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ASSESSMENT OF THE 2002

SKAGIT RIVER SPORT FISHERY

Prepared for

Skagit Environmental Endowment Commission
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Summary

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An on-site survey of the Canadian Skagit and Sumallo Rivers' trout fisheries was conducted during the summer and fall of 2002. The primary objective was to replicate a survey first conducted in 1986 and subsequently replicated in 1990, 1992 and 1994 to monitor changes in angler effort and success. In all five surveys, information on angler characteristics and social carrying capacity was also collected.

From July 1 to October 31, 2002, total angler effort was estimated at 16,422 hours. Overall, angler use in 2002 was substantially lower than the 1994 season (27,967 hours). At the lower Skagit River effort was lower than 1994 and 1992, but higher than effort in 1986 or 1990. At the upper Skagit River, 2002 effort decreased by 54% from 1994, but was similar to 1986, 1990 and 1992. Angler effort at the Sumallo River decreased by 20% over 1994.

Angler success for rainbow trout (0.46 fish per hour) was lower than in 1994 (0.74 fish per hour) or 1992 (0.69 fish per hour) but similar to earlier surveys (1986: 0.43 fish per hour; 1990: 0.36 fish per hour). The decrease in catch rates can probably be attributed to river conditions. Similar to 1986 and 1990, the 2002 season had high water conditions early in the season that persisted into August, contributing to poor success in the months of July and August. Conversely, in 1992 and 1994 low water conditions early in the season contributed to higher success in the months of July and August. Angler success was similar to 1994 levels in September when the water levels had dropped and fishing conditions improved.

The 2002 estimated catch of 8,042 rainbow trout was a 63% decrease from 1994 (21,941) and a 46% decrease from 1992 (14,786), but was still higher than 1990 (5,306 trout) and 1986 (5,605 trout). The rainbow catch at the lower Skagit River (6,565) was 62% lower than in 1994 (17,301) and 47% lower than 1992 (12,286), but still substantially higher than the estimated catch in both 1990 (3,925) and 1986 (4,301). At the upper Skagit River, the estimated catch (1,121) of rainbow trout was lower than 1994 and 1992, but similar to 1990 and 1986. The estimated catch in the Sumallo River (356) decreased by 72% from 1994, but was similar to 1992 and double the estimated catch of 1986 and 1990. The magnitude of the catch in the Sumallo River was small compared to the Skagit River areas. The general decrease in catch in all areas as compared to 1992 and 1994 was the result of decreased success rates and effort. Although success was similar to 1986 and 1990, effort was higher in 2002, producing higher overall catch estimates compared to the first two surveys.

The estimated catch of char (198 fish) decreased from 1994 (376 fish), but was still higher than 1992 (140 fish), 1990 (106 fish) and 1986 (115 fish). No tagged char were reported caught during the course of the survey. Char catch remains low in the Skagit and Sumallo River systems.

Angler use in 2002 approached the management goal level of 3,600 angler days per year (Neuman 1988). Since anglers in 2002 still rated the Skagit and Sumallo River fishing experience as high quality, the current level of angler use appears sustainable. The management goal for angler success of one fish per hour was only achieved in September in Section 2 of the lower Skagit River. High catch rates in 1994, which were close to management goals, appear to have been caused by exceptional fishing conditions and anomalously high fish abundance as corroborated by the 1994 snorkel survey. The lower success rates this year were likely influenced by early season high water levels. Snorkel surveys should be conducted again in conjunction with the angler survey to assess relative abundance of rainbow trout as compared to abundance indices established in surveys from 1982 to 1998.

The Skagit River and Ross Reservoir Management Plan developed in 1988 had a 5 to 10 year time frame (Neuman 1988). The management plan should be reviewed and updated as required, taking into account trend data gathered from snorkel surveys, angler surveys and biological sampling. However, the continued paucity of complaints about any aspect of the fishery indicates Skagit and Sumallo River anglers are generally satisfied with the current management of the Skagit River and Ross Reservoir fisheries.

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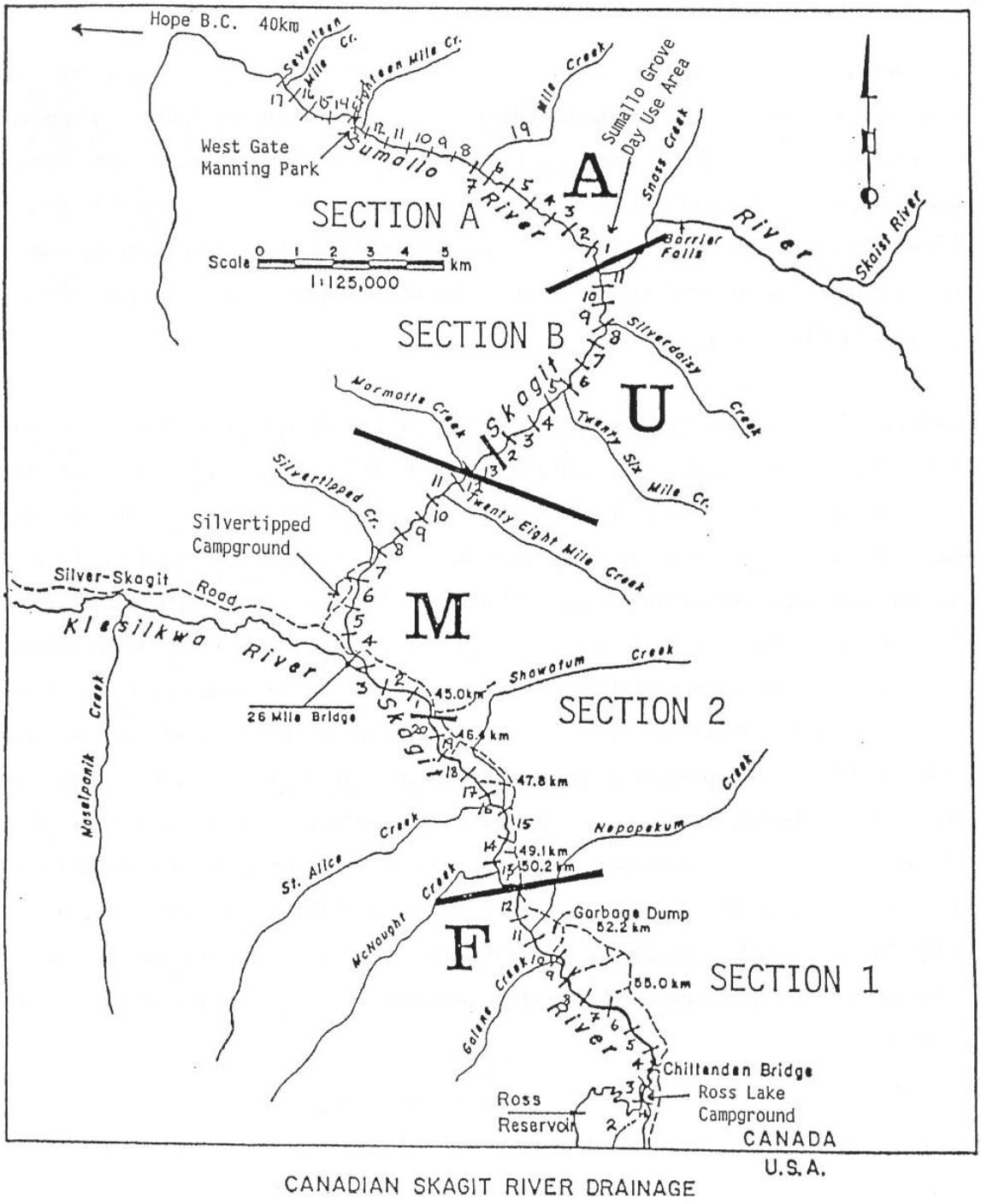
1.0 INTRODUCTION

1.1 Background

Ross Reservoir and the Canadian Skagit River, located approximately 40 km southeast of Hope, B.C., (Figure 1) support popular recreational fisheries for rainbow trout (*Oncorhynchus mykiss*) and to lesser extent Dolly Varden char (*Salvelinus malma*)*, Bull Trout (*S. confluentus*)* brook trout (*S. fontinalis*)* and cutthroat trout (*O. clarki*). Studies (Griffith and Greiner 1983; Griffith 1984) strongly suggest that the sport fishery in the Skagit River in Canada is largely supported by a migratory stock of rainbow trout. The fish enter the Skagit River during the spring spawning period, then return to Ross Reservoir (primarily in the United States) at variable rates throughout the summer and early fall (Scott and Peterson 1986; Scott and Neuman, in prep.). Additionally, the migratory rainbow trout stock spawning in the Skagit River contributes substantially to the Ross Reservoir fishery. Earlier investigations indicated that almost half of the rainbow trout fry production in the Ross Reservoir watershed came from the Skagit River (Seattle City Light 1974).

In 1985, the British Columbia Ministry of Environment (now Ministry of Water, Land and Air Protection; MWLAP) and the Washington State Department of Wildlife (WDW; responsible for sport fishery management of the American portion of Ross Reservoir) began joint studies of the sport fisheries and fish stocks in this important international drainage. The information collected was used to develop joint management plans for the river and reservoir (Neuman 1988). The management plan for the Skagit River identified the need to regularly monitor the fishery to evaluate management strategies, respond to increasing use, and detect the effects of reservoir harvest on the river fishery.

* Both bull trout and Dolly Varden char will be referred to as "char" for the purposes of this report. Brook trout (also a char species) shall be referred to separately by its common name.



CANADIAN SKAGIT RIVER DRAINAGE

Figure 1. Survey sections (Section 1, Section A, etc.) and catch location index (F13, M10, etc.) used during the 2002 Skagit River angler survey.

Studies in the late 1980's indicated that the reservoir was overfished and, as a consequence, fish stocks in the river were depressed (Johnston 1989). In 1990 restrictive angling regulations (Appendix 1) were introduced on both the Canadian and American portions of the reservoir to reduce harvest and restore stocks. The effects of these regulations on reservoir fish stocks are being monitored by WDW. These regulations drastically reduced angler catch and harvest. As well, beginning with the 1992 season, a total catch and release angling regulation was implemented on the Skagit River to further reduce harvest (Appendix 1).

Surveys of the Canadian Skagit River sport fishery have been conducted in 1985, 1986, 1990, 1992, and 1994 (Scott and Peterson 1986; Scott and Lewynsky 1987; Scott et. al. 1991; Scott and Staley 1993; Scott et. al. 1995). The 1985 overview survey provided rough estimates of effort and catch and defined angler use patterns. This information was used to develop a statistical design for more rigorous sampling to increase the precision and accuracy of parameter estimates (Lewynsky 1986). The 1986, 1990, 1992 and 1994 surveys were conducted using the Lewynsky (1986) balanced sampling design. The design yielded precise estimates of effort, catch rates and catch that were used to measure changes in major fishery characteristics. Overall, angler use in the 1994 season increased 43% from 1992. At the lower Skagit River effort was up by more than 30% from 1992 and more than double the effort from 1986 or 1990. In 1994, at the lower Skagit River, similar to 1992, a large amount of angular effort was expended during early and peak season compared to 1986 and 1990. At the upper Skagit River, 1994 effort increased by 93% from 1992 and almost triple the effort from 1990. As in 1992, angler effort and the number of interviews obtained at the Sumallo River in 1994 were low and should be regarded with caution, although 1994 effort was up substantially over previous years.

Angler success for rainbow trout (0.74 fish per hour) in 1994 was similar to 1992 (0.69 fish per hour) but significantly increased from both the earlier surveys (1986: 0.43 fish per hour; 1990: 0.36 fish per hour). The increase in catch rates in all areas was thought to be attributed to reduced harvest in the reservoir since 1990 and undepleted fish abundance in the river due to the catch and release regulations.

The 1994 estimated catch of 21,941 rainbow trout was a 48% increase over 1992 (14,786) and a significant increase from 1990 (5,305 trout) and 1986 (5,605 trout). The rainbow catch at the lower Skagit River (17,301) was 41% higher than in 1992 (12,286) and about quadruple the estimated catch in both 1990 (3,925) and 1986 (4,301). At the upper Skagit River, the estimated catch of 3,369 rainbow trout increased by more than 50% from 1992 and almost tripled that of 1990 or 1986. A dramatic increase in estimated catch was evident at the Sumallo River, although the magnitude of the catch was small (1,271 fish) compared to the Skagit River areas. The general increase in estimated catch in all areas was the result of moderately higher angler success combined with substantially increased angler effort.

The estimated catch of char in 1994 (376 fish) increased from 1992 (140 fish), 1990 (106 fish) and 1986 (115 fish). Char were reported caught in the Sumallo River in 1994, which had no reported captures in 1990 or 1992.

Trends in the major fishery statistics since 1986 indicated some major objectives and goals stated in the Skagit River Management Plan (Neuman 1988) were realized in 1994. With the increase in angler effort in 1994, angler use exceeded the management goal level of 3,600 angler days per year. However, with the apparent good supply of fish and relatively uncrowded conditions, the fishing experience at the Sumallo and Skagit Rivers was still high quality as rated by anglers.

In 1994, the management goal for angler success of one fish per hour was achieved in the lower Skagit River during the peak months of the fishery (July through September). However, catch rates did not reach this level in the upper Skagit or Sumallo Rivers.

A char telemetry program was conducted concurrent with the 2002 Skagit River sport fishery survey, but was independent from this study. The 2002 sport fishery survey was conducted by the same operational and analytical methods that were used in the previous four surveys. This report presents results from the 2002 survey.

1.2 Historical Angler Use Surveys

Results of previous investigations of angler effort and catch at the Skagit River were summarized by Scott and Peterson (1986). Essentially, only anecdotal information was reported for the Skagit River prior to 1970. From 1971 to 1973, consultants engaged by Seattle City Light in conjunction with what is now MWLAP conducted angler surveys of the Skagit River. These surveys provided baseline data on angler numbers and distribution, catch by species, catch rates and demographic characteristics of the anglers. Statistically reliable estimates of total angler effort and catch were not calculated. However, in 1971 the total catch was thought to approximate 4,000 fish (Seattle City Light 1972). The baseline survey in 1985 estimated angler effort at 16,548 hours (4,142 days) with an estimated rainbow trout catch of 3,579 fish, of which 2,307 (65%) were harvested (Scott and Peterson 1986). Statistical estimates from the 1985 survey are not reliably comparable to the 1986, 1990, 1992 or 1994 surveys because it was conducted by different methods.

1.3 Objectives

The primary objective of the 2002 survey was to replicate previous surveys conducted using the Lewynsky (1986) design applied in 1986, 1990, 1992 and 1994 to produce parameter estimates that would be reliably comparable between the five years. Consistent with the previous surveys, this survey was conducted to provide the following types of information to measure changes in major fishery characteristics:

- estimate of angler effort in hours and days;
- spatial and temporal distribution of angler effort;
- estimate of angler catch;
- spatial and temporal distribution of angler catch;
- estimate of angler success in both catch per hour and per day;
- spatial and temporal distribution of angler success;
- frequency distribution of angler catch, i.e. percentage of anglers that caught 0 fish, 1 fish, 2 fish, etc.;
- an angler profile (age distribution, residence location, amount of new use, amount of repeat use);
- information on angling methods including success by gear type and compliance with angling regulations; and,
- angler opinions and attitudes regarding use levels, regulations, fishing experience attributes, other recreational uses of the river, etc.

2.0 METHODS

2.1 Survey Design and Operation

The 2002 survey design and operation was consistent with that described for the 1992 survey (Scott and Staley 1993).

The operational requirements of the surveys were based on specifications outlined by Lewynsky (1986) and included in Appendix 2 of Scott and Lewynsky (1987). Operational procedures and sampling schedules were followed with rigorous sampling protocol.

As in 1986, 1990, 1992 and 1994, the survey area included the Skagit River from Ross Reservoir to the Sumallo River confluence and the Sumallo River for 15 kilometres upstream.

2.2 Survey Information Collected

Anglers in both areas were asked to volunteer the same information. The following primary effort and catch information was recorded for each interview:

- time of interview;
- location of the angler at the time of interview (Figure 1);
- time the angler started fishing (to the nearest 5 minutes);
- whether the angler had finished fishing for the day;
- time fished on the preceding day (to the nearest 0.5 hours);
- fishing method;
- number of anglers per vehicle;
- number of fish of each species caught and released; and,
- tag type, capture location, tag colour and tag number of any marked fish.

Information on weather and water conditions that may have affected fishing success was recorded on each survey day.

The following angler profile information was recorded the first time an angler was interviewed (i.e. profile information was not recorded multiple times for the same angler during repeat interviews):

- angler age category was estimated;
- angler residence location;
- whether the angler was a fish and game club member;

- year the angler first fished the Skagit River;
- rating of the quality of the fishing experience at the Skagit or Sumallo Rivers;
- identification of any negative aspects of the fishing experience;
- angler awareness of the presence of bull trout in the Skagit River;
- opinion on a regulation change to support area and/or time specific closures to protect spawning bull trout;
- how many anglers they expected to encounter at this site;
- how many anglers they had encountered at this site by the time of the interview; and,
- opinion on the number of anglers they encountered while fishing the Skagit River (too few; just right; too many; no opinion).

As opposed to surveys conducted in 1986, 1990, 1992 and 1994, anglers in 2002 were not asked whether they were aware of the current fishing regulations on the Skagit River as it was assumed the knowledge level would be high. Current regulations have been in place for 10 years and knowledge was already close to 90% in 1994 (Scott et. al. 1995). As well, anglers in 2002 were asked their opinion about area and/or time specific closures to protect spawning bull trout as opposed to a general opinion about current char related regulations asked in 1994.

Counts of anglers and vehicles were recorded on a Count Tally Sheet (Appendix 2). Information collected during interviews was recorded on an Angler Interview Form (Appendix 3). Additionally, copies of the current B.C. Sport Fishing Regulations Synopsis were offered and provided to anglers.

2.3 Survey Data Management and Analysis

To ensure accurate data collection, workers examined completed data sheets to verify and validate all records (i.e. for illegible entries, erroneous codes, incomplete entries, etc.) at the completion of each field day. The field records were again examined and verified when received by the Project Manager, who collated them by monthly blocks for subsequent computer entry.

Data summary and statistical analysis were conducted consistent with the 1986, 1990, 1992 and 1994 surveys and according to the prescribed estimation procedure in the survey design (Appendix 7 in Scott and Lewynsky 1987). Variance of the estimates was calculated following the procedure outlined in Appendix 8 of Scott and Lewynsky (1987).

3.0 RESULTS

3.1 Angling Conditions

At the initiation of the survey (July 1) the Skagit River water levels were high, resulting in poor fishing conditions. High water conditions persisted through to the middle of the month, then began to gradually recede. Water levels during July 2002, were similar to July 1990 and much higher than in 1992 or 1994. Fishing conditions improved during the month of August as the water levels continued to drop. Low water persisted through the month of September producing favourable fishing conditions. In comparison, water levels were extremely low in September 1994 resulting in less than favourable conditions by the middle of the month, particularly in the upper Skagit and Sumallo Rivers. Low water levels and good weather were prevalent in October up until the last two days of the survey (October 26 and 27) when a substantial rain event occurred.

Access to fishing sites has not changed since the 1994 survey, although many of the trails at the lower Skagit River have become quite overgrown in eight years.

3.2 Angler Effort and Catch Characteristics at the Lower Skagit River

3.2.1 Estimated Total Angler Effort

A total of 792 anglers were interviewed during the course of the survey. Of these, 632 (80%) of the interviews occurred in the lower Skagit River area. Anglers fished an estimated 11,987 hours (2,327 days) between July 1 and October 31, 2002 at the lower Skagit River (Table 1).

Table 1. Estimated angler effort in the lower Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Angler Hours	Standard Error	Mean Hours Fished per Day	Total Angler days
July	1	Midweek	286	(18)	5.91	48
		Weekend	432	(40)	3.75	115
		Total	718	(44)	4.40	163
	2	Midweek	429	(37)	0.00	n/a
		Weekend	839	(57)	12.17	68
		Total	1,268	(68)	12.17	n/a
	Month Total		1,986	(81)	4.70	423
August	1	Midweek	525	(31)	7.89	66
		Weekend	992	(71)	3.99	248
		Total	1,517	(77)	4.83	314
	2	Midweek	966	(50)	0.00	n/a
		Weekend	1,233	(59)	5.73	215
		Total	2,199	(78)	5.73	n/a
	Month Total		3,716	(109)	5.27	705
September	1	Midweek	961	(64)	5.51	174
		Weekend	1,201	(103)	5.30	226
		Total	2,163	(121)	5.41	400
	2	Midweek	1,080	(53)	0.00	n/a
		Weekend	1,440	(95)	4.33	332
		Total	2,520	(109)	4.33	n/a
	Month Total		4,683	(163)	4.29	1,091
October	1	Midweek	618	(41)	3.69	167
		Weekend	294	(42)	5.84	50
		Total	913	(59)	4.21	217
	2	Midweek	374	(12)	0.00	n/a
		Weekend	315	(41)	0.00	n/a
		Total	689	(42)	n/a	n/a
	Month Total		1,602	(72)	5.23	306
Season	1	Midweek	2,391	(84)	5.49	435
		Weekend	2,920	(138)	4.84	603
		Total	5,310	(161)	5.04	1,054
	2	Midweek	2,849	(83)	n/a	n/a
		Weekend	3,827	(133)	6.06	632
		Total	6,676	(156)	6.02	1,109
	Season Total		11,987	(224)	5.15	2,327

The standard error for angler hours was estimated at 11,763 to 12,211 hours, or +/- 1.9% of the estimated total, indicating excellent precision of the estimate. The 95% confidence limit would be roughly twice the standard error or about +/- 3.7% of the estimated total effort. The estimate of angler days is without confidence intervals and should be regarded with caution.

3.2.2 Temporal and Spatial Distribution of Angler Effort

In 2002, angler effort at the lower Skagit River (Figure 2) was highest during September (39% of the season total), followed by August (31%), July (17%) and October (13%).

From July through October 2002, the estimated angling effort in Section 1 of the lower Skagit River was similar to Section 2 (Table 1).

Average counts of approximately 1 angler per count occurred in the vicinity of F10 and F13 (Figure 3). Mean angler counts of between 0.5 and 1 occurred at F4, F5 and F14. High average counts for F1, F9, F19, M1 and M3 were based on miscellaneous angler counts of only 1 or 2 count tallies and are erroneous.

At the lower Skagit River, angler effort was generally oriented toward weekends and highest effort was during midday (Appendix 4). Overall, there was little effort before 10:00 am in the morning (no effort was recorded before 10:00 am in Section 1 for September and in Section 2 for October). During July and August, angler effort generally persisted into the evening. However, by September no effort was recorded in the lower Skagit River after 6:00 pm.

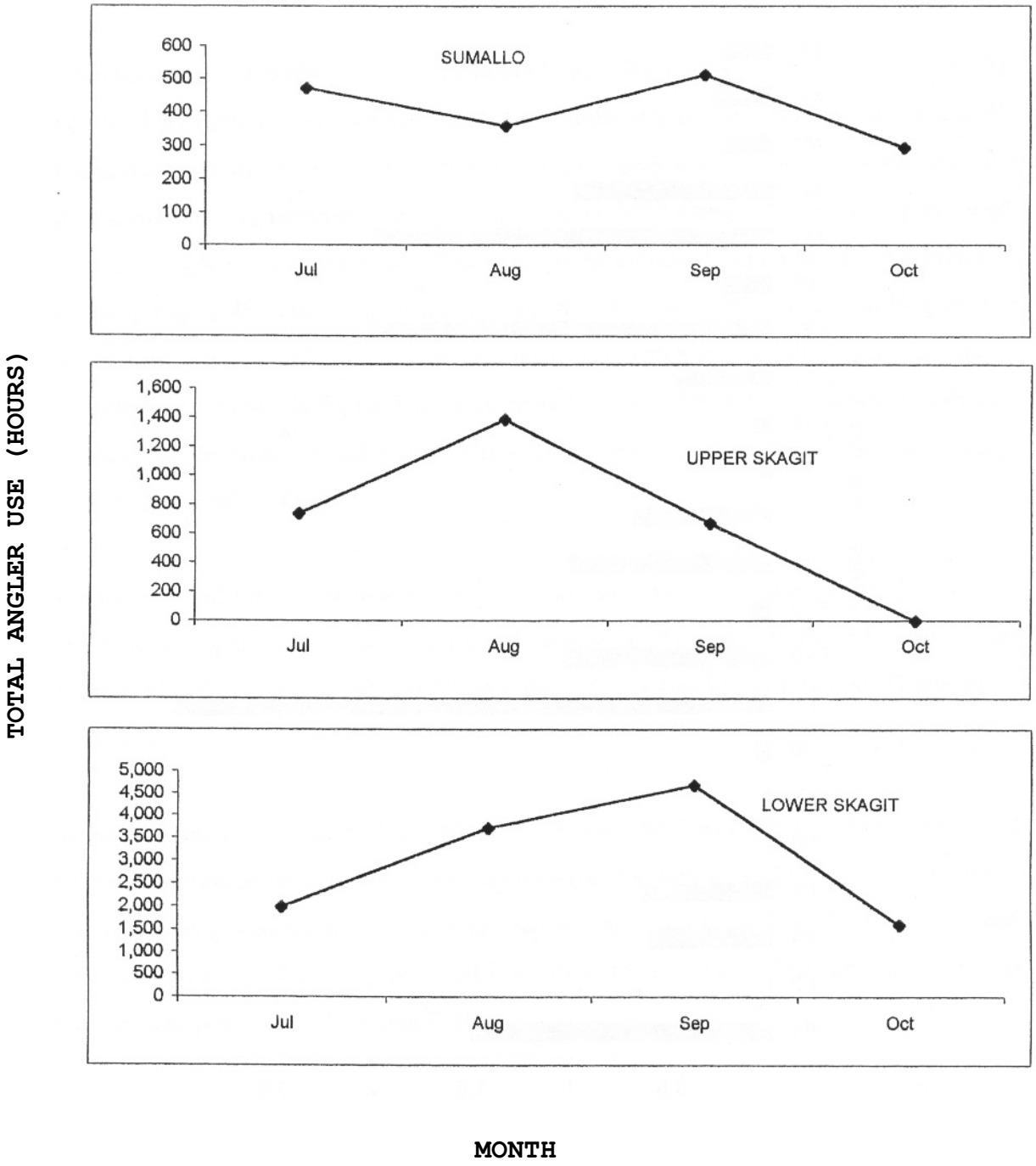


Figure 2. Monthly distribution of angling effort in the Skagit River trout fishery, July 1 through October 31, 2002.

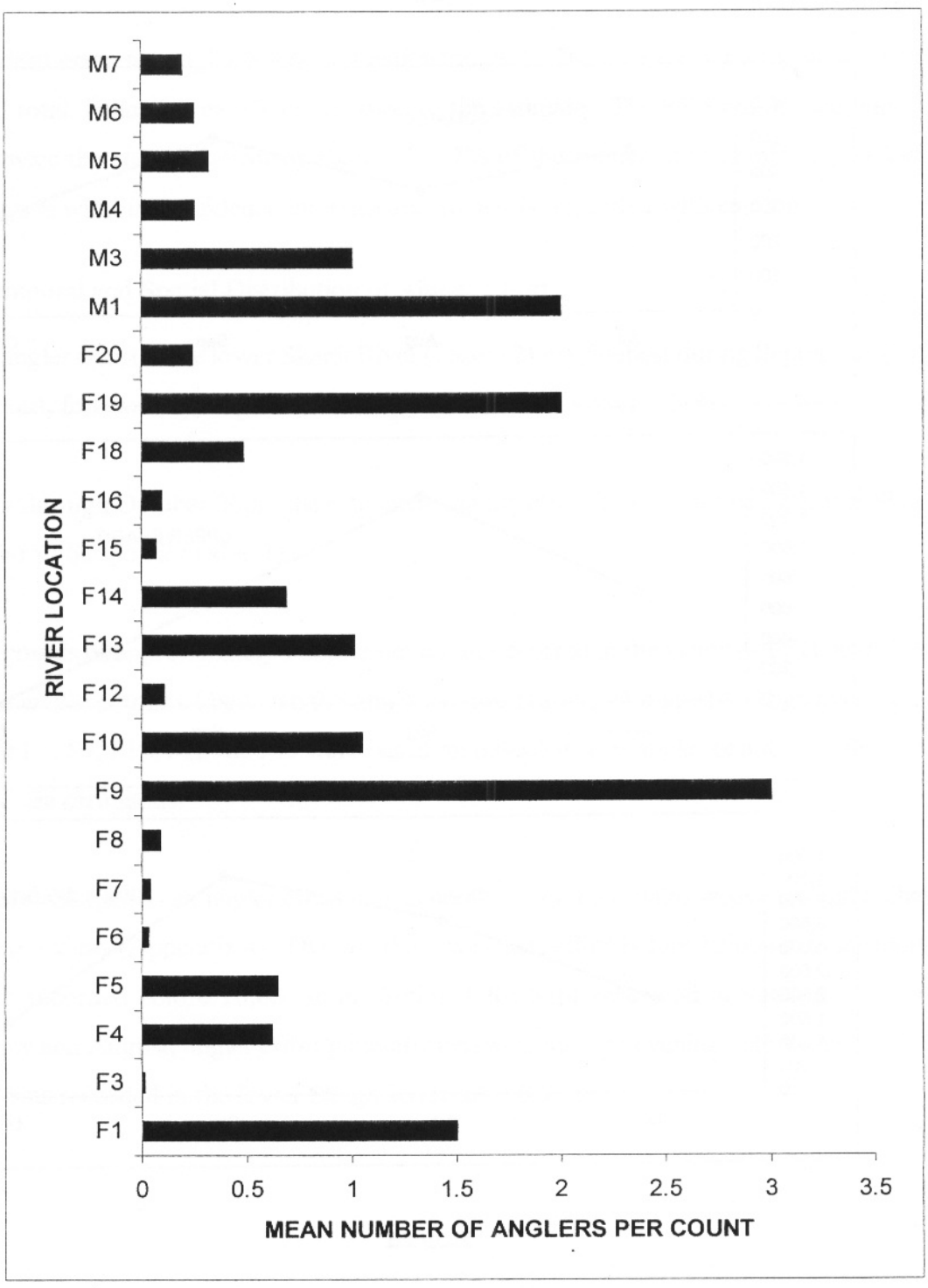


Figure 3. Distribution of angler effort among catch location sites during the lower Skagit River trout fishery, July 1 through October 31, 2002.

3.2.3 Estimated Total Catch

The estimated total catch of rainbow trout in the lower Skagit River between July 1 and October 31, 2002 was 6,565 fish (Table 2). The standard error for estimated total catch was estimated at 1,986 to 11,144 rainbow trout, or +/- 70% of the estimated total. See Section 4.1 for a discussion on the high standard errors for catch estimates and catch rates in the 2002 survey. The greatest percentage of rainbow trout caught in the lower Skagit River was in the month of September (58%), followed by August (30%; Figure 4). The monthly catch dropped in October (9%) and was at its lowest in July (3%). In July, August and October the estimated total catch in Section 1 exceeded that in Section 2 (Table 2). However, in September the estimated total catch in Section 2 was almost double that of Section 1. Anglers reported catching fish in both sections throughout the entire season except for Section 2 in the month of October.

Distribution of recorded total catch among catch location sites is shown in Figure 5. The highest number of fish was caught at the Nepopekum Day Use area (F10), followed by F13. Other areas where catch was high (between 50 and 100 fish reported) were F4 and F5 (Chittenden Bridge area) F14, F18, and F20.

The estimated total catch of char in the lower Skagit River was 180 fish (Table 3). The results should be regarded with caution as the standard error was high (see Section 4.1). The greatest number of captures (41%; 73 fish) occurred during October followed by August (36%; 65 fish). Only 26 and 16 char were estimated caught in September and July, respectively. One tagged char (pink tag) was observed at the Nepopekum Day Use area (F10) on August 31.

Only 2 cutthroat trout and no brook trout were reported caught in the lower Skagit River.

Table 2. Estimates of rainbow trout captured (released) in the lower Skagit River, trout fishery, July 1 though October 31, 2002.

Month	River Section	Day Type	Rainbow Trout Catch Released	Standard Error
July	1	Midweek	64	(066)
		Weekend	94	(179)
		Total	158	(191)
	2	Midweek	0	(000)
		Weekend	22	(083)
		Total	22	(083)
	Month Total		180	(208)
August	1	Midweek	434	(534)
		Weekend	642	(2,107)
		Total	1,076	(2,174)
	2	Midweek	531	(132)
		Weekend	332	(768)
		Total	863	(780)
	Month Total		1,939	(2,309)
September	1	Midweek	646	(404)
		Weekend	715	(1,248)
		Total	1,361	(1,312)
	2	Midweek	397	(034)
		Weekend	2,073	(3,484)
		Total	2,469	(3,484)
	Month Total		3,830	(3,723)
October	1	Midweek	520	(1,314)
		Weekend	96	(066)
		Total	616	(1,315)
	2	Midweek	0	(000)
		Weekend	0	(000)
		Total	0	(000)
	Month Total		616	(1,315)
Season	1	Midweek	1,664	(1,476)
		Weekend	1,547	(2,456)
		Total	3,211	(2,866)
	2	Midweek	928	(136)
		Weekend	2,427	(3,569)
		Total	3,354	(3,571)
	Season Total		6,565	(4,579)

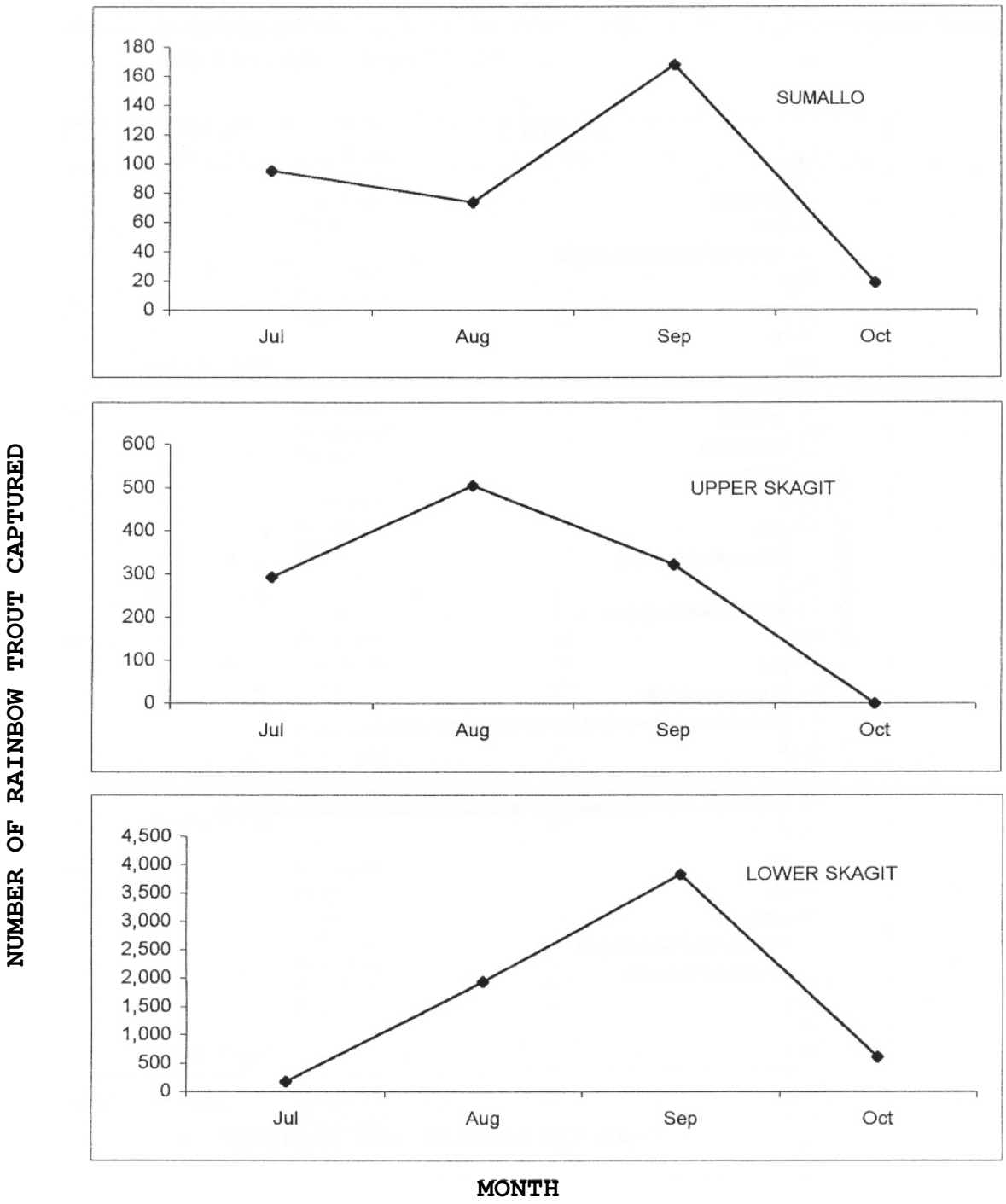


Figure 4. **Monthly distribution of the estimated rainbow trout catch in the Skagit River trout fishery, July 1 through October 31, 2002.**

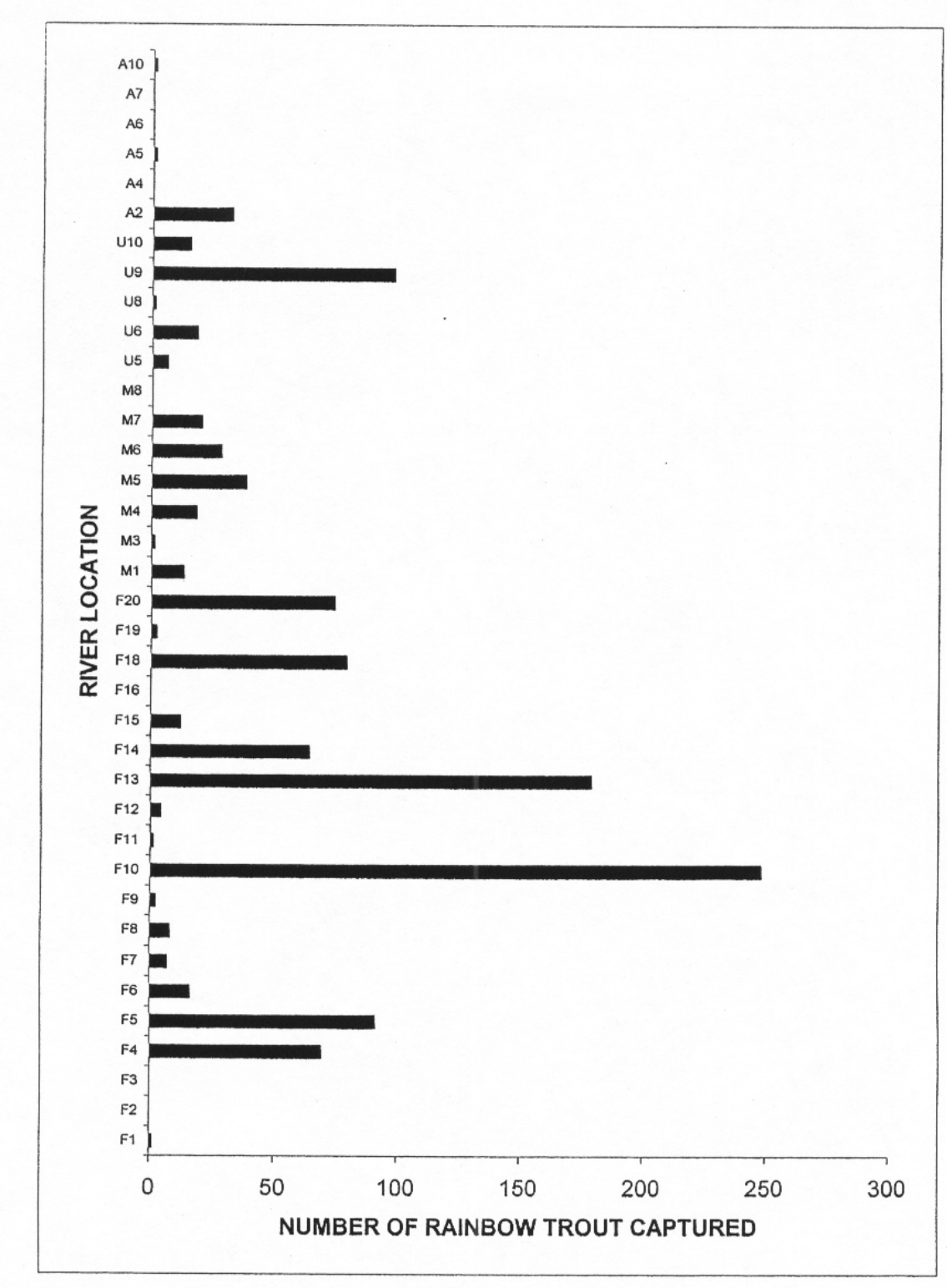


Figure 5. Distribution of the rainbow trout catch among catch location sites as reported by anglers in the Skagit River trout fishery, July 1 through October 31, 2002.

Table 3. Estimates of char captured (released) in the lower Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Char Catch Released	Standard Error
July	1	Midweek	0	(0)
		Weekend	1	(20)
		Total	1	(20)
	2	Midweek	0	(0)
		Weekend	15	(1)
		Total	15	(1)
	Month Total		16	(20)
August	1	Midweek	13	(101)
		Weekend	13	(219)
		Total	26	(241)
	2	Midweek	39	(102)
		Weekend	0	(0)
		Total	39	(102)
	Month Total		65	(262)
September	1	Midweek	16	(69)
		Weekend	10	(109)
		Total	26	(129)
	2	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Month Total		26	(129)
October	1	Midweek	0	(0)
		Weekend	6	(97)
		Total	6	(97)
	2	Midweek	0	(0)
		Weekend	67	(186)
		Total	67	(186)
	Month Total		73	(210)
Season	1	Midweek	29	(123)
		Weekend	31	(264)
		Total	60	(291)
	2	Midweek	39	(102)
		Weekend	81	(186)
		Total	120	(212)
	Season Total		180	(360)

3.2.4 Angler Success

Estimated monthly catch rates for rainbow trout in the lower Skagit River increased sharply from July to August with a small increase in September. The catch rate then tapered off in October with rates similar to August (Table 4; Figure 6). The highest success rate (in September) was 0.74 fish per hour. The lowest monthly catch rate in July (0.18 fish per hour) was about one quarter that estimated for September. Angler success was consistently higher in Section 1 than in Section 2 except for the month of September when success in Section 2 was double that of Section 1 (Table 4). The monthly distribution of angler success in the lower Skagit River exhibited a temporal trend fairly similar to the monthly distribution of catch (Figures 4 and 6). As with the catch estimates, catch rate standard errors were high (season mean standard error was +/- 87%) and catch rate results should be regarded with caution (see Section 4.1).

Over the 2002 season, only F6 had a catch rate over 1 fish per angler hour (Figure 7). Relatively few fish were caught at F6 (Figure 5) and the high catch rate reflected good catch success by a small number of anglers. Similarly, high catch rates in F8 and F15 (between 0.8 and 1 fish per angler hour) reflect good success by relatively few anglers. The high catch rates at F13, F18 and F20 (between 0.6 and 1 fish per angler hour) were based on information from a good sample of anglers and indicates good overall success in these areas. No other locations at the lower Skagit River had a catch rate of over 0.5 fish per angler hour.

Angler success for rainbow trout by fly angling (0.54 fish per hour; Table 5) was greater than for lure angling (0.39 fish per hour).

About half of the anglers at the lower Skagit River had caught at least one fish by the time of their interview (Figure 8). Catches of up to 6 rainbow trout were fairly common. The highest recorded catch was 20 rainbow trout. A small number of anglers had high angler success (between 7 and 20 fish with fairly even dispersion).

Estimated catch rates for char were low throughout the season at the lower Skagit River (Table 6) and should be regarded with caution due to high standard errors (see Section 4.1).

Table 4. Estimated mean catch per angler hour for rainbow trout in the lower Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Rainbow Trout Catch Per Hour Released	Standard Error
July	1	Midweek	0.2227	(0.2294)
		Weekend	0.2182	(0.4133)
		Mean	0.2191	(0.3835)
	2	Midweek	0.0000	(0.0000)
		Weekend	0.0260	(0.1162)
		Mean	0.0214	(0.0822)
	Month Mean		0.1833	(0.2773)
August	1	Midweek	0.8270	(0.7581)
		Weekend	0.6469	(0.8696)
		Mean	0.7013	(0.8158)
	2	Midweek	0.5499	(0.4105)
		Weekend	0.2694	(0.3562)
		Mean	0.3255	(0.3843)
	Month Mean		0.6335	(0.6376)
September	1	Midweek	0.6714	(0.5581)
		Weekend	0.5957	(0.7795)
		Mean	0.6201	(0.6779)
	2	Midweek	0.3673	(0.4692)
		Weekend	1.4393	(0.6415)
		Mean	1.2063	(0.5620)
	Month Mean		0.7394	(0.6226)
October	1	Midweek	0.8413	(0.6739)
		Weekend	0.3247	(0.2457)
		Mean	0.5120	(0.5072)
	2	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Month Mean		0.4819	(0.3586)
Season	1	Midweek	0.6935	(0.5901)
		Weekend	0.4874	(0.6315)
		Mean	0.5485	(0.6183)
	2	Midweek	0.3582	(0.3117)
		Weekend	0.6801	(0.3715)
		Mean	0.6181	(0.3429)
	Season Mean		0.5605	(0.4999)

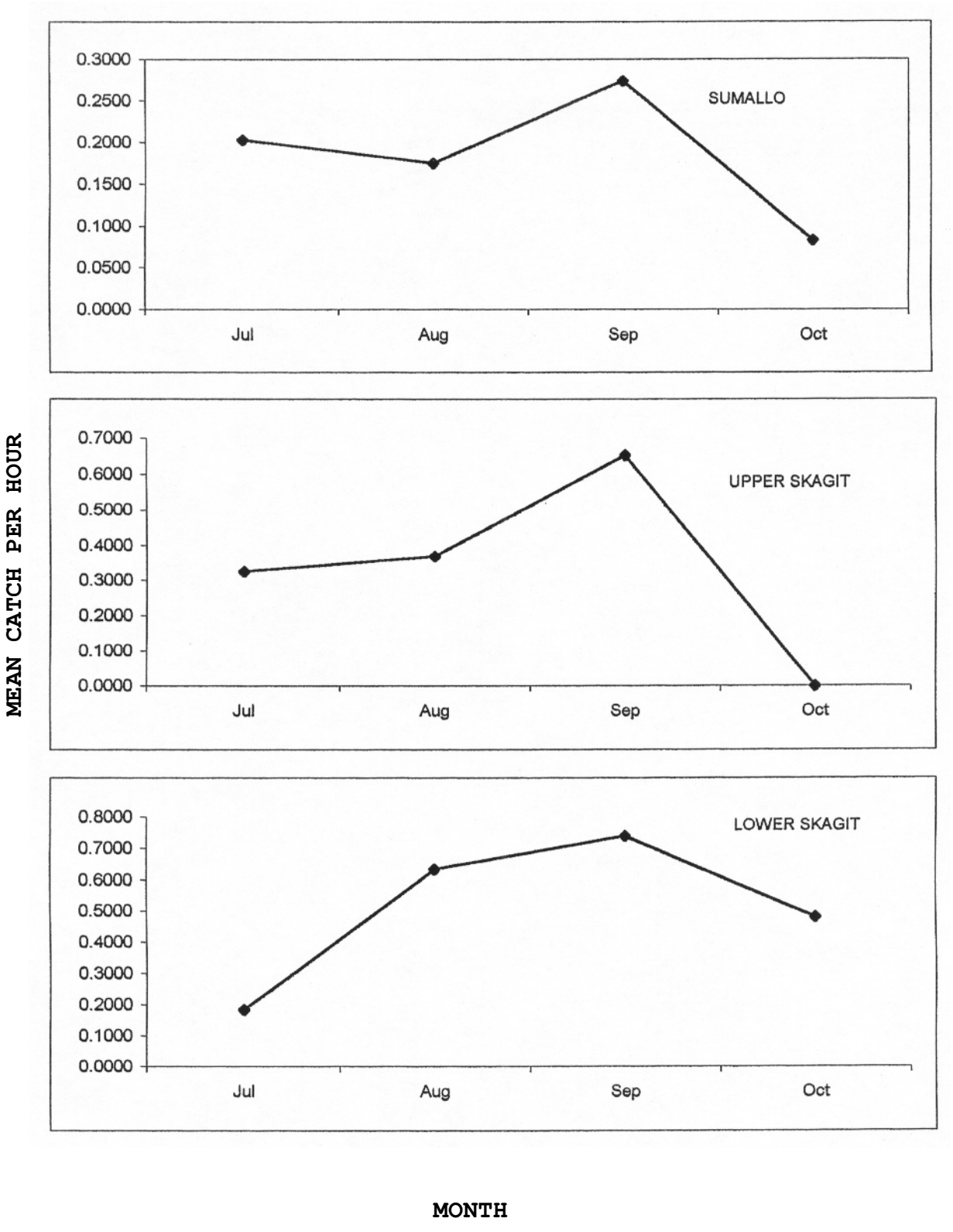


Figure 6. Temporal distribution of angler success in the Skagit River trout fishery, July 1 through October 31, 2002.

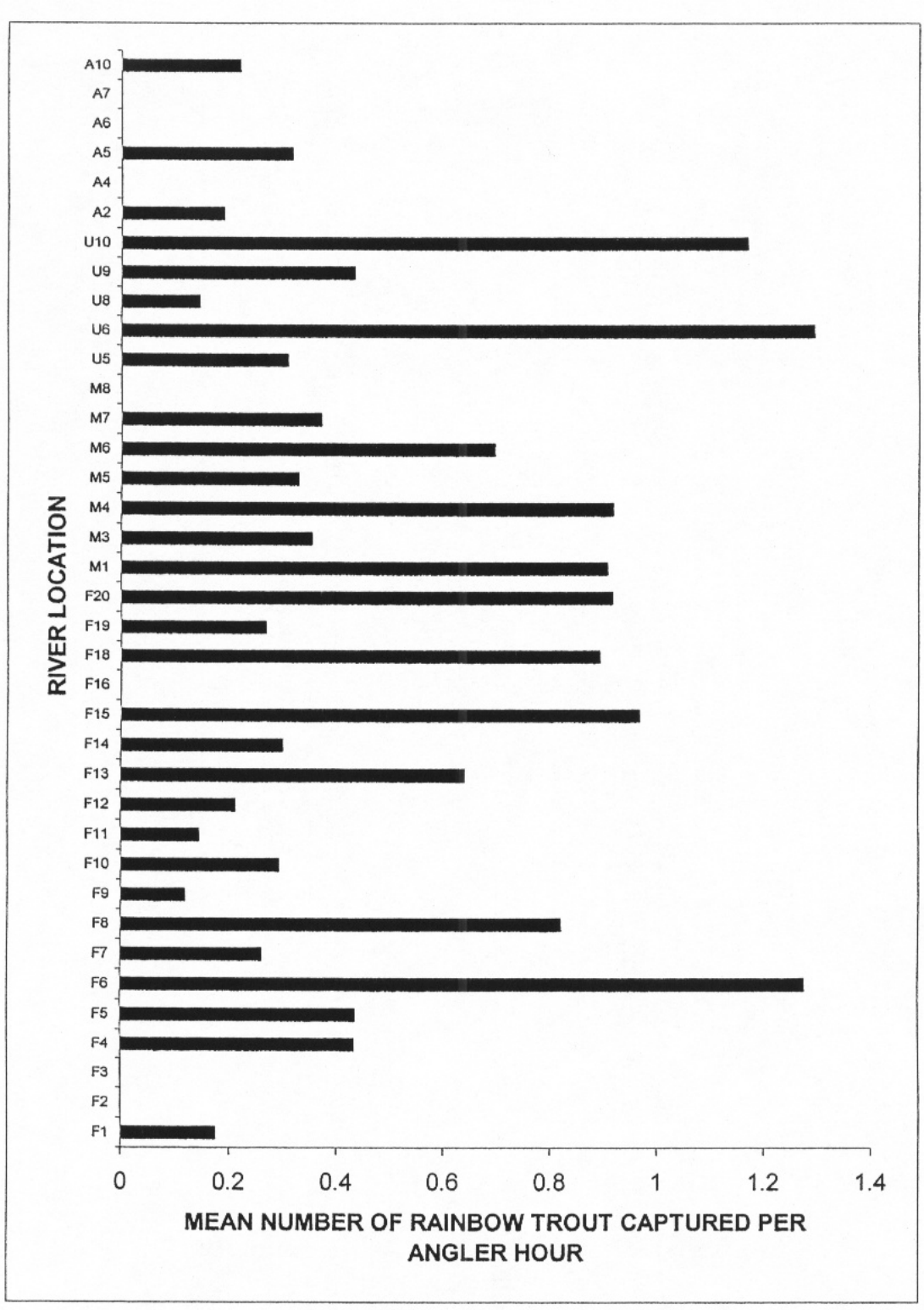


Figure 7. Distribution of angler catch success for rainbow trout among catch location sites in the Skagit River trout fishery, July 1 through October 31, 2002.

Table 5. **Hours fished and estimated catch rates by gear type in the Skagit River trout fishery, July 1 through October 31, 2002.**

	LURES			BAIT			FLY		
REGIONS	HOURS FISHED	CATCH PER HOUR		HOURS FISHED	CATCH PER HOUR		HOURS FISHED	CATCH PER HOUR	
		RT	CHAR		RT	CHAR		RT	CHAR
Lower Skagit	476	0.3938	0.0769	0	0.0000	0.0000	11,511	0.5388	0.0089
Upper Skagit	133	0.0000	0.0000	0	0.0000	0.0000	2,665	0.4195	0.0083
Sumallo	108	0.1082	0.0000	12	1.0000	0.0000	1,517	0.2586	0.0000
Total	717	0.2522	0.0489	12	1.0000	0.0000	15,693	0.4634	0.0079
% of Total	4.4%			0.1%			95.6%		

Notes: RT = rainbow trout

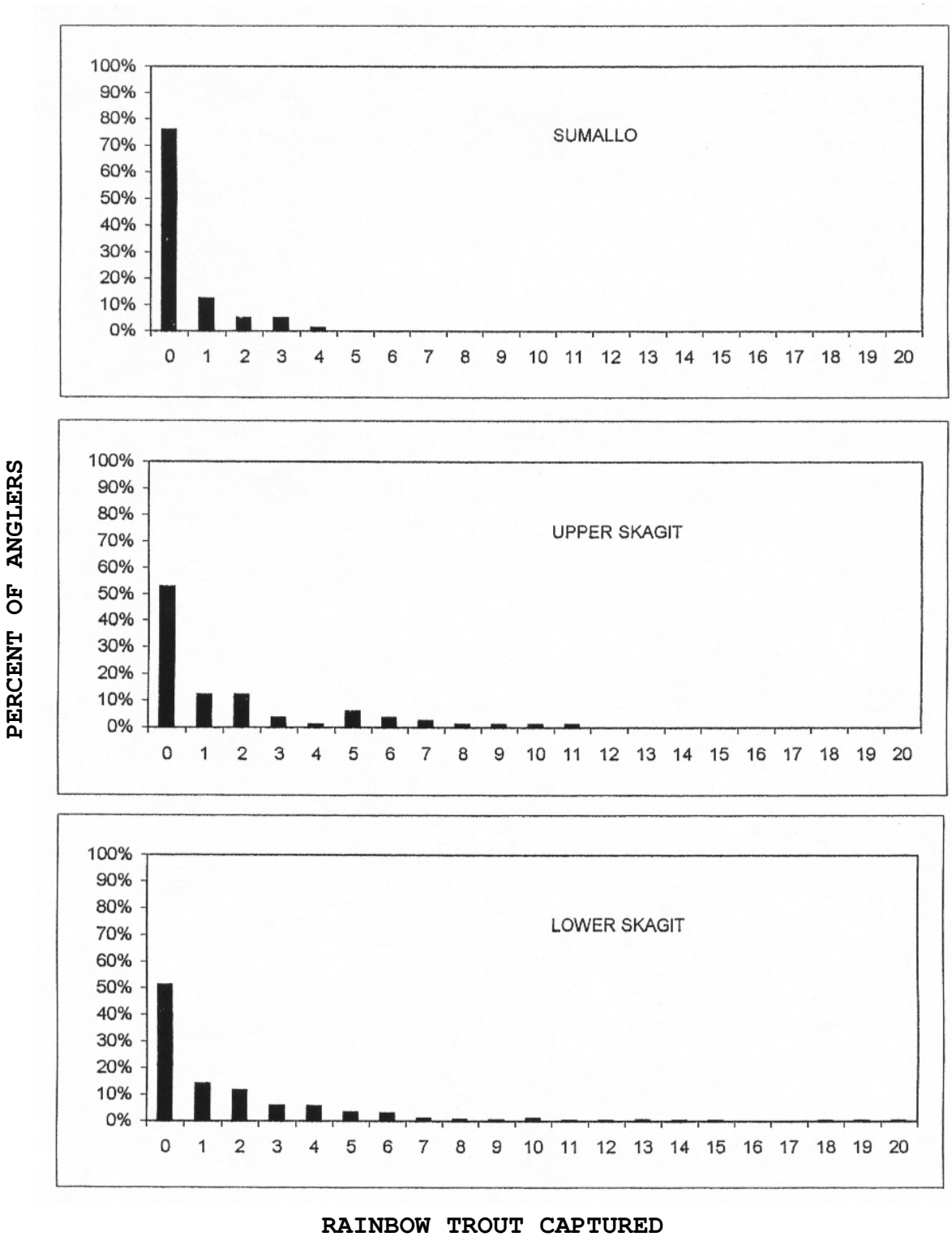


Figure 8. **Percent frequency distribution of the number of anglers catching 0, 1, 2 or more rainbow trout during the Skagit River trout fishery, July 1 through October 31, 2002**

Table 6. Estimated mean catch per angler hour for char in the lower Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Char Catch per hour Released	Standard Error
July	1	Midweek	0.0000	(0.0000)
		Weekend	0.0024	(0.0088)
		Mean	0.0020	(0.0062)
	2	Midweek	0.0000	(0.0000)
		Weekend	0.0173	(0.0775)
		Mean	0.0143	(0.0548)
	Month Mean		0.0042	(0.0390)
August	1	Midweek	0.0251	(0.0886)
		Weekend	0.0134	(0.0424)
		Mean	0.0152	(0.0695)
	2	Midweek	0.0399	(0.1055)
		Weekend	0.0000	(0.0000)
		Mean	0.0080	(0.0178)
	Month Mean		0.0139	(0.0507)
September	1	Midweek	0.0167	(0.0627)
		Weekend	0.0083	(0.0669)
		Mean	0.0110	(0.0648)
	2	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Month Mean		0.0087	(0.0286)
October	1	Midweek	0.0000	(0.0000)
		Weekend	0.0221	(0.0642)
		Mean	0.0141	(0.0454)
	2	Midweek	0.0000	(0.0000)
		Weekend	0.2118	(0.3833)
		Mean	0.2118	(0.2710)
	Month Mean		0.0252	(0.1943)
Season	1	Midweek	0.0011	(0.0543)
		Weekend	0.0031	(0.0512)
		Mean	0.0025	(0.0527)
	2	Midweek	0.0018	(0.0527)
		Weekend	0.0064	(0.1955)
		Mean	0.0056	(0.1385)
	Season Mean		0.0117	(0.1033)

3.3 Angler Effort and Catch Characteristics at the Upper Skagit and Sumallo Rivers

3.3.1 Estimated Total Angler Effort

Of 792 anglers interviewed during the survey, 160 (20%) occurred in the upper Skagit and Sumallo River areas. The 160 interviews were evenly split between the upper Skagit (81 interviews), and the Sumallo Rivers (79 interviews).

Anglers fished an estimated 4,435 hours (1,159 days) between July 1 and October 31, 2002 at the upper Skagit and Sumallo Rivers (Table 7). The standard error for angler hours was estimated at 4,320 to 4,550 hours or +/-2.6% of the estimated total, indicating excellent precision of the estimate. The 95% confidence interval is roughly twice the standard error (+/-5.2% of estimated effort). Anglers at the upper Skagit River fished an estimated 2,798 hours (513 days) between July 1 and October 31. The standard error for angler hours was estimated at 2,698 to 2,898 hours or +/-3.6% of the estimated total. Sumallo River anglers fished an estimated 1,637 hours (646 days) between July 1 and October 31. The standard error for angler hours was estimated at 1,579 to 1,695 hours or +/-3.5% of the estimated total. Of note, the length of the average angler day in the Sumallo River (2.53 hours fished per day) was half that of either the upper Skagit River (5.45 hours fished per day) or the lower Skagit River (5.15 hours fished per day).

3.3.2 Temporal and Spatial Distribution of Angler Effort

At the upper Skagit River, angler effort was highest in August (50% of season effort) followed by July (26% of season effort). Effort in September was similar to July in the upper Skagit River and no effort was recorded in October. Angler effort at the Sumallo River was highest during September (31% of season effort) and July (29% of season effort). A slight decline in effort occurred in August and October (Table 7; Figure 2).

Table 7. Estimated angler effort in the Sumallo and upper Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Angler Hours	Standard Error	Mean Hours Fished per Day	Total Angler days
July	Sumallo	Midweek	264	(9)	1.26	209
		Weekend	207	(14)	1.99	104
		Total	471	(17)	1.50	313
	Upper Skagit	Midweek	383	(34)	4.86	78
		Weekend	353	(27)	3.27	107
		Total	736	(43)	3.98	185
	Month Total		1,207	(46)	2.42	498
August	Sumallo	Midweek	168	(18)	0.50	336
		Weekend	190	(25)	0.50	380
		Total	358	(31)	0.50	716
	Upper Skagit	Midweek	651	(33)	5.03	129
		Weekend	739	(55)	6.78	109
		Total	1,390	(64)	5.84	238
	Month Total		1,748	(71)	1.83	954
September	Sumallo	Midweek	265	(25)	2.72	97
		Weekend	248	(26)	4.15	59
		Total	513	(36)	3.29	156
	Upper Skagit	Midweek	240	(26)	0.00	n/a
		Weekend	431	(57)	6.72	64
		Total	671	(63)	6.72	n/a
	Month Total		1,184	(72)	4.21	281
October	Sumallo	Midweek	176	(19)	6.38	27
		Weekend	119	(21)	3.63	32
		Total	295	(28)	5.00	59
	Upper Skagit	Midweek	0	(0)	0.00	n/a
		Weekend	0	(0)	0.00	n/a
		Total	0	(0)	n/a	n/a
	Month Total		295	(28)	5.00	59
Season	Sumallo	Midweek	873	(38)	2.33	374
		Weekend	764	(44)	2.80	272
		Total	1,637	(58)	2.53	646
	Upper Skagit	Midweek	1,274	(54)	4.94	257
		Weekend	1,523	(84)	5.94	256
		Total	2,798	(100)	5.45	513
	Season Total		4,435	(115)	3.83	1,159

Angler effort at the upper Skagit and Sumallo Rivers was generally oriented toward weekends throughout the season, although some effort did occur during midweek in both areas. Angler effort in both areas was highest during midday to early evening.

3.3.3 Estimated Total Catch

The estimated total catch of rainbow trout at the upper Skagit and Sumallo Rivers was 1,477 fish (Table 8). The standard error was estimated at 507 to 2,447 fish, or +/-66% (see Section 4.1). Total catch in August was 39% of the estimated season catch, followed by September (33%), July (26%) and October (1%).

An estimated 1,121 trout or 76% of the combined catch of the upper Skagit and Sumallo Rivers came from the upper Skagit River (Table 8). At the upper Skagit River, 45% of the season catch occurred in August (Table 8; Figure 4), followed by September (29%) and July (26%). No fish were reported caught in October as no anglers were observed.

The greatest numbers of rainbow trout reported caught at the upper Skagit River (Figures 1 and 5) came from the vicinity of U9 (Silverdaisy Creek), followed by U6 (Twenty-six Mile Creek) and U10. Many interviewers did not name a specific angling location on the upper Skagit River, therefore, a complete picture of reported catch per angling location could not be derived for this section of river.

An estimated 356 trout or 24% of the combined catch of the upper Skagit and Sumallo Rivers came from the Sumallo River (Table 8). In the Sumallo River, 47% of the catch occurred in September, followed by July (27%) and August (21%). Only 5% of the total estimated catch in the Sumallo River came in October (Table 8; Figure 4). The greatest number of trout were reported caught at A2 (Figures 1 and 5).

A total of 18 char were estimated caught in the upper Skagit River (Table 9). See Section 4.1 for a discussion on standard errors. All of the char were caught in the upper Skagit River (no char were reported caught in the Sumallo River). The majority were caught in July (83%), while August had 17% of the total estimated catch. No char were reported caught in September or October.

Table 8. Estimates of rainbow trout captured (released) in the Sumallo and upper Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Rainbow Trout Catch Released	Standard Error
July	Sumallo	Midweek	75	(103)
		Weekend	20	(20)
		Total	95	(105)
	Upper Skagit	Midweek	238	(136)
		Weekend	55	(749)
		Total	293	(762)
	Month Total		388	(769)
August	Sumallo	Midweek	74	(43)
		Weekend	0	(0)
		Total	74	(43)
	Upper Skagit	Midweek	229	(111)
		Weekend	277	(546)
		Total	506	(557)
	Month Total		580	(559)
September	Sumallo	Midweek	140	(99)
		Weekend	28	(14)
		Total	168	(100)
	Upper Skagit	Midweek	0	(0)
		Weekend	322	(168)
		Total	322	(168)
	Month Total		490	(195)
October	Sumallo	Midweek	7	(5)
		Weekend	13	(8)
		Total	19	(10)
	Upper Skagit	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Month Total		19	(10)
Season	Sumallo	Midweek	295	(149)
		Weekend	61	(26)
		Total	356	(151)
	Upper Skagit	Midweek	467	(176)
		Weekend	655	(942)
		Total	1,121	(958)
	Season Total		1,477	(970)

Table 9. Estimates of char captured (released) in the Sumallo and upper Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Char Catch Released	Standard Error
July	Sumallo	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Upper Skagit	Midweek	15	(1)
		Weekend	0	(0)
		Total	15	(1)
	Month Total		15	(1)
August	Sumallo	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Upper Skagit	Midweek	0	(0)
		Weekend	3	(24)
		Total	3	(24)
	Month Total		3	(24)
September	Sumallo	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Upper Skagit	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Month Total		0	(0)
October	Sumallo	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Upper Skagit	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Month Total		0	(0)
Season	Sumallo	Midweek	0	(0)
		Weekend	0	(0)
		Total	0	(0)
	Upper Skagit	Midweek	15	(1)
		Weekend	3	(24)
		Total	18	(24)
	Season Total		18	(24)

3.3.4 Angler Success

Combined catch success rates for rainbow trout at the upper Skagit and Sumallo Rivers were highest in September (0.35 fish per hour) and August (0.33 fish per hour). Catch rates were lower in July (0.27 fish per hour) and declined dramatically in October (0.08 fish per hour; Table 10). The season mean for both areas combined was 0.30 fish per hour (see Section 4.1 for a discussion of standard errors). The monthly distribution of angler success in the Sumallo River exhibited a temporal trend similar to the monthly distribution of catch (Figures 4 and 6). However, temporal trends in catch success and estimated catch in the upper Skagit River were quite different. Although catch success remained steady from July through August, effort increased substantially in August (Table 7) producing higher estimated catch for that month. Comparatively high catch success in September was due to a small number of anglers (only 8 interviews) with good catch success, resulting in a lower estimated catch compared to August.

At the upper Skagit River, the highest catch success for rainbow trout occurred in September (0.65 fish per hour). July and August both had similar estimates (0.32 and 0.37 fish per hour respectively). Catch success was not generated in October as anglers were not encountered and no fish were reported caught (Table 10). The highest mean catch rate per fishing site (approximately 1.3 fish per hour) was recorded at U6 (Figures 1 and 7), followed by U10 (1.2 fish per hour). Due to the small sample size (5 interviews from U6 and 7 interviews from U10) these results should be viewed with caution.

Less than one half of the anglers interviewed at the upper Skagit River reported catching at least one rainbow trout (Figure 8). Most successful anglers caught up to 6 trout, although catches of up to 11 were recorded.

At the upper Skagit River, catch rates using a fly were 0.42 fish per hour (Table 5). No anglers reported catching a fish using a lure or bait.

Table 10. Estimated mean catch per angler hour for rainbow trout in the Sumallo and upper Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Rainbow Trout Catch Per Hour Released	Standard Error
July	Sumallo	Midweek	0.2843	(0.3887)
		Weekend	0.0952	(0.0982)
		Mean	0.2033	(0.2993)
	Upper Skagit	Midweek	0.6204	(0.3488)
		Weekend	0.1562	(2.1180)
		Mean	0.3250	(0.2522)
	Month Mean		0.2656	(0.1044)
August	Sumallo	Midweek	0.4386	(0.2475)
		Weekend	0.0000	(0.0000)
		Mean	0.1754	(0.1565)
	Upper Skagit	Midweek	0.3518	(0.1699)
		Weekend	0.3751	(0.7363)
		Mean	0.3696	(0.6492)
	Month Mean		0.3255	(0.2175)
September	Sumallo	Midweek	0.5275	(0.3684)
		Weekend	0.1140	(0.0547)
		Mean	0.2741	(0.2332)
	Upper Skagit	Midweek	0.0000	(0.0000)
		Weekend	0.7469	(0.3723)
		Mean	0.6535	(0.3482)
	Month Mean		0.3519	(0.0986)
October	Sumallo	Midweek	0.0392	(0.0295)
		Weekend	0.1053	(0.0673)
		Mean	0.0832	(0.0575)
	Upper Skagit	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Month Mean		0.0832	(0.0217)
Season	Sumallo	Midweek	0.3685	(0.1266)
		Weekend	0.0859	(0.0226)
		Mean	0.2075	(0.0848)
	Upper Skagit	Midweek	0.4374	(0.0948)
		Weekend	0.3674	(0.2317)
		Mean	0.3856	(0.2051)
	Season Mean		0.2977	(0.1576)

The highest success rates for rainbow trout in the Sumallo River occurred in September (0.27 fish per hour), followed by July (0.20 fish per hour), August (0.17 fish per hour) and October (0.08 fish per hour; Table 10). The highest mean catch rate for rainbow trout (approximately 0.3 fish per hour; Figure 7) was at the A5 angling site, however, this estimate was derived from only 2 angler interviews. Catch rates for A2 and A10 were approximately 0.2 fish per angler hour. Catch rates for A2 are considered an accurate reflection of catch success for this area due to a relatively high sample size.

At the Sumallo River, 24% of interviewed anglers reported catching one or more fish (Figure 8). Most of the successful anglers caught fewer than 3 rainbow trout and the maximum reported catch was 4 fish.

Catch rates were higher for fly (0.3 fish per hour) than for lure (0.1 fish per hour; Table 5). The high catch rate for illegal bait fishing was based on only 2 angler interview.

Estimated catch rates for char were low in the upper Skagit and Sumallo Rivers throughout the season (Table 11).

Table 11. Estimated mean catch per angler hour for char in the Sumallo and upper Skagit River trout fishery, July 1 through October 31, 2002.

Month	River Section	Day Type	Char Catch Per Hour Released	Standard Error
July	Sumallo	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Upper Skagit	Midweek	0.0390	(0.1220)
		Weekend	0.0000	(0.0000)
		Mean	0.0124	(0.0863)
	Month Mean		0.0063	(0.0610)
August	Sumallo	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Upper Skagit	Midweek	0.0000	(0.0000)
		Weekend	0.0039	(0.0215)
		Mean	0.0031	(0.0152)
	Month Mean		0.0024	(0.0108)
September	Sumallo	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Upper Skagit	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Month Mean		0.0000	(0.0000)
October	Sumallo	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Upper Skagit	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Month Mean		0.0000	(0.0000)
Season	Sumallo	Midweek	0.0000	(0.0000)
		Weekend	0.0000	(0.0000)
		Mean	0.0000	(0.0000)
	Upper Skagit	Midweek	0.0000	(0.0610)
		Weekend	0.0002	(0.0108)
		Mean	0.0001	(0.0438)
	Season Mean		0.0027	(0.0310)

3.4 Characteristics, Opinions and Attitudes of Skagit River Anglers During 2002

3.4.1 Angler Profile

Over 30% of Skagit River anglers were estimated to be over age 45 and almost 70% were over age 30 (Table 12; Figure 9). Just under one third of the anglers (30%) were estimated to be 16 to 30 years old and only 3% were estimated to be youth under 16.

Among the four river sections, the greatest percentage of anglers over age 45 was at the lower and upper Skagit River (33% and 29% respectively). The greatest percentage of children (estimated to be under age 16) was at the Sumallo River (10%). In the 16-30 and 30-45 age category, the percentage of anglers was fairly evenly distributed between the upper and lower Skagit and the Sumallo River areas.

Table 12. Age distribution of anglers interviewed in the Skagit River trout fishery, July 1 through October 31, 2002.

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
Age	n	%	n	%	n	%	n	%
Under 16	9	1.9%		0.0%	7	9.7%	16	2.6%
16 - 30	141	29.8%	19	27.5%	22	30.6%	182	29.6%
30 - 45	166	35.1%	30	43.5%	29	40.3%	225	36.6%
Over 45	157	33.2%	20	29.0%	14	19.4%	191	31.1%
N	473		69		72		614	

Overall, 82% of the anglers named the Lower Mainland as their place of residence (Table 13; Figure 10). The remaining categories were (in order of frequency) Washington state (8%), B.C. locations outside of the Lower Mainland (5%), U.S. states other than Washington (3%), other countries (2%) and other Canadian provinces (1%).

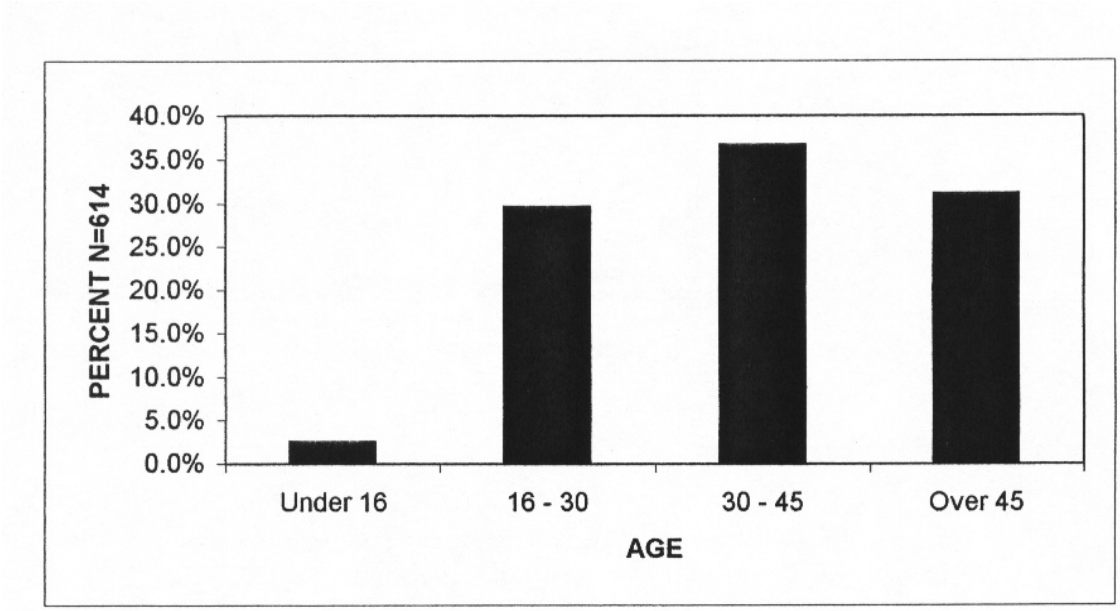


Figure 9. **Percent frequency distribution of estimated angler age categories in the Skagit River trout fishery, July 1 through October 31, 2002.**

Table 13. **Residence of anglers interviewed during the Skagit River trout fishery, July 1 through October 31, 2002.**

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
Origin	n	%	n	%	n	%	n	%
Lower Mainland	379	80.1%	60	87.0%	64	88.9%	503	81.9%
Other BC	18	3.8%	5	7.2%	5	6.9%	28	4.6%
Other Canada	6	1.3%	0	0.0%	0	0.0%	6	1.0%
Washington State	48	10.1%	1	1.4%	1	1.4%	50	8.1%
Other USA	16	3.4%	2	2.9%	0	0.0%	18	2.9%
Other Than Canada and USA	6	1.3%	1	1.4%	2	2.8%	9	1.5%
N	473		69		72		614	

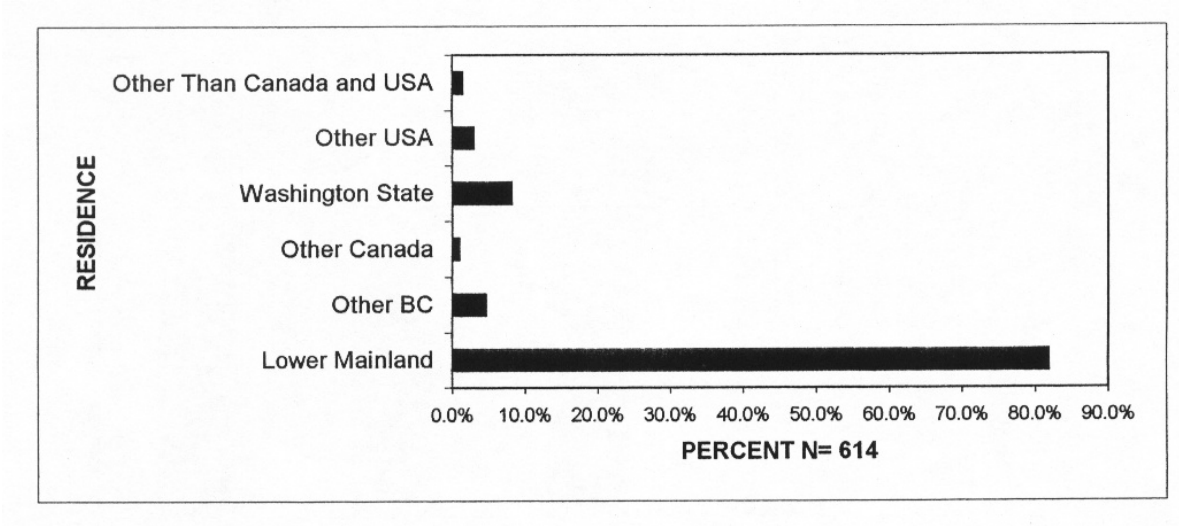


Figure 10. Percent frequency distribution of residence of anglers interviewed in the Skagit River trout fishery, July 1 through October 31, 2002.

The Sumallo and the upper Skagit Rivers had the highest proportion of anglers from the Lower Mainland (89% and 87% respectively) followed by the lower Skagit River (80%). Anglers from Washington state were encountered primarily in the lower Skagit River (10%) and only rarely in the Sumallo and upper Skagit River areas (1% each). The Sumallo River had the highest percentage of anglers from countries other than Canada or the USA (2.8%).

The predominant gear type in all areas was fly (96% of total hours of effort), followed by lures (4%; Table 5). Illegal bait use was estimated to be about 0.1% of total effort. The only area where bait use was observed was in the Sumallo River. In the lower Skagit River 96% of the effort was by fly fishing and only 4% used lures. Similar effort by gear type was found in the upper Skagit (95% fly; 5% lure) and Sumallo Rivers (93% fly; 7% lure).

Overall, anglers most frequently fished the Skagit River for the first time in 2002 or between 1995 and 1999 (Table 14; Figure 11). The section with the highest percentage of 2002 first time reports was in the Sumallo River (38%) whereas the lowest percentage was at the lower Skagit River (25%).

Table 14. First year of use by anglers in the Skagit River trout fishery, July 1 through October 31, 2002.

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
Year	n	%	n	%	n	%	n	%
Before 1975	22	4.7%	5	7.2%	4	5.6%	31	5.0%
1975-79	18	3.8%	5	7.2%	2	2.8%	25	4.1%
1980-84	24	5.1%	6	8.7%	7	9.7%	37	6.0%
1985-89	38	8.0%	3	4.3%	3	4.2%	44	7.2%
1990-94	72	15.2%	6	8.7%	9	12.5%	87	14.2%
1995-99	127	26.8%	19	27.5%	13	18.1%	159	25.9%
2000	26	5.5%	4	5.8%	5	6.9%	35	5.7%
2001	30	6.3%	1	1.4%	2	2.8%	33	5.4%
2002	116	24.5%	20	29.0%	27	37.5%	163	26.5%
N	473		69		72		614	

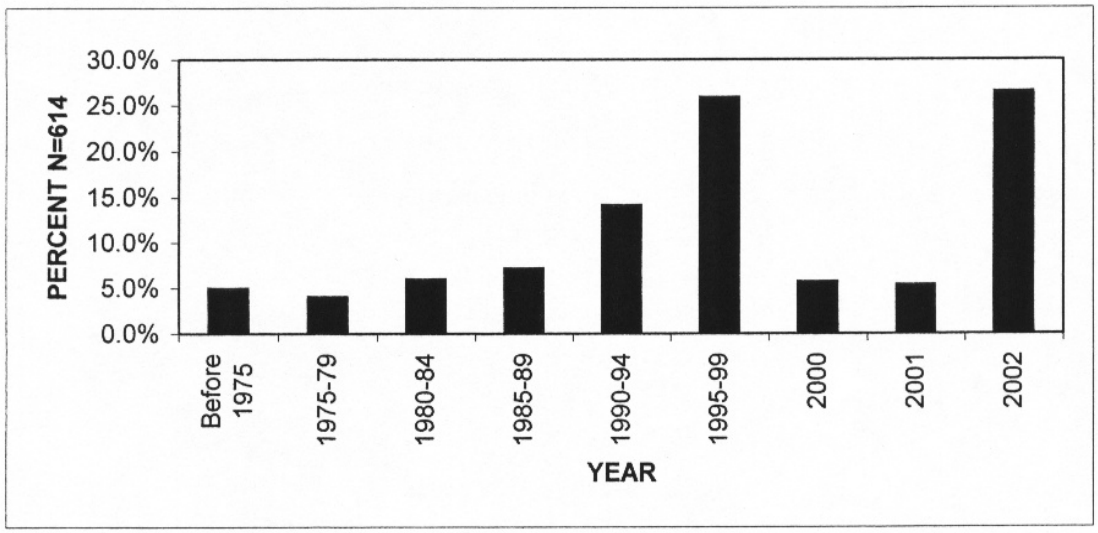


Figure 11. Percent frequency distribution of reported first year of fishing the Skagit River trout fishery, July 1 through October 31, 2002.

Of note, 64% of the anglers interviewed at the lower and upper Skagit River and 53% in the Sumallo River fished these areas for the first time prior to 2000. A total of 42% of the anglers reported their first fishing experience in the lower Skagit River between 1990 and 1999 and approximately one third of interviewed anglers reported fishing both the Sumallo and the Upper Skagit Rivers for the first time between 1990 and 1999.

Twenty five percent of interviewed anglers on the lower Skagit River had been interviewed previously in the survey (Table 15). Fewer anglers were previously interviewed at the upper Skagit River (15%) and the Sumallo River (9%).

Table 15. Percent frequency of first time and repeat interviews in the Skagit River trout fishery, July 1 through October 31, 2002.

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
	n	%	n	%	n	%	n	%
First Time	473	74.8%	69	85.2%	72	91.1%	614	77.5%
Repeat	159	25.2%	12	14.8%	7	8.9%	178	22.5%
N	632		81		79		792	

Only 11% of first time interviewed anglers were fish and game club members. The highest proportion was at the upper Skagit (13%) and lower Skagit Rivers (12%). Only 4% of first time interviewed anglers at the Sumallo River were fish and game club members.

3.4.2 Angler Opinions and Attitudes

Overall, 59% of the anglers interviewed reported they were aware the Skagit River and Ross Reservoir included bull trout (Table 16). A total of 68% of anglers in the upper Skagit River said they were aware with 60% in the lower Skagit River and 42% in the Sumallo River.

A high percentage of anglers interviewed stated that they would support area and/or time specific closures to protect spawning bull trout. Of those that were aware of the presence of bull trout, 86% would support closures, while 91% of those that were not aware would support closures.

The anglers were not asked their opinion of the existing special regulations (catch and release, barbless hooks and the bait restriction). However, a few anglers volunteered comments concerning these regulations (Appendix 5).

Table 16. Percent of anglers aware that char in the Skagit River and Ross Reservoir included bull trout that agreed with area and/or time specific closures, July 1 through October 31, 2002.

		LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
		n	%	n	%	n	%	n	%
AWARE									
	Favour	241	84.6%	45	95.7%	24	80.0%	310	85.6%
	Not Favour	43	15.1%	1	2.1%	4	13.3%	48	13.3%
	Don't Know	1	0.4%	1	2.1%	2	6.7%	4	1.1%
	Total	285		47		30		362	
NOT AWARE									
	Favour	175	93.1%	20	90.9%	34	81.0%	229	90.9%
	Not Favour	8	4.3%	0	0.0%	2	4.8%	10	4.0%
	Don't Know	5	2.7%	2	9.1%	6	14.3%	13	5.2%
	Total	188		22		42		252	
TOTAL		473		69		72		614	

The majority of anglers (91%) rated the quality of their fishing experience as good to excellent (Table 17, Figure 12). The other 9% of anglers either felt they had fair (8%), poor (1%) or terrible (less than 1%) experiences. Similar perceived quality ratings occurred in the upper and lower Skagit River. In the Sumallo River, a lower percentage of anglers gave a rating as excellent and a higher percentage gave a rating as fair compared to the upper and lower Skagit Rivers. No anglers gave a poor or terrible rating at the upper Skagit or Sumallo Rivers and only 1% gave a poor or terrible rating at the lower Skagit River.

When asked "What, if anything, is the one thing you dislike about fishing the Skagit River?", the largest proportion of responses was in the "no opinion" category (44%; Table 18; Figure 13). The most frequent complaint was about mosquitos (25% of responses), followed by crowds (8%), and poor success (6%). Of note, a higher percentage of anglers at the upper Skagit River reported poor catch rates as a negative aspect of the fishery (16%) compared to the lower Skagit (5%) or the Sumallo River (8%) anglers. The lowest frequency of complaints (less than 1%) concerned not being able to camp on gravel bars. Eleven percent of anglers had other complaints about the fishing experience (Appendix 5).

Table 17. Perceived quality of fishing experience as rated by anglers interviewed in the Skagit River trout fishery, July 1 through October 31, 2002.

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
Rating	n	%	n	%	n	%	n	%
Excellent	257	54.6%	42	60.9%	20	27.8%	319	52.1%
Good	172	36.5%	26	37.7%	42	58.3%	240	39.2%
Fair	36	7.6%	1	1.4%	10	13.9%	47	7.7%
Poor	5	1.1%	0	0.0%	0	0.0%	5	0.8%
Terrible	1	0.2%	0	0.0%	0	0.0%	1	0.2%
Total	471		69		72		612	

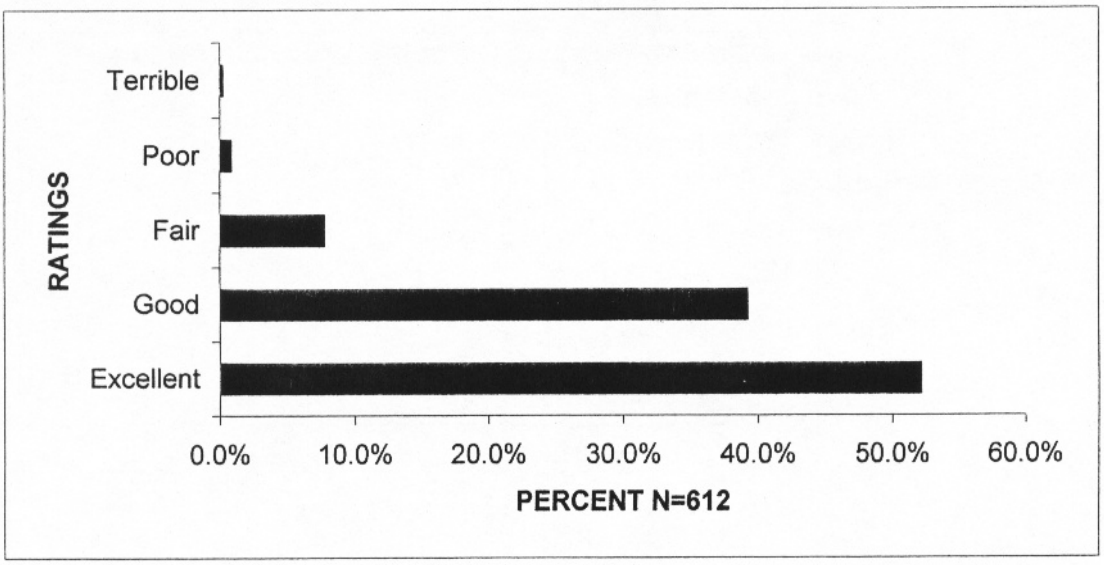


Figure 12. **Percent frequency distribution of perceived quality of fishing experience as rated by anglers during the Skagit River trout fishery, July 1 through October 31, 2002.**

Table 18. **Perceived negative factors of the angling experience at the Skagit River trout fishery, July 1 through October 31, 2002.**

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
Attribute	n	%	n	%	n	%	n	%
Crowded	36	7.6%	7	10.1%	6	8.3%	49	8.0%
Small Fish	4	0.8%	1	1.4%	2	2.8%	7	1.1%
Poor Catch Rates	22	4.7%	11	15.9%	6	8.3%	39	6.4%
Litter	11	2.3%	1	1.4%	2	2.8%	14	2.3%
Lack of Ethics	10	2.1%	0	0.0%	4	5.6%	14	2.3%
No Camping on Gravel Bars	3	0.6%	0	0.0%	0	0.0%	3	0.5%
Mosquitos	150	31.7%	1	1.4%	0	0.0%	151	24.6%
Other	55	11.6%	5	7.2%	9	12.5%	69	11.2%
No Opinon	182	38.5%	43	62.3%	43	59.7%	268	43.6%
N	473		69		72		614	

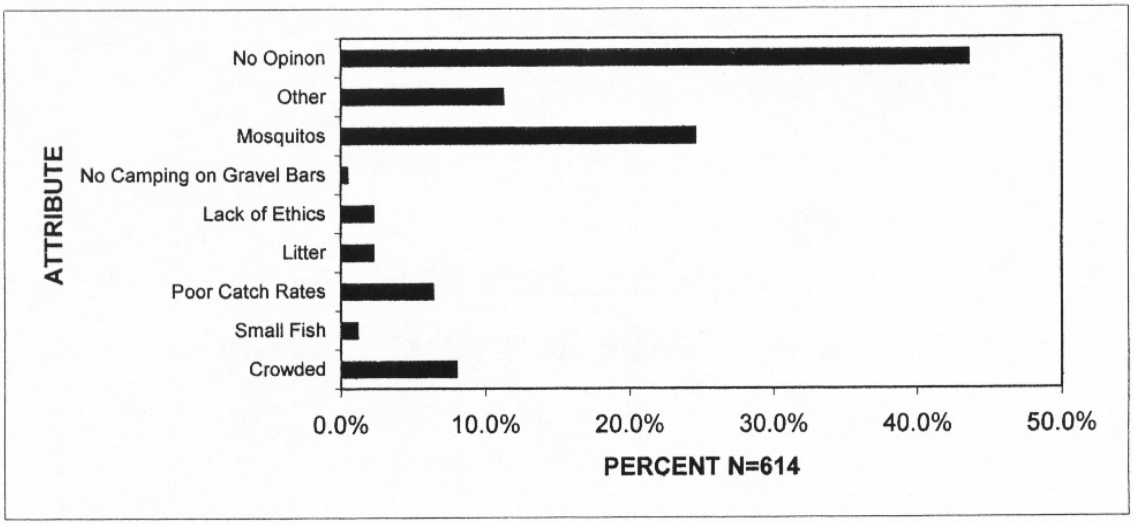


Figure 13. Percent frequency distribution of perceived negative aspects of the angling experience reported by anglers at the Skagit River trout fishery, July 1 through October 31, 2002.

Anglers expected they would encounter higher numbers of other anglers in the lower Skagit River than either the upper Skagit or Sumallo Rivers (Figure 14). Encounters of 10 or more anglers were expected at some lower Skagit River fishing sites with moderate frequency. Expected encounters of over 10 anglers were very low for the upper Skagit and Sumallo Rivers, (the majority expected to see 6 or less).

A large number of lower Skagit River anglers reported not seeing any other anglers at the time of their interview. However, because of the roving design this data could be based on relatively short fishing time compared to the upper Skagit River where more interviews reflected completed fishing trips. Encounters of up to six others were fairly common at the lower Skagit River and encounters with up to 16 other anglers were reported.

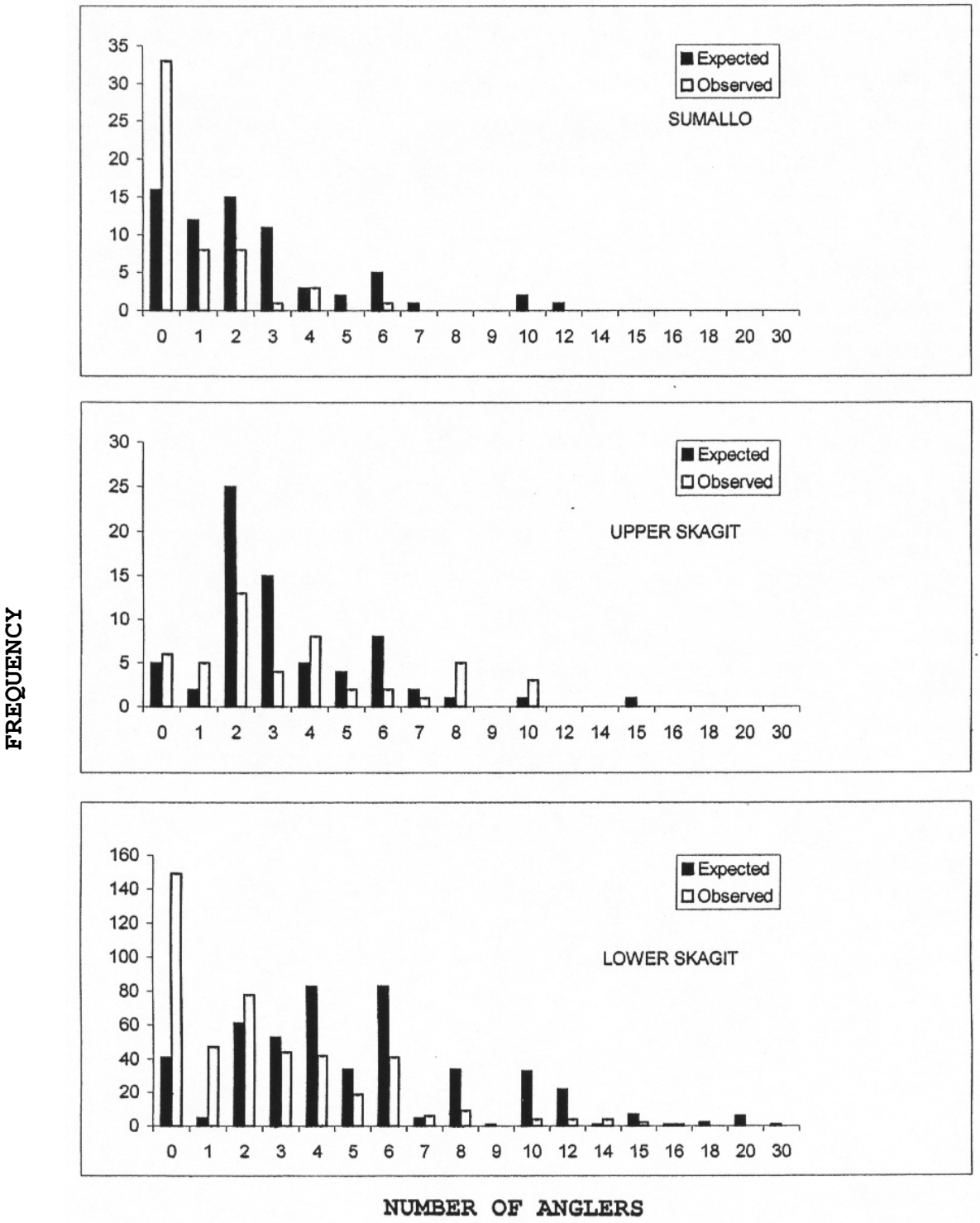


Figure 14. Frequency distribution of expected and actual encounters with other anglers reported by anglers interviewed in the Skagit River trout fishery, July 1 through October 31, 2002.

At the upper Skagit River most anglers expected they would encounter at least 2 or 3 other anglers while fishing and between 0 to 4 encounters regularly occurred. Many anglers in the Sumallo River encountered no other anglers prior to the interview, and the majority reported seeing less than 3 anglers. The results for this area should be viewed with caution as many anglers spent only a short time fishing.

Encounters with other anglers were overall more likely during weekends (especially in July and August), as reflected by the daily effort profiles (Appendix 4).

Most interviewed anglers (83%) considered the angler density to be "just right", while only 12% stated that there were "too many" (Table 19). Five percent of the anglers had no opinion. Angler perceptions of use levels were fairly similar when comparing the three areas. Although, of note, 16% of the upper Skagit River anglers felt there were too many other anglers.

Table 19. Angler perception of use levels at the Skagit River trout fishery, July 1 through October 31, 2002.

	LOWER SKAGIT		UPPER SKAGIT		SUMALLO		TOTAL	
Perception	n	%	n	%	n	%	n	%
Too Few	2	0.4%		0.0%		0.0%	2	0.3%
Just Right	397	83.9%	54	78.3%	57	79.2%	508	82.7%
Too Many	57	12.1%	11	15.9%	6	8.3%	74	12.1%
Don't Know	17	3.6%	4	5.8%	9	12.5%	30	4.9%
N	473		69		72		614	

3.5 Comparisons of the 1986, 1990, 1992, 1994 and 2002 Skagit River Trout Fishery

3.5.1 Comparison of Major Parameter Estimates

3.5.1.1 Angler Effort

Estimated total angler effort for all areas combined in 2002 (16,422) decreased by 41% from 1994 (27,967 hours). Angler effort also decreased from 1992, but was higher than 1986 and 1990 (Scott and Lewynsky 1987; Scott et. al. 1991; Scott and Staley 1993; Scott et. al. 1995; Table 20; Figure 15). At the lower Skagit River, angler effort decreased by 7,800 hours (39%) from 1994. In 2002, at the lower Skagit River, less effort was expended in July and August than in 1992 or 1994, but was similar to 1986 and 1990 (Figure 15). Effort was very similar to 1994 in September and October, (higher than the 1992, 1990 and 1986 surveys). The temporal effort pattern within Sections 1 and 2 was similar to the combined temporal effort pattern when comparing previous years (Figure 15).

Total angler effort at the upper Skagit River decreased by 54% (3,326 hours) from 1994, but was similar to all the previous surveys (Table 20). Estimated angler effort at the upper Skagit River in July has been variable over the years (Figure 16). However, angler effort from August through October at the upper Skagit River was similar to surveys conducted in 1986, 1990 and 1992, but lower than in 1994.

Total angler effort at the Sumallo River decreased by 20% (411 hours; Table 20) from 1994. Effort followed a similar pattern to 1986 and 1990 in July and August (lower than 1992 or 1994). In September and October, angler effort was higher than in all the previous surveys (Figure 16).

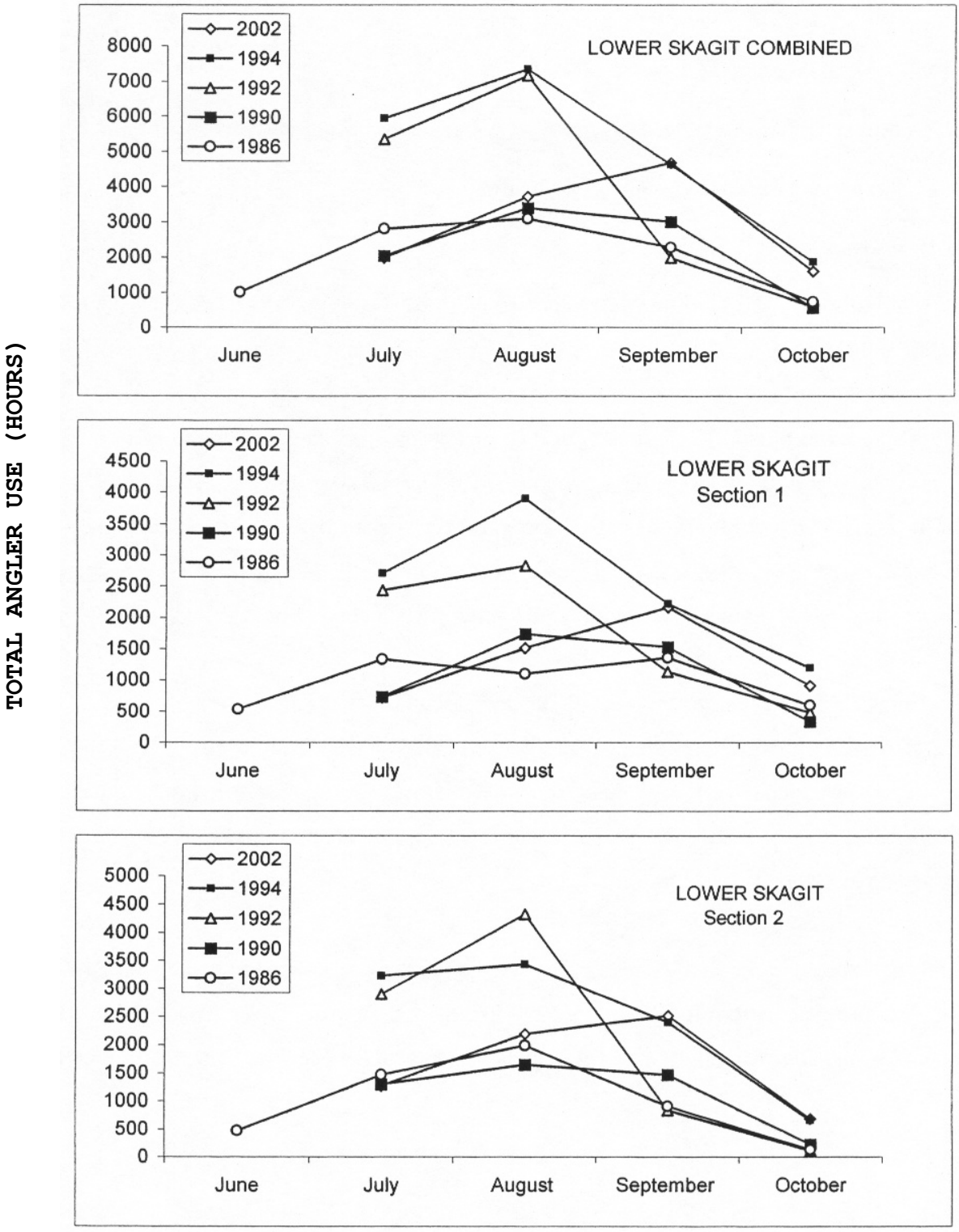


Figure 15. Comparison of monthly effort in the lower Skagit River trout fishery in 1986, 1990, 1992, 1994 and 2002.

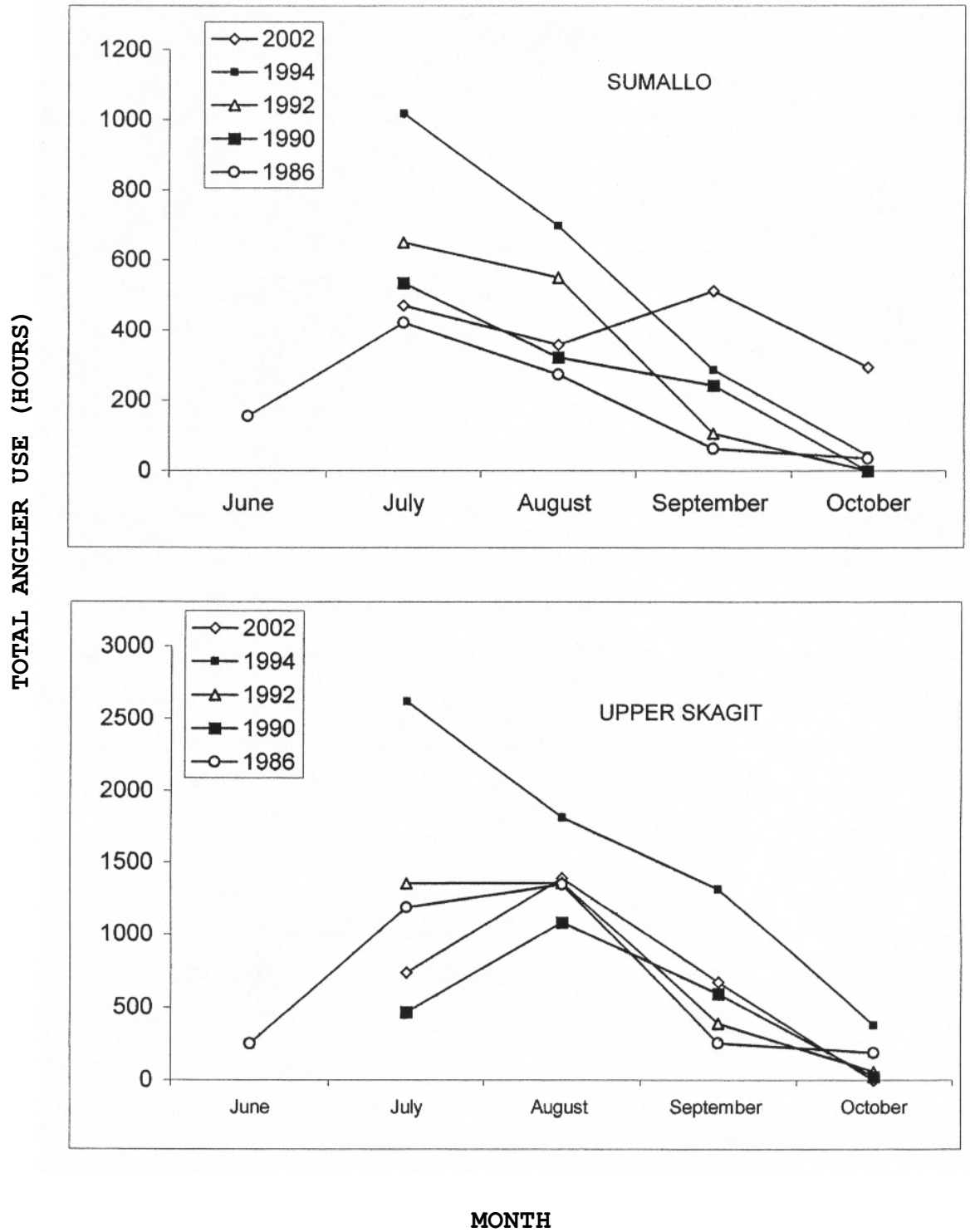


Figure 16. Comparison of monthly effort in the upper Skagit and Sumallo River trout fishery in 1986, 1990, 1992, 1994 and 2002.

Table 20. Comparison of 1986, 1990, 1992, 1994 and 2002 effort statistics for the Skagit River trout fishery.

	1986*	1990	1992	1994	2002	% Change**
Total Hours Angler Effort						
All areas	12,704	12,271	19,554	27,967	16,422	-41%
Lower Skagit	8,922	8,971	15,082	19,795	11,987	-39%
Section 1	4,416	4,351	6,893	10,045	5,310	-47%
Section 2	4,506	4,646	8,189	9,750	6,676	-32%
Upper Skagit	2,987	2,173	3,166	6,124	2,798	-54%
Sumallo	795	1,101	1,306	2,048	1,637	-20%

* 1986 estimates are adjusted to coincide with the July 1 to October 31 survey period of 1990, 1992, 1994 and 2002.

** Percentage change between 1994 and 2002.

3.5.1.2 Catch Rates

Overall angler success for rainbow trout in 2002 (0.46 fish per hour) was reduced from 1994 (0.74 per hour) and 1992 (0.69 fish per hour), but was similar to 1986 (0.43 fish per hour) and 1990 (0.36 fish per hour; Table 21). In the lower Skagit (both sections combined) catch rates in July were much lower than during either 1992 or 1994 (Figure 17) but were similar to those in 1986 and 1990. In August 2002, overall catch rates were similar to 1986 and 1992. By September, catch rates were higher than all previous surveys except 1994. In October, the catch rates were similar to 1992. The October 1990 catch rate was considered an aberration due to an extraordinarily large catch at the mouth of the river (more than 100 trout) by only three anglers.

In Section 1, catch rates remained lower than 1994 (similar to 1986) from July through to September. In October, the catch rate in Section 1 was similar to 1992 and slightly higher than in 1986 or 1994. In Section 2, catch rates were lower than all previous years in July and similar to 1990 in August. In September, the catch rate increased dramatically and was higher than all previous years.

Table 21. Comparison of 1986, 1990, 1992, 1994 and 2002 angler success statistics at the Skagit River trout fishery.

	Rainbow Trout Catch Per Hour					
Seasonal Catch Per Hour	1986*	1990	1992	1994	2002	% Change**
All Areas	0.425	0.355	0.693	0.738	0.463	-37%
Lower Skagit	0.461	0.377	0.713	0.835	0.561	-33%
Section 1	0.476	0.463	0.683	0.894	0.549	-39%
Section 2	0.451	0.305	0.827	0.771	0.618	-20%
Upper Skagit	0.361	0.482	0.659	0.500	0.386	-23%
Sumallo	0.166	0.142	0.323	0.523	0.208	-60%

* Adjusted mean catch rates for 1986 were weighted according to sample size.
** Percentage change between 1994 and 2002.

At the upper Skagit, the overall mean catch rate (0.39 fish per hour) in 2002 decreased from 1994 (0.5 fish per hour), 1992 (0.66 fish per hour) and 1990 (0.48 fish per hour) but was similar to 1986 (0.36 fish per hour; Table 21). In July, catch rates were similar to 1986 and 1990 (markedly lower than 1992 and 1994; Figure 18). In August, catch rates were lower than all previous surveys. In September, however, the catch rate was significantly higher than all previous surveys. This result should be regarded with caution as the catch rate was based on good overall success from a small number of anglers. As with previous surveys, catch rates declined in October.

At the Sumallo River, the overall mean catch rate for 2002 was markedly decreased from 1994 (Table 21). In July, the 2002 catch rate was similar to 1990 and 1992 and marginally lower than 1994 (Figure 18). In August and September, the catch rates were much lower than 1994. In October, catch rates declined.

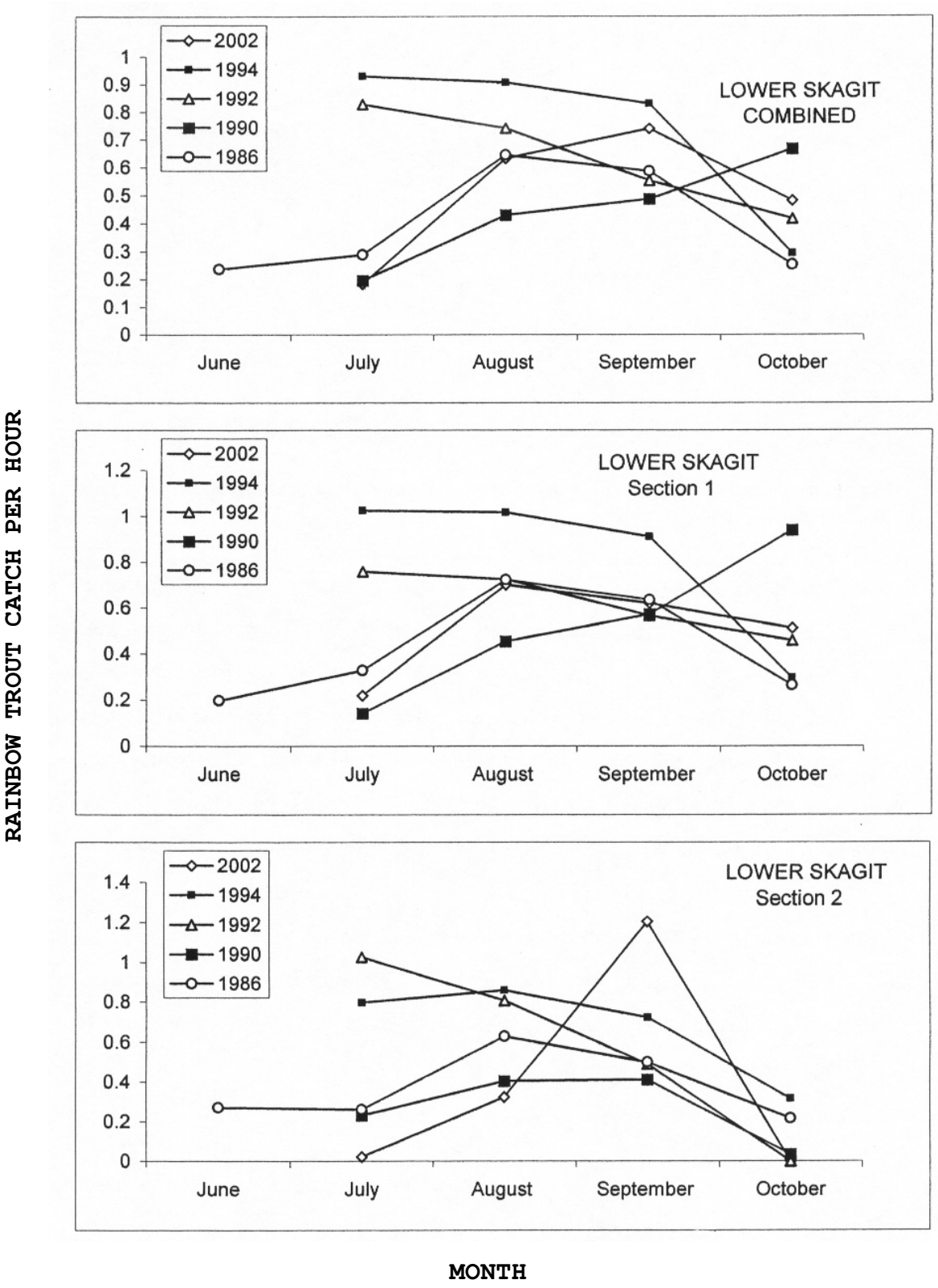


Figure 17. Comparison of monthly catch rates in the lower Skagit River trout fishery in 1986, 1990, 1992, 1994 and 2002.

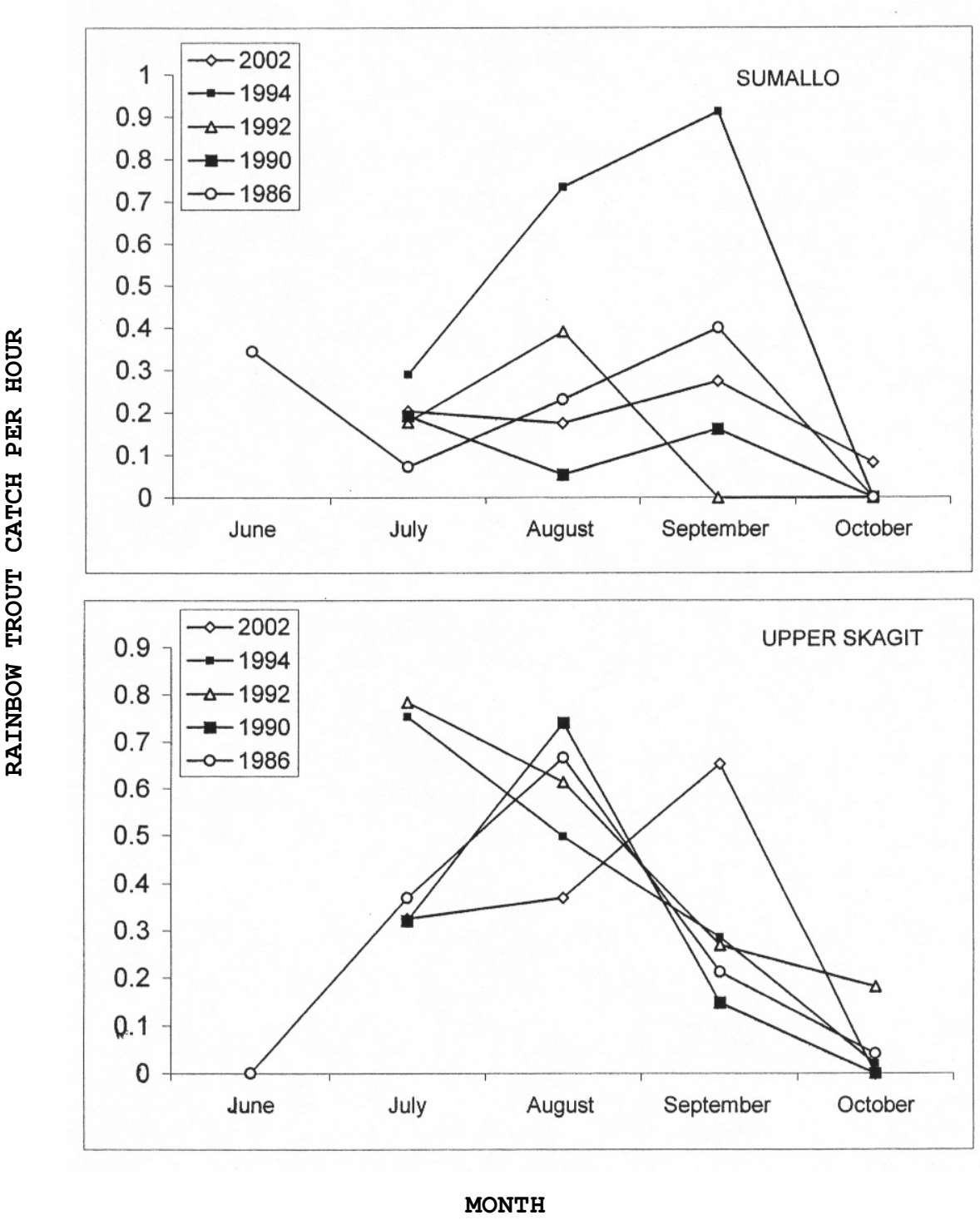


Figure 18. Comparison of monthly catch rates in the upper Skagit and Sumallo River trout fishery in 1986, 1990, 1992, 1994 and 2002.

3.5.1.3 Estimated Catch

The 2002 estimated total catch for all areas combined decreased markedly (63%; 13,899 fish) from 1994 and 1992 (decrease of 6,744 fish), but was still higher than the estimated catch in the first two surveys (1986 and 1990; Table 22). At the lower Skagit River in July and August, the temporal distribution of estimated catch for both sections combined was markedly lower than 1994 or 1992 and similar to 1986 and 1990 (Figure 19). In September, the estimated catch was similar to 1994 (higher than 1986, 1990 and 1992). In October, the estimated catch was similar to all the previous surveys.

The estimated catch at the upper Skagit River in 2002 was similar to 1986 in July and August (lower than 1994 and 1992), and similar to all previous surveys from September through to October (Figure 20). The estimated catch for the Sumallo River was lower from July through to September compared to 1994. In October, similar to previous surveys, the catch was very low (Figure 20).

The 2002 estimated total catch of char (198 fish) for all areas combined decreased from 1994, but was still higher than in 1992, 1990 and 1986 (Table 23). As stated previously, the 2002 estimate should be viewed with caution due to the large standard error. The char catch estimate was higher in Section 2 of the lower Skagit River than in all previous surveys. As in 1990 and 1992, no char were reported caught in the Sumallo River. Catch estimates for the upper Skagit River were low compared to 1992 and 1994.

Table 22. Comparison of 1986, 1990, 1992, 1994 and 2002 angler catch statistics at the Skagit River trout fishery.

	1986*	1990	1992	1994	2002	% Change**
Total Catch of Rainbow Trout						
All areas	5,605	5,306	14,786	21,941	8,042	-63%
Lower Skagit	4,301	3,925	12,286	17,301	6,565	-62%
Section 1	2,169	2,377	4,876	9,670	3,211	-67%
Section 2	2,132	1,548	7,410	7,631	3,354	-56%
Upper Skagit	1,138	1,207	2,183	3,369	1,121	-67%
Sumallo	166	174	317	1,271	356	-72%

* 1986 estimates are adjusted to coincide with the July 1 to October 31 survey period of 1990, 1992, 1994 and 2002.

** Percentage change between 1994 and 2002.

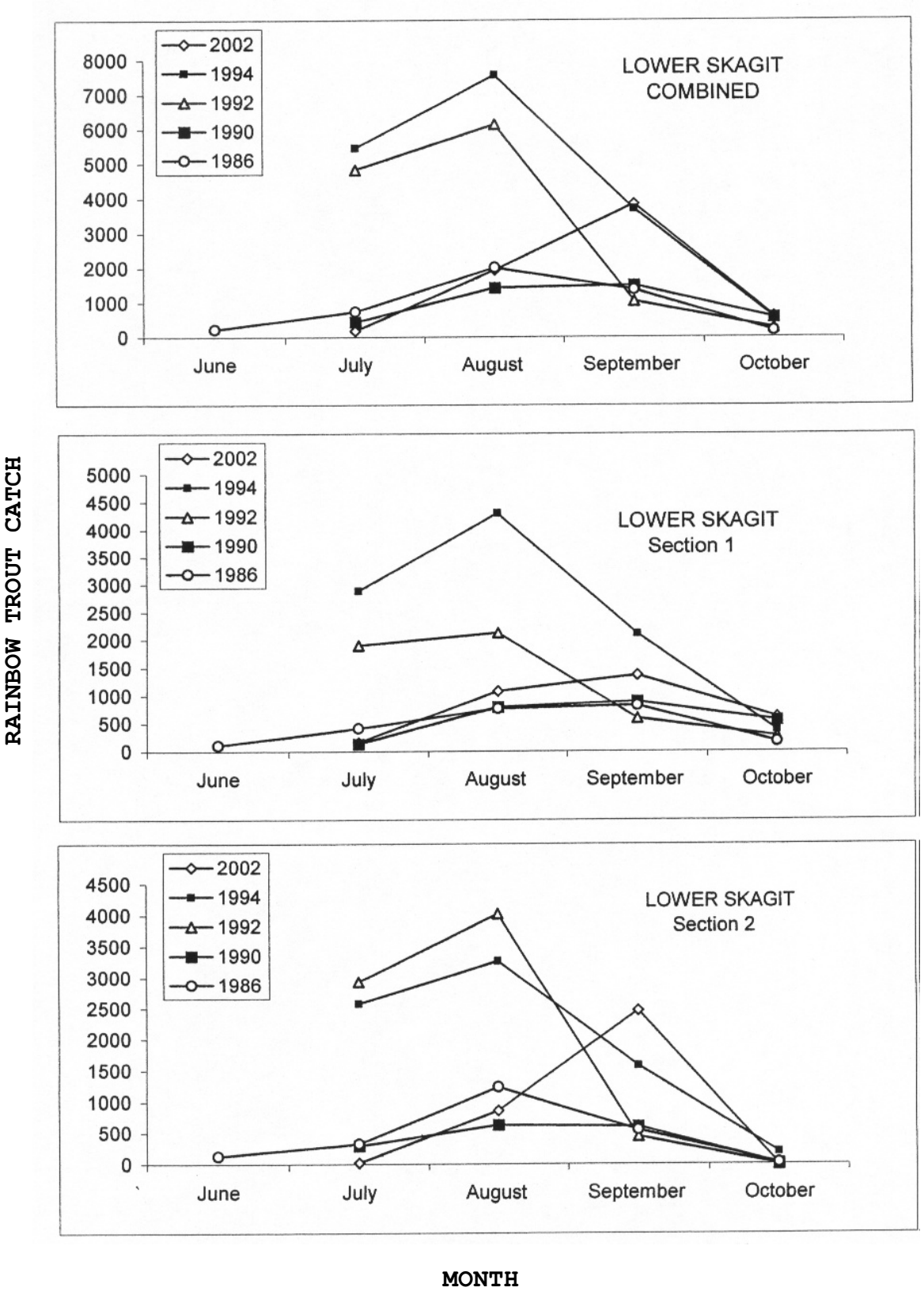


Figure 19. Comparison of monthly catch estimates in the lower Skagit River trout fishery in 1986, 1990, 1992, 1994 and 2002.

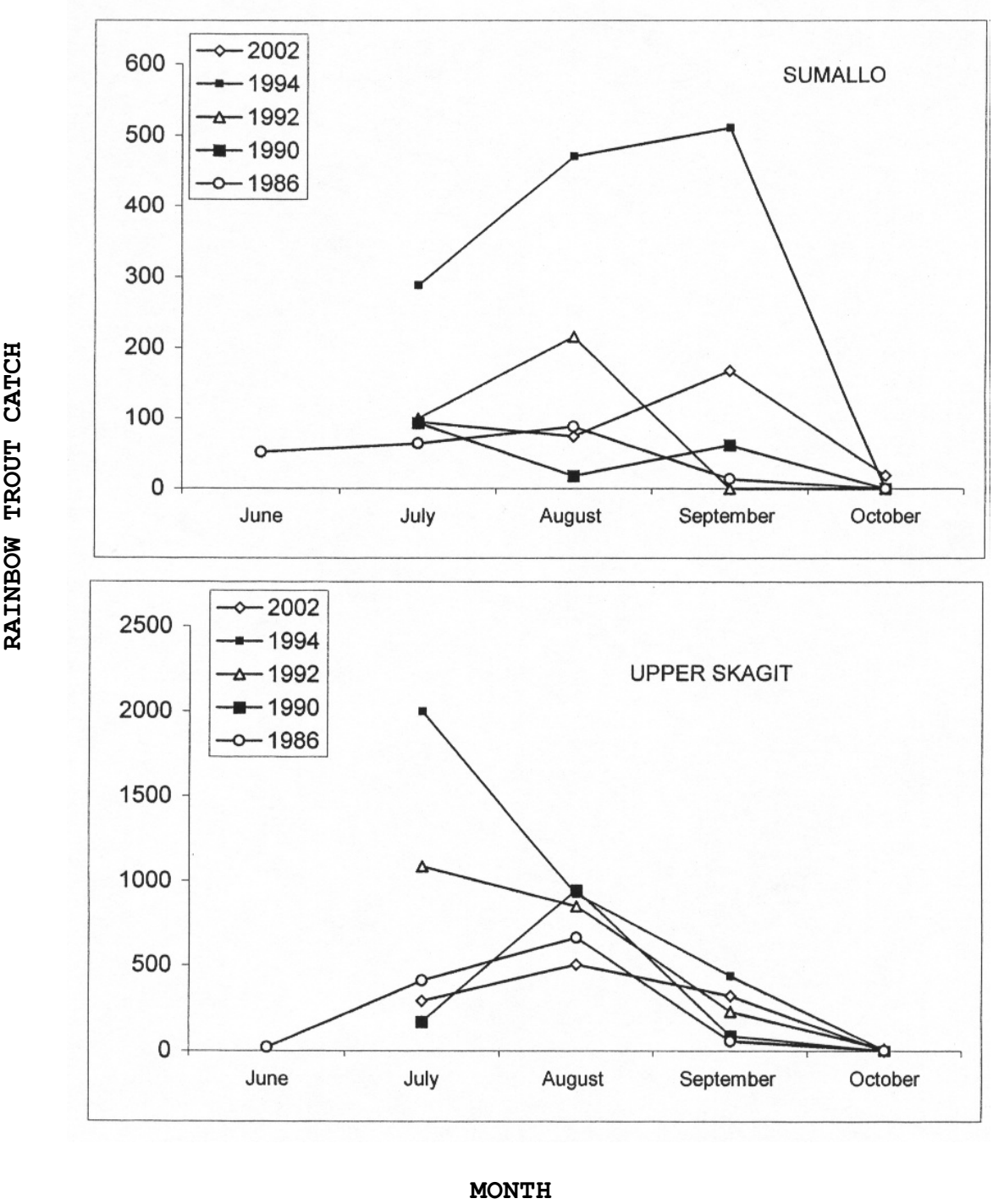


Figure 20. Comparison of monthly catch estimates in the upper Skagit and Sumallo River trout fishery in 1986, 1990, 1992, 1994 and 2002.

Table 23. Comparison of the char catch statistics in the Skagit River trout fishery in 1986, 1990, 1992, 1994 and 2002.

	1986	1990	1992	1994	2002
All Areas	115	106	140	376	198
Lower Skagit	80	106	82	223	180
Section 1	41	48	34	153	60
Section 2	39	58	48	70	120
Upper Skagit	27	0	58	75	18
Sumallo	8	0	0	78	0

Notes: 1. Catch and release for char in the Skagit River was imposed prior to the 1992 survey, and in Ross Reservoir (both Canadian and American portions) prior to the 1994 survey.

3.5.2 Comparison of Angler Characteristics

Overall, fewer young anglers (under 16) were interviewed this year (3%) in the Skagit River than in all previous surveys (Table 24). Conversely, substantially more anglers over 45 (31%) were interviewed than in all previous surveys.

A decline in the number of young anglers (under 16) and a corresponding increase in the number of older (over 45) anglers occurred in all areas when compared to the 1994 survey. The steady decline in anglers over 45 at the upper Skagit River reversed in 2002, with 25% more anglers interviewed in this age bracket than in 1994.

Table 24. Comparison of age distribution of anglers interviewed during the Skagit River Trout fishery in 1986, 1990, 1992, 1994 and 2002.

	LOWER SKAGIT					UPPER SKAGIT				
	Percent					Percent				
Age	1986	1990	1992	1994	2002	1986	1990	1992	1994	2002
Under 16	5.2	4.1	5.2	6.8	1.9	1.7	10.3	8.5	13.0	0.0
16 - 30	16.3	28.5	30.9	34.9	29.8	31.7	17.7	35.0	48.0	27.5
30 - 45	56.7	56.2	45.7	44.1	35.1	35.0	52.9	45.0	35.0	43.5
Over 45	11.8	10.8	18.3	14.2	33.2	30.0	19.1	12.0	3.9	29.0
Sample Size	769	390	405	628	473	59	68	94	152	69
	SUMALLO					**COMBINED**				
	Percent					Percent				
Age	1986	1990	1992	1994	2002	1986	1990	1992	1994	2002
Under 16	11.6	23.9	17.4	13.0	9.7	5.7	8.2	6.3	8.4	2.6
16 - 30	41.3	23.9	47.8	33.3	30.6	28.6	26.4	32.4	37.2	29.6
30 - 45	30.6	41.3	30.4	44.4	40.3	52.1	53.3	44.8	42.4	36.6
Over 45	16.5	10.9	4.3	9.3	19.4	13.6	11.8	16.5	12.0	31.1
Sample Size	121	92	23	54	72	949	550	522	834	614

In 2002, the overall distribution of angler residences was similar to the previous four surveys (Table 25), with a predominance of Lower Mainland origin anglers interviewed. Of note, was the increase in the overall percentage of American anglers (especially from Washington State) compared to all the previous surveys.

At the lower Skagit River, there was a noticeable increase in the percentage of anglers interviewed from Washington State. A total of 10% of all anglers interviewed in the lower Skagit River came from Washington State as compared to 6% in 1994. Percentage values from the Sumallo River and the upper Skagit River should be regarded with caution due to the low sample size.

Overall, the percentage of anglers interviewed who were fish and game club members was similar to 1994 (Table 26) and decreased from 1992 and 1990.

Table 25. Comparison of residences of anglers interviewed in the Skagit River trout fishery in 1986, 1990, 1992, 1994 and 2002.

	LOWER SKAGIT					UPPER SKAGIT				
	Percent					Percent				
Origin*	1986	1990	1992	1994	2002	1986	1990	1992	1994	2002
L	98.3	88.5	89.1	86.8	80.1	89.5	73.8	87.2	86.8	87.0
B	1.5	1.9	1.5	3.3	3.8	7.0	6.6	5.3	4.6	7.2
C	1.1	3.2	1.0	1.9	1.3	3.5	11.5	3.2	2.6	0.0
W	2.5	4.0	7.2	5.8	10.1	0.0	3.3	0.0	0.7	1.4
U	0.9	1.3	1.0	1.4	3.4	0.0	0.0	2.1	2.6	2.9
S	0.3	0.8	0.2	0.8	1.3	0.0	4.9	0.2	2.6	1.4
Number	752	374	405	638	473	57	61	94	152	69
	SUMALLO					COMBINED				
	Percent					Percent				
Origin*	1986	1990	1992	1994	2002	1986	1990	1992	1994	2002
L	66.4	81.4	87.0	87.0	88.9	90.1	85.7	88.7	86.8	81.9
B	14.0	7.1	13.0	3.7	6.9	3.4	3.7	2.7	3.6	4.6
C	10.3	8.6	0.0	1.9	0.0	2.4	5.0	1.3	2.0	1.0
W	3.4	1.4	0.0	5.6	1.4	2.8	3.6	5.6	4.9	8.1
U	4.3	1.4	0.0	1.9	0.0	1.4	1.2	1.1	1.7	2.9
S	1.7	0.0	0.0	0.0	2.8	0.5	1.2	0.6	1.1	1.5
Number	116	70	23	54	72	925	505	522	844	614

* (L) Lower Mainland of British Columbia; (B) other British Columbia; (C) other Canadian; (W) Washington State; (U) other American; (S) other than Canadian or American.

Table 26. Comparison of the percentage of fish and game club members among the anglers interviewed during the Skagit River trout fishery in 1990, 1992, 1994 and 2002.

	PERCENTAGE			
Area	1990	1992	1994	2002
Lower Skagit	16	18	12	12
Upper Skagit	16	29	9	13
Sumallo	7	4	7	4
All Areas	14	19	11	11

For all areas combined, the percentage of anglers fly fishing has increased steadily over the five years of survey (Table 27) with a concomitant decrease in anglers using lures. Gear type distribution in the lower Skagit and Sumallo Rivers was similar to 1994, whereas, the upper Skagit River had a substantial decline in the number of anglers using lures and a corresponding increase in the number of anglers fly fishing.

In 1990, 1992 and 1994 almost half the anglers interviewed were fishing the Skagit River for the first time that particular year (1990:43%; 1992:48%; 1994:48%). However, in 2002 the number of anglers fishing the Skagit River for the first time that year, dropped to 27%. The proportion of first time interviews was similar in all four years (1990:84%; 1992:76%; 1994:83%; 2002: 78%). These data were not collected in 1986.

Table 27. Comparison of gear type used in the 1986, 1990, 1992, 1994 and 2002 Skagit River trout fishery.

	LOWER SKAGIT					UPPER SKAGIT				
	Percent					Percent				
Gear Type	1986	1990	1992	1994	2002	1986	1990	1992	1994	2002
Lure	33.8	23.2	10.7	3.6	4.0	25.0	14.6	20.1	11.8	2.5
Bait	2.9	0.9	0.9	1.5	0.0	11.7	1.2	1.2	1.4	0.0
Fly	63.2	76.0	88.4	94.9	96.0	63.3	84.2	78.2	86.8	97.5
Number	780	462	409	645	632	60	82	94	151	81
	SUMALLO					**COMBINED**				
	Percent					Percent				
Gear Type	1986	1990	1992	1994	2002	1986	1990	1992	1994	2002
Lure	21.9	48.5	71.5	27.4	24.1	30.6	26.0	16.4	7.1	5.6
Bait	31.0	3.0	0.0	2.8	2.5	10.0	1.2	0.9	1.6	0.3
Fly	47.1	48.5	28.5	69.8	73.4	59.5	72.6	82.8	91.3	94.1
Number	255	99	23	54	79	925	643	526	850	792

3.5.3 Comparison of Angler Attitudes and Opinions

Anglers were not asked about their perceived quality of fishing experience until 1992. From the three angler surveys, the perceived quality of the fishing experience rated as excellent has increased steadily (1992: 37%; 1994: 43%; 2002: 52%). Those that rated their angling experience as good (1992: 40%; 1994: 38%; 2002: 39%) were very similar over the three years. Those that rated their experience as fair (1992: 16%; 1994: 15%; 2002: 8%) poor (1992: 7%; 1994: 4%; 2002; 1%) and terrible (1992; 0.8%; 1994: 0.8%; 2002: 0.2%) has decreased.

More anglers in 2002 (83%) assessed the use level to be "just right" (Table 28) compared to all previous surveys (1990, 1992, and 1994). Less anglers in 2002 (12%) felt there were too many other anglers compared to 1994 (22%) and 1990 (20%), but similar to 1992 (16%).

In the lower Skagit areas, both the expected number of encounters with other anglers and actual numbers of encounters with other anglers were similar in proportion to 1992 and 1994 (Scott and Staley 1993; Scott et. al. 1995; Figure 14). At the upper Skagit River, anglers in 2002 expected to see fewer anglers than in 1994 and the number of anglers actually encountered was also lower compared to 1994. In the Sumallo River, the proportion of anglers that observed either 0, 1 or 2 anglers while fishing was similar to 1994.

The percentage of anglers in 2002 (44%) with no opinion on what was the most negative factor relating to their angling experience was similar to the 1990 and 1992 surveys and a substantial decrease from the 1994 (76%) survey (Table 29). Many more anglers in 2002 (25%) named mosquitos as the most negative factor of their angling experience compared to previous surveys. Poor success was stated as a negative factor more often in 2002 (6%) than in 1994 (3%). However, less anglers in 2002 perceived small fish to be a negative factor than in 1994. Factors such as crowds and poor ethics were reported with similar frequency to previous years. As in 1994, litter was not a major concern in 2002. Other complaints (11%) are documented in Appendix 5.

Table 28. Comparison of angler perception of the use level at the Skagit River trout fishery in 1990, 1992, 1994 and 2002.

	PERCENTAGE			
Use Level	1990	1992	1994	2002
Too Few	0.0	0.3	0.8	0.3
Just Right	71.0	74.6	62.0	82.7
Too Many	20.0	15.7	22.2	12.1
Didn't Know	9.0	9.4	15.1	4.9

Table 29. Comparison of perceived most negative factor of the angling experience volunteered by anglers at the Skagit River trout fishery in 1990, 1992, 1994 and 2002.

	PERCENTAGE			
Attribute	1990	1992	1994	2002
No opinion	45.8	31.2	75.5	43.6
Crowded	6.3	11.7	9.4	8.0
Small fish	0.0	0.0	3.7	1.1
Poor success	5.3	2.3	2.9	6.4
Poor ethics	3.2	0.8	1.0	2.3
Mosquitoes	4.2	3.8	4.5	24.6
Litter	9.5	4.1	2.9	2.3
Catch & release regulations	0.0	31.2	0.0	N/A
Other	N/A	N/A	N/A	11.2

4.0 DISCUSSION

4.1 Primary Parameter Estimates

Marginal fishing conditions in the lower Skagit River in July and August, due to high water, likely caused reduced angler effort in these months compared to 1994. However, favourable fishing conditions due to lower water levels and good weather during September resulted in effort similar to 1994 in the lower Skagit for that month. It is likely that if angling conditions in 2002 were similar to those in 1994 during July and August, overall angler anger effort in 2002 would have been greater, particularly in August.

At the upper Skagit River, results indicated angler effort may be stable and not increasing as suggested by the 1994 survey. The angler effort level in 2002 also suggests that angler effort levels estimated in 1994 may be atypically high due to favourable angling conditions and good fish abundance, compared to previous years the fishery was surveyed (Scott et. al. 1995; Harper and Scott 1998).

In the Sumallo River, angler effort in the early season was also similar to other early season high water years (1986 and 1990). There was no apparent reason for higher angler effort in September and October, compared to other surveys, since fishing conditions or catch rates were not markedly different than other years, particularly in October.

River conditions also resulted in reduced angler success in 2002. Overall success was down from 1994 and 1992 (years when the water was low early in the season) but similar to 1986 and 1990 (years when the water was high early in the season). Favourable conditions in September produced similar angler success rates to 1994. Results confirmed angler catch rates are dependant on water levels and favourable angling conditions, which can vary substantially from season to season. The variability in catch rates in different water conditions also suggests catch rates in the sport fishery may not be a reliable indicator of fish abundance in the Skagit and Sumallo Rivers in months when higher water levels prevail.

The upper Skagit River showed a similar pattern of low success in the months of July and August when conditions were less than favourable and a substantial increase in September (higher than all previous years even if the relatively large variance is taken into consideration) when fishing conditions were ideal, although the sample size of anglers interviewed was small.

In the Sumallo River, angler success was much lower than 1994, but similar to all the previous surveys indicating that high success in the Sumallo River in 1994 may have been an anomaly due to exceptional angling conditions and/or an abundance of fish.

Overall estimated catch was down in all areas compared to 1994 and 1992 as a result of reduced early season effort and reduced overall success. Higher catch estimates in the lower Skagit River in September were due to increased angler effort combined with an increase in angler success (especially in Section 2), likely due to improved angling conditions compared to August.

The estimates of standard errors around most of the catch and effort data were larger in 2002 than in some of the previous years surveyed. This increase is likely due to a combination of factors. In some strata (Month, River Section, Day Type, Hour Block) there were relatively few to no interviews. When the variance estimates were weighted and aggregated from these strata it resulted in larger variance for some of the aggregate estimates.

Secondly, in some strata, particularly with small numbers of interviews, the variance of the catch per hour was very large. These observations happened when most of the people interviewed reported zero catch and one or two anglers interviewed reported a large catch, suggesting that the variability in catch success was very high in many cases. These variances resulted in larger standard errors.

4.2 Social Aspects of the Fishery

It appears that the influx of new anglers into the Skagit River fishery (due likely to the regulation changes in 1992) peaked in the 1990's. As opposed to surveys in 1990, 1992 and 1994, the proportion of first time angler use has dropped substantially (the majority of anglers stated they had fished the Skagit for the first time prior to 2000). Results of the 2002 survey indicated that use was predominantly from anglers more familiar with the system and future surveys may bear out a trend toward a higher proportion of anglers who have fished the Skagit and Sumallo Rivers over a period of years. These anglers may be more sensitive to changes in angler use and other social aspects of the fishery. For example, anglers that have been exposed to use levels in the 1990's will be less tolerant if the use levels increase in the future (Shelby and Heberlein 1984).

When asked to identify any negative aspects of the fishery, the proportion of anglers that mentioned crowding (unprompted) was low in all areas indicating the Skagit and Sumallo fisheries are still within social carrying capacity. This contention is supported by the low percentage of anglers in all areas who responded that there were “too many anglers” when questioned about angler use levels. The chief complaint in the 2002 fishery was about the prevalence of mosquitos, which could be directly related to the high water levels experienced during the early portion of this survey.

As in previous surveys, most anglers continue to make one or two trips annually to the area as indicated by the relatively low percentage of repeat interviews.

The level of expected encounters with other anglers did not change dramatically from 1994, suggesting anglers perceive the use level to be relatively constant between the two surveys. The number of reported encounters with other anglers on any given day has decreased from the 1994 survey. The lower number of reported encounters with other anglers may have improved the quality of the fishing experience as the perceived quality of the fishing experience in general was improved from the 1994 survey.

A shift in the age distribution appears to have occurred since surveys conducted in 1994 and earlier. More people over 45 were angling in all areas. This may relate to the influx of anglers that began fishing the Skagit and Sumallo Rivers in the early to mid 1990's or a more aging population in general. If a trend toward a generally older angling population is established in future surveys, factors such as improved access to angling sites may become an issue. Of note was the decline of young anglers under 16. This could indicate a shift away from families utilizing the Skagit River as a recreational fishery.

The other demographic change appears to be the increase in the number of anglers from Washington State to the lower Skagit River. The lower Skagit River appears to be becoming more of a "destination" river for anglers from the United States, who are willing to pay the additional licence fees to be able to fish this system.

4.3 Management Implications

With the catch and release regulation on the river and the restrictive regulations both MWALP and WDW have implemented on Ross Reservoir, these agencies have taken significant action to reduce harvest and protect and enhance the "wild" fish stocks. Legal harvest has been eliminated in the river and illegal bait fishing and harvest continues to decrease. Fish taken illegally likely accounts for far less than the tolerable harvest in the management plan of 1,000 fish (Neuman 1988). Furthermore, the majority of anglers were in favour of further time or location specific closures in order to protect spawning bull trout populations if the need can be biologically justified by the regulatory agencies.

Angler use in 2002 approached the management goal level of 3,600 angler days per year (Neuman 1988). Anglers in 2002 rated the Skagit and Sumallo Rivers' fishing experience as high quality (higher than all previous years even though catch success decreased compared to 1992 and 1994) indicating that the tolerable use levels in the management plan will not detract from the fishing experience. As well, a large percentage of the anglers interviewed began fishing the Skagit system in the 1990's when use levels were higher than historical levels. These anglers may have a greater tolerance for company than long time Skagit River anglers who experienced lower use levels of the 1980's.

The management goal for angler success of one fish per hour was only achieved in September in Section 2 of the lower Skagit River. High catch rates in 1994, which were close to management goals, appear to have been caused by exceptional fishing conditions and high fish abundance (Scott et. al. 1995; Harper and Scott 1998). The lower success rates this year were likely caused, at least partially, by a prolonged freshet and high water levels. This indicates catch rates in the sport fishery may not reflect fish abundance in the river when angling conditions are less than optimum. To verify the trends exhibited in the sport fishery survey, regular (every two to four years) snorkel surveys should be conducted to monitor relative abundance of the trout and char stocks compared to abundance indices established in snorkel surveys conducted in 1982 to 1998 (Harper and Scott 1998). Conducting the snorkel survey in conjunction with the angler survey is particularly valuable, as demonstrated in 1994 when the high fish abundance observed in the snorkel survey corroborated the anomalously high catch rates observed in the sport fishery.

Since an angler survey was not conducted between 1994 and 2002 (8 year span), a substantial data gap has occurred in the trend data. This survey should be replicated every 3 to 5 years as recommended in the management plan (Neuman 1988). This frequency would more accurately align to the 3 to 4 year life cycle of rainbow trout in the Skagit system (Harper and Scott 1998b).

The 2002 survey results showed river levels and fishing conditions play a major role in angler use and success on the Skagit system. Future surveys should monitor river levels from a fixed elevation (as opposed to relative water level) to more accurately compare water levels and fishing conditions during survey years.

The Skagit River and Ross Reservoir Management Plan developed in 1988 had a 5 to 10 year time frame (Neuman 1988), which has elapsed. The management plan should be reviewed and updated as required, taking into consideration trend data gathered from snorkel surveys, angler surveys and biological sampling. With relative angler use levels, use patterns and angler characteristics well defined from the 5 angler surveys, it will be possible to refine the management objectives and strategies in Neuman (1988) to reflect the distinctly different fisheries in each of the 3 geographic areas.

For example, a higher percentage of upper Skagit River anglers perceived angler use to be too high compared to the other 2 areas, indicating upper Skagit River anglers would be more sensitive to an increase in angler effort and the fishery may be at social carrying capacity.

The continued paucity of complaints about any aspect of the fishery indicates Skagit and Sumallo River anglers are generally satisfied with the current management of the Skagit River and Ross Reservoir fisheries.

Since all five surveys were conducted by identical field and analytical methods, we believe comparisons of statistics for these seasons are very reliable. In addition to the primary fishery statistics, the information on basic angler profiles and pertaining to use level perceptions is becoming increasingly useful as demographic trends emerge from the subsequent surveys.

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APPENDICES

Appendix 1. Special angling regulations and regional angling regulations applicable to the 2002 Skagit River trout fishery.

SKAGIT RIVER REGULATIONS

1. Angling Closure November 1 through June 30.

2. No bait permitted.

3. Catch and Release only.

4. Single barbless hook.

ROSS RESERVOIR REGULATIONS

CANADA

1. Angling Closure November 1 through June 30.

2. No bait permitted.

3. Char release.

4. Trout daily harvest quota: 3 fish (none under 33 cm)

Appendix 2. Example of the Count Tally Sheet used during the 2002 Skagit River Angler Survey.

2002 SKAGIT RIVER ANGLER SURVEY COUNT SHEET

NAME: _____ Codes: 1. Day Type: H - Holiday
W - Weekday

WATER TEMP:_____ TIME:_____ LOC:_____ 2. Wx: S - Sunny
C - Cloud
R - Rain

Staff Gauge:_____

3. Water Level H - High
M - Medium
L - Low

4. Water Clarity C - Clear
T - Tinted
D - Dirty

Date m d	Day Type	Wx	Water Cl Lv	Sec	Site	Loc	Time 2400	Angler Count	Vehicle Count

COMMENTS:

Appendix 3. Example of the Angler Interview Form used during the 2002 Skagit River Angler Survey.

2002 SKAGIT RIVER ANGLER SURVEY INTERVIEW SHEET

Interviewer: _____ Interview Frequency: 1 in ____

Date: _____(m)/_____(d) Day Type: Holiday Weekday

1. Location of interview (F6, M4, etc) _____
2. Time of interview (nearest 5 minutes) _____
3. At what time did you start fishing today? _____
4. Completed trip? Yes No
5. Hours fished on immediate previous day _____
6. Gear type: Fly fishing Artificial Lure
7. How many anglers are in your vehicle? _____
8. Catch Summary

	Released	Killed
Rainbow		
Char		
Other: Ct Eb		

9. Were any fish tagged? Yes No

If yes, Spaghetti Radio Both Capture Location_____

Tag Colour _____ Tag Number _____

10. Have you been interviewed in this survey previously? Yes No

---

IF NO TO QUESTION 10, ASK THE FOLLOWING QUESTIONS:

11. Estimate angler age: Under 16 16-30 30-45 Over 45
12. Where do you live? LM BC Can Wash USA Other
13. Are you a member of a Fish & Wildlife Club? Yes No
14. When was the first time you fished the Skagit River?

    2002 2001 2000 1995-1999 1990-1994

    1985-1989 1980-1984 1975-1979 Before 1975
15. How would you rate your fishing experience at the Skagit (or Sumallo River?)

    Excellent Good Fair Poor Terrible
16. What, if anything, is the one thing you dislike about fishing the Skagit River?

    1. Crowded 2. Small fish 3. Poor catch success rate 4. Litter

    5. Lack of fishing ethics 6. No Camping on gravel bars 7. Mosquitoes

    8. _____ 9._____ 10. No opinion

17a. Are you aware that char in the Skagit/Ross system include bull trout, a species of special concern?YesNo

17b. Would you support area and/or time specific closures within the current season to protect spawning bull trout? Yes No Don't Know

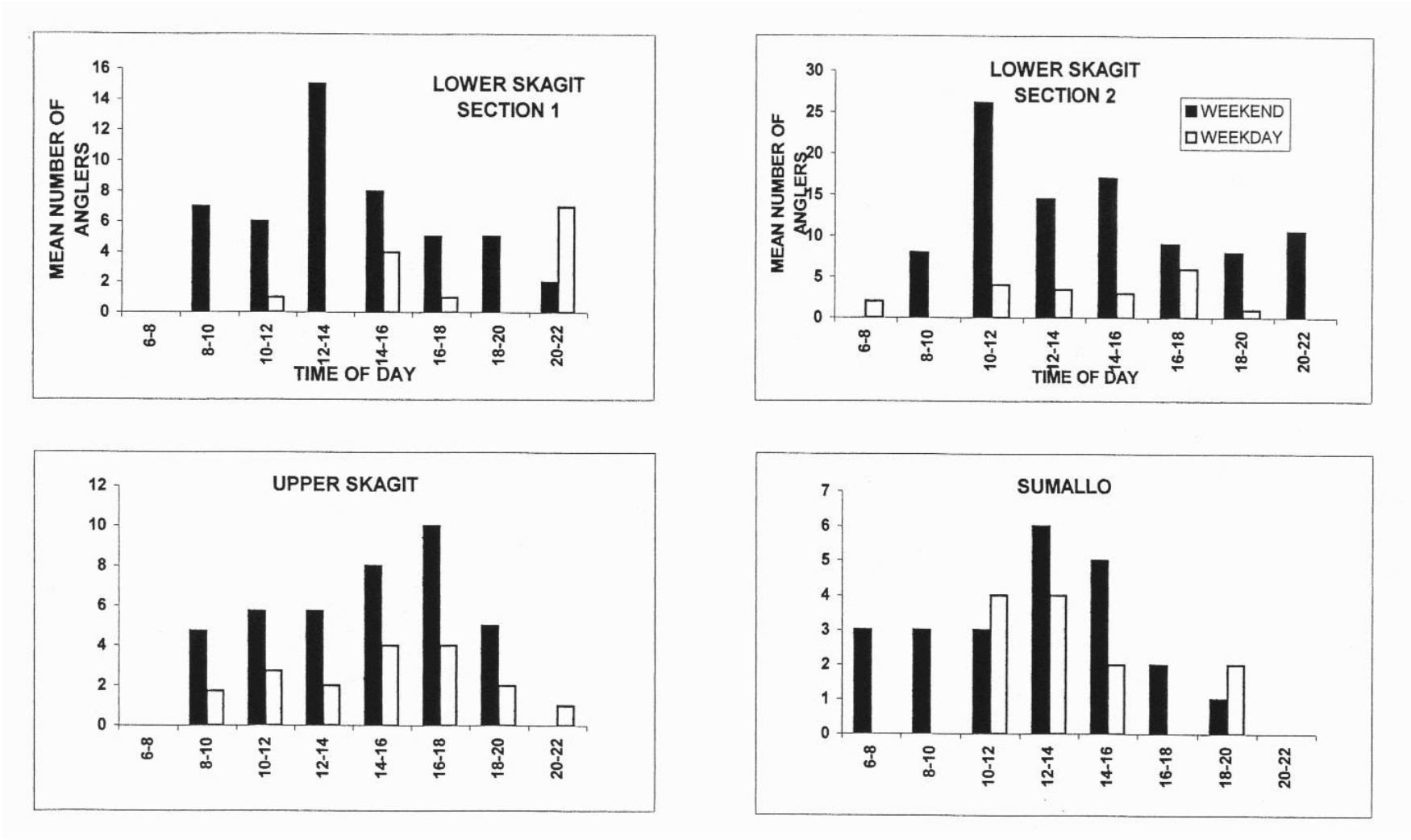
18a. What is the total number of anglers you expect to see at this fishing site today?_____

18b. How many anglers have you seen at this fishing site today?_____

18c. We'd like your opinion about the number of anglers you encounter while fishing the Skagit River.

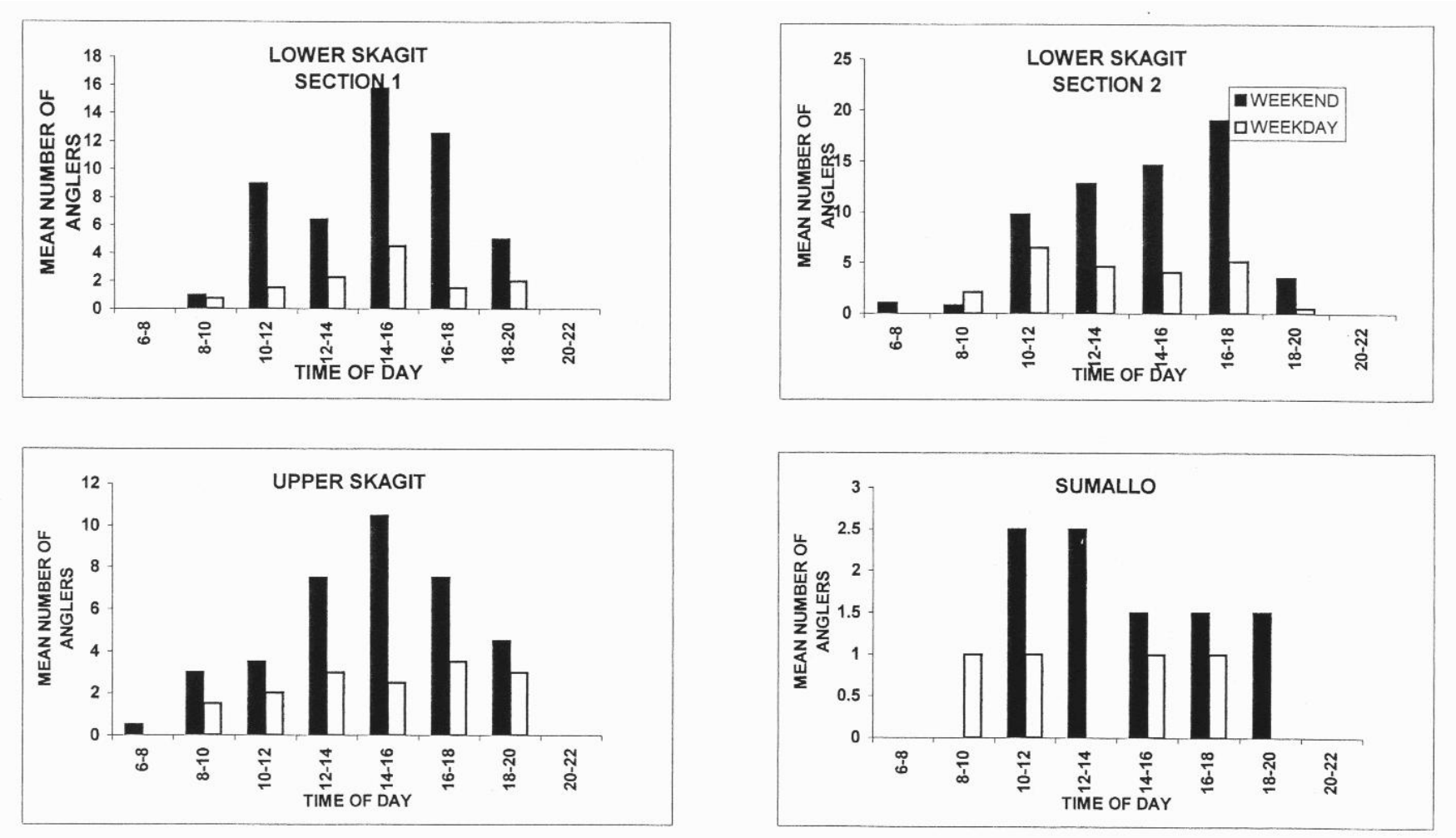
Too few Just right Too many Don't know

THANK YOU FOR YOUR TIME!



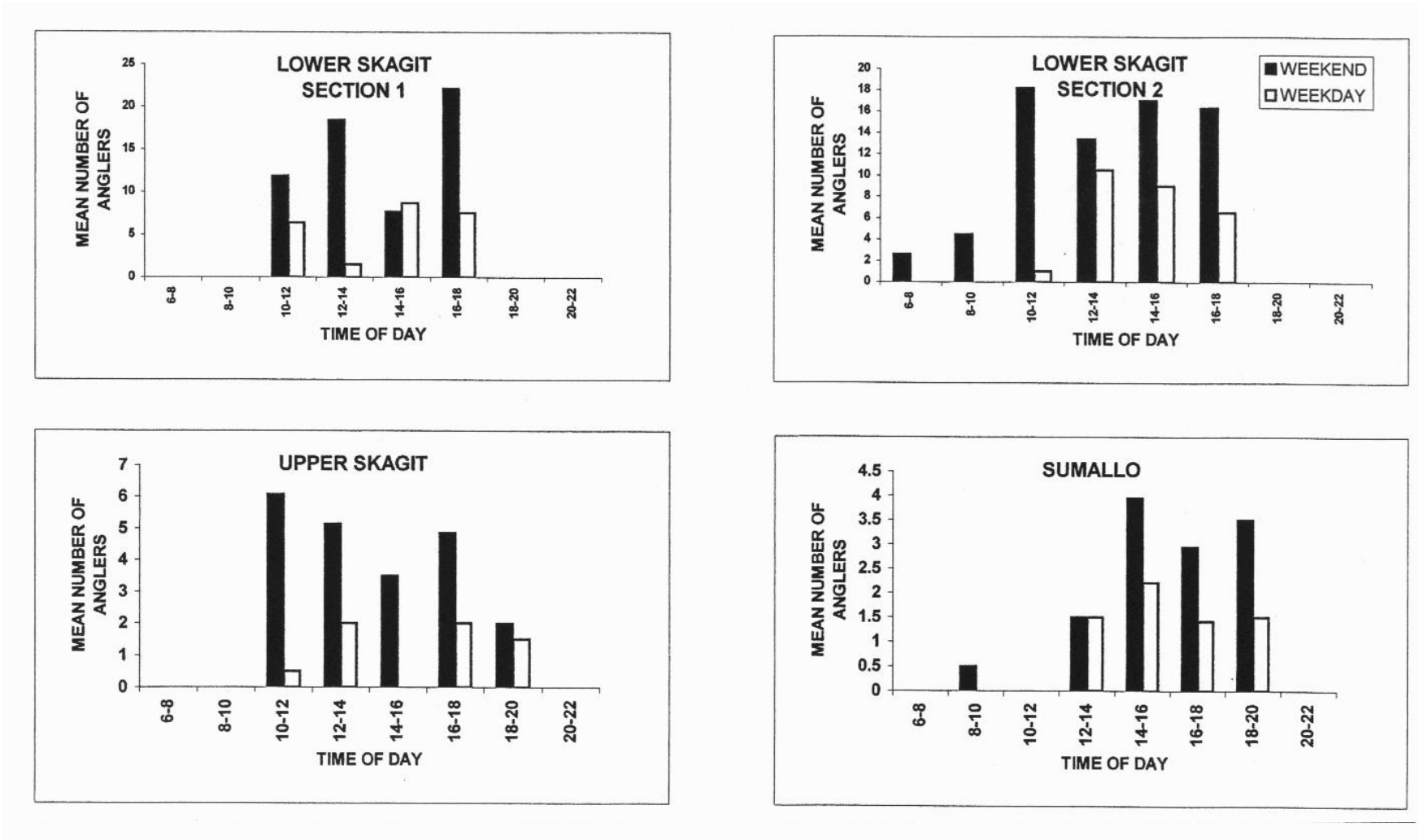
JULY

Appendix 4. Profile of daily angling effort for midweek and weekend days in the Skagit River trout fishery, July 1 through October 31, 2002.



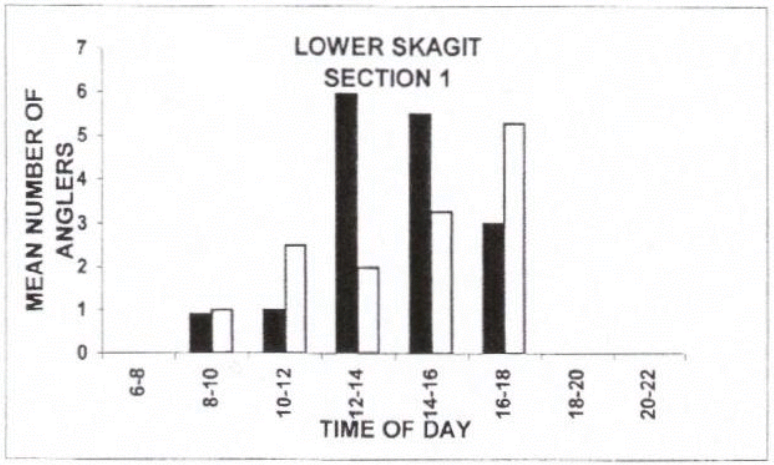
AUGUST

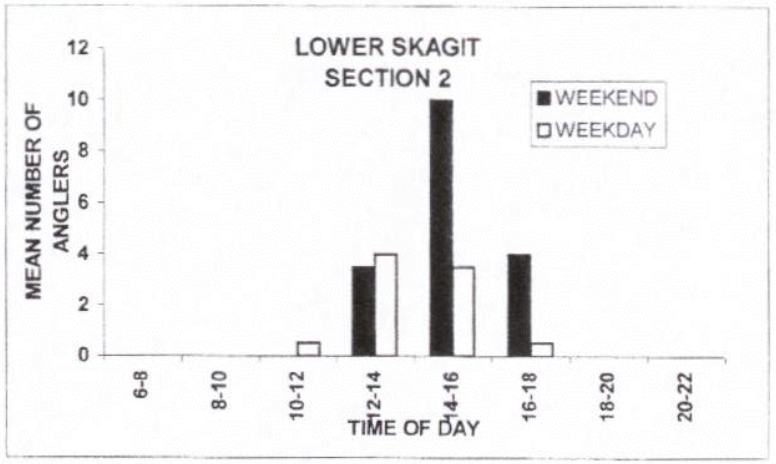
Appendix 4. Profile of daily angling effort for midweek and weekend days in the Skagit River trout fishery, July 1 through October 31, 2002.

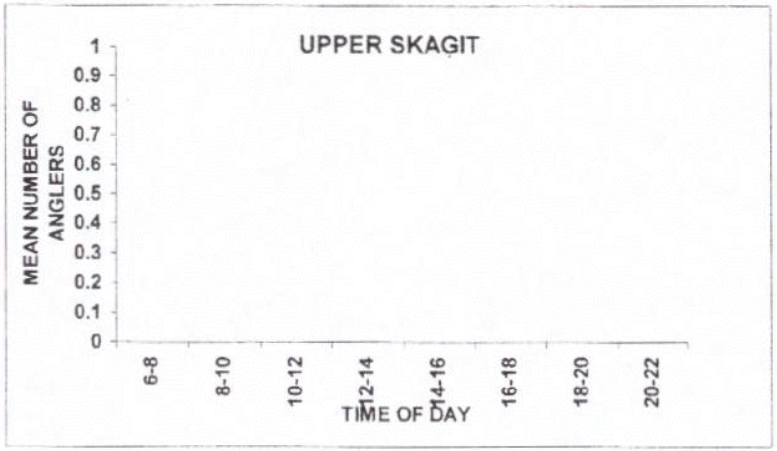


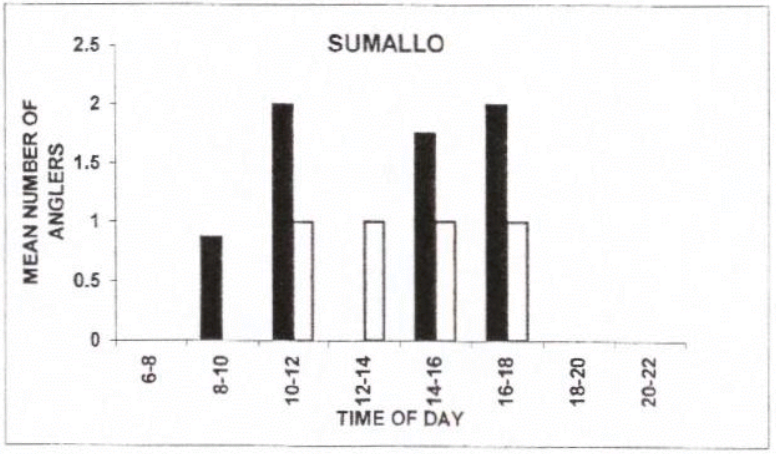
SEPTEMBER

Appendix 4. Profile of daily angling effort for midweek and weekend days in the Skagit River trout fishery, July 1 through October 31, 2002.









OCTOBER

Appendix 4. Profile of daily angling effort for midweek and weekend days in the Skagit River trout fishery, July 1 through October 31, 2002.

Appendix 5. General comments volunteered by anglers during the 2002 Skagit River Angler Survey (the frequency of the comment is in parenthesis).

The following eight categories of comments have been compiled primarily from the additional comments that were volunteered in interviews. Many of these additional comments were in direct response to a particular interview question, but none of them were prompted by the interviewer. The following eight broad categories of comments were identified as being relevant to the objectives of the 2002 angler survey:

1. Fish and game club representation
2. Comments on angling regulations and fisheries management
3. Comments or observations on angler use
4. Comments or observations on quality of angling experience
5. Comments or observations on fish, fish behaviour or fish habitat
6. Comments or observations concerning other recreational uses
7. Comments regarding access
8. General comments, observations and or concerns

1. FISH CLUB REPRESENTATION

B.C. Federation of Fly Fishermen	(3)
Steelhead Society	(2)
4 Corners Fly Fishing Club	(3)
B.C. Wildlife Federation	(2)
Trout Unlimited	(8)
Osprey Fly Fishers	(1)
Ducks Unlimited	(4)
West Water Fly Fishers	(1)
North Shore Fish & Game Club	(1)
North Burnaby Fish & Game Club	(1)
Seymour Steelhead Society	(1)
Streamkeepers Society	(1)

Appendix 5 (continued)

2. ANGLING REGULATIONS AND FISHERIES MANAGEMENT

- (Regarding Question 17b) Restriction maybe implemented but no complete river closures (1)
- (Regarding 17b) Its already C & R, why have more closures (2)
- (Regarding 17b) Bull trout populations must be determined and what is affecting their populations, longer studies must be conducted to determine management strategies (1)
- Angler has noticed every year that the fish that have been caught within this system have kept on getting larger since the implementation of C & R (1)
- Comments regarding the replacement of the large regulation signs that used to be at 26 mile bridge (1)
- Comments regarding that there should at least be a one fish limit (2)
- Comment regarding the complete removal of C & R (Dislikes it) (3)
- Angler stated that this fishery should be completely fly-fishing only (1)
- Closures and enforcement is needed to suppress poaching (4)
- Would accept closures to protect Bull Trout (1)
- The catch limit on Ross Lake should be removed (5)
- The fishing season in the Skagit is too short (4)
- Stranded trout fry from stray pools should be salvaged back into the river (2)

3. ANGLER USE

- C&R violations (1)
- Barbless hook violations (3)
- Bait ban violations (2)
- Comments regarding encountering too many other anglers (32)
- Comments on increasing angling pressure (4)

- Comment regarding not enough anglers to help show where the fish are (1)

4. QUALITY OF ANGLING EXPERIENCE

- Angler felt like the Skagit was the best place in the world to relax and relieve stress, even when nothing has been caught (2)
- Angler felt that the Skagit is one of the quietest rivers in the Lower Mainland (1)
- Angler dislikes the river drifters (pontooners, canoers, rafters), ruins quality of experience (2)
- "Best place in the world, best place to fish, best trout fishery..." (27)
- Angler stated that this has been the best year yet since they first started (1)

5. FISH AND FISH HABITAT

- Comments regarding the river morphology and how much it has changed (1)
- Disliked having to walk over log jams and debris (2)
- Comments regarding the river being too high (12)
- Dislikes the low water in the Upper Skagit/Summallo (1)
- Comments regarding that the fishing is better this year than last (2)
- Comments referring to the fish being "spooky" (2)
- Angler stated they caught a cutbow (1)
- Thought some fish were still spawning (2)
- Angler stated they caught a brook trout (1)

Appendix 5 (concluded)

6. RECREATION

- Disliked camping ban near the good angling sites (1)
- Dislikes the fact that you cannot camp off the road (1)
- Dislikes not being able to bike on the park trails (2)

7. ACCESS

- Comment regarding that there should be a toll put against Americans for using our roads to access their Hozomeen Campground (2)
- Angler felt that the road could use some repairing (too bumpy) (8)
- Angler felt that the roads have been upgraded too much, stop! (1)
- Comments towards there being too much dust on the road (7)
- Remove the road bans on all access points along the road to the river (1)
- Anglers felt that the trails that accessed the river should be brushed out (6)
- Angler felt that the access to the river is too difficult (15)

8. GENERAL

- Angler was surprised that Canadians pick up trash after one another (2)
- Angler stated that he comes to the Skagit every year (1)
- Comment regarding that there are no signs that warn of hazardous plants (1)
- Too many Americans (1)
- Dislikes the logging activity around the park (1)