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FALL 1984 AND SPRING 1985 STEELHEAD CREEL SURVEYS FOR THE SNAKE AND LOWER GRANDE RONDE RIVERS

by

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ABSTRACT

Creel surveys were conducted on the Snake and Grande Ronde rivers during the fall 1984 and spring 1985 steelhead seasons, as part of an evaluation of the effectiveness of Lyon's Ferry Hatchery. Over 91,000 adult steelhead crossed Lower Granite dam this fall, which is more than twice the long term average of 38,435 fish. This large number of fish has caused major changes in the steelhead fishery on the Snake River.

Shore anglers expended 39,125 angler hours (7,985 angler days) of effort from 1 September to 30 November 1984 in the lower Snake River reservoirs to catch 405 steelhead. No estimated catch was made for boat anglers because of low boat-angler effort. Additionally, a popular new steelhead fishery developed in December in Lower Granite Reservoir. Catch rates as high as 4.7 hrs/fish were documented. A total of 983 steelhead were estimated to have been caught by boat and shore anglers with 8,797 hours of effort in Lower Granite Reservoir during December. Creeled fish averaged 14.6 lbs.

The mid-Snake River, particularly that area between the confluence with the Clearwater and Asotin Creek (Zone A) consistently had the highest fishing pressure for steelhead of any part of the Snake River during the fall season. Over 125 boats were observed in Zone A on one weekend day in November, during the peak of the steelhead season. Approximately 104,978 (± 11,343) angler hours (26,917 angler days) were expended in the mid-Snake to catch 3,521 steelhead weighing 44,059 lbs. Wild fish comprised 23.4% of the catch (estimated total of 824 fish). Adipose clipped hatchery fish comprised 8.4% of the season's catch.

The lower 4 miles of the Grande Ronde received 2,644 angler hours, primarily by fly fishermen, and had an average catch rate of 12.1 hrs/steelhead. The Grande Ronde attracted fly fishermen from as far away as Georgia and Maine.

A comparison of catch rate estimates from two data collection techniques and agencies is discussed.

Only Lower Granite Reservoir was surveyed intensively in the lower Snake River during the spring (1 Jan to 30 March 1985) steelhead fishery. Shore anglers concentrated at the exit of the fish ladder at Lower Granite Dam while boat anglers were present throughout the reservoir. As many as 135 boats were observed on Lower Granite Reservoir in January. A total of 43,315 angler hours (7,599 angler days) were expended to catch 1,837 steelhead. Wild fish comprised 13% of the catch. No estimate of the steelhead catch for boat anglers could be made for the month of March because of low angler effort.

Approximately 893 steelhead were harvested by anglers with 22,714 (± 5,973) angler hours (5,408 angler days) of effort in the mid-Snake River during spring. Wild fish comprised 17.7% of the total catch. Angling effort was reduced in this river section because of the attractiveness of fishing Lower Granite Reservoir and the Clearwater River.

Most fish caught were 34 inches in length, approximately 14 pounds, and had resided in the ocean for 2 years. Over 90% of the coded-wire tags recovered from the sport catch were from Dworshak N.F. Hatchery. Lyons Ferry contributed only about 4% (333 fish) of the total estimated fall and spring catch of 7,639 steelhead. However, this is the first year of returns of Lyons Ferry production and these steelhead may over-winter in unsurveyed portions of the Snake or Columbia rivers.

Punchcard returns from the Snake River (38%) exceeded the 27% return rate used statewide to estimate steelhead harvests for individual rivers.

INTRODUCTION

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

The Washington Department of Game (WDG) has conducted less intensive steelhead creel surveys on a portion of the Snake River during the fall and spring seasons of 1982-83 and 1983-84. WDG also annually estimates the steelhead catch for various rivers in the state by using steelhead punchcard 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 mitigation goals established in the Lower Snake River Compensation Plan.

The fall 1984 and spring 1985 steelhead seasons were open on the Snake River from 1 September to 31 December and 1 January to 30 March, respectively. A consumptive fishery existed but a 2-inch dorsal regulation (to protect wild steelhead) was in effect below Red Bird Creek, Idaho, until 15 November. Upstream of Red Bird Creek the 2-inch dorsal regulation remained in effect throughout the fall and spring seasons. Daily possession and annual catch limits in Washington were 2 and 20 steelhead, respectively, for the Snake River. Idaho had similar regulations for the Snake River during the fall but creel limits were liberalized during their spring season (1 January to 30 April) to 4 steelhead/day and 20/season below Red Bird Creek.

The Grande Ronde River was open from 1 September to 30 November to catch-and-release fishing only, and artificial lures and flies were required. The lower 1 1/2 miles of the Grande Ronde River (up to the bridge) was open for fishing throughout the year but little or no fishing effort existed after November.

OBJECTIVES

The objectives of creel surveys on the Snake and Grande Ronde rivers were to:

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

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

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

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

2). Examine coded-wire tags and identify the release location 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 the lengths, weights, sex, and percentage of fish of wild and hatchery origin in the catch.

3. Obtain information concerning angler demographics and the percentage of steelhead caught by anglers using Washington punchcards (this is for direct comparison of our catch estimate with that derived from returned steelhead punchcards).

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

STUDY AREA

The Snake and Grande Ronde rivers are the major waterways along or near the boundaries of southeast Washington (Fig. 1). For convenience in designing and conducting the creel surveys we divided the Snake River into two segments:

1. Lower Snake River -- from the mouth to Red Wolf Bridge in Clarkston, Washington (about 138 miles). This segment consists of four US Army Corps of Engineer dams and their reservoirs and portions of WDG fish management sections 164 - 168 (e.g. 164 is from the mouth of the Snake to Ice Harbor Dam and 168 is all of the Snake River in Washington above Lower Granite Dam).

2. Mid-Snake River -- from Clarkston (Red Wolf Bridge) upstream to the Grande Ronde River (at Lime Point). Nearly all of this portion of the river is managed as boundary waters by Idaho Fish and Game (IFG) and WDG (part of mgmt. section 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 Reservoir and it also includes the confluence with the Clearwater River.

   Zone B -- Asotin Creek upstream to Red Bird Creek (approx. 10 miles). This zone is primarily free flowing river conditions.

   Zone C -- Red Bird Creek to the Grande Ronde River (approx. 13.5 miles). This is free flowing river conditions.

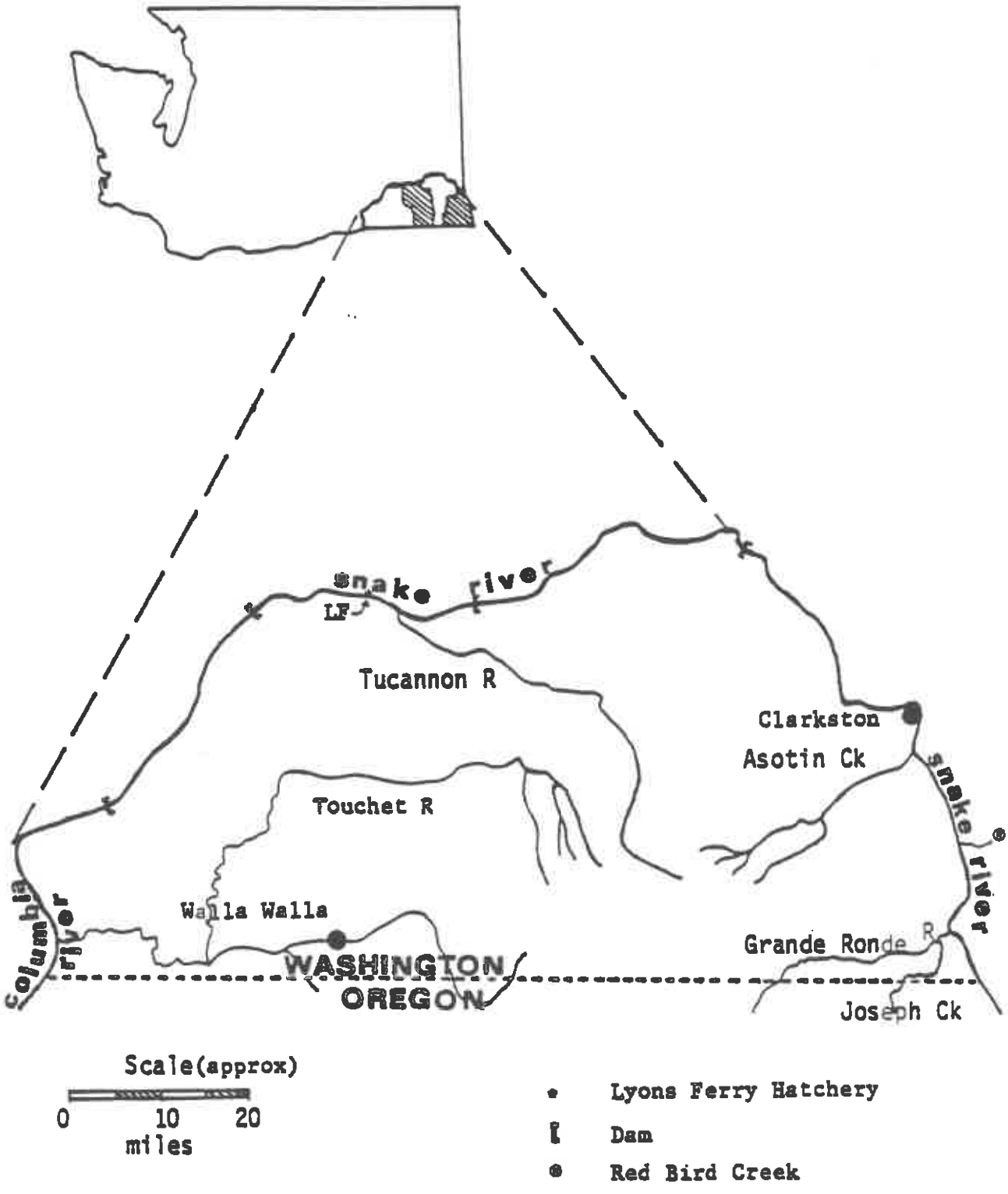

Figure 1. The relative locations of the major streams in southeast Washington and the landmarks used in this study.

The Grande Ronde River also was divided for administrative purposes into the lower Grande Ronde (Zone D -- river mouth to "The Narrows," just upstream of Joseph Creek; approx. 4 miles) and the upper Grande Ronde River (from "The Narrows" upstream to the Oregon-Washington State line; approx. 30 miles).

METHODS

Data Collection

Surveys of the mid-Snake, Lower Granite Reservoir, and lower Grande Ronde river were conducted from along a road that parallels these river segments. The lower Snake and upper Grande Ronde rivers, on the other hand, have very limited road access (access is concentrated near the dams or at recreational facilities on the lower Snake River) and were surveyed primarily at major access areas.

A fixed-wing aircraft was used to make an angler count for the entire 138 mile length of the lower Snake River on 23 September, while WDG personnel in boats or automobiles counted and interviewed anglers "on the ground." Also, on other days boat counts were often paired with boat trailer counts for indications of angler use elsewhere on the reservoirs. On the upper Grand Ronde River we saw no boats or rafts during two cursory surveys, and access was limited except along the two main roads. Therefore, we found little evidence to suggest there was any angler effort except near the road access areas for both these stream segments. Consequently, our creel surveys were concentrated in those areas with good road access.

We surveyed the lower Snake River and conducted boat and shore angler counts on 4 - 6 days/month from 10 September through 30 November. Angler interviews and creel checks were conducted whenever possible. Only one count/day was possible on the lower Snake River because of the length of river and the time required to traverse the survey route. This survey was terminated at the end of November and reestablished only on Lower Granite Reservoir in mid-December.

Survey efforts were intensified for Lower Granite Reservoir (up to Red Wolf Bridge in Clarkston) during January. Two to four counts/day were made during 8 or 9 days between Red Wolf Bridge and Wawawai (about 1 1/2 miles above Lower Granite dam). Boats also were counted from Wawawai to Lower granite Dam by walking about 1/4 mile along the railroad tracks and viewing the reservoir to the dam through a spotting scope. Shore anglers on the south side of the river near Lower Granite Dam could not be observed adequately in this manner. Consequently, in February the survey was adjusted to include surveys of Lower Granite Dam. Only two counts per day could be made because of the time required to complete this extended survey route. Times, days, starting points and directions of travel were chosen at random. Interviews were made whenever possible along the survey routes. Also, several days per month (Dec - Feb) a boat

was used to obtain creel checks along portions of the reservoir. A boat was not available for creel checks in March.

The creel survey on the mid-Snake River was conducted from 1 September to 30 March (inclusive). The lower Grande Ronde survey was established in association with the mid-Snake survey, and terminated 30 November when the steelhead season closed on this stream. Two or more counts per day were made from an automobile (with randomly selected starting points, directions, and times of day) during one randomly selected weekend day or holiday and one weekday per week, for all zones on the mid-Snake and lower Grande Ronde rivers. Creel check interviews were made whenever shore or boat anglers were accessible. Boat angler interviews centered around boat ramps on the Washington side of the river until November. Idaho Fish and Game (IFG) conducted angler interviews from a boat and kindly provided us with their data. In November, December, and January boat angler checks were made cooperatively by WDG and IFG. WDG also frequently used a boat to obtain angler interviews and creel checks in February (a boat was not available in March). Information obtained from anglers included; the angling party size, total hours fished that day, whether the data was for a complete or incomplete fishing trip, gear types, and angler demographics. Steelhead retained by anglers were examined for external marks, weighed and measured. A determination of wild or hatchery origin was made for each steelhead observed by examination of the dorsal fin for erosion or deformaties. Snouts were collected from adipose clipped steelhead observed in the catch for retrieval of coded-wire tags.

A sample of Washington steelhead punchcards were marked and the total number of marked punchcards were recorded. This was an attempt to estimate the return rate for Snake River steelhead anglers' punchcards sent to Olympia at the end of the season; for adjustment of the punchcard derived catch estimates.

Data Analysis

Counts of fishing boats and shore anglers were averaged for each day-type (weekends or holidays, and weekdays) and multiplied by the appropriate constants (i.e., mean number of anglers/boat, average hours of daylight per day, and the average 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. The mean number of anglers/boat and the percent steelhead anglers were obtained during creel check interviews. The average 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 in accordance with the observed angler behavior.

The mean angler hours/day for each day-type were then multiplied by the number of days available per month for each day-type, to get the total angler hours expended during the month for each day-type. The sum of all strata (day-types, zones, and months) is the estimated total angler effort (in angler hrs) for that river segment. This estimate was

divided by the average length of an angling day (obtained from complete angling trip data) to estimate the total angling days expended.

Total catch was estimated for each river segment by summing the strata estimates obtained by multiplying the mean number of anglers/month (mean anglers/day x number of days/month), in each day-type, by the appropriate catch rate estimate from creel check interviews.

Most of the angler effort estimates for the mid-Snake, Lower Granite Reservoir, and the lower Grande Ronde include confidence limits. However, in cases where confidence intervals were not calculated, justification and any modification of the methods are described in the appropriate tables. Confidence intervals for catch per effort and catch estimates could not be computed without access to a computer. Statistical formulas and methods were obtained from Barrett and Nutt (1979), Scheaffer et al. (1979), and Dr. R. K. Steinhorst, University of Idaho statistician (pers. comm.).

RESULTS AND DISCUSSION

FALL 1984

Lower Snake River

Angler effort estimates for the lower Snake River should be used with caution because of the small number of anglers observed and the lack of computed confidence intervals (Table 1, Appendix A). The boat angler hour estimate is particularly troublesome because we have only one weekend estimate of the percentage of boat anglers that were steelhead fishing, for 3 of 5 management sections (50% on 23 September). Also, the mean number of anglers/boat had to be averaged over all management sections, all day-types, and all months to obtain reasonable sample sizes. Our one attempt to use a fixed-wing aircraft, with concurrent ground checks, to obtain complete counts of anglers, catch rates, and the percentage of anglers steelhead fishing for the entire lower Snake River was relatively unproductive. Bad weather, equipment failures, and incomplete data collection resulted in little usable information. However, we know from Knox (1982) that only a small portion of the anglers on the reservoirs in September - December are steelhead fishing. Unfortunately that information may not be directly applicable because the steelhead fishery has changed due to the large return of fish this year. Over 91,000 steelhead crossed Lower Granite Dam this fall (Tim Quinn, WDG, pers. comm.), which is more than twice the 9 year average of 38,435 fish (US Corps of Engineers 1983).

Catch rates for shore anglers varied substantially among management sections (Appendix B) but sample sizes were small in all cases. We suspect a severe unreported-fish bias for anglers immediately below Little Goose Dam. This section consistently received the highest fishing pressure (until 1 December) and we were informed of many fish being

Table 1. Estimated steelhead angler effort, catch rate, and catch for shore anglers fishing in the lower Snake River, 1 Sept.-30 Nov., 1984.

Month	Day-type[a]	Estimated angler effort (hours/day)[b]	Available days/month (N)[b]	Estimated angler hours/month[c]	Catch rate (hrs/fish)[b]	Estimated catch
Sept.	WE	686	11	7,541	249	30
	WD	342	19	6,503	249[d]	26
	Total		30	14,043	250	56
Oct.	WE	815	9	7,331	113	65
	WD	268	22	5,904	69	85
	Total		31	13,235	88	150
Nov.	WE	553	9	4,975	80	63
	WD	327	21	6,871	51	136
	Total		30	11,846	60	199
	Fall Season Total			39,125	97	405

[a] WE = Weekends and major holidays. WD = Weekdays.

[b] Data from Appendix A.

[c] Mean angler hours/day x number of days available per month.

[d] Used the same catch rate as the WE because of lack of data.

caught (and kept). However, we saw few fish during our creel checks. Part of the reason for this low reporting rate of fish caught may be because of noncompliance with the 2 inch dorsal regulation.

Catch rates had to be averaged over all sections because of poor sample sizes. No estimate was obtained for boat angler catch rates.

An estimated 405 steelhead were caught with 39,124.7 angler hours of effort by shore anglers in the lower Snake River during the fall period (1 Sept to 1 Dec) (Table 1). An estimate of 4.9 hours per angler day was obtained from limited complete trip data for shore anglers (n = 12 anglers, 59.0 hrs). Thus, the data indicates that 7,984.6 angler days were expended by shore anglers on the lower Snake River. No estimate of the average length of an angling day is available for boat anglers, even though boat anglers expended 4,123 - 8,246 angling hours of effort (depending upon which factor, 50% or 100% of the anglers are steelhead fishing, is applied to the data in Appendix A).

We decided to terminate our survey efforts on the lower Snake River on 1 December because of the expense of the survey and the poor quality data obtained. However, about this time a relatively new fishery began to expand just upstream of Lower Granite Dam. Catch rates were reported to be excellent and word of the good fishing spread rapidly. We were unable to respond to this unexpected fishery until Saturday the 15th of December. The catch rate for 18 boats checked that Saturday was 5.27 hrs/fish (n = 45 anglers, 121.5 hrs). Shore anglers had a catch rate of 28 hrs/fish (n = 10 anglers, 28 hrs.). The following Sunday the catch rate for 13 boats was 4.7 hrs/fish (n = 29 anglers, 47 hrs.). By this time the angling pressure was spread over the entire length of the reservoir, although boats were concentrated immediately above the dam. As many as 41 boats were seen along the reservoir during weekend days.

We estimate that during the month of December 983 steelhead were caught (and retained) with 8,797.4 hours of effort in the reservoir between Lower Granite Dam and Red Wolf Bridge at Clarkston (Table 2). This catch is more than double the estimated catch for the entire Lower Snake River from September to December. We suspect an additional 100-200 steelhead were probably caught in the lower reservoirs during December; but we have no data to confirm that.

Wild fish comprised an average of 10.8% of the catch in the lower Snake River (Table 3). Approximately 5% of the observed catch was adipose clipped.

The Lower Granite fishery attracted new steelhead anglers (some anglers indicated they had never fished for steelhead before and others had not fished for steelhead since Lower Granite Dam was constructed) and many Idaho residents.

Mid-Snake River

Boat anglers consistently exerted more fishing pressure in the upper portion of Lower Granite Reservoir between Clarkston and Asotin (Zone A)

Table 2. Estimated angler effort and catch for Lower Granite Reservoir (up to Red Wolf Bridge in Clarkston), December, 1984

		Boats					Shore			
hours available[a]	day-type (N)[b]	mean no. of boats (n)[c]	anglers per boat (n)[d]	estimated angler effort (angler hrs)[e]	catch rate in hrs/fish (anglers, hrs)[f]	estimated catch[g]	mean no. anglers[h]	estimated angler effort[e]	catch rate in hrs/fish (anglers,hrs)[f]	estimated catch[g]
7.0	WE (11)	23.0 (4)	2.4 (149,62)	4,250.40	7.47 (144,455.8)	569	8.7	669.9	35.0 (18,70)	19
	WD (20)	8.0 (2)	2.4	2,688.00	7.47	360	8.7	1,218.0	35.0	35
	Total			6,909.49		929		1,887.90		54

[a] Although 8.5 hours of daylight were available, most anglers didn't begin fishing until 9-1000 hours. Counts were made from 1000 hours to 1500 hours. Therefore, 7 hours was used to adjust the mean number of anglers and represent a more appropriate daily average.

[b] WE = Weekends and major holidays. WD = Weekdays. N = The number of days of that day-type available per month.

[c] 25.5 boats was the actual mean for weekends but it was adjusted to 23.0 to account for the unsampled early part of the month when the number of boats was presumably lower. n = the number of days sampled. WD mean of 8.0 is from a sample on 12/6 by K. Kiler, IFG and a sample on 12/19 by WDG.

[d] n = number of anglers, and boats checked during 3 days of creel check interviews by boat.

[e] The total estimated angler effort (in angler hours) was obtained by multiplying the mean number of boats (or shore anglers) by the appropriate constants (hours available/day, days available/month, mean number anglers/boat). All anglers interviewed were steelhead fishing.

[f] Catch rate and sample size (anglers, hrs) from 3 days of creel check interviews from a boat for boat anglers and 2 days of creel checks on shore.

[g] Catch = estimated angler effort x catch rate.

[h] Obtained from counts on 2 days.

[i] Data from WE used because of lack of data for this strata.

Table 3. Data for steelhead observed in angler creels along the lower Snake River, fall 1984.

month (n)[a]	x̄ length	x̄ weight	% female	% wild	% adipose clipped	% caught in 164[b]	% caught in 165[b]	% caught in 166[b]	% caught in 167[b]	% caught in 168[b]
Sept. (1)	30.5	- -	100	00.0	00.0	00.0	00.0	100.0	00.0	00.0
Oct. (7)	30.0	9.9	43	00.0	28.6	42.8	14.3	28.6	00.0	14.3
Nov. (14)	26.0	6.4	50	28.6	00.0	00.0	28.6	50.0	00.0	21.4
Total (n)	27.3 (21)	7.8 (17)	50 (22)	18.2 (22)	9.1 (22)	13.6	22.7	45.5	00.0	18.2
Dec.[c] (n)	34.0 (56)	14.6 (9)	52.6 (55)	7.7 (52)	3.7 (56)					100.0
Grand Total (n)	32.2 (78)	10.2 (26)	51.9 (77)	10.8 (73)	5.2 (78)	- -	- -	- -	- -	- -

[a] n= number of fish sampled.

[b] WDG fishery management sections. 164 is below Ice Harbor Dam and 168 is above Lower Granite Dam (and only includes up to Red Wolf Bridge in Clarkston, as used here).

[c] We surveyed only the area from Lower Granite Dam to Clarkston during December.

than in all the other zones combined (Table 4). Shore angling pressure varied within the zones by month and day-type. November was the peak of the steelhead angling pressure, when as many as 126 boats were observed between Red Wolf Bridge and Asotin Creek (7.5 miles). Angling pressure is probably greatest here because no special boating equipment or boating skills (on flat water of the reservoir) are required and this is an important wintering area for adult steelhead.

Catch rates varied from 108.6 hours/fish in October to as low as 9.5 hours in December (Table 5). The large number of boats on the river may have been a harassment factor that reduced catch rates during weekends over those observed on weekdays in November.

September and October catch rate estimates obtained from boat angler interviews at boat ramps (predominantly complete trip data) were substantially lower than those obtained by creel checking from a boat on the river (mainly incomplete trip data -- Table 6). Although in November, sample sizes (for hours fished and anglers interviewed) were large for both methods and little difference occurred between the estimates from these two techniques (Tables 5 and 6). It is difficult to determine whether the estimates varied because; 1) inherent differences exist between complete and incomplete trip data, or 2) few days were sampled by boat, or because of the small sample obtained from boat ramp interviews, or 3) some bias exists in the sampling methods (e.g., times and location) for one or both methods. However, it appears that when sample sizes are large there is no difference between complete and incomplete trip catch rate estimates (Table 5). Malvestuto et al. (1978) also concluded that there was no difference in catch rate estimates from incomplete or complete trip data.

Catch rate estimates obtained from interviews at boat ramps were used for calculating the total catch in September and October because they represented a larger sample of days than did the interviews from a boat. A combined average estimate was not used because the same survey days and many of the same anglers were included in both estimates. Consequently, the estimates are not independent of one another (see Table 6).

Total monthly angling effort was highest on weekdays, but daily angling pressure was greatest during weekends (Table 7, Appendix C). An estimated total effort of 104,977.5 (± 11,342.2) angler hours were expended by steelhead anglers along the mid-Snake River. Completed angler trips consisted of approximately 3.9 hours duration (Table 8). Therefore, we estimate that 26,917.3 angler days were expended during the fall season on the mid-Snake River to catch 3,521 steelhead.

Wild fish comprised a higher percentage of the total catch in September than during all other months (Table 9), and accounted for 23.4% of the fish caught during the entire season (estimated total of 824 wild fish caught). Adipose clipped fish were more abundant in the catch during November and December and equaled 8.4% of the total catch for the season. Mean fish lengths and weights increased in November and December over fish sizes obtained in early fall because of the predominance of

Table 4. Angler effort estimates (and strata variables used in effort calculations) for the mid-Snake and lower Grande Ronde (Zone D) rivers, fall 1984.

				Boats				Shore		
Month	Hrs. avail.[a]	Day-type[b] (n,N)[c]	Zone[d]	Mean no. of boats (std. dev)[e]	Mean anglers per boat[f]	Percent steelhead anglers[g]	Mean steelhead angler hrs/day[g]	Mean no. anglers (std/ dev)[e]	Percent steelhead anglers[g]	Mean steelhead angler hrs/day[g]
Sept.	13.5	WE (5,11)	A	11.30 (8.13)	2.23	72.1	245.3	3.40 (2.38)	37.2	17.1
			B	3.00 (1.58)	2.23	72.1	65.1	1.80 (0.57)	37.2	9.1
			C	1.40 (0.82)	2.23	72.1	30.4	3.40 (2.88)	37.2	17.1
			D	---	--	--	--	3.40 (3.15)	73.0	33.5
		WD (4,19)	A	9.13 (7.85)	2.06	84.4	214.1	3.88 (3.71)	57.7	30.2
			B	1.63 (1.03)	2.06	84.4	38.1	1.87 (0.63)	57.7	14.6
			C	0.25 (0.50)	2.06	84.4	5.8	1.00 (0.41)	57.7	7.8
			D	---	--	--	--	1.75 (2.53)	100.0	23.6
Oct.	12.0	WE (4,9)	A	31.50 (21.63)	2.30	100.0	869.4	1.75 (1.44)	87.1	18.3
			B	7.88 (3.68)	2.30	100.0	217.4	3.00 (3.19)	87.1	31.4
			C	1.75 (1.19)	2.30	100.0	48.3	5.13 (2.63)	87.1	53.6
			D	---	--	--	--	4.88 (5.94)	96.0	56.2
		WD (5,22)	A	26.70 (17.16)	2.08	99.4	662.6	0.40 (0.65)	73.5	3.5
			B	5.50 (1.87)	2.08	99.4	136.5	1.40 (1.19)	73.5	12.4
			C	1.10 (0.65)	2.08	99.4	27.3	3.10 (1.60)	73.5	27.3
			D	---	--	--	--	4.20 (2.93)	100.0	50.4

Table 4. (cont.)

Month	Hrs. avail.[a]	Day-type (n,N)[c]	Zone[d]	Boats: Mean no. of boats (std. dev)[e]	Boats: Mean anglers per boat[f]	Boats: Percent steelhead anglers[f]	Boats: Mean steelhead angler hrs/day[g]	Shore: Mean no. anglers (std. dev)[e]	Shore: Percent steelhead anglers[f]	Shore: Mean steelhead anglers hrs/day[g]
Nov.	10.0	WE (4,9)	A	90.75 (14.69)	2.19	100.0	1987.4	3.23 (3.06)	96.2	31.1
			B	18.13 (9.12)	2.19	100.0	397.1	2.65 (1.91)	96.2	25.5
			C	3.23 (1.00)	2.19	100.0	70.7	2.95 (1.17)	96.2	28.4
			D	---	--	--	--	0.73 (1.20)	100.0	7.3
		WD (5,21)	A	44.3 (12.81)	2.12	100.0	939.2	1.70 (1.44)	100.0	17.0
			B	9.6 (4.84)	2.12	100.0	203.5	2.20 (1.53)	100.0	22.0
			C	0.50 (0.61)	2.12	100.0	10.6	1.50 (0.67)	100.0	15.0
			D	---	--	--	--	0.70 (0.67)	100.0	7.0
Dec.	8.5	WE (5,11)	A	39.40 (17.82)	2.19	100.0	733.4	1.70 (1.40)	93.0	13.4
			B	6.90 (4.84)	2.19	100.0	128.4	1.40 (1.29)	93.0	11.1
			C	1.00 (1.27)	2.19	100.0	18.6	1.40 (1.29)	93.0	11.1
			D	---	--	--	--	--	--	--
		WD (4,20)	A	14.63 (9.65)	2.05	100.0	254.8	0.50 (0.41)	100.0	4.3
			B	2.25 (1.32)	2.05	100.0	39.2	1.38 (0.79)	100.0	11.7
			C	0.125 (0.25	2.05	100.0	2.2	0.25 (0.50)	100.0	2.1
			D	---	--	--	--	--	--	--

Table 4. (cont.)

[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 number of days sampled and N = the number of that day/type available for the month.

[d] Zone A = Clarkston (Red Wolf Bridge) to Asotin Creek (7.5 miles).
Zone B = Asotin Creek to Redbird Creek (10 miles).
Zone C = Redbird Creek to the Grande Ronde River (at Line Point - 13.5 miles).
Zone D = Grande Ronde River from the mouth to "The Narrows", just upstream of Joseph Creek (approx. 4.0 miles).

[e] Estimated by 2 or more angler counts per day from an automobile during randomly selected days.

[f] Estimated from angler interviews while conducting creel checks. Zones A, B, and C were combined because of small samples in zones B and C.

[g] Calculated by multiplying mean boats (or mean shore anglers) by constants (hours per day and/or mean anglers per boat, percent steelhead anglers) to get mean steelhead anglers per day.

[h] Grande Ronde closed to steelhead fishing 30th of November.

Table 5. Steelhead catch rate data obtained from anglers interviewed on the mid-Snake River, fall 1984.

			Shore Anglers				Boat Anglers				
Month	Day-type[a](n)[b]	Agency[c]	No. of anglers	Total angling hrs.	No. of fish retained	Hrs/fish retained	No. of anglers	No. of boats	Total angling hours	No. of fish retained	Hrs/fish retained
Sept.	WE(5)	WDG	27	55.1	1	55.1	143	64	534.0	7	76.3
	(1)	IFG	--	--	-	--	104	46	332.0	6	55.3
	WD(4)	WDG	10	11.8	1	11.8	70	34	250.8	3	83.6
Oct.	WE(4)	WDG	41	74.1	1	74.1	253	110	991.6	12	82.6
	(2)	IFG	--	--	-	--	288	124	811.5	30	27.1
	WD(5)	WDG	28	58.0	1	58.0	156	75	543.0	5	108.6
	(1)	IFG	--	--	-	--	19	10	32.5	1	32.5
Nov.	WE(4)	WDG	47	137.0	5	27.4	257	117	1095.0	29	37.8
	(3)	IFG	--	--	-	--	637	263	2182.5	58	37.6
	WD(5)	WDG	35	59.8	4	14.9	193	91	870.5	39	22.3
	(4)	IFG	--	--	-	--	176	85	788.8	39	20.2
	(2)	WDG[d]	--	--	-	--	131	59	531.4	26	20.4
Dec.	WE(5)	WDG	40	69.9	5	14.0	182	83	765.5	41	18.7
	(1)	IFG	--	--	-	--	146	62	362.9	25	15.1
	WD(4)	WDG	13	15.5	0	?	39	19	135.0	14	9.6
	(2)	IFG	--	--	-	--	67	35	274.8	18	15.3

[a] WE = Weekends and major holidays. WD = Weekdays.

[b] n = The number of days sampled.

[c] WDG = Washington Department of Game. These samples were taken at boat ramps or along the shoreline.
IFG = Idaho Department of Fish and Game. These samples were taken by boat and WDG personnel assisted with much of this data collection.

[d] WDG = Separate creel checks from a boat. These data were collected like that of IFG and could be pooled with those data.

Table 6. Comparison of catch rate data obtained from creel checks by Idaho Fish and Game and Washington Department of Game personnel for the same days on the mid-Snake River, fall 1984.

Date	Agency	No. anglers interviewed	Total angler-hours	No. of fish retained	fish released	catch rate (hrs/fish)[c]
9/29	IFG[a]	104	332.0	6	4	55.3
	WDG[b]	65	236.3	3	3	78.8
10/28	IFG	173	464.5	18	5	25.8
	WDG	75	228.0	2	3	114.0
11/11	IFG	207	696.0	21	20	33.1
	WDG	63	255.8	6	9	42.6
12/09	IFG	146	362.9	25	0	15.1
	WDG	63	258.0	12	0	21.5

[a]IFG = Idaho Fish and Game. Data was collected from a boat and represents mainly incomplete angler trip data. WDG assisted in collecting much of this data in November and December.

[b]WDG = Washington Department of Game. Data was collected at various boat ramps on the Washington side of the river and represents mainly complete angler trip data.

[c]For retained fish only.

Table 7. Estimated angler effort, catch rates, and catch for steelhead anglers on the mid-Snake River, fall 1984.

Month	Day-type[a]	Angler-type	Angler effort for all zones (E) in hrs. (+ CI)[b,c]	Catch rate (CR) fish/hr. (hrs/fish)[d,e]	Estimated Catch
Sept.	WE	boat	3,748.7 (1,363.10)	0.013 (76.28)	49
		shore	475.1 (137.99)	0.018 (55.10	9
	WD	boat	4,901.7 (3,141.63)	0.012 (83.60)	59
		shore	999.0 (497.14)	0.085 (11.75)	85
	Total		10,124.5 (3,463.24)	0.020 (50.12)	202
Oct.	WE	boat	10,215.5 (4,068.22)	0.012 (82.63)	124
		shore	928.9 (306.79	0.014 (74.10)	12
	WD	boat	18,181.5 (7,416.77)	0.009 (108.60)	168
		shore	950.8 (320.02)	0.017 (58.00)	16
	Total		30,276.6 (8,470.86)	0.011 (94.61)	320
Nov.	WE	boat	22,096.9 (2,544.47)	0.027 (37.76)	585
		shore	764.1 (244.51)	0.037 (27.40)	29
	WD	boat	24,218.9 (4,765.71)	0.046 (21.61)[g]	1,121
		shore	1,134.0 (361.07)	0.067 (14.94)	76
	Total		48,213.9 (5,420.01)	0.038 (26.62)	1,811
Dec.	WE	boat	9,685.4 (2,504.74)	0.054 (18.67)	519
		shore	391.3 (132.24)	0.072 (13.99)	28
	WD	boat	5,924.5 (3,036.15)	0.104 (9.64)[h]	615
		shore	361.3 (111.56)	0.072 (13.99)	26
	Total		16,362.4 (3,939.38)	0.073 (13.77)	1,188
	Season Total (1 Sept.-31 Dec.)		104,977.5 (11,342.17)	0.034 (29.82)	3,521

[a] WE = Weekends and major holidays. WD = Weekdays.

[b] Zones A, B, and C combined.

[c] 95 percent confidence intervals if data is normally distributed, otherwise, confidence intervals are at least 75 percent.

[d] Catch rates shown are from data collected by WDG only. Major differences exist with Idaho Fish and Game data.

[e] Confidence intervals may be calculated in the future when access to a computer becomes available.

[f] Angler effort X CR = Catch (rounded to whole fish).

[g] Weighted mean from creel checks at boat ramps and WDG creel checks from a boat.

[h] No fish caught with 15.5 hours of effort, however, sample size is small. The value of 13.99 hours per fish appears to be an appropriate value and was taken from weekend shore anglers.

Table 8. Average angler-day length for completed fishing trips on the mid-Snake River, fall 1984.

Month	Average complete trip length in hours (no. sampled anglers, hours)	
	Boat	Shore
Sept.	3.82 (208,795.8)	1.5 (2,3.0)
Oct.	4.25 (110,467.5)	3.28 (8,26.3)
Nov.	3.92 (109,426.5)	3.75 (4,15.0)
Dec.	3.91 (108,422.8)	2.66 (3,8.0)
Combined average	3.95	3.07

Table 9. Data from steelhead observed in angler creels along the mid-Snake River, fall 1984.*

Month	$\bar{X}$ Length in. (n)[a]	$\bar{X}$ Weight lbs. (n)[a]	% Female (n)[a]	% Wild (n)[a]	% Adipose clipped (n)[a]	% Zone A Caught (n)[a]	% Zone B Caught (n)[a]	% Successful anglers with WA. Residence (n)[a]	% Steelhead on Washington punch card (n)[a]
Sept.	28.5 (17)	8.8 (10)	83.3 (18)	35.29 (17)	5.88 (17)	70.60 (17)	17.65 (17)	50.00 (12)	---
Oct.	31.2 (46)	10.1 (11)	48.8 (43)	20.45 (44)	4.54 (44)	57.77 (45)	28.88 (45)	73.68 (19)	---
Nov.	32.8 (164)	13.0 (49)	57.6 (164)	21.45[b] (163)	7.97 (163)	85.38 (130)	13.84 (130)	64.70 (85)	42.85 (21)
Dec.	31.7 (76)	13.1 (20)	61.3 (75)	26.67 (75)	12.00 (75)	71.64 (67)	22.39 (67)	85.18 (27)	66.13 (62)

* Some data collected by Idaho Fish and Game personnel are included here.

a n = Sample size.

b Before 11/15/84 WDG estimate = 1.5% wild (of 22 fish) - IDFG estimate = 2.0% wild (of 50 fish).
After 11/15/84 WDG estimate = 39.4% wild (of 71 fish) - IDFG estimate = 25% wild (of 20 fish).

larger, B run steelhead. Resident Washington anglers represented the majority of successful anglers checked, although Washington punchcard use was occasionally exceeded by Idaho tag use (Table 9).

IFG and WDG personnel measured dorsal fins for hatchery steelhead observed in the catch from 3 - 12 November because of comments by anglers that many, or most, of the hatchery fish they caught had dorsal fins exceeding the 2 inch height allowed by law. Dorsal fin height was measured for 41 hatchery steelhead observed in angler creels and 17 fish (41.5%) had dorsals exceeding the 2 inch regulation. However, only 1.5% of the catch (of 22 fish) observed by WDG from 3 - 12 November and 2.0% observed by IFG (of 50 fish) were considered to be of wild origin (Table 9). On 15 November the 2 inch dorsal regulation was no longer in effect for zones A and B. Wild fish comprised 36.3% (of 91 fish) of the catch observed from 15 - 30 November by WDG and IFG. Hence, it appears that the regulation, although unpopular, was protecting wild fish as it was intended.

Grande Ronde River

The lower Grande Ronde River is considered a "Blue Ribbon" steelhead stream by some fly fishermen. As such it attracted anglers from as far away as Georgia, Illinois, British Columbia, Maine, and Montana, as well as from the relatively local areas of Oregon, Idaho and Washington. Although fishing with lures is legal on the Grande Ronde (bait is prohibited), 67% of the anglers interviewed (n = 36 anglers) in September and 96% (n = 49 anglers interviewed) in October were fly fishing. Angler effort was minimal during November (Table 10) and no fish were caught by the 6 anglers interviewed (9.24 hrs of effort). Total estimated angler effort for steelhead in the lower Grande Ronde was 2,644.1 (± 995.4) angler hours. If all released fish had been retained an estimated 219 steelhead potentially could have been harvested.

The upper Grande Ronde River near Shumaker and Rattlesnake grades was surveyed by automobile on the weekend days of 15 September and 10 November. No anglers were seen during those cursory surveys. A few anglers were incidentally observed near Wenatchee Creek in early October. We have no estimate of angler effort or catch rates for this stream segment. Due to the poor access, and the long distances involved in getting to this river segment, an intensive creel survey of the upper Grande Ronde River will be extremely expensive.

SPRING 1985

Lower Snake River

Only Lower Granite Reservoir was surveyed intensively during the spring. However, spot checks in various portions of the lower river indicated that temporary "hot spots" existed that exhibited excellent catch rates and attracted anglers. None of these local fisheries are known to have lasted more than a week or two before completely disappearing. Unfortunately, adequate samples were not obtained to

Table 10. Angler effort, catch rate, and potential catch for the lower Grande Ronde River (Zone D)[a], 1 September through November, 1984.

Month	Day-type[b]	Angler type	Angler effort in hours (± CI)[c]	Catch rate in Fish/hr(hrs/fish)	Potential catch of fish[d]
Sept.	WE	84.2% fly	368.3 (243.3)	0.069 (14.5)	25
	WD	47.1% fly	448.9 (557.3)	0.033 (29.5)	15
	Total	66.7% fly (n=36 anglers interviewed)	817.1 (626.5)	------	40
Oct.	WE	95.8% fly	505.4 (458.7)	0.066 (15.1)	33
	WD	95.8% fly	1108.8 (607.8)	0.132 (7.6)	146
	Total	95.8% fly (n=49 anglers interviewed)	1614.2 (761.5)	------	179
Nov.	WE	----	65.7 (80.4)	0[e]	--
	WD	----	147.0 (110.0)	0[e]	--
	Total	50.0 fly (n=6 anglers interviewed)	212.7 (68.1)	------	--
	Season Total		2,644.1 (995.4)		219

[a] Mouth to "The Narrows" just above the mouth of Joseph Creek, approximately four miles.

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

[c] 95 percent confidence intervals if data is normally distributed, otherwise 75% C.I.

[d] Angler effort X catch rate = estimated potential catch of fish.

[e] No fish caught by the 6 anglers interviewed (9.25 hrs. of effort). Therefore, no catch rate can be computed.

appropriately estimate angler effort or catch for the Snake River below Lower Granite Dam.

Shore anglers concentrated primarily near the exit of the fish ladder above Lower Granite Dam. Boat anglers also concentrated immediately above the dam but they could be found fishing throughout the entire reservoir. Shore angling pressure only exceeded boat angling during March, when few boaters could be found on Lower Granite Reservoir (Appendices D and E). Angling pressure peaked on 12 January when 135 boats were observed between Red Wolf bridge and Lower Granite Dam. The catch rate was poor that day and boat angling pressure decreased substantially after that. Shore angling effort increased slightly as the season progressed. Catch rates from shore increased while catch rates from boats decreased over the season (Table 11, Appendix F). A total of 43,314.6 angler hours were expended to catch an estimated 1,837 steelhead. This catch estimate does not include any catch from the few boat anglers on the reservoir in March. No estimate of their catch rate could be made as no fish were checked. We estimated that approximately 7,599 angler days were expended on Lower Granite Reservoir with an average fishing trip of 5.7 hrs in length (Table 12).

Mean size of fish decreased during the season as did the percentage of adipose clipped steelhead (Table 13). Wild fish comprised 13.6% of the catch.

Mid-Snake River

Boat anglers consistently expended more angling effort in the mid-Snake River than did shore anglers (Appendices G and H). Boat anglers also generally had better catch rates than shore anglers. Approximately 893 steelhead were harvested with 22,713.7 (± 5,972.9) angler hours of effort during the spring season (Table 14). No catch estimate could be attributed to the fishery during the month of March because few anglers were present and no fish were observed during that month. Catch rates reportedly were excellent on the Clearwater River in Idaho in March, therefore, few anglers fished the Snake River.

An average angler day was estimated to be 4.0 hours for boat anglers (Table 15). No estimate could be made for shore anglers. At least 5,408 angler days were expended on the mid-Snake River during the spring season.

Angler effort and catch for the mid-Snake River are approximately half the effort and catch of Lower Granite Reservoir; despite the fact that catch rates remained relatively good on the mid-Snake River (Appendix I). Obviously, the new fishery on Lower Granite Reservoir was very attractive to anglers.

Nearly 64% of all steelhead caught on the mid Snake were retained on Washington punchcards in January and February and 11.2% of all the fish were adipose clipped (Table 16). No fish were checked in March.

Table 11. Estimated steelhead angler effort, catch rates, and catch for Lower Granite Reservoir, spring 1985.

Month	Day-type[a]	Angler-type	Angler effort in hrs (+ CI)[b]	Catch rates in fish/hr (hrs/fish)		Estimated catch[c]
Jan.	WE	boat	8,296.4+ (3,739.4)[d]	0.038	26.50	313
		shore	1,072.4 (---)[d]	0.028	35.89	30
	WD	boat	12,409.8 (4,593.0)[d]	0.075	13.40	926
		shore	1,152.4 (---)[d]	0.023	42.66	27
	Total		22,931.0 (---)[d]			1,296
Feb.	WE	boat	4,619.3 (2,791.4)	0.028	35.37	131
		shore	2,520.0 (809.4)	0.018	54.08	47
	WD	boat	4,160.2 (2,077.9)	0.016	63.58	65
		shore	2,413.0 (1,220.1)	0.043	20.06	120
	Total		13,712.6 (3,775.4)			363
Mar.	WE	boat	1,118.8 (1,175.5)	--	--[e]	--[e]
		shore	1,415.2 (643.8)	0.046	21.57	66
	WD	boat	1,058.8 (288.0)	--	--[e]	--[e]
		shore	3,078.2 (996.8)	0.036	27.50	112
	Total		6,671.0 (1,694.9)			178[f]
Season Total			43,314.6 (---)	0.042	23.58	1,837[f]

[a] WE = Weekends and holidays. WD = Weekdays.

[b] 95 percent confidence intervals if data is normally distributed, otherwise, confidence intervals are at least 75 percent.

[c] Angler effort x catch rate (fish/hr) = # of fish caught.

[d] Shore angler estimates had to be adjusted because shore anglers could not be counted adequately with a spotting scope from near Wawawai Landing. All shore angler estimates were multiplied by 2 to approximate the number of shore anglers actually observed at various times. Therefore, CI could not be calculated.

[e] No fish checked so no estimate is possible. No creel checks were made from a boat and no fish were checked at boat ramps.

[f] Probably a slight underestimate because no catch rate is available for boat anglers in March.

Table 12. Average angler-day length for completed fishing trips in Lower Granite Reservoir, spring 1985.

Month	Average complete trip length in hours (no. sampled anglers, hrs) Boat	Shore
January	5.9 2.0[a] (126, 745)	no estimate[b]
February	4.6 2.4 (30, 137)	no estimate[b]
March	5.9 2.4 (10, 59)	no estimate[b]
Combined	5.7 (166, 941)	2.8[b] (10, 26.8)

[a] ±1 Standard deviation.

[b] Small sample of completed fishing trips.

Table 13. Data from steelhead observed in angler creels along Lower Granite Reservoir, spring 1985.

month	$\bar{x}$ length (n)[a]	$\bar{x}$ weight (n)[a]	% female (n)[a]	% wild (n)[a]	% ad. clipped (n)[a]	% of fish > 32" (n)[a]
January	33.93 (121)	14.9 (34)	59.35 (123)	13.22 (121)	8.94 (121)	80.16 (121)
February	32.5 (25)	13.0 (10)	76.00 (25)	11.1 (27)	14.8 (27)	74.07 (27)
March	28.5 (14)	8.6 (14)	36.0 (14)	21.0 (14)	0.0 (14)	28.57 (14)

[a] n = number of fish sampled.

Table 14. Estimated angler effort, catch rates, and catch for steelhead anglers on the mid-Snake River, spring 1985.

Month	Day-type[a]	Angler-type	Angler effort for all Zones (E) in hrs	(CI)[b,c]	Catch rates (CR) in fish/hr	(hrs/fish)	Estimated catch[d]
Jan.	WE	boat	6,414.3	(1,353.0)	0.049	(20.29)	316
		shore	498.2	(149.6)	0.034	(29.30)	17
	WD	boat	4,056.6	(1,502.6)	0.068	(14.76)	275
		shore	504.9	(205.5)	0.027	(37.49)	8
	Total		11,474.0	(1,382.6)	--	--	616
Feb.	WE	boat	3,201.1	(5,032.9)	0.056	(18.00)	178
		shore	284.7	(360.7)	0.000	(0.00)[e]	0[h]
	WD	boat	3,031.0	(2,255.1)	0.026	(38.90)	78
		shore	862.1	(787.6)	0.025	(40.50)	21
	Total		7,378.9	(5,582.6)	--	--	277
Mar.	WE	boat	1,323.6	(832.2)	--	--[f]	0[h]
		shore	204.7	(148.4)	--	--[f]	0[h]
	WD	boat	1.950.0	(1,358.8)	--	--[g]	0[h]
		shore	382.5	(192.4)	--	--[g]	0[h]
	Total		3,860.8	(1,611.8)			0[h]
Season Total			22,713.7	(5,972.9)	0.039	(25.44)	893[h]

[a] WE = Weekends and holidays. WD = Weekdays.

[b] Zones A, B, C combined.

[c] 95 percent confidence intervals if data is normally distributed, otherwise, confidence intervals are at least 75 percent.

[d] Angler effort x catch rate (fish/hr) = # of fish caught.

[e] No fish checked for 21 anglers and 52.5 hrs of effort.

[f] No creel checks were made from a boat ramp interviews (64 angler hrs-boat, 54 angler hrs-shore).

[g] No fish checked (6 angler hrs-boat, 11 angler hrs-shore)

[h] Probably an underestimate because no catch rate could be obtained in March; small sample of anglers interviewed.

Table 15. Average angler-day length for completed fishing trips in mid-Snake River, spring 1985.

Month	Average complete trip length in hours ± std. dev. (no. sampled anglers, hrs) Boat	Shore
January	4.3 ± 2.1 (115, 489.3)	2.3 ± 2.9 (5, 11.5)
February	3.8 ± 1.6 (30, 137)	3.1 ± 0.1 (5, 15.3)
March	3.8 ± 1.4 (18, 69.5)	no sample
Combined	4.2 (160, 661.3)	2.8 (10, 26.8)

Table 16. Data from steelhead observed in angler creels along the mid-Snake River, spring 1985.

month	$\bar{x}$ length (n)[a]	$\bar{x}$ weight (n)[a]	% female (n)[a]	% wild (n)[a]	% ad. clipped (n)[a]	% Zone A Caught (n)[a]	% Zone B Caught (n)[a]	% WA Residence (n)[a]	% WA Punch-card (n)[a]
Jan.	34.1 (78)	13.9 (25)	65.4 (78)	22.4 (76)	9.0 (78)	95.8 (73)	2.8 (73)	66.7 (39)	66.7 (72)
Feb.	33.5 (20)	13.4 (13)	60.0 (20)	0.0 (20)	20.0 (20)	100 (21)	0.0 (21)	61.9 (21)	61.9 (21)
Mar.	No fish checked								

[a] n = Sample size.

LENGTH-FREQUENCY AND AGE OF SAMPLED STEELHEAD

Length-frequencies for wild fish on the lower and mid-Snake River do not have a well defined pattern like those of hatchery fish (Figs. 2 and 3). Most of the hatchery fish observed were approximately 34 inches long, 13-14 pounds, and had resided in the ocean 2 years. Only 1 of the 83 fish with readable scales was on its second spawning migration (Appendix J). Most of the hatchery fish caught were apparently B run steelhead as indicated by their large size (> 32 inches).

Data for individual steelhead observed in the catch are available in District files in Dayton, WA.

CODED-WIRE TAG RECOVERY

Snouts were collected from 29 and 25 steelhead during the fall and spring fisheries, respectively; for a total of 54. Snouts from 49 fish were examined for coded-wire tags (cwt); 47 cwt were recovered. An additional 27 snouts containing 25 cwt were collected during April 1985 from steelhead retained at Lyons Ferry Hatchery (Appendix K).

Steelhead returning to Dworshak National Fish Hatchery (DNFH) were the major component of the sport catch containing tags. Steelhead originating from Lyons Ferry Hatchery (LFH) comprised only 2.1% (1 of 47) of the total sample of cwts recovered by WDG from the sport catch. An additional 5 Lyons Ferry cwts were recovered by Idaho fish and Game; 2 (of 21 = 9.5%) were collected from the sport catch by creel checks on the Snake River near Clarkston, 2 voluntary angler returns (of 35 voluntary returns = 5.7%), and 1 spawning rack return at DNFH (Rodney Duke, IFG, personal comm.). IFG creel checks were conducted primarily during the fall fishery while WDG's were weighted towards late fall and spring. The distribution of voluntary returns is not known at this time. Consequently, we estimate that 10.5% of the 2,333 steelhead (222 fish) caught in the mid-Snake River between 1 Sept and 30 Nov were of Lyons Ferry origin. An additional 2.1% of the remaining 5,306 steelhead caught in the lower and mid-Snake (111 fish) were of Lyons Ferry origin. Thus, approximately 333 steelhead caught in the spring and fall sport fisheries were produced by LFH.

All fish retained at Lyons Ferry Hatchery had originated from Lyons Ferry (Appendix K).

PUNCHCARD RETURNS

Although it is required by law that all punchcards be sent into WDG after the season closes, only 60 of the 157 initialized punchcards were returned by Snake River steelhead anglers to WDG headquarters in Olympia. This 38.2% return rate is well above the 27% return rate that is applied statewide to estimate steelhead harvests for individual rivers. Our estimate may be biased because we marked more punchcards from successful anglers than from unsuccessful anglers. However, it was difficult to locate anglers who had not caught any steelhead during the

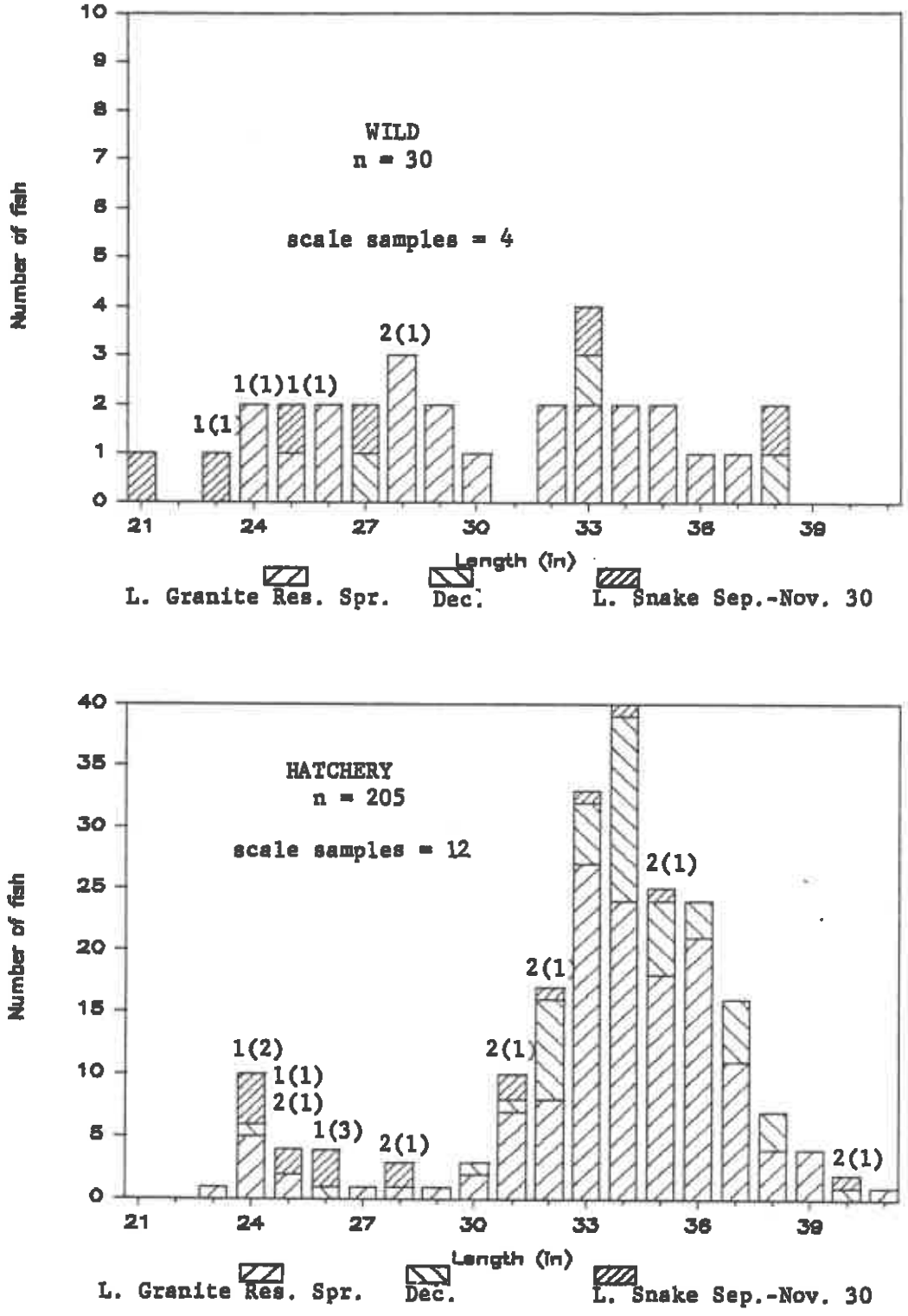

Figure 2. Length-frequencies of steelhead observed in the catch in the lower Snake River during the fall 1984 and spring 1985. Years of ocean residency are indicated above bars (number of individual fish scale sampled in parenthesis).

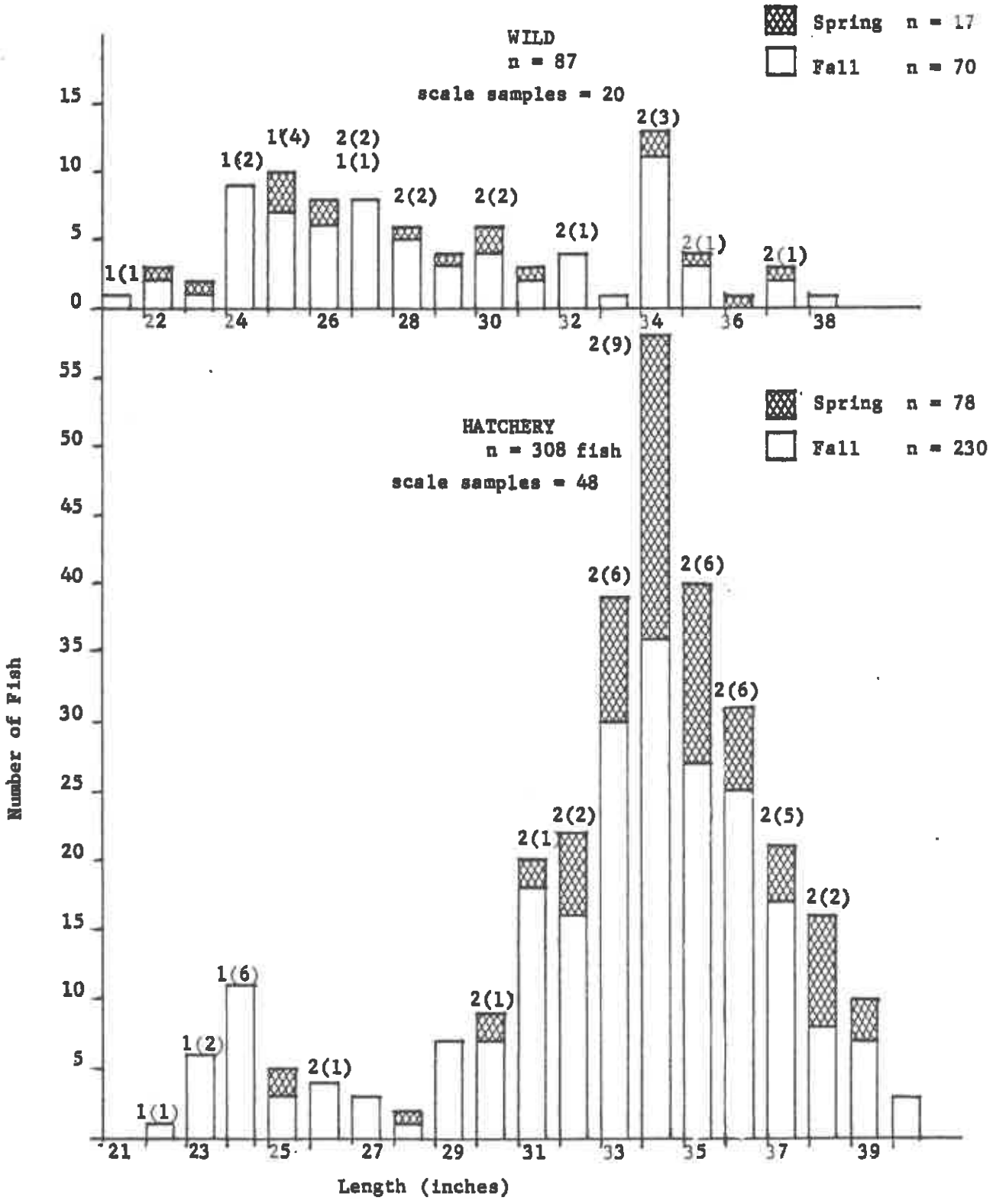

Figure 3. Length-frequency of steelhead observed in the catch for the mid-Snake River during fall 1984 and spring 1985. Years of ocean residency are indicated above some bars (number of individual fish scale sampled in parenthesis).

year. Also, those punchcards that were marked while they contained no steelhead punches may have changed to the successful category before the end of the season.

We will compare our creel survey catch estimates for Snake River management zones with those estimates derived from punchcard returns when punchcard catch estimates become available in late 1985. Our survey of the mid-Snake River indicates that 60.2% of the 3,521 (2,113) steelhead in the fall harvest and 65.6% of the 893 (586) steelhead caught during spring were retained on Washington punchcards. Also an additional 1,388 and 1,837 steelhead were retained on Washington punchcards during fall and spring, respectively, in Lower Granite Reservoir. Therefore, our catch estimates for management zone 168 (above Lower Granite Dam) are 3,565 (including 64 steelhead caught immediately above Lower Granite from 1 September to 30 November) and 2,423 steelhead during fall 1984 and spring 1985, respectively.

Also, in the future we intend to compare our estimates of harvest and angler effort with the results of the IFG telephone survey of Idaho punchcard holders.

CONCLUSIONS

Creel surveys for the lower Snake and upper Grande Ronde rivers need to be intensified if more accurate information is desired. Both areas have poor access and require large amounts of time and travel. At present these expenditures cannot be justified for the upper Grande Ronde River. However, the rapidly changing fishery on the lower Snake River needs to be adequately monitored in the future. Some method of accurately, and economically, estimating the catch (and the percentage of the catch that is comprised of Lyons Ferry steelhead) from this river segment must be developed in the near future.

The mid-Snake creel survey was modified to include creel check interviews obtained from a boat with those obtained at boat ramps. This increased the sample size and provided complete as well as incomplete trip data. Also, our statistical analysis may be modified to use single-stage cluster sampling instead of stratified random sampling to estimate the boat angling pressure. This method would account for variability in the mean anglers per boat estimate, which is not presently accounted for. The addition of more angler counts per day should improve the precision of the angler effort estimates, but that option may or may not be cost-effective. Confidence intervals for catch rates and total catch estimates should be calculated in the future when access to a computer, and the appropriate programs, are available. Overall, we have a high degree of confidence in our mid-Snake angler effort, catch rates, and catch estimates because of the large sample sizes involved and our efforts to maintain random sampling.

Only a small number of tagged steelhead of Lyons Ferry origin were recovered from the sport harvest during our intensive creel survey.

Our sampling was limited during the early fall fishery and we were forced to use IFG data for that period. We are concerned by the differences between the three estimates of Lyons Ferry's contribution to the catch. However, it is obvious from the lengths and weights of fish caught, and the cwt information that "B" run steelhead from Dworshak N.F. Hatchery in Idaho constituted over 90% of the steelhead harvested in the Snake River. Anglers with Washington punchcards caught over 60% of the steelhead in the mid-Snake and 100% of the steelhead in the lower Snake River. Therefore, Washington punchcard holders benefited significantly from the excellent "B" steelhead run that wintered in the Snake River.

This was the first year of returns (1 salts) of Lyons Ferry Hatchery production so it is not surprising that the contribution to the harvest was small. Also, Lyons Ferry steelhead may winter in the Grand Ronde River and the lower-most portion of the Snake River where fishing effort (and our survey efforts) was relatively light.

Next year our survey efforts should be expanded for the lower Snake River, and our scale analysis program increased, to provide better data. It is important also that we attempt to identify wintering areas for Lyons Ferry steelhead.

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Appendix A. Lower Snake River angler effort data, fall 1984.

Month	Hrs. avail.[a]	Day type[b] (n,N)[c]	Mgmt. sec.[d]	Boat: Mean no. of boats (std. dev)[e]	Boat: Mean anglers per boat[f]	Boat: Estimated steelhead angler hrs/day[g]	Shore: Mean no. anglers (std. dev)[e]	Shore: Percent Steelhead anglers[h]	Shore: Estimated Steelhead angler hrs/day[g]
Sept.	13.5	WE	164	2.5(0.71)	1.96	66.2	14.5(9.19)	69.0	135.1
		(2,11)	165	0.0(0.00)	"	0.0	7.0(5.20)	80.0	75.6
			166	3.0(1.73)	"	79.4	35.3(17.10)	82.0	390.8
			167	4.0(3.61)	"	105.8	8.0(1.00)	31.0	33.5
			168	1.0(1.00)	"	26.5	6.0(5.29)	62.5	50.6
						277.8			685.5
		WD	(164	1.0(-)	"	26.5	9.0(1.00)	60.0	72.9
		(1,19)	(165	0.0(-)	"	0.0	2.0(1.00)	76.8	20.7
			(166	0.5(0.71)	"	13.2	20.5(3.54)	85.0	235.2
		(2,19)	(167	2.0(0.00)	"	52.9	1.5(0.71)	66.0	13.4
			(168	0.0(0.00)	"	0.0	0.0(0.00)	76.8	0.0
						92.6			342.2
Oct.	12.0	WE	164	1.0(1.41)	1.96	23.5	7.5(4.95)	93.4	84.1
		(2,9)	165	1.5(2.12)	"	35.3	6.5(4.95)	83.5	65.1
			166	6.5(2.12)	"	152.9	55.0(11.31)	84.5	557.7
			167	2.0(1.41)	"	47.0	11.0(0.00)	72.5	95.7
			168	0.0(0.00)	"	0.0	1.0(1.41)	100.0	12.0
						258.7			814.6
		WD	164	1.0(1.41)	"	23.5	5.5(7.78)	67.0	44.2
		(2,22)	165	0.0(0.00)	"	0.0	6.5(9.19)	27.0	21.1
			166	0.0(0.00)	"	0.0	15.0(1.41)	89.5	161.1
			167	0.0(0.00)	"	0.0	0.5(0.71)	100.0	6.0
			168	0.0(0.00)	"	0.0	3.0(4.24)	100.0	36.0
						23.5			268.4

Appendix A. Lower Snake River angler effort data, fall 1984 (cont.).

Month	Hrs. avail.[a]	Day type[b] (n,N)[c]	Mgmt. sec.[d]	Boat: Mean no. of boats (std. dev)[e]	Boat: Mean anglers per boat[f]	Boat: Estimated steelhead angler hrs/day[g]	Shore: Mean no. anglers (std. dev)[e]	Shore: Percent Steelhead anglers[h]	Shore: Estimated steelhead angler hrs/day[g]
Nov.	10.0	WE (3,9)	164	0.0(0.00)	1.96	0.0	2.0(2.00)	100.0	20.0
			165	0.0(0.00)	"	0.0	8.0(5.20)	45.5	36.4
			166	1.0(1.00)	"	19.6	39.3(14.15)	97.3	382.7
			167	0.0(0.00)	"	0.0	1.7(1.53)	60.0	10.0
			168	0.0(0.00)	"	0.0	10.7(3.27)	97.3	103.7
						19.6			552.8
		WD (3,21)	164	0.0(0.00)	"	0.0	1.3(2.31)	100.0	13.3
			165	0.0(0.00)	"	0.0	3.7(4.73)	100.0	36.6
			166	0.0(0.00)	"	0.0	24.7(7.57)	97.6	240.7
			167	0.66(1.15)	"	12.9	0.7(1.15)	50.0	3.3
			168	0.33(0.58)	"	6.5	3.3(1.53)	100.0	33.3
						19.4			327.2

[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] Generally estimated by only 1 angler count/day for n days.

[f] This is an overall average for the entire season because of a small sample size. Most data was from shore counts of boats on the river.

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

[h] This estimate was obtained from interviews. No estimate is given for boats because boat anglers were interviewed on only 1 day (ave = 50%).

[i] Weighted mean for WD because of lack of data.

Appendix B. Lower Snake River steelhead catch rate data, fall 1984.

Month	Day-type[a] (n)	Mgmt. section[b]	No. of Anglers interviewed	Angling hrs. expended	Steelhead caught (released)	Catch rate (hrs/fish)[c]
Sept.	WE	164	16	56.3	0	--
	(2)	165	15	54.5	0(1)	--
		166	74	101.5	1	101.5
		167	13	30.0	0	--
		168	8	7.0	0	--
	Total		126	249.3	1	$\bar{x}$=249.3[d]
	WD	164	5	11.0	0	--
	(1)	165	0	0.0	0	--
		166	40	145.8	0	--
	(2)	167	3	1.5	0	--
		168	0	0.0	0	--
	Total		48	158.3	0	?
Oct.	WE	164	15	41.8	3	13.9
	(2)	165	12	30.3	0	--
		166	96	460.0	2	230.0
		167	18	25.8	0	--
		168	2	8.0	0(1)	--
	Total		143	565.8	5	$\bar{x}$=113.2[d]
	WD	164	9	23.0	0	--
	(2)	165	11	21.0	1	21.0
		166	28	74.5	0	--
		167	1	3.8	0	--
		168	7	16.5	1(1)	16.5
	Total		56	138.8	2	$\bar{x}$= 69.4[d]
Nov.	WE	164	6	10.0	0	--
	(3)	165	22	31.0	2	15.5
		166	115	410.8	4(1)	102.7
		167	5	1.3	0	--
		168	32	104.5	1	104.5
	Total		180	557.5	7	$\bar{x}$= 79.6
	WD	164	4	11.5	0	--
	(3)	165	11	48.0	2	24.0
		166	72	264.3	3	88.1
		167	2	1.0	0	--
		168	10	30.3	2	15.1
	Total		99	355.0	7	$\bar{x}$= 50.7

[a] WE = Weekends and major holidays. WD = Weekdays. n = The # of days sampled.

[b] WDG fish management sections. 164 is below Ice Harbor Dam, 168 is above Lower Granite Dam. Sections change at dams.

[c] Catch rate is calculated only for steelhead retained.

[d] This is a weighted mean (total hours expended/fish retained).

Appendix C. Estimated angler effort by strata on the Mid-Snake River, fall 1984.

Month	Day-type	Angler-type	Zone	Estimated angler effort (hrs/month)	Confidence limits[a]
Sept.	WE	Boats	A	2,698.2	1,333.8
			B	716.3	249.4
			C	334.1	129.6
			Combined	3,748.7	1,363.1
		Shore	A	187.8	86.9
			B	99.5	20.8
			C	187.8	105.1
			Combined	475.1	138.0
	WD	Boats	A	4,068.1	3,108.7
			B	723.3	408.4
			C	110.3	198.1
			Combined	4,901.7	3,141.6
		Shore	A	573.5	487.3
			B	277.5	82.7
			C	148.0	53.7
			Combined	999.0	497.1
	Sept. Total (n=54, N=180)[b]			10,124.5	3,463.2
Oct.	WE	Boats	A	7,824.6	4,004.6
			B	1,956.3	681.8
			C	434.7	220.3
			Combined	10,215.5	4,068.2
		Shore	A	164.6	101.2
			B	282.2	223.6
			C	482.1	184.1
			Combined	928.9	306.8
	WD	Boats	A	14,577.9	7,367.9
			B	3,002.9	803.1
			C	600.6	279.9
			Combined	18,181.5	7,416.8
		Shore	A	77.6	99.5
			B	271.7	182.1
			C	601.5	243.6
			Combined	950.8	320.0
	Oct. Total (n=54, N=186)[b]			30,276.6	8,470.9

Appendix C. (cont.)

Month	Day-type	Angler-type	Zone	Estimated angler effort (hrs/month)	Confidence limits[a]
Nov.	WE	Boats	A	17,896.8	2,157.9
			B	3,573.4	1,340.3
			C	636.6	294.1
			Combined	22,096.9	2,544.5
	WE	Shore	A	279.5	197.1
			B	229.3	123.3
			C	255.3	75.7
			Combined	764.1	244.5
	WD	Boats	A	19,722.4	4,453.9
			B	4,273.9	1,682.2
			C	222.6	212.9
			Combined	24,218.9	4,765.7
		Shore	A	357.0	236.2
			B	462.0	250.0
			C	315.0	110.0
			Combined	1,134.0	361.1
	Nov. Total (54, 180)[b]			48,213.9	5,420.0
Dec.	WE	Boats	A	8,067.7	2,410.7
			B	1,412.9	654.7
			C	204.8	172.4
			Combined	9,685.4	2,504.1
		Shore	A	47.8	80.2
			B	121.7	74.3
			C	121.7	74.3
			Combined	391.3	132.2
	WD	Boats	A	5,096.8	3,007.0
			B	784.2	412.4
			C	43.6	77.9
			Combined	5,924.6	3,036.2
		Shore	A	85.0	62.1
			B	233.8	53.0
			C	42.5	76.0
			Combined	361.3	111.6
	Dec. Total (n=54, N=186)[b]			16,362.4	3,939.4
	Season total (1 Sept. - 31 Dec.)			104,977.5	± 11,342.2

[a] 95 percent confidence interval if data are normally distributed, otherwise, at least 75 percent.

[b] n = # of sampling units sampled, N = # of sampling available.

Appendix D. Angler effort estimates (and strata variables used in effort calculations) for Lower Granite Reservoir (to Red Wolf Bridge in Clarkston), spring 1985.

Month	Hrs. avail.[a]	Day-type[b] (n,N)[c]	Boats: Mean no. of boats (std. dev)[d]	Boats: Mean anglers per boat[e]	Boats: Percent steelhead anglers[e]	Boats: Mean steelhead angler hrs/day[f]	Shore: Mean no. anglers (std/ dev)[d]	Shore: Percent steelhead anglers[e]	Shore: Mean steelhead angler hrs/day[f]
Jan.	9.0	WE (4,9)	42.5 (25.70)	2.41	100.0	921.83	13.24[e] (---)	100.0	119.16
		WD (4,22)	27.25 (11.15)	2.30	100.0	564.08	5.82[e] (---)	100.0	52.38
Feb.	10.0	WE (3,9)	23.33 (14.95)	2.20	100.0	513.26	28.0 (9.54)	100.0	280.00
		WD (5,19)	9.2 (5.99)	2.38	100.0	218.96	12.7 (8.36)	100.0	127.00
Mar.	11.0	WE (3,9)	4.67 (5.20)	2.42	100.0	124.32	15.83 (7.64)	90.3	157.24
		WD (2,22)	1.75 (0.35)	2.50	100.0	48.13	13.25 (3.18)	96.0	139.92

[a] Derived by using a sunrise-sunset table (by Nautical Almanac Off., U.S. Naval Observator, Washington D.C.) and adjusting it according to angler fishing behavior, if neccessary.

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

[c] n = The number of days sampled and N = The number of that day-type available for the month.

[d] Estimated by several instantaneous counts on randomly selected days.

[e] Estimated from angler interviews.

[f] Calculated by multiplying mean boats (or mean shore anglers) by constants (hours/day, and/or mean anglers/boat, percent steelhead anglers) to get mean steelhead anglers/day.

Appendix E. Estimated angler effort by strata for Lower Granite Reservoir, spring 1985.

Month	Day-type	Angler-type	Estimated angler effort (hrs/month)	Confidence limits[a]
Jan.	WE	boats	8,296.4	3,739.4
		shore	1,072.4	---[c]
		Combined	9,368.9	---[c]
	WD	boats	12,409.8	4,593.0
		shore	1,152.4	---[c]
		Combined	13,562.1	---[c]
	Monthly total (n=16, N=62)[b]		22,931.0	---[c]
Feb.	WE	boats	4,619.3	2,791.4
		shore	2,520.0	809.4
		Combined	7,139.3	2,906.4
	WD	boats	4,160.2	2,077.9
		shore	2,413.0	1,220.1
		Combined	6,573.2	2,409.7
	Monthly total (n=16, N=56)[b]		13,712.6	3,775.4
Mar.	WE	boats	1,118.8	1,175.5
		shore	1,415.2	643.8
		Combined	2,534.0	1,340.2
	WD	boats	1,058.8	288.0
		shore	3,078.2	996.8
		Combined	4,137.0	1,037.6
	Monthly total (n=10, N=62)[b]		6,671.0	1,694.9
	Season total		43,314.6	---

[a] 95 percent confidence intervals if data are normally distributed, otherwise, at least 75 percent.

[b] n = Number of sampling units sampled, N = Number of sampling units available.

[c] Confidence intervals were not calculated because the shore angler effort estimate had to be multiplied by 2 to reflect the actual angling effort observed. Our uncorrected estimates were based on attempted counts through a spotting scope from Wawawai of anglers at Lower Granite Dam.

Appendix F. Steelhead Catch rate data for Lower Granite Reservoir, spring 1985.

		Shore Anglers				Boat Anglers				
Month	Day-type[a] (n)[b]	No. of anglers	Total angling hours	No. of fish retained	hrs/fish retained	No. of anglers	No. of boats	Total angling hours	No. of fish retained	hrs/fish retained
Jan.	WE (7)	75	251.3	7	35.9	362	136	1537.3	58	26.5
	WD (7)	42	128.0	3	42.7	159	69	738.0	55	13.4
Feb.	WE (3)	116	324.5	6	54.1	97	44	283.0	8	35.4
	WD (4)	52	160.5	8	20.1	62	26	190.8	3	63.6
Mar.[c]	WE (3)	56	151.0	7	21.6	12	5	69.0	0	-- [d]
	WD (2)	48	192.5	7	27.5	5	2	13.5	0	-- [d]

[a] WE = Weekends and holidays. WD = Weekdays.

[b] n = Number of days sampled.

[c] No creel checks were made from a boat (boat in for repairs) so small sample size.

[d] No estimate could be made.

Appendix G. Angler effort estimates (and strata variables used in effort calculations) for the mid-Snake River, spring 1985.

				Boats				Shore		
Month	Hrs. avail.[a]	Day-type[b] (n,N)[c]	Zone[d]	Mean no. of boats (std. dev)[e]	Mean anglers per boat[f]	Percent steelhead anglers[g]	Mean steelhead angler hrs/day[g]	Mean no. anglers (std/ dev)[e]	Percent steelhead anglers[f]	Mean steelhead angler hrs/day[g]
Jan.	9.0	WE (4,9)	A	29.79 (9.54)	2.29	100.0	614.0	2.66 (1.96)	100.0	23.9
			B	4.21 (2.07)	2.29	100.0	86.8	1.87 (1.49)	100.0	16.8
			C	0.58 (0.69)	2.29	100.0	12.0	1.62 (0.28)	100.0	14.6
		WD (5,22)	A	9.10 (4.60)	2.08	100.0	170.4	1.95 (1.20)	100.0	17.6
			B	0.75 (0.61)	2.08	100.0	14.0	0.45 (0.44)	100.0	4.0
			C	0.00 (0.00)	2.08	100.0	0.0	0.15 (0.33)	100.0	1.4
Feb.	9.5	WE (2,9)	A	14.17 (20.03)	2.34	100.0	315.0	2.17 (3.06)	100.0	20.6
			B	1.67 (2.36)	2.34	100.0	37.0	0.17 (0.23)	100.0	1.6
			C	0.17 (0.23)	2.34	100.0	3.67	1.00 (1.41)	100.0	9.5
		WD (3,19)	A	7.36 (6.30)	1.85	100.0	129.4	3.92 (4.02)	100.0	37.2
			B	1.39 (0.67)	1.85	100.0	24.4	0.25 (0.43)	100.0	2.4
			C	0.33 (0.29)	1.85	100.0	5.8	0.61 (0.79)	100.0	5.8
Mar.	9.5	WE (3,9)	A	5.17 (4.36)	2.28	100.0	112.0	0.69 (0.66)	69.0	4.5
			B	1.15 (1.15)	2.28	100.0	24.9	0.86 (1.28)	69.0	8.4
			C	0.47 (0.41)	2.28	100.0	10.2	1.92 (2.50)	69.0	12.6

Appendix G. (cont.)

Month	Hrs. avail.[a]	Day-type[b] (n,N)[c]	Zone[d]	Boats: Mean no. of boats (std. dev)[e]	Boats: Mean anglers per boat[f]	Boats: Percent steelhead anglers[f]	Boats: Mean steelhead angler hrs/day[g]	Shore: Mean no. anglers (std/ dev)[e]	Shore: Percent steelhead anglers[f]	Shore: Mean steelhead angler hrs/day[g]
Mar. (cont.)		WD (2,22)	A	3.96 (2.41)	2.00	100.0	75.2	1.25 (0.35)	100.0	11.9
			B	0.71 (0.64)	2.00	100.0	13.4	0.25 (0.35)	100.0	3.3
			C	0.00 (0.00)	2.00	100.0	0.0	0.33 (0.47)	100.0	4.5

[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 behvior if necessary.

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

[c]n = The number of days sampled and N = the number of that day/type available for the month.

[d]Zone A = Clarkston (Red Wolf Bridge) to Asotin Creek (7.5 miles). Zone B = Asotin Creek to Redbird Creek (10 miles). Zone C = Redbird Creek to the Grande Ronde River (at Line Point - 13.5 miles). Zone D = Grande Ronde River fromthe mouth to "The Narrows," just upstream of Joseph Creek (approx. 4.0 miles).

[e]Estimated by 2 or more angler counts per day from an automobile during randomly selected days.

[f]Estimated from angler interviews while conducting creek checks. Zones A, B, and C were combined because of small samples in Zones B and C.

[g]Calculated by multiplying mean boats (or mean shore anglers) by constants (hours per day and/or mean anglers per boat, percent steelhead anglers) to get mean steelhead anglers per day.

Appendix H. Estimated angler effort by strata for mid-Snake River, spring 1985.

Month	Day-type	Angler-type	Zone	Estimated angler effort (hrs/month)	Confidence limits[a]
Jan.	WE	Boats	A	5,525.8	1,319.0
			B	780.9	286.2
			C	107.6	95.4
			Combined	6,414.3	1,353.0
		Shore	A	215.5	118.3
			B	151.5	90.0
			C	131.2	16.9
			Combined	498.2	149.6
	WD	Boats	A	3,747.7	1,489.5
			B	308.9	197.5
			C	0.0	0.0
			Combined	4,056.6	1,502.6
		Shore	A	386.1	186.8
			B	89.1	68.5
			C	29.7	51.4
			Combined	504.9	205.5
	Jan. Total (n=54, N=186)[b]			11,474.0	1,382.6
Feb.	WE	Boats	A	2,835.0	4,998.1
			B	333.1	587.7
			C	33.0	58.1
			Combined	3,201.1	5,032.9
		Shore	A	185.1	326.7
			B	14.1	24.9
			C	85.5	150.8
			Combined	284.7	360.7
	WD	Boats	A	2,457.7	2,229.5
			B	463.2	239.6
			C	110.2	239.6
				3,031.1	2,255.1
		Shore	A	706.8	768.5
			B	45.1	82.8
			C	110.1	150.8
			Combined	862.0	787.6
	Feb. Total (n=30, N=168)[b]			7,378.9	5,582.6

Appendix H. (Continued)

Month	Day-type	Angler-type	Zone	Estimated angler effort (hrs/month)	Confidence limits[a]
Mar.	WE	Boats	A	1,007.8	801.3
			B	224.2	211.4
			C	91.6	75.4
			Combined	1,323.6	832.2
		Shore	A	40.7	36.7
			B	50.7	36.7
			C	113.3	139.1
			Combined	204.7	148.4
Mar.	WD	Shore	A	1,655.3	1,358.4
			B	294.7	36.1
			C	0.0	0.0
			Combined	1,950.0	1,358.8
		Shore	A	261.3	98.6
			B	52.3	98.6
			C	69.0	132.5
			Combined	382.5	192.4
	Mar. Total (n=30, N=186)[b]			3,860.8	1,611.8
	Season total (n=114, N=540)[b]			22,713.7	5,972.9

[a] 95 percent CI if data are normally distributed, otherwise, at least 75 percent.

[b] n = number of sampling units. N = number of sampling units available.

Appendix I. Steelhead catch rate data obtained from anglers interviewed on mid-Snake River, spring 1985.

		Shore Anglers				Boat Anglers				
Month	Day-type[a] (n)[b]	No. of anglers	Total angling hours	No. of fish retained	Hrs/fish retained	No. of anglers	No. of boats	Total angling hours	No. of fish retained	Hrs/fish retained
Jan.	WE (6)	49	88.0	3	29.3	240	105	870.7	43	20.3
	WD (6)	27	60.5	1	60.5	131	63	472.4	32	14.8
Feb.	WE (2)	21	52.5	0	--[c]	75	32	306.0	17	18.0
	WD (5)	27	40.5	1	40.5	37	20	116.8	3	38.9
Mar.	WE (3)	20	54.0	0	--[c]	16	7	63.5	0	--[c]
	WD (2)	7	11.0	0	--[c]	2	1	6.0	0	--[c]

[a] WE = Weekends and holidays. WD = Weekdays.

[b] n = Number of days sampled.

[c] No fish retained, therefore, no estimate was made.

Appendix J: Scale analysis for sport caught steelhead, Fall 1984 and Spring 1985.

Table 1. Scale analysis from samples collected during creel survey below Lower Granite Dam, Fall 1984.

Age [a] (yrs)	Fork Length (in)	Weight (lbs)	Sex	Dorsal fin condition [b]	Marks
R.2	35	14	M	H	
R/U [c]	27.5	8	F	H	
1.1	26	5.5	M	H	
1.1	26	6.5	F	H	
1.1	25.5	6	M	H	
1.1	24		M	H	LP
1.1	24	5	F	H	
1.1 [s]	25	5.5	F	H	
1.2	32	10.5	M	H	AD
1.2	25	5	M	H	RP
1.2	31	9	F	H	LP
1.2	40	20	M	H	AD
2.1	24	4.5	F	W	
2.1	23		F	W	
2.2	25	6.5	F	W	
3.1	25	5	F	W	

	Number	Percent of Total	% of Hatchery or Wild
TOTAL SAMPLES	16	100	
UNREADABLE SAMPLES	1	6.3	
READABLE SAMPLES	15	100	
HATCHERY FISH	11	73.3	100.0
1 SALTS	6	40	54.5
2 SALTS	5	33.3	45.5
AD CLIPS	2	13.3	18.2
WILD	4	26.7	100.0
1 SALTS	3	20	75.0
2 SALTS	1	6.7	25.0
RESPAWNERS	1	6.7	0.0

[a] Age is indicated with the years of fresh water residence before the decimal and years of ocean residency after the decimal.

[b] Stubbed or deformed dorsal fins were used as indicators of hatchery fish.

[c] R = regenerated, U = unreadable.

[s] Spawning check in scale, therefore, fish is on repeat spawning migration.

Appendix J: (Cont').

Table 2. Scale analysis of samples collected from Fall 1984 and Spring 1985 creel surveys above Lower Granite Dam (includes the mid-Snake R.).

Age (yrs) a	Fork Length (in)	Weight (lbs)	Sex	Dorsal fin condition b	Marks c
# d	37	17	M	H	
# d	35		F	H	AD
1.1	23	4.5	M	H	
1.1	23.5		M	H	
1.1	24		F	H	AD
1.1	23	4.5	F	H	
1.1	24		F	H	LP
1.1	24		F	H	
1.1	23.5	3.5	M	H	
1.1	22	5	M	H	
1.1	23.5		M	H	
1.2	37	17	M	H	AD
1.2	34	15	F	H	
1.2	33	13.5	F	H	
1.2	26	7.5	F	H	
1.2	32	12	F	H	AD
1.2	34	15	F	H	
1.2	38	16.5	M	H	
1.2	34	15.5	F	H	
1.2	35	15	M	H	
1.2	34		M	H	
1.2	34	12.75	F	H	
1.2	36	15	F	H	
1.2	35	11.75	M	H	
1.2	33		F	H	
1.2	37	10.5	M	H	
1.2	37	18	M	H	
1.2	33	13.5	F	H	
1.2	32	11.5	M	H	
1.2	35	14.5	F	H	
1.2	34	15	F	H	
1.2	34	16.75	M	H	
1.2	33	14	M	H	
1.2	36	16	F	H	
1.2	34	15	F	H	
1.2	37	17	M	H	
1.2	36		M	H	
1.2	36		F	H	
1.2	35	15	F	H	
1.2	36.5		F	H	
1.2	34.5		M	H	AD
1.2	33	14	F	H	AD
1.2	31		F	H	

Appendix J:

Table 2. (cont)

Age (yrs) a	Fork Length (in)	Weight (lbs)	Sex	Dorsal fin condition b	Marks c
1.2	36	16	F	H	
1.2	30	9	F	H	
1.2	34	15	M	H	
R	37	17	M	H	
R	28	7.5	F	H	
R	34	14.5	F	H	AD
R	34	14	M	H	
R	33	14	F	H	
R	38		M	H	
R	32		F	H	
R	34.5	15	F	H	
R	34	14	M	H	
R	38.5		M	H	
R	35	15	M	H	AD
R	28.5	7.5	F	H	
R	34.5		F	H	
R	38	16	M	H	
R	30.5		M	H	
R	34	14.5	F	H	AD
R	31		M	H	
R.2	35	15	F	H	
R.2	33	13	M	H	
U.2	37.5		F	H	
U.2	35	15	M	H	
1.1	21	1.5	M	W	
1.1	24	4.5	F	W	
1.2 W	32	12	F	W	
1.2	34	14	F	W	
1.2	37	16	M	W	
1.2	27.5		F	W	
1.2	34.5	16	F	W	
1.2	34	14	M	W	
1.2	33.5	14.5	F	W	
2.1	23.5	4.5	F	W	
2.1 (3.1) F	25	5	F	W	
2.1	26.5	6.5	F	W	
2.1	25	6	F	W	
2.1	26	6	F	W	
2.1	25	5.5	F	W	
2.2	28	8.5	F	W	
2.2	27	7	F	W	
2.2	27		F	W	
2.2	29.5	9.5	F	W	
2.2	30	11.5	F	W	
R	28		M	W	
R	32		F	W	
R	29	9	M	W	
U	24	4.5	F	W	
U	26	6	M	W	

Table 2. (cont).

	Number	Percent of Total	% of Hatchery or Wild
TOTAL SAMPLES	92	100.0	
UNREADABLE SAMPLES	24	26.1	
READABLE SCALES	68	100.0	
HATCHERY FISH	48	70.6	100.0
1 SALTS	9	13.2	18.8
2 SALTS	39	57.4	81.3
AD CLIPS	9	13.2	18.8
WILD FISH	20	29.4	100.0
1 SALTS	8	11.8	40.0
2 SALTS	12	17.6	60.0
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.
[b] Stubbed or deformed dorsal fins were used as indicators of hatchery fish.
[c] Ad = adipose clipped. LP = left pectoral clipped. RP = right pectoral clipped.
[d] No scales in sample envelope.
[e] R = regenerated scale. U = unreadable scale.
[f] Fish may have spent 3 years in fresh water.
[H] Dorsal criteria had indicated this was a hatchery fish.
[W] Scale analysis indicates that this was a wild fish, although it spent only 1 year in fresh water.

Appendix K: Coded-wire tags (cwt) recovered from steelhead during Fall 1984 and Spring 1985.

Date Recovered	Fish Length (in)	Sex	Recovery Type	Recovery Location [a]	CWT Code
1/6/85	25	m	sport	Clarkston	63-28-38 [b]
4/2/85	26	m	rack	LFH	63-28-39
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85	18	m	rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85	26	m	rack	LFH	63-28-38
4/2/85	27	m	rack	LFH	63-28-38
4/2/85	26	m	rack	LFH	63-28-38
4/2/85	28	m	rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85	28	m	rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85	25	m	rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-38
4/2/85	24	m	rack	LFH	63-28-38
4/2/85			rack	LFH	63-28-39
4/2/85			rack	LFH	63-28-38
4/2/85	29	m	rack	LFH	no tag
4/2/85	24	f	rack	LFH	lost [c]
	Information from IFG [d]				
10/24/85	24	m	sport	Clarkston	63-28-38
10/28/84	24	m	sport	Clarkston	63-28-40
12/1/84	-	f	sport [e]	Clarkston	63-28-38
4/23/85	26	f	rack	DNFH	63-28-38
11/24/84	33	-	sport [e]	Clarkston	62-16-50 [f]
	Total Lyons Ferry cwt recovered = 33				
12/22/84	37	m	sport	LGR	5-10-24 [g]
1/5/85	34	f	sport	-	5-10-24
11/29/84	32	m	sport	ASOTIN	5-10-24
12/29/84	33	f	sport	CLARKSTON	5-10-24
1/8/85	-	m	sport	-	5-10-25
1/26/85	33.5	f	sport	-	5-10-25

Appendix K: (cont')

Date Recovered	Fish Length (in)	Sex	Recovery Type	Location [a]	CWT Code
1/19/85	30	f	sport	CLARKSTON	5-10-25 [b]
12/29/84	33	f	sport	CLARKSTON	5-10-25
11/20/84	35.5	f	sport	CLARKSTON	5-10-25
1/20/85	35	m	sport	LGR	5-10-25
2/13/85	34.5	f	sport	CLARKSTON	5-10-25
2/16/85	34	f	sport	CLARKSTON	5-10-25
11/20/84	37	m	sport	CLARKSTON	5-10-25
10/14/84	32	m	sport	IHR	5-10-25
1/5/85	32	f	sport	LGR	5-10-25
1/10/85	34	f	sport	LGR	5-10-25
1/11/85	36	m	sport	CLARKSTON	5-10-26
2/16/85	32.5	f	sport	CLARKSTON	5-10-26
2/16/85	34	f	sport	LGR	5-10-27
11/12/84	35	f	sport	CLARKSTON	5-10-27
1/4/85	34	f	sport	CLARKSTON	5-10-27
1/15/85	32.5	f	sport	-	5-10-27
1/5/85	33	f	sport	CLARKSTON	5-10-27
1/31/85	-	f	sport	CLARKSTON	5-10-27
1/6/85	32	f	sport	CLARKSTON	5-10-27
1/12/85	34	m	sport	LGR	5-10-27
11/20/84	33	f	sport	ASOTIN	5-10-27
1/27/85	35	f	sport	LGO	23-6-6
11/28/84	30	f	sport	CLARKSTON	23-6-6
2/11/84	-	f	sport	CLARKSTON	23-6-8
2/16/85	35	f	sport	CLARKSTON	23-6-8
11/29/84	34	f	sport	ASOTIN	23-6-8
12/29/84	33	f	sport	CLARKSTON	23-16-2
1/20/85	37	m	sport	LGR	23-16-2
12/29/84	37	m	sport	CLARKSTON	23-16-3
1/10/85	30	f	sport	LGR	23-16-3
1/10/85	32	-	sport	LGR	23-16-4
1/22/85	35.5	m	sport	LGR	23-16-4
12/22/84	32	f	sport	LGR	23-16-4
10/27/84	40	m	sport	IHR	23-16-4
2/16/85	32.5	f	sport	LGR	23-16-4
11/29/84	34	f	sport	CLARKSTON	23-16-5
1/27/85	35	m	sport	LGO	23-16-5
12/2/84	35	m	sport	ASOTIN	23-16-5
1/15/85	33	f	sport	LGR	23-16-5
11/26/84	36	m	sport	CLARKSTON	10-22-52
1/26/85	36	m	sport	CLARKSTON	lost [c]
1/12/85	37	m	sport	LGR	lost [c]

[a] Clarkston = Zone A, LFH = Lyons Ferry Hatchery, DNFH = Dworshak N. F. Hatchery, LGR = L. Granite Reservoir, Asotin = Zone B, IHR = Ice Harbor Dam, LGO = immed. below L. Granite Dam.

[b] Lyons Ferry cwt code released in 1983.

Appendix K. (cont')

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[c] cwt was lost during dissection.

[d] Rodney Duke, IFG, personal comm. (2 of 21 cwt recovered by IFG from the sport catch = 9.5 %, 2 of 35 cwt voluntarily returned by anglers = 5.7 %).

[E] Voluntary return by angler.

[F] Lyons Ferry cwt code released in 1982.

[G] Clearwater River, Idaho releases.