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SNAKE RIVER STEELHEAD CREEL SURVEYS

PART I: 1985-86 ANNUAL REPORT

LYONS FERRY TROUT HATCHERY EVALUATION

by

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ABSTRACT

Creel surveys were conducted on the Snake River from its mouth to the Grande Ronde River (169 miles) during the fall of 1985 and spring of 1986, as part of an evaluation of Lyons Ferry Hatchery (LFH). A record run of nearly 105,000 adult steelhead crossed Lower Granite Dam this fall. We estimate that 5,497 of those steelhead were harvested in the Snake R. below the Grande Ronde River. A total of 7,880 steelhead were harvested from the entire creel survey area on the Snake River (mouth to the Grande Ronde River).

Anglers expended 52,707 and 22,517 hours to harvest 1,491 and 892 steelhead from the lower Snake River during the fall and spring, respectively. Wild fish comprised 17 to 20 % of the harvest.

Angler interest was quite high on Lower Granite Reservoir because of the excellent season last year. Angler effort and harvest peaked in November and January but catch rates were highest in December. A fall total of 39,655 (± 4,808) angler hours were expended to harvest 1,320 (± 244) steelhead. Spring angler effort was 27,595 (± 7,235) angler hours with an estimated harvest of 869 (± 276) steelhead. This is a 46 % decline in angler effort and a 63 % decline in harvest from the spring of 1984. Muddy river conditions affected the spring 1986 fishery. Fall and spring angler effort was approximately 8,323 and 8,550 angler days, respectively. Wild fish comprised less than 17 % of the harvest in any month.

An estimated total effort of 103,290 (± 9,871) angler hours were expended by anglers along the mid Snake River to harvest approximately 3,026 (± 441) steelhead during the fall of 1985. Poor fishing conditions existed during the spring when anglers harvested 282 (± 87) steelhead with 13,974 (± 2,197) angler hours of effort. Approximately 26,093 and 3,556 angler days of effort were expended in the mid Snake River during fall and spring fisheries, respectively. Wild fish comprised as much as 26 % of the harvest in November. Washington anglers harvested nearly 41 % of the steelhead from the mid Snake River.

Length-frequencies, scale analyses, and expanded harvest estimates of coded-wire tags are presented. Exploitation rates for marked groups of LFH steelhead averaged 9 to 13 %.

Creel survey results are compared with WDG punchcard-derived harvest estimates and IFG telephone survey results. Punchcard returns to Olympia from the Snake River (30.3 %) exceeded the statewide average (23.8 %) used to estimate steelhead harvest for individual rivers.

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INTRODUCTION

These creel surveys were designed, conducted, and funded primarily to provide information concerning adult steelhead trout (*Salmo gairdneri*) fisheries, as part of an evaluation study of Lyon's Ferry Trout Hatchery. The information, however, is equally valuable for steelhead management in southeast Washington and adjacent areas of northern Idaho and northeast Oregon.

The Washington Department of Game (WDG) has conducted steelhead creel surveys on portions of the Snake River during the fall and spring seasons of 1982-83, 1983-84, and 1984-85 (Mendel and Aufforth 1985). WDG also annually estimates the steelhead catch for various rivers in the state by using steelhead punchcard (permit) returns. Steelhead creel surveys will be conducted annually on the Snake River to assist us with evaluating the effectiveness of Lyon's Ferry Hatchery in meeting trout mitigation goals established in the Lower Snake River Compensation Plan (LSRCP).

The fall 1985 and spring 1986 steelhead seasons were open on the Snake River from 1 September to 31 December, and 1 January to 31 March, respectively. A consumptive fishery existed, but a 2-inch dorsal regulation and a barbless hook requirement (to protect wild steelhead) were in effect below Red Bird Creek, Idaho, until 15 November. Upstream of Red Bird Creek the 2-inch dorsal and barbless hook regulations remained in effect throughout the fall and spring seasons. Daily catch, possession, and annual limits in Washington were 2, 4, and 20 steelhead, respectively, for the Snake River. Idaho's daily catch and possession limits, and fishing regulations for the Snake R. were the same as Washington's during the fall season. Idaho had a fall and spring season limit of 10 fish. Idaho's spring regulations allowed anglers to retain 2 hatchery or wild steelhead per day, or have 4 in possession. However, the 1986 steelhead regulations from WDG indicated that only fish with missing adipose or ventral fins could legally be harvested during the spring season. The new WDG regulations were not enforced; thus by default all steelhead caught during the spring could be retained (as had been allowed in late November and December of 1985). However, many Washington anglers were confused by the spring regulations and released fish that were legal to keep, or anglers refused to fish because the regulations were perceived to be too restrictive or confusing.

A record run of nearly 105,000 adult steelhead were available for the fall 1985 steelhead fishery above Lower Granite Dam on the Snake River. The previous record was in the fall of 1984, with just over 91,000 adult steelhead crossing Lower Granite Dam between June and mid-December. Runs the previous 9 years (since the closing of Lower Granite Dam) have averaged approximately 39,500 steelhead in the fall (data from Corps of Engineers 1984).

OBJECTIVES

The objectives of creel surveys on the Snake River during the fall of 1985 and spring of 1986 were to:

1. Estimate the total steelhead angler effort (in angler hours and/or angler days), catch per effort, and harvest in each river section.

2. Determine the composition of the steelhead harvest. This includes:

   a) Estimating the portion of the catch contributed by Lyon's Ferry Hatchery. The following tasks are required to accomplish this sub-objective:

      1) Estimate the percentage of the catch that is marked (branded, adipose or left ventral clipped, and coded-wire tagged).

      2) Examine coded-wire tags and identify the release location, agency, and date for all marked steelhead observed in the catch.

      3) Estimate the total contribution of adult steelhead that was produced by Lyon's Ferry Hatchery.

   b) Obtaining information regarding lengths, weights, sex, age, duration of ocean residency, and the percentage of fish of wild and hatchery origin in the harvest.

3. Estimate angler exploitation rates and determine wintering areas for marked groups of adult Lyon's Ferry Hatchery steelhead.

4. Obtain information concerning angler residency and the percentage of steelhead caught in the mid-Snake River by anglers using Washington punchcards (this is for direct comparison of our harvest estimates with those estimates derived from returned steelhead punchcards. Comparison with Idaho Fish and Game's telephone harvest estimates will also be attempted.).

4. Attempt to estimate the steelhead punchcard return rates from Snake River steelhead anglers.

STUDY AREA

The Snake River is the major waterway in, and forms the boundary of, southeast Washington (Fig. 1). For convenience in designing and conducting creel surveys we divided the Snake River into 4 major segments:

1. Ice Harbor -- from the mouth of the Snake R. to Little Goose Dam (70.3 miles). This segment includes 2 dams and reservoirs, and WDG management sections 164 (mouth of the Snake River to Ice Harbor Dam), 165 (from Ice Harbor Dam to Lower Monumental Dam),and 166 (from L. Monumental Dam to Little Goose Dam).

2. Little Goose -- from Little Goose Dam to Lower Granite Dam (37.2 miles -- WDG mgmt zone 167).

3. Lower Granite -- from Lower Granite Dam to Red Wolf Bridge in Clarkston, WA. (approx. 30.5 miles -- part of WDG mgmt. zone 168).

4. Mid-Snake -- from Red Wolf Bridge in Clarkston (just downstream of the Idaho-Washington border) upstream to the Grande Ronde River (at Lime Point). Nearly all of this portion of the Snake River is managed as boundary waters by Idaho Fish and Game (IFG) and WDG (part of mgmt zone 168). This segment was further subdivided into zones:

   Zone A -- Red Wolf Bridge to Asotin Creek (approx. 7.5 miles). This zone consists of flat water at the upper end of Lower Granite Reservior and includes the confluence with the Clearwater River.

   Zone B -- Asotin Creek upstream to Red Bird Creek, Idaho (approx. 10.2 miles). This zone is primarily free flowing river conditions.

   Zone C -- Red Bird Creek to just upstream of the Grande Ronde River (at Lime Point - approx. 13.5 miles). This is free flowing river conditions.

METHODS

Data Collection

Roving census technicians conducted angler counts for the mid-Snake R. and Lower Granite Reservoir from along roads that parallel these river segments. The lower Snake River (Ice Harbor and Little Goose segments) has very limited road access. Access is primarily located near the dams or at recreational facilities. Therefore, interviews and angler counts were made only at these areas. Also a fixed-wing aircraft was used on weekends to make angler counts for the entire 138 mile length of the lower Snake River in an attempt to determine the accuracy of our roving census of anglers.

Angler surveys began at Ice Harbor during the week of 9 September, while all other river segments (routes) were first censused during the weekend of 14-15 September. Shore anglers and boats were counted from automobiles 2-4 times each day (for the various routes and sections, by using randomly selected starting points, directions, and times of day), generally on 1 randomly selected weekday (WD) and weekend day (WE) each week. However, in October we increased our sampling rate to 8-9 weekdays for the Lower Snake R. to try to reduce the variance of our estimates for that area. Then we reduced our sampling rates for December through March because the extra sample days did not substantially improve the variances we obtained. Angler count data were recorded on forms we designed (Appendices A and B).

Creel checks and interviews were made during angler counts whenever shore or boat anglers were accessable. Boat angler interviews often were centered around boat ramps before, during, or after scheduled angler counts. However, we supplemented our boater interviews several days each month by using a boat to survey boat anglers on the water. Boat survey schedules were coordinated between IFG and WDG so that both agencies would not be on the mid-Snake during the same day. IFG kindly provided us with data they collected. Information obtained from anglers interviewed by WDG was recorded on WDG creel forms (Appendix C) and included; angling party size, total hours fished that day (in each zone), whether the data was for a complete or incomplete angling trip, angler type (boat or shore) gear types used, zone, and the number of steelhead kept or released. Steelhead retained by anglers were examined for marks (brands, tags, fin clips), weighed and measured. We determined wild or hatchery origin for each steelhead observed (by presence or absence of fin clips or by examination of the dorsal fin for erosion or deformaties). Snouts were collected for retrieval of coded-wire tags from adipose or ventral clipped steelhead observed during our creel surveys. Scale samples were taken from many of the fish we saw so that we could determine age and

duration of ocean residency. On the mid-Snake we also recorded which state permit was validated for each fish kept. This enabled us to determine the percentage of the harvest attributeable to Washington (or Idaho) anglers. Thus, we can compare partitioned harvest estimates with WDG's punchcard-derived harvest estimates or IFG's steelhead harvest estimate (which is derived from a telephone survey).

A sample of Washington steelhead punchcards (permits) were marked during our creel checks and a running tally of marked punchcards was kept and recorded. Marked punchcards that were returned to the Olympia WDG office were counted in July 1985. This was our attempt to estimate the percentage of Snake River steelhead anglers' punchcards that were returned to Olympia (as required by law) at the end of the season. This return rate can be used to adjust the annual punchcard-derived steelhead harvest estimates.

Employees of the National Marine Fisheries Service (NMFS) at Lower Granite Dam retrieved and read coded-wire tags from snouts we collected. They also trapped migrating adult steelhead in the fish ladder at Lower Granite, read brands, and jaw tagged Lyons Ferry steelhead for us. All scale samples that we collected were read under contract in Olympia.

Data Analysis

We used stratified random sampling with day as the sampling unit to estimate angler effort . Two or more counts (subsamples) of fishing boats and shore anglers were averaged, for each day sampled, to estimate the numbers of anglers present during any hour of the sampled days. These daily estimates of fishing boats and shore anglers present per hour were averaged for each day-type (holidays or weekends, and weekdays) for each month. Those means and standard deviations then were multiplied by the appropriate constants (i.e., mean number of anglers/boat, average number of hours per fishing day, and the percent of anglers that were pursuing steelhead trout) to get the mean number of boat and shore angler hours expended per day, for each day-type, during a particular month. Mean number of anglers/boat and the percent of anglers steelhead fishing were obtained from angler interviews. The average fishing day-length was determined from a sunrise-sunset table for Lewiston, Idaho and Clarkston, Washington (Nautical Almanac Office, US Naval Observatory, Washington, D.C.) and adjusted according to the observed angler behavior.

The mean angler hours per day, for each day-type, were multiplied by the number of days (of that day-type) available per month. This resulted in an estimate of the total angler hours expended during the month for each angler-type (boat or shore) and each day-type (WE or WD). Simple random sampling statistics formulas were used to this point to calculate strata

estimates and confidence limits. The total of all strata (day-types, angler-types, zones, and months) is the estimated total angler effort (in angler hours) for that river segment. Combined strata estimates were calculated by using stratified random sampling statistics formulas. Monthly total angler effort estimates were divided by the average length of an angling day for shore and boat anglers (obtained from complete angling trip data) to estimate the total angling days expended per river segment.

Catch per unit effort (CPUE) was calculated for each stratum from angler interview data obtained from: 1) WDG (and/or IFG) boat surveys, 2) angler count surveys, 3) or by creel checks at boat ramps. Most interviews of shore anglers were obtained during counts of anglers. Data were collected and partitioned into the same strata as were used for angler effort estimates. We used party as the sampling unit for our CPUE estimates because the data were collected from many sources, and often insufficient interviews were obtained during a particular day to accurately represent the CPUE for that day. CPUE estimates with day as the sampling unit would have been preferrable, but was not possible in these surveys.

Total harvest was estimated for each river segment and/or stratum by multiplying the estimated anglers per month by the appropriate catch rate (CPUE) from creel check interviews. Angler effort, CPUE, and harvest estimates for the mid-Snake River and Lower Granite Reservoir include confidence estimates. Confidence intervals were not calculated for the lower Snake River because CPUE estimates were often combined for several strata and/or routes because of low numbers of anglers or insufficient sampling.

All formulas for computing estimates and their confidence limits are provided in a detailed example, with party or day as the sampling units (Appendix C). Statistical formulas and methods were obtained from Barrett and Nutt (1979), Scheaffer et al. (1979), and Dr. R. K. Steinhorst, our statistical consultant at the Univ. of Idaho (pers. comm.).

For each river section we estimated sampling rate (# of fish sampled / estimated harvest), mark rate (# of fish with clipped fins / # of fish sampled), total marked fish in the harvest (harvest x mark rate), and total # of coded-wire tags (cwt) in the harvest (total marked fish in the harvest x the proportion of snouts checked that had cwts). Total expanded harvest estimates for each individual cwt code (for a particular river section) were estimated by multiplying the total cwts in the harvest by the proportion of the total cwts of a particular tag code (# of recoveries for a cwt code / total cwt recoveries). Fish that were not seen during creel checks, or snouts that were not collected, were not included in the analyses.

We estimated sport fishing exploitation rates for Lyons Ferry Hatchery steelhead above Lower Granite Dam by using the voluntary returns of jaw tags to National Marine Fisheries Service (NMFS). Jaw tags were attached to the mandible of branded returning steelhead, of Lyons Ferry origin, that were examined at the adult trap at the Lower Granite fish ladder. The jaw tags indicated a $5.00 reward for their return. We also collected jaw tag numbers (and/or the jaw tag) whenever we encountered them during our creel survey activities. The total number of jaw tags recovered from the sport harvest (for a particular brand code) was divided by the total number of fish with jaw tags to estimate exploitation rates. This was repeated for brand groups that had been released in the Grande Ronde River or the Tucannon River.

RESULTS AND DISCUSSION

Lower Snake River

Six flights scheduled for November through February had to be cancelled due to poor weather conditions, even after several flights had been rescheduled several times. We were able to conduct 2 angler counts of the lower river from a fixed-wing aircraft in October (Table 1). Although the aerial and "ground" counts do not entirely correspond because of differences in times and durations of the counts, they are generally quite comparable. Shoreline counts often resulted in larger numbers of shore anglers than were counted from the air. Persons counting anglers from the aircraft concluded that 2.6 or 3.0 % (3 of 115 and 2 of 67) of shore anglers, and 6.5 or 3.6 % (3 of 46, 1 of 28) of the boats would have been missed from the "ground" counts during October 20 and 26, respectively. However, aerial counts of shore anglers were lower than from the shoreline counts, thus the percentage of anglers that may have been missed from the ground would be less than the 2.6 - 3.0 % estimate obtained from the air. Boat counts may have differed because of the mobility of boaters and the differences in times of the aerial and ground counts. The results presented here are not conclusive enough to positively determine a correction factor for the "ground" counts, but it is apparent that few anglers were missed by our roving censuses from the shorelines.

Confidence limits were not calculated for angler effort, CPUE, or harvest estimates for areas below Lower Granite Dam. We had fully intended to calculate confidence limits for all estimates for the entire Snake River. We used similar sampling rates for angler counts and shore angler interviews on the lower river as we did for Lower Granite and the mid-Snake. However, the lower river areas generally had low angler effort that was highly variable from day to day. We doubled our sampling rate for weekend days in October but the resulting angler effort

Table 1. Comparison of aerial and ground angler counts for the lower Snake River (mouth to Clarkston), October 1985.

		Aerial Counts			Ground Counts		
Date	WDG mgmt. Section[A]	Time Span	# shore Anglers	# of Boats	Time Span	# shore Anglers	# of Boats
10-20	164	1021-26	5	1	1000-1130	12	0
	165	1026-42	5	4	1000-1230	15	3
	166	1042-1103	27(2)	8	--*	--	--
	167	1103-25	1	8(2)	--	--	--
	168	1125-43	29	25(1)	--	--	--
10-26	164	1720-28	6	0	1600-1730	6	0
	165	1700-1720	19	2	1620-1850	25	1
	166	1640-1700	20(3)	1	1623-1729	22	1
	167	1615-1640	11	7(1)	1500-1623	11	7
	168	1540-1615	59	18	1530-1728	62	16

A 164 is below Ice Harbor Dam. Sections change at each dam.

() Boats or anglers that the observer in the aircraft believes would not have been seen from the ground counts.

* No corresponding ground counts were conducted in these sections.

estimates still had unacceptably large standard deviations (Appendix D, Table 1). Thus, the low angler effort would have required substantially increasing our sampling rate to obtain reasonable confidence limits, but the expense would not have been justified. Also, we often could not obtain an estimate of CPUE for individual strata because of low angler effort and/or low sampling rate (Appendix D). Boat anglers were seldom interviewed from a boat on the water in any of the areas below Lower Granite Dam because of lack of man-power. Consequently, we frequently had to combine many strata and management sections to obtain an estimate of CPUE for areas below Lower Granite Dam (Appendix D, Table 2). The resulting estimates of angler effort, CPUE, and harvest (Table 2) are crude and should be used with caution; but they are the best we could obtain with the resources available.

Wild fish comprised 17-19 % of the catch observed in the creel for the lower Snake River (Table 3). Most wild fish could not be retained before 15 November because of the 2 inch dorsal fin regulation.

Angler counts and creel surveys were terminated for WDG management sections 164 and 165 (above and below Ice Harbor Dam) at the end of February. Angler effort was very low in these sections in January and February and was expected to remain low in March. March surveys for section 166 included only the portion of Lower Monumental Reservoir between Lyon's Ferry Hatchery and Little Goose Dam. Lower portions of the reservoir were not surveyed in March.

No attempt was made to estimate the length of completed angling trips for the river below Lower Granite Dam because of small sample sizes for many of the sections of the river. Catch rates for incomplete angling trips usually are not significantly different than those for completed trips (Malvestuto et al. 1978, Bradbury 1986).

Table 2. Monthly angler effort, catch rate (CPUE), and harvest estimates for the lower Snake River, fall 1985 and spring 1986.

Month	WDG mgmt. sections	Angler effort (angler hrs)	Mean CPUE (fish/hr)	steelhead harvest
Sept.[A]	164	3,323	0.028	94
	165	2,485	0.009	22
	166	6,753	0.015	100
	167	973	0.007	7
Oct.	164	2,058	0.015	30
	165	1,468	0.014	20
	166	9,000	0.019	170
	167	2,146	0.013	27
Nov.	164	510	0.027	14
	165	2,907	0.025	73
	166	4,789	0.026	124
	167	2,441	0.020	48
Dec.	164	425	0.061	26
	165	4,115	0.047	194
	166	3,327	0.050	166
	167	5,987	0.063	376
Fall Total		52,707		1,491
Jan.	164	72	0.028	2
	165	1,383	0.040	55
	166	3,605	0.029	106
	167	9,967	0.042	422
Feb.	164	13	0.000	0
	165	167	0.042	7
	166	1,414	0.038	54
	167	4,908	0.050	247
Mar.	164	?[B]	?[B]	?[B]
	165	?[B]	?[B]	?[B]
	166	676	?[C]	?
	167	312	?[C]	?
Spring Total		22,517		892

A Not complete for Sept., creel survey began 9/9/85 for sections 164 & 165 and 9/14/85 for sections 166 & 167.
B No survey conducted, so no estimate.
C No catch rate estimate possible.

Table 3. Data for steelhead observed in angler creels along the lower Snake River, fall 1985 and spring 1986.

Season	WDG mgmt. sec.[a]	$\bar{X}$ length in cm (n)[b]	Std. dev.	% Female (n)[b]	% Wild (n)[b]	% of fish adipose clipped (n)[b]	Total # of fish creeled
Fall	164	69.5 (16)	11.65	25.0 (4)	26.7 (15)	60.0 (10)	19
	165	69.2 (24)	8.50	62.5 (24)	16.7 (24)	45.0 (20)	24
	166	72.6 (65)	10.65	40.7 (59)	17.2 (64)	41.5 (53)[c]	68
	167	70.3 (30)	10.36	43.3 (30)	24.1 (29)	36.4 (22)	34
Total		71.1 (135)	--	45.3 (117)	19.7 (132)	42.9 (105)	145
Spring[d]	164	-- (0)	--	--	--	--	0
	165	66.0 (1)	--	--	--	--	1
	166	71.4 (8)	9.00	25.0 (8)	0.0 (7)	42.9 (7)	8
	167	71.4 (67)	10.16	56.7 (67)	19.4 (62)	22.0 (50)	75
Total		71.3 (76)	--	53.3 (75)	17.4 (69)	24.1 (57)	84

a WDG fishery mgmt sections.

b # of fish sampled

c Plus 1 fish left ventral clipped but not adipose clipped.

d Only 1 fish seen in March.

Lower Granite Reservoir

Flights of Lower Granite Reservoir in October 1985 indicate few, if any, anglers were missed by our roving angler counts from an automobile. One of 25 boats (4%) recorded during the 20 October flight was marked as possibly not being visible from the road (Table 1). All boats were thought to be visible from the road during the 26 October flight. No road access exists for the 3 miles between Wawawai and Lower Granite Dam. We used binoculars to view 1.5 - 2 miles of the river from each end to count boats, but it was possible to miss boats that moved between Wawawai and the Dam while the surveyor was required to be away from the river (to travel the 35 miles across the Palouse Prairie to reach the river at the other end). During that time (up to 1 hr) boats could launch, dock, or move so as not to be included in the count, or they could have been counted more than once. We have no indications that boats were actually being missed with the present method. We presently assume our counts are accurate for our angler effort estimates.

Angler effort strata variables and sampling data are presented in Appendix E, Table 1. We made some supplementary surveys with a boat 2-6 days per month to obtain catch rates (Appendix E, Table 2) and composition of the catch data for boat anglers. Minimal angler effort, and other duties, precluded us from conducting boat checks in March.

Angler effort and harvest peaked in November 1985 and again in January 1986, but catch rates were generally best in December (Table 4). The maximum number of boats seen on the reservoir at any one time was 61 on 11 January, while shore angler effort was highest on 26 October (62 shore anglers). Angler counts also were relatively high in January. A fall total of 39,655 (± 4,808) angler hours was expended to harvest 1,320 (± 244) steelhead from Lower Granite Reservoir. Anglers in 1985 demonstrated substantial interest in the steelhead fishery early in the season. Angler effort during September and October 1985 substantially exceeded the 1,748 angler hours estimated for the same months of 1984 (see Appendix A, Mendel and Aufforth 1985). Boat anglers expended 2,696 angler hours in September 1985 alone, while in September and October 1984 they had been non-existant on the reservoir. During November and December 1985 bitterly cold weather caused the boat ramps to become iced and the river to freeze, thereby limiting the angling effort and harvest. Nevertheless, December 1985 angling effort was still estimated at 9,422 (± 2,787) angling hrs.; exceeding the 8,797 angling hrs. estimated for December 1984. Catch rates in December 1985 were far below the 0.134 fish per hour recorded by boat anglers in December 1984. Consequently, harvest in December 1985 was only 40 % of the estimated harvest

Table 4. Estimated angler effort, catch rates, and harvest for steelhead anglers on Lower Granite Reservoir, fall 1985.

Month	Day-type[A]	Angler-type	Angler Effort hrs	Angler Effort (± CI)[B]	Catch Rate[C] fish/hr	Catch Rate (± CI)[B]	Harvest[D,G] fish	Harvest (± CI)[B]
Sept[E]	WE	Boat	1,619	414	0.000	0.000	0[F]	0
		Shore	1,346	521	0.017	0.021	23	30
	WD	Boat	1,077	674	0.109	0.044	117	89
		Shore	529	7	0.030	0.058	16	31
	Total		4,404	947	0.020	0.015	89	71
Oct	WE	Boat	2,720	479	0.028	0.017	77	48
		Shore	3,651	672	0.026	0.010	94	42
	WD	Boat	3,129	1,754	0.040	0.028	126	115
		Shore	4,573	1,570	0.035	0.015	162	90
	Total		14,073	2,495	0.030	0.008	419	130
Nov	WE	Boat	3,771	2,183	0.057	0.018	214	143
		Shore	2,124	1,035	0.011	0.008	23	21
	WD	Boat	3,827	1,302	0.020	0.035	78	139
		Shore	2,035	835	0.012	0.013	24	29
	Total		11,756	2,869	0.030	0.009	350	135
Dec	WE	Boat	3,812	791	0.047	0.010	178	54
		Shore	1,154	175	0.014	0.014	16	17
	WD	Boat	3,358	2,547	0.038	0.020	127	121
		Shore	1,098	788	0.028	0.032	31	44
	Total		9,422	2,787	0.040	0.008	374	135
Fall	Total		39,655	4,808	0.033	0.005	1,320[E]	244

A WE = weekends and major holidays, WD = weekdays.

B 95 % confidence limits if data are normally distributed, otherwise at least 75 % CI.

C Catch rate for retained fish only (released fish are not included).

D Angler effort X catch rate = harvest (rounded to whole fish).

E Not completed for September, consists of 9/14-9/30 only.

F No fish caught, so no catch rate (See Appendix E).

G Strata harvest estimates may not sum to total harvest because total harvest and confidence limits were recalculated using total angler effort and CPUE for the monthly or seasonal totals.

in December of the previous year.

Spring angler effort was estimated to be 27,595 (± 7,235) angler hours with an estimated harvest of 869 (± 276) steelhead (Table 5). This represents a 46 % decline in angler effort and a 63 % decline in harvest for the same estimates for the spring of 1985 (43,315 angler hrs. and 1,837 steelhead, respectively). A mild spring with early spring rains and snow melt created muddy river conditons and poor fishing for most of the spring steelhead season. March angling effort, catch rate, and harvest estimates have poor confidence limits because of poor fishing conditions and low angler interest.

Estimates for the average length of an angling trip for shore anglers are based on a small sample of anglers and should be used cautiously (Table 6). Estimates for boat anglers should be much more reliable. By dividing the total angler hours estimated in Tables 4 and 5 by the average complete trip lengths in Table 6 we estimate that approximately 2,356 angler days were expended by boat anglers and 5,967 angler days by shore anglers during the fall of 1985. Approximately 4,317 and 4,233 angler days were expended by boat and shore anglers,respectively, to catch steelhead in the spring of 1986.

The average size of harvested fish was greatest in December (Table 7) when Dworshak Hatchery "B run" steelhead were wintering in the reservoir. Wild fish comprised less than 17 % of the steelhead observed in the harvest during any month.

Mid Snake River

The entire mid-Snake River is visible from the road so we did not conduct any aerial counts. Sampling information and strata variables used in calculating angler effort is presented in Appendix F, Table 1. Some of our catch rate data was obtained from boat ramps or along the Washington shore during angler count days. WDG or IFG often made surveys from a boat to obtain catch rate and composition of the catch data. IFG selected which fall and spring weekends they would survey. We supplemented those survey days on weekdays and a few weekends. Some data for Zone A (Clearwater R. confluence to Asotin Creek) was also collected on weekdays by IFG. IFG kindly conducted their sampling according to our zone designations and provided us with their data. We attempted to keep the data independent so that any angler that may have been inadvertently interviewed by both agencies on the same day would not be included in both agency's data. Catch rate data for various strata are presented in Appendix F, Table 2.

As in 1984, boat anglers exerted more fishing pressure in the upper portion of Lower Granite Reservoir, between Clarkston

Table 5. Estimated angler effort, catch rates, and harvest for steelhead anglers on Lower Granite Reservoir, spring 1986.

Month	Day-type[A]	Angler-type	Angler Effort hrs	Angler Effort (± CI)[B]	Catch Rate[C] fish/	Catch Rate (± CI)[B]	Harvest[DG] fish	Harvest (± CI)[B]
Jan	WE	Boat	4,515	3,142	0.027	0.014	122	107
		Shore	2,900	1,456	0.023	0.011	68	47
	WD	Boat	3,341	1,335	0.052	0.027	173	116
		Shore	2,415	681	0.043	0.021	104	58
	Total		13,171	3,773	0.032	0.008	427	164
Feb	WE	Boat	1,879	384	0.036	0.032	67	63
		Shore	3,048	329	0.041	0.014	125	45
	WD	Boat	2,394	2,114	0.038	0.026	91	106
		Shore	2,765	783	0.029	0.015	80	47
	Total		10,086	2,310	0.036	0.010	366	128
Mar	WE	Boat	448	429	0.000	0.000[E]	--	--
		Shore	1,584	118	0.019	0.016	29	25
	WD	Boat	99	179	--	--	--	--[F]
		Shore	2,206	836	0.013	0.017	28	123
	Total		4,337	5,725	0.014	0.010	60	96
Spring Total			27,594	7,235	0.032	0.006	869	276

A WE = weekends and major holidays, WD = weekdays.

B 95 % confidence limits if data are normally distributed, otherwise at least 75 % CI.

C Catch rate for retained fish only (released fish are not included).

D Angler effort X catch rate = harvest (rounded to whole fish).

E No fish caught, so no catch rate (See Appendix E).

F No parties interviewed that were steelhead fishing, thus no catch rate or harvest estimate.

G Strata harvest estimates may not sum to total harvest because total harvest and conf. limits were recalculated using total angler effort and total CPUE for the monthly or seasonal totals.

Table 6. Average angler-day length for completed fishing trips on Lower Granite Reservoir, fall 1985 and spring 1986.

Month	Boat		Shore	
	Mean complete trip length (hours)	No. sampled anglers & (hours)	Mean complete trip length (hours)	No. sampled anglers & (hours)
Sep.	4.1	8 (33.0)	1.4	5 (7.0)
Oct.	4.9	29 (143.0)	5.1	12 (61.0)
Nov.	5.4	19 (101.8)	3.7	8 (29.5)
Dec.	5.5	142 (784.5)	4.2	3 (12.5)
Fall Totals	5.4	198 (1062.3)	3.9	28 (110.0)
Jan.	5.4	48 (259.3)	---	2 (8.3)
Feb.	2.7	6 (16.0)	---	0 (0.0)
Mar.	7.0	10 (69.5)	1.7	4 (6.8)
Spring Totals	5.4	64 (344.8)	2.5	6 (15.0)

Table 7. Data from steelhead observed in angler creels along Lower Granite Reservoir, fall 1985 and spring 1986.

Month (n)*	Mean fork Length cm (Std.dev.) (n)*	Mean wt. kg (Std.dev.) (n)*	% Female (n)*	% Wild (n)*	% Adipose Clipped (n)*	% L.Ventral clipped (n)*
Sep. (8)	70.7 9.882 (7)	2.3 - (1)	55.0 (7)	16.7 (6)	28.6 (7)	0.0 (7)
Oct. (55)	64.5 6.495 (50)	2.75 1.026 (28)	62.8 (43)	15.9 (44)	11.9 (42)	0.0 (42)
Nov. (49)	70.3 10.435 (46)	2.49 0.829 (11)	53.2 (47)	14.9 (47)	19.1 (47)	0.0 (47)
Dec. (122)	72.8 11.318 (116)	4.73 2.190 (47)	53.3 (105)	12.3 (106)	10.4 (106)	2.8 (106)
Jan. (67)	70.4 10.971 (64)	3.93 2.026 (41)	44.6 (65)	6.3 (64)	6.3 (64)	0.0 (64)
Feb (64)	65.6 5.786 (59)	2.76 0.734 (48)	60.7 (61)	8.5 (59)	8.5 (59)	0.0 (59)
Mar. (8)	65.2 6.436 (8)	2.68 0.951 (8)	25.0 (8)	0.0 (8)	25.0 (8)	0.0 (8)

* n = # of kept fish sampled in the harvest; some fish were not seen or no data were recorded.

and Asotin (Zone A) than in all other zones combined (Table 8). Shore angling pressure varied between zones by month and day-type, but it was highest in Zone C during October and November. Total Angling effort and harvest was greatest in October and November, while catch rates peaked in November. An estimated total effort of 103,290 (± 9871) angler hours were expended by anglers along the mid-Snake River to harvest an estimated 3,026 (± 441) steelhead during the fall of 1985. This is similar to our angler effort estimate (104,977 ± 11,342 angler hrs.) and harvest estimate (3,521) for the fall of 1984 (Mendel and Aufforth 1985). Angler interest was high at the beginning of the 1985 season as angler effort in September and October exceeded that of the same months in 1984. However, severe winter weather reduced angler effort in November 1985 to below that observed in November the previous year. Catch rates and harvest in December were far below those seen in December of 1984, even though angler effort was nearly the same both years.

Poor fishing conditions existed during the spring of 1986 as frequent rain and an early spring runoff kept the river muddy much of the season. During the months of January and February anglers expended 13,974 (± 2,197) angler hrs. to harvest 282 (+ 87) steelhead (Table 9). Angler effort, catch rates, and harvest were substantially below those observed in the spring of 1985 (Mendel and Aufforth 1985). Harvest in January and February 1986 was only 31.9 % of estimated harvest during the same period in 1985. Angler effort was so low in February that we discontinued the creel survey in March 1986.

Estimates for the average length of an angling trip for shore anglers are based on a small sample of anglers and should be used cautiously (Table 10). Estimates for boat anglers should be much more reliable because of the larger sample sizes. By using these trip length estimates to divide into the total angler hours estimated for fall and spring, we estimate that approximately 22,735 (93,215.3 / 4.1) angler days were expended by boat anglers and 3,358 angler days (10,074.7 / 3) by shore anglers during the fall of 1985. Approximately 3,294 (12,845,7 / 3.9) and 262 (1,128.6 / 4.3) angler days were expended by boat and shore anglers, respectively, to catch steelhead in the spring of 1986. Much more angler effort and harvest occurred on Lower Granite than on the mid-Snake R. in the spring of 1986.

The average size of harvested fish was largest in December (Table 11) when Dworshak Hatchery "B run" steelhead were wintering in the area. Wild fish comprised as much as 26.4 % of the harvest in November. Washington punchcards were used for a large portion of the harvest except in December and February. An overall average of 41.33 % of the fish harvested on the mid-Snake River were retained on Washington punchcards.

Table 8. Estimated angler effort, catch rates, and harvest for steelhead anglers on the mid-Snake River, fall 1985.

Month	Day-type[A]	Zone	Angler-type	Angler Effort hrs	Angler Effort (± CI)[B]	Catch Rate[C] fish/hr	Catch Rate[C] (± CI)[B]	Harvest[D] fish	Harvest[D] (± CI)[B]
Sep[F]	WE	A	Boat	6,410	1,181	0.013	0.006	81	41
			Shore	252	11	---	---[G]		
		B	Boat	841	173	0.049	0.059	41	50
			Shore	137	51	---	---		
		C	Boat	648	429	0.028	0.034	18	26
			Shore	224	99	---	---		
	WD	A	Boat	4,336	819	0.014	0.012	62	51
			Shore	478	230	---	---		
		B	Boat	899	124	0.085	0.076	76	69
			Shore	174	86	---	---		
		C	Boat	0	0	---	---		
			Shore	143	29	---	---		
	Total			14,542	1,538	0.016	0.006	237	94
Oct	WE	A	Boat	8,598	888	0.026	0.009	224	78
			Shore	715	257	0.019	0.039	--[H]	--
		B	Boat	4,361	1,052	0.015	0.008	64	40
			Shore	296	168	0.041	0.043	12	15
		C	Boat	1,330	383	0.017	0.029	23	39
			Shore	532	152	0.015	0.027	--	--
	WD	A	Boat	10,241	2,827	0.030	0.010	303	120
			Shore	664	224	---	---		
		B	Boat	4,832	1,105	0.031	0.012	149	69
			Shore	680	517	0.012	0.025	--	--
		C	Boat	1,465	629	0.118	0.075	--	--
			Shore	1,243	601	0.021	0.029	26	39
	Total			34,958	3,528	0.026	0.005	909	191
Nov	WE	A	Boat	14,749	5,854	0.046	0.012	674	325
			Shore	522	148	---	---		
		B	Boat	5,731	1,979	0.036	0.021	203	139
			Shore	504	310	0.012	0.022	--	--
		C	Boat	1,012	544	0.027	0.036	27	40
			Shore	514	312	0.046	0.059	24	35
	WD	A	Boat	7,819	3,501	0.031	0.009	258	138
			Shore	705	267	0.015	0.027	--	--
		B	Boat	3,192	1,311	0.033	0.021	105	48
			Shore	329	161	---	---		
		C	Boat	369	280	---	---		
			Shore	296	274	0.036	0.060	--	--
	Total			35,771	7,275	0.036	0.007	1298	356

Table 8. (Continued)

Month	Day-type[A]	Zone	Angler-type	Angler Effort hrs	Effort (± CI)[B]	Catch Rate[C] fish/hr	(± CI)[B]	Harvest[D] [E] fish	(± CI)[B]
Dec	WE	A	Boat	5,811	2,676	0.037	0.013	216	125
			Shore	278	163	0.023	0.044	--	--[H]
		B	Boat	1,652	930	0.031	0.033	51	64
			Shore	227	108	---	---[G]		
		C	Boat	487	209	0.060	0.084	--	--
			Shore	115	81	0.121	0.216	--	--
	WD	A	Boat	6,722	4,522	0.031	0.012	211	166
			Shore	566	235	---	---		
		B	Boat	1,162	986	0.014	0.016	17	25
			Shore	291	124	0.021	0.040	--	--
		C	Boat	548	286	---	---		
			Shore	161	151	0.059	0.058	--	--
	Total			18,019	5,451	0.033	0.008	589	228
Fall Total				103,290	9,871	0.029	0.003	3026	441

[A] WE = Weekends and major holidays, WD = weekdays.

[B] 95 % confidence intervals if data are normally distributed, otherwise at least 75 % CI.

[C] Catch rates includes data by IFG and WDG for kept fish only.

[D] Angler effort X catch rate = harvest.

[E] Strata harvest estimates may not sum to total harvest because total harvest and confid. limits were calculated by using the total angler effort and total CPUE for the monthly or seasonal total harvest estimates.

[F] September incomplete, began the creel survey on 9/14.

[G] No fish kept by interviewed anglers, no catch rate estimate possible.

[H] Less than 10 parties or 2 fish kept in the sample of interviewed anglers, therefore no harvest estimate was calculated for this strata.

Table 9. Estimated angler effort, catch rates, and harvest for steelhead anglers on the mid-Snake River, spring 1986.

Month	Day-type[A]	Zone	Angler-type	Angler Effort hrs	(± CI)[B]	Catch Rate[C] fish/hr	(± CI)[B]	Harvest[D] [G] fish	(± CI)[B]
Jan	WE	A	Boat	4,191	1,028	0.020	0.009	83	41
			Shore	147	102	---	---[E]		
		B	Boat	1,139	323	0.014	0.014	16	17
			Shore	59	35	---	---		
		C	Boat	305	159	0.022	0.030	7	10
			Shore	218	160	0.053	0.067	11	16
	WD	A	Boat	1,959	382	0.022	0.013	43	27
			Shore	149	178	---	---		
		B	Boat	685	348	0.024	0.053	--	--[F]
			Shore	53	56	---	---		
		C	Boat	181	204	0.076	0.105	--	--
			Shore	32	31	---	---		
	Total			9,117	1,252	0.021	0.006	187	63
Feb	WE	A	Boat	2,312	1,544	0.015	0.012	35	37
			Shore	89	73	---	---		
		B	Boat	502	326	0.015	0.022	7	12
			Shore	42	9	---	---		
		C	Boat	323	176	---	---		
			Shore	199	104	---	---		
	WD	A	Boat	599	614	0.035	0.026	21	28
			Shore	42	44	---	---		
		B	Boat	551	549	---	---		
			Shore	100	102	0.090	0.223	--	--
		C	Boat	100	177	---	---		
			Shore	0	102	---	---		
	Total			4,858	1,805	0.019	0.010	94	59
Spring Total				13,974	2,197	0.020	0.005	282	87

[A] WE = Weekends and major holidays, WD = weekdays.

[B] 95 % confidence intervals if data are normally distributed, otherwise at least 75 % CI.

[C] Catch rates includes data by IFG and WDG for kept fish only.

[D] Angler effort X catch rate = harvest.

[E] No fish kept by interviewed anglers, no catch rate possible.

[F] Less than 10 parties or 2 fish kept in the sample of interviewed anglers, therefore no harvest estimate was calculated for this strata.

[G] Strata harvest estimates may not sum to total harvest because total harvest and confid. limits were calculated using the total angler effort and total CPUE for the monthly and seasonal totals.

Table 10. Average angler-day length for completed fishing trips on the mid-Snake River, fall 1985 and spring 1986.

	Boat		Shore	
Month	Mean complete trip length (hours)	No. sampled anglers & (hours)	Mean complete trip length (hours)	No. sampled anglers & (hours)
Sep.	4.1	124 (507.8)	---	2 (8.5)
Oct.	4.0	281 (1135.8)	3.5	4 (14.0)
Nov.	4.0	179 (713.8)	---	2 (1.8)
Dec.	4.3	135 (578.8)	2.9	7 (20.5)
Fall Totals	4.1	719 (2936.0)	3.0	15 (44.8)
Jan.	4.0	69 (272.5)	---	0 (0.0)
Feb.	1.8	3 (5.3)	4.3	4 (17.0)
Spring Totals	3.9	72 (277.8)	4.3	4 (17.0)

Table 11. Data from steelhead observed in angler creels along the mid-Snake River, fall 1985 and spring 1986.*

Month (n)#	Mean fork Length cm (Std.dev.) (n)#	Mean wt. kg (n)#	% Female (n)#	% Wild (n)#	% Adipose Clipped (n)#	% L.Ventral clipped (n)#	% zone A caught (n)#	% zone B caught (n)#	% sucessful anglers with WA residence (n)#	% steelhead on WA punchcard (n)#
Sep. (35)	65.6 8.508 (35)	- - (0)	60.0 (35)	20.6 (34)	20.6 (34)	0.0 (34)	65.7 (35)	22.9 (35)	37.5 (8)	50.0 (8)
Oct. (143)	69.8 9.058 (134)	3.19 1.442 (22)	51.5 (132)	11.1 (135)	22.9 (135)	2.2 (135)	66.9 (142)	27.5 (142)	47.2 (36)	63.2 (38)
Nov. (159)	73.7 11.851 (146)	4.05 1.790 (16)	45.2 (146)	26.4 (148)	9.5 (148)	3.4 (148)	74.8 (159)	21.4 (159)	30.3 (33)	39.5 (38)
Dec. (121)	77.7 11.714 (115)	4.72 2.170 (16)	55.7 (115)	20.2 (114)	15.8 (114)	0.9 (114)	87.1 (116)	6.9 (116)	21.7 (23)	25.6 (43)
Jan. (58)	69.0 8.372 (57)	3.76 1.106 (5)	62.5 (56)	26.3 (57)	19.3 (57)	5.3 (57)	82.1 (56)	7.1 (56)	42.9 (7)	46.7 (15)
Feb (15)	74.7 9.270 (13)	- - (0)	38.5 (13)	15.4 (13)	7.7 (13)	0.0 (13)	66.7 (15)	26.7 (15)	- (0)	12.5 (8)
Mar.	NO FISH SEEN									
									Total	41.3 (150)

* Includes Idaho Fish and Game data.

\# n = the number sampled; some other fish recorded as kept in the creel checks were not seen or some data were not recorded.

Length-Frequency and Age of Sampled Steelhead

Length-frequencies of wild fish consistantly had peaks at 65 cm and 80 cm. Hatchery fish had similar peaks at 65-70 cm and 85-90 cm.(Figs. 2,3,4). The general relation between steelhead length and weight is presented in Figure 5. This relation changes over the course of the fishing season due to elongation of jaws in the males and the loss of body weight in both sexes as the season progresses. "A run" steelhead comprised most of the harvest; with the most frequent size of fish in the harvest at about 67 cm (27 in) and 3.0 kg (6.6 lbs). Many anglers complained about the small size of fish caught this season compared with the average fish of 34 in and 14 lb harvested during the fall and spring of 1984 and 1985.

Results of our scale analysis indicates a considerable overlap exists between length classes and duration of ocean residency (Fig.6). Fish that had resided in the ocean for 3 years comprised 4.2 % and 2.3 % of the wild and hatchery fish, respectively. Approximately 16.9 % of all wild fish had resided in fresh water for 3 years. Our scale analyst assumed that all steelhead with 1 year of fresh water residency were of hatchery origin. This may not reflect actual conditions for wild fish as a small percentage of wild steelhead smolt after only 1 year in fresh water (Kucera 1986, Loch et al. 1985, Johnson and Cooper 1985, 1986). Data for individual fish included in our scale analysis are listed in Appendix G.

Coded-Wire Tag Recovery

Snouts were collected by WDG personnel from 110 steelhead that had adipose or left ventral fin clips. Snouts from 109 steelhead were examined by NMFS personnel for coded-wire tags (cwts). They retrieved 44 cwts representing 23 separate tag codes. Most tag codes were from releases by IFG or NMFS at Dworshak or Lower Granite Dam. Only 10 cwts from Lyons Ferry Hatchery (LFH, codes beginning with 63) were recovered by WDG personnel from the Snake River. These cwts included 1983 releases into the Grande Ronde River Basin at Enterprise, Oregon, (1 recovery, 8 fish estimated in the harvest) and at Lyons Ferry Hatchery (4 recoveries, 30 fish in the harvest). Six of the LFH cwts recovered (estimated 41 fish in the harvest) were from 1984 releases into the Tucannon River (63-32 tag codes). No cwts from LFH were recovered in the sport harvest downstream of Lower Granite Dam. All cwts recovered by WDG personnel and estimates of the expanded harvests by individual tag code are presented in Table 12. Details of sampled or voluntary recoveries are presented in Appendix H. Only 5 of the 14 snouts voluntarily returned contained cwts.

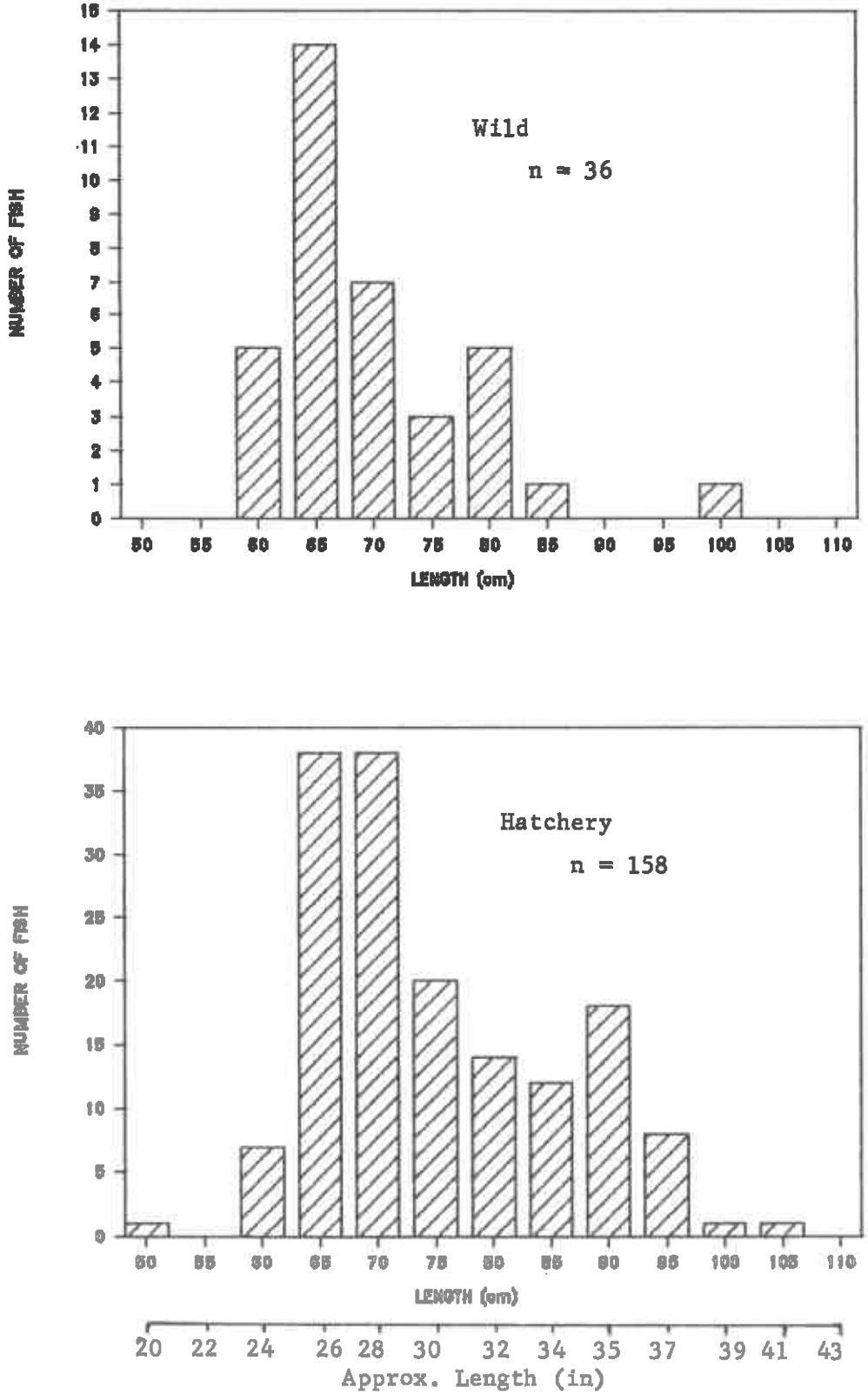
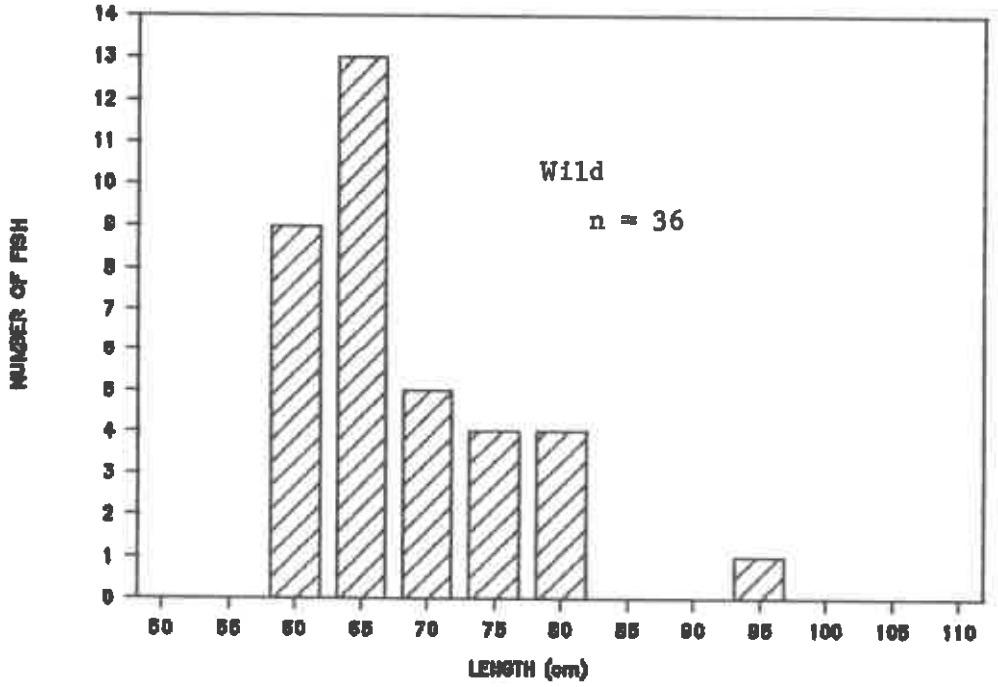


Figure 2. Length-frequencies of steelhead observed in the catch on the Lower Snake River during the fall 1985 and spring 1986.



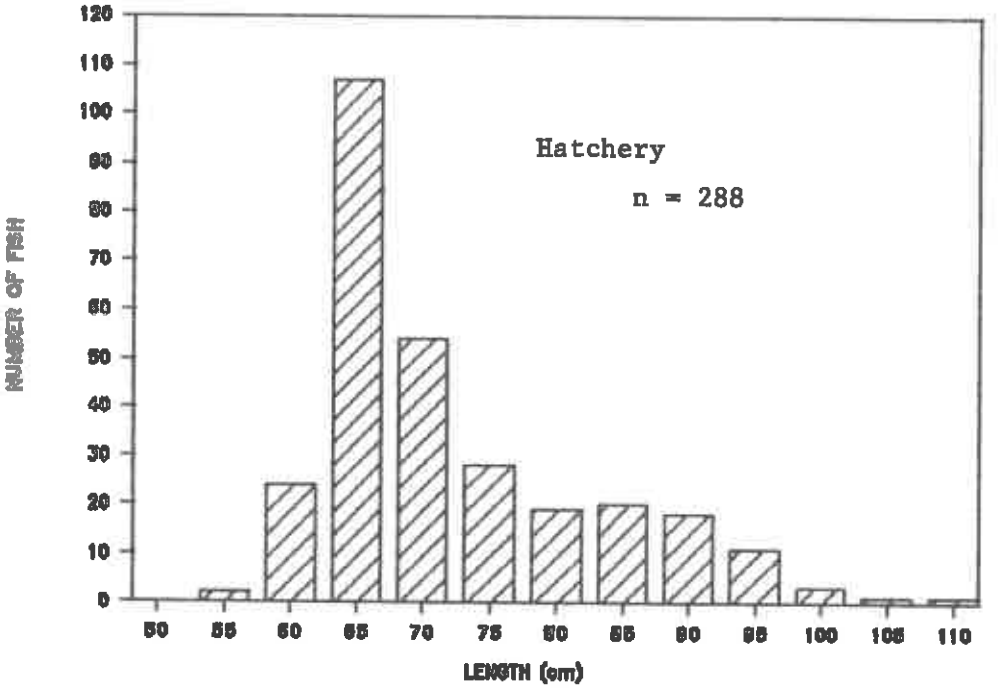
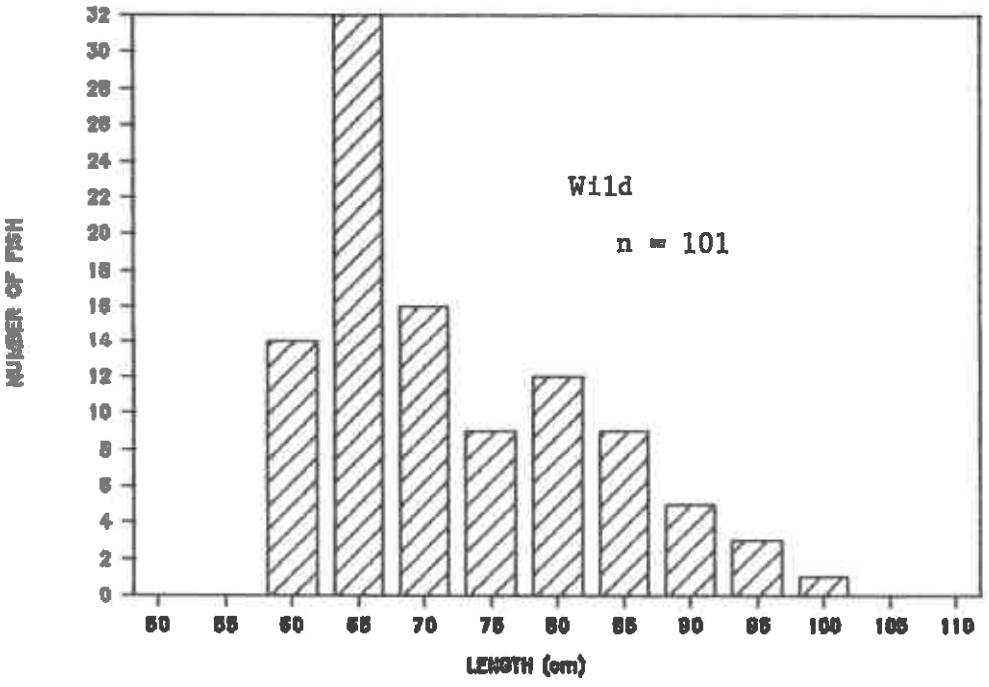


Figure 3. Length-frequencies of steelhead observed in the catch on Lower Granite Reservoir, fall 1985 and spring 1986.



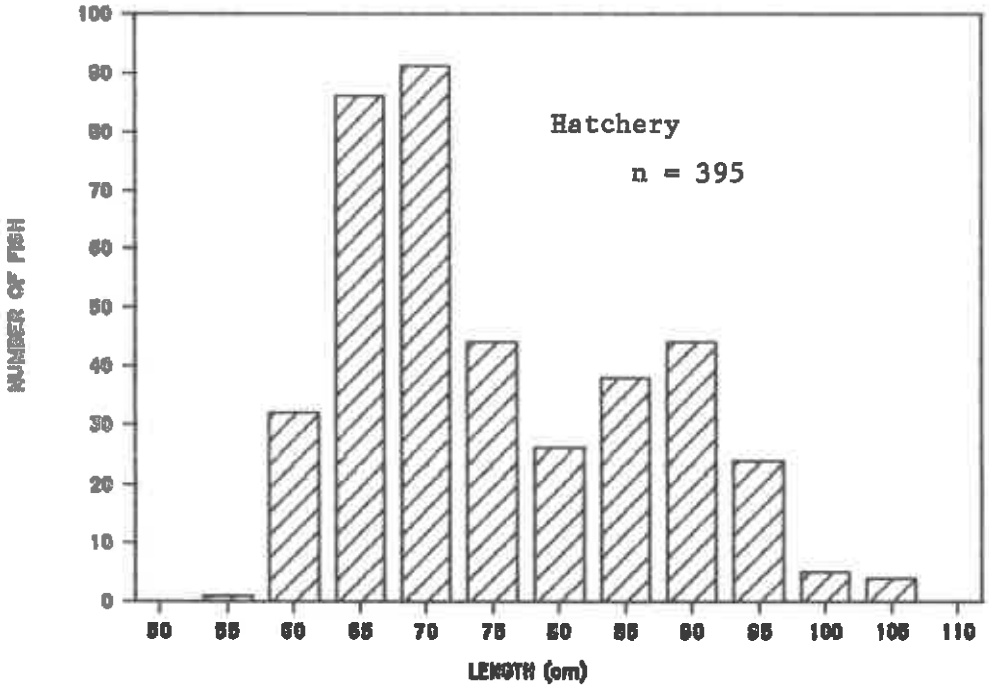
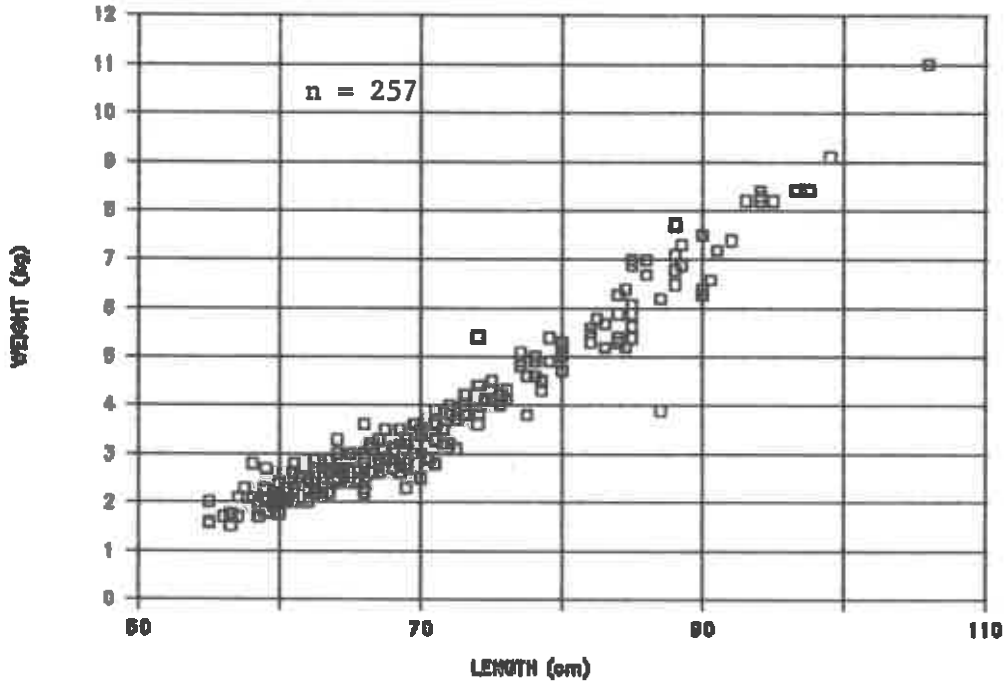


Figure 4. Length-frequencies of steelhead observed in the catch on the mid-Snake River during the fall 1985 and spring 1986.



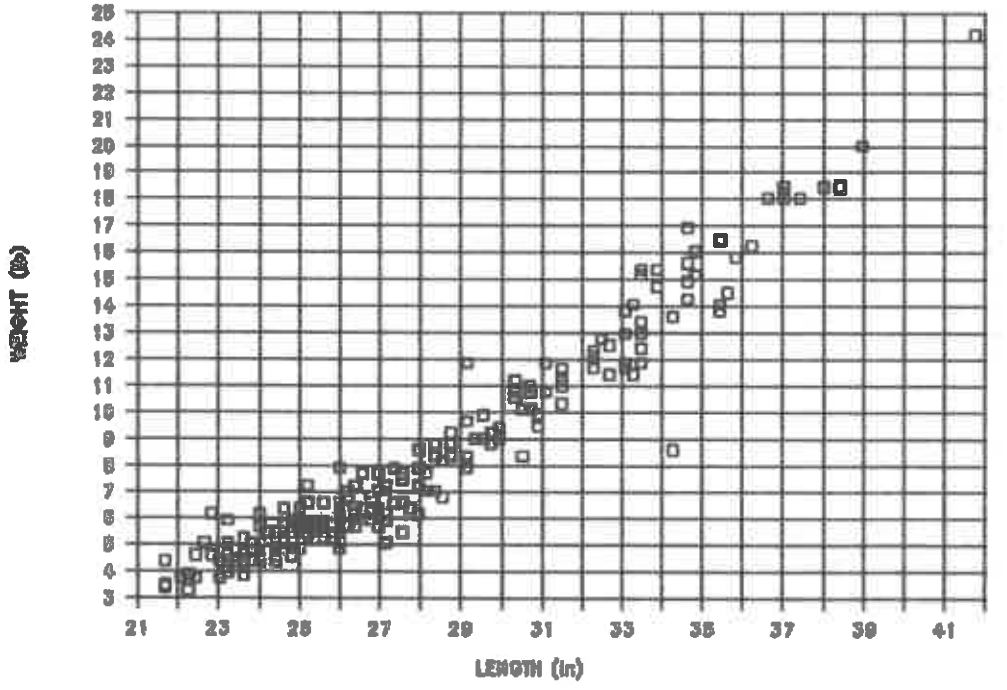
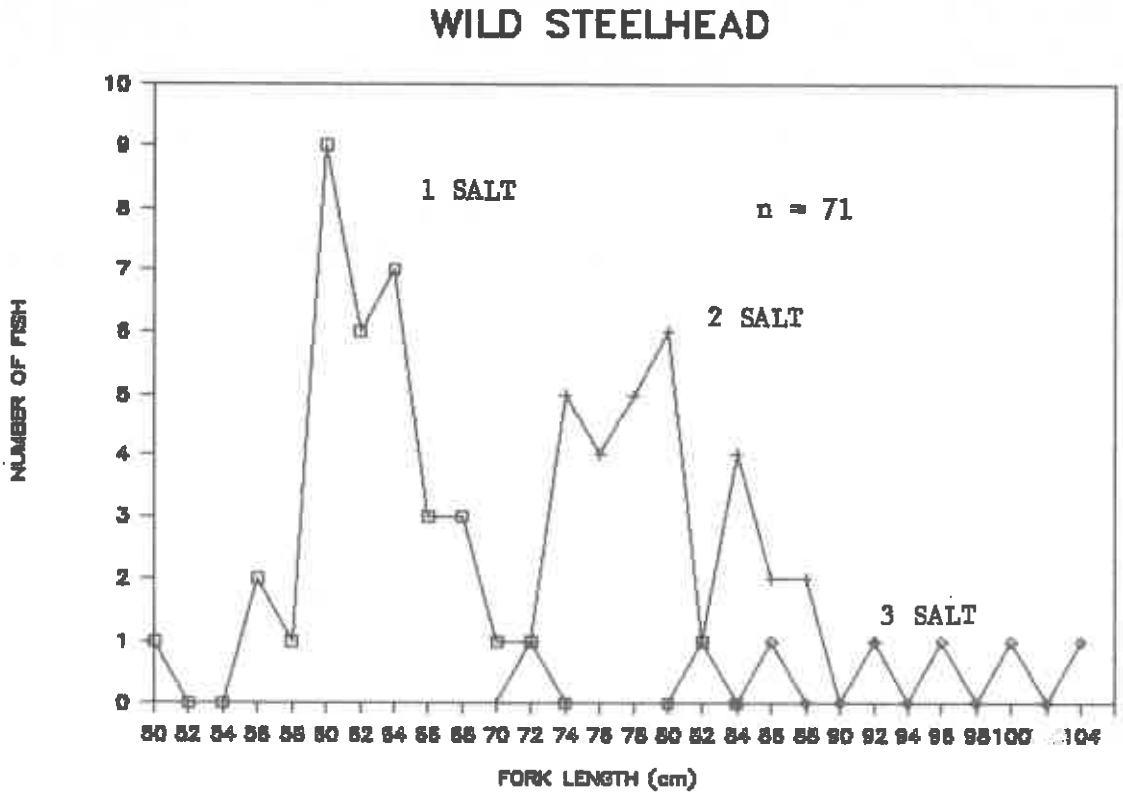


Figure 5. Length-weight for adult steelhead observed in the catch on the Snake River, fall 1985 and spring 1986.



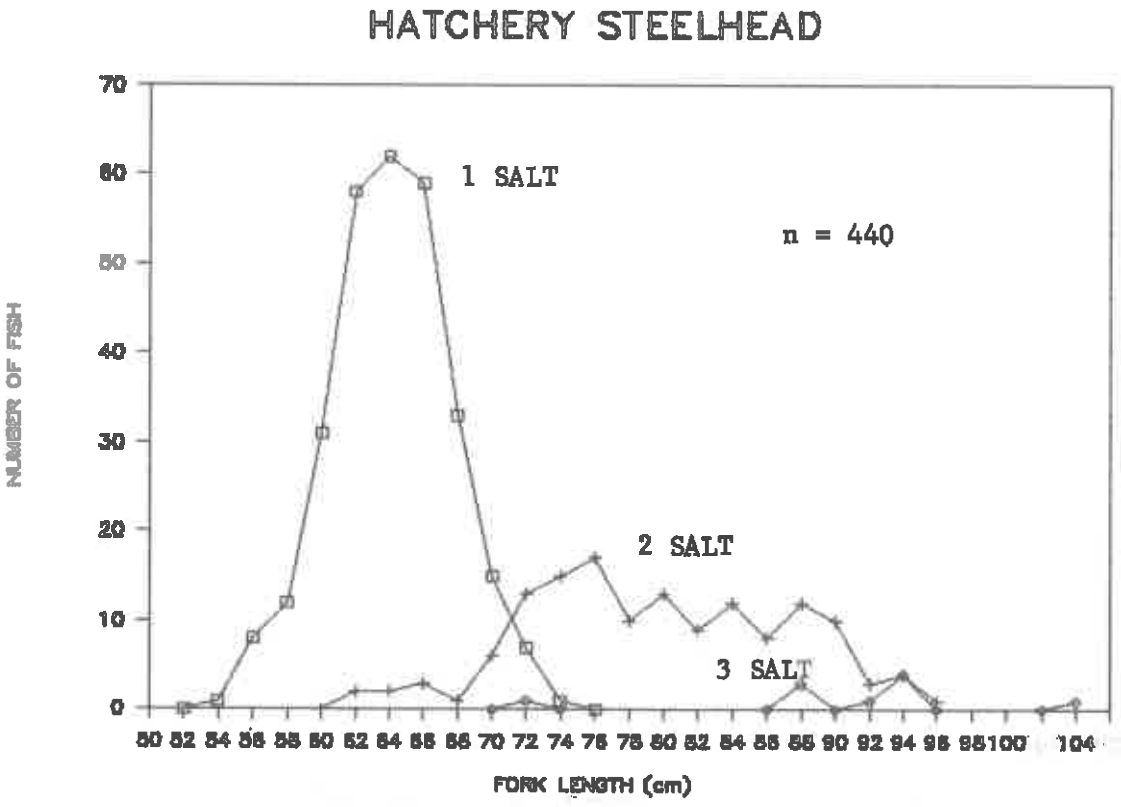


Figure 6. Length-frequency and duration of salt water residency (from scale samples taken by WDG) for steelhead from the Snake River, fall 1985 and spring 1986.

Table 12. Coded-wire tag expansions for the Snake R., fall 1985 and spring 1986.

Sec.[a]	Season	Estimated Harvest[b]	# Fish Checked (Sample Rate)[c]	# Fish Fin Clipped (Mark Rate)[d]	# Snouts Taken	# Snouts Checked (# cwt, no tags)	Total Estimated # Fish Clipped (% w/ cwt)[e]	Total Estimated cwt in Harvest[f]	CWT code	# Recovered	Expanded cwt in Harvest (by code)[g]
Mid 168	Fall	3026	442 (.1461)	28 (.0633)	26	25 (9,16)	191.5 (36.00)	68.96	5-13-36	1	8
									10-25-16	1	8
									23-16-19	1	8
									23-16-39	1	8
									23-16-51	1	8
									63-28-39	1	8
									63-28-38	1	8
									63-32-15	2	15
										9	71
Mid 168	Spring	282	70 (.2482)	1 (.0143)	1	1 (1,0)	4 (100.0)	4	63-32-12	1	4
L6R 168	Fall	1320	204 (.1545)	32 (.1569)	28[i]	28[i] (15,13)	207.11[i] (53.6)	111.0[i]	5-10-24	1	7
									10-27-45	1	7
									23-16-04[i]	1	7
									23-16-16	1	7
									23-16-19[i]	1	7
									23-16-39	4	30
									23-16-45	1	7
									23-16-46	1	7
									63-28-38	1	7
									63-32-14	1	7
									63-32-15	2	15
										15	108
L6R 168	Spring	869	132 (.1519)	11 (.0838)	10	10 (4,6)	72.4 (40.0)	28.96	23-16-4	1	7
									23-16-17	1	7
									63-28-38	2	15
										4	29

Table 12. (Continued)

Sec.[a]	Season	Estimated Harvest[b]	# Fish Checked (Sample Rate)[c]	# Fish Fin Clipped (Mark Rate)[d]	# Snouts Taken	# Snouts Checked (# cwt, no tags)	Total Estimated # Fish[e] Clipped (% w/ cwt)[f]	Total Estimated cwt in Harvest[g]	CWT code	# Recovered	Expanded cwt in Harvest (by code)[h]
L.SN. 164-167	FALL	1491	131 (.0879)	48 (.3664)	36	36 (12,24)	546.3 (33.33)	182.1	5-10-28	1	15
									5-13-35	1	15
									10-25-17	1	15
									10-25-19	1	15
									23-16-19	2	30
									23-16-38	2	30
									23-16-39	3	46
									UNREADABLE	1	15
										12	181
L.SN. 164-167	SPRING	892	76 (.0852)	16 (.2105)	11	11 (5,6)	187.8	85.4	10-27-46	2	34
									23-16-17	1	17
									23-16-39	1	17
									23-16-40	1	17
										5	85

a Mid=mid Snake river above Red Wolf Bridge in Clarkston, L. Granite Dam (LGR) up to Red Wolf BR., L.Sn.= Lower Snake R. below LGR.

b Estimated harvest from other tables in this report.

c (# Fish checked / estimated harvest) = sample rate.

d (# of fish fin clipped / # fish checked) = mark rate.

e (Total harvest x mark rate) = estimated # of fin clipped fish in harvest.

f (# cwt's / # snouts checked) x 100 = % of snouts with cwt's

g (Estimated total fin clipped fish x % of snouts with cwt's) = # cwt's in harvest.

h (# recoveries of a tag code / total # cwt's) x Estimated cwt's in harvest = estimated tag codes in the harvest (expanded).

i Includes 2 jaw tag recoveries without snouts taken.

IFG also sampled LFH cwts from several river locations (Kent Ball and Tim Cochnauer, IFG, pers. comm). LFH cwt recoveries and expanded harvest estimates for Idaho sampling efforts are presented in Appendix I. Idaho sampling of steelhead retained on Washington punchcards and their cwts are presently unavailable.

All hatchery or spawning survey recoveries of brands and cwts for spring 1986 will be reported in the Part II 1985-86 Annual Report.

We have corrected our 1984-85 cwt data from our previous report (Mendel and Aufforth 1985). Revised cwt expansions for 1984-85 are presented in Appendix J. Only 1 cwt recovered by WDG was from LFH (expands to 10 fish in the harvest). The mid Snake R. sampling rate was 10 % for IFG and 2 of 19 cwts recovered were LFH. Thus, IFG estimates that 10 fish of each tag (63-28-38 and 63-28-40) were harvested (Ball 1986).

Other Tag Recovery

A list of jaw tags, brands, and IFG anchor tags that were seen during the creel survey or were volunteered by anglers is presented in Appendix K. Any readable brands or jaw tags from fish from which we didn't take a snout have been included in the cwt recoveries and expanded harvest estimates for individual tag codes.

Exploitation Rates

The 1983 release at Lyons Ferry Hatchery (brand LA-S-1) had a higher sport fishery exploitation rate than for the 2 groups released in 1983 in the Grande Ronde River (brand RA-S, Table 13). All exploitation rates for the 1984 releases are for fish from the Tucannon River. Exploitation appears very low for these marked groups of LFH steelhead. IFG estimates that sport fishing exploitation for LSRCP hatchery "A run" steelhead in Idaho varied between 38 and 69 % (Ball 1986).

Comparison with Other Harvest Estimates

WDG Punchcard-Derived Estimates

Although it is required by law, and there is now a $5.00 rebate, for all punchcards to be sent into WDG after the season closes, only 91 of 300 punchcards initialed by WDG employees in the field were returned by steelhead anglers in southeast Washington. This 30.33 % return rate is less than the 38.2 % rate we estimated for 1984-85, but again exceeds the 23.76 %

Table 13. Jaw tag data and estimated sport fishery exploitation rates for the Snake River above Lower Granite Dam, fall 1985 and spring 1986.*

# of Fish Jaw Tagged	Brand Group	Release Year	Sport Harvest Returns	% Exploitation Rate	Hatchery Recoveries (additional)
131	RA-S-1	1983	9	6.9	14(2)■
109	RA-S-2	1983	9	8.3	11
218	LA-S-1	1983	25^	11.5	2
			mean =	8.9	
			std. dev.=	2.4	
159	RA-IV-1	1984	18	11.3	1
189	RA-IV-3	1984	22	11.6	0
103	RA-IJ-1	1984	17	16.5	2
87	RA-IJ-2	1984	11	12.6	1
			mean =	13.0	
			std. dev.=	2.4	

* Data provided by NMFS in Pasco and L. Granite Dam.

^ Also 2 additional recoveries from jaw tags attached at Bonneville Dam.

■ Also 2 recoveries from spawning surveys.

that was applied statewide to estimate steelhead harvests for individual rivers (Gibbons 1987). We did not tell anglers the actual reason we marked their punchcards, even if asked. We also attempted to mark punchcards from successful as well as unsuccessful anglers, to reduce any biases in our estimates.

The punchcard-derived harvest estimates (Gibbons 1985) appear to generally underestimate harvest during fall 1984 and spring 1985 (Table 14). However, punchcard estimates were very similar to creel estimates of harvest for the lower Snake River in fall 1985 and spring 1986 (Table 15). Although we don't know the accuracy of either estimating method, the extremely high cost of obtaining the data with a creel survey is prohibitive and does not seem to result in a substantial difference from the punchcard-derived estimate. Therefore, in the future we will not attempt a creel survey to estimate harvest or angler effort for the lower river.

The results of the creel survey and punchcard-derived harvest estimates for WDG management section 168 (above Lower Granite Dam) vary, but we have estimates of the accuracy of our creel survey harvest estimates (Table 16). The areas covered in the two estimates are not identical because the creel survey only encompasses from L. Granite Dam upstream to Lime Point, near the Grande Ronde R., while the punchcard section includes that portion of the river upstream to the Oregon state line. However, the harvest between Lime Point and the Oregon state line is not known to be very substantial. Also we had to use the estimated percentage of the harvested fish validated with Washington punchcards, for the portion of the Snake R. adjacent to Idaho, to estimate harvest comparable to punchcard harvest estimates.

IFG Telephone Survey Estimates

We also compared our mid-Snake harvest estimates with those obtained by an IFG telephone survey (Cochnauer 1986). We had to estimate the percentage of the steelhead harvest for the mid Snake River that was validated on Idaho steelhead permits. This estimate was then multiplied by our mid Snake R. harvest estimate to arrive at an appropriate harvest estimate to compare with IFG's estimate. The river areas are not identical in each states survey. IFG's section 01 (Lower Snake River) is from the Idaho-Washington state line to the Salmon River while our mid Snake R. section includes about 1 mile below the Idaho/ Washington border (to Red Wolf Bridge) and only extends upstream to Lime Point near the Grande Ronde River. However, IFG harvest estimates (for anglers with Idaho steelhead permits) in 1984-1985 are nearly as high as our total mid Snake R. harvest by both Idaho and Washington anglers (Table 17). Their 1985-86 estimates show less disparity with our estimates. These comparisons indicate that: 1) either the harvest in 1984-85

Table 14. Comparison of harvest estimates from creel surveys and punchcard returns for the Snake River, fall 1984 and spring 1985.

WDG Mgmt. zone	Estimating method	Sep	Oct	Nov	Dec	Fall Total	Jan	Feb	Mar	Spring Total
168 LGR	CREEL	--	--	--	983	--	1296	363	178	1837
168 MID	CREEL	202	320	1811	1188	3521	616	277	0#	893
168 Total	CREEL	--	--	--	2171	--	1912	640	178#	2730#
168 Total	PUNCHCARD+	78	320	841	1654	2893	1339	422	226	1987
164-168	CREEL	258	470	2010	2171*	4909	1912*	640*	178*	2730
164-168	PUNCHCARD+	149	500	1386	1654	3689	1339	422	226	1987

\+ Harvest estimate based on punchcards returned to WDG (Gibbons 1985)

* Sections 164-167 were not included in the creel survey for these months.

\# Estimate for mid Snake is incomplete for March.

Table 15. Comparison of harvest estimates from creel surveys and punchcard + returns for the lower Snake River, fall 1985 and spring 1986.

WDG Mgmt. zone	Estimating Method	Sept	Oct	Nov	Dec	Fall Total	Jan	Feb	Mar	Spring Total	Grand Total
164	creel	94	30	14	26	164	2	0	-- *	2	166
	punchcard	69	42	24	31	166	9	0	2	11	177
165	creel	22	20	73	194	309	55	6	-- *	61	370
	punchcard	33	9	111	87	240	27	4	4	35	275
166	creel	100	170	124	166	560	106	54	--**	160	720
	punchcard	113	226	109	162	610	42	22	24	88	698
167	creel	7	27	48	376	458	422	247	--**	669	1127
	punchcard	9	47	51	317	424	133	109	4	246	670
Monthly Total	creel	223	247	259	762	1491	585	308	--**	892	2383
	punchcard	224	324	295	597	1440	211	135	34	380	1820

* No survey conducted.

** No catch rate estimate possible, thus no harvest estimate.

\+ Harvest estimates based on punchcard returns to WDG (Gibbons 1987).

Table 16. Comparison of harvest estimates (95 % confidence limits) from creel surveys and punchcard-derived harvest estimates for WDG management section 168, fall 1985 and spring 1986.

Section	Estimating Method	Sep	Oct	Nov	Dec	Fall Total	Jan	Feb	Mar	Spring Total
168 LGR	CREEL	89* (71)	419 (130)	350 (135)	374 (135)	1320 (244)	427 (164)	366 (128)	60 (96)	869 (276)
168 MID	CREEL	237* (94)	909 (191)	1298 (356)	589 (228)	3026 (441)	187 (63)	94 (59)	--	282 (87)
168 TOTAL	CREEL	326*	1,328	1,648	963	4,346	614	460	60*	1,151
168	PUNCHCARD+	151	730	619	573	2,073	448	557	62	1,067#

* Not complete for the month.

\+ from Gibbons 1987.

\# Plus 13 fish harvested in April during closed season (Gibbons 1987).

Table 17. Comparison of Idaho Fish and Game (IFG, Section 01) and WDG harvest estimates for the Snake River between Clarkston and the Grande Ronde River.

Period	Agency		Sep	Oct	Nov	Dec	Fall Total	Jan	Feb	Mar	Spring Total
Fall-Sp 1984-85	IFG	※	18	360	1063	828	2,539 (79 %)+	--	--	--	**784 +** (63 %)+
Fall-Sp 1984-85	WDG	#	202	320	1811	1188	3,521 (77 %)	616	277	--a	893 (82 %)
	WDG		Harvest by Idaho anglers based on 39.76 % of above harvest on Idaho Permits.					Harvest by Idaho anglers based on 34.41 % of above harvest on Idaho Permits.			
							1,400				**307**
Fall-Sp 1985-86	IFG	※※	167	530	743	387	1,883	301	213	22	**530**
Fall-Sp 1985-86	WDG	b	237 (94)	909 (191)	1,298 (356)	589 (228)	3,026 (441)	187 (63)	94 (59)	--	282 (87)
	WDG		Harvest by Idaho anglers based on 55.29 % of above harvest on Idaho Permits.					Harvest by Idaho anglers based on 64.54 % of above harvest on Idaho Permits.			
			118	335	781	439	1,673	100	82	--	182

※ Results of a telephone survey (Cochnauer 1986).
\+ From Ball 1986, pg. 24, % hatchery fish in parenthesis.
\# Total harvest by both Washington and Idaho anglers estimated from a creel survey of the mid Snake River (Mendel and Aufforth 1985).
a No estimate for March.
※※ Results of a telephone survey (K. Ball, pers. comm.).
b Total harvest estimates from a creel survey on mid Snake River for both Washington and Idaho anglers (95 % confid. limits).

between Lime Point and the Salmon R. was extremely high, or 2) the telephone surveys overestimate the harvest of fish from the mid Snake River. Unfortunately, the inclusion of the river section between Lime Point and the Salmon R. in IFG's survey makes any comparison of the results of the two harvest estimates relatively speculative.

CONCLUSIONS

The formulas we used to calculate variance and confidence limits for the harvest estimate were based on the assumption that angler effort and CPUE data were collected by separate, independent, randomized data collection procedures. This is not always true for boat anglers, and it is rarely true for shore anglers, because anglers were often interviewed as they were encountered during angler effort counts. Therefore, theoretically we should add a covariance factor in our estimates of the variance of the harvest. We are attempting to identify the correct covariance formula for future creel surveys. Also, due to an oversight all strata CPUE's were calculated with incomplete trip data only. Monthly and season CPUE's include complete and incomplete trip data. Nevertheless, we are reasonably confident of our angler effort, CPUE, and harvest estimates for the Snake R. above L. Granite Dam (section 168). The calculated confidence intervals for monthly and seasonal totals are better than we had expected they might be. We plan no major changes to our creel survey design next year for this river section. However, the lower Snake R. creel survey is another matter. Difficult, isolated access areas, and a sporadic, disjunct fishery have resulted in poor accuracy of our estimates. A substantial increase in sampling effort would be necessary to achieve reasonable estimates of CPUE and harvest. Costs for such an effort are prohibitive and the fishery is presently too small to justify an increased sampling program. This has convinced us to use WDG's punchcard harvest estimates for the lower Snake River (sections 164-167). We will occasionally sample angler creels along the lower Snake R. in the future to determine the composition of the catch and to retrieve tagged fish.

It is obvious that steelhead anglers are benefitting from Lyons Ferry Hatchery programs by the number of LFH cwts that were estimated to have been harvested. The harvest of LFH cwts this run-year is substantially above the 1984-85 estimates. Yet we are concerned by the low estimates of sport fishery exploitation for several steelhead tag groups from LFH, as well as the large number of branded fish from our Tucannon R. releases that winter above L. Granite Dam. We must emphasize that the exploitation rates presented in this report should be considered minimum exploitation rates because some jaw tags recovered in the harvest undoubtedly were not seen by WDG or returned to NMFS. However, we believe the error to be fairly small so we think the

exploitation rates presented are a fairly accurate representation of the actual rates for LFH steelhead above L. Granite Dam.

Our estimates of the percentage of wild steelhead in the harvest may be a slight overestimation because of the presence of unmarked hatchery steelhead with no deformaties in the dorsal fins. Some of these fish are likely to be LFH steelhead. This problem should be insignificant in the future as most, or all, of the hatchery fish are fin clipped. Fin clipping of all hatchery fish could also resolve problems with the classification of hatchery fish in our scale analysis. This may enable us to accurately estimate the percentage of returning wild (natural) steelhead that smolt after 1 year in freshwater.

At present, comparison of our creel results above L. Granite Dam with either WDG or IFG statewide harvest techniques (for estimating harvest for individual river sections) is not completely appropriate because of differences in the river segments included in the estimates. The large differences in the punchcard and creel estimates may reflect: 1) that the punchcards that are returned to WDG do not accurately represent the average catch per angler, or 2) that the bias correction factor (to account for successful anglers being more likely to return their punchcards) and/or the punchcard return rate applied statewide is inappropriate for the upper Snake River. We encourage WDG to create a new fishery management section that would separate Lower Granite Reservoir from the more natural portion of the Snake River above Clarkston. This would be more practical for fishery management considerations and greatly improve our ability to compare creel survey results and punchcard harvest estimates. At some point in the near future we wish to use the punchcard harvest estimates for all areas of the Snake River, if possible, so that we can emphasize sampling other steelhead fisheries in southeast Washington where no data exists.

We are interested in a better comparison of our harvest estimates from our creel surveys with IFG's telephone survey estimates. This requires a change in the area of river included in IFG's lower Snake R. section, so that the Snake R. from the state line at Clarkston upstream to the Grande Ronde R. (or some portion of that area) is separated in their harvest estimates. A valid comparison could help IFG evaluate or fine tune their telephone survey as well as enable us to evaluate their method as a possible replacement for our expensive creel surveys.

Also, we will attempt to obtain the all the cwt data from IFG creel checks for steelhead retained on the Snake River. IFG has not expanded any of the cwt data for steelhead caught by Washington anglers. These data are important and at least should be reported for other agencies to use. We may be able to incorporate the data into our cwt expansions for the mid Snake River.

We will evaluate and report return rates of LFH steelhead as well as estimate the total sport harvest of LFH steelhead in the project area in Part II of our 1985-86 Annual Report.

We attempted to evaluate the effects of the Corps of Engineers dredging program on steelhead fishing during January through March 1986. However, the unusually high, natural turbidity in the area near the confluence of the Clearwater R. precluded adequate opportunity to evaluate the impacts of the dredging on steelhead fishing near the Port of Clarkston. Severe turbidity in the Snake River downstream of the Clearwater was caused by frequent rain and an early snow melt in January and February. Turbidity was usually attributeable to the Clearwater R. but on some days the Snake R. was muddy while the Clearwater R. had relatively low turbidity. Anglers were observed on several occasions fishing in the clear waters of the Snake River just upstream of the turbid waters from the Clearwater River. We did observe that the large dredge produced a wake of 4 to 5 feet while in transport. We feel that this wake could be a substantial safety hazard for occupants of small fishing craft in the area and thus may affect steelhead fishing. The impacts of dredging activities on the steelhead fishery will be monitored in the future, as the opportunity arises.

Next year we will conduct our creel surveys on the Snake (section 168) and the Grande Ronde rivers in Washington. We will further examine the exploitation rates and cwt recoveries for LFH steelhead. Recoveries above L. Granite Dam of branded Tucannon R. releases will also be compiled to determine if we have a serious straying problem with those fish.

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APPENDIX A: ANGLER COUNT FORMS

1. Lower Snake River (plus L. Granite)
2. Mid Snake River

ANGLER EFFORT SURVEY---LOWER SNAKE RIVER -- 1985

DATE _____ ROUTE _____

CENSUS TAKER _____ WEEKEND, WEEKDAY DAY _____

STARTING POINT _____ STARTING TIME _____

LOCATION	NO INTERVIEWS	TIME	NO. OF ANGLERS SHORE	BOATS	COMMENTS

WEATHER: air temp _____ time _____ wind _____

sky 0-10% cloudy 10-50% >50% other _____ water clarity _____

ADDITIONAL COMMENTS:

	ACTUAL	ANGLER
DAYLIGHT		
DARKNESS		

SAMPLING EFFORT 1-2 WD AND 1 WE PER WEEK

ANGLER EFFORT COUNTS

	ACTUAL	ANGLER
DAYLIGHT		
DARKNESS		

DATE _____ MONTH _____ DAY TYPE (weekend, weekday)

COUNT TIMES (0700--1000, 1000-1300, 1300-1600, 1600-1900)
(0600,0800 0900,1100 1200,1400 1500)

INITIALS _____

COUNT START TIME _____ COUNT START LOCATION (Corps office, G. Ronde,)

ZONE	START TIME	NO. OF BOATS	TOTAL BOATS	NO. SHORE ANGLERS	TOTAL S.ANGLER	STOP TIME	COMMENTS (weather, water conditions, etc)

stream _____ air temp _____ time _____
water temp _____ location _____ time _____
water level _____ clarity _____ wind _____
sky 0-10% cloudy 10-50% cloudy > 50%cloudy other _____

ANGLER COUNTS / WEEK 1 WE and 1 WD per WEEK

stream _____ air temp _____ time _____
water temp _____ location _____ time _____
water level _____ clarity _____ wind _____
sky 0-10% 10-50% > 50% other _____

APPENDIX B: Angler interview data form for steelhead creel survey on the Snake River fall 1985 and spring 1986.

GAM 558 -602-

ANGLER SURVEY FORM

№ 34356

WATER: Snake R. SECTION: 168 mid COUNTY: Asotin

DATE: MO. 10 DAY 17 YR. 19 85 INTERVIEWER: DM (')

COUNTS: TIME | BOAT (a, b, A) | SHORE | TOTAL | COMPLETE | PARTIAL

FOR PARTY		FOR EACH ANGLER IN PARTY — Obtain individual information																						
NUMBER IN PARTY	TIME CHECKED OR FINISHED	"AGE" ADULT	"AGE" JUV.	HOURS FISHED	COMPLETE TRIP? YES	COMPLETE TRIP? NO	SATISFIED? YES	SATISFIED? NO	ANGLER TYPE	GEAR CODE	SPECIES	ORIGIN (clip)	MARK CODES	NUMBER FISH KEPT	NUMBER FISH RELEASED	LENGTH CODE	TOTAL LENGTH (centimeters) 1 Len cm	2 WT kg	3 SEX	4	5	6 ZONE	7 Res	8 State Permit
2	1105	✓		2.1		✓			B	L	SH			0								A		
		✓		2.1		✓			B	L	SH			0								A		
3	1107	✓		3.5	✓				B	L	SH	H	AD	1			62.5	2.3	m			B	I	W
		✓		3.5	✓				B	L	SH				1							B		
			✓	2.5	✓				B	L	SH											B		
1	1115	✓		1.3		✓			S	B	SH											C		
2	1200	✓		5.4		✓			B	B	SH	W	—	1			66	—	F			C	I	I
		✓		5.4		✓			B	B	SH				—							C		
1	1215	✓		—		✓			S	B	SmB											C		

used for % SH fishing
NOT Counted in catch rate
Small Mouth Bass angling

(P=Plunk, D=Drift), B=Boat, S=Shore, T=Tube

B=Bait, L=Lure, F=Fly

S=Sublegal, L=Legal, O=Overlegal

APPENDIX C: CREEL ANALYSIS EXAMPLE

Appendix D. Lower Snake River creel survey data.

Table 1. Lower Snake River angler effort data, fall 1985 and spring 1986.

				Boats				Shore			
Month	Hrs. avail.[A]	Day type[B] (n,N)[C]	Mgmt. sec.[D]	Mean No. of boats (std. dev)	Mean anglers per boat[E] ($ intervs.)	% steelhead anglers[E] ($ intervs.)	Estimated steelhead angler hrs/mon[F]	Mean No. of anglers (std. dev.)	% steelhead anglers[E] ($ of intervs)	Estimated steelhead ang.hrs/mon[F]	
Sep.	13	WE	164	2.67 (0.76)	2.00 (1)[G]	50.0 (4)[G]	104.13	20.33 (8.51)	67.7 (96)	1073.55	
		(3,6)	165	6.00 (0.50)	2.00 (6)[G]	21.4 (28)	200.30	23.33 (7.10)	43.9 (107)	798.87	
			166	7.17 (2.75)	--- (0)[G]	0.0 (8)[G]	279.63	35.33 (7.23)	79.5 (156)	2190.81	
			167	8.50 (6.38)	2.00 (2)[G]	50.0 (8)[G]	331.50	5.50 (4.82)	94.4 (18)	404.98	
					2.00 (9)[H]	25.0 (48)[H]	915.56			4468.20	
		WD	164	0.88 (0.63)	2.00 (1)[G]	100.0 (2)[G]	375.69	9.25 (1.56)	92.8 (70)	1785.47	
		(4,16)	165	2.00 (0.91)	2.50 (5)[G]	71.4 (7)[G]	858.72	5.63 (2.78)	53.6 (69)	627.68	
		(3,11)	166	1.17 (1.16)	2.00 (1)[G]	100.0 (1)[G]	344.19	31.33 (1.53)	87.9 (132)	3938.09	
			167	0.38 (0.33)	3.00 (1)[G]	100.0 (3)[G]	111.29	3.50 (3.12)	25.0 (16)	125.13	
					2.44 (8)[H]	84.6 (13)[H]	1694.10			6475.37	
Oct.	11.5	WE	164	1.00 (1.08)	4.00 (1)[G]	40.0 (10)	82.06	11.63 (5.31)	87.5 (80)	936.22	
		(4,8)	165	1.25 (1.26)	2.00 (6)[G]	58.3 (19)	149.59	15.75 (8.57)	55.7 (122)	807.09	
			166	4.25 (3.62)	2.67 (3)[G]	57.1 (14)	497.87	33.88 (10.30)	94.4 (195)	2942.41	
			167	5.50 (1.68)	2.09 (11)[G]	88.5 (26)	998.16	8.50 (1.23)	43.8 (48)	342.52	
					2.23 (21)[H]		1728.14			5028.24	
		WD	164	0.17 (0.50)	--- (0)[G]	--- (0)[G]	69.13	4.17 (3.71)	88.1 (84)	971.01	
		(9,23)	165	0.11 (0.22)	--- (0)[G]	--- (0)[G]	45.95	3.17 (2.26)	55.6 (54)	465.75	
		(8,23)	166	1.19 (1.34)	2.00 (5)[G]	76.9 (13)	483.28	20.31 (3.93)	94.5 (273)	5076.54	
			167	1.19 (1.03)	2.00 (4)[G]	80.0 (10)	502.76	2.38 (2.94)	48.2 (27)	304.67	
					2.00 (9)[H]	78.3 (23)[H]	1101.12			6818.20	
Nov.	10	WE	164	0.25 (0.50)	--- (0)[G]	--- (0)[G]	56.65	2.75 (4.86)	80.0 (20)	242.00	
		(4,11)	165	3.62 (4.05)	2.00 (6)[G]	100.0 (12)[G]	820.29	10.00 (2.86)	79.7 (64)	876.70	
		(5,11)	166	4.20 (2.86)	2.25 (4)[G]	100.0 (9)[G]	951.72	15.20 (10.32)	96.7 (122)	1617.16	
			167	5.00 (3.38)	2.00 (7)[G]	100.0 (14)[G]	1133.00	5.00 (2.99)	21.7 (23)	119.35	
					2.06 (17)[H]	100.0 (35)[H]	2961.66			2854.87	
		WD	164	0.25 (0.29)	--- (0)[G]	--- (0)[G]	79.33	0.88 (0.75)	100.0 (8)[G]	132.47	
		(4,19)	165	1.13 (1.03)	1.50 (2)[G]	100.0 (2)[G]	356.96	6.13 (2.59)	73.3 (45)	853.73	
		(5,19)	166	0.80 (1.53)	2.00 (1)[G]	100.0 (2)[G]	253.84	11.05 (7.71)	93.6 (110)	1965.13	
			167	2.50 (1.47)	--- (0)[G]	--- (0)[G]	793.25	2.63 (2.39)	5.0 (20)[G]	395.76	
					1.67 (3)[H]	100.0 (4)[H]	1483.38		79.2 (183)[H]	3347.09	
Dec.	8.5	WE	164	1.25 (1.77)	--- (0)[G]	--- (0)[G]	230.56	0.75 (0.35)	100.0 (3)	63.75	
		(2,10)	165	7.75 (6.01)	2.00 (15)	100.0 (30)	1317.50	12.75 (0.35)	100.0 (28)	1083.75	
			166	5.00 (1.41)	2.00 (4)[G]	100.0 (8)[G]	922.25	3.75 (1.06)	100.0 (20)	318.75	
			167	9.50 (4.95)	2.32 (22.0)	100.0 (51)	1873.40	4.25 (2.47)	100.0 (28)	361.25	
					2.17 (41)[H]	100.0 (89)[H]	4343.71			1827.50	
		WD	164	0.33 (0.29)	--- (0)[G]	--- (0)[G]	130.77	0.00 (0.00)	--- (0)	0.00	
		(3,21)	165	3.50 (2.78)	2.00 (3)[G]	100.0 (6)[G]	1386.95	1.83 (1.61)	100.0 (5)	326.66	
			166	1.94 (0.31)	2.08 (12)[G]	100.0 (25)	768.76	7.38 (2.66)	100.0 (49)	1317.33	
			167	6.88 (1.93)	2.50 (8)[G]	100.0 (20)	2726.38	5.75 (1.85)	100.0 (31)	1026.38	
					2.22 (23)[H]	100.0 (51)[H]	5012.82			2670.37	

Appendix D. Lower Snake River creel survey data.

Table 1. (cont')

Month	Hrs. avail.[A]	Day type[B] (n,N)[C]	Mgmt. sec.[D]	Boats: Mean No. of boats (std. dev)	Boats: Mean anglers per boat[E] (# intervs.)	Boats: % steelhead anglers[E] (# intervs.)	Boats: Estimated steelhead angler hrs/mon[F]	Shore: Mean No. of anglers (std. dev.)	Shore: % steelhead anglers[E] (# of intervs)	Shore: Estimated steelhead ang.hrs/mon[F]
Jan.	10	WE	164	0.17 (0.29)	--- (0)[G]	--- (0)[G]	38.10	0.33 (0.58)	100.0 (2)	33.00
		(3,10)	165	0.67 (0.76)	1.50 (3)[G]	100.0 (3)[G]	135.41	3.67 (1.53)	100.0 (21)	367.00
		(4,10)	166	5.83 (4.61)	2.50 (5)[G]	100.0 (5)[G]	1359.01	10.25 (1.85)	100.0 (64)	1025.00
			167	20.38 (15.12)	2.40 (25)[G]	100.0 (60)[G]	4890.00	15.75 (9.75)	93.9 (114)	1575.00
					2.33 (33)[H]	100.0 (68)[H]	6443.33			3000.00
		WD	164	0.00 (0.00)	--- (0)[G]	--- (0)[G]	00.00	0.00 (0.00)	-- (0)[G]	0.00
		(3,21)	165	0.50 (0.87)	--- (0)[G]	--- (0)[G]	231.00	3.00 (1.50)	100.0 (14)	630.00
		(4,21)	166	1.33 (0.58)	--- (0)[G]	--- (0)[G]	615.85	2.88 (2.46)	100.0 (21)	604.80
			167	4.63 (2.96)	2.20 (5)[G]	100.0(11)[G]	2136.75	6.75 (3.69)	96.3 (53)	1365.03
					2.20 (5)[H]	100.0 (11)[H]	2983.60		97.7 (88)[H]	2599.85
Feb.	10.5	WE	164	0.00 (0.00)	--- (0)[G]	--- (0)[G]	0.00	0.17 (0.29)	0.0 (1)[G]	13.39
		(3,9)	165	0.33 (0.29)	--- (0)[G]	--- (0)[G]	81.03	0.67 (1.15)	75.0 (4)	53.58
			166	1.83 (1.89)	2.00 (2)[G]	100.0 (4)[G]	446.04	7.50 (6.61)	80.9 (47)	573.38
			167	8.29 (3.62)	2.61 (33)	100.0 (86)	2044.69	13.71 (7.78)	87.6 (89)	1134.78
					2.58 (35)[H]	100.0 (90)[H]	2571.76		85.0 (140)	2302.20
		WD	164	0.00 (0.00)	--- (0)[G]	--- (0)[G]	0.00	0.00 (0.00)	--- (0)[G]	0.00
		(3,19)	165	0.00 (0.00)	--- (0)[G]	--- (0)[G]	0.00	0.17 (0.29)	0.0 (1)[G]	31.99
		(4,19)	166	0.00 (0.00)	2.00 (1)[G]	100.0 (2)[G]	0.00	2.13 (2.32)	93.1 (29)	394.69
			167	1.17 (0.71)	1.80 (5)[G]	100.0 (9)[G]	425.32	6.67 (2.89)	98.0 (49)	1303.07
					1.83 (6)[H]	100.0 (11)[H]	425.32		96.2 (79)	1729.75
Mar.	11	WE	164	no counts				no counts		
		(0,10)	165	no counts				no counts		
		(4,10)	166	1.38 (2.14)	--- (0)[G]	0.0 (12)	0.00	17.50 (22.52)	15.1 (106)	290.68
			167	0.75 (0.94)	--- (0)[G]	0.0 (2)[G]	0.00	7.78 (2.63)	3.6 (84)	30.81
					--- (0)[H]	0.0 (14)[H]	0.00			331.49
		WD	164	no counts				no counts		
		(0,21)	165	no counts				no counts		
		(3,21)	166	0.00 (0.00)	--- (0)	0.0 (2)	0.00	1.67 (2.47)	100.0 (3)	385.77
			167	0.33 (0.29)	2.00 (1)	100.0 (2)	153.85	4.67 (0.53)	11.8 (17)	127.29
							153.85			513.06

A Derived by using a sunrise-sunset table (Nautical Almanac Office, U.S. Naval Observatory, Washington D.C.) and adjusting it according to angler behavior, if necessary.

B WE = Weekends and major holidays. WD = Weekdays.

C n = The number of days sampled, and N = the number of days of that day-type available per month.

D Management sections as indicated in the fishing regulations and on steelhead punchcards. 164 is below Ice Harbor Dam and 168 is above Lower Granite Dam. All sections change at each dam.

E Calculated from angler interview data.

F Calculated by multiplying constants (hrs/day, and/or anglers/boat, percent steelhead angling, days/mon.) by the mean number of boats, or mean number of shore anglers.

G Used combined estimate for all mgmt. sections within this daytype, angler-type and month -- small sample size or no data

H Combined average estimate for all sections, within daytype, angler-type and month.

I Not complete for Sep., began creel survey 9/9/85 for sections 164 and 165 and 9/14/85 for sections 166 and 167.

Appendix D. (cont')

Table 2. Lower Snake River steelhead catch rate data and estimated harvest, fall 1985 and spring 1986.

Month	Day-type[A]	Mgmt. section[B]	Angler type	No. of Anglers interviewed	Angling hrs. expended	Steelhead kept (released)	Catch rate (CPUE) fish/hr[C]	Estimated no. of steelhead harvested[D]
Sept.	WE	164	boat	2	2.00	0 (0)	--	0
			shore	65	195.02	3 (0)	0.01538	17
		165	boat	6	16.50	0 (0)	--	0
			shore	47	130.20	0 (0)	0.01140[E]	9
		166	boat	0	0.00	0 (0)	--	0
			shore	124	336.65	5 (4)	0.01485	33
		167	boat	4	18.20	1 (0)	--	0
			shore	17	40.55	0 (0)	0.01140[E]	5
		combined	shore	253	702.40	8 (4)	0.01140[F]	
	WD	164	boat	2	4.00	0 (0)	--	0
			shore	65	162.90	7 (0)	0.04292	77
		165	boat	5	23.00	0 (0)	--	0
			shore	37	145.90	3 (0)	0.02058	13
		166	boat	2	5.00	0 (0)	--	0
			shore	116	300.63	0 (1)	0.01638[E]	67
		167	boat	3	6.00	0 (0)	--	0
			shore	4	1.00	0 (0)	0.01638[E]	2
		combined	shore	222	610.43	10 (1)	0.01638[F]	
Oct.	WE	164	boat	4	10.00	1 (0)	0.00592[E]	0
			shore	70	167.40	1 (1)	0.01123[E]	11
		165	boat	14	38.40	0 (0)	0.00592[E]	1
			shore	68	267.60	3 (2)	0.01121	9
		166	boat	8	21.00	0 (0)	0.00592[E]	3
			shore	184	492.90	7 (4)	0.01420	42
		167	boat	23	99.50	0 (0)	0.00592[E]	6
			shore	21	51.25	0 (0)	0.01123[E]	4
		combined	boat	49	169.00	1 (0)	0.00592[F]	
		combined	shore	343	979.15	11 (7)	0.01123[F]	
	WD	164	boat	0	0.00	0 (0)	0.02179[E]	2
			shore	74	172.20	3 (0)	0.01742	17
		165	boat	0	0.00	0 (0)	0.02179[E]	1
			shore	30	80.85	0 (1)	0.02016[E]	9
		166	boat	10	19.50	0 (0)	0.02179[E]	11
			shore	258	892.30	20 (2)	0.02242	114
		167	boat	8	26.40	1 (0)	0.02179[E]	11
			shore	13	44.75	1 (0)	0.02017	6
		combined	boat	18	45.90	1 (0)	0.02179[F]	
		combined	shore	375	1190.10	24 (3)	0.02017[F]	
Nov.	WE	164	boat	0	0.00	0 (0)	0.02177[E]	1
			shore	16	25.90	1 (0)	0.04107[E]	10
		165	boat	12	37.50	2 (0)	0.02177[E]	18
			shore	51	151.40	6 (1)	0.03964	35
		166	boat	9	52.80	1 (0)	0.02177[E]	21
			shore	118	344.70	14 (1)	0.04062	66

Table 2. (cont')

Month	Day-type[A]	Mgmt. section[B]	Angler type	No. of Anglers interviewed	Angling hrs. expended	Steelhead kept (released)	Catch rate (CPUE) fish/hr[C]	Estimated no. of steelhead harvested[D]
Nov.	WE	167	boat	14	47.50	0 (0)	0.02177[E]	25
			shore	22	38.00	2 (0)	0.04107[E]	3
		combined	boat	35	137.80	3 (0)	0.02177[F]	
		combined	shore	207	560.00	23 (2)	0.04107[F]	
	WD	164	boat	0	0.00	0 (0)	0.01757[E]	1
			shore	8	18.45	0 (0)	0.01641[E]	2
		165	boat	3	8.00	0 (0)	0.01757[E]	6
			shore	33	75.20	1 (0)	0.01641[E]	14
		166	boat	2	8.00	0 (0)	0.01757[E]	5
			shore	103	263.90	5 (2)	0.01895	32
		167	boat	2	17.00	0 (0)	0.01757[E]	12
			shore	2	8.00	0 (0)	0.01641[E]	6
		combined	boat	7	33.00	0 (0)	0.01757[F]	
		combined	shore	146	365.55	6 (2)	0.01641[F]	
Dec.	WE	164	boat	0	0.00	0 (0)	0.07220[E]	17
			shore	3	1.00	0 (0)	0.01156[E]	1
		165	boat	30	138.75	9 (0)	0.06485	85
			shore	28	59.25	0 (0)	0.01156[E]	13
		166	boat	8	43.00	7 (0)	0.07220[E]	67
			shore	20	56.50	1 (0)	0.01156[E]	4
		167	boat	51	247.50	15 (0)	0.06061	114
			shore	28	56.25	1 (0)	0.01156[E]	4
		combined	boat	89	429.25	31 (0)	0.07220[F]	
		combined	shore	79	173.00	2 (0)	0.01156[F]	
	WD	164	boat	0	0.00	0 (0)	0.05817[E]	8
			shore	0	0.00	0 (0)	0.04529[E]	0
		165	boat	6	26.00	0 (0)	0.05817[E]	81
			shore	5	11.75	0 (0)	0.04529[E]	15
		166	boat	25	46.70	3 (0)	0.06423	45
			shore	49	131.95	5 (1)	0.03789	50
		167	boat	20	82.00	6 (0)	0.07315	199
			shore	31	121.25	7 (0)	0.05774	59
		combined	boat	51	154.70	9 (0)	0.05817[F]	
		combined	shore	85	264.95	12 (1)	0.04529[F]	
Jan.	WE	164	boat	0	0.00	0 (0)	0.03849[E]	1
			shore	2	1.00	0 (0)	0.04458[E]	1
		165	boat	3	15.00	0 (0)	0.03849[E]	6
			shore	21	47.15	0 (0)	0.04458[E]	16
		166	boat	5	21.50	0 (0)	0.03849[E]	52
			shore	64	160.25	3 (0)	0.01872	19
		167	boat	60	301.20	13 (0)	0.04316	211
			shore	107	226.95	14 (0)	0.06169	97
		combined	boat	68	337.70	13 (0)	0.03849[F]	
		combined	shore	194	381.35	17 (0)	0.04458[F]	

Table 2. (cont')

Month	Day-type[A]	Mgmt. section[B]	Angler type	No. of Anglers interviewed	Angling hrs. expended	Steelhead kept (released)	Catch rate (CPUE) fish/hr[C]	Estimated no. of steelhead harvested[D]
Jan.	WD	164	boat	0	0.00	0 (0)	0.01716[E]	0
			shore	0	0.00	0 (0)	0.04675[E]	0
		165	boat	0	0.00	0 (0)	0.01716[E]	4
			shore	14	22.68	0 (0)	0.04675[E]	29
		166	boat	0	0.00	0 (0)	0.01716[E]	11
			shore	21	49.50	2 (0)	0.04040	24
		167	boat	11	58.25	1 (0)	0.01716[E]	37
			shore	51	141.80	8 (0)	0.05640	77
		combined	boat	11	58.25	1 (0)	0.01716[E]	
		combined	shore	86	213.93	10 (0)	0.04675[F]	
Feb.	WE	164	boat	0	0.00	0 (0)	0.06631[E]	0
			shore	0	0.00	0 (0)	0.01627[E]	0
		165	boat	0	0.00	0 (0)	0.06631[E]	5
			shore	3	2.45	0 (0)	0.01627[E]	1
		166	boat	4	3.20	0 (0)	0.06631[E]	30
			shore	38	120.10	0 (0)	0.01627[E]	9
		167	boat	86	403.95	27 (1)	0.06684	137
			shore	78	184.70	5 (0)	0.02701	31
		combined	boat	90	407.15	27 (1)	0.06631[F]	
		combined	shore	119	307.25	5 (1)	0.01627[F]	
	WD	164	boat	0	0.00	0 (0)	0.07364[E]	0
			shore	0	0.00	0 (0)	0.03447[E]	0
		165	boat	0	0.00	0 (0)	0.07364[E]	0
			shore	0	0.00	0 (0)	0.03447[E]	0
		166	boat	2	6.00	0 (0)	0.07364[E]	0
			shore	27	78.10	3 (0)	0.03842	15
		167	boat	9	34.75	3 (0)	0.08636	37
			shore	48	125.00	4 (0)	0.03200	42
		combined	boat	50	40.75	3 (0)	0.07364[F]	
		combined	shore	75	203.10	7 (0)	0.03447[F]	
Mar.	WE	164	boat	no counts				
		165	boat	no counts				
		166	boat	0	0.00	0 (0)	---	--
			shore	16	64.50	0 (0)	---	--
		167	boat	0	0.00	0 (0)	---	--
			shore	3	3.40	0 (0)	---	--
	WD	164	boat	no counts				
		165	boat	no counts				
		166	boat	0	0.00	0 (0)	---	--
			shore	3	2.75	0 (0)	---	--
		167	boat	2	5.00	0 (0)	---	--
			shore	2	1.00	0 (0)	---	--

A WE = Weekends and major holidays. WD = Weekdays.
B WDG fish management sections. 164 is below Ice Harbor Dam. Sections change at dams.
C Catch rate is calculated only for steelhead retained. Does not include all of Sept.
D Calculated by multiplying angler effort (Appendix D, Table 1) by catch rate.
E No CPUE, or small sample size, so CPUE from combined WDG mgmt. sections was used.
F Combined CPUE for all mgmt. sections within angler-type, day-type, and month.
G CPUE for WE and WD were combined because no fish were kept during WD.

Appendix E. Lower Granite creel survey data.

Table 1. Angler effort estimates (and strata variables used in effort calculations) for Lower Granite Reservoir, fall 1985 and spring 1986.

			Boats				Shore		
Month	Hours Avail.[a]	Day-type[b] (n,N)[c]	Mean no. of boats (std.dev.)	Mean # anglers per boat[d] (s)[f]	% steelhead angling[d] (s)[f]	Estimated steelhead angler hrs per month[e]	Mean no. of anglers (std.dev.)	% steelhead angling[d] (s)[f]	Estimated steelhead angler hrs per month[e]
Sep.	13	WE	10.38	2.08	100.0	1619.28	19.00	90.8	1345.68
		(2,6)	(2.298)	(24)	(24)		(6.364)	(98)	
		WD	4.09	2.25	81.8	1076.79	5.21	71.0	529.10
		(2,11)	(2.081)	(9)	(11)		(0.057)	(31)	
Oct.	11.5	WE	15.25	2.07	93.7	2719.52	44.63	88.9	3651.48
		(4,8)	(3.797)	(118)	(126)		(11.607)	(226)	
		WD	6.10	1.94	100.0	3129.04	20.50	84.3	4573.21
		(5,23)	(4.321)	(35)	(35)		(8.895)	(166)	
Nov.	10	WE	16.4	2.09	100.0	3770.80	19.50	99.0	2124.10
		(5,11)	(14.376)	(144)	(144)		(14.392)	(203)	
		WD	10.83	1.86	100.0	3826.60	10.71	100.0	2034.90
		(4,19)	(4.151)	(13)	(13)		(4.946)	(84)	
Dec.	8.5	WE	20.67	2.17	100.0	3812.25	13.88	97.8	1154.30
		(4,10)	(5.533)	(378)	(378)		(2.720)	(139)	
		WD	8.75	2.15	100.0	3357.59	6.25	98.3	1097.78
		(4,21)	(7.377)	(181)	(155)		(4.992)	(60)	
Jan.	10	WE	21.00	2.15	100.0	4515.00	29.00	100.0	2900.00
		(4,10)	(18.868)	(209)	(196)		(18.797)	(238)	
		WD	7.30	2.18	100.0	3341.10	11.90	96.6	2415.00
		(5,21)	(3.735)	(96)	(93)		(4.669)	(112)	
Feb.	10.5	WE	9.25	2.00	100.0	1879.37	32.25	100.0	3047.63
		(4,9)	(2.533)	(71)	(71)		(4.664)	(186)	
		WD	6.00	2.15	100.0	2394.00	14.17	97.8	2765.07
		(3,19)	(5.000)	(70)	(70)		(3.786)	(118)	
Mar.	11	WE	1.63	2.50	100.0	447.70	19.25	74.8	1584.00
		(4,10)	(2.016)	(15)	(15)		(1.848)	(131)	
		WD	0.17	2.50[g]	100.0	99.33	9.33	98.5	2286.05
		(3,21)	(0.289)	--	--		(3.547)	(44)	

a Derived by using a sunrise-sunset table (by Nautical Almanac Office, U.S. Naval Observatory, Washington D.C.), and adjusting it according to angler fishing behavior, if necessary.

b WE = weekends and major holidays. WD = weekdays.

c n = the # of days sampled and N = the # of days available for the month.

d Calculated from angler interview data.

e Calculated by multiplying constants (hrs/day, N, % steelhead angling, and anglers per boat, if appropriate) by the mean # of boats, or mean # shore anglers. (Not complete for Sep.).

f s = the # of anglers interviewed to obtain this estimate.

g No WD boat angler interviews, therefore WE estimate was used.

Appendix E. Lower Granite Creel Survey data.

Table 2. Estimated catch rates and CPUE data obtained from steelhead anglers interviewed on Lower Granite Reservoir, fall 1985 and spring 1986.

Month	Day-type	Angler-type	no. of parties interviewed (# anglers)	Total angling hours	# fish kept (released)	Catch rate fish/hr[a]	95% CI[b]
Sep.	WE	boat	12 (24)	106.30	0 (1)	---	---
		shore	62 (89)	229.45	4 (4)	0.0174	0.02090
	WD	boat	4* (9)	27.50	3 (0)	0.1091	0.04409
		shore	14 (20)	33.25	1 (1)*	0.0303	0.05801
	total		92 (142)	396.50	8 (6)	0.0202	0.01541
Oct	WE	boat	59 (125)	529.00	15 (6)	0.0284	0.01706
		shore	117 (215)	895.35	23 (10)	0.0257	0.01043
	WD	boat	18 (35)	149.00	6 (2)	0.0403	0.02800
		shore	107 (138)	508.40	18 (12)	0.0354	0.01518
	total		301 (513)	2081.75	62 (30)	0.0298	0.00755
Nov	WE	boat	69 (144)	633.65	36 (1)	0.0568	0.01832
		shore	101 (200)	637.45	7 (0)	0.0110	0.00782
	WD	boat	6* (11)	49.00	1 (2)*	0.0204	0.03522
		shore	55 (85)	256.85	3 (0)	0.0117	0.01313
	total		231 (440)	1576.95	47 (3)	0.0298	0.00885
Dec	WE	boat	174 (378)	1709.50	80 (2)	0.0468	0.01039
		shore	72 (136)	362.65	5 (0)	0.0138	0.01444
	WD	boat	70 (155)	554.10	21 (0)	0.0379	0.02045
		shore	40 (59)	141.25	4 (0)	0.0283	0.03214
	total		356 (728)	2767.50	110 (2)	0.0397	0.00813
fall	total		980(1823)	6822.70	227 (41)	0.0333	0.00463
Jan	WE	boat	92 (196)	703.15	19 (0)	0.0270	0.01377
		shore	127 (229)	688.00	16 (0)	0.0233	0.01069
	WD	boat	43 (93)	328.25	17 (1)	0.0518	0.02741
		shore	83 (115)	347.00	15 (0)	0.0432	0.02072
	total		345 (633)	2066.40	67 (1)	0.0324	0.00823
Feb	WE	boat	33 (71)	279.75	10 (0)	0.0357	0.03235
		shore	94 (178)	729.10	30 (0)	0.0411	0.01422
	WD	boat	34 (70)	235.50	9 (2)	0.0382	0.02598
		shore	74 (118)	519.75	15 (0)	0.0289	0.01472
	total		235 (435)	1764.10	64 (2)	0.0363	0.00951
Mar	WE	boat	6* (15)	97.75	0 (0)	---	---
		shore	48 (97)	321.80	6 (0)	0.0186	0.01567
	WD	boat	0* (0)	0.00	0 (0)	---	---
		shore	26 (42)	156.15	2 (0)	0.0128	0.01723
	total		80 (154)	575.70	8 (0)	0.0139	0.01047
spring	total		660(1220)	4406.20	139 (3)	0.0315	0.00559

a CPUE calculated for retained fish only.
b See Appendix C for how this was calculated. 95 % CI if data are normally distributed, otherwise at least 75 %.
* Small sample size.

Appendix F. Mid Snake River creel survey data.

Table 1. Angler effort estimates (and strata variables used in effort calculations) for the mid-Snake River, fall 1985 and spring 1986.

				Boats				Shore		
Month	Hours Avail.[A]	Day-type[B] (n,N)[C]	Zone[D]	Mean no. of boats (std.dev.)[E]	Mean anglers per boat[F] (s)[G]	% steelhead angling[F] (s)[GI]	Estimated steelhead angler hrs per month[H]	Mean no. of anglers (std.dev.)[E]	% steelhead angling[F] (s)[GI]	Estimated steelhead angler hrs per month[H]
Sep.	13	WE (3,6)	A	39.05 (8.808)	2.22 (427)	94.8 (205)	6410.04	6.00 (0.330)	53.8 (52)	251.94
			B	5.17 (1.305)	2.20 (33)	94.8	840.84	3.28 (1.495)	53.8	137.28
			C	3.39 (2.742)	2.59 (44)	94.8	648.18	5.33 (2.887)	53.8	223.86
		WD (2,11)	A	16.80 (2.362)	1.96 (104)	96.7 (121)	4335.76	5.00 (1.881)	66.7 (18)	477.62
			B	2.17 (0.233)	3.00 (15)	96.7	899.47	1.83 (0.707)	66.7	174.46
			C	0.00 (0.000)	---	---	0.00	1.50 (0.240)	66.7	143.00
Oct.	11.5	WE (4,8)	A	42.29 (6.175)	2.21 (627)	100.0 (88)	8598.32	9.25 (4.699)	84.0 (100)	714.84
			B	19.96 (6.766)	2.39 (225)	100.0	4360.80	3.83 (3.082)	84.0	296.24
			C	5.67 (2.308)	2.55 (28)	100.0	1330.32	6.88 (2.700)	84.0	531.76
		WD (5,23)	A	18.77 (6.549)	2.07 (285)	99.7 (290)	10241.44	2.63 (1.121)	95.4 (86)	663.90
			B	8.73 (2.522)	2.10 (560)	99.7	4832.42	2.70 (2.588)	95.4	679.77
			C	2.47 (1.340)	2.25 (9)	99.7	1465.33	4.93 (3.019)	95.4	1243.15
Nov.	10	WE (5,11)	A	57.30 (34.429)	2.34 (518)	100.0 (144)	14748.80	5.60 (2.275)	89.7 (107)	552.20
			B	21.80 (11.394)	2.39 (170)	100.0	5731.08	5.10 (4.762)	89.7	503.80
			C	3.90 (3.170)	2.36 (33)	100.0	1012.80	5.20 (4.770)	89.7	513.78
		WD (5,19)	A	29.27 (11.823)	2.03 (422)	100.0 (172)	7018.50	3.87 (1.907)	96.0 (74)	784.90
			B	8.40 (4.492)	2.00 (100)	100.0	3192.00	1.88 (1.151)	96.0	328.70
			C	0.97 (0.961)	2.00 (1)	100.0	368.60	1.63 (1.959)	96.0	296.40
Dec.	8.5	WE (4,10)	A	30.38 (18.062)	2.25 (452)	100.0 (90)	5810.60	3.33 (2.526)	98.2 (54)	277.95
			B	9.80 (6.602)	2.14 (45)	100.0	1651.55	2.71 (1.669)	98.2	226.95
			C	2.29 (1.272)	2.50 (15)	100.0	487.05	1.38 (1.250)	95.2	114.75

Appendix F. (Cont')

Table 1. (Cont')

Month	Hours Avail.[A]	Day-type (n,N)[C]	Zone	Boats: Mean no. of boats (std.dev.)	Boats: Mean anglers per boat (s)[GI]	Boats: % steelhead angling (s)[GI]	Boats: Estimated steelhead angler hrs per month[H]	Shore: Mean no. of anglers (std.dev.)[E]	Shore: % steelhead angling (s)[GI]	Shore: Estimated steelhead angler hrs per month[H]
Dec.	8.5	WD (5,21)	A	18.37 (15.829)	2.05 (361)	100.0 (233)	6722.31	3.17 (1.688)	100.0 (67)	565.85
			B	3.00 (3.260)	2.17 (39)	100.0	1162.04	1.63 (0.893)	100.0	290.96
			C	1.47 (0.983)	2.09 (17)	100.0	548.00	0.90 (1.084)	100.0	160.65
Jan.	10	WE (4,10)	A	10.00 (5.977)	2.22 (444)	100.0 (177)	4191.00	1.56 (1.390)	94.4 (18)	147.00
			B	5.06 (1.053)	2.25 (97)	100.0	1139.00	0.63 (0.479)	94.4	59.00
			C	1.19 (0.800)	2.56 (23)	100.0	305.00	2.31 (2.193)	94.4	218.00
		WD (4,21)	A	4.71 (1.022)	1.90 (216)	100.0 (38)	1959.30	0.83 (1.104)	85.3 (34)	149.10
			B	1.83 (1.035)	1.70 (16)	100.0	684.60	0.29 (0.345)	85.3	52.50
			C	0.30 (0.479)	2.25 (9)	100.0	100.60	0.17 (0.191)	85.3	31.50
Feb.	10.5	WE (3,9)	A	11.33 (8.021)	2.16 (147)	100.0 (36)	2312.42	0.94 (0.821)	100.0 (21)	00.03
			B	2.33 (1.607)	2.20 (57)	100.0	501.00	0.44 (0.090)	100.0	41.50
			C	1.50 (0.000)	2.20[f] (0)	100.0	323.19	2.11 (1.169)	100.0	199.40
		WD (4,19)	A	1.50 (1.732)	2.00 (34)	100.0 (0)	590.50	0.21 (0.249)	100.0 (6)	41.90
			B	1.30 (1.540)	2.00[f] (0)	100.0	550.62	0.50 (0.577)	100.0	99.75
			C	0.25 (0.500)	2.00[f] (0)	100.0	99.75	0.00 (0.000)	---	0.00
Mar.	No estimate.									

a Derived by using a sunrise-sunset table (by Nautical Almanac Office, U.S. Naval Observatory, Washington D.C.), and adjusting it according to angler fishing behavior, if necessary.

b WE = Weekends and major holidays. WD = Weekdays.

c n = The # of days sampled and N = the # of that daytype available per month. (Sep. incomplete).

d Zone A = Clarkston (Red Wolf Bridge) to Asotin Creek, Zone B = Asotin Creek to Redbird Creek, Zone C = Redbird Creek to the Grande Ronde R. (at Lime Point)

e Estimated by 2 or more counts per day from an automobile during randomly selected days and times.

f Estimated from angler interview data.

g s = the # of anglers interviewed to obtain the estimate.

h Calculated by multiplying mean # boats (or mean # shore anglers) by constants (hrs/day, N, % steelhead angling, or mean anglers /boat,where appropriate) to get mean steelhead angler hrs./month.

Appendix F. Mid-Snake creel survey data.

Table 2. Estimated catch rates and CPUE data obtained from steelhead anglers interviewed on the mid-Snake River, fall 1985 and spring 1986.

Month	Day-type	Zone	Angler-type	no. of parties interviewed (# anglers)	Angling hours expended	# fish kept (released)	Catch Rate (CPUE) fish/hr[A]	95% CI[B]
Sep.	WE	A	boat	192 (427)	1429.65	18 (20)	0.0126	0.00595
			shore	3 (4)	6.50	0 (0)	---	---
		B	boat	15 (33)	103.00	5 (0)	0.0485	0.05892
			shore	5 (8)	20.50	0 (0)	---	---
		C	boat	17 (44)	144.25	4 (16)	0.0277	0.03352
			shore	12 (16)	34.35	0 (10)	---	---
	WD	A	boat	53 (104)	348.70	5 (3)	0.0143	0.01147
			shore	2 (2)	7.00	0 (0)	---	---
		B	boat	5* (15)	35.40	3 (1)	0.0847	0.07554
			shore	2 (4)	6.50	0 (0)	---	---
		C	boat	0 (0)	0.00	0 (0)	---	---
			shore	6 (6)	5.70	0 (1)	---	---
	total			313 (665)	2149.55	35 (51)	0.0163	0.00620
Oct.	WE	A	boat	284 (627)	1648.00	43 (29)	0.0261	0.00867
			shore	11 (20)	53.00	1 (0)*	0.0189	0.03948
		B	boat	94 (225)	822.00	12 (33)	0.0146	0.00840
			shore	17 (34)	73.20	3 (0)	0.0410	0.04306
		C	boat	11 (28)	115.50	2 (4)	0.0173	0.02859
			shore	31 (44)	65.05	1 (5)*	0.0154	0.02736
	WD	A	boat	270 (560)	1653.60	49 (38)	0.0296	0.01012
			shore	9 (11)	20.30	0 (0)	---	---
		B	boat	136 (285)	809.95	25 (18)	0.0309	0.01239
			shore	25 (39)	82.15	1 (0)*	0.0122	0.02487
		C	boat	4* (9)	25.50	3 (2)	0.1176	0.07496
			shore	30 (42)	95.35	2 (11)	0.0210	0.02690
	total			922(1924)	5463.60	142 (140)	0.0260	0.00479
Nov.	WE	A	boat	221 (581)	1860.75	85 (20)	0.0457	0.01227
			shore	11 (15)	45.75	0 (0)	---	---
		B	boat	71 (170)	647.75	23 (11)	0.0355	0.02052
			shore	35 (52)	86.85	1 (2)*	0.0115	0.02194
		C	boat	14 (33)	149.00	4 (6)	0.0268	0.03585
			shore	16 (34)	86.60	4 (2)	0.0462	0.05892
	WD	A	boat	208 (422)	1365.50	42 (13)	0.0308	0.00947
			shore	24 (31)	68.35	1 (0)*	0.0146	0.02693
		B	boat	54 (108)	302.65	10 (4)	0.0330	0.02075
			shore	15 (23)	38.05	0 (0)	---	---
		C	boat	1* (2)	8.00	0 (0)	---	---
			shore	12 (20)	27.00	1 (1)*	0.0370	0.08014
	total			683(1431)	4707.25	171 (59)	0.0363	0.00663

Table 2. (Cont')

Month	Day-type	Zone	Angler-type	no. of parties interviewed (# anglers)	Angling hours expended	# fish kept (released)	Catch Rate (CPUE) fish/hr[a]	95% CI[b]
Dec.	WE	A	boat	201 (452)	1564.75	58 (2)	0.0371	0.01285
			shore	20 (25)	42.90	1 (0)*	0.0233	0.04376
		B	boat	21 (45)	130.50	4 (0)	0.0307	0.03336
			shore	17 (21)	23.80	0 (0)	---	---
		C	boat	6* (15)	66.50	4 (3)	0.0602	0.08436
			shore	9 (13)	16.50	2 (1)	0.1212	0.21642
	WD	A	boat	176 (361)	1434.35	45 (3)	0.0314	0.01224
			shore	29 (36)	70.25	0 (0)	---	---
		B	boat	18 (39)	139.25	2 (0)	0.0144	0.01590
			shore	17 (21)	48.50	1 (0)*	0.0206	0.04027
		C	boat	6 (17)	48.90	0 (4)	---	---
			shore	7 (11)	17.05	1 (2)*	0.0587	0.05797
	total			527(1056)	3603.25	118 (15)	0.0327	0.00779
Fall total				2445(5076)	15923.65	466 (265)	0.0293	
Jan.	WE	A	boat	200 (444)	1575.45	31 (0)	0.0197	0.00852
			shore	6 (7)	9.75	0 (0)	---	---
		B	boat	43 (97)	280.20	4 (0)	0.0143	0.01402
			shore	6 (9)	14.00	0 (0)	---	---
		C	boat	9 (23)	89.75	2 (2)	0.0223	0.02958
			shore	8 (13)	37.95	2 (1)	0.0527	0.06697
	WD	A	boat	109 (216)	734.25	16 (0)	0.0218	0.01299
			shore	6 (10)	6.95	0 (0)	---	---
		B	boat	9 (16)	42.00	1 (0)*	0.0238	0.05930
			shore	2 (2)	2.00	0 (0)	---	---
		C	boat	4* (9)	26.50	2 (2)	0.0755	0.10469
			shore	4 (5)	10.70	0 (0)	---	---
	total			406 (851)	2829.50	58 (5)	0.0205	0.00626
Feb.	WE	A	boat	68 (147)	399.85	6 (0)	0.0150	0.01208
			shore	2 (6)	8.25	0 (0)	---	---
		B	boat	25 (57)	201.65	3 (0)	0.0149	0.02175
			shore	3 (4)	7.50	0 (0)	---	---
		C	boat	2 (7)	7.75	0 (0)	---	---
			shore	6 (12)	35.00	0 (1)	---	---
	WD	A	boat	17 (34)	142.50	5 (0)	0.0351	0.02602
			shore	3 (6)	8.00	0 (0)	---	---
		B	boat	1 (2)	5.00	0 (0)	---	---
			shore	3 (5)	11.10	1 (0)*	0.0901	0.22273
		C	boat	1* (2)	5.00	1 (0)	---	---
			shore	0 (0)	0.00	0 (0)	---	---
	total			131 (282)	831.10	16 (1)	0.0193	0.00970
Spring total				537(1133)	3660.60	74 (6)	0.0202	0.00531

a CPUE calculated for retained fish only.
b See Appendix C for calculation methods. 95 % CI if data are normally distributed, otherwise at least 75 %.
* Small sample size.

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 1. Scale analysis from scales collected during the fall of 1985 and spring of 1986 during a creel survey below Lower Granite Dam.

AGE (yrs)[a]	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION[b]	FIN CLIPS	COMMENTS[c]
1.1	10486	62.5	F	H	AD	167
1.1	22286	63.0	F	H		167
1.1	92085	66.0	F	H		164
1.1	122185	63.0	F	W		167
1.1	101285	67.5	M	H	AD	165
1.1	101085	66.0	M	--		167
1.1	111685	64.5	M	H	AD	165
1.1	122185	61.0	F	H		167
1.1	120185	70.0	M	H		165
1.1	11186	61.5	M	H		167
1.1	111685	62.0	F	W		165
1.1	92185	63.0	F	--		167
1.1	30486	66.0	M	H	AD	165
1.1	21986	62.0	F	H		167
1.1	120785	67.0	F	H	AD	165
1.1	11986	67.0	F	H		167
1.1	120785	63.5	M	H	AD	165
1.1	12586	66.0	M	H		167
1.1	102685	67.5	M	H		166
1.1	101285	69.5	--	--		167
1.1	112585	62.0	F	H		166
1.1	121485	62.5	M	H	AD-LV	167
1.1	111785	64.0	M	W		166
1.1	121985	69.0	F	W		167
1.1	100585	70.0	M	H	AD	166
1.1	12186	70.5	M	H		167
1.1	100285	66.5	M	H	AD	166
1.1	20886	65.0	F	H		167
1.1	10486	69.0	--	H	AD	166
1.1	12186	60.5	F	W		167
1.1	92185	57.0	--	H	AD	166
1.1	122185	67.0	F	H		167
1.1	101785	66.5	M	H	AD	166
1.1	12586	63.0	F	H		167
1.1	102185	69.0	F	H	AD	166
1.1	122185	67.0	M	H		167
1.1	101085	68.0	F	W		166
1.1	11186	61.0	F	H		167
1.1	11986	58.0	M	H		167
1.1	121985	65.5	F	W		167
1.1	11986	65.5	M	W		167
1.1	21286	61.5	M	H		167
1.1	92085	61.0	F	H		164

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 1. (Cont')

AGE (yrs)[a]	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION[b]	FIN CLIPS	COMMENTS[c]
1.1	12586	68.0	M	H	AD	167
1.1	111685	61.0	F	H	AD	165
1.1	20886	58.0	F	H		167
1.1	112185	72.0	F	H	AD	165
1.1	12586	63.0	F	W		167
1.1	101285	59.5	F	H		165
1.1	121985	68.5	M	H	AD	167
1.1	91585	65.5	--	--		166
1.1	122685	69.0	M	H	AD	167
1.1	112585	63.0	F	H		166
1.1	22286	60.0	M	H		167
1.1	110985	68.0	M	H		166
1.1	121985	65.0	F	W		167
1.1	120885	70.5	M	H	AD	166
1.1	101285	60.0	M	H		167
1.1	101985	67.0	M	H	AD	166
1.1	21986	61.5	F	H		167
1.1	11186	65.5	M	W		167
1.1	22386	67.0	M	H		167
1.1	111685	65.0	F	H		165
1.1	121985	57.0	F	H	AD	167
1.1	120785	59.5	F	H		165
1.1	122185	65.0	M	W		167
1.1	102685	62.0	F	H		166
1.1	21986	64.0	F	H		167
1.1	10486	63.5	--	--		166
1.1	12586	65.0	M	H		167
1.1	122185	65.0	M	W		166
1.1	21286	0.0	--	--		167
1.1	120785	71.5	F	W		165
1.1	20886	63.0	F	H		167
1.1	101085	70.5	M	H	AD	166
1.1	12186	63.0	M	H		167
1.1	92685	63.5	F	H		164
1.1	112385	73.0	F	H	AD	166
1.1	111085	66.5	F	H	AD	165
1.1	122185	61.0	F	W		167, IFG 0700
(1.1)[d]	101285	65.0	M	H		165
(1.1)	12186	68.0	F	H		167
1.2	21286	75.0	--	--		166
1.2	11186	84.0	F	W		167
1.2	20886	80.0	F	H	AD	167
1.2	101885	72.5	M	H	AD	166

Appendix B: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 1. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.2	22286	82.5	F	H	AD	167
1.2	122185	79.0	F	W		166
1.2	122185	89.0	M	H		167
1.2	101085	91.5	M	H	AD	166
1.2	122185	83.0	M	H		167
1.2	110985	88.5	F	H	AD	166
1.2	12586	75.0	F	H		167
1.2	103185	84.5	M	H		166
1.2	20886	88.0	F	H	AD	167
1.2	120185	78.5	F	H	LV	166
1.2	22286	76.0	F	H		167
1.2	111785	75.0	F	H		166
1.2	20886	81.0	F	H	AD	167
1.2	122185	92.0	M	H		166
1.2	120885	88.5	M	H	AD	167
1.2	111685	83.0	F	H		165
1.2	11186	73.5	F	H		167
1.2	112585	83.0	F	H		166
1.2	12586	71.0	F	H		167
1.2	101985	66.0	M	H	AD	166
1.2	12586	73.5	M	H	AD	167
1.2	100985	89.0	M	H		166
1.2	21286	0.0	--	--		167
1.2	102685	89.0	M	H	AD	166, JT # B10233
1.2	122185	82.0	M	H		167
1.2	120785	66.0	M	W		165
1.2	20886	81.0	F	H		167
1.2	103185	78.5	F	H		166
1.2	11186	72.5	F	W		167
1.2	101885	62.5	M	H	AD	166
1.2	122185	88.0	F	H		167
1.2	120185	94.5	M	H	AD	166
1.2	21986	71.0	M	H		167
1.2	121985	87.0	M	H	AD	166
1.2	122185	76.0	F	H		167
1.2	120185	93.0	M	H	AD	166
1.2	22386	75.0	M	H		167
1.2	101885	89.0	M	H		166
1.2	122185	96.0	M	H	AD	167, Could be 1.3
1.2	101085	88.0	M	H	AD	166
1.2	11686	75.5	--	H	AD	166
1.2	12986	70.0	M	H		167
1.2	102685	77.0	M	H		166
1.2	102185	70.0	M	H		166

Appendix B: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 1. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.2	100985	84.0	F	H		166
1.2	112585	80.5	M	H		166
1.2?	121985	82.0	M	H		167
(1.2)	101085	84.5	M	H		166
(1.2)	92685	71.0	M	H	AD	164
(1.2)	22286	78.5	F	H		167
1.3	12586	94.0	M	H		167
1.3	100285	87.5	M	--		166
1.3	92685	94.0	M	H	AD	164
1.3	20886	88.0	F	H		167
R.3	20886	104.0	M	H		167
2.1	20886	60.0	F	W		167
2.1	20886	62.0	F	W		167
2.1	11186	62.0	F	W		167
2.1	101985	66.0	F	W		166
2.1	92185	50.0	--	--		166
2.1*	103185	61.0	F	H		166
2.1	12586	62.0	M	W		167
(2.1)	12186	61.5	--	--		166
2.2	21986	74.0	--	--		166
2.2	20886	79.0	F	W		167
2.2	21986	76.0	F	W		167
2.2	111785	77.0	F	W		166
(2.2)	20886	78.0	F	W		167
3.1	11186	61.0	F	W		167
3.2*	11186	76.0	F	H		167
R.1*	92685	60.0	F	W		164
NS *	112485	81.5	M	H		165
NS	92685	--	--	H	AD	164
NS	111785	69.0	M	H		166
NS	92185	66.0	F	H	AD	164
NS	122485	61.0	M	W		166
NS	110285	93.0	M	H	AD	165
NS	111685	70.5	F	W		165
NS	92685	59.5	F	W		164
NS	11686	78.0	F	H		167
R *	101885	67.0	F	--		166
R	101885	65.0	M	H	AD	166
R	111785	68.0	M	H		166
R	112585	59.0	F	W		166
R	92985	63.5	F	H	AD	166
R	92985	66.0	F	H	AD	166
R	120185	74.0	F	H	AD	166
R	20886	97.0	M	W		167
R	112385	61.5	M	W		166
R	11186	69.0	F	H	AD	167

Appendix B: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 1. (Cont')

AGE (yrs)[a]	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION[b]	FIN CLIPS	COMMENTS[c]
R	110985	69.0	M	H		166
R	12186	75.5	M	H	AD	167
R	120185	63.5	F	H		166
R	22286	79.0	M	H		167
R	10486	64.0	--	H	AD	166
R	20886	89.0	M	H		167
R	120185	87.5	M	H		166
R	122485	61.0	F	H		166
R	120185	62.0	F	W		166
R	12586	68.0	M	H		167
R(NS)	92685	90.0	M	H		164
R(NS)	122685	65.0	M	W		167
R(NS)	92685	91.0	F	H	AD	164
R(NS)	122185	61.0	F	H	AD-RP	167
R(NS)	120785	63.5	M	H	AD	165
R(NS)	121985	74.0	M	H	AD	167
R(NS)	121985	60.5	M	H		167
R(NS)	120785	92.0	F	H		165
R(NS)	110285	58.0	F	W		165
R(NS)	121485	67.5	F	H	RP	167

	Number	Percent of Total	% of Hatchery or wild
Total Samples	196	100.0	
Unreadable Samples	39	19.9	
Readable Samples	157	100.0	
Hatchery Fish	141	89.8	100.0
1 Salts	82	52.2	58.2
2 Salts	54	34.4	38.3
3 Salts	5	3.2	3.5
Ad & Lv clips	45	28.7	31.9
Wild Fish	16	10.2	100.0
1 Salts	10	6.4	62.5
2 Salts	6	3.8	37.5
Respawners	0	0.0	0.0

[a] Age is indicated with the years of fresh water residence before the decimal and years of ocean residency after the decimal. All fish with a 1 preceeding the decimal are considered to be of hatchery origin, unless indicated otherwise.
[b] Stubbed or deformed fins were used as indicators of hatchery fish.
[c] WDG fishery mgmt. sections (164-168).
[d] Parenthesis means that only 1 scale was readable.
[e] R = regenerated, NS = no scales in sample.
[w] Scale analysis indicates a wild fish.

Appendix B: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. Scale analysis for samples collected during the fall 1985 and spring 1986 during a creel survey above Lower Granite Dam (includes mid-Snake R.).

AGE (yrs)[a]	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION[b]	FIN CLIPS	COMMENTS[c]
1.1	92185	60.5	F	--		168
1.1	102285	62.0	M	H		168
1.1	10886	63.0	M	H		168
1.1	92785	64.0	M	H		168
1.1	121485	66.0	F	H		168
1.1	102685	56.0	F	H		168
1.1	21586	60.5	M	H		168
1.1	120785	61.0	F	H		168
1.1	92785	60.0	F	W		168
1.1	13186	61.0	F	H		168
1.1	92985	62.2	F	--		168
1.1	120785	58.0	M	H		168
1.1	120785	61.0	F	W		168
1.1	13186	61.5	F	H		168
1.1	120785	65.0	F	W		168
1.1	93085	61.0	M	--		168
1.1	120785	60.0	F	W		168
1.1	13186	64.5	M	H		168
1.1	92985	56.5	F	--		168
1.1	120785	65.0	M	H		168
1.1	121585	64.0	M	H		168
1.1	102685	64.0	M	H		168
1.1	120785	67.0	M	H		168
1.1	120785	62.0	F	H		168
1.1	120785	65.0	F	H		168
1.1	102285	66.0	F	H		168
1.1	121585	62.0	F	--		168
1.1	121885	63.0	M	H		168
1.1	102485	68.0	M	H		168
1.1	20286	66.0	M	H		168
1.1	121585	63.0	M	H		168
1.1	121885	66.5	M	H		168
1.1	93085	67.5	M	H	AD	168
1.1	102285	65.5	M	H		168
1.1	100585	55.0	F	H		168
1.1	122285	62.0	F	H		168
1.1	121885	62.0	F	H		168
1.1	20286	61.5	F	--		168
1.1	121885	66.0	M	H		168
1.1	120685	64.0	F	--		168
1.1	120685	60.0	F	W		168
1.1	102685	64.0	M	H		168
1.1	100585	62.0	F	H		168
1.1	112585	57.0	F	H		168

Appendix B: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.1	120685	65.0	F	H		168
1.1	20286	56.5	M	W		168
1.1	120485	66.5	M	H		168
1.1	100985	59.0	F	H		168
1.1	113085	63.0	F	W		168
1.1	20286	60.0	F	--		168
1.1	112485	62.0	M	W		168
1.1	111785	63.0	F	H		168
1.1	100685	62.5	F	H		168
1.1	102585	68.5	M	H		168
1.1	112385	61.0	F	H		168
1.1	111785	67.0	M	--		168
1.1	100985	62.0	F	H		168
1.1	102485	61.0	F	H		168
1.1	111785	60.5	F	H		168
1.1	111785	66.0	F	H		168
1.1	122885	65.0	M	H		168
1.1	102285	61.5	M	H		168
1.1	111785	71.5	M	H		168
1.1	101085	0.0	F	W		168
1.1	122885	64.0	M	H		168
1.1	20286	59.5	F	H		168
1.1	122985	63.0	F	W		168
1.1	111685	60.0	M	H		168
1.1	111785	67.0	M	H		168
1.1	20286	62.0	F	H		168
1.1	101285	76.0	M	H		168
1.1	123085	66.0	F	H		168
1.1	101285	64.0	F	H		168
1.1	20286	65.5	F	H		168
1.1	111385	57.5	F	H		168
1.1	111085	59.0	M	H		168
1.1	123085	64.0	M	H		168
1.1	102485	54.0	F	--		168
1.1	10386	63.0	M	H		168
1.1	110985	64.0	M	H		168
1.1	10386	66.0	F	H		168
1.1	20286	62.5	F	H		168
1.1	10486	64.5	F	H		168
1.1	101285	62.5	F	H		168
1.1	10486	65.0	M	H	AD	168
1.1	32386	66.0	M	H		168
1.1	10486	60.5	F	H		168
1.1	110785	66.0	M	H		168
1.1	10486	63.0	M	H		168
1.1	20286	57.0	F	H		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.1	101385	63.5	F	--		168
1.1	110485	60.5	F	H		168
1.1	10586	63.0	F	H		168
1.1	20286	60.0	F	H		168
1.1	101885	64.0	F	H		168
1.1	121485	68.5	M	H		168
1.1	10786	68.0	M	H		168
1.1	30586	60.0	F	H		168
1.1	10786	65.0	M	W		168
1.1	120785	63.0	F	H		168
1.1	121585	59.0	M	H		168
1.1	20486	62.5	F	H		168
1.1	11186	59.5	F	H		168
1.1	120785	63.0	M	H		168
1.1	101885	62.0	M	H		168
1.1	30186	58.0	F	H		168
1.1	110385	65.5	M	W		168
1.1	120685	64.0	M	H		168
1.1	101985	63.0	M	H		168
1.1	20686	65.0	F	H	AD	168
1.1	11286	63.0	F	H	AD	168
1.1	120685	66.0	M	H		168
1.1	110285	67.0	F	H		168
1.1	20686	68.0	F	H		168
1.1	110285	67.5	M	H	AD	168
1.1	100685	65.0	F	H		168
1.1	110285	62.5	M	H		168
1.1	20686	65.0	F	H		168
1.1	11886	61.0	F	H		168
1.1	122885	65.0	F	H	AD	168
1.1	110285	63.5	M	H		168
1.1	20686	60.0	F	H		168
1.1	110285	64.5	F	H	AD	168
1.1	111785	69.0	M	H		168
1.1	11886	59.0	F	H	LV	168
1.1	22486	64.0	M	H		168
1.1	12186	64.0	F	H		168
1.1	101285	59.0	M	H		168
1.1	110285	59.0	F	W		168
1.1	20686	69.0	M	H		168
1.1	102985	60.0	F	--		168
1.1	10386	65.0	M	H		168
1.1	102985	72.0	F	H	AD	168
1.1	20686	64.5	F	H		168
1.1	12686	67.0	M	--		168
1.1	10486	59.5	M	H		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.1	102085	66.0	M	H		168
1.1	22086	65.5	F	H		168
1.1	102985	61.5	F	H		168
1.1	110785	62.0	F	H		168
1.1	13086	65.0	M	H		168
1.1	22086	60.0	F	H		168
1.1	102985	66.0	M	H		168
1.1	120785	62.0	M	W		168
1.1	13186	66.0	M	H		168
1.1	20686	67.5	M	H		168
1.1	13186	65.0	F	H		168
1.1	121585	64.0	M	H		168
1.1	102985	61.0	F	W		168
1.1	22086	66.0	M	H		168
1.1	11186	62.0	F	W		168
1.1	120685	68.0	M	H	AD	168
1.1	101885	61.0	F	H		168
1.1	20986	63.5	F	H		168
1.1	11186	61.0	F	H		168
1.1	122885	55.0	F	H	LV	168
1.1	110285	58.5	F	W		168
1.1	20986	62.0	F	H		168
1.1	11886	58.0	F	H		168
1.1	111085	56.0	F	H		168
1.1	11886	61.0	M	H		168
1.1	20986	64.0	F	H		168
1.1	11886	63.0	F	H		168
1.1	10586	72.0	M	H		168
1.1	102085	67.0	F	H		168
1.1	20986	64.5	M	H		168
1.1	12586	65.0	F	H		168
1.1	121585	69.0	M	H		168
1.1	12686	70.0	M	H		168
1.1	21886	63.0	F	H		168
1.1	13186	64.0	M	H		168
1.1	122885	68.0	F	H		168
1.1	13186	61.0	F	H		168
1.1	21586	62.0	M	H		168
1.1	102085	65.0		W		168
1.1	110985	68.5	M	H		168
1.1	101985	60.0	F	W		168
1.1	21586	61.0	F	H		168
1.1	11286	65.5	M	H		168
1.1	120685	63.0	M	--		168
1.1	11886	63.5	M	H		168
1.1	92185	56.0	M	H		168
1.1	102985	56.0	F	--		168
1.1	111785	61.0	F	H	LP	168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)[a]	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION[b]	FIN CLIPS	COMMENTS[a]
1.1	13086	63.5	M	W		168
1.1	21586	64.0	F	H		168
1.1	102985	63.0	M	H		168
1.1	120785	64.5	F	H	LV	168, RA-IV-3
1.1	101985	64.0	F	H		168
1.1	12186	62.0	F	H		168, RA-IJ-1
1.1	12186	64.5	M	H		168
1.1	100785	58.5	F	H		168L
1.1	102985	66.5	M	H		168
1.1	100785	65.0	F	H		168L
1.1	110285	66.0	M	H	AD	168
1.1	11186	61.0	F	H		168
1.1	102985	67.0	M	--		168
1.1	100785	60.0	F	H	AD	168L
(1.1)[c]	121585	64.0	M	H		168
(1.1)	20786	72.5	M	H		168
(1.1)	113085	62.0	M	W		168
(1.1)	123085	70.5	M	H		168
(1.1)	20286	65.0	M	H		168
(1.1)	110785	63.5	M	H		168
(1.1)	12586	67.5	M	H		168
(1.1)	121885	62.0	F	H		168
1.2	120785	90.0	M	H		168
1.2	12686	87.0	F	H		168
1.2	100985	71.0	F	H		168B
1.2	121885	75.0	F	H		168
1.2	120685	82.5	F	--		168
1.2	110385	85.0	M	H		168
1.2	100285	79.0	M	--		168
1.2	121885	88.0	M	H		168
1.2	11886	76.0	M	H		168
1.2	111785	90.0	M	H		168
1.2	11886	90.0	M	H		168
1.2	111785	76.5	F	H		168
1.2	120785	72.0	F	H		168
1.2	100585	82.0	M	H	AD	168
1.2	120785	84.0	F	H		168
1.2	122885	80.0	M	H		168
1.2	20586	80.0	M	--		168
1.2	111785	73.0	M	H		168
1.2	121585	77.0	M	H		168
1.2	20286	71.5	M	H	AD	168
1.2	13186	75.5	F	H		168
1.2	121285	80.0	F	H		168
1.2	10486	88.0	F	H		168
1.2	11286	74.0	F	--		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.2	122885	88.5	F	H		168
1.2	121285	74.0	F	H		168
1.2	121585	73.0	F	H		168
1.2	121285	88.0	M	H	AD	168
1.2	102685	61.0	F	H		168
1.2	11186	72.0	F	H		168
1.2	122885	88.0	F	H		168
1.2	121285	85.0	M	H		168
1.2	122885	80.0	F	H		168
1.2	11186	77.0	F	H		168
1.2	123085	94.0	F	H		168
1.2	121485	70.0	F	H		168
1.2	111785	89.0	M	H		168
1.2	121485	85.0	M	H		168
1.2	121585	79.5	F	H		168
1.2	121585	73.0	F	W		168
1.2	100685	77.0	M	W		168
1.2	10586	83.0	F	H		168
1.2	102285	77.0	F	H		168
1.2	10586	90.5	M	H		168
1.2	102985	64.0	F	H		168
1.2	21586	71.5	F	H		168
1.2	20686	69.5	F	H		168
1.2	10486	74.5	F	H		168
1.2	110385	70.0	--	H		168
1.2	111685	81.0	M	H		168
1.2	30186	62.0	M	H		168
1.2	20286	66.0	M	H		168
1.2	110485	75.0	F	H		168
1.2	13186	71.0	F	H		168
1.2	20286	69.5	--	H	AD	168
1.2	111785	75.0	F	H		168
1.2	20286	78.5	F	H		168
1.2	92185	74.0	F	--		168
1.2	120485	74.0	F	H		168
1.2	110385	75.5	--	H		168
1.2	11685	71.0	M	H		168
1.2	20286	71.0	F	H		168
1.2	12286	79.0	F	H		168
1.2	120685	85.0	F	H		168
1.2	102985	86.5	F	H	AD	168, G17013
1.2	13186	80.0	M	H		168
1.2	120685	76.0	F	H	AD	168, G17756
1.2	12686	74.0	F	H		168
1.2	120785	79.0	F	H		168, JT-#?
1.2	30186	68.0	M	H		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION*	FIN CLIPS	COMMENTS*
1.2	112485	80.0	M	H		168
1.2	111785	73.0	F	H		168
1.2	11186	73.0	F	H		168
1.2	101285	74.0	--	W		168
1.2	111785	86.0	M	H		168
1.2	20286	71.0	F	H		168
1.2	120785	83.0	F	H		168, G20306
(1.2)	122985	84.0	F	H		168
(1.2)	121585	83.0	F	H	AD	168, G20709
(1.2)	121485	86.0	F	H		168
(1.2)	120685	76.0	M	H	AD	168
(1.2)	121585	90.0	M	H		168
(1.2)	22086	77.5	M	H		168
(1.2)	120685	94.0	M	H		168
R.2	11386	92.0	M	H		168
R.2	122885	85.0	F	H		168
R.2	121485	74.0	F	H		168
U.2	120785	82.5	F	H		168
1.3	11286	94.0	F	H		168
1.3	122885	91.0	F	H		168
1.3	123085	94.0	F	H		168
(1.3)	111785	88.0	F	H		168
U.3	122285	72.0	M	H		168
2.1*	100985	55.0	F	H		168B
2.1	100985	59.5	F	W		168
2.1*	121485	82.5	--	H		168
2.1	121585	63.0	M	W		168
2.1	93085	64.5	F	--		168
2.1	12186	67.0	M	W		168
2.1	120485	67.0	F	W		168
2.1	122885	66.0	F	W		168
2.1	11886	60.0	--	W		168
2.1	102485	59.0	M	W		168
2.1*	20986	64.5	M	H		168
2.1	110785	60.0	F	W		168
2.1	111785	59.0	F	W		168
2.1	111685	63.0	F	W		168
2.1*	122985	64.0	F	H		168
2.1	93085	56.0	--	--		168
2.1*	11186	63.5	M	H		168
2.1*	122985	70.0	M	H		168
2.1	121285	66.0	F	W		168
2.1	111685	59.0	F	--		168
(2.1S)*	111785	0.0	F	W		168
(2.1)*	11286	58.0	F	H		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)[a]	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION[b]	FIN CLIPS	COMMENTS[c]
(2.1)*	121885	60.0	M	H		168
2.2*	121585	104.0	M	H		168
2.2	121585	71.0	F	W		168
2.2*	112485	77.0	F	H		168
2.2	100585	85.0	F	--		168
2.2	120485	88.0	M	W		168
2.2*	122985	74.0	F	H		168
2.2	121585	79.0	F	W		168
2.2*	122985	82.0	F	H		168
2.2*	10486	83.0	F	H		168
2.2	111785	74.5	F	W		168
2.2	112385	92.0	M	W		168
2.2*	100985	73.0	F	H		168
2.2	11286	76.0	F	W		168
2.2	120685	84.5	F	W		168
2.2	120685	80.0	F	W		168
2.2	20286	78.5	F	W		168
(2.2)	120785	80.0	F	W		168
(2.2)	120485	76.0	F	W		168
2.3*	13186	96.5	M	H		168
2.3*	13186	99.0	M	H		168
3.1	121285	64.0	F	W		168
3.1	111685	67.0	M	W		168
3.1	111785	71.0	F	W		168
3.2*	121085	84.0	M	H		168
3.2	110785	85.0	F	--		168
3.2*	10486	84.0	M	H		168
3.2	121085	73.0	F	W		168
3.2*	120485	88.5	F	H		168
3.2*	111785	79.0	F	H		168
(U.2)	111685	77.0	M	W		168
3.3*	112485	86.0	F	H		168
R(W).3*	112485	92.0	M	H		168
NS[c]	20686	72.5	F	H		168
R	13186	78.0	M	H		168
R	121485	83.0	F	H		168
R	110385	61.0	--	H		168
R	121885	89.0	M	H		168
R	110785	71.0	F	H		168
R	21586	66.0	M	H		168
R	11186	70.5	--	--		168
R	121585	66.5	M	H	LV	168, 827453
R	121585	95.0	M	H		168
R	120785	92.0	F	H		168
R	20286	69.0	M	H		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

AGE (yrs)*	DATE CAPTURED	FORK LENGTH (cm)	SEX	DORSAL FIN CONDITION**	FIN CLIPS	COMMENTS***
R	102985	77.0	F	H	AD	168, G17344
R	20486	66.0	F	H		168
R	111785	67.0	M	H	AD	168
R	93085	65.0	F	--		168
R	120785	77.0	M	H		168
R	91885	74.0	M	--		168
R	12686	67.0	M	H		168
R	102685	62.0	M	H		168
R	111485	88.0	M	H		168
R	121585	88.0	F	H		168
R	13186	90.5	M	H		168
R	102885	63.5	M	H		168
R	120685	62.0	F	--		168
R	120785	67.0	M	W		168
R	102285	74.5	F	W		168
R(NS)	122385	85.0	F	H		168
R(NS)	20686	66.0	M	H		168
R(NS)	21886	61.0	F	H		168
R(NS)	122985	106.0	M	--		168, G24061
R(NS)	21586	67.0	F	H		168
R(NS)	20986	62.0	F	H		168
R(NS)	22086	72.0	M	H		168
R(NS)	12186	91.0	M	H		168
R(NS)	122885	65.0	M	H		168
R(NS)	10786	61.0	M	W		168
R(NS)	122385	94.0	F	H		168
R(NS)	122885	64.0	M	H		168
R(NS)	111785	93.0	F	--		168
R(NS)	122885	62.0	F	H		168
R(NS)	122385	93.0	M	H		168
R(NS)	10586	67.0	M	H		168
R(NS)	30186	78.0	M	H		168
R(NS)	122885	66.0	M	H		168
R(NS)	111785	83.0	M	--		168
R(NS)	122885	68.0	M	H	AD	168
R(NS)	120785	87.0	M	H		168
R(NS)	10786	66.0	M	H		168
R(NS)	122885	90.0	M	H		168
R(NS)	22086	57.0	M	H		168
R(NS)	122885	61.0	M	H	AD	168
R(NS)	123085	67.0	M	H		168

Appendix G: Scale analysis for sport caught steelhead, fall 1985 and spring 1986.

Table 2. (Cont')

	Number	Percent of Total	% of Hatchery or Wild
Total Samples	407	100.0	
Unreadable Samples	53	13.0	
Readable Samples	354	100.0	
Hatchery Fish	299	84.5	100.0
1 Salts	206	58.2	68.9
2 Salts	88	24.9	29.4
3 Salts	5	1.4	1.7
Ad & Lv clips	22	6.2	7.4
Wild Fish	55	15.5	100.0
1 Salts	26	7.3	47.3
2 Salts	25	7.1	45.5
3 Salts	5	1.1	7.3
Respawners (Wild)	1	0.3	1.8

[a] Age is indicated with the years of fresh water residence before the decimal and years of ocean residency after the decimal. All fish with a 1 preceeding the decimal are considered a hatchery fish wunless indicated otherwise.
[b] Stubbed or deformed dorsal fins were used as indicators of hatchery fish.
[c] WDG fishery mgmt. sections (168L = L. Granite Reservoir, 168B = Zone B of mid-Snake area of section 168).
[d] Parenthesis means only 1 scale was read.
[e] The S after ocean residency means a spawning check in scale.
[f] Scale analysis indicates wild origin.
[g] R = Regenerated, U = Unreadable, NS = No scales in sample.

Appendix H. Snouts from the Snake River examined by National Marine Fisheries Service (NMFS) for WDG, fall 1985 and spring 1986.

ID #	Date	Type & Location[A]	Len. (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[B]	Brand[C]	Jaw Tag	Coded-wire Tag (Cwt)
62	92185	S 164	71		F	H	AD			
47	92985	S 164	68		F	H	AD			
41	100885	S 164	71.5		F	H	AD			
138	101485	S 164	91		F	H	AD	RA-Z-1		23-16-39
45	110385	S 164	94		M	H	AD	RA-F-3		23-16-19
29	91185	S 165	66		M	H	AD			
40	101285	S 165	67.5		M	H	AD			
24	111085	S 165	66.5	3.2	F	H	AD			
21	111685	S 165	61		F	H	AD			
25	112185	S 165	72		F	H	AD			
22	120785	S 165	63.5		M	H	AD			unreadable
27	120785	S 165	63.5		M	H	AD			
37	10486	S 166	69		M	H	AD			10-27-46
39	10486	S 166	64		M	H	AD			10-27-46
119	11686	S 166	75.5		M	H	AD			
57	92185	S 166	57		U	H	AD			
58	92985	S 166	66		U	H	AD			
59	92985	S 166	63.5		F	H	AD			
56	100285	S 166	66.5		M	H	AD			
54	100585	S 166	70		M	H	AD			
34	101085	S 166	88		M	H	AD	LAW-1		23-16-38
28	101085	S 166	91.5		M	H	AD	LAW-1		23-16-38
36	101085	S 166	70		M	H	AD			
52	101785	S 166	66.5		M	H	AD			
55	102185	S 166	69		F	H	AD			
53	102685	S 166	89		M	H	AD	RAZ-1	B10233	23-16-39
20	110985	S 166	88.5	7.3	F	H	AD	RAZ-1		23-16-39
19	111785	S 166	76		M	H	AD			
23	112385	S 166	73		F	H	AD			10-25-17
38	120885	S 166	70.5		M	H	AD			5-13-35
35	10486	S 167	62.5		F	H	AD			
118	12186	S 167	75.5		M	H	AD			
117	12586	S 167	68		M	H	AD			
116	12586	S 167	73.5		M	H	AD			
122	20886	S 167	88		F	H	AD	RAF-1		23-16-40
120	20886	S 167	80		F	H	AD	RAF-2		23-16-17
133	22286	S 167	83		F	H	AD	RAZ-1		23-16-39
137	22286	S 167	76		F	H	AD			
60	92185	S 167	63		F	H	AD			
12	102985	S 167	62	2.1	M	H	AD			
33	120885	S 167	88.5	6.4	M	H	AD	RAZ-1		23-16-39
26	121485	S 167	62.5		M	H	AD,LV			5-10-28
31	121985	S 167	74		M	H	AD			
32	121985	S 167	68.5		M	H	AD			
30	121985	S 167	57		F	H	AD			10-25-19
51	122185	S 167	61		F	H	AD,RP			
90	122685	S 167	69		M	H	AD			
48	92185	S 168A	56		M	H	AD			
65	93085	S 168A	67.5		M	H	AD			

Appendix H. (Continued).

ID #	Date	Type & Location[A]	Len. (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[B]	Brand[C]	Jaw Tag	Coded-wire Tag (Cwt)
71	100985	S 168A	68	3.5	F	H	AD			10-25-16
16	101085	S 168A	66	2.8	M	H	AD			
8	102285	S 168A	66		M	H	AD			
11	102285	S 168A	67		F	H	AD			
2	102985	S 168A	86		F	H	AD	RAF-3	G17013	23-16-19
1	102985	S 168L	77		F	H	AD	LAS-1	G17344	63-28-38
15	102985	S 168A	72		F	H	AD			
4	110785	S 168A	59		F	H	LV			63-32-13
6	110785	S 168A	65		M	H	AD			
3	110785	S 168A	62		F	H	LV	RAIJ-2	G27204	63-32-13
89	112485	S 168A	67	3.3	M	H	AD			
88	112485	S 168A	69	3.2	M	H	AD			
103	121085	S 168A	66	2.9	F	H	AD	RAS-1	PIT TAG	63-28-39
77	121085	S 168A	64	2.6	F	H	AD			
104	11886	S 168A/B	59		F	H	LV	RA1J-1		63-32-12
72	100985	S 168B	63	2.2	M	H	AD			5-13-36
69	100985	S 168B	72	4	M	H	AD			
68	100985	S 168B	77	5.1	M	H	AD	RAZ-1	G20286	23-16-39
66	100985	S 168C	59	2.3	U	H	AD,LV	RAL-3	G27430	23-16-51
73	100985	S 168C	65.5	2.6	M	H	AD			
98	10486	S 168L	65	2.7	M	H	AD			
96	11286	S 168L	63		F	H	AD			
107	13186	S 168L	71	3.9	F	H	AD	LAS-1	G17439	63-28-38
112	13186	S 168L	97.5	8.4	M	H	AD	LAK-2	G24003	23-16-4
115	20286	S 168L	69.5	3.6	M	H	AD			
106	20686	S 168L	84	5.4	F	H	AD	RAF-2	G20403	23-16-17
105	20686	S 168L	64	2.4	F	H	AD			
111	21886	S 168L	77	3.8	M	H	AD	LAS-1	G17167	63-28-38
109	30586	S 168L	68.5	2.6	M	H	AD			
108	31686	S 168L	61	2.1	M	H	AD			
67	92785	S 168L	85		F	H	AD	LAW-1	G20265	23-16-38
70	100585	S 168L	63	2.5	M	H	AD			
63	100585	S 168L	60	2.2	F	H	AD,LV			10-27-45
64	100785	S 168L	60	1.75	F	H	AD			
9	101285	S 168L	62.5	2.6	F	H	AD			
13	102685	S 168L	62		M	H	AD			
10	110285	S 168L	66		M	H	AD			
5	110285	S 168L	65		F	H	AD			
83	111785	S 168L	71.5		M	H	AD			
81	111785	S 168L	67		M	H	AD			
101	111785	S 168L	80		M	H	AD	LAW-2	G20476	23-16-16
100	111785	S 168L	69		M	H	AD	RAL-2	G27581	23-16-46
86	111785	S 168L	59		F	H	AD			
91	120685	S 168L	68		M	H	AD			
93	120785	S 168L	64.5		F	H	LV	RA1V-3	G27478	63-32-15
78	120785	S 168L	79		F	H	AD	RAZ-1	G17739	23-16-39
95	120785	S 168L	83		F	H	AD	RAZ-1	G20306	23-16-39

Appendix H. (Continued).

ID #	Date	Type & Location[A]	Len. (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[B]	Brand[C]	Jaw Tag	Coded-wire Tag (Cwt)
82	121485	S 168L	67	2.9	M	H	AD			
84	121585	S 168L	83		F	H	AD	RAZ-1	G20709	23-16-39
79	121585	S 168L	66.5		M	H	LV	RA1V-3	G27453	63-32-15
80	122885	S 168L	65		F	H	AD			
92	122885	S 168L	85	6.1	M	H	AD	RAF-3	G20717	23-16-19
76	122885	S 168L	55	2	F	H	LV	RA1V-1	G27306	63-32-14
87	122885	S 168L	90	6.4	M	H	AD			5-10-24
97	122885	S 168L	61	2.6	M	H	AD			
7	101785	S 168M	64		M	H	AD			
14	110785	S 168M	66		M	H	AD			
99	120685	S 168M	76		M	H	AD			
102	120685	S 168M	76		F	H	AD	LAS-1	G17756	63-28-38
94	121885	S 168M	60	2.4	M	H	LV			
18	92285	V 164	66		F	H	AD			
44	92685	V 164	?	3.2	F	H	AD			
42	92685	V 164	64		F	H	AD			
17	93085	V 164	66.5		F	H	AD			
46	110485	V 164	71		M	H	AD			
43	110285	V 165	93		M	H	AD	RAF-2		23-16-17
61	92085	V 166	64		M	H	AD			
50	122185	V 167	96		M	H	AD			5-13-52
110	12186	V 168A	60		F	H	LV	RA1J-1	G26129	63-32-12
49	90785	V 168A	61	2.3	M	H	AD,LV			10-27-44
74	121485	V 168A	85	6.4	F	H	?	IFG AT	00845	
75	101785	V 168L	?	2.3	?	?	?	IFG AT	00194	
86	122885	V 168L	64		M	H	AD,RP			
114	123185	V 168L	59		U	H	LV	RA1V-3	G27140	63-32-15

A Type of recovery (eg. s = sport, v = voluntary) and location by WDG mgmt. sections. 168A = zone A in section 168, 168L = L. Granite Reservoir below Red Wolf Bridge., 168M = mid Snake R., zone unknown.

B Ad = adipose clip, LV = left ventral clip (left pelvic fin).

C RA = right anterior, LA = left anterior, IFG AT = IFG anchor tag.

Appendix I. Idaho Fish and Game (IFG) sport recoveries for Lyons Ferry Hatchery steelhead coded-wire tags in fall 1985 and spring 1986 (includes only cwts from fish caught and recorded on Idaho permits) (T. Cochnauer and K. Ball, IFG, pers. comm.).

Cwt code	Recovery type	River Location[A]	Capture Date	Length (cm)	Sex	Jaw Tags	Estimated harvest (expanded)[B]
63-28-38	sport	Clearw.A	11/05/85	68.5	F		25
63-28-38	sport	Clearw.A	10/29/85	70.0	F		
63-28-38	sport	Clearw.B	11/21/85	76.0	F		
63-28-38	sport	Clearw.B	10/21/85	78.0	M		
63-28-38	vol	Salmon A	09/26/85	61.0	F		
63-28-38	sport	Snake A	11/01/85	72.5	M	G17214	8
63-28-38	sport	Snake B	10/28/85	84.0	M		
63-28-39	sport	Snake C	11/09/85	68.0	F		8
63-32-12	sport	Clearw.A	10/19/85	62.0	F		14
63-32-12	sport	Clearw.A	10/13/85	61.5	M		
63-32-12	vol.	Snake	12/24/85	66.0	F		
63-32-13	sport	Clearw.A	10/22/85	62.0	F		13
63-32-14	sport	Clearw.A	11/16/85	90.0	F		6
63-32-14	sport	Snake	10/26/85	62.5	M		13
63-32-14	sport	Snake A	11/16/85	62.0	M		
63-32-14	sport	Snake B	01/25/86	61.0	M	G26027	9
63-32-14	vol.	Salmon B	11/09/85	63.5	F		
63-32-15	sport	Snake	10/26/85	71.0	M	G27359	5
63-32-15	vol.	Snake	11/13/85	63.5	?	G27160	
63-32-15	vol.	Snake	11/15/85	?	M	G27305	
63-32-15	vol.	Snake	11/01/85	63.5	F	G27477	
63-32-15	vol.	Snake	10/25/85	71.1	F		
63-32-15	vol.	Snake	11/18/85	66.0	F		
63-32-15	sport	Clearw.A	11/30/85	61.5	M		13
63-32-15	sport	Clearw.A	10/26/85	60.0	F		

[A] Clearw.A = Clearwater R. confluence to pump station.
Clearw.B = Clearwater R. pump station to Cherry Lane.
Salmon A = Salmon R. below Whitebird Creek.
Salmon B = Whitebird to Riggins.
Snake = Snake R. below Salmon R.
Snake A, B, or C = WDG zones for mid Snake R.

[B] cwt expansion for a particular tag code, in a particular river section, by fall or spring. Does not include fish caught by anglers using Washington punchcards and interviewed by IFG (from K. Ball, IFG.).

Appendix J. Coded-wire tag recoveries and expansions for the Snake River, fall 1984 and spring 1985 (Revision to Mendel and Rufforth 1985).

Section	Season	Estimated Harvest*	# Fish checked (sample rate)	# Fish clipped (mark rate)	# Snouts Taken	# Snouts Checked (# cut, no tags)	Total # clipped in harvest (% w/ cut)	Total # cut in harvest	cut code	# recovered	Expanded cut in harvest
L.Snake + 164-167	Fall	1,388	76 (.0548)	4 (.0526)	4	4 (4,0)	73 (100.0)	73.3	5-10-24	1	18
									5-10-25	1	18
									23-16-4	2	37
										4	73
LGR ** 168	Spring	1,897	159 (.0866)	15 (.0949)	15	11 (11,0)	173.3 (100.0)	173.3	5-10-25	3	47
									5-10-27	2	32
									23-16-3	1	16
									23-16-4	4	69
									23-16-5	1	16
										11	174
Mid ++ 168	Fall	3,521	173 (.0491)	17 (.0983)	17	14 (14,0)	346.0 (100.0)	346.0	5-10-24	2	49
									5-10-25	3	74
									5-10-27	2	49
									10-22-52	1	25
									23-6-6	1	25
									23-6-8	1	25
									23-16-2	1	25
									23-16-3	1	25
									23-16-5	2	49
										14	346
Mid 168	Spring	893	97 (.1086)	13 (.1340)	12	12 (12,0)	119.7	119.7	5-10-24	1	10
									5-10-25	3	90
									5-10-26	2	20
									5-10-27	3	90
									23-6-8	1	10
									63-28-38	1	10
									lost	1	10
										12	120

* from Mendel and Rufforth 1985.
\+ includes sections 164-167 plus L. Granite Reservoir, but Dec. consists of only L. Granite data.
** 27 fish were checked below L. Granite Dam - all on 2 days in Jan. in section 167 - 3 snouts taken with cuts 23-16-2, 23-16-5, 23-16-6.
++ Does not include data collected with IFG because they retained all snouts. See their expansions for that data.

Appendix K. External tags or brands observed by WDG on steelhead during creel surveys, fall 1985 and spring 1986.

Date (m/d/y)	Location[a]	Tag[b]	Length (cm)	Sex	Origin	Fin Clips	Observer[c]
120785	168M	G27343	69	M	H	-	IFG
120785	168M	JT#?	96	M	H	AD	IFG
120885	168M	JT#?	90.5	M	H	AD	IFG
120685	168A	G17756	76	F	H	AD	WDG
121085	168A	JT#?	66	F	H	AD	WDG
012286	168A	RA-LT-1	60	F	H	LV	VOL
010386	168A	ID-00838	61.5	F	H	AD	IFG
011186	168A	G17214	72.5	F	H	AD	IFG
012486	168A	G20402	81.5	H	H	AD	IFG
012586	168B	G26027	61	F	H	LV	IFG
093085	168B	ID-00525-Y	65	F	H	--	WDG
110885	168A	G26043	58	F	H	--	IFG
110885	168B	G27369	66	M	H	LV	IFG
110885	168B	G27604	62	M	H	--	IFG
111685	168M	ID600316-0	76	F	W	--	IFG
111685	168M	G27221	62	M	H	LV	IFG
110385	168C	ID#?	59	F	H	--	WDG
110785	168A	G27204	62	F	H	LV	WDG
112085	168A	G27431	65	F	H	--	IFG
102385	168A	G17234	86	F	H	AD	IFG
102685	168A	G27359	71	M	H	LV	IFG
102785	168A	JT#?	77	M	H	AD	IFG
102785	168B	JT#?	86	F	H	AD	IFG
102885	168B	ID00450-0	63.5	F	H	--	IFG
102885	168B	G17544	84	M	H	AD	IFG
103085	168A	G20375	83	F	H	AD	IFG
103085	168A	G17066	79	F	H	AD	IFG
102685	168B	JT#?	63	F	H	LV	WDG
100985	168B	G20286	77	M	H	AD	WDG
100985	168C	G27430	59	--	H	LV	WDG
092785	168L	G20265	85	F	H	AD	WDG
102985	168A	G17013	86.5	F	H	AD	WDG
102985	168	G17344	77	F	H	AD	WDG
111785	168	G27581	69	M	H	AD	WDG
111785	168	G20476	80	M	H	AD	WDG
120785	168	G27478	64.5	F	H	LV,RAIV-3	WDG
120785	168	G20306	83	F	H	AD	WDG
120785	168	G17739	79	F	H	AD	WDG
121485	168	G20624	66.5	F	H	AD	WDG
121585	168	G27453	66.5	M	H	LV	WDG
121585	168	G20709	83	F	H	AD	WDG
122885	168	G20717	85	M	H	AD	WDG
122885	168	G27306	55	F	H	LV,RAIV-1	WDG
122985	168	G24061	106	M	H	AD	WDG

Appendix K. (Continued).

Date (m/d/y)	Location[a]	Tag[b]	Length (cm)	Sex	Origin	Fin Clips	Observer[c]
013186	168	G24003	97.5	M	H	AD	WDG
013186	168	G17439	71	F	H	AD	WDG
020686	168	ID00065	62	M	H	--	WDG
020686	168	G20403	84	F	H	--	WDG
021886	168	G17167	77.5	M	H	AD	WDG
012186	168	G26129	60	F	H	? RAIJ-1	VOL
012186	167	ID0700	61	F	W	--	WDG
102685	166	B10233	89	M	H	--	WDG

[a] WDG mgmt. sections. 168M = Mid Snake R, section 168. 168A, B, or C is section 168 zone A, B, or C. 168L = Section 168, L. Granite Reservoir, below Red Wolf Bridge.

[b] JT = jaw tag. Tags beginning with G are jaw tags from L. Granite Dam and B means Bonneville Dam. ID tags are anchor tags of IFGs. RA or LA are right anterior or left anterior brands.

[c] WDG = Wash. Dept. of Game, IFG = Idaho Fish and Game. VOL = volunteer.