclimation site prior to release. There were no increased loss problems with the BY98 captive brood progeny.

There were no cases of clinical BKD in the Lostine River stock at Lookingglass Hatchery or at the acclimation site. All 20 mort/moribund and 66 grab-sampled Lostine River fish examined in 2000 had ELISA values ≤ 0.141 OD units. With respect to the lack of BKD in the progeny of BY98 clinical BKD females, it is important to note that they were at extremely low density with only approximately 3200 fish in raceway 15 (BKD segregated raceway).

Erythrocytic inclusion body syndrome (EIBS) inclusions were not detected in any fish examined. All samples tested for virus or replicating agents were negative. There were no significant bacterial fish pathogens detected in kidney cultures in 2000. Gill wet mounts of grab-sampled fish during monthly monitoring and at preliberation revealed areas of bumpy gill tips and hyperplasia. Four of 16 (25.0%) grab-sampled Lostine River fish at the preliberation examination had moderate to heavy bumpy gill tips with low level hyperplasia. The external parasites *Ambiphrya* (*Scyphidia*) and *Epistylus* were detected in wet mount microscopy of body scrapings at various levels but not on gills during monthly monitoring and preliberation examinations in 2000.

1999 BROOD YEAR

The 1999 captive broodstock F1s are scheduled for release in April of 2001. La Grande fish pathology personnel monitored the progeny of Lostine River captive brood spawned in 1999 for fish health. Initial examinations were conducted at Irrigon Hatchery where the BY99 F1's were initially ponded and given one 21-day erythromycin (Aquamycin) medicated feeding prior to transfer to Lookingglass Hatchery. The majority of fish health monitoring occurred at Lookingglass Hatchery during April-December 2000. A scheduled second 28-day Aquamycin medicated feeding was given to the BY99 F1's in July/August. The main disease problem with this brood year (up to December 2000) was bacterial kidney disease (BKD), which was manifested by increased loss in raceways that had progeny from moderate/clinical BKD females. However, external cold water disease bacteria infections (flexibacteriosis) and external fungus were other significant disease findings.

A pre-transfer examination on March 23, 2000 at Irrigon Hatchery revealed the presence of *Renibacterium salmoninarum* (Rs) by the direct fluorescent antibody test (DFAT) at high to clinical levels in 3/7 (42.8%). These fry were progeny of clinical females. This was the beginning of what continued to be a problem at Lookingglass Hatchery throughout 2000 in the high-risk progeny from clinical BKD females. Due to program and space constraints the progeny from moderate level females were mixed with progeny from clinical females at Lookingglass Hatchery.

The first examinations of these fish at Lookingglass Hatchery were in response to increased loss (early April 2000). Severe tail erosion was observed in 90% of mort/moribund fish examined (late April) and *Flavobacterium psychrophilum* (CWD bacteria) were isolated from these tail erosion lesions. This loss was attributed to delayed onset of external bacterial infection (flexibacteriosis) causing these tails to erode following the stressful process of being transferred from Irrigon Hatchery to Lookingglass Hatchery.

Routine monthly monitoring activities began at Lookingglass Hatchery in May 2000. Infectious hematopoietic necrosis virus (IHNV) and other culturable viruses were not detected through December 2000. However patterns developed revealing the prevalence of BKD by raceway which generally showed a correlation to maternal BKD levels (BKD summary table). Increased loss due to BKD followed the CWT tagging/clipping process in June 2000 in Lostine River raceways 6 & 7. External fungus was also observed following marking in raceway seven. Peak losses due to BKD occurred in early July in raceways 6 & 7 with losses at 0.4%/day. Following Aquamycin medicated feeding losses dropped to around 0.02%/day for R6 & 7.

Table 9 summarizes the BKD history of the 1999 cohort. These data support what is known regarding Rs and the known mechanism of vertical transmission (parent to progeny) within the egg. A recommendation was made on October 9, 2000 (ODFW memorandum) to recommend ways to prevent BKD losses for future brood years at Lookingglass Hatchery.

Table 9. BKD summary of Lostine River captive brood BY99 F1's at Lookingglass Fish Hatchery in 2000.

Stock	Raceway	BKD Segregation	Proportion (%) of Clinical BKD in mortality (July-December) ELISA OD ≥ 1.000	Mortality of F1 progeny since tagging/final ponding to end of December 2000	
				Total Loss	% Loss
200F99	R2	Low	0/16 (0)	158	0.46
200F99	R4	Low	1/21 (4.8)	113	0.33
200F99	R3	Mod/Clinical	9/22 (40.9)	125	0.62
200F99	R5	Low/Mod/Clinical	10/24 (41.7)	106	0.73
200F99	R6	Mod/Clinical	20/20 (100.0)	2177	11.62
200F99	R7	Mod/Clinical	27/27 (100.0)	2201	12.42

Operation and Research Coordination

The Nez Perce Tribe participated in the planning process with the Oregon Department of Fish and Wildlife and the Confederated Tribes of the Umatilla Indian Reservation in the development of the Grande Ronde Basin Endemic Spring Chinook Salmon Supplementation Program. As a salmon manager, the Tribe is interested in continuing its coordination with ODFW and CTUIR for the successful operation, monitoring and evaluation of this project. To that end, the Nez Perce Tribe participates in the Technical Oversight Team (TOT) with members from ODFW, CTUIR, and NMFS and the Annual Operating Plan (AOP) development meetings. We continue to participate in management meetings regarding this program.

Furthermore, the Nez Perce Tribe believes that close coordination in the monitoring and evaluation of this project should lead us to a greater understanding of supplementation and its effectiveness in endangered species recovery. Therefore, cooperative efforts with ODFW CTUIR, and NMFS are required to establish synergistic relationships between this and the BPA funded projects listed below.

Artificial Production projects funded under the Columbia River Basin Fish and Wildlife Program that are or will be associated with this project are: 9801006 – Captive Broodstock Artificial Propagation (NPT), 9703800 - Listed Stock Gamete Preservation (NPT), 8805301 - NEOH Master Plan (NPT), 8805305 –NEOH Master Plan and Facilities (ODFW), and 9604400 - Grand Ronde Basin Spring Chinook Captive Broodstock Program. Monitoring and evaluation of hatchery products will occur through this M&E project.

Monitoring and Evaluation projects funded under the Columbia River Basin Fish and Wildlife Program that will complement the Lostine project are: 8712700 - Smolt Monitoring by Non-Federal Entities, 9801006 – Captive broodstock Artificial Propagation and 9202604 – Spring Chinook Salmon Early Life History (ODFW).

Problems Encountered and Anticipated Changes

PROBLEMS ENCOUNTERED

Both operational and research related problems occurred in 2000 during the course of administering the Lostine supplementation program. The more pervasive problems are detailed below.

Lostine Weir

The panel style weir installed at the Clearwater Diversion proved to be inoperable during periods of high flows and excessive debris load. From experience we believe the picket style weir used in previous years will fail when flows exceed 800 cfs. However, collection of broodstock from the Lostine chinook population over the entire breadth of the run is most prudent. An adult collection facility needs to be operable over the majority of the immigration season. Run timing data are incomplete, but preliminary analysis suggests that immigration occurs between May and September, with the majority of fish immigrating before July. Since discharge commonly exceeds 800 cfs during this period, a weir designed to withstand those flows is needed.

Volitional Release Monitoring

For the past two years we were without an effective method for monitoring the volitional departure of the acclimated smolts. Yet, we are charged with evaluating their behavior and comparing their performance with their wild counterparts.

Low Flow

Low flows in the Lostine River likely create passage problems for migrating salmon during the months of August and September (R2 Resource Consultants 1998). A large volume of water is diverted each summer for irrigation purposes via 14 irrigation ditches. If salmon marked and passed at the weir can not negotiate the dewatered reaches above the weir then the assumptions of mark and recapture are violated on the spawning grounds during carcass recovery. Therefore, low flow conditions not only adversely impact fish passage, but as a result, also effect population estimates. Any factor causing under representation of marked fish during carcass recovery would lead to an overestimation of population size.

ANTICIPATED PROGRAM CHANGES

New Weir

A newly designed and manufactured panel weir will be installed at the Willet site in 2001. We will set up the weir beginning in March in an attempt to fish across the entire chinook run. A winch system will allow the panels to recline during periods of high debris.

Acclimation Facility

A request for a "within-year" change to the SOW was submitted to the Anadromous Fish Managers Caucus of CBFWA. The request concerned monies from the Lostine River 1999 carry-over funds or place-holder funds to purchase and install an FS1001 PIT tag detection system for the Lostine River Acclimation Facility. The request was granted in 2000 and Biomark Inc. was given the contract for installation work. The system is now operational and will be used during the 2001 smolt release.

The FS1001 transceiver is a high performance unit specifically designed for permanent installations such as at acclimation facilities and dams. Software designed with time-stamp capabilities makes this system particularly appealing for volitional release applications. We believe a tested PIT tag monitoring system operating at the Lostine River Acclimation Facility will prove advantageous to Nez Perce evaluation efforts. Action codes for each raceway combined with fish movement data according to day and hour will allow for proper analysis of rearing and acclimation strategies. Calculating the number of fish remaining after the volitional period will be possible without the handling stress of a mark and recapture estimate. Because of the time-stamp feature, accurate migration timing through the hydrosystem is also possible for each fish from a volitional release. Negative travel times would no longer be recorded.

The PIT tag monitoring system will also likely benefit other BPA-funded projects within the Basin as well as the Lostine River Monitoring and Evaluation project. Projects such as the Fish Passage Center Comparative Survival Studies, *PTAGIS* and downstream interrogation sites would receive accurate and timely information.

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