

FISHERY DATA SERIES NO. 68

STATISTICS FOR SELECTED SPORT FISHERIES
ON THE LOWER KENAI PENINSULA, ALASKA,
DURING 1987 WITH EMPHASIS
ON DOLLY VARDEN CHAR¹

By

L. L. Larson
D. T. Balland
and
S. K. Sonnichsen

Alaska Department of Fish and Game
Division of Sport Fish
Juneau, AK 99802

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iv
LIST OF APPENDICES.....	v
ABSTRACT.....	1
INTRODUCTION.....	2
METHODS.....	4
Fishery Monitoring.....	4
Roving Creel Survey.....	4
Anchor River Weir.....	7
Biological Sampling.....	8
Dolly Varden Char.....	8
Coho Salmon.....	8
Steelhead/Rainbow Trout.....	8
RESULTS.....	8
Creel Survey.....	8
Effort.....	9
Harvest Rates.....	9
Harvest.....	9
Demographic Data.....	9
Anchor River Weir.....	9
Biological Data.....	19
Dolly Varden char.....	19
Coho Salmon.....	19
Steelhead/Rainbow Trout.....	19
RECOMMENDATIONS AND CONCLUSIONS.....	19
Creel Survey.....	19
Anchor River Weir.....	26
Deep Creek and Ninilchik River.....	26

TABLE OF CONTENTS (Continued)

	<u>Page</u>
LITERATURE CITED.....	26
APPENDIX TABLES.....	30

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Summary of mean angler counts, by period, for the sport fishery on the Anchor River, July through October, 1987.....	10
2. Estimated effort (angler-hours) for the sport fishery on the Anchor River, July through October, 1987.....	11
3. Catch (CPUE) and harvest (HPUE) rates (fish per hour), by month, for Dolly Varden char during the sport fishery on the Anchor River, July through October, 1987.....	12
4. Catch (CPUE) and harvest (HPUE) rates (fish per hour), by month for coho salmon during the sport fishery on the Anchor River, July through October, 1987.....	13
5. Catch (CPUE) and harvest (HPUE) rates (fish per hour) and month for steelhead/rainbow trout during the sport fishery on the Anchor River, July through October, 1987.....	14
6. Estimated catch and harvest, by species, for the sport fishery on the Anchor River, July through October, 1987.....	15
7. Age and sex compositions of Dolly Varden char mortalities collected at the weir site and in the sport harvest on the Anchor River during 1987.....	20
8. Mean length (mm), by age group, of Dolly Varden char mortalities collected from the sport harvest and at the weir in the Anchor River during 1987.....	21
9. Age and sex compositions of coho salmon mortalities collected from the sport harvest and at the weir on the Anchor River during 1987.....	23
10. Mean length (mm) by age group of coho salmon and steelhead/rainbow trout mortalities collected in the sport harvest and at the weir site in the Anchor River during 1987.....	24
11. Age and sex compositions of steelhead/rainbow trout mortalities collected from the sport harvest and at the weir on the Anchor River during 1987.....	25

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Map of lower Kenai Peninsula.....	3
2. Mean daily water discharge of the Anchor River, South Fork, in cubic feet per second (CFS) as measured by USGS, 1987.....	17
3. Mean (A) and cumulative (B) daily proportional weir counts of Dolly Varden char passed upstream though the Anchor River weir, 1987.....	18
4. Mean length showing 95% confidence intervals of Dolly Varden char passed through the Anchor River Weir, 1987.....	22

LIST OF APPENDICES

<u>Appendix Table</u>	<u>Page</u>
1. Angler counts, by period, for the sport fishing on the Anchor River from July through October, 1987.....	31
2. Comparison (Y=significant difference) of mean angler counts between periods for lower Kenai Peninsula sport fisheries, 1987.....	33
3. Daily summary statistics for fishing effort and harvest of Dolly Varden char, coho salmon, and steelhead/rainbow trout for the sport fishing on the Anchor River, July through October, 1987.....	34
4. Number of fish, by species and date, passed upstream through the Anchor River weir during 1987. Also included is the number of Dolly Varden char tagged during 1987.....	38
5. Detailed release and recovery information from all Dolly Varden char tags recovered from anglers in 1987..	40

ABSTRACT

A creel survey was conducted on the Anchor River from July through October 1987 to determine sport fishing effort and harvest of Dolly Varden char *Salvelinus malma*, coho salmon *Oncorhynchus kisutch*, and steelhead/rainbow trout *Salmo gairdneri* and to collect information regarding angler demographics and preference for bait or artificial lures. Effort on the Anchor River was estimated to be 29,958 angler-hours with most of the effort occurring in the lower 1.5 kilometers of the river. An estimated 2,653 Dolly Varden char, 2,263 coho salmon, and 181 steelhead/rainbow trout were harvested. Resident anglers represented 73 percent of the fishing population. Of the resident anglers, 54 percent lived less than 33 kilometers from Anchor Point. Seventy-seven percent of the anglers interviewed during the time bait was an option did not use bait.

A weir, located at river kilometer 1.5 of the Anchor River, was in continual operation from 3 July through 10 September 1987 to assess the immigration, emigration, and migrational patterns of Dolly Varden char. Just over 19,000 Dolly Varden char were passed upstream of the weir, of which 3,208 were tagged with Floy FD-67 and/or FTF-69 tags. Dolly Varden char were also tagged on Deep Creek and the Ninilchik River. A total of 1,488 Dolly Varden char were passed downstream of the weir.

KEY WORDS: Anchor River, Deep Creek, Ninilchik River, Kenai Peninsula, anadromous, Dolly Varden, coho salmon, rainbow trout, steelhead trout, creel census, harvest, effort, weir, age composition, sex composition.

INTRODUCTION

The Anchor and Ninilchik Rivers and Deep Creek on the lower Kenai Peninsula (Figure 1) support recreational fisheries for chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, and pink salmon *O. gorbuscha*; Dolly Varden char *Salvelinus malma*; and anadromous (steelhead trout) and resident rainbow trout *Salmo gairdneri*. The downstream sections of each of these streams are crossed by the Sterling Highway making them easily accessible to the fishing public. Much of the river frontage on these streams is publicly owned, providing ample camping and parking areas. Due to their relatively small size, all fishing in these streams is conducted from the bank. Of the three streams, the Anchor River is the most heavily used providing an average of 33,128 recreational fishing days (angler-days) annually from 1977 through 1985 (Mills 1979-1986). The Ninilchik River and Deep Creek provided an average of 13,255 and 13,108 angler-days, respectively, over this same period.

The fisheries targeting chinook salmon, coho salmon, steelhead trout, and Dolly Varden char are of major importance to recreational anglers on the lower Kenai Peninsula, whereas the fisheries targeting resident rainbow trout and pink salmon are of lesser importance. The recreational fishery for Dolly Varden char in the Anchor River is one of the largest in Alaska and is of particular concern to resource managers. During the period 1977 to 1983, the harvest from this fishery averaged nearly 15,000 fish annually (Mills 1979-1984). In 1984, regulations for this fishery became more restrictive as the bag and possession limits were reduced from ten fish to five and the use of bait was prohibited after 16 September. Since these regulations have been in effect, the harvest of Dolly Varden char has averaged approximately 6,600 fish (Mills 1985-1986). Although a marked decline has been observed in the harvest of Dolly Varden char after initiation of the new regulations, concern has been expressed that the decline may also reflect a depressed population. To date, the Department has conducted no quantitative assessments of this resource, other than estimated harvest in the statewide mail survey (Mills 1979-1987).

The Department initiated a pilot program in 1986 to investigate the Dolly Varden char resource of the lower Kenai Peninsula streams. The program involved angler interviews to estimate catch and harvest rates, aerial surveys to estimate angler distribution, and tagging fish to determine migrational patterns among lower Kenai Peninsula streams (Nelson et al. 1987). The program was expanded in 1987 to include more detailed estimates of effort and harvest in the Anchor River fishery, census of the Dolly Varden char immigration into and emigration out of the Anchor River, a more aggressive tagging program in the three major streams, and estimation of length and age parameters. The long-term goal of the program is to build a quantitative database with which to estimate sustainable yield for this resource.

Information pertaining to the Dolly Varden char, steelhead/rainbow trout, and coho salmon fisheries has been presented by Allin (1954, 1957), Balland

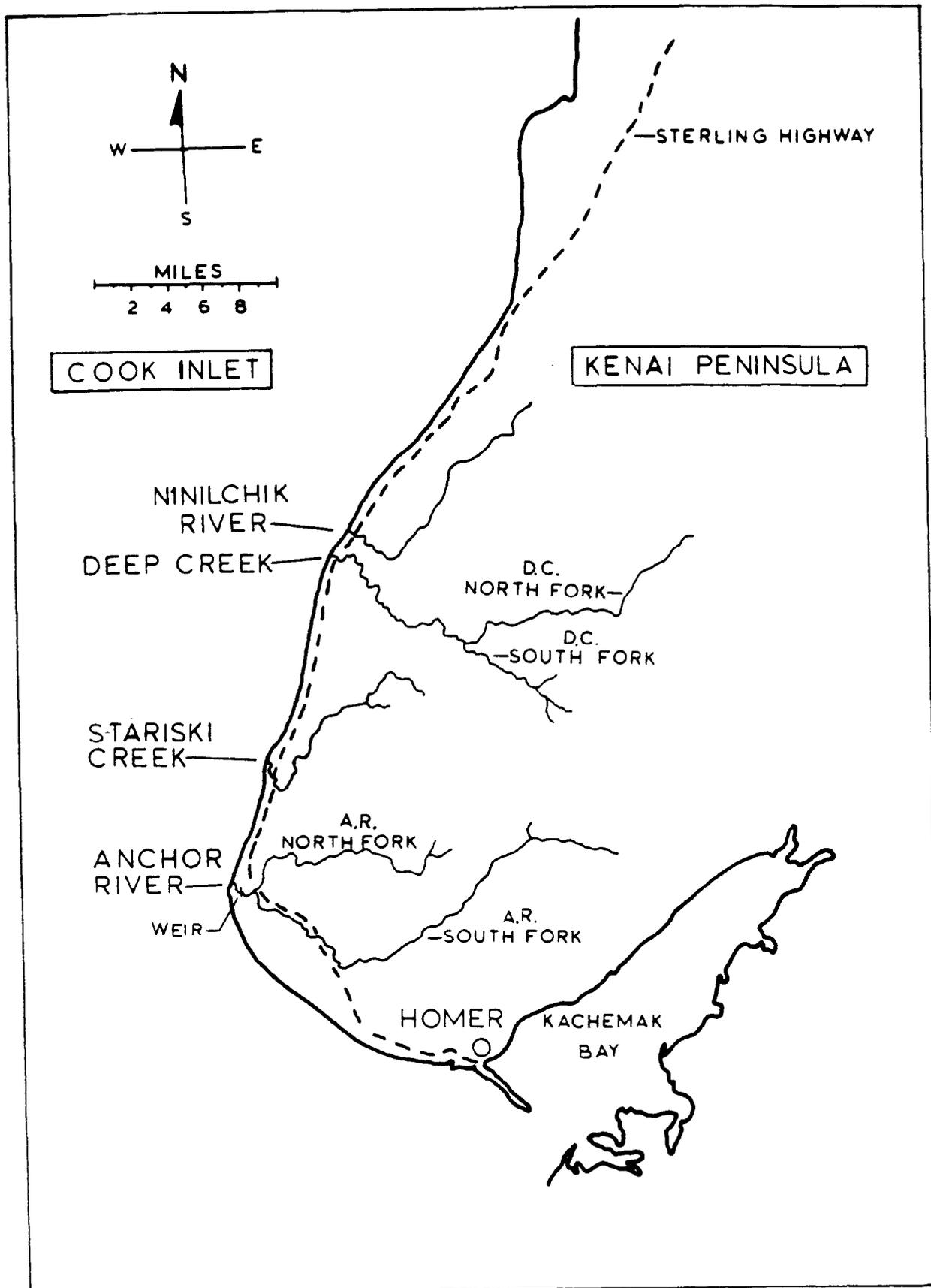


Figure 1. Map of lower Kenai Peninsula.

(1985-1986), Nelson et al. (1987), Wallis and Balland (1981-1984) and Wallis and Hammarstrom (1979-1982). Harvest and effort estimates have been reported by Mills (1979-1987).

METHODS

Fishery Monitoring

Aerial surveys conducted in 1986 indicated the sport fishery for the Anchor River occurs primarily in the lower 3 km of the river below the junction of the north and south forks. The area is accessible from public camping and parking areas. To maximize angler contacts, the creel survey was confined to this area. Creel survey variables were determined separately for areas downstream and upstream of a weir installed approximately 1.5 km upstream from the saltwater terminus of the Anchor River.

Roving Creel Survey:

A creel survey was conducted on the Anchor River from 1 July to 31 October 1987. Effort in angler-hours and harvests of Dolly Varden char, coho salmon, and steelhead/rainbow trout were estimated during this time frame.

Angler counts were conducted following a stratified random sampling design. The fishing day was considered 20 hours long (0400-2359 hours) during July, 16 hours long (0600-2159 hours) during August, 12 hours long (0800-1959 hours) during September, and 8 hours long (1000-1759 hours) during October. Each fishing day was stratified into as many 4-hour time periods as were permitted by the length of the fishing day.

Sampling was stratified by weekdays and weekend/holidays. Two sampling periods were randomly selected for sampling on each weekend/holiday and three on selected weekdays each week. Sampling periods were randomly selected subject to the constraint that the same period was never sampled on 2 consecutive days. This selection was used to minimize the covariance between angler counts. Schedules for weekdays and weekend/holidays were selected separately.

Counts of anglers were made by a roving creel survey clerk and took approximately 45 minutes to complete. One count was made during each interview period. A starting time was randomly selected in the first period of a sample day and subsequent counts were spaced a minimum of 4 hours apart. This was done to minimize the covariance between counts in adjacent periods. Counts were conducted by walking the length of the fishing area as quickly as possible and counting all anglers actively engaged in fishing. Counts were recorded separately for the areas downstream and upstream of the weir. All counts were considered instantaneous (Neuhold and Lu 1957).

The creel survey clerk allocated available interview time downstream and upstream of the weir according to the most recent angler count. For example, if one-third of the anglers counted were downstream and two-thirds of the anglers counted were upstream of the weir, then 1 hour was spent in

campgrounds and parking areas downstream and 2 hours in campgrounds and parking areas upstream of the weir.

Completed-trip angler interviews were collected from anglers who claimed they were through fishing for the day or had fished the previous day. Information collected during angler interviews consisted of target species, number retained and number released (by species), total hours fished (to the nearest 1/2 hour), terminal gear (bait or artificial; through 15 September only), and residence.

Harvest per unit effort (HPUE) was estimated from both direct interviews and voluntary angler interview cards. Direct interviews are the more common methodology used in other Alaskan sport fisheries. Direct interview creel surveys, however, are expensive to conduct. Although it is not known with certainty which estimate, if either, is correct; it was initially hypothesized that the estimate of HPUE derived from interview cards could be biased high. This would result from a tendency of successful anglers to complete and return the cards.

Angler effort (E) was calculated using a stratified random sample design (Schaeffer et al. 1979). Effort in angler-hours and its variance was estimated separately for each weekend and for each fishery as:

$$\hat{E} = \sum_{j=1}^P H_j \bar{Y}_j \quad (1)$$

$$V(\hat{E}) = \sum_{j=1}^P H_j^2 (s_j^2/n_j) \quad (2)$$

where:

p = the number of periods per time frame,

\bar{Y}_j = the mean number of anglers per count in stratum j,

H_j = total number of hours fishing possible in stratum j,

s_j^2 = the sample variance for angler counts in stratum j, and

n_j = the number of angler counts conducted in stratum j.

Mean effort and harvest per angler were calculated for each location and time frame using a two-stage random sample design with days as the primary sample units and anglers as the secondary sample units (Von Geldern and Tomlinson 1973). Arithmetic means were calculated from all completed-trip anglers interviewed at a location and time frame.

The variance of mean effort was estimated as (Sukhatme et al. 1984):

$$V(\bar{f}) = [1 - (d/D)]s_B^2/d + [\sum_{i=1}^d (s_{wi}^2/m_i)]/dD \quad (3)$$

where:

$$s_{wi}^2 = [\sum_{k=1}^{m_i} (f_{ik} - \bar{f}_i)^2] / (m_i - 1), \quad (4)$$

$$s_B^2 = [\sum_{i=1}^d (\bar{f}_i - \bar{F})^2] / (d - 1), \quad (5)$$

and

d = number of days on which sampling was conducted,

D = number of possible days at a location in a time frame,

f_{ik} = effort by angler k interviewed on day i,

m_i = number of anglers interviewed on day i, and

\bar{F} = mean effort per angler at a location during a time frame.

The variance of mean harvest per angler was estimated by substituting individual harvests for efforts in the above formulae.

Harvest per effort, \bar{h}/\bar{f} , was computed for each location and time frame. The variance of harvest per effort is approximated by the variance for a quotient of two random variables (Jessen 1978),

$$\hat{V}(\bar{h}/\bar{f}) = (\bar{h}/\bar{f})^2 [(s_h^2/h^2) + (s_f^2/\bar{f}^2) - (2rs_h s_f / \bar{h}\bar{f})] \quad (6)$$

where:

\bar{h} = mean number of fish caught per angler,

\bar{f} = as defined previously,

s_h^2 = two-stage variance of \bar{h} ,

s_f^2 = two-stage variance of \bar{f} , and

r = Person's correlation coefficient for the h_{ik} and f_{ik} .

Total harvest (H) and its variance for each location and time frame was computed as (Goodman 1960):

$$\hat{H} = \hat{E} (\bar{h}/\bar{f}) \quad (7)$$

$$V(\hat{H}) = [\hat{E}^2 \hat{V}(\bar{h}/\bar{f})] + [(\bar{h}/\bar{f})^2 V(\hat{E})] - [V(\hat{E}) \hat{V}(\bar{h}/\bar{f})]. \quad (8)$$

Major assumptions necessary for the creel survey are:

1. Angler counts made during the same day and on consecutive days are independent.
2. No significant fishing effort occurs during the hours not included in the fishing day.
3. Interviewed anglers are representative of the total angler population.
4. The number of anglers interviewed during a day is proportional to the effort on that day.
5. Fishing effort does not influence catch per unit effort.
6. Angler efforts and harvests are normally distributed random variables.

Anchor River Weir

A weir was installed approximately 1.5 km upstream from the saltwater terminus of the Anchor River. Weir pickets were 1.25 cm diameter solid aluminum rods placed in an aluminum channel framework having a 1.25 cm gap between pickets. Channel frames were 3.6 m long by 1.05 m high. The aluminum frames rested against wooden tripods spaced approximately 3.0 m apart. Traps were installed to capture both upstream and downstream migrating fish. All fish migrating through the weir were counted by species.

Approximately 25% of the immigration of Dolly Varden char greater than 200 mm in fork length were tagged with Floy FTF-69 fingerling tags. All Dolly Varden char that were tagged were measured for tip-of-snout to fork-of-tail length (to the nearest millimeter). All mortalities were sampled for age by removing both otoliths. In addition, 500 Dolly Varden char were tagged with 5 cm long Floy FD-67 anchor tags as well as the Floy FTF-69 fingerling tags. All Dolly Varden char to be tagged were first anesthetized with CO₂.

Water temperature was recorded automatically with a continually recording thermograph. Daily stream discharge was obtained from a United States Geological Survey station located on the South Fork of the Anchor River.

Stream discharge from the North Fork, which is of much lesser volume than the South Fork, was assumed to be proportional to the South Fork.

Biological Sampling

Dolly Varden char, coho salmon, and steelhead/rainbow trout were sampled for age, sex, and length information.

Dolly Varden Char:

All Dolly Varden char mortalities observed at the weir and in the sport fishery were sampled to estimate sex composition, length-frequency of the harvest, and age composition of each length interval. Length intervals were defined as 50 mm increments beginning at 200 mm.

Coho Salmon:

A total of 150 coho salmon mortalities observed at the weir and in the sport fishery were sampled for age (three scales from the preferred area¹), sex, and length (mid-eye to fork-of-tail). This sample size was based on a desired level of accuracy and precision (95% confidence interval $\pm 5\%$ of the estimate) for the estimate of age composition (Thompson 1987), given the assumption that 15% of the scales would be illegible. Letting P_h equal the estimated proportion of age group h , the variance of P_h was estimated using the normal approximation to the binomial (Schaeffer et al. 1979):

$$V(\hat{P}_h) = \hat{P}_h(1-\hat{P}_h)/(n_T-1) \quad (9)$$

where n_T is the number of coho salmon scales read.

Steelhead/Rainbow Trout:

Steelhead/rainbow trout mortalities observed at the weir and in the sport fishery were sampled for age (three scales from the preferred area), sex, and length (snout-to-fork). These data were used to estimate length-at-age.

RESULTS

Creel Survey

A creel survey was conducted on the lower 3.0 km of the Anchor River from 1 July to 31 October 1987.

¹ The left side of the fish approximately three rows above the lateral line and on the diagonal row downward from the posterior insertion of the dorsal fin (Clutter and Whitesel 1956).

Effort:

Mean counts of anglers were significantly different between daily periods in most cases (Appendix Tables 1 and 2 and Table 1). Estimated effort (Table 2) from July through October on the Anchor River was 29,958 angler-hours. Effort peaked during July upstream of the weir and during August downstream of the weir. Nearly four times as much effort was expended downstream of the weir (24,060 angler hours) as upstream of the weir (5,898 angler-hours).

Harvest Rates:

Daily harvest rates for Dolly Varden char ranged from 1.545 to 0.0 fish per angler hour (Appendix Table 3). Peak harvest rates for Dolly Varden char occurred during July (Table 3), for coho salmon during August (Table 4), and for steelhead/rainbow trout during October (Table 5).

Harvest:

An estimated 2,653 Dolly Varden char, 2,263 coho salmon, and 181 steelhead/rainbow trout were harvested in the Anchor river from 1 July through 31 October 1987 (Table 6). Most of the harvest of each species occurred below the weir.

Demographic Data:

Demographic data collected during direct angler interviews indicated that 73% of all anglers were residents. Of these resident anglers, 46% lived within 33 km of Anchor Point. Of the anglers interviewed during the time bait was an option, 77% did not use bait.

Anchor River Weir

The weir was in continual operational from 3 July through 10 September 1987. On 10 September rising water (Figure 2) caused severe streambed scouring under the fish trap and behind the weir face. As a result, the weir was dismantled on 11 September.

A total of 19,062 Dolly Varden char approximately 200 mm or greater in length were passed upstream of the weir (Figure 3 and Appendix Table 4). The peak of the immigration occurred in late July, with 50% of the run having passed the weir by 27 July. In addition, 1,488 live Dolly Varden char of the same length range were passed through the downstream trap of the weir. Another 134 Dolly Varden char were found dead in the downstream trap.

A total of 3,394 Dolly Varden char were tagged on the lower Kenai Peninsula streams: 3,208 at the Anchor River weir, 69 in Deep Creek, and 117 in the Ninilchik River. Of these, 69 were recovered in the sport fishery (Appendix Table 5). In addition, three tags were recovered from fish tagged on the Anchor River in 1986 (Nelson et al. 1987).

Table 1. Summary of mean angler counts, by period, for the sport fishery on the Anchor River, July through October, 1987.

Stratum	July Periods					August Periods				September Periods			October Periods	
	A	B	C	D	E	A	B	C	D	A	B	C	A	B
Below weir weekdays														
Number of counts	4	2	6	5	5	7	6	8	5	7	9	8	14	14
Mean count	1.8	3.0	8.3	15.2	5.2	22.0	27.7	31.8	25.4	7.0	12.2	9.1	2.9	2.2
Standard error	1.0	0.0	2.2	2.3	1.4	5.8	4.8	4.7	6.0	1.4	2.7	1.6	0.7	0.5
Below weir weekends														
Number of counts	3	2	2	4	5	5	5	5	5	6	6	4	9	9
Mean count	3.3	15.0	9.5	12.5	13.4	29.6	27.4	37.6	36.6	14.3	15.7	23.0	8.0	4.8
Standard error	3.3	1.0	4.5	4.7	2.5	9.5	4.2	5.1	3.6	2.8	2.9	4.5	2.6	1.2
Above weir weekdays														
Number of counts	4	2	6	5	5	7	6	8	5	7	9	8	14	14
Mean count	0.5	3.0	3.8	6.4	1.4	0.4	4.2	3.1	1.2	1.6	4.6	3.1	4.1	3.4
Standard error	0.5	1.0	0.9	2.0	0.8	0.0	0.8	0.8	0.5	0.7	0.8	0.8	0.7	0.6
Above weir weekends														
Number of counts	3	2	2	4	5	5	5	5	5	6	6	4	9	9
Mean count	0.0	1.0	5.5	6.0	2.2	0.6	4.8	4.6	4.0	8.5	6.3	5.8	10.8	6.9
Standard error	0.0	1.0	2.5	2.3	1.4	0.4	2.2	1.8	1.1	1.9	1.4	2.7	1.8	1.7

Table 2. Estimated effort (angler-hours) for the sport fishery on the Anchor River, July through October, 1987.

Month	We/ Wd ¹	No. Int. ²	No. Days Pos. ³	No. Days Smp. ⁴	Angler/ Count	Estimated Effort					
						Below Weir			Above Weir		
						Angler Hours	Standard Error	Rel. Prec. ⁵	Angler Hours	Standard Error	Rel. Prec.
July	We	98	9	8	14.0	1,934	281	28.5%	529	138	51.2%
	Wd	95	22	12	10.7	2,679	293	21.5%	1,211	203	32.8%
	Total	193	31	20	12.1	4,613	406	17.3%	1,740	245	27.6%
Aug.	We	228	10	10	36.3	5,248	483	18.0%	560	125	43.7%
	Wd	369	21	19	29.3	8,973	903	19.7%	749	109	28.4%
	Total	597	31	29	32.3	14,221	1,024	14.1%	1,309	166	24.8%
Sept.	We	217	9	8	24.0	1,908	219	22.5%	741	130	34.4%
	Wd	218	21	18	12.9	2,381	289	23.8%	777	116	29.2%
	Total	435	30	26	17.3	4,289	363	16.6%	1,518	174	22.5%
Oct.	We	241	9	8	15.2	511	114	43.7%	707	100	27.6%
	Wd	184	22	18	6.2	426	75	34.4%	624	78	24.6%
	Total	425	31	26	9.7	937	136	28.5%	1,331	127	18.7%
Total	We	784	37	34	22.6	9,601	611	12.5%	2,537	248	19.2%
	Wd	866	86	67	11.6	14,459	995	13.5%	3,361	269	15.7%
	Total	1,650	123	101	15.3	24,060	1,168	9.5%	5,898	366	12.2%

- ¹ Weekend/Holiday (We) or Weekday (Wd).
- ² Number of anglers interviewed.
- ³ Number of possible interview days.
- ⁴ Number of interview days sampled.
- ⁵ Relative Precision.

Table 3. Catch (CPUE) and harvest (HPUE) rates (fish per hour), by month, for Dolly Varden char during the sport fishery on the Anchor River, July through October, 1987.

Month Fishery	Effort (hrs) ¹		Catch				Harvest				
	Mean	SE ²	Mean	SE	CPUE	SE	Mean	SE	HPUE	SE	
July											
Weekend	2.88	0.2458	1.712	0.3123	0.5957	0.1093	0.650	0.1234	0.2261	0.0444	
Weekday	3.10	0.3816	3.728	0.0093	0.0080	0.2509	0.938	0.2741	0.3022	0.0731	
Total	2.99	0.2581	2.727	0.5219	0.9117	0.1622	0.795	0.1373	0.2658	0.0480	
August											
Weekend	3.38	0.1938	0.279	0.1128	0.0825	0.0337	0.104	0.0872	0.0310	0.0257	
Weekday	3.03	0.1303	0.386	0.1369	0.1275	0.0444	0.124	0.3000	0.0410	0.0119	
Total	3.17	0.1604	0.342	0.1125	0.1079	0.0352	0.116	0.0735	0.0366	0.0231	
September											
Weekend	4.73	0.2753	0.690	0.1411	0.1461	0.0275	0.218	0.0734	0.0462	0.0149	
Weekday	4.12	0.2311	0.847	0.2364	0.2055	0.0555	0.032	0.0153	0.0074	0.0368	
Total	4.47	0.2606	0.782	0.1397	0.1749	0.0300	0.117	0.0254	0.0262	0.0055	
October											
Weekend	3.88	0.2353	0.926	0.2161	0.2388	0.0522	0.422	0.1344	0.1089	0.0340	
Weekday	3.69	0.2028	0.812	0.1774	0.2200	0.0462	0.218	0.0832	0.0591	0.0228	
Total	3.75	0.1935	0.860	0.1871	0.2290	0.0473	0.317	0.0657	0.0845	0.0173	

¹ Effort in angler-hours.

² Standard Error.

Table 4. Catch (CPUE) and harvest (HPUE) rates (fish per hour), by month for coho salmon during the sport fishery on the Anchor River, July through October, 1987.

Month	Fishery	Effort (hrs) ¹		Catch				Harvest			
		Mean	SE ²	Mean	SE	CPUE	SE	Mean	SE	HPUE	SE
July											
	Weekend	2.88	0.2457	0.000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.0000
	Weekday	3.10	0.3816	0.025	0.0093	0.0080	0.0028	0.025	0.0093	0.0080	0.0028
	Total	2.99	0.2581	0.012	0.0055	0.0042	0.0018	0.012	0.0055	0.0042	0.0018
August											
	Weekend	3.38	0.1938	0.572	0.1097	0.1695	0.0338	0.408	0.0692	0.1209	0.0223
	Weekday	3.03	0.1303	0.510	0.0662	0.1684	0.0226	0.403	0.0505	0.1331	0.0173
	Total	3.17	0.1604	0.536	0.0525	0.1689	0.0183	0.405	0.0394	0.1278	0.0141
September											
	Weekend	4.73	0.2753	0.176	0.0558	0.0373	0.0175	0.063	0.0150	0.0134	0.0033
	Weekday	4.12	0.2311	0.258	0.0560	0.0625	0.0142	0.411	0.0786	0.0998	0.0201
	Total	4.47	0.2606	0.309	0.0649	0.0692	0.0150	0.176	0.0462	0.0393	0.0106
October											
	Weekend	3.88	0.2353	0.000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.0000
	Weekday	3.69	0.2028	0.008	0.0030	0.0020	0.0008	0.008	0.0030	0.0020	0.0008
	Total	3.75	0.1935	0.004	0.0020	0.0010	0.0005	0.004	0.0020	0.0010	0.0005

¹ Effort in angler-hours.

² Standard Error.

Table 5. Catch (CPUE) and harvest (HPUE) rates (fish per hour) and month for steelhead/rainbow trout during the sport fishery on the Anchor River, July through October, 1987.

Month Fishery	Effort (hrs) ¹		Catch				Harvest			
	Mean	SE ²	Mean	SE	CPUE	SE	Mean	SE	HPUE	SE
July										
Weekend	2.88	0.2458	0.013	0.1235	0.0043	0.0043	0.000	0.0000	0.0000	0.0000
Weekday	3.10	0.3816	0.025	0.0719	0.0080	0.0232	0.000	0.0000	0.0000	0.0000
Total	2.99	0.2581	0.019	0.0438	0.0062	0.0147	0.000	0.0000	0.0000	0.0000
August										
Weekend	3.38	0.1938	0.050	0.0161	0.0147	0.0048	0.010	0.0052	0.0029	0.0015
Weekday	3.03	0.1303	0.034	0.0332	0.0114	0.0110	0.014	0.0099	0.0046	0.0033
Total	3.17	0.1604	0.041	0.0203	0.0128	0.0064	0.012	0.0076	0.0039	0.0024
September										
Weekend	4.73	0.2753	0.282	0.0605	0.0596	0.0117	0.092	0.0281	0.0194	0.0057
Weekday	4.12	0.2311	0.258	0.0711	0.0625	0.0170	0.025	0.0112	0.0060	0.0027
Total	4.47	0.2606	0.293	0.0806	0.0656	0.0172	0.055	0.0117	0.0124	0.0025
October										
Weekend	3.88	0.2353	0.252	0.0780	0.0649	0.0192	0.081	0.0260	0.0210	0.0066
Weekday	3.69	0.2028	0.368	0.0645	0.0998	0.0170	0.083	0.0230	0.0224	0.0062
Total	3.75	0.1935	0.306	0.0699	0.0816	0.0179	0.081	0.0241	0.0216	0.0063

1 Effort in angler-hours.

2 Standard Error.

Table 6. Estimated catch and harvest, by species, for the sport fishery on the Anchor River, July through October, 1987.

Month	Fishery	We/ Wd ¹	Dolly Varden Char				Coho Salmon				Steelhead/Rainbow Trout			
			Catch	SE ²	Harvest	SE	Catch	SE	Harvest	SE	Catch	SE	Harvest	SE
July														
Below Weir	We		1,152	267.9	437	106.2	0	0.0	0	0.0	8	8.4	0	0.0
	Wd		3,217	755.0	810	213.8	21	7.8	21	7.8	21	61.9	0	0.0
Above Weir	We		315	99.4	120	38.6	0	0.0	0	0.0	2	2.3	0	0.0
	Wd		1,454	386.2	366	106.7	10	3.7	10	3.7	10	27.8	0	0.0
Total			6,138	894.9	1,733	264.3	31	8.7	31	8.7	41	68.4	0	0.0
August														
Below Weir	We		433	180.8	163	134.9	890	194.8	634	130.4	77	25.9	15	8.2
	Wd		1,144	413.0	368	112.7	1,511	252.4	1,194	195.8	102	98.3	41	29.6
Above Weir	We		46	21.1	17	14.5	95	28.1	68	19.4	8	3.2	2	0.9
	Wd		95	35.7	31	9.9	126	24.8	100	19.4	9	8.2	3	2.5
Total			1,718	452.7	579	176.7	2,622	321.0	1,996	236.9	196	102.0	61	30.8
September														
Below Weir	We		279	61.2	88	30.0	71	23.7	26	6.8	114	25.8	37	11.6
	Wd		489	144.1	18	9.0	238	55.5	149	38.0	149	44.0	14	6.5
Above Weir	We		108	27.6	34	12.4	28	9.9	10	2.9	44	11.5	14	4.9
	Wd		160	48.9	6	3.0	78	19.3	49	13.1	49	14.9	5	2.2
Total			1,036	166.3	146	33.8	415	64.1	234	40.9	356	54.3	70	14.4
October														
Below Weir	We		122	37.6	56	21.0	0	0.0	0	0.0	33	12.1	11	4.1
	Wd		94	25.4	25	10.3	1	0.4	1	0.4	43	10.3	10	3.1
Above Weir	We		169	43.6	77	26.2	0	0.0	0	0.0	46	14.9	15	5.1
	Wd		137	33.3	37	14.6	1	0.5	1	0.5	62	13.1	14	4.2
Total			522	71.3	195	38.0	2	0.6	2	0.6	184	25.4	50	8.3

-Continued-

Table 6. Estimated catch and harvest, by species, for the sport fishery on the Anchor River, July through October, 1987 (continued).

Month	Fishery	We/ Wd ¹	Dolly Varden Char				Coho Salmon				Steelhead/Rainbow Trout			
			Catch	SE ²	Harvest	SE	Catch	SE	Harvest	SE	Catch	SE	Harvest	SE
Season Total														
	Below Weir	We	1,986	331.1	744	175.5	961	196.2	660	130.6	232	39.4	63	14.8
		Wd	4,944	872.9	1,221	242.0	1,771	258.6	1,365	199.6	315	124.6	65	30.5
	Above Weir	We	638	114.0	248	50.4	123	29.8	78	19.6	100	19.3	31	7.1
		Wd	1,846	392.3	440	108.1	215	31.7	160	23.7	130	35.1	22	5.3
	Total		9,414	1,019.6	2,653	321.9	3,070	327.5	2,263	240.5	777	136.7	181	35.0

¹ Weekend/holiday (We) or Weekday (Wd).

² Standard Error.

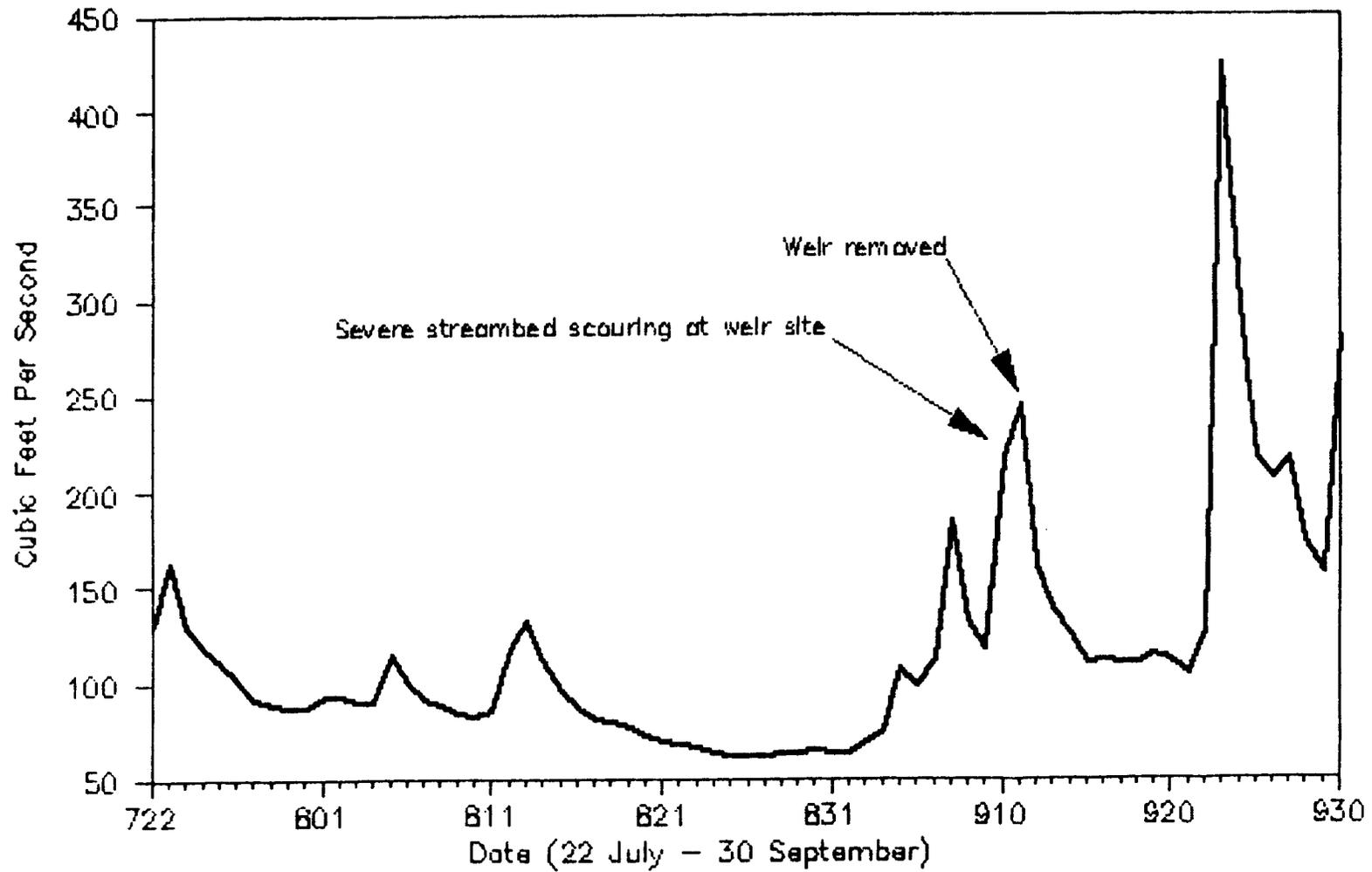


Figure 2. Mean daily water discharge of the Anchor River, South Fork, in cubic feet per second (CFS) as measured by USGS, 1987.

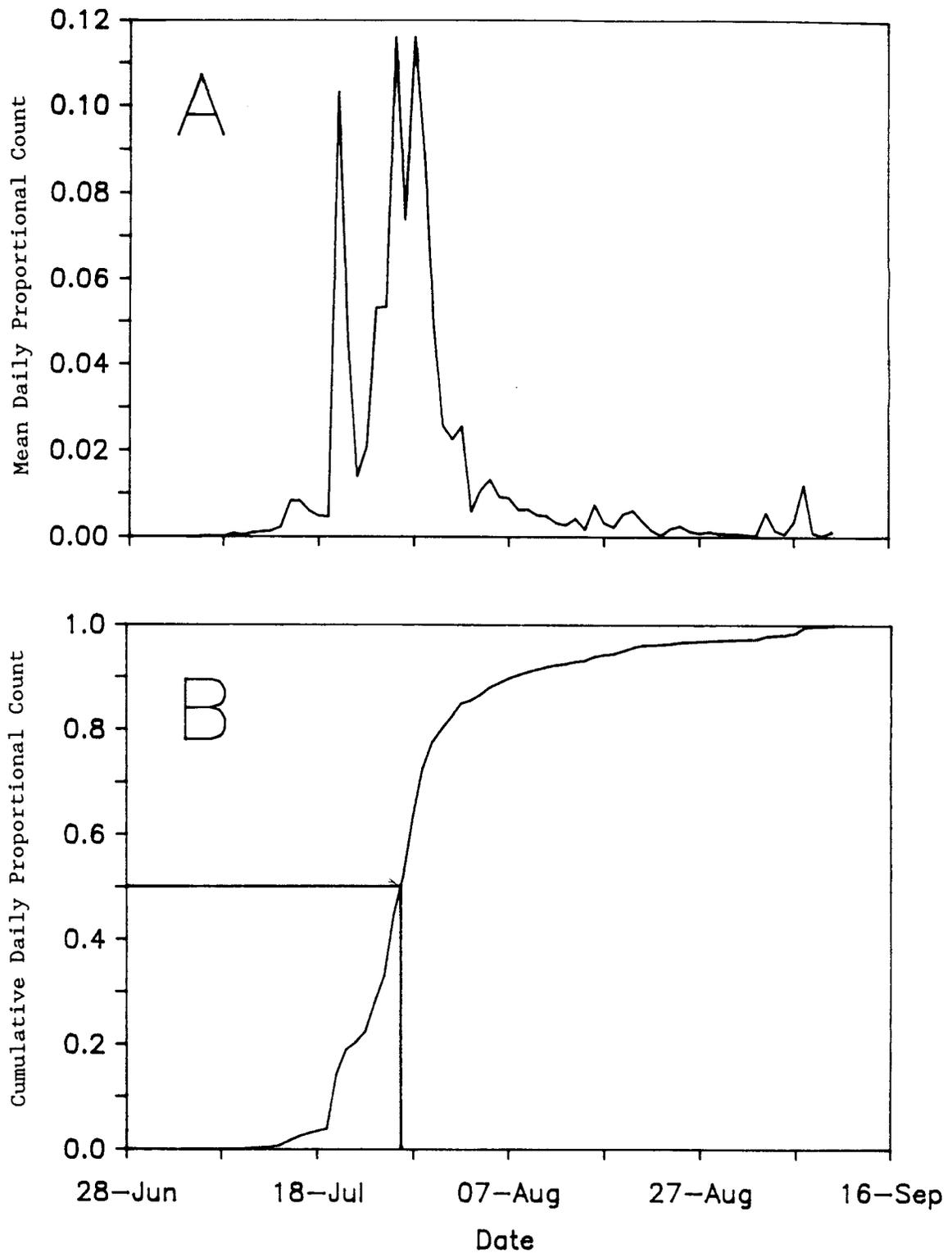


Figure 3. Mean (A) and cumulative (B) daily proportional weir counts of Dolly Varden char passed upstream through the Anchor River weir, 1987.

Some interchange of Dolly Varden char between systems was documented. Of the fish tagged on the Anchor River, one fish was recovered in the Ninilchik River. Of the fish tagged in Deep Creek and the Ninilchik River, two fish from each system were recovered in the Anchor River.

Biological Data

Dolly Varden char, coho salmon, and steelhead/rainbow trout were sampled for age, sex, and length information.

Dolly Varden char:

Dolly Varden char mortalities from the weir and the sport fishery ranged in age from 2 to 10 years. Since the mortalities from the sport harvest had significantly fewer younger fish and more older fish than the mortalities sampled at the weir site ($\alpha=0.05$), the age composition from the these two sources were estimated separately (Table 7). Age 5 fish were most common in the sport harvest while age 4 fish were most common in the weir mortalities. Sex composition of Dolly Varden char remained nearly equal through age 4. Mean length-at-age was estimated by pooling data from both sources (Table 8). The mean length of immigrating Dolly Varden char decreased from July through mid-August (Figure 4).

Coho Salmon:

Most of the sampled male and female coho salmon were age 2.1 (Table 9). Mean length of age 2.1 male and female coho salmon was approximately 600 mm (Table 10).

Steelhead/Rainbow Trout:

The age of sampled steelhead/rainbow trout was primarily 3.2 for both males and females (Table 11). Mean length-at-age of sampled male and female age 3.2 steelhead/rainbow trout was approximately 665 mm (Table 10).

RECOMMENDATIONS AND CONCLUSIONS

Creel Survey

Harvest of Dolly Varden char during the period 1979 through 1986 has averaged 11,558, ranging from 21,364 in 1979 to 3,914 in 1986. The estimated total harvest of Dolly Varden char on the Anchor River during 1987 was 2,653 fish. Given the immigration of 19,062 Dolly Varden char and the estimated harvest of 1,965 Dolly Varden char below the weir, we estimate that 20,766 Dolly Varden char entered the Anchor River in 1987. This results in an exploitation rate for Dolly Varden char in the Anchor River sport fishery of approximately 13%².

² Calculated as $(2,653)/(19,062+1,965)$ assuming that the fish harvested below the weir were immigrating to the river.

Table 7. Age and sex compositions of Dolly Varden char mortalities collected at the weir site and in the sport harvest on the Anchor River during 1987.

component	Age Group									Total
	2	3	4	5	6	7	8	9	10	
<u>Sport Harvest</u>										
Male										
Percent	0.0	2.0	6.9	13.7	8.8	4.9	2.9	0.0	0.0	39.2
Sample Size	0	2	7	14	9	5	3	0	0	40
Female										
Percent	0.0	0.0	8.8	24.5	18.6	5.9	2.9	0.0	0.0	60.7
Sample Size	0	0	9	25	19	6	3	0	0	62
Sexes Combined										
Percent	0.0	2.0	15.7	38.2	27.4	10.8	5.8	0.0	0.0	99.9
Sample Size	0	2	16	39	28	11	6	0	0	102
<u>Mortalities</u>										
Male										
Percent	0.6	5.9	21.2	10.0	3.5	0.9	0.3	0.3	0.3	43.0
Sample Size	2	20	72	34	12	3	1	1	1	146
Female										
Percent	0.6	7.6	19.7	19.1	5.3	4.1	0.6	0.0	0.0	57.0
Sample Size	2	26	67	65	18	14	2	0	0	194
Sexes Combined										
Percent	1.2	13.5	40.9	29.1	8.8	5.0	0.9	0.3	0.3	100.0
Sample Size	4	46	139	99	30	17	3	1	1	340

Table 8. Mean length (mm), by age group, of Dolly Varden char mortalities collected from the sport harvest and at the weir in the Anchor River during 1987.

Component	Age Group								
	2	3	4	5	6	7	8	9	10
Sport Harvest									
Mean Length		256	306	371	399	421	472		
Standard Error		55.2	33.4	39.8	53.8	54.3	78.9		
Sample Size	0	2	16	39	28	11	6	0	0
Mortalities									
Mean Length	224	236	252	334	370	377	448	369	515
Standard Error	26.3	17.0	35.0	62.2	75.3	55.5	60.6		
Sample Size	4	49	144	101	31	17	3	1	1

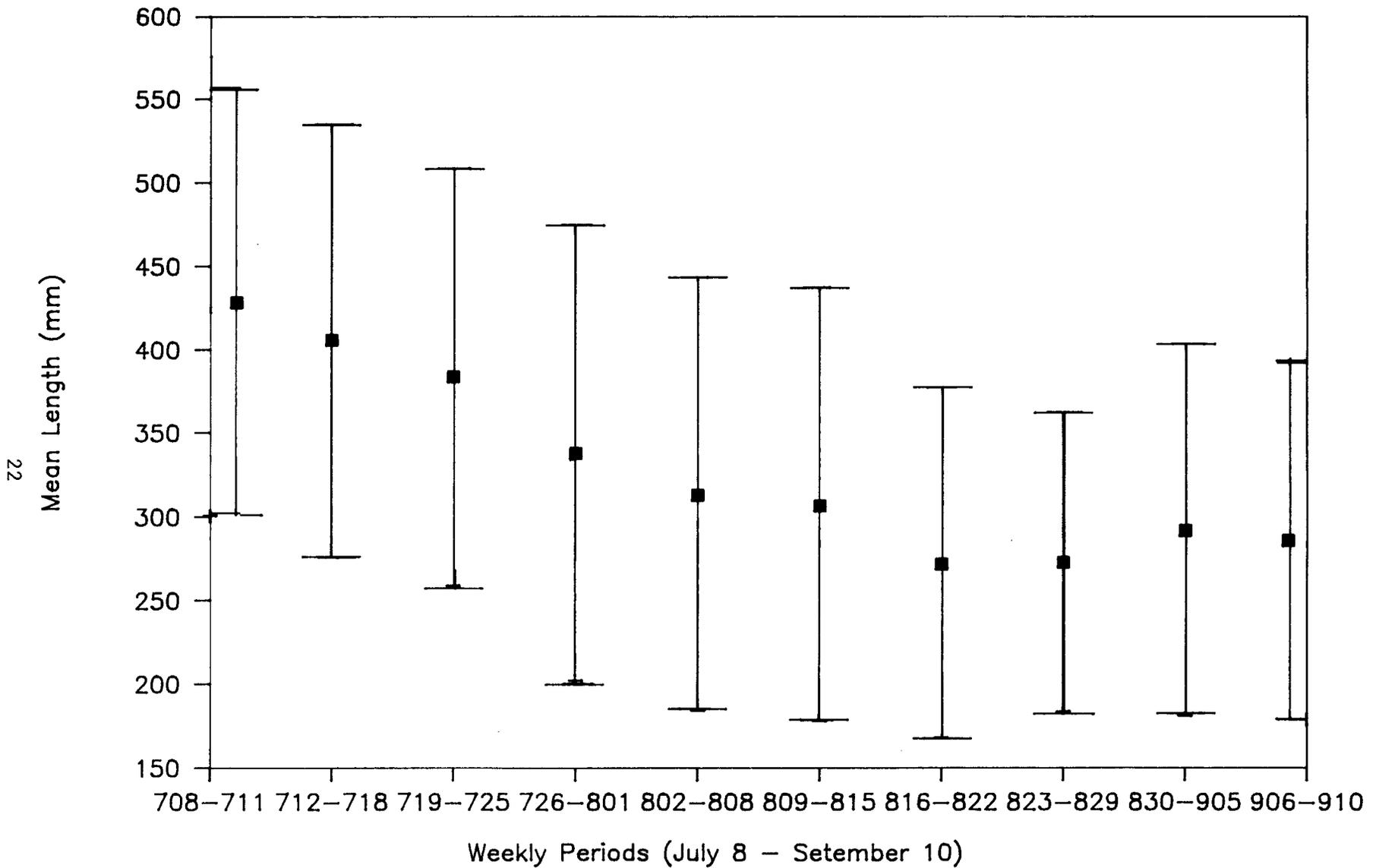


Figure 4. Mean length showing 95% confidence intervals of Dolly Varden char passed through the Anchor River weir, 1987.

Table 9. Age and sex compositions of coho salmon mortalities collected from the sport harvest and at the weir on the Anchor River during 1987.

Component	Age Group				Total
	1.1	2.1	2.2	3.1	
Males					
Percent	16.7	44.3	0.0	1.4	62.4
Number	23	61	0	2	86
Females					
Percent	10.1	27.5	0.0	0.0	37.6
Number	14	38	0	0	52
Sexes Combined					
Percent	26.8	71.7	0.0	1.4	100.0
Number	37	99	0	2	138

Table 10. Mean length (mm) by age group of coho salmon and steelhead/rainbow trout mortalities collected in the sport harvest and at the weir site in the Anchor River during 1987.

COHO SALMON:

Component	Statistic	Age Group		
		1.1	2.1	3.1
Male				
	Mean Length	583.9	600.7	570.0
	Standard Error	41.0	42.4	14.1
	Sample Size	23	61	2
Female				
	Mean Length	596.4	603.9	570.0
	Standard Error	28.3	30.4	14.1
	Sample Size	14	38	2

STEELHEAD/RAINBOW TROUT:

Component	Statistic	Age Group				
		2.1	2.2	3.1	3.2	3.2S1 ¹
Male						
	Mean Length	480.0	700.0	705.0	665.8	705.0
	Standard Error			35.0	51.8	49.5
	Sample Size	1	1	2	6	2
Female						
	Mean Length	630.0	622.0	787.5	664.1	787.5
	Standard Error	56.6	49.6	2.5	33.8	3.5
	Sample Size	2	5	2	16	2

¹ Represents the diadromous growth of 3 years freshwater and 2 years saltwater with one spawning check.

Table 11. Age and sex compositions of steelhead/rainbow trout mortalities collected from the sport harvest and at the weir on the Anchor River during 1987.

Component	Age Group					Total
	2.1	2.2	3.1	3.2	3.2S1 ¹	
Males						
Percent	2.6	2.6	5.1	15.4	5.1	30.8
Number	1	1	2	6	2	12
Females						
Percent	5.1	12.8	5.1	41.1	5.1	69.2
Number	2	5	2	16	2	27
Sexes Combined						
Percent	7.7	15.4	10.2	56.4	10.2	100.0
Number	3	6	4	22	4	39

¹ Represents the diadromous growth of 3 years freshwater and 2 years saltwater with one spawning check.

Fishing effort, although mainly concentrated from saltwater upstream for 3 km, does occur during late July and early August along a few highway access locations further upstream (Nelson et al. 1987). To account for this, the survey will be expanded during 1988 to include the lower reaches of the South Fork of the Anchor River.

Anchor River Weir

Abundance of Dolly Varden char in the Anchor River during 1987 (21,000) is greater than historic levels described by Allin in 1954 (7,000) and in 1957 (11,500).

Greater proportions of Dolly Varden char were tagged in the Anchor River during periods when few fish were immigrating than during periods when many fish were immigrating. It is anticipated that by switching to tags that can be applied more quickly, more fish can be tagged during periods of high movement. Floy FD-67 anchor tags have been found to be quicker to apply, easier to read and identify, and better retained than FTF-69 fingerling tags (Franzin and McFarlane 1987). The daily tagging rate should be maintained at 25% of the daily passage of Dolly Varden char upstream of the weir. This may require detaining some fish during peak migration periods.

Deep Creek and Ninilchik River

To adequately describe migratory patterns between lower Kenai Peninsula streams, it will be necessary to increase the number of Dolly Varden char tagged on Deep Creek and Ninilchik River. To accomplish this, sampling will be conducted during the anticipated peak immigration period in these streams (July through mid-August). A weir will be installed on Ninilchik River during July, and seine nets deployed in Deep Creek in early August. All Dolly Varden char captured will be tagged with Floy FD-67 anchor tags.

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APPENDIX TABLES

Appendix Table 1. Angler counts, by period, for the sport fishing on the Anchor River from July through October, 1987.

Date	Wd/ ² We	Periods ¹									
		A		B		C		D		E	
		Below Weir	Above Weir	Below Weir	Above Weir	Below Weir	Above Weir	Below Weir	Above Weir	Below Weir	Above Weir
701	Wd	3	2			2	3				
704	We					14	8			11	8
705	We	0	0					4	10		
708	Wd			3	2					9	4
709	Wd					7	6	12	12		
710	Wd			3	4					8	2
711	We			14	2	5	3				
712	We							5	10	9	1
713	Wd			5	5			19	5		
714	Wd	0	0							4	1
715	Wd					6	6	8	10		
718	We	0	0	16	0						
719	We							18	2	11	1
722	Wd					15	1	21	2		
724	Wd	4	0							2	0
725	We	10	0							13	1
726	We							23	2	23	0
727	Wd	0	0			15	2				
731	Wd							16	3	3	0
801	We	23	2	27	4						
802	We					7	0	21	2		
804	Wd			13	5			9	0		
806	Wd	10	0					31	3		
807	Wd			44	6	38	4				
808	We	9	0	28	12						
809	We					37	8	34	4		
810	Wd	6	1			20	7				
812	Wd			18	6			24	5		
813	Wd	43	0					43	1		
815	We			43	8			49	5		
816	We	53	2			43	2				
817	Wd			36	1	23	2				
819	Wd	41	0			54	1				
821	Wd			33	3			39	4		
822	We	32	1					39	7		
823	We			20	1	53	10				
824	Wd					41	2	29	2		
825	Wd	25	1	22	4						
827	Wd	21	0					15	0		
829	We	47	0			32	1				
830	We			25	1			34	0		
831	Wd	8	1			15	0				

-CONTINUED-

Appendix Table 1. Angler counts, by period, for the sport fishing on the Anchor River from July through October, 1987 (continued).

Date	Wd/ ² We	Periods ¹									
		A		B		C		D		E	
		Below Weir	Above Weir	Above Weir	Below Weir						
902	Wd			23	4	14	0				
903	Wd	10	0	23	3						
905	We	25	8	28	0						
906	We	16	0			33	4				
908	Wd	12	1			16	8				
910	Wd			7	3	10	2				
911	Wd	7	0			6	4				
912	We	11	11	12	6						
913	We	14	14			27	13				
914	Wd	6	1			8	2				
915	Wd			7	5	12	3				
918	Wd			14	5	12	7				
919	We	16	8	15	7						
920	We			20	7	20	6				
922	Wd	9	5	16	5						
923	Wd			0	0	0	1				
924	Wd	2	1	4	8						
926	We	4	10	10	10						
927	We			9	8	12	0				
928	Wd	3	3			11	6				
1001	Wd	2	1	1	2						
1002	Wd	3	8	3	7						
1003	We	25	12	6	7						
1004	We	8	8	10	10						
1007	Wd	8	5	1	2						
1008	Wd	6	3	2	2						
1009	Wd	4	0	2	1						
1010	We	8	11	6	8						
1011	We	13	18	8	8						
1012	Wd	9	4	7	4						
1013	Wd	5	5	7	3						
1016	Wd	3	6	4	1						
1017	We	10	20	8	18						
1018	We	1	7	2	0						
1019	We	1	3	0	0						
1021	Wd	2	0	3	0						
1023	Wd	3	0	1	0						
1024	We	5	9	1	4						
1025	We	1	9	4	5						
1026	Wd	1	0	3	0						
1027	Wd	5	3	3	3						
1028	Wd	6	5	8	4						
1029	Wd	0	0	2	2						

¹ Period: A=0800-1159 hrs., B=1200-1559 hrs., C=1600-1959 hrs.

² Weekday (Wd) or Weekend/Holiday (We).

Appendix Table 2. Comparison (Y=significant difference) of mean angler counts between periods for lower Kenai Peninsula sport fisheries, 1987.

July					August					September					October				
PPC ¹	BWe ²	BWd ³	AWe ⁴	AWd ⁵	PPC	BWe	BWd	AWe	AWd	PPC	BWe	BWd	AWe	AWd	PPC	BWe	BWd	AWe	AWd
AB	Y	Y		Y	AB			Y	Y	AB		Y	Y	Y	AB	Y	Y	Y	Y
AC		Y	Y	Y	AC			Y	Y	AC	Y	Y		Y					
AD	Y	Y	Y	Y	AD			Y	Y	BC	Y	Y		Y					
AE	Y	Y	Y	Y	BC	Y			Y										
BC		Y	Y		BD	Y			Y										
BD		Y	Y	Y	CD		Y		Y										
BE		Y		Y															
CD		Y		Y															
CE		Y		Y															
DE		Y	Y	Y															

- 1 Possible Period Combinations.
- 2 Below weir Weekend.
- 3 Below weir Weekday.
- 4 Above weir Weekend.
- 5 Above weir Weekday.

Appendix Table 3. Daily summary statistics for fishing effort and harvest of Dolly Varden char, coho salmon, and steelhead/rainbow trout for the sport fishing on the Anchor River, July through October, 1987.

Date	Wd/ We ¹	Effort (hrs)			Dolly Varden Harvest			Coho Salmon Harvest			Steelhead/Rainbow Harvest		
		SS ²	Mean	SE ³	Mean	SE	HPUE ⁴	Mean	SE	HPUE	Mean	SE	HPUE
703	We	6	4.4	1.34	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
704	We	6	3.0	0.73	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
705	We	3	1.8	0.17	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
707	Wd	2	2.8	0.75	1.50	1.500	0.545	0.00	0.000	0.000	0.00	0.000	0.000
708	Wd	9	3.5	0.77	0.11	0.111	0.032	0.00	0.000	0.000	0.00	0.000	0.000
709	Wd	7	1.9	0.09	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
710	Wd	4	3.1	1.48	0.25	0.250	0.080	0.00	0.000	0.000	0.00	0.000	0.000
711	We	7	1.6	0.18	0.29	0.286	0.174	0.00	0.000	0.000	0.00	0.000	0.000
712	We	9	1.6	0.44	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
713	Wd	2	2.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
714	Wd	11	2.7	0.38	0.09	0.091	0.033	0.00	0.000	0.000	0.00	0.000	0.000
715	Wd	6	1.9	0.45	0.17	0.167	0.087	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	2	5.0	3.00	0.50	0.500	0.100	0.00	0.000	0.000	0.00	0.000	0.000
718	We	7	4.8	1.35	2.00	0.787	0.418	0.00	0.000	0.000	0.00	0.000	0.000
719	We	8	1.9	0.36	0.63	0.498	0.323	0.00	0.000	0.000	0.00	0.000	0.000
722	Wd	5	2.2	0.73	3.40	0.600	1.545	0.00	0.000	0.000	0.00	0.000	0.000
723	Wd	2	4.0	2.00	2.00	1.000	0.500	0.00	0.000	0.000	0.00	0.000	0.000
724	Wd	16	4.2	0.66	2.19	0.534	0.526	0.13	0.125	0.030	0.00	0.000	0.000
725	We	17	3.6	0.42	1.29	0.418	0.364	0.00	0.000	0.000	0.00	0.000	0.000
726	We	17	2.6	0.40	0.53	0.333	0.202	0.00	0.000	0.000	0.00	0.000	0.000
727	Wd	5	3.4	1.18	1.60	0.812	0.471	0.00	0.000	0.000	0.00	0.000	0.000
730	Wd	2	7.0	3.00	0.50	0.500	0.071	0.00	0.000	0.000	0.00	0.000	0.000
731	Wd	8	2.1	0.28	0.38	0.263	0.176	0.00	0.000	0.000	0.00	0.000	0.000

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Appendix Table 3. Daily summary statistics for fishing effort and harvest of Dolly Varden char, coho salmon, and steelhead/rainbow trout for the sport fishing on the Anchor River, July through October, 1987 (continued).

Date	Wd/ We ¹	Effort (hrs)			Dolly Varden Harvest			Coho Salmon Harvest			Steelhead/Rainbow Harvest		
		SS ²	Mean	SE ³	Mean	SE	HPUE ⁴	Mean	SE	HPUE	Mean	SE	HPUE
801	We	4	6.6	1.18	1.00	1.000	0.151	0.00	0.000	0.000	0.00	0.000	0.000
802	We	6	4.3	0.80	1.67	1.054	0.385	0.17	0.167	0.038	0.00	0.000	0.000
804	Wd	8	2.1	0.43	0.75	0.250	0.353	0.00	0.000	0.000	0.00	0.000	0.000
806	Wd	32	3.3	0.44	0.13	0.098	0.038	0.38	0.117	0.115	0.00	0.000	0.000
807	Wd	20	3.7	0.42	0.50	0.344	0.136	0.45	0.185	0.122	0.05	0.050	0.014
808	We	21	2.5	0.25	0.19	0.131	0.078	0.43	0.130	0.175	0.00	0.000	0.000
809	We	7	2.6	0.58	0.00	0.000	0.000	0.43	0.202	0.162	0.14	0.143	0.054
810	Wd	39	2.4	0.16	0.00	0.000	0.000	0.79	0.173	0.325	0.00	0.000	0.000
812	Wd	26	4.2	0.34	0.23	0.115	0.055	0.58	0.177	0.137	0.00	0.000	0.000
813	Wd	32	2.3	0.16	0.00	0.000	0.000	0.34	0.139	0.153	0.00	0.000	0.000
815	We	25	4.1	0.43	0.00	0.000	0.000	0.28	0.123	0.069	0.00	0.000	0.000
816	We	31	2.3	0.19	0.10	0.071	0.042	0.35	0.143	0.153	0.00	0.000	0.000
817	Wd	14	4.9	0.70	0.00	0.000	0.000	0.21	0.155	0.044	0.00	0.000	0.000
819	Wd	27	2.4	0.28	0.00	0.000	0.000	0.67	0.151	0.279	0.00	0.000	0.000
821	Wd	22	2.6	0.32	0.23	0.227	0.088	0.14	0.075	0.053	0.00	0.000	0.000
822	We	17	4.4	0.85	0.00	0.000	0.000	0.41	0.211	0.093	0.00	0.000	0.000
823	We	30	3.7	0.48	0.00	0.000	0.000	0.47	0.133	0.126	0.00	0.000	0.000
824	Wd	20	4.0	0.53	0.25	0.160	0.063	0.05	0.050	0.013	0.00	0.000	0.000
825	Wd	26	2.4	0.29	0.00	0.000	0.000	0.38	0.137	0.157	0.04	0.038	0.016
827	Wd	28	2.8	0.28	0.00	0.000	0.000	0.21	0.079	0.076	0.00	0.000	0.000
829	We	37	3.5	0.36	0.00	0.000	0.000	0.43	0.153	0.125	0.05	0.038	0.016
830	We	5	3.7	1.61	0.00	0.000	0.000	1.00	0.447	0.270	0.00	0.000	0.000
831	Wd	14	3.2	0.65	0.00	0.000	0.000	0.50	0.139	0.157	0.07	0.071	0.022

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Appendix Table 3. Daily summary statistics for fishing effort and harvest of Dolly Varden char, coho salmon, and steelhead/rainbow trout for the sport fishing on the Anchor River, July through October, 1987 (continued).

Date	Wd/ We ¹	Effort (hrs)			Dolly Varden Harvest			Coho Salmon Harvest			Steelhead/Rainbow Harvest		
		SS ²	Mean	SE ³	Mean	SE	HPUE ⁴	Mean	SE	HPUE	Mean	SE	HPUE
902	Wd	16	3.3	0.35	0.00	0.000	0.000	0.50	0.224	0.150	0.00	0.000	0.000
903	Wd	19	2.9	0.48	0.00	0.000	0.000	0.89	0.252	0.312	0.00	0.000	0.000
905	We	18	2.8	0.29	0.00	0.000	0.000	0.72	0.240	0.257	0.11	0.076	0.040
906	We	26	3.5	0.42	0.00	0.000	0.000	0.00	0.000	0.000	0.12	0.064	0.033
908	Wd	26	5.1	0.75	0.23	0.139	0.045	0.08	0.053	0.015	0.15	0.072	0.030
910	Wd	13	3.2	0.91	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.077	0.024
911	Wd	12	3.7	0.84	0.00	0.000	0.000	0.17	0.112	0.045	0.00	0.000	0.000
912	We	2	4.0	2.00	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
913	We	26	5.2	0.62	0.27	0.131	0.052	0.12	0.085	0.022	0.08	0.053	0.015
914	Wd	20	5.7	0.81	0.50	0.185	0.088	0.10	0.069	0.018	0.20	0.092	0.035
915	Wd	14	5.6	0.72	0.00	0.000	0.000	0.14	0.097	0.026	0.00	0.000	0.000
918	Wd	4	6.1	0.97	0.00	0.000	0.000	0.75	0.479	0.122	0.00	0.000	0.000
919	We	14	4.8	0.53	0.29	0.286	0.060	0.14	0.097	0.030	0.00	0.000	0.000
920	We	27	4.4	0.60	0.15	0.116	0.034	0.00	0.000	0.000	0.00	0.000	0.000
922	Wd	7	7.2	0.79	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
923	Wd	9	1.9	0.59	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
924	Wd	5	1.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
926	We	11	7.3	1.08	0.00	0.000	0.000	0.00	0.000	0.000	0.09	0.091	0.013
927	We	28	5.7	0.64	0.18	0.090	0.031	0.00	0.000	0.000	0.00	0.000	0.000
928	Wd	10	5.0	0.89	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

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Appendix Table 3. Daily summary statistics for fishing effort and harvest of Dolly Varden char, coho salmon, and steelhead/rainbow trout for the sport fishing on the Anchor River, July through October, 1987 (continued).

Date	Wd/ We ¹	Effort (hrs)			Dolly Varden Harvest			Coho Salmon Harvest			Steelhead/Rainbow Harvest		
		SS ²	Mean	SE ³	Mean	SE	HPUE ⁴	Mean	SE	HPUE	Mean	SE	HPUE
1001	Wd	12	2.2	0.41	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.083	0.038
1002	Wd	5	7.4	1.66	0.00	0.000	0.000	0.00	0.000	0.000	0.40	0.245	0.054
1003	We	11	4.5	0.78	0.55	0.390	0.120	0.00	0.000	0.000	0.00	0.000	0.000
1004	We	29	4.5	0.54	0.24	0.146	0.054	0.00	0.000	0.000	0.21	0.077	0.046
1007	Wd	22	4.3	0.44	0.23	0.185	0.053	0.05	0.045	0.011	0.00	0.000	0.000
1008	Wd	5	3.9	1.02	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
1009	Wd	9	3.4	0.80	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
1010	We	15	2.4	0.24	0.00	0.000	0.000	0.00	0.000	0.000	0.07	0.067	0.027
1011	We	41	3.6	0.34	0.68	0.183	0.190	0.00	0.000	0.000	0.00	0.000	0.000
1012	Wd	9	3.7	0.56	0.44	0.294	0.119	0.00	0.000	0.000	0.00	0.000	0.000
1013	Wd	4	3.6	1.38	0.25	0.250	0.069	0.00	0.000	0.000	0.00	0.000	0.000
1016	Wd	11	4.8	0.50	0.18	0.182	0.038	0.00	0.000	0.000	0.18	0.122	0.038
1017	We	25	5.3	0.44	0.20	0.115	0.038	0.00	0.000	0.000	0.12	0.066	0.023
1018	We	12	2.8	0.62	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.083	0.030
1019	Wd	8	1.6	0.18	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
1021	Wd	7	3.4	0.66	1.14	0.769	0.340	0.00	0.000	0.000	0.00	0.000	0.000
1023	Wd	6	3.8	0.75	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
1024	We	4	5.0	0.58	1.00	0.707	0.200	0.00	0.000	0.000	0.25	0.250	0.050
1025	We	12	3.4	0.60	0.75	0.509	0.220	0.00	0.000	0.000	0.00	0.000	0.000
1026	Wd	6	2.4	0.37	0.67	0.494	0.276	0.00	0.000	0.000	0.17	0.167	0.069
1027	Wd	8	3.4	0.62	0.25	0.164	0.074	0.00	0.000	0.000	0.13	0.125	0.037
1028	Wd	6	2.1	0.61	0.00	0.000	0.000	0.00	0.000	0.000	0.50	0.224	0.240
1029	Wd	4	1.1	0.13	0.25	0.250	0.222	0.00	0.000	0.000	0.00	0.000	0.000

¹ Weekday (Wd) or Weekend/Holiday (We).

² Sample Size, number of anglers interviewed.

³ Standard Error

⁴ Harvest Per Unit Effort.

Appendix Table 4. Number of fish, by species and date, passed upstream through the Anchor River weir during 1987. Also included is the number of Dolly Varden char tagged during 1987.

Date	Number Dolly V. Tagged	Species ¹						
		DV	SS	PS	KS	RS	CS	SH
04-Jul				1	13			
05-Jul		1		1	2			
06-Jul		5		10	9			
07-Jul		3		4	19			
08-Jul	1	2		1	7			
09-Jul	5	17		15	10			
10-Jul	7	8		5	19			
11-Jul	17	20		7	6	1		1
12-Jul	23	26		10	3			
13-Jul	26	29		2	5	2		2
14-Jul	19	45		4	4			
15-Jul	101	163		28	8	1		
16-Jul	144	161		13	8			
17-Jul	102	116		12	8			1
18-Jul	87	92		21	10			2
19-Jul	86	88		16	2			
20-Jul	90	1,970		74	1	2		
21-Jul	51	882	2	108				
22-Jul	115	265		51	1			
23-Jul	57	401		35	2	1		
24-Jul	72	1,017		8	1			
25-Jul	150	1,021	1	26	1	1		
26-Jul	90	2,210		141	1			
27-Jul	83	1,403		72	3	1		
28-Jul	60	2,213	4	146	3			
29-Jul	140	1,701		131	14	1		
30-Jul	75	936		48	1	1		
31-Jul	90	489	1	22	1	1		
01-Aug	100	429		42	2	2		
02-Aug	90	488	1	46	2			1
03-Aug	93	110		71	3			
04-Aug	110	208	14	38	2	3		
05-Aug	100	253	7	38	2	2		
06-Aug	100	175	10	23	1			
07-Aug	105	171	7	40	3			2

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Appendix Table 4. Number of fish, by species and date, passed upstream through the Anchor River weir during 1987. Also included is the number of Dolly Varden char tagged during 1987 (continued).

Date	Number Dolly V. Tagged	Species ¹						
		DV	SS	PS	KS	RS	CS	SH
08-Aug	99	119	4	18	5	2		1
09-Aug	67	122	23	33	11			
10-Aug	67	95	32	20	1	1		
11-Aug	60	90	20	13	1	2		
12-Aug	36	62	128	26		3	2	
13-Aug	36	53	30	20				
14-Aug	41	82	18	18	1			
15-Aug	27	33	16	14		1		
16-Aug		144	64	25	1			1
17-Aug	50	62	26	22	1	1		
18-Aug	29	44	19	20				
19-Aug	21	103	33	16				
20-Aug	20	118	60	16				1
21-Aug	30	73	33	16	3			1
22-Aug	33	30	18	20			1	2
23-Aug	1	6	25	35				2
24-Aug	22	38	83	23				2
25-Aug	22	50	55	20		1		4
26-Aug	14	25	33	23				1
27-Aug	5	15	8	17		1		
28-Aug	16	24	13	36			1	
29-Aug	8	14	20	18			1	
30-Aug	4	11	36	60		1		6
31-Aug	6	11	53	15				2
01-Sep	2	7	16					
02-Sep		7	36	57			4	4
03-Sep	12	109	410	73				19
04-Sep	22	30	120	28				7
05-Sep	6	13	27	13			2	3
06-Sep	26	70	658	47				40
07-Sep	24	234	228	7				23
08-Sep	7	18	2	1		1		1
09-Sep		5	8	1				10
10-Sep		27	7	3			1	6
Totals:	3,208	19,062	2,409	2,084	204	33	19	136

¹ Species: DV=Dolly Varden char SS=coho salmon
PS=pink salmon KS=chinook salmon
RS=sockeye salmon CS=chum salmon
SH=steelhead/rainbow trout

Appendix Table 5. Detailed release and recovery information from all Dolly Varden char tags recovered from anglers in 1987.

Anchor Tag Number ¹	Finger Tag Number ²	Date Tagged	Date Recov.	Days Out	Tagging Location ³	Mile Recov.	Miles Traveled ⁴
24		01-Oct	19-Oct	383	AR/BC	4.75	-10.25
70		02-Oct	26-Jul	297	AR/BC	0.90	-14.10
57		02-Oct	28-Jul	299	AR/BC	6.25	-8.75
	1037	12-Jul	26-Oct	106	ARW		
	1143	15-Jul	28-Oct	105	ARW	1.25	0.25
	1148	15-Jul	13-Sep	60	ARW	1.75	0.75
	1178	15-Jul	15-Jul	0	ARW	1.10	0.10
	1191	15-Jul	15-Jul	0	ARW	1.10	0.10
	1341	16-Jul	11-Aug	26	ARW	7.75	6.75
	1347	16-Jul	26-Oct	102	ARW		
	1362	17-Jul	25-Jul	8	ARW	4.75	3.75
	1397	17-Jul	25-Jul	8	ARW	4.75	3.75
	1493	18-Jul	25-Jul	7	ARW	4.75	3.75
	1697	20-Jul	25-Jul	5	ARW	4.75	3.75
	6994	20-Jul	25-Oct	97	DC	1.50AR	-18.00
	1740	21-Jul	10-Aug	20	ARW	6.75	5.75
	1752	21-Jul	24-Jul	3	ARW	1.10	0.10
	1773	21-Jul	12-Aug	22	ARW	0.90	-0.10
	1840	22-Jul	22-Sep	62	ARW	0.90	-0.10
	1851	22-Jul	25-Jul	3	ARW	4.75	3.75
	1912	23-Jul	25-Oct	94	ARW	1.50	0.50
	1999	24-Jul	11-Oct	79	ARW	1.50	0.50
	2027	24-Jul	30-Jul	6	ARW	5.75	4.75
	2061	25-Jul	08-Nov	106	ARW	2.00NR	-20.00
	2131	25-Jul	10-Aug	16	ARW	6.75	5.75
148		27-Jul	03-Aug	7	DC	0.75	-0.25
129		27-Jul	13-Aug	17	DC	1.00ARW	-17.50
	2377	28-Jul	07-Aug	10	ARW		
	2449	29-Jul	23-Aug	25	ARW	1.50	0.50
	2492	29-Jul	05-Aug	7	ARW	1.00	0.00
	2588	30-Jul	01-Aug	2	ARW	0.65	-0.35
	2598	30-Jul	30-Jul	0	ARW	1.10	0.10
	2604	30-Jul	01-Aug	2	ARW	6.25	5.25
	2658	31-Jul	14-Aug	14	ARW	5.75	4.75
	2730	01-Aug	10-Aug	9	ARW	6.75	5.75
	2742	01-Aug	02-Oct	62	ARW	0.75	-0.25
	2814	01-Aug	03-Aug	2	ARW	5.75	4.75
	2831	02-Aug	09-Oct	68	ARW	6.25	5.25
	2841	02-Aug	12-Aug	10	ARW	4.75	3.75
	2855	02-Aug	10-Aug	8	ARW	6.75	5.75
	2875	02-Aug	28-Aug	26	ARW	7.75	6.75
	2892	02-Aug	14-Oct	73	ARW	1.10	0.10

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Appendix Table 5. Detailed release and recovery information from all Dolly Varden char tags recovered from anglers in 1987 (continued).

Anchor Tag Number ¹	Finger. Tag Number ²	Date Tagged	Date Recov.	Days Out	Tagging Location ³	Mile Recov.	Miles Traveled ⁴
	2904	02-Aug	18-Aug	16	ARW	6.25	5.25
	2928	03-Aug	07-Aug	4	ARW	1.75	0.75
	2930	03-Aug	10-Aug	7	ARW	6.75	5.75
	2931	03-Aug	10-Aug	7	ARW	6.75	5.75
	2939	03-Aug	03-Aug	0	ARW	2.00	1.00
	3000	03-Aug	23-Aug	20	ARW	1.50	0.50
	3016	04-Aug	07-Aug	3	ARW	1.75	0.75
	3020	04-Aug	07-Aug	3	ARW	1.75	0.75
	3073	04-Aug	09-Oct	66	ARW	6.25	5.25
	3147	05-Aug	07-Aug	2	ARW	1.75	0.75
	3273	06-Aug	21-Aug	15	ARW	0.90	-0.10
	3347	07-Aug	12-Sep	36	ARW	0.75	-0.25
	3502	08-Aug	14-Aug	6	ARW	5.75	4.75
169	LOST	09-Aug	21-Oct	73	ARW	1.50	0.50
185	3554	09-Aug	12-Aug	3	ARW	5.75	4.75
207	3573	09-Aug	14-Aug	5	ARW	7.75	6.75
LOST	3581	09-Aug	14-Oct	66	ARW	1.10	0.10
218	3585	09-Aug	26-Oct	78	ARW		
371	LOST	11-Aug	26-Aug	15	ARW	1.10	0.10
390	3743	12-Aug	AUGUST		ARW	1.75	0.75
413	3765	13-Aug	15-Aug	2	ARW	4.75	3.75
431	3782	13-Aug	11-Oct	59	ARW	1.50	0.50
481	LOST	15-Aug	31-Aug	16	ARW	9.75	8.75
515	3939	18-Aug	16-Oct	59	ARW	4.75	3.75
	4039	22-Aug	03-Oct	42	ARW	0.75	-0.25
	4125	28-Aug	28-Aug	0	ARW	0.75	-0.25
	4125	28-Aug	27-Sep	30	ARW	0.75	-0.25
	4210	06-Sep	27-Sep	21	ARW	0.90	-0.10
	4210	06-Sep	27-Sep	21	ARW	0.75	-0.25
958		22-Sep	09-Oct	17	NR	1.00AR	-24.50
933		24-Sep	25-Oct	31	NR	1.50AR	-20.00

¹ Floy anchor type tag (FD-67).

² Floy fingerling type tag (FTF-69).

³ Tagging Location: AR/BC = Anchor River (river mile 15) near Beaver Creek.

ARW = Anchor River Weir.

DC = Deep Creek.

NR = Ninilchik River.

⁴ Indicates the shortest water distance between the point of tagging and the point of recovery and is not reflective of actual distance traveled. A negative (-) sign indicates downstream movement from the location of tagging.