ANNUAL REPORT

FISCAL YEAR 1994

IDAHO FISHERY RESOURCE OFFICE

AHSAHKA, IDAHO

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Project Leader — Date

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Associate Manager — Date

[signature] — 1/25/95
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I. NARRATIVE

Introduction

The Idaho Fishery Resource Office (FRO) was originally established as the Dworshak Fisheries Assistance Office in 1981 and became fully operational in FY 82. The name change to the Idaho Fishery Resource Office occurred in 1991 as part of a region-wide change to better reflect the office's responsibilities and functions. The Idaho FRO is located on the grounds of Dworshak National Fish Hatchery, Ahsahka, Idaho, approximately 40 miles east of Lewiston, Idaho, on the main-stem Clearwater River. The office is staffed by eleven full-time permanent employees and five full-time temporary employees. The primary purpose of the Idaho FRO is to assist in management and evaluation of fishery resources which relate to federal issues, i.e., fishery resources of national significance, fishery mitigation for federal projects, assistance to Indian tribes, fishery work on federal lands and other fishery projects as called for under federal law. Activities are primarily directed toward protection, restoration and enhancement of anadromous fish resources in the Lower Snake River Basin.

During Fiscal Year 1994, we provided information to the Snake River Salmon Recovery Team and reviewed preliminary draft documents. We prepared a number of Biological Assessments on FWS activities in the Snake River Basin, including hatchery production releases, trap operation, and ongoing studies. We are continuing to be involved with ESA issues and have coordinated with Ecological Services, both the Boise and Spokane Field Offices on assessments and listing topics.

Another major area of our office's work includes evaluation and fishery management planning for the three federally operated hatcheries in Idaho; Dworshak National Fish Hatchery (NFH), Hagerman NFH, and Kooskia NFH. Our office compiles the information required to assess how each of the three hatcheries are meeting their established mitigation goals. Our office also helps design studies to evaluate hatchery effectiveness and various management scenarios. We work closely with the Idaho Department of Fish and Game (IDFG), the Nez Perce Tribe, the Shoshone-Bannock Tribe, and the Shoshone-Paiute Tribe in evaluating various fish management programs in Idaho.

Developing databases for fisheries of national significance has also become a major activity of the Idaho FRO. We are presently participating in three major research/management projects: 1) Acquiring data on spawning, rearing, and migration of the threatened Snake River fall chinook salmon; 2) Acquiring data on the use of supplementation to increase natural/wild populations of spring chinook salmon in the Snake River Basin; and 3) Investigating the potential interactions of hatchery and wild steelhead in lower Clearwater River tributaries.

Station Operations

1. To produce the healthiest most viable smolts possible, our office, together with Dworshak NFH, developed a project in 1990 to evaluate the effect of rearing density on smolt survival and adult returns. Spring chinook salmon from BY 1989 and 1990 were reared at three densities and were released on 4/04/91 and 4/15-16/92, respectively.

   Results of the hatchery rearing phase and post-release performance of smolts (migration time and survival) have already been summarized in a Progress Report.

   Adult returns are complete for BY 89. Low density groups returned at a higher rate than either medium or high density groups, based on coded wire tag returns. Adult returns for BY 90 will be complete in 1995. However, poor ocean conditions in 1992-1993 (El Nino) resulted in very low returns in 1994 and returns in 1995 are not expected to be improved. Thus, adult return data for BY 90 will be insufficient for evaluation.

   Our office is recommending that rearing density for spring chinook be re-evaluated when brood stock become available.

2. Spring chinook have generally been released near the last part of March or first part of April at Dworshak NFH. Preliminary smolt assessment data indicate that spring chinook salmon smolts at Dworshak NFH may not be fully developed at the time of release. For this reason, our office developed a pilot study in 1993, in coordination with Dworshak NFH and Dworshak FHC, to evaluate the effect of time of release on smolt survival to Lower Granite Dam and on the rate at which adults return from the ocean.

   Three groups of about 129,000 each were released on April 8, April 22, and May 6, 1993. Based on PIT-tag information, we observed that smolts released later migrated faster and survived at a higher rate than smolts released earlier. However, higher river flows during the later releases may have contributed more to the increased smolt survival than smolt development. Although not part of the original study, the experiment was repeated with the 1994 releases. Three groups of about 70,000 each were released on April 8, April 22, and May 6, 1994. Similar to releases in 1993, later releases migrated much faster than earlier releases. However, migration rate did not appear to affect survival. Cumulative interrogation rates for PIT-

tagged fish were not significantly different for the first or last release groups but were higher for the second group. A progress report combining the two years of data at Dworshak NFH and one year of data at Kooskia NFH is being prepared. The need to conduct such studies over several years is necessary in order to account for annual variability in environmental conditions. Final evaluation results will not be completed until 1997.

3. Spring chinook salmon at Dworshak NFH have had a chronic problem with bacterial kidney disease (BKD) which undoubtedly contributes to various sources of mortality after release. Although BKD has recently not been as severe as in past years, the problem persists. Modifications in production protocols, such as lower rearing densities, have helped to reduce stress and improve survival. However, administration of erythromycin several times during the rearing period has been an important factor in providing spring chinook protection against BKD.

   At the request of the University of Idaho, the Hatchery Evaluation Team (HET) for the Dworshak-Kooskia NFH Complex agreed to develop a study proposal designed to generate data on the efficacy of feeding erythromycin to spring chinook salmon at the Complex in 1993. Three objectives were developed for the study: (1) to compare the efficacy and palatability of gallimycin 50-P to a proposed new formulation of 22 percent erythromycin in a wheat germ carrier; (2) to compare the efficacy of the new erythromycin formulation administered for 21 days versus 28 days; and (3) to compare the efficacy of two treatments versus three treatments of the new erythromycin formulation during the rearing period.

   All experimental treatment groups were released in April 1994 and included representative PIT-tag groups to monitor migration time and downstream migration success. Data from this study is still being compiled and analyzed.

   The study has been extended for BY 1993 and 1994. Experiments for those brood years will be fairly similar to those of BY 92. In addition, we have included, for the first time, control groups that will not receive any erythromycin during rearing.

4. The number of fall chinook salmon spawning in the riverine reach of the Snake River has declined dramatically over the past two decades. As a result, in 1992, Snake River fall chinook salmon were added to the federal list of threatened species. This listing was upgraded to endangered species status by emergency action in 1994. This listing increased the need for data on

Snake River fall chinook salmon spawning escapement, spawning habitat, and juvenile emigration characteristics.

During FY 94 we: (1) conducted aerial surveys to count fall chinook salmon redds in the Snake River; (2) used underwater video and ground searches at sites to improve the accuracy of the aerial redd counts and locate deepwater redds; (3) assessed fall chinook spawning in the tailrace of Lower Granite and Lower Monumental dams; (4) modelled the effects of changes in river flow on fall chinook salmon spawning habitat availability; (5) described the early life history and emigration timing of naturally produced Snake River fall chinook salmon; (6) estimated the influence of water flow, water temperature, and juvenile fall chinook salmon size on emigration rate; and (7) provided real time updates on the above 7 objectives to the National Marine Fisheries Service (NMFS) and the Fish Passage Advisory Committee (FPAC).

Eight fall chinook redd surveys were conducted by helicopter from 25 October to 13 December 1993. Redd counts were made from Asotin, Washington (RM 145), to Hells Canyon Dam (RM 247) on the Snake River. Surveys usually included a side trip up the Imnaha River (RM 191.7) and the Grande Ronde River (RM 168.7). Observation conditions were good on all redd surveys of the Snake River conducted in 1993.

A total of 127 fall chinook salmon redds were observed in the Snake River between Asotin, Washington, and Hells Canyon Dam in the fall of 1993. Fifty-nine of these redds were observed during weekly helicopter surveys, 67 redds were observed by underwater camera, and 1 redd was observed by boat. Helicopter surveys of the Snake River and tributaries above Asotin were conducted in a cooperative effort with the Idaho Power Company (IPC), Washington Department of Fisheries, and the U. S. Fish and Wildlife Service (USFWS).

In 1993, weekly redd counts in the Snake River peaked earlier, and the total count was greater, than counts made about the same times in 1991 and 1992. The peak redd count occurred on 1 November in 1993, 23 November in 1992, and 18 November in 1991. Weekly redd counts totaled 59 in 1993, 45 in 1992, and 41 in 1991.

The distribution of redds observed by helicopter survey in the Snake River was similar from 1991-1993. Sixty-one percent of the redds observed during weekly helicopter surveys were downstream of the Grande Ronde River in 1993, compared to 64% in 1992, and 59% in 1991. The single site with the greatest number

of redds observed from the air was at Upper Buffalo Rapids (RM 161) with 10 redds observed in 1993, and Captain Johns Creek (RM 162) with 9 redds observed in 1992, and 15 in 1991.

The USFWS and IPC performed redd searches using underwater video cameras in the free-flowing river above Lower Granite Reservoir. A total of 67 redds were observed at all sites by underwater camera, 60 of these were within one river mile, RM 165.5 to RM 166.5. The range of depths where most of the deep-water redds were observed, was 10.0-21.1 ft at the time surveys were conducted.

A preliminary count of 16 redds were observed during searches of the tailraces below lower Snake River dams. Twelve fall chinook salmon redds were observed in the tailrace of Lower Granite Dam by combining observations from underwater cameras and SCUBA divers. Four redds were observed in the tailrace of Little Goose Dam by underwater camera. The USFWS used SCUBA divers, under "zero flow" conditions, to search for redds in the Lower Granite and Lower Monumental dam tailraces, and to validate and mark redds that were initially observed by underwater camera in the Lower Granite Dam tailrace.

We made estimates of fall chinook salmon spawning habitat and potential redd number for two sites composed of three habitat types in the Snake River using a technique we have developed using Instream Flow Incremental Methodology. We called the technique the Total Effective Area (TEA) methodology. The TEA estimates appeared reasonable in terms of believable redd estimates and were the result of careful application of slope, scour, and binary spawning criteria (velocity, depth, and substrate). TEA did not appear to be particularly sensitive to flow throughout the range of flows we simulated. The habitat we modelled was determined to be underseeded. The two sites, representing at most 8 km of river, were predicted to accommodate about 370 fall chinook salmon redds at 14 KCFS. Under current escapement levels, there are generally less than 50 redds counted in this river reach in a high escapement year. Concerns that spawning habitat availability is limiting the adult escapement to levels of about 250 natural fall chinook salmon per year are unfounded based on this analysis. Our habitat modelling results also helped define critical threshold levels, maximum sustainable production estimates, and an estimate of recovery population level for use by the Biological Parameters Work Group, a group working under the State of IDFG et al. v NMFS et al. court case settlement.

Juvenile fall chinook salmon emigration rate was analyzed in 1994 using 1993 data from 49 known fall chinook salmon (based on electrophoresis). Emigration rate (2.1 km/d) was similar to that of 1991 (2.3 km/d), but was slower than in 1992 (3.6 km/d). It is possible that the faster emigration rate in 1992 was due to the truncated detection pattern of PIT-tagged fall chinook salmon at Lower Granite Dam; the 1992 data set lacked late arriving, presumably slow migrants. Also the warmer water temperatures in 1992 may have accelerated smoltification or initiated behavioral changes that may have led to increased emigration rates.

Assuming fall chinook salmon emigration behavior evolved under decreasing summer flows when water is warming rapidly, we suggested that the fall race may have evolved to respond to major changes in the pattern of flow and temperature to survive. However, it remains unclear how and to what degree these variables influence migration behavior and survival. Statistical analyses of the relationships between emigration rate and environmental and biological variables have produced mixed results. The 1993 emigration rate analysis indicated that release temperature had the greatest effect on emigration rate of PIT-tagged fall chinook salmon followed closely by release size. Flow did not appear to have a significant effect on emigration rate in 1993. Conversely, our 1992 analyses suggested under low flow, warm water years that augmenting summer flows to 40 KCFS at Lower Granite Dam increases fall chinook salmon emigration rate. The low numbers of fish recovered at Lower Granite Dam, unknown fish guidance efficiencies (FGEs), and untested assumptions regarding rearing and migration act to increase the variability surrounding emigration rate estimates. Collecting additional data under a wider range of environmental conditions should increase the precision of emigration rate estimates and further clarify the relation between fall chinook salmon survival, flow, and temperature.

We monitored Snake River water temperatures over the 1993 brood year (October 1993 - September 1994) to predict fall chinook salmon fry emergence timing for the NMFS and FPAC. Emergence in the Snake River ended very close to our predicted date of June 10. We PIT tagged a total of 2,348 subyearling chinook salmon in the Snake River by the week of 19 June. Higher water temperatures of 20°C curtailed all PIT-tagging on the Snake River by 23 June. We PIT tagged a total of 692 subyearling chinook salmon in the Clearwater River by 7 July. The subyearlings in the Clearwater River emerged about three weeks later than their Snake River counterparts leading to a retarded life cycle.

We updated the Lower Granite Dam passage prediction (made with the regression formulae described earlier) for Snake River fall chinook salmon weekly and provided this data to the NMFS and FPAC. The range of predicted passage (27 May to 23 August) bounded the actual timing of emigration. We mispredicted the peak of emigration by 6 days (predicted = 1 July; actual = 7 July). A total of 129 PIT-tagged Snake River subyearling chinook were detected as of 8 August. Only one of the subyearling chinook salmon we tagged in the Clearwater River in 1994 was detected at Lower Granite Dam in 1994. The pattern of low detection rates in Clearwater data is consistent with 1992.

5. We conducted work on our spring chinook supplementation project in cooperation with the Idaho Supplementation Studies (ISS) program. Participants in ISS include IDFG (lead agency), FWS, Nez Perce Tribe, and Shoshone-Bannock Tribe. We will compare the outmigration success of PIT-tagged natural spring chinook salmon smolts with PIT-tagged hatchery smolts (both outplants and direct releases). The overall ISS design will allow comparison with "natural" streams and other test streams being supplemented. Our office is primarily looking at two tributaries in the Clearwater River drainage to evaluate impacts of hatchery produced smolts and/or parr releases. In 1994, 10 segments on Pete King Creek (parr supplementation), a tributary of the Lochsa River, and 21 segments on Clear Creek (smolt supplementation), a tributary of the Middle Fork Clearwater River, were snorkeled and substrate typed according to established protocol. The 1994 juvenile spring chinook salmon counts and densities in Clear Creek were marginally up from 1993. While in Pete King Creek, the 1994 juvenile spring chinook densities were up dramatically from 1993. The 1993 stocked parr moved out very quickly, but the 1994 parr remained in Pete King Creek at least until fall.

Stream temperatures (after snorkeling) at Kooskia NFH averaged over 80°F for nearly two months. We were very concerned over the fate of the juveniles we had seen in Clear Creek during snorkling. Since we do not electrofish, trap, or PIT-tag at temperatures greater than 66°F our sampling efforts were curtailed until late September. We were able to find parr after the water cooled in the fall.

Redd and adult spawner surveys were conducted three times in Clear Creek and once in Pete King Creek. Twenty-five adults were trucked and released above the two low water barriers in Clear Creek. No redds were located and 1 adult was observed during our surveys on Clear Creek. This may be another bad year for natural production in Clear Creek. For the third

consecutive year, no adults or redds were found in Pete King Creek.

We PIT-tagged over 450 spring chinook salmon parr captured in Clear Creek. In 1992 most of the parr were found in a relatively small section of stream immediately below the Nez Perce National Forest boundary. In 1993 however, the parr were dispersed more evenly throughout the drainage. In 1994 the parr were very difficult to find until they began moving in early fall. PIT-tagging and electrofishing mortality were each less than one percent. As a low flow alternative to the screw trap operation in Clear Creek, we trapped outmigrants near the Kooskia hatchery water intake structure, utilizing a low tech weir and trap.

6. During FY 94, we have continued our work on mountain whitefish in the Lochsa River drainage, as part of the long-term nationwide National Fishery Resources Status and Trends Program. This program is designed to look at the possible effects of global warming on fish populations. We monitored mountain whitefish (MWF) populations in White Sand and Crooked Fork creeks, both tributaries of the Lochsa River. Mountain whitefish inhabit the low to mid-sections of these creeks in the summer, then migrate downstream into the Lochsa River in winter. We plan to compare MWF population and water temperature trends observed in Crooked Fork Creek to those of the less impacted primary study stream, White Sand Creek, in an effort to account for any potential human-caused differences.

Initial investigations have shown that most sexually mature MWF in the Lochsa River drainage migrate upstream in the spring and summer, and downstream in the fall and winter. Changes in climate are expected to affect the distribution, migration, and spawning of MWF due to their close links with water temperature. In 1994, the upper limit of mountain whitefish distribution was documented as the same as in 1993. Established sites were monitored above and below this area.

Monitoring was done by snorkeling downstream through each site, counting MWF. Sites were monitored bi-weekly until MWF began migrating downstream in late August. Downstream sites were then monitored weekly as MWF began to school in large groups for their pre-spawn staging.

Once MWF gathered into larger schools, they were captured using hook and line. Fish were measured for length and weight, checked for ripeness, floy tagged, scales collected, and released. Fish tagged the previous year were observed returning to their

respective streams. The few anomalies to this behavior were more likely misidentification due to the colors fading on some of the floy tags.

The majority of MWF spawning occurred during late October, 1994. There was a mass migration downstream in the same time period.

Water temperature data was collected at six sites throughout the year to correlate water temperature changes with changes in MWF distribution activity and/or population age structure. Using water temperature data along with climatological data from additional sources, the SNTEMP model has been built to run multiple temperature scenarios for the Lochsa River drainage. The model will be used to predict the effects of potential climate changes on MWF populations.

7. As part of the Dworshak-Kooskia NFH Complex Hatchery Evaluation Team, our office participated in a detailed review of the Spring Chinook Salmon Production Program at Dworshak NFH. Constraints in the program were identified by the Team and recommendations were forwarded to the project leaders that would relax production constraints and potentially improve smolt condition and fitness. The Team was directed by the project leaders to implement changes within guidelines. The Team is currently developing quantitative production goals to guide product quality.

8. We continued to work on endangered salmon issues in 1994. We are assisting with the Salmon Recovery Plan by providing personnel to help write the Hatchery section and by providing comments on the other sections. We have prepared Biological Assessments for NMFS on hatchery operation issues such as ladder operation and the steelhead program. We also provided NMFS with steelhead data for their region-wide status review. We have coordinated with the Boise and Coeur d'Alene offices of Ecological Services on assessment of impacts of various projects, i.e., pumping, road construction, etc. on listed salmon.

9. In FY 94 we began the "Interaction of hatchery and wild steelhead in the Clearwater River" study. Three tributaries of the lower Clearwater River were selected for the project in 1994. Population density estimates were completed at two sites for each creek during low water flow. These data were compared with similar work done by the Nez Perce Tribe during the mid-1980's. Genetic analysis, using electrophoretic techniques to ascertain influences of Dworshak National Fish Hatchery (NFH) steelhead on wild fish, is currently being completed on 142 wild

steelhead collected from these creeks. Health analysis, for comparison to Dworshak NFH steelhead, has been completed on these wild steelhead by the Dworshak Fish Health Center. To assist in assessing optimum size-of-release for minimizing straying and maximizing survival, 2,809 Dworshak NFH steelhead smolts were tagged with Passive Integrated Transponders (PIT). The Dworshak NFH PIT-tagged samples were stratified by three rearing systems, three sizes-at-release, and three release sites. In order to analyze straying rates, effects of Dworshak NFH releases on wild fish, and survival of strays and wild fish to Lower Granite Dam, sampling was conducted in the three study tributaries bi-weekly from just prior to release of Dworshak NFH fish to the end of July. Two hundred and thirty fish collected in these creeks were PIT-tagged and released. Nineteen percent (44 steelhead) were strays from Dworshak NFH. An annual progress report analyzing these data with recommendations for following years is being prepared. This project is being conducted cooperatively by the Idaho Fishery Resource Office, the Dworshak National Fish Hatchery, the Dworshak Fish Health Center, and the Nez Perce Tribe. Genetics work was completed by the National Marine Fisheries Service.

The three creeks studied in FY 94, Bedrock, Big Canyon, and Cottonwood creeks, will again be used as study creeks in FY 95. This could be expanded to include two or three additional creeks depending on the water year and time available. All FY 1994 activities will be repeated in 1995. The number of steelhead PIT-tagged at Dworshak NFH will be adjusted from 2,800 to 3,250 to allow for replication within time-of-spawning categories. Juvenile traps will be placed on study tributaries to monitor outmigration of juvenile steelhead. The only other modification to the original proposal will be placement of an adult weir trap on one study creek to determine numbers of adult wild and hatchery steelhead spawning in that creek.

10. We again sampled kokanee in three tributaries to Dworshak Reservoir for disease background. The Reservoir provides the water for both Dworshak hatchery and the LSRCP Clearwater hatchery. Samples were collected and analyzed from Breakfast, Isabella, and Skull creeks on the North Fork Clearwater River above Dworshak Reservoir. This year we collected 497 kokanee salmon spawners with none testing positive for IHN virus. The positive IHN detection rate in past years ranged from 0.0-1.5% with the average at 0.6%.

11. Spring chinook salmon and steelhead run summaries and prediction information were prepared for Dworshak and Kooskia NFH's (see Appendices A and B, respectively). This data, in

conjunction with IDFG and Nez Perce Tribe information, is used to set fishing seasons and future hatchery production plans.

12. In FY 94 we provided minimal fishery management assistance to the Shoshone-Paiute Tribe, Duck Valley Indian Reservation. However, we did recommend stocking levels and coordinated fish rearing and stocking from Hagerman NFH.

13. We completed a five-year plan for the Lower Snake River Compensation Plan Program at Dworshak NFH. The plan covers evaluation activities, budgets, and schedules for the next five years.

14. Idaho FRO has the responsibility for the fishery database for all three federal hatcheries in Idaho. We gather and computerize distribution and return data as well as complete summary release files.

Additionally, our office is developing a PIT-tag database that will provide release and interrogation information for chinook and steelhead released from Dworshak and Kooskia NFHs. Currently, data is available back to 1991. We are, however, continuing to compile data from previous years (back to 1988 for steelhead) as time permits, as well as adding new data yearly. We expect to begin pooling our data with other agencies, such as the Idaho Department of Fish and Game, and NMFS. This is part of an effort to build a large database and begin developing multi-variate regression models that will relate factors such as flow, time of release, size at release, migration time, and survival. This database can also be used to compare return rates of various tag groups (CWT, PIT, freeze brand) to determine effects of the various tags on adult return.

15. Idaho FRO personnel participated on the following committees and study teams in 1994:

a. Member of the Nez Perce Tribal Hatchery Team developing the Draft Environmental Impact Statement on the construction of an anadromous salmon hatchery and associated facilities.
b. Member of the outplanting subcommittee to establish priority, numbers, and places for outplanting steelhead fingerlings, smolts, adults, and spring chinook fingerlings from Dworshak and Kooskia NFHs.
c. We assist in planning tagging, branding, and clipping work at the various hatcheries, particularly Dworshak and Kooskia NFHs.
d. Member of Idaho Supplementation TAC. As a member of this committee, we review and provide technical guidance on

developing Idaho supplementation projects. We also participate by sampling two study streams in the Idaho Supplementation Studies program.

f. Pacific States Marine Fishery Commission/Pacific Salmon Commission. We contribute to their regional coded-wire tag database for release and recovery data as well as advise the mark committee on sample design and policy.

g. Member of Idaho Stream Segment of Concern Working groups. We provide technical fishery information to the various groups upon request.

h. Member of Endangered Species Technical Committee. This team reviews endangered species issues relating to anadromous salmon in the Columbia Basin.

i. Member of Columbia River PIT-tag Steering Committee.

j. Member of Clear Creek Coordinated Resource Management Planning Group.

k. Participated on the Pacific Salmon Biological Technical Committee regarding west coast steelhead.

l. Assisted NMFS with the writing of the Salmon Recovery Plan.

m. Member of the Idaho Fisheries Habitat Enhancement Coordination committee.

n. Members on the Dworshak-Kooskia Hatchery Evaluation Team

o. Member of the Hagerman Hatchery Evaluation Team

p. Participate in Region I Fisheries Visioning Supplementation Team.

q. Participated in the Atlantic Salmon Assessment Committee Working Group meeting.

r. Participated on the Watershed Enhancement Teams for Potlatch and Mission-Lapwai Creeks.

s. Participated on a committee to develop a regional sperm cryopreservation program for "at-risk" salmonid stocks.

Station Cost Summary

With the continued expansion of our staff, projects, and other activities, expenditures for FY 94 increased over FY 93.

A major expenditure in FY 94 was the continued lease of a modular office building to accommodate our increased staff. We also continued to lease a 4WD vehicle. We added three 486 desktop computers, a 486 laptop computer, laser printer sharing devices, and a Polaroid slide maker to our ADP equipment.

Considerable minor equipment, supplies, and services were again purchased for the Snake River Fall Chinook Project this year. Major purchases include a remote weather station, contract with the USFS, and helicopter flights.

With the start-up of the new Fishery Stewardship Project considerable equipment were purchased and contracts were let. Major purchases included PIT tags, electroshocker, thermographs, and funds were provided to the Nez Perce Tribe, and Dworshak NFH and FHC.

Major Purchase Cost Summary:

1.	General office purchases	
	Building lease	15,580
	Vehicle lease	3,240
	Desktop computers (3)	8,253
	Scanner w/ software	1,305
	Polaroid palette	3,890
	Printer sharers (2)	2,204
2.	Fall Chinook Project	
	Weather station	11,111
	Tagline	2,439
	USFS contract	22,000
	Helicopter flights	4,860
	Brochure	1,200
3	Fishery Stewardship Program	
	Temperature loggers	1,753
	PIT tags	17,400
	Dry suits	1,145
	Electroshocker	3,326
	Weir	4,800
	Laptop computer and printer	1,810
	Nez Perce Tribe contract	43,604
	Dworshak NFH	13,000
	Dworshak FHC	33,833

Future Outlook

Idaho FRO will continue to function as a key player in the complex problems stemming from anadromous salmonid production and management in the Snake River Basin. The outlook is greater demand by more user groups for fewer resources and the requisite for agencies to do more with less.

We will continue to evaluate chinook and steelhead production at Dworshak and Kooskia NFHs to determine how the Service can best meet their goals. We will also work with Hagerman NFH by providing technical assistance and coordination. We will continue to serve as the lead office for the Hatchery Evaluation Teams for all federal hatcheries in Idaho. Because of low returns for chinook at Dworshak and Kooskia they continue to be the main focus of evaluation projects including rearing density, release time, release site, feed trials, BKD segregation, efficacy of erythromycin, etc.

We will continue to document Dworshak steelhead production and contributions providing information to states, tribes, and others concerning seasons and CWT, PIT tag, and freeze brand information. We have begun and will continue a project looking at hatchery and wild steelhead interactions in lower Clearwater tributaries. This project is a cooperative study with involvement of Dworshak NFH, Dworshak Fish Health Lab, and the Nez Perce Tribe. We plan to expand our field efforts next season looking at more streams and returning adults if possible.

Our work on Snake River fall chinook will continue as a cooperative study with NBS, WDFW, and Idaho Power Company. We will continue in our ro as the experts on fall chinook in the Snake River Basin and in ing accurate data and information to numerous agencies and tribes Columbia Basin. This study is also leading into another d project with NMFS and the Nez Perce Tribe looking at tion and survival of fall chinook salmon in the Snake River, iver, and Lower Granite Reservoir.

ontinue to monitor whitefish in White Sand and Crooked Fork rt of the National Fishery Resource Monitoring Program lentify possible global warming effects. We will also chery supplementation and natural production of spring ugh the BPA funded Idaho Supplementation Studies.

will continue to be deeply involved in ESA issues with the der assisting in writing the Salmon Recovery Plan and providing comments and technical support, as well as ng in various work groups and committees. We foresee more me being spent in this area with steelhead under petition and on being downgraded to endangered.

d earlier, we are considered the experts on fall chinook in River basin and with our other ongoing studies we will be the authority in major fishery issues throughout the

II. FORMS

SUMMARY OF FISH AND WILDLIFE MANAGEMENT AREAS SERVED

Station Idaho FRO

Fiscal Year 1994

Check only one of the Following:	Restoration/ Mitigation [x]	Management Assistance [ ]	Federal Leadership [ ]

Management Activities 1	Area Served 2	Number of Projects 3	Staff Years (FTE's) 4
Stock Evaluations	NFH	5	2.5
Fish/Wildlife Stocking	State	8	1.1

Form 3-112 (Rev. 7/88)

SUMMARY OF FISH AND WILDLIFE MANAGEMENT AREAS SERVED

Station Idaho FRO

Fiscal Year 1994

Check only one of the Following:	Restoration/ Mitigation ☐	Management Assistance [x]	Federal Leadership ☐

Management Activities 1	Area Served 2	Number of Projects 3	Staff Years (FTE's) 4
Management Plan Development	Tribal	1	.2
Coordination and Technical Assistance	Tribal	2	.4
	Other Federal	6	1.4
	State	5	.4
Fish and Wildlife Stocking	State	1	.1

Form 3-112 (Rev. 7/88)

SUMMARY OF FISH AND WILDLIFE MANAGEMENT AREAS SERVED

Station Idaho FRO

Fiscal Year 1994

Check only one of the Following: Restoration/ Mitigation ☐ Management Assistance ☐ Federal Leadership [X]

Management Activities 1	Area Served 2	Number of Projects 3	Staff Years (FTE's) 4
Habitat Surveys	NBS	2	1.5
	State	2	.5
Population Analysis and Monitoring	NBS	2	2.5
	State	2	.5
Endangered Species	Other Federal	4	1.5
Coordination and Technical Assistance	NBS	4	.8
	Other Federal	4	.2
	State	6	.3
Stock Evaluations	NFH	7	.9
Fish/Wildlife Stocking	State	1	.1
Interagency Cooperative Management	Other Federal	3	.2

Form 3-112 (Rev. 7/88)

REPORT OF STATION PERSONNEL

Station Idaho FRO

Fiscal Year 1994

Part I - Permanent Personnel (FTE's _____)				
Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
William H. Miller	Project Leader	GM-13	10/01/93-9/30/94	Full-time
Howard L. Burge	Asst. Project Leader	GS-12	10/01/93-9/30/94	Full-time
Ralph B. Roseberg	Fishery Biologist	GS-11	10/01/93-9/30/94	Full-time
William P. Connor	Fishery Biologist	GS-11	10/01/93-9/30/94	Full-time
Ray N. Jones	Fishery Biologist	GS-11	10/01/93-9/30/94	Full-time
Aaron P. Garcia	Fishery Biologist	GS-11	10/01/93-9/30/94	Full-time
(CONTINUED)	Part II - Temporary Personnel (FTE's _____)			
Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Rick A. King	Maintenance Worker	WG-04	10/01/93-9/30/94	Full-time
(CONTINUED)	Part III - Other Personnel (FTE's _____)			
Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Susannah B. Ray	Volunteer	N/A	10/01/93-12/14/93	Full-time

Form 3-114 (Rev. 4/88)

REPORT OF STATION PERSONNEL

Station Idaho FRO (Continued) Fiscal Year 1994

Part I - Permanent Personnel (FTE's _____)				
Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Jerry D. Berg	Fishery Biologist	GS-09	10/01/93-2/06/94	Full-time (trainee)
Elizabeth A. Rockhold	Fishery Biologist	GS-07	10/01/93-9/30/94	Full-time
Diane E. Praest	Secretary	GS-06	10/01/93-9/30/94	Full-time
Amy C. Kishpaugh	Office Automation Clerk	GS-04	10/01/93-9/30/94	Full-time
Randall S. Bowen	Biological Science Aid	GS-04	10/01/93-9/30/94	Full-time
Pat Bigelow	Fishery Biologist	GS-11	06/12/94-9/30/94	Full-time
Part II - Temporary Personnel (FTE's _____)				
Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Douglas C. Burum	Biological Science Tech	GS-05	10/1/93-9/30/94	Full-time
Tom Kendall	Biological Science Tech	GS-05	4/11/94- 9/30/94	Full-time
(CONTINUED) Part III - Other Personnel (FTE's _____)				
Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Travis Cebola	Volunteer	N/A	7/05/94- 7/22/94	Full-time

Form 3-114 (Rev. 4/88)

...NNEL

Fiscal Year 1994

Station Idaho FRO (Continued)

Part I - Permanent Personnel (FTE's _____)

Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5

Part II - Temporary Personnel (FTE's _____)

Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Craig A. Eaton	Biological Science Tech.	GS-05	10/01/93-9/30/94	Full-time
Jill M. Olson	Fishery Biologist	GS-05	10/01/93-9/30/94	Full-time

Part III - Other Personnel (FTE's _____)

Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5

Form 3-114 (Rev. 4/88)

REPORT OF STATION PERSONNEL

Fiscal Year 1994

Station Idaho FRO (Continued)

Part I - Permanent Personnel (FTE's _____)

Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5

Part II - Temporary Personnel (FTE's _____)

Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5
Russ Waitt	Biological Science Tech.	GS-04	5/16/94-9/30/94	Full-time
John Branstetter	Student Trainee	GS-04	6/01/94-8/27/94	Full-time

Part III - Other Personnel (FTE's _____)

Name Of Employee 1	Functional Title 2	Grade 3	Period Worked 4	Remarks 5

Form 3-114 (Rev. 4/88)

OPERATIONS/MAINTENANCE COST DATA

Station Idaho FRO

Fiscal Year 1994

	Cost			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
1. Salaries, Permanent (Including Benefits):	489,000			
2. Salaries, Temporary (Including Benefits):	83,898			
3. Operating Costs:				
A. Utilities				
1. Telephone	3,054			
2. Electricity _____ KWH				
3. Heating Oil _____ Gal				
4. Natural Gas _____ Cu Ft				
5. Other Building rental	14,580			
B. Vehicle Maintenance				
1. Distribution Vehicles # _____				
Total Mileage _____				

Form 3-110 (Rev. 4/88)

OPERATIONS/MAINTENANCE COST DATA

Station Idaho FRO

Fiscal Year 1994

	Cost			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
3. B.(cont) Vehicle Maintenance				
2. Non-Distribution Vehicles # 5 Boats # 5 Total Mileage 46,048	10,456			
C. Fuel for Vehicles/Boats				
1. Fuel (Dist.) Gal Vehicles-3,126 Boats-2,006				
2. Fuel (Non-Dist) 5132 Gals TOTAL	6,419			
D. Supplies				
1. Fish Food / Rearing (Hagerman-Duck Valley trout)	8,732			
2. Chemicals a. Fish Related				
b. Non-Fish Related				

Form 3-110 (Continued) (Rev. 4/88)

OPERATIONS/MAINTENANCE COST DATA

Station Idaho FRO

Fiscal Year 1994

	Cost			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
3. D.(cont) Supplies				
3. Fertilizer				
4. Tags and Tagging Supplies	23,520			
5. Office Supplies	11,093			
6. Custodial Maintenance Supplies	712			
7. Other Supplies (including furniture for new office space)	6,172			
E. Travel and Training	51,838			
F. Moving Expenses				
G. Miscellaneous (List): Waders, wetsuits, diving supplies, materials, film, batteries, nets, buoys, cables, anchors, packs, etc.	18,469			

Form 3-110 (Continued) (Rev. 4/88)

OPERATIONS/MAINTENANCE COST DATA

Station Idaho FRO

Fiscal Year 1994

	Cost			
	Operations (Fisheries) 1	Cyclical Maintenance (Fisheries) 2	Quarters Maintenance 3	Other Funding 4
4. Total Operations (Total: Lines 1, 2, and 3 A-G)	727,943			
5. Vehicles Purchased (List)				
6. Total Vehicles Purchased (Total: Line 5)				
7. Equipment Purchased (over $500)(List)	See Attachment A (next page)			
8. Total Equipment (Total: Line 7)	178,643			
9. Cyclical Maintenance (List)				
10. Total Cyclical Maintenance (Total: Line 9)				
11. Quarters Maintenance (List)				
12. Total Quarters Maintenance (Total: Line 11)				
13. Total Maintenance (Total: Lines 6, 8, 10, 12)	178,643			

14. Grand Total (Total: Lines 4 and 13) $906,586

Form 3-110 (Continued) (Rev. 4/88)

Attachment A

Item	Cost
Desktop computers (3)	8,253
Software	3,663
Scanner w/ software	1,305
Polaroid palette	3,890
Printer sharers (2)	2,204
Tape Back-up	549
Copier	4,400
Remote Weather station	11,111
Temperature loggers (12)	1,753
Dry-suits (2)	1,145
Electroshocker	3,326
Weir	4,800
Laptop computer and printer	1,810
Dissloved Oxygen Meters (2)	1,672
Freeze Core Gravel Sampler	2,700
Turbidimeter	919
Tagline	2,439
Brochure	1,200
Clear Creek Trap Contract	2,535
Tagging Contract	5,992
Genetics Contract	500
Dworshak NFH	13,000
Dworshak FHC	33,873
Nez Perce Tribe Contract	43,604
Forest Service Contract	22,000
TOTAL	178,643

PUBLIC RELATIONS

Station Idaho FRO Fiscal Year 1994

1. Presentations:	Number of Groups	Number of People
On Site	Static Display	500+
Off Site	12	800+

2. Number of Visitors:

Official	100
Public	25

3. Other Public Relation Activities:

Type of Activity	
Hunter safety instruction	25
Elementary school education	60
Interactions with fishermen	75-100

Remarks:

Static display presentation was during Dworshak NFH's Open House where we had a display set up. The number of visitors listed is an estimate since no official log is kept.

A big part of our public relation occurs when we are out in the field conducting research. We often answer numerous questions concerning the work we're doing and the resource in general.

Form 3-172 (Rev. 4/88)

III. APPENDICES

APPENDIX A

ADULT SPRING CHINOOK SALMON RETURNS TO DWORSHAK-KOOSKIA NFH COMPLEX IN 1994 AND PROGNOSIS FOR 1995

Prepared by:

William H. Miller
Project Leader

Howard L. Burge
Assistant Project Leader

Ray N. Jones
Ralph B. Roseberg
Fishery Biologists

Douglas C. Burum
Biological Science Technician

U.S. Fish and Wildlife Service
Idaho Fishery Resource Office
Ahsahka, Idaho

December 1994

Introduction

Dworshak NFH is located at the confluence of the North Fork and the main-stem of the Clearwater River near Ahsahka, Idaho. Construction of the hatchery was included in the authorization for Dworshak Dam and Reservoir (Public Law 87-847, October 23, 1962) to mitigate for losses of anadromous steelhead (*Oncorhynchus mykiss*) caused by the dam and reservoir.

The hatchery was designed and constructed by the U.S. Army Corps of Engineers (COE) and has been administered and operated by the U.S. Fish and Wildlife Service since the first phase of construction was completed in 1969. At that time, the hatchery had 25 Burrows ponds on a reuse system and 59 ponds on single-pass for rearing steelhead. In 1972, a second phase of construction placed all ponds on the reuse system with the option of operating some ponds on either reuse or single pass. Additional construction was completed in 1982 under the Lower Snake River Compensation Plan to provide rearing facilities for spring chinook salmon (*O. tshawytscha*). A total of 30 8-foot by 80-foot raceways were constructed (In 1993, two of these raceways were converted to adult holding ponds). In 1986, 12 8-foot by 75-foot raceways were converted from rainbow trout rearing to chinook salmon rearing.

Dworshak NFH formed a "Complex" with Kooskia NFH on April 9, 1978. All administrative responsibilities and operations for both hatcheries were assigned to the Project Leader at Dworshak NFH. Kooskia NFH is located about 1.5 miles southeast of Kooskia, Idaho, near the confluence of Clear Creek and Middle Fork of the Clearwater River. Because of production constraints, disease considerations, and other factors, Dworshak NFH has held and spawned spring chinook salmon adults returning to Kooskia NFH, as well as incubated eggs and reared juveniles. With the inception of the Lower Snake River Compensation Plan (LSRCP) program for spring chinook salmon at Dworshak NFH, transfers between hatcheries have occurred frequently and for several years, the programs were combined. Recently, however, the programs have been separated and adults and offspring are being handled separately.

This report includes a summary of the 1994 adult returns of spring chinook salmon to Dworshak and Kooskia NFHs and predictions for the 1995 adult returns.

Since a low return was predicted in 1994 for Clearwater River spring chinook salmon, a sport fishery season was not opened and the Nez Perce Tribe did not open a subsistence season.

1994 Run Size

Rack Returns

Overall, returns to the Dworshak-Kooskia NFH Complex in 1994 were dismal. The 1994 adult SCS return to Dworshak NFH was the lowest return on record, 74 fish. The previous low was in 1984, the first year of returns (Table 1). The adult SCS return to Kooskia NFH was 232, the lowest return since 1982 (Table 2). In 1994, all adult spawning occured at Dworshak NFH and an estimated 508,080 green eggs were taken (Table 3). This is the combined take for the Dworshak-Kooskia NFH Complex.

Table 1. Hatchery rack returns and age composition of spring chinook salmon for Dworshak NFH, 1984-1994.

Year	I-salt	II-salt	III-salt	Unmeasured	Total Return
1984	14	52	16	0	82
1985	13	281	35	5	334
1986	78	346	91	0	516
1987	25	1604	376	12	2017
1988	163	569	1240	0	1972
1989	156	1322	221	1	1700
1990	7	1892	135	8	2042
1991	16	77	72	0	165
1992	23	286	40	21	370
1993	9	452	359	3	823
1994	3	30	41	0	74

Table 2. Hatchery rack returns and age composition of spring chinook salmon for Kooskia NFH, 1972-1994.

Year	I-salt	II-salt	III-salt	Unmeasured	Total Return
1972	5	0	0	0	5
1973	5	45	0	0	50
1974	16	35	2	0	53
1975	15	284	27	0	326
1976	409	286	106	0	801
1977	333	2539	154	0	3026
1978	23	1676	336	0	2035
1979	11	100	264	0	375

Table 2. cont.

Year	I-salt	II-salt	III-salt	Unmeasured	Total Return
1980	9	55	3	0	67
1981	1	168	78	0	247
1982	3	116	139	0	258
1983	1	231	141	0	373
1984	55	80	206	0	341
1985	26	449	54	0	529
1986	21	159	103	0	283
1987	16	607	64	0	687
1988	39	363	193	0	595
1989	107	717	142	7	973
1990	11	921	209	0	1141
1991	10	98	350	9	467
1992	14	239	38	21	312
1993	11	749	409	11	1180
1994	1	96	135	0	232

Table 3. Dworshak-Kooskia NFH Complex spring chinook salmon spawning data for 1994.

	Males	Females	Total
Adults Spawned	97	126	223
Green Eggs	--	--	508,080
Eyed Eggs	--	--	435,400
Percent Eye-up	--	--	87.4

Stock Description

The initial Dworshak NFH spring chinook program utilized a variety or mix of stocks for release years 1983-1986 (Table 4). Leavenworth and Little White Salmon stocks both have been strongly influenced by Carson stock transfers to their programs. The two release years of Rapid River stock (1987-1988) indicate a complete shift from Carson type stocks to rearing smolts from eggs transferred from Rapid River State Fish Hatchery. For those two release years, the eggs taken at Dworshak NFH and Kooskia NFH returns were transferred to Kooskia NFH. This mix was referred to as Clearwater stock (Table 5). In fact, the Kooskia NFH program already had stock made up primarily of Carson derivatives. So

the resultant Kooskia stock (1989 and later) is still considered a Carson type stock. The recent returns to Dworshak NFH (1989 and later) are referred to as Dworshak stock, since they are progeny of returns to Dworshak NFH, rather than products of Rapid River egg transfers. The Dworshak stock is referred to as a Rapid River type stock. Length frequency data, ocean age class at return time information, and allele frequencies (Elliot and Pascho 1994) all support a distinction between Dworshak and Kooskia stocks.

Table 4. Genetic make-up of Dworshak NFH spring chinook salmon smolts directly released from the hatchery.

Release Year	Genetic Make-up*	% Rack Return
1983	75.1% LW	0.0741
	12.3% RR	
	12.6% LE	
1984	100% LE	0.2831
1985	67.8% LW	0.2570
	32.2% LE	
1986	100% LE	0.1610
1987	100% RR	0.0981
1988	100% RR	0.1898
1989	100% DW	0.0077
1990	100% DW	0.0528
1991	100% DW	0.0471

RR - Rapid River
LW - Little White Salmon
LE - Leavenworth
DW - Dworshak

Table 5. Genetic make-up of Kooskia NFH spring chinook salmon smolts directly released from the hatchery.

Release Year	Genetic Make-up*	% Rack Return
1971	85.6% RR - 14.4% WR	0.0343
1972	100% RR	0.0698
1973	100% CA	0.0798
1974	100% CA	0.1498
1975	58% RR - 42% CA	0.4094
1976	100% SS	0.2338
1977	84% CA - 11% KK - 5% LW	0.0088
1978	75% RR - 25% CA	0.0123
1979	69% KK - 31% CA	0.0327
1980	31% KK - 69% CA	0.0336
1981	64% CA - 19% KK - 17% RR	0.0390
1982	100% CA	0.0272
1983	65% KK - 35% LE	0.0970
1984	89% KK - 11% RR	0.0533
1985	100% KK	0.2721
1986	100% KK	0.1483
1987	100% CL	0.1263
1988	100% CL	0.1770
1989	100% KK	0.0300
1990	100% KK	0.1630
1991	100% KK	0.2430

*RR - Rapid River
CA - Carson
SS - South Santiam
LW - Little White Salmon
KK - Kooskia
LE - Leavenworth
CL - Clearwater

Age Composition

Age composition of the run is presently based on fork length categories. The length categories were derived from known age/length/sex data from CWT recovery databases. I-salts are 56 cm or less, II-salts are 57 through 81 cm, and III-salts are larger than 81 cm. The age composition for the 1994 adult return is displayed in Table 6.

Table 6. Age composition for 1993 spring chinook salmon returning to Dworshak-Kooskia NFH Complex.

Dworshak NFH			Kooskia NFH		
Age	Number	Percent	Age	Number	Percent
I-salt	3	4.1	I-salt	1	0.4
II-salt	30	40.5	II-salt	96	41.4
III-salt	41	55.4	III-salt	135	58.2
TOTAL MEASURED	**74**	**100**	**TOTAL MEASURED**	**232**	**100**

Survival

The III-salt returns in 1994 complete the returns from the 1,094,884 smolts released at Dworshak NFH and the 396,619 smolts released at Kooskia NFH in 1991. Total returns to the North Fork of the Clearwater from the 1991 release were 23 I-salts, 452 II-salts, and 41 III-salts for a hatchery return survival rate of 0.0471 percent (Table 7). Total returns to Clear Creek from the 1991 release were 14 I-salts, 749 II-salts, and 135 III-salts for a hatchery return survival rate of 0.2430 percent (Table 8).

Table 7. Return vs. release numbers for adult spring chinook salmon returns to Dworshak NFH.

Release Year	Smolts Released at Hatchery*	I-salts (% return)	II-salts (% return)	III-salts (% return)	Total (% return)
1988	1,547,219	156 (0.0101%)	2709 (0.1751%)	72 (0.0047%)	2937 (0.1898%)
1989	1,651,472	10 (0.0006%)	77 (0.0047%)	40 (0.0024%)	127 (0.0077%)
1990	1,251,247	16 (0.0013%)	286 (0.0229%)	359 (0.0287%)	661 (0.0528%)
1991	1,094,884	23 (0.0021%)	452 (0.0413%)	41 (0.0037%)	516 (0.0471%)
1992	959,369	9 (0.0009%)	30 (0.0031%)		
1993	1,278,273	3 (0.0002%)			

*Includes smolt releases at hatchery only. Does not include off-site releases or fry/fingerling releases.

Table 8. Return vs. release numbers for adult spring chinook salmon returns to Kooskia NFH.

Release Year	Smolts Released at Hatchery*	I-salts (% return)	II-salts (% return)	III-salts (% return)	Total (% return)
1988	778,407	107 (0.0137%)	921 (0.1183%)	350 (0.0450%)	1378 (0.1770%)
1989	384,235	11 (0.0029%)	98 (0.0255%)	38 (0.0096%)	147 (0.0383%)
1990	403,701	10 (0.0025%)	239 (0.0590%)	409 (0.1013%)	658 (0.1630%)
1991	396,619	14 (0.0038%)	749 (0.2026%)	135 (0.0365%)	898 (0.2430%)
1992	727,251	11 (0.0015%)	96 (0.0132%)		
1993	343,437	1 (0.0003%)			

*Includes smolts released at hatchery only. Does not include off-site releases or fry/fingerling releases.

Coded-wire Tag (CWT) Recoveries

Our facilities have significantly increased SCS marking from the contribution only level (1987 release year, at Dworshak, one CWT group) to the several studies level (1988-1994 release years, 9 to 24 CWT groups). At Kooskia NFH, we released CWT groups less often (1984, 1990, 1992, 1993, and 1994). In 1993 and 1994 all hatchery fish were marked in order to discriminate between hatchery and natural or wild stocks. The increased marking in recent years has enlarged the SCS CWT recovery database to a point where it is much more useful for hatchery evaluation. It also dramatically increased the workload for CWT sampling, recovery, and data processing.

A summary of adult SCS recoveries in the Dworshak NFH rack is shown in Table 9. All recoveries at the Dworshak rack were Dworshak NFH marks this year. Rack recoveries in previous years have included strays from other hatcheries and National Marine Fisheries Service transportation study marks.

Table 9. Summary of CWT recoveries for adult spring chinook salmon in the Dworshak NFH rack (1987-1994).

Rack Year	Total Recoveries	Recoveries of Dworshak Marks
1987	25	19
1988	55	49
1989	77	47
1990	306	302
1991	30	10
1992*	183	177
1993*	449	449
1994*	51	28

*1992, 1993, and 1994 recoveries include fish tagged at Kooskia NFH. Previous recoveries were only of fish tagged at Dworshak NFH.

1994 Run Predictions

Dworshak NFH-1994

The 1994 SCS returns to Dworshak NFH were disappointing. Our prediction was for a poor return. However, even that prediction was overly optimistic. The data used to generate the estimate was outside the range of previous regression information. The II-salt overestimate was especially sad (290 predicted, 30 actual). Unfortunately, the jack return was a new record low.

1994 Run Prediction

I-salt =	21
II-salt =	290
III-salt =	100
Total n =	**411**

1994 Rack Return

I-salt =	3
II-salt =	30
III-salt =	41
Total run =	**74**

Kooskia NFH-1994

The 1994 SCS returns to Kooskia NFH were disappointing, but our larger prediction database helped better predict Kooskia NFH returns. The III-salt prediction was close. These fish were returning from an better ocean survival year than the other two age classes. So even though the two salt returns were even lower than expected, Kooskia NFH had nearly as many adult returns as Rapid River State Fish Hatchery, which released several times as many smolts. The tendency for Kooskia stock to have a larger proportion of returns come back as III-salts than Rapid River stock was advantageous this year.

1994 Run Prediction

I-salt =	26
II-salt =	247
III-salt =	187
Total n =	**460**

1994 Rack Return

I-salt =	1
II-salt =	96
III-salt =	135
Total Run =	**232**

1995 Run Predictions

The following is our prediction for the 1995 SCS run to the Dworshak-Kooskia Complex.

Dworshak NFH		Kooskia NFH	
I-salts	19	I-salts	14
II-salts	40 ±20	II-salts	80 ±50
III-salts	15 ±10	III-salts	40 ±50
TOTAL	**74 ±30**	**TOTAL**	**134 ±100**

Total predicted to return both hatcheries in 1995 is 211 ±130.

The total hatchery spring chinook salmon predicted to return to Dworshak and Kooskia NFH's in 1995 will not meet the complete broodstock requirements. The number of adults needed for supplying eggs to fill both hatcheries is estimated at 1,700. Actual number needed varies, depending on number of eggs per female (which varies with size and age of fish returning) and sex ratio of any particular run. The estimated return will also be far short of our LSRCP mitigation goal of 9,135 adults returning to Lower Granite Dam.

Literature Cited

Elliot, Diane G. and R. J. Pascho. 1994. Juvenile fish transportation: Impact of bacterial kidney disease on survival of spring/summer chinook salmon stocks. Annual Report. U.S. Army Corps of Engineers. Contract E86920048. 79p.

APPENDIX B

ADULT STEELHEAD RETURNS TO DWORSHAK NFH IN 1993-94 AND PROGNOSIS FOR 1994-95

Prepared By:

William H. Miller
Project Leader

Howard L. Burge
Assistant Project Leader

Ralph B. Roseberg
Ray N. Jones
Fishery Biologists

Douglas C. Burum
Biological Science Technician

U.S. Fish and Wildlife Service
Idaho Fishery Resource Office
Ahsahka, Idaho

December 1994

Introduction

Dworshak NFH is located at the confluence of the North Fork and the main-stem of the Clearwater River near Ahsahka, Idaho. Construction of the hatchery was included in the authorization for Dworshak Dam and Reservoir (Public Law 87-847, October 23, 1962) to mitigate for losses of anadromous steelhead (*Oncorhynchus mykiss)* caused by the dam and reservoir.

The hatchery was designed and constructed by the U.S. Army Corps of Engineers (COE) and has been administered and operated by the U.S. Fish and Wildlife Service since the first phase of construction was completed in 1969. At that time, the hatchery had 25 ponds on a reuse system and 59 ponds on single-pass. In 1972, a second phase of construction placed all ponds on reuse systems with the option of operating some ponds on either reuse or single-pass.

The North Fork Clearwater River steelhead stock maintained by Dworshak NFH is unique in the Columbia River Basin. At maturity, males and females of this stock (also referred to as "B" run steelhead) average about 91 cm (36 inches) and 82 cm (33 inches) in length, respectively. Spawning stock is comprised of three age classes; I-, II-, and III- "salt" fish. This nomenclature refers to the number of complete years fish have spent in salt water. Fish are actually two years older than this system indicates, as they are reared for one year in the hatchery and spend another year emigrating to and returning from the ocean to the hatchery.

The "B" run steelhead enter the Columbia River in August, usually later than the smaller size "A" run fish. The "B" run steelhead reach the Snake and Clearwater Rivers in the fall, then over-winter until their final spawning run into the hatchery.

Releases of steelhead smolts from Dworshak National Fish Hatchery (NFH) began in 1970 with the first hatchery produced adults returning in 1972. The 1993-94 return marked the 22nd year that artificially spawned North Fork Clearwater River steelhead have returned to Dworshak NFH. Table 1 summarizes the Dworshak NFH steelhead returns to the Clearwater from 1972-1994. This report reviews the statistics of the 1993-94 run and the prognosis for 1994-95.

1993-94 Adult Returns

The hatchery ladder was opened October 28, 1993 and remained open until November 9, 1993. A total of 178 early run steelhead entered the trap during this period. The initiation of fish ladder operation in October was a continuing attempt to insure inclusion of early arriving steelhead in the hatchery gene pool. The fish ladder was reopened January 11, 1994 and was closed on May 3, 1994. A total of 3,579 adult steelhead entered the ladder during the spring of 1994. The total returns by age, sex, and time of return including a summary of spawning data is listed in Table 2. A total of 2,686 carcasses from spawned adults, health sampled fish, and excess fish were donated to the Idaho Department of Education food bank and 184 carcasses were given to Washington State University to feed captive bears.

Table 1. Number of steelhead returning to Dworshak National Fish Hatchery, estimates of hatchery fish harvested, and total hatchery returns to the Clearwater River, Idaho.

Return[1]	Number Back To DNFH	Estimated Clearwater Sport Harvest	Estimated Clearwater Tribal Harvest	Unharvested Clearwater Hatchery Fish[8]	Total Hatchery Fish Returning to Clearwater R.
1972-73	9,938	2,068	-	0	12,006
1973-74	7,910	2,320	-	0	10,230
1974-75	1,698	N.S.[3]	290	0	1,988
1975-76	1,858	N.S.	430	0	2,288
1976-77	3,100	N.S.	410	0	3,510
1977-78	12,727	14,000	(1,000)[5]	0	27,727
1978-79	4,939	4,610	(500)	0	10,049
1979-80	2,519	N.S.	1,250	300	4,069
1980-81	1,968	4,510	(1,000)	500	7,978
1981-82	3,054	1,665	(1,000)	0	5,719
1982-83	7,672	13,967[4]	(1,500)	0	23,139
1983-84	3,284	6,500	(,500)	100	11,384
1984-85	14,018	19,410	(1,500)	2,700	37,628
1985-86	4,462	7,240	1,471	1,800	15,002
1986-87	5,286[2]	15,679	4,210[6]	3,000	28,175
1987-88	3,764	8,766[9]	1,478[7]	2,000	16,008
1988-89	6,041	11,332[9]	1,242[10]	3,700	22,315
1989-90	10,630	27,953[9]	1,710[10]	3,650	43,943[11]
1990-91	7,876	12,810	1,211	2,250	24,147
1991-92	3,700	10,416	1,326	1,650	17,092
1992-93	7,900	19,351[9]	1,184	3,368	31,803
1993-94	3,757	11,207[9]	675	1,457	17,096

(1972-73 to 1983-84 data based on report from Pettit, 1985, IDFG Federal Aid Report, Project F-73-6, January, 1985.)

[1]Return year is from October through May.
[2]Actual number returned, ladder closed, not a complete return figure.
[3]N.S., no sport fishing season.
[4]Pettit included an additional 2,000 fish in harvest from Snake River for a ... of 15,967.
[5]( ) guesstimate on tribal harvest by author.
[6]Mauney, J.L. et al. 1988. A survey of the Nez Perce subsistenc... steelhead trout (*Oncorhynchus mykiss*) the Dworshak National Fish ... North Fork of the Clearwater River, Idaho, 1986-87.
[7]Mauney, J.L. et. al. 1990. A survey of the Nez Perce subsistence ... steelhead trout (*Oncorhynchus mykiss*) North Fork of the Clearwater R... 1987-88.
[8]Based on return percentage back to hatchery to calculate returning of ... from upstream releases.
[9]Kent Ball, IDFG, Salmon, Idaho, Personal Communication, preliminary number that may be adjusted down
[10]Paul Kucera, Nez Perce Tribe, Lapwai, Idaho, Personal Communication.
[11]We believe the sport estimate of 27,953 is around 8,000 too high and the total number of Dworshak steelhead to the Clearwater River was in the range of 31,000 to 35,000.

SHOULD SAY STEVE PETTIT, IDFG, LEWISTON, ID
WAS IT ADJUSTED DOWN?

Table 2. Adult steelhead returns and spawning data for 1993-1994 at Dworshak National Fish Hatchery, Idaho.

	Males	Females	Total
Fall Run (10/28 to 11/29)			
I-salt	7	0	7
II-salt	64	96	160
III-salt	8	3	11
Spring Run (2/16 to 5/3)			
I-salt	39	15	54
II-salt	817	2,566	3,383
III-salt	96	47	142
Combined Total			
I-salt	46	15	61
II-salt	881	2,662	3,453
III-salt	127	35	162
Total Rack Return	1,030	2,727	3,757
Total Number Spawned	403	1,127	1,530

Green Eggs = 7,193,835
Eyed Eggs = 6,226,800
Percent eye up = 89.9%

Age Composition

Steelhead age composition is determined by fork lengths of coded-wire tagged adults returning to Dworshak NFH. The criteria for age determination of males and females is listed below:

	I-salt	II-salt	III-salt
Males	< 73 cm	73 - 92 cm	> 92 cm
Females	< 68 cm	68 - 90 cm	> 90 cm

The age composition of steelhead returning to Dworshak NFH in 1993-1994 was as follows:

	Number	Percent
I-salt	61	1.6
II-salt	3,543	94.3
III-salt	153	4.1

The number of I-salts was an all time record low. The adult return was comprised of 72.6 percent females and 27.4 percent males. For a more detailed summary of age and sex composition, see Table 2.

Survival

The return of Dworshak NFH steelhead to the rack was comprised of an estimated 94.3 percent II-salt fish. If this factor is applied to our estimated total of 17,096 steelhead to the Clearwater River, then 16,122 II-salt fish returned to the Clearwater. In 1991, Dworshak NFH released 2,655,998 steelhead smolts in the Clearwater River drainage. Based on the estimated II-salt returns to the Clearwater of 16,122, this equals a .6 percent smolt to adult rack return.

Adult Outplanting

Occasionally we have more adult steelhead return to the hatchery than are necessary for broodstock. When this happens they are outplanted into various streams to allow natural spawning or to provide for specific sport fisheries. In 1994, Dworshak NFH outplanted 400 adult steelhead into the Boise River. Table 3 summarizes numbers and release locations of the outplanted adults.

Table 3. Dworshak NFH Adult Steelhead Outplants, 1994.

Date	Males	Females	Total	Site	Purpose
2/24/92	54	146	200	Boise River	Sport Fish Enhancement
3/03/94	28	172	200	Boise River	Sport Fish Enhancement
TOTAL	**82**	**318**	**400**		

Table 4. Coded wire tag recoveries of adult steelhead - Dworshak NFH rack.

Release year	Tag code	Study	# Released	# Recovered	% Return
1990 (III Salt)	52044	Sys. 1 Contribution	20,016	4	0.020
	52045	Sys. 2 Contribution	19,797	14	0.071
	52046	Sys. 3 Contribution	20,279	2	0.010
	52047	Early Arrival Progeny	21,290	9	0.042
	52048	Early Arrival Progeny	20,888	12	0.057
	52049	Early Arrival Progeny	21,387	3	0.014
1991 (II Salt)	52424	Sys. 1, KNFH Early Rear.	19,773	23	0.116
	52425	Sys. 1, HNFH Early Rear.	20,320	28	0.137
	52426	Sys. 2, DNFH IHN+ Parents	19,858	15	0.076
	52427	Sys. 2, DNFH Early Rear.	19,515	28	0.144
	52428	Early Return Progeny	20,547	26	0.127
	52429	Early Return Progeny	20,499	39	0.190
	52430	Early Return Progeny	20,293	33	0.167
1992 (I Salt)	52419	Early Return Progeny	20,645	0	0.000
	52420	Sys. 1 Contribution	20,705	0	0.000
	52421	Sys. 2 Contribution	19,909	0	0.000
	52422	Sys. 2 Contribution	20,499	0	0.000
	52423	Sys. 3 Contribution	20,709	0	0.000
	52626	Sys. 3 Contribution	20,039	0	0.000

Review of the 1993-1994 Adult Return Predictions

For the 1993-1994 steelhead run, Idaho FRO had predicted 7,000 fish back to the Dworshak NFH rack (1993 Annual Report). Our estimate was 46% over the actual return of 3,757. Low fall water flows tend to slow upstream migration of Dworshak steelhead. Sport harvest of Dworshak NFH fish in Washington sport fisheries increase dramatically under these conditions.

Predictions for Adult Steelhead Returns

Our usual method of prediction starts with a regression of I and II ocean steelhead returns to Dworshak NFH. We use the equation to predict the incoming II oceans which comprise the vast majority of the run. III and I ocean fish are usually estimated by using an average rate of return. This method assumes that downriver variables such as Zone 6 harvest and Idaho in-river sport harvest remain relatively unchanged. This year is unusual in that it is a low water year, there are low adult return numbers, and there was a record low I ocean rack return last year. In a year on the margin of existing data (like this one) our traditional method of prediction may yield results with less precision than in other years. Therefore, we prepared another estimate starting with data from Bonneville Dam. We adapted the approach of Kent Ball (IDFG) to suit our needs. A combination of Kent's analysis, Steelhead

Technical Advisory Committee information, and Reservoir Control Center Adult Fish Passage Center data was used to produce another prediction.

1994-95 DNFH Rack Prediction

Regression Method		Modified IDFG Method	
I Ocean	200	I Ocean	200
II Ocean	2,300	II Ocean	2,200
III Ocean	200	III Ocean	200
Total Rack	2,700	Total Rack	2,600

1994-95 Steelhead Run Prediction

The two prediction strategies unexpectedly yielded results that were very similar. We based this year's prediction on traditional (regression) analysis. With an estimated sport harvest rate of 60% on Dworshak NFH fish entering the Clearwater and expected hatchery returns, we have projected the following:

Predicted Number	Location or Fishery
2,600	DNFH rack return
200	KNFH rack return
5,700	Sport fishery harvest
500	Nez Perce tribal harvest
500	Fish not harvested
9,500	TOTAL DNFH "B" steelhead returning to the Clearwater River

As shown above, we are expecting less DNFH steelhead back to the Clearwater in the 1994-95 season than returned in the 1993-94 season.

Literature Cited

Roseberg, R.B., H.L. Burge, W.H. Miller and D. Diggs, 1991. A review of coded-wire tagged fish released from Dworshak, Kooskia, and Hagerman National Fish Hatcheries. 1976-1990. U.S. Fish and Wildlife Service Report. Ahsahka, ID.