BONNEVILLE POWER ADMINISTRATION

# Spokane Tribal Hatchery

Annual Report 2005 March 2006 DOE/BP-00020783-1

This Document should be cited as follows:

*Peone, Tim, "Spokane Tribal Hatchery", 2005 Annual Report, Project No. 199104600, 17 electronic pages, (BPA Report DOE/BP-00020783-1)*

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This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

# SPOKANE TRIBAL HATCHERY

## Annual Report
## January 1, 2005 - December 31, 2005

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BPA Project No. 91-046-00
Intergovernmental Contract No. 00020783

## 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 harvestable fisheries for kokanee salmon (*Oncorhynchus nerka*) and rainbow trout (O*ncorhynchus mykiss*) in Lake Roosevelt and Banks Lake (Grand Coulee Dam impoundments).

The Spokane Tribe, Washington Department of Fish and Wildlife, Colville Confederated Tribes and Lake Roosevelt Development Association/Lake Roosevelt Volunteer Net Pen Project are cooperating in a comprehensive artificial production program to produce kokanee salmon (*Oncorhynchus nerka*) and rainbow trout (O*ncorhynchus mykiss*) for annual releases into the project area. The program consists of the Spokane Tribal Hatchery, Sherman Creek Hatchery, Ford Trout Hatchery and Lake Roosevelt Rainbow Trout Net Pen Rearing Projects. The Lake Roosevelt and Banks Lake Fisheries Evaluation Program monitor and evaluates release strategies and production methods for the aforementioned projects. Between 1985 and 2005 the projects have collectively produced up to 800,000 rainbow trout and 4 million kokanee salmon for release into Lake Roosevelt and 1.4 million kokanee fry for Banks Lake annually. In 2005, the annual release goal included 3.3 million kokanee fry, 475,000 kokanee yearlings and 500,000 rainbow trout yearlings.

Fish produced by this project in 2005 to meet collective fish production and release goals included: 3,446,438 kokanee fingerlings, 347,730 rainbow trout fingerlings and 525,721 kokanee yearlings. Kokanee yearlings were adipose fin clipped before release. Stock composition consisted of Meadow Creek and Lake Whatcom kokanee, 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 2004 Lake Roosevelt fisheries investigations indicate hatchery/net pen stocking significantly contributed to rainbow trout catch and harvest rates while the impact on the kokanee fishery was minimal. Success of the Lake Roosevelt kokanee artificial production program appears to be limited primarily owing to predation, precocity and high entrainment rates through Grand Coulee Dam. Recommendations for future hatchery/net pen operations include use of stocks compatible or native to the upper Columbia River, continue kokanee fry and post-smolt releases, 100% triploid hatchery stock rainbow trout used and adipose fin clip hatchery stock rainbow trout prior to release.

The Spokane Tribal Hatchery is funded by the Bonneville Power Administration under directives by the Northwest Power Conservation Council Columbia River Basin Fish & Wildlife Program, Resident Fish Substitution Measures, 1987 to current (Subbasin Plan), as partial mitigation for anadromous and resident fish losses in the blocked areas above Chief Joseph and Grand Coulee Dams.

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**AKNOWLEDGEMENTS**

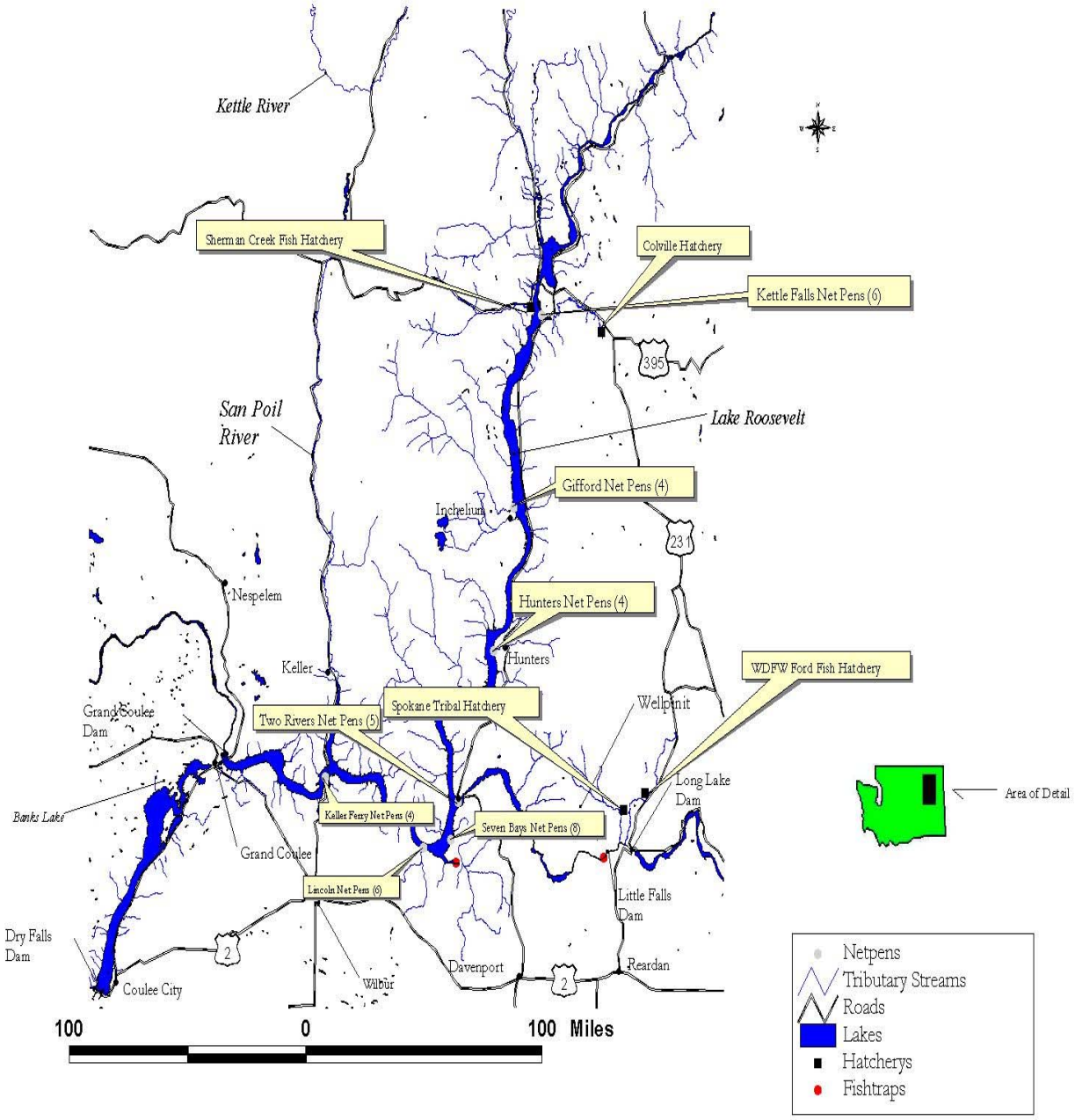
We gratefully acknowledge the following people and their respective agencies for direction and coordination of this restoration and enhancement project for the Lake Roosevelt Fisheries: Richard LeCair and Sheri Sears of the Colville Confederated Tribes Fish & Wildlife Department, John Whalen, Chris Donley, Curt Vail, Mitch Combs, Rex Gearheart, Steve Roberts, Ace Trump, Cory Morrison, Rich Watson, Heather Woller, Jim Ebel and Jeff Korth of the Washington Department of Fish & Wildlife; Dr. Allan T. Scholz and Holly McLellan of Eastern Washington University; Deanne Pavlik, Kim Fields, Ben Scolfield and Chuck Lee of the Lake Roosevelt Fisheries Evaluation Program/Spokane Tribal Fisheries Department, and; Gene Smith and Vic Melin 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 Brenda Heister, Chief Financial Officer Carol Evans, Contracting Officer Jeanne Flett and Accountant Jerilyn Sengbusch 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.

The U.S. Department of Energy, BPA, under the authority of the 1980 Pacific Northwest Electric Power Planning and Conservation Act, provided funding for this project (Inter-governmental Contract No. 00020783).

**Spokane Tribal Hatchery**

## DESCRIPTION OF PROJECT/PROGRAM AREA

The Spokane Tribal Hatchery is located in northeast Washington near the south/eastern region of Lake Roosevelt at Metamooteles Springs (formerly known as Galbraith Springs), with an effluent that flows into Chamokane Creek, a tributary near the Spokane arm of the reservoir. Fish are produced for release into Lake Roosevelt and Banks Lake, mainstem Columbia River impoundments formed by the construction of Grand Coulee Dam in 1941 (Roosevelt) and 1951 (Banks). Lake Roosevelt inundates 33,490 hectares at a full pool elevation of 393 m and has a maximum depth of 122 m (Stober et al. 1979). Banks Lake inundates 10,881 hectares at a full pool elevation of 479 m and has a maximum depth of 26 m (Baldwin 2002). Water is pumped up 85 m from a pumping plant near the forebay of Grand Coulee Dam to a canal feeding water into Banks Lake. The map below illustrates the project area including sites of associated Lake Roosevelt and Banks Lake artificial production projects in the captioned boxes.



## 2005 SPOKANE TRIBAL HATCHERY WORK ELEMENTS AND STATUS.

Listed below is a summary of work elements, deliverables and status for work items performed by the Spokane Tribal Hatchery during the 2005 contractual period.

Table 1. 2005 Work Elements, Deliverables and Status.

| Work Element - No. & Title | Deliverables | Status |
|---|---|---|
| **W.E. 56 & 65 – Acclimate and Transfer Fish** | Transfer 500,000 Rainbow Trout to Net Pen Rearing Program for acclimation and sub sequential release into Lake Roosevelt in Spring 2006. Transfer 500,000 kokanee yearlings to Lake Roosevelt for release in spring 2005. Transfer 300,000 kokanee fingerlings to Banks Lake for release in spring 2005. Transfer up to 3.2 million kokanee fry to lower and upper tributaries in Lake Roosevelt for release spring 2005. | Completed |
| **W.E. 174 – Develop Annual Operating Plan** | Develop and submit 2006 Statement of Work using BPA formatted template. | Completed |
| **W.E. 59 – Incubate Eggs** | Culture 625,000 rainbow trout eggs and 3.8 million kokanee salmon eggs. | Completed |
| **W.E. 60 – Maintain Fish Health and Pathology Sampling** | Rear fish using established/calculated relative flow and density indices, exercise prudent sanitation and disinfecting practices, schedule regular pathological sampling by WDF&W Fish Pathologist. | Completed |
| **W.E. 61 – Maintain Hatchery Building and Grounds** | Perform appropriate maintenance on hatchery buildings, equipment and grounds. | Completed |
| **W.E. 176 – Produce Fish** | Produce approximately 500,000 kokanee yearlings, 3.2 million kokanee fry and 500,000 rainbow trout fingerlings. | Kokanee production completed, 350,000 rainbow trout produced. |
| **W.E. 158 – Mark Fish** | Adipose fin clip 500,000 kokanee and 500,000 rainbow trout, thermal mark 3.2 million kokanee fry. | Kokanee marking completed, rainbow trout not completed due to lack of funds. |

## 2005 FISH PRODUCTION

*Operational Summary & Stocking Strategy*

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.

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.

*Stocks Used*

In 2005, 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.

*Egg Culturing*

KO:WHAL:04:H - (Lake Whatcom Kokanee, Brood Year 2004)
A total of 1,820,880 kokanee eggs received from WDF&W Lake Whatcom Hatchery were incubated in 2005. Mortality from initial incubation to hatch included 64,177 eggs picked off for a 96% survival rate with approximately 1,756,703 transferred to feeding fry.

KO:MEAD:04:W - (Meadow Creek Kokanee, Brood Year 2004)
A total of 2,487,168 kokanee eggs received from British Columbia Meadow Creek Hatchery were incubated in 2005. Mortality from initial incubation to hatch included 187,044 eggs picked off for a 92% survival rate with approximately 2,300,124 transferred to feeding fry.

RB:SPOK:04:H - (Spokane Trout Hatchery, Brood Year 2004)
A total of 640,272rainbow trout eggs received from WDF&W Spokane Trout Hatchery were incubated in 2005. Mortality from initial incubation to hatch included 62,169 eggs picked off for a 90% survival rate with approximately 578,103 transferred to feeding fry.

Listed in Table 2 below is a summary of 2005 Fish Egg Culturing results.

Table 2. Spokane Tribal Hatchery 2005 egg culturing results.

| Stock | No. Eggs @ Initial Incubation | Mortality | No. Transferred To Fry | % SURVIVAL |
|---|---|---|---|---|
| KO:WHAL:04:H | 1,820,880 | 64,177 | 1,756,703 | 96% |
| KO:MEAD:04:W | 2,487,168 | 187,044 | 2,300,124 | 92% |
| RB:SPOK:04:H | 640,272 | 62,169 | 578,103 | 90% |
| | **4,948,320** | **313,390** | **4,634,930** | **94%** |

*Fry, fingerling and yearling production.*

KO:MEAD:04:W - (Meadow Creek Stock Kokanee, Brood Year 2004)
Production of Meadow Creek stock kokanee began with the initial rearing of 2,300,124 fry averaging 4,774 fish per pound at feed training. Total fish produced from this stock was 1,849,605 fingerlings with a total weight gain of 16,340 pounds. Total food fed was 29,860 pounds ensuing a final feed conversion of 1.83 pounds fed per pound of growth. 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 7.4%. A total of 364,185 fish from this lot were carried over for 2005 rearing and release.

KO:WHAL:04:H - (Lake Whatcom Stock Kokanee, Brood Year 2004)
Production of Lake Whatcom stock kokanee began with the initial rearing of 1,756,703 fry averaging 4,875 fish per pound at feed training. Total fish produced from this stock was 1,707,229 fingerlings with a total weight gain of 7,104 pounds. Total food fed was 8,640 pounds ensuing a final feed conversion of 1.22 pounds fed per pound of growth. 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 6.5%. A total of 108,593 fish from this lot were carried over for 2005 production and release.

KO:SPOK:04:W - (Spokane Trout Hatchery Stock Rainbow Trout, Brood Year 2004)
Production of this Spokane Trout Hatchery stock rainbow trout began with the initial rearing of 578,103 fry averaging 2,500 fish per pound at feed training. Total fish produced from this stock was 347,730 fingerlings with a total weight gain of 10,240 pounds. Total food fed was 16,680 pounds ensuing a final feed conversion of 1.63 pounds fed per pound of growth. Diet consisted of Moore-Clark Nutra Starter fed at 2.5% biomass, Apollo Trout fed at 1-2% biomass. Mortality during this rearing cycle was exceptional high at 21% as a result of 90,000 fish lost when a pump and low water float alarm malfunctioned. The problem was fixed with increased periodic monitoring of working status.

KO:MEAD:03:W - (Meadow Creek Stock Kokanee, Brood Year 2003)
A total of 525,721 Meadow Creek stock kokanee yearlings were produced from fish carried over from 2004. Weight gain was 11,785 pounds while 18,000 pounds of food was fed ensuing a final feed conversion of 1.53 pounds fed per pound of growth. Diet consisted of Apollo fed at 1% biomass. Mortality during this rearing cycle was 3.9%.

Listed below is a summary of the 2005 fish production results.

Table 3. Spokane Tribal Hatchery fish production summary for 2005.

| **Stock** | KO:MEAD:04:W | KO:WHAL:04:H | RB:SPOK:04:H | KO:MEAD:03:W |
|---|---|---|---|---|
| **No. Fish @ Beginning** | 2,300,124 | 1,756,703 | 578,103 | 508,372 |
| **Lbs. @ Beginning** | 460 | 360 | 231 | 23,374 |
| **No. Fish Shipped** | 1,485,420 | 1,601,636 | 347,730 | 525,721 |
| **Lbs. Shipped** | 3,210 | 4,749 | 10,471 | 35,159 |
| **% Mortality** | 7.4% | 6.5% | 21% | 3.9% |
| **No. Fish @ End** | 364,185 | 105,593 | 0 | 0 |
| **Lbs. @ End** | 13,590 | 2,715 | 0 | 0 |
| **Lbs. Gain** | 16,340 | 7,104 | 10,240 | 11,785 |
| **Lbs. Fed** | 29,860 | 8,640 | 16,680 | 18,000 |
| **Feed Conv.** | 1.83 | 1.22 | 1.63 | 1.53 |

## 2005 FISH RELEASES AND INTER-PROGRAM TRANSFERS

Total fish released by this project in 2005 included 3,087,056 kokanee fry/fingerlings and 296,018 kokanee yearlings. Table 4 lists the number released for each stock produced by the Spokane Tribal Hatchery in 2005.

Table 4. Summary of fish releases by the Spokane Tribal Hatchery in 2005.

| ***Kokanee Yearlings - BY'03 Meadow Creek Kokanee Stock*** | | | |
|---|---|---|---|
| **Date(s)** | **No. Released** | **Release Location** | **Identifying Mark** |
| 3/17/05 | 24,750 | Little Falls Dam | Adipose Fin Clip |
| 3/22/05 | 24,125 | Ft. Spokane | Adipose Fin Clip |
| 4/7-8/05 | 46,515 | Ft. Spokane | Adipose Fin Clip |
| 4/14-15/05 | 99,768 | Ft. Spokane | Adipose Fin Clip |
| 5/19-20/05 | 51,360 | Ft. Spokane | Adipose Fin Clip |
| ***Total*** | ***296,018*** | | |
| ***Kokanee Fry/Fingerlings- BY'04 Meadow Creek Kokanee Stock*** | | | |
| **Date(s)** | **No. Released** | **Release Location** | **Identifying Mark** |
| 3/29/05 | 444,800 | Big Sheep Creek | Thermal Otolith |
| 3/30/05 | 973,100 | Onion Creek | Thermal Otolith |
| 11/8-9/05 | 67,520 | Gold Creek – San Poil | Adipose Fin Clip |
| ***Total*** | ***1,485,420*** | | |
| ***Kokanee Fry/Fingerlings – BY'04 Lake Whatcom Kokanee Stock*** | | | |
| **Date(s)** | **No. Released** | **Release Location** | **Identifying Mark** |
| 4/7-8/05 | 432,000 | Hawk Creek | Thermal Otolith |
| 4/25-26/05 | 287,808 | Norup Creek–Banks Lk | Thermal Otolith |
| 5/24-25/05 | 291,680 | Hawk Creek | Thermal Otolith |
| 6/7-9/05 | 590,148 | Hawk Creek | Thermal Otolith |
| ***Total*** | ***1,601,636*** | | |

Fish produced for inter-program transfer in 2005 included 229,703 kokanee yearlings and 347,730 rainbow trout fingerlings. Inter-program fish transfers for subsequent stocking in 2006 are listed in Table 5.

Table 5. Summary of 2005 Inter-Project Transfers for Subsequent Release in 2006.

| ***Kokanee Yearlings- BY'03 Meadow Creek Kokanee Stock*** | | | |
|---|---|---|---|
| **Date(s)** | **No. Transferred** | **Project Transferred To** | **Identifying Mark** |
| 4/5-15/05 | 73,598 | Sherman Creek Hatchery | Adipose & Left Vent Clip |
| 4/6-11/05 | 78,330 | Sherman Creek Hatchery | Adipose & Left Pec Clip |
| 4/11-12/05 | 77,775 | Sherman Creek Hatchery | Adipose & Right Pec Clip |
| ***Total*** | ***229,703*** | | |
| ***Rainbow Trout Fingerlings – BY'4 Spokane Trout Hatchery Stock*** | | | |
| **Date(s)** | **No. Transferred** | **Project Transferred To** | **Comments** |
| 6/6-7/05 | 223,833 | Sherman Creek Hatchery | 50:50-Triploid/Diploid |
| 10/4/05 | 103,173 | Seven Bays Net Pens | 50:50-Triploid/Diploid |
| 10/5/05 | 20,724 | Two Rivers Net Pens | 50:50-Triploid/Diploid |
| ***Total*** | ***347,730*** | | |

## DISCUSSION

*History of Lake Roosevelt Artificial Production*

The Lake Roosevelt artificial production program is a supplementation program developed as partial mitigation for the loss of anadromous and resident fishes above Grand Coulee and Chief Joseph dams. Rainbow trout production began in 1986 at the Spokane Trout Hatchery (WDFW facility), which provided rainbow trout fingerlings to the volunteer net pen program operated by the Lake Roosevelt Development Association (Cichosz et al. 1997a). The number of rainbow trout provided by the Spokane Trout Hatchery began at 50,000 rainbow and increased to 276,500 rainbow trout by 1990 (Spotts et al. 2002). Kokanee salmon production began at Ford Trout Hatchery (WDFW facility), which provided approximately 850,000 plus fry to Lake Roosevelt annually from 1988 through 1990 (Cichosz et al. 1997a). The purpose of these early releases was to begin fisheries enhancement in Lake Roosevelt prior the construction of Sherman Creek and Spokane Tribal Hatcheries, the two hatcheries that were dedicated solely for production to Lake Roosevelt. The Spokane Tribal and Sherman Creek Hatcheries began releasing fish in 1991 and 1992, respectively. Initial hatchery releases were comprised of approximately 1.7 million kokanee fry and 400,000 rainbow trout annually through 1994. Additionally, approximately 100,000 kokanee salmon yearlings were released from 1992-1994 to allow the Monitoring/Evaluation Program to assess yearling versus fry survival (Cichosz et al. 1997a). Beginning in 1995, based on the results of these assessments, the Monitoring/Evaluation Program recommended shifting production goals to approximately one million kokanee yearlings and 500,000 rainbow trout. In 1995, the hatcheries released approximately 440,000 yearling kokanee salmon, 500,000 kokanee salmon fry, and 400,000 rainbow trout, before shifting to nearly 100% yearling kokanee production in 1996. Annual assessments indicated the rainbow trout fishery increased substantially, while the kokanee salmon supplementation program has had more limited success (Underwood et al, 1996b, Fields et al, 2005, McLellan et al. 2004).

Concern regarding genetic integrity and introgression with native species/stocks have lead co-managers to begin assessing alternative kokanee and rainbow trout stocks to be utilized by the artificial production program in Lake Roosevelt. Approximately 60,000 redband trout are currently released into Lake Roosevelt through the Colville Hatchery redband trout production program, which utilizes a stock of redband trout native to the upper Columbia region. This stock is currently under investigation to compare their performance to the successful Spokane stock rainbow trout. The final tagging studies should be completed by 2008, at which time managers will determine if an incresse in the redband rainbow trout production is warranted (McLellan 2005). Additionally, after completing a pairwise comparison of performance (recruitment to the creel), the artificial production program plan to increase triploid Spokane stock rainbow trout production (or any other non-endemic stock utilized by the program) from 50% to 100% beginning in 2006. Kokanee stocks are also under review by co-managers and the Evaluation Program has begun assessing utilization of an upriver stock (Meadow Creek kokanee) and the potential to triploid Lake Whatcom stock in the future. Lake Whatcom stock kokanee are the coastal, non-endemic stock historically used for hatchery purposes in Lake Roosevelt. All hatchery raised kokanee salmon yearlings released into Lake Roosevelt have been adipose clipped since 1998, and all hatchery rainbow trout fingerlings released into Lake Roosevelt

are slated to be 100% adipose clipped beginning in 2006 for 2007 releases (2005 brood year).

In 2000, the Evaluation Program began monitoring early maturation and sex-ratios in the hatcheries and found that a large percentage of kokanee salmon that were being released as yearlings at 17 months were sexually mature as 2 year olds and exhibited skewed sex ratios (4 males to 1 female; Spokane Tribe of Indians, unpublished data). The cost of raising kokanee salmon yearlings that were part of the fishery for 4 months only led co-managers to begin assessing alternatives that exhibited better cost-effectiveness. Beginning in 2004, the production program began releasing 400,000 yearling kokanee salmon, approximately 3 million kokanee salmon fry, 500,000 rainbow trout and 60,000 redband trout annually. The shift back to a kokanee salmon fry production program was a management decision based on eight years of yearling assessment findings, and the limited success and associated cost of the kokanee program during that time. Adaptive management actions during those assessments included moving kokanee away from predator traps, releasing them in upper reservoir tributaries, and increasing the overall number of fry released. Currently, production goals for kokanee fry releases into Lake Roosevelt are limited by kokanee egg availability, increasing the need to meet the program goal of creating a self-sustaining kokanee fishery in Lake Roosevelt. This has become more critical as the Lake Whatcom stock kokanee are slated to lose their disease free status in the future, which will disallow them from being utilized for stocking in Washington State. Additionally, Meadow Creek egg availability has been unreliable historically. The Arrow Lake fertilization program has increased their reliability, but the cost of eggs is expected to increase in the future and ultimately decrease the number of eggs available to the program. Management direction is to release as many kokanee fry into the designated release locations as possible. One very promising prospect for kokanee eggs for Lake Roosevelt is a run of Meadow Creek stock currently returning in large enough numbers to Northrup Creek in Banks Lake to provide the eggs necessary for Lake Roosevelt. The Washington Department of Fish and Wildlife have developed a plan to figure out how to collect the eggs and our program supports funding the Banks Lake Fisheries Evaluation Program in order to complete this work.

*Coordination – Lake Roosevelt Management Team, Lake Roosevelt Hatcheries Coordination Team and Lake Roosevelt Fisheries Evaluation Team*

Three separate groups exist to develop management, monitoring and evaluation decisions on Lake Roosevelt. The groups meet independently and have specific tasks identified per group, but membership strongly overlaps and the groups tend to work synergistically to meet objectives. 1) The Lake Roosevelt Management Team is comprised of one individual from each of the fishery management entities (Spokane Tribe of Indians, Colville Confederated Tribes and Washington Department of Fish and Wildlife). They work together to develop recommendations and fishing regulations and to update the Lake Roosevelt Guiding Document based on the best available science provided by the Evaluation Program. 2) The Lake Roosevelt Hatchery Coordination Team is comprised of the co-managers and individuals associated with the artificial production program through the hatcheries, net pen program and monitoring efforts. They meet bi-annually to review hatchery program status, the recommendations of the Management Team and Evaluation Program and in-hatchery research. 3) The Lake Roosevelt Fisheries Evaluation Program is comprised of all individuals working on Lake Roosevelt including individuals from other projects including the Lake Roosevelt Net Pen Project Coordinator and volunteers. They

are tasked with regular meetings to review annual reports and new science developments, to assess recommendations and ensure they represent the best science and to guide the science behind monitoring and evaluation efforts, with particular emphasis towards eliminating duplicated efforts and to foster efficient utilization of funds.

*Future Program Direction – Lake Roosevelt Fisheries Guiding Document*
Early in the development of the artificial production program for Lake Roosevelt, the Lake Roosevelt Fisheries Management Plan (Scholz, 1985) was developed to guide fisheries management decisions. The plan was used as a guide to assist co-managers in decision making through the 1990's. During that time, new information was collected that has been used to guide co-mangers in developing annual recommendations to the Lake Roosevelt Hatchery Coordination Team and to guide monitoring and evaluation efforts. In 2005, the Lake Roosevelt Fisheries Guiding Document was developed to compliment and update the Management Plan. It is a living document that outlines current fisheries goals and the future direction of the artificial production program as directed by the Lake Roosevelt Management Team, comprised of the Lake Roosevelt co-managers (Washington Department of Fish and Wildlife, Spokane Tribe of Indians and the Colville Confederated Tribes). Additionally, the Guiding Document provides co-managers with specific actions to guide monitoring and evaluation actions. We anticipate that the modeling results will be useful for informing the guiding document and allowing for predictive, as well as, adaptive management of the fishery.

## CONCLUSION & RECOMMENDATIONS

The Lake Roosevelt Monitoring and Evaluation Program has clearly shown the success of the rainbow trout mitigation program. It has been a mainstay of the Lake Roosevelt subsistence and recreational fishery for the past 14 plus years. Future direction is to increase the number of Spokane stock rainbow trout from 500,000 to 750,000 released annually through the Lake Roosevelt Net Pen Program and Sherman Creek and Spokane Tribal hatcheries, triploid 100% of the Spokane Stock rainbow trout (or other non-endemic stock) and to adipose fin clip 100% of hatchery rainbow trout released into the reservoir. Additionally, co-managers plan to increase the number of redband (native) trout released into the reservoir from 60,000 to 100,000 annually when feasible and complete studies examining the performance of redband trout in the reservoir. Annual monitoring of the rainbow trout and the redband trout program will be completed via the recently re-designed reservoir-wide creel and seasonal fish surveys.

The complexities of a maturing reservoir, fish hostile hydro-operations, invasive, exotic species and limited habitat availability need to be considered in order to develop future direction of the kokanee program. Entrainment has been a particularly difficult problem that is still poorly understood by co-managers. Kokanee are a species that seem to be very susceptible to entrainment due to their pelagic habitat use and tendency to follow flow and drifting prey into the fore bays of dams, increasing their probability to entrain. Based on the current status of the program, co-managers plan to: continue fry versus post-smolt experiments to assess the performance of fry and post-smolts released into tributaries; begin studies to assess emigration of kokanee from British Columbia and assess life history of at-large/wild kokanee in Lake Roosevelt to better understand survival strategies and

allow co-managers to better mimic their success; and collect eggs from Lake Roosevelt kokanee to try and identify a kokanee stock that may be uniquely adapted to the challenges of surviving in the reservoir and to be used as a potential alternative as the availability of other stocks declines.

Fishery management recommendations for 2006 fish production that will be implemented accordingly by Lake Roosevelt Hatcheries Coordination Team consensus include:

*Kokanee Salmon Program*

1. Adipose fin clip all yearling kokanee salmon before release.
2. Release up to 250,000 Meadow Creek yearling kokanee at Fort Spokane and 25,000 at Little Falls Dam as an interim put and take management action for kokanee.
3. Release 300,000 kokanee fry/fingerlings at Banks Lake.
4. Release up to 1.2 million kokanee fry at Onion Creek, 500,000 kokanee fry at Big Sheep Creek and 100,000 kokanee yearlings at Onion Creek using Meadow Creek stock. This is as effort to restore runs of kokanee in the northern part of Lake Roosevelt while complementing increased kokanee harvest goals.
5. Release up to 1.2 million kokanee fry and 100,000 kokanee yearlings at Hawk Creek using Lake Whatcom stock. This is also as an effort to restore runs in the southern reservoir while complementing increased kokanee harvest goals.
6. Use a unique fin clip/mark to identify specific release groups.
7. Unique mark (fin clips, thermal) specific release groups.
8. Release kokanee fry and yearlings after the reservoir starts re-filling (mid-May on).

*Rainbow Trout Program*

1. Triploid 100% Spokane Trout Hatchery stock rainbow trout.
2. Perform annual triploid testing.
3. Produce 500,000 rainbow trout fingerlings for transfer to Sherman Creek Hatchery and Lake Roosevelt Net Pens for subsequent release in 2006.
4. Increase Spokane Trout Hatchery stock rainbow trout production to 750,000 beginning in 2007, 100% triploids.
5. Increase Phalon Lake red band rainbow trout production to 100,000 for Lake Roosevelt net pens (Sherman Creek and Colville WDFW Hatcheries action).
6. Release rainbow trout yearlings after the reservoir has started re-filling (mid-May on; Lake Roosevelt Net Pen Rearing Project action).

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**Lake Roosevelt Kokanee**

**Lake Roosevelt Rainbow Trout**