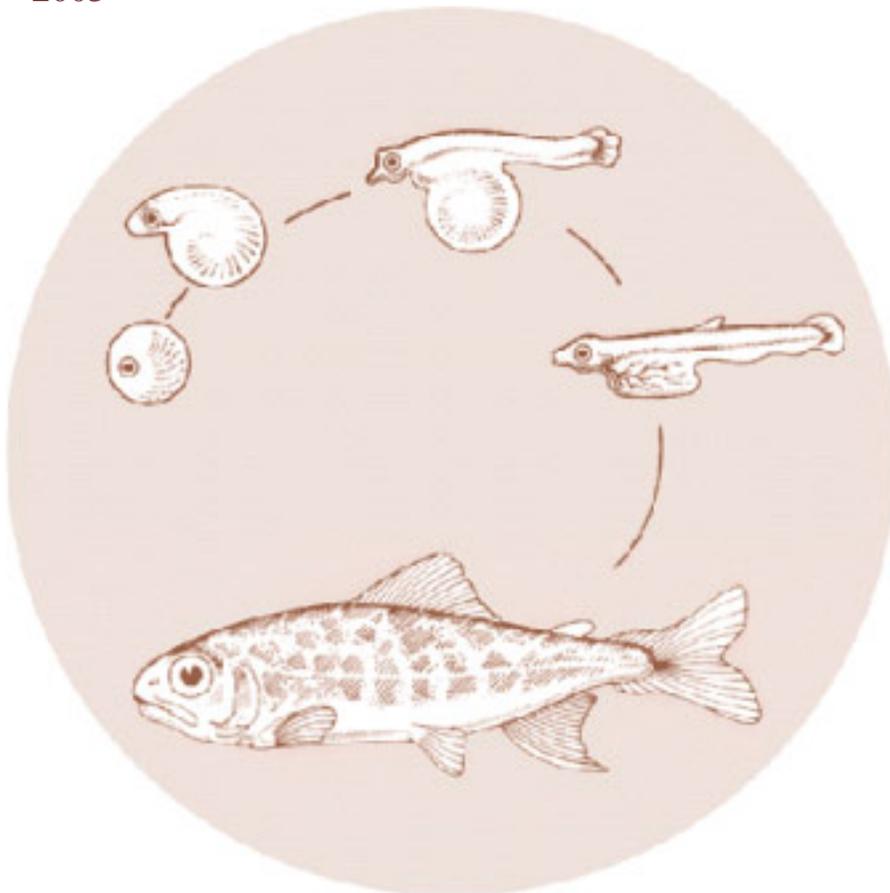


Umatilla Hatchery Satellite Facilities

Operations and Maintenance

Annual Report
2003



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**UMATILLA HATCHERY SATELLITE FACILITIES
OPERATION AND MAINTENANCE**

ANNUAL REPORT 2003

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ABSTRACT

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperating in a joint effort to enhance steelhead and re-establish salmon runs in the Umatilla River Basin. As an integral part of this program, Bonifer Pond, Minthorn Springs, Imeqes C-mem-ini-kem, Thornhollow and Pendleton satellite facilities are operated for acclimation and release of juvenile summer steelhead (*Oncorhynchus mykiss*), fall and spring chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*). Minthorn is also used for holding and spawning adult summer steelhead and Three Mile Dam and South Fork Walla Walla facilities are used for holding and spawning chinook salmon. In some years, Three Mile Dam may also be used for holding and spawning coho salmon.

In the spring of 2003, summer steelhead were acclimated and released at Bonifer Pond (41,369), Minthorn Springs (42,805), and Pendleton (42,783). Yearling coho (1,546,167) were also acclimated and released at Pendleton. Yearling spring chinook salmon (782,106) were acclimated and released at Imeqes C-mem-ini-kem. In addition, 166,183 spring chinook were transported to Imeqes C-mem-ini-kem in November for release in the spring of 2004. At Thornhollow, 509,135 yearling fall chinook and 313,383 subyearling fall chinook were acclimated.

CTUIR and ODFW personnel monitored the progress of outmigration for juvenile releases at the Westland Canal juvenile facility. Nearly all juveniles released in the spring migrated downstream prior to the trap being opened in early July.

A total of 99 unmarked and 10 marked summer steelhead were collected for broodstock at Three Mile Dam from October 1, 2002, through April 11, 2003 and were transported to Minthorn for holding and spawning. An estimated 184,827 green eggs were taken from 30 females and were transferred to Umatilla Hatchery for incubation and rearing.

A total of 559 adult and 27 jack spring chinook salmon were collected for broodstock at Three Mile Dam from April 21 through June 10, 2003, and were transported to South Fork Walla Walla. An estimated 1,051,246 green eggs were taken from 240 females and were transferred to Umatilla Hatchery. Excess unmarked broodstock (20 adult males and three jacks) were released into the South Fork Walla Walla River at the end of spawning.

A total of 280 adult and one jack spring chinook salmon were transferred from Three Mile Dam to South Fork Walla Walla between April 25 and May 15 for temporary holding. On August 7, 272 adults and one jack were released into the South Fork Walla Walla River to spawn naturally.

A total of 21 adult spring chinook salmon were transferred from Ringold Hatchery to South Fork Walla Walla on June 2 for temporary holding. On August 7, 17 adults were released into the South Fork Walla Walla River to spawn naturally.

A total of 391 adult and 18 jack fall chinook salmon were collected and held for broodstock at Three Mile Dam from September 16 to November 20, 2003. An estimated 681,594 green eggs

were taken from 170 females. The eggs were transferred to Umatilla Hatchery. Coho salmon broodstock were not collected in 2003.

Personnel from the ODFW Eastern Oregon Fish Pathology Laboratory in La Grande took samples of reproductive fluids and tissues from Umatilla River summer steelhead and spring and fall chinook salmon broodstock for monitoring and evaluation purposes. Fifty-five spawned summer steelhead were sampled for replicating viral agents and infectious hematopoietic necrosis virus (IHNV) was detected in 25 fish. Summer steelhead were not examined for bacterial kidney disease (*Renibacterium salmoninarum*; BKD) in 2003. IHNV was detected in 11 of 77 spawned spring chinook females. Two hundred forty spawned spring chinook females were sampled for BKD. One fish had a clinical level of Rs antigen (ELISA OD₄₀₅ reading of 0.979) and four fish had low to moderate levels (ELISA OD₄₀₅ readings between 0.200 and 0.399). All other fish had low to negative levels of Rs antigen (ELISA OD₄₀₅ readings of 0.199 or less). Twenty-five spring chinook mortalities were also examined for BKD. Five fish had clinical levels of Rs antigen (ELISA OD₄₀₅ readings of 1.122 to 2.462). All other fish had negative to low levels (0.094 or less). Ten fish had high levels of aeromonad-pseudomonad bacteria and Furunculosis was detected in three fish. Cell culture assays for replicating viral agents on 110 spawned fall chinook females were negative. One hundred seventy-one spawned fall chinook females were sampled for BKD and all had ELISA readings equal to less than 0.158, indicating negative to low level positives. Two fall chinook mortalities were examined for BKD and both had OD₄₀₅ readings of less than 0.100, also indicating negative to very low levels of Rs antigen.

Regularly scheduled maintenance of pumps, equipment, and facilities was performed in 2003. Critical maintenance and repair was also performed by Umatilla Passage Facility Operation and Maintenance personnel.

ACKNOWLEDGEMENTS

Bonneville Power Administration (BPA) funded this project. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) thank Jonathan McCloud and other BPA personnel for their assistance. Thanks are extended to Mike Gribble, Jack Hurst, Sam Onjukka, Glenda Claire, and other Oregon Department of Fish and Wildlife (ODFW) personnel for providing assistance in the spawning of summer steelhead and spring and fall chinook salmon and for monitoring the fish for the presence of pathogens. Bill Duke (ODFW) assisted with collection and transport of steelhead and chinook salmon broodstock and collection of data at Three Mile Dam and Westland Canal. Bob Becker (ODFW) supervised and coordinated fish transfers to the acclimation facilities. Thanks go to Wes Stonecypher, Josh Hanson, and Danny St. Hilaire (ODFW) for sharing their juvenile pre-release data and for assisting in the collection of broodstock data. We thank landowners Rosemary and Wes Gladow and Richard Kaye for their cooperation and Union Pacific Railroad for providing access to the facilities. Thanks are also extended to the Umatilla Basin Fish Facilities Operation and Maintenance crew for helping to maintain the facilities.

Thanks go to the CTUIR staff for their cooperation and contributions to this report. Preston Bronson, Brian Conner, Larry Cowapoo, Vern Spencer, Joe Spicer, and David Thompson collected data from adults returning to Three Mile Dam and assisted in the collection and transport of steelhead and chinook salmon broodstock. Paul Kissner and other biologists and technicians collected data and snouts from spawning ground and creel surveys. Michelle Thompson provided the administration of the agreement and Julie Burke, Celeste Reves, and Esther Huesties provided office management and secretarial services. Gary James and Brian Zimmerman provided technical oversight and critical review of this report.

Thanks go to Chris Dearing, Mike McCloud, Louis Case, Tysen Minthorn, and Tela Branstetter for the long hours and weekends spent operating and maintaining the facilities and for collecting data.

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INTRODUCTION

Background

The Umatilla River Basin historically supported large runs of anadromous salmonids, including summer steelhead (*Oncorhynchus mykiss*), fall and spring chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*). The runs of chinook and coho salmon were essentially eliminated in the early 1900's. The losses have generally been attributed to the development of hydroelectric dams and to forestry, agriculture, and irrigation practices. The single indigenous naturally spawning anadromous stock left in the Umatilla River Basin is a run of summer steelhead.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) began efforts to enhance steelhead and re-establish salmon runs in the Umatilla River Basin in the early 1980's. As an integral part of these efforts, Bonifer Pond (Bonifer), Minthorn Springs (Minthorn), Imeques C-mem-ini-kem (Imeques), Thornhollow, Pendleton, Three Mile Dam and South Fork Walla Walla satellite facilities were constructed. The facilities are administered under the Fish and Wildlife Program of the Northwest Power Planning Council and are funded by Bonneville Power Administration (BPA).

The facilities are operated by CTUIR in cooperation with ODFW. Bonifer, Minthorn, Imeques, Thornhollow, and Pendleton facilities are operated for acclimation and release of juvenile salmon and summer steelhead. The main goal of acclimation is to reduce stress from trucking prior to release and improve imprinting of juvenile salmonids in the Umatilla River Basin. Minthorn is also used for holding and spawning summer steelhead and Three Mile Dam and South Fork Walla Walla facilities are used for holding and spawning fall and spring chinook salmon. In some years, coho salmon may also be held and spawned at Three Mile Dam. This report details activities associated with operation and maintenance of the satellite facilities in 2003.

Facility Descriptions and Operations

The Bonifer facility is located adjacent to Meacham Creek at rivermile (RM) 2 (Figure 1). The pond spills into Boston Canyon Creek, which flows approximately 20 yards before entering Meacham Creek. Meacham Creek flows into the Umatilla River at RM 79. The facility consists of a 1.75-acre earthen pond and concrete water outlet control structure which also functions as a fish trap. The pond holds approximately 4.5 acre-feet of water and is fed by three nearby springs. Flows range from approximately 750 to 1,850 gallons per minute (gpm). Operations began in 1984.

The Minthorn facility is located approximately four miles east of Mission, Oregon (Figure 1). The facility is located on Minthorn Springs Creek, which is formed from the inflow of several springs located immediately south of the Umatilla River. The creek is approximately one mile long, with the facility located near the mouth at Umatilla RM 63.8. The facility includes two raceways

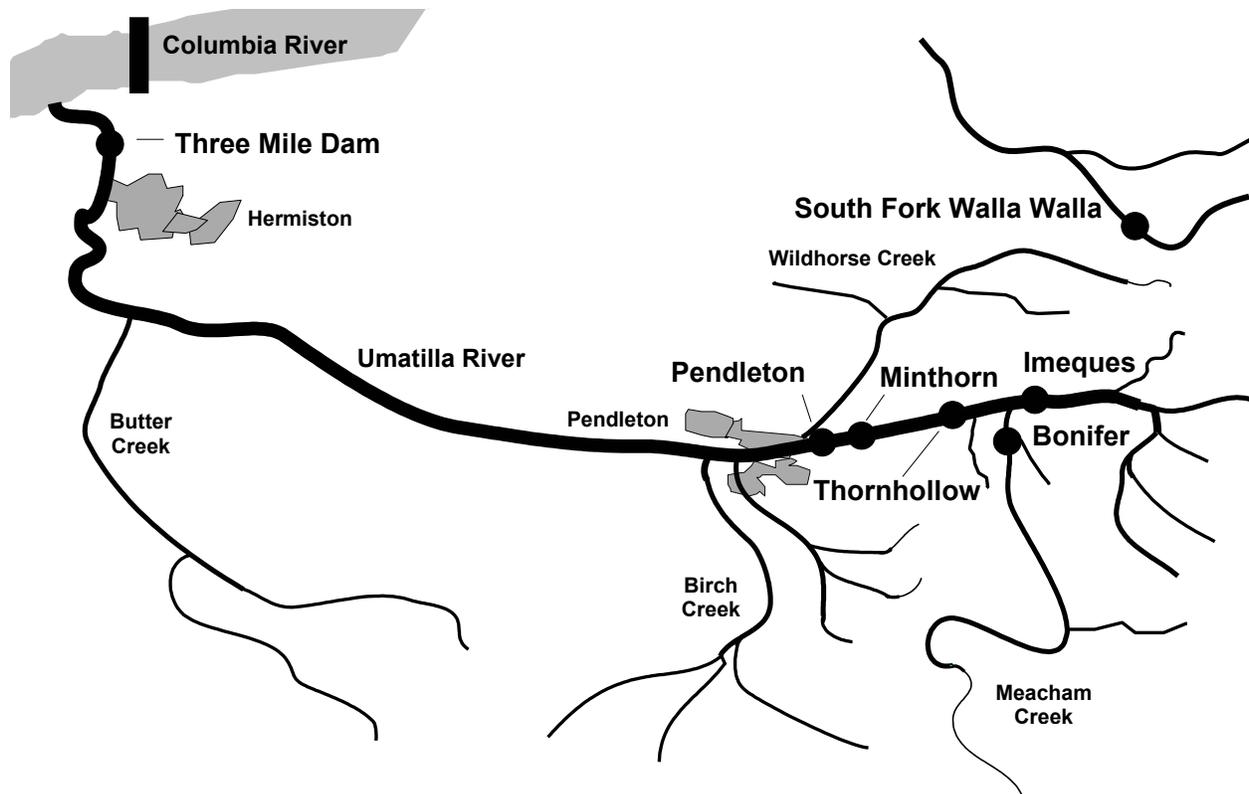


Figure 1. Three Mile Dam, Pendleton, Minthorn, Thornhollow, Imeques C-mem-ini-kem, Bonifer, and South Fork Walla Walla satellite facilities.

(each 120 x 12 x 3 foot effective water depth; 4,320 cubic feet), pump station, standby generator and water outlet control structure, which also functions as a fish trap and summer steelhead broodstock holding area. Water through the brood holding area is supplied by gravity and ranges from approximately 500 to 2,100 gpm. Water supply to the raceways is pumped from the creek. Water depth is usually held at three feet with a single-pass water pumping rate of 800 gpm through each raceway. Two valves control the effluent water to allow for either recycling of flows into the intake pond or discharge downstream of the intake and adult holding area. Minthorn was first operated in 1986.

The Imeques facility is located on the upper Umatilla River at RM 79.5 (Figure 1). The facility includes a water intake structure with automatic screen cleaner, water headbox/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow (approximately 1,600 gpm per pond). Imeques C-mem-ini-kem was completed and began operations in 1994.

The Thornhollow facility is located on the upper Umatilla River at RM 73.5 (Figure 1). The facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, storage building, two acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. Water flow is approximately 1,600 gpm per pond. Thornhollow was completed and began operations in 1995.

The Pendleton facility is located on the upper Umatilla River at RM 56 (Figure 1). The facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each), settling pond for pond cleaning, and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. Water flow is approximately 1,600 gpm per pond. The facility was completed and began operations in 2000.

The Three Mile Dam facility is located on the lower Umatilla River at approximately RM 4 (Figure 1). The facility includes a water intake system with automatic screen cleaning, pump station having a pumping capacity of 8,000 gpm, six adult holding ponds (each 90 x 10 x 5 foot effective water depth; 4,500 cubic feet), mechanical fish crowder, visitor facilities including restrooms, standby generator and chemical storage, bunkhouse and spawning buildings. The bunkhouse includes two bunkrooms, kitchen area, office space, conference room, shop, and restrooms. The spawning building includes a fish lift, electroshock anesthesia system, sorting and spawning facilities, wet and dry storage rooms, walk-in cooler, and restroom.

The South Fork Walla Walla facility is located east of Milton-Freewater, Oregon (Figure 1). The facility is located on the South Fork of the Walla Walla River at approximately RM 7. The facility includes a water intake system with automatic screen cleaning, pump station having a pumping capacity of 8,700 gpm, ozone water treatment system, settling pond, five adult holding ponds (each 90 x 10 x 5 foot effective water depth; 4,500 cubic feet), mechanical fish crowder, standby generator, chemical storage and spawning buildings and two homes for nite watch personnel. The spawning building includes a fish lift, electroshock anesthesia system, sorting and spawning facilities, wet and dry storage rooms, walk-in cooler/freezer, and restroom and office space.

Project Objectives

The following are the project objectives for FY 2003:

Objective 1: Increase adult salmon and steelhead survival and homing to the Umatilla River basin.

Task 1.1: Hold and feed juvenile salmon and summer steelhead in facilities prior to release in the Umatilla River basin.

Task 1.2: Determine trends in juvenile outmigration timing.

- Task 1.3: Maintain the facilities in good working order.
- Objective 2: Provide holding for adult summer steelhead, spring and fall chinook and coho salmon and supply eggs to Umatilla and other hatcheries for incubation, rearing and later release in the Umatilla River basin.
 - Task 2.1: Hold and artificially spawn summer steelhead, spring and fall chinook and possibly coho salmon as well as collect physical data.
 - Task 2.2: Provide temporary holding for fall and spring chinook outplanting programs.
 - Task 2.3: Assist ODFW in collecting samples from prespawn mortalities and spawned fish for disease analysis.
 - Task 2.4: Maintain the facilities in good working order.
- Objective 3: Participate in planning and review process for the Walla Walla Hatchery Master Plan.
 - Task 3.1: Review and comment on the development of the artificial production sections in the Walla Walla Hatchery Master Plan.
- Objective 4: Increase production of Carson stock spring chinook for release in the Umatilla River.
 - Task 4.1: Provide funding for the United States Fish and Wildlife Service to produce 350,000 spring chinook salmon for release in the Umatilla River. The funding includes fin marking and coded-wire tagging costs.

METHODS

Objective 1: Adult Survival and Homing

Task 1.1: Juvenile Holding

Juvenile summer steelhead, coho, and spring and fall chinook salmon were transported by ODFW to the acclimation facilities using 3,000 and 5,000 gallon fish transport trucks. One group of spring chinook was transported to Imeques in November, 2002, and was over wintered and released in the spring of 2003. Another group of spring chinook was transported to Imeques in November, 2003, and is being over wintered for release in the spring of 2004. Proposed acclimation periods for fish received and released in the spring of 2003 were three weeks for fall chinook subyearlings and four weeks for summer steelhead, coho, and spring and fall chinook yearlings. The fish were fed Biomoist Feed (Bio-Oregon Inc., Warrenton, Oregon) twice each day. Fish were to be fed at a rate of approximately 0.5 to 1.5% body weight per day (BWD). Mortalities were removed daily and ODFW pathology personnel were available to address specific disease concerns.

With one exception, all acclimated groups were allowed to volitionally release during the final week of holding, after which the remainder of the fish were forced out. The one exception was a group of coho which were forced out. The total number of fish released was estimated using ODFW Fish Liberation Reports and acclimation mortality records. The number of fish tagged was estimated using ODFW Coded-Wire Tagging Operation Summaries, hatchery and acclimation mortality records, and tag retention sampling prior to release.

Oregon Department of Fish and Wildlife personnel sampled all summer steelhead, and fall and spring chinook salmon groups the day of release for weight and fork length. CTUIR personnel sampled coho juveniles the day of release for weight and fork length.

Temperatures were taken at the facilities during acclimation. Temperatures were recorded hourly by automatic temperature recorders (Vemco Minilog). Dissolved oxygen (DO) measurements were not taken in 2003 because all project DO meters (model YSI 55) were inoperable.

Task 1.2: Juvenile Outmigration Monitoring

Juvenile salmonids were collected at the Westland Canal juvenile facility (RM 27) during trapping operations. The trap was monitored daily and fish were hauled as necessary by CTUIR and ODFW Fish Passage Operations (FPO) personnel (Zimmerman et al. 2003). The trap is located approximately 29.0, 36.8, 46.5, 52.5, and 54.0 rivermiles downstream from Pendleton, Minthorn, Thornhollow, Imeques, and Bonifer, respectively.

Juveniles were sampled five out of six days fish were hauled during the juvenile trapping period. Species and marks were recorded on all fish sampled and lengths were recorded on a portion of the salmonids. Weight samples were taken using standard hatchery practices to estimate the

average size of the fish. The weight samples were used to estimate the total number of fish hauled on sampling days by multiplying the number of fish per pound by the number of pounds loaded.

Task 1.3: Juvenile Acclimation Facility Maintenance

Regularly scheduled maintenance of pumps, equipment, and facilities was performed in 2003. Critical maintenance and repair was also performed by the project in conjunction with the Umatilla Passage Facility Operation and Maintenance (UPFOM) crew.

Objective 2: Adult Holding and Spawning

Task 2.1: Adult Collection, Holding and Spawning

Collection, Holding and Spawning of Summer Steelhead

Summer steelhead were collected for broodstock through the cooperative efforts of CTUIR and ODFW. Fish were trapped at Three Mile Dam, located approximately three miles upstream from the mouth of the Umatilla River, and were transported to Minthorn by Fish Passage Operations personnel using a 370 gallon fish transport tank.

The broodstock goal was 110 adults. To help maintain the genetic integrity of the hatchery population, the first priority for broodstock was to collect 100 unmarked fish at a male to female ratio of 1:1. Fish were collected throughout the run to provide a representative cross-section of the population. To allow for male mortality and difficulty in finding sufficient mature male spawners on a given spawn day, 10 coded-wire tagged hatchery males (adipose and left ventral clipped) were also collected throughout the run.

Beginning February 19, 2003, and continuing through May 21, broodstock were treated three times per week with hydrogen peroxide (UNIVAR USA, Spokane, WA.) to help control fungus. A one-hour flow-through treatment at approximately 100 ppm active ingredient (8.4 gallons) was used.

Beginning April 2, and continuing through the end of the spawning season, broodstock were sorted weekly to determine maturation. Ripe fish were spawned by CTUIR and Umatilla Hatchery personnel using standard hatchery practices. A 3 x 3 spawning matrix was used whenever possible and matings were random. Eggs from each family group were water hardened in iodophor (Argentyne, Argent Chemical Laboratories) at 75 ppm for one hour and transferred to Umatilla Hatchery for incubation and rearing.

Fork and MEHP lengths were taken on all prespawn mortalities and spawned fish. MEHP length was defined as the distance from the middle of the eye to the end of the hypural plate. Fin marks were recorded and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from unmarked fish.

Collection, Holding and Spawning of Spring Chinook Salmon

Spring chinook salmon broodstock were also collected at Three Mile Dam. The goal was to collect 560 adult broodstock at a female to male ratio of 1:1. Jacks were also collected at a rate of one jack for every 10 adult males collected. Fish Passage Operations personnel transported fish to the South Fork Walla Walla facility using a 3,000 gallon fish transport truck.

On the day of collection, each fish was injected with Oxytetracycline 200 and Gallimycin 200 at a rate of approximately 10mg/kg/fish and 20mg/kg fish, respectively. The fish were given a second injection at the same dosage rates on July 1 at South Fork Walla Walla. Beginning May 14 and continuing through May 28, broodstock were treated with formalin three times per week to help control fungus. A one-hour flow-through treatment at approximately 167 ppm (8 gallons) was used. Beginning June 1 and continuing through June 11, fish were treated three days per week with hydrogen peroxide at approximately 100 ppm active ingredient (13 gallons). From June 16 to the end of the spawning season, fish were again treated three days per week with formalin (8 or 13 gallons/treatment).

Beginning August 20, fish were sorted and spawned once per week by CTUIR and ODFW personnel. A spawning ratio of 1:1 was used. The eggs from each female were fertilized individually and the eggs from four females were pooled to form one family group. The eggs were water hardened in iodophor at 75 ppm and transferred to Umatilla Hatchery.

Fork and MEHP lengths were taken on prespawn mortalities and spawned fish. Fin marks were recorded and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from unmarked fish. After the spawning season was completed, all adipose clipped fish were sacrificed for coded-wire tag recovery. Fork and MEHP lengths were taken, fin marks were recorded, and snouts were collected. Unmarked fish were released into the South fork Walla Walla River after sex was recorded.

Collection, Holding and Spawning of Fall Chinook Salmon

Fall chinook salmon broodstock were collected and held at Three Mile Dam. The initial collection rate was 100% of the total adult return and at a male to female ratio of 1:1. The collection rate was adjusted as necessary to provide the goal of 380 adults. Jacks were also collected at a rate of one for every 10 adult males.

Fall chinook broodstock collected from September 16 to September 30 were injected with both Oxytetracycline and Erythromycin on October 1 and at the same dosage rates as spring chinook. Fish collected from October 1 through October 31 were injected at the time of collection. Fish collected after October 31 were not injected.

Beginning October 1 and continuing through November 24, the fish were treated two or three days per week with hydrogen peroxide to help control fungus. A flow through treatment at approximately 100 ppm active ingredient (13 gallons) was used.

Beginning November 5, fish were sorted and spawned once or twice per week by CTUIR and ODFW personnel. A spawning ratio of 1:1 was used, but after fertilization, the eggs from four females were pooled to form one family group. The eggs were water hardened in iodophor at 75 ppm and transferred to Umatilla Hatchery for early incubation.

After the spawning season was completed, all remaining fish were sacrificed. Fork and MEHP lengths were taken on prespawn mortalities, spawned fish and excess fish sacrificed. Fin marks and the presence of blank-wire tags were recorded and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from unmarked fish.

Collection, Holding and Spawning of Coho Salmon

Coho salmon broodstock were not collected in 2003. Oregon Department of Fish and Wildlife hatcheries supplied all 2003 broodstock eggs for the Umatilla River program.

Task 2.2: Adult Collection, Holding and Outplanting

Collection Holding and Outplanting Spring Chinook Salmon

Fish Passage Operations personnel utilized both 750 and 3,000 gallon fish transport units to transfer adult spring chinook from Three Mile Dam to South Fork Walla Walla for temporary holding. On the day of collection, each fish was injected with Oxytetracycline 200 and Gallimycin 200 at a rate of approximately 10mg/kg/fish and 20mg/kg/fish, respectively. The fish were given a second injection at the same dosage rates on July 2 at South Fork Walla Walla. Beginning May 14 and continuing through May 28, fish were treated with formalin three times per week to help control fungus. A one-hour flow-through treatment at approximately 167 ppm (8 gallons) was used. Beginning June 1 and continuing through June 11, fish were treated three days per week with hydrogen peroxide at approximately 100 ppm active ingredient (13 gallons). From June 16 to August 4, fish were again treated three days per week with formalin. On August 7, all live fish were loaded into a 3,500 gallon transport truck and were hauled by Fish Passage Operations personnel and released into the South Fork Walla Walla River to spawn naturally. Sex, fork and MEHP lengths were taken on all mortalities and snouts were collected from all coded-wire tagged fish. Sex and marks were recorded on all fish released.

In addition, Fish Passage Operations personnel utilized a 750 gallon fish transport unit to transfer adult spring chinook from Ringold Hatchery to South Fork Walla Walla for temporary holding. These fish were not injected with Oxytetracycline or Erythromycin at the time of collection; however, they were injected at South Fork Walla Walla on July 2 and again on August 7. Beginning June 4, fish were treated with hydrogen peroxide three days per week to help control fungus. A one-hour flow-through treatment at approximately 100 ppm active ingredient was used. On June 16, treatments were switched to formalin three days per week at approximately 167 ppm. On August 7, all live fish were loaded into a 3,500 gallon transport truck and were hauled by Fish Passage Operations personnel and released into the South Fork Walla Walla River to spawn naturally. Sex and marks were recorded on all mortalities and fish released. Fork lengths were also collected from mortalities. None of these fish were coded-wire tagged.

Collection Holding and Outplanting Fall Chinook Salmon

All fall chinook adults outplanted in 2003 were released directly into the Umatilla River.

Task 2.3: Disease Sampling

Disease Sampling of Summer Steelhead Broodstock

Spawned adult steelhead were sampled for the presence of replicating viral agents by ODFW Northeast Oregon Fish Pathology Laboratory (NOFPL) in La Grande for monitoring and evaluation purposes as part of the Umatilla Hatchery Fish Health Monitoring Program. Reproductive fluid, pyloric caeca, kidney, and spleen were sampled. Prespawn mortalities were also sampled for culturable bacteria.

Disease Sampling of Spring Chinook Salmon Broodstock

Adult spring chinook salmon were also sampled for the presence of selected pathogens. Ovarian fluid and pyloric caeca, kidney, and spleen samples from spawned females were assayed for replicating viral agents. Kidney samples from the same spawned females were examined for bacterial kidney disease (*Renibacterium salmoninarum*; BKD). Prespawn mortalities were sampled for BKD and other culturable bacteria.

Disease Sampling of Fall Chinook Salmon Broodstock

Adult fall chinook salmon were also sampled. Ovarian fluid, pyloric caeca, kidney, and spleen samples from spawned females were assayed for replicating viral agents. Kidney samples from the same females were examined for BKD. Kidney samples were also taken from prespawn mortalities to test for BKD and other typical pathogens.

Disease Sampling of Coho Salmon Broodstock

Coho salmon broodstock were not collected in 2003. Oregon Department of Fish and Wildlife hatcheries supplied all 2003 broodstock eggs for the Umatilla River program.

Task 2.4: Adult Holding and Spawning Facility Maintenance

Maintenance, repair and service of electrical and mechanical equipment, ponds, pumps, water supply systems, screens, fencing, fishways, buildings and grounds was performed. Other maintenance was conducted as necessary.

Objective 3: Walla Walla Hatchery Facilities

Task 3.1: Walla Walla Hatchery Facilities Review and Comment

Participated in the development of the Walla Walla Hatchery Master Plan for spring chinook by providing hatchery rearing criteria.

Objective 4: Increased Spring Chinook Salmon Production

Task 4.1: Increased Spring Chinook Salmon Production

Funding was provided for the United States Fish and Wildlife Service (USFWS) to produce 350,000 spring chinook salmon juveniles at Little White Salmon Hatchery (LWSH) for release in the Umatilla River basin. The funding includes fin marking and code-wire tagging costs. This activity was an objective under this project and the funding was identified as an independent line item in the project budget. However, this was not a subcontract under the project and funding for this activity was contracted directly between BPA and the USFWS.

RESULTS AND DISCUSSION

Objective 1: Adult Survival and Homing

Task 1.1: Juvenile Holding

Acclimation and Release of Juvenile Salmonids

Fall chinook salmon have been released in the Umatilla River Basin every year since 1982 and from acclimation facilities from 1983 to 1991 and from 1995 through 2003 (Appendix A). The 1982 release was from Spring Creek tule stock (Appendix B). Since then, all releases have been of upriver bright stock. Spring chinook salmon from Carson stock have been released since 1986 (Appendix C) and from acclimation facilities from 1986 to 1992 and from 1994 through 2003 (Appendix A). Summer steelhead of Skamania and Oxbow stocks were released from 1967 through 1970 (Appendix D). In 1975, one release of Umatilla stock steelhead occurred and fish releases every year since 1981 have been from this stock. Summer steelhead have been released from acclimation facilities since 1984 (Appendix E). Coho salmon have been released since 1987 and from acclimation facilities in 1987, 1989 through 1991, and from 2000 to 2003 (Appendices E & F).

Three groups of summer steelhead (126,957 fish), five groups of spring chinook (782,106 fish), three groups of fall chinook (822,518 fish), and four groups of coho salmon (1,546,167 fish) were among the 3,277,748 salmon and steelhead acclimated and released into the Umatilla River basin in 2003 (Table 1). One group of 311,406 fall chinook subyearlings was released directly into the Umatilla River at RM 48.5.

Acclimation at Bonifer

Summer Steelhead

A group of 41,369 summer steelhead at 4.8/lb. was released from Bonifer. The fish were allowed to voluntarily release from April 22 to 28, 2003. The remaining fish were released on April 28, after being held for 21 to 27 days (Table 1). Included in the release were 19,217 coded-wire tagged fish (adipose and left ventral fin clipped; Appendix G) and 22,152 adipose clipped only fish. They were fed 0.49% BWD and total mortality was 0.27% (Table 2). The mean temperature during acclimation was 8.5 degrees C (Table 2). The average fork length was 217 mm (Table 3). The length frequency distribution is shown in Figure 2.

Acclimation at Minthorn

Summer Steelhead

One group of 42,805 summer steelhead at 4.0/lb. was released from Minthorn. The fish were allowed to voluntarily release from April 22 to 29, 2003. The remaining fish were released on April 28 and 29 after being acclimated for 22 to 29 days (Table 1). Included in the release

Table 1. Juvenile Salmon and Steelhead Releases in the Umatilla River Basin in 2003.

Species	Brood Year	Stock	Hatchery	Number Released	No./lb.	Release Location	In Facility	In River	Mark	No. Marked
Fall Chinook	2001	Umatilla URB	Bonneville	261,065	13.1	Thornhollow	Jan. 29/30	Mar. 1/7	AdCWT BWT	27,105 233,960
Fall Chinook	2001	Umatilla URB	Bonneville	248,070	10.5	Thornhollow	Mar. 12/18	Apr. 8/15	AdCWT BWT	28,175 219,895
Fall Chinook	2002	Priest Rapids URB	Umatilla	313,383	54.6	Thornhollow	May 1	May 16/22	AdCWT	312,339
Fall Chinook	2002	Priest Rapids URB	Umatilla	<u>311,406</u>	56.2	Uma. RM 48.5	----	May 22	AdCWT	308,975
Subtotal				1,133,924						
Spring Chinook	2001	Umatilla	Umatilla	104,679	13.0	Imeqes	Nov. 15	Mar. 1/6	AdRV CWT Ad Only	41,817 62,862
Spring Chinook	2001	Umatilla	Umatilla	102,217	12.1	Imeqes	Jan. 14	Mar. 1/6	AdRV CWT Ad Only	42,310 59,907
Spring Chinook	2001	Umatilla	Umatilla	148,748	12.2	Imeqes	Jan. 14/15	Mar. 1/6	AdRV CWT Ad Only	59,530 89,218
Spring Chinook	2001	Umatilla	Umatilla	103,656	11.6	Imeqes	Jan. 15	Mar. 1/6	AdRV CWT Ad Only	2,364 101,292
Spring Chinook	2001	Umatilla	Little White Salmon	<u>322,806</u>	16.9	Imeqes	Mar. 12/18	Apr. 8/15	AdRV CWT Ad Only	33,738 289,068
Subtotal				782,106						
Coho	2001	Tanner Cr.	Cascade	249,988	16.3	Pendleton	Feb. 11/12	Mar. 1/5	AdCWT CWT only	26,086 27,308
Coho	2001	Tanner Cr.	Cascade	591,349	15.0	Pendleton	Mar. 10/14	Apr 3/10	AdCWT	27,298
Coho	2001	Tanner Cr.	Cascade	188,971	15.4	Pendleton	Mar. 14/17	Mar. 28	Unmarked	Unmarked
Coho	2001	Tanner Cr.	Lower Herman Cr.	<u>515,859</u>	15.8	Pendleton	Feb. 11/12	Mar. 1/5	AdCWT	26,989,
Subtotal				1,546,167						
Summer Sthd.	2002	Umatilla R.	Umatilla	41,369	4.8	Bonifer	Apr. 1	Apr. 22/28	AdLV CWT Ad Only	19,217 22,152
Summer Sthd.	2002	Umatilla R.	Umatilla	42,805	4.0	Minthorn	Mar. 31	Apr. 22/29	AdLV CWT Ad Only	18,702 24,103
Summer Sthd.	2002	Umatilla R.	Umatilla	<u>42,783</u>	4.4	Pendleton	Apr. 2	Apr. 22/30	AdLV CWT Ad Only	20,240 22,543
Subtotal				126,957						
TOTAL				3,589,154						

Table 2. Food rations, mortalities, temperatures, and D.O. concentrations during acclimation of juvenile summer steelhead, coho, and spring and fall chinook salmon at Bonifer, Minthorn, Thornhollow, Imeques, and Pendleton acclimation facilities in 2003.

Species	Release Location	Release Date	Days Held	Food Fed (%)	Mortality		Temperature (C)			D.O. (mg/L)		
					Total	%	Min.	Max.	Average	Min.	Max.	Average
Summer Steelhead	Bonifer	Apr 22/28	21-27	0.49	111	0.27	3.7	12.7	8.5	----	----	---
Summer Steelhead	Minthorn	Apr 22/29	22-29	0.71	95	0.22	6.7	13.3	9.3	----	----	---
Summer Steelhead	Pendleton	Apr 22/30	20-28	0.68	57	0.13	4.4	12.7	8.8	----	----	---
Fall Chinook	Thornhollow	Mar 1/7	30-37	0.41	367	0.14	1.6	7.1	4.6	----	----	---
Fall Chinook	Thornhollow	Apr 8/15	21-34	0.39	314	0.13	4.1	10.6	6.8	----	----	---
Fall Chinook	Thornhollow	May 16/22	15-21	2.00	689	0.22	5.5	14.5	9.2	----	----	---
Spring Chinook	Imeques	Mar 1/6	106-111	0.34	229	0.22	1.1	8.3	4.6	----	----	----
Spring Chinook	Imeques	Mar 1/6	46-51	0.43	143	0.14	1.1	7.1	4.3	----	----	----
Spring Chinook	Imeques	Mar 1/6	45-51	0.39	202	0.14	1.1	7.1	4.3	----	----	----
Spring Chinook	Imeques	Mar 1/6	45-50	0.42	174	0.17	1.1	7.1	4.3	----	----	----
Spring Chinook	Imeques	Apr 8/15	21-34	0.49	4,519	1.38	3.4	9.2	5.7	----	----	----
Coho	Pendleton	Mar 1/5	17-22	0.29	151	0.06	2.0	7.4	5.3	----	----	----
Coho	Pendleton	Apr 3/10	20-31	0.24	825	0.14	4.4	11.1	7.2	----	----	----
Coho	Pendleton	Mar 28	11-14	0.25	239	0.13	4.6	9.2	6.8	----	----	----
Coho	Pendleton	Mar 1/5	17-22	0.29	423	0.08	2.0	7.4	5.3	----	----	----

Table 3. Size at release for juvenile summer steelhead, coho, and spring and fall chinook salmon released in the Umatilla River Basin in 2003.

Species	Release Location	Release Date	Days Held	No./lb.			Fork Length (mm)		
				Mean	Std. Dev.	N =	Mean	Std. Dev.	N =
Summer Steelhead	Bonifer	Apr 22/28	21-27	4.8	1.7	97	217	26.3	297
Summer Steelhead	Minthorn	Apr 22/29	22-29	4.0	1.5	199	218	26.5	608
Summer Steelhead	Pendleton	Apr 22/30	20-28	4.4	1.7	98	212	26.0	300
Fall Chinook	Thornhollow	Mar 1/7	30-37	13.1	7.4	211	146	24.5	663
Fall Chinook	Thornhollow	Apr 8/15	21-34	10.5	3.3	206	155	18.1	619
Fall Chinook	Thornhollow	May 16/22	15-21	54.6	12.5	118	90	6.2	319
Spring Chinook	Imeques	Mar 1/6	106-111	13.0	3.0	122	140	8.9	356
Spring Chinook	Imeques	Mar 1/6	46-51	12.1	2.3	107	145	9.6	306
Spring Chinook	Imeques	Mar 1/6	45-51	12.2	3.4	112	146	13.0	304
Spring Chinook	Imeques	Mar 1/6	45-50	11.6	2.8	100	149	12.4	308
Spring Chinook	Imeques	Apr 8/15	21-34	16.9	3.4	204	132	9.7	593
Coho	Pendleton	Mar 1/5	17-22	16.3	3.3	304	134	8.6	304
Coho	Pendleton	Apr 3/10	20-31	15.0	3.3	325	139	9.7	325
Coho	Pendleton	Mar 28	11-14	15.4	3.2	304	137	9.1	304
Coho	Pendleton	Mar 1/5	17-22	15.8	3.4	313	136	9.8	313

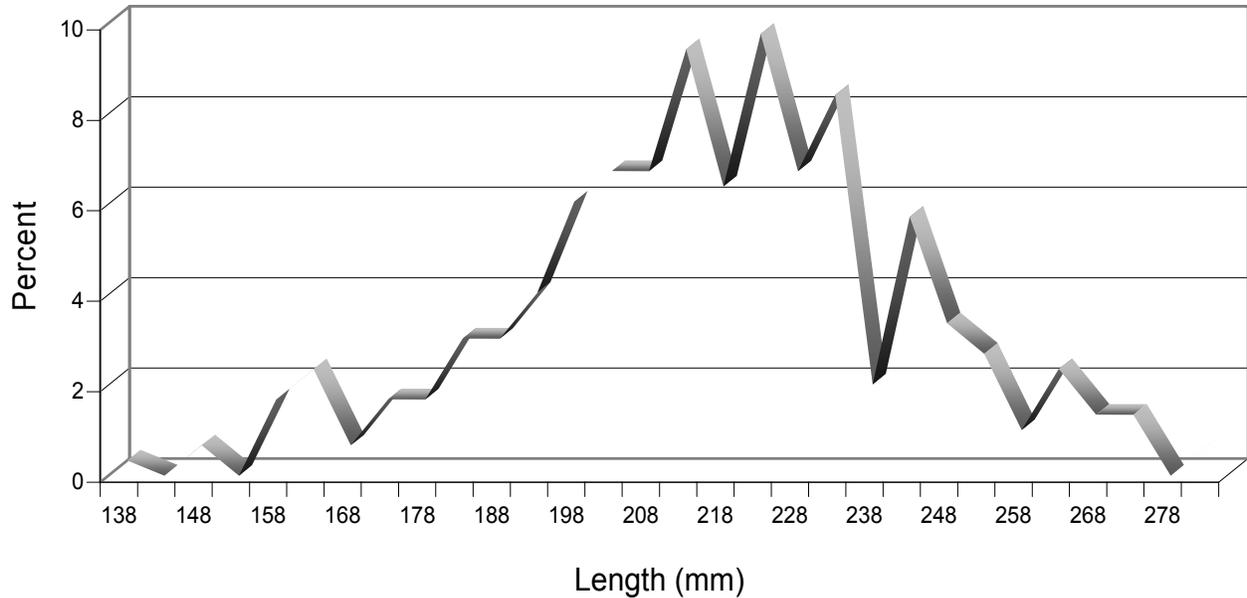


Figure 2. Length frequency distribution of juvenile summer steelhead released at Bonifer Acclimation Facility between 4/22 and 4/28/03.

were 18,702 coded-wire tagged fish (adipose and left ventral fin clipped; Appendix G) and 24,103 adipose clipped only fish. The fish were fed 0.71% BWD and total mortality was 0.22% (Table 2). The mean temperature during acclimation was 9.3 degrees C (Table 2). The average fork length was 218 mm (Table 3). The length frequency distribution of this group is shown in Figure 3.

Acclimation at Thornhollow

Fall Chinook

One group of 261,065 fall chinook yearlings at 13.1/lb. was released from Thornhollow between March 1 and 7, 2003 after being acclimated for 30 to 37 days (Table 1). This included 27,105 coded-wire tagged fish (adipose clipped; Appendix G) and 233,960 blank wire tagged fish. They were fed 0.41% BWD and total mortality was 0.14% (Table 2). The mean temperature was 4.6 degrees C (Table 2). The average fork length was 146 mm (Table 3). The length frequency distribution is shown in Figure 4.

A second group of 248,070 fall chinook yearlings at 10.5/lb. was released from Thornhollow between April 8 and 15, 2003, after being held for 21 to 41 days (Table 1). Included in

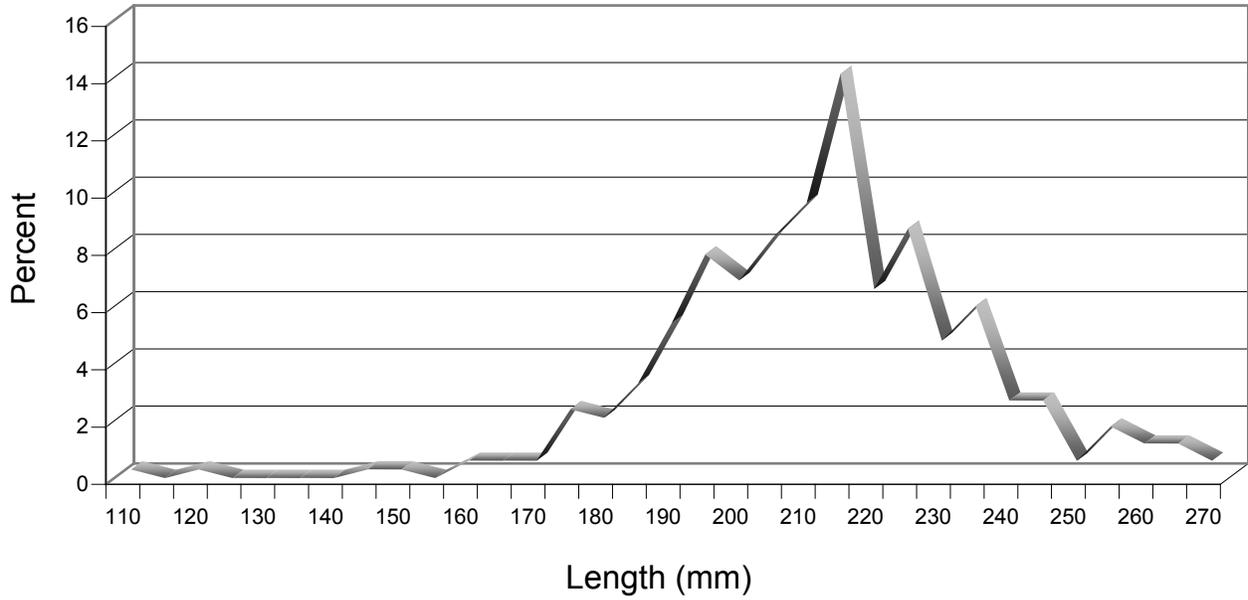


Figure 3. Length frequency distribution of juvenile summer steelhead released at Minthorn Acclimation Facility between 4/22 and 4/29/03.

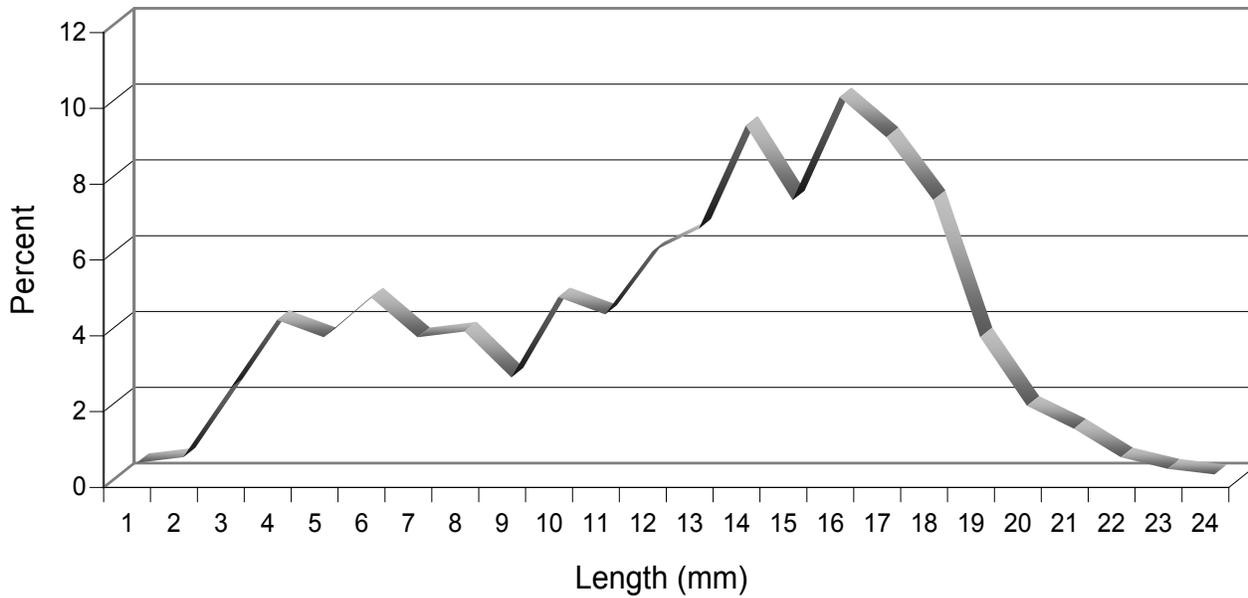


Figure 4. Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 3/1 and 3/7/03.

the release were 28,175 coded-wire tagged fish (adipose clipped; Appendix G) and 219,895 blank wire tagged fish. They were fed 0.39% BWD and total mortality was 0.13% (Table 2). The mean temperature was 6.8 degrees C (Table 2). The average fork length was 155 mm (Table 3). The length frequency distribution of this group is shown in Figure 5.

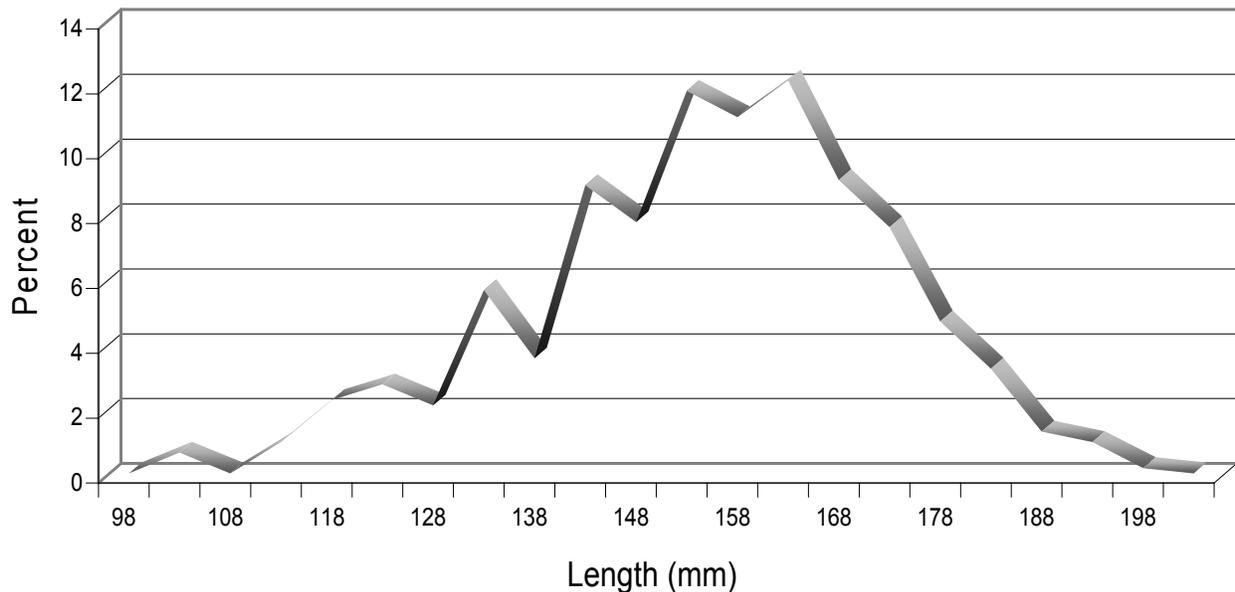


Figure 5. Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 4/8 and 4/15/03.

One group of 313,383 fall chinook subyearlings at 54.6/lb. was acclimated at Thornhollow and released between May 16 and 22, 2003, after being held for 15 to 21 days (Table 1). All fish were coded-wire tagged (adipose clipped; Appendix G). They were fed 2.0% BWD and total mortality was 0.22% (Table 2). The mean temperature was 9.2 degrees C (Table 2). The average fork length was 90.2 mm (Table 3). The length frequency distribution of this group is shown in Figure 6.

Acclimation at Imeques C-mem-ini-kem

Spring Chinook

One group of 104,679 spring chinook yearlings at 13.0/lb. was acclimated at Imeques and released between March 1 and 6, 2003, after being acclimated for 106 to 111 days (Table 1). This included 41,817 coded-wire tagged fish (adipose and right ventral clipped; Appendix G) and 62,862 adipose clipped fish. They were fed 0.34% BWD and total mortality was 0.22% (Table 2). The

mean temperature was 4.6 degrees C (Table 2). The average fork length was 140 mm (Table 3). The length frequency distribution of this group is shown in Figure 7.

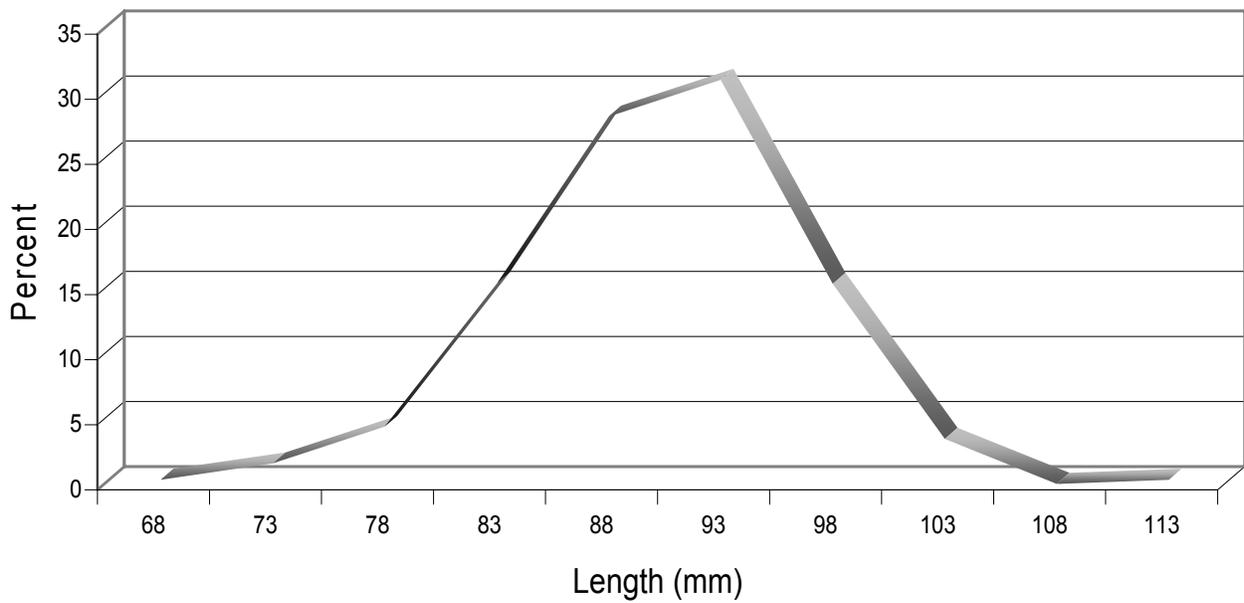


Figure 6. Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 5/16 and 5/22/03.

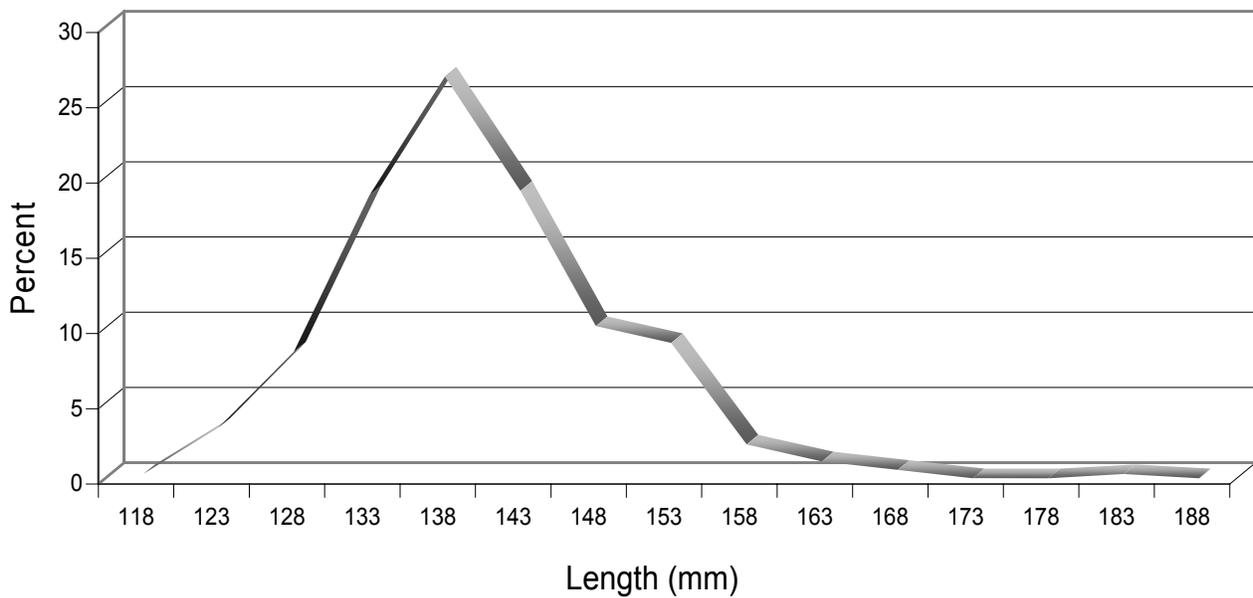


Figure 7. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/6/03.

A second group of 102,217 spring chinook yearlings at 12.1/lb. was released from Imeqes between March 1 and 6, 2003, after being acclimated for 46 to 51 days (Table 1). This included 42,310 coded-wire tagged fish (adipose and right ventral clipped; Appendix G) and 59,907 adipose clipped fish. They were fed 0.43% BWD and total mortality was 0.14% (Table 2). The mean temperature and DO was 4.3 degrees C (Table 2). The average fork length was 145 mm (Table 3). The length frequency distribution of this group is shown in Figure 8.

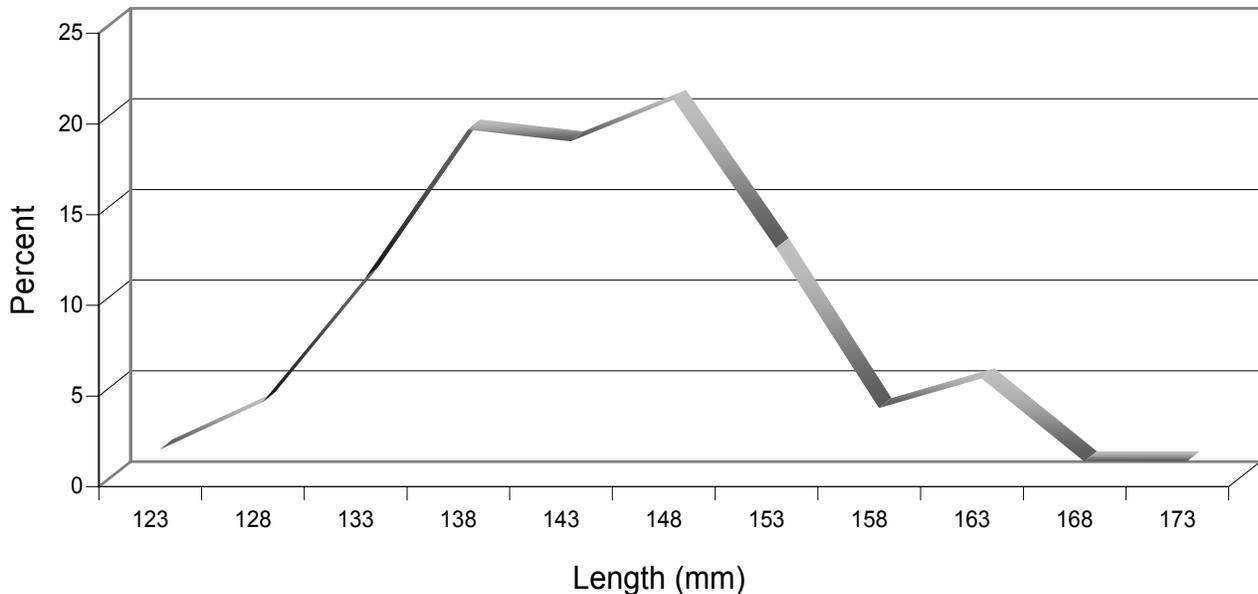


Figure 8. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/6/03.

A third group of 148,748 spring chinook yearlings at 12.2/lb. was also released from Imeqes between March 1 and 6, 2003, after being acclimated for 45 to 51 days (Table 1). This included 59,530 coded-wire tagged fish (adipose and right ventral clipped; Appendix G) and 89,218 adipose clipped fish. They were fed 0.39% BWD and total mortality was 0.14% (Table 2). The mean temperature was 4.3 degrees C (Table 2). The average fork length was 146 mm (Table 3). The length frequency distribution of this group is shown in Figure 9.

A fourth group of 103,656 spring chinook yearlings at 11.6/lb. was released from Imeqes between March 1 and 6, 2003, after being acclimated for 45 to 50 days (Table 1). This included 2,364 coded-wire tagged fish (adipose and right ventral clipped; Appendix G) and 101,292 adipose clipped fish. They were fed 0.42% BWD and total mortality was 0.17% (Table 2). The mean temperature was 4.3 degrees C (Table 2). The average fork length was 149 mm (Table 3). The length frequency distribution of this group is shown in Figure 10.

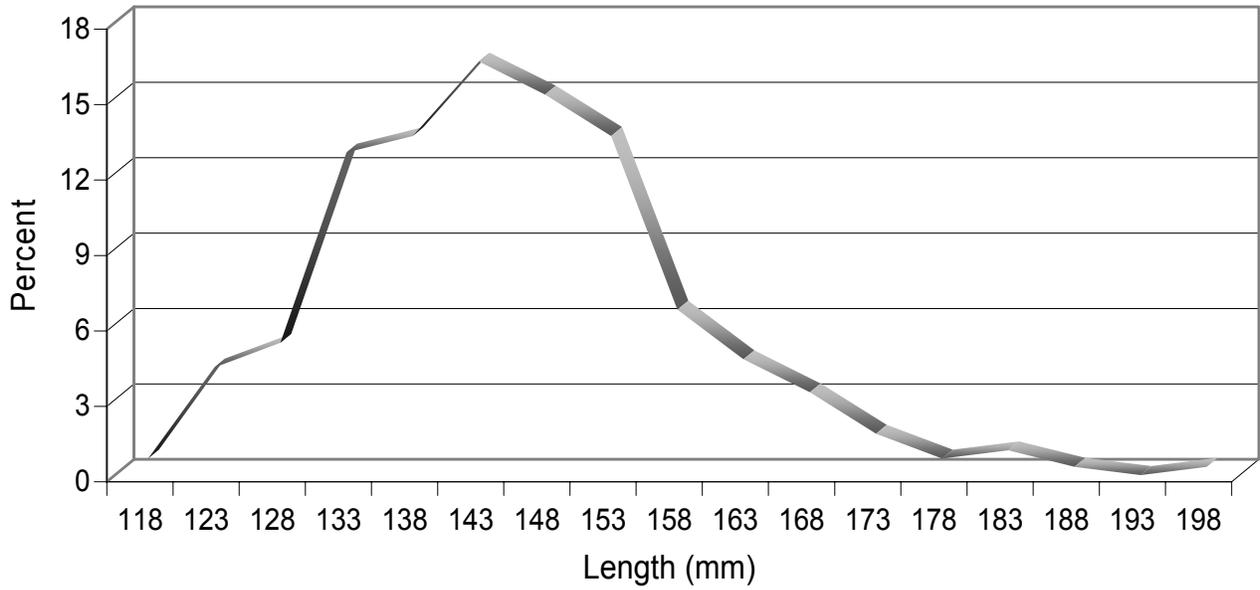


Figure 9. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/6/03.

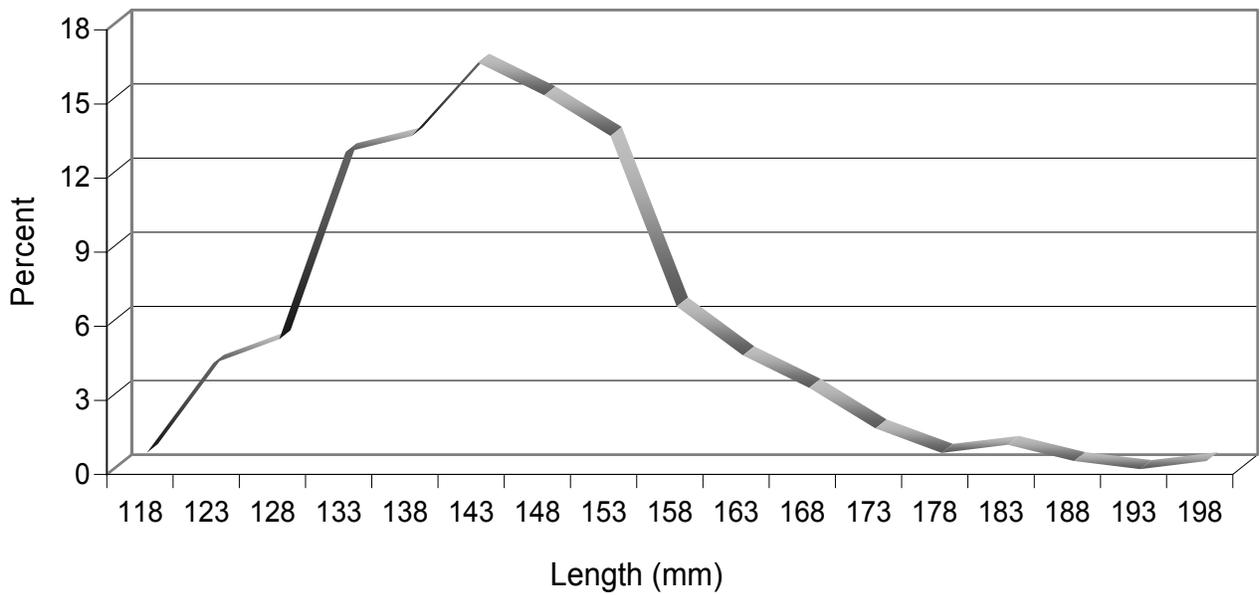


Figure 10. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem between 3/1 and 3/6/03.

A group of 322,806 spring chinook yearlings at 16.9/lb. was released from Imeques between April 8 and 15, 2003, after being acclimated for 21 to 34 days (Table 1). This included 33,738 coded-wire tagged fish (adipose and left ventral clipped; Appendix G) and 289,068 adipose clipped fish. They were fed 0.49% BWD and total mortality was 1.38% (Table 2). The mean temperature was 5.7 degrees C (Table 2). The average fork length was 132 mm (Table 3). The length frequency distribution of this group is shown in Figure 11.

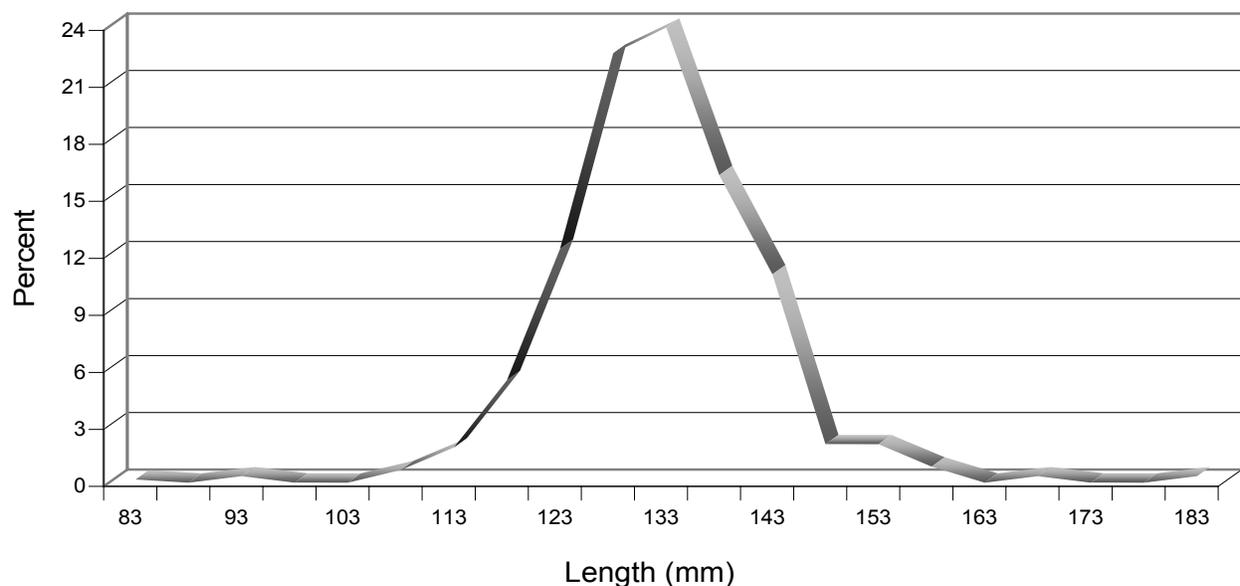


Figure 11. Length frequency distribution of juvenile spring chinook salmon released at Imeques C-mem-ini-kem between 4/8 and 4/15/03.

Acclimation at Pendleton

Summer Steelhead

A group of 42,783 summer steelhead at 4.4/lb. was released from Pendleton. The fish were allowed to voluntarily release from April 22 to 30, 2003. The remaining fish were released on April 30 after being acclimated for 20 to 28 days (Table 1). Included in the release were 20,240 coded-wire tagged fish (adipose and left ventral fin clipped; Appendix G) and 22,543 adipose clipped only fish. They were fed 0.68% BWD and total mortality was 0.13% (Table 2). The mean temperature was 8.8 degrees C (Table 2). The average fork length was 212 mm (Table 3). The length frequency distribution is shown in Figure 12.

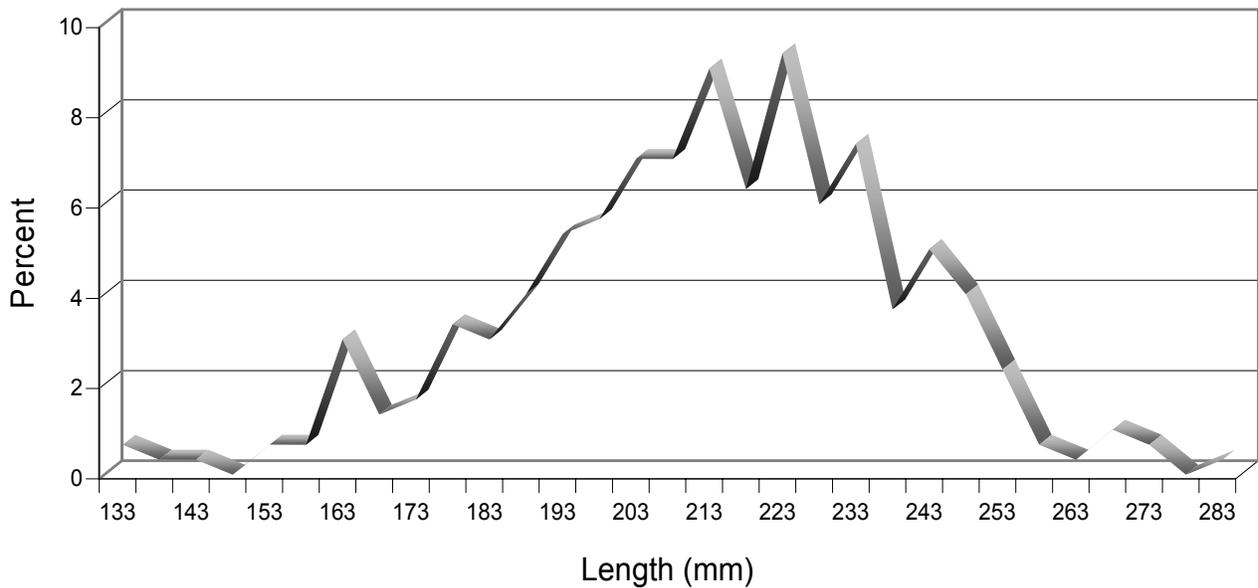


Figure 12. Length frequency distribution of juvenile summer steelhead released at Pendleton Acclimation Facility between 4/22 and 4/30/03.

Coho

One group of 249,988 coho yearlings at 16.3/lb. was released from Pendleton between March 1 and 5, 2003 after being acclimated for 17 to 22 days (Table 1). This included 26,086 adipose clipped coded-wire tagged fish, 27,308 non-clipped coded-wire tagged fish, and 196,594 unmarked fish (Appendix G). They were fed 0.29% BWD and total mortality was 0.06% (Table 2). The mean temperature was 5.3 degrees C (Table 2). The average fork length was 134 mm (Table 3). The length frequency distribution of this group is shown in Figure 13.

A second group of 515,859 coho yearlings at 15.8 /lb. was also released from Pendleton between March 1 and 5, 2003, after being acclimated for 17 to 22 days (Table 1). This included 26,989 coded-wire tagged fish (adipose clipped; Appendix G) and 196,594 unmarked fish. They were fed 0.29% BWD and total mortality was 0.08% (Table 2). The mean temperature was 5.3 degrees C (Table 2). The average fork length was 136 mm (Table 3). The length frequency distribution of this group is shown in Figure 14.

A third group of 188,971 coho yearlings at 15.4/lb. was released from Pendleton on March 28, 2003, after being acclimated for 11 to 14 days (Table 1). None of these fish were marked or coded-wire tagged (Appendix G). They were fed 0.25% BWD and total mortality was 0.13% (Table 2). The mean temperature was 6.8 degrees C (Table 2). The average fork length was 137 mm (Table 3). The length frequency distribution of this group is shown in Figure 15.

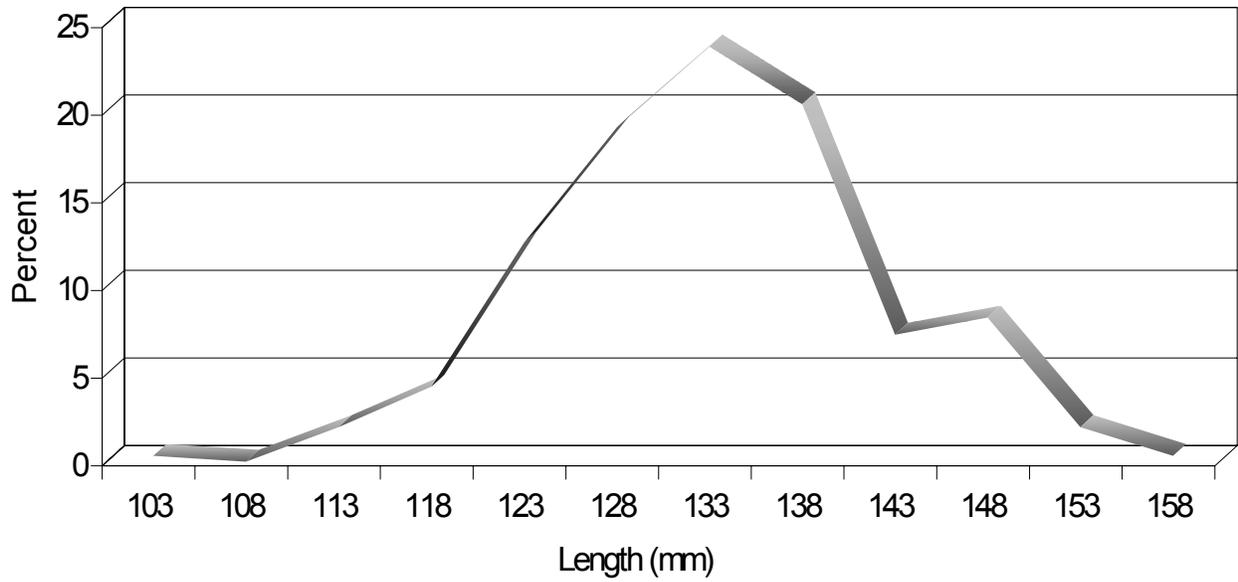


Figure 13. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 3/1 and 3/5/03.

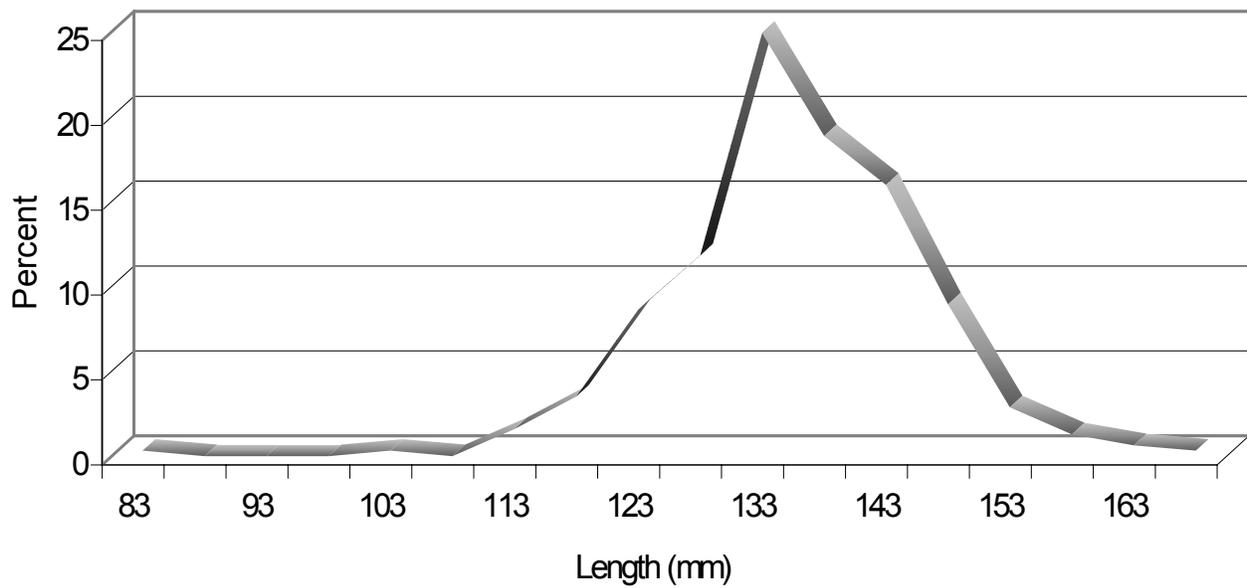


Figure 14. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 3/1 and 3/5/03.

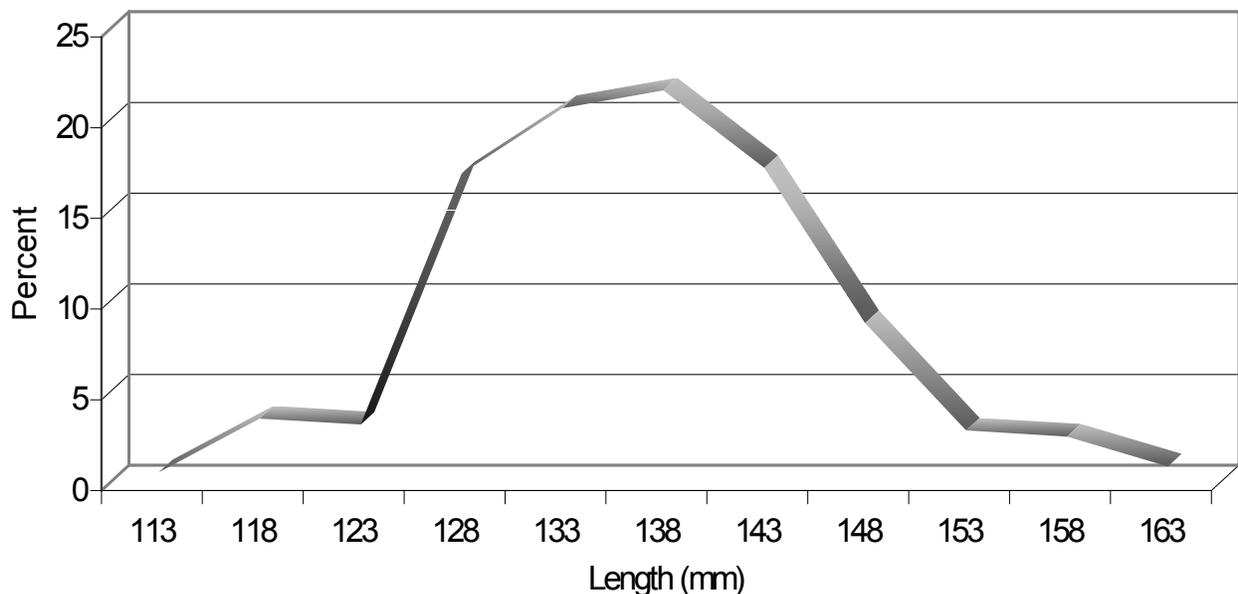


Figure 15. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility 3/28/03.

A fourth group of 591,349 coho yearlings at 15.0/lb. was released from Pendleton between April 3 and 10, 2003, after being acclimated for 20 to 31 days (Table 1). This included 27,298 coded-wire tagged fish (adipose clipped; Appendix G) and 564,051 unmarked fish. They were fed 0.24% BWD and total mortality was 0.14% (Table 2). The mean temperature was 7.2 degrees C (Table 2). The average fork length was 139 mm (Table 3). The length frequency distribution of this group is shown in Figure 16.

Task 1.2: Juvenile Outmigration Monitoring

In 2003, flows allowed the Westland Canal juvenile facility to operate in the bypass mode until July 6. Trapping began on this day and continued until the close of the trap on July 18 (Table 4). An estimated 205 pounds of fish, including warm-water and non-game species, were hauled; indicating the majority of the hatchery released fish migrated downstream prior to the trap being opened.

A total of 1,133 fish were sampled from July 7 to July 18 (Appendix H). An estimated 56.0% (635 fish) were unmarked chinook and an additional 12.1% (137 fish) were hatchery (adipose clipped) chinook. Six yearling coho (0.5%), 36 unmarked subyearling coho (3.2%), 104 subyearling steelhead (9.2%), one marked yearling steelhead (0.1%), and 214 warm-water and non-game species (18.9%) were also sampled.

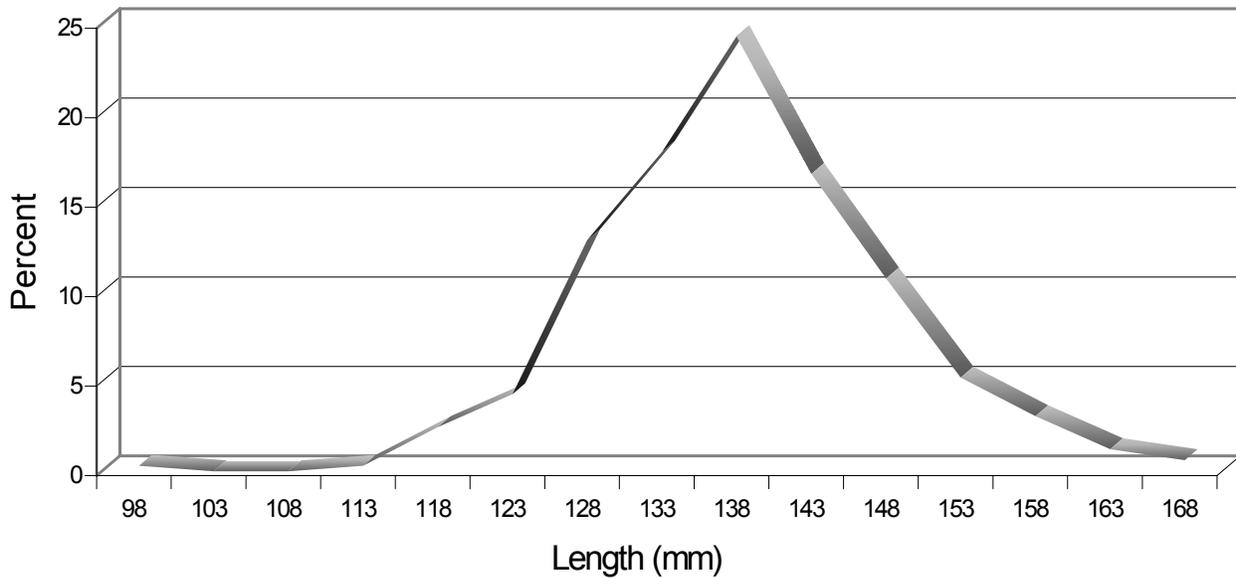


Figure 16. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 4/3 and 4/10/03.

Table 4. Estimated number of fish captured at the Westland Canal juvenile facility in 2003. /a

Date	No. Fish Hauled	Salmonids						Non-game & Warm Water Species
		Marked		Unmarked				
		Chinook /b	STS (y)	Coho (sy)	Coho (y)	Chinook (sy & y)	StS (sy)	
July 7	899	108	0	30	4	493	86	177
July 9	781	110	0	20	2	396	61	192
July 11	738	69 /c	0	29	7	462	80	91
July 14	531	76 /d	3	19	6	315	60	51
July 16	Did not Sample							
July 18	151	6	0	5	0	99	11	30
Total	3,101	370	3	104	20	1,764	299	541

/a The unmarked chinook sampled were believed to be both fall chinook subyearlings and spring chinook yearlings from natural production; y = yearling, sy = subyearling.

/b All were adipose clipped.

/c Includes one yearling (~250mm).

/d Includes one yearling (204mm).

Task 1.3: Juvenile Acclimation Facility Maintenance

Regularly scheduled maintenance and repair was performed at all juvenile acclimation facilities in 2003. Routine facility maintenance work consisted mostly of weed abatement, maintenance of buildings, grounds, and equipment, and maintenance of the electric fence at Bonifer. Project and Umatilla Passage Facility Operation and Maintenance personnel performed critical maintenance and repair. Tasks included: 1) repaired pressure relief valves on two of the three Thornhollow vertical turbine pumps, 2) rebuilt three juvenile horizontal bar screens at Bonifer, 3) replaced the outlet dam boards on both ponds at Thornhollow, 4) removed gravel at the Imeqes intake, and 5) repaired the walk-in freezer and installed a high temperature alarm.

Objective 2: Adult Holding and Spawning

Task 2.1: Adult Collection, Holding and Spawning

Collection, Holding and Spawning of Summer Steelhead

A total of 99 unmarked and 10 marked summer steelhead were collected for broodstock from October 1, 2002, through April 11, 2003. Fish were selected throughout the run to provide a representative cross-section of the population. Broodstock collected by month are listed in Appendix I.

A total of 30 unmarked females, 29 unmarked males, and two marked males were spawned from April 2 to May 28, 2003 (Table 5 and Appendix J). An estimated 184,827 green eggs were taken with a mean fecundity of 6,161.

Total prespawn mortality during the adult holding period was 45.0% (Table 5). In comparison, prespawn mortality at Minthorn has ranged from 1.5 to 39.1% and has averaged 18.3% since 1987-88. Unlike previous years, there were no excess broodstock in 2003. All died prior to spawning or were spawned.

Table 5. Summer steelhead broodstock collection, spawning, and mortality in 2002-03. /a

Number Collected			Number Spawned						Number of Mortality					
Females	Males	Total	Females	%	Males	%	Total	%	Females	%	Males	%	Total	%
51	58	109	30	58.8	31	53.4	61	56.0	20	39.2	29	50.0	49	45.0

/a The last female spawned on the last spawn day was fertilized with the milt from two males, one of which had been spawned previously.

Collection, Holding and Spawning of Spring Chinook Salmon

A total of 306 adult male, 27 jack, and 253 female spring chinook salmon were collected for broodstock at Three Mile Dam from April 21 to June 10, 2003 (Table 6). Two hundred forty females and 240 males were spawned from August 20 to September 10, 2003, and an estimated 1,051,246 green egg were taken (Appendix K). The mean fecundity was 4,380.

Total prespawm mortality was 8.5% (Table 6). This included 42 males (12.6%) and eight females (3.2%). In comparison, prespawm mortality has ranged from 2.4 to 23.3% and has averaged 9.6% for previous brood years (1997 through 2002). Twenty excess adult males and three jacks were released into the South Fork Walla Walla River at the end of the spawning season. There were no excess females in 2003.

Table 6. Spring chinook broodstock collection, spawning, and mortality in 2003. /a

Number Collected			Number Spawmed						Number of Mortality					
Females	Males	Total	Females	%	Males	%	Total	%	Females	%	Males	%	Total	%
253	333	586	240	94.9	240	72.1	480	81.9	8	3.2	42	12.6	50	8.5

/a The numbers in the table do not include one green male, one spawned out male, one male accidentally killed and not used, and four green females.

Collection, Holding and Spawning of Fall Chinook Salmon

A total of 196 adult male, 18 jack, and 195 female fall chinook salmon were collected for broodstock from September 16 to November 20, 2003 (Table 7). One hundred seventy females and 170 males were spawned from November 5 to December 1, 2003, and an estimated 681,594 green eggs were taken (Appendix L). The mean fecundity was 4,009.

Total prespawm mortality was 1.96% (four females and four males; Table 7). In comparison, total prespawm mortality for fish held at Three Mile Dam has ranged from 0.7 to 13.4% and has averaged 7.3% for previous brood years (1996 to 2002). At the end of the spawning season, all excess fish (34 adult males, five jacks, and 20 adult females) were sacrificed.

Collection, Holding and Spawning of Coho Salmon

Coho salmon broodstock were not collected in 2003. Oregon Department of Fish and Wildlife hatcheries supplied all 2003 broodstock eggs for the Umatilla River program.

Table 7. Fall chinook broodstock collection, spawning, and mortality in 2003. /a

Number Collected			Number Spawned						Number of Mortality					
Females	Males	Total	Females	%	Males	%	Total	%	Females	%	Males	%	Total	%
195	214	409	170	87.2	170	79.4	340	83.1	4	2.1	4	1.9	8	1.96

/a The numbers spawned do not include one spawned out female and one male with bloody milt that was not used.

Task 2.2: Adult Collection, Holding and Outplanting

Collection, Holding and Outplanting Spring Chinook Salmon

A total 280 adult spring chinook (132 females and 148 males) and one jack were transferred from Three Mile Dam to South Fork Walla Walla between April 25 and May 15, 2003, for temporary holding. On August 7, 272 adults (129 females and 143 males) and one jack were loaded into a 3,000 gallon transport truck and hauled by Fish Passage Operations personnel and released into the South Fork Walla Walla River to spawn naturally. Adult mortality during the holding period was 2.85% (five males and three females).

A total 21 adult spring chinook (13 females and 8 males) were transferred from Ringold Hatchery to South Fork Walla Walla on June 2 for temporary holding. On August 7, 17 fish (9 females and 8 males) were loaded into a 3000 gallon transport tank and hauled by Fish Passage personnel and released into the South Fork Walla Walla River to spawn naturally. Adult mortality during the holding period was 19.0% (four females). This compares to 8.5% mortality for Umatilla River broodstock.

Collection, Holding and Outplanting Fall Chinook Salmon

Fall chinook salmon for outplanting were not held at Three Mile Dam in 2003. All fall chinook received from Ringold Hatchery were released directly into the Umatilla River.

Task 2.3: Disease Sampling

Disease Sampling of Summer Steelhead Broodstock

Cell culture assays of the ovarian fluid from 19 of 30 spawned females were positive for infectious hematopoietic necrosis virus (IHNV) (Table 8). IHNV was also detected in six of 25 milt samples and 16 of 25 pooled pyloric caeca, kidney, and spleen samples (three fish pools) taken from the same females.

Table 8. Results of disease sampling of Umatilla River summer steelhead and spring and fall chinook salmon broodstock in 2003.

Species	Test	Incidence	Comments	
Summer steelhead				
Spawned Fish	Culturable viruses	OF Milt PKS	19/30 6/25 16/25	IHNV IHNV IHNV
Mortalities	Aeromonad-pseudomonad bacteria	23/28	Eleven fish had high levels of bacteria, eight had moderate levels, and four had low levels of bacteria.	
Spring Chinook				
Spawned Fish	Culturable viruses	OF PKS	11/77 2/18	IHNV IHNV
	Bacterial kidney disease	5/240	One fish had a clinical level of Rs antigen (OD ₄₀₅ reading of 0.979) and four fish had low to moderate levels (OD ₄₀₅ readings between 0.200 and 0.399). All others had low to negative levels of Rs antigen (equal to or less than 0.199).	
Mortalities	Bacterial kidney disease	5/25	Five fish had clinical levels of Rs antigen (OD ₄₀₅ readings of 1.122 to 2.462). All others had low to negative levels of Rs antigen (equal to or less than 0.094).	
	Aeromonad-pseudomonad bacteria	10/25	High levels of bacteria.	
	Furunculosis	3/25	.	
Fall Chinook				
Spawned Fish	Culturable viruses	OF PKS	0/110 0/17	No evidence of viral infection No evidence of viral infection
	Bacterial kidney disease	0/171	All had low to negative levels of Rs antigen (OD ₄₀₅ readings equal to or less than 0.158).	
Mortalities	Bacterial kidney disease	0/2	Both had low to negative levels of Rs antigen (OD ₄₀₅ readings less than 0.100).	
	Aeromonad-pseudomonad bacteria	1/2	Low level of bacteria.	
	Cold water disease	1/2	Low level of infection	

Twenty-eight prespawn mortalities were sampled for culturable bacteria. Aeromonad-pseudomonad bacteria were detected in 23 fish. Eleven fish had high levels of bacteria, eight fish had moderate levels, and four fish had low levels of bacteria.

Disease Sampling of Spring Chinook Salmon Broodstock

The ovarian fluid from 11 of 77 spawned females was positive for IHNV (Table 8). IHNV was also detected in two of 18 pooled pyloric caeca, kidney, and spleen samples (four fish pools) taken from the same females. Kidney samples from 240 spawned females were taken to test for BKD. One fish had a clinical level of infection (ELISA OD₄₀₅ reading of 0.979) and four fish had low to moderate levels of Rs antigen (ELISA OD₄₀₅ readings between 0.200 and 0.399). All other fish had low to negative levels (0.199 or less).

Twenty-five mortalities were sampled for culturable bacteria. Five fish had clinical levels of Rs antigen (ELISA OD₄₀₅ readings of 1.122 to 2.462). All other fish had negative to low levels (0.094 or less). Ten fish had high levels of aeromonad-pseudomonad bacteria and furunculosis was detected in three fish.

Disease Sampling of Fall Chinook Salmon Broodstock

The ovarian fluid from 110 spawned females and pooled pyloric caeca, kidney and spleen samples (four fish pools) from the same females were negative for replicating viral agents (Table 14). Kidney samples from 171 spawned females were taken to test for BKD. All had ELISA OD₄₀₅ readings equal to or less than 0.158, indicating negative to low level positives.

Two mortalities were sampled for BKD. Both had OD₄₀₅ readings of less than 0.100, indicating low to negative antigen levels. These same two fish were also tested for other bacteria. Low levels of Aeromonad-pseudomonad bacteria were cultured from the kidneys of one fish and cold water disease was found at low levels in one fish.

Disease Sampling of Coho Salmon Broodstock

Coho salmon broodstock were not collected in 2003. Oregon Department of Fish and Wildlife hatcheries supplied all 2003 broodstock eggs for the Umatilla River program.

Task 2.4: Adult Holding and Spawning Facility Maintenance

Regularly scheduled maintenance and repair was performed at all adult holding and spawning facilities in 2003. Routine facility maintenance work consisted mostly of weed abatement and maintenance of buildings, grounds, and equipment. Project and Umatilla Passage Facility Operation and Maintenance personnel performed critical maintenance and repair. Tasks included: 1) installing extensions on the South Fork Walla Walla brood pond intake valves so they could be accessed more easily, 2) replacing the South Fork Walla Walla sump pump, and 3) repaired the South Fork Walla Walla booster pump system valves, 4) replaced a heat pump on one of the South Fork Walla Walla residences, 5) trouble shot the South Fork Walla Walla fire pump system on three

separate occasions, 6) replaced the South Fork Walla Walla fire pump system contactor switch, and 7) upgraded the Three Mile Dam pumping and alarm systems to make them more versatile and reliable.

Objective 3: Walla Walla Hatchery Facilities

Task 3.1: Walla Walla Hatchery Facilities Review and Comment

A scoping meeting was held in February to develop a Walla Walla Hatchery Master Plan for spring chinook. The preferred alternative identified in the draft plan is to construct a production hatchery facility at the location of the existing South Fork Walla Walla brood facility. Provided space and flow requirements for the draft master plan preferred alternative. As additional drafts are developed, rearing criteria will be further defined. In the future, as designs are developed for the Step Two Master Plan submittals, the project will provide review and comment on fish culture criteria and facility designs.

Objective 4: Increased Spring Chinook Salmon Production

Task 4.1: Increased Spring Chinook Salmon Production

Funding was provided by BPA directly to the USFWS under a separate contract to produce, mark, and tag 350,000 spring chinook salmon juveniles at LWSH for release in the Umatilla River basin. The actual number of juveniles received from LWSH was 327,325. All fish were adipose fin clipped and 32,625 fish were also right ventral fin clipped and coded-wire tagged. Details of the fish culture and marking activities related to this production are reported directly to BPA by the USFWS.

Although this activity is an objective under this project and the funding is identified as an independent line item in the project budget, its inclusion is extremely confusing. The funding for this activity is contracted directly between BPA and the USFWS and details of work performed are reported directly to BPA by the USFWS. For 2004, this objective and budget line item will be removed from this project Statement of Work and Budget and will be contracted directly between BPA and the USFWS.

Literature Cited

Rowan, G. D. 2003. Umatilla Hatchery Satellite Facilities Operation and Maintenance. Report submitted to Bonneville Power Administration, Project No. 1983-435-00.

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APPENDICES

Appendix A. Juvenile fall and spring chinook salmon releases in the Umatilla River Basin (1982-2003). /a

Year	Fall Chinook							Spring Chinook			
	Lower Umatilla	Upper Umatilla	Bonifer	Minthorn	Thornhollow	Imeques	Pendleton	Lower Umatilla	Upper Umatilla	Bonifer	Imeques
1982	3,807,171 (sy) (b)										
1983		80,564 (y)	20,000 (y)								
1984	966,250 (sy)	175,104 (y)	53,308 (y)								
1985	3,223,172 (sy)	60,507 (y)	137,655 (y) 51,000 (f)								
1986	2,029,602 (sy)		115,779 (y)	91,036 (y) 35,574 (f)					300,438 (sy)	99,970 (y) 75,000 (f)	
1987	1,476,830 (sy)		102,363 (y)	111,143 (y & sy)					169,100 (sy)	99,897 (y)	
1988	3,316,007 (sy)	79,681 (f)	99,550 (y)	115,199 (y & f)				156,312 (y)	210,496 (y & f)	107,427 (y & f)	
1989	2,393,710 (sy)	295,575 (y & f)		78,825 (f)					164,786 (y & f)	160,734 (y & f)	
1990		255,614 (y) 3,132,127 (sy & f)		71,864 (f)				99,775 (y)	195,425 (y & f)	194,783 (y & f)	
1991	10,462 (sy) (c)	194,847 (y) 3,166,079 (sy)		79,672 (sy)				5,937 (y) (c)	265,428 (y & f)	181,649 (y & f)	
1992	7,837 (sy) (c)	220,440 (y) 3,182,712 (sy)						5,272 (y) (c)	189,910 (y) 1,484,555 (sy & f)	109,101 (y)	
1993	29,681 (sy) (c)	2,629,917 (sy) 134,837 (y)						10,952 (y) (c)	480,864 (y) 1,128,176 (sy & f)		
1994	22,174 (sy) (c)	2,843,212 (sy) 283,453 (y)						8,890 (y) (c)	610,245 (y)		1,217,602 (sy & f)
1995					227,088 (y) 561,423 (sy)	1,904,875 (sy)					673,331 (y)
1996					204,022 (y) 853,598 (sy)	360,381 (y) 2,106,815 (sy)					378,561 (y)
1997					433,347 (y) 788,310 (sy)	86,574 (y) 1,792,523 (sy)					225,883 (y)
1998					436,010 (y) 1,010,140 (sy)	1,767,302 (sy)					827,612 (y) 114,370 (f)

Appendix A cont.

Year	Fall Chinook							Spring Chinook			
	Lower Umatilla	Upper Umatilla	Bonifer	Minthorn	Thornhollow	Imeques	Pendleton	Lower Umatilla	Upper Umatilla	Bonifer	Imeques
1999					449,568 (y)	1,842,666 (sy)					659,607 (y)
2000					469,756 (y)		2,044,648 (sy)				816,184 (y)
2001	322,283 (y)				975,871 (sy)						782,733 (y)
2002	312,869 (sy)				400,761 (y)						876,121 (y)
2003	311,406 (sy)				324,713 (sy)						782,106 (y)
					520,564 (y)						
					307,194 (sy)						
					509,135 (y)						
					313,383 (sy)						

/a y = yearling releases; sy = subyearling releases; f = fall releases; upper Umatilla River includes Meacham Creek

/b Releases in 1982 were Tule stock; all other releases have been upriver brights

/c Passage evaluation releases

Appendix B. Hatchery releases of fall chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No. lb.	Stock
1982	Bonneville/SCNFH	3,807,171	79.0-92.0	Tule
1983	Bonneville	100,564	5.9	Bonneville URB
1984	Bonneville	228,412	8.6	Bonneville URB
1984	Bonneville	966,250	85.1	Bonneville URB
1985	Bonneville	3,223,172	92.3	Bonneville URB
1985	Bonneville	198,162	7.8	Bonneville URB
1985	Bonneville	51,000	16.2	Bonneville URB
1986	Irrigon	206,815	4.7-5.0	Bonneville URB
1986	Irrigon	2,029,602	86.0	Bonneville URB
1986	Irrigon	35,574	11.6	Bonneville URB
1987	Irrigon	1,476,830	60.4	Priest Rapids URB
1987	Bonneville	211,506	8.1-8.6	Bonneville URB
1987	Irrigon	2,000	20.0	Priest Rapids URB
1988	Irrigon	1,886,757	68.3	Priest Rapids URB
1988	Irrigon	1,429,250	93.1	Bonneville URB
1988	Irrigon	94,089	8.6-9.8	Priest Rapids URB
1988	Bonneville	200,341	8.8-10.2	Bonneville URB
1989	Bonneville	217,443	8.6	Bonneville URB
1989	Irrigon	2,393,710	66.6	Priest Rapids URB
1989	Irrigon	156,957	10.9-11.1	Priest Rapids URB
1990	Bonneville	255,614	8.2	Bonneville URB
1990	Irrigon	2,425,681	87.5	Bonneville URB
1990	Irrigon	629,800	82.4	Priest Rapids URB
1990	Irrigon	148,510	8.8-9.2	Bonneville URB
1991	Bonneville	194,847	7.8	Bonneville URB
1991	Irrigon	10,462	80.0-194.0	Bonneville URB
1991	Irrigon	3,245,751	80.5-86.0	Bonneville URB
1992	Bonneville	220,440	7.6-7.7	Bonneville URB
1992	Umatilla	2,678,343	62.2	Bonneville URB
1992	Irrigon	504,369	53.4	Umatilla River
1992	Irrigon	5,167	62.8	Umatilla River
1992	Umatilla	2,670	112.0	Bonneville URB
1993	Bonneville	134,837	9.1	Bonneville URB
1993	Umatilla	2,629,917	62.7	Upriver Brights /a
1993	Umatilla	29,681	95.5-142.0	Upriver Brights /a
1994	Bonneville	283,453	8.5-10.4	Bonneville URB
1994	Umatilla	2,843,212	65.2	Upriver Brights /b
1994	Umatilla	22,174	85.0-171.0	Upriver Brights /b
1995	Bonneville	227,088	8.0	Bonneville URB
1995	Umatilla	2,466,298	63.1-64.7	Priest Rapids URB
1996	Bonneville	421,316	7.0-7.1	Bonneville URB
1996	Umatilla	143,087	5.1	Priest Rapids URB
1996	Umatilla	2,960,413	63.9-71.0	Priest Rapids URB
1997	Umatilla	258,953	7.6-8.1	Priest Rapids URB
1997	Willard	260,968	13.6	Upriver Brights /c
1997	Umatilla	2,580,833	66.0-67.3	Upriver Brights /b

Appendix B. Hatchery releases of fall chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No. lb.	Stock
1998	Bonneville	256,910	10.8	Bonneville URB
1998	Willard	179,100	7.8	Upriver Brights /c
1998	Umatilla	2,777,442	64.9-67.7	Priest Rapids URB
1999	Bonneville	449,568	9.0-9.4	Umatilla River
1999	Umatilla	1,842,666	55.9	Upriver Brights /d
2000	Bonneville	235,246	10.9	Umatilla River
2000	Bonneville	234,510	10.1	Umatilla River
2000	Umatilla	975,871	49.0	Priest Rapids URB
2000	Umatilla	2,044,648	48.3	Priest Rapids URB
2001	Bonneville	213,499	9.7	Umatilla River
2001	Bonneville	187,262	9.2	Umatilla River
2001	Umatilla	324,713	45.3	Umatilla River
2001	Umatilla	322,283	33.6	Umatilla River
2002	Bonneville	259,607	9.0	Umatilla River
2002	Bonneville	260,957	8.7	Umatilla River
2002	Umatilla	307,194	40.6	Umatilla River
2002	Umatilla	312,869	39.0	Umatilla River
2003	Bonneville	261,065	13.1	Umatilla River
2003	Bonneville	248,070	10.5	Umatilla River
2003	Umatilla	313,383	54.6	Umatilla River
2003	Umatilla	311,406	56.2	Umatilla River

/a Bonneville, Little White Salmon and Umatilla River broodstock

/b Priest Rapids and Umatilla River broodstock

/c Little White Salmon broodstock

/d Priest Rapids and Little White Salmon broodstock

Appendix C. Hatchery releases of spring chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1986	Carson	99,970	22.8	Carson
1986	Irrigon	300,438	87.0	Carson
1986	Irrigon	75,000	15.0	Carson
1987	Carson	99,897	10.4	Carson
1987	Oxbow	169,100	199.0	Carson
1988	Bonneville	1,196	21.4	Carson /a
1988	Carson	99,895	20.6	Carson
1988	Bonneville	297,377	8.3-10.3	Carson /a
1988	Bonneville	75,767	11.1	Carson /a
1989	Bonneville	325,520	10.6-12.0	Carson /a
1990	Carson	99,775	18.6	Carson
1990	Bonneville	390,208	9.0-13.4	Carson /a
1991	Carson	96,733	16.9-20.6	Carson
1991	Bonneville	196,657	10.1-11.8	Carson /a
1991	Bonneville	159,624	16.5-16.8	Carson /b
1992	Carson	90,982	18.7	Carson
1992	Carson	5,272	18.7	Carson
1992	Bonneville	208,029	8.5-9.2	Carson /a
1992	Umatilla	955,752	35.4	Carson
1992	Irrigon	294,458	32.5	Carson
1992	Bonneville	132,929	11.3	Carson
1992	Umatilla	101,416	19.4	Carson
1993	Bonneville	186,948	14.5	Carson
1993	Umatilla	208,782	8.3	Carson
1993	Carson	85,134	20.3	Carson
1993	Carson	10,952	20.0-20.5	Carson
1993	Umatilla	667,367	27.6	Carson
1993	Umatilla	460,809	19.9	Carson
1994	Umatilla	205,143	8.4	Carson
1994	Bonneville	152,854	11.5	Carson
1994	Bonneville	252,248	12.3	Carson
1994	Umatilla	8,890	8.1-8.3	Carson
1994	Umatilla	839,377	30.4	Carson
1994	Umatilla	378,225	8.7	Carson
1995	Bonneville	247,871	10.3	Carson
1995	Umatilla	275,804	7.9	Carson
1995	Bonneville	74,735	14.4	Carson
1995	Bonneville	74,921	11.4	Carson
1996	Umatilla	378,561	8.9	Carson /c
1997	Umatilla	225,883	9.1	Carson /d
1998	Umatilla	382,714	11.6	Carson /e
1998	Umatilla	114,370	18.1	Carson /f
1998	Little White Salmon	172,999	15.6	Carson /e
1998	Little White Salmon	172,258	11.6	Carson /e
1998	Carson	99,641	16.3	Carson
1999	Umatilla	253,831	13.7	Carson /f
1999	Little White Salmon	302,015	12.7-16.1	Carson /f
1999	Carson	103,761	13.2	Carson

Appendix C cont.

Year of Release	Hatchery	No. Released	No./lb.	Stock
2000	Umatilla	254,101	13.3	Carson /g
2000	Umatilla	103,621	12.2	Carson /g
2000	Little White Salmon	173,545	13.1	Carson /h
2000	Little White Salmon	185,069	11.1	Carson /h
2000	Carson	99,848	14.4	Carson
2001	Umatilla	91,727	14.8	Carson /f
2001	Umatilla	244,794	10.4	Carson /f
2001	Little White Salmon	165,310	13.0	Carson /f
2001	Little White Salmon	180,919	11.3	Carson /f
2001	CNFH	99,983	13.9	Carson
2002	Umatilla	107,717	13.8	Carson /f
2002	Umatilla	104,089	12.0	Carson /f
2002	Umatilla	148,048	13.7	Carson /f
2002	Umatilla	152,026	12.3	Carson /f
2002	Willard NFH	143,516	17.0	Carson /f
2002	Willard NFH	220,725	14.9	Carson /f
2003	Umatilla	104,679	13.0	Carson /f
2003	Umatilla	102,217	12.1	Carson /f
2003	Umatilla	148,748	12.2	Carson /f
2003	Umatilla	103,656	11.6	Carson /f
2003	Little White Salmon	322,806	16.9	Carson /f

/a Carson via Lookingglass broodstock

/b Carson via Lookingglass, Umatilla River and Big Canyon broodstock

/c Carson via Lookingglass (Wallowa H.) and Ringold (Lyons Ferry H.) broodstock

/d Carson via Ringold (Lyons Ferry H.) and Little White Salmon broodstock

/e Carson via Little White Salmon broodstock

/f Carson via Umatilla River broodstock

/g Carson via Ringold (Lyons Ferry H.) and Umatilla River broodstock

/h Carson via Ringold (Little White Salmon H.) broodstock

Appendix D. Hatchery releases of summer steelhead in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1967	Gnat Creek	109,805	75.0	Skamania
1967	Oak Springs	238,020	117.0	Idaho (Oxbow)
1967	Wallowa	142,240	240.0	Idaho (Oxbow)
1968	Gnat Creek	23,100	66.0	Skamania
1968	Gnat Creek	150,000	Eggs	Skamania
1969	Carson	174,341	145.0	Skamania
1970	Wizard Falls	39,489	8.0-9.0	Skamania
1975	Oak Springs	11,094	9.0	Umatilla River
1981	Oak Springs	17,558	6.0-9.0	Umatilla River
1981	Oak Springs	9,400	145.0	Umatilla River
1982	Oak Springs	59,494	7.0-8.0	Umatilla River
1982	Oak Springs	67,940	124.0	Umatilla River
1983	Oak Springs	60,500	11.0	Umatilla River
1983	Oak Springs	52,700	62.0	Umatilla River
1984	Oak Springs	57,939	6.5	Umatilla River
1984	Oak Springs	22,000	135.0	Umatilla River
1985	Oak Springs	39,134	150.0	Umatilla River
1986	Oak Springs	54,137	8.4	Umatilla River
1987	Oak Springs	1,485	5.5	Umatilla River
1988	Oak Springs	95,290	6.5-10.3	Umatilla River
1988	Oak Springs	10,033	57.5	Umatilla River
1988	Irrigon	24,618	3200.0	Umatilla River
1989	Oak Springs	81,712	5.5-6.6	Umatilla River
1990	Oak Springs	89,193	5.5-7.7	Umatilla River
1991	Oak Springs	71,935	6.2-8.7	Umatilla River
1991	Oak Springs	3,998	12.5	Umatilla River
1992	Umatilla	19,977	5.8	Umatilla River
1992	Umatilla	47,458	5.8	Umatilla River
1992	Umatilla	64,550	5.0	Umatilla River
1992	Umatilla	67,419	5.5	Umatilla River
1992	Umatilla	5,443	5.8	Umatilla River
1993	Umatilla	44,824	4.5	Umatilla River
1993	Umatilla	47,979	5.6	Umatilla River
1993	Umatilla	65,465	6.1	Umatilla River
1994	Umatilla	51,403	4.9	Umatilla River
1994	Umatilla	49,598	5.1	Umatilla River
1994	Umatilla	52,097	5.2	Umatilla River
1994	Umatilla	1,732	5.7	Umatilla River
1995	Umatilla	48,539	5.6	Umatilla River
1995	Umatilla	49,983	4.7	Umatilla River
1995	Umatilla	47,941	5.5	Umatilla River
1996	Umatilla	47,543	5.1	Umatilla River
1996	Umatilla	49,377	5.3	Umatilla River
1996	Umatilla	49,783	5.1	Umatilla River
1997	Umatilla	46,788	4.6	Umatilla River
1997	Umatilla	41,555	5.4	Umatilla River
1997	Umatilla	48,944	4.9	Umatilla River

Appendix D cont.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1998	Umatilla	49,084	4.7	Umatilla River
1998	Umatilla	41,088	5.9	Umatilla River
1998	Umatilla	47,313	5.5	Umatilla River
1999	Umatilla	41,843	4.9	Umatilla River
1999	Umatilla	44,226	5.5	Umatilla River
1999	Umatilla	35,564	5.9	Umatilla River
1999	Umatilla	9,878	43.9	Umatilla River
2000	Umatilla	51,659	4.8	Umatilla River
2000	Umatilla	52,736	4.7	Umatilla River
2000	Umatilla	49,343	6.4	Umatilla River
2001	Umatilla	50,829	4.8	Umatilla River
2001	Umatilla	48,291	5.4	Umatilla River
2001	Umatilla	41,403	4.7	Umatilla River
2002	Umatilla	54,917	5.1	Umatilla River
2002	Umatilla	54,366	4.2	Umatilla River
2002	Umatilla	47,521	4.5	Umatilla River
2002	Umatilla	1,826	3.6-4.2	Umatilla River
2003	Umatilla	41,369	4.8	Umatilla River
2003	Umatilla	42,805	4.0	Umatilla River
2003	Umatilla	42,783	4.4	Umatilla River

Appendix E. Juvenile summer steelhead and coho releases in the Umatilla River Basin (1981-2003). /a

Year	Summer Steelhead					Coho			
	Lower Umatilla	Upper Umatilla	Minthorn	Bonifer	Thornhollow & Pendleton	Lower Umatilla	Upper Umatilla	Minthorn	Pendleton
1981		17,558 (y)							
1982		9,400 (sy)							
1983		59,494 (y)							
1984		67,940 (sy)							
1985		60,500 (y)		57,939 (y)					
1986		52,700 (sy)		22,000 (sy)					
1987				53,850 (y)					
1988				39,134 (sy)					
1989				54,137 (y)					
1990		1,485 (y) (2)				786,660 (y) (6)			
1991	33,984 (y) (3)	40,790 (4 & 5)	30,549 (y)			996,433 (y) (3)			
1992		29,586 (y)	29,852 (y)	22,274 (y)			829,607 (y)	161,889 (y)	
1993		29,446 (y)		59,747 (y)		202,315 (y) (6)	654,209 (y)	157,299 (y)	
1994	3,998 (y) (7)	29325 (y)		42,610 (y)			802,655 (y)	132,404 (y)	
1995	5,443 (y) (7)	131,969 (y)	47,458 (y)	19,977 (y)			961,386 (y)	152,974 (y)	
1996			47,979 (y)	110,289 (y)		437,884 (y) (8)	454,794 (y)		
1997	1,732 (y) (7)		49,598 (y)	103,500 (y)		418,222 (y) (8)	465,883 (y)		
1998			49,983 (y)	96,480 (y)		824,963 (y) (8)	689,303 (y)		
1999			47,543 (y)	49,377 (y)	49,783 (y)	977,378 (y) (8)	500,005 (y)		
2000			46,788 (y)	90,499 (y)		1,400,939 (y) (8)			
2001			49,084 (y)	88,401 (y)	54,974 (y)		1,606,786 (y)		
2002	9,878 (sy)		41,843 (y)	79,790 (y)			1,475,922 (y)		
2003			104,395 (y)	49,343 (y)					1,561,290 (y)
			92,232 (y)	48,291 (y)					1,474,559 (y)
			47,521 (y)	54,917 (y)	54,366 (y)				1,621,857 (y)
			42,805 (y)	41,369 (y)	42,783 (y)				1,546,167 (y)

- /1 y = yearling releases; sy = subyearling releases; upper Umatilla River includes Meacham Creek
- /2 Small release due to IHNV & IPN problems in eggs
- /3 Fish released below Westland Dam
- /4 Includes both experimental control group and gradeouts from 88 brood year
- /5 Does not include unfed fry
- /6 Released at RM 23
- /7 Passage evaluation releases
- /8 Released at RM 42.5

Appendix F. Hatchery releases of coho salmon in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1966	Little White Salmon	500,000	1312.0	Little White Salmon
1967	Little White Salmon	200,000	1087.0	Little White Salmon
1967	Cascade	500,000	Eggs	Tanner Creek
1968	Little White Salmon	750,000	Eggs	Little White Salmon
1969	Carson	200,040	23.0	Little White Salmon
1987	Cascade	948,549	13.5-14.0	Tanner Creek
1988	Cascade	996,433	16.6	Tanner Creek
1989	Cascade	986,906	15.3-18.2	Tanner Creek
1990	Cascade	988,928	11.2-14.7	Tanner Creek
1991	Cascade	955,629	15.4-17.1	Tanner Creek
1992	Cascade	489,165	15.7	Tanner Creek
1992	Cascade	472,221	15.5	Tanner Creek
1993	Cascade	437,884	17.5	Tanner Creek
1993	Cascade	454,794	17.6	Tanner Creek
1994	Cascade	465,883	17.1	Tanner Creek
1994	Cascade	418,222	18.1	Tanner Creek
1995	Cascade	502,105	14.7	Tanner Cr. & Umatilla R
1995	Cascade	497,449	14.5	Tanner Cr. & Umatilla R
1995	Sandy	191,854	13.9	Tanner Creek
1995	Lower Herman Cr.	322,858	20.3	Tanner Creek
1996	Lower Herman Cr.	465,769	17.9	Tanner Creek
1996	Cascade	500,005	18.0	Tanner Creek
1996	Cascade	511,609	18.6	Tanner Creek
1997	Klaskanine	81,445	18.1	Tanner Creek
1997	Gnat Creek	881,341	15.3	Tanner Cr. & Sandy R.
1997	Lower Herman Cr.	438,153	16.0	Umatilla River
1998	Cascade	1,078,436	16.8	Tanner Creek
1998	Lower Herman Cr.	528,350	16.3	Tanner Creek
1999	Cascade	1,010,608	17.9	Tanner Creek
1999	Lower Herman Cr.	465,314	15.8	Tanner Creek
2000	Cascade	249,792	16.8	Tanner Creek
2000	Cascade	798,210	15.2	Tanner Creek
2000	Lower Herman Cr.	513,288	16.8	Tanner Creek
2001	Cascade	745,497	13.7	Tanner Creek
2001	Cascade	250,323	17.5	Tanner Creek
2001	Lower Herman Cr.	478,739	17.5	Tanner Creek
2002	Cascade	249,684	14.7	Tanner Creek
2002	Cascade	185,018	14.0	Tanner Creek
2002	Cascade	644,680	14.2	Tanner Creek
2002	Lower Herman Cr.	542,475	15.6	Tanner Creek
2003	Cascade	249,988	16.3	Tanner Creek
2003	Cascade	591,349	15.0	Tanner Creek
2003	Cascade	188,971	15.4	Tanner Creek
2003	Lower Herman Cr.	515,859	15.8	Tanner Creek

Appendix G. Liberation information for summer steelhead, coho, and spring and fall chinook salmon coded-wire tagged and released in the Umatilla River Basin in 2003.

Species Brood Year	Number Released	Release Date	No./lb.	Number Tagged	CWT Code	Release Location
<u>Summer Steelhead</u>						
2002	41,369	Apr 22/28	4.8	19,217	093640	Bonifer
2002	42,805	Apr 22/29	4.0	18,702	093639	Minthorn
2002	42,783	Apr 22/30	4.4	20,240	093641	Pendleton
<u>Fall Chinook</u>						
2001	261,065	Mar 1/7	13.1	27,105	093627	Thornhollow
2001	248,070	Apr 8/15	10.5	28,175	093628	Thornhollow
2002	157,180	May 16/22	54.6	156,136	093761	Thornhollow
2002	<u>156,203</u>	May 16/22	54.6	<u>156,203</u>	093759	Thornhollow
	313,383			312,339		
2002	155,856	May 22	55.9	154,645	093762	Uma. RM 48.5
2002	<u>155,550</u>	May 22	56.6	<u>154,330</u>	093760	Uma. RM 48.5
	311,406			308,975		
<u>Spring Chinook</u>						
2001	52,399	Mar 1/6	13.0	21,197	093606	Imeques
2001	<u>52,280</u>	Mar 1/6	13.0	<u>20,620</u>	093603	Imeques
	104,679			41,817		
2001	49,850	Mar 1/6	12.1	21,415	093605	Imeques
2001	<u>52,367</u>	Mar 1/6	12.1	<u>20,895</u>	093604	Imeques
	102,217			42,310		
2001	45,538	Mar 1/6	12.2	18,620	093609	Imeques
2001	51,538	Mar 1/6	12.2	20,061	093608	Imeques
2001	<u>51,672</u>	Mar 1/6	12.2	<u>20,849</u>	093607	Imeques
	148,748			59,530		
2001	103,656	Mar 1/6	11.6	2,364	093609	Imeques
2001	199,991	Apr 8/15	17.0	16,334	054657	Imeques
2001	<u>122,815</u>	Apr 8/15	16.8	<u>17,404</u>	054658	Imeques
	322,806			33,738		
<u>Coho</u>						
2001	515,859	Mar 1/5	15.8	26,989	091933	Pendleton
2001	249,988	Mar 1/5	16.3	26,086	091934	Pendleton
				27,308	093616 /a	
2001	188,971	Mar 28	15.4	Unmarked	Unmarked	Pendleton
2001	591,349	Apr 3/10	15.0	27,298	091935	Pendleton

/a CWT and not clipped

Appendix H. Fish Sampled at Westland Canal juvenile facility in 2003. /a

Date	Number of Fish Sampled	Salmonids						Non-game & Warm Water Species
		Marked /b		Unmarked				
		Chinook /b	STS (y)	Coho (sy)	Coho (y)	Chinook (sy & y)	StS (sy)	
July 7	208	25	0	7	1	114	20	41
July 9	460	65 /c	0	12	1	233	36	113
July 11	203	19 /d	0	8	2	127	22	25
July 14	167	24	1	6	2	99	19	16
July 18	95	4	0	3	0	62	7	19
Total	1,133	137	1	36	6	635	104	214

/a The unmarked chinook sampled were believed to be both fall chinook subyearlings and spring chinook yearlings from natural production. y = subyearling, sy = subyearling.

/b All were adipose clipped.

/c Includes one yearling (~250mm).

/d Includes one yearling (204mm).

Appendix I. Umatilla River summer steelhead broodstock collection in 2002-03.

Date Collected	Hatchery		Total Hatchery	Unmarked		Total Unmarked	Total		Total
	Males	Females		Males	Females		Males	Females	
Oct 1	1		1	1	3	4	2	3	5
Oct 3				1	1	2	1	1	2
Oct 8				1	3	4	1	3	4
Oct 11	1		1	2	1	3	3	1	4
Oct 14				1		1	1		1
Oct 16				1		1	1		1
Oct 21					1	1		1	1
Oct 24				2	2	4	2	2	4
Nov 11				4	3	7	4	3	7
Nov 25	1		1				1		1
Dec 16	1		1	2	1	3	3	1	4
Jan 3	1		1	2	2	4	3	2	5
Jan 13				1	1	2	1	1	2
Jan 15				1		1	1		1
Jan 16				1	2	3	1	3	4
Jan 30	1		1	3	3	6	4	3	7
Feb 10				2	2	4	2	2	4
Feb 13				2	2	4	2	2	4
Feb 24				3	3	6	3	3	6
Mar 10				2	3	5	2	3	5
Mar 11	1		1	2	1	3	3	1	4
Mar 13	2		2	2	2	4	4	2	6
Mar 25				3	3	6	3	3	6
Mar 26				4	4	8	4	4	8
Mar 28				2		2	2		2
Apr 9				4	6	10	4	6	10
Apr 11				2		2	2		2
Total /a	9		9	51	49	100	60	49	109
/b	10		10	48	51	99	58	51	109

/a Data provided at the time of collection at Three Mile Dam by Fish Passage Operations personnel.

/b Data taken from broodstock held and spawned at Minthorn.

Appendix J. Summer steelhead broodstock spawning at the Minthorn adult holding and spawning facility in 2003.

Date Spawned	Fish Number	Sex	Family Number	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Mark	Comments	Green Eggs	Eyed Eggs
April 2	1	F	1	805	665	None			
	2	F	1	684	571	None			
	3	F	1	615	518	None			
	4	M	1	789	648	None			
	5	M	1	660	532	None			
	6	M	1	783	639	None			
	7	F	2	680	577	None			
	8	F	2	740	618	None			
	9	F	2	762	634	None			
	10	M	2	795	657	None			
	11	M	2	806	647	None			
	12	M	2	610	498	None			
	13	F	3	595	495	None			
	14	F	3	700	584	None			
	15	F	3	715	593	None			
	16	M	3	565	464	None			
	17	M	3	780	638	None			
	18	M	3	858	684	None			
	19	F	4	---	588	None			
	20	F	4	---	518	None			
	21	F	4	716	600	None			
	22	M	4	595	478	AdLV			
	23	M	4	632	507	None			
	24	M	4	606	493	None			
								<u>71,912</u>	<u>50,592</u>
April 9	25	F	5	599	504	None			
	26	F	5	708	594	None			
	27	F	5	718	603	None			
	28	M	5	625	507	None			
	29	M	5	835	682	None			
	30	M	5	655	534	None			
								<u>21,920</u>	<u>20,736</u>
April 16	31	F	6	805	670	None			
	32	F	6	590	505	None			
	33	M	6	700	575	None			
	34	M	6	720	660	None			
								<u>12,944</u>	<u>11,440</u>

Appendix J cont.

Date Spawned	Fish Number	Sex	Family Number	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Mark	Comments	Green Eggs	Eyed Eggs
April 23	35	F	7	785	580	None			
	36	F	7	810	700	None			
	37	F	7	575	500	None			
	38	M	7	650	525	None			
	39	M	7	810	665	None			
	40	M	7	740	600	None			
	41	F	8	695	580	None			
	42	F	8	660	555	None			
	43	F	8	585	490	None			
	44	M	8	725	600	None			
	45	M	8	685	570	None			
	46	M	8	795	640	None			
								34,788	28,470
April 30	47	F	9	---	534	None			
	48	M	9	626	505	AdLV			
								5,697	5,520
May 7	49	F	10	693	584	None			
	50	M	10	760	613	None			
								5,356	5,226
May 14	51	F	11	750	640	None			
	52	M	11	---	---	None	Live Spawned		
								9,306	5,076
May 21	53	F	12	710	594	None			
	54	F	12	642	527	None			
	55	F	12	702	585	None			
	56	M	12	680	553	None			
	57	M	12	---	---	None	Live Spawned		
	58	M	12	---	---	None	Live Spawned		
								18,380	15,872
May 28	59	F	13	602	507	None			
	60	M	13	550	447	None			
	61	M	13	597	484	None			
								4,524	4,378
							Total	184,827	147,310
							Fecundity	6,161	

Appendix K. Spring chinook salmon broodstock spawning and mortality at South Fork Walla Walla in 2003. /a

Date	Number of Fish Spawned		No. Green Eggs Taken	No. Eyed Eggs Taken	Number of Mortality	
	Females	Males			Females	Males
May 24						1
May 25						1
June 11					1	
June 15						1
June 16					1	
June 18					1	
June 22						1
June 25						1
June 29						1
July 7						1
July 9					1	
July 14						1
July 15					1	
Aug 3						1
Aug 11					1	
Aug 12					1	1
Aug 14						1
Aug 16						1
Aug 17						2
Aug 20	22	22	105,625	72,811		1
Aug 23						1
Aug 24					1	1
Aug 27	101	101	461,716	381,391		1
Sept 1						3
Sept 3	100	100	411,744	353,657		1
Sept 5						1
Sept 6						1
Sept 7						2
Sept 10	17	17	72,161	63,688		16
Total	240	240	1,051,246	871,547	8	42

/a The numbers in the table do not include one green male, one spawned out male, one male killed accidentally and not used, and four green females.

Appendix L. Fall chinook salmon broodstock spawning and mortality at Three Mile Dam in 2003. /a

Date	Number of Fish Spawned		No. Green Eggs Taken	No. Eyed Eggs Taken	Number of Mortality	
	Females	Males			Females	Males
Sept 30						2
Nov 5	19	19	64,461	43,500		
Nov 10	22	22	75,774	62,250	2	1
Nov 13	15	15	60,746	50,750	1	
Nov 17	67	67	318,003	269,750		
Nov 20	11	11	35,699	29,000	1	
Nov 25	31	31	110,211	103,500		1
Dec 1	5	5	16,700	14,500		
Total	170	170	681,594	573,250	4	4

/a The numbers in the table do not include one spawned out female and one male with bloody milt.