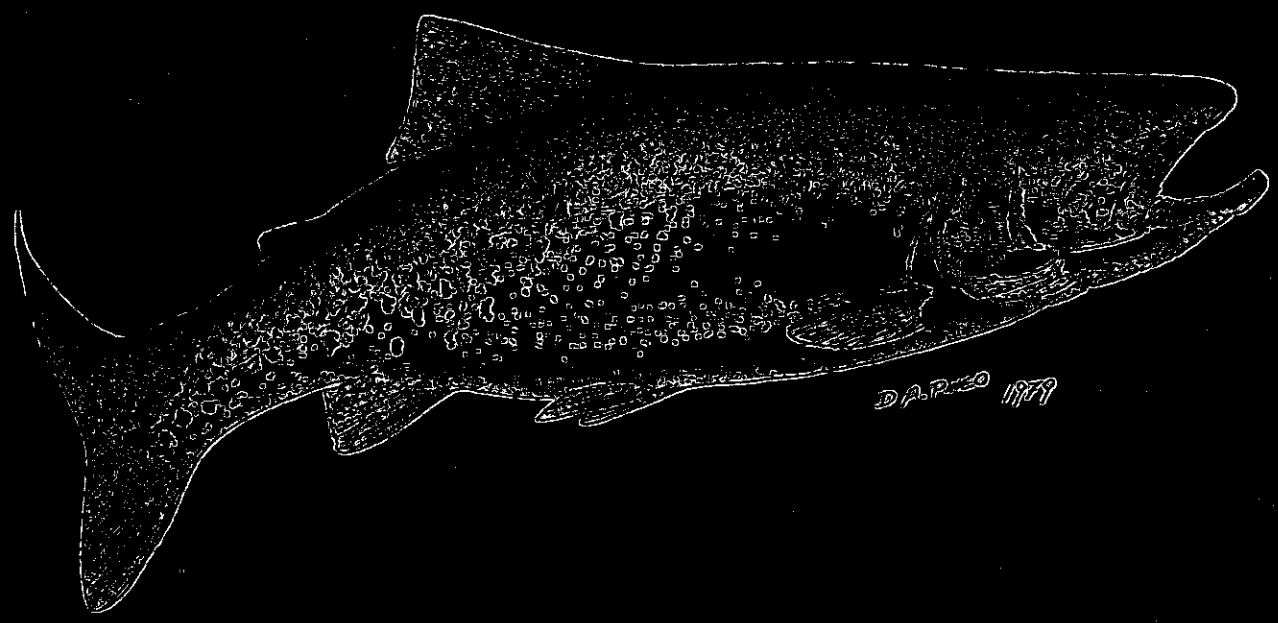
29

WASHINGTON STATE GAME DEPARTMENT

FISHERIES MANAGEMENT DIVISION

85-23



LYONS FERRY EVALUATION STUDY

1983 ANNUAL REPORT

by
Mark L. Schuck
Fishery Biologist
Washington State Department of Game

LYONS FERRY EVALUATION STUDY

1983 ANNUAL REPORT

by

Mark L. Schuck
Fishery Biologist
Washington State Department of Game

U. S. FISH & WILDLIFE SERVICE
Fishing Resources - - Region 1
Portland, Oregon 97208
Under Cooperative Agreement
14-16-0001-83266 (js)
Lyons Ferry Study # FR1/LSR-85-13

OUTLINE

ABSTRACT

Lyons Ferry Hatchery remained under construction for all of 1983. Steelhead production at the hatchery was comprised of 581,213 Wells stock and 232,000 Wallowa stock smolts reared and released. Another 190,000 Wallowa stock smolts were reared cooperatively for Oregon Department of Fish and Wildlife. The average smolt released from the rearing ponds was 191 mm fork length and weighed 72 grams. Broodstock releases, reared in raceways were 222 mm and weighed 107 grams. Juvenile mortality from fry to smolt was 4 percent. There was no incidence of viral or bacterial disease during the 1983 production year.

One hundred sixty thousand (160,000) coded wire tagged and/or branded steelhead were released for two separate studies. Tag loss was 3 percent and brand loss was approximately 9 percent. Juvenile outmigration began the last week in April and was complete by mid-May. Estimated smolt passage at Lower Granite Dam and McNary Dam ranged between 41.3 - 61.1 percent of releases. Residualism and estimating error may be reasons for such poor performance.

Adults returned to the hatchery from a small 1982 release. These fish proceeded above Lower Granite Dam at 0.46 percent of release. Total return of these one-salt fish was estimated at 0.68 percent, above the design specification for the hatchery of 0.5 percent. Proper homing to the hatchery may be a problem in future years.

Thirty-six waters were planted with 45,500 pounds of legal rainbow trout. An estimated 51,000 recreation days were attributed to 10 of the 36 planted waters.

Several tasks and one objective were inadequately performed because of funding delays. An expanded program in 1984 and 1985 are expected.

1.0 INTRODUCTION:

1.1 Project Summary

This is the first report by the Washington Department of Game concerning initial activities at a new steelhead production facility on the Snake River. Lyons Ferry Hatchery began operation in 1982, while still under construction. Washington Department of Game (WDG) operates half of the joint salmon-steelhead facility, which is the only new production hatchery constructed in Washington under the Lower Snake River Compensation Plan (U.S. Army, 1975). Three remote conditioning ponds will be constructed and an existing WDG trout hatchery will be renovated and enlarged as part of this program. These activities were still in the planning stage during the time period this report covers. Therefore, they will be explained and researched more completely in future reports of our ongoing studies.

Early efforts at obtaining project approval and funding for the evaluation work were plagued with delays. Many of the objectives and tasks outlined in the 1983 proposal (appendix 1) were written for specific time periods in the year that correspond logically to steelhead culture practices. Because of a lengthy time delay in obtaining project funds, some of the tasks received only cursory attention. Lack of equipment and manpower precluded collection of sufficient data to properly accomplish the tasks outlined. Other tasks remained incomplete because the appropriate time for the work had come and gone before the project became active.

Although there were several limiting factors that affected our work this first year, considerable background data was collected. Therefore, the intent of this report will be to explain as fully as possible the cultural and management practices that were in effect or inititatd during the project period. Many of the cultural activities were dictated by necessity, need or emergency, and are therefore distinctly non-typical. These activities must be adequately explained, since they could conceivably affect smolt to adult survival: a basic measurement we plan to use for our long-term evaluation. Very few conclusions were reached as a result of our work this year.

Rather, we hope the information contained herein will prove useful, in coming years, when returns from our steelhead releases are complete for several brood years. Then, proper documentation of rearing, releasing and management practices will be invaluable in detecting the course of hatchery operation for years to come.

1.2 Project Description

Lyons Ferry Hatchery is an expansive facility covering about 10 acres of land directly adjacent to the Snake River near the confluence of the Palouse River, Franklin County, Washington. Washington Department of Game's facility includes a hatchery-office-storage building, eight remote deep wells supplying water, gravity flow supply line, aeration tower, 19 concrete raceways (10' x 100'), three semi-natural rearing ponds with 2.0 surface acres each, and a concrete release structure through which the pond reared steelhead are accessed for release. A fish ladder, adult holding ponds, spawning facility, and three remote conditioning ponds are scheduled for construction during 1984 and 1985.

Additional raceway capacity at Lyons Ferry was renegotiated between Washington Department of Game and the U.S. Army Corps of Engineers. Approximately half of the legal rainbow trout capacity was eliminated from the Lyons Ferry site and relocated at the Tucannon Hatchery (See Figure 1). This facility was sold to the Corps of Engineers and will be completely rebuilt and modernized to accommodate the increased production need. Tucannon Hatchery will also be used as a spawning/rearing facility for spring chinook salmon as part of Washington Department of Fisheries' program.

Seven and one half (7-1/2) percent of the legal trout capacity of the program from Lyons Ferry was also directed into habitat improvement within the project area. This production, 7,000 pounds, will be provided by increases in natural spawning and rearing expected from improved instream habitat (See Mendel; 1984).

2.0 METHODS:

2.1 Hatchery Operation

All hatchery operations, procedures, and most decisions concerning handling and care of the fish are controlled by the hatchery manager. Hatchery records are complete and were the source for data concerning rearing time, egg source, disease history, release time and location, food conversion, and partly for size at release. Stock analysis and statement of origin were obtained from Washington Department of Game publication No. 84-9 (Williams, 1984) and from a personal communication with Oregon Department of Fish and Wildlife District Biologist Ken Witty.

Items not covered, or incompletely covered, by hatchery records were augumented by evaluation procedures. Size at time of release was determined from samples taken from the lake release structure or raceways. Our goal was to sample 0.005 percent of the production release. Lengths in millimeters and weight in grams were taken from all groups of fish in separate lakes or raceways. Mean lengths and weights were obtained for each stock by combining samples from throughout the release period. Distinct groups were kept separate, where necessary, and samples were taken from the groups on an equal basis. Estimates of percent precocious males were obtained from these samples. Descaling samples were collected from within the total sample group as part of a basin-wide effort to isolate point sources of descal- which can seriously affect smolt survival. Standard descaling report forms were used.

Condition factors were obtained from the formula:

$$K = \frac{W}{L^3} \times 1000$$ where L = length in centimeters
W = weight in grams
K = condition factor

Juvenile mortality was obtained from comparing "fish in" to "fish out" numbers in the hatchery report. Sources of mortality were determined by observation and concurrence with the hatchery manager.

2.2 Smolt Outmigration

Three different release strategies were to be used in 1985. Direct release from the hatchery, trucking to another hatchery and

(2.2 Smolt Outmigration con't)

release after a "conditioning period", and finally, trucking from the hatchery and direct release into a river or stream. Numbers released at each location were determined by discussions with Curt Vail, District Fishery Biologist.

Outmigration from the lakes was observed from the first day retaining screens were removed. Normally, only one or two lakes were drained through the release structure at a time. Water flow and number of fish have to be controlled to prevent over-crowding and stressing of the smolts in the release structure.

Assessment of smolt survival throughout their migration was obtained from samples taken and expanded at the Snake and Columbia River Dams by National Marine Fisheries Service personnel. Data on estimated fish passage at Lower Granite, McNary, and John Day Dams is available in a yearly research publication (Sims et al).

2.3 Fish Marking Program

Tagging levels of smolt releases were determined by available hatchery space for maintaining distinct tag codes or mark groups, design criteria established under Pacific Marine Fisheries Commission guidelines, and funding level. Nitrogen freeze brands, binary coded wire tags and fin clips were utilized singly and in combination to identify separate groups.

Tagging and branding were conducted during December, 1983. National Marine Fisheries personnel were contracted to perform the tagging since Washington Department of Game did not possess the equipment or expertise for this activity.

Tag loss was determined after two weeks by passing anesthetized fish through a Smith-Root tube type tag detector. Tag releases were reported to the Pacific Marine Fishery Commissin for publication in their annual report.

2.4 Assessing Adult Returns of Steelhead To Project Area

The National Marine Fishery Service monitors adult passage at Bonneville, McNary and Lower Granite Dams. Information on 1982 brand releases into the Grande Ronde River and the Snake River at Lyons Ferry were compiled from published and unpublished reports (Sims et al; NMFS, unpublished data). Harvest of adults return-to Snake River areas occurs in sport, commercial and treaty Indian Fisheries in the Columbia River. Where available, recovery data from tagged release groups was compiled to help estimate adult interception as a portion of total adult return rates.

(2.4 Assessing Adult Returns of Steelhead To Project Area con't)

Sport harvest occurs in the Snake River at each of the Snake river Dams and in the free-flowing portion of river above Lower Granite Dam. This portion of river was sampled in a limited creel survey done with help from Idaho Department of Fish and Game personnel. An estimate of effort was obtained from regualar random counts of boats and fishermen. Catch rates were obtained from angler checks made between effort counts. Biological data was collected from fish caught and kept. The limited nature of The survey did not allow statistically-sound confidence limits to be established. A catch estimate was made for each month of the season from the equation.

$\hat{C} = e\ x$ where $\hat{C}$ = estimated catch

e = mean effort

= mean catch rate

An estimate of steelhead harvest in the river below Lower Granite Dam was obtained from Washington Department of Game's steelhead punch card estimating program.

2.5 Steelhead Populations in Project Rivers

Delays in funding effectively restricted us from obtaining data in 1983. A habitat improvement project, funded separately under the Compensation Program did, however, obtain some data on project rivers.

2.6 Legal Trout Program

Most of the resident trout season was past before funding was available. Lakes and streams planted with Compensation Plan fish were identified, and the number and pounds of fish planted were recorded. Some information on angler use in a Washington Department of Game management area is presented in summary.

3.0 RESULTS AND DISCUSSION:

3.1 Hatchery Operation

3.1.1 Stock Characteristics

Starting hatchery operations in 1982 posed a problem. The intent of Lower Snake River Compensation was to replace anadromous salmonids "in-place" and "in-kind". Early guidelines provided by the Fish & Wildlife Service, with concurrence by the states, stressed the use of indigenous stocks of fish wherever possible. Investigators believed indigenous, or native, stocks would have the best possibility for success in upriver areas. This was the belief of Department of Game personnel for steelhead stocks to be used in Washington Compensation Plan rivers. Additionally, remnant runs of steelhead still exist in many of the rivers. Over-stocking these "native" fish with non-indigenous hatchery fish would likely decrease wild spawning success as discussed by Chilcote in the Kalama River genetics study (Chilcote et al 1984, Leider et al 1984). This type of management would be counterproductive and contradict to WDG guidelines. Unfortunately no broodstock development program had been undertaken by the Department in anticipation of this new hatchery, or the guidelines which stressed indigenous fish. During planning stages Department of Game considered costly stock development unnecessary since two long-term summer steelhead stocks had been cultured effectively for several years. Skamania Hatchery stock, a lower Columbia River tributary, and Wells Hatchery stock, an upper Columbia River fish were chosen for use. Skamania stock had been used for small scale fry and smolt plants into the Tucannon River and Mill Creek in the late 1970's, with some success. However in 1982, serious IHN disease problems had arisen at Skamania. Hatchery Fish being held at Lyons Ferry were returned to Skamania Hatchery to replace losses that had occurred there, and also to remove the disease contamination problems these fish posed at a new disease-free facility.

A replacement group of fish was needed and contacts with Oregon provided that group. Oregon Department of Fish and Wildlife (ODFW) began developing their "Wallowa Hatchery" stock from apparent wild fish trapped at Ice Harbor and Little Goose Dams in the springs of 1976-79. Adult "A" (?) run fish were held at Wallowa Hatchery and spawned. Juveniles were reared one or two years and released into a tributary of the Grande Ronde River. Limited hatchery space and cold water did not allow rapid expansion of the program.

(3.1.1 Stock Characteristics con't)

These fish had most characteristics of the preferred indigenous Snake River fish which were sought by WDG. Lyons Ferry could provide more rearing space, hence both agencies would benefit by more rapid expansion of a joint brood program. Egg needs in 1985 and 1986 for Lyons Ferry and Irrigan Hatchery would be much larger than could be supplied at ODFW's current rate of development. An agreement was reached that the Department of Game would rear about 240,000 Wallowa stock fish for Oregon in return for 50,000 broodstock smolts to be released at Lyons Ferry and additional fish in future years to help with Department of Game's portion of the program. These fish can be described as smaller "A" run-type summer steelhead returning as adults primarily after one and two years salt water growth. Spawning occurs from March through May, with females producing from 2,000-4,000 eggs.

Even though it was decided to utilize this stock of fish in Washington tributaries as a "best" available fish, there were some reservations that should be noted. Early trapping and development was done rather haphazardly. Decisions to accept fish at the trap site for the program were based on visual inspection only. Size and apparent "wildness" from dorsal fin inspection were primary criteria. Scale samples were not taken to confirm freshwater growth or to distinguish A and B run fish. Finally, very few fish were marked for positive identification upon return to allow basic evaluation of their performance.

The Wallowa stock was acceptable, even considering the development shortfalls just listed. Because of these shortfalls and the newness of the stock, the Department of Game deemed it prudent to utilize two separate stocks of fish, the second being Wells Hatchery upper Columbia River fish previously mentioned. It was decided that these fish were acceptable, as they met certain basic criteria, ie: they had been succesfully cultured for many years in the upper Columbia drainage; they were representative of "A" run summer steelhead; there had been no incidence of of viral infection up to this time; there was an abundant supply of eggs available from Wells Hatchery on short notice; and these fish had also been used in the Snake River drainage by Department of Game in past years.

The 1982 brood year was described by Williams (1984) as consisting of 94.9 percent hatchery origin and 5.1 percent naturally produced fish. Most returning adults had spent two years in salt water (86.4 percent) with 13 percent returning after one year and less than one percent after three years. The average fork length for adults was about 65 centimeters. Peak spawning occurred in January. Size and adult age at maturity may not be truly indicative of long-term performance. In past years, this fish was known to return more evenly distributed

(3.1.1 Stock Characteristics con't)

between age one and two fish. Environmental variables may have altered this year's return, but it is doubtful that hatchery growth or adult age will change significantly when cultured at Lyons Ferry.

It was decided these fish would be used for 1983 releases in Compensation Plan streams. Wallowa stock would be substituted in all Snake River tributaries starting in 1984. Wells stock could continue to be used in the Walla Walla River system beyond 1983, since it was a Columbia River tributary and most plants would occur in stream areas no longer utilized by wild fish.

Legal size rainbow trout at Lyons Ferry were Spokane stock. This is a long-term rainbow broodstock developed by Department of Game at the Spokane Hatchery. They are a rapid growing, colorful fish that has exhibited excellent one year growth characteristics and is easily caught in both lake and stream situations. The Department currently has facilities to provide egg requirements for Lyons Ferry production needs and this stock will likely be used in the future unless serious disease problems arise. Crawford (1976) provides a more detailed analysis and history of this stock.

3.1.2 JUVENILE GROWTH:

Hatchery records are kept monthly on lots (groups) of fish, their growth, and estimated total numbers based on poundage and samples of fish per pound. When done carefully, these records can be reasonably accurate. All fish were received after hatching from 1982 brood (1983 release year). Table 3.1 lists estimated numbers of fry received at Lyons Ferry in 1982.

TABLE 3.1 Trout Production at Lyons Ferry Hatchery, 1983

Sp.	Stock	Fry	Feed (lbs)	Smolts (lbs)	Feed Conversion	Mean Length (mm)	Mean Weight (gms)	K-Factor	Number Planted
SS	Wells	673,820	124,001	92,001	1.33	191	70.8	9.6-10.9	581,213 @
SS	Wallowa	241,600	49,850	36,342	1.53	187	76.7	10.5-12.4	232,030
RB	Spokane	273,884	13,750						249,729

@ 69,422 sub-smolts were out-planted amounting to 1,322 pounds of fish. Total steelhead plant for Wells stock was 650,635.

Production of steelhead was greater at Lyons Ferry, this year, than originally planned. The 674,000 Columbia River fish had been the entire program planned in 1982. The additional 241,000 Snake River fish from Oregon were added after an agreement between the States. These fish caused a space problem as a result of construction flaws at the hatchery. Long-term rearing at Lyons Ferry is dependent upon three large rearing ponds, which were incomplete in the summer of 1983. Most of the fish needed to be transferred into ponds by late summer, as the raceways were becoming over-crowded. However, structural problems with the lakes caused further delay and most fish were not ponded until late October and November. Over-crowding in the raceways was expected to adversely affect growth. Some smaller groups held for tagging were not ponded until mid-January.

Fish are fed with automatic feeders in the raceways and by a truck mounted power feeder in the rearing ponds. Feeding rates were based on monthly estimates of poundage per raceway or rearing pond, and reference charts provided by the feed manufacturer. All steelhead were fed Oregon Moist Pellet (OMP) at recommended chart levels. Feeding rates were adjusted by the hatchery manager during the growing year to prevent over-growth in some groups and to encourage smoltification in general. Adjustments are well within acceptable limits to ensure fish health.

Rainbow trout were fed a dry diet preparation used for legal trout production. Growth rates are not as critical for rainbows because of greater rearing time available and the dry food provides a considerable cost-savings over OMP.

Food conversion rates were quite good for all groups of fish. There was a measurable difference in conversion between Columbia River (Wells) and Snake River (Wallowa) stocks (Table 3.1). Better food conversion may be the result of several factors. First, the Wells stock is a long-term hatchery reared fish and exhibited much more docile behavior when observed in the raceways. Activities

(3.1.2 Juv. Growth Con't)

in or around the raceways such as cleaning or size grading of the fish were probably less stressful to Wells stock than to the very "spooky" behavior displayed by Wallowa stock fish. Any presence of hatchery personnel around the raceways caused Wallowa fish to flee away and pack themselves densely at the opposite end. This type of reaction cannot have aided growth or food conversion.

The two stocks were also treated differently during grading. Very small Wallowa fish that were graded out from the majority were kept and nursed along separarately in an attempt to produce every possible smolt from the limited supply of fish. This was not necessary with the Wells fish, where undersize, slow-growing fry were removed entirely from the program. The larger more even-sized Wells fish would be expected to convert their diets better than the Wallowa fish, as was the case. More normal activities in future years will provide better circumstances for comparison of the productive ability of Wallowa fish in the hatchery. Their current conversion rate is not low enough to be of concern.

3.1.3 Fish at Release

There was considerable variation in the size of smolts at times of release. Samples from the various groups are summarized in Table 3.2. The means expressed in the Table are a summation of all samples taken over the entire release period. Screens were removed from the lakes about April 25, and our first samples collected on April 30. Fish were out-planted from May 1 through May 12 and length weight samples taken on most days. Samples taken from Lake 1 were a mixture of marked and unmarked fish from both stocks. These fish were the hatchery brood release and survival group. The individual group's sample characteristics were kept separate to compare with the growth and condition of other groups reared under different circumstances. These fish reared in the pond for the shortest time of any group.

TABLE 3.2 Length, Weight and Condition Factors (K) for Production Groups at Lyons Ferry Hatchery in 1983.

Stock	Location	Sample Size	Length (mm) $\bar{x}$	Length (mm) Range	Weight (gms) $\bar{x}$	Weight (gms) Range	K-Factor $\bar{x}$	K-Factor Range	Precocious Male (1)
Wallowa	Raceway	629	187	137-214	76.7	29.7-104.3	11.7	10.5-12.4	2.9%
Wallowa	Lake 1	40	220.4	213-223	103.3	94-107	9.65	-	
Wells	Lake 1	63	223.4	215-230	110.4	96-121	9.9	-	3% (2)
Wells	Lake 1	43	191.9	-	71.8	-	10.2	-	
Wells	Lake 2	336	190.3	178-196	69.4	60-74	10.1	9.7-10.5	-
Wells	Lake 3	300	192.0	183-196	72.2	66-76	10.2	9.6-10.9	-

(1) Percentages based on limited sample size, not necessarily representative.
(2) Cumulative for all groups in Lake 1.

(3.1.3 Fish at Release con't)

Variability of group growth and size was greater for Wallowa stock. Later spawning time, and the greater duration of spawning combined with factors previously mentioned (ie: rearing conditions and grading practices) explain these variations. Most of these fish were returned to Oregon in May 1983 for out-planting. Twelve percent of the sampled fish were considerably lighter (39%) than mean weight and 27 percent shorter than mean length. These fish were quite evidently not smolts at time of release; however, Oregon expressed belief that at least some would rear additional years in streams outmigrate in the future.

The average size (at release) of fish held in Lake 1 for future broodstock was larger than either Lakes 2 or 3 for Wallowa and Wells stock. These fish were only in Lake 1 for about 12 weeks. The apparent size contradiction was a result of the coded wire tagging process (Section 3.3). Tagging was conducted in December of 1982, and larger fish had to be chosen to allow for freeze branding. Smaller fish could not be used for assured brand retention and visibility at outmigration.

3.1.4 MORTALITY AND PREDATOR LOSS:

Overall mortality in the hatchery from fry to smolt was very low. Table 3.3 summarizes mortality by stock. Constant water temperature and no disease out-

TABLE 3.3 Fry to Smolt survival - Lyons Ferry Hatchery 1983

Sub-Smolts Species	Smolts Stock	Fry	Sub-Smolts Planted	Smolts Planted	Survival
S. Steelhead	Wallowa	241,600	0	232,030	96%
S. Steelhead	Wells	673,820	69,422	581,213	86%@

@Total accountable survival for smolts and sub-smolts was 96.5%

breaks during the rearing period provided excellent survival conditions. Predator losses to seagulls, herons and ravens were a concern throughout the season. Constant hazing of seagulls was necessary to keep the bird population controlled. When hazing with cracker shells was discontinued, several hundred seagulls would congregate near the lakes within a few days.

Another source of mortality was precocialism and failure to outmigrate. Rearing ponds have a semi-natural rock bottom that does not allow fish to be flushed from the pond. Considerable effort was expended to remove as many fish as possible. Eventually however, water flow was terminated and any remaining fish perished. These fish were rapidly consumed by seagulls, so an accurate estimate of loss was difficult. As many as 7,000 fish, approximately 1,000 pounds, may have perished in pond bottoms. The remaining 15,000 fish loss can be attributed

(3.1.4 Mortality & Predator Loss Con't)

to some pre-planting mortality in the lakes, ongoing predatory loss and unattributable loss that may occur as discrepancies in estimating fry numbers and smolts planted. Error is inevitable in any estimate. Current mortality appears to be very acceptable and predatory loss is not a serious problem as long as current hazing efforts continue.

3.2 FISH MARKING:

3.2.1 Smolts Marked

Table 3.4 summarizes mark, tag, and brand releases associated with Lyons Ferry Hatchery through 1983. The 1981 release was from the Tucannon Hatchery as part of a homing study conducted by National Marine Fisheries Service (NMFS) and is included for comparison purposes in future reports. A complete discussion of experimental methods and purpose are described by Slatick et al. (1982)

TABLE 3.4 Mark Releases from Lyons Ferry/Tucannon Complex 1981-83

Release Year	Tag Code	Brand	# Released	Size (#/lb)	Tag Loss	Release Site	Stock
1981	62/16/08	LA-T-1	106,806	-	-	G. Ronde	Wells
1982	62/16/50	LA-IJ-1	35,155	9.7	-	G. Ronde	Wallowa
1983 @	62/16/50	LA-IJ-3	27,940	8.0	-	L. Ferry	Wallowa
	-	LD-S-1	52,253	4.3	-	L. Ferry	Wells
	63/28/38	LA-S-1	50,597	4.3	3.2%	L. Ferry	Wallowa
	63/28/39	RA-S-1	34,431	5.8	3.3%	Oregon	Wallowa
	63/28/40	RA-S-2	32,078	5.0	2.7%	Oregon	Wallowa

@ Brand visibility was about 91% at time of release

The 1982 release was an attempt to assess survival of a new stock of fish available from Oregon. These were the first Wallowa stock reared in Washington, and were obtained as grade-offs from Irrigon test hatchery. Tag and brands were to help assess outmigration and adult survival. Release of a single tag code at two locations caused problems in assessing actual adult performance. Juvenile performance is discussed in Section 3.3.3.

1983 releases were two separate experiments. Two duplicate releases were made into the Grande Ronde River in Oregon for identification and adult return studies. Coded wire tags are necessary to activate adult traps on the

(3.2.1 Smolts Marked con't)

Columbia and Snake Rivers. This fish will contribute to timing and stock interception studies in lower river fisheries. Duplicate releases from Lyons Ferry Hatchery were made to assess outmigration performance and homing capability to the hatchery release site. Wells stock fish were not tagged due to lack of funds.

3.3 SMOLT OUTMIGRATION:

3.3.1. Smolt Releases and Locations

Table 3.5 summarizes all steelhead plants by stock and by planting site for 1983. The total number of fish planted was 700,717 and amounted to 108,513 pounds of steelhead. Oregon received 24,570 pounds of smolts and sub-smolts under a mutual agreement.

TABLE 3.5 Smolt Plants from Lyons Ferry Hatchery 1983

Planting Site	Drainage	# Planted@	(#/lb)	Stock	Marks
Enterprise, Or.	G. Ronde	64,133	5.7	Wallowa	Ad/Cwt/Brand
Enterprise, Or.	G. Ronde	44,330	15.5	Wallowa	No marks
Enterprise, Or.	G. Ronde	72,943	7.4	Wallowa	No marks
Lyons Ferry	Snake R.	50,619	4.3	Wallowa	Ad/Cwt/Brand
Lyons Ferry	Snake R.	52,253	4.3	Wells	Brand only
Walla Walla R.	Columbia	91,260	7.0	Wells	No marks
Tucannon R.	Snake R.	148,275	6.5	Wells	No marks
Lyons Ferry	Snake R.	35,680	7.0	Wells	No marks
Touchet R.	Walla Walla	76,250	7.1	Wells	No marks
Mill Creek	Walla Walla	28,200	7.1	Wells	No marks
Asotin Creek	Snake R.	36,774	6.8	Wells	No marks

@ Discrepancies in numbers may occur if compared to mark releases. Source of this table is hatchery planting forms based on poundage estimates, not enumeration.

3.3.2 Hatchery Operation

Two types of releases occurred this year. Most fish were removed from the rearing pond through the release structure, then pumped into trucks and hauled away to a final release site. A second group was allowed to volitionally migrate from a rearing pond into the Snake River over five or six days, then the remainder was forced out.

Fish were pumped into trucks using a Nielson fish pump. Some early problems with pump operation resulted in stressed, injured, or dead fish. Minor changes

(3.3.2 Hatchery Operation con't)

in procedure to prevent large numbers of fish from being stranded in the pump solved this problem. Concerns about descaling from the pump were unfounded, as we could measure no increase in scale loss after loading and transport. Descaling samples were collected during the length-weight sampling prior to transport. Sampling was coordinated with a basin-wide study to identify sources of scale loss. The criteria for classifying an individual descaled, was 40 percent scale loss on one side of the body. There was no measurable scale loss from fish either in the lakes or from raceways. This statement is slightly misleading because there were in fact fish with scale loss in the mid-lateral area of both sides but loss was insufficient to classify fish as descaled. The minor scale loss observed was probably from various sources such as lake drain structures, drain pipe, release holding structure, fish pump, handling, and transportation. Descaling does not appear to be a problem in the Lyons Ferry system.

3.3.3 MIGRATION THROUGH DAMS:

Migrational data from two years are available. The 1982 release included here was reared at Tucannon Hatchery and released at two locations (See Section 3.2.1). Although these fish were small and may not be representative of smolts reared at Lyons Ferry; they were WDG's first marked release from the site. TABLE 3.6 summarizes mark releases and estimated passage at a particular dam. Passage estimates were obtained from Sims et al. 1983 and 1984.

TABLE 3.6 Estimated Passage of Branded Lyons Ferry Steelhead at Lower Granite and McNary Dams, 1982 and 1983.

Brand	Year	# Released[@]	Dam	# Collected	Est. Passage	% of Release	Size #/lb	Stock
LA- 1J-1	1982	35,155	L. Granite	7,562	21,466	61.1	9.7	Wallowa
LA-1J-3	1982	27,940	McNary	2,803	14,985	53.6	8.0	Wallowa
RA-S-1	1983	33,000	L. Granite	8,151	15,616	47.3	5.8	Wallowa
RA-S-2	1983	32,000	L. Granite	6,557	13,230	41.3	5.0	Wallowa
LA-S-1	1983	50,597	McNary	6,128	31,192	61.6	4.3	Wallowa
LD-S-2	1983	52,253	McNary	4,432	22,433	42.9	4.3	Wells

@ See Table 3.4 for release site

Mark groups collected in 1983 at Lower Granite Dam were released from ODFW's Wallowa Hatchery after a 24-hour acclimation period. One half of the fish sampled at Lower Granite Dam of these mark groups passed the dam within 12-18 days of release; however, fish continued to pass the dam for over two months. Fish released from Lyons Ferry and collected at McNary were collected for over three months, but it appears at least one half the fish passed the dam within 8-12 days.

(3.3.3. Migration Through Dams con't)

Estimated fish passage at the sampling dams showed a substantial loss of juveniles within the system in every case. The low passage rate is somewhat surprising at Lower Granite Dam. No other major dams are present in the system before Lower Granite, yet passage rates are lower than lower river releases where two dams hinder movement and induce mortality. Also interesting, was the greater passage rate for the 1982 release above L. Granite Dam. These fish were quite small compared to the 1983 release, and considerable residualism occurred (Witty, Personal Communication) with the 1983 release. It seems unlikely that fish this size would outmigrate more readily than smolts of greater size. Water flow, collection efficiency, delayed trucking mortality and point of release may have affected these numbers as well as passage estimate errors for all groups.

These figures should not be considered smolt survival, rather an indication of outmigration performance. Collection efficiency at the dams, a major parameter in estimating passage, varies dramatically with changes in flows. Because of this variance, confidence limits are very wide and utilizing estimates as indirect measures of survival becomes questionable. Survival rate studies proposed by the Water Budget Center in 1984, and after, could provide better survival rate data which can be used for our releases.

3.4 ADULT RETURNS:

3.4.1 Dam Count (Brand Sampling)

Down river sampling of tagged or branded adult steelhead is the first chance of recovering adults after release. Brand sampling is an integral part of this program, which allows accurate enumeration and positive identification without harming the fish. Sampling of adults was conducted by NMFS personnel at Bonneville and Lower Granite Dams in 1983. Expected adult returns were limited to a single tag release in 1982 from fish reared at the Tucannon Hatchery. These fish are not representative of Lyons Ferry production, as previously mentioned, but do provide insight into what may be expected from subsequent releases in the upper Snake River drainage. TABLE 3.7 summarizes recoveries of marks or tags for various locations throughout the drainage. It should be noted that trapping efficiency is very low at Bonneville Dam and probably accounts for the small sample size when compared with Lower Granite Dam, which is several hundred miles up river.

TABLE 3.7 Mark Recoveries in Columbia River Basin for 1983
(Tag Code 62-16-50, Brand (LA-IJ-1 and LA-IJ-3)

Location	Bonneville Dam	L. Granite Dam	Columbia R. Sport	Columbia R. Indian	Snake R. Sport	Other
#	24@	289	1	16	21	1
% of Release	.038	.458	.001	.025	.033	.001

@ Trapping efficiency very low in 1983

(3.4.1 Dam Count (Brand Sampling) con't)

Combining Lower Granite Dam passage with comsumptive sport or commercial tag recoveries gives a smolt to adult return of 0.518 percent. These fish are only those which can be directly accounted. Returns, however, meet the original design criteria for the Lyons Ferry, which was 0.5 percent return from smolts. This was also only the one-salt returns for the release and additional two salt adults are expected in 1984.

Two possible problems became evident from brand groups sampled at Lower Granite Dam. Each brand position, 1 and 3, was released in a different location. Brand position 1 was released in the Grande Ronde River approximately 70 miles above Lower Granite Dam and adult returns were 74 of the 289 sampled or about 26 percent. These adult fish returned more poorly than brand position 3, which were released at Lyons Ferry Hatchery after two weeks of conditioning and comprised the remaining 74 74 percent of sampled fish. The disparity in survival rates is and somewhat unexpected considering the success of smolt transport at Lower Granite Dam in recent years, and the high survival rate estimated for the IJ-1 group juveniles. The second problem is the failure of brand group 3 to return to the hatchery. These fish were conditioned and fed for two weeks at the hatchery but continued up river above two dams during summer migration and the following spring. There was no apparent "drop back" to the hatchery during spawning. This behavior could interfere with successful adult brood returns to the hatchery in future years.

3.4.2 Sport, Commercial and Treaty Indian Harvest

Tag recoveries, as listed in Table 3.7, are the result of in-hand samples from the areas listed. These numbers should be considered an absolute minimum return size since there is no error in counted numbers. These fish were recovered from fisheries while sampling to estimate harvest. Utilizing harvest estimates and sample rates allows an expansion of these recoveries to an estimated total contribution in the fishery. These expansions (Table 3.8) are based on sample ates for all steelhead throughout the entire sample period. Sample rates varied

TABLE 3.8 Expanded Tag Recoveries, Columbia River, 1983

Location	L. Granite Dam	Columbia R. Sport	Columbia R. Indian	Total
# Fish	390	9	27	426
% of Release	.618	.014	.042	.675
Expansion Factor	1.349	9.0	1.687	

from 11 to 74 percent (King 1984, Morrill 1984 unpub.) of harvest or passage. or passage. Sport fishery samples were lowest, but increased sampling effort in future years should provide better information. Expanded returns present a better picture of returns and contributions.

(3.4.2 Sport, Commercial and Treaty Indian Harvest con't)

Harvest of steelhead in these fisheries occurred on a near record run of steelhead into the Columbia River system in 1983 (King 1984). The run of 217,600 counted at Bonneville Dam was the highest since 1972.

Table 3.9 summarizes harvest estimates for major fisheries occurring on Snake River stock steelhead. It is imperative that sampling in these fisheries continue to allow proper assessment of adult survival from L.S.R.C.P. smolt releases. Some of these fisheries will be directly sampled by hatchery evaluation personnel (eg. Snake River sport) but lower Columbia River fisheries information must be obtained from Oregon Department Fish and Wildlife, Washington Department of Fisheries or Washington Department of Game existing programs.

TABLE 3.9 Harvest of Steelhead in the Columbia River Basin, 1982-83

	Harvest Location					
Year	L. Col. (1) Sport	Col. Sport (2) Bonn-McNary	Snake R. Below (3) L. Granite	Snake R. Above (3) L. Granite	Col. R. (4) Treaty Ind.	Total
1982	4,385	767	431	2,097	4,000	11,680
1983	3,700	559	979	1,417	15,100	21,755

(1) From: The 1983 Lower Columbia River Recreational Fisheries; King, 1984. Including Washington and Oregon catch.
(2) From: Summary of 1983 Summer-Run Steelhead Sport Catch in Washington, 1984: Washington only.
(3) From: Lyons Ferry Evaluation Sampling 1982-84 (See Appendix 2).
(4) From: Oregon Department of Fish and Wildlife, Washington Department of Fisheries, Washington Department sampling 1982-83, C. Morrill personal communication of unpublished data.

3.5 EXISTING POPULATION:

3.5.1 Juvenile Populations in Project Streams

The intent of this section was to provide field data on juvenile and adult populations from project area streams in southeast Washington. The direct need of this data was to establish a baseline from which increases or decreases in population density could be measured in order to properly assess the performance of future Lyons Ferry smolt plants. Unfortunately, delays in budgeting and contract preparation for the 1983 field season forced us to miss collecting data in 1983.

As part of a separate but related program, however, Mendel and Taylor (1981) collected significant juvenile population data for all major streams in the area. This information was used in siting habitat improvement structures built in 1983. The information is too lengthy to repeat here, but will be used in

(3.5.1 Juvenile Populations in Project Streams con't)

subsequent evaluation reports as a point of reference. Where possible, electroshocking sites on all streams for 1984 will duplicate Mendel's locations but will not be as numerous.

In overview, all streams to be planted with smolts have existing populations of rainbow/steelhead trout as well as varying densities of brown trout, bull trout, chinook salmon, mountain whitefish, dace, sculpin, sucker, shiner, and lamprey. Salmonid populations and their habitat have seriously degraded in recent times (Fulton 1970, Kelley and Associates 1982) especially after the floods of 1964-65 and 1973. Streams are generally shallow, fast and lacking good pool habitat necessary for juvenile salmonids age 1+ and older. Stream side vegetation is often lacking or insufficient to prevent summer stream temperatures from reaching critical levels for salmonids (Mendel and Taylor 1981), especially in lower stream areas. Salmonid populations are primarily comprised of age 0 and 1+ age groups with very few fish larger than 150 mm fork length evident (Mendel and Taylor 1981, Mendel 1984). All streams are open during the general trout season and receive light to heavy angling pressure, which may account for the absence of older age class fish. Only the Walla Walla and Touchet Rivers have open steelhead seasons. Most other tributaries have been closed to steelhead angling for several years to protect remnant wild populations. Steelhead harvest on the Touchet and Walla Walla River ranges between 100-300 fish each annually, based on punch and estimates. This fishing is supported by a wild run of fish which spawn primarily in the uppermost reaches of both streams. Sporadic plants of eggs, fry, and smolts were made in the 1970s. Several Snake and Columbia River stocks (including Idaho Dworshak "B" run) were used, but little evidence is available to assess the success of these plants.

3.5.2

Adult spawning historically occurred in most tributaries in March, April and early May (Eldred, 1960: Eldred, 1964). Adult steelhead and redds were observed in the Tucannon River and Asotin Creek in 1983. A sampling schedule for walking portions of both streams was attempted; however, it became evident early in the season that high run-off and murky water conditions frequently interfered with visibility. Quantification of redds/mile was not possible this season. Enumeration of escaping adults would be preferable to spawning ground counts, and additional personnel will be required to adequately sample with either method. Some trapping may be possible in 1984 at the Tucannon Hatchery and more effort to count redds will be made.

3.6 Legal Trout Program

Legal trout production under L.S.R.C.P. will be reared at Lyons Ferry and Tuccannon Hatchery. Total production from the hatcheries will be 86,000 pounds of legal size (3/lb.) rainbow trout. Idaho will receive 6,200 pounds annually and Washington receives the remainder. Thirty-six lakes, ponds, and

(3.6 Legal Trout Program con't)

streams receive plants of rainbow annually. Appendix 3 lists waters which received plants in 1983 from the 1981 brood year. Total poundage planted in 1983 was about 45,500 pounds.

Fisherman days use in the areas are difficult to estimate because of the large number of ponds and streams planted. Columbia County plants occur mainly within a Washington Department of Game habitat management area and some sample data is available from quarterly use reports. Total use for trout during 1983(excluding whitefish fishing) was 51,331 man days. This number was evenly split between lake and stream anglers. Most effort occurs on the lakes in April-June then shifts to stream angling July-October. Creel data from early season checks in lake and stream show some carryover fro previous year plants but not more than 10 percent of total harvest.

Catch of juvenile steelhead in the Tucannon River was an early season problem. Attempts to control this activity with a minimum size limit was not effective because of severe hooking mortality on released fish. Estimated harvest, based on voluntary checkouts from the HMA, was over 180,000 trout. Such high numbers, almost twice the total legal trout plant, cast doubt on the usefulness of this information. Some cross-checks of the data indicate succesful fisherman are much more likely to check out voluntarily than unsuccessful fisherman. This factor combined with the fact that only one fisherman in ten stops, would account for a gross overestimation of harvest. These short falls point to the need for a better estimator of harvest. The size and nature of the fishery will likely require a detailed and expensive creel survey program in some future year to accurately assess harvest rates and total man days recreation provided by L.S.R.C.P. legal plants.

The remaining legal trout fisheries are intensively fished and because almost no carryover occurs in these small lakes and ponds, we suspect 90-95 percent utilization annually. Some carryover will occur in parts of the Touchet and Walla Walla rivers, Mill Creek, Mill Creek Reservoir, and Asotin Creek, but we were unable to assess harvest in these areas. A creel survey of Asotin Creek was performed in 1984 but was not available for this report. That information will be included in our 1984 annual report.

4.0 Summary

1983 evaluation work at Lyons Ferry was not completed to full potential. Funding delays, construction problems at the hatchery, unfamilarity with the area, and insufficient man power left many tasks unaccomplished. Our basic approach to long term evaluation of a new facility is still sound and necessary to determine the success or failure of this program. Expanded budgets in future years will allow adequate sampling of field resources and timely completion of outlined tasks necessary if objectives are to be adequately addressed. Comments concerning each objective (Appendix 1), its shortfalls or strengths are appropriate here.

(4.0 Summary con't)

OBJ. 1. Juvenile growth and development in the hatchery is the easiest task of this program since the fish are in a controlled environment. These are some apparent growth and behavior differences between the two stocks of fish being used, but we hesitate to draw any conclusions. Both groups of fish were handled and stressed more than desired because of constant construction problems. These problems are not likely in future years, which should allow for better hatchery environment conditions. This is a very important objective and will be retained throughout the life of the project. Future years may allow for size at release studies to determine best possible fish size for each stock.

OBJ. 2. Smolt out-migration behavior is an early source of data for assessing the success of each year's release. Information provided by N.M.F.S. personnel is crucial to this portion of our program, and we would strongly recommend continued funding of this juvenile sampling program at the dams.

Lyons Ferry smolts outmigrated well in 1982 and 1983. There are some unusually high loss rates from our smolt releases. We feel these "lost" fish are being lost primarily to residualism and turbine mortality even though releases are made to coincide with flushing spills at the dams to improve downstream survival. Significant error in estmating passage at the dams could also misrepresent the outmigration. Survival studies in 1984 and 1985 are planned by the Water Budget Center.

OBJ. 3. Few adult returns were expected in 1983. There was, however, a disturbing tendency to bypass Lyons Ferry Hatchery and proceed up river. Returns in 1984-86 will provide more information on adult returns and homing ability. Continued marking of broodstock releases from the hatchery are critical because of this concern.

OBJ. 4. Positive identification of hatchery stock releases will be an integral and crucial part of the evaluation study and hatchery operation for the forseeable future. The need to assess escapement, mortality, and harvest in multiple locations and fisheries will be a major need. Without this information, it will not be possible to determine if compensation goals have been met.

Hatchery design currently limits the number of mark groups that can be released Completion of three conditioning ponds in 1984 and 1985 may allow more marked fish to be held separately.

OBJ. 5. Adult returns are the primary indicator of success for the program. Assessing spawning escapement is an integral part of this need. Spawning ground surveys are a useful tool for charting long-term improvements in anadramous runs in places where those fish are likely to spawn. Compensation plan streams in southeast Washington have serious habitat and erosion problems that make it very difficult to view the progression of spawning throughout the season. Heavily turbid waters frequently obscure spawning activity. Juvenile age-class populations are one means by which spawning success can be indirectly measured. Field data is available in several streams for the area, and we will

(4.0 Summary con't)

collect data through 1985. Careful review of the data should help us decide the best means of assessing adult returns.

OBJ. 6. Legal trout production at Lyons Ferry was determined from estimated user-days of fishing lost because of pool impoundment. The basis for the evaluation is dependent on this measurement of recreational effort. The scope of the project is a serious problem. Cost to adequately sample a large number of waters is prohibitive. Representative waters will be selected in 1984 and 1985 for more thorough sampling, and we will estimate harvest and the number of recreational user-days provided. This program will be the least accurate of all our objective needs and may require extensive modification if it is to be useful or precise.

Our general approach to evaluation will remain unchanged. Tasks and objectives will change as needs demand and as the program expands to its full compliment of facilities and production in 1985 and 1986.

LITERATURE CITED

1. Chilcote, M. W., S. A. Leider, J. J. Loch. 1984. Kalama River Salonid Studies 1983 Progress Report. Washington Department of Game publication 84-5. 82 pg. plus appendixes.

2. Crawford, B. A. 1979. The Origin and History of the Trout Broodstocks of the Washington Department of Game. Washington Department of Game Fishery Research Report. 61 p. plus appendixes.

3. Eldred, D. and J. Douglas. 1960-1964. A Report of Factors Influencing the Production of Steelhead in Southeast Washington. Unpublished 13 pgs.

4. Fulton, L. A. 1970. Spawning Areas and Abundance of Steelhead Trout and Coho, Sockeye, and Chum Salmon in the Columbia River Basin -- Past and Present. U.S.F.W.S., Special Science Report -- Fish. 618. 37 pgs.

5. Leider, S. A., M. W. Chilcote, J. J. Loch. 1984. Kalama River Studies Final Report. Part 1: Watershed Spawning Studies. Washington Department of Game Publication 84-7. 18 pgs.

6. Mendel, G., M. Taylor. 1981. Lower Snake River Fishery Enhancement Study Phase II Report. 1981. Report to U.S. Army Corps of Engineers. 77 pgs. plus appendixes.

7. Mendel, G. 1984. Instream Habitat Improvement in Southeast Washington; 1983 Annual Report (Phase II). Report to U.S. Army Corps of Engineers. 36 p. plus appendixes.

8. Sims, C. W., A. A. Giorgi, R. C. Johnsen, D. A. Brege. 1983. Migrational Characteristics of Juvenile Salmon and Steelhead in the Columbia River Basin 1982. Report to U. S. Army Corps of Engineers. 28 p. plus appendixes.

9. Sims, C. W., A. E. Giorgi, R. C. Johnsen; D. A. Brege 1984. Migrational Characteristics of Juvenile Salmon and Steelhead in the Columbia River Basin 1983. Report to U. S. Army Corps of Engineers. 30 p. plus appendixes.

10. Slatick, E., L. G. Gilbreath, J. R. Harmon, K. A. Walch. 1982. Imprinting Salmon and Steelhead Trout for Homing, 1981. Report to Bonneville Power Admin. 49 p. plus appendix.

11. U. S. Army Engineer District, Walla Walla, Washington, June 1975. Special Report: Lower Snake River Fish and Wildlife Compensation Plan. 1975. 95 p. plus appendixes.

12. Williams, K.; Wells Hatchery Stock Analysis: 1982 Broodstock. WDG Publication #84-9, 11 pg.

Appendix 1

APPROACH:

Populations of hatchery reared steelhead will theoretically be distinctly different between river systems. Where management has defined native populations that are uniquely adept at survival, those groups will hopefully be preserved. Using an external mark with the population serves to identify two groups, marked and unmarked. Marking has been done for release in 1983 of both schemes. Some groups were marked as representatives of a larger group to aide in determining return and interception rates. Another group was completely marked for positive identification to develop disease-free broodstock. A third group was marked to distinguish it as non-preferred/non-wild interim production stock. Utilizing these marks to their full potential requires several specific data collection points:

(1) Monitoring passage, as smolts, at hydroelectric facilities to assess delays or changes in migratory behavior.

(2) Sport and commercial harvest locations for contribution and catch as percent of returning adults.

(3) Adult passage at hydroelectric facilities (triggered by coded wire tags at selected Columbia and Snake River dams).

(4) Direct collection of brood adults at the hatchery and also collection of stray fish which were released into terminal rivers but "homed" to the hatchery.

(5) Terminal sport fisheries in compensation plan rivers.

(6) Finally, increases or decreases in adult spawners in natal areas of tributary streams.

Evaluation requires all these factors to be analyzed. Without one, or a combination of areas, the picture is incomplete and objective analysis is replaced by conjectur and inference.

Proper experimental design utilizing some or all of the marking techniques mentioned earlier, will allow changes or differences in groups to be accurately measured and statistically tested.

Study Plan:

Objective 1: Document Juvenile Growth and Development

Task 1.1 Document mean rearing time from egg take to smolt release for distinct egg take groups. Include disease history to determine effects on growth. Much of this information is available from hatchery records.

Task 1.2 Sample 0.005 to 0.01 percent of separately reared groups for mean fork length and weight in millimeters and grams respectively.

Task 1.3 Calculate condition factors for all groups based on data from Task 1.2. Compare wild stock growth and condition to hatchery stock currently being used to supplement production. Radical differences in condition factors between hatchery and wild parent smolts may provide an indicatin of expected smolt performance and survival.

Task 1.4 Estimate raceway, or pond mortality, based on estimates of numbers of fish stocked versus number of fish removed. Attempt to identify sources of mortality. Some possibilities are:

a. disease
b. avian predator
c. stocking estimates error

Task 1.5 Determine smolt hardiness by analyzing condition factors and percent descaling of smolts prior to release. Descaling has a direct effect on survival and will be evaluated utilizing standard descaling report forms used by transporting agencies. This data will also be submitted to Idaho as part of their smolt descaling research.

Objective 2: Document Smolt Out-migration Behavior

Smolts will be released under three different circumstances during 1983. Directly from Lyons Ferry into the Snake River. Trucked from Lyons Ferry to Enterprise, Oregon, held for one to five days, then allowed to volitionally migrate. Trucked from Lyons Ferry to river release sites and dumped directly in the river at several sites.

Task 2.1 Observe and record migration behavior from rearing ponds through the release structure. Document first day where screens are removed. Observe numbers migrating over a period of time and total number left in rearing pond.

Task 2.2 Document transfer of smolts from Lyons Ferry to Wallowa Hatchery and document descaling causd by trucking. Determine by observation if transfer decreases willingness to migrate, or if trucking induces residualism. Observe if migration pattern from Wallowa differs from Lyons Ferry.

Task 2.3 Observe and document smolt behavior from river release sites, according to river conditions and willingness to migrate.

Task 2.4 Determine migratin time and performance down river by information gathered at established smolt transport and sampling locations on the Snake and Columbia rivers. Externally freeze branded fish will be indicators of group performance (see Obj. 5).

Objective 3: Document hathcery rack returns of marked production and broodstock hatchery releases.

Marked rerutns will be used as part of totals for quantifying percent return from release.

Task 3.1 Determine timing of returns from Lyons Ferry releases by examining returns of branded-coded wire tagged adults to adult collection facilities at McNary and Lower Granite Dams. (see Obj. 5). Direct collection at Lyons Ferry will be possible after fall 1984.

Task 3.2 Examine adult returns to Wallowa Hatchery to determine percent return marked Lyons Ferry reared fish for brood year 1985-86.

Objective 4: Mark representative groups from Objectives 2, 3, to allow accurate statistically sound analysis of those objectives and to establish the basis for adult return evaluation to tributary rivers in future years.

Task 4.1 Determine planting allotment for each compensation plan river to be planted based on available 1982 brood production.

Task 4.2 Establish coded-wire tagging levels based upon data from Task 4.1 guidelines set forth in the P.M.F.C. according to standard reporting procedures adapted by Pacific Coast States.

Objective 5: Attempt to establish some reliable indicator, other than sport harvest, to evaluate increased spawning escapement or success in target rivers. Juvenile age class population estimates for selected study sections and a Redd per mile index are two possibilities.

Task 5.1 Locate representative juvenile rearing areas in the Tucannon and Touchet River systems that will provide year-around habitat on the Tucannon for all aspects of rearing capability.

Task 5.2 Establish two or three 100 meter sections to be electroshocked in the fall for age 0 and age 1 steelhead on each river.

Task 5.3 Use standard backpack electroshocker and block nets at upper and lower end of section to prevent recruitment or escape. A two-pass removal method for calculating population (Zippin, 1958) would be used. Fish would be kept live in buckets until

(Task 5.3 Continued)

shocking was complete, then weighed (gms) and measured (mm) respectively. Percentage age class would then be established by lengths.

Task 5.4 Compute population estimates and confidence intervals as described by Zippin (1958). This data will serve as a baseline when added to juvenile data collected by Mendel (ibid). Increases in juvenile age class abundance will be an indirect indicator of increased spawning escapement from a specific smolt plant.

Task 5.5 Establish two or three study sections one kilmeter (1 km) in length on both the Tucannon and Touchet rivers. These sections should be representative, as far as possible, with environmental constraints of spawning area in these systems.

Task 5.6 Walk each section once per week beginning in April to identify: (a) initial date of spawning; (b) density of spawners, expressed as mean Redds per mile figure from all areas; (c) differences in spawning areas; (d) completion of spawning; (e) possible siltation or high water effects on Redd integrity.

Task 5.7 Determine if any other possible indicator of escapement or success is feasible and initiate if possible.

Objective 6: Document resident legal trout utilization in stocked compensation plan waters. Lakes are stocked with known numbers of legal size rainbow and brown trout. Estimating total catch during the season will provide utilization as a percent of fish planted.

Task 6.1 Creel census stocked lakes on a weighted random basis toward weekends, holidays, and high-use period directly following lake/stream plantings. Some of these times are:

a. opening day trout season
b. opening week trout season
c. weekends
d. July 4th
e. random week days

Task 6.2 Take early morning and mid-day counts of fishermen on these lakes to be used in a lake harvest model described by Brown (1976).

Task 6.3 Calculate man-days utilization of lakes and streams based on catch and c/e derived from model and creel data collected.

Appendix 2: Snake River sport sampling 1983-84 season.*
* Estimates and data based on limited sampling.

	Sample Days	Effort (Hours) Boat	Bank	C/E Boats Weekend	Week day	C/E Bank	Catch
Sept.	2	-@	-	-	-	NA	-
Oct.	3	21,865	375	.012	.006	.006	217
Nov.	6	25,987	1,320	.025	.04	.02	878
Dec.	11	7,051	536	.053	.032	.016	321
Jan.	8	1,782	68	.021	.021	-	38
	30	56,688	2,299				1,454

@ Insufficient data.
Catch rates are estimates.

Fish Sampled (steelhead)

Date	Boat	Bank	Length (cm)	Sex	Hatchery/Wild
9-25	x		57		H
	x		61		W
	x		62		H
10-9	x		64		W
10-30	x		66		H
	x		54		H
	x		57		W
	x		68		H
11-18	x		94		H
			61		H
			61		W
			66		H
			74		W
11-23	x		61		H
			96		H
			97		H
			84		H
			80		H
			64		W
			70		H

Appendix 2: Snake River sport sampling 1983-84 season.* (Continued)
* Estimates and data based on limited sampling.

Date	Boat	Bank	Length (cm)	Sex	Hatchery/Wild
11-26			80		H
			69		H
			86		H
			86		H
			91		H
	x		69		H
			66		H
11-27	x		63		W
			62		H
		x	58		W
		x	63		W
12-4	x		66	M	H
			64	F	W
			66	M	H
			66	M	H
			68	M	H
			72	M	H
12-5	x		70	M	W
			61	F	W
12-9	x		65		W
			67		H
			66		H
12-10	x		59		H
			82		H
			74		H
			70		H
			70		H
			86		H
			62		H
			71		H
			88		W
			110		H
	x		84		H
12-12	x		70	M	H
			90	M	H
			93	M	H
12-13	x		65	F	W
12-17	x		66	M	H
			79	F	H
			99	M	H

Appendix 2: Snake River sport sampling 1983-84 season.* (Continued)
* Estimates and data based on limited sampling.

Date	Boat	Bank	Length (cm)	Sex	Hatchery/Wild
12-18	x		62		W
			86		H
			56		W
12-31	x		104		H
			61		W
			66		W
			84		H
			91		H
			80		H
			93		H
			68		H
1-6-84	x		67	M	H
			59	M	H
1-7-84	x		73		H
			68		H
			71	M	W
			57	F	W
			61	F	W
			73	F	W
1-11-84	x		66		H
			71		H
			----		%H = 71.6 %W = 28.4

Total Fish Samples 81
Mean Length 72.3 cm
Boat Catch = 97.5%
Bank Catch = 2.5%

%M = 67
%F = 33

29.6% of fish > 80 cm (31.5 inches)

Appendix 3: 1983 Legal trout Allotments

County	Water	Species	# of Plants	Total Numbers
Asotin	Golf Course Pond	Rb	2	5,000
	Headgate Pond	Rb	2	4,000
	Evans Pond	Rb	2	2,000
	Alpowa Creek	Rb	2	3,000
	Asotin Creek	Rb	2	6,000
				20,000
Garfield	Baker's Pond	Rb	2	1,000
	Pataha Creek	Rb	1	3,000
	Cole's Pond	Rb	2	2,000
				6,000
Columbia	Beaver Lake	Rb	2	6,000
	Big Four Lake	Rb	1	2,500
	Blue Lake	Rb	2	10,000
	Dayton Pond	Rb	2	1,000
	Deer Lake	Rb	2	6,000
	Rainbow Lake	Rb	2	15,000
	Watson Lake	Rb	2	10,000
	Curl Lake	Rb	To be determined later	
	Dam Pond	Rb	2	1,000
	Spring Lake	Rb	2	8,000
	S. Touchet River	Rb	1	2,000
	Touchet River	Rb	1	5,000
	Tucannon River	Rb	3	40,000
				106,500
Walla Walla	College Place Pond	Rb	2	1,000
	Fishhook Park Pond	Rb	1	4,000
	Jefferson Pond	Rb	2	1,000
	Mill Creek Res.	Rb	1 (fall)	15,000
	Quarry Pond	Rb	2	10,000
	Coppei Creek	Rb	1	2,500
	Dry Creek	Rb	1	2,500
	Mill Creek	Rb	1	6,000
	Blue Creek	Rb	1	500
				42,500
Franklin	Dalton Lake	Rb	1	5,000
	Mannes Pond	Rb	1	3,000
				8,000
Whitman	Garfield Pond	Rb	1	1,500
	Gilchrist Pond	Rb	1	1,500
	Rock Lake	Rb	1	10,000 + residue
	Union Flat Creek	Rb	1	2,500
				15,500

GRAND TOTAL - 198,500

1984 LEGAL TROUT PLANT ALLOTMENTS

County	Water	Species	#of Plants	Total Numbers
Asotin	Golf Course Pond	Rb	3	5,000
	Headgate Pond	Rb	3	4,000
	Evans Pond	Rb	2	2,000
	Alpowa Creek	Rb	1	2,000
	Asotin Creek	Rb	1	6,000
	Silcott Pond	Rb		1,000
Garfield	Baker's Pond	Rb	1	1,000
	Pataha Creek	Rb	2	3,000
	Cole's Pond	Rb	3	2,500
	Casey Pond	Rb	2	1,000
Columbia	Beaver Lake	Rb	4	4,000
	Big Four Lake	Rb	1	2,500
	Blue Lake	Rb	4	10,000
	Dayton Pond	Rb	2	1,000
	Deer Lake	Rb	4	6,000
	Watson Lake	Rb	4	11,500
	Dam Pond	Rb	2	1,000
	Spring Lake	Rb	4	8,000
	S. Touchet River	Rb	1	2,000
	Tucannon River	Rb	3	30,000
	Touchet River	Rb	-	4,000
	Orchard Pond (L.F. Marina)	Rb	-	500
Walla Walla	College Place Pond	Rb	2	1,000
	Fishhook Park Pond	Rb	2	6,000
	Jefferson Pond	Rb	2	1,000
	Mill Creek Res.	Rb	1	17,000
	Quarry Pond	Rb	2	10,000
	Coppei Creek	Rb	1	2,500
	Dry Creek	Rb	1	2,500
	Mill Creek	Rb	2	6,000
	Blue Creek	Rb	1	500
Franklin	Dalton Lake	Rb	1	5,000
Whitman	Garfield Pond	Rb	1	1,500
	Gilchrist Pond	Rb	1	1,500
	Rock Lake	Rb	1	15,000
	Union Flat Creek	Rb	1	1,000
			Total:	178,500