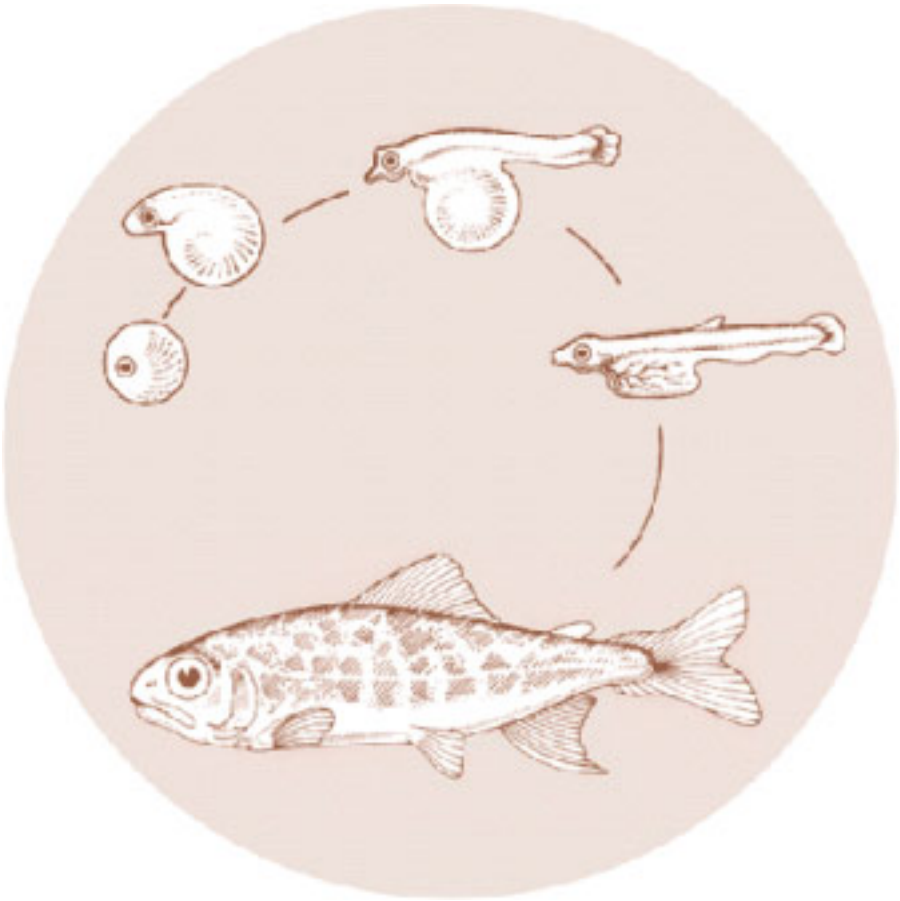
Spokane Tribal Hatchery

Annual Report
2003



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SPOKANE TRIBAL HATCHERY

Annual Report
January 1, 2003 - December 31, 2003

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EXECUTIVE SUMMARY

Due to the construction and operation of Grand Coulee Dam (1939), anadromous salmon have been eradicated and resident fish populations permanently altered in the upper Columbia River region. Federal and private hydropower dam operations throughout the Columbia River system severely limits indigenous fish populations in the upper Columbia. Artificial production has been determined appropriate for supporting a harvestable fishery for kokanee salmon (*Oncorhynchus nerka*) and rainbow trout (O*ncorhynchus mykiss*) in Lake Roosevelt and Banks Lake (Grand Coulee Dam impoundments).

A collaborative multi-agency artificial production program for the Lake Roosevelt and Banks Lake fisheries exists consisting of the Spokane Tribal Hatchery, Sherman Creek Hatchery, Ford Trout Hatchery and the Lake Roosevelt Kokanee and Rainbow Trout Net Pen Rearing Projects. These projects operate complementary of one another to target an annual release of 1 million yearling kokanee and 500,000 yearling rainbow trout for Lake Roosevelt and 1.4 million kokanee fry/fingerlings for Banks Lake.

Combined fish stocking by the hatcheries and net pen rearing projects in 2003 included: 899,168 kokanee yearlings released into Lake Roosevelt; 1,087,331 kokanee fry/fingerlings released into Banks Lake, 44,000 rainbow trout fingerlings and; 580,880 rainbow trout yearlings released into Lake Roosevelt. Stock composition of 2003 releases consisted of Lake Whatcom kokanee, 50:50 diploid-triploid Spokane Trout Hatchery (McCloud River) rainbow trout and Phalon Lake red-band rainbow trout. All kokanee were marked with either thermal, oxytetracyline or fin clips prior to release.

Preliminary 2003 Lake Roosevelt fisheries investigations indicate hatchery/net pen stocking significantly contributed to harvestable rainbow trout and kokanee salmon fisheries. An increase in kokanee harvest was primarily owing to new release strategies. Walleye predation, early maturity and entrainment through Grand Coulee Dam continues to have a negative impact on adult kokanee returns and limits the success of hatchery/net pen stocking on the number of harvestable fish. Preliminary results of gonad necropsies indicate a reduced incidence of precocious kokanee produced at the Spokane Tribal Hatchery in 2003. This was a probable attribute of change in hatchery rearing practices employed on 2002 brood year kokanee produced in 2003, primarily thermal manipulation and feed protein source.

Kokanee and rainbow trout fingerlings transferred to Lake Roosevelt and Banks Lake net pen rearing operations in the fall of 2003 for subsequent release as yearlings in 2004 consisted of 645,234 rainbow trout and 627,037 kokanee salmon. A total of 590,000 Lake Whatcom kokanee fingerlings were carried over at the Spokane Tribal Hatchery for stocking as yearlings in 2004.

Recommendations for future hatchery/net pen operations include use of stocks compatible or native to the upper Columbia River, continue hatchery-rearing practices to reduce precocity rates of kokanee and continue new kokanee stocking strategies associated with increased kokanee harvest rates.

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AKNOWLEDGEMENTS

We gratefully acknowledge the following people and their respective agencies for direction and coordination of this restoration and enhancement project for the Lake Roosevelt Fisheries: John Arterburn, Richard LeCair and Monte Miller of the Colville Confederated Tribes Fish & Wildlife Department, John Whalen, Mike Lewis, Curt Vail, Mitch Combs, Steve Roberts and Jeff Korth of the Washington Department of Fish & Wildlife; Dr. Allan T. Scholz and Holly McLellan of Eastern Washington University; Deanne Pavlik and Chuck Lee of the Lake Roosevelt Fisheries Evaluation Program/Spokane Tribal Fisheries Department, and; Gene Smith of the Lake Roosevelt Development Association. Additional appreciation for facilitative and administration support of this project is warranted to Project Manager Greg Baesler of the Bonneville Power Administration (BPA), BPA Contracting Officer Rae Ellen Griffith, Chief Financial Officer Carol Evans and Contracting Officer Jeanne Flett of the Spokane Tribe of Indians (STOI), and STOI Department of Natural Resources Director Rudy Peone and STOI Fish and Wildlife Programs Director Billie Joe Kieffer.

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INTRODUCTION

Project History – Implementation of Artificial Production

Various fisheries investigations from the 1940's to the early 1990's concluded reservoir operations effect on reproduction and early rearing habitat limited the ability of existing rainbow trout and kokanee salmon of producing a viable fishery while noting a substantial biological productivity base (primary and secondary) capable of supporting a large number adult fish (Gangmark and Fulton 1949, Nigro, 1981, Jagielo 1984, Scholz et al. 1986, Peone et al. 1990).

Continued fishery investigations in the 1980's indicated the use of artificial production as a viable way to restore and enhance kokanee salmon and rainbow trout in Lake Roosevelt and Banks Lake. Following recommendations in a feasibility study by Scholz et al. (1986), two hatcheries, a rainbow habitat improvement project and a program for monitoring and evaluating these measures was amended into the Northwest Power Planning Council 1987 Columbia Basin Fish and Wildlife Program. The measures for the hatcheries included one constructed in 1991 at Galbraith Springs on the Spokane Indian Reservation operated by the Spokane Tribe of Indians (Spokane Tribal Hatchery), and one constructed in 1992 at Sherman Creek (a northern tributary in Lake Roosevelt) operated by the Washington Department of Fish and Wildlife. Operation of the two hatcheries compliments each other. Kokanee eggs collected from Sherman Creek along with rainbow trout eggs received from state allotments are incubated at the Spokane Tribal Hatchery. Resulting progeny are reared at the Spokane Tribal Hatchery before release into Lake Roosevelt or transfer to either net pen rearing operations or the Sherman Creek Hatchery. Kokanee and rainbow fingerlings/yearlings are reared at these sites and also released into Lake Roosevelt after the spring drawdown period.

In the 1980's, volunteers from Lake Roosevelt initiated a successful rainbow trout net pen-rearing program. Fingerlings reared at state and federal hatcheries were transferred to net pens in the fall and the volunteers reared the fish to the following spring before release. Prompted by excellent harvest returns and growth rates of net pen reared rainbow trout, as well as insufficient space at state and federal hatcheries, additional space was incorporated in the design of the kokanee hatcheries to rear 500,000 rainbow trout needed for the Lake Roosevelt net pen program. In 1994, the Northwest Power Planning Council amended the Lake Roosevelt Net Pen Project in its Fish and Wildlife Program to employ a coordinator, support operation and maintenance needs and provide fish feed.

Initial stocking from 1987 to 1994 focused on releasing up to 13-million kokanee fry and 500,000 rainbow trout yearlings. However, 1989 to 1994 Lake Roosevelt fisheries monitoring and evaluation data indicated kokanee released as yearlings performed significantly better than fry releases. Accordingly, the hatcheries have since shifted to a yearling kokanee release program for Lake Roosevelt. The current stocking program established by fishery managers from the WDF&W, Colville Confederated Tribes and Spokane Tribe of Indians consists of 1 million yearling kokanee and 500,000 yearling rainbow trout for Lake Roosevelt and 1.4 million kokanee fry/fingerlings for Banks Lake.

Spokane Tribal Hatchery

Lake Roosevelt Kokanee

ARTIFICIAL PRODUCTION PROGRAM OVERVIEW

Multi-Agency Artificial Production Program

The Spokane Tribal Hatchery is one component of a multi-agency artificial production program for restoring and enhancing the Lake Roosevelt and Banks Lake kokanee and rainbow trout fishery. The other components include the Sherman Creek Hatchery, Ford Trout Hatchery and the Lake Roosevelt Kokanee and Rainbow Trout Net Pen Rearing Projects. Each project has its own production goal to collectively produce up to 1 million kokanee yearlings, 1.4 million kokanee fry/fingerlings and 500,000 rainbow trout yearlings for annual stocking into Lake Roosevelt and Banks Lake.

Spokane Tribal Hatchery

Designed and constructed by the BPA in 1990, the Spokane Tribal Hatchery, is a state of the art facility with modern fish production equipment. The hatchery consists of 44 indoor/outdoor raceways with 26,752 cubic feet of rearing space, utilizes ground and surface water, incubates fish eggs using self fabricated upwelling units, and uses modern fish handling and transportation equipment. The hatchery has a laboratory consisting of microscopes (phase contrast and dissecting), analytical balances and fish necropsy tools. Detailed description of the Spokane Tribal Hatchery fish production methods can be found in the 2003 Scope of Work - Annual Operating Plan.

Stocks Used

In 2003, stock composition consisted of Lake Whatcom kokanee, Spokane Trout Hatchery (McCloud River) rainbow trout and Phalon Lake redband rainbow trout. These stocks are identified in Hatchery and Genetic Management Plans for Lake Roosevelt artificial programs developed in 2000. Stock identification methods included marking hatchery kokanee with distinguishing fin clips, oxytetracycline marking and thermal otolith marking.

Operational Summary & Stocking Strategy

The Spokane Tribal Hatchery cultures kokanee and rainbow trout eggs allotted or obtained from Lake Roosevelt and rears resulting progeny through fry, fingerling and yearling stages for annual stocking, inter-program transfer and/or carry over. Stocking includes kokanee fry and yearling releases into Banks Lake and Lake Roosevelt. Inter-program transfers for subsequent stocking into Lake Roosevelt includes kokanee yearlings transferred to the Sherman Creek Hatchery, rainbow trout fingerlings transferred to the Sherman Creek Hatchery and kokanee and rainbow trout fingerlings transferred to Lake Roosevelt Net Pen Projects, all for subsequent release into the project area.

Lake Roosevelt Hatcheries Coordination

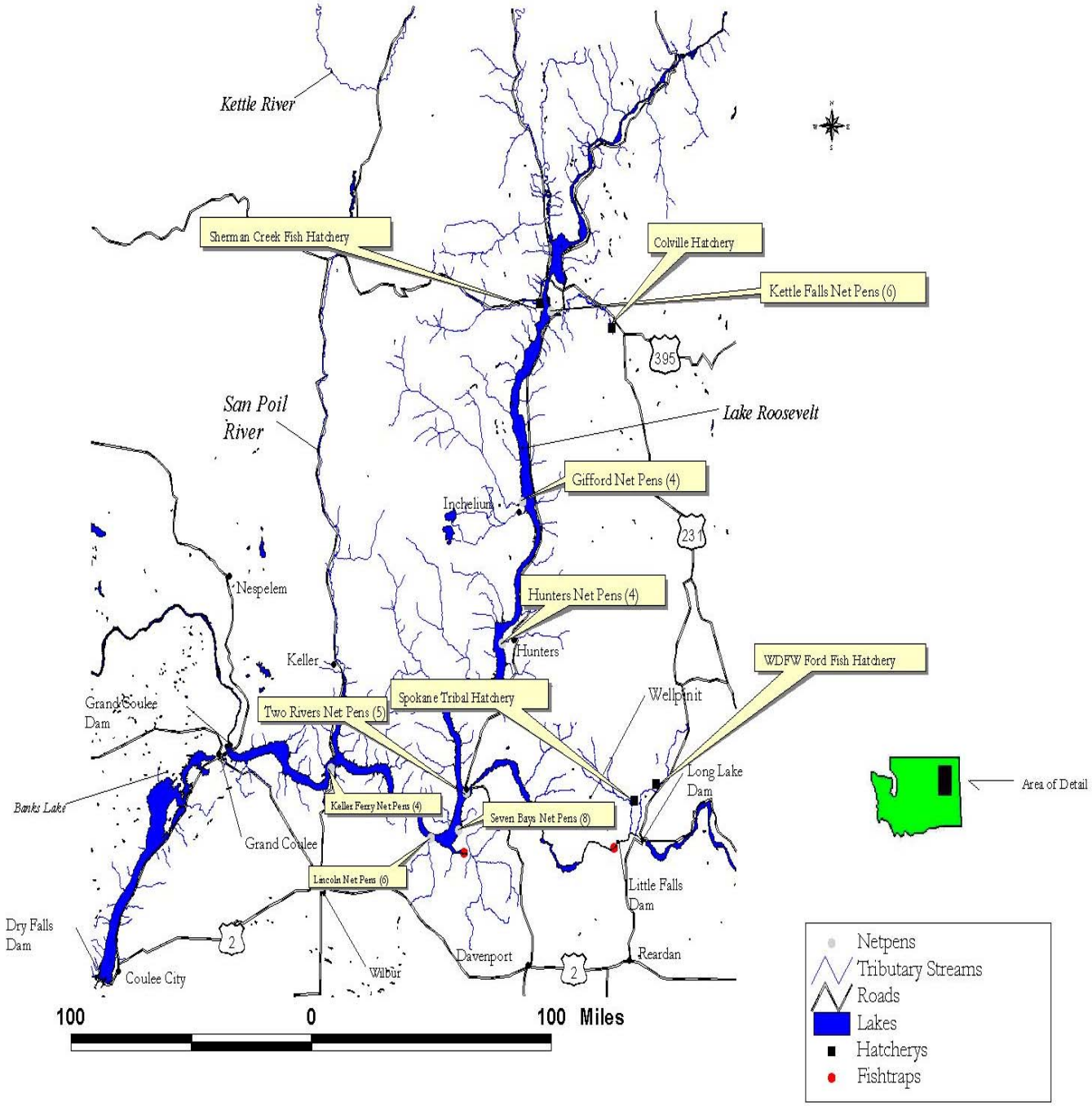
Fishery managers from the Washington Department of Fish and Wildlife, Spokane Tribe of Indians and Colville Confederated Tribes comprise the Lake Roosevelt Hatcheries Coordination Team responsible for directing hatchery and net pen rearing operations.

Monitoring and Evaluation

The Lake Roosevelt and Banks Lake Fisheries Evaluation Programs monitor hatchery and net pen releases including performance and impact on biota. Management implications are brought for to the Lake Roosevelt Hatcheries Coordination Team for implementation.

DESCRIPTION OF PROJECT/PROGRAM AREA

Lake Roosevelt is a mainstem Columbia River impoundment formed by Grand Coulee Dam in 1941. The reservoir, located in Northeast Washington, inundates 33,490 hectares at a full pool elevation of 393 m above sea level. Lake Roosevelt has a maximum width of 3.4 km, and maximum depth of 122 m. The map below illustrates the project area including sites of the hatcheries and net pen rearing projects.



2003 SPOKANE TRIBAL HATCHERY OJECTIVES AND TASKS

Table 1 lists status of 2003 Scope of Work Objectives and Tasks implemented during this report period. Supplemental information of total Lake Roosevelt Artificial Production Program stocking is also included in this report.

Table 1. Scope of Work Objectives and Task implemented in 2003.

SOW Objective	Task & Activity	Status
1. Egg Collection, Spawning & Incubation of 1.625 million Kokanee Eggs and 645,000 Rainbow Trout to Meet 2003 APG.	**1.1 & 1.2** Lake Roosevelt kokanee brood stock capture, holding & spawning; Kokanee Egg Collection from Sherman Creek.	Limited by adverse reservoir operation and elevation; Insufficient return of viable adults.
	1.3 WDF&W & British Columbia egg allotments.	Completed
	1.4 Infectious hematopoietic necrosis (IHN), infectious pancreatic necrosis (IPN) and viral hemorrhagic septicemia (VHS) virus sampling of Lake Roosevelt Kokanee.	Completed
	1.5 Egg enumeration and incubator loading.	Completed
2. Fry & Fingerling Rearing Methods to Meet 2003 APG.	**2.1** Incubation and hatching kokanee and rainbow trout.	Completed
	2.2 Feeding & production of kokanee and rainbow trout.	Completed
	2.3 Raceway loading for fry, fingerling and adult rearing.	Completed
3. Distribution Dates & Locations for Kokanee and Rainbow Trout Releases & Transfers	**3.1** Release 225,000 BY'01 kokanee yearlings at Ft. Spokane.	Completed
	3.2 Release 25,000 BY'01 kokanee yearlings at Little Falls Dam.	Completed
	3.3 Release 25,000 BY'01 kokanee yearlings at Colville River.	Completed
	3.4 Transfer 225,000 kokanee yearlings to the Sherman Creek Hatchery.	Completed
	3.5 Release 300,000 kokanee fingerlings at Banks Lake.	Completed
	3.6 Transfer 500,000 kokanee fingerlings to Lake Roosevelt Net Pens.	Completed
	3.7 Transfer 250,000 rainbow trout fingerlings to the Sherman Creek Hatchery.	Completed
	3.8 Transfer 250,000 rainbow trout fingerlings to Lake Roosevelt Net Pens.	Completed
4. Water Quantity & Quality Necessary to Meet the 2003 APG.	**4.1** Regulation of water inflow during incubation.	Completed
	4.2 Water inflow regulation during fry, fingerling & adult rearing.	Completed
	4.3 Monitoring water quality during fry & fingerling rearing.	Completed
	4.4 Raceway hygiene.	Completed
	4.5 Routine cleaning of spring pond waters.	Completed
5. Adipose Clip Kokanee Salmon Before Release Into Lake Roosevelt	**5.1** Kokanee fin clipping.	Completed
6. Maintenance of Hatchery Building & Grounds, Visitation Improvements & Cultural Preservation	**6.1** Building improvements, capital acquisition & general hatchery maintenance.	Completed
	6.2 Visitation improvements.	Completed
	6.3 Cultural preservation.	Completed
7. Travel & Training Necessary for Meeting 2003 Annual Production Goal &/Or Operation & Maintenance Related.	**7.1** Attending monthly meetings of the Lake Roosevelt Fisheries Managers.	Completed

2003 FISH PRODUCTION

Stock identification format - Species: Stock: Brood Year: Brood Origin
Species - KO = kokanee, RB = rainbow trout
Stock - WHAL = Lake Whatcom, SPOK = Spokane Trout
Hatchery (McCloud River), PHAL = Phalon Lake
Brood Year - 01 = 2000, 02=2002
Brood Origin - H = Hatchery, W = Wild

Egg Culturing
Listed below is a summary of the 2003 incubation results.

Table 2. Spokane Tribal Hatchery egg incubation results for 2003.

STOCK	DATE RECEIVED	NO. EGGS RECEIVED	HATCH DATE	LOSS @ HATCH	NO. TRANS. TO FRY	% SURVIVAL
KO:ROOSE:02:W/H	10/01/2002	10,386	11/30/2002	4,155	6,231	60%
KO:WHAL:02:H	12/30/2002	375,080	01/19/2003	10,792	182,170	97%
KO:WHAL:02:H	01/08/2003	103,072	02/06/2003	43,384	988,688	96%
KO:WHAL:02:H	02/06/2003	267,200	02/28/2003	647	266,553	99%
	Summary:	**1,684,738**		**58,978**	**1,625,760**	**96%**
RB:SPOK:02:H – triploids	12/11/2002	503,372	01/10/2003	34,751	468,621	93%
RB:SPOK:01:H – diploids	12/13/2002	340,105	01/10/2003	2,290	337,815	99%
	Summary:	**843,477**		**37,041**	**806,436**	**96%**

KO:ROOSE:02:W/H – (Lake Roosevelt Kokanee, Brood Year 2002)
A total of 10,386 eggs were incubated from kokanee brood collected from Lake Roosevelt. Mortality from initial incubation to hatchery was 4,155 for a 60% survival rate and 6,231 transferred to fry. Many of the females collected had unviable/un-developed eggs.

KO:WHAL:02:H - (Lake Whatcom Kokanee, Brood Year 2002)
A total of 1,674,352 kokanee eggs were incubated in 2003 from allotments received from WDF&W Lake Whatcom Hatchery. Mortality from initial incubation to hatch was 54,823 for a 92% survival rate and approximately 1,619,529 transferred to fry.

RB:SPOK:02:H - (Spokane Trout Hatchery, Brood Year 2002)
A total of 843,477 rainbow trout eggs were incubated in 2003 from allotments received from WDF&W Spokane Trout Hatchery. Mortality from initial incubation to hatch was 37,041 for a 96% survival rate and approximately 806,436 transferred to fry.

Adult Kokanee Collection Efforts – Fall 2002 & Fall 2003
Adult kokanee collected in the fall of 2002 for subsequent production in 2003 included 33 females and 21 males collected from trapping and electro-fishing operations at Little Falls Dam and Hawk Creek. Adult collection in 2004 did not occur in the fall of 2003.

Fry, fingerling and yearling production.
Listed below is a summary of the 2003 fish production results.

Table 3. Spokane Tribal Hatchery fish production summary for 2003.

Stock	KO:WHAL:01:H	KO:ROOSE:02:W/H	KO:WHAL:02:H	RB:SPOK:02:H
No. Fish @ Beginning	509,972	6,231	1,619,529	806,436
Lbs. @ Beginning	14,999	1.78	360	322
No. Fish Shipped	508,590	0	745,350	598,947
Lbs. Shipped	37,821	0	7,273	21,981
% Mortality	4%	27%	17%	24%
No. Fish @ End	0	4,562	597,930	10,955
Lbs. @ End	0	507	13,939	1,217
Lbs. Gain	22,822	505	20,852	22,876
Lbs. Fed	24,300	520	30,680	30,606
Feed Conv.	1.06	1.03	1.47	1.34

KO:WHAL:01:H - (Lake Whatcom Kokanee, Brood Year 2001)
A total of 508,590 Lake Whatcom kokanee yearlings totaling 37,281 pounds were produced from this stock in 2003. Total weight gain during this rearing cycle was 22,822 pounds. The total food fed was 24,300 pounds ensuing a final feed conversion 1.06 pounds fed per pound of growth for this lot. Diet consisted of Moore-Clark Nutra, Apollo and Proactive feeds normally fed at 1% biomass. Mortality during this rearing cycle was 4%.

KO:ROOSE:02:W/H – (Lake Roosevelt Kokanee, Brood Year 2002)
Production of this stock began with the initial rearing of 6,231 fry produced from cultured eggs. Average size at feed training was 3,500 fish per pound. A total of 4,562 Lake Roosevelt kokanee fingerlings totaling 507 pounds were produced from this stock in 2003. Total weight gain during this rearing cycle was 505. The total food fed was 520 pounds ensuing a final feed conversion 1.03 pounds fed per pound of growth for this lot. Diet consisted of Moore-Clark Nutra and Apollo feeds normally fed at 2.5 – 1.5 % biomass. Mortality during this rearing cycle was 27%.

KO:WHAL:02:H - (Lake Whatcom Kokanee, Brood Year 2002)
Production of this stock began with the initial rearing of 1,619,529 million fry produced from cultured eggs. Average size at feed training was 4,500 fish per pound. Total fish from this stock produced in 2003 was 1,343,280 fingerlings weighing 21,212 pounds. Total weight gain during this rearing cycle was 20,852 pounds. The total food fed was 30,680 pounds ensuing a final feed conversion 1.47 pounds fed per pound of growth for this lot. Diet consisted of Moore-Clark Nutra Starter fed at 2.5% biomass, Nutra Fry fed at 2% and Apollo fed at 1% biomass. Mortality during this rearing cycle was 17%.

RB:SPOK:02:H - (Spokane Trout Hatchery, Brood Year 2002)
Production of this stock began with the initial rearing of 806,436 fry produced from cultured eggs. Average size at feed training was 2,500 fish per pound. Total fish from this stock produced in 2003 was 598,947 fingerlings weighing 23,252 pounds. Total weight

gain during this rearing cycle was 22,876 pounds. The total food fed was 30,606 pounds ensuing a final feed conversion 1.34 pounds fed per pound of growth for this lot. Diet consisted of Moore-Clark Nutra Starter fed at 2.5% biomass, Moore-Clark Trout AB fed at 2%, Silver Cup/Nelson fed @ 1.5% and Apollo trout fed at 1% biomass. Mortality during this rearing cycle was 24%.

Kokanee Carried Over at the Spokane Tribal Hatchery for Release in 2004
A total of 597,930 brood year 2002 kokanee were carried over for production and subsequent release in 2004.

Fish Marking
Fish marked in 2003 was inclusive of brood year 2002 Lake Whatcom kokanee stock. A total of 1.6 million kokanee were marked in 2003. Types of marks are listed in the table 4.

Table 4. Fish marked and produced at the Spokane Tribal Hatchery in 2003.

Number Marked	Mark Type	Release Location - Date	Comments
300,400	Thermal Otolith	Banks Lake – Spring 2003 Plant	Marked by WDF&W
444,950	Adipose Fin Clip	Lake Roosevelt Net Pens Spring 2004	For subsequent release as yearlings in 2004
63,110	Right Pectoral & Adipose Fin Clip	Sherman Creek Hatchery Spring 2004	Precocity Test Group – Spring Water Production
73,667	Left Pectoral & Adipose Fin Clip	Sherman Creek Hatchery 2004	Precocity Test Group – Well Water Production
75,040	Left Ventral & Adipose Fin Clip	Sherman Creek Hatchery Spring 2004	Precocity Test Control Group – Mix Water Prod.
24,800	Right Ventral & Adipose Fin Clip	Meyers Falls/Colville River – Spring 2004	Adult Return Collection Site Investigations
52,240	Left Ventral	Banks Lake – Spring 2004	Ford Trout Hatchery Exchange
304,691	Adipose Fin Clip	Lake Roosevelt Spring 2004	Ft. Spokane, Little Falls Dam & Spring Canyon Releases

Kokanee Precocity Investigations
Water used to produce Brood year 2002 kokanee in 2003 included 3 sources used exclusively throughout the year to investigate thermal manipulation effects on precocity. The sources included spring water, well water and mixed water with temperatures recorded daily. Sexual ratios were all near 1:1 and no mature-precocious fish were found. Table 5 lists results of gonad necropsies performed by LRFEP staff in the fall of 2003.

Table 5. Results of gonad necropsies performed on kokanee in 2003.

	Spring Water		**Well Water**		**Mixed Water**	
	Immature	*Mature*	*Immature*	*Mature*	*Immature*	*Mature*
Male	114	0	100	0	109	0
Female	100	0	100	0	102	0
M/F Ratio	1.14:1		1:1		1.06:1	

2003 STOCKING

Kokanee and Rainbow Trout Stocking by Lake Roosevelt and Banks Lake Artificial Production Projects/Program

Collectively, Lake Roosevelt and Banks Lake artificial production projects produced a total of 899,168 kokanee yearlings, 1,087,331 kokanee fingerlings, 44,000 rainbow trout fingerlings and 580,880 rainbow trout yearlings for stocking into Lake Roosevelt and Banks Lake in 2003. Stock composition consisted of Lake Whatcom kokanee and 50:50 diploid/triploid Spokane Trout Hatchery rainbow trout and Phalon Lake Redband trout. Table 6 summarizes the total stocked per brood year and stock origin.

Table 6. Summary of total kokanee and rainbow trout stocked in 2003.

ID Code (Spc:Stk:BY:BO)	No. Stocked	Location
KO:WHAL:01:H – Yearlings	899,168	Lake Roosevelt
KO:WHAL:02:H – Fry/Fingerlings	1,087,331	Banks Lake
RB:SPOK:01:H – Yearlings	566,571	Lake Roosevelt
RB:PHAL:02:W – Yearlings	14,309	Lake Roosevelt
RB:SPOK:02:H – Fingerlings	44,000	Lake Roosevelt

Note: This table includes stocking information provided by the Ford Trout Hatchery, Sherman Creek Hatchery and Lake Roosevelt Net Pen Rearing Project.

2003 Inter-Program Transfers of Kokanee and Rainbow Trout for 2004 Release

Inter-program fish transfers for subsequent stocking in 2004 are listed in table 7. Stock composition included Lake Whatcom kokanee, 50:50 diploid/triploid Spokane Trout Hatchery rainbow trout and Phalon Lake Redband trout.

Table 7. Summary of 2003 Inter-Project Transfers for Subsequent Release in 2004.

Dates	ID Code (Spc:Stk:BY:BO)	No. Transferred	Project From	Project To
Sept-Oct 2003	RB:SPOK:02:H	268,327	Sherman Creek Hatchery	LRDA Lake Roosevelt Rainbow Trout Net Pens
Sept-Oct 2003	RB:SPOK:02:H	294,320	Spokane Tribal Hatchery	LRDA Lake Roosevelt Rainbow Trout Net Pens
Nov – Dec 2003	RB:PHAL:03:W	82,587	Colville Trout Hatchery	WDFW/LRDA Lake Roosevelt Rainbow Trout Net Pens
	TOTAL	**645,234**		
Oct-Nov 2003	KO:WHAL:02:H	444,950	Spokane Tribal Hatchery	Sherman Creek Hatchery Kokanee Net Pens
Oct 2003	KO:WHAL:02:H	53,328	Ford Trout Hatchery	Sherman Creek Hatchery Kokanee Net Pens
Oct 2003	KO:WHAL:02:H	128,759	Ford Trout Hatchery	Banks Lake Electric City Net Pens
	TOTAL	**627,037**		

2003 MAINTENANCE AND IMPR0VEMENTS

Well Water Development and Water Conveyance System
A water conveyance system for a new well drilled in 2002 was completed this year. The work included earth moving, electrical and plumbing to connect the supply line to the hatchery head box. The new well was wired in to the electrical transformer for alternative generator power backup and also to an existing alarm panel. The new system is built to produce up to 1,000 gallons per minute operated with a variable speed drive built for a 50 hp line shaft pump.

Bureau of Indian Affaires Hatchery Cyclical Maintenance Grant
Funds granted were used to purchase supplies and equipment for painting the hatchery building(s), construct raceway baffles for shade/cover, purchasing supplies for anti-predator coverings for exposed fish raceways and employ 2 part-time laborers. The following work was accomplished:

Exterior Painting - Approximately 50% of the building was actually painted. Future objective includes finish the required painting utilizing funds available, either hatchery operational funds or another hatchery cyclical maintenance grant.

Shade and Predator Netting - A total of 176 4' x 4' HDPE metal framed baffles were constructed and installed in 44 fish rearing raceways for shade and increased water exchange. Supplies were purchased for the anti-predator netting and approximately 50% of the work was completed. Future objective includes finish the required painting utilizing funds available, either hatchery operational funds or another hatchery cyclical maintenance grant.

DISCUSSION

During the first 4 years (1991 to 1995) of hatchery stocking, the emphasis was for production and release of kokanee fry/fingerlings. However, coded wire tag recoveries and a study to chemically imprint and assess smoltification of hatchery produced kokanee indicated that kokanee released as residualized smolts (e.g. yearlings) were captured in higher numbers than kokanee released as fry/fingerlings. Additionally, entrainment losses and predation have a greater impact on kokanee released as fry as opposed to residualized smolts. As a result, the hatcheries have shifted from kokanee fry releases to residualized smolts/yearlings. The current stocking levels for Lake Roosevelt and Banks Lake are based upon artificial production capacities well as the number of fish impoundments can support.

Low reservoir elevation in the fall of 2003 limited adult collection (trapping and electro-fishing) capabilities by this project at Little Falls Dam and Hawk Creek. Supplemental efforts to collect adult kokanee during LRFEP sampling resulted in 2,296 adults collected reservoir wide predominantly consisting of age-2 fish. Hatchery staff attempts to spawn 32 age-3 females with 20 age-3 males captured in the fall of 2002 resulted in 10,386 eggs collected. A high incidence of ovarian deformity was noted in the females resulting in the few eggs collected. Full allotments of kokanee and rainbow trout eyed-eggs were received from WDF&W hatchery programs (Whatcom and Spokane Hatchery) to support 2003 fish production.

A shift in kokanee stocking strategy in 2003 to increase chances of angler harvest appears successful. Increased stocking levels at Ft. Spokane and Gifford sites resulted in increased catch rates and adult returns reservoir wide. The rainbow trout program continues to sustain a viable fishery. Entrainment and predation continues to be a limiting factor for artificial production success in terms of amount of harvest and escapement. Draft results of 2002 LRFEP investigations to evaluate current stocks used and stocking strategies are being reviewed for future implementation.

Preliminary review of changes in kokanee production practices, specifically water source/temperature and feed protein source, may have significantly reduced the incidence of precocity and skewed sex ratios in 2003. Gonad necropsies indicated near 1:1 ratio of male to females with zero early maturity detected.

In terms of economic feasibility, the hatcheries and net pen projects are responsible for a thriving economic base surrounding the sport fishery that has been established. In 1985, the U.S. Fish and Wildlife survey estimated the economic value of the Lake Roosevelt fishery at $2.8 million while post-artificial production program results estimates as much as $12.8 million.

RECOMMENDATIONS

Fishery management recommendations for 2004 fish production that will be implemented accordingly include:

Kokanee Salmon Program

1. Continue current stocking level and adipose clip kokanee before release into Lake Roosevelt.
2. Continue stocking strategies implemented in 2003.
3. Continue thermal manipulation of water and feed protein source.
4. Unique mark (fin clips, thermal) specific release groups.
5. Investigate tributary fry releases for run restoration and possible future egg collection sources.
6. Utilize compatible stocks, Lake Roosevelt and Meadow Creek priorities.

Rainbow Trout Program

1. Continue utilizing 50% triploid/sterile Spokane Trout Hatchery stock.
2. Continue current stocking level and strategy.
3. Continue investigating use of Phalon Lake Redband Trout stock.

LITERATURE CITED

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APPENDIX A

2003

LAKE ROOSEVELT AND BANKS LAKE
ARTIFICIAL PRODUCTION PROGRAM
STOCKING SUMMARIES

Table 8. Summary of BY'01 kokanee yearlings stocked into Lake Roosevelt by artificial production projects in 2003.

KO:WHAL:01:H - (Lake Whatcom Brood Year 2001 Stock)					
Dates (Mo/Day/Yr)	**Project**	**No. Stocked**	**Ave.Size (Fish/lb)**	**Location(s) Stocked**	**Comments/Marks**
5/05/03	Spokane Tribal Hatchery	24,900	12/lb	Little Falls Dam	Left Pectoral & Adipose Fins Clipped
5/05/03	Sherman Creek Hatchery – Kokanee Net Pens	34,792	16.6/lb	Seven Bays Net Pens	Adipose Fin Clipped
5/06/03	Sherman Creek Hatchery – Kokanee Net Pens	104,472	19/lb	Lincoln Net Pens	Adipose Fin Clipped
5/06/03	Spokane Tribal Hatchery	24,960	12/lb	Colville River – Meyers Falls	Right Ventral & Adipose Fins Clipped
5/14-21/03	Spokane Tribal Hatchery	229,461	11lb	Ft. Spokane	Right Pectoral & Adipose Fins Clipped
6/02/03	Sherman Creek Hatchery – Kokanee Net Pens	232,106	21/lb	Colville River Net Pens	Adipose Fin Clipped
6/03/03	Sherman Creek Hatchery – Kokanee Net Pens	20,060	18/lb	Grand Coulee Dam	Adipose Fin Clipped
6/09/03	Sherman Creek Hatchery	203,596	11/lb	Gifford Ferry	Left Ventral, Right Ventral & Adipose Fin Clipped
6/09/03	Sherman Creek Hatchery	24,821	10.8/lb	Sherman Creek	Left Ventral & Adipose Fin Clipped
	TOTAL	**899,168**			

Table 9. Summary of BY'02 kokanee spring fry and fall fingerlings stocked into Banks Lake by artificial production projects in 2003.

KO:WHAL:02:H - (Lake Whatcom Brood Year 2002 Stock)					
Dates (Mo/Day/Yr)	**Project**	**No. Stocked**	**Ave.Size (Fish/lb)**	**Location(s) Stocked**	**Comments/Marks**
5/12/03	Spokane Tribal Hatchery	121,000	440/lb	Banks Lake Northrup Creek	Spring Fry – Thermal Otolith Marked
5/13/03	Spokane Tribal Hatchery	121,000	440/lb	Banks Lake Northrup Creek	Spring Fry – Thermal Otolith Marked
6/05/03	Ford Trout Hatchery	367,033	619.9/lb	Banks Lake Northrup Creek	Spring Fry – Thermal Otolith Marked
7/07/03	Spokane Tribal Hatchery	58,400	160/lb	Banks Lake Northrup Creek	Spring Fry – Thermal Otolith Marked
10/15/03	Ford Trout Hatchery	419,898	51.4/lb	Banks Lake Northrup Creek	Fall Fingerlings Thermal Otolith Marked
	TOTAL	**1,087,331**			

Table 10. Summary of BY'01 rainbow trout yearlings stocked into Lake Roosevelt by artificial production projects in 2003.

RB:SPOK:01:H - (Spokane Trout Hatchery/McCloud River Brood Year 2001 Stock)				
Dates (Mo/Day/Yr)	**Project**	**No. Stocked**	**Ave.Size (Fish/lb)**	**Location(s) Stocked**
4/16-23/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	50,403	5.5/lb	Keller Ferry Net Pens
5/27/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	63,103	4/lb	Lincoln Net Pens
5/28/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	166,076	4.6/lb	Seven Bays Net Pens
6/03/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	61,525	5.4/lb	Hunters Net Pens
6/04/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	78,920	4.6/lb	Two Rivers Net Pens
6/08/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	61,243	4.4/lb	Hall Creek Net Pens
6/25/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	78,928	6.3/lb	Kettle Falls Net Pens
8/18/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	6,373	1.9/lb	Kettle Falls Net Pens
	TOTAL	**566,571**		

Table 11. Summary of BY'02 rainbow trout fingerlings/yearlings stocked into Lake Roosevelt by artificial production projects in 2003.

RB:PHAL:02:W - (Phalon Lake Redband Trout Brood Year 2002 Stock)				
Dates (Mo/Day/Yr)	**Project**	**No. Stocked**	**Ave.Size (Fish/lb)**	**Location(s) Stocked**
9/19/03	Sherman Creek Hatchery	14,309	5.5/lb	Kettle Falls Net Pens
	Sub-total	**14,309**		
RB:SPOK:02:H - (Spokane Trout Hatchery/McCloud River Brood Year 2002 Stock)				
10/29/03	Lake Roosevelt Rainbow Trout Net Pen Rearing Project	10,000	19/lb	Seven Bays Net Pens
12/04/03	Spokane Tribal Hatchery	34,000	10/lb	Little Falls Dam
	Sub-total	**44,000**		
	TOTAL	**58,309**		