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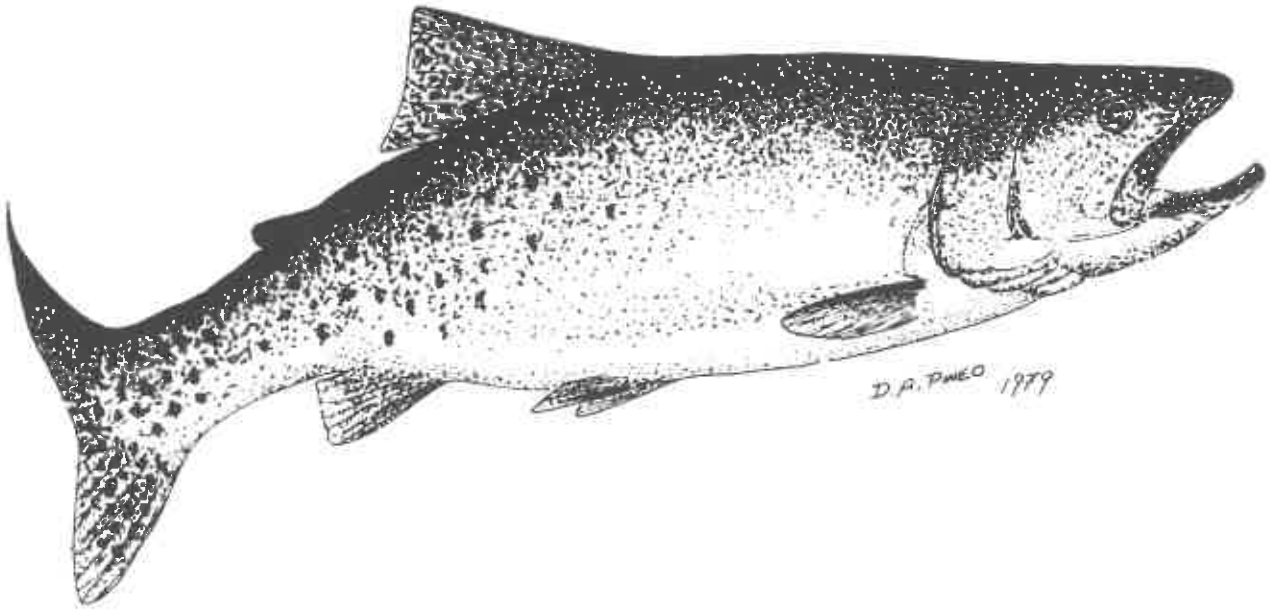

FALL 1986 AND SPRING 1987
SNAKE RIVER STEELHEAD CREEL SURVEYS

PART I: 1986-87 ANNUAL REPORT
LYONS FERRY TROUT HATCHERY EVALUATION

by
Glen W. Mendel
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Report No. FR1/LSR-88-07

Report Date April 1988

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We also extend our thanks to the many anglers who permitted us to frequently interrupt their fishing trips; thus enabling us to obtain catch rate and catch composition data. Their patience and cooperation are appreciated.

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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 1986 and spring of 1987, as part of an evaluation of Lyons Ferry Hatchery (LFH). A record run of nearly 124,000 adult steelhead crossed Lower Granite Dam this fall. A total of 9,988 steelhead were harvested from the entire creel survey area on the Snake River (mouth to the Grande Ronde River).

Approximately 84 % of the steelhead harvested below Lower Granite Dam were fin clipped. Completed fishing trips averaged 5.7 to 6.0 hrs. for boaters during fall and spring, respectively. Completed fishing trips for shore anglers averaged less than half that of boaters (2.5 to 1.8 hrs. during fall and spring).

Angler interest was quite high on Lower Granite Reservoir early in the season because of the excellent seasons the past 2 years. Angler effort, catch rates, and harvest peaked in December. A fall total of 65,569 (± 5,819) angler hours were expended to harvest 1,825 (± 292) steelhead. Spring angler effort was 26,827 (± 5,619) angler hours with an estimated harvest of 800 (± 232) steelhead. Muddy river conditions affected the spring 1987 fishery. Fall and spring angler effort was approximately 12,078 and 5,113 angler days, respectively. Wild fish generally comprised less than 16 % in any month, except September.

As in past years, more fishing effort was expended between Red Wolf Bridge and Asotin Creek (zone A) than in all other portions of the mid Snake River combined. An estimated total effort of 145,218 (± 12,690) angler hours were expended by anglers along the mid Snake River to harvest approximately 4,162 (± 587) steelhead during the fall of 1986. Poor fishing conditions existed during the spring when anglers harvested 424 (± 167) steelhead with 17,884 (± 2,816) angler hours of effort. Approximately 34,062 and 4,342 angler days of effort were expended in the mid Snake River during fall and spring fisheries, respectively. Wild fish comprised as much as 36 % of the harvest in February. Washington anglers harvested 38 % of the steelhead during the fall on the mid Snake and 46 % during the spring.

The Grande Ronde River was also surveyed this year. The upper portion of the Grande Ronde River was a cooperative survey with the Oregon Dept. of Fish and Wildlife. Only 200 steelhead were harvested from the portion of the Grande Ronde River in Washington. Mean completed angling trip length for shore anglers was 4.4 hrs. during the fall.

The Walla Walla R. accounted for the most steelhead harvested of the other 4 southeast Washington streams we surveyed. Few harvested fish were actually seen by WDG personnel from any of these streams.

Length-frequencies, scale analyses, and expanded harvest estimates of coded-wire tags are presented. Returning Lyons Ferry Hatchery steelhead are contributing substantially to the Snake River sport fishery. Exploitation rates for marked groups of LFH steelhead averaged 7 to 9 % in the Snake River.

Creel survey results are compared with WDG punchcard-derived harvest estimates. Punchcard returns to Olympia from southeast Washington (31.4 %) exceeded the statewide average (28.5%), as did the percentage of successful anglers (77.25 vs 57.29 %), which is used to estimate steelhead harvest for individual rivers. Annual punchcard harvest estimates for the Snake River have averaged 12.05 % below harvest estimates from creel surveys. This annual correction factor will be used with punchcard harvest estimates in the future instead of conducting expensive creel surveys on the Snake River. We will continue to sample for catch composition and coded wire tags on the Sanke River. The Grande Ronde R. will be sampled again next year, and catch composition data will be collected from some of the other streams as well.

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, 1984-85 (Mendel and Aufforth 1985), and 1985-86 (Mendel et. al 1987). WDG also annually estimates the steelhead catch for various rivers in the state by using steelhead punchcard returns. Steelhead creel surveys have been 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 Fish and Wildlife Compensation Plan (LSRCP).

The fall 1986 and spring 1987 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 with a wild steelhead release regulation (initially only fish missing ventral or adipose fins could be retained - regulations were amended to include fish with dorsal fins < 2 in). 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 similar, but required barbless hooks. Idaho had a daily catch, possession, and season limit of 3, 9, and 20 steelhead, respectively, on the Snake River.

The fall fishing regulations for the Grande Ronde River were the same as for the Snake River, except for 2 areas. From the river's mouth to the County bridge and from Cougar Creek to the Oregon State Line, only catch-and-release fishing was allowed, requiring barbless lures or flies, and bait was prohibited. No spring steelhead fishery existed on the Grande Ronde.

A record run of nearly 124,000 adult steelhead were available for the fall 1986 steelhead fishery above Lower Granite Dam on the Snake River. The previous record was in the fall of 1985, with just over 105,000 adult steelhead crossing Lower Granite Dam between June and mid-December. This was the third consecutive year of record runs over Lower Granite Dam. Fall runs the previous 9 years (from the closing of Lower Granite Dam through 1983) average approximately 39,500 steelhead (data from US Army Corps of Engineers 1984). During the past 3 years (1984-1986) an average of approximately 107,000 adult steelhead have migrated upstream of L. Granite Dam from 1 July to 15 December (US A. Corps of Engineers 1987).

Steelhead fishing regulations for the Tucannon, Touchet, and Walla Walla rivers, as well as Mill Creek, were similar to those for the Snake River. These streams, however, remained open for steelhead fishing until 15 April in 1987. Steelhead fishing was prohibited above the Wolf Fork of the Touchet River, from Cummings Creek to the Tucannon Hatchery Bridge on the Tucannon, and above Mullen St. Bridge on Mill Creek. The Walla Walla River below Nine Mile Bridge was open year around, while on the Tucannon River only catch-and-release fishing was allowed above the mouth of the Little Tucannon R. Steelhead fishing did not open on the Tucannon R. until 1 November 1986.

OBJECTIVES

The objectives of creel surveys on the Snake and Grande Ronde rivers during the fall of 1986 and spring of 1987 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 (above Lower Granite Dam).

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

   a) Estimate that portion of the sport catch contributed by returning steelhead of Lyon's Ferry Hatchery origin. The following tasks are required to accomplish this sub-objective:

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

      2) Examine coded-wire tags, brands and jaw 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) Obtain information regarding lengths, weights, sex, age, duration of ocean residency, and the percentage of fish of 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 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 harvest estimates derived from returned steelhead punchcards).

5. Attempt to estimate the steelhead punchcard return rates from Snake River steelhead anglers and compare harvest estimates from the past 3 years of creel survey with those estimates derived from punchcard returns.

This year we added the objective of obtaining catch composition information (see 2 b above) from the steelhead fisheries along the Washington portions of the Walla Walla, Touchet, and Tucannon rivers, as well as Mill Creek.

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 Reservoir 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.

   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.

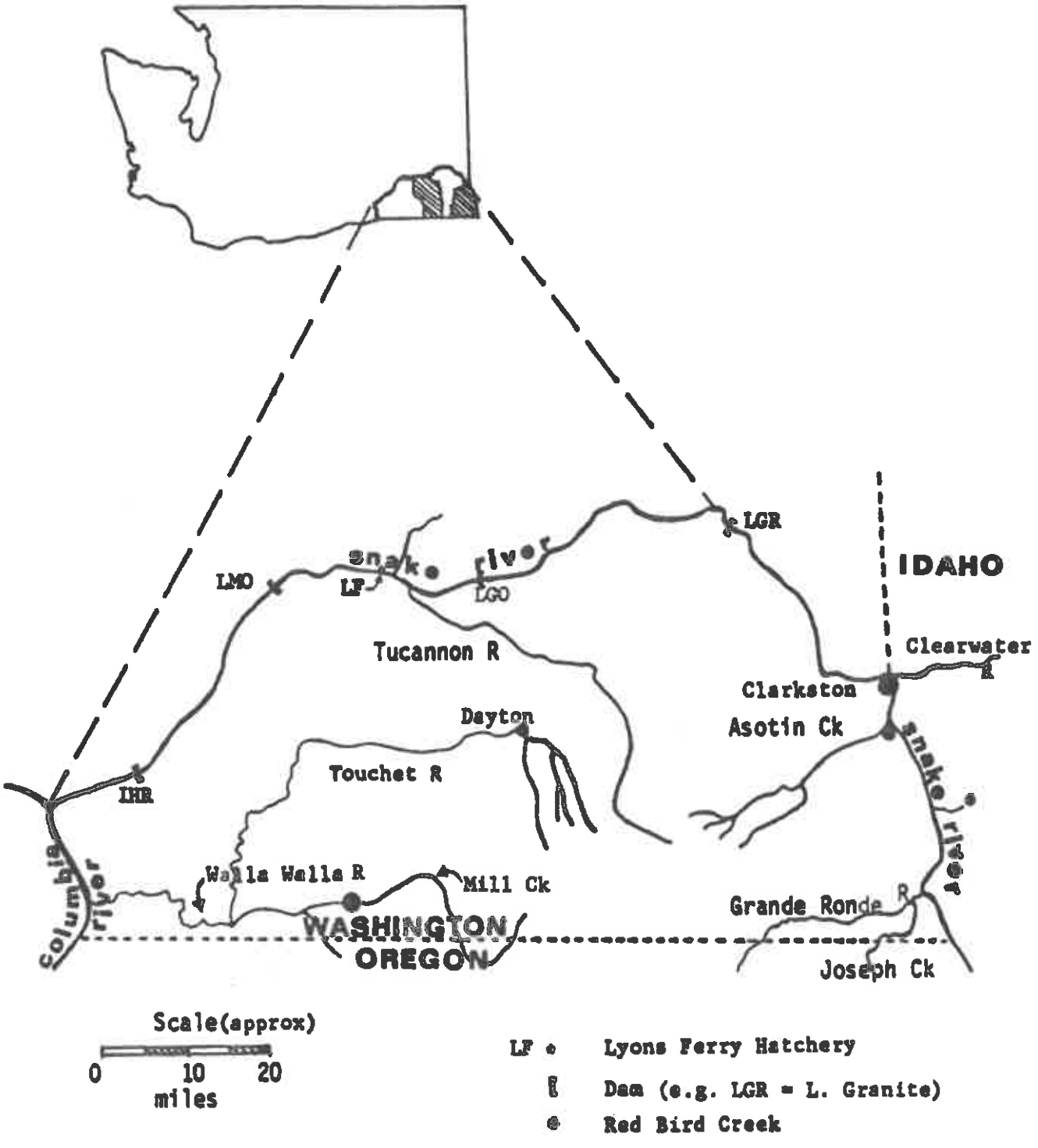


Figure 1. The relative locations of the major streams in southeast Washington and the landmarks used in this study.

The Grande Ronde River within Washington was divided into 3 major segments and several subsections as follows:

1. Lower -- mouth to "The Narrows" just upstream of Joseph Creek (approx. 4.5 miles).

   Zone D -- mouth to Asotin County Road Bridge (approx. 2.5 miles). Catch-and-release area, bait prohibited.

   Zone D1 -- Asotin Co. Road Bridge to "The Narrows" (approx. 2 miles). Consumptive fishery area.

2. Shumaker -- (Zone E1 - approx. 6 miles). Access limited to Shumaker Grade. Consumptive fishery area.

3. Upper -- Access area below State Highway 129 Bridge (at Bogan's Oasis) to Oregon State Line.

   Zone B1 -- Access below bridge to Cougar Creek (approx. 7 miles). Consumptive fishery area.

   Zone A -- Cougar Creek to Oregon State Line (approx. 5 miles). Catch-and-release fishing, bait prohibited.

The numeral 1 following a zone letter designation indicates a wild steelhead release zone. Other zones were catch and release only.

Areas of other streams that we surveyed include:

Tucannon River -- mouth to the Little Tucannon R.

Walla Walla R. -- mouth to the Oregon State Line.

Touchet River -- mouth to the Wolf Fork, near Dayton.

Mill Creek -- mouth to Mullen St. Bridge, in Walla Walla.

METHODS

Data Collection

Roving census technicians conducted angler counts for the mid-Snake R., Grande Ronde, and Lower Granite Reservoir from along roads that parallel these river segments, similar to 1985-86. Creel survey methods for these stream sections are similar to those reported for the 1985-86 creel program (Mendel et al. 1987). Angler surveys began at Lower Granite, the mid Snake, and the Grande Ronde rivers during the week of 1 September. Shore anglers and boats were counted from automobiles 2-4 times each sample 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 for the Snake and lower Grande Ronde.

Creel checks and interviews were made during angler counts whenever shore or boat anglers were accessible. 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 WDG and IFG so that both agencies would not be on the mid-Snake during the same day. IFG kindly provided us with the data they collected. Complete and incomplete angling trip data were combined to obtain catch rate estimates. Catch rates for incomplete angling trips usually are not significantly different than those for complete trips (Malvestuto et al. 1978, Bradbury 1986).

The middle section of the Grande Ronde R., because of its remoteness, was generally surveyed only once each day from the Shumaker road on days that were selected for the Lower Grande Ronde survey. Poor road conditions on Shumaker, or lack of time before or after the mid Snake and lower Grande Ronde routes, occasionally precluded surveys on this stretch of river. No checks were made along Shumaker during November because of poor road conditions and minimal angler use during October.

Oregon Fish and Wildlife (ODFW) personnel randomly selected the days, times and directions of angler counts and interviews for the upper Grande Ronde. Three or four angler counts and a separate interview period were selected at random. On days with few anglers, interviews could be conducted during the counts. ODFW and WDG personnel coordinated so that each agency was responsible for collecting data on specified days. Each agency was then responsible for data collection for the entire surveyed portion of the upper Grande Ronde River in both Washington and Oregon on their scheduled survey days. Signs were posted to notify anglers of the cooperative survey and that they may be interviewed by personnel from either agency, regardless of State boundaries. Data for the Washington portion of the Grande Ronde River were analyzed by WDG. ODFW used their own analysis methods for the data from within Oregon boundaries (Rich

Carmichael, pers. comm.).

The lower Snake (Ice Harbor and Little Goose segments), Tucannon, Walla Walla, and Touchet rivers, as well as Mill Creek have limited visibility from the road. Anglers were interviewed at available access areas to obtain catch rate and catch composition information. Angler counts were not conducted on these streams because of the difficulty of seeing anglers along most of the watercourses. We decided to use the harvest estimates based on punchcard returns to Olympia, instead of estimating harvest from our creel surveys. Surveys began 30 October for the lower Snake River, 12 November for the Tucannon River, 14 November for the Walla Walla River and Mill Creek, and 5 December for the Touchet River. Generally, these areas were surveyed 2-5 times per month, mainly on weekends.

Angler counts were recorded on a data form that was modified from our 1985-86 surveys (Appendix A). Information obtained from anglers interviewed by WDG was recorded on creel forms as in the previous year (Mendel et al. 1987) 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, the number of steelhead kept or released, whether the punchcard was initialed by us that day, and whether the snout was taken from each fish kept. 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 the presence or absence of fin clips, or by examination of the dorsal fin for erosion or deformities. Snouts were collected for retrieval of coded-wire tags from steelhead observed with clipped adipose (for fish >=70 cm) or ventral fins. 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 attributable to Washington (or Idaho) anglers. Thus, we could 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 1987. 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.

Employees of the National Marine Fisheries Service (NMFS) at Lower Granite Dam removed 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 branded steelhead for us. All scale samples that we collected were read under contract in Olympia.

Data Analysis

Creel analysis was similar to last year's (see Mendel et al. 1987 for details).

Coded-wire tag expansions were calculated using IFG data and jaw tags or brands seen in the creel survey. For each river section we estimated sampling rate (# of fish sampled / estimated harvest), mark rate (# of fish with ventral clipped fins, large fish with adipose clips, or jaw tagged or branded fish/ # of fish sampled), total marked fish in the harvest (harvest x mark rate), and total # of coded-wire tags (cwt - including jaw tags and brands), in the harvest (total marked fish in the harvest x the proportion of snouts checked that had cwts, jaw tags or brands). 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. IFG personnel took snouts only from ventral clipped steelhead. We, however, took snouts from steelhead with ventral clips as well as from adipose clipped fish >= 70 cm (because of the possibility of 3 salt steelhead returning with adipose clips that indicate the presence of cwts).

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) and jaw tag recoveries from our creel surveys. Numbered metal jaw tags were attached to the mandible of branded, coded-wire tagged steelhead, of Lyons Ferry origin, that were examined in the adult trap at the Lower Granite fish ladder. The jaw tags indicate a "$5.00 REWARD" for their return and include a return address. The total number of jaw tags recovered from the sport harvest (for a particular brand code) was divided by the total number of fish that had jaw tags attached at L. Granite to estimate exploitation rates. This was repeated for brand groups that had been released in the Grande Ronde, Snake, and Tucannon rivers.

We compared our Lyons Ferry Evaluation creel survey harvest estimates for section 168 (above Lower Granite Dam) for the Snake River, with the WDG punchcard estimates for the same zone for three harvest years, 1984-85 through 1986-87. Our estimates were taken from two previous reports (Mendel and Aufforth 1985, Mendel et al. 1987) and the data presented in this report. WDG punchcard estimates were obtained from the annual Steelhead Trout Sport Catch in Washington (WDG information pamphlets).

Monthly estimates and season totals were compared with a paired "t" test to determine if there were significant differences between the results of the two estimating procedures.

RESULTS AND DISCUSSION

Lower Snake River

We did not attempt to calculate harvest estimates from creel surveys for the lower Snake River because of our poor success in 1985-86 (Mendel et al. 1987). Instead we relied on harvest estimates derived from punchcard returns to Olympia (Table 1). Our sampling was primarily to obtain catch composition data. We conducted 5 days of sampling of anglers from a boat and 20 days of checking from the shore during the fall. Only 2 days of boat checks and 6 shore checks were completed in the spring of 1987.

Table 1. Punchcard-derived steelhead harvest estimates for WDG management sections on the lower Snake River, fall 1986 and spring 1987 * (WDG 1987).

Month	Below Ice H.Dam	Below L. Mon. Dam	Below L. Goose D.	Below L. Granite D.
Sep.	30	13	98	8
Oct.	70	125	394	36
Nov.	19	157	352	81
Dec.	30	218	220	195
Jan.	13	110	214	165
Feb.	13	19	36	95
Mar.	2	11	40	13
	177	653	1,354	593

* WDG mgmt. sections are 164 = below Ice Harbor, 165 = below Lower Monumental Dam, 166 = below Little Goose Dam, 167 = below Lower Granite Dam.

Adipose or ventral clipped steelhead comprised 84.4 % of the harvested fish seen on the lower Snake (Table 2). The remaining harvested fish had no fin clips.

Completed boat fishing trips (Table 3) were nearly the same length during fall (5.7 hrs.) and spring (6.0 hrs.). Completed fishing trip lengths for shore anglers averaged less than half those of boat anglers (2.5 and 1.8 hrs. for fall and spring, respectively).

Table 2. Data for steelhead observed in angler creels along the lower Snake River, fall 1986 and spring 1987.

WDG mgmt. sec.	Mean fork length (cm)(n)[a]	Std. dev.	% Female (n)[a]	% fish with no marks(n)[ab]	% ventral clipped(n)[a]	% adipose clipped(n)[ac]	Total # of fish creeled
164	---	---	---	---	---	---	0
165	66.3 (12)	8.99	66.7 (12)	0 (12)	0 (12)	100.0 (12)	13
166	70.3 (68)	11.42	55.4 (65)	20.6 (68)	10.3 (68) [d]	69.1 (68) [d]	72
167	72.9 (64)	13.27	39.1 (64)	13.1 (61)	6.6 (61) [e]	80.3 (61) [e]	67
Total	71.0 (144)	12.09	48.9 (141)	15.6 (141)	7.8 (141)	76.6 (141)	152

a # of fish sampled.
b includes 5 wild fish in sec. 166 and 3 in sec. 167.
c All ADLV clipped fish are listed under ventral clipped and not under AD clipped.
d 4 fish of unknown origin, % is based only on fish of known origin.
e 6 unk. origin.

Table 3. Average angler-day length for completed fishing trips on the lower Snake River, fall 1986 and spring 1987.

		Boat		Shore	
Season	WDG Mgmt. Sect.	Mean complete trip length in hours(SD) [a]	No. sampled anglers (parties,hrs.)	Mean complete trip length in hours (SD) [a]	No. sampled anglers (parties,hrs.)
Fall	164-165	---	6 (3,31.5)	1.0 (0.0)	1 (1,1.0)
	166	5.1 (2.13)	61 (26,308.2)	3.2 (1.85)	12 (9,39.0)
	167	6.2 (1.93)	73 (29,454.6)	1.43 (0.89)	7 (4,10.0)
Fall Total		5.7 (2.08)	140 (58,794.3)	2.5 (1.77)	20 (14,50.0)
Spring Total	164-167	6.0 (2.04)	72 (33,434.9)	1.8 (0.99)	20 (9,36.9)

a SD = standard deviation.

Lower Granite Reservoir

Angler effort strata variables and sampling data are presented (Appendix B, Table 1). We made supplementary surveys with a boat each month to obtain catch rates (Appendix B, Table 2) and composition of the catch data for boat anglers. Minimal angler effort and other duties precluded us from conducting more than 1 boat check in September and 2 checks in March. Other months had 4-7 boat checks each.

Angler effort, catch rate, and harvest peaked in December 1986 (Table 4). The maximum number of boats seen on the reservoir at any one time was 80 on 28 December while shore angler effort was highest on 15 November (56 shore anglers). Angler counts also were relatively high in November. A fall total of 65,569 (± 5,819) angler hours was expended to harvest 1,825 (± 292) steelhead from Lower Granite Reservoir.

Spring angler effort was estimated to be 26,827 (± 5,619) angler hours with an estimated harvest of 800 (± 232) steelhead (Table 5). This represents a slight decline in angler effort and harvest compared with the 2 previous spring seasons. A mild spring with early spring rains and snow melt created muddy river conditions and poor fishing for most of the February and March. March angling effort, catch rate, and harvest estimates have poor confidence limits because of poor fishing conditions and low angler interest.

Angler interest at Lower Granite Reservoir has grown steadily during the past 3 seasons as have the record returns of steelhead past Lower Granite Dam (Table 6), but catch rates and harvests have varied inconsistently. Anglers in 1986 demonstrated increased interest in the steelhead fishery early in the season over that seen in the fall of 1985.

By dividing the total estimated angler hours (Tables 4 and 5) by the average length of completed fishing trips (Table 7) we estimate that approximately 7,011 (42,767 / 6.1 hrs.) angler days were expended by boat anglers and 5,067 angler days (22,801 / 4.5 hrs.) by shore anglers during the fall of 1986. Approximately 2,936 (17,029 / 5.8 hrs.) and 2,177 (9,796 / 4.5) angler days were expended by boat and shore anglers, respectively, to catch steelhead in the spring of 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 7). Estimates for boat anglers should be much more reliable.

The average size of harvested fish was greatest in January (Table 8) when Dworshak Hatchery "B run" steelhead were wintering in the reservoir. Fish with clipped fins comprised an average of 86.9 % of the harvest in the fall, and 94.9 % in spring.

Table 4. Estimated angler effort, catch rates, and harvest for steelhead anglers on Lower Granite Reservoir, fall 1986.

Month	Day type[A]	Angler type	Angler Effort: Angler hrs.	Angler Effort: ± 95% CI[B]	Catch Rate[C]: Fish/hr.	Catch Rate[C]: ± 95% CI[B]	Harvest[D,E]: # Fish	Harvest[D,E]: ± 95% CI[B]
Sep.	WE	Boat	1,598	641	0.025	0.024	41	42
		Shore	1,957	1,223	0.002	0.004	4	8
	WD	Boat[F]	574	133	0.000	0.000	0	0
		Shore	974	449	0.035	0.042	35	45
	Total		5,103	1,458	0.010	0.008	54	44
Oct.	WE	Boat	3,876	1,331	0.024	0.010	93	50
		Shore	2,514	290	0.013	0.011	32	27
	WD	Boat	5,457	1,101	0.029	0.022	157	123
		Shore	6,020	1,020	0.013	0.009	78	57
	Total		17,867	2,027	0.019	0.006	343	110
Nov	WE	Boat	9,498	3,008	0.033	0.011	310	144
		Shore	3,910	1,212	0.014	0.009	56	38
	WD	Boat	4,525	1,549	0.023	0.015	103	78
		Shore	2,935	946	0.025	0.016	73	54
	Total		20,869	3,716	0.025	0.006	526	163
Dec.	WE	Boat	7,884	1,261	0.055	0.012	436	119
		Shore	2,062	225	0.027	0.014	55	29
	WD	Boat	9,355	3,174	0.038	0.016	356	195
		Shore	2,429	1,450	0.017	0.012	41	39
	Total		21,730	3,718	0.041	0.008	895	224
Fall	Total		65,569	5,819	0.028	0.004	1,825	292

A WE =weekends and major holidays, WD = weekdays.
B 95 % confidence intervals if data are normally distributed, otherwise at least 75 % CI.
C Catch rate for retained fish only (released fish not included).
D Angler effort x catch rate = harvest (rounded to whole fish).
E Strata harvest estimates may not sum to total harvest because total harvest and CI were recalculated using total angler effort and CPUE for the monthly or seasonal totals.
F No WD interviews for boaters so data for WE used here also.

Table 5. Estimated angler effort, catch rates, and harvest for steelhead anglers on Lower Granite Reservoir, spring 1987.

Month	Day type [A]	Angler type	Angler Effort: Angler hrs.	Angler Effort: ±95 % CI [B]	Catch Rate [C]: Fish/hr	Catch Rate [C]: ±95 % CI [B]	Harvest [DF]: # Fish	Harvest [DF]: ±95 % CI [B]
Jan.	WE	Boat	6,845	2,238	0.036	0.010	247	106
		Shore	2,327	783	0.031	0.016	73	46
	WD	Boat	6,270	4,476	0.056	0.023	349	292
		Shore	2,435	1,372	0.012	0.012	29	38
	Total		17,879	5,248	0.037	0.008	663	241
Feb.	WE	Boat	2,382	1,029	0.011	0.014	27	35
		Shore	1,516	724	0.005	0.009	7	14
	WD	Boat	1,019	1,079	0.000	--- [E]	0	--
		Shore	1,421	657	0.016	0.016	23	26
	Total		6,338	1,783	0.010	0.007	65	50
Mar.	WE	Boat	352	228	0.011	0.018	4	7
		Shore	1,054	278	0.023	0.028	24	31
	WD	Boat	161	87	0.000	--- [E]	0	--
		Shore	1,043	845	0.038	0.043	39	58
	Total		2,610	922	0.023	0.018	61	82
Spring	Total		26,827	5,619	0.030	0.006	800	232

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

B 95 % confidence intervals 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). Variables have been rounded so that multiplying them may not result in the harvest values in the table.

E No fish caught so no catch rate, (See Appendix B, Table 2).

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

Table 6. Comparison of creel survey results for Lower Granite Reservoir, run years 1984-1986. [A]

Month	1984-85 Angler Effort (hrs)	1984-85 CPUE (fish/hr)	1984-85 Harvest (fish)	1985-86 Angler Effort (hrs)	1985-86 CPUE (fish/hr)	1985-86 Harvest (fish)	1986-87 Angler Effort (hrs)	1986-87 CPUE (fish/hr)	1986-87 Harvest (fish)	3 Yr. Ave. Angler Effort (hrs)	3 Yr. Ave. Harvest (fish)
Sep.	848[B]	0.004[C]	3	4,404	0.020	89	5,103	0.010	54	3,452	49
Oct.	900[B]	0.010[C]	90	14,073	0.030	419	17,867	0.019	343	10,947	284
Nov.	1,769[B]	0.015[C]	265	11,756	0.030	350	20,869	0.025	526	11,465	380
Dec.	8,797	0.112	983	9,422	0.040	374	21,730	0.041	895	13,316	751
Fall Tot.	12,314		1,341[a]	39,655	0.033	1,320	65,569	0.028	1,825	39,179	1,495
Jan.	22,931	0.057	1,296	13,171	0.032	427	17,879	0.037	663	17,994	795
Feb.	13,713	0.026	363	10,086	0.036	366	6,338	0.010	65	10,046	265
Mar.	6,671	0.027	178	4,337	0.014	60	2,620	0.023	61	4,539	100
Spr. Tot.	43,315		1,837[a]	27,594	0.032	869	26,827	0.030	800	32,579	1,169
Grand Tot.	55,629		3,178	67,249		2,189	92,396		2,625	71,758	2,664

A Data are from Mendel and Aufforth 1985, Mendel et al. 1987, and Tables 4 and 5 of this report. Note: angler effort X CPUE may not equal harvest as reported in this table because variables reported here have been rounded. Season CPUE and harvest were recalculated and are not additive (or averages) for 1985 and 1986 run years. Grand totals = sum of season totals.

B Based on only 1 angler count per day for 4-6 days per month. Separated from L. Snake (sec. 164-167) in the 1985 annual report and recalculated for this table.

C Estimated from combined CPUE for all L. Snake R. WDG fish mgmt. sections (164-168) because of small sample sizes. Used these CPUE values X the recalculated angler effort to estimate the harvest for section 168 in L. Granite Reservoir. This has not been included in previous reports.

* Did not recalculate seasonal totals from average effort and average CPUE, instead used sum of the effort and harvest values for 1984-85 only.

Table 7. Average angler-day length for completed fishing trips on Lower Granite Reservoir, fall 1986 and spring 1987.

	Boat		Shore	
Month	Mean complete trip length in hours (SD)[A]	# sampled anglers (parties,hrs.)	Mean complete trip length in hours (SD)[A]	# sampled anglers (parties,hrs.)
Sep.	3.9 (0.86)	11 (4,43.0)	3.2 (2.64)	4 (4,12.8)
Oct.	6.1 (2.46)	56 (25,341.3)	5.6 (2.68)	8 (5,44.5)
Nov.	6.3 (2.21)	31 (16,195.7)	3.7 (0.50)	4 (3,15.0)
Dec.	6.2 (2.48)	90 (44,558.5)	4.1 (0.32)	3 (2,12.4)
Fall Tot.	**6.1 (2.42)[B]**	**188 (89,1138.5)**	**4.5 (2.24)**	**19 (14,84.6)**
Jan.	5.7 (2.12)	39 (20,220.9)	---	---
Feb.	6.1 (2.12)	14 (7,86.0)	---	1 (1,3.75)
Mar.	---	1 (1,7.5)	---	2 (2,7.25)
Spr. Tot.	**5.8 (2.10)[C]**	**54 (28,314.4)**	**---[D]**	**3 (3,11.0)**

A SD = standard deviation.
B Weekend and weekdays combined. Fall WE mean = 6.0, SD = 2.57, n = 128 anglers (58 parties), WD mean = 5.8, SD = 1.92, n = 59 (31 parties).
C Weekend and weekdays combined. Spring WE mean = 5.6, SD = 2.01, n = 39 anglers (19 parties), WD mean = 6.5, SD = 2.26, n = 15 (9 parties).
D insufficient sample size for a valid estimate.

Table 8. Data from steelhead observed in angler creels along Lower Granite Reservoir, fall 1986 and spring 1987.

Month (n) [A]	Mean fork Length (cm) Std.dev. (n) [A]	Mean wt. (kg) Std.dev. (n) [A]	% Female (n) [A]	% fish with no marks (n) [A]	% Adipose Clipped (n) [AB]	% Ventral clipped (n) [AC]
Sep. (10)	69.1 *13.03* (8)	3.2 *1.45* (3)	50.0 (10)	30.0 (10)	60.0 (10)	10.0 (10)
Oct. (53)	69.6 *12.11* (47)	3.9 *1.93* (23)	42.5 (40)	16.3 (43)	62.8 (43)	20.9 (43)
Nov. (73)	71.0 *12.32* (70)	4.3 *2.07* (40)	40.8 (71)	12.9 (70)	77.1 (70)	10.0 (70)
Dec. (136)	74.4 *11.46* (136)	4.8 *1.75* (61)	56.6 (136)	11.1 (135)	81.5 (135)	7.4 (135)
Fall Tot. (272)	72.5 *11.97* (261)	4.4 *1.92* (127)	49.8 (257)	13.2 (258)	76.4 (258)	10.5 (258)
Jan. (105)	75.8 *11.26* (100)	4.6 *1.86* (61)	55.4 (101)	5.0 (101)	88.1 (101)	6.9 (101)
Feb (9)	69.8 *13.85* (9)	3.6 *2.28* (6)	66.7 (9)	0.0 (9)	100.0 (9)	0.0 (9)
Mar. (9)	66.1 *6.23* (7)	2.8 *1.41* (2)	85.7 (7)	14.3 (7)	57.1 (7)	28.6 (7)
Spr. Tot. (123)	74.7 *11.48* (116)	4.5 *1.90* (69)	58.1 (117)	5.1 (117)	87.2 (117)	7.7 (117)

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

B includes 6 wild fish in the fall. 1 fish marked wild, no marks, in spring was actually 1. ventral clipped - included under ventral clipped fish.

C All ADLV or ADRV clipped fish are included under ventral clipped and not under AD clipped.

Mid Snake River

Sampling information and strata variables used in calculating angler effort are presented in Appendix C, Table 1. Some of our catch rate data were 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 weekends and weekdays. Therefore, a total of 6-9 days per month were sampled by boat, except in September, February and March when we surveyed only 2, 3 and 1 days, respectively. Some data for Zone A (Clearwater R. confluence to Asotin Creek) were 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 C, Table 2.

As in 1984 and 1985, boat anglers expended more fishing effort in the upper portion of Lower Granite Reservoir, between Clarkston and Asotin (Zone A), than in all other zones combined (Table 9). Peak boat angler effort occurred on 25 October with 315 boats (219 in zone A, 70 in zone B, and 26 in zone C). 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 December. An estimated total effort of 145,218 ($\pm$ 12,690) angler hours were expended by anglers along the mid-Snake River to harvest an estimated 4,162 ($\pm$ 587) steelhead during the fall of 1986. This exceeds any of our previous angler effort estimates. Angler interest was very high at the beginning of the 1986 fall season and river and weather conditions were generally good.

During the months of January and February, anglers expended 17,884 ($\pm$ 2,816) angler hrs. to harvest 424 ($\pm$ 167) steelhead (Table 10). Anglers expended the most effort and had the best catch rates of the spring season during January. Boat anglers had some difficulty because of cold weather and icy boat ramps in January. Also "ice out" on the Grande Ronde and Clearwater rivers affected anglers in January. These rivers were also very muddy in February, as was the Snake R. during March.

Angler effort, catch rates, and harvests for the mid Snake R. have varied over the past 3 years but show no relation to the size of the run past Lower Granite Dam (Table 11).

By dividing the total angler hours expended by the average lengths of angler trips (Table 12), we estimate that

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

Month	Day-type [A]	Zone	Angler-type	Angler Effort hrs	Angler Effort (± CI) [B]	Catch Rate [C] fish/hr	Catch Rate (± CI) [B]	Harvest [DE] fish	Harvest (± CI) [B]
Sep	WE	A	Boat	3,478	1,467	0.013	0.012	47	46
			Shore	0	0	0.000	0.000	0	0
		B	Boat	1,165	798	0.014	0.015	16	22
			Shore	291	190	0.000	0.000 [F]	0	0
		C	Boat	378	203	0.040	0.080	15	32
			Shore	186	71	0.064	0.137	12	26
	WD	A	Boat	3,969	2,858	0.057	0.105	227	472
			Shore	87	60	0.000	0.000 [F]	0	0
		B	Boat	1,260	1,242	0.000	0.000	0	0
			Shore	41	16	0.000	0.000	0	0
		C	Boat	189	340	0.000	0.000	0	0
			Shore	202	212	0.000	0.000	0	0
	Total			11,245	3,570	0.016	0.009	180	120
Oct	WE	A	Boat	14,146	4,775	0.018	0.007	261	132
			Shore	371	29	0.000	0.000 [F]	0	0
		B	Boat	5,209	1,078	0.027	0.010	140	60
			Shore	221	117	0.000	0.000 [F]	0	0
		C	Boat	2,802	260	0.046	0.022	128	63
			Shore	976	136	0.049	0.046	48	46
	WD	A	Boat	15,639	5,433	0.023	0.011	355	220
			Shore	573	521	0.000	0.000	0	0
		B	Boat	7,813	3,493	0.032	0.018	251	184
			Shore	677	490	0.035	0.069	24	52
		C	Boat	3,412	2,136	0.070	0.048	239	227
			Shore	1,531	682	0.018	0.026	28	42
	Total			53,369	8,445	0.027	0.005	1,431	357
Nov	WE	A	Boat	18,903	5,570	0.024	0.009	458	216
			Shore	423	382	0.044	0.069	19	36
		B	Boat	8,387	2,650	0.029	0.011	240	119
			Shore	1,044	630	0.029	0.017	30	26
		C	Boat	3,140	390	0.033	0.022	105	69
			Shore	935	666	0.054	0.052	50	62
	WD	A	Boat	13,872	4,144	0.028	0.011	390	195
			Shore	424	143	0.000	0.000	0	0
		B	Boat	6,671	1,600	0.023	0.013	197	123
			Shore	819	362	0.018	0.034	15	29
		C	Boat	2,916	977	0.044	0.016	127	65
			Shore	703	415	0.046	0.054	32	44
	Total			60,236	7,725	0.029	0.005	1,740	381

Table 9. (Continued)

Month	Day-type [A]	Zone	Angler-type	Angler Effort hrs	Angler Effort (± CI) [B]	Catch Rate [C] fish/hr	Catch Rate (± CI) [B]	Harvest [DE] fish	Harvest (± CI) [B]
Dec.	WE	A	Boat	4,683	1,778	0.029	0.011	136	74
			Shore	182	97	0.066	0.084	12	17
		B	Boat	1,644	642	0.033	0.020	55	40
			Shore	182	80	0.000	0.000 [F]	0	0
		C	Boat	1,644	556	0.045	0.020	74	41
			SH	303	98	0.058	0.059	18	19
	WD	A	Boat	7,832	3,396	0.022	0.014	172	133
			Shore	261	115	0.000	0.000 [F]	0	0
		B	Boat	1,961	1,248	0.018	0.034	35	74
			Shore	340	194	0.022	0.041	7	15
		C	Boat	1,019	413	0.044	0.027	45	33
			Shore	317	260	0.258	0.237	82	106
	Total			20,368	4,157	0.035	0.008	704	212
Fall	Total			145,218	12,690	0.029	0.003	4,162	587

[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. Variable have been rounded so multiplying them may not = harvest values in table because of rounding.
[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] No fish kept by interviewed anglers, no catch rate estimate possible.

Table 10. Estimated angler effort, catch rates, and harvest for steelhead anglers on the mid-Snake River, spring 1987.

Month	Day-type [A]	Zone	Angler-type	Angler Effort hrs	Angler Effort (± CI) [B]	Catch Rate [C] fish/hr	Catch Rate (± CI) [B]	Harvest [DF] fish	Harvest (± CI) [B]
Jan	WE	A	Boat	3,626	1,745	0.027	0.018	96	82
			Shore	47	43	---	--- [E]	0	--
		B	Boat	1,092	519	0.012	0.013	13	16
			Shore	83	46	---	---	0	--
		C	Boat	889	367	0.056	0.043	52	45
			Shore	190	131	0.038	0.073	7	15
	WD	A	Boat	3,550	1,582	0.041	0.028	146	122
			Shore	202	102	---	--- [E]	--	--
		B	Boat	1,147	424	0.010	0.023	11	24
			Shore	192	195	---	---	--	--
		C	Boat	100	104	---	---	--	--
			Shore	299	243	---	---	--	--
	Total			11,419	2,504	0.029	0.011	328	145
Feb	WE	A	Boat	670	289	0.013	0.017	9	12
			Shore	79	26	---	---	0	--
		B	Boat	866	391	0.008	0.016	7	15
			Shore	47	41	---	---	0	--
		C	Boat	638	429	0.011	0.022	7	15
			Shore	283	231	---	---	0	--
	WD	A	Boat	633	668	0.012	0.022	8	18
			Shore	26	44	---	---	0	--
		B	Boat	935	378	---	---	0	--
			Shore	0	0	---	---	0	--
		C	Boat	389	399	0.078	0.111	30	--
			Shore	174	196	---	---	0	--
	Total			4,741	1,125	0.016	0.014	76	70
Mar	WE	A	Boat	327	202	---	---	0	--
			Shore	79	70	---	---	0	--
		B	Boat	93	153	---	---	0	--
			Shore	10	16	---	---	0	--
		C	Boat	421	132	---	---	0	--
			Shore	119	74	---	---	0	--
	WD	A	Boat	228	425	---	---	0	--
			Shore	109	140	---	---	0	--
		B	Boat	114	212	---	---	0	--
			Shore	109	103	---	---	0	--
		C	Boat	114	212	---	---	0	--
			Shore	0	0	---	---	0	--
	Total			1,724	627	0.000	0.000	0	0

Table 10. (Cont').

Month	Angler Effort hrs	(± CI) [B]	Catch Rate [C] fish/hr	(± CI) [B]	Harvest [DF] fish	(± CI) [B]
Spring Total	17,884	2,816	0.024	0.008	424	167

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. Variables have been rounded so when multiplied may not = table values.
E No fish kept by interviewed anglers, no catch rate possible.
F 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 11. Comparison of creel survey results for the mid Snake River, run years 1984-1986.[A]

	1984-85			1985-86			1986-87			3 Yr. Ave.	
Month	Angler Effort (hrs)	CPUE (fish/hr)	Harvest (fish)	Angler Effort (hrs)	CPUE (fish/hr)	Harvest (fish)	Angler Effort (hrs)	CPUE (fish/hr)	Harvest (fish)	Angler Effort (hrs)	Harvest (fish)
Sep.	10,124	0.020	202	14,542	0.016	237	11,245	0.016	180	11,970	206
Oct.	30,277	0.011	320	34,958	0.026	909	53,369	0.027	1,431	39,535	887
Nov.	48,214	0.038	1,811	35,771	0.036	1,298	60,236	0.029	1,740	48,074	1,616
Dec.	16,362	0.073	1,188	18,019	0.033	589	20,368	0.035	704	18,250	827
Fall Tot.	104,977		3,521	103,290	0.029	3,026	145,218	0.029	4,162	117,828	3,570
Jan.	11,474	0.054	616	9,117	0.021	187	11,419	0.029	328	10,670	377
Feb.	7,379	0.037	277	4,858	0.019	94	4,741	0.016	76	5,659	149
Mar.	3,861	--[B]	--[B]	--[B]	--[B]	--[B]	1,724	0.000	0	2,792	---
Spr. Tot.	22,714		893	13,975	0.02	282	17,884	0.024	424	19,121	533
Grand Tot.	127,691		4,414	117,265		3,308	163,102		4,586	136,950	4,103

A Data are from Mendel and Aufforth 1985, Mendel et al. 1987, and Tables 4 and 5 of this report. Note: angler effort X CPUE may not equal harvest as reported in this table because variables reported here have been rounded. Season CPUE and harvest were recalculated and are not additive (or averages) for 1985 and 1986 run years. Grand totals = sum of season totals.
B No creel survey in March 1985-86, no catch rate (CPUE) for 1984-85 because no fish seen.

Table 12. Average angler-day length for completed fishing trips on the mid Snake River, fall 1986 and spring 1987.

Month	Boat: Mean complete trip length in hours (SD)[A]	Boat: No. sampled anglers (parties,hrs.)	Shore: Mean complete trip length in hours (SD)[A]	Shore: No. sampled anglers (parties,hrs.)
Sep.	2.8 (1.00)	17 (8,47.5)	---[D]	4 (3,1.6)
Oct.	5.1 (2.39)[B]	121 (55,614.0)	3.1 (1.43)	7 (6,22.0)
Nov.	4.1 (2.16)[C]	107 (47,437.7)	3.7 (2.47)	17 (12,63.5)
Dec.	4.1 (1.86)	86 (44,353.6)	3.2 (1.87)	13 (10,41.7)
Fall Tot.	4.4 (2.21)[E]	331 (154,1452.9)	3.1 (2.17)	41 (31,128.8)
Spr. Tot.	4.3 (1.97)	40 (21,171.1)	---[D]	2 (2,1.3)

A SD = standard deviation.
B Weekend and weekdays combined. Oct. WE mean = 5.1, SD = 2.46, n = 107 anglers (48 parties), Oct. WD mean = 4.7, SD = 1.86, n = 14 (7 parties).
C Weekend and weekdays combined. Nov. WE mean = 3.9, SD = 2.34, n = 66 anglers (26 parties), Nov. WD mean = 4.4, SD = 1.85, n = 41 (21 parties).
D insufficient sample size for a valid estimate.
E Combined weekends (WE) and weekdays (WD). See footnotes B & C.

30,485 (134,132 / 4.4) angler days were expended by boat anglers and 3,577 angler days (11,089 / 3.1) by shore anglers during the fall of 1986. Approximately 3,682 (15,832 / 4.3) and 660 (2,047 / 3.1) angler days were expended by boat and shore anglers, respectively, to catch steelhead in the spring of 1987. Much more angler effort and harvest occurred on Lower Granite reservoir than on the mid-Snake R. in the spring of 1987, similar to 1986. Estimates for the average length of a boat angling trip during spring are based on a small sample of anglers and should be used cautiously. No estimate could be made for shore anglers during spring 1987.

The average size of harvested fish was largest during November through January (Table 13) when Dworshak Hatchery "B run" steelhead were wintering in the area. Fish with clipped fins comprised 86.5 % of the harvest in the fall, and 88.8 % during spring. Washington punchcards were used for only a about 38 % of the harvested fish, except in February.

Grande Ronde River

Angler effort was highest throughout the season in zone D which is the catch-and-release zone near the mouth of the river (Table 14 - Variables used in calculating angler effort and catch rate are presented in Appendix D). Angler effort per mile was generally highest in the zones nearest the mouth of the river while the consumptive fishery area near the Oregon State line had the least use (Appendix E). Average catch rates were highest in October (0.10 fish/hr.), but remained quite high through November (0.06 fish/hr.). Anglers using artificial flies or lures predominated on the Grande Ronde, even in the wild steelhead release areas (Appendix F). Most steelhead caught were released even within the consumptive fishery zones. We saw only 2 steelhead that were retained during the entire creel survey, while 59 steelhead were reported as released. Unfortunately we have no idea what percentage of the released fish had to be released because they were unclipped or wild fish.

Approximately 1,571 angler days were expended by anglers on the Grande Ronde River with an average completed fishing trip of 4.4 hours (Table 15). Boat anglers contributed only 1,074 hours to the total fishing effort for the season (Appendix E), and we have no estimate of an average completed boat trip. Boaters were most frequently encountered in the consumptive fishery area at Shumaker (zone E1) during October. Most boaters we met indicated they were spending 2-4 days floating down the river while fishing, hunting and camping.

Table 13. Data from steelhead observed in angler creels along the mid-Snake River, fall 1986 and spring 1987.*

Month (n)#	Mean fork Length (cm) Std.dev. (n)#	Mean wt. (kg.) Std. dev. (n)#	% Female (n)#	% fish with No marks (n)#	% Adipose Clipped (n)# **	% Ventral clipped (n)#	% zone A caught (n)#	% zone B caught (n)#	% steelhead on WA punchcard (n)#
Sep. (11)	69.8 9.85 (9)	2.6 - (1)	77.8 (9)	0.0 (9)	100.0 (9)	0.0 (9)	54.5 (11)	27.3 (11)	37.5 (8)
Oct. (143)	68.1 12.15 (130)	3.3 1.66 (50)	55.8 (129)	14.0 (129)	78.3 (129)	7.8 (129)	35.2 (142)	33.8 (142)	36.0 (125)
Nov. (176)	73.2 12.74 (161)	4.7 2.02 (41)	49.1 (161)	12.9 (163)	72.4 (163)	14.7 (163)	39.8 (176)	30.7 (176)	40.0 (145)
Dec. (102)	73.7 13.51 (98)	5.3 2.14 (21)	32.7 (98)	15.2 (99)	76.8 (99)	8.1 (99)	38.2 (102)	14.7 (102)	38.5 (96)
Fall Tot. (432)	71.6 12.90 (398)	4.2 2.04 (113)	47.9 (397)	13.5 (400)	76.0 (400)	10.5 (400)	38.3 (431)	27.8 (431)	38.2 (374)
Jan. (41)	74.6 11.08 (40)	5.2 1.49 (16)	61.0 (41)	16.7 (36)	72.2 (36)	11.1 (36)	56.1 (41)	9.8 (41)	37.5 (32)
Feb (11)	63.9 9.38 (11)	3.1 2.20 (3)	54.6 (11)	36.4 (11)	45.5 (11)	18.2 (11)	27.3 (11)	9.1 (11)	72.7 (11)
Mar.	NO FISH SEEN								
Spr. Tot. (52)	72.3 11.54 (51)	4.8 1.74 (19)	59.6 (52)	21.3 (47)	66.0 (47)	12.8 (47)	50.0 (52)	9.6 (52)	46.5 (43)

* 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. - Not included in n.
@ includes wild fish (5) in fall and(2)in spring.
** All adLv or Rv are listed under ventral clipped and not under ad clipped.

Table 14. Estimated angler effort, catch rates, and harvest for steelhead anglers on the Grande Ronde R., fall 1986.

Month	Zone [B]	Angler Effort hrs	(± CI)	Catch Rate fish/hr	(± CI)	Harvest [A] # of fish
Sep	D	324	237			
	D1	77	69			
	E1 *	70	124			
	B1	196	60			
	A	157	105			
	Total	827	302			3
Oct	D	1,942	1,024			
	D1	618	306			
	E1 *	1,288	854			
	B1	636	260			
	A	351	74			
	Total	4,834	1,396	0.0205 [C]	0.2213	77
Nov	D	476	393			
	D1	189	115			
	B1	472	172			
	A	127	95			
	Total	1,263	454			39
Dec	D	53	60			
	D1	21	32			
	Total	74	68			71
Fall Total D1-B1	*	2,553	568	Catch and Keep - shore anglers only 0.0056 [C]	0.00744	
Fall Total ALL	*	6,999	1,499			200 [D]

A Harvest estimates from WDG punchcard returns. Estimates not possible from creel survey.

B Zone D is a catch and release area from the mouth to the County bridge (2.5 miles), D1 is from the bridge upstream to "The Narrows" (approx. 2 miles), E1 is Shumaker Grade area (6 miles), B1 is just below Bogan's at Rattlesnake Grade to Cougar Creek (7 miles), Zone A is Cougar Creek to Oregon State Line (5 miles). All zones labels ending in 1 are wild steelhead release (catch and Keep) zones.

* Use data from zone E1 with caution because few angler days sampled and only 1 count per day. No sampling in E1 in November or December because of bad roads.

C Only 2 fish kept by anglers were seen during the entire creel survey - both fish by shore anglers in November.

D Includes 10 fish estimated to have been harvested in August - however the season did not open until 1 Sept.

Table 15. Average angler-day length for shore anglers with completed fishing trips on the Grande Ronde River, fall 1986.

Day-type	Mean complete trip length (hrs)	(SD)[A]	No. sampled anglers	No. sampled (parties, hrs.)
WE	4.9	(3.86)	26	(14, 128.75)
WD	3.4	(2.55)	15	(9, 51.0)
Fall Tot.	4.4	(3.49)	41	(23, 179.75)

A SD = standard deviation.

Other Streams

Catch rate and catch composition data were collected by sampling mainly weekend days 2-3 times per month. We surveyed 6 days in the fall and 6 days in spring (5.7 % of days available) for the Walla Walla River and Mill Creek. Ten days (9.5 %) were sampled on the Touchet River, and 11 days (10.0 %) on the Tucannon River in the spring of 1987. Sampling periods ranged from 11 November to 20 February on the Walla Walla R. and Mill Creek, and 1 March to 5 April on the Touchet River. We were unable to locate any anglers on the Tucannon R. until 8 February, and we sampled there until 5 April.

Harvest estimates from punchcard returns indicate a substantial steelhead fishery existed on the Walla Walla River (Table 16). Access is limited and surveying this river is difficult and time consuming. Only 9 retained steelhead were seen during our creel surveys on this river (Table 17). Eleven other steelhead were seen from the Touchet and Tucannon rivers.

Size and Age of Sampled Steelhead

We collected and analyzed 386 scale samples from the steelhead fishery (Table 18). The results of our scale analysis are similar to those for 1985-86 (Mendel et al. 1987) with 1 salt (remained in salt water 1 year) steelhead comprising over 50 % of the sample. Considerable overlap exists among fork lengths of 1, 2,and 3 salt steelhead (Fig. 2).

Table 16. Harvest estimates from punchcard returns for the Walla Walla, Touchet, Tucannon rivers and Mill Creek, fall 1986 and spring 1987 (from WDG 1987).*

Month	Tucannon R.	Touchet R.	Walla W. R.	Mill Ck.
Sep.	7	0	4	0
Oct.	5	0	252	0
Nov.	3	6	248	0
Dec.	5	34	445	13
Jan.	0	15	159	0
Feb.	5	17	167	6
Mar.	86	151	250	15
Apr.	95	68	59	6
Total	206	291	1,584	40

Table 17. Data for steelhead in angler creels along Mill Creek and the Walla Walla, Touchet and Tucannon Rivers, fall 1986 and spring 1987.

Season	WDG mgmt. sec.[A]	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	194	60.8 (4)	3.71	25.0 (4)	0 (4)	100.0 (4)	4
	185	--	--	--	--	--	--
	189	--	--	--	--	--	--
Fall Total		60.8 (4)	3.71	25.0 (4)	0 (4)	100.0 (4)	4
Spring	194	66.0 (5)	6.06	40.0 (5)	20.0 [C] (5)	60.0 (5)	5
	185	61.1 (8)	2.26	75.0 (8)	0 (8)	100.0 (8)	8
	189	60.0 (3)	4.06	66.0 (3)	0 (3)	100.0 (3)	3
Spring Total		62.3 (16)	--	68.7 (16)	6.25 (16)	87.5 (16)	16

A WDG fishery mgmt sections: 194=Walla Walla River; 106=Mill Cr.; 185=Touchet River, and 189=Tucannon River.
B # of fish sampled.
C does not include one unclipped hatchery fish included in total.

Table 18: Scale analysis for sport caught steelhead, fall 1986 and spring 1987.

	Number	Percent of Total	% of Hatchery or Wild	Mean Length (cm)	Std. dev.
Total Samples	386	100.00			
Unreadable Samples	0	0.00			
Readable Samples *	386	100.00			
Hatchery Fish	373	96.63	100.00		
1 Salts	211	54.66	56.57	61.54	4.802
2 Salts	149	38.60	39.95	81.06	6.238
3 Salts	13	3.37	3.49	85.27	4.284
Wild Fish **	13	3.37	100.00		
1 Salts	8	2.07	61.54	59.75	4.743
2 Salts	4	1.04	30.77	82.30	8.941
3 Salts	1	0.26	7.69		
Respawners	0	0.00	0.00		

* Eleven scale samples were regenerated so years in fresh water could not be determined. All these samples are included in the Hatchery group.

** 2 Adipose clipped and 1 L. ventral clipped fish included in this group scale analysis indicated wild origin (2 yrs freshwater).

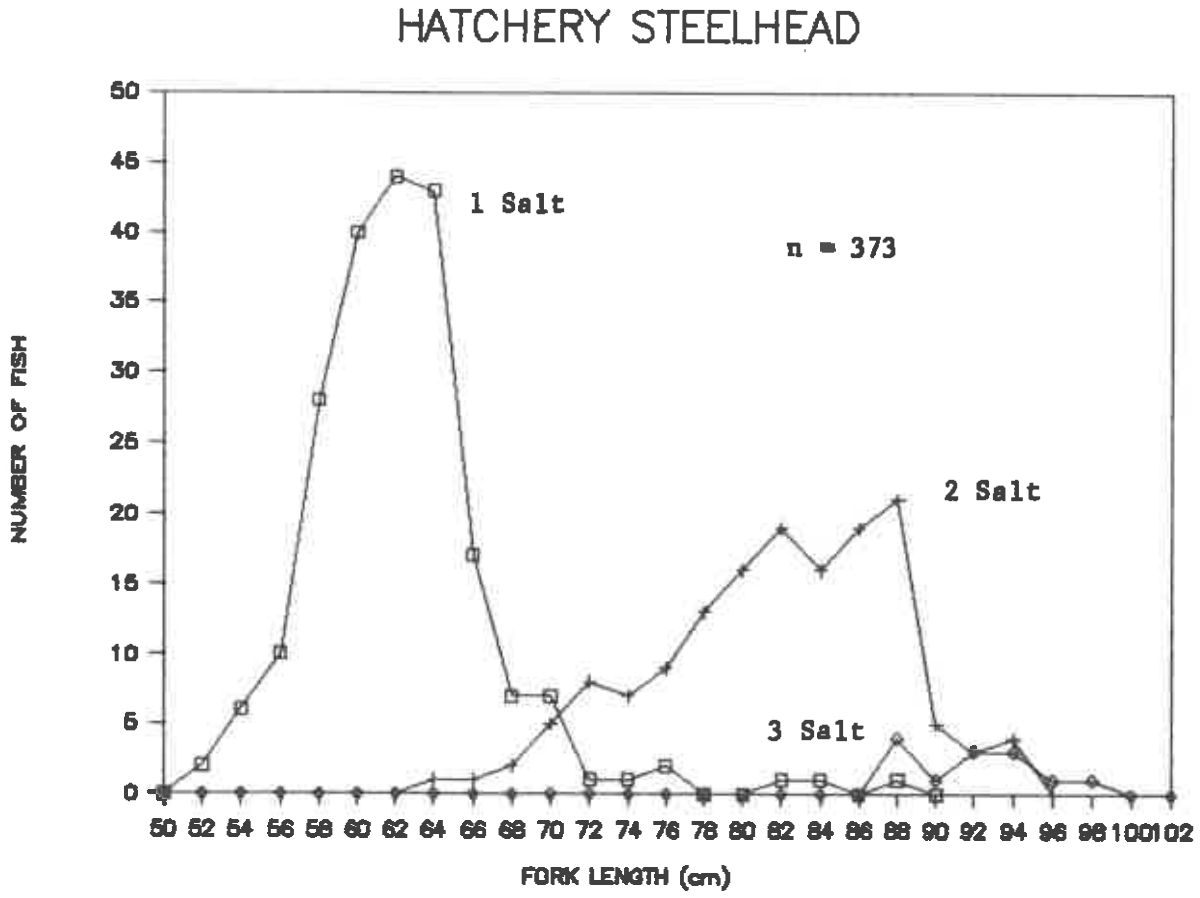


Figure 2. Length-frequency and duration of saltwater residency (from scale samples taken by WDG) for hatchery steelhead from the Snake River sport harvest, fall 1986 and spring 1987.

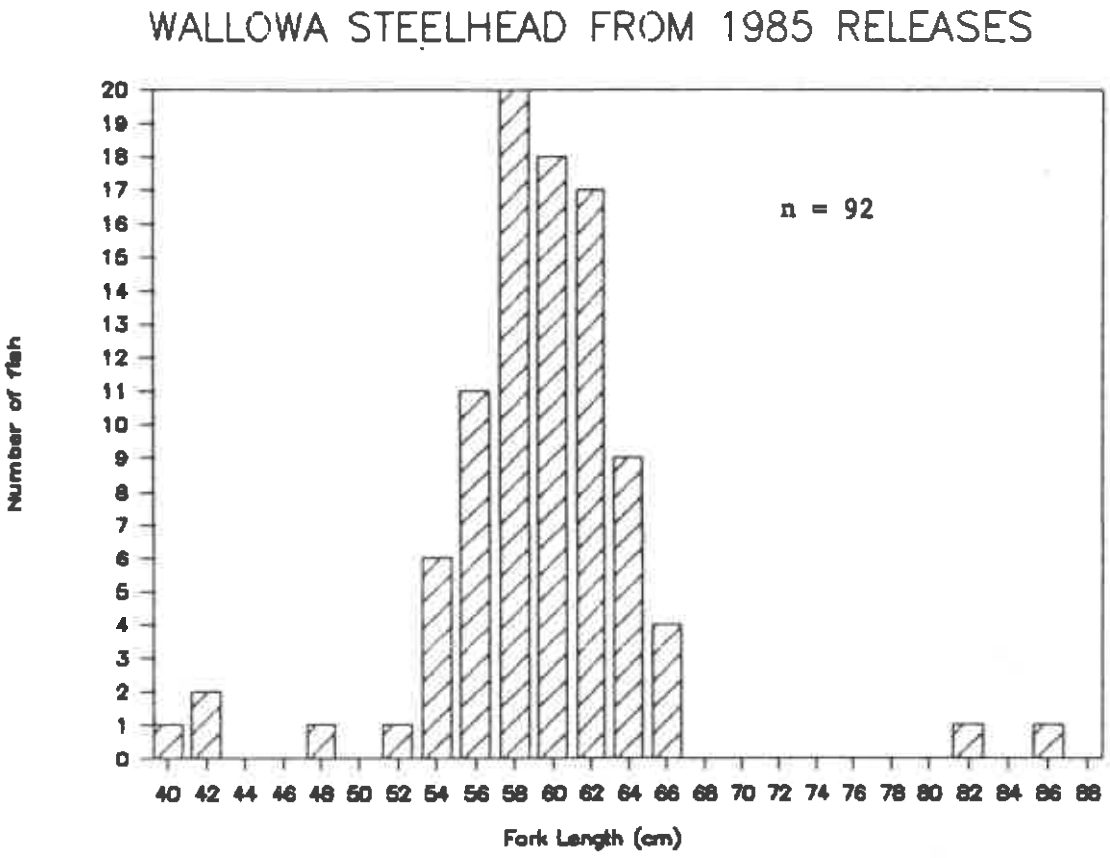
All 1986 run year recoveries of marked steelhead of Lyons Ferry Hatchery (LFH) origin containing length or sex information are reported in Appendix G. These data were used for length-frequencies, sex ratios, mean length, and length-weight relations of 1984 and 1985 mark groups (3 fish were not included in the histograms because they were reported too late: 66 cm F, 62/16/27; 59 cm M, 62/16/29; 58 cm F, 62/16/30).

Length-frequencies of 1985 LFH mark groups are similar for both Wallowa and Wells stocks of steelhead (Fig. 3). Those LFH fish less than 50 cm are presumably steelhead that remained in freshwater, while all others had resided in the ocean for 1 year (1 salt) or more. Steelhead from 1985 releases that are larger than 68 cm don't appear to be from 1 salt populations. Although, our limited scale data for these fish tend to confirm that they are 1 salts. The 1 salt fish >80 cm show a substantial overlap with 2 salt (1984 releases) fish (Fig. 4); and would be incorrectly aged by length-frequency analysis (Fig.5). We are uncertain whether this overlap represents errors in our data, errors in scale reading, or is indicative of reality. All recovered 1984 mark groups are from Tucannon River releases, thus we do not have any 2 salt recoveries for the Grande Ronde River releases.

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, 1986). Data for individual fish included in our scale analysis are on file in the District office.

Recovered Wells fish had a high incidence of males (2.46 males/female, n = 45 fish sampled) and had a mean fork length of 59.9 cm (SD = 4.78, n = 46, total of 47 fish recovered). Wallowa steelhead from 1985 releases had a 1.47 male/female ratio (n = 94 fish) and averaged 59.6 cm in fork length (SD = 4.82, n = 91, excluding fish < 50 cm). Wallowa fish from 1984 releases had only a 0.29 male/female ratio and averaged 73.6 cm in fork length (SD = 3.02, n = 22 fish).

The general relation between length and weight for recovered LFH steelhead is presented in Figure 6. This relation is based on a small sample of fish and 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.



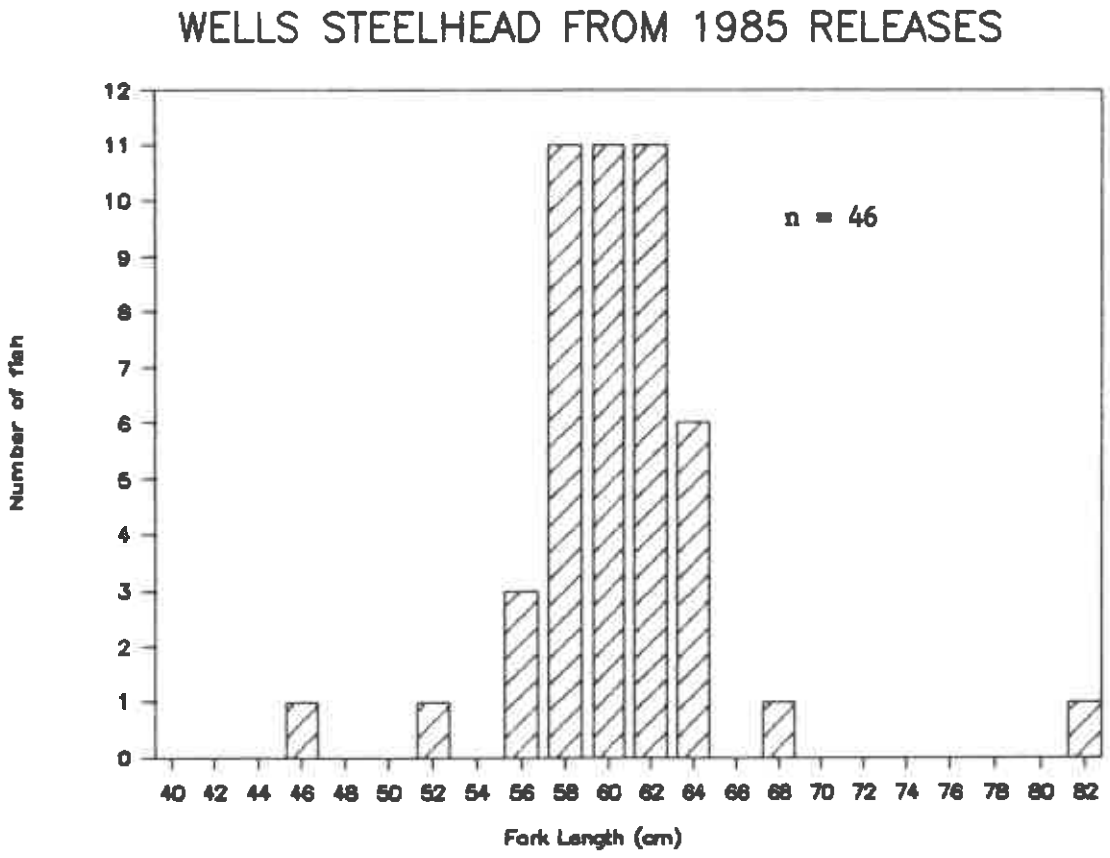


Figure 3. Length-frequencies for 1 salt returns, -Lyons Ferry Hatchery steelhead (various recoveries for 1986 run year).

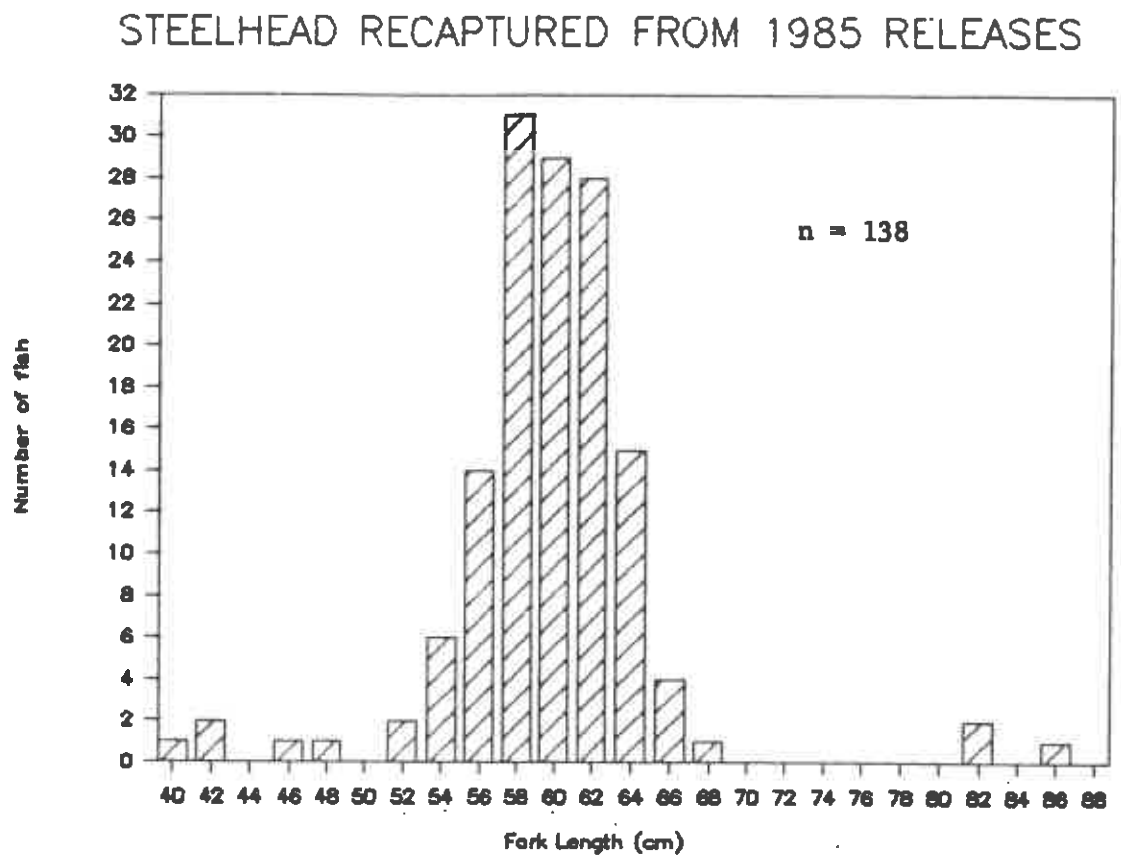


Figure 4. Length-frequencies for 1 salt (both stocks) and 2 salt LFH steelhead recovered during the 1986 run-year.

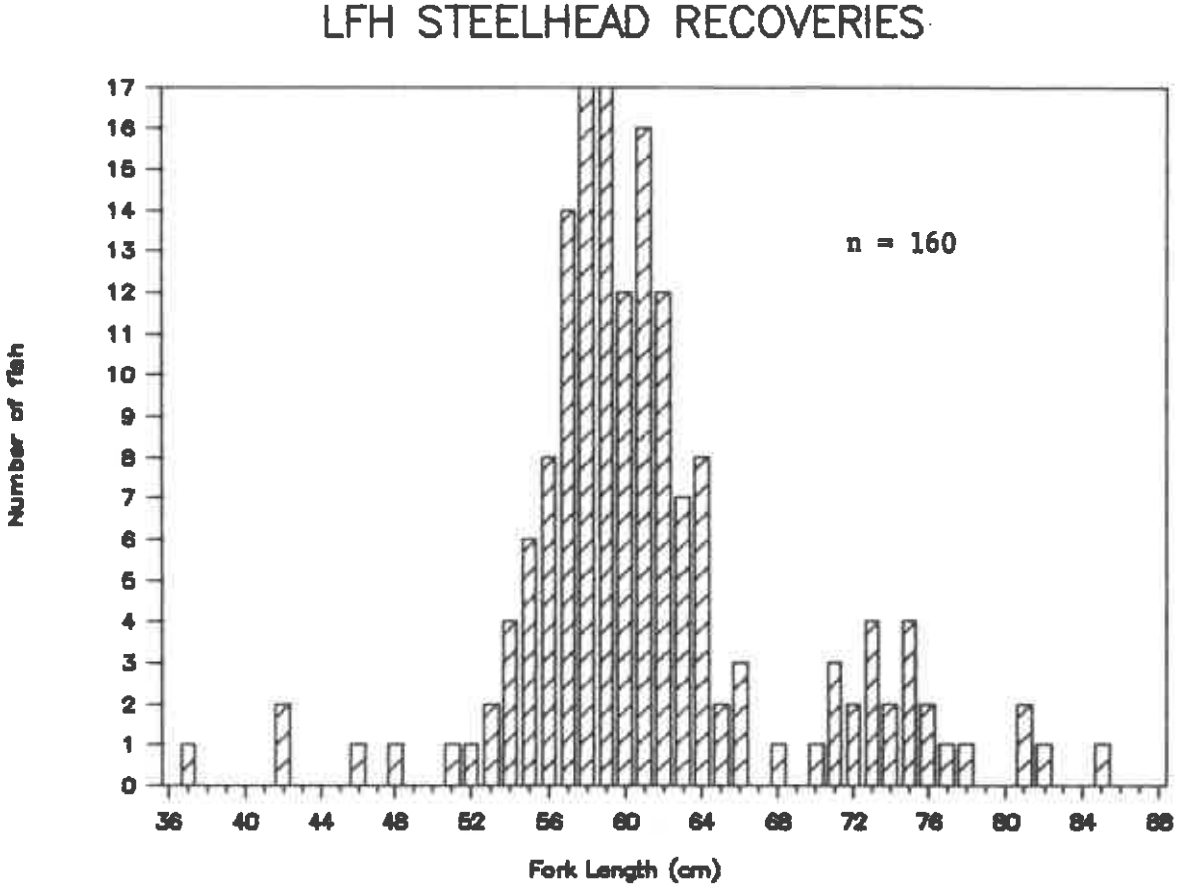


Figure 5. Length-frequency for combined 1 and 2 salt steelhead from Lyons Ferry Hatchery recovered during the 1986 run-year.

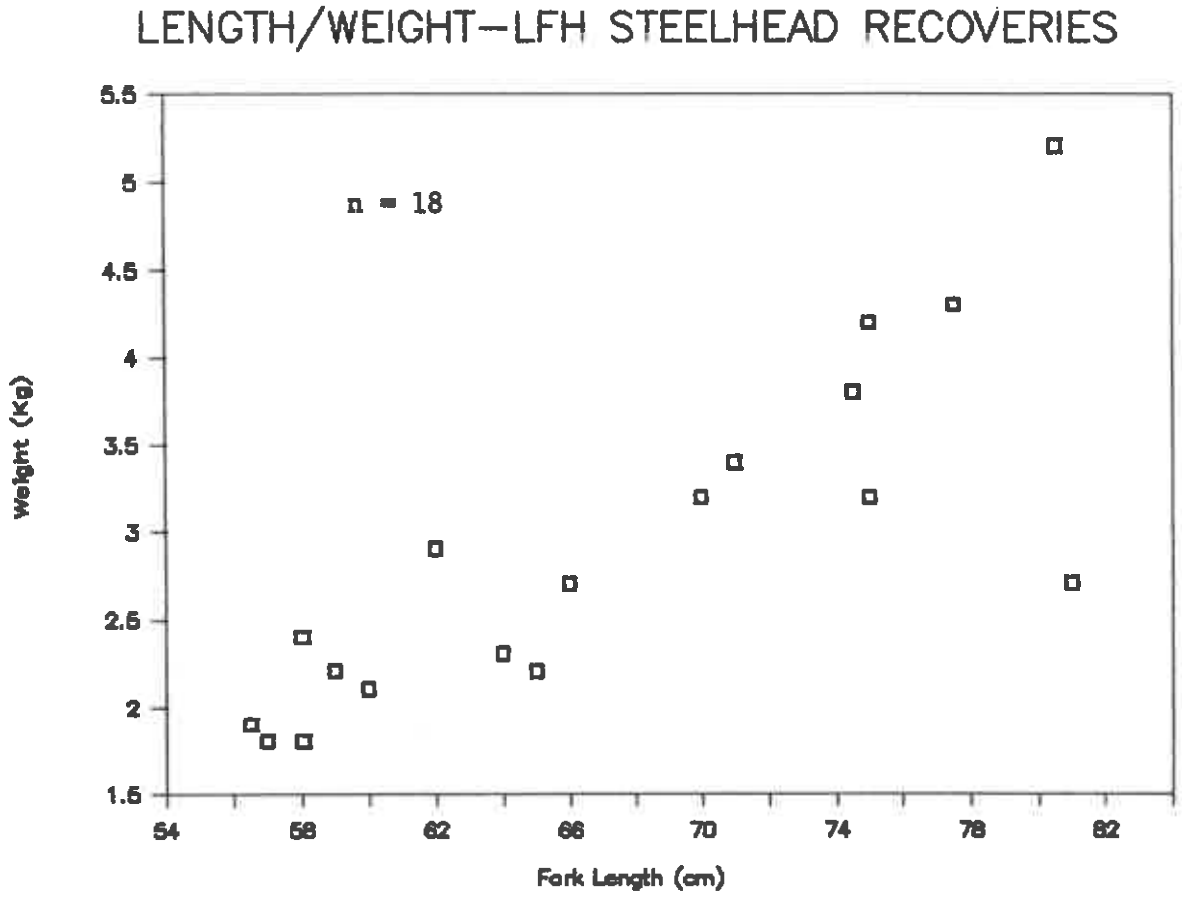


Figure 6. Length-weight relation for LFH steelhead recovered during the 1986 run-year.

"B run" and 2 salt steelhead were more common in the harvest this year than last year (as indicated by the mean lengths of fish caught in the mid Snake River and L. Granite Reservoir). Mean fork length of steelhead caught in various areas of the Snake River are significantly different (Table 19, ANOVA, $F = 41.35$, $df = 3, 651$). A Tukey's Test (Zar 1984) was used to determine which portions of the Snake River contained harvested fish of significantly different mean lengths. Steelhead caught in Zone A, near the confluence of the Clearwater River, were significantly larger than fish from any other area on the upper Snake River, while steelhead from Zone C (above Red Bird Creek) were significantly smaller than for all other areas (Table 20). Fish from Zone B and L. Granite (LG) Reservoir were of similar size.

Table 19. Comparison of mean fork lengths (cm) of steelhead caught in various sections of the Snake River, WDG mgmt. section 168, fall 1986 and spring 1987.

Month	LGR		Zone A		Zone B		Zone C	
	Len	SD (n)	Len	SD (n)	Len	SD (n)	Len	SD (n)
Sep.	69.1	13.01 (8)	73.0	9.4 (6)	63.3	8.5 (3)	---	(0)
Oct.	69.6	12.11 (47)	73.0	13.06 (48)	67.4	11.50 (45)	62.5	8.92 (37)
Nov.	71.0	12.32 (70)	80.6	9.75 (66)	73.1	13.26 (47)	63.2	8.32 (48)
Dec.	74.4	11.46 (136)	83.2	9.26 (39)	77.0	14.46 (16)	63.9	9.20 (43)
Fall Total**	72.5	11.97 (261)	78.6	11.44 (159)	71.1	13.05 (111)	63.4	8.85 (124)
Jan.	75.8	11.26 (100)	79.3	8.38 (22)	83.1	15.02 (4)	64.9	6.52 (14)
Feb.	69.8	13.85 (9)	71.7	16.13 (3)	63.0	--- (1)	60.7	4.21 (7)

** Signif. difference among mean lengths for various areas in WDG mgmt. section 168. ANOVA F = 41.351, $F_{0.005(1),3,651} = 5.91$ (Zar 1984).

Table 20. Tukey's Tests of mean fork lengths of steelhead harvested from various locations in the Snake River, fall 1986.

- k (# groups) = 4
- error Mean Square = 132.5644 (from ANOVA)
- error degrees of freedom (df) = 651
- Standard Error (SE: for unequal group sizes) $= \sqrt{\frac{s^2}{2}\left(\frac{1}{n_A} + \frac{1}{n_B}\right)}$
- $q = \frac{\bar{x}_1 - \bar{x}_2}{SE}$

locations (zones):	C	B	LG	A
samples ranked by means:	1	2	3	4
ranked sample means:	63.35	71.09	72.50	78.90
size of samples:	124	111	261	159

	Difference	SE	q	Table value 651,4 $q_{0.001}$
A vs C *	78.64 - 63.35 = 15.29	0.9754	15.68	5.309
A vs B *	78.64 - 71.09 = 7.55	1.0070	7.50	"
A vs LG*	78.64 - 72.50 = 6.14	0.8190	7.50	"
LG vs C*	72.50 - 63.35 = 9.15	0.8880	10.30	"
LG vs B	72.50 - 71.09 = 1.41	0.9225	1.53	"
B vs C *	71.09 - 63.35 = 7.74	1.1064	7.28	"

* significantly different mean lengths (α= 0.001).

Coded-Wire Tag Recovery

Snouts were collected, or brands and jaw tags were read, by WDG personnel from 262 steelhead that had adipose or left ventral fin clips. One snout was lost, but all others were examined by NMFS personnel for coded-wire tags (cwts). Seventy-one recoveries were made of cwts or brands/jaw tags representing 19 different cwt codes and 5 separate brand groups. A total of 59 cwts from LFH origin steelhead were recovered by WDG or IFG personnel from the Snake River and used in our expansions. These cwts included 1984 releases into the Tucannon River Basin (63- codes), and 1985 releases at Lyons Ferry Hatchery (codes 62-16-44 or 45), Tucannon River at Curl Lake, (codes 62-16-29 or 30) and at Cottonwood Pond on the Grande Ronde, (codes 62-16-27 or 28). Brand groups recovered included RA-7S-1 (Water Budget Release at Ice Harbor Dam), RA-7N-1 (Water Budget Release at L. Goose), RA-H-1 (LFH release), LA-J-1, and a LA-H-1 (misread?). All cwts recovered by WDG personnel and estimates of the expanded harvests by individual tag code are presented for Lower Granite and the lower Snake

River (Table 21). WDG and IFG cwt recoveries are expanded for the mid Snake R (Table 22) but IFG recoveries above the Grande Ronde had to be excluded because we were unsure whether these fish were caught below the Oregon State Line within our management section 168. Details of sampled or voluntary recoveries are presented in Appendix H.

IFG also sampled LFH cwts from several other river locations (Kent Ball, IFG, pers. comm). LFH cwt recoveries and expanded harvest estimates for Idaho sampling efforts are presented in Appendix I.

A partial list of hatchery or spawning survey recoveries of brands and cwts for spring 1987 is in Appendix G. Other recoveries at LFH will be analyzed in the Part II 1986-87 Annual Report.

We have corrected our 1985-86 cwt data from our previous report (Mendel et al. 1987). Revised cwt expansions for 1985-86 are presented in Appendix J. Revision was necessary because the original expansions inadvertently contained fish sampled by IFG in the sample rate, but not in the cwt recoveries. Thus, our revised sampling rate has decreased and the expansions have increased dramatically.

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 for 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 total number of jaw tags attached at Lower Granite Dam during the season and the total return of tags from the sport fishery provide the numbers to calculate a simple estimate of sport exploitation, by group and by year (Table 23).

The calculated exploitation rates by brand group for the three years are very similar and appear to be low for all 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). However, they use a different method to calculate exploitation rates than we do so the numbers are not directly comparable. As a check of our exploitation rates we used WDG punchcard harvest estimates compared with estimates of hatchery steelhead over Lower Granite Dam (Table 24). Results are similar to those from our jaw tags.

Table 21. Coded-wire tag expansions for L. Granite Reservoir and the lower Snake R., fall 1986 and spring 1987.

Sec.[A]	Season[B]	Estimated Harvest[C]	# Fish Checked (Sample Rate)[D]	# Fish Marked[E] (Mark Rate)[F]	# Snouts Taken[E]	# Snouts Checked (# cwt, no tags)	Total Estimated # Fish Marked[G] (% w/ cwt)[H]	Total Estimated cwt in Harvest[I]	CWT code	# Tags Recovered	Expanded tags in Harvest (by code)[J]
LGR 168	Fall	1825	264 (.1447)	140[K] (.5303)	122[L]	122 (31,91)	967.8 (25.41)	245.92	5-13-35	3	24
									10-26-32	1	8
									23-16-17	1	8
									23-16-38	1	8
									23-16-39	1	8
									23-16-46	2	16
									62-16-28	2	16
									62-16-44	10	79
									63-32-12	1	8
									63-32-14	6	48
									63-32-15	1	8
									RA-7M-1	1	8
									RA-M-1	1	8
										---	---
										31	247
LGR 168	Spring	800	117 (.1463)	72[M] (.6154)	67[M]	67[M] (11,56)	492.3 (16.42)	80.83	10-25-17	1	7
									23-16-44	1	7
									23-16-45	1	7
									63-32-12	2	15
									63-32-14	2	15
									63-32-15	2	15
									62-16-44	1	7
									LA-J-1	1	7
										---	---
										11	80
L.GN. 167	Fall	320	41 (.1281)	17 (.4146)	12	12 (2,10)	132.7 (16.67)	22.12	62-16-44	1	11
									RA-7B-1	1	11
										---	---
										2	22
L.GN. 167	Spring	273	20 (.0733)	12 (.6000)	10	10 (2,8)	163.8 (20.00)	32.76	62-16-45	1	16
									10-28-07	1	16
										---	---
										2	32

Table 21. (Continued)

Sec.[A]	Season[B]	Estimated Harvest[C]	# Fish Checked (Sample Rate)[D]	# Fish Marked[E] (Mark Rate)[F]	# Snouts Taken[E]	# Snouts Checked (# cwt, no tags)	Total Estimated # Fish Marked[G] (% w/ cwt)[H]	Total Estimated cwt in Harvest[I]	CWT code	# Tags Recovered	Expanded tags in Harvest (by code)[J]
L.SN. 164-166	Fall	1726	71 (.0411)	29 (.4085)	23	23 (2,21)	705.0 (08.70)	61.33	62-16-29 LA-H-1	1 1 --- 2	31 31 --- 62
L.SN. 166	Spring	290	7 (.0241)	2 (.2857)	2	2 (1,1)	82.9 (50.00)	41.43	62-16-28	1 --- 1	41 --- 41

A L. Granite Dam (LGR) up to Red Wolf BR., L.Sn.= Lower Snake R. below LGR.
B Fall = 1 Sept. to 31 Dec., Spring = 1 Jan. to 31 Mar.
C Estimated harvest from other tables in this report for LGR, otherwise from WDG statewide harvest estimates derived from punchcard returns.
D (# Fish checked / estimated harvest) = sample rate.
E Adipose clipped steelhead >=70cm were sampled for cwts by using a metal detector or the snouts were taken for examination. 1 cwt was found in a large adipose clipped fish during the fall and 1 cwt in spring. Jaw tagged, ventral clipped, or branded fish are included in addition to those from which we took snouts.
F (# of fish fin clipped / # fish checked) = mark rate.
G (Total harvest x mark rate) = estimated # of fin marked fish in harvest.
H (# tags and brands / # snouts checked) x 100 = % of snouts with cwt's or other marks.
I (Estimated total marked fish x proportion of snouts with tags) = # tags in harvest.
J (# recoveries of a tag code / total # tags) x Estimated marks in harvest = estimated tag codes in the harvest (expanded).
K 106 adipose clipped fish >= 70cm included.
L 69 adipose clipped fish checked with a detector and 21 other snouts from ad. clipped fish taken.
M 63 adipose clipped fish >= 70cm included.
N 44 Adipose clipped fish checked with detector and 13 additional snouts taken.
O Only fish in section 167 were checked.

Table 22. Coded-wire tag expansions for the mid Snake R., fall 1986 and spring 1987.

Sec.[A]	Season[B]	Estimated Harvest[C]	# Fish Checked[D] (Sample Rate)[E]	# Fish Marked[F] (Mark Rate)[G]	# Snouts Taken[H]	# Snouts Checked (# tags, no tags)	Total Estimated # Fish Marked[I] (% w/tags)[J]	Total Estimated cwt in Harvest[K]	CWT code	# tags Recovered	Expanded cwt in Harvest (by code)[K]
Mid	Fall	4162	203	23	21[M]	21	471.56	426.67	10-25-17	1	23
168	MDB		(.0488)	(.1133)		(19,2)	(90.48)		10-25-21	1	23
									10-25-46 *	1	23
									23-16-46	1	23
									62-16-27	4	90
									62-16-28	5	112
									62-16-44	3	67
									63-32-12	1	23
									63-32-14	1	23
									63-32-15	1	23
										19	430
Mid	Fall		194[N]	15[N]	14[N]	14[N]			10-25-17	1	
01	IFB[L]					(12,2)			10-25-19	1	
									10-26-32	1	
									10-28-06	1	
									23-18-16	1	
									62-16-27	2	
									62-16-28	2	
									62-16-29	1	
									62-16-30	2	
										12	
COMBINED		4162	397	38	35	35	398.38	352.84	10-25-17	2	23
FALL			(.0954)	(.0957)		(31,3)	(88.57)		10-25-19	1	11
									10-25-21	1	11
									10-26-32	1	11
									10-25-46	1	11
									10-28-06	1	11
									23-18-16	1	11
									23-16-46	1	11
									62-16-27	6	68
									62-16-28	7	80
									62-16-29	1	11
									62-16-30	2	23
									62-16-44	3	34
									63-32-12	1	11
									63-32-14	1	11
									63-32-15	1	11
										31	349

Table 22. (Continued)

Sec.[A]	Season[B]	Estimated Harvest[C]	# Fish Checked[D] (Sample Rate)[E]	# Fish Marked[F] (Mark Rate)[G]	# Snouts Taken[D]	# Snouts Checked (# tags, no tags)	Total Estimated # Fish Marked[H] (% w/tags)[I]	Total Estimated cwt in Harvest[J]	CWT code	# tags Recovered	Expanded cwt in Harvest (by code)[K]
Mid 168	Spr. WDW	424	35 (.0825)	5 (.1429)	5	5 (3,2)	60.57 (60.00)	36.34	10-25-17	1	12
									62-16-28	1	12
									62-16-44	1	12
										3	36
Mid 01	Spr. IFG [L]		11	2	1	1 (1,0)			63-32-14	1	
COMBINED		424	46	7	6	6	64.52	43.01	10-25-17	1	11
	SPRING		(.1085)	(.1522)		(4,2)	(66.67)		62-16-28	1	11
									62-16-44	1	11
									63-32-14	1	11
										4	44

A Mid-mid Snake river from Oregon State Line to Red Wolf Bridge in Clarkston.
B Fall = 1 Sept. to 31 Dec., Spring = 1 Jan. to 31 March.
C Estimated harvest from other tables in this report.
D Adipose clipped steelhead >=70cm were sampled for cwts by using a metal detector or a snout was taken by WDW but IFG sampled only ventral clipped fish. No cwts were found on any of these large adipose clipped fish. Thus, only ventral clipped, jaw tagged, or branded fish are included here for both agencies.
E (# Fish checked / estimated harvest) = sample rate.
F (# of fish marked / # fish checked) = mark rate.
G plus 5 voluntary returns. (4 cwts = 62/16/27, 1 cwt = 10/25/17).
H (Total harvest x mark rate) = estimated # of fin marked in harvest.
I (# tags / # snouts checked) x 100 = % of snouts with tags.
J (Estimated total marked fish x proportion of snouts with tags) = # tags in harvest.
K (# recoveries of a tag code / total # tags) x Estimated tags in harvest = estimated tag codes in the harvest (expanded).
L Includes all available jaw tags. Data for fish checked above the Grande Ronde R. is not included unless we could discern whether it was from below the Oregon state line. (3 cwts from above G. Ronde R., 2 cwts = 62/16/27, 1 cwt = 62/16/28). Fish harvested on either Idaho or Washington punchcards are included here.
M Includes 2 jaw tag recoveries without snouts taken.
* LA-J-1 was actually seen but cwt may be 10-25-44, 45, or 46.

Table 23. Estimates of sport exploitation of tagged/branded steelhead groups passing L. Granite, 1984-86 run years.

Release Year	Brand	# Fish Examined	Number of fish jaw tagged (%)	# Sport Recoveries	Percent Exploit.
1983	LA-S-1	679	206 (30.34)	25	12.14
	RA-S-1	336	112 (33.34)	8	7.14
	RA-S-2	268	104 (38.80)	9	8.60
		1,283	422 (32.89)	42	9.29
1984	RA-IJ-1	299	197 (65.88)	18	9.13
	RA-IJ-2	238	179 (75.21)	15	8.37
	RA-IV-1	381	274 (71.92)	24	8.74
	RA-IV-3	498	350 (70.28)	27	7.71
		1,416	1,000 (70.62)	84	8.49
1985 *	LA-S-1	109	71 (65.14)	6	8.45
	LA-S-2	96	58 (60.42)	3	5.20
	RA-H-1	548	317 (57.85)	27	8.52
	RA-H-2	120	52 (43.33)	0	0
	RA-17-1	664	329 (49.55)	26	7.90
	RA-17-3	557	257 (46.14)	17	6.61
		2,094	1,084 (51.76)	79	7.25 **

* Returns of jaw tags attached during the fall of 1985 are incomplete for all of these groups. Numbers and percentages for 1985 releases will change in 1988.

** Excluding RA-H-2 brand groups.

Table 24. Exploitation rates calculated from creel harvest estimates and steelhead passage at Lower Granite Dam.

Run Year [A]	L. Granite Dam Count [B]	% Wild [C]	# Wild	# Hatchery	Creel Harvest Estimate [D,E]	% Exploitation rate
1984	104,523	24.00	25,086	79,437	7,592	7.3
1985	116,063	23.01	26,706	89,357	5,497	4.7
1986	129,972	20.40	26,514	103,458	7,211	5.5

A July 1 to June 30.
B Corps of Engineers, 1985-87.
C IFG scale age data, Tim Cochnauer, pers. comm.
D In 1984 only Hatchery fish could be retained until Nov. 15, then all fish could be kept. In 1985 and 1986 retained fish had to have dorsal fins less than 2 in. in height.
E See Tables 6 and 11 of this report.

Comparison with Other WDG Estimates

WDG Punchcard-Derived Estimates

Although it is required by law that all punchcards be returned into WDG after the season closes, (and there is now a $5.00 rebate) only 545 of 1,738 punchcards initialed by WDG employees in the field were returned by steelhead anglers from southeast Washington. This 31.36 % return rate exceeded the 28.46 % that was returned statewide (B. Taylor, WDG, pers. commun.). Successful anglers represented 77.25 % of the initialed punchcards returned from southeast Washington, whereas the statewide average was 57.29 %.

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.

We identified small sample sizes for recovery of coded wire tag (cwt) groups as a deficiency in sport harvest sampling that should be corrected (Mendel et al. 1987). Given the constraints of expected budgets over the next few years, it is unlikely that we could expand our sampling above its current rate. Therefore we examined alternatives for modifying our sampling methods to improve the collection of tags from the fishery. One obvious way to conserve our budget would be to rely on the WDG punchcard estimates of harvest for the areas we were sampling. We had estimated harvest independently of the punchcard from fall 1984 through spring 1987, however, and there were consistent differences between the two estimates. If no significant differences existed between the two harvest estimates for those years we could use the punchcard harvest estimates and channel our sampling away from expensive, time consuming angler effort counts and harvest estimates. We then could focus on collecting as many coded wire tagged fish from the fishery as possible.

The punchcard-derived harvest estimates generally appear to underestimate harvest during fall and spring (Table 25). 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. 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 large. 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.

The creel harvest estimates exceed the punchcard-derived estimates by an average of 12.05 % for the 3 years (Table 25). The annual differences between the harvest estimates is quite consistent and varies from 9.78 to 13.65 %. A paired-t test for comparing the 21 pairs of estimates was significant ($t = 2.398$, $\alpha = 0.05$, $df = 20$). Therefore, we will apply a correction factor of 12.05 % to the annual punchcard estimates in the future to improve their accuracy and use these corrected estimates in our cwt expansions. Consequently, next year we will not attempt a creel survey to estimate harvest or angler effort for the Snake River.

Table 25. Comparison of harvest estimating procedures on the Snake River (WDG mgmt. section 168), 1984-1986 run years.

Harvest Estimating Method	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
				1984				
Creel [A,B]	90	227	1041	1769	1707	534	178	5546
Punchcard	78	320	841	1654	1339	422	226	4880
								-----
						difference =		666
								(13.65 %)
				1985				
Creel [A]	207	993	863	525	514	378	60	3540
Punchcard	151	730	619	573	448	557	62	3140
								-----
						difference =		400
								(12.74 %)
				1986				
Creel [A]	121	858	1222	1166	786	120	61	4334
Punchcard [C]	70	738	1034	1046	772	168	120	3948
								-----
						difference =		386
								(9.78 %)
				3 Year Average difference = (12.05 %)				

A Harvest calculation for mid Snake X proportion of harvest on Wash. punchcard, plus L. Granite harvest calculation.
B Calculated harvest estimates for Sep., Oct., and Nov. by using the original data and separating the angler effort for L. Granite Dam, then multiplying by the average catch rate for all the lower Snake (because of small sample sizes).
C See Appendix L for calculation methods.
D percentage of difference of punchcard estimate.

CONCLUSIONS

The formulas we used to calculate variance and confidence limits for the harvest estimate are based on the assumption that angler effort and catch rate 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. Dr. Steinhorst has attempted to identify the correct covariance formula, but he has been unsuccessful. Nevertheless, we are reasonably confident of our angler effort, catch rate, and harvest estimates for the Snake R. above L. Granite Dam (section 168). The calculated confidence intervals for monthly and seasonal totals are probably slightly conservative, but acceptable.

Sampling this year was easier and less costly for the lower Snake River (sections 164-167) because we used WDG's punchcard harvest estimates for our cwt expansions. However, sampling the Grande Ronde has been expensive and frustrating even with ODFW assistance. We will attempt to increase our sampling effort on the Grande Ronde next year to provide reasonable estimates. If that should fail we will need to use the punchcard harvest estimates in the future without any evaluation of their validity. We also need to delete sampling on Mill Creek and some other streams to concentrate on fewer streams and obtain a larger sample of fish.

A comparison of the last 3 years of creel survey results indicates that harvests the past 2 years have been lower than in 1984-85 and that the fish are generally smaller. One salt steelhead have predominated the past 2 years. "B run" fish are less numerous than in 1984-85 and comprise a smaller percentage of the total run.

It is apparent from our scale samples for the past 2 years that length frequencies can not be used to separate 3 salt fish from 1 and 2 salt fish. Even 1 salt fish appear to have some representatives > 80 cm (2.3 % of all 1 salts) that are substantially larger than the general population of 1 salts. Next year we will attempt to determine whether these large 1 salt fish are errors in our data, or indicative of reality. We will also attempt to obtain data to estimate the percentage of LFH fish that smolt after 2 years in fresh water.

Wintering groups (stocks ?) of steelhead appear to segregate into various locations on the Snake River based on mean lengths. "B run" fish or 2 salts predominate near the mouth of the Clearwater River.

We took a number of snouts this year from adipose clipped steelhead in the hope of recovering more cwts. However, few of these snouts contained cwts. In the future we will have substantially fewer snouts to sample because the presence of cwts will be indicated by left ventral clips. We do need more cooperation for our sampling efforts on the mid Snake River to enable us to use all fish examined by IFG personnel, and to eliminate any duplication in our cwt expansions.

It is obvious that steelhead anglers benefit 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. Also, the 1985-86 cwt expansion revisions substantially increased our estimates of the harvest of Lyons Ferry steelhead containing cwts. 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 passed above L. Granite Dam. We must emphasize that the exploitation rates presented in this report should be considered <u>minimum</u> values because some jaw tags recovered in the harvest undoubtedly were not seen by WDG, IFG, or returned to NMFS. However, we believe the error to be fairly small. Thus, we think the exploitation rates presented are a fair representation of the actual rates for LFH steelhead above L. Granite Dam. The potential problem of apparent wandering above L. Granite Dam by returning steelhead released at LFH or the Tucannon River will be discussed further in our 1986-87 Part II Report.

Our jaw tag exploitation estimates also compare very favorably to our computed exploitation rates for the general run over Lower Granite Dam in the same years. These comparisons tend to indicate that our LFH fish are contributing to the Snake River fishery in a similar percentage as the general steelhead population. Although the average rates for all years are lower than our other computed values, these numbers are based primarily on voluntary returns from the fishery. We fully expect a negative bias to be evident because of fishermen that would keep a jaw tag as a souvenir of the season, or simply lose or forget about sending in the tag. There is no way of accounting for tags that were taken in the fishery but not turned in for the reward. We do believe that the information is valuable in both assessing the relative contribution of Lyons Ferry origin steelhead to the sport fishery, and as a check against our more intensive estimate of exploitation based on harvest and escapement.

At present, comparison of our creel results above L. Granite Dam with WDG statewide harvest estimates (for estimating harvest for individual river sections) is not completely appropriate because of differences in the river segments included in the estimates. The differences are small and consistent for the run year harvest estimates, but vary

widely for the monthly estimates. However, next year we plan to use the punchcard harvest estimates for all areas of the Snake River so that we can concentrate our creel activities on catch composition and cwt expansions. We hope to increase our sampling of other steelhead fisheries in southeast Washington where no data presently exists.

Next year we will conduct our creel survey on the the Grande Ronde River in Washington and collect catch composition data from the Snake River. We will further examine the exploitation rates and cwt recoveries for LFH steelhead. Recoveries above L. Granite Dam of branded, returning Tucannon R. released steelhead will also be compiled to determine if we have a serious straying or behavioral problem with those fish.

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ANGLER EFFORT COUNT DATA

(ANGLER COUNTS PER WEEK 1 WE & 1 WD)

COUNT PERIODS
(0700 - 1000, 1000 - 1300, 1300 - 1600, 1600 - 1900)

ALTERNATE START TIMES
(0600,0800) (0900, 1100) (1200,1400) (1500)

MONTH _____

DATE _____

DAYTYPE (WE, WD)

	Actual	Angler
DAYLIGHT	_____	_____
DARKNESS	_____	_____

INITIALS _____

COUNT START TIME _____ START LOCATION _____

ZONE (or) LOC.	START TIME	# OF BOATS	TOTAL BOATS	SHORE ANGLERS COUNT	TOTAL SHORE	STOP TIME	COMMENTS (Weather, Water Conditions, etc)

STREAM _____ AIR TEMP o F _____ TIME _____

WATER TEMP o F _____ LOCATION _____ TIME _____

WATER LEVEL _____ CLARITY _____ WIND _____

SKY 0-10% CLOUDY, 10-50%, > 50% CLOUDY OTHER (PRECIP) _____

Appendix A. Angler effort count form, 1986-87 steelhead creel survey.

Appendix B. Lower Granite creel survey data.

Table 1. Angler effort estimates (and strata variables used in effort calculations) for Lower Granite Reservoir, fall 1986 and spring 1987.

			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.	12	WE	8.67	2.26	75.4	1598.08	20.67	87.7	1957.28
		(3,9)	(3.686)	(43)	(57)		(13.696)	(138)	
		WD	1.33	2.26 [g]	75.4 [g]	573.55	4.83	80.0	974.48
		(3,21)	(0.289)	(43)	(57)		(2.082)	(25)	
Oct.	11.5	WE	20.25	2.11	98.5	3876.05	30.88	88.5	2513.81
		(4,8)	(9.836)	(264)	(268)		(5.039)	(226)	
		WD	10.63	1.97	98.6	5457.16	24.13	94.3	6020.82
		(4,23)	(2.359)	(69)	(70)		(4.498)	(159)	
Nov.	10	WE	39.25	2.20	100.0	9498.50	36.25	98.1	3918.50
		(4,11)	(15.580)	(341)	(341)		(14.080)	(259)	
		WD	10.88	2.19	100.0	4525.04	16.13	95.8	2934.74
		(4,19)	(4.191)	(138)	(138)		(5.851)	(95)	
Dec.	9	WE	44.63	2.18	100.0	7884.72	25.63	99.3	2861.69
		(4,9)	(9.570)	(301)	(301)		(3.750)	(149)	
		WD	22.88	2.07	100.0	9354.71	12.88	95.9	2429.66
		(5,22)	(9.848)	(201)	(201)		(9.719)	(121)	
Jan.	9.5	WE	31.83	2.26	100.0	6845.51	24.50	100.0	2327.50
		(3,10)	(10.774)	(292)	(292)		(8.529)	(116)	
		WD	15.25	2.06	100.0	6270.28	12.38	98.7	2435.58
		(4,21)	(12.100)	(169)	(169)		(7.758)	(74)	
Feb.	10.5	WE	11.50	2.19	100.0	2381.59	16.50	97.3	1516.54
		(3,9)	(5.268)	(103)	(103)		(8.352)	(73)	
		WD	2.75	1.86	100.0	1018.85	7.13	100.0	1421.44
		(4,19)	(3.279)	(13)	(13)		(3.705)	(57)	
Mar.	11	WE	1.83	2.18	88.9	352.04	12.17	87.5	1053.95
		(3,9)	(1.258)	(24)	(27)		(3.493)	(56)	
		WD	1.00	1.00	66.7	161.44	5.00	86.2	1043.26
		(3,22)	(0.580)	(2)	(3)		(3.775)	(29)	

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. Product may not equal the reported value because variables have been rounded.

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

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

Appendix B. Lower Granite Creel Survey data.

Table 2. Estimated catch rates and CPUE data obtained from steelhead anglers interviewed on Lower Granite Reservoir, fall 1986 and spring 1987.

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	19 (43)	157.10	4 (0)	0.0255	0.02351
		shore	74 (114)	518.65	1 (2)	0.0019	0.00391
	WD	boat	0 (0)	-----	-----	------	-------
		shore	13 (20)	84.50	3 (0)	0.0355	0.04188
	total		106 (177)	760.25	8 (2)	0.0105	0.00800
Oct	WE	boat	125 (264)	1039.05	25 (11)	0.0241	0.00967
		shore	120 (200)	696.50	9 (6)	0.0129	0.01053
	WD	boat	35 (69)	278.60	8 (1)	0.0287	0.02165
		shore	102 (150)	541.15	7 (9)	0.0129	0.00926
	total		382 (683)	2555.30	49 (27)	0.0192	0.00576
Nov	WE	boat	155 (341)	1287.05	42 (13)	0.0326	0.01089
		shore	151 (254)	769.55	11 (3)	0.0143	0.00865
	WD	boat	63 (138)	439.30	10 (5)	0.0228	0.01516
		shore	72 (91)	322.50	8 (1)	0.0248	0.01629
	total		441 (824)	2818.40	71 (22)	0.0252	0.00637
Dec	WE	boat	138 (301)	1502.00	83 (27)	0.0553	0.01212
		shore	85 (148)	523.70	14 (3)	0.0267	0.01366
	WD	boat	97 (201)	709.80	27 (11)	0.0380	0.01614
		shore	83 (116)	469.70	8 (4)	0.0170	0.01174
	total		403 (766)	3205.20	132 (45)	0.0412	0.00751
fall	total		1332(2450)	9339.15	260 (96)	0.0278	0.00371
Jan	WE	boat	129 (292)	1555.15	56 (17)	0.0360	0.01000
		shore	70 (116)	381.30	12 (1)	0.0315	0.01643
	WD	boat	82 (169)	539.25	30 (3)	0.0556	0.02304
		shore	55 (73)	249.50	3 (2)	0.0120	0.01336
	total		336 (650)	2725.20	101 (23)	0.0371	0.00784
Feb	WE	boat	47 (103)	346.90	4 (4)	0.0115	0.01361
		shore	43 (71)	213.50	1 (1)	0.0047	0.00885
	WD	boat	7 (13)	68.50	0 (0)	------	-------
		shore	39 (57)	250.50	4 (2)	0.0160	0.01599
	total		136 (244)	879.40	9 (7)	0.0102	0.00727
Mar	WE	boat	11 (24)	94.50	1 (1)	0.0106	0.01794
		shore	28 (49)	172.25	4 (0)	0.0232	0.02845
	WD	boat	2* (2)	13.20	0 (0)	------	-------
		shore	18 (25)	106.25	4 (8)	0.0377	0.04270
	total		59 (100)	386.20	9 (9)	0.0233	0.01771
spring	total		531 (994)	3990.80	119 (39)	0.0298	0.00596

a CPUE calculated for retained fish only.

b See Mendel et al.(1987) for how this was calculated. 95 % CI if data are normally distributed, otherwise at least 75 %.

* Small sample size.

Appendix C. Mid Snake River creel survey data.

Table 1. Angler effort estimates (and strata variables used in effort calculations) for the mid-Snake River, fall 1986 and spring 1987.

				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.	12	WE (4,9)	A	15.75 (8.912)	2.11 (150)	96.8 (155)	3,477.82	5.75 (2.723)	0.0 (2)	0.00
			B	4.63 (4.258)	2.33 (77)	100.0 (77)	1,165.54	5.00 (4.378)	53.9 (25)	290.74
			C	1.75 (1.258)	2.00 (16)	100.0 (16)	378.00	3.25 (1.658)	52.9 (17)	185.87
		WD (4,21)	A	7.88 (6.303)	2.00 (10)	100.0 (10)	3,969.00	2.75 (2.102)	12.5 (8)	86.69
			B	2.50 (2.739)	2.00 (2)	100.0 (2)	1,260.00	1.13 (0.479)	14.3 (7)	40.57
			C	0.38 (0.750)	2.00 (2)	100.0 (2)	189.00	1.38 (1.681)	58.3 (12)	202.10
Oct.	11.5	WE (4,8)	A	69.25 (33.057)	2.22 (504)	100.0 (504)	14,145.55	7.50 (0.817)	53.8 (13)	371.50
			B	25.75 (7.533)	2.21 (312)	99.4 (314)	5,209.84	2.75 (2.062)	87.5 (16)	221.35
			C	11.38 (1.493)	2.68 (166)	100.0 (166)	2,801.86	12.13 (2.394)	87.5 (56)	976.83
		WD (5,23)	A	38.40 (13.348)	1.95 (248)	99.6 (249)	15,638.83	2.60 (2.988)	83.3 (12)	573.17
			B	12.60 (7.119)	2.34 (143)	100.0 (143)	7,812.88	3.20 (2.928)	80.0 (35)	677.12
			C	4.30 (3.402)	3.00 (42)	100.0 (42)	3,412.05	5.90 (3.324)	98.1 (52)	1,530.66
Nov.	10	WE (3,11)	A	73.33 (21.945)	2.34 (471)	100.0 (471)	16,902.62	5.00 (4.583)	76.9 (26)	423.06
			B	31.83 (9.828)	2.40 (297)	100.0 (297)	8,387.17	9.67 (5.923)	98.2 (56)	1,044.34
			C	10.50 (1.323)	2.72 (174)	100.0 (174)	3,140.17	8.50 (6.144)	100.0 (43)	935.00
		WD (5,19)	A	38.50 (14.979)	1.90 (311)	100.0 (311)	13,871.52	2.60 (1.140)	85.7 (14)	423.51
			B	20.20 (4.855)	2.26 (183)	100.0 (183)	8,671.22	4.70 (2.707)	91.7 (24)	818.52
			C	6.20 (2.707)	2.48 (99)	100.0 (99)	2,915.55	3.70 (2.842)	100.0 (28)	703.00
Dec.	9	WE (4,9)	A	29.75 (15.152)	1.94 (274)	100.0 (274)	4,682.85	2.50 (1.780)	90.0 (20)	182.25
			B	9.63 (5.039)	2.11 (116)	100.0 (116)	1,644.30	2.88 (1.782)	78.3 (23)	182.25
			C	6.88 (3.119)	2.95 (124)	100.0 (124)	1,644.14	4.00 (1.732)	93.5 (31)	303.10

Appendix C. (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.	9	WD (5,22)	A	20.40 (11.249)	1.97 (128)	98.5 (130)	7,831.69	1.60 (0.894)	82.4 (17)	260.96
			B	5.20 (4.207)	1.90 (40)	100.0 (40)	1,961.19	1.80 (1.304)	95.5 (22)	340.16
			C	2.10 (1.084)	2.45 (49)	100.0 (49)	1,018.71	1.60 (1.673)	100.0 (16)	316.80
Jan.	9.5	WE (4,10)	A	17.13 (10.641)	2.23 (56)	100.0 (56)	3,625.68	0.50 (0.577)	100.0 (4)	47.50
			B	5.75 (3.524)	2.00 (82)	100.0 (82)	1,092.50	0.88 (0.629)	100.0 (16)	83.13
			C	3.63 (1.931)	2.58 (62)	100.0 (62)	889.58	2.00 (1.700)	100.0 (16)	190.00
		WD (4,21)	A	9.38 (4.644)	1.90 (112)	100.0 (112)	3,550.50	1.13 (0.629)	90.0 (10)	201.89
			B	2.88 (1.102)	2.00 (34)	100.0 (34)	1,147.13	1.30 (1.540)	70.2 (13)	192.52
			C	0.25 (0.289)	2.00 (10)	100.0 (10)	99.75	1.50 (1.354)	100.0 (13)	299.25
Feb.	10.5	WE (3,9)	A	3.83 (1.756)	1.85 (37)	100.0 (37)	678.19	0.83 (0.289)	100.0 (2)	78.72
			B	3.67 (1.756)	2.50 (40)	100.0 (40)	866.28	0.83 (0.764)	60.0 (5)	47.25
			C	3.17 (2.255)	2.13 (32)	100.0 (32)	630.35	3.00 (2.598)	100.0 (14)	283.50
		WD (4,19)	A	1.50 (1.780)	2.12 (36)	100.0 (36)	633.61	0.13 (0.250)	100.0 (1)	24.94
			B	1.88 (0.854)	2.50 (20)	100.0 (20)	935.26	0.00 (0.000)	-----	0.00
			C	0.75 (0.866)	2.60 (13)	100.0 (13)	389.03	0.88 (1.109)	100.0 (14)	174.56
Mar.	11	WE (3,9)	A	1.17 (0.764)	2.83[I] (3)	100.0[I] (3)	327.29	1.33 (1.258)	60.0[I] (25)	79.20
			B	0.33 (0.577)	2.83[I] (3)	100.0[I] (3)	93.46	0.17 (0.289)	60.0[I] (25)	9.90
			C	1.50 (0.500)	2.83[I] (3)	100.0[I] (3)	420.75	2.00 (1.323)	60.0[I] (25)	118.80
		WD (3,22)	A	0.33 (0.577)	2.83[I] (3)	100.0[I] (3)	228.45	1.50 (1.803)	30.0[I] (10)	108.90
			B	0.17 (0.289)	2.83[I] (3)	100.0[I] (3)	114.22	1.50 (1.323)	30.0[I] (10)	108.90
			C	0.17 (0.289)	2.83[I] (3)	100.0[I] (3)	114.22	0.00 (0.000)	-----	0.00

Appendix C. (Cont')

Table 1. (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 # of days sampled and N = the # of that daytype available per month.

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 Line 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. Product may not equal the reported value because the variables have been rounded.

I Estimate used for several zones because of small sample sizes in some zones.

Appendix C. Mid-Snake creel survey data.

Table 2. Estimated catch rates and CPUE data obtained from steelhead anglers interviewed on the mid-Snake River, fall 1986 and spring 1987.

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	71 (150)	371.00	5 (1)	0.0135	0.01162
			shore	0 (0)	----	-----	---	---
		B	boat	31 (77)	216.50	3 (2) *	0.0139	0.01509
			shore	6 (13)	13.30	0 (1)	---	---
		C	boat	8 (16)	25.00	1 (1) *	0.0400	0.08037
			shore	7 (9)	15.50	1 (0) *	0.0645	0.13742
	WD	A	boat	5 (10)	17.50	1 (0) *	0.0571	0.10505
			shore	1 (1) *	1.75	0 (0)	---	---
		B	boat	1 (2) *	8.00	0 (0)	---	---
			shore	1 (1) *	0.75	0 (0)	---	---
		C	boat	1 (2) *	5.00	0 (1)	---	---
			shore	7 (7)	11.85	0 (2)	---	---
	total			139 (288)	686.15	11 (8)	0.0160	0.00922
Oct.	WE	A	boat	227 (504)	1948.50	36 (9)	0.0185	0.00689
			shore	4 (7)	3.40	0 (0)	---	---
		B	boat	141 (312)	1188.75	32 (18)	0.0269	0.01013
			shore	7 (14)	25.40	0 (1)	---	---
		C	boat	62 (166)	635.00	29 (35)^	0.0457	0.02184
			shore	31 (50)	143.60	7 (4)	0.0488	0.04615
	WD	A	boat	127 (248)	616.95	14 (3)	0.0227	0.01147
			shore	7 (10)	16.10	0 (0)	---	---
		B	boat	61 (143)	405.20	13 (8)	0.0321	0.01828
			shore	21 (28)	56.60	2 (1) *	0.0353	0.06851
		C	boat	14 (42)	100.10	7 (10)	0.0699	0.04788
			shore	35 (51)	108.45	2 (18) *	0.0184	0.02554
	total	C		741(1583)	5296.25	142 (109)	0.0268	0.00516
Nov.	WE	A	boat	201 (471)	1566.75	38 (14)	0.0243	0.00881
			shore	13 (20)	45.35	2 (0) *	0.0441	0.06907
		B	boat	124 (297)	1084.75	31 (10)	0.0286	0.01109
			shore	32 (55)	207.05	6 (2)	0.0290	0.01657
		C	boat	64 (174)	719.50	24 (51)	0.0334	0.02165
			shore	26 (43)	111.30	6 (4)	0.0539	0.05155
	WD	A	boat	164 (311)	925.95	26 (7)	0.0281	0.01115
			shore	10 (12)	14.20	0 (0)	---	---
		B	boat	81 (183)	571.10	13 (6)	0.0228	0.01350
			shore	15 (22)	55.55	1 (0) *	0.0180	0.03393
		C	boat	40 (99)	343.55	15 (29)	0.0437	0.01641
			shore	20 (28)	65.85	3 (4) *	0.0456	0.05384
	total[C]			741 (1716)	5,711.40	165 (127)	0.0289	0.00512

Appendix C. (Cont').

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	141 (274)	1,000.00	29 (12)	0.0290	0.01113
			shore	14 (18)	30.20	2 (0) *	0.0662	0.08436
		B	boat	55 (116)	389.65	13 (5)	0.0334	0.02009
			shore	16 (18)	25.45	0 (0)	---	---
		C	boat	42 (124)	579.80	26 (16)	0.0448	0.01981
			shore	18 (29)	68.90	4 (3)	0.0581	0.05949
	WD	A	boat	65 (128)	364.15	8 (12)	0.0220	0.01372
			shore	14 (14)	26.45	0 (0)	---	---
		B	boat	21 (40)	110.85	2 (0) *	0.0180	0.03403
			shore	15 (21)	46.15	1 (0) *	0.0217	0.04132
		C	boat	20 (49)	179.80	8 (21)	0.0445	0.02683
			shore	11 (16)	27.10	7 (2)	0.2583	0.23726
	total	C		436 (856)	2,893.00	100 (71)	0.0346	0.00759
Fall total				2,107 (4443)	14,586.80	418 (315)	0.0287	0.00317
Jan.	WE	A	boat	70 (156)	376.60	10 (2)	0.0265	0.01828
			shore	3 (4) *	5.00	0 (0)	---	---
		B	boat	41 (82)	258.40	3 (6)	0.0116	0.01325
			shore	9 (16)	35.10	0 (2)	---	---
		C	boat	24 (62)	221.00	13 (10)	0.0588	0.04292
			shore	8 (16)	26.50	1 (6) *	0.0377	0.07278
	WD	A	boat	59 (112)	316.40	13 (5)	0.0411	0.02832
			shore	9 (9)	21.35	0 (0)	---	---
		B	boat	17 (34)	103.40	1 (1) *	0.0097	0.02018
			shore	10 (12)	30.35	0 (0)	---	---
		C	boat	5 (10)	20.00	0 (2)	---	---
			shore	9 (13)	13.55	0 (1)	---	---
	total	C		266 (528)	1,429.15	41 (35)	0.0287	0.01092
Feb.	WE	A	boat	20 (37)	155.50	2 (0) *	0.0129	0.01687
			shore	2 (2) *	1.25	0 (0)	---	---
		B	boat	16 (40)	121.50	1 (0) *	0.0082	0.01638
			shore	2 (3) *	9.25	0 (0)	---	---
		C	boat	15 (32)	92.50	1 (6) *	0.0108	0.02183
			shore	8 (14)	26.90	0 (1)	---	---
	WD	A	boat	17 (36)	82.60	1 (1) *	0.0121	0.02240
			shore	1 (1) *	0.50	0 (0)	---	---
		B	boat	8 (20)	47.05	0 (0)	---	---
			shore	1 (1) *	1.00	0 (1)	---	---
		C	boat	6 (14)	64.10	5 (5)	0.0780	0.11130
			shore	10 (14)	25.10	0 (0)	---	---
	total	C		106 (216)	627.25	10 (14)	0.0159	0.01414

Appendix C. (Cont').

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]
Mar.	WE+WD	ALL	boat	6 (17)	61.5	0 (0)	---	---
			shore	13 (18)	32.0	0 (1)	---	---
	total			19 (35)	93.5	0 (1)	---	---
Spring total				391 (779)	2,149.90	51 (50)	0.0237	0.00836

A CPUE calculated for retained fish only.

B See Mendel et al. (1987) for calculation methods. 95 % CI if data are normally distributed, otherwise at least 75 %.

C A few parties could not be segregated into strata but they are included in the totals. Therefore the sum of the strata variables does not equal the total of the strata as reported.

* Small sample size.

^ The computer failed to separate a party into this strata that had released 2 fish. This party has not been included in any strata variables reported but it is included in the totals.

Appendix D. Grande Ronde River creel survey data.

Table 1. Angler effort estimates (and strata variables used in effort calculations) for the Grande Ronde River, fall 1986 and spring 1987.

				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)[e]	% steelhead angling[f] (s)[e]	Estimated steelhead angler hrs per month[h]	Mean no. of anglers (std.dev.)[e]	% steelhead angling[f] (s)[e]	Estimated steelhead angler hrs per month[h]
Sep.	13	WE (3,9)	D	0.00 (0.000)	----	----	0.00	2.63 (2.700)	94.4 (18)	298.84
		(3)	D1	0.00 (0.000)	----	----	0.00	0.38 (0.250)	40.0 (25)	17.55
		(1)	E1	0.00 (0.000)	----	----	0.00	1.50 (2.121)	40.0 (25)	70.20
		(4)	B1	0.00 (0.000)	----	----	0.00	1.60 (0.812)	40.0 (8)	74.97
		(4)	A	0.00 (0.000)	----	----	0.00	0.88 (1.267)	50.0 (8)	51.21
		WD (4,21)	D	0.00 (0.000)	----	----	0.00	0.13 (0.250)	100.0 (4)	34.13
		(4)	D1	0.00 (0.000)	----	----	0.00	0.38 (0.479)	58.3 (12)	59.79
		(2)	E1	0.00 (0.000)	----	----	0.00	0.00 (0.000)	58.3 (12)	0.00
		(6)	B1	0.10 (0.100)	2.33J (7)	100.0J (7)	26.48	0.61 (0.256)	58.3 (9)	97.02
		(6)	A	0.00 (0.000)	----	----	0.00	0.50 (0.612)	77.8 (9)	106.28
Oct.	11.5	WE (4,8)	D	0.00 (0.000)	----	----	0.00	5.50 (3.028)	97.7 (44)	494.48
		(4)	D1	0.00 (0.000)	----	----	0.00	2.25 (1.041)	81.1 (37)	167.76
		(2)	E1	0.50 (0.707)	2.33 (7)	100.0 (7)	107.12	2.50 (0.707)	81.1 (37)	186.48
		(4)	B1	0.00 (0.000)	----	----	0.00	1.69 (0.099)	81.1 (15)	125.84
		(4)	A	0.00 (0.000)	----	----	0.00	1.81 (0.239)	100.0 (15)	166.72
		WD (5,23)	D	0.00 (0.000)	----	----	0.00	5.70 (5.000)	96.0 (25)	1,447.16
		(5)	D1	0.10 (0.224)	2.33J (7)	100.0J (7)	61.41	1.50 (1.369)	98.0 (56)	388.47
		(3)	E1	1.33 (1.155)	2.33J (7)	100.0J (7)	821.79	0.67 (1.155)	98.0 (56)	172.73
		(8)	B1	0.00 (0.000)	----	----	0.00	1.97 (1.730)	98.0 (13)	509.68
		(8)	A	0.00 (0.000)	----	----	0.00	0.87 (0.595)	89.0 (13)	84.46

Appendix D. Cont'.

Table 1. Cont'.

Month	Hours Avail.[a]	Daytype[b] (n,N)[c]	Zone[d]	Boats: Mean no. of boats (std.dev.)[e]	Boats: Mean anglers per boat[f] (s)[e]	Boats: % steelhead angling[f] (s)[e]	Boats: Estimated steelhead angler hrs per month[h]	Shore: Mean no. of anglers (std.dev.)[e]	Shore: % steelhead angling[f] (s)[e]	Shore: Estimated steelhead angler hrs per month[h]
Nov.	10	WE (4,11)	D	0.00 (0.000)	----	----	0.00	2.36 (2.496)	100.0 (9)	261.25
		(4)	D1	0.00 (0.000)	----	----	0.00	1.50 (1.225)	100.0 [i] (12)	165.00
		(0)	E1	----	----	----	----	----	100.0 [i] (12)	-----
		(4)	B1	0.00 (0.000)	----	----	0.00	2.25 (1.258)	100.0 [i] (6)	246.95
		(4)	A	0.00 (0.000)	----	----	0.00	0.50 (0.636)	100.0 (6)	54.78
		WD (4,19)	D	0.00 (0.000)	----	----	0.00	1.13 (1.931)	100.0 (10)	213.75
		(4)	D1	0.00 (0.000)	----	----	0.00	0.13 (0.268)	100.0 [i] (19)	23.75
		(0)	E1	----	----	----	----	----	100.0 [i] (19)	-----
		(7)	B1	0.00 (0.000)	----	----	0.00	1.19 (1.153)	100.0 [i] (13)	225.53
		(7)	A	0.00 (0.000)	----	----	0.00	0.38 (0.676)	100.0 (13)	72.20
Dec.	9.5	WE (4,9)	D	0.00 (0.000)	----	----	0.00	0.38 (0.750)	100.0 (3)	32.06
		(4)	D1	0.00 (0.000)	----	----	0.00	0.25 (0.500)	100.0 (4)	21.38
		WD (5,22)	D	0.00 (0.000)	----	----	0.00	0.10 (0.224)	100.0 (1)	20.90
		(5)	D1	0.00 (0.000)	----	----	0.00	0.00 (0.000)	----	-----

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 D = mouth to County Bridge, Zone D1 = Bridge to "The Narrows", E1 = Shumaker Grade area, B1 = access area below Rattlesnake Grade to Cougar Creek, Zone A = Cougar Creek to Oregon State line.

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. Table values may not equal product of variables because variables are rounded.

i Estimate used for zones B1, D1 and E1 combined because of small sample sizes in some zones.

j Use average anglers/boat of 2.33 from all boaters interviewed in October.

Appendix D. Grande Ronde River creel survey data.

Table 2. Estimated catch rates and CPUE data obtained from steelhead anglers interviewed on the Grande Ronde River, fall 1986 and spring 1987.

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	D	boat	0 (0)	0.00	0 (0)	---	---
			shore	13 (17)	45.20	0 (0)	---	---
		E1	boat	0 (0)	0.00	0 (0)	---	---
			shore	6 (10)	20.75	0 (0)	---	---
		A	boat	0 (0)	0.00	0 (0)	---	---
			shore	2 (5)	7.00	0 (0)	---	---
	WD	D	boat	0 (0)	0.00	0 (0)	---	---
			shore	3 (4)	6.90	0 (1)	---	---
		E1	boat	0 (0)	0.00	0 (0)	---	---
			shore	5 (7)	9.30	0 (0)	---	---
		A	boat	0 (0)	0.00	0 (0)	---	---
			shore	4 (7)	3.90	0 (1)	---	---
	total			33 (50)	93.05	0 (2)	---	---
Oct.	WE	D	boat	0 (0)	0.00	0 (0)	---	---
			shore	22 (43)	171.65	0 (4)	---	---
		E1	boat	1 (2)	13.00	0 (0)	---	---
			shore	19 (30)	85.05	0 (9)	---	---
		A	boat	0 (0)	0.00	0 (0)	---	---
			shore	9 (15)	54.25	0 (1)	---	---
	WD	D	boat	0 (0)	0.00	0 (0)	---	---
			shore	15 (24)	90.00	0 (11)	---	---
		E1	boat	2 (5)	8.50	0 (1)	---	---
			shore	26 (48)	130.75	0 (9)	---	---
		A	boat	0 (0)	0.00	0 (0)	---	---
			shore	6 (8)	27.75	0 (9)	---	---
	total	c		101 (176)	588.95	0 (45)	---	---
Nov.	WE	D	boat	0 (0	0.00	0 (0)	---	---
			shore	7 (9)	8.45	0 (2)	---	---
		E1	boat	0 (0	0.00	0 (0)	---	---
			shore	12 (18)	47.15	1 (0) *	0.0212	0.03633
		A	boat	0 (0)	0.00	0 (0)	---	---
			shore	4 (6)	11.30	0 (0)	---	---
	WD	D	boat	0 (0	0.00	0 (0)	---	---
			shore	7 (10)	25.25	0 (3)	---	---
		E1	boat	0 (0	0.00	0 (0)	---	---
			shore	9 (19)	50.55	1 (2) *	0.0198	0.02798
		A	boat	0 (0)	0.00	0 (0)	---	---
			shore	4 (12)	17.65	0 (1)	---	---
	total			43 (74)	160.55	2 (8) *	0.0125	0.01510
	total	E1	shore	21 (37)	97.70	2 (2)	0.0205	0.02213

Appendix E. Angler effort and effort per mile for the Grande Ronde River, fall 1986.

Month	Zone ^	Day-type	Angler Type	Angler Effort (hrs)	95 % CI	Hrs./ Mile *
Sept.	D	WE	B	---	---	
			S	290.04	228.97	
		WD	B	---	---	
			S	34.13	61.41	
		Total		324.17		129.67
	D1	WE	B	---	---	
			S	17.55	8.72	
		WD	B	---	---	
			S	59.79	68.58	
		Total		77.34		38.67
	E1	WE	B	---	---	
			S	70.20	123.82	
		WD	B	---	---	
			S	---	---	
		Total		70.20		11.70
	B1	WE	B	---	---	
			S	75.00	28.31	
		WD	B	26.48	44.80	
			S	97.19	28.15	
		Total		198.67		39.73
	A1	WE	B	---	---	
			S	51.25	55.22	
		WD	B	---	---	
			S	106.20	89.71	
		Total		157.45		22.49
		Sept. Total		**827.83**	**301.67**	**36.79**
Oct.	D	WE	B	---	---	
			S	494.50	192.49	
		WD	B	---	---	
			S	1447.34	1006.09	
		Total		1941.84		776.74
	D1	WE	B	---	---	
			S	167.81	54.90	
		WD	B	61.63	109.04	
			S	388.55	280.74	
		Total		617.99		309.00
	E1	WE	B	107.18	185.65	
			S	186.48	64.60	
		WD	B	821.80	766.27	
			S	172.72	322.14	
		Total		1288.18		214.70
	B1	WE	B	---	---	
			S	125.86	47.39	
		WD	B	---	---	
			S	509.69	256.01	
		Total		635.55		127.11
	A1	WE	B	---	---	
			S	166.80	15.57	

Appendix E. Continued.

Month	Zone [A]	Day-type	Angler Type	Angler Effort (hrs)	95 % CI	Hrs./ Mile [B]
	A1	WD	B	---	---	
			S	184.62	71.91	
		Total		351.42		50.20
		Oct. Total		**4834.98**	**1394.90**	**214.89**
Nov.	D	WE	B	---	---	
			S	261.25	219.01	
		WD	B	---	---	
			S	213.75	326.01	
		Total		475.00		190.00
	D1	WE	B	---	---	
			S	165.00	107.47	
		WD	B	---	---	
			S	23.75	42.20	
		Total		188.75		94.38
	B1	WE	B	---	---	
			S	246.95	110.38	
		WD	B	---	---	
			S	225.53	131.57	
		Total		472.48		94.50
	A1	WE	B	---	---	
			S	54.78	55.84	
		WD	B	---	---	
			S	72.20	77.21	
		Total		126.98		18.14
		Nov. Total [C]		**1263.21**	**454.04**	**56.14**
Dec.	D	WE	B	---	---	
			S	32.06	47.80	
		WD	B	---	---	
			S	20.90	36.74	
		Total		52.96		21.18
	D1	WE	B	---	---	
			S	21.38	31.86	
		WD	B	---	---	
			S	---	---	
		Total		21.38		10.69
		Dec. Total [C]		**74.34**	**68.19**	**16.52**
Catch and Keep Season Total				3569.68	979.10	274.59
Catch and Release Season Total [*]				3429.00	---	457.20
Season Total				**6998.68**	**1499.19**	**311.05**

A Zone D = mouth to County Bridge (2.5 miles), D1 = bridge to "The Narrows" (2 miles), E1 = Shumaker Grade area (6 miles), B1 = access area below Rattlesnake Gr. to Cougar Cr.(7 miles), A = Cougar Cr. to the Oregon State line (5 mi.).

B Per mile of access.

C Zone E1 was terminated in Nov. due to poor road conditions. Zones B1 and A were canceled in Dec. when the river became iced over.

* by subtraction of catch and keep total from season total.

Appendix F. Gear type use on the Grande Ronde River, fall 1986.

Month	Zone	Fly	Lure	Bait	Comb. [A]	% Bait or Comb. Angling
Sept.	D	19	2	0	0	
	D1	2	4	2	1	
	E1	0	1	0	1	
	B1	1	8	3	0	
	A	3	7	2	0	
	Total	25	22	7	2	16.1
Oct.	D	59	5	0	1	
	D1	21	7	0	0	
	E1	5	5	0	0	
	B1	17	10	2	6	
	A	11	10	2	0	
	Total	113	37	4	7	6.8
Nov.	D	12	5	2	0	
	D1	3	4	1	0	
	B1	2	20	3	4	
	A	2	15	0	1	
	Total [B]	19	44	6	5	14.9
Fall Total [C]		**157**	**103**	**17**	**14**	**10.7**

A Combination angling includes the use of two or more types of gear on the same day. All individuals sampled used bait and lures except three which used unknown gear types.
B Zone E1 was terminated in November due to poor road conditions.
C Does not include December, due to small sample size of anglers.

Appendix G. Lyons Ferry Hatchery steelhead recoveries, by cwt for fall 1986 and spring 1987. (only fish with length or sex information are included).

Category ^	Length	Sex	CWT	Wt.	Recovery Date	Location
IFG	60	M	62-16-28		111686	168M
SPORT	59	F	62-16-28		101286	168B
SNAKE R.	61	F	62-16-27		101186	168M
	85	F	62-16-27		101186	168M
	58	M	62-16-27		102686	168M
	61	F	62-16-30		101286	168M
	64	M	62-16-30		120686	168B
	60	F	62-16-29		110886	168A
	73	F	63-32-14		11787	168B
	62	M	62-16-28		112286	168M
	61	F	62-16-27		110886	168M
IFG OTHER	66	F	62-16-27		101286	SALM
	59	M	62-16-29		120786	L. CLW.
	58	F	62-16-30		101586	L. CLW.
	66	F	62-16-27		40787	PAHS HAT
	82	F	62-16-28		20487	L. CLW.
	57	M	62-16-29		42887	DWOR HAT
	59	M	62-16-44		40787	DWOR HAT
	59	U	62-16-44		50587	DWOR HAT
	56	M	62-16-44		50587	DWOR HAT
	59	F	62-16-44		50587	DWOR HAT
	59	F	62-16-44		10387	L. CLW
	76	F	63-32-12		42187	DWOR HAT
	72	M	63-32-14		42187	DWOR HAT
	73	F	63-32-14		11987	SNAKE 01
	76	F	63-32-14		42187	DWOR HAT
	75	F	63-32-15		40787	DWOR HAT
	72	F	63-32-15		42187	DWOR HAT
LSNAKE	63	F	62-16-28		11787	166
	60.5	M	62-16-29		121386	166
	66	M	62-16-45		10287	167
	61	M	62-16-44		111686	167
	42	U	62-16-45		41487	166
LGR	62	M	62-16-44	2.9	102586	168L
	58	M	62-16-44	2.4	102586	168L
	60	M	62-16-28		102686	168L
	62.5	M	62-16-44		102686	168L
	58	M	62-16-44		112386	168L
	56.5	M	62-16-44	1.9	112386	168L
	71	F	63-32-14	3.4	112586	168L
	74	M	63-32-14		120686	168L
	70	F	63-32-14	3.2	122186	168L
	75	F	63-32-12	3.2	122186	168L
	57.5	M	62-16-44		122386	168L
	71	F	63-32-14		11087	168L
	66	F	63-32-14	2.7	12787	168L
	72.5	F	63-32-12		13087	168L

Appendix G. Continued.

Category ^	Length	Sex	CWT	Wt.	Recovery Date	Location
	57	F	62-16-44	1.8	30687	168L
MID	58	M	62-16-44	1.8	111386	168A
	75	M	63-32-12	4.2	112286	168A
	71	F	63-32-15		112486	168A
	61	M	62-16-27		110186	168B
	62	M	62-16-28		102586	168C
	64	M	62-16-28	2.3	110486	168C
	58.5	F	62-16-28		110686	168C
	61	M	62-16-27		110986	168C
	60	F	62-16-28		111786	168C
	60	F	62-16-27		112186	168C
	56	M	62-16-27		112186	168C
	61	M	62-16-27		112186	168C
	0	M	62-16-27	2.4	112386	168C
	65	M	62-16-27	2.2	120486	168C
	62	M	62-16-28		121486	168C
	61	F	62-16-27		121486	168C
	63	M	62-16-28		11887	168C
	54.5	F	62-16-44		21487	168A
	59	F	62-16-44	2.2	101586	168B
	74	F	63-32-14		111086	168A
	64	M	62-16-44		122786	168B
LGR	80.5	F	63-32-15	5.2	11087	168L
	73	F	63-32-12		12787	168L
	74.5	F	63-32-15	3.8	30787	168L
	61	U	62-16-44		101686	168L
G26423	81	M	62-16-44	2.7	102586	168L
	61	M	62-16-44		112386	168L
	60	M	62-16-44	2.1	112386	168L
	77	M	63-32-12		120786	168L
	77.5	M	63-32-15	4.3	122186	168L
	64	M	62-16-44		122386	168L
	63.5	M	62-16-44		122886	168L
LSNAKE	61.5	F	RA-7S-1		113086	167
LFH RACK	60	F	62-16-45		30987	LFH
	63.5	M	62-16-45		30987	LFH
	54.5	F	62-16-28		30987	LFH
	48	M	62-16-45		30987	LFH
	55	F	62-16-45		30987	LFH
	58	F	62-16-45		30987	LFH
	59	F	62-16-45		30987	LFH
	59	F	62-16-44		31687	LFH
	61.5	M	62-16-44		31687	LFH
	57	M	62-16-45		31687	LFH
	63.5	M	62-16-44		31687	LFH
	62.5	M	62-16-45		31687	LFH
	51	M	62-16-44		31687	LFH
	62.5	M	62-16-45		31687	LFH
	58	M	62-16-45		31687	LFH

Appendix G. Continued.

Category ^	Length	Sex	CWT	Wt.	Recovery Date	Location
	46	M	62-16-44		31687	LFH
	55	M	62-16-27		31687	LFH
	59	M	62-16-44		33087	LFH
	62	M	62-16-44		33087	LFH
	57	M	62-16-44		33087	LFH
	58	M	62-16-45		33087	LFH
	61	M	62-16-45		33087	LFH
	62	M	62-16-44		33087	LFH
	59	M	62-16-30		33087	LFH
	63	M	62-16-45		33087	LFH
	68	M	62-16-44		32587	LFH
	58	F	62-16-44		32587	LFH
	62	M	62-16-45		32587	LFH
	58	F	62-16-44		32587	LFH
	56	M	62-16-44		32587	LFH
	64	M	62-16-44		32587	LFH
	60	M	62-16-44		32587	LFH
	58	F	62-16-44		32587	LFH
	59	M	62-16-44		32587	LFH
	57	M	62-16-45		32587	LFH
	57	F	62-16-45		32587	LFH
	59	M	62-16-44		32587	LFH
	61	M	62-16-44		32387	LFH
	56	F	62-16-45		31285	LFH
	65	F	62-16-45		32387	LFH
	63	M	62-16-45		32387	LFH
	61	M	62-16-44		32387	LFH
	62	F	62-16-44		32387	LFH
	0	F	62-16-44		32387	LFH
	62	M	62-16-45		32387	LFH
	57	F	62-16-44		32387	LFH
COTTONW.	59.5	F	62-16-27		41287	CWD
Pond	53	F	62-16-27		41287	CWD
	61	F	62-16-28		41287	CWD
	57	F	62-16-28		41287	CWD
	56	F	62-16-27		40887	CWD
	54.5	F	62-16-28		40887	CWD
	57	M	62-16-27		40987	CWD
	53.5	F	62-16-27		40987	CWD
	57	M	62-16-28		40887	CWD
	55.5	F	62-16-28		40987	CWD
	60.5	M	62-16-27		41187	CWD
	58	M	62-16-27		41287	CWD
	56.5	M	62-16-28		41087	CWD
	54	M	62-16-28		40987	CWD
	58	F	62-16-27		42887	CWD
G18321	58.4	M	62-16-28		41587	CWD
	59.7	M	62-16-27		40687	CWD
	55	M	62-16-28 ?	?		CWD

Appendix G. Continued.

Category [A]	Length	Sex	CWT	Wt.	Recovery Date	Location
	59.2	M	62-16-28 ?	?		CWD
	60	M	62-16-28 ?	?		CWD
	58	F	62-16-27 ?	?		CWD
	59	F	62-16-27 ?	?		CWD
GR015	54	M	62-16-27		41787	CWD
G26657	53	M	62-16-28		41787	CWD
G27886	58	M	62-16-27		41587	CWD
G26558	57	M	62-16-28		41587	CWD
G26186	55.5	F	62-16-27		41287	CWD
G18363	62	M	62-16-28		41187	CWD
G18567	56.2	M	62-16-28		41387	CWD
G26631	57.5	F	62-16-28		41087	CWD
G27907	56	F	62-16-28		41087	CWD
G18151	59	M	62-16-28		40387	CWD
G27956	54	F	62-16-28		40287	CWD
G18307	59	M	62-16-27		40287	CWD
G27901	58	M	62-16-27		33087	CWD
G26241	52	M	62-16-28		33087	CWD
RAINBOW	42	U	62-16-45		41487	LFH
RAINBOW	36.5	M	62-16-45		30287	LFH
ID03245B	55	F			41687	CWD
ID01785R	56.5	F			40787	CWD

A Jaw tags and other notes also listed here.

Appendix H. Snouts from the Snake River examined by National Marine Fisheries Service (NMFS) for WDG, fall 1986 and spring 1987.

ID #	Date (m/d/y)	Location[A]	Type[B]	Len (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[C]	Brand[C]	Jaw Tag	CWT
125	0 ?? 0 ??		V	0	0	U	U	U	N	G27095	63-32-14
42	120786	01 ??	S	82	0	F	H	AD [D]			
77	120486	165	V	73.5	0	F	H	AD			
79	120486	165	V	76.5	0	F	H	AD			
72	120586	165	S	86.5	0	F	H	AD			
153	011187	166	S	79	0	F	H	AD			
138	011787	166	S	63	0	F	H	ADLV	RA-17-3	N	62-16-28
117	041486	166	S	42	0	U	H	LV [E]		N	621645
118	041486	166	S	42	0	U	H	AD [E]		N	N
33	110286	166	S	88	0	M	H	AD			
29	110286	166	S	87.5	0	M	H	AD			
28	111586	166	V	93.5	0	M	H	AD			
34	111886	166	S	87	0	M	H	AD			
30	111886	166	S	78.5	0	F	H	AD			
27	111886	166	S	76	0	F	H	AD			
32	111886	166	S	89	0	F	H	ADLV			
37	111886	166	S	79	0	F	H	AD			
75	113086	166	S	94	0	M	H	AD			
68	120386	166	S	78.5	0	F	H	AD			
73	120386	166	S	81	0	F	H	AD			
67	120386	166	S	72	0	F	H	AD			
80	120386	166	S	34	0	F	H	ADLV [E]		N	7-38-1
66	120586	166	S	70.5	0	F	H	AD			
78	121386	166	S	82	0	F	H	AD			
74	121386	166	S	85	0	F	H	AD			
83	121386	166	S	60.5	0	M	H	ADLV	LA-S-1	N	62-16-29
70	121386	166	S	76.5	0	F	H	ADLP			
89	122186	166	S	74.5	0	F	H	AD			
88	122686	166	S	93	0	M	H	AD			
122	010287	167	S	66	0	M	H	LV	N	N	62-16-45
113	010287	167	S	87	0	M	H	AD			
121	010287	167	S	33	0	U	H	AD [E]		N	N
124	010487	167	S	89	5.9	M	H	ADLV	N	N	10-28-7
139	011787	167	S	86.5	0	M	H	AD			
141	011787	167	S	76	4.1	M	H	AD			
146	011787	167	S	90	0	M	H	AD			
149	011787	167	S	89	0	F	H	AD			
142	012487	167	S	85	0	M	H	AD			
144	012487	167	S	79	0	M	H	AD			
140	020887	167	S	85	0	F	H	AD			
31	111686	167	S	88	0	M	H	AD			
36	111686	167	S	61	0	M	H	LV	N	N	62-16-44
35	111886	167	S	78	0	F	H	AD			
91	122686	167	S	89	0	M	H	AD			
87	122686	167	S	86	0	F	H	AD			
101	122686	167	S	85	4.7	F	H	AD			
98	122686	167	S	84	0	F	H	AD			
93	122686	167	S	91.5	0	F	H	AD			
103	122686	167	S	91.5	0	M	H	AD			
95	122686	167	S	77.5	0	F	H	AD			
102	122686	167	S	94	0	M	H	AD			

Appendix H. (Cont').

ID #	Date (m/d/y)	Location[A]	Type[B]	Len (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[C]	Brand[C]	Jaw Tag	CWT
115	010787	168A	S	78.5	5	F	H	AD			
145	021087	168A	S	86.5	0	M	H	ADLV	N	N	10-25-17
21	111386	168A	S	90.5	7	M	H	AD			
12	111386	168A	S	58	1.8	M	H	ADLV	RA-H-1	G27893	62-16-44
20	111386	168A	S	80	5.5	F	H	ADLV	N	N	10-25-17
57	112086	168A	S	84	6.3	F	H	AD			
59	112086	168A	S	84	6.4	F	H	AD			
63	112286	168A	S	75	4.2	M	H	LV	RA-IJ-1	G21360	63-32-12
54	112486	168A	S	71	0	F	H	LV	N	N	63-32-15
49	112486	168A	S	83	5.9	F	H	AD			
53	112486	168A	S	69	0	F	H	ADLV	N	N	10-27-46
50	112986	168A	V	81	0	F	H	ADLV	LA-J-?	N	10-25-17
51	112986	168A	V	74	0	F	H	NM [F]			
44	120486	168A	S	79	5.1	F	H	AD			
71	121386	168A	S	84	0	M	H	AD			
69	121386	168A	S	89	0	M	H	AD			
99	122286	168A	S	81	0	F	H	AD			
112	122986	168A	S	84.5	0	F	H	AD			
154	123186	168A	S	91.5	6.8	M	H	AD			
26	110186	168B	S	61	0	M	H	ADLV	N	N	62-16-27
25	111386	168B	S	69	3.9	F	H	ADLV			
13	111386	168B	S	88	6.8	M	H	AD			
92	122286	168B	S	91.5	0	M	H	AD			
129	011887	168C	S	65	0	M	H	ADLV			
126	011887	168C	S	59	0	F	H	ADLV			
7	101286	168C	S	58	2.1	M	H	ADLVRP	N	N	10-25-21
5	102586	168C	S	62	0	M	H	ADLV	RA-17-3	N	62-16-28
23	110486	168C	S	64	2.3	M	H	ADLV	N	N	62-16-28
18	110586	168C	V	72	0	F	H	ADLV			
22	110686	168C	S	58.5	0	F	H	ADLV	N	N	62-16-28
11	110986	168C	S	61	0	M	H	ADLV	RA-17-1	N	62-16-27
65	111786	168C	S	60	0	F	H	ADLV	RA-17-3	N	62-16-28
39	112186	168C	V	60	0	F	H	ADLV	RA-17-1	N	62-16-27
41	112186	168C	V	56	0	M	H	ADLV	N	N	62-16-27
40	112186	168C	V	61	0	M	H	ADLV	RA-17-1	G26322	62-16-27
43	112386	168C	V	0	2.4	M	H	ADLV [G]		N	62-16-27
55	120486	168C	S	65	2.2	M	H	ADLV	N	N	62-16-27
84	121486	168C	S	62	0	M	H	ADLV	N	N	62-16-28
82	121486	168C	S	61	0	F	H	ADLV	RA-17-1	N	62-16-27
85	121486	168C	S	71	3.5	F	H	LV	N	G18462	23-16-46
106	122286	168C	S	73	0	F	H	ADRV			
114	010387	168L	S	83	5.9	M	H	AD			
123	010387	168L	S	90	6.8	M	H	ADLV	N	N	23-16-44
147	010887	168L	S	82	5.5	F	H	AD			
148	010887	168L	S	78	5.5	F	H	AD			
135	010887	168L	S	84	0	M	H	AD			
134	011087	168L	S	71	0	F	H	LV	RA-IV-1	N	63-32-14
128	011087	168L	S	84	0	F	H	AD	N	N	23-16-45
133	011887	168L	S	77.5	0	F	H	AD			
131	012187	168L	S	87.5	0	M	H	AD			

Appendix H. (Cont').

ID #	Date (m/d/y)	Location[A]	Type[B]	Len (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[C]	Brand[C]	Jaw Tag	CWT
127	012187	168L	S	86.5	0	F	H	AD			
155	012387	168L	S	77.5	0	F	H	ADLV	N	N	10-25-17
152	012387	168L	S	66	2.7	F	H	LV	N	N	63-32-14
151	012787	168L	S	88.5	0	F	H	AD			
130	013087	168L	S	72.5	0	F	H	LV	RA-IJ-1	N	63-32-12
132	013187	168L	S	91.5	0	M	H	AD			
143	020487	168L	S	90	0	F	H	AD			
136	021887	168L	S	92.5	7.6	M	H	AD			
150	022887	168L	S	77.5	4.9	F	H	AD			
137	030687	168L	S	57	1.8	F	H	LV	N	N	62-16-44
9	092886	168L	S	54.5	1.7	F	H	ADLV			
6	101886	168L	S	89	6.7	M	H	LV	N	N	5-13-35
17	101986	168L	S	87	0	M	H	AD			
16	101986	168L	S	73	0	M	H	AD			
8	102586	168L	S	62	2.9	M	H	LV	RA-H-1	N	62-16-44
3	102586	168L	S	58	2.4	M	H	LV	RA-H-1	N	62-16-44
2	102686	168L	S	60	0	M	H	ADLV	RA-17-3	G18480	62-16-28
10	102686	168L	S	62.5	0	M	H	LV	RA-H-1	G18373	62-16-44
4	102986	168L	S	61	0	F	H	ADLV	RA-L-2	N	N
1	110486	168L	S	61	0	F	H	ADLV	N	N	10-26-32
24	110886	168L	S	62	2.8	M	H	ADLV			
14	111486	168L	S	88	0	F	H	AD			
15	111486	168L	S	84	0	M	H	AD			
36	111586	168L	S	94	0	M	H	AD			
61	111686	168L	S	89.5	0	F	H	AD			
56	111686	168L	S	78	5	F	H	AD			
58	112386	168L	S	60	2.1	M	H	LV	RA-H-1	G26357	NO SNOUT
62	112386	168L	S	58	0	M	H	LV	RA-H-1	G27801	62-16-44
60	112386	168L	S	56.5	1.9	M	H	LV	N	N	62-16-44
52	112586	168L	S	71	3.4	F	H	LV	RA-IV-1	G18065	63-32-14
64	112986	168L	S	81	0	M	H	NM? F			
48	120286	168L	S	85	0	M	H	AD			
45	120686	168L	S	92	0	F	H	AD			
47	120686	168L	S	63	0	M	H	LV	RA-H-1	N	N
46	120686	168L	S	74	0	M	H	LV	RA-IV-1	N	63-32-14
81	121386	168L	S	84.5	0	F	H	ADLV	N	N	5-13-35
120	121486	168L	S	83	0	F	H	AD			
108	121486	168L	S	94	0	M	H	AD			
76	121486	168L	S	86.5	0	F	H	AD			
94	121886	168L	S	83	0	F	H	AD			
96	121886	168L	S	88	7.5	M	H	AD			
86	122186	168L	S	70	3.2	F	H	LV	RA-IV-1	N	63-32-14
105	122186	168L	S	75	3.2	F	H	LV	RA-IJ-1	G17999	63-32-12
97	122286	168L	S	90	6.3	M	H	AD			
90	122386	168L	S	83	0	F	H	AD	N	N	5-13-35
104	122386	168L	S	57.5	0	M	H	ADLV	N	N	62-16-44
100	122386	168L	S	56	0	F	H	AD	RA-7-N	N	N
109	122886	168L	S	88	0	F	H	AD			
107	122886	168L	S	85	0	F	H	AD			

Appendix H. (Cont').

ID #	Date (m/d/y)	Location[A]	Type[B]	Len (cm)	Wt. (kg)	Sex	Orig.	Fin Clips[C]	Brand[C]	Jaw Tag	CWT
119	122886	168L	S	58.5	0	F	H	LV			
116	122886	168L	S	87	0	M	H	AD			
110	122886	168L	S	85	0	M	H	AD			
111	123086	168L	S	81	4.1	F	H	AD	LA-W-1	N	N
19	092886	168L	V	0	0	F	H	NM [F]			

A WDG fishery management sections; 168A = zone A of 168, 168L = Lower Granite Reservoir portion of 168.
B Type of recovery: V = VOLUNTARY, S = SPORT.
C RA = right anterior, LA = left anterior, LV = left ventral, AD = adipose clip.
D Near Salmon R.?
E Rainbow trout sport catch.
F Not needed.
G Vol. to NMFS.

Appendix I. Idaho Fish and Game (IFG) sport recoveries for Lyons Ferry Hatchery steelhead coded-wire tags in fall 1986 and spring 1987 (includes cwts from fish caught and recorded on Idaho or Washington permits) (IFG data from K. Ball, IFG, pers. comm.).

Cwt code	Recovery type	River Location[A]	Capture Date	Length (cm)	Sex	Jaw Tags	Estimated harvest (expanded)[B]
62-16-27	sport[C]	L.Snake	10/11/86	61.0	F	G27988	67
62-16-27	sport[C]	L.Snake	10/11/86	85.0	F		
62-16-27	sport	L.Snake C	11/08/86	61.0	F	G26567	
62-16-27	sport	L.Snake C	10/26/86	58.0	M		
62-16-27	sport	L.Salmon	10/12/86	66.0	F		16
62-16-28	sport	L.Snake B	10/12/86	59.0	F		41
62-16-28	sport[C]	L.Snake	11/16/86	60.0	M		
62-16-28	sport	L.Snake C	11/22/86	62.0	M		
62-16-28	sport	N.F.CLW.	02/04/87	82.0	F		5
62-16-29	sport	L.Snake A	11/08/86	60.0	F		11
62-16-29	sport	L.CLW D	12/07/86	59.0	M		3
62-16-30	sport	L.Snake B	12/06/86	64.0	M		11
62-16-30	sport	L.CLW A	10/15/86	58.0	F		20
62-16-44	sport	L.CLW D	01/03/87	59.0	F	G27770	5
63-32-14	sport	L.Snake C	01/19/87	73.0	F	G18170	14

[A] CLW A = Clearwater R. confluence to pump station.
CLW B = Clearwater R. pump station to Cherry Lane.
CLW D = Below Orofino Bridge.
L.Snake = Snake R. below Salmon R. to State Line at Clearwater confluence.
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. Includes fish caught by anglers using Washington punchcards and interviewed by IFG.

[C] Not used in WDG cwt expansions for mid Snake River because it was unknown whether the fish were caught above or below the Oregon State line. All other L. Snake R. fish have been included in WDG cwt expansions for the mid Snake (Table 21).

Appendix J. Revised coded-wire tag expansions for the Snake R., fall 1985 and spring 1986.

Sec.[A]	Season[B]	Estimated Harvest[C]	# Fish Checked (Sample Rate)[D]	# Fish Marked (Mark Rate)[E]	# Snouts Taken	# Snouts Checked (# tags, no tags)	Total Estimated # Fish Marked[F] (Z w/ cwt)[G]	Total Estimated tags in Harvest[H]	Tag code	# tags Recovered	Expanded tags in Harvest (by code)[I]
Mid 168	Fall	3026	123 (.0406)	29 (.2358)	27	25 (9,16)	713.53 (36.00)	256.87	5-13-36	1	29
									10-25-16	1	29
									23-16-19	1	29
									23-16-39	1	29
									23-16-51	1	29
									63-28-39	1	29
									63-28-38	1	29
									63-32-13	2	57
										9	260
Mid 168	Spring	282	14 (.0496)	1 (.0714)	1	1 (1,0)	20.14 (100.0)	20.14	63-32-12	1	20
LGR 168	Fall	1320	204 (.1545)	32 (.1569)	28	28 (15,13)	207.11 (53.6)	111.0	5-10-24	1	7
									10-27-45	1	7
									23-16-04	1	7
									23-16-16	1	7
									23-16-19	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
LGR 168	Spring	869	132 (.1519)	11 (.0833)	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

Appendix J. (Continued).

Sec.[A]	Season[B]	Estimated Harvest[C]	# Fish Checked (Sample Rate)[D]	# Fish Marked (Mark Rate)[E]	# Snouts Taken	# Snouts Checked (# tags, no tags)	Total Estimated # Fish Marked[F] (% w/ cwt)[G]	Total Estimated tags in Harvest[H]	Tag code	# tags Recovered	Expanded tags in Harvest (by code)[I]
L.SN.	FALL	1491	131	48	36	36	546.3	182.1	5-10-28	1	15
164-167			(.0879)	(.3664)		(12,24)	(33.33)		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.	SPRING	892	76	16	11	11	187.8	85.4	10-27-46	2	34
164-167			(.0852)	(.2105)		(5,6)			23-16-17	1	17
									23-16-39	1	17
									23-16-40	1	17
										5	85

A 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 Fall = 1 Sept. to 31 Dec., Spring = 1 Jan. to 31 Mar.

C Estimated harvest from other tables (See IFB expansions in Appendix I, Hendel et al. 1987.), plus 6 jaw tags (4 RA-IV-1, 1 RA-IJ-1, 1 RA-F-1) collected by IFB but not included in IFB expansions, or in this table.

D (# Fish checked / estimated harvest) = sample rate. Revised to exclude IFB data from fish sampled.

E (# of fish marked / # fish checked) = mark rate. WDG data only - includes jaw tags and brands.

F (Total harvest x mark rate) = estimated # of marked fish in harvest.

G (# tags / # snouts checked) x 100 = % of snouts with tags.

H (Estimated total marked fish x proportion of snouts with tags) = # tags in harvest.

I (# recoveries of a tag code / total # tags) x Estimated tags in harvest = estimated tag codes in the harvest (expanded).

Appendix K. External tags and brands observed on the Snake River during creel surveys, fall 1986 and spring 1987.

Date (m/d/y)	Loc.*	Tag or brand **	Length (cm)	Sex	Origin	marks	snout taken	Observer
101686	LGR	G21298	91.5	U	H	U	N	WDG
101686	LGR	G26273	61	U	H	U	N	WDG
102586	LGR	G26423	81	M	H	LV,RA-?	N	WDG
102686	LGR	G18373	62.5	M	H	LV	Y	WDG
102686	LGR	G18480	60	M	H	ADLV	Y	WDG
102986	LGR	RA-L-2	61	F	H	ADLV	Y	WDG
112386	LGR	G18419	61	M	H	NM	N	WDG
112386	LGR	G26357	60	M	H	LV	N	WDG
112386	LGR	G27801	57.5	M	H	LV	Y	WDG
112586	LGR	G18065	71	F	H	LV,RAIV1	Y	WDG
120686	LGR	RA-H-1	63	M	H	LV	Y	WDG
120686	LGR	RA-IV-1	74	M	H	LV	Y	WDG
120786	LGR	ID02183	63	M	H	AD	N	WDG
120786	LGR	G21372	77	M	H	NM	N	WDG
121386	LGR	G24359	93	M	H	AD	N	WDG
121386	LGR	G18593	79	F	H	AD	N	WDG
122186	LGR	G17999	75	F	H	LV,RAIJ1	Y	WDG
122186	LGR	RA-IV-1	70	F	H	LV	Y	WDG
122186	LGR	G21348	77.5	M	H	ADLV,RAIV3	N	WDG
	LGR	G21348				ID03163B		WDG
122386	LGR	RA-7N	56	F	H	AD	Y	WDG
122386	LGR	G27781	64	M	H	LV	N	WDG
122886	LGR	G18200	63.5	M	H	LV	N	WDG
123086	LGR	LA-W-1	81	F	H	AD	Y	WDG
11087	LGR	G18079	80.5	F	W	NM	N	WDG
11087	LGR	RA-IV-1	71	F	H	LV	Y	WDG
12787	LGR	RA-IJ-1	73	F	H	LV	N	WDG
13087	LGR	RA-IJ-1	72.5	F	H	LV	Y	WDG
13187	LGR	LA-J-1	89	F	H	AD	N	WDG
30787	LGR	RA-IV-3	74.5	F	H	LV	N	WDG
111586	166	LA-H-1	61	U	H	LV	N	WDG
113086	167	RA-7S-1	61.5	F	H	AD	N	WDG
121386	166	LA-B-1	60.5	M	H	ADLV	Y	WDG
11787	166	RA-17-3	63	F	H	ADLV	Y	WDG
11887	MID-C	G26715	63	M	H	ADLVRA173	N	WDG
11787	C	G18170	73	F	H	LV	Y	IFG
11787	C	ID03382B	66	M	U	U	N	IFG
21487	A	G27799	54.5	F	H	NM	N	WDG
101586	B	G18226	59	F	H	LV	N	WDG
110986	C	RA-17-1	61	M	H	ADLV	Y	WDG
111086	A	G18365	74	F	H	LV	N	WDG
111386	A	G27893	58	M	H	ADLV	Y	WDG
111786	C	RA-17-3	60	F	H	ADLV	Y	WDG
112186	C	G26322	61	M	H	ADLVRA171	Y VOL	WDG
112186	C	RA-17-1	60	F	H	ADLV	Y VOL	WDG
112286	A	G21360	75	M	H	LV	Y	WDG
112986	A	LA-J-1	81	F	H	ADLV	Y	WDG
110886	A	ID3168B		U	W	NM	N	IFG
110886	C	G26567	62	M	H	ADLV	Y	IFG
112286	C	ID01891R	62	M	H	ADLV	Y	IFG

Appendix K. Continued.

Date (m/d/y)	Loc.*	Tag or brand **	Length (cm)	Sex	Origin	marks	snout taken	Observer
101186	B	ID02923	62	F	H	AD	N	IFG
101286	B	826563	59	F	H	AD	N	IFG
101286	B	827909	61	F	H	AD	N	IFG
121386	A	RA-L?	89	M	H	AD	Y	WDG
121486	C	818462	71.5	F	H	LV	Y	WDG
121486	C	RA-17-1	61	F	H	ADLV	Y	WDG
121686	C	ID03330B		U	W	NM	N REL.	WDG
122786	C	ID3140					N REL.	WDG
122786	B	818614	64	M	H	LV	N	WDG
123186	L	ID03318R	0	U	H	AD	VOL	WDG
101186	M	827988	61	F	H	U	Y	IFG

* LGR = Lower Granite Reservoir below Red Wolf Bridge, Mid = Mid Snake R. above Red Wolf Bridge (A, B, C = zones). 166 is WDG fish mgmt. sect.

** IFG anchor tags = ID######R, R = red B = blue, color unk. if no trailing letter.

Appendix L. Paired sample "t" test for WDG punchcard and LFH creel survey harvest estimates on the Snake R.(mgmt. section 168), run years 1984-1986 (Zar 1984).

Year	Month	Creel Est.	P. Card Est.	Differences
1984	Sep.	90	78	12
	Oct.	227	320	-93
	Nov.	1,041	841	200
	Dec.	1,769	1,654	115
	Jan.	1,707	1,339	368
	Feb.	534	422	112
	Mar.	178	226	-48
1985	Sep.	207	151	56
	Oct.	993	730	263
	Nov.	863	619	244
	Dec.	525	573	-48
	Jan.	514	448	66
	Feb.	378	557	-179
	Mar.	60	62	-2
1986	Sep.	121	70 ^	51
	Oct.	858	738	120
	Nov.	1,222	1,034	188
	Dec.	1,166	1,046	120
	Jan.	768	772	-4
	Feb.	120	168	-48
	Mar.	61	120	-59
Totals =		13,402	11,968	Mean = 68.28571

$H_o: u = 0$, $H_A: u_1 = 0$ Variance = 17021.91

Table value: Sd = 130.4680

For v=20 @α =.05 S.Error = 28.47046

t = 2.086 t = 2.3985, n = 21, v (df) = 20

Reject H_o: There is a significant difference between the two harvest estimating techniques for the 21 month period.

^ 1986 punchcard harvest estimates above for section 168 may be different than values published by the WDG. The values in this table were recalculated from raw data using a correction factor not influenced by creel data. This recalculation was necessary to enable us to compare with 1985 and 1986 punchcard estimates. WDG punchcard-derived harvest estimates are calculated by multiplying the total number of fish recorded as kept on steelhead punchcards returned to the WDG (# of punches), by a correction factor. The correction factor is used to account for recorded harvest on punchcards that were not returned. The correction factor is computed by comparing creel harvest estimates on key index rivers scattered throughout western and southern Washington with raw punchcard data (punches). It was determined that expanding punchcard harvest based solely on the percent return of punchcards over estimated actual harvest (eg.: if 25% of all cards are returned, punches would be multiplied by 4 to obtain total harvest). Expansion factors varied between 2.0 and 2.4 in recent years.

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