FISHERY DATA SERIES NO. 85

ESTIMATES OF EFFORT AND HARVEST FOR SELECTED SPORT FISHERIES FOR CHINOOK SALMON IN NORTHERN COOK INLET, ALASKA, 1988.[1]

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TABLE OF CONTENTS

	Page
LIST OF TABLES	iii
LIST OF FIGURES	vi
LIST OF APPENDIX TABLES	viii
ABSTRACT	1
INTRODUCTION	2
METHODS	4
Creel Surveys	4
Roving Creel Surveys	4
Direct Expansion Creel Surveys	11
Biological Data	17
Escapement Counts	18
Hatchery Contributions	18
RESULTS	19
Remote Streams	19
Deshka River	19
Alexander Creek	23
Lake Creek	30
Clear Creek and Talkeetna River	30
Roadside Streams	39
Willow Creek	39
Sheep Creek	44
Montana Creek	44
Summary	52
Age, Sex, and Length Compositions of Harvested Chinook Salmon	58
Escapement Counts	58
Hatchery Contributions	58
ACKNOWLEDGEMENTS	58
LITERATURE CITED	67

TABLE OF CONTENTS (continued)

	Page
APPENDIX.....	70

LIST OF TABLES

Table		Page
1.	Definitions for the notation used in the equations for the roving creel surveys	8
2.	Definitions for the notation used in the equations for the direct expansion creel surveys	15
3.	Estimated number of angler-hours of effort during each of the weekday and weekend/holiday components of the fishery for chinook salmon in the Deshka River, 1988	20
4.	Estimated harvest and catch rates of chinook salmon during each of the weekday and weekend/holiday components of the fishery for chinook salmon in the Deshka River, 1988	24
5.	Estimated number of chinook salmon harvested and number caught during each of the weekday and weekend/holiday components of the fishery for chinook salmon in the Deshka River, 1988	25
6.	Estimated number of angler-hours of effort during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Alexander Creek, 1988	26
7.	Estimated harvest and catch rates of chinook salmon during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Alexander Creek, 1988	29
8.	Estimated number of chinook salmon harvested and number caught during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Alexander Creek, 1988	31
9.	Estimated number of angler-hours of effort during each week of the fishery for chinook salmon in Lake Creek, 1988	32
10.	Estimated harvest and catch rates of chinook salmon during each week of the fishery for chinook salmon in Lake Creek, 1988	34
11.	Estimated number of chinook salmon harvested and number caught during each week of the fishery for chinook salmon in Lake Creek, 1988	35

LIST OF TABLES (Continued)

Table		Page
12.	Estimated number of angler-hours of effort during each of the weekday and weekend/holiday components of the fisheries for chinook salmon in Clear Creek and Talkeetna River, 1988	36
13.	Estimated harvest and catch rates of chinook salmon during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Clear Creek and the Talkeetna River, 1988	40
14.	Estimated number of chinook salmon harvested and number caught during each of the weekday and weekend/holiday components of the fisheries for chinook salmon in Clear Creek and Talkeetna River, 1988	41
15.	Estimated number of angler-hours of effort during the weekend-only fisheries for chinook salmon in Willow Creek, 1988	42
16.	Estimated harvest and catch rates of chinook salmon during the weekend-only fisheries for chinook salmon in Willow Creek, 1988	45
17.	Estimated number of chinook salmon harvested and number caught during the weekend-only fisheries for chinook salmon in Willow Creek, 1988	46
18.	Estimated number of angler-hours of effort during the weekend-only fisheries for chinook salmon in Sheep and Montana Creeks, 1988	47
19.	Estimated harvest and catch rates of chinook salmon during the weekend-only fisheries for chinook salmon in Sheep and Montana Creeks, 1988	49
20.	Estimated number of chinook salmon harvested and number caught during the weekend-only fisheries for chinook salmon in Sheep and Montana Creeks, 1988	50
21.	Summary of estimated angler-effort, chinook salmon harvest, and chinook salmon catch by sport fisheries in northern Cook Inlet that were surveyed during 1988	53
22.	Measures of the intensity of the fisheries for chinook salmon for each of the sport fisheries surveyed in northern Cook Inlet in 1988	56

LIST OF TABLES (Continued)

Table		Page
23.	Sex and age composition of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988.....	59
24.	Mean length (mid-eye to fork-of-tail) in millimeters by sex and age group of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988.....	61
25.	Sex and age composition of chinook salmon sampled from escapement carcass surveys in northern Cook Inlet, 1988.....	64
26.	Mean length (mid-eye to fork-of-tail) in millimeters by sex and age group of chinook salmon sampled from escapement carcass surveys in northern Cook Inlet, 1988.....	65
27.	Escapement counts of chinook salmon for northern Cook Inlet streams in 1988.....	66

LIST OF FIGURES

Figure		Page
1.	Map of the northern Cook Inlet area.....	3
2.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the downstream location of the Deshka River, 1988.....	21
3.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the upstream location of the Deshka River, 1988.....	22
4.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the downstream location of Alexander Creek, 1988.....	27
5.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the upstream location of Alexander Creek, 1988.....	28
6.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Lake Creek, 1988.....	33
7.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Clear Creek, 1988.....	37
8.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Talkeetna River, 1988.....	38
9.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Willow Creek, 1988.....	43
10.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Sheep Creek, 1988.....	48

LIST OF FIGURES (continued)

Figure		Page
11.	Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Montana Creek, 1988	51
12.	Percent of angler-effort, chinook salmon harvest, and chinook salmon catch contributed by each of the remote stream fisheries surveyed to the total for those fisheries, 1988	54
13.	Percent of angler-effort, chinook salmon harvest, and chinook salmon catch contributed by each of the weekend-only stream fisheries surveyed to the total for those fisheries, 1988	55
14.	Measure of the intensity of the fisheries for chinook salmon for each of the sport fisheries surveyed in Northern Cook Inlet, 1988	57

LIST OF APPENDIX TABLES

Appendix Table		Page
1.	Angler counts during the fishery for chinook salmon in the Deshka River, 1988	71
2.	Paired sign test of harvest per unit effort (HPUE) of chinook salmon for Deshka River anglers interviewed at the downstream Deshka River and Susitna Landing survey locations, 1988, to evaluate validity of combining data sets	72
3.	Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in the downstream area of the Deshka River, 1988	73
4.	Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in the upstream area of the Deshka River, 1988	74
5.	Angler counts during the fishery for chinook salmon in Alexander Creek, 1988	75
6.	Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by all anglers interviewed during the fishery for chinook salmon in the downstream area of Alexander Creek, 1988	76
7.	Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in the upstream area of Alexander Creek, 1988	77
8.	Angler counts during the fishery for chinook salmon in Lake Creek, 1988	78
9.	Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in Lake Creek, 1988	79
10.	Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Clear Creek at Talkeetna Landing during periods A and B, 1988	81

ABSTRACT

Creel surveys of selected sport fisheries for chinook salmon *Oncorhynchus tshawytscha* in northern Cook Inlet were conducted during 1988. Roving creel surveys were conducted at the Deshka River, Alexander Creek, and Lake Creek. Direct expansion creel surveys were conducted at Clear Creek, Talkeetna River, and the weekend-only fisheries at Willow, Sheep, and Montana Creeks. For all the fisheries surveyed, the estimated total effort by anglers was 220,987 angler-hours. An estimated 14,590 chinook salmon were harvested (fish kept only) by anglers and 28,602 chinook salmon were caught (fish kept and fish released). The majority of the angler-effort (73 percent), chinook salmon harvest (67 percent), and chinook salmon catch (72 percent) occurred in the remote (accessible only by boat or plane) fisheries which are open 7 days a week. The weekend-only fisheries in Willow, Sheep, and Montana Creeks, however, had the largest angler-effort and harvest per hour when the fisheries were open. The 1.3 and 1.4 age groups were the most abundant ages in the sport harvests in all streams. A total escapement of 67,218 chinook salmon was counted in the tributaries to the Susitna River.

KEY WORDS: creel survey, northern Cook Inlet, chinook salmon, harvest, catch, effort, escapement counts, population age structure.

INTRODUCTION

The sport fishery for chinook salmon *Oncorhynchus tshawytscha* in northern Cook Inlet is among the largest recreational fisheries in Alaska (Mills 1987). This fishery occurs in tributaries to the Susitna River and other smaller rivers which drain directly into northern Cook Inlet (Figure 1). The areas where the sport fishery occurs can be categorized into three groups: (1) tributaries on the east side of the Susitna River that are accessible from the Parks Highway; (2) remote Susitna and Yentna River tributaries that are not road-accessible and primarily enter the mainstem of these rivers from the west and north; and (3) remote river systems that drain directly into northern Cook Inlet from the north and west.

During the 1960's and 1970's, the sport fishery for chinook salmon in northern Cook Inlet systems was periodically closed because of small chinook salmon escapement. The commercial fishery for chinook salmon returning to northern Cook Inlet systems was closed from 1963 to 1985. These closures helped increase the returns of chinook salmon to a level that resource managers felt could once again be exploited. The sport fishery for chinook salmon has been open every year since 1979 and a limited commercial fishery for chinook salmon in northern Cook Inlet reopened in 1986.

Prior to 1986, only five streams along the Parks Highway were open to sport fishing for chinook salmon. Three of these streams (Willow, Montana, and Caswell Creeks) were open only during four weekends from mid-June through early July, while the Talkeetna and Little Susitna Rivers were open to continuous fishing from late May to early July. Effort in these fisheries increased from an estimated 47,500 angler-hours in 1979 to over 155,000 angler-hours in 1985 (Hepler and Bentz 1986). During this period, the estimated harvests of chinook salmon by these fisheries ranged from 1,650 fish in 1979 to nearly 4,900 fish in 1984 (Hepler and Bentz 1986). In 1986, five additional road-accessible streams (Little Willow, Sheep, Goose, Sunshine, and Birch Creeks) were opened to fishing during four weekends from mid-June through early July. In 1987, the entire Susitna River corridor between the mouth of the river and upstream to the confluence of the Talkeetna River was opened to sport fishing and the weekend fishing period on these streams was extended to include Mondays. The same regulations remained in effect in 1988 for all the streams, although the season on Willow Creek was extended for an additional 3 days by Emergency Order.

The number of remote streams open to chinook salmon fishing in the Susitna and Yentna River drainages and in western Cook Inlet has also increased since 1979. From 1979 to 1982, only the Deshka River, Lake Creek, and Alexander Creek were open to chinook salmon fishing. In 1983, the open area was expanded to include the entire Chuitna and Yentna River drainages. In 1984, all coastal streams draining into western Cook Inlet north of the West Foreland and all tributaries on the west side of the Susitna River downstream of the Deshka River were added to the open area (Figure 1). These additional openings increased angler-effort in the remote fisheries from an estimated 65,900 angler-hours in 1979 to 136,400 angler-hours in 1985 (Hepler and Bentz 1986). During the period 1979 through 1986, the estimated harvests of

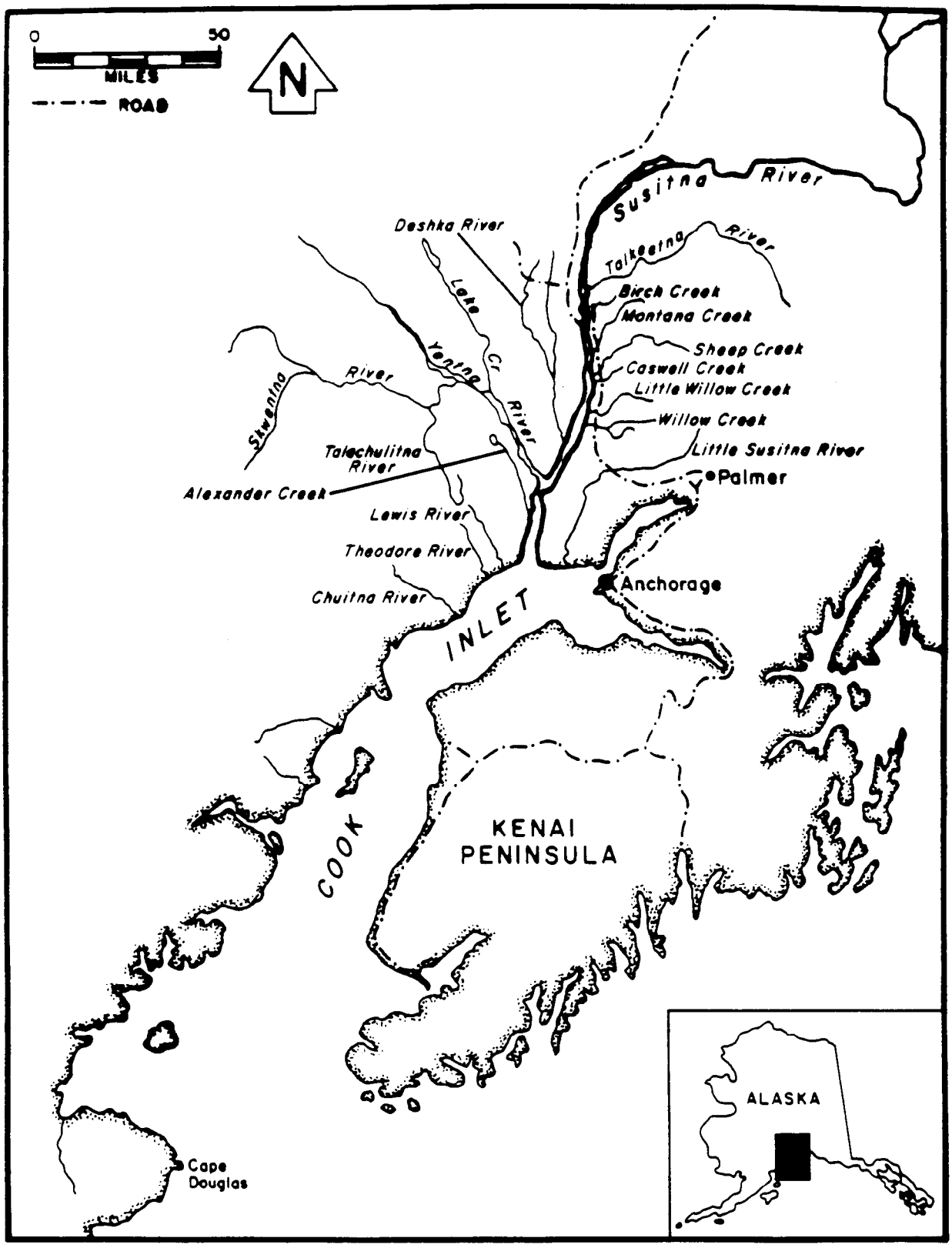

Figure 1. Map of the northern Cook Inlet area.

chinook salmon by these fisheries ranged from 3,166 fish in 1981 to 11,413 fish in 1985 (Hepler and Bentz 1986). In 1987, the upper Susitna River drainage above its confluence with the Talkeetna River was also opened to sport fishing and 1 additional week was added to the fishing season on the remote streams. The same regulations remained in effect on all the remote streams in 1988.

The objectives of this report are to present: (1) estimates of angler-effort (total number of angler-hours expended) for sport fisheries in selected roadside and remote streams in the Susitna River drainage; (2) estimates of the harvest (number of fish kept by anglers) and catch (number of fish kept plus those released by anglers) of chinook salmon in these streams; (3) estimates of the sex, age, and length compositions of chinook salmon harvested in these streams; and (4) estimates of the ordinal index of chinook salmon spawning in selected streams in northern Cook Inlet.

Harvest and effort estimates for the years 1979 to 1987 are presented in Bentz (1982, 1983), Delaney and Hepler (1983), Hepler and Bentz (1984, 1985, 1986, 1987), Hepler et al. (1988), Hepler and Kubik (1982), Kubik (1980, 1981), and Watsjold (1980, 1981).

METHODS

Creel Surveys

Two types of creel surveys, roving and direct expansion, were used in this study. Direct expansion surveys are used in locations where the majority of the anglers exit through one location whereas roving creel surveys are used where anglers can exit at a variety of locations. The sample design and methods of analysis for each are described below.

Roving Creel Surveys:

Roving creel surveys (Neuhold and Lu 1957) were conducted to estimate effort for and catch and harvest of chinook salmon by anglers on the Deshka River, Alexander Creek, and Lake Creek. Brief descriptions of these systems follow:

Deshka River. Approximately 50 km (31 mi) of the Deshka River were open to fishing for chinook salmon from 1 January to 13 July. The open section was divided into two survey areas for the creel survey. The downstream area encompassed the lower 1.6 km (1.0 mi) of the river from its confluence with the Susitna River upstream to the Alaska Department of Fish and Game cabin. Primary access by anglers to the downstream area is by riverboats launched from Susitna Landing and Deshka Landing. The upstream area included the remaining open section from the cabin upstream to the confluence of Moose and Kroto Creeks. Primary access by anglers to this area is by riverboats that travel upstream from the mouth, floatplanes that land on nearby lakes, and float trips that originate from Petersville Road.

Alexander Creek. The entire drainage of Alexander Creek was open to fishing for chinook salmon from 1 January to 13 July. The open section was divided

into two survey areas. The downstream area encompassed the lower 1.6 km (1.0 mi) from the creek's confluence with the Susitna River upstream to Gabbert's Fish Camp. The upstream area encompassed the remaining open section from Gabbert's Fish Camp upstream to Alexander Lake. Primary access by anglers to the downstream area is by riverboats, wheelplanes, and floatplanes and to the upper area by float trips that originate from Alexander Lake and riverboats that travel upstream from the creek's mouth.

Lake Creek. The entire drainage of Lake Creek was open to fishing for chinook salmon from 1 January to 13 July. Physical barriers within the river, however, restricted the majority of the anglers to the lower 3.2 km (2.0 mi) of the river. The survey area, therefore, only included the lower 3.2 km of the stream. Primary access by anglers to this fishery is by floatplanes and riverboats.

A stratified random sample design was used for angler counts on the downstream areas of the Deshka River and Alexander Creek and on Lake Creek. Days were stratified into either three (Deshka River and Alexander Creek) or five (Lake Creek) sample periods. Effort was estimated separately for weekdays and for weekends/holidays for each week the fishery was surveyed for Alexander Creek and the Deshka River and by weekly period for Lake Creek. For Alexander Creek and the Deshka River, 3 days were randomly selected without replacement within each weekday component for conducting angler counts. An angler count was conducted in each period (A, B, and C) on each selected day. For each weekend/holiday component in these streams an angler count was conducted in all periods. For Lake Creek, 5 days were randomly selected, without replacement, in each 7-day weekly period for conducting angler counts. An angler count was conducted each period on each selected day.

Counts of anglers were conducted from a fixed-wing aircraft on the upstream areas of the Deshka River and Alexander Creek. Because of the expense of these surveys, only five counts were conducted each week; three on randomly selected (without replacement) weekdays, and one on each weekend/holiday day. A simple random sample design was used. The angler day was stratified into three 6-hour sample periods to ensure the distribution of sampling effort over the defined angler-day.

Details for the creel survey at each location were as follows:

Deshka River - downstream.

1. Dates: 23 May to 1 July.
2. Fishing day: 20 hours, 0400 through 2400.
3. Daily periods: two 6-hour sample periods (A and C) and one 7-hour sample period (B).
4. Sample unit length: 2 hours.
5. Other: Survey clerks only interviewed anglers who indicated they would not exit this fishery through the boat launch at Susitna Landing, Deshka Landing, or Willow Creek.

Deshka River - upstream.

1. Dates: 23 May to 13 July.
2. Fishing day: 18 hours, 0500 through 2300.
3. Daily periods: three 6-hour sample periods (A, B, and C).
4. Other: Catch rate and harvest rate data for this location were collected from anglers exiting the fishery at Susitna Landing (refer to the direct expansion methods for a description of this location).

Alexander Creek - downstream.

1. Dates: 23 May to 12 June.
2. Fishing day: 18 hours, 0500 through 2300.
3. Daily periods: three 6-hour sample periods (A, B, and C).
4. Sample unit length: 2 hours.

Alexander Creek - upstream.

1. Dates: 6 June to 13 July.
2. Fishing day: 18 hours, 0500 through 2300.
3. Daily periods: three 6-hour sample periods (A, B, and C).
4. Other: Additional catch rate and harvest rate data for this location were collected from anglers exiting the fishery through the downstream area of Alexander Creek.

Lake Creek.

1. Dates: 4 June to 13 July.
2. Fishing Day: 20 hours, 0500 through 0100 (next day).
3. Daily periods: five 4-hour sample periods (A, B, C, D, and E).
4. Sample unit length: 2 hours.

Within a period selected for sampling, a starting time was randomly selected to conduct an angler count from the whole hours in the period (0500, 0600, etc.). Anglers were counted by a creel clerk who drove a riverboat the length of the survey area on Lake Creek and in the downstream survey areas of the Deshka River and Alexander Creek. It took approximately 15 minutes to conduct an angler count in these areas. Anglers were counted by a creel clerk from a fixed-wing aircraft on the upstream areas of the Deshka River and Alexander Creek. A coin was tossed to determine the starting point (upstream or downstream) for beginning the angler count at the start of a selected count time. Angler counts were considered instantaneous events (Neuhold and Lu 1957).

Angler interviews were conducted during the time remaining in a sample unit not used for the angler count. Interviews were conducted throughout the length of the survey area on Lake Creek and the downstream areas of the Deshka River and Alexander Creek. Survey clerks recorded the following information from each angler interviewed:

1. the number of hours spent fishing;
2. the number and species of fish harvested (kept);
3. the number and species of fish released;
4. whether the angler had completed the fishing trip or not;
5. whether or not the angler had been interviewed previously during the same day;
6. whether or not the angler was using a professional guide;
7. whether the angler used guided, chartered, or private transportation to reach the fishery; and
8. for boat anglers, whether the boat was an inboard, airboat, raft, or outboard. Additionally, if an outboard was used, which of the following categories it fell into: 2-49 horsepower (hp), 50-80 hp, or greater than 80 hp.

For the downstream Deshka River and downstream Alexander Creek surveys, angler effort (E) and its variance were estimated separately for the weekdays and weekend/holiday components of each week. For the Lake Creek survey, angler effort and its variance was estimated by weekly periods. Effort in these streams was estimated using a stratified random sample, by period. Angler effort (in angler-hours) was estimated by expanding mean angler counts ($\bar{x}$) by the number of available fishery hours (H) as (Scheaffer et al. 1979):

$$\hat{E} = \sum_{j=1}^{p} \bar{x}_j H_j \qquad [1]$$

Definitions of the notation for the roving creel surveys are presented in Table 1. The variance of the estimated effort in this approach was estimated as (Scheaffer et al. 1979):

$$V(\hat{E}) = \sum_{j=1}^{p} [H_j^2 (s_j^2/n_j)] \qquad [2]$$

For the upstream areas of the Deshka River and Alexander Creek, effort was estimated for each week using a simple random sample procedure as:

$$\hat{E} = \bar{x}H \qquad [3]$$

with the variance of $\hat{E}$ being estimated as:

$$V(\hat{E}) = H^2 (s^2/n) \qquad [4]$$

Total effort for each fishery was estimated by summing all the weekly or weekday and weekend/holiday estimates. Since these are considered independent estimates, the estimated variance of the total was the sum of the variances.

Table 1. Definitions for the notation used in the equations for the roving creel surveys.

Notation	Definition
$\hat{C}$	the estimate of catch[1] during a specific weekday or weekend/holiday component of a fishery.
$\bar{c}$	the mean catch[1] per angler by all anglers interviewed during a specific weekday or weekend/holiday component of a fishery.
$\bar{c}_i$	the mean catch[1] per angler by all anglers interviewed on day i during a specific weekday or weekend/holiday component of a fishery.
c_{ik}	the catch[1] by angler k interviewed on day i during a specific weekday or weekend/holiday component of a fishery.
D	the number of days the fishery was open during a specific weekday or weekend/holiday component of a fishery.
d	the number of days on which angler interviews were conducted during a specific weekday or weekend/holiday component of a fishery.
$\hat{E}$	the estimate of effort in angler-hours for a specific weekday or weekend/holiday component of a fishery.
$\bar{f}$	the mean number of hours fished by all anglers interviewed during a specific weekday or weekend/holiday component of a fishery.
f_{ik}	the number of hours spent fishing by angler k interviewed on day i during a specific weekday or weekend/holiday component of a fishery.
H	the number of hours of possible fishing time during a specific weekly, weekday or weekend/holiday component of a fishery.
H_j	the number of hours of possible fishing time during period j of a specific weekday or weekend/holiday component of a fishery.
m_i	the number of anglers interviewed on day i during a specific weekday or weekend/holiday component of a fishery.
n	the number of angler counts conducted during a specific weekly, weekday or weekend/holiday component of a fishery.
n_j	the number of angler counts conducted during period j of a specific weekday or weekend/holiday component of a fishery.

-continued-

Table 1. Definitions for the notation used in the equations for the roving creel surveys (continued).

Notation	Definition
p	the number of daily time periods (A, B, C, etc.) in a specific weekday or weekend/holiday component of a fishery.
r	the correlation between the c_{ik} and f_{ik} for anglers interviewed during a specific weekday or weekend/holiday component of a fishery.
s^2	the sample variance for the mean angler count during a specific weekly, weekday or weekend/holiday component of a fishery ($\bar{x}$).
s_c^2	the two-stage estimate of variance for the mean catch by anglers interviewed during a specific weekday or weekend/holiday component of a fishery ($\bar{c}$).
s_f^2	the two-stage estimate of variance for the mean effort by anglers interviewed during a specific weekday or weekend/holiday component of a fishery ($\bar{f}$).
s_i^2	the sample variance for the mean catch by anglers interviewed on day i of a specific weekday or weekend/holiday component of a fishery ($\bar{c}_i$).
s_j^2	the sample variance for the mean angler count during period j of a specific weekday or weekend/holiday component of a fishery ($\bar{x}_j$).
$\bar{x}$	the mean angler count for a specific weekly, weekday or weekend/holiday component of a fishery.
$\bar{x}_j$	the mean angler count for period j during a specific weekday or weekend/holiday component of a fishery.

[1] Catch refers to either the catch of a single species (fish kept plus those released) or to harvest of a single species (fish kept) depending on the quantity being estimated.

Rates of catch (CPUE, fish kept plus those released) and harvest (HPUE, fish kept only) of chinook salmon were estimated using a two-stage sample design with a finite number of primary sampling units (days) and an unknown number of secondary units (anglers). Only completed-trip interviews were used to estimate catch and harvest rates on the Deshka River and upstream Alexander Creek and Lake Creek. All angler interviews (completed and incomplete) were used for downstream Alexander Creek because there were small numbers of completed interviews and, therefore, the incomplete and completed interviews were combined to reduce the variability of the estimates. Catch rates were estimated for each sampled day and for each weekday and weekend/holiday component.

Catch per unit of effort (CPUE) was estimated for each of the weekday and weekend/holiday components of the fishery as:

$$CPUE = \bar{c}/\bar{f} \qquad [5]$$

The variance of CPUE was approximated using the formula for the quotient of the mean of two random variables (Jessen 1978), which is:

$$V(CPUE) \approx [\bar{c}/\bar{f}]^2 [s_c^2/\bar{c}^2 + s_f^2/\bar{f}^2 - (2rs_c s_f/\bar{c}\bar{f})] \qquad [6]$$

The two-stage variance estimate for the mean catch per angler ($\bar{c}$) was (Sukhatme et al. 1984, Von Geldern and Tomlinson 1973):

$$s_c^2 = [1-(d/D)]s_B^2/d + [\sum_{i=1}^{D}(s_i^2/m_i)]/(dD) \qquad [7]$$

where:

$$s_B^2 = [\sum_{i=1}^{D}(c_i - \bar{c})]^2/(d-1) \qquad [8]$$

The variance for the mean hours fished per angler ($\bar{f}$) was estimated identically as for $\bar{c}$ by substituting the necessary quantities for effort into equations 7 and 8.

Total catch ($\hat{C}$) for any weekly, weekday, or weekend/holiday component was estimated as:

$$\hat{C} = \hat{E}\ CPUE \qquad [9]$$

The variance of this estimate was calculated using the formula for the product of two independent random variables (Goodman 1960):

$$V(C) = [E^2\ V(CPUE)] + [CPUE^2\ V(E)] - [V(E)\ V(CPUE)] \quad [10]$$

Mean harvest rates, total harvest, and associated variances were estimated for each weekly, weekday, and weekend/holiday component following the above procedures with the exception that fish harvested by interviewed anglers were substituted for catch.

The total catch and harvest for each fishery was estimated by summing the estimates for all the weekly, weekday, and weekend/holiday components. Since these are considered independent estimates, the estimated variance of the total was the sum of the variances.

Necessary assumptions for these analyses are:

1. angler counts made during the same day and on consecutive days are independent;
2. interviewed anglers are representative of the total angler population;
3. the number of anglers interviewed during any day is proportional to the effort on that day; and
4. no significant fishing effort occurs during the hours 2300-0500 on Alexander Creek and the upstream location of the Deshka River, and during the hours 2400-0400 on the downstream location of Alexander Creek and 0100-0500 on Lake Creek.

The harvest of chinook salmon per angler-hour (HPUE) by anglers interviewed at the survey location in the downstream area of the Deshka River was compared to the HPUE by Deshka River anglers who exited the downstream fishery at the Susitna Landing survey location. Anglers interviewed at the survey location in the downstream area of the Deshka River were not interviewed again at the Susitna Landing survey location so the two data sets were considered independent. To test whether the two sets of interview data could be pooled, a sign test (Conover 1980) was performed on the differences between the daily HPUE of chinook salmon at each location by treating the two estimates of HPUE as paired samples. Only days when five or more anglers were interviewed at each location were included in the analysis. The hypothesis tested can be stated as: the probability of HPUE estimated from the Susitna Landing interviews being larger than HPUE for the Deshka River interviews on any given day is the same as the probability of it being smaller. The sign test was selected because the values of HPUE were small and no assumption about the distribution of the data were necessary for the test.

Appropriate catch rate and harvest rate data collected from anglers at the Susitna Landing survey location were used to estimate catch and harvest by the fishery in the upstream area of the Deshka River.

Direct Expansion Creel Surveys:

Direct expansion creel surveys were used on the Talkeetna River and Clear, Willow, Sheep, and Montana creeks. Brief descriptions of these systems follow:

Talkeetna River and Clear Creek. The Talkeetna River, which enters from the east at kilometer 157.8 (mile 98.0), is a major tributary to the Susitna River. The entire Talkeetna River drainage is open to chinook salmon fishing, however, due to the high turbidity in the mainstem of the Talkeetna River and rapids which are not passable by boat at approximately kilometer 29.0 (mile 18.0), fishing effort is concentrated at kilometer 8.1 (mile 5.0) near the mouth of Clear (Chunilna) Creek. Clear Creek was open to chinook salmon fishing for 3.2 km (2.0 mi) upstream from the creek's mouth from 1 January to 13 July. This fishery was accessible only by riverboat. Angler interviews for this fishery were collected at the boat landing in the village of Talkeetna.

Willow Creek. The section open to fishing for chinook salmon in Willow Creek included all waters within a 0.4 km (0.25 mi) radius of the creek's confluence with the Susitna River and upstream to the Parks Highway. This section was open to fishing for chinook salmon on four consecutive weekends (from 0001 Saturday to 2400 Monday) from 13 June to 6 July. Generally, salmon hold in the confluence area and migrate upstream to the area near the Parks Highway bridge in early July. Because the stream is accessible from the road, primary access by anglers to the fishery is by vehicle and foot. Anglers normally fish within 0.8 km (0.5 mi) of the bridge area. Three access locations were surveyed: (1) the Parks Highway bridge, where anglers either reach the river from the road and fish near the bridge or use the private boat launch near the bridge; (2) Susitna Landing, where anglers reach Willow Creek using boats launched at the Landing; and (3) the head of the trail that leads to the mouth of Willow Creek, where anglers reach the stream by foot and fish in the vicinity of the creek's confluence with the Susitna River.

Sheep and Montana creeks. These streams were open to chinook salmon fishing on four consecutive weekends (from 0001 Saturday to 2400 Monday) from 13 June to 6 July within a 0.4 km (0.25 mi) radius of their confluence with the Susitna River and upstream to the Parks Highway bridges. The length of stream which is open to fishing varies with the morphology of the stream and ranges from approximately 3 km for Montana Creek to 13.0 km for Sheep Creek. These streams are accessible from the Parks Highway, foot trails from the Parks Highway to the open fishing areas, and by riverboat. The streams were surveyed at their Parks Highway access sites.

A stratified random sample design was used for the direct expansion creel surveys. The angler day was stratified into either two or three sample periods. Effort was estimated separately for the weekday and weekend/holiday components of each week the fishery was surveyed. Three days were randomly selected without replacement for sampling within each weekday component. All periods were sampled in each selected weekday. Each period was sampled on each weekend/holiday day for all the survey locations.

Details for the creel survey at each location were as follows:

Talkeetna Boat Landing (Clear Creek and Talkeetna River).

The Talkeetna boat landing is the primary boat launch used by recreational boaters in the Susitna River north of the village of Talkeetna and the Talkeetna River drainage. The landing is located in the village of Talkeetna on the Talkeetna River near its confluence with the Susitna River.

1. Dates: 20 June to 13 July.
2. Fishing day: 16 hours, 0800 through 2400.
3. Daily periods: two 8-hour sample periods (A and B).
4. Sample unit length: 3.5 hours.

Willow (mouth and bridge), Sheep, and Montana Creeks.

1. Dates: 11 June (Sheep Creek) and 18 June (Willow and Montana Creeks) to 6 July (Sheep and Montana Creeks) and 11 July (Willow Creek); weekends (Saturday, Sunday, and Monday) only.
2. Fishing day: 24 hours, 0000 through 2400.
3. Daily periods: 6 hours for A and C and 12 hours for B.
4. Sample unit length: 3 hours for A and C, 4 hours for B on Montana and Sheep Creeks and 3 hours for A and C, 6 hours for C on Willow Creek.

Susitna Landing (Willow Creek):

Susitna Landing is the primary boat launch used by recreational boaters for the Susitna River drainage below the Parks Highway bridge. The landing is located on the Kashwitna River near its confluence with the Susitna River.

1. Dates: 11 June to 11 July.
2. Fishing day: 18 hours, 0500 through 2300.
3. Daily periods: three 6-hour sample periods (A, B, and C).
4. Sample unit length: 3 hours.

Within a period selected for sampling, a time to begin sampling was randomly selected from those whole hours in the period (0500, 0600, etc.). This allowed the entire sample unit to fall within the defined period. A creel survey clerk was stationed at an access site to a fishery during each selected sample period. All anglers departing the fishery through the access site during the sample period were contacted by the survey clerk. Survey clerks recorded the same information from each interviewed angler as previously described for the roving creel surveys. If the survey clerk was unable to contact all anglers (usually due to large numbers of anglers leaving the fishery at the same time), a count of all anglers who were not interviewed was kept.

The estimation of angler effort (E) by a direct expansion creel survey can be considered as a problem in estimating a rate. Effort was estimated in units of angler-hours. The rate estimated was the mean number of angler-hours leaving an access site during each hour the fishery was in progress. The

product of this rate and the total number of possible fishing hours in the fishery was an estimate of angler effort. This can be expressed as:

$$\hat{E} = \sum_{j=1}^{P} H_j \ (\bar{e}_j/\bar{h}_j) \qquad [11]$$

Definitions of the notation used to describe the direct expansion surveys are presented in Table 2. The variance of effort was estimated as:

$$\hat{V}(E) = \sum_{j=1}^{P} H_j^2 \ V(\bar{e}_j/\bar{h}_j) \qquad [12]$$

The variance of the rate, $\bar{e}_j/\bar{h}_j$, was approximated as the variance for the quotient of two random variables (Jessen 1978):

$$V(\bar{e}_j/\bar{h}_j) \approx (\bar{e}_j/\bar{h}_j)^2 (1/d_j)(s_e^2/\bar{e}_j^2 + s_h^2/\bar{h}_j^2 - 2rs_e s_h/\bar{e}_j\bar{h}_j)(1 - h_j/H_j) \qquad [13]$$

In most of the fisheries surveyed, the time spent surveying on day i of period j (h_{ij}) was relatively constant on each sampling occasion. In some instances, however, the h_{ij} varied considerably during the fishery due to logistical problems and the h_{ij} were considered random variables. This variation is represented by the variance of the sample unit length in Equation 13 (s_h^2). The coefficient of variation was used to determine if the h_{ij} were treated as random variables. If the coefficient of variation exceeded 20 percent, the h_{ij} were treated as random variables, otherwise the h_{ij} were treated as constant.

For h_{ij} constant, s_h^2 equals zero and the variance of the estimate of angler effort simplifies to:

$$\hat{V}(\hat{E}) = \sum_{j=1}^{P} d_j \ (H_j/h_j)^2 \ s_e^2 \ (1 - h_j/H_j) \qquad [14]$$

When it was not possible to interview all anglers (M_{ij}) leaving the access site, the effort by the anglers who were not interviewed was estimated. In contrast to the previous situation, where the effort leaving the fishery during period j on day i (e_{ij}) was considered to be measured without error, error is now associated with e_{ij}. Effort leaving the fishery during a given sample unit was estimated for period j on day i by:

$$\hat{e}_{ij} = M_{ij} \ \bar{f}_{ij} \qquad [15]$$

and the associated variance as:

$$\hat{s}^2_{eij} = M_{ij}^2 \ (s^2_{fij}/m_{ij}) \ (1 - m_{ij}/M_{ij}) \qquad [16]$$

Table 2. Definitions for the notation used in the equations for the direct expansion creel surveys.

Notation	Definition
D	the number of days the fishery was open during a specific weekday or weekend/holiday component of a fishery[1].
d_j	the number of days censused during period j of a specific weekday or weekend/holiday component of a fishery[1].
$\hat{E}$	the estimate of effort in angler-hours[2] for a specific weekday or weekend/holiday component of a fishery[1].
$\bar{e}_j$	the mean number of angler-hours[2] leaving a census site during a sample unit in period j of a specific weekday or weekend/holiday component of a fishery[1].
e_{ij}	the number of angler-hours[2] leaving a census site during period j on day i of a specific weekday or weekend/holiday component of a fishery[1].
$\bar{f}_{ij}$	the mean number of hours fished by anglers censused during period j on day i of a specific weekday or weekend/holiday component of a fishery[1].
H_j	the number of hours of possible fishing time during period j of a specific weekday or weekend/holiday component of a fishery[1].
$\bar{h}_j$	the mean number of hours censused on days sampled during period j of a specific weekday or weekend/holiday component of a fishery[1].
h_j	the number of hours censused during period j of a specific weekday or weekend/holiday component of a fishery[1].
h_{ij}	the number of hours censused during period j on day i of a specific weekday or weekend/holiday component of a fishery[1].
M_{ij}	the number of completed-trip anglers leaving the fishery during period j of day i during a specific weekday or weekend/holiday component of a fishery[1].
m_{ij}	the number of completed-trip anglers leaving the fishery who are interviewed during period j of day i during a specific weekday or weekend/holiday component of a fishery[1].
p	the number of daily time periods (A, B, C, etc.) in a specific weekday or weekend/holiday component of a fishery[1].

-continued-

Table 2. Definitions for the notation used in the equations for the direct expansion creel surveys (continued).

Notation	Definition
r	the correlation between the e_{ij} and h_{ij} for sample units collected during a specific weekday or weekend/holiday component of a fishery[1].
s_e^2	the sample variance for the mean number of angler-hours leaving a census site on a sample day during a period of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{e}_j$).
s_{eij}^2	the estimated sample variance for the mean number of angler-hours leaving a census site during period j on day i of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{e}_{ij}$).
s_{fij}^2	the sample variance for the mean effort by anglers departing a fishery during period j on day i of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{f}_{ij}$).
s_h^2	the sample variance for the mean number of hours censused on a sample day during a period of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{h}_j$).

[1] Fishery refers to an access site that is censused to estimate effort and catch for a particular fishery.

[2] All angler-hours referred to are for completed-trip anglers.

Effort for period j was estimated by:

$$\hat{E}_j = H_j \ (\hat{e}_j/h_j) \qquad [17]$$

The variance of $\hat{E}_j$ was estimated using equations 12 and 13 with the exception that the variance of the mean number of angler-hours of effort by completed-trip anglers censused during each sampling event now has two components, the within-day variance due to missed anglers and the between-day variance. Letting $\hat{s}_e^2$ estimate the variance of $\hat{e}_j$:

$$\hat{s}_e^2 = s_{Be}^2 + h_j/[d_j(H_j - h_j)] \ (\sum_{i=1}^{D} \hat{s}_{eij}^2) \qquad [18]$$

with the between-day variance (s_{Be}^2) estimated as:

$$s_{Be}^2 = [\sum_{i=1}^{D} (\hat{e}_{ij} - \bar{e}_j)^2]/(d_j - 1), \qquad [19]$$

the variance of $\hat{E}_j$ was estimated by substituting $\hat{s}_e^2$ for s_e^2 in equation 13 (Sukhatme et al. 1984).

By replacing s_e^2 with $\hat{s}_e^2$, the variance of the angler effort estimate simplifies to equation 14 when the h_j are constant.

The catch and harvest of a species, and their variances, were estimated with the same procedures used to estimate effort by simply substituting the corresponding quantities for catch or harvest in place of effort.

Assumptions necessary for the direct expansion creel survey design are:

1. no significant fishing effort occurs during the hours not included in the fishing day;
2. all anglers participating in a particular fishery exit the fishery through a surveyed access site; and
3. all anglers who are not interviewed are counted and all non-interviewed anglers are completed-trip anglers.

Biological Data:

In each fishery, the chinook salmon harvested by the sport fishery were randomly sampled for age, sex, and length. In addition, carcasses of chinook salmon in the spawning escapements to Montana and Willow Creeks and the Deshka River were randomly sampled for age, sex, and length. Three scales were collected on the left side of each fish approximately two rows above the

lateral line and on the diagonal row downward from the posterior insertion of the dorsal fin as described in Clutter and Whitesel (1956). Scales were mounted on adhesive-coated cards and impressions were made in cellulose acetate. Age determinations were made by examination of scales using a microfiche reader. Ages were designated using the European method (Koo 1962) where the first number refers to the number of years of freshwater residence after emergence and the second number refers to the number of years of marine residence. Fish lengths were measured from the middle of the eye to fork of the tail (to the nearest 0.5 cm).

The proportional age composition of the sampled portion of the sport harvest was estimated for each fishery. Letting p_h equal the estimated proportion of age group h in the sample, the variance of p_h was estimated using the normal approximation to the binomial (Scheaffer et al. 1979):

$$V(\hat{p}_h) = \hat{p}_h(1-\hat{p}_h)/(n_T-1), \qquad [20]$$

where n_T is the total number of legible scales collected from chinook salmon during the fishery.

Mean length at age by sex and its variance were estimated using standard normal procedures.

Escapement Counts

Chinook salmon spawning in established index streams within the study area were counted using aerial (rotary-wing aircraft) and foot surveys; and at a weir. Ease of access determined the survey type for each index stream. Surveys were conducted during the peak spawning period which was identified through frequent inspections of spawning activity in index streams which are easily accessible. Escapement data reported are the maximum number of fish, both live and dead, observed during a single survey. No attempt has been made to account for fish not observed due to poor visibility, migrational timing, or decay. Additional escapement data were collected from a weir located on Deception Creek, a tributary to Willow Creek.

Hatchery Contributions

A portion of the chinook salmon harvested by the sport fishery at Willow Creek were examined for a missing adipose fin. Chinook salmon having a missing adipose fin were assumed to contain a coded-wire tag (CWT) implanted at a hatchery. Adult chinook salmon were expected to return to Willow Creek from a stocking of 534,389 smolts during 1985 (Clupach 1988). The contribution of stocked fish to the harvest at Willow Creek was calculated as:

$$\hat{H}_s = \hat{H}\ (m_c/p_r n_2), \qquad [21]$$

where:

$\hat{H}$ = the estimated harvest of chinook salmon at Willow Creek,
m_c = the number of chinook salmon observed to be missing an adipose fin in the Willow Creek fishery,

p_r = the proportion of chinook salmon that received a mark at the time of stocking (0.267), and
n_2 = the number of chinook salmon examined from the sport fishery for a missing adipose fin.

The bias-corrected variance of the estimated contribution of stocked fish to the harvest was estimated using the procedures of Clark and Bernard (1987).

RESULTS

Remote Streams

The remote streams are those which anglers can reach only by boat or plane. In 1988, creel surveys were conducted on the following remote streams: the Deshka River, both downstream and upstream sections; Alexander Creek, both downstream and upstream sections; Lake Creek; Clear Creek; and the Talkeetna River. Angler count creel surveys were used at all locations except for Clear Creek and the Talkeetna River where direct expansion creel surveys were used. The fisheries in these streams are open 7 days a week.

Deshka River:

The creel survey of the Deshka River was conducted from 23 May through 1 July in the downstream section and 23 May through 12 July in the upstream section of the river.

Effort. Number of anglers counted ranged from 0 to 170 in the downstream section and from 0 to 70 in the upstream section (Appendix Table 1). Estimated angler-effort during the survey was 60,418 angler-hours, of which 38,202 angler-hours (63%) were in the downstream section and 22,216 angler-hours (37%) were in the upstream section (Table 3). The distribution of fishing effort between the weekday and weekend/holiday components was about equal in both sections of the river; 37% of the downstream effort and 43% of the upstream effort occurred during the weekend/holiday component. Effort peaked in the downstream section during the weekday period of 6 June through 10 June and the upstream section during the weekday periods from 31 May through 3 June and 6 June through 10 June (Figures 2 and 3).

Harvest Rates and Catch Rates. A sign test was performed to compare the daily values of harvest per hour of chinook salmon in the downstream section estimated using interviews from anglers exiting the fishery at Susitna Landing to the daily HPUE values using interviews of anglers not exiting the fishery through Susitna Landing (Appendix Table 2). There was no significant ($P > 0.10$) difference between the two groups, and therefore the interviews from the two groups were pooled.

Daily harvest and catch rates of chinook salmon ranged from 0.000 to 0.147 and 0.000 to 0.196 fish per hour respectively (Appendix Table 3) in the downstream section of the Deshka River and from 0.000 to 0.250 and 0.000 to 1.500 fish per hour in the upstream section, respectively (Appendix Table 4). The weekday component from 20 to 24 June had the highest chinook salmon harvest

Table 3. Estimated number of angler-hours of effort during each of the weekday and weekend/holiday components of the fishery for chinook salmon in the Deshka River, 1988.

Location Component[1]		Effort	Standard Error	95% Confidence Interval	Relative Precision[2]
Downstream					
WE	5/28-5/30	3,146.0	483.2	2,199 - 4,093	30.1%
WE	6/04-6/05	4,311.0	498.4	3,334 - 5,288	22.7%
WE	6/11-6/12	4,772.0	397.8	3,992 - 5,552	16.3%
WE	6/18-6/19	1,298.0	313.2	684 - 1,912	47.3%
WE	6/25-6/26	725.0	372.5	0 - 1,455	100.7%
	Sub-total	14,252.0	936.5	12,417 - 16,087	12.9%
WD	5/23-5/27	2,103.0	513.8	1,096 - 3,110	47.9%
WD	5/31-6/03	3,754.0	554.7	2,667 - 4,841	29.0%
WD	6/06-6/10	7,433.0	1389.8	4,709 - 10,157	36.6%
WD	6/13-6/17	6,427.0	874.5	4,713 - 8,141	26.7%
WD	6/20-6/24	3,393.0	318.0	2,770 - 4,016	18.4%
WD	6/27-7/01	840.0	228.0	393 - 1,287	53.2%
	Sub-total	23,950.0	1,849.6	20,325 - 27,575	15.1%
TOTAL		38,202.0	2,073.2	34,139 - 42,265	10.6%
Upstream					
WE	5/28-5/30	1,296.0	224.8	855 - 1,737	34.0%
WE	6/04-6/05	1,602.0	234.0	1,143 - 2,061	28.6%
WE	6/11-6/12	2,736.0	648.0	1,466 - 4,006	46.4%
WE	6/18-6/19	1,620.0	864.0	0 - 3,313	104.5%
WE	6/25-6/26	522.0	486.0	0 - 1,475	182.5%
WE	7/02-7/04 & 7/09-7/10[3]	1,674.0	766.1	172 - 3,176	89.7%
	Sub-total	9,450.0	1,447.3	6,789 - 12,287	30.0%
WD	5/31-6/03 & 6/06-6/10[3]	4,925.0	1,932.2	1,138 - 8,712	76.9%
WD	6/13-6/17	3,990.0	1,386.8	1,272 - 6,708	68.1%
WD	6/20-6/24 & 6/27-7/01[3]	3,000.0	491.1	2,037 - 3,963	32.1%
WD	7/05-7/08 & 7/11-7/13[3]	851.0	148.9	559 - 1,143	34.3%
	Sub-total	12,776.0	2,433.1	7,997 - 17,535	37.4%
TOTAL		22,216.0	2,831.0	16,667 - 27,765	25.0%
GRAND TOTAL		60,418.0	3,509.9	53,540 - 67,296	11.4%

[1] WE = weekend/holiday; WD = weekday.
[2] Relative precision of 95% confidence interval.
[3] Components were combined because of small sample sizes.

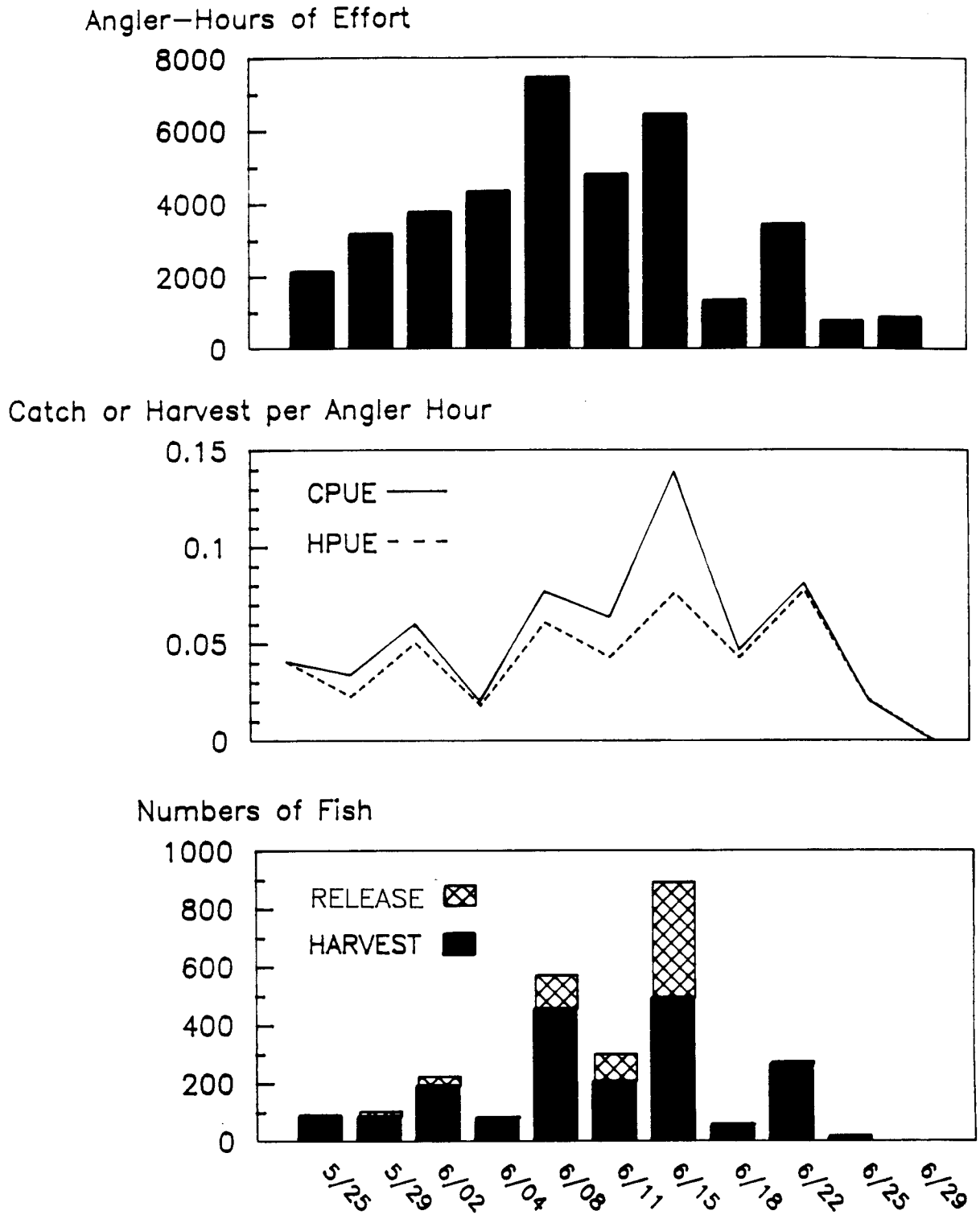

Figure 2. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the downstream location of the Deshka River, 1988.

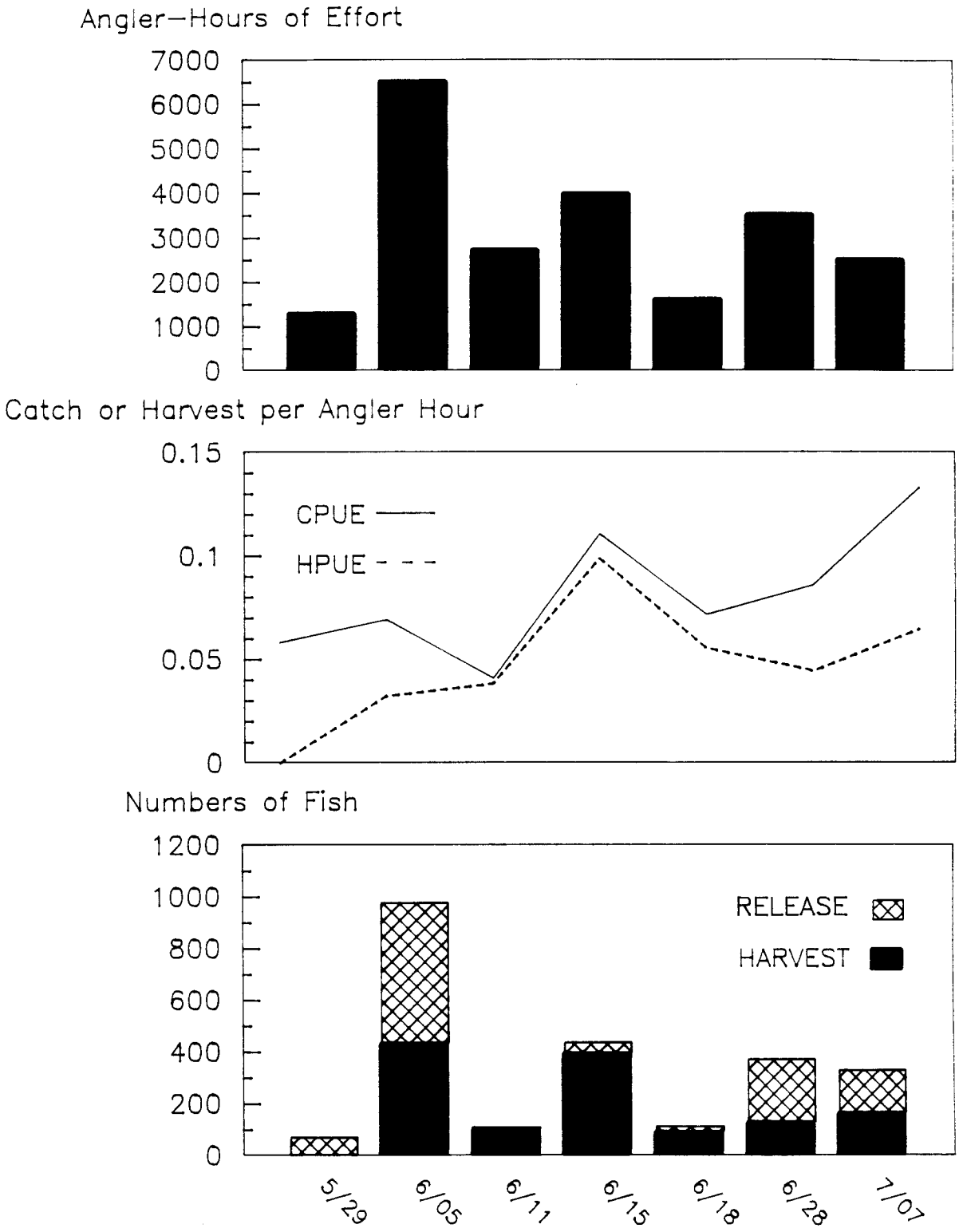

Figure 3. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the upstream location of the Deshka River, 1988.

rate, 0.775 fish per hour, of all components in the downstream section (Table 4, Figure 2) and the weekday components from 13 to 17 June had the highest chinook salmon harvest rates, 0.099 fish per hour, of all components in the upstream section (Table 4, Figure 3). Catch rates of chinook salmon peaked during the weekday component from 13 to 17 June in the downstream section (Table 4, Figure 2) and during the combined weekday components from 31 May to 3 June and to 6 to 10 June in the upstream section (Table 4, Figure 3).

Harvest and Catch. The estimated harvest of chinook salmon in the Deshka River during the creel survey was 3,230 fish; 1,917 chinook salmon (59%) were harvested in the downstream section and 1,313 chinook salmon (41%) were harvested in the upstream section (Table 5). In the downstream section, 44% of the chinook salmon caught by anglers were released and in the upstream section 46% of the chinook salmon caught were released. Catch and harvest in the downstream section peaked in the weekday component from 13 June through 17 June and in the upstream section during the weekday component from 31 May through 10 June (Figures 2 and 3).

Alexander Creek:

The creel survey of Alexander Creek was conducted from 23 May through 12 June in the downstream section and from 28 May through 3 July in the upstream section.

Effort. Number of anglers counted ranged from 0 to 112 in the downstream section and from 0 to 65 in the upstream section (Appendix Table 5). Estimated effort during the survey was 32,890 angler-hours of which 13,344 angler-hours (41%) were in the downstream section and 19,546 angler-hours (59%) were in the upstream section (Table 6). In the downstream section of the river, 51% of the angler-effort occurred during the weekend/holiday component but in the upstream section only 32% of the effort occurred during this component. Effort peaked in the downstream section during the weekday component from 6 June through 10 June and in the upstream section during the weekday component from 31 May through 10 June (Figures 4 and 5).

Harvest Rates and Catch Rates. Daily harvest and catch rates of chinook salmon ranged from 0.017 to 0.188 and 0.027 to 0.992 fish per hour, respectively (Appendix Table 6) in the downstream section of Alexander Creek and from 0.000 to 0.222 and 0.000 to 1.385 fish per hour, respectively in the upstream section (Appendix Table 7). The weekday component from 31 May to 3 June had the highest chinook salmon harvest rate, 0.160 fish per hour, of all components in the downstream section (Table 7, Figure 4) and the weekend/holiday components from 25 to 26 June had the highest chinook salmon harvest rate, 0.189 fish per hour, of all components in the upstream section (Table 7, Figure 5). Catch rates of chinook salmon peaked during the weekday component from 23 to 27 June in the downstream section and during the weekday components from 5 to 8 July and from 11 to 13 July in the upstream section (Table 7, Figure 5).

Harvest and Catch. The estimated harvest of chinook salmon in Alexander Creek during the creel survey was 2,438 fish of which 907 chinook salmon

Table 4. Estimated harvest and catch rates[1] of chinook salmon during each of the weekday and weekend/holiday components of the fishery for chinook salmon in the Deshka River, 1988.

Location Component[2]	Number of Interviews[3]	Harvest Rate	Standard Error	Catch Rate	Standard Error
Downstream					
WE 5/28-5/30	67	0.0226	0.0065	0.0338	0.0102
WE 6/04-6/05	157	0.0180	0.0042	0.0201	0.0050
WE 6/11-6/12	134	0.0428	0.0065	0.0636	0.0110
WE 6/18-6/19	156	0.0427	0.0070	0.0465	0.0072
WE 6/25-6/26	71	0.0208	0.0074	0.0208	0.0074
WD 5/23-5/27	30	0.0407	0.0197	0.0407	0.0197
WD 5/31-6/03	42	0.0503	0.0119	0.0603	0.0179
WD 6/06-6/10	97	0.0609	0.0127	0.0772	0.0180
WD 6/13-6/17	54	0.0762	0.0120	0.1391	0.0293
WD 6/20-6/24	68	0.0775	0.0197	0.0812	0.0209
WD 6/27-7/01	7	0.0000	0.0000	0.0000	0.0000
Upstream					
WE 5/28-5/30	18	0.0000	0.0000	0.0581	0.0280
WE 6/04-6/05	72	0.0201	0.0067	0.0403	0.0164
WE 6/11-6/12	82	0.0384	0.0089	0.0406	0.0094
WE 6/18-6/19	124	0.0553	0.0082	0.0715	0.0113
WE 6/25-6/26	35	0.0557	0.0147	0.0557	0.0147
WE 7/02-7/04 & 7/09-7/10[4]	46	0.0587	0.0166	0.1600	0.1498
WD 5/31-6/03 & 6/06-6/10[4]	21	0.0814	0.0505	0.1860	0.0909
WD 6/13-6/17	37	0.0988	0.0199	0.1105	0.0282
WD 6/20-6/24 & 6/27-7/01[4]	34	0.0331	0.0139	0.1157	0.0469
WD 7/05-7/08 & 7/11-7/13[4]	12	0.0769	0.0501	0.0769	0.0501

[1] Harvest includes only fish kept and catch includes fish kept and fish reported as released. Rates are number of fish harvested or caught per hour fished for interviewed anglers.

[2] WE = weekend/holiday; WD = weekday.

[3] Completed-trip angler interviews only.

[4] Components were combined because of small sample sizes.

Table 5. Estimated number of chinook salmon harvested[1] and number caught[2] during each of the weekday and weekend/holiday components of the fishery for chinook salmon in the Deshka River, 1988.

Location Component[3]		Harvest	SE[4]	95% Confidence Interval	Catch	SE[4]	95% Confidence Interval
Downstream							
WE	5/28-5/30	84	23.9	37 - 131	106	35.6	36 - 176
WE	6/04-6/05	78	20.1	39 - 117	87	23.8	40 - 134
WE	6/11-6/12	204	35.4	135 - 273	303	58.2	189 - 417
WE	6/18-6/19	55	16.0	24 - 86	60	17.2	26 - 94
WE	6/25-6/26	15	9.0	0 - 33	15	9.0	0 - 33
	Sub-total	436	50.7	337 - 535	571	74.8	424 - 718
WD	5/23-5/27	86	45.3	0 - 175	86	45.3	0 - 175
WD	5/31-6/03	189	52.4	86 - 292	226	74.3	80 - 372
WD	6/06-6/10	453	125.5	207 - 699	574	169.9	241 - 907
WD	6/13-6/17	490	101.4	291 - 689	894	222.7	458 - 1,330
WD	6/20-6/24	263	71.2	123 - 403	276	75.5	128 - 424
WD	6/27-7/01	0	0.0	0 - 0	0	0.0	0 - 0
	Sub-total	1,481	189.5	1,110 - 1,852	2,056	302.9	1,462 - 2,650
TOTAL		1,917	196.1	1,533 - 2,301	2,627	312.0	2,016 - 3,238
Upstream							
WE	5/28-5/30	0	0.0	0 - 0	75	38.1	0 - 150
WE	6/04-6/05	32	11.6	9 - 55	65	27.7	11 - 119
WE	6/11-6/12	105	34.4	38 - 172	111	36.3	40 - 182
WE	6/18-6/19	90	49.1	0 - 186	116	63.7	0 - 241
WE	6/25-6/26	29	27.2	0 - 82	29	27.2	0 - 82
WE	7/02-7/04 & 7/09-7/10[5]	98	51.3	0 - 199	268	254.4	0 - 767
	Sub-total	354	84.3	189 - 519	664	270.3	134 - 1,194
WD	5/31-6/03 & 6/06-6/10[5]	401	277.7	0 - 945	916	546.7	0 - 1,988
WD	6/13-6/17	394	156.0	88 - 700	441	186.0	76 - 806
WD	6/20-6/24 & 6/27-7/01[5]	99	37.4	26 - 172	347	149.9	53 - 641
WD	7/05-7/08 & 7/11-7/13[5]	65	43.5	0 - 150	65	43.5	0 - 150
	Sub-total	959	323.6	325 - 1,593	1,769	598.2	597 - 2,941
TOTAL		1,313	334.4	658 - 1,968	2,433	656.4	1,146 - 3,720
GRAND TOTAL		3,230	387.7	2,470 - 3,990	5,060	726.8	3,635 - 6,485

[1] Harvest includes only fish kept.

[2] Catch includes fish kept and fish reported as released.

[3] WE = weekend/holiday; WD = weekday.

[4] SE = standard error.

[5] Components were combined because of small sample sizes.

Table 6. Estimated number of angler-hours of effort during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Alexander Creek, 1988.

Location Component[1]		Effort	Standard Error	95% Confidence Interval	Relative Precision[2]
Downstream					
WE	5/28-5/30	1,710.0	217.9	1,283 - 2,137	25.0%
WE	6/04-6/05	2,640.0	251.2	2,148 - 3,132	18.7%
WE	6/11-6/12	2,490.0	341.4	1,821 - 3,159	26.9%
	Sub-total	6,840.0	476.6	5,906 - 7,774	13.7%
WD	5/23-5/27	390.0	253.7	0 - 887	127.5%
WD	5/31-6/03	2,364.0	543.2	1,299 - 3,429	45.0%
WD	6/06-6/10	3,750.0	379.7	2,006 - 4,494	19.8%
	Sub-total	6,504.0	709.6	5,113 - 7,895	21.4%
TOTAL		13,344.0	854.8	11,669 - 15,019	12.6%
Upstream					
WE	5/28-5/30 & 6/04-6/05[3]	1,818.0	336.0	1,159 - 2,477	36.2%
WE	6/11-6/12	1,404.0	432.0	557 - 2,251	60.3%
WE	6/18-6/19	936.0	144.0	654 - 1,281	30.2%
WE	6/25-6/26	864.0	432.0	17 - 1,711	98.0%
WE	7/02-7/04 & 7/09-7/10[3]	1,134.0	185.8	770 - 1,498	32.1%
	Sub-total	6,156.0	735.8	4,714 - 7,598	23.4%
WD	5/31-6/03 & 6/06-6/10[3]	5,249.0	1,958.5	1,410 - 9,088	73.1%
WD	6/13-6/17	2,640.0	1,185.3	317 - 4,963	88.0%
WD	6/20-6/24	2,640.0	550.7	1,561 - 3,719	40.9%
WD	6/27-7/01	1,380.0	368.6	658 - 2,102	52.4%
WD	7/05-7/08 & 7/11-7/13[3]	1,481.0	357.8	780 - 2,182	47.4%
	Sub-total	13,390.0	2,409.9	8,667 - 18,113	35.3%
TOTAL		19,546.0	2,519.8	14,607 - 24,485	25.3%
GRAND TOTAL		32,890.0	2,660.8	27,675 - 38,105	15.9%

[1] WE = weekend/holiday; WD = weekday.
[2] Relative precision of 95% confidence interval.
[3] Components were combined because of small sample sizes.

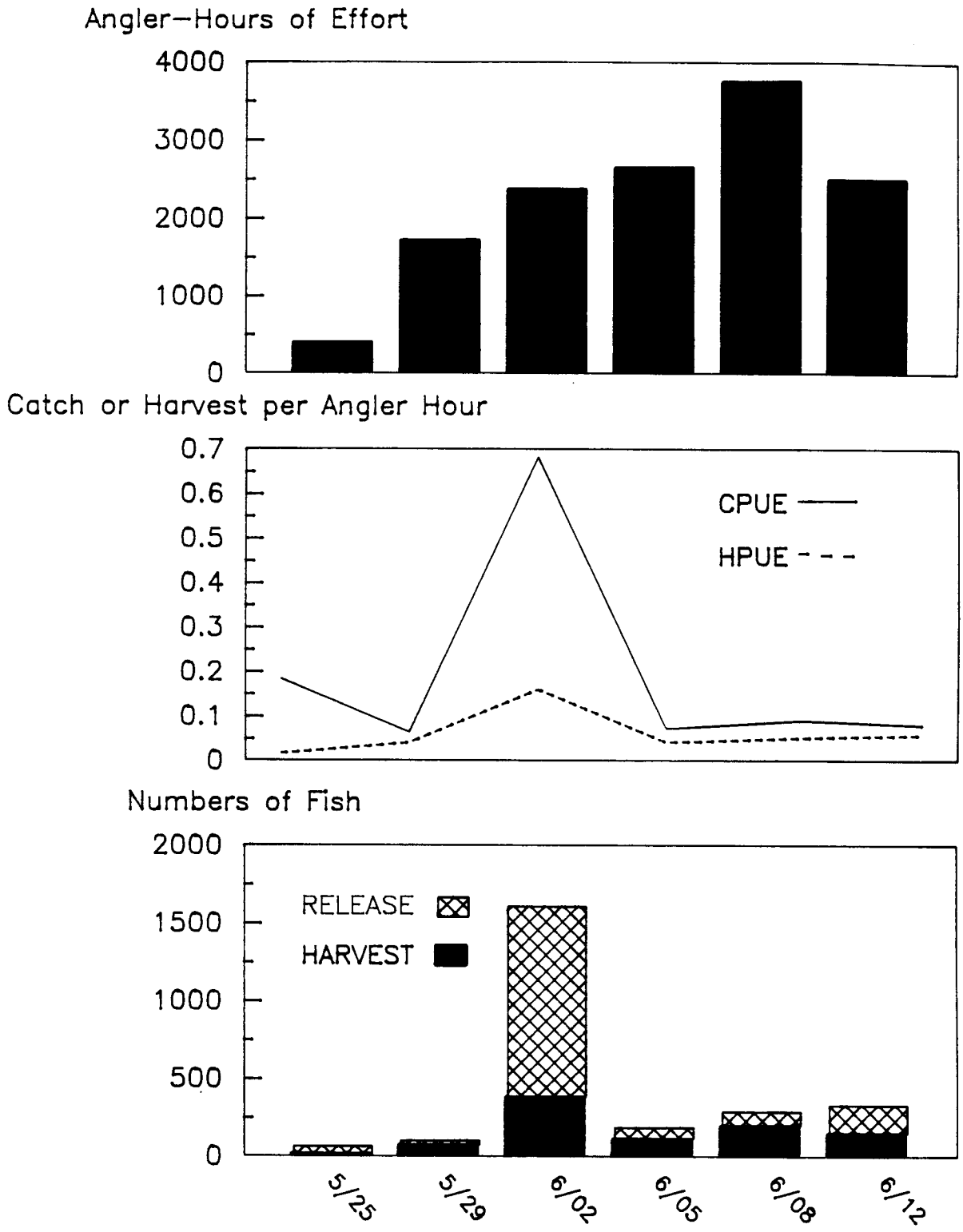

Figure 4. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the downstream location of Alexander Creek, 1988.

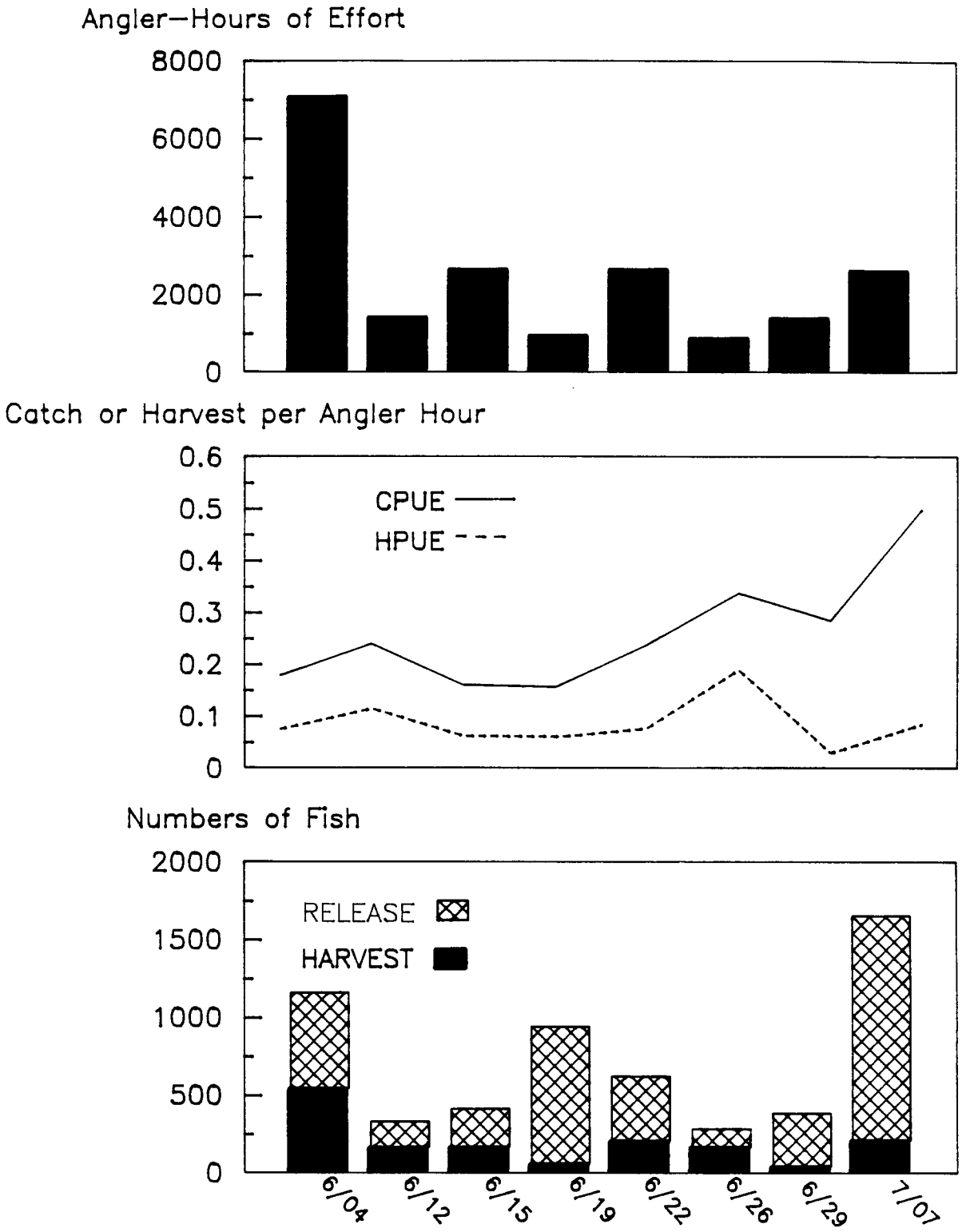

Figure 5. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in the upstream location of Alexander Creek, 1988.

Table 7. Estimated harvest and catch rates[1] of chinook salmon during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Alexander Creek, 1988.

Location Component[2]		Number of Interviews[3]	Harvest Rate	Standard Error	Catch Rate	Standard Error
Downstream						
WE	5/28-5/30	385	0.0418	0.0066	0.0636	0.0101
WE	6/04-6/05	303	0.0415	0.0058	0.0732	0.0111
WE	6/11-6/12	225	0.0588	0.0070	0.0793	0.0106
WD	5/23-5/27	28	0.0166	0.0073	0.1826	0.0401
WD	5/31-6/03	188	0.1599	0.0157	0.6827	0.0819
WD	6/06-6/10	244	0.0522	0.0074	0.0909	0.0126
Upstream						
WE	5/28-5/30 & 6/04-6/05[4]	12	0.0870	0.0347	0.0870	0.0347
WE	6/11-6/12	48	0.1144	0.0237	0.2399	0.0483
WE	6/18-6/19	54	0.0603	0.0158	0.1552	0.0273
WE	6/25-6/26	25	0.1892	0.0509	0.3378	0.0767
WE	7/02-7/04 & 7/09-7/10[4]	47	0.0982	0.0220	0.1718	0.0276
WD	5/31-6/03 & 6/06-6/10[4]	59	0.0728	0.0231	0.1921	0.0173
WD	6/13-6/17	89	0.0614	0.0297	0.1591	0.0258
WD	6/20-6/24	65	0.0767	0.0207	0.2379	0.0678
WD	6/27-7/01	81	0.0292	0.0106	0.2838	0.0396
WD	7/05-7/08 & 7/11-7/13[4]	24	0.0648	0.0366	0.9907	0.1794

[1] Harvest includes only fish kept and catch includes fish kept and fish reported as released. Rates are number of fish harvested or caught per hour fished for interviewed anglers.

[2] WE = weekend/holiday; WD = weekday.

[3] Completed- and incompleted-trip angler interviews were used.

[4] Components were combined because of small sample sizes.

(37%) were harvested in the downstream section and 1,531 chinook salmon (63%) were harvested in the upstream section (Table 8). In the downstream section, 65% of the chinook salmon caught by anglers were released and, in the upstream section, 68% of the chinook salmon caught were released. Catch and harvest peaked in the downstream section during the weekday component from 31 May through 3 June (Table 8, Figure 4) and in the upstream component during the combined weekday components of 31 May through 3 June and 6 June through 10 June (Table 8, Figure 5).

Lake Creek:

The creel survey of Lake Creek was conducted from 4 June through 13 July.

Effort. Numbers of anglers counted ranged from 0 to 177 (Appendix Table 8). Estimated angler-effort during the survey was 38,778 angler-hours (Table 9). Effort peaked during the weekday period from 18 June through 24 June (Figure 6).

Harvest Rates and Catch Rates. Daily harvest rates of chinook salmon ranged from 0.000 to 0.200 fish per hour and daily catch rates from 0.000 to 0.400 fish per hour (Appendix Table 9). The weekly component from 25 June to 1 July had the highest chinook salmon harvest rate (0.073 fish per hour) whereas catch rates of chinook salmon (0.162 fish per hour) peaked during the weekly component from 9 to 13 July (Table 10, Figure 6).

Harvest and Catch. The estimated harvest of chinook salmon in Lake Creek during the creel survey was 2,631 fish (Table 11). Catch and harvest peaked during the weekly component from 18 June through 24 June. Anglers released 53% of the chinook salmon caught during the Lake Creek fishery.

Clear Creek and Talkeetna River:

A direct expansion creel survey was conducted at the Talkeetna boat landing from 20 June through 13 July to estimate angler-effort and chinook salmon harvest by the fisheries in Clear Creek and the Talkeetna River.

Effort. The number of anglers exiting the fishery at Clear Creek through Talkeetna Landing during a surveyed period ranged from 4 to 144 (Appendix Table 10). Estimated angler-effort during the survey was 25,271 angler-hours of which 9,966 angler-hours (39%) occurred during the weekend/holiday component and 15,305 angler-hours (61%) during the weekday component (Table 12). Effort peaked during the weekday component from 27 June through 1 July (Table 12, Figure 7).

The number of anglers exiting the fishery in the Talkeetna River through Talkeetna Landing during a surveyed period ranged from 1 to 42 (Appendix Table 11). A total of 3,515 angler-hours of effort were estimated for this fishery, with peak effort occurring during the weekday component from 20 June through 24 June (Table 12, Figure 8).

Harvest Rates and Catch Rates. The weekday component from 11 to 13 July had the highest chinook salmon harvest rate, 0.056 fish per hour, of all

Table 8. Estimated number of chinook salmon harvested[1] and number caught[2] during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Alexander Creek, 1988.

Location Component[3]		Harvest	SE[4]	95% Confidence Interval	Catch	SE[4]	95% Confidence Interval
Downstream							
WE	5/28-5/30	71	14.4	43 - 99	109	22.1	66 - 152
WE	6/04-6/05	110	18.4	74 - 146	193	34.5	125 - 261
WE	6/11-6/12	146	26.4	94 - 198	338	83.7	174 - 502
	Sub-total	327	35.3	258 - 396	640	93.2	457 - 823
WD	5/23-5/27	6	4.7	0 - 15	71	47.8	0 - 165
WD	5/31-6/03	378	94.1	194 - 562	1,614	415.9	799 - 2,429
WD	6/06-6/10	196	33.9	130 - 262	297	49.6	200 - 394
	Sub-total	580	100.6	384 - 776	1,982	421.6	1,156 - 2,808
TOTAL		907	106.2	699 - 1,115	2,622	431.7	1,776 - 3,468
Upstream							
WE	5/28-5/30 & 6/04-6/05[5]	158	68.6	24 - 292	158	68.6	24 - 292
WE	6/11-6/12	161	58.7	46 - 276	337	122.1	98 - 576
WE	6/18-7/19	56	17.0	23 - 89	145	33.7	79 - 211
WE	6/25-6/26	163	90.2	0 - 340	292	156.8	0 - 599
WE	7/02-7/04 & 7/09-7/10[5]	111	30.7	51 - 171	195	44.4	108 - 282
	Sub-total	649	132.4	390 - 908	1,127	217.5	701 - 1,553
WD	5/31-6/03 & 6/06-6/10[5]	382	181.6	26 - 738	1,008	921.3	0 - 2,814
WD	6/13-6/17	162	101.1	0 - 360	420	198.2	32 - 808
WD	6/20-6/24	202	68.2	68 - 336	628	218.7	199 - 1,057
WD	6/27-7/01	40	17.7	5 - 75	392	117.1	162 - 622
WD	7/05-7/08 & 7/11-7/13[5]	96	57.5	0 - 209	1,467	438.3	608 - 2,326
	Sub-total	882	226.9	437 - 1,327	3,915	1,068.5	1,821 - 6,009
TOTAL		1,531	262.7	1,016 - 2,046	5,042	1,090.4	2,905 - 7,179
GRAND TOTAL		2,438	283.3	1,883 - 2,993	7,664	1,172.8	5,365 - 9,963

[1] Harvest includes only fish kept.
[2] Catch includes fish kept and fish reported as released.
[3] WE = weekend/holiday; WD = weekday.
[4] SE = standard error.
[5] Components were combined because of small sample sizes.

Table 9. Estimated number of angler-hours of effort during each week of the fishery for chinook salmon in Lake Creek, 1988.

Component[1]	Effort	Standard Error	95% Confidence Interval	Relative Precision[2]
WK 6/04-6/10	2,061.0	390.0	1,297 - 2,825	37.1%
WK 6/11-6/17	5,690.0	354.7	4,995 - 6,385	12.2%
WK 6/18-6/24	15,288.0	747.0	13,824 - 16,752	9.6%
WK 6/25-7/01	10,101.0	651.0	8,825 - 11,377	12.6%
WK 7/02-7/08	4,625.0	484.4	3,676 - 5,574	20.5%
WK 7/09-7/13	1,013.0	197.8	625 - 1,401	38.3%
TOTAL	38,778.0	1,238.5	36,351 - 41,205	6.3%

[1] WK = week.

[2] Relative precision of 95% confidence interval.

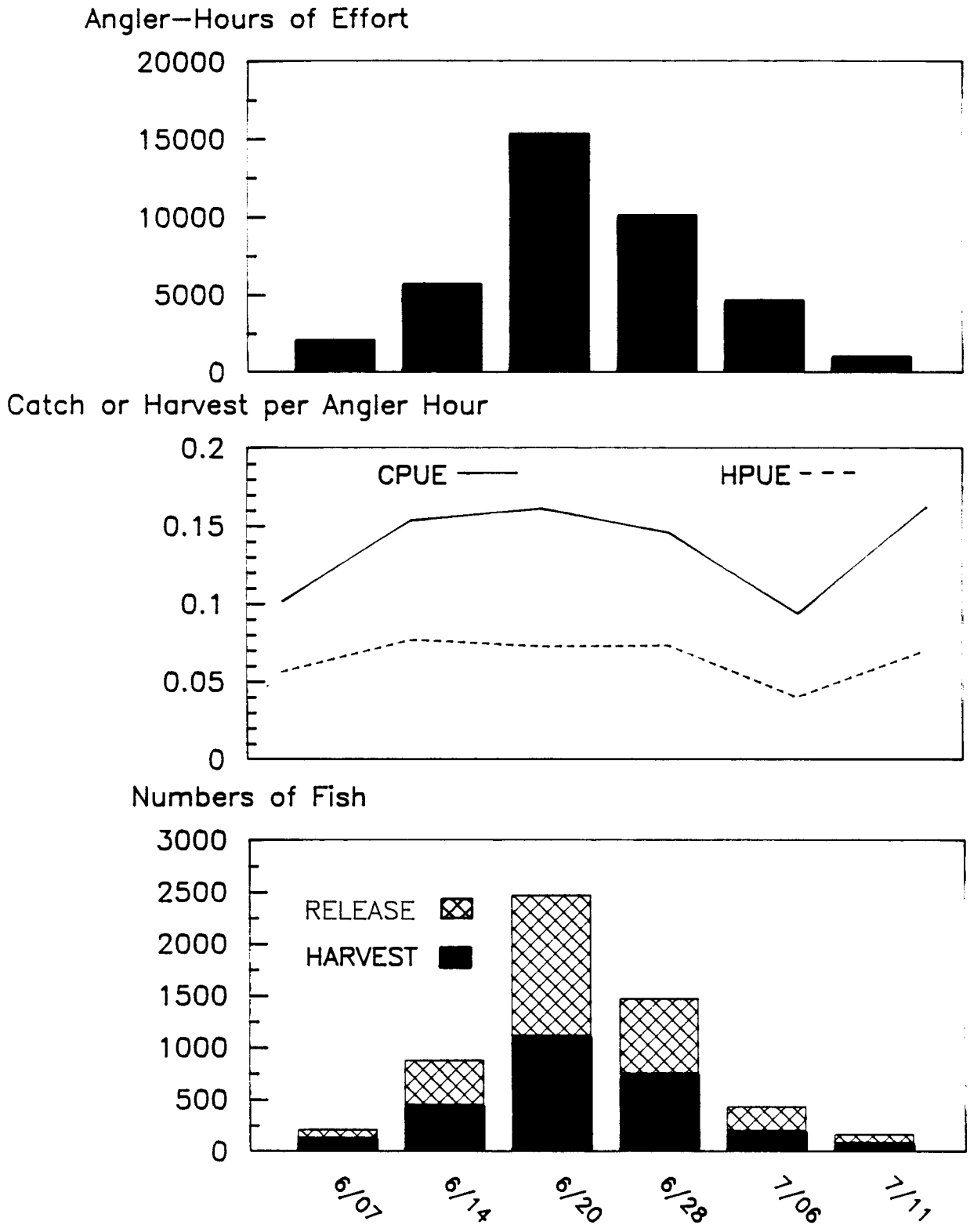

Figure 6. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Lake Creek, 1988.

Table 10. Estimated harvest and catch rates[1] of chinook salmon during each week of the fishery for chinook salmon in Lake Creek, 1988.

Component[2]	Number of Interviews[3]	Harvest Rate	Standard Error	Catch Rate	Standard Error
WK 6/04-6/10	184	0.0556	0.0108	0.1018	0.0138
WK 6/11-6/17	321	0.0761	0.0058	0.1540	0.0123
WK 6/18-6/24	504	0.0718	0.0039	0.1615	0.0079
WK 6/25-7/01	438	0.0726	0.0059	0.1455	0.0142
WK 7/02-7/08	228	0.0393	0.0057	0.0935	0.0119
WK 7/09-7/13	63	0.0692	0.0151	0.1624	0.0270

[1] Harvest includes only fish kept and catch includes fish kept and fish reported as released. Rates are number of fish harvested or caught per hour fished for interviewed anglers.

[2] WK = week.

[3] Completed-trip angler interviews only.

Table 11. Estimated number of chinook salmon harvested[1] and number caught[2] during each week of the fishery for chinook salmon in Lake Creek, 1988.

Component[3]	Harvest	SE[4]	95% Confidence Interval	Catch	SE[4]	95% Confidence Interval
WK 6/04-6/10	115	30.8	55 - 175	210	48.6	115 - 305
WK 6/11-6/17	433	42.7	349 - 517	876	88.6	702 - 1,050
WK 6/18-6/24	1,098	80.7	940 - 1,256	2,469	170.1	2,136 - 2,802
WK 6/25-7/01	733	75.6	585 - 881	1,470	171.9	1,133 - 1,807
WK 7/02-7/08	182	32.4	118 - 246	432	71.1	293 - 571
WK 7/09-7/13	70	20.3	30 - 110	165	41.8	83 - 247
TOTAL	2,631	128.3	2,380 - 2,882	5,622	274.8	5,083 - 6,161

[1] Harvest includes only fish kept.

[2] Catch includes fish kept and fish reported as released.

[3] WK = week.

[4] SE = standard error.

Table 12. Estimated number of angler-hours of effort during each of the weekday and weekend/holiday components of the fisheries for chinook salmon in Clear Creek and Talkeetna River, 1988.

Fishery Component[1]		Effort	Standard Error	95% Confidence Interval	Relative Precision[2]
Clear Creek					
WE	6/25-6/26	2,613.4	1,095.4	466 - 4,760	82.2%
WE	7/02-7/04	5,052.5	792.1	3,500 - 6,605	30.7%
WE	7/09-7/10	2,300.5	259.3	1,792 - 2,809	22.1%
	Sub-total	9,966.4	1,376.4	7,269 - 12,664	27.1%
WD	6/20-6/24	2,438.1	1,168.6	148 - 4,729	93.9%
WD	6/27-7/01	6,045.7	569.0	4,930 - 7,161	18.4%
WD	7/05-7/08	5,147.5	752.3	3,673 - 6,622	28.6%
WD	7/11-7/13	1,673.2	188.9	1,303 - 2,043	22.1%
	Sub-total	15,304.5	1,513.6	12,338 - 18,271	19.4%
TOTAL		25,270.9	2,045.9	21,261 - 29,281	15.9%
Talkeetna River					
WE	6/25-6/26	741.6	461.5	0 - 1,646	122.0%
WE	7/02-7/04	786.0	182.4	428 - 1,144	45.5%
	Sub total	1,527.6	496.2	555 - 2,500	63.7%
WD	6/20-6/24	841.9	265.0	323 - 1,361	61.7%
WD	6/27-7/01	807.6	388.9	45 - 1,570	94.4%
WD	7/05-7/08	338.3	261.7	0 - 851	151.6%
	Sub-total	1,987.8	538.5	932 - 3,043	53.1%
TOTAL		3,515.4	732.3	2,080 - 4,951	40.8%

[1] WE = weekend/holiday; WD = weekday.

[2] Relative precision of 95% confidence interval.

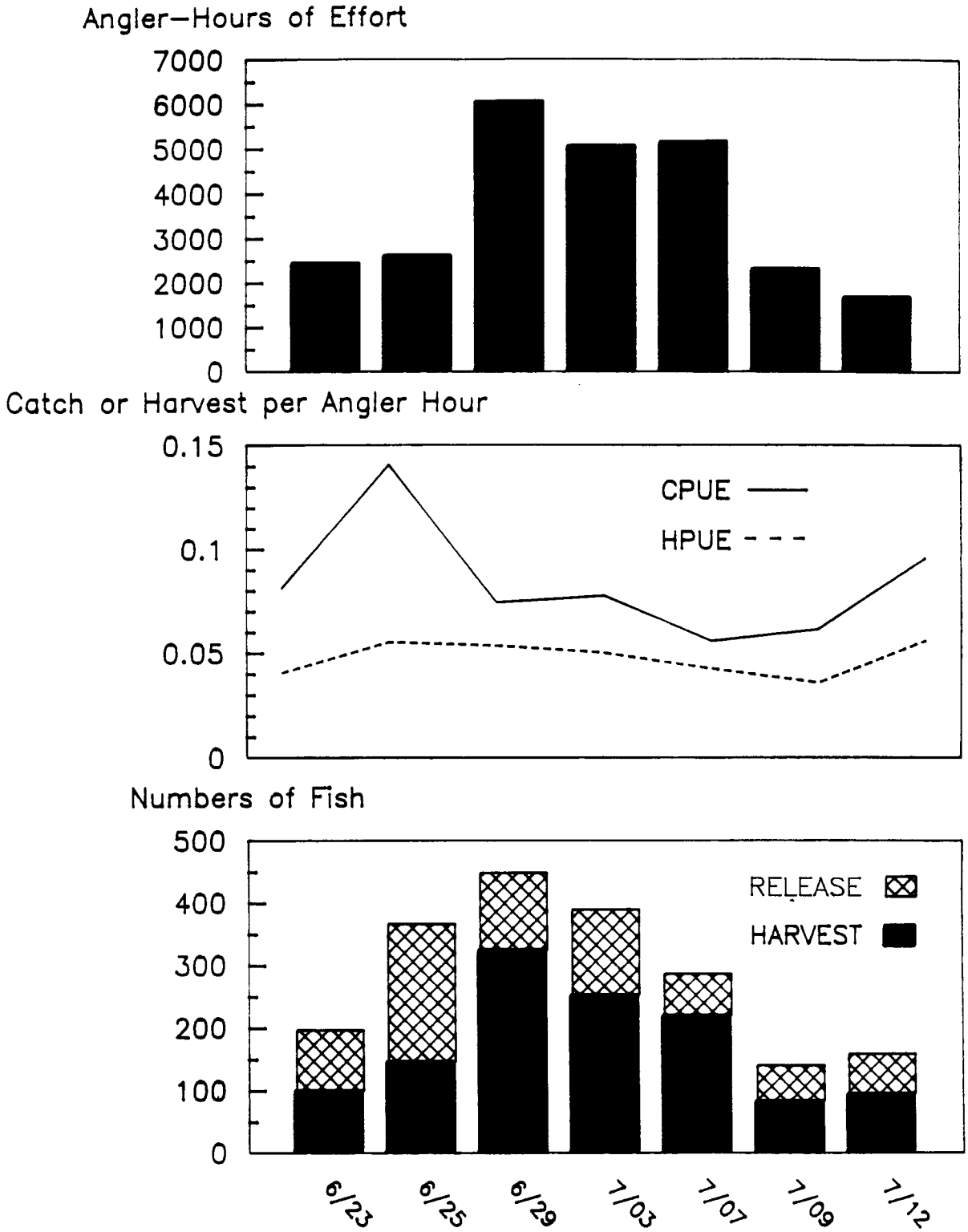

Figure 7. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Clear Creek, 1988.

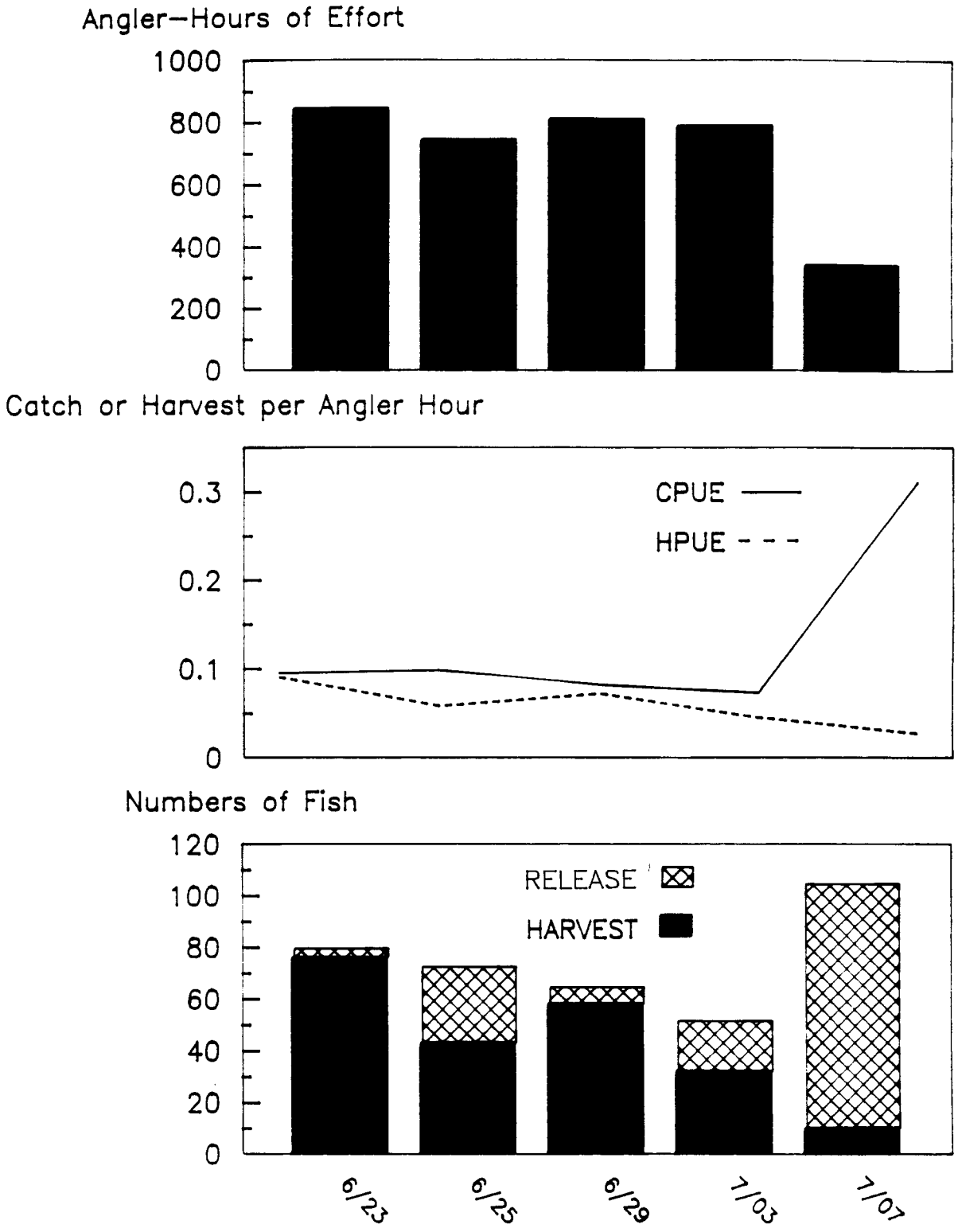

Figure 8. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Talkeetna River, 1988.

components in the fishery at Clear Creek (Table 13, Figure 7). Catch rates of chinook salmon (0.140 fish per hour) peaked during the first weekend of the season (25 June through 26 June) at Clear Creek (Table 13, Figure 7).

The weekday component of 20 to 24 June had the highest chinook salmon harvest rate, 0.091 per hour, of all the components in the fishery for Talkeetna River (Table 14, Figure 8). Catch rates of chinook salmon (0.031 fish per hour) peaked during the last weekday component (5 July through 8 July) of the fishery at Talkeetna River (Table 14, Figure 8).

Harvest and Catch. The estimated harvest of chinook salmon in Clear Creek during the creel survey was 1,217 fish of which 481 chinook salmon (40%) were harvested during the weekend/holiday component and 736 chinook salmon (60%) were harvested during the weekday component (Table 14). Catch and harvest peaked during the weekday component from 27 June through 1 July (Table 14, Figure 7). During the fishery at Clear Creek, 39% of the chinook salmon caught by anglers were released.

A harvest of only 219 chinook salmon was estimated for the fishery in the Talkeetna River of which 60% occurred during the weekday components of the fishery (Table 14). Catch peaked during the weekday component from 5 July though 8 July whereas harvest peaked during the weekday component from 20 June through 24 June (Table 14, Figure 8). Anglers released 42% of their chinook salmon catch during the Talkeetna River fishery.

Roadside Streams

The roadside streams are those which are accessible to anglers from the road system. In 1988, creel surveys were conducted in the following roadside streams: Willow, Sheep, and Montana Creeks. Direct expansion creel surveys were used at all these locations. The fisheries in all roadside streams are weekend-only fisheries (from midnight Friday to midnight Monday).

Willow Creek:

Direct expansion creel surveys were conducted at the stream mouth and the Parks Highway bridge locations on Willow Creek during the four weekends from 18 June to 11 July. Anglers fishing at Willow Creek also exited the fishery at Susitna Landing during the four weekends from 11 June to 11 July.

Effort. The number of anglers exiting the fishery at Willow Creek through Susitna Landing during a surveyed period ranged from 1 to 15 (Appendix Table 12). Most anglers exited the fishery at the mouth, where the number of anglers exiting the fishery during a surveyed period ranged from 13 to 125 (Appendix Table 13), or at the Parks Highway bridge, where the number of anglers exiting the fishery ranged from 2 to 72 (Appendix Table 14). Estimated angler-effort during the survey was 23,409 angler-hours (Table 15). Most anglers exited the fishery at the mouth (59% of the total) or Parks Highway bridge (37% of the total); only 4% of the anglers exited the fishery through Susitna Landing. Effort peaked during the weekend component from 2 July through 4 July (Table 15, Figure 9).

Table 13. Estimated harvest and catch rates[1] of chinook salmon during each of the weekday and weekend/holiday components of the fishery for chinook salmon in Clear Creek and Talkeetna River, 1988.

Location Component[2]	Number of Interviews[3]	Harvest Rate	Standard Error	Catch Rate	Standard Error
Clear Creek					
WE 6/25-6/26	184	0.0554	0.0065	0.1409	0.0188
WE 7/02-7/04	368	0.0502	0.0046	0.0778	0.0072
WE 7/09-7/10	186	0.0358	0.0056	0.0616	0.0102
WD 6/20-6/24	97	0.0406	0.0116	0.0813	0.0191
WD 6/27-7/01	222	0.0536	0.0084	0.0744	0.0135
WD 7/05-7/08	174	0.0426	0.0058	0.0560	0.0080
WD 7/11-7/13	130	0.0560	0.0076	0.0956	0.0149
Talkeetna River					
WE 6/25-6/26	44	0.0584	0.0180	0.0985	0.0400
WE 7/02-7/04	52	0.0451	0.0104	0.0729	0.0163
WD 6/20-6/24	37	0.0905	0.0328	0.0950	0.0310
WD 6/27-7/01	28	0.0725	0.0119	0.0821	0.0089
WD 7/05-7/08	17	0.0270	0.0085	0.3108	0.0946

[1] Harvest includes only fish kept and catch includes fish kept and fish reported as released. Rates are number of fish harvested or caught per hour fished for interviewed anglers.

[2] WE = weekend/holiday; WD = weekday.

[3] Completed-trip angler interviews only.

Table 14. Estimated number of chinook salmon harvested[1] and number caught[2] during each of the weekday and weekend/holiday components of the fisheries for chinook salmon in Clear Creek and Talkeetna River, 1988.

Fishery Component[3]		Harvest	SE[4]	95% Confidence Interval	Catch	SE[4]	95% Confidence Interval
Clear Creek							
WE	6/25-6/26	146	65.0	19 - 273	368	104.8	163 - 573
WE	7/02-7/04	252	61.0	132 - 372	391	97.5	200 - 582
WE	7/09-7/10	83	12.1	59 - 107	142	18.5	106 - 178
	Sub-total	481	90.0	305 - 657	901	144.3	618 - 1,184
WD	6/20-6/24	99	50.5	0 - 198	198	112.1	0 - 418
WD	6/27-7/01	324	46.5	233 - 415	450	69.9	313 - 587
WD	7/05-7/08	219	18.1	184 - 254	288	20.2	248 - 328
WD	7/11-7/13	94	10.0	74 - 114	160	26.4	108 - 212
	Sub-total	736	71.7	595 - 877	1,096	136.2	829 - 1,363
TOTAL		1,217	115.0	992 - 1,442	1,997	198.5	1,608 - 2,386
Talkeetna River							
WE	6/25-6/26	43	26.0	0 - 94	73	43.9	0 - 159
WE	7/02-7/04	32	11.1	10 - 54	52	20.1	13 - 91
	Sub-total	75	28.3	20 - 130	125	48.3	30 - 220
WD	6/20-6/24	76	21.5	34 - 118	80	18.5	44 - 116
WD	6/27-7/01	58	29.8	0 - 116	65	29.1	8 - 122
WD	7/05-7/08	10	5.7	0 - 21	105	70.6	0 - 243
	Sub-total	144	37.2	71 - 217	250	78.6	96 - 404
TOTAL		219	46.7	127 - 311	375	92.2	194 - 566

[1] Harvest includes only fish kept.

[2] Catch includes fish kept and fish reported as released.

[3] WE = weekend/holiday; WD = weekday.

[4] SE = standard error.

Table 15. Estimated number of angler-hours of effort during the weekend-only fisheries for chinook salmon in Willow Creek, 1988.

Fishery - Location Component[1]		Effort	Standard Error	95% Confidence Interval	Relative Precision[2]
Willow Creek - Susitna Landing					
WE	6/18-6/20	277.5	108.8	64 - 491	76.8%
WE	6/25-6/27	135.0	62.6	12 - 258	90.9%
WE	7/02-7/04	343.0	136.4	76 - 611	77.9%
WE	7/09-7/11	290.0	188.9	0 - 661	127.5%
	Sub-total	1,045.5	264.7	1,310 - 1,565	49.6%
Willow Creek - Mouth					
WE	6/18-6/20	2,940.2	453.4	2,052 - 3,829	30.2%
WE	6/25-6/27	4,654.7	880.6	2,929 - 6,381	37.1%
WE	7/02-7/04	3,474.6	200.2	3,082 - 3,867	11.3%
WE	7/09-7/11	2,650.7	457.4	1,754 - 3,547	33.8%
	Sub-total	13,720.2	1,109.2	11,546 - 15,894	15.8%
Willow Creek - Bridge					
WE	6/18-6/20	1,407.6	248.9	920 - 1,895	34.7%
WE	6/25-6/27	1,378.5	392.2	610 - 2,147	55.8%
WE	7/02-7/04	2,596.4	226.1	2,153 - 3,040	17.1%
WE	7/09-7/11	3,260.8	115.7	3,034 - 3,488	7.0%
	Sub-total	8,643.3	529.4	7,606 - 9,681	12.0%
TOTAL		23,409.0	1,257.2	20,946 - 25,874	10.5%

[1] WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

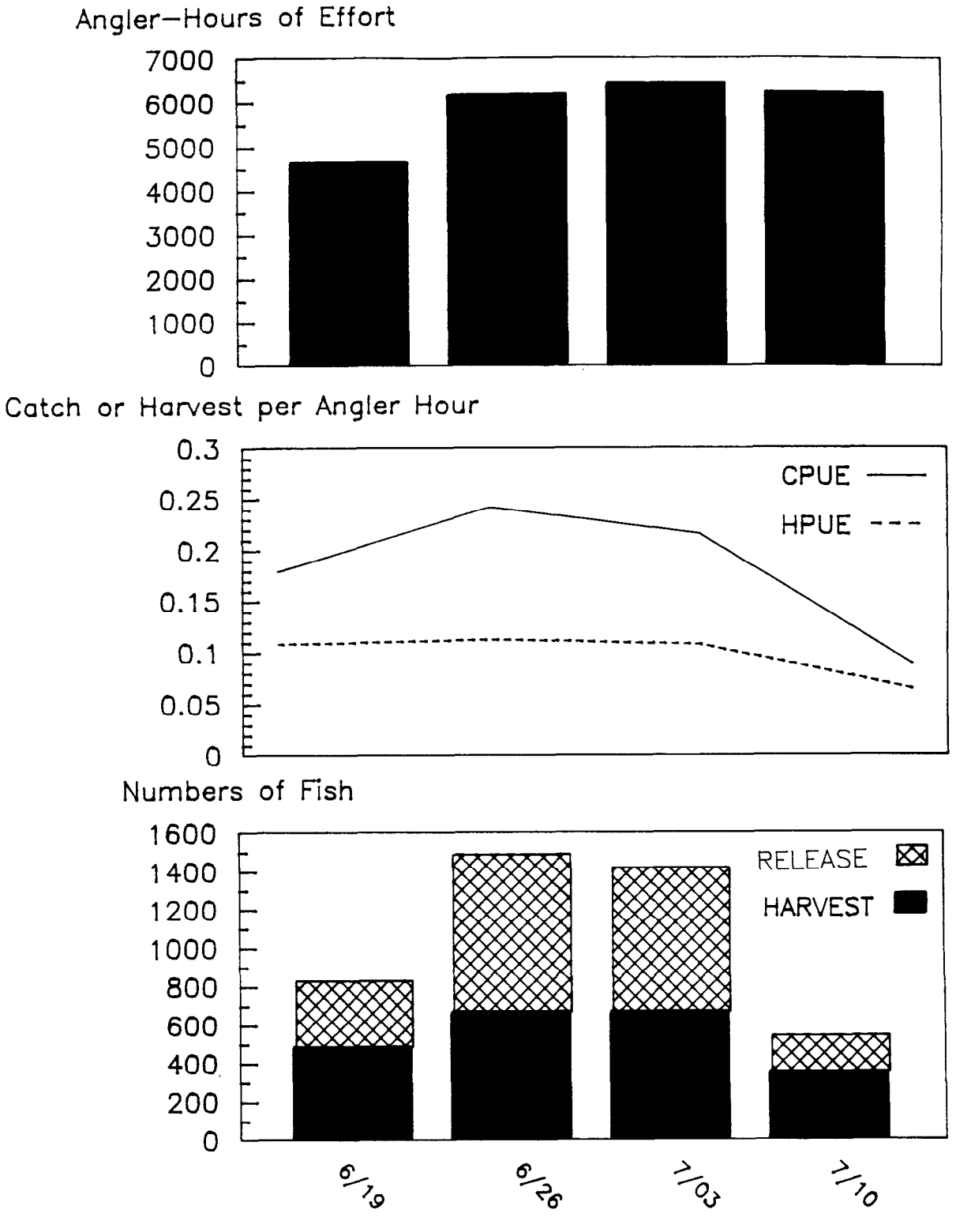

Figure 9. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Willow Creek, 1988.

Harvest Rates and Catch Rates. The highest chinook salmon harvest rate (0.128 fish per hour) for the Willow Creek fishery occurred during the weekend from 25 June to 27 June for anglers exiting the fishery at the Parks Highway Bridge (Table 16, Figure 9). Catch rates of chinook salmon (0.275 fish per hour) peaked during this same weekend, but for anglers exiting the fishery from the mouth of the stream (Table 16, Figure 9).

Harvest and Catch. The estimated harvest of chinook salmon in Willow Creek during the creel survey was 2,160 fish (Table 17). Most of the harvest occurred during the middle two weekends the fishery was open (Figure 9). During the Willow Creek fishery, 50% of the chinook salmon caught by anglers were released.

Sheep Creek:

A direct expansion creel survey was conducted at the Parks Highway bridge on Sheep Creek during the four weekends from 11 June to 4 July.

Effort. The number of anglers exiting the fishery at Sheep Creek during a surveyed period ranged from 31 to 153 (Appendix Table 15). Estimated angler-effort during the survey was 22,101 angler-hours (Table 18). Most of the effort (34% of the total) occurred during the third weekend of the fishery (Figure 10).

Harvest Rates and Catch Rates. The highest chinook salmon harvest and catch rates (0.109 and 0.138 fish per hour, respectively) for the Sheep Creek fishery occurred during the weekend from 18 June to 20 June (Table 19, Figure 10).

Harvest and Catch. The estimated harvest of chinook salmon in Sheep Creek during the creel survey was 1,776 fish (Table 20). Most of the catch and harvest occurred during the middle two weekends the fishery was open (Figure 10). Only 28% of the chinook salmon caught by anglers were released during the Sheep Creek fishery.

Montana Creek:

A direct expansion creel survey was conducted at the Parks Highway bridge on Montana Creek during the three weekends from 18 June to 4 July.

Effort. The number of anglers exiting the fishery at Montana Creek during a surveyed period ranged from 17 to 152 (Appendix Table 16). Estimated angler-effort during the survey was 14,604 angler-hours (Table 18). Most of the effort (53% of the total) occurred during the last weekend of the fishery (Figure 11).

Harvest Rates and Catch Rates. The highest chinook salmon harvest and catch rates (0.099 and 0.139 fish per hour respectively) for the fishery in Montana Creek occurred during the weekend from 18 to 20 June (Table 19, Figure 11).

Harvest and Catch. The estimated harvest of chinook salmon in Montana Creek during the creel survey was 919 fish (Table 20). Most of the catch and

Table 16. Estimated harvest and catch rates[1] of chinook salmon during the weekend-only fisheries for chinook salmon in Willow Creek, 1988.

Location Component[2]	Number of Interviews[3]	Harvest Rate	Standard Error	Catch Rate	Standard Error
Willow Creek, Bridge					
WE 6/18-6/20	135	0.0904	0.0096	0.1174	0.0138
WE 6/25-6/27	167	0.1277	0.0118	0.2031	0.0226
WE 7/02-7/04	207	0.1129	0.0095	0.1529	0.0190
WE 7/09-7/11	269	0.0726	0.0068	0.0799	0.0077
Willow Creek, Mouth					
WE 6/18-6/20	308	0.1050	0.0069	0.2115	0.0209
WE 6/25-6/27	367	0.1011	0.0064	0.2537	0.0259
WE 7/02-7/04	251	0.1012	0.0078	0.2746	0.0315
WE 7/09-7/11	298	0.0378	0.0078	0.0975	0.0129
Willow Creek, Susitna Landing					
WE 6/18-6/20	24	0.1004	0.0364	0.1255	0.0435
WE 6/25-6/27	13	0.0980	0.0678	0.0980	0.0678
WE 7/02-7/04	23	0.0450	0.0238	0.1532	0.0462
WE 7/09-7/11	18	0.0452	0.0203	0.0452	0.0203
Willow Creek, All sites combined					
WE 6/18-6/20	467	0.1004	0.0056	0.1788	0.0148
WE 6/25-6/27	547	0.1091	0.0056	0.2349	0.0212
WE 7/02-7/04	482	0.1033	0.0058	0.2147	0.0179
WE 7/09-7/11	585	0.0564	0.0045	0.0859	0.0071

[1] Harvest includes only fish kept and catch includes fish kept and fish reported as released. Rates are number of fish harvested or caught per hour fished for interviewed anglers.

[2] WE = weekend/holiday; WD = weekday.

[3] Completed-trip angler interviews only.

Table 17. Estimated number of chinook salmon harvested[1] and number caught[2] during the weekend-only fisheries for chinook salmon in Willow Creek, 1988.

Location Component[3]		Harvest	SE[4]	95% Confidence Interval	Catch	SE[4]	95% Confidence Interval
Willow Creek - Susitna Landing							
WE	6/18-6/20	26	12.2	2 - 50	35	16.6	2 - 68
WE	6/25-6/27	14	6.6	1 - 27	14	6.6	1 - 27
WE	7/02-7/04	15	6.5	2 - 28	54	24.2	7 - 101
WE	7/09-7/11	12	4.1	4 - 20	12	4.1	4 - 20
	Sub-total	67	15.9	36 - 98	115	84.3	55 - 175
Willow Creek - Mouth							
WE	6/18-6/20	326	51.1	226 - 426	629	79.3	474 - 784
WE	6/25-6/27	474	45.0	386 - 562	1,200	270.3	670 - 1,730
WE	7/02-7/04	354	38.8	278 - 430	954	223.1	517 - 1,391
WE	7/09-7/11	93	21.4	51 - 135	265	104.0	61 - 469
	Sub-total	1,247	81.2	1,088 - 1,406	3,048	374.1	2,315 - 3,781
Willow Creek - Bridge							
WE	6/18-6/20	130	46.4	39 - 221	172	72.4	30 - 314
WE	6/25-6/27	176	37.8	102 - 250	280	73.1	137 - 423
WE	7/02-7/04	296	50.6	197 - 395	416	73.2	273 - 559
WE	7/09-7/11	244	47.4	151 - 337	272	58.6	157 - 387
	Sub-total	846	91.6	666 - 1,026	1,140	139.2	867 - 1,413
TOTAL		2,160	123.5	1,918 - 2,402	4,303	400.3	3,518 - 5,088

[1] Harvest includes only fish kept.

[2] Catch includes fish kept and fish reported as released.

[3] WE = weekend/holiday.

[4] SE = standard error.

Table 18. Estimated number of angler-hours of effort during the weekend-only fisheries for chinook salmon in Sheep and Montana Creeks, 1988.

Fishery Component[1]	Effort	Standard Error	95% Confidence Interval	Relative Precision[2]
Sheep Creek				
WE 6/11-6/13	4,573.8	326.4	3,934 - 5,214	14.0%
WE 6/18-6/20	5,590.0	370.0	4,865 - 6,315	13.0%
WE 6/25-6/27	7,618.7	1,009.6	5,640 - 9,598	26.0%
WE 7/02-7/04	4,318.4	441.4	3,453 - 5,184	20.0%
TOTAL	22,100.9	1,207.3	19,735 - 24,467	10.7%
Montana				
WE 6/18-6/20	1,835.3	245.6	1,354 - 2,317	26.2%
WE 6/25-6/27	5,020.6	455.4	4,128 - 5,913	17.8%
WE 7/02-7/04	7,748.3	594.6	6,583 - 8,914	15.0%
TOTAL	14,604.2	788.2	13,059 - 16,149	10.6%

[1] WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

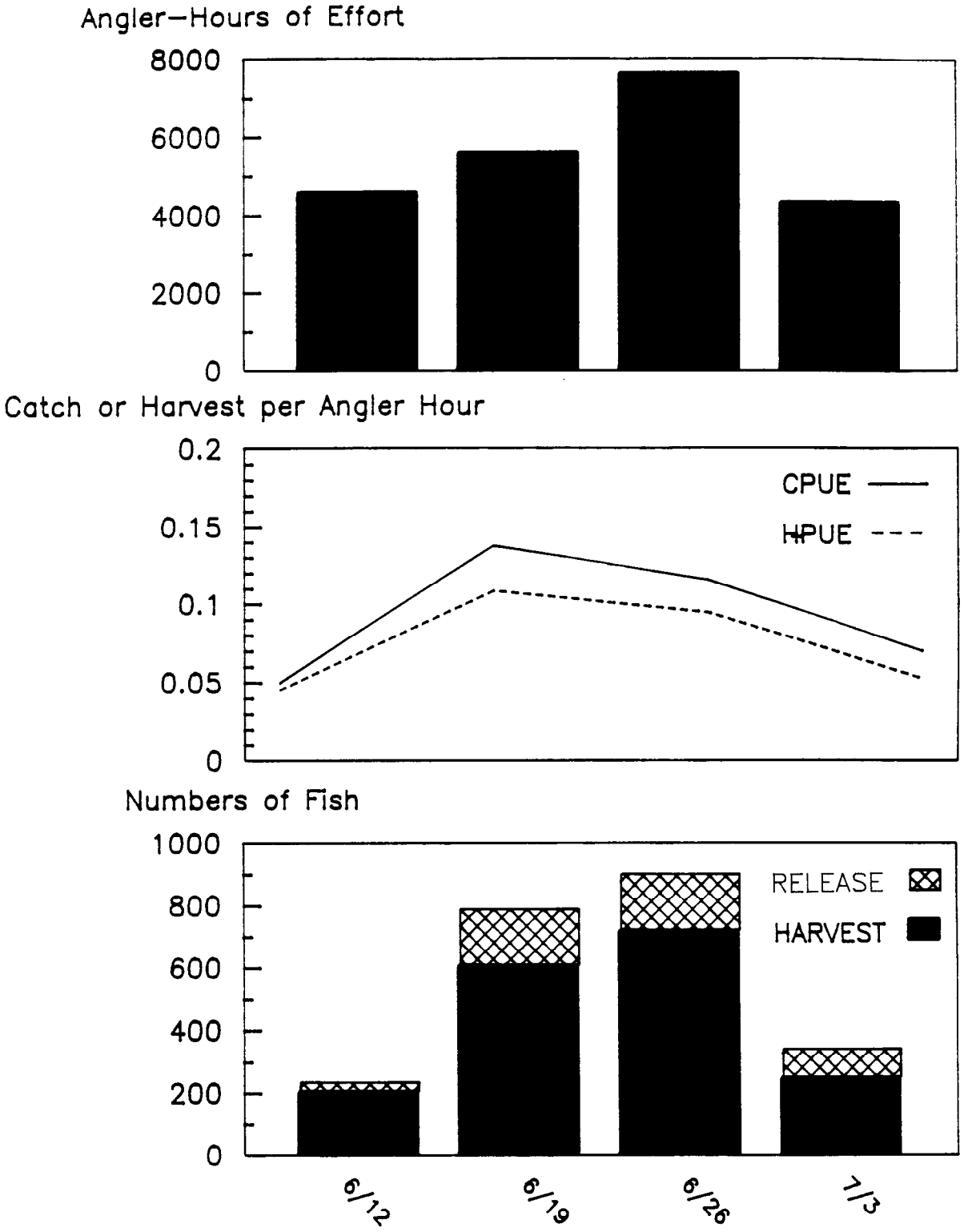

Figure 10. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Sheep Creek, 1988.

Table 19. Estimated harvest and catch rates[1] of chinook salmon during the weekend-only fisheries for chinook salmon in Sheep and Montana Creeks, 1988.

Location Component[2]	Number of Interviews[3]	Harvest Rate	Standard Error	Catch Rate	Standard Error
Sheep Creek					
WE 6/11-6/13	342	0.0431	0.0054	0.0499	0.0070
WE 6/18-6/20	490	0.1086	0.0073	0.1380	0.0097
WE 6/25-6/27	657	0.0946	0.0056	0.1156	0.0082
WE 7/02-7/04	431	0.0525	0.0053	0.0698	0.0097
Montana Creek					
WE 6/18-6/20	269	0.0992	0.0112	0.1392	0.0156
WE 6/25-6/27	629	0.0537	0.0078	0.0813	0.0174
WE 7/02-7/04	787	0.0625	0.0042	0.0866	0.0068

[1] Harvest includes only fish kept and catch includes fish kept and fish reported as released. Rates are number of fish harvested or caught per hour fished for interviewed anglers.

[2] WE = weekend/holiday.

[3] Completed-trip angler interviews only.

Table 20. Estimated number of chinook salmon harvested[1] and number caught[2] during the weekend-only fisheries for chinook salmon in Sheep and Montana Creeks, 1988.

Fishery Component[3]	Harvest	SE[4]	95% Confidence Interval	Catch	SE[4]	95% Confidence Interval
Sheep Creek						
WE 6/11-6/13	204	45.6	115 - 293	238	51.6	137 - 339
WE 6/18-6/20	606	70.1	469 - 743	791	127.5	541 - 1,041
WE 6/25-6/27	718	107.9	507 - 929	903	150.6	608 - 1,198
WE 7/02-7/04	248	82.8	86 - 410	343	93.4	160 - 526
TOTAL	1,776	159.7	1,463 - 2,089	2,275	224.3	1,835 - 2,715
Montana Creek						
WE 6/18-6/20	189	68.7	54 - 324	263	91.6	83 - 443
WE 6/25-6/27	256	42.0	174 - 338	383	73.7	239 - 527
WE 7/02-7/04	474	75.8	325 - 623	660	143.7	378 - 942
TOTAL	919	110.6	702 - 1,136	1,306	185.7	942 - 1,670

[1] Harvest includes only fish kept.

[2] Catch includes fish kept and fish reported as released.

[3] WE = weekend/holiday.

[4] SE = standard error.

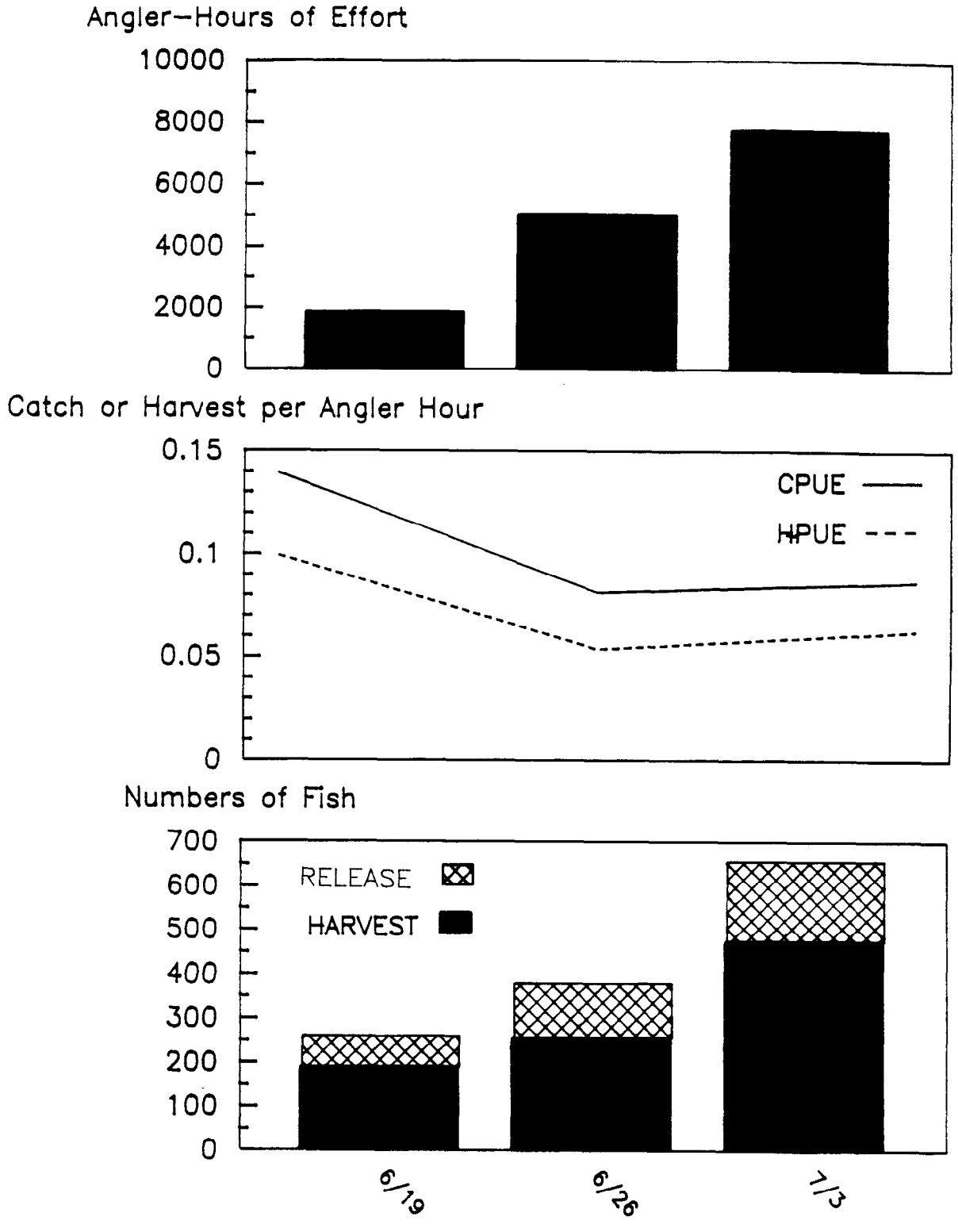

Figure 11. Angler-effort; catch and harvest per unit effort (CPUE and HPUE); and, catch and harvest of chinook salmon for temporal components of the sport fishery in Montana Creek, 1988.

harvest occurred during the last weekend the fishery was open (Figure 11). During the Montana Creek fishery, 30% of the chinook salmon caught by anglers were released.

Summary:

For the fisheries in Northern Cook Inlet surveyed during 1988, most of the angler-effort (73%), harvest of chinook salmon (67%), and catch of chinook salmon (72%) occurred in the remote fisheries: Deshka River, Alexander Creek, Lake Creek, Clear Creek, and the Talkeetna River (Table 21). Of these, the Deshka River fishery had the largest estimated effort and harvest of chinook salmon whereas Alexander Creek had the largest chinook salmon catch of all the fisheries surveyed. The Lake Creek fishery had the second largest effort, while the Deshka River had the second largest catch of chinook salmon. The proportion of the harvest and catch of chinook salmon from each of the remote fisheries was not equal to the proportion of the effort in the fishery to the total for the remote fisheries (Figure 12). For example, Alexander Creek had 25% of the harvest and 37% of the catch, but only 20% of the effort for the remote streams.

While the roadside streams were overall less significant in terms of effort (27%), harvest (33%), and catch (28%) of chinook salmon, they did provide significant fishing opportunity during 1988. The harvest of chinook salmon from two roadside streams (Willow and Sheep Creeks) were larger than in two remote streams (Clear Creek and the Talkeetna River). As was the case for the remote streams, the proportion of the catch and harvest by each roadside fishery was not equal to the proportion of effort in each fishery. For example, Willow Creek had 39% of the weekend-only effort but 44% of the harvest and 55% of the catch of chinook salmon (Figure 13).

The number of angler-hours of effort for each fishery is not the best measure of the popularity of the fisheries because the fisheries in the remote streams are conducted 7 days a week over a period of 4 to 6 weeks while the fisheries in the roadside streams occur during three or four 3-day weekends. For this reason, we divided the totals for angler-effort, chinook salmon harvest, and chinook salmon catch estimated for each fishery by the number of possible fishing hours during the creel survey period for that fishery to index the intensity of the fishery. The number of hours of possible fishing was computed as the product of the number of days the fishery was open during the creel survey period and the number of hours in the defined angler day. The computed indices can be used to compare the popularity of the weekend-only fisheries in the roadside streams in relation to the remote fisheries. The fisheries in Willow and Sheep Creeks rank as the top two for the indices for angler-effort, harvest, and catch (Table 22, Figure 14). More chinook salmon were harvested in Willow Creek per hour the fishery was open (7.5) than in any other surveyed fishery. The next largest harvest per hour was in Sheep Creek where 6.2 chinook salmon were harvested during each hour the fishery was open. Lake Creek and the downstream section of the Deshka River were the most popular remote fisheries.

Table 21. Summary of estimated angler-effort, chinook salmon harvest, and chinook salmon catch by sport fisheries in northern Cook Inlet that were surveyed during 1988.

Fishery	Effort (angler-hours)	Standard Error	Rel. Pre.[1]	Harvest[2]	Standard Error	Rel. Pre.[1]	Catch[3]	Standard Error	Rel. Pre.[1]
Deshka River	60,418	3,509	11.4%	3,230	388	23.5%	5,060	727	28.2%
Alexander Creek	32,890	2,661	15.9%	2,438	283	22.8%	7,664	1,173	30.0%
Lake Creek	38,778	1,238	6.3%	2,631	128	9.5%	5,622	275	9.6%
Clear Creek	25,271	2,046	15.9%	1,217	115	18.5%	1,997	199	19.4%
Talkeetna River	3,515	732	40.8%	219	47	42.1%	375	92	48.1%
Remote Sub-total	160,872	5,064	6.2%	9,735	512	10.3%	20,718	1,423	13.5%
Willow Creek	23,410	1,257	10.5%	2,160	123	11.2%	4,303	400	18.2%
Sheep Creek	22,101	1,207	10.7%	1,776	160	17.7%	2,275	224	19.3%
Montana Creek	14,604	788	10.6%	919	111	23.7%	1,306	186	27.9%
Roadside Sub-total	60,115	1,913	6.2%	4,855	230	9.3%	7,884	495	12.3%
GRAND TOTAL	220,987	5,413	4.8%	14,590	562	7.5%	28,602	1,507	10.3%

[1] Relative precision of 95% confidence interval.

[2] Harvest includes only fish kept.

[3] Catch includes fish kept and fish reported as released.

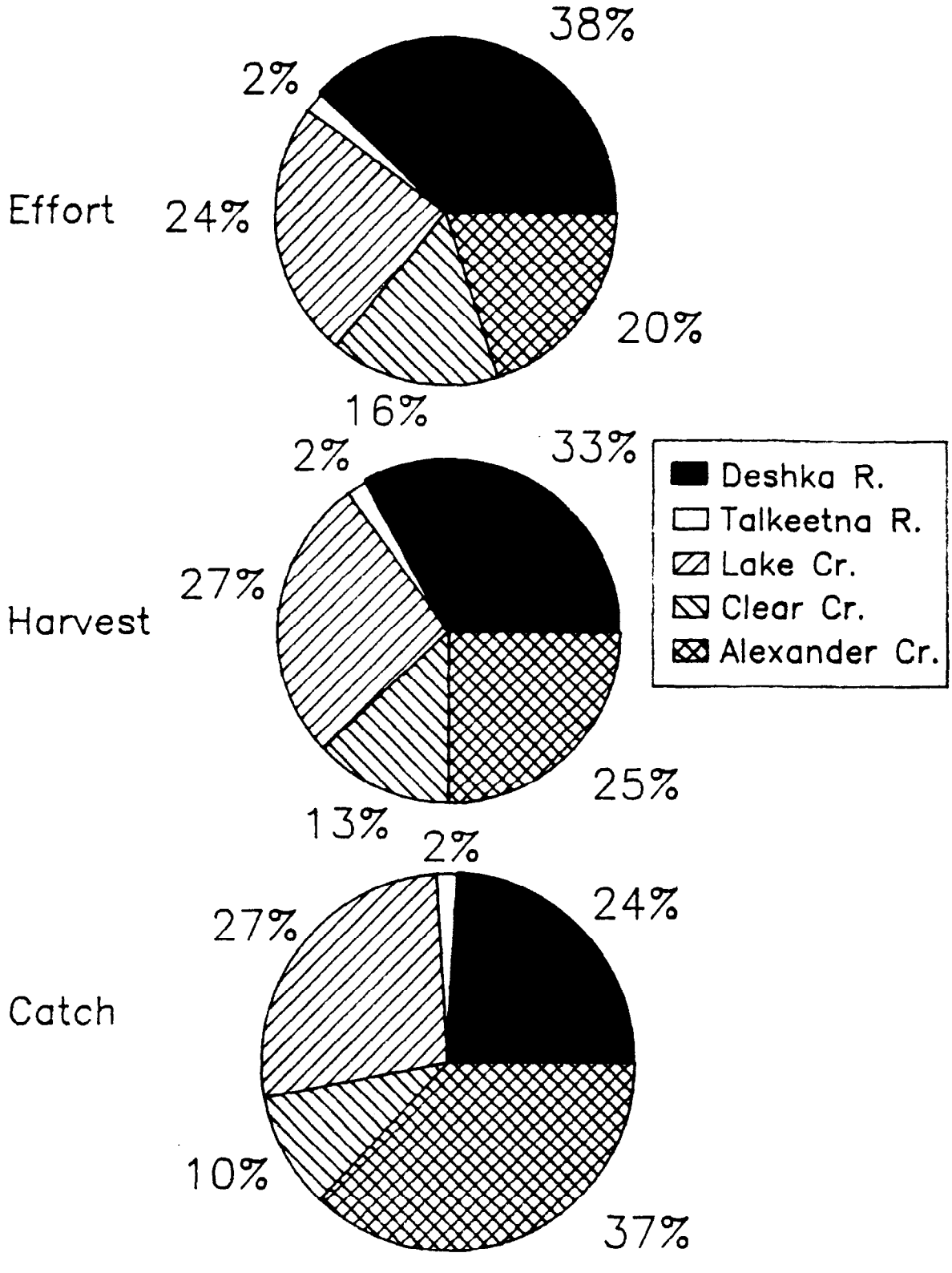

Figure 12. Percent of angler-effort, chinook salmon harvest, and chinook salmon catch contributed by each of the remote stream fisheries surveyed to the total for those fisheries, 1988.

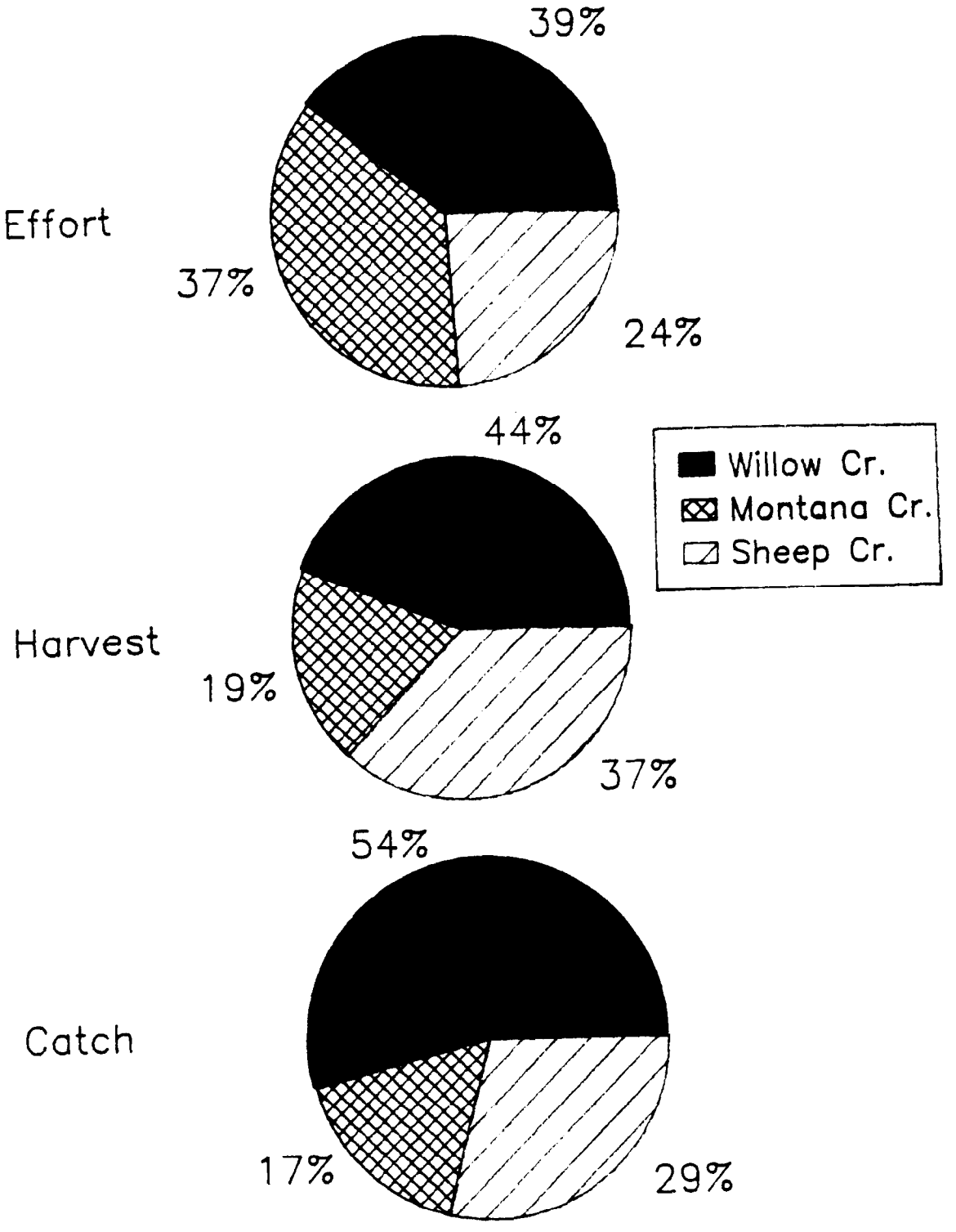

Figure 13. Percent of angler-effort, chinook salmon harvest, and chinook salmon catch contributed by each of the weekend-only stream fisheries surveyed to the total for those fisheries, 1988.

Table 22. Measures of the intensity of the fisheries for chinook salmon for each of the sport fisheries surveyed in northern Cook Inlet in 1988.

Fishery	Hours Poss.[1]	Effort (ang-hrs)	Effort/ hour[2]	Rank	Harvest	Harvest/ hour[3]	Rank	Catch	Catch/ hour[4]	Rank
Willow Creek	288	23,410	81.3	1	2,160	7.5	1	4,303	14.9	1
Sheep Creek	288	22,101	76.7	2	1,776	6.2	2	2,275	7.9	2
Montana Creek	216	14,604	67.6	3	919	4.3	3	1,306	6.0	6
Clear Creek	416	25,271	60.7	4	1,217	2.9	5	1,997	4.8	7
Lake Creek	800	38,778	48.5	5	2,631	3.3	4	5,662	7.1	3
Deshka R. - downstream	800	38,202	47.8	6	1,917	2.4	6	2,627	3.3	8
Alexander Cr. - downstream	378	13,344	35.3	7	907	2.4	6	2,622	6.9	4
Deshka R. - upstream	846	22,216	26.3	8	1,313	1.6	9	2,433	2.9	9
Alexander Cr. - upstream	846	19,546	23.1	9	1,531	1.8	8	5,042	6.1	5
Talkeetna River	416	3,515	8.4	10	219	0.5	10	375	0.9	10

[1] Total number of hours possible for fishing during the creel survey period. Defined as the product of the number of days in the creel survey period and the number of hours in the defined angler day.

[2] Average number of hours of angler-effort on the stream during an hour.

[3] Average number of chinook salmon harvested in the stream during an hour.

[4] Average number of chinook salmon caught in the stream during an hour.

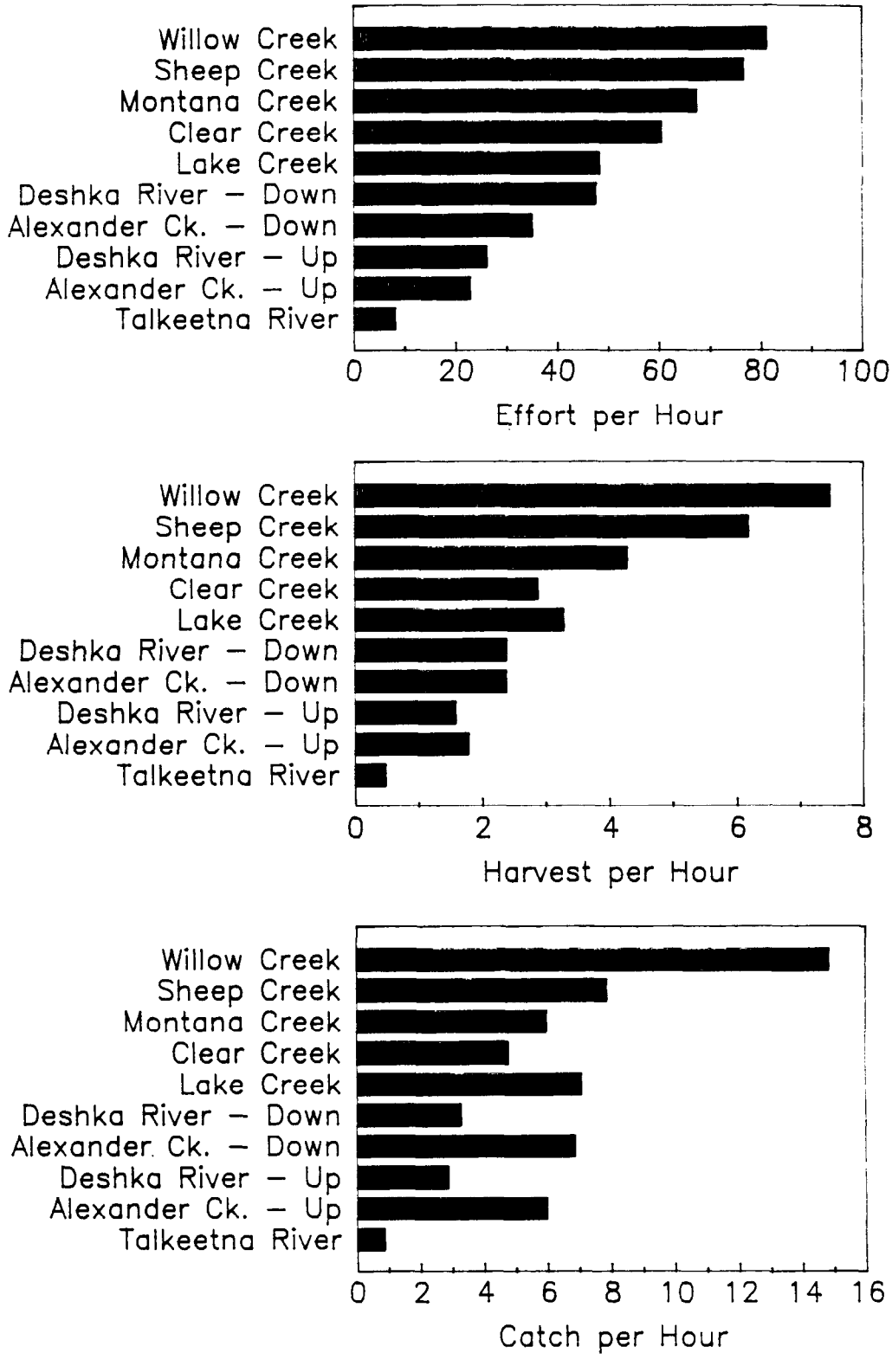

Figure 14. Measure of the intensity of the fisheries for chinook salmon for each of the sport fisheries surveyed in Northern Cook Inlet, 1988.

Age, Sex, and Length Compositions of Harvested Chinook Salmon

Chinook salmon aged 1.3 and 1.4 were the predominant age groups in the harvests of all the fisheries sampled (Table 23). Mean lengths by sex and age group for the sampled harvests are summarized in Table 24. Age distributions obtained from carcass surveys were similar to those obtained from the creel surveys (Tables 25 and 26).

Escapement Counts

Overall, 81,548 spawning chinook salmon were counted in index streams in northern Cook Inlet during 1988 (Table 27). A total of 67,218 chinook salmon were counted in Susitna River tributaries in 1988. Escapement counts of chinook salmon in tributaries to the Susitna River ranged from 465 fish for Indian Creek to 19,200 fish for the Deshka River. In western Cook Inlet, a total of 5,546 chinook salmon were counted. Escapement to the weir located on the Little Susitna River was enumerated at 7,712.

Hatchery Contributions

Five hundred twenty-eight chinook salmon from the sport fishery at Willow Creek were examined for a missing adipose fin of which eight were observed to have a missing adipose fin. Based on this, the estimated contribution of hatchery-produced chinook salmon to the Willow Creek harvest during 1988 was 578 fish (standard error = 204.2).

ACKNOWLEDGMENTS

This report represents the efforts of several persons not named in the text who substantially contributed to its completion. We would like to thank: Mr. Douglas McBride for his guidance in preparing the manuscript; Mr. Bob Lafferty for his field supervision and data analysis; and Ms. Sandy Sonnichsen and Ms. Gail Heineman for their assistance with data analysis programs.

Table 23. Sex and age composition of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988.

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1	Total
Alexander Creek											
Downstream											
	Male	Percent	0.0	0.0	6.5	0.0	18.2	0.0	24.7	5.2	54.5
	Female	Percent	0.0	0.0	35.1	0.0	9.1	0.0	1.3	0.0	45.5
(n = 77)[1]	Combined	Percent	0.0	0.0	41.6	0.0	27.3	0.0	26.0	5.2	100.0
		Std Err	0.00	0.00	0.06	0.00	0.05	0.00	0.05	0.03	
Upstream											
	Male	Percent	0.0	0.0	2.6	0.0	31.6	0.0	7.9	2.6	44.7
	Female	Percent	0.0	0.0	21.1	0.0	34.2	0.0	0.0	0.0	55.3
(n = 38)[1]	Combined	Percent	0.0	0.0	23.7	0.0	65.8	0.0	7.9	2.6	100.0
		Std Err	0.00	0.00	0.07	0.00	0.08	0.00	0.04	0.03	
Locations Combined											
	Male	Percent	0.0	0.0	5.2	0.0	22.6	0.0	19.1	4.3	51.3
	Female	Percent	0.0	0.0	30.4	0.0	17.4	0.0	0.9	0.0	48.7
(n = 115)[1]	Combined	Percent	0.0	0.0	35.7	0.0	40.0	0.0	20.0	4.3	100.0
		Std Err	0.00	0.00	0.04	0.00	0.05	0.00	0.04	0.02	
Deshka River											
Downstream											
	Male	Percent	0.8	0.0	25.0	0.0	13.5	0.0	9.4	1.6	50.4
	Female	Percent	0.8	0.4	37.3	0.4	10.7	0.0	0.0	0.0	49.6
(n = 244)[1]	Combined	Percent	1.6	0.4	62.3	0.4	24.2	0.0	9.4	1.6	100.0
		Std Err	0.01	0.00	0.03	0.00	0.03	0.00	0.02	0.01	
Upstream											
	Male	Percent	0.0	0.9	17.8	0.0	18.7	0.0	16.8	0.9	55.1
	Female	Percent	0.0	0.9	36.4	0.0	7.5	0.0	0.0	0.0	44.9
(n = 107)[1]	Combined	Percent	0.0	1.9	54.2	0.0	26.2	0.0	16.8	0.9	100.0
		Std Err	0.00	0.01	0.05	0.00	0.04	0.00	0.04	0.01	
Locations Combined											
	Male	Percent	0.6	0.3	22.8	0.0	15.1	0.0	11.7	1.4	51.9
	Female	Percent	0.6	0.6	37.0	0.3	9.7	0.0	0.0	0.0	48.1
(n = 351)[1]	Combined	Percent	1.1	0.9	59.8	0.3	24.8	0.0	11.7	1.4	100.0
		Std Err	0.01	0.00	0.03	0.00	0.02	0.00	0.02	0.01	
Lake Creek											
	Male	Percent	0.5	1.0	30.9	0.0	8.2	0.5	3.4	0.5	44.9
	Female	Percent	1.0	0.0	44.4	0.0	8.2	0.0	1.4	0.0	55.1
(n = 207)[1]	Combined	Percent	1.4	1.0	75.4	0.0	16.4	0.5	4.8	0.5	100.0
		Std Err	0.01	0.01	0.03	0.00	0.03	0.00	0.01	0.00	

-continued-

Table 23. Sex and age composition of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988 (continued).

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1	Total
Talkeetna River											
	Male	Percent	1.2	0.0	31.5	0.0	13.1	0.0	8.3	0.0	54.2
	Female	Percent	0.6	0.0	38.7	0.0	6.5	0.0	0.0	0.0	45.8
(n = 168)[1]	Combined	Percent	1.8	0.0	70.2	0.0	19.6	0.0	8.3	0.0	100.0
		Std Err	0.01	0.00	0.04	0.00	0.03	0.00	0.02	0.00	
Montana Creek											
	Male	Percent	0.0	0.0	10.2	0.0	23.0	0.0	23.0	0.0	56.2
	Female	Percent	1.3	0.4	32.7	0.0	8.0	0.0	1.3	0.0	43.8
(n = 226)[1]	Combined	Percent	1.3	0.4	42.9	0.0	31.0	0.0	24.3	0.0	100.0
		Std Err	0.01	0.00	0.03	0.00	0.03	0.00	0.03	0.00	
Sheep Creek											
	Male	Percent	0.7	0.7	25.9	0.0	15.6	0.0	9.5	1.4	53.7
	Female	Percent	1.4	0.0	39.5	0.0	5.4	0.0	0.0	0.0	46.3
(n = 147)[1]	Combined	Percent	2.0	0.7	65.3	0.0	21.1	0.0	9.5	1.4	100.0
		Std Err	0.01	0.01	0.04	0.00	0.03	0.00	0.02	0.01	
Willow Creek:											
Mouth											
	Male	Percent	0.0	0.0	13.0	1.6	26.4	0.0	14.4	1.6	57.1
	Female	Percent	0.5	0.5	18.5	1.9	19.8	0.0	1.4	0.3	42.9
(n = 368)[1]	Combined	Percent	0.5	0.5	31.5	3.5	46.2	0.0	15.8	1.9	100.0
		Std Err	0.00	0.00	0.02	0.01	0.03	0.00	0.02	0.01	
Parks Highway Bridge											
	Male	Percent	1.4	0.0	16.4	0.7	24.7	0.0	5.5	0.0	48.6
	Female	Percent	0.0	0.0	33.6	2.1	15.1	0.0	0.7	0.0	51.4
(n = 146)[1]	Combined	Percent	1.4	0.0	50.0	2.7	39.7	0.0	6.2	0.0	100.0
		Std Err	0.01	0.00	0.04	0.01	0.04	0.00	0.02	0.00	
Locations Combined											
	Male	Percent	0.4	0.0	14.0	1.4	25.9	0.0	11.9	1.2	54.7
	Female	Percent	0.4	0.4	22.8	1.9	18.5	0.0	1.2	0.2	45.3
(n = 514)[1]	Combined	Percent	0.8	0.4	36.8	3.3	44.4	0.0	13.0	1.4	100.0
		Std Err	0.00	0.00	0.02	0.01	0.02	0.00	0.01	0.01	

[1] n = sample size.

Table 24. Mean length (mid-eye to fork-of-tail) in millimeters by sex and age group of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988.

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1
Alexander Creek - downstream										
	Male	Mean	0	0	932	0	737	0	591	338
		Standard Error	0	0	71	0	18	0	18	14
		Sample Size	0	0	5	0	14	0	19	4
	Female	Mean	0	0	916	0	812	0	800	0
		Standard Error	0	0	13	0	20	0	0	0
		Sample Size	0	0	27	0	7	0	1	0
Alexander Creek - upstream										
	Male	Mean	0	0	900	0	763	0	668	530
		Standard Error	0	0	0	0	15	0	54	0
		Sample Size	0	0	1	0	12	0	3	1
	Female	Mean	0	0	909	0	797	0	0	0
		Standard Error	0	0	18	0	10	0	0	0
		Sample Size	0	0	8	0	13	0	0	0
Alexander Creek - all sites										
	Male	Mean	0	0	927	0	749	0	605	376
		Standard Error	0	0	58	0	12	0	18	40
		Sample Size	0	0	6	0	26	0	22	5
	Female	Mean	0	0	915	0	802	0	800	0
		Standard Error	0	0	11	0	9	0	0	0
		Sample Size	0	0	35	0	20	0	1	0
Lake Creek										
	Male	Mean	1,005	925	1,001	0	748	675	630	380
		Standard Error	0	95	9	0	35	0	15	0
		Sample Size	1	2	64	0	17	1	7	1
	Female	Mean	978	0	922	0	866	0	667	0
		Standard Error	18	0	11	0	21	0	9	0
		Sample Size	2	0	92	0	17	0	3	0
Talkeetna River										
	Male	Mean	1,065	0	1,009	0	818	0	635	0
		Standard Error	15	0	10	0	26	0	13	0
		Sample Size	2	0	53	0	22	0	14	0
	Female	Mean	935	0	939	0	837	0	0	0
		Standard Error	0	0	8	0	13	0	0	0
		Sample Size	1	0	65	0	11	0	0	0

-continued-

Table 24. Mean length (mid-eye to fork-of-tail) in millimeters by sex and age group of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988 (continued).

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1
Deshka River - downstream										
	Male	Mean	933	0	906	0	734	0	562	420
		Standard Error	18	0	10	0	14	0	18	50
		Sample Size	2	0	61	0	33	0	23	4
	Female	Mean	905	1,050	858	790	769	0	0	0
		Standard Error	25	0	6	0	12	0	0	0
		Sample Size	2	1	91	1	26	0	0	0
Deshka River - upstream										
	Male	Mean	0	915	870	0	723	0	564	385
		Standard Error	0	0	32	0	24	0	14	0
		Sample Size	0	1	19	0	20	0	18	1
	Female	Mean	0	855	854	0	796	0	0	0
		Standard Error	0	0	8	0	28	0	0	0
		Sample Size	0	1	39	0	8	0	0	0
Deshka River - all sites										
	Male	Mean	933	915	897	0	730	0	563	413
		Standard Error	18	0	11	0	13	0	12	39
		Sample Size	2	1	80	0	53	0	41	5
	Female	Mean	905	953	857	790	775	0	0	0
		Standard Error	25	98	5	0	11	0	0	0
		Sample Size	2	2	130	1	34	0	0	0
Montana Creek										
	Male	Mean	973	915	980	0	822	0	621	353
		Standard Error	0	0	18	0	22	0	23	3
		Sample Size	1	1	38	0	23	0	14	2
	Female	Mean	1,031	0	935	0	850	0	0	0
		Standard Error	69	0	17	0	17	0	0	0
		Sample Size	2	0	58	0	8	0	0	0
Sheep Creek										
	Male	Mean	973	915	980	0	822	0	621	353
		Standard Error	0	0	18	0	22	0	23	3
		Sample Size	1	1	38	0	23	0	14	2
	Female	Mean	1,031	0	935	0	850	0	0	0
		Standard Error	69	0	17	0	17	0	0	0
		Sample Size	2	0	58	0	8	0	0	0

-continued-

Table 24. Mean length (mid-eye to fork-of-tail) in millimeters by sex and age group of chinook salmon sampled from sport fisheries in northern Cook Inlet, 1988 (continued).

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1
Willow Creek - mouth										
	Male	Mean	0	0	962	794	814	0	616	348
		Standard Error	0	0	16	23	10	0	18	8
		Sample Size	0	0	48	6	97	0	53	6
	Female	Mean	955	973	946	842	836	0	666	660
		Standard Error	50	18	8	34	8	0	40	0
		Sample Size	2	2	67	7	73	0	5	1
Willow Creek - bridge										
	Male	Mean	1,000	0	1,004	815	843	0	639	0
		Standard Error	40	0	21	0	18	0	21	0
		Sample Size	2	0	22	1	36	0	8	0
	Female	Mean	0	0	929	827	835	0	810	0
		Standard Error	0	0	20	13	13	0	0	0
		Sample Size	0	0	49	3	22	0	1	0
Willow Creek - all sites										
	Male	Mean	1,000	0	975	797	822	0	619	348
		Standard Error	40	0	13	20	9	0	16	8
		Sample Size	2	0	70	7	133	0	61	6
	Female	Mean	955	973	939	838	836	0	690	660
		Standard Error	50	18	9	23	7	0	40	0
		Sample Size	2	2	116	10	95	0	6	1

Table 25. Sex and age composition of chinook salmon sampled from escapement carcass surveys in northern Cook Inlet, 1988.

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1	Total
Deshka River (Moose Creek)											
	Male	Percent	0.0	0.0	17.7	0.0	32.3	0.0	3.5	0.0	53.5
	Female	Percent	0.0	0.0	19.7	0.0	25.2	0.0	1.6	0.0	46.5
(n = 77)[1]	Combined	Percent	0.0	0.0	37.4	0.0	57.5	0.0	5.1	0.0	100.0
		Std Err	0.00	0.00	0.03	0.00	0.03	0.00	0.01	0.00	
Willow Creek											
	Male	Percent	0.0	0.0	31.4	0.0	11.4	0.0	0.0	0.0	42.9
	Female	Percent	0.0	0.0	41.4	0.0	12.9	0.0	2.9	0.0	57.1
(n = 38)[1]	Combined	Percent	0.0	0.0	72.8	0.0	24.3	0.0	2.9	0.0	100.0
		Std Err	0.00	0.00	0.05	0.00	0.05	0.00	0.02	0.00	
Montana Creek											
	Male	Percent	0.0	0.0	0.0	0.0	20.0	0.0	20.0	0.0	40.0
	Female	Percent	0.0	0.0	40.0	0.0	20.0	0.0	0.0	0.0	60.0
(n = 115)[1]	Combined	Percent	0.0	0.0	40.0	0.0	40.0	0.0	20.0	0.0	100.0
		Std Err	0.00	0.00	0.16	0.00	0.16	0.0	0.13	0.00	

Table 26. Mean length (mid-eye to fork-of-tail) in millimeters by sex and age group of chinook salmon sampled from escapement carcass surveys in northern Cook Inlet, 1988.

Fishery	Sex		Age Group 1.5	2.4	1.4	2.3	1.3	2.2	1.2	1.1
Deshka River (Moose Creek)										
	Male	Mean	0	0	935	0	873	0	709	0
		Standard Error	0	0	8	0	10	0	39	0
		Sample Size	0	0	45	0	82	0	9	0
	Female	Mean	0	0	862	0	837	0	823	0
		Standard Error	0	0	8	0	7	0	32	0
		Sample Size	0	0	50	0	64	0	4	0
Willow Creek										
	Male	Mean	0	0	998	0	814	0	0	0
		Standard Error	0	0	22	0	37	0	0	0
		Sample Size	0	0	22	0	8	0	0	0
	Female	Mean	0	0	932	0	823	0	890	0
		Standard Error	0	0	11	0	16	0	30	0
		Sample Size	0	0	29	0	9	0	2	0
Montana Creek										
	Male	Mean	0	0	0	0	925	0	690	0
		Standard Error	0	0	0	0	25	0	60	0
		Sample Size	0	0	0	0	2	0	2	0
	Female	Mean	0	0	900	0	818	0	0	0
		Standard Error	0	0	21	0	8	0	0	0
		Sample Size	0	0	4	0	2	0	0	0

Table 27. Escapement counts[1] of chinook salmon for northern Cook Inlet streams in 1988

Location	Count
Susitna River tributaries	
Deshka River	19,200
Prairie Creek	8,650
Lake Creek	6,633
Alexander Creek	6,273
Clear Creek	4,850
Talachulitna River	4,112
Peters Creek	3,927
Willow Creek	2,496
Montana Creek	2,016
Little Willow Creek	1,515
Portage Creek	1,402
Sheep Creek	1,215
North Fork Kashwitna River	1,159
Goose Creek	1,076
Cache Creek	818
Deception Creek	790[2]
Grizzly Creek	630
Indian Creek	456
Total	67,218
Little Susitna River	7,712[2]
Matanuska River	
Moose Creek	1,072[3]
West Cook Inlet	
Theodore River	1,906
Chuitna River	3,024
Lewis River	616
Total	5,546

[1] Surveys were conducted from rotary-wing aircraft unless otherwise noted.

[2] Escapement through a weir.

[3] Survey was conducted on foot.

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APPENDIX

Appendix Table 1. Angler counts during the fishery for chinook salmon in the Deshka River, 1988.

Date	Weekend/ Holiday(*)	Counts by Period: Downstream Fishery[1] A	B	C	Upstream Fishery[2] A	B	C
5/23		2	8	9			
5/24		12	23	33			
5/25							
5/26							
5/27		33	44	27			
5/28	*	23	52	25			18
5/29	*	37	108	38			32
5/30	*	82	89	31		22	
5/31					1		
6/01							
6/02		40	68	15			
6/03		56	57	50			12
6/04	*	86	151	137			38
6/05	*	88	123	70	51		
6/06		33	44	42			
6/07		62	88	76			30
6/08		56	112	159	70		
6/09							
6/10						39	
6/11	*	99	154	118			94
6/12	*	120	170	67		58	
6/13		17	96	33			
6/14		88	103	70	16		
6/15							
6/16							48
6/17		56	68	58			69
6/18	*	22	80	38			69
6/19	*	6	36	20	21		
6/20							
6/21							19
6/22		31	65	22			
6/23		27	45	18	18		
6/24		21	45	39		24	
6/25	*	34	52	15		28	
6/26	*	8	0	2	1		
6/27		10	20	16	8		
6/28		2	4	2			
6/29		0	11	12			9
6/30							
7/01							22
7/02	*					37	
7/03	*				39		
7/04	*						0
7/05							
7/06					10		
7/07							
7/08					5		
7/09	*				17		
7/10	*						0
7/11							
7/12						7	
7/13						5	

[1] Period A: 0400 to 1059 hrs; Period B: 1100 to 1659 hrs; Period C: 1700 to 2400 hrs.

[2] Period A: 0500 to 1059 hrs; Period B: 1100 to 1659 hrs; Period C: 1700 to 2300 hrs.

Appendix Table 2. Paired sign test of harvest per unit effort (HPUE) of chinook salmon for Deshka River anglers interviewed at the downstream Deshka River and Susitna Landing survey locations, 1988, to evaluate validity of combining data sets.

Date	Downstream Deshka River		Susitna Landing		Sign of Difference
	Sample Size[1]	HPUE	Sample Size[1]	HPUE	
5/29	8	0.000	19	0.033	+
5/30	21	0.031	8	0.000	-
6/03	12	0.076	10	0.000	-
6/04	25	0.016	61	0.013	-
6/05	22	0.007	49	0.031	+
6/06	8	0.000	11	0.036	+
6/11	23	0.023	48	0.048	+
6/12	18	0.033	45	0.050	+
6/14	6	0.085	8	0.061	-
6/22	14	0.063	13	0.000	-
6/23	15	0.169	8	0.025	-
6/25	8	0.035	44	0.017	-
6/26	9	0.000	10	0.062	+

[1] Records with sample size less than 5 were omitted from the analysis.

Appendix Table 3. Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in the downstream area of the Deshka River, 1988.

Date	Wd/ We[1]	SS[2]	EFFORT (hrs) Mean	EFFORT (hrs) SE[3]	HARVEST Mean	HARVEST SE[3]	HARVEST HPUE	CATCH Mean	CATCH SE[3]	CATCH CPUE
5/23	Wd	9	6.6	1.63	0.44	0.176	0.068	0.44	0.176	0.068
5/24	Wd	4	2.8	1.30	0.25	0.250	0.091	0.25	0.250	0.091
5/27	Wd	17	6.0	0.90	0.12	0.081	0.020	0.12	0.081	0.020
5/28	We	9	2.9	0.71	0.00	0.000	0.000	0.00	0.000	0.000
5/29	We	29	4.4	0.54	0.10	0.058	0.023	0.10	0.058	0.023
5/30	We	29	3.8	0.42	0.10	0.058	0.027	0.21	0.115	0.054
6/02	Wd	20	4.6	0.92	0.20	0.092	0.043	0.20	0.092	0.043
6/03	Wd	22	4.9	0.75	0.27	0.117	0.056	0.36	0.168	0.075
6/04	We	86	6.0	0.29	0.08	0.030	0.014	0.08	0.030	0.014
6/05	We	71	6.1	0.34	0.14	0.042	0.023	0.17	0.053	0.028
6/06	Wd	19	5.7	0.67	0.11	0.072	0.019	0.11	0.072	0.019
6/07	Wd	29	5.6	0.60	0.34	0.114	0.061	0.41	0.145	0.073
6/08	Wd	37	4.3	0.31	0.32	0.087	0.076	0.43	0.137	0.101
6/10	Wd	12	5.2	0.60	0.50	0.195	0.096	0.67	0.284	0.128
6/11	We	71	5.4	0.38	0.23	0.050	0.042	0.32	0.080	0.061
6/12	We	63	6.2	0.45	0.27	0.061	0.044	0.41	0.103	0.067
6/13	Wd	16	4.3	0.30	0.44	0.128	0.103	0.63	0.202	0.147
6/14	Wd	14	6.6	0.89	0.50	0.139	0.076	1.29	0.529	0.196
6/15	Wd	9	3.7	0.72	0.33	0.167	0.091	0.33	0.167	0.091
6/17	Wd	15	7.3	1.31	0.40	0.131	0.055	0.73	0.345	0.101
6/18	We	100	5.3	0.27	0.19	0.039	0.036	0.22	0.044	0.042
6/19	We	56	4.4	0.29	0.25	0.058	0.056	0.25	0.058	0.056
6/20	Wd	2	3.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
6/22	Wd	27	4.7	0.47	0.19	0.076	0.039	0.19	0.076	0.039
6/23	Wd	23	3.0	0.35	0.26	0.094	0.086	0.26	0.094	0.086
6/24	Wd	16	4.3	0.54	0.63	0.155	0.147	0.69	0.151	0.162
6/25	We	52	5.5	0.52	0.12	0.045	0.021	0.12	0.045	0.021
6/26	We	19	2.6	0.58	0.05	0.053	0.020	0.05	0.053	0.020
6/27	Wd	5	5.5	0.00	0.00	0.000	0.000	0.00	0.000	0.000
7/01	Wd	2	1.5	0.00	0.00	0.000	0.000	0.00	0.000	0.000
7/02	We	6	5.0	0.00	0.17	0.167	0.033	0.50	0.500	0.100
7/03	We	11	5.7	0.36	0.36	0.152	0.063	0.36	0.152	0.063
7/04	We	5	5.0	0.45	0.60	0.245	0.120	0.80	0.374	0.160

[1] Weekday (Wd) or Weekend/holiday (We).
[2] Sample size, number of anglers interviewed.
[3] Standard error.

Appendix Table 4. Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in the upstream area of the Deshka River, 1988.

Date	Wd/ We[1]	SS[2]	EFFORT (hrs) Mean	EFFORT (hrs) SE[3]	HARVEST Mean	HARVEST SE[3]	HARVEST HPUE	CATCH Mean	CATCH SE[3]	CATCH CPUE
5/23	Wd	2	8.0	0.00	0.50	0.500	0.063	0.50	0.500	0.063
5/24	Wd	2	5.0	0.00	1.00	0.000	0.200	1.00	0.000	0.200
5/28	We	7	4.9	0.40	0.00	0.000	0.000	0.57	0.297	0.118
5/29	We	8	4.3	1.16	0.00	0.000	0.000	0.13	0.125	0.029
5/30	We	3	6.0	3.21	0.00	0.000	0.000	0.00	0.000	0.000
6/02	Wd	2	8.0	0.00	0.50	0.500	0.063	2.50	0.500	0.313
6/03	Wd	2	4.0	0.00	1.00	1.000	0.250	2.50	0.500	0.625
6/04	We	38	5.4	0.55	0.11	0.050	0.019	0.13	0.067	0.024
6/05	We	34	4.2	0.45	0.09	0.049	0.021	0.26	0.148	0.063
6/07	Wd	4	4.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
6/08	Wd	5	4.0	0.00	0.20	0.200	0.050	0.20	0.200	0.050
6/10	Wd	8	3.3	0.55	0.38	0.263	0.115	0.63	0.420	0.192
6/11	We	42	5.3	0.44	0.05	0.048	0.009	0.05	0.048	0.009
6/12	We	40	6.2	0.48	0.40	0.093	0.065	0.42	0.101	0.069
6/13	Wd	6	5.5	0.22	1.00	0.000	0.182	1.33	0.211	0.242
6/14	Wd	5	1.8	0.49	0.20	0.200	0.111	0.20	0.200	0.111
6/15	Wd	7	5.3	0.61	0.43	0.202	0.081	0.43	0.202	0.081
6/17	Wd	19	4.9	0.73	0.37	0.114	0.075	0.37	0.114	0.075
6/18	We	71	6.1	0.38	0.34	0.063	0.056	0.48	0.098	0.079
6/19	We	53	3.5	0.31	0.19	0.054	0.055	0.19	0.054	0.055
6/20	Wd	4	2.8	0.25	0.00	0.000	0.000	0.00	0.000	0.000
6/21	Wd	4	8.0	0.58	0.00	0.000	0.000	0.00	0.000	0.000
6/22	Wd	16	5.9	0.92	0.31	0.120	0.053	1.25	0.929	0.213
6/24	Wd	10	4.5	0.20	0.10	0.100	0.022	0.10	0.100	0.022
6/25	We	16	5.4	0.78	0.38	0.125	0.069	0.38	0.125	0.069
6/26	We	19	4.9	0.48	0.21	0.096	0.043	0.21	0.096	0.043
7/02	We	2	4.0	0.00	0.00	0.000	0.000	6.00	3.000	1.500
7/03	We	24	2.9	0.36	0.25	0.090	0.088	0.54	0.208	0.190
7/04	We	12	5.3	0.33	0.33	0.142	0.063	0.33	0.142	0.063
7/06	Wd	9	7.8	0.88	0.78	0.222	0.100	0.78	0.222	0.100
7/08	Wd	3	7.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
7/09	We	4	7.0	1.00	0.25	0.250	0.036	0.25	0.250	0.036
7/10	We	4	5.0	2.48	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.

Appendix Table 5. Angler counts during the fishery for chinook salmon in Alexander Creek, 1988.

Date	Weekend/ Holiday(*)	Counts by Period: Downstream Fishery[1] A	B	C	Upstream Fishery[2] A	B	C
5/23							
5/24		0	0	0			
5/25		6	5	15			
5/26							
5/27							
5/28	*	40	40	37			27
5/29	*	34	48	21			11
5/30	*	26	35	4		22	
5/31					0		
6/01							
6/02		15	28	20			
6/03		46	36	52			11
6/04	*	59	102	79			12
6/05	*	78	66	56	29		
6/06		27	29	56			
6/07		24	54	46			35
6/08		51	50	38	51		
6/09							
6/10						65	
6/11	*	112	103	65			27
6/12	*	38	69	28		51	
6/13							
6/14					3		
6/15							
6/16							43
6/17							42
6/18	*						30
6/19	*				22		
6/20							
6/21							18
6/22							
6/23					31		
6/24						39	
6/25	*					36	
6/26	*				12		
6/27					23		
6/28							
6/29							14
6/30							
7/01							9
7/02	*					19	
7/03	*				16		
7/04	*						9
7/05							
7/06					18		
7/07							
7/08					8		
7/09	*				10		
7/10	*						9
7/11							
7/12						15	
7/13						6	

[1] Period A: 0600 to 1159 hrs; Period B: 1200 to 1759 hrs; Period C: 1800 to 2400 hrs.

[2] Period A: 0500 to 1059 hrs; Period B: 1100 to 1659 hrs; Period C: 1700 to 2300 hrs.

Appendix Table 6. Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by all anglers interviewed during the fishery for chinook salmon in the downstream area of Alexander Creek, 1988.

Date	Wd/ We[1]	SS[2]	EFFORT (hrs) Mean	EFFORT (hrs) SE[3]	HARVEST Mean	HARVEST SE[3]	HARVEST HPUE	CATCH Mean	CATCH SE[3]	CATCH CPUE
5/25	Wd	28	2.2	0.21	0.04	0.036	0.017	0.39	0.195	0.183
5/27	Wd	47	4.3	0.45	0.15	0.052	0.035	0.26	0.077	0.059
5/28	We	189	2.6	0.13	0.13	0.024	0.049	0.19	0.032	0.071
5/29	We	51	3.6	0.23	0.10	0.042	0.027	0.10	0.042	0.027
5/30	We	81	2.6	0.20	0.15	0.043	0.057	0.26	0.087	0.099
6/01	Wd	8	2.0	0.70	0.38	0.263	0.188	0.38	0.263	0.188
6/02	Wd	77	2.5	0.20	0.44	0.075	0.176	2.49	0.417	0.992
6/03	Wd	106	2.9	0.21	0.40	0.055	0.136	1.31	0.224	0.451
6/04	We	175	4.1	0.22	0.18	0.032	0.043	0.29	0.057	0.071
6/05	We	113	3.8	0.25	0.16	0.035	0.042	0.32	0.073	0.084
6/06	Wd	48	3.5	0.28	0.21	0.066	0.060	0.35	0.113	0.102
6/07	Wd	76	5.2	0.35	0.16	0.050	0.030	0.33	0.102	0.063
6/08	Wd	111	4.4	0.32	0.28	0.046	0.063	0.49	0.089	0.110
6/11	We	109	5.9	0.28	0.30	0.055	0.052	0.42	0.088	0.072
6/12	We	113	3.7	0.22	0.25	0.044	0.067	0.33	0.058	0.089

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table 7. Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in the upstream area of Alexander Creek, 1988.

Date	Wd/ We[1]	SS[2]	EFFORT (hrs) Mean	EFFORT (hrs) SE[3]	HARVEST Mean	HARVEST SE[3]	HARVEST HPUE	CATCH Mean	CATCH SE[3]	CATCH CPUE
5/29	We	2	3.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
6/03	Wd	2	1.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
6/04	We	20	4.3	0.32	0.25	0.123	0.058	0.30	0.128	0.069
6/05	We	2	2.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
6/07	Wd	18	5.4	0.53	0.56	0.166	0.103	1.17	0.406	0.216
6/08	Wd	37	4.7	0.40	0.11	0.065	0.023	0.54	0.256	0.116
6/09	Wd	61	3.6	0.19	0.20	0.051	0.055	0.43	0.149	0.120
6/10	Wd	54	4.7	0.43	0.30	0.078	0.063	0.52	0.156	0.110
6/11	We	107	4.5	0.22	0.47	0.089	0.104	0.93	0.160	0.206
6/12	We	72	4.8	0.28	0.40	0.073	0.083	1.47	0.240	0.305
6/13	Wd	88	5.0	0.28	0.27	0.048	0.055	1.08	0.163	0.217
6/14	Wd	94	4.8	0.29	0.17	0.039	0.035	0.49	0.078	0.101
6/17	Wd	23	5.0	0.41	0.22	0.088	0.043	0.43	0.176	0.087
6/18	We	49	4.3	0.26	0.29	0.071	0.066	0.73	0.167	0.169
6/19	We	52	5.5	0.35	0.25	0.061	0.045	0.50	0.118	0.090
6/20	Wd	27	4.0	0.35	0.26	0.114	0.065	0.93	0.333	0.234
6/22	Wd	36	6.8	0.41	0.58	0.146	0.085	2.14	0.334	0.313
6/23	Wd	23	3.6	0.51	0.09	0.060	0.024	0.48	0.198	0.133
6/24	Wd	53	3.5	0.31	0.26	0.067	0.075	0.45	0.106	0.128
6/25	We	54	3.2	0.21	0.44	0.086	0.137	0.67	0.118	0.206
6/26	We	18	2.9	0.27	0.39	0.118	0.132	0.89	0.212	0.302
6/28	Wd	23	5.6	0.48	0.35	0.119	0.063	1.09	0.355	0.195
6/29	Wd	53	3.2	0.30	0.15	0.050	0.047	0.30	0.092	0.094
6/30	Wd	29	4.2	0.54	0.00	0.000	0.000	2.14	0.231	0.504
7/01	Wd	19	3.5	0.79	0.00	0.000	0.000	1.16	0.220	0.328
7/02	We	40	3.0	0.29	0.38	0.085	0.124	0.93	0.180	0.306
7/03	We	12	5.3	0.39	0.25	0.131	0.048	0.25	0.131	0.048
7/04	We	3	3.0	0.00	0.33	0.333	0.111	0.33	0.333	0.111
7/07	Wd	16	3.5	0.39	0.06	0.063	0.018	0.25	0.171	0.071
7/08	Wd	9	4.3	0.33	0.11	0.111	0.026	6.00	1.333	1.385
7/09	We	8	3.0	0.65	0.00	0.000	0.000	1.63	0.324	0.542
7/10	We	6	3.0	0.63	0.67	0.211	0.222	2.17	0.307	0.722
7/11	Wd	16	5.5	0.56	0.56	0.128	0.102	3.69	0.675	0.670
7/12	Wd	8	4.0	0.00	0.75	0.164	0.188	4.00	0.926	1.000
7/13	Wd	6	2.0	0.00	0.17	0.167	0.083	0.33	0.333	0.167

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table 8. Angler counts during the fishery for chinook salmon in Lake Creek, 1988.

Date	Weekend/ Holiday(*)	Counts by Period[1] A	B	C	D	E
6/04	*	3	10	4	18	9
6/05	*					
6/06						
6/07		1	1	3	3	2
6/08		7	3	6	19	18
6/09		0	21	18	15	35
6/10		20	46	24	35	47
6/11	*	15	34	74	15	52
6/12	*	15	45	59	37	42
6/13		21	47	49	19	20
6/14		35	39	86	39	36
6/15						
6/16						
6/17		5	56	77	36	63
6/18	*					
6/19	*					
6/20		35	158	167	93	89
6/21		42	129	143	110	19
6/22		86	110	150	118	107
6/23		72	177	127	108	62
6/24		69	134	158	131	136
6/25	*					
6/26	*	68	111	73	46	77
6/27		47	142	105	47	49
6/28		114	97	126	44	
6/29		55	71	79	67	44
6/30						
7/01		27	95	76	30	57
7/02	*					
7/03	*					67
7/04		36	38	55	39	13
7/05		8	36	36	16	23
7/06		17	46	49	25	23
7/07						
7/08						
7/09	*	6	25	25	15	11
7/10	*					
7/11						
7/12		0	5	5	1	7
7/13		11	13	10	8	10

[1] Period A: 0500 to 0859 hrs; Period B: 0900 to 1259 hrs; Period C: 1300 to 1659 hrs; Period D: 1700 to 2059 hrs; Period E: 2100 to 0100 hrs.

Appendix Table 9. Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in Lake Creek, 1988.

Date	Wd/ We[1]	SS[2]	EFFORT (hrs) Mean	EFFORT (hrs) SE[3]	HARVEST Mean	HARVEST SE[3]	HARVEST HPUE	CATCH Mean	CATCH SE[3]	CATCH CPUE
5/26	Wd	4	2.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
5/27	Wd	10	6.0	0.63	0.00	0.000	0.000	0.00	0.000	0.000
5/28	We	27	7.3	0.36	0.07	0.051	0.010	0.07	0.051	0.010
5/29	We	77	5.6	0.36	0.08	0.031	0.014	0.10	0.040	0.019
5/30	We	49	3.9	0.30	0.06	0.035	0.016	0.18	0.145	0.047
5/31	Wd	17	7.7	0.21	0.35	0.119	0.046	0.71	0.306	0.092
6/03	Wd	23	3.1	0.52	0.17	0.081	0.056	0.17	0.081	0.056
6/04	We	18	4.6	0.80	0.11	0.076	0.024	0.11	0.076	0.024
6/05	We	9	2.6	0.61	0.00	0.000	0.000	0.00	0.000	0.000
6/07	Wd	20	2.4	0.24	0.25	0.099	0.106	0.25	0.099	0.106
6/08	Wd	10	5.0	1.15	0.50	0.167	0.100	0.50	0.167	0.100
6/09	Wd	63	4.0	0.34	0.24	0.054	0.060	0.49	0.113	0.124
6/10	Wd	64	4.5	0.38	0.22	0.052	0.049	0.50	0.092	0.112
6/11	We	74	4.9	0.32	0.30	0.063	0.060	0.55	0.091	0.113
6/12	We	109	5.4	0.31	0.28	0.043	0.051	0.62	0.079	0.116
6/13	Wd	49	5.3	0.32	0.53	0.083	0.100	1.37	0.288	0.257
6/14	Wd	31	3.8	0.31	0.55	0.091	0.143	1.23	0.231	0.319
6/15	Wd	10	5.0	0.00	1.00	0.000	0.200	1.10	0.100	0.220
6/16	Wd	24	6.3	0.24	0.63	0.132	0.100	0.83	0.167	0.133
6/17	Wd	24	3.0	0.40	0.08	0.058	0.027	0.08	0.058	0.027
6/18	We	31	10.8	0.91	0.97	0.098	0.090	1.97	0.260	0.182
6/19	We	101	6.6	0.37	0.33	0.049	0.050	0.92	0.114	0.140
6/20	Wd	40	6.7	0.46	0.30	0.073	0.045	0.63	0.111	0.093
6/21	Wd	92	5.8	0.33	0.30	0.048	0.052	0.79	0.084	0.137
6/22	Wd	78	6.6	0.34	0.59	0.056	0.089	0.96	0.096	0.145
6/23	Wd	97	7.1	0.40	0.49	0.053	0.070	1.65	0.146	0.234
6/24	Wd	65	5.2	0.21	0.66	0.059	0.127	0.82	0.087	0.156
6/25	We	98	7.1	0.36	0.58	0.068	0.082	0.88	0.131	0.123
6/26	We	101	6.6	0.31	0.44	0.050	0.066	0.80	0.095	0.121
6/27	Wd	76	6.3	0.21	0.57	0.057	0.090	1.57	0.157	0.250
6/28	Wd	88	6.1	0.28	0.35	0.051	0.057	0.49	0.065	0.080
6/29	Wd	41	5.8	0.27	0.61	0.092	0.105	1.59	0.171	0.272

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Appendix Table 9. Daily summary statistics for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers interviewed during the fishery for chinook salmon in Lake Creek, 1988 (continued).

Date	Wd/We[1]	SS[2]	EFFORT (hrs) Mean	EFFORT (hrs) SE[3]	HARVEST Mean	HARVEST SE[3]	HARVEST HPUE	CATCH Mean	CATCH SE[3]	CATCH CPUE
7/01	Wd	34	5.6	0.33	0.12	0.056	0.021	0.44	0.153	0.079
7/02	We	45	8.4	0.69	0.33	0.071	0.039	0.96	0.211	0.113
7/03	We	62	5.3	0.24	0.18	0.049	0.033	0.55	0.112	0.103
7/04	We	52	5.8	0.87	0.17	0.053	0.030	0.35	0.082	0.060
7/05	Wd	37	4.5	0.40	0.35	0.080	0.079	0.51	0.126	0.115
7/06	Wd	12	4.3	0.42	0.08	0.083	0.020	0.50	0.230	0.118
7/08	Wd	20	8.8	0.79	0.30	0.105	0.034	0.55	0.170	0.063
7/09	We	12	4.2	0.58	0.33	0.142	0.079	0.75	0.305	0.178
7/10	We	8	2.3	0.37	0.38	0.263	0.167	0.50	0.267	0.222
7/11	Wd	14	4.0	0.59	0.21	0.114	0.054	1.43	0.343	0.357
7/12	Wd	24	7.2	0.72	0.46	0.104	0.064	0.75	0.162	0.105
7/13	Wd	5	7.2	0.73	0.40	0.245	0.056	0.60	0.400	0.083

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table 10. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Clear Creek at Talkeetna Landing during periods A and B, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD A (0800-1559 hrs)													
6/20	Wd												
6/21	Wd												
6/22	Wd												
6/23	Wd	3.5	8		72.00	9.00	0.000	0	0.00	0.00	0	0.00	0.00
6/24	Wd	3.5	25		203.00	8.12	0.851	9	0.36	0.10	19	0.76	0.28
6/25	We	3.5	8		51.00	6.38	1.191	2	0.25	0.16	18	2.25	0.75
6/26	We	3.5	113	8	612.75	5.42	0.323	35	0.31	0.04	73	0.65	0.11
6/27	Wd												
6/28	Wd												
6/29	Wd	3.5	35		204.00	5.83	0.493	14	0.40	0.08	18	0.51	0.10
6/30	Wd	3.5	30		161.50	5.38	0.649	15	0.50	0.09	17	0.57	0.10
7/01	Wd	3.5	33		223.00	6.76	0.801	10	0.30	0.08	14	0.42	0.12
7/02	We	3.5	46		273.50	5.95	0.503	20	0.43	0.07	35	0.76	0.15
7/03	We	3.5	58		362.50	6.25	0.613	8	0.14	0.05	11	0.19	0.06
7/04	We	3.5	138	6	706.50	5.12	0.272	46	0.33	0.05	72	0.52	0.06
7/05	Wd												
7/06	Wd												
7/07	Wd	3.5	32		126.50	3.95	0.426	9	0.28	0.08	11	0.34	0.09
7/08	Wd	3.5	26		147.50	5.67	0.826	11	0.42	0.10	14	0.54	0.11
7/09	We	3.5	59		361.00	6.12	0.355	15	0.25	0.06	18	0.31	0.07
7/10	We	3.5	49		210.00	4.29	0.521	8	0.16	0.05	28	0.57	0.15
7/11	Wd	3.5	43		218.00	5.07	0.402	10	0.23	0.07	17	0.40	0.08
7/12	Wd	3.5	21		144.50	6.88	0.775	9	0.43	0.11	9	0.43	0.11
7/13	Wd	3.5	19		113.00	5.95	0.887	4	0.21	0.10	4	0.21	0.10

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Appendix Table 10. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Clear Creek at Talkeetna Landing during periods A and B, 1988 (continued).

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD B (1600-2400 hrs)													
6/20	Wd	3.5	4		16.00	4.00	0.000	1	0.25	0.25	1	0.25	0.25
6/21	Wd												
6/22	Wd												
6/23	Wd	3.5	55		328.00	5.96	0.446	14	0.25	0.06	30	0.55	0.12
6/24	Wd	3.5	5		21.00	4.20	0.735	2	0.40	0.24	2	0.40	0.24
6/25	We	3.5	47		320.00	6.81	0.462	18	0.38	0.07	31	0.66	0.15
6/26	We	3.5	16		116.50	7.28	1.148	6	0.38	0.13	33	2.06	0.69
6/27	Wd												
6/28	Wd												
6/29	Wd	3.5	34		308.50	9.07	0.445	24	0.71	0.08	37	1.09	0.14
6/30	Wd	3.5	32		252.00	7.88	0.758	9	0.28	0.08	17	0.53	0.16
7/01	Wd	3.5	58		438.00	7.55	0.445	13	0.22	0.06	15	0.26	0.07
7/02	We	3.5	32		219.50	6.86	0.646	11	0.34	0.09	11	0.34	0.09
7/03	We	3.5	34		219.50	6.46	0.416	11	0.32	0.08	17	0.50	0.11
7/04	We	3.5	60	8	351.00	5.85	0.449	11	0.18	0.05	20	0.33	0.09
7/05	Wd												
7/06	Wd												
7/07	Wd	3.5	70		518.50	7.41	0.347	16	0.23	0.05	21	0.30	0.06
7/08	Wd	3.5	46		333.50	7.25	0.440	12	0.26	0.07	17	0.37	0.08
7/09	We	3.5	48		222.00	4.63	0.340	7	0.15	0.05	10	0.21	0.07
7/10	We	3.5	30		213.50	7.12	0.529	6	0.20	0.09	6	0.20	0.09
7/11	Wd	3.5	10		47.00	4.70	0.359	6	0.60	0.16	14	1.40	0.34
7/12	Wd	3.5	18		110.50	6.14	0.441	5	0.28	0.11	7	0.39	0.16
7/13	Wd	3.5	19		99.00	5.21	0.387	7	0.37	0.11	19	1.00	0.35

[1] Wd = Weekday; We = Weekend/holiday.

[2] Standard error.

Appendix Table 11. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in the Talkeetna River at Talkeetna Landing during periods A and B, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD A (0800-1559 hrs)													
6/20	Wd	3.5	6		49.00	8.17	0.749	1	0.17	0.17	2	0.33	0.21
6/21	Wd												
6/22	Wd												
6/23	Wd	3.5	8		37.00	4.63	0.375	7	0.88	0.13	7	0.88	0.13
6/24	Wd	3.5	7		28.00	4.00	0.000	7	1.00	0.00	7	1.00	0.00
6/25	We												
6/26	We	3.5	34	8	215.00	6.32	0.728	12	0.35	0.08	20	0.59	0.13
6/27	Wd												
6/28	Wd												
6/29	Wd												
6/30	Wd	3.5	7		35.00	5.00	0.000	2	0.29	0.18	2	0.29	0.18
7/01	Wd												
7/02	We	3.5	11		68.00	6.18	0.553	7	0.64	0.15	12	1.09	0.25
7/03	We	3.5	18		125.00	6.94	0.623	3	0.17	0.09	3	0.17	0.09
7/04	We	3.5	4	6	16.00	4.00	1.732	0	0.00	0.00	0	0.00	0.00
7/05	Wd												
7/06	Wd												
7/07	Wd	3.5	1		10.00	110.00	0.000	1	1.00	0.00	16	16.00	0.00
PERIOD B (1600-2400 hrs)													
6/20	Wd	3.5	12		87.00	7.25	0.446	3	0.25	0.13	3	0.25	0.13
6/21	Wd												
6/22	Wd												
6/23	Wd	3.5	4		20.00	5.00	0.000	2	0.50	0.29	2	0.50	0.29
6/24	Wd												
6/25	We	3.5	6		51.00	8.50	1.118	3	0.50	0.22	6	1.00	0.52
6/26	We	3.5	4		8.00	2.00	0.000	1	0.25	0.25	1	0.25	0.25
6/27	Wd												
6/28	Wd												
6/29	Wd	3.5	16		132.00	8.25	0.750	10	0.63	0.13	10	0.63	0.13
6/30	Wd	3.5	5		40.00	8.00	1.225	3	0.60	0.24	5	1.00	0.32
7/01	Wd	3.5	1		5.00	5.00	0.000	0	0.00	0.00	0	0.00	0.00
7/02	We												
7/03	We	3.5	6		27.00	4.50	1.565	2	0.33	0.21	3	0.50	0.34
7/04	We	3.5	13	8	52.00	4.00	0.620	1	0.08	0.08	3	0.23	0.12
7/05	Wd												
7/06	Wd												
7/07	Wd	3.5	16		64.00	4.00	0.000	1	0.06	0.06	7	0.44	0.18

[1] Wd = Weekday; We = Weekend/holiday.
[2] Standard error.

Appendix Table 12. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Willow Creek at Susitna Landing during periods A, B, and C, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE^2	Total	Mean	SE^2	Total	Mean	SE^2
PERIOD A (0600-1159 hrs)													
5/29	We												
5/30	We												
6/04	We												
6/05	We												
6/11	We												
6/12	We												
6/18	We	2.0	6		33.00	5.50	0.000	0	0.00	0.00	1	0.17	0.17
6/19	We												
6/20	Wd												
6/25	We	2.0	8		28.00	3.50	0.567	1	0.13	0.13	1	0.13	0.13
6/26	We	2.0	3		9.00	3.00	0.000	3	1.00	0.00	3	1.00	0.00
6/27	Wd												
7/02	We												
7/03	We	2.0	2		4.00	2.00	0.000	2	1.00	0.00	2	1.00	0.00
7/04	We												
7/09	We	2.0	1		1.50	1.50	0.000	1	1.00	0.00	1	1.00	0.00
7/10	We	2.0	1		0.50	0.50	0.000	1	1.00	0.00	1	1.00	0.00
7/11													
PERIOD B (1200-1759 hrs)													
5/29	We												
5/30	We												
6/04	We												
6/05	We												
6/11	We												
6/12	We	3.5	2		8.00	4.00	0.000	0	0.00	0.00	0	0.00	0.00
6/18	We	3.5	8		46.00	5.75	0.472	7	0.88	0.13	7	0.88	0.13
6/19	We	3.5	5		17.00	3.40	0.100	1	0.20	0.20	1	0.20	0.20
6/20	Wd												
6/25	We	3.5	2		14.00	7.00	0.000	1	0.50	0.50	1	0.50	0.50
6/26	We												
6/27	Wd												
7/02	We	3.5	1		6.00	6.00	0.000	0	0.00	0.00	2	2.00	0.00
7/03	We												
7/04	We												
7/09	We	3.5	4		24.00	6.00	0.577	2	0.50	0.29	2	0.50	0.29
7/10	We	3.5	4		8.00	2.00	0.000	0	0.00	0.00	0	0.00	0.00
7/11	Wd												

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Appendix Table 12. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Willow Creek at Susitna Landing during periods A, B, and C, 1988 (continued).

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD C (1800-2400 hrs)													
5/29	We	2.0	2		6.00	3.00	0.000	0	0.00	0.00	0	0.00	0.00
5/30	We	2.0	6		6.00	1.00	0.000	0	0.00	0.00	0	0.00	0.00
6/04	We												
6/05	We												
6/11	We												
6/12	We												
6/18	We	2.0	5		23.50	4.70	1.347	4	0.80	0.37	6	1.20	0.58
6/19	We												
6/20	Wd												
6/25	We												
6/26	We												
6/27	Wd												
7/02	We												
7/03	We	2.0	6		45.00	7.50	0.500	1	0.17	0.17	4	0.67	0.33
7/04	We	2.0	15		62.00	4.13	0.654	2	0.13	0.09	11	0.73	0.37
7/09	We												
7/10	We												
7/11	Wd	2.0	8		76.50	9.56	1.189	1	0.13	0.13	1	0.13	0.13

[1] Wd = Weekday; We = Weekend/holiday.

[2] Standard error.

Appendix Table 13. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Willow Creek at the mouth of Willow Creek during periods A, B, and C, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD A (0000-0559 hrs)													
6/18	We	1.0	20	2	64.50	3.23	0.350	17	0.85	0.08	19	0.95	0.14
6/19	We	3.0	22		53.00	2.41	0.283	12	0.55	0.11	12	0.55	0.11
6/20	Wd	3.0	48		136.25	2.84	0.325	21	0.44	0.07	29	0.60	0.11
6/25	We	0.0											
6/26	We	3.0	86		214.75	2.50	0.267	27	0.31	0.05	36	0.42	0.09
6/27	Wd	3.0	31		86.50	2.79	0.218	18	0.58	0.09	25	0.81	0.17
7/02	We	0.0											
7/03	We	3.0	38		115.25	3.03	0.450	13	0.34	0.09	34	0.89	0.43
7/04	We	3.0	29		80.00	2.76	0.268	8	0.28	0.10	10	0.34	0.13
7/09	We	3.0	42		116.00	2.76	0.118	11	0.26	0.07	17	0.40	0.12
7/10	We	3.0	104		221.75	2.13	0.173	5	0.05	0.02	9	0.09	0.03
7/11	Wd	3.0	25		70.00	2.80	0.414	7	0.28	0.09	8	0.32	0.10
PERIOD B (0600-1759 hrs)													
6/18	We	6.0	35		208.50	5.96	0.574	22	0.63	0.08	43	1.23	0.23
6/19	We	6.0	77		356.00	4.62	0.333	26	0.34	0.05	66	0.86	0.25
6/20	Wd	6.0	13		61.00	4.69	0.644	9	0.69	0.13	40	3.08	1.05
6/25	We	6.0	125		639.75	5.12	0.249	39	0.31	0.05	95	0.76	0.14
6/26	We	0.0											
6/27	Wd	6.0	69	4	308.50	4.47	0.280	52	0.75	0.05	193	2.80	0.41
7/02	We	6.0	55	6	271.50	4.94	0.277	36	0.65	0.08	60	1.09	0.15
7/03	We	0.0											
7/04	We	6.0	64	4	344.50	5.38	0.398	26	0.41	0.06	130	2.03	0.48
7/09	We	6.0	35		158.00	4.51	0.405	8	0.23	0.07	15	0.43	0.16
7/10	We	0.0											
7/11	Wd	6.0	15		63.00	4.20	0.271	2	0.13	0.09	3	0.20	0.14
PERIOD C (1800-2400 hrs)													
6/18	We	3.0	34		180.00	5.29	0.567	12	0.35	0.08	44	1.29	0.47
6/19	We	3.0	14		80.00	5.71	0.759	4	0.29	0.13	5	0.36	0.13
6/20	Wd	3.0	45		241.50	5.37	0.407	22	0.49	0.08	34	0.76	0.12
6/25	We	3.0	37		202.00	5.46	0.645	9	0.24	0.07	14	0.38	0.12
6/26	We	3.0	19		82.00	4.32	0.590	10	0.53	0.12	26	1.37	0.42
6/27	Wd	0.0											
7/02	We	3.0	34		165.50	4.87	0.397	19	0.56	0.09	60	1.76	0.32
7/03	We	3.0	31		130.25	4.20	0.384	10	0.32	0.09	10	0.32	0.09
7/04	We	0.0											
7/09	We	3.0	25		120.50	4.82	0.563	0	0.00	0.00	3	0.12	0.07
7/10	We	3.0	52		255.50	4.91	0.384	5	0.10	0.04	43	0.83	0.26
7/11	Wd	0.0											

[1] Wd = Weekday; We = Weekend/holiday.

[2] Standard error.

Appendix Table 14. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery in Willow Creek at Willow Creek bridge during periods A, B, and C, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD A (0000-0559 hrs)													
6/18	We												
6/19	We	3.0	6		20.50	3.42	0.735	0	0.00	0.00	0	0.00	0.00
6/20	Wd	3.0	2		9.00	4.50	3.500	2	1.00	0.00	2	1.00	0.00
6/25	We	3.0	13		18.75	1.44	0.230	13	1.00	0.00	15	1.15	0.15
6/26	We	3.0	4		11.00	2.75	0.250	2	0.50	0.29	2	0.50	0.29
6/27	Wd	3.0	5		11.50	2.30	0.200	2	0.40	0.24	2	0.40	0.24
7/02	We	3.0	9		14.25	1.58	0.295	9	1.00	0.00	9	1.00	0.00
7/03	We	3.0	13		63.75	4.90	0.817	8	0.62	0.14	8	0.62	0.14
7/04	We	3.0	6		14.50	2.42	0.271	3	0.50	0.22	3	0.50	0.22
7/09	We	3.0	22	12	56.25	2.56	0.247	11	0.50	0.11	13	0.59	0.13
7/10	We	3.0	13	7	46.50	3.58	0.500	2	0.15	0.10	3	0.23	0.17
7/11	Wd	3.0	15	6	66.50	4.43	0.670	0	0.00	0.00	0	0.00	0.00
PERIOD B (0600-1759 hrs)													
6/18	We	6.0	4	7	13.00	3.25	0.144	0	0.00	0.00	0	0.00	0.00
6/19	We	6.0	40	11	185.75	4.64	0.464	28	0.70	0.07	43	1.07	0.21
6/20	Wd	6.0	24		128.75	5.36	0.847	11	0.46	0.10	11	0.46	0.10
6/25	We	6.0	20		81.00	4.05	0.476	12	0.60	0.11	20	1.00	0.28
6/26	We	6.0	72		344.50	4.78	0.269	34	0.47	0.06	62	0.86	0.20
6/27	Wd	6.0	15		58.00	3.87	0.924	8	0.53	0.13	8	0.53	0.13
7/02	We	3.0	15		86.25	5.75	0.875	3	0.20	0.11	3	0.20	0.11
7/03	We	6.0	48	12	177.00	3.69	0.291	34	0.71	0.07	37	0.77	0.09
7/04	We	6.0	54		267.50	4.95	0.409	18	0.33	0.06	20	0.37	0.08
7/09	We	6.0	43	16	169.25	3.94	0.440	28	0.65	0.07	34	0.79	0.10
7/10	We	6.0	31	11	122.75	3.96	0.546	18	0.58	0.09	18	0.58	0.09
7/11	Wd	6.0	38	6	165.75	4.36	0.600	4	0.11	0.05	4	0.11	0.05
PERIOD C (1800-2400 hrs)													
6/18	We	3.0	24		82.50	3.44	0.477	6	0.25	0.09	8	0.33	0.14
6/19	We	3.0	21		98.75	4.70	0.497	9	0.43	0.11	9	0.43	0.11
6/20	Wd	3.0	14		92.00	6.57	0.987	1	0.07	0.07	1	0.07	0.07
6/25	We	3.0	8		54.00	6.75	0.620	6	0.75	0.16	14	1.75	0.75
6/26	We	3.0	19		72.00	3.79	0.441	7	0.37	0.11	13	0.68	0.30
6/27	Wd	3.0	11		38.50	3.50	0.309	4	0.36	0.15	4	0.36	0.15
7/02	We	3.0	19	7	88.00	4.63	0.568	10	0.53	0.12	20	1.05	0.39
7/03	We	3.0	25		137.50	5.50	0.572	14	0.56	0.10	22	0.88	0.35
7/04	We	3.0	18	19	125.50	6.97	0.712	11	0.61	0.12	27	1.50	0.66
7/09	We	3.0	36	14	210.25	5.84	0.677	9	0.25	0.07	9	0.25	0.07
7/10	We	3.0	33	14	172.50	5.23	0.462	10	0.30	0.08	10	0.30	0.08
7/11	Wd	3.0	38	6	216.25	5.69	0.423	7	0.18	0.06	7	0.18	0.06

[1] Wd = Weekday; We = Weekend/holiday.

[2] Standard error.

Appendix Table 15. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery at Sheep Creek during periods A, B, and C, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD A (0000-0559 hrs)													
6/11	We	3.0	45	7	166.75	3.71	0.272	5	0.11	0.05	5	0.11	0.05
6/12	We	3.0	26	5	106.00	4.08	0.464	5	0.19	0.08	5	0.19	0.08
6/13	Wd												
6/18	We	3.0	57	7	67.50	1.18	0.104	36	0.63	0.06	53	0.93	0.11
6/19	We	3.0	37	8	192.50	5.20	0.578	19	0.51	0.10	20	0.54	0.11
6/20	Wd	3.0	17	20	54.25	3.19	0.406	4	0.24	0.11	4	0.24	0.11
6/25	We	3.0	123	50	305.25	2.48	0.083	48	0.39	0.05	48	0.39	0.05
6/26	We	3.0	56	10	190.00	3.39	0.225	28	0.50	0.07	33	0.59	0.08
6/27	Wd	3.0	29	6	96.50	3.33	0.208	11	0.38	0.09	11	0.38	0.09
7/02	We	3.0	86	51	217.00	2.52	0.138	39	0.45	0.05	44	0.51	0.06
7/03	We	3.0	35	3	191.25	5.46	0.555	6	0.17	0.06	6	0.17	0.06
7/04	We	3.0	33		137.50	4.17	0.301	5	0.15	0.06	5	0.15	0.06
PERIOD B (0600-1759 hrs)													
6/11	We	4.0	43	5	183.25	4.26	0.428	14	0.33	0.07	16	0.37	0.09
6/12	We	4.0	38	5	237.75	6.26	1.138	3	0.08	0.04	4	0.11	0.05
6/13	Wd	4.0	31	15	199.50	6.44	1.198	13	0.42	0.09	14	0.45	0.10
6/18	We	4.0	54	12	232.50	4.31	0.418	36	0.67	0.06	59	1.09	0.19
6/19	We	4.0	46	25	167.25	3.64	0.343	26	0.57	0.09	29	0.63	0.11
6/20	Wd	4.0	87	15	315.50	3.63	0.274	17	0.20	0.04	17	0.20	0.04
6/25	We	4.0	73	30	352.75	4.83	0.320	29	0.40	0.06	56	0.77	0.22
6/26	We	4.0	118	12	472.25	4.00	0.321	47	0.40	0.05	51	0.43	0.05
6/27	Wd	4.0	42	5	156.50	3.73	0.395	17	0.40	0.08	18	0.43	0.08
7/02	We	4.0	31	11	114.50	3.69	0.352	5	0.16	0.07	11	0.35	0.23
7/03	We	4.0	39	15	107.75	2.76	0.356	8	0.21	0.07	10	0.26	0.09
7/04	We	4.0	48	6	206.25	4.30	0.470	4	0.08	0.04	16	0.33	0.19
PERIOD C (1800-2400 hrs)													
6/11	We	3.0	47	5	241.50	5.14	0.612	3	0.06	0.04	3	0.06	0.04
6/12	We	3.0	51	5	272.25	5.34	0.722	6	0.12	0.05	7	0.14	0.06
6/13	Wd	3.0	61	8	217.50	3.57	0.305	21	0.34	0.06	27	0.44	0.10
6/18	We	2.0	51	12	237.75	4.66	0.424	24	0.47	0.07	33	0.65	0.08
6/19	We	3.0	83	20	335.50	4.04	0.359	23	0.28	0.06	23	0.28	0.06
6/20	Wd	3.0	58	25	201.50	3.47	0.428	11	0.19	0.07	11	0.19	0.07
6/25	We	3.0	65	50	351.50	5.41	0.468	25	0.38	0.06	29	0.45	0.08
6/26	We	3.0	65	15	232.75	3.58	0.234	21	0.32	0.06	24	0.37	0.07
6/27	Wd	3.0	86	7	316.50	3.68	0.284	8	0.09	0.03	16	0.19	0.06
7/02	We	3.0	64	12	282.50	4.41	0.396	10	0.16	0.05	10	0.16	0.05
7/03	We	3.0	62	15	210.50	3.40	0.287	4	0.06	0.03	4	0.06	0.03
7/04	We	3.0	33	2	93.25	2.83	0.384	1	0.03	0.03	3	0.09	0.05

[1] Wd = Weekday; We = Weekend/holiday.
[2] Standard error.

Appendix Table 16. Daily totals, means, and standard errors for effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the fishery at Montana Creek during periods A, B, and C, 1988.

Date	We/ Wd[1]	Hours Censused	Sample Size	Missed Anglers	Effort			Harvest			Catch		
					Total	Mean	SE[2]	Total	Mean	SE[2]	Total	Mean	SE[2]
PERIOD A (0000-0559 hrs)													
6/18	We	3.0	61		107.25	1.76	0.132	23	0.38	0.06	36	0.59	0.11
6/19	We	3.0	17		56.50	3.32	0.348	3	0.18	0.10	3	0.18	0.10
6/20	Wd												
6/25	We	3.0	152		353.50	2.33	0.127	19	0.13	0.03	23	0.15	0.04
6/26	We	3.0	38		158.50	4.17	0.552	4	0.11	0.05	7	0.18	0.11
6/27	Wd	3.0	30		118.25	3.94	0.432	29	0.97	0.27	52	1.73	0.72
7/02	We	3.0	87		186.00	2.14	0.114	46	0.53	0.05	65	0.75	0.10
7/03	We	3.0	90		303.00	3.37	0.231	26	0.29	0.05	28	0.31	0.06
7/04	We	3.0	77		322.75	4.19	0.245	8	0.10	0.04	19	0.25	0.09
PERIOD B (0600-1759 hrs)													
6/18	We	4.0	20		91.50	4.58	0.831	4	0.20	0.09	8	0.40	0.18
6/19	We	4.0	17		54.50	3.21	0.289	3	0.18	0.10	3	0.18	0.10
6/20	Wd	4.0	46		137.25	2.98	0.424	28	0.61	0.08	36	0.78	0.09
6/25	We	4.0	113		316.50	2.80	0.350	9	0.08	0.03	11	0.10	0.03
6/26	We	4.0	73		303.50	4.16	0.555	8	0.11	0.04	15	0.21	0.10
6/27	Wd	4.0	70		192.75	2.75	0.251	17	0.24	0.06	19	0.27	0.07
7/02	We	4.0	73		431.00	5.90	0.232	40	0.55	0.06	70	0.96	0.14
7/03	We	4.0	124		554.25	4.47	0.268	19	0.15	0.03	20	0.16	0.04
7/04	We	4.0	74		385.00	5.20	0.375	15	0.20	0.05	16	0.22	0.05
PERIOD C (1800-2400 hrs)													
6/18	We	3.0	16		58.50	3.66	0.625	0	0.00	0.00	0	0.00	0.00
6/19	We	3.0	52		127.50	2.45	0.242	11	0.21	0.06	14	0.27	0.06
6/20	Wd	3.0	40		143.00	3.58	0.286	5	0.13	0.05	8	0.20	0.07
6/25	We	3.0	56		228.50	4.08	0.409	3	0.05	0.03	3	0.05	0.03
6/26	We	3.0	40		124.00	3.10	0.371	4	0.10	0.05	4	0.10	0.05
6/27	Wd	3.0	57		198.25	3.48	0.280	14	0.25	0.06	28	0.49	0.14
7/02	We	3.0	143		543.50	3.80	0.206	15	0.10	0.03	20	0.14	0.04
7/03	We	3.0	62		207.50	3.35	0.272	8	0.13	0.04	8	0.13	0.04
7/04	We	3.0	57		265.00	4.65	0.357	23	0.40	0.07	31	0.54	0.14

[1] Wd = Weekday; We = Weekend/holiday.

[2] Standard error.