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HARVEST OF CHINOOK SALMON *(Oncorhynchus tshawytscha)* AND COHO SALMON *(O. kisutch)* AND ANGLER-EFFORT BY THE LOWER KENAI RIVER RECREATIONAL FISHERIES, 1986

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ABSTRACT

A creel survey was conducted on the Kenai River between the outlet of Skilak Lake and Cook Inlet from 17 May through 28 September 1986. The recreational fishery in this section of the Kenai River is directed primarily for two species, chinook salmon (*Oncorhynchus tshawytscha* Walbaum) during June and July, and coho salmon (*O. kisutch* Walbaum) during August and September. The estimated angler-effort and harvest during the early (May and June) chinook salmon run were 183,901 angler-hours and 7,561 chinook salmon, respectively. The estimated angler-effort and harvest during the late (July) chinook salmon run were 244,440 angler-hours and 9,004 chinook salmon, respectively. Unguided anglers exerted 76.2 percent of the total effort and took 54.5 percent of the total chinook salmon harvest while guided anglers exerted 23.8 percent of the effort and harvested 45.5 percent of the total.

The estimated angler-effort and harvest during the coho salmon fishery (August and September) were 281,070 angler-hours and 42,574 chinook salmon, respectively. Unguided anglers exerted 84.9 percent of the total effort and took 74.1 percent of the total coho salmon harvest, while guided anglers exerted 15.1 percent of the effort and harvested 25.9 percent of the total. Harvest and catch estimates for sockeye salmon (*O. nerka* Walbaum), pink salmon (*O. gorbuscha* Walbaum), rainbow trout (*Salmo gairdneri* Richardson), and Dolly Varden char (*Salvelinus malma* Walbaum) are also presented.

KEY WORDS: Kenai River, chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, creel survey, effort, harvest, angler, CPUE, guided angler, nonguided angler.

INTRODUCTION

The Kenai River supports the largest freshwater recreational fishery in Alaska. There were more than 300,000 angler-days of effort on the river in 1985 (Mills 1986). The majority of the effort occurs in the section of the river between the outlet of Skilak Lake and Cook Inlet (Figure 1). There are two major fisheries in this section, a fishery which targets primarily on returning chinook salmon (*Oncorhynchus tshawytscha* Walbaum) during May, June, and July, and a fishery which targets primarily on returning coho salmon (*O. kisutch* Walbaum) during August and September. Angler-effort in both fisheries has increased in 6 of the 9 years since creel surveys for these fisheries were begun in 1977 (Figure 2). Sockeye salmon (*O. nerka* Walbaum), pink salmon (*O. gorbuscha* Walbaum), Dolly Varden char (*Salvelinus malma* Walbaum), and rainbow trout (*Salmo gairdneri* Richardson) are also harvested by recreational anglers in the Kenai River.

Prior to 1970, the Kenai River recreational fishery was mainly comprised of shore-based anglers targeting on sockeye salmon in July and coho salmon in August and early September. In 1973, large numbers of anglers began experimenting with a technique used effectively by anglers fishing for chinook salmon on rivers in the Pacific Northwest. The technique involved

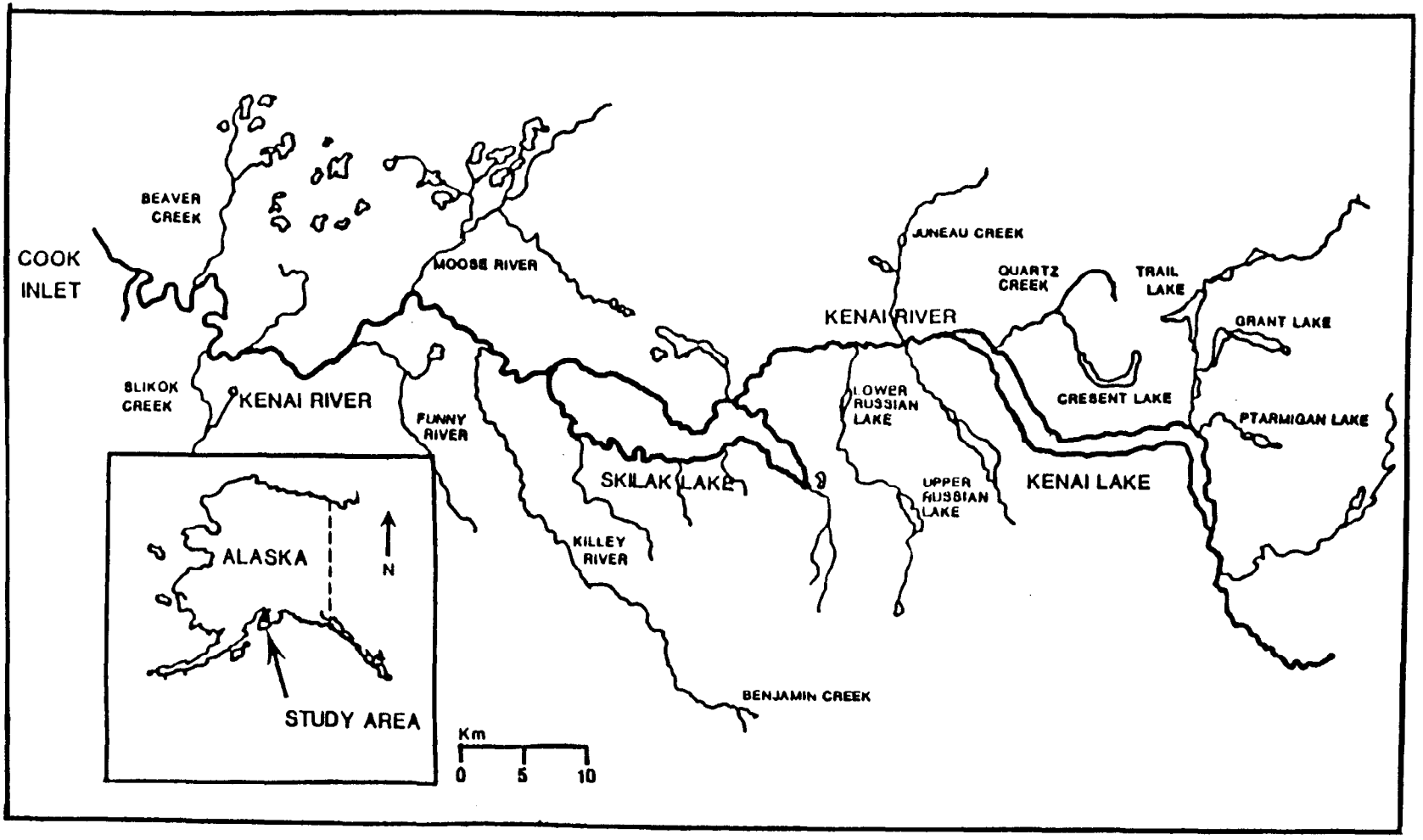

Figure 1. Map of the Kenai River drainage.

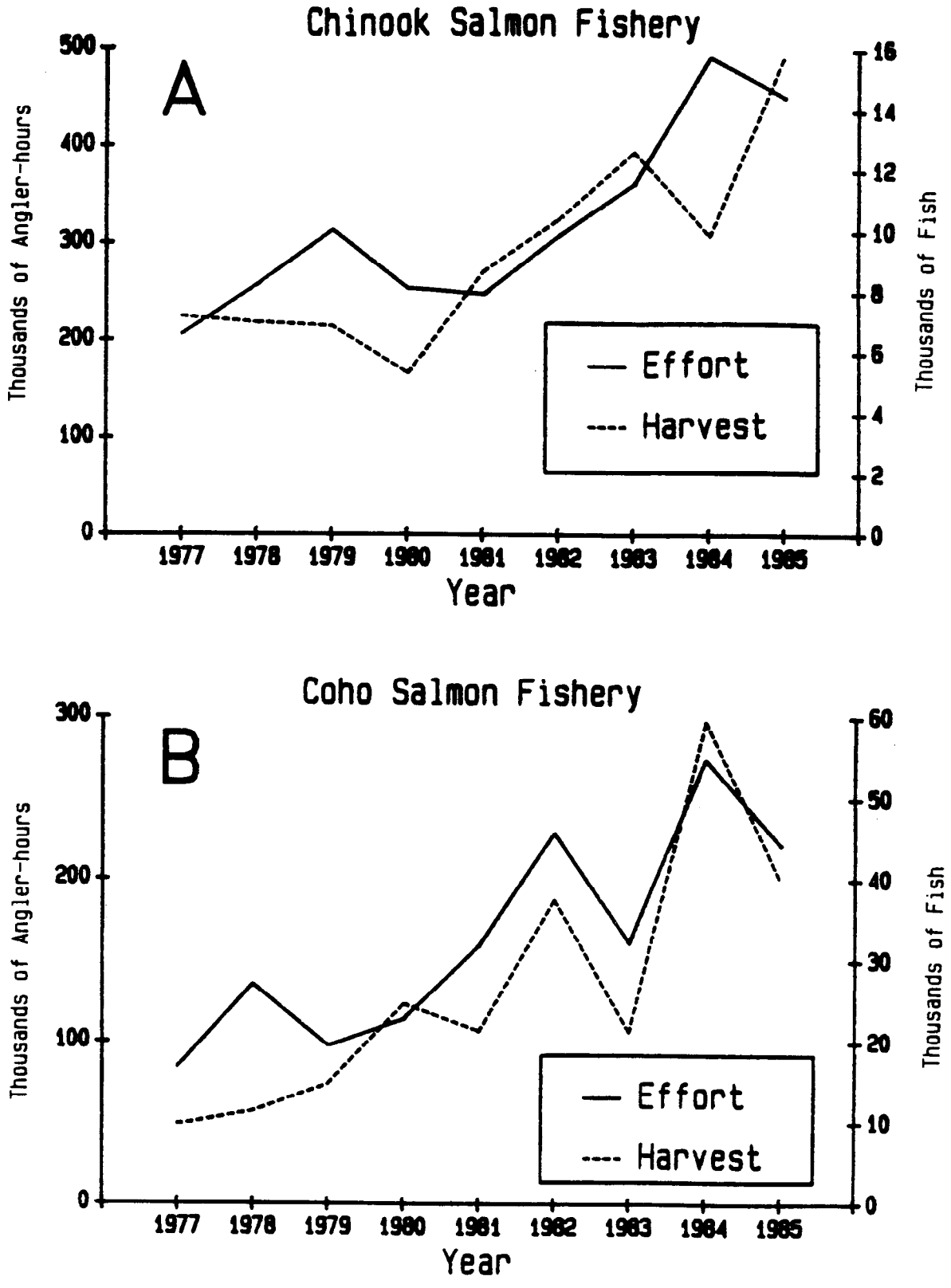

Figure 2. Estimated effort and harvest for the Kenai River chinook salmon (A) and coho salmon (B) recreational fisheries, 1977-1985.

bouncing brightly colored terminal gear along the bottom at river velocity from a drifting boat. This method proved very effective for chinook salmon on the Kenai River and the fishery began to expand rapidly.

The chinook salmon return to the Kenai River has two distinct components: (1) an early run which typically enters the river from mid-May until late June and (2) a late run which typically enters the river from late June through early August. Fish from both runs are prized by recreational anglers due to their large size, especially those from the late run which average about 18 kg and may exceed 36 kg. The world record sport-caught chinook salmon, which weighed 44.1 kg, was caught in the Kenai River in 1985. The separation date between the early run and late run varies annually. The separation date is determined by inspecting graphs of daily catch-per-unit-effort (CPUE) for recreational anglers and for drift gillnets used in a chinook salmon mark-recapture study (Conrad and Larson in preparation). In general there is a low point on the two CPUE curves which can be used to separate the runs. The two runs are not discrete units, however. As the number of early-run fish entering the Kenai River declines, the number of late-run fish increases. The degree of overlap cannot be estimated at this time.

The coho salmon return to the Kenai River also has two distinct components: (1) an early run which typically peaks in August and (2) a late run which typically peaks in September. The late run continues to enter the river into November but fishing effort after September is minimal.

Management of the recreational fisheries is complicated by the relatively large commercial harvests of returning chinook and coho salmon. Chinook salmon are harvested primarily by the setnet fishery along the eastern shores of Cook Inlet (McBride et al. 1985) and coho salmon are harvested primarily by the drift gillnet fishery. User-group conflicts have resulted in intense pressure upon the Department of Fish and Game to conduct increasingly precise management of the Kenai River salmon resources. In addition, the extreme popularity of the Kenai River fishery resources has resulted in increased emphasis on habitat protection, evidenced by the creation of the Kenai River Special Management Area in 1984 by the Alaska State Legislature. The water column and state lands adjacent to the Kenai River were placed into the state park system under the auspices of the Department of Natural Resources, Division of Parks and Outdoor Recreation.

Previous information pertaining to the Kenai River chinook and coho salmon fisheries has been presented by Hammarstrom (1975-1981), Hammarstrom and Larson (1982-1984), and Hammarstrom et al. (1985). In addition, the recreational harvest has been estimated by Mills (1978, 1980-1986) through the Alaska Statewide Harvest Survey.

The current Kenai River creel survey program provides fisheries data which: (1) are used as a basis for inseason management decisions regarding the conduct of the recreational fishery, (2) are evaluated to refine long-term management objectives, and (3) are needed by the Alaska Board of Fisheries in making allocation decisions regarding these resources. The objective of this report is to present detailed information

for the creel surveys of the chinook and coho salmon recreational fisheries conducted in 1986, including estimates of angler-effort and harvest and catch of the major fish species.

Fishing Regulations

The regulations for Kenai River chinook salmon are very restrictive. Only the section of the river between the outlet of Skilak Lake and Cook Inlet is open to chinook salmon fishing. Although by regulation the chinook salmon season is from 1 January through 31 July, it effectively begins in mid-May when the fish first begin entering the river. The daily bag and possession limit is one fish per day greater than 41 cm in length and there is a season limit of two chinook salmon greater than 41 cm. In 1986, fishing from boats below the outlet of Skilak Lake was prohibited on Mondays in May, June, and July, except Monday of Memorial Day. Anyone that retains a chinook salmon 41 cm in length or greater is prohibited from fishing from a boat for the remainder of that day.

There are further restrictions for guided anglers. In addition to the closure to boat fishing on Mondays, fishing from a registered guide vessel on any Sunday in July is prohibited and in 1986, fishing from a guided boat was allowed only between 0600 and 1800 hours during June and between 0700 and 1900 hours during July.

The daily bag and possession limit for other salmon species is an aggregate of three fish 41 cm in length or greater and there is no annual limit. The daily bag and possession limit for rainbow trout is three fish, only one of which may be over 51 cm, and there is an annual limit of two fish over 51 cm. The daily bag and possession limit for Dolly Varden char is five fish. There are no days or hours closed to boat fishing for either unguided or guided anglers during the remainder of the year.

METHODS

A roving creel survey (Neuhold and Lu 1957) was used to estimate sport fishing effort, in units of angler-hours, during the Kenai River chinook salmon and coho salmon fisheries. Angler counts were considered to be instantaneous and to reflect fishing effort at the time of the count. Catch-per-unit-effort (number of fish harvested per hour fished) was estimated from both completed-trip and incomplete-trip angler interviews. The number of chinook salmon harvested in a stratum was estimated by the product of the effort and catch rate estimates for the stratum. Angler-effort was estimated separately for three sections of the Kenai River downstream from Skilak Lake (Figure 3): (1) downstream, from Cook Inlet to the Soldotna Bridge, (2) midstream, from the Soldotna bridge to Naptowne Rapids, and (3) upstream, from Naptowne Rapids to the outlet of Skilak Lake. Effort and harvest were estimated separately for the early and late run components of the chinook salmon and coho salmon fisheries.

Both unguided and guided anglers participate in the Kenai River chinook salmon and coho salmon fisheries. Guided anglers fish strictly from boats and are easily recognized because guided boats are required to have a large identifying decal. Because unguided and guided anglers have very

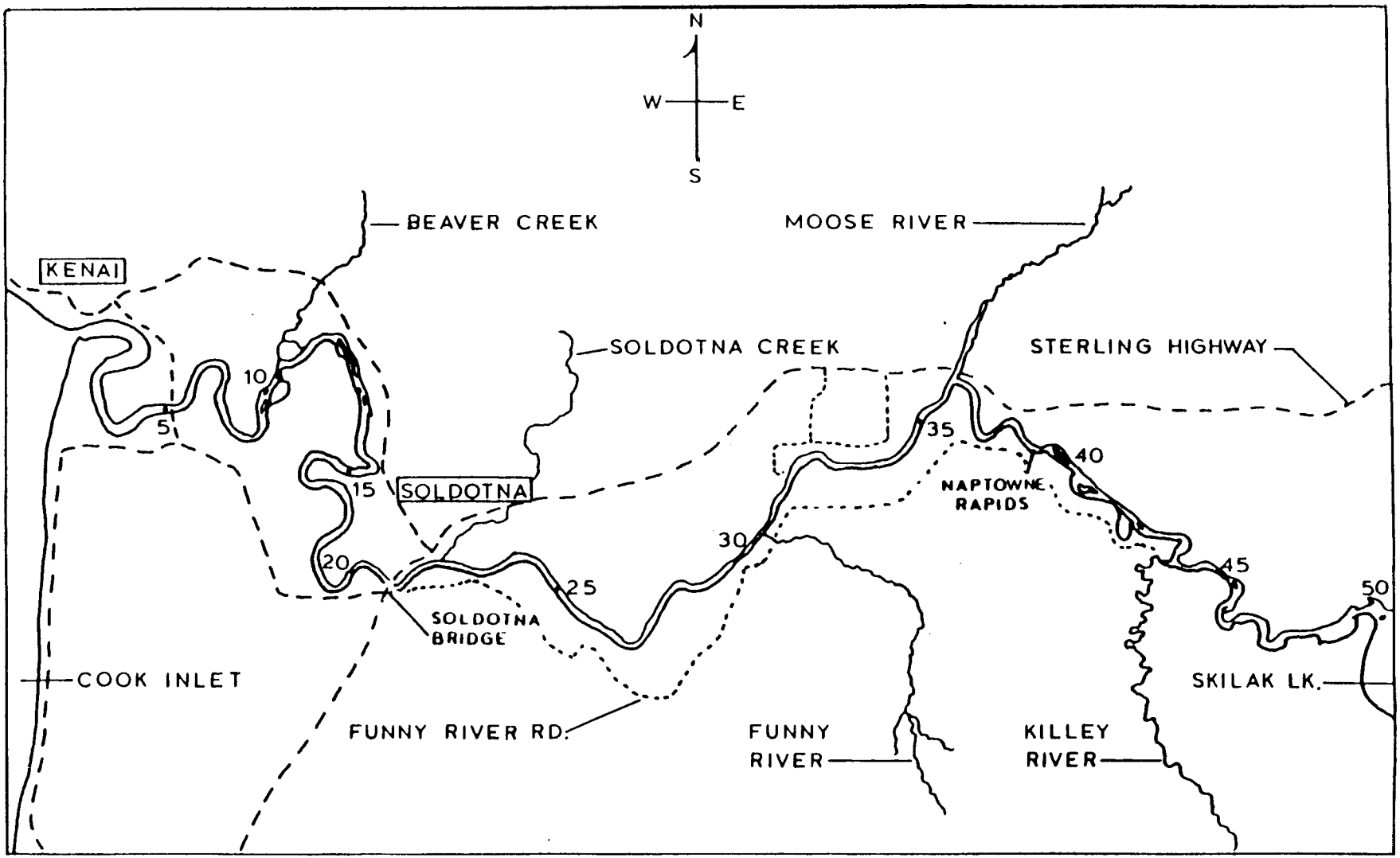

Figure 3. Area of the Kenai River where chinook salmon and coho salmon creel surveys were conducted.

different harvest rates, effort, CPUE, and harvest were estimated separately. Only boat anglers were surveyed during the chinook salmon fishery because shore anglers harvest very few chinook salmon. During the coho salmon fishery, both boat and shore anglers were surveyed.

Chinook Salmon Creel Survey Study Design

The chinook salmon creel survey began on 17 May in the downstream section and on 3 June in the upstream section and continued until the chinook salmon season closed on 31 July. Fishing from boats is prohibited on the Kenai River on all Mondays in May (except Memorial Day), June, and July, therefore Mondays were not surveyed. Guided anglers are further prohibited from fishing on Sundays in July. The unguided angler-day was defined to be 20 hours long, from 0400-2400 hours. The angler-day was stratified into five 4-hour daily time strata (referred to as periods). They were: A, from 0400-0759 hours; B, from 0800-1159 hours; C, from 1200-1559 hours; D, from 1600-1959 hours; and E, from 2000-2359. In May, the guided angler-day was the same length as the unguided angler-day. For guided anglers, period A began at 0600 hours in June and 0700 hours in July, and period D ended at 1800 hours in June and 1900 hours in July (refer to Fishing Regulations in the Introduction). There was no period E for guided anglers in June or July.

Estimates for unguided anglers were stratified further by weekdays and weekends/holidays. Estimates for guided anglers were not similarly stratified because this does not significantly reduce the variance of the effort estimates (Appendix E).

Angler Counts:

Separate sampling schedules were established for the downstream and upstream sections of the river. Sampling levels were determined by the amount of creel survey clerk time available. The downstream creel survey was designed to fully utilize two creel survey clerks each working 37.5 hours per week. The upstream creel survey was designed to fully utilize one creel survey clerk working 37.5 hours per week.

On a day selected for sampling, either two or four periods from the five available (A, B, C, D, or E) were randomly selected without replacement. Within a period selected for sampling, a starting time for the angler count was randomly selected from the four even-hour times in the period (e.g., 0400, 0500, 0600, or 0700 hrs for period A).

Angler counts were conducted from a boat in the downstream and upstream sections of the Kenai River. At the time designated on the schedule, the creel survey clerk started from a randomly selected end of the section of the river to be surveyed. The angler count was made as the boat was driven at a constant rate of speed through the survey area to the opposite end of the river section. This trip usually took about 45 minutes and every effort was made to ensure that the trip was completed in less than 1 hour. During the angler count, the creel survey clerk recorded the following: (1) total number of unguided boats, (2) total number of guided boats, (3) total number of unguided anglers in boats, (4) total number of anglers in guided boats, and (5) total number of shore anglers. Boats

were considered to be engaged in fishing if they were in operation, as opposed to tied to the shore, regardless of whether or not an angler's line was in the water when the count was being conducted. Guides were not included in the counts during the chinook salmon fishery as they are prohibited from fishing while guiding.

Aerial surveys were conducted to estimate the proportion of fishing effort occurring in the the midstream section of the river. During the flight, the number of boats actively engaged in fishing in each river section was recorded.

Downstream Section. The majority of fishing effort during the chinook salmon fishery occurs in the downstream section of the river. A sampling schedule was established in which angler counts were conducted on each day the fishery was open. Angler counts were scheduled for four of the five daily periods on every weekend/holiday day and on 2 weekdays each week. Only two angler counts were scheduled for the two remaining weekdays each week.

Upstream Section. Angler counts were scheduled for each weekend/holiday day and on 2 randomly selected weekdays each week in the upstream section. Only two angler counts were scheduled for each sample day.

Midstream Section. Three aerial surveys of the river between Skilak Lake and Cook Inlet were scheduled each week, on 1 randomly selected weekend day and on 2 randomly selected weekdays. Although count times were randomly selected, weather and aircraft availability occasionally altered this schedule.

Angler Interviews:

During a sample period, angler interviews were conducted by creel survey clerks when they were not conducting the angler count. Angler interviews were conducted by randomly contacting boat anglers throughout the river section from the survey boat. Both completed-trip and incomplete-trip anglers were interviewed. Because of the regulation prohibiting fishing from a boat after retaining a chinook salmon, most completed-trip anglers were successful and most incomplete-trip anglers were unsuccessful.

An additional creel survey clerk was used to interview completed-trip anglers at major public and private launch sites in the downstream section of the river. This person was part of a chinook salmon mark-recapture study and the sampling design for this portion of the creel survey is described in Conrad and Larson (in preparation).

The following information was recorded for each angler interviewed: (1) type of angler (guided or unguided), (2) trip type (completed or incomplete), (3) hours fished, (4) number and species of fish caught and kept, and (5) number and species of fish caught and released.

Biological Data:

Chinook salmon kept by anglers interviewed during the surveys were randomly selected for biological sampling. Mid-eye to fork-of-tail length

was measured to the nearest 0.5 cm, the sex of the fish was identified, and scales were removed from the preferred area (Clutter and Whitesel 1956). Three scales were collected from each fish and placed on an adhesive-coated card, ten fish per card. Impressions of scale cards were made on acetate and scale images were examined using a microfiche reader.

Coho Salmon Creel Survey Study Design

The coho salmon creel survey began on 1 August and continued until 28 September in both sections of the river. With some exceptions, the coho salmon survey was conducted similarly to the chinook salmon creel survey. The angler-day was reduced to 16 hours in August (from 0600-2200 hrs) and 12 hours in September (from 0800-2000 hrs) to account for the decreased number of daylight hours. The daily time strata were adjusted for the coho salmon creel survey by eliminating period E in August and shifting the starting time of period A to 0600 hours. In September, period D was eliminated and the starting time of period A shifted to 0800 hours. The angler-day and weekday and weekend/holiday stratification were the same for unguided and guided anglers during the coho salmon creel survey.

Angler Counts:

Separate sampling schedules were established for the downstream and upstream sections of the river. Sampling levels were again determined by the amount of creel survey clerk time available. Both creel surveys were designed to fully utilize one creel survey clerk working 37.5 hours per week.

Angler counts were scheduled for each weekend/holiday day and on 3 randomly selected weekdays each week in both the downstream and upstream sections. Only two angler counts were scheduled for a sample day. Sample periods and count times were selected as described for the chinook salmon creel survey.

Angler counts were conducted following the same procedures described for the chinook salmon creel survey except that guides were included in the angler counts. Effort in the midstream section of the river was not estimated during the coho salmon creel survey.

Angler Interviews:

Angler interviews were conducted following the procedures described for the chinook salmon creel survey except that during August and September both shore and boat anglers were interviewed by the creel survey clerks. All interviews were collected by the survey clerks conducting the angler counts; there were no clerks stationed at launch sites as during the chinook salmon creel survey.

Biological Data:

Biological samples for coho salmon were collected identically to those for chinook salmon.

Data Analyses

Angler-effort, harvest and catch rates by species, harvest and catch by species, and associated variances, were estimated similarly for the downstream and upstream sections of the chinook salmon and coho salmon fisheries. In the following sections, harvest refers to fish retained by anglers and catch refers to fish retained plus those reported as released by anglers.

There were seven strata for the chinook salmon fishery in the downstream section, four in the early run and three in the late run. The early run strata were: (1) unguided anglers weekdays, (2) unguided anglers weekends/holidays, (3) guided anglers in May, and (4) guided anglers in June. Effort for guided anglers had to be estimated separately for May and June because of the change in the length of the guided angler-day from 20 hours to 12 hours on 1 June. The strata for the late run of the downstream section were: (1) unguided anglers weekdays, (2) unguided anglers weekends/holidays, and (3) guided anglers.

There were six strata for the chinook salmon fishery in the upstream section, four in the early run and two in the late run. The early run strata were: (1) unguided anglers weekdays, (2) unguided anglers weekends/holidays, (3) guided anglers in June, and (4) guided anglers in July. Effort for guided anglers had to be estimated separately for June and July because of the change in the starting time of the guided angler-day from 0600 to 0700 hours on 1 July. Late run strata for the downstream section were: (1) unguided anglers weekdays and (2) guided anglers. Unguided anglers were not stratified by weekdays and weekends/holidays because there were only two weekends during the late run and sufficient counts were not conducted in each period to produce an estimate for the weekend stratum.

The downstream and upstream sections each had eight strata for the coho salmon fishery. The early and late runs in each section had the same four strata: (1) unguided anglers weekdays, (2) unguided anglers weekends/holidays, (3) guided anglers weekdays, and (4) guided anglers weekends/holidays.

Effort:

The number of angler-hours of effort during fishery stratum t was estimated as follows (Neuhold and Lu 1957):

$$\hat{E}_t = \sum_{j=1}^{1} H_{tj} \bar{x}_{tj}$$

where:

$\bar{x}_{tj}$ = the mean number of anglers per count during period j of fishery stratum t,

H_{tj} = the total number of hours of possible fishing time during period j of fishery stratum t, and

l = the number of periods (A, B, C, etc.) in stratum t.

The variance of effort was estimated as follows (Scheaffer et al. 1979):

$$\hat{V}(E_t) = \sum_{j=1}^{l} H_{tj}^2 \, (s_{tj}^2/n_{tj})$$

where:

s_{tj}^2 = the sample variance of $\bar{x}_{tj}$, and

n_{tj} = the number of angler counts during period j of fishery stratum t.

The finite population correction factor was not applied as angler counts were considered to be instantaneous.

Harvest Rates:

Mean effort and mean harvest by species were estimated from the angler interview data for the strata defined previously. Mean effort was estimated as:

$$\bar{f}_t = \left(\sum_{i=1}^{D} \sum_{k=1}^{m_i} f_{ik}\right) \Big/ \sum_{i=1}^{D} m_i$$

where:

f_{ik} = the effort (in hours) by angler k at the time of the interview on day i,

m_i = the number of anglers interviewed on day i, and

D = the number of days the fishery was open during stratum t.

The variance of mean effort was estimated using a two-stage sample design with days representing the first-stage sample units and anglers the second-stage sample units (Von Geldern and Tomlinson 1973). On a given sample day, the number of second-stage units available was unknown. The variance of mean effort was estimated as follows (Sukhatme et al. 1984):

$$V(\bar{f}_t) = [1 - (d/D)] \, s_B^2/d + \left(\sum_{i=1}^{D} s_{Wi}^2/m_i\right)/dD$$

where:

d = the number of days sampled during stratum t,

s_{Wi}^2 = the sample variance of effort for anglers interviewed during day i, and

s_B^2 = the between-day variance of angler-effort.

The between-day variance, s_B^2, was estimated as follows:

$$s_B^2 = [\sum_{i=1}^{D} (\bar{f}_{ti} - \bar{f}_t)^2]/(d-1)$$

where:

$\bar{f}_{ti}$ = the mean effort by anglers interviewed during day i of stratum t.

Mean harvest of a species and its variance were estimated identically to effort except the corresponding quantities for harvest are substituted for all occurrences of effort (f). Harvest rate (HPUE) for a species during stratum t was estimated by:

$$HPUE_t = \bar{c}_t/\bar{f}_t$$

where:

$\bar{c}_t$ = the mean harvest during fishery stratum t.

The variance of $HPUE_t$ was approximated by the variance for the quotient of the mean of two random variables (Jessen 1978), which is:

$$\hat{V}(\bar{c}_t/\bar{f}_t) \cong (\bar{c}_t/\bar{f}_t)^2 (s_c^2/\bar{c}_t^2 + s_f^2/\bar{f}_t^2 - 2rs_c s_t/\bar{c}_t\bar{f}_t)$$

where:

s_c^2 = the two-stage variance estimate for $\bar{c}_t$,

s_f^2 = the two-stage variance estimate for $\bar{f}_t$, and

r = the correlation coefficient between the f_{ik} and the c_{ik} in stratum t.

CPUE for a species and its variance were estimated by replacing the number of fish harvested with the number of fish caught in the above formulae.

Harvest:

The harvest of a species during a stratum was estimated by:

$$\hat{H}_t = \hat{E}_t HPUE_t.$$

The variance of $\hat{H}_t$ was estimated using Goodman's (1960) formula for the variance of the product of two independent random variables which is as follows:

$$V(\hat{H}_t) = [\hat{E}_t^2 \, V(HPUE_t)] + [HPUE_t^2 \, V(\hat{E}_t)] - [V(\hat{E}_t) \, V(HPUE_t)].$$

Totals (for example, the early run unguided angler total) for effort and harvest were estimated by summing the appropriate strata estimates. Estimates of effort and harvest for the strata were considered independent, therefore, the variance of the total was estimated by the sum of the appropriate variances.

Catch of a species and its variance were estimated by replacing HPUE with CPUE in the above formulae.

The major assumptions necessary for these analyses are:

1. Significant fishing effort occurs only between the hours defined for the angler-day.

2. Individual angler-effort and angler harvest (or catch) are normally distributed random variables.

3. Incomplete-trip angler interviews provide an unbiased estimate of completed-trip HPUE and CPUE (DiConstanzo 1956).

4. Anglers are interviewed in proportion to their abundance (DiConstanzo 1956) and interviewed anglers are representative of the total angler population.

5. Catch rate and length of fishing trip are independent (DiConstanzo 1956).

Midstream Section Effort and Harvest:

Fishing effort in the midstream section of the Kenai River during the chinook salmon creel survey was estimated from boat counts made during aerial surveys of the river. The proportion of boat fishing effort occurring in the midstream section was calculated separately for the early run and the late run. For each aerial survey, the proportion of effort in the midstream section (p_m) was calculated as the quotient of the number of boats counted in the midstream section and the number of boats counted between between the outlet of Skilak Lake and Cook Inlet. Effort in the midstream section (E_m) during either the early-run or late-run chinook salmon fishery was estimated as follows:

$$\hat{E}_m = \bar{p}_m \, (\hat{E}_d + \hat{E}_u)/(1-\bar{p}_m)$$

where:

$\bar{p}_m$ = the mean of the p_ms for a run,

$\hat{E}_d$ = the estimated number of angler-hours of effort in the downstream section for a run, and

$\hat{E}_u$ = the estimated number of angler-hours of effort in the upstream section for a run.

Effort was estimated separately for unguided and guided anglers. The variances of the midstream effort estimates were approximated by the delta method (Seber 1982) as follows:

$$V(\hat{E}_m) \cong [(\hat{E}_d+\hat{E}_u)/(1-\bar{p})^2]^2 V(\bar{p}) + [\bar{p}/(1-\bar{p})]^2 V(\hat{E}_d+\hat{E}_u)$$

where: the variance of $\bar{p}$ is the sample variance of the p_ms divided by the number of flights, the variances of E_d and E_u are estimated as described under Effort, and the covariance between the estimated effort for the downstream and upstream sections and $\bar{p}$ is assumed to be zero.

Chinook salmon catch rates for the midstream section were estimated as the combined total catch rate for the downstream and upstream sections. This is expressed as:

$$HPUE_m = (\hat{H}_d + \hat{H}_u)/(\hat{E}_d + \hat{E}_u)$$

for the harvest rate and:

$$CPUE_m = (\hat{C}_d + \hat{C}_u)/(\hat{E}_d + \hat{E}_u)$$

for the catch rate, where the subscripts denote the middle (m), downstream (d), or upstream (u) sections of the river. The variances of the rates were also approximated by the delta method. The following formula was used for the variance of harvest rate (HPUE):

$$V(HPUE_m) \cong [1/(\hat{E}_d+\hat{E}_u)]^2 V(\hat{H}_d+\hat{H}_u) + [-(\hat{C}_d+\hat{C}_u)/(\hat{E}_d+\hat{E}_u)^2]^2 V(\hat{E}_d+\hat{E}_u)$$

where the variances of $(\hat{E}_d+\hat{E}_u)$ and $(\hat{H}_d+\hat{H}_u)$ are calculated as described previously. The covariance between the combined downstream and upstream effort and harvest is omitted from the above equation because it is unknown, although it is assumed positive (as effort increases harvest should increase). The product of the covariance and the derivatives of the numerator and denominator of $HPUE_m$ or $(CPUE_m)$ would be subtracted from the above equation because of the negative derivative for the denominator. Therefore, the formula above is probably a conservative estimate of the variance of $HPUE_m$. The variance of $CPUE_m$ was estimated using the same formula but the combined downstream and upstream catches and their variances were substituted for the harvest counterparts.

The harvest and catch of chinook salmon in the midstream section were estimated for unguided and guided anglers following the procedures described for the downstream and upstream sections. The variances of these estimates were estimated as described previously, also.

Biological Data:

The proportional age composition of the chinook salmon harvest was estimated for each run. Letting p_{hi} equal the estimated proportion of age group h in stratum i, the variance of p_{hi} was estimated using the normal approximation to the binomial (Scheaffer et al. 1979):

$$V(\hat{p}_{hi}) = \hat{p}_{hi}(1-\hat{p}_{hi})/(n_{Ti}-1),$$

where, n_{Ti} is the number of legible scales read from chinook salmon sampled during stratum i.

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

RESULTS

The following dates, based on the criteria described previously, were used to define the early and late runs in the chinook salmon fishery. The early run was from 17 May through 30 June and the late run from 1 July through 31 July in the downstream section. In the upstream section, the early run was from 3 June through 13 July and the late run from 15 July through 31 July. During the coho salmon fishery, the early run was designated from 1 August through 31 August and the late run from 1 September through 28 September in both the downstream and upstream sections.

Chinook Salmon Fishery

Because of mechanical and other logistical problems, only 61 of the 66 days possible during the chinook salmon fishery were surveyed in the downstream section of the Kenai River. In the upstream section, 40 of the 51 days possible were surveyed.

Effort:

Between one and four angler counts were conducted on each sample day in the downstream section, with four counts being the mode (four counts were conducted on 24 of the 61 sample days). Two angler counts were conducted on each day surveyed in the upstream section.

Downstream Section. Angler counts in the downstream section ranged from 9 to 828 unguided anglers and from 0 to 343 guided anglers (Appendix Tables A1 and A2). The largest unguided angler count occurred on 27 July and the largest guided angler count on 29 July. The means of the unguided angler counts for the late run strata were all larger than the means of the

unguided angler counts for the early run strata (Table 1). Within a period, the mean count of unguided anglers for the weekend/holiday stratum was always larger than the mean count for the weekday stratum (Table 1), except during period E of the late run.

The estimated effort during the early run was 142,095 angler-hours (Table 2). The majority of this effort was by unguided anglers; 71% of the total early run effort was by unguided anglers, 36% during the weekday stratum and 35% during the weekend/holiday stratum. The estimated effort during the late run was 207,322 angler-hours (Table 2). The majority of this effort was by unguided anglers, also; 77% of the total late run effort was by unguided anglers, 47% during the weekday stratum and 30% during the weekend/holiday stratum.

Upstream Section. Angler counts in the upstream section ranged from 0 to 139 unguided anglers and from 0 to 15 guided anglers (Appendix Tables A3 and A4). The largest unguided angler count occurred on 15 June and the largest guided angler count on 26 June. Within a period, the mean count of unguided anglers for the weekend/holiday stratum was always larger than the mean count for the weekday stratum (Table 3). The largest mean guided angler counts were 6.0 for period B in June and July of the early run.

The estimated effort during the early run was 19,738 angler-hours (Table 4). The majority of this effort was by unguided anglers; 93% of the total early run effort was by unguided anglers, 40% during the weekday stratum and 53% during the weekend/holiday stratum. The estimated effort during the late run was 13,407 angler-hours 97% of which was by unguided anglers (Table 4).

Midstream Section. The counts of angler boats in each section of the Kenai River between Skilak Lake and Cook Inlet, conducted during aerial surveys, are summarized in Table 5. Six counts were conducted during the early run and five counts during the late run. The mean proportion of total boat effort in the midstream section was 0.120 for the early run and 0.097 for the late run. Because unguided boats cannot be distinguished from guided boats from the air, the estimated proportion of effort in the midstream section during each run was used to estimate both unguided and guided angler-effort. Estimated effort for the midstream section during the early run was 16,184 angler-hours for unguided anglers (standard error [SE] = 1,475) and 5,884 angler-hours for guided anglers (SE = 469). During the late run, estimated effort for the midstream section was 18,585 angler-hours for unguided anglers (SE = 2,191) and 5,126 angler-hours for guided anglers (SE = 616).

Harvest Rates and Catch Rates:

A total of 12,434 angler interviews were collected during the downstream creel survey, 5,810 during the early run and 6,624 during the late run. In the upstream section, 4,059 angler interviews were collected, 2,666 during the early run and 1,393 during the late run.

Downstream Section. Chinook salmon daily harvest rates by unguided angler ranged from 0.000 to 0.088 fish per per hour during the early run and from

Table 1. Summary of the angler counts for each of the strata in the Kenai River downstream chinook salmon creel survey, 1986.

Stratum	Period A	B	C	D	E
EARLY RUN					
Unguided anglers weekdays:					
Number of counts	10	9	12	11	8
Mean count	116.1	138.0	129.6	114.3	37.4
Standard error	25.4	38.5	15.2	25.8	9.9
Unguided anglers weekends:					
Number of counts	8	11	13	10	5
Mean count	170.3	212.7	189.2	152.9	91.2
Standard error	37.7	44.0	29.8	33.5	40.2
Guided anglers in May:					
Number of counts	5	6	5	5	4
Mean count	38.6	20.7	27.0	14.0	4.0
Standard error	14.9	4.9	9.0	6.0	1.6
Guided anglers in June:					
Number of counts	7	14	20	9	
Mean count	173.0	145.9	88.8	75.3	
Standard error	11.8	12.5	7.3	9.0	
LATE RUN					
Unguided anglers weekdays:					
Number of counts	12	12	9	12	8
Mean count	256.4	298.7	333.1	248.3	226.3
Standard error	42.8	42.9	35.8	39.1	47.4
Unguided anglers weekends:					
Number of counts	6	6	6	5	4
Mean count	271.3	488.0	349.7	391.8	216.5
Standard error	95.1	97.3	77.3	81.9	31.3
Guided anglers:					
Number of counts	4	14	13	11	
Mean count	195.8	236.1	145.2	113.0	
Standard error	33.6	18.2	14.6	24.3	

Table 2. Estimated number of angler-hours of fishing effort by boat anglers during each of the strata in the Kenai River downstream chinook salmon fishery, 1986.

Stratum	Estimated Effort	Standard Error	95% Confidence Interval	Relative Precision
EARLY RUN				
Unguided weekdays	51,392	5,364	40,878 - 61,906	20.5%
Unguided weekends	48,979	5,013	39,152 - 58,804	20.1%
Guided May	5,839	1,070	3,741 - 7,937	35.9%
Guided June	35,885	1,624	32,701 - 39,069	8.9%
Sub-totals:				
Unguided anglers	100,371	7,342	85,980 - 114,762	14.3%
Guided anglers	41,724	1,945	37,911 - 45,536	9.1%
Early Run Total	142,095	7,595	127,208 - 156,981	10.5%
LATE RUN				
Unguided weekdays	98,120	6,726	84,938 - 111,302	13.4%
Unguided weekends	61,823	6,457	49,168 - 74,478	20.5%
Guided	47,379	2,830	41,831 - 52,927	11.7%
Sub-totals:				
Unguided anglers	159,943	9,323	141,669 - 178,217	11.4%
Guided anglers	47,379	2,830	41,831 - 52,927	11.7%
Late Run Total	207,322	9,744	188,225 - 226,419	9.2%
BOTH RUNS COMBINED				
Unguided anglers	260,314	11,867	237,054 - 283,573	8.9%
Guided anglers	89,103	3,434	82,372 - 95,834	7.6%
TOTAL	349,417	12,354	325,203 - 373,630	6.9%

Table 3. Summary of the angler counts for each of the strata in the Kenai River upstream chinook salmon creel survey, 1986.

Stratum	Period A	B	C	D	E
EARLY RUN					
Unguided anglers weekdays:					
Number of counts	4	5	9	8	8
Mean count	3.0	26.4	22.1	18.1	15.6
Standard error	2.4	6.9	4.4	3.6	4.4
Unguided anglers weekends:					
Number of counts	3	6	5	7	3
Mean count	3.3	32.2	65.2	46.3	54.3
Standard error	2.4	10.3	20.6	10.8	8.8
Guided anglers in June:					
Number of counts	1	8	10	4	
Mean count	2.0	6.0	1.4	4.8	
Standard error	-[1]	2.2	0.5	2.0	
Guided anglers in July:					
Number of counts	0	2	3	5	
Mean count	0[2]	6.0	1.7	2.8	
Standard error		3.0	1.2	0.8	
LATE RUN					
Unguided anglers:					
Number of counts	3	5	2	7	5
Mean count	5.3	67.8	48.0	38.3	58.4
Standard error	3.9	8.3	0.0	6.5	21.2
Guided anglers:					
Number of counts	0	4	2	4	
Mean count	0[2]	1.5	3.5	2.0	
Standard error		0.6	1.5	0.4	

[1] Any variance associated with the A period estimate was ignored.

[2] No effort assumed during period A.

Table 4. Estimated number of angler-hours of fishing effort by boat anglers during each of the strata in the Kenai River upstream chinook salmon fishery, 1986.

Stratum	Estimated Effort	Standard Error	95% Confidence Interval	Relative Precision
EARLY RUN				
Unguided weekdays	7,844	941	5,999 - 9,689	23.5%
Unguided weekends	10,469	1,409	7,708 - 13,229	26.4%
Guided June	1,034	238	569 - 1,500	45.0%
Guided July	391	132	133 - 648	66.0%
Sub-totals:				
Unguided anglers	18,313	1,694	14,992 - 21,633	18.1%
Guided anglers	1,425	272	893 - 1,957	37.3%
Early Run Total	19,738	1,716	16,375 - 23,100	17.0%
LATE RUN				
Unguided	13,069	1,437	10,252 - 15,886	21.6%
Guided	338	86	169 - 507	50.1%
Late Run Total	13,407	1,440	10,584 - 16,229	21.1%
BOTH RUNS COMBINED				
Unguided anglers	31,382	2,221	27,028 - 35,736	13.9%
Guided anglers	1,763	285	1,203 - 2,322	31.7%
TOTAL	33,145	2,240	28,755 - 37,535	13.2%

Table 5. Boat counts by river section conducted during aerial surveys of the Kenai River chinook salmon fishery, 1986.

Date	Downstream Count	Downstream Pro.[1]	Midstream Count	Midstream Pro.[1]	Upstream Count	Upstream Pro.[1]	Total Count
EARLY RUN							
5/29	20	0.769	3	0.115	3	0.115	26
6/10	127	0.841	16	0.106	8	0.053	151
6/20	101	0.748	16	0.119	18	0.133	135
6/21	112	0.663	25	0.148	32	0.189	169
6/26	56	0.812	9	0.130	4	0.058	69
6/28	79	0.669	12	0.102	27	0.229	118
Mean		0.750		0.120		0.130	
Standard Error		0.030		0.007		0.029	
LATE RUN							
7/05	149	0.683	16	0.073	53	0.243	218
7/09	55	0.764	6	0.083	11	0.153	72
7/18	243	0.841	28	0.097	18	0.062	289
7/19	322	0.739	47	0.108	67	0.154	436
7/24	191	0.746	32	0.125	33	0.129	256
Mean		0.755		0.097		0.148	
Standard Error		0.025		0.009		0.029	

[1] Proportion of total boat count.

0.006 to 0.087 during the late run (Appendix Tables B1 and B3). Peak chinook salmon daily catch rates by unguided anglers occurred on 10 June and 27 June during the early run and on 15 July during the late run (Figure 4). Chinook salmon daily harvest rates by guided anglers ranged from 0.019 to 0.273 fish per hour during the early run and from 0.020 to 0.168 during the late run (Appendix Tables B2 and B4). Peak daily catch rates by guided angler occurred on 5 June during the early run and on 29 July during the late run (Figure 4). Guided angler harvest and catch rates were higher than those for unguided anglers in all strata (Table 6).

Peak daily harvest rates of other species by unguided anglers were: 0.021 for sockeye salmon, 0.096 for coho salmon, 0.010 for pink salmon, 0.006 for rainbow trout, and 0.010 for Dolly Varden char (Appendix Tables B5, B7, and B8). Peak daily harvest rates of other species by guided anglers were: 0.016 for sockeye salmon, 0.086 for coho salmon, 0.020 for pink salmon, 0.013 for rainbow trout, and 0.021 for Dolly Varden char (Appendix Tables B6, B9, and B10).

Upstream Section. Chinook salmon daily harvest rates by unguided anglers ranged from 0.000 to 0.045 fish per per hour during the early run and from 0.000 to 0.013 during the late run (Appendix Tables B11 and B13). Peak chinook salmon daily catch rates by unguided anglers occurred on 2 July during the early run and on 30 July during the late run (Figure 5). Chinook salmon daily harvest rates by guided anglers ranged from 0.000 to 0.369 fish per hour during the early run and from 0.000 to 0.364 during the late run (Appendix Tables B12 and B13). Peak daily catch rates by guided angler occurred on 29 June during the early run and on 25 July during the late run (Figure 5). Guided angler harvest and catch rates were higher than those for unguided anglers in all strata (Table 7).

Peak daily harvest rates of other species by unguided anglers were: 0.277 for sockeye salmon, 0.013 for coho salmon, 0.072 for rainbow trout, and 0.091 for Dolly Varden char (Appendix Tables B14 and B16). Peak daily harvest rates of other species by guided anglers were: 0.889 for sockeye salmon, 0.024 for pink salmon, 0.417 for rainbow trout, and 0.250 for Dolly Varden char (Appendix Tables B15 and B17).

Midstream Section. During the early run, the chinook salmon harvest rates for the downstream and upstream sections combined were 0.0265 (SE = 0.00354) by unguided anglers and 0.0813 (SE = 0.00740) by guided anglers. Catch rates were 0.0444 fish per hour (SE = 0.00534) by unguided anglers and 0.1249 fish per hour (SE = 0.01145) by guided anglers. Estimated chinook salmon harvest rates for the midstream section during the late run were 0.0285 (SE = 0.00264) by unguided anglers and 0.0671 (SE = 0.00667) by guided anglers. Estimated chinook salmon catch rates during the late run were 0.0521 (SE = 0.00459) by unguided anglers and 0.1013 (SE = 0.00976) by guided anglers.

Harvest and Catch:

Harvest and catch of chinook salmon by boat anglers were estimated for each stratum in the downstream and upstream sections of the Kenai River. Estimated effort and catch rates for each stratum (Tables 2 and 6, respectively), were used to estimate harvest and catch in the downstream

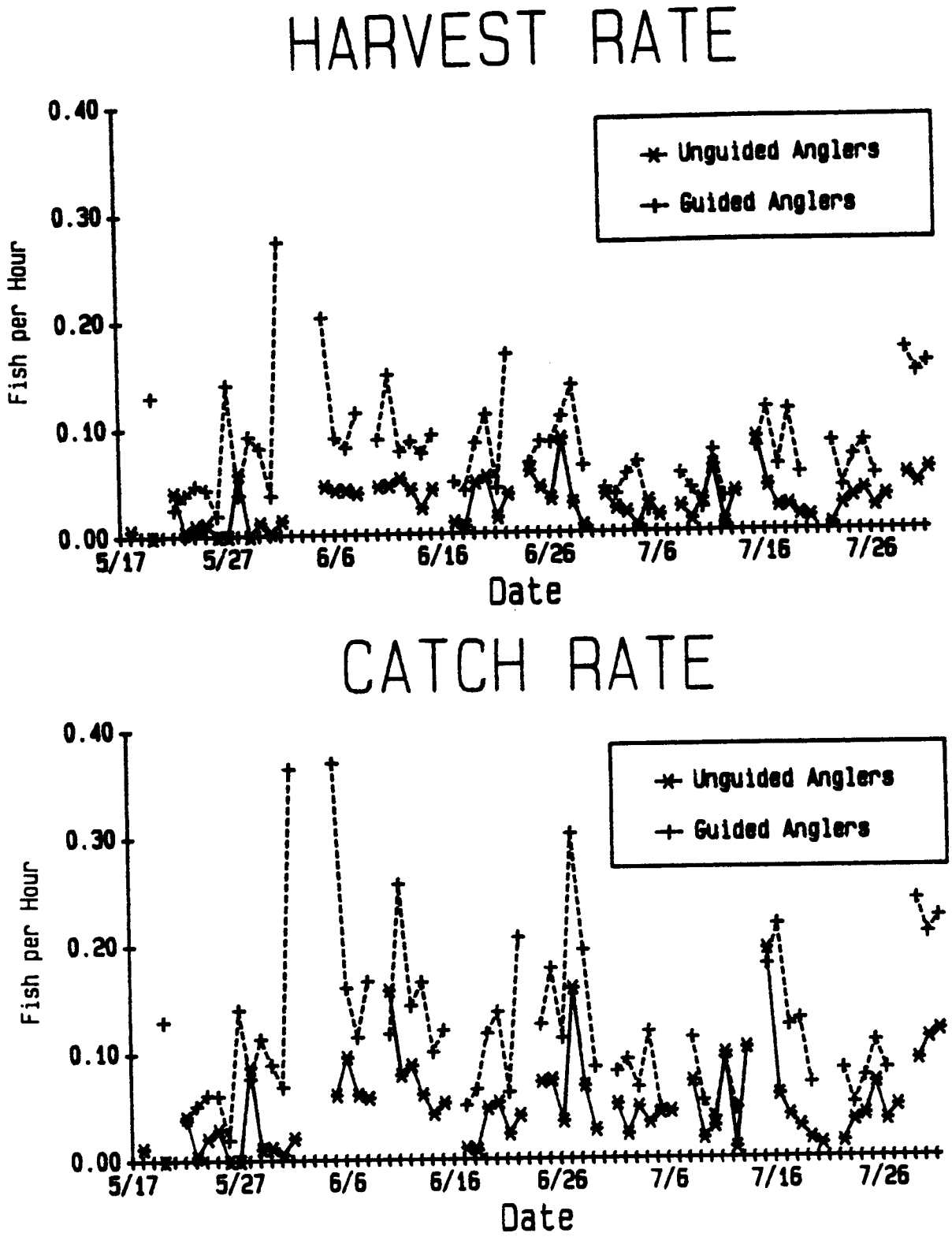

Figure 4. Daily chinook salmon harvest and catch rates for unguided and guided anglers in the Kenai River downstream fishery.

Table 6. Estimated chinook salmon catch-per-unit-effort (CPUE) by boat anglers during each of the strata in the Kenai River downstream chinook salmon fishery, 1986.

Stratum	Days n[1]	Days N[2]	Number of Interviews	Harvest[3] CPUE	Standard Error	Catch[4] CPUE	Standard Error
EARLY RUN							
Unguided weekdays	21	24	1,799	0.0343	0.00526	0.0569	0.00690
Unguided weekends	14	15	1,733	0.0244	0.00247	0.0398	0.00350
Guided May	11	12	515	0.0471	0.01312	0.0662	0.01329
Guided June	23	25	1,763	0.0865	0.00605	0.1355	0.00978
LATE RUN							
Unguided weekdays	18	18	2,816	0.0365	0.00217	0.0661	0.00317
Unguided weekends	9	9	2,048	0.0206	0.00180	0.0387	0.00293
Guided	23	23	1,760	0.0675	0.00357	0.1018	0.00481

1 Number of days on which interviews were collected.
2 Number of days possible for interviewing.
3 Harvest CPUE includes fish reported as kept only.
4 Catch CPUE includes fish reported as kept and fish reported as released.

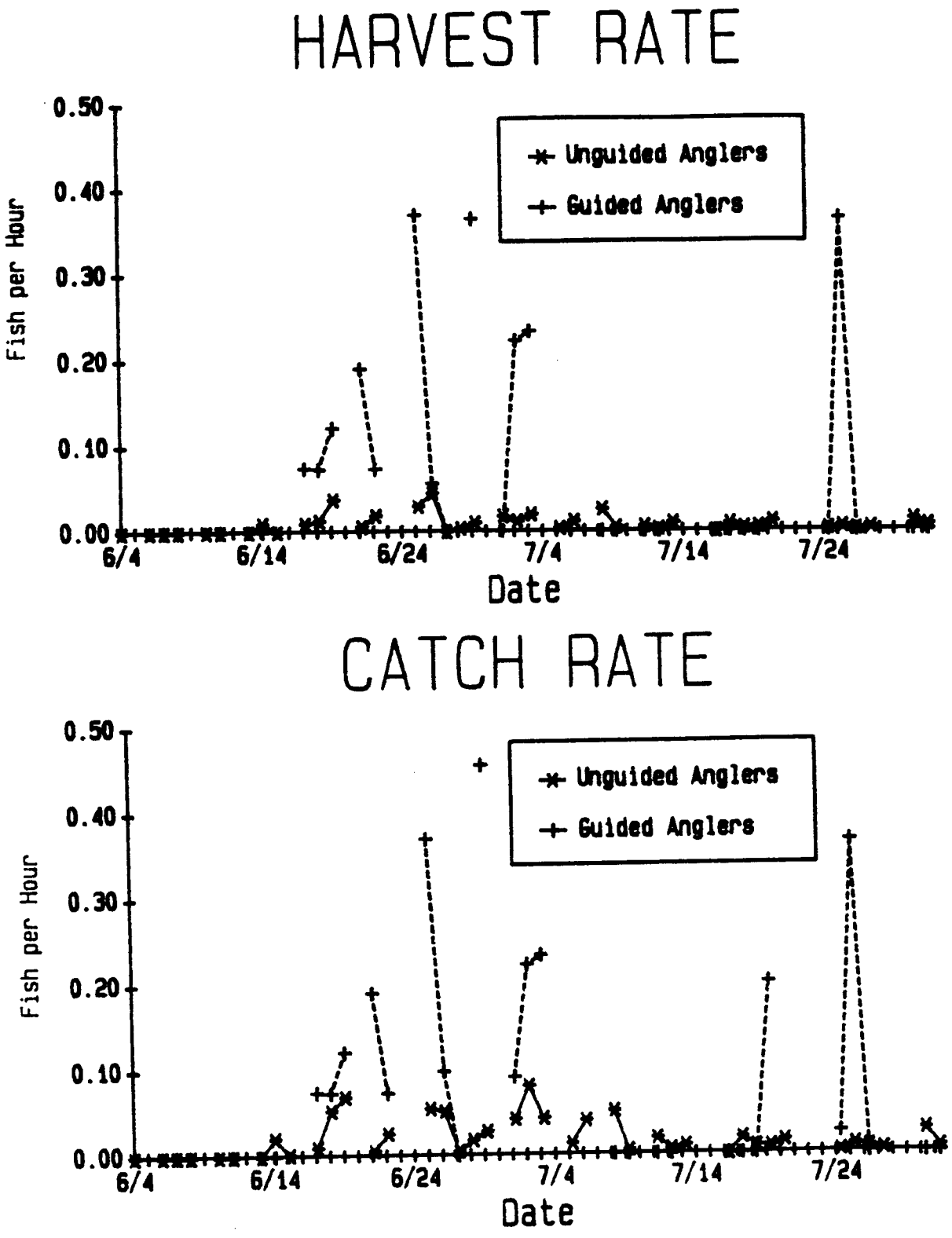

Figure 5. Daily chinook salmon harvest and catch rates for unguided and guided anglers in the Kenai River upstream fishery.

Table 7. Estimated chinook salmon catch-per-unit-effort (CPUE) by boat anglers during each of the strata in the Kenai River upstream chinook salmon fishery, 1986.

Stratum	Days n[1]	Days N[2]	Number of Interviews	Harvest[3] CPUE	Standard Error	Catch[4] CPUE	Standard Error
EARLY RUN							
Unguided weekdays	17	23	1,036	0.0154	0.00318	0.0320	0.00587
Unguided weekends	12	13	1,429	0.0064	0.00134	0.0141	0.00230
Guided June	14	24	140	0.1064	0.02521	0.1168	0.02775
Guided July	7	10	61	0.0476	0.02361	0.0536	0.02638
LATE RUN							
Unguided anglers	11	15	1,355	0.0057	0.00161	0.0102	0.00246
Guided anglers	9	13	38	0.0132	0.01593	0.0264	0.02059

1 Number of days on which interviews were collected.
2 Number of days possible for interviewing.
3 Harvest CPUE includes fish reported as kept only.
4 Catch CPUE includes fish reported as kept and fish reported as released.

section. For the upstream section, estimated effort and catch rates for each stratum (Tables 4 and 7, respectively), were used to estimate harvest and catch.

Downstream Section. An estimated 14,390 chinook salmon were harvested by boat anglers in the downstream fishery of which 6,337 (44%) were caught during the early run and 8,053 (56%) during the late run (Table 8). Unguided anglers harvested 7,813 chinook salmon (54% of the total) and guided anglers harvested 6,577 fish (46% of the total). The total chinook salmon catch by boat anglers in the downstream fishery was 23,824: 10,122 fish (42%) during the early run and 13,702 fish (58%) during the late run (Table 8). Unguided anglers released 43% of their chinook salmon catch while guided anglers released 35% of their catch.

Upstream Section. An estimated 395 chinook salmon were harvested by boat anglers in the upstream fishery: 317 (80%) during the early run and 78 (20%) during the late run (Table 9). Unguided anglers harvested 262 chinook salmon (66% of the total) and guided anglers harvested 133 fish (34% of the total). The total chinook salmon catch by boat anglers in the upstream fishery was 683: 541 fish (79%) during the early run and 142 fish (21%) during the late run (Table 9). Unguided anglers released 51% of their chinook salmon catch while guided anglers released only 12% of their catch.

Midstream Section. During the early run, an estimated 429 chinook salmon (SE = 69) were harvested in the midstream section by unguided anglers and 478 (SE = 58) by guided anglers. Chinook salmon catches during the early run were 719 (SE = 108) and 735 (SE = 89) for unguided anglers and guided anglers, respectively. Estimated chinook salmon harvests for the midstream section during the late run were 529 (SE = 79) by unguided anglers and 344 (SE = 53) for guided anglers. Estimated chinook salmon catches during the late run were 968 (SE = 142) for unguided anglers and 519 (SE = 80) for guided anglers.

Other Species. The estimated harvest and catch of species other than chinook salmon for the downstream and upstream sections are summarized in Tables 10 and 11, respectively. Coho salmon were the second most common species caught after chinook salmon in the downstream section; 2,609 coho salmon were harvested and 2,654 were caught. More sockeye salmon were harvested (1,639) and caught (3,257) in the upstream section than any other species.

Summary:

The estimated total angler effort during the chinook salmon fishery was 428,341 angler-hours (Table 12). Estimated total harvest and catch of chinook salmon were 16,565 fish and 27,448 fish, respectively (Table 12). Unguided anglers exerted 76.2% of the effort and harvested 54.5% of the chinook salmon while guided anglers exerted 23.8% of the effort and harvested 45.5% of the fish. The majority of the effort (81.5%) and chinook salmon harvest (86.9%) were estimated to occur in the downstream section of the fishery (Figure 6). For effort, 7.8% occurred in the upstream section and 10.7% in the midstream section. Only 2.3% of the chinook salmon harvest was from the upstream section and 10.8% from the midstream section.

Table 8. Estimated number of chinook salmon harvested and total number caught by boat anglers during each of the strata in the Kenai River downstream chinook salmon fishery, 1986.

Stratum	Harvest[1]	Standard Error	Rel. Pre.[2]	Catch[3]	Standard Error	Rel. Pre.
EARLY RUN						
Unguided weekdays	1,763	326	36.2%	2,924	466	31.3%
Unguided weekends	1,195	172	28.2%	1,949	263	26.4%
Guided May	275	91	64.6%	387	104	52.7%
Guided June	3,104	258	16.3%	4,862	414	16.7%
Sub-totals:						
Unguided	2,958	368	24.4%	4,873	535	21.5%
Guided	3,379	274	15.9%	5,249	427	15.9%
Early Run Total	6,337	459	14.2%	10,122	684	13.3%
LATE RUN						
Unguided weekdays	3,581	325	17.8%	6,486	542	16.4%
Unguided weekends	1,274	173	26.6%	2,393	308	25.2%
Guided anglers	3,198	255	15.6%	4,823	367	14.9%
Sub-totals:						
Unguided	4,855	368	14.8%	8,879	623	13.8%
Guided	3,198	255	15.6%	4,823	367	14.9%
Late Run Total	8,053	447	10.9%	13,702	723	10.3%
BOTH RUNS COMBINED						
Unguided	7,813	520	13.1%	13,752	821	11.7%
Guided	6,577	374	11.2%	10,072	563	13.0%
TOTAL	14,390	641	8.7%	23,824	996	8.2%

[1] Harvest includes fish reported as kept only.

[2] Relative precision for 95% confidence interval.

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

Table 9. Estimated number of chinook salmon harvested and total number caught by boat anglers during each of the strata in the Kenai River upstream chinook salmon fishery, 1986.

Stratum	Harvest[1]	Standard Error	Rel. Pre.[2]	Catch[3]	Standard Error	Rel. Pre.
EARLY RUN						
Unguided weekdays	121	29	46.5%	251	55	42.7%
Unguided weekends	67	17	48.5%	148	31	41.2%
Guided June	110	36	63.8%	121	39	63.8%
Guided July	19	11	110.5%	21	12	112.0%
Sub-totals:						
Unguided	188	33	34.5%	399	63	30.9%
Guided	129	37	56.8%	142	41	56.8%
Early Run Total	317	50	30.9%	541	75	27.2%
LATE RUN						
Unguided anglers	74	22	59.5%	133	35	51.7%
Guided anglers	4	5	261.2%	9	7	154.7%
Late Run Total	78	23	58.0%	142	36	49.5%
BOTH RUNS COMBINED						
Unguided	262	40	29.7%	532	72	26.6%
Guided	133	37	55.0%	151	42	54.0%
TOTAL	395	54	27.3%	683	83	23.9%

[1] Harvest includes fish reported as kept only.

[2] Relative precision for 95% confidence interval.

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

Table 10. Estimated number of sockeye salmon, coho salmon, pink salmon, rainbow trout, and Dolly Varden char harvested and caught by boat anglers during the Kenai River downstream chinook salmon fishery, 1986.

Species	Unguided Anglers				Guided Anglers				Total			
	Harvest[1]	St. Err.	Catch[2]	St. Err.	Harv.	St. Err.	Catch	St. Err.	Harv.	St. Err.	Catch	St. Err.
EARLY RUN												
Sockeye salmon	30	15	30	15	108	25	108	25	138	29	138	29
Rainbow trout	20	11	29	14	32	15	61	25	52	18	90	29
Dolly Varden	41	56	50	56	75	24	75	24	116	61	125	61
LATE RUN												
Sockeye salmon	346	76	365	79	81	25	81	25	427	80	446	82
Coho salmon	2,007	223	2,052	229	602	78	602	78	2,609	236	2,654	242
Pink salmon	254	69	474	121	142	30	190	43	396	76	664	128
Rainbow trout	70	26	70	26	38	24	62	30	108	36	132	40
Dolly Varden	391	82	403	83	85	21	104	24	476	85	507	86

[1] Harvest includes fish reported as kept only.

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

Table 11. Estimated number of sockeye salmon, coho salmon, pink salmon, rainbow trout, and Dolly Varden char harvested and caught by boat anglers during the Kenai River upstream chinook salmon fishery, 1986.

Species	Unguided Anglers				Guided Anglers				Total			
	Harvest[1]	St. Err.	Catch[2]	St. Err.	Harv.	St. Err.	Catch	St. Err.	Harv.	St. Err.	Catch	St. Err.
EARLY RUN												
Sockeye salmon	20	8	20	8	3	2	3	2	23	8	23	8
Rainbow trout	319	52	724	108	44	41	62	49	363	66	786	119
Dolly Varden	729	99	972	126	25	46	41	52	754	109	1,013	137
LATE RUN												
Sockeye salmon	1,610	271	3,228	647	29	17	29	17	1,639	271	3,257	647
Coho salmon	42	20	42	20	0		0		42	20	42	20
Pink salmon	0		21	12	2	1	2	1	2	1	23	12
Rainbow trout	4	2	71	24	0		0		4	2	71	24
Dolly Varden	308	74	661	194	0		0		308	74	661	194

[1] Harvest includes fish reported as kept only.

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

Table 12. Summary of estimated angler-effort, chinook salmon harvest, and chinook salmon catch by all boat anglers for each river section of the Kenai River chinook salmon fishery, 1986

Run	Downstream Section	Upstream Section	Midstream Section	Total	95% Confidence Interval
Early Run					
Effort	142,095	19,738	22,068	183,901	168,340 - 199,461
St. Err.	7,595	1,716	1,548	7,939	
Harvest	6,337	317	907	7,561	6,639 - 8,483
St. Err.	459	50	90	470	
Catch	10,122	541	1,454	12,117	10,740 - 13,493
St. Err.	684	75	140	702	
Late Run					
Effort	207,322	13,407	23,711	244,440	224,625 - 264,254
St. Err.	9,744	1,440	2,276	10,109	
Harvest	8,053	78	873	9,004	8,106 - 9,901
St. Err.	447	23	96	458	
Catch	13,702	142	1,487	15,331	13,876 - 16,785
St. Err.	723	36	163	742	
Total Both Runs					
Effort	349,417	33,145	45,779	428,341	403,147 - 453,534
St. Err.	12,354	2,240	2,752	12,854	
Harvest	14,390	395	1,780	16,565	15,278 - 17,851
St. Err.	641	54	132	656	
Catch	23,824	683	2,941	27,448	25,445 - 29,450
St. Err.	996	83	215	1,022	

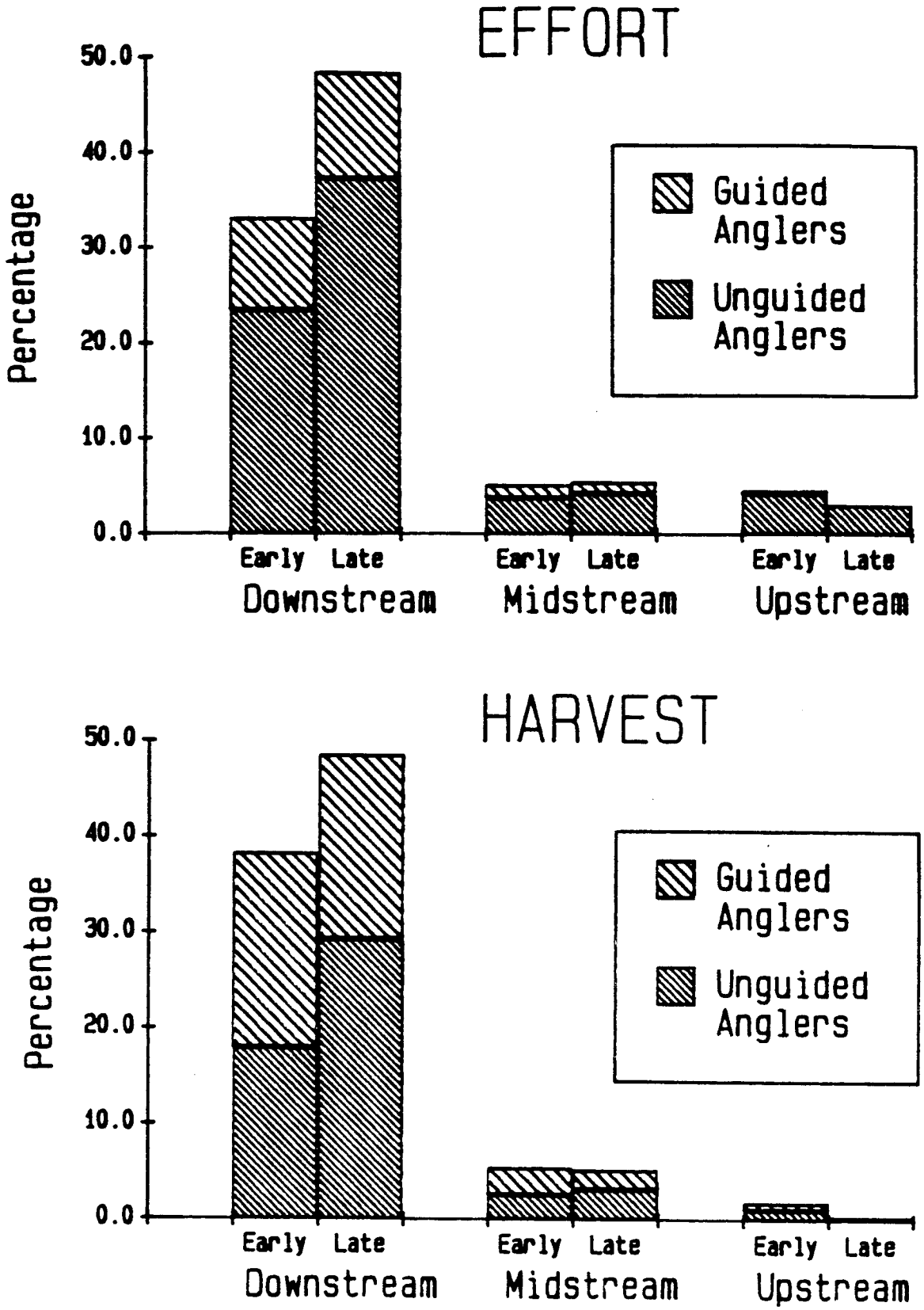

Figure 6. Percent of total angler-effort and chinook salmon harvest by unguided and guided anglers for each run and river section in the Kenai River chinook salmon fishery, 1986.

Biological Data:

The most abundant age groups in the early run harvest were ages 1.3 and 1.4 chinook salmon which composed 35.6% and 48.8% of the sample, respectively (Table 13). Ages 1.3 and 1.4 chinook salmon were the most abundant age groups in the late run harvest, also, contributing 39.3% and 44.3% to the sample, respectively (Table 13). The mean lengths at age for each sex were greater in late run fish than in early run fish for all age groups (Table 14). The mean lengths of male chinook salmon sampled from the harvest were generally larger than the mean length of females from the same age group and run.

Discussion:

The major assumptions necessary for the effort and harvest estimates were explained in the Methods section. It is important to determine how well the data conform to these assumptions to evaluate whether the current experimental design and methods of analysis are appropriate. It is beyond the scope of this report to examine every assumption, but several were examined.

A major assumption is that incomplete-trip angler interviews provide an unbiased estimate of completed-trip angler harvest and catch rates. More than 70% of the angler interviews used to estimate HPUE and CPUE were incomplete-trip interviews, therefore, it is important that this assumption be true. This assumption can be examined using the downstream creel survey data. In the downstream creel survey, the majority (88%) of the interviews collected by survey personnel using a boat to contact anglers (referred to as the roving survey) were incomplete-trip interviews. Conversely, the majority (72%) of the interviews collected by survey personnel at access sites were completed-trip interviews. The harvest rates for these sets of angler interviews were compared to evaluate the assumption.

Intuitively, this is probably an erroneous assumption for the interviews collected during the roving creel survey. This is due to the very restrictive fishery regulations for chinook salmon (limit is one chinook salmon over 41 cm in length per day and an angler cannot fish from a boat for the remainder of the day once a fish over 41 cm is retained). Therefore, when an angler keeps a chinook salmon, the angler essentially becomes a completed-trip angler. Since they can no longer fish, many anglers leave the river after catching and keeping a chinook salmon. This is especially true for unguided anglers with their own boats. Conversely, most guided anglers remain with the guide for the duration of the charter. Once anglers have left the river, the roving survey cannot interview them. Therefore, the probability of a successful angler (an angler who has harvested a chinook salmon) being interviewed by the roving creel survey is less than the probability of an unsuccessful angler being interviewed. This should not be a problem with the angler interviews collected by the survey personnel stationed at the major access sites because they are contacting anglers as they leave the river. As long as those anglers who are successful use the same access sites as those anglers who are not successful, all anglers should have an equal probability of being interviewed.

Table 13. Age composition of chinook salmon sampled from the harvest during the early and late runs of the Kenai River chinook salmon fishery, 1986.

RUN	Sex		Age Group 1.1	1.2	1.3	1.4	1.5	Total
EARLY	Male	Percent	0.2	6.4	19.7	17.8	4.5	48.6
(n=533)[1]	Female	Percent	0.0	0.6	15.9	31.0	3.9	51.4
	Combined	Percent	0.2	7.0	35.6	48.8	8.4	
		St. Error	0.2	1.1	2.1	2.2	1.2	
LATE	Male	Percent	0.2	9.4	20.7	21.3	2.9	54.5
(n=512)	Female	Percent	0.0	0.8	18.6	23.0	3.1	45.5
	Combined	Percent	0.2	10.2	39.3	44.3	6.0	
		St. Error	0.2	1.3	2.2	2.2	1.1	

[1] n = sample size.

Table 14. Mean length (mm) by age group of chinook salmon sampled from the harvest during the early and late runs of the Kenai River chinook salmon fishery, 1986.

Sex		Age Group 1.1	1.2	1.3	1.4	1.5
EARLY RUN						
Male	Mean Length	380	652	848	1,024	1,089
	Standard Error		11	8	9	19
	Sample Size	1	34	105	95	24
Female	Mean Length			847	959	1,027
	Standard Error			7	5	19
	Sample Size			85	165	21
LATE RUN						
Male	Mean Length		673	921	1,086	1,126
	Standard Error		10	9	5	18
	Sample Size		48	106	109	15
Female	Mean Length		689	927	1,023	1,065
	Standard Error		49	5	6	16
	Sample Size		4	95	118	16

The data from the downstream roving and access site creel surveys support this conjecture as only 7% of the unguided anglers and 18% of the guided anglers interviewed during the roving creel survey were successful anglers. For the access site survey, however, 21% of the unguided anglers and 38% of the guided anglers were successful. The access site survey estimates of HPUE and CPUE may be biased because of a tendency for the interviewer to contact anglers who had a chinook salmon in possession instead of at random. However, this is not thought to have occurred to such a degree as to invalidate the general conclusions drawn from this comparison. The harvest rates estimated from each set of data provide additional evidence that incomplete-trip interview HPUE is not an unbiased estimate of completed-trip interview HPUE for this fishery. HPUE estimated from the roving angler interviews is less than that estimated from the access site interviews in every stratum (Table 15).

Another major assumption is that both unguided and guided anglers are interviewed in proportion to their abundance on any day sampled. This cannot be examined directly because the effort on a given day is unknown. However, the total number of interviews conducted in each stratum should be proportional to the effort estimated for the stratum. The relationship between the number of anglers interviewed and the estimated effort for each stratum is shown in Figure 7. The number of anglers interviewed is approximately proportional to the effort for both guided and unguided anglers in the downstream and upstream creel surveys. Therefore, this assumption is met.

Coho Salmon Fishery

During the coho salmon fishery, 40 of the 59 days possible during the survey period were sampled in the downstream section of the Kenai River. In the upstream section, 39 of the 59 days possible were surveyed.

Effort:

Two angler counts were usually conducted on each sample day in the downstream section; there were 9 days when a single angler count was conducted. Two angler counts were conducted on every survey day in the upstream section except for 2 days when a single count was conducted.

Downstream Section. Angler counts in the downstream section ranged from 32 to 733 unguided anglers and from 0 to 152 guided anglers (Appendix Tables C1 and C2). The largest unguided angler count occurred on 10 August and the largest guided angler count on 12 September. Within a period, the mean count of unguided anglers for the weekend/holiday stratum was always larger than the mean count for the weekday stratum (Table 16).

The estimated effort during the early run (August) was 162,804 angler-hours (Table 17). The majority of this effort was by unguided anglers; 84% of the total early run effort was by unguided anglers, 39% during the weekday stratum and 45% during the weekend/holiday stratum. The estimated effort during the late run (September) was 78,127 angler-hours (Table 17). The majority of this effort was by unguided anglers, also; 81% of the total late run effort was by unguided anglers, 44% during the weekday stratum and 37% during the weekend/holiday stratum.

Table 15. Comparison of chinook salmon harvest-per-unit-effort (HPUE) estimated from all angler interviews collected by the roving boat creel survey and from completed-trip angler interviews collected by the access site creel survey for each of the strata in the Kenai River downstream chinook salmon fishery, 1986.

Stratum	Roving Creel Survey			Access Site Creel Survey		
	Number of Interviews	HPUE	Standard Error	Number of Interviews	HPUE	Standard Error
EARLY RUN						
Unguided weekdays	1,558	0.0297	0.00523	240	0.0507	0.01146
Unguided weekends	1,509	0.0210	0.00242	224	0.0384	0.00681
Guided May	456	0.0437	0.01341	59	0.0614	0.01699
Guided June	1,254	0.0774	0.00652	507	0.1006	0.01037
LATE RUN						
Unguided weekdays	2,498	0.0329	0.00227	318	0.0521	0.00779
Unguided weekends	1,708	0.0203	0.00210	314	0.0216	0.00449
Guided	1,254	0.0621	0.00432	504	0.0772	0.00869

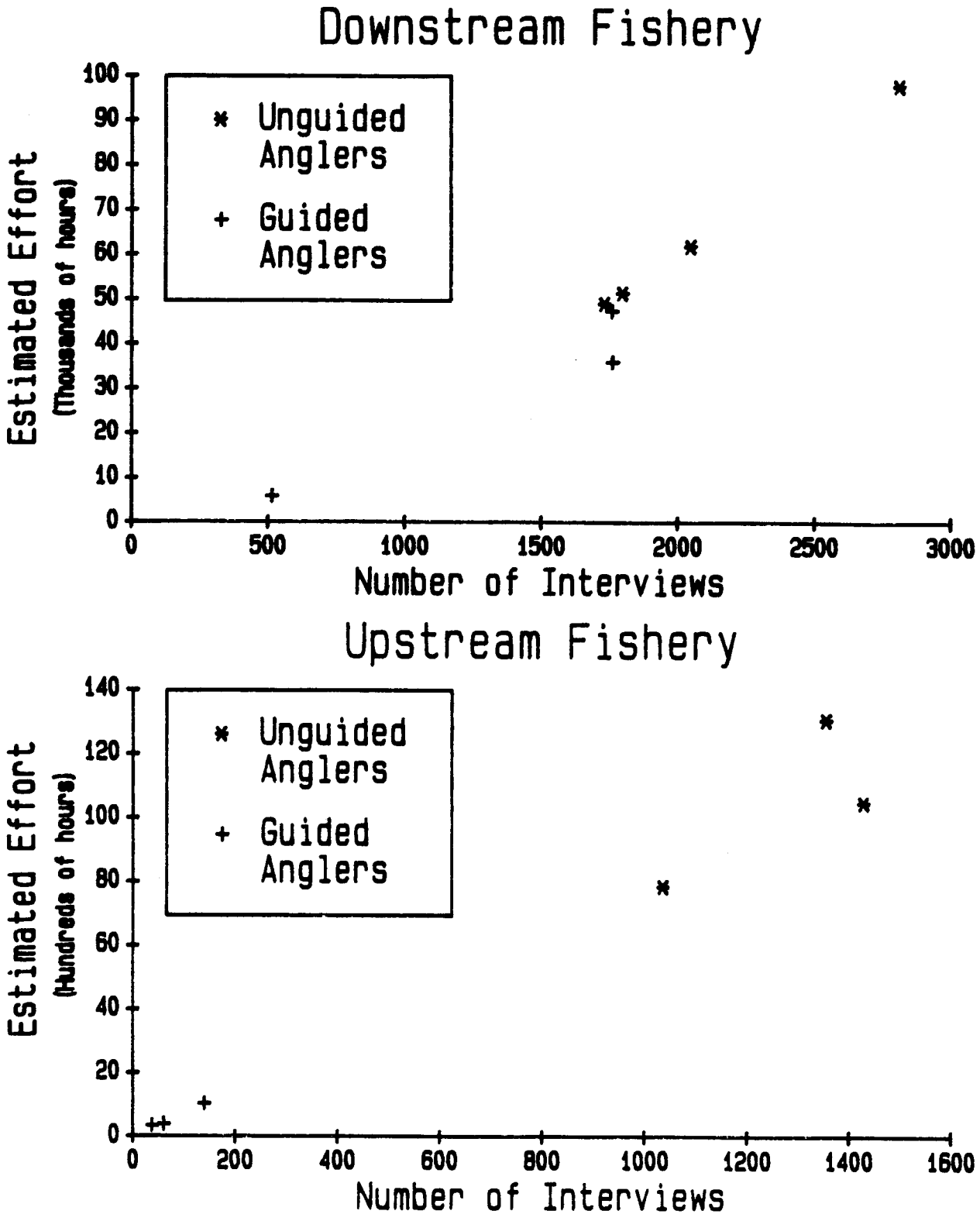

Figure 7. Number of unguided and guided anglers interviewed during each stratum versus the effort estimated for the stratum in the downstream and upstream sections of the Kenai River chinook salmon fishery, 1986.

Table 16. Summary of the angler counts for each of the strata in the Kenai River downstream coho salmon creel survey, 1986.

Stratum	Period A	B	C	D
EARLY RUN				
Unguided anglers weekdays:				
Number of counts	4	5	7	8
Mean count	156.5	197.4	213.4	185.3
Standard error	28.7	28.6	23.0	10.9
Unguided anglers weekends:				
Number of counts	4	3	4	6
Mean count	438.5	453.3	477.3	455.2
Standard error	91.2	107.4	59.0	96.2
Guided anglers weekdays:				
Number of counts	3	5	8	8
Mean count	68.0	62.2	43.5	23.4
Standard error	29.5	17.7	10.1	8.7
Guided anglers weekends:				
Number of counts	4	3	4	6
Mean count	98.5	84.0	48.3	20.8
Standard error	15.8	5.1	9.9	11.0
LATE RUN				
Unguided anglers weekdays:				
Number of counts	4	8	7	
Mean count	199.3	116.6	131.9	
Standard error	52.8	15.9	26.4	
Unguided anglers weekends:				
Number of counts	3	5	7	
Mean count	489.0	146.4	178.4	
Standard error	94.5	20.4	38.8	
Guided anglers weekdays:				
Number of counts	4	8	7	
Mean count	69.5	28.9	19.4	
Standard error	28.4	5.6	6.0	
Guided anglers weekends:				
Number of counts	3	5	7	
Mean count	94.0	41.6	26.9	
Standard error	14.1	11.4	7.2	

Table 17. Estimated number of angler-hours of fishing effort during each of the strata in the Kenai River downstream coho salmon fishery, 1986.

Stratum	Estimated Effort	Standard Error	95% Confidence Interval	Relative Precision
EARLY RUN				
Unguided weekdays	63,217	4,020	55,338 - 71,096	12.5%
Unguided weekends	72,970	7,221	58,817 - 87,123	19.4%
Guided weekdays	16,554	3,098	10,482 - 22,626	36.7%
Guided weekends	10,063	890	8,320 - 11,806	17.3%
Sub-totals:				
Unguided anglers	136,187	8,264	119,990 - 152,384	11.9%
Guided anglers	26,617	3,223	20,300 - 32,934	23.7%
Early Run Total	162,804	8,871	145,417 - 180,191	10.7%
LATE RUN				
Unguided weekdays	34,028	4,645	24,924 - 43,132	26.8%
Unguided weekends	29,298	3,751	21,946 - 36,650	25.1%
Guided weekdays	8,953	2,246	4,550 - 13,356	49.2%
Guided weekends	5,848	702	4,472 - 7,224	23.5%
Sub-totals:				
Unguided anglers	63,326	5,970	51,624 - 75,028	18.5%
Guided anglers	14,801	2,353	10,188 - 19,414	31.2%
Late Run Total	78,127	6,418	71,709 - 84,545	8.2%
BOTH RUNS COMBINED				
Unguided anglers	199,513	10,195	179,531 - 219,495	10.0%
Guided anglers	41,418	3,991	33,597 - 49,239	18.9%
TOTAL	240,931	10,948	219,472 - 262,390	8.9%

Upstream Section. Angler counts in the upstream section ranged from 3 to 184 unguided anglers and from 0 to 12 guided anglers (Appendix Tables C3 and C4). The largest unguided angler count occurred on 31 August and the largest guided angler counts on 7 and 22 August. Within a period, the mean count of unguided anglers for the weekend/holiday stratum was always larger than the mean count for the weekday stratum (Table 18). The most common count for guided anglers in the upstream section was zero. Because very few guided anglers were interviewed, it was necessary to combine the weekday and weekend/holiday strata in the upstream section to attain sufficient numbers of interviews to estimate harvest and catch rates for guided anglers.

The estimated effort during the early run was 21,363 angler-hours (Table 19). The majority of this effort was by unguided anglers; 97% of the total early run effort was by unguided anglers, 42% during the weekday stratum and 55% during the weekend/holiday stratum. The estimated effort during the late run was 18,776 angler-hours (Table 19). The majority of this effort (98%) was by unguided anglers, also.

Midstream Section. Aerial surveys of the distribution of fishing effort in the downstream, midstream, and upstream sections of the Kenai River were not conducted during the coho salmon fishery. Effort and harvest were not estimated for the midstream section during the coho salmon fishery.

Harvest Rates and Catch Rates:

A total of 4,827 angler interviews were collected during the downstream creel survey, 2,513 during the early run and 2,314 during the late run. In the upstream section, 3,703 angler interviews were collected, 2,361 during the early run and 1,342 during the late run.

Downstream Section. Coho salmon daily harvest rates by unguided anglers ranged from 0.030 to 0.277 fish per per hour during the early run and from 0.067 to 0.296 during the late run (Appendix Tables D1 and D3). Peak coho salmon daily catch rates by unguided anglers occurred on 22 August during the early run and on 19 September during the late run (Figure 8). Coho salmon daily harvest rates by guided anglers ranged from 0.025 to 0.475 fish per hour during the early run and from 0.042 to 0.579 during the late run (Appendix Tables D2 and D4). Peak daily catch rates by guided anglers occurred on 18 August during the early run and on 3 September during the late run (Figure 8). Guided angler harvest and catch rates were higher than those for unguided anglers in all strata (Table 20).

Peak daily harvest rates of other species by unguided anglers were: 0.044 for sockeye salmon, 0.201 for pink salmon, 0.014 for rainbow trout, and 0.024 for Dolly Varden char (Appendix Tables D5, D6, and D8). Peak daily harvest rates of other species by guided anglers were: 0.011 for sockeye salmon, 0.210 for pink salmon, 0.016 for rainbow trout, and 0.023 for Dolly Varden char (Appendix Tables D7 and D9).

Table 18. Summary of the angler counts for each of the strata in the Kenai River upstream coho salmon creel survey, 1986.

Stratum	Period A	B	C	D
EARLY RUN				
Unguided anglers weekdays:				
Number of counts	6	4	10	4
Mean count	9.2	30.8	42.9	24.8
Standard error	3.4	4.2	7.0	9.2
Unguided anglers weekends:				
Number of counts	4	5	4	5
Mean count	34.3	105.2	93.5	58.2
Standard error	4.1	27.6	16.5	17.6
Guided anglers:				
Number of counts	10	9	14	9
Mean count	0.4	0.9	3.4	0.8
Standard error	0.4	0.6	1.2	0.5
LATE RUN				
Unguided anglers weekdays:				
Number of counts	5	8	7	
Mean count	52.0	43.0	35.4	
Standard error	9.9	4.7	6.4	
Unguided anglers weekends:				
Number of counts	3	5	6	
Mean count	65.3	107.6	61.8	
Standard error	9.8	15.4	14.9	
Guided anglers:				
Number of counts	8	13	13	
Mean count	1.8	1.6	0.3	
Standard error	0.9	0.7	0.3	

Table 19. Estimated number of angler-hours of fishing effort during each of the strata in the Kenai River upstream coho salmon fishery, 1986.

Stratum	Estimated Effort	Standard Error	95% Confidence Interval	Relative Precision
EARLY RUN				
Unguided weekdays	9,036	1,074	6,931 - 11,141	23.3%
Unguided weekends	11,646	1,476	8,754 - 14,538	24.8%
Guided	681	186	317 - 1,045	53.4%
Sub-totals:				
Unguided anglers	20,682	1,825	17,105 - 24,259	17.3%
Guided anglers	681	186	317 - 1,045	53.4%
Early Run Total	21,363	1,835	17,767 - 24,959	16.8%
LATE RUN				
Unguided weekdays	9,913	966	8,020 - 11,806	19.1%
Unguided weekends	8,452	849	6,789 - 10,115	19.7%
Guided	411	136	145 - 677	64.8%
Sub-totals:				
Unguided anglers	18,365	1,286	15,845 - 20,885	13.7%
Guided anglers	411	136	145 - 677	64.8%
Late Run Total	18,776	1,293	16,242 - 21,310	13.5%
BOTH RUNS COMBINED				
Unguided anglers	39,047	2,233	34,671 - 43,423	11.2%
Guided anglers	1,092	230	641 - 1,543	41.3%
TOTAL	40,139	2,244	35,740 - 44,538	11.0%

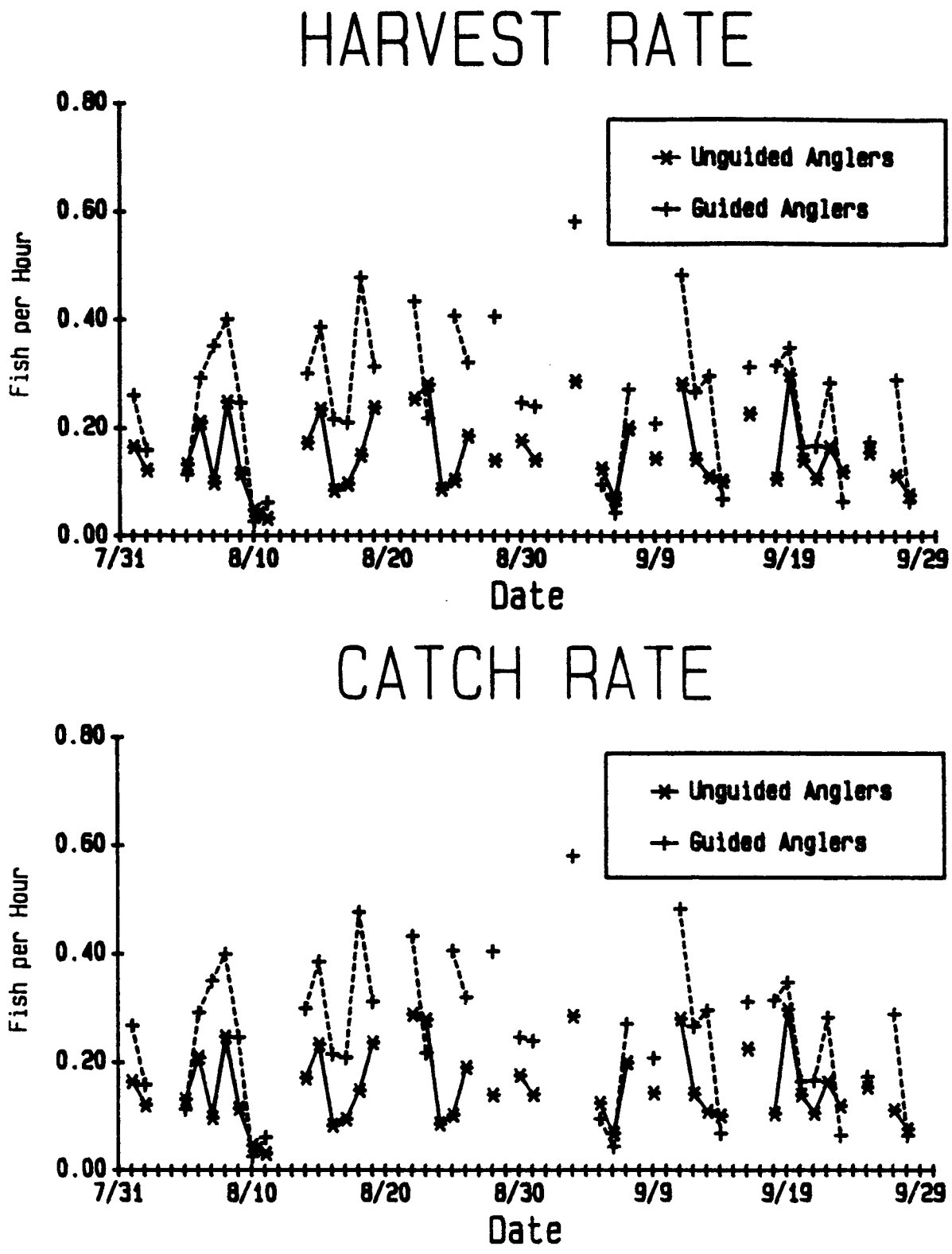

Figure 8. Daily coho salmon harvest and catch rates for unguided and guided anglers in the Kenai River downstream fishery.

Table 20. Estimated coho salmon catch-per-unit-effort (CPUE) by anglers during each of the strata in the Kenai River downstream coho salmon creel survey, 1986.

Stratum	Days n[1]	Days N[2]	Number of Interviews	Harvest[3] CPUE	Standard Error	Catch[4] CPUE	Standard Error
EARLY RUN							
Unguided weekdays	14	21	944	0.1529	0.01179	0.1550	0.01196
Unguided weekends	9	10	892	0.1273	0.00986	0.1273	0.00986
Guided weekdays	14	21	385	0.3192	0.02743	0.3199	0.02741
Guided weekends	9	10	292	0.2123	0.02381	0.2123	0.02381
LATE RUN							
Unguided weekdays	11	19	792	0.1746	0.01232	0.1746	0.01232
Unguided weekends	8	9	987	0.1097	0.00801	0.1097	0.00801
Guided weekdays	11	19	293	0.2622	0.02911	0.2622	0.02911
Guided weekends	8	9	242	0.1929	0.01686	0.1929	0.01686

1 Number of days on which interviews were collected.
2 Number of days possible for interviewing.
3 Harvest CPUE includes fish reported as kept only.
4 Catch CPUE includes fish reported as kept and fish reported as released.

Upstream Section. Coho salmon daily harvest rates by unguided anglers ranged from 0.014 to 0.167 fish per hour during the early run and from 0.039 to 0.190 during the late run (Appendix Tables D10 and D12). Peak coho salmon daily catch rates by unguided anglers occurred on 30 August during the early run and on 9 September during the late run (Figure 9). Coho salmon daily harvest rates by guided anglers ranged from 0.000 to 0.167 fish per hour during the early run and from 0.000 to 0.800 during the late run (Appendix Tables D11 and D12). Peak daily catch rates by guided anglers occurred on 6 August during the early run and on 26 September during the late run (Figure 9). Guided angler harvest and catch rates were higher than those for unguided anglers in the late run but not in the early run (Table 21).

Peak daily harvest rates of other species by unguided anglers were: 0.262 for sockeye salmon, 0.112 for pink salmon, 0.014 for rainbow trout, and 0.143 for Dolly Varden char (Appendix Tables D13, D14, D17, and D18). Peak daily harvest rates of other species by guided anglers were: 1.000 for sockeye salmon, 0.042 for pink salmon, 0.022 for rainbow trout, and 0.544 for Dolly Varden char (Appendix Tables D15 and D16).

Harvest and Catch:

Harvest and catch of coho salmon by shore and boat anglers were estimated for each stratum in the downstream and upstream sections of the Kenai River. Estimated effort and catch rates for each stratum from Tables 17 and 20, respectively, were used to estimate harvest and catch in the downstream section. For the upstream section, estimated effort and catch-rates for each stratum from Tables 19 and 21, respectively, were used to estimate harvest and catch.

Downstream Section. An estimated 39,006 coho salmon were harvested by anglers in the downstream fishery: 26,375 (68%) during the early run and 12,631 (32%) during the late run (Table 22). Unguided anglers harvested 28,110 coho salmon (72% of the total) and guided anglers harvested 10,896 fish (28% of the total). The total coho salmon catch by anglers in the downstream fishery was 39,151: 26,520 fish (68%) during the early run and 12,631 fish (32%) during the late run (Table 22). Unguided anglers released only 0.5% of their coho salmon catch while guided anglers released only 0.1% of their catch.

Upstream Section. An estimated 3,568 coho salmon were harvested by anglers in the upstream fishery: 1,281 (36%) during the early run and 2,287 (64%) during the late run (Table 23). Unguided anglers harvested 3,441 coho salmon (96% of the total) and guided anglers harvested 127 fish (4% of the total). The estimated total coho salmon catch by anglers in the upstream fishery was 3,951: 1,383 fish (35%) during the early run and 2,568 fish (65%) during the late run (Table 23). Unguided anglers released 10% of their coho salmon catch while guided anglers released only 5% of their catch.

Other Species. The estimated harvest and catch of species other than coho salmon for the downstream and upstream sections are summarized in Tables 24 and 25, respectively. Pink salmon were the second most common species harvested after coho salmon in the downstream section with a harvest of

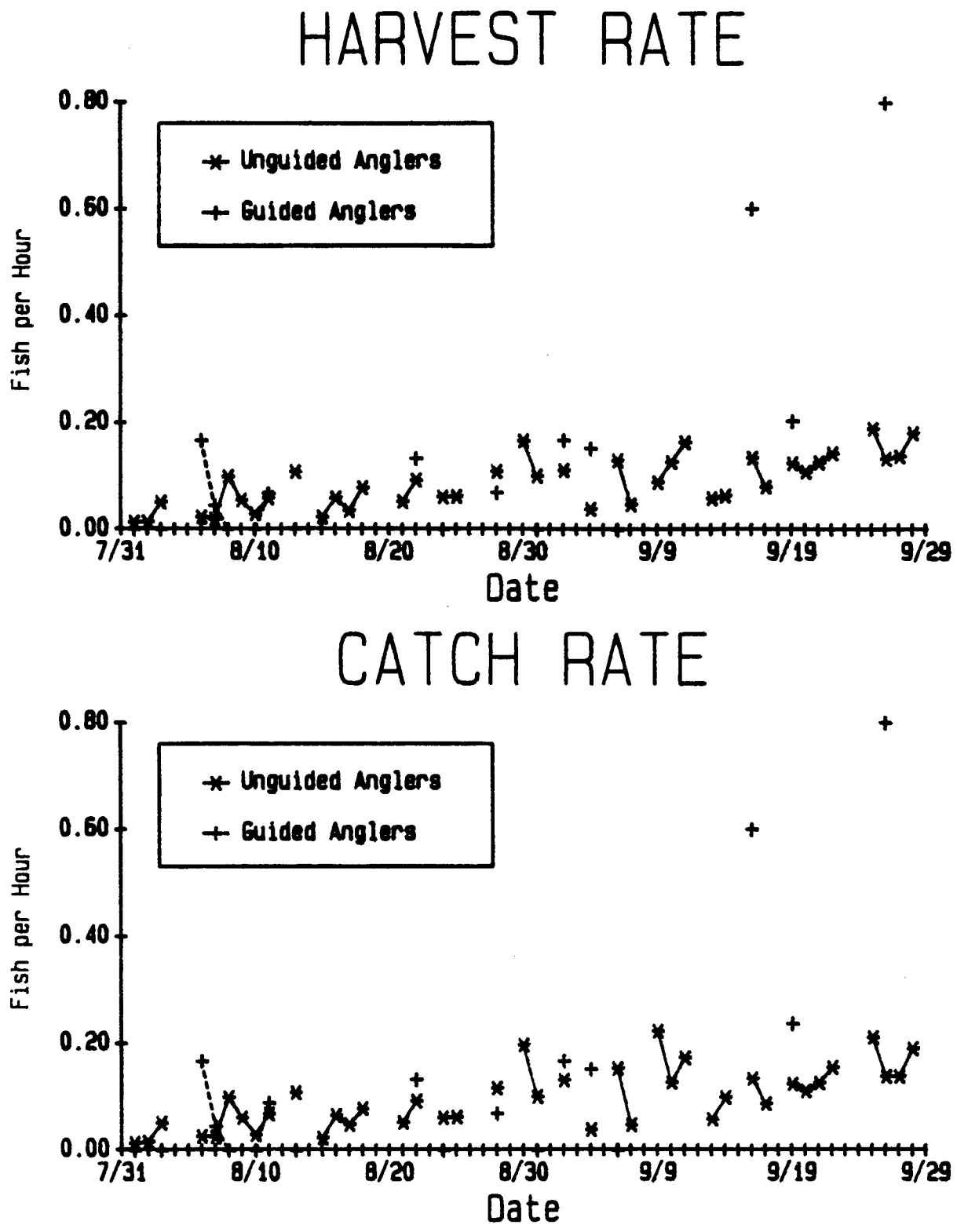

Figure 9. Daily coho salmon harvest and catch rates for unguided and guided anglers in the Kenai River upstream fishery.

Table 21. Estimated coho salmon catch-per-unit-effort (CPUE) by anglers during each of the strata in the Kenai River upstream coho salmon creel survey, 1986.

Stratum	Days n[1]	Days N[2]	Number of Interviews	Harvest[3] CPUE	Standard Error	Catch[4] CPUE	Standard Error
EARLY RUN							
Unguided weekdays	12	21	921	0.0581	0.00869	0.0601	0.00879
Unguided weekends	9	10	1,362	0.0621	0.00688	0.0691	0.00774
Guided	12	31	78	0.0477	0.01403	0.0511	0.01434
LATE RUN							
Unguided weekdays	11	19	700	0.1276	0.01214	0.1475	0.01603
Unguided weekends	8	9	604	0.1098	0.01164	0.1193	0.01210
Guided anglers	6	28	38	0.2291	0.09142	0.2379	0.09351

1 Number of days on which interviews were collected.
2 Number of days possible for interviewing.
3 Harvest CPUE includes fish reported as kept only.
4 Catch CPUE includes fish reported as kept and fish reported as released.

Table 22. Estimated number of coho salmon harvested and total number caught by anglers during each of the strata in the Kenai River downstream coho salmon fishery, 1986.

Stratum	Harvest[1]	Standard Error	Rel. Pre.[2]	Catch[3]	Standard Error	Rel. Pre.
EARLY RUN						
Unguided weekdays	9,666	965	19.6%	9,799	979	19.6%
Unguided weekends	9,289	1,165	24.6%	9,289	1,165	24.6%
Guided weekdays	5,284	1,085	40.2%	5,296	1,087	40.2%
Guided weekends	2,136	304	27.9%	2,136	304	27.9%
Sub-totals:						
Unguided	18,955	1,513	15.6%	19,088	1,522	15.6%
Guided	7,420	1,127	29.8%	7,432	1,129	29.8%
Early Run Total	26,375	1,886	14.0%	26,520	1,895	14.0%
LATE RUN						
Unguided weekdays	5,941	911	30.1%	5,941	911	30.1%
Unguided weekends	3,214	473	28.8%	3,214	473	28.8%
Guided weekdays	2,348	641	53.5%	2,348	641	53.5%
Guided weekdays	1,128	167	29.0%	1,128	167	29.0%
Sub-totals:						
Unguided	9,155	1,027	22.0%	9,155	1,027	22.0%
Guided	3,476	662	37.3%	3,476	662	37.3%
Late Run Total	12,631	1,222	19.0%	12,631	1,222	19.0%
BOTH RUNS COMBINED						
Unguided	28,110	1,829	12.8%	28,243	1,836	12.7%
Guided	10,896	1,307	23.5%	10,908	1,309	23.5%
TOTAL	39,006	2,248	11.3%	39,151	2,254	11.3%

1 Harvest includes fish reported as kept only.

2 Relative precision for 95% confidence interval.

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

Table 23. Estimated number of coho salmon harvested and total number caught by anglers during each of the strata in the Kenai River upstream coho salmon fishery, 1986.

Stratum	Harvest[1]	Standard Error	Rel. Pre.[2]	Catch[3]	Standard Error	Rel. Pre.
EARLY RUN						
Unguided weekdays	525	100	37.3%	543	102	36.8%
Unguided weekends	723	121	32.9%	805	136	33.0%
Guided anglers	33	13	75.8%	35	13	74.8%
Sub-totals:						
Unguided	1,248	157	24.7%	1,348	170	24.7%
Guided	33	13	75.8%	35	13	74.8%
Early Run Total	1,281	158	24.1%	1,383	170	24.1%
LATE RUN						
Unguided weekdays	1,265	172	26.6%	1,462	213	28.5%
Unguided weekends	928	135	28.5%	1,008	144	27.9%
Guided anglers	94	47	98.5%	98	49	97.2%
Sub-totals:						
Unguided	2,193	219	19.5%	2,470	257	20.4%
Guided	94	47	98.5%	98	49	97.2%
Late Run Total	2,287	224	19.2%	2,568	261	19.9%
BOTH RUNS COMBINED						
Unguided	3,441	269	15.3%	3,818	308	15.8%
Guided	127	49	75.5%	133	50	74.3%
TOTAL	3,568	274	15.0%	3,951	312	15.5%

1 Harvest includes fish reported as kept only.

2 Relative precision for 95% confidence interval.

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

Table 24. Estimated number of sockeye salmon, pink salmon, rainbow trout, and Dolly Varden char harvested and caught by anglers during the Kenai River downstream coho salmon fishery, 1986.

Species	Unguided Anglers				Guided Anglers				Total			
	Harvest[1]	St. Err.	Catch[2]	St. Err.	Harv.	St. Err.	Catch	St. Err.	Harv.	St. Err.	Catch	St. Err.
EARLY RUN												
Sockeye salmon	221	157	284	170	21	14	21	14	242	157	305	170
Pink salmon	7,490	1,045	44,549	5,792	1,051	423	4,350	1,377	8,541	1,127	48,899	5,954
Rainbow trout	77	62	77	62	9	10	9	10	86	63	86	63
Dolly Varden	561	164	580	168	74	35	74	35	635	168	654	172
LATE RUN												
Pink salmon	92	44	509	167	0	0	35	19	92	44	544	168
Rainbow trout	37	23	37	23	11	8	11	8	48	24	48	24

[1] Harvest includes fish reported as kept only.

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

Table 25. Estimated number of sockeye salmon, pink salmon, rainbow trout, and Dolly Varden char harvested and caught by anglers during the Kenai River upstream coho salmon fishery, 1986.

Species	Unguided Anglers				Guided Anglers				Total			
	Harvest[1]	St. Err.	Catch[2]	St. Err.	Harv.	St. Err.	Catch	St. Err.	Harv.	St. Err.	Catch	St. Err.
EARLY RUN												
Sockeye salmon	1,512	215	4,005	517	28	25	81	39	1,540	216	4,086	519
Pink salmon	257	73	3,790	708	5	3	151	58	262	73	3,941	710
Rainbow trout	70	18	179	39	2	2	5	2	72	18	184	39
Dolly Varden	990	151	1,891	297	86	38	102	45	1,076	156	1,993	300
LATE RUN												
Sockeye salmon	4	3	669	182	0		105	78	4	3	774	198
Pink salmon	255	84	6,486	1,087	7	5	105	59	262	84	6,591	1,089
Rainbow trout	4	5	100	65	0		0		4	5	100	65
Dolly Varden	131	53	290	94	0		0		131	53	319	99

[1] Harvest includes fish reported as kept only.

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

8,633 fish and the most common species caught with a catch of 49,443 fish. Sockeye salmon were the second most common species harvested after coho salmon in the upstream section with a harvest of 1,544 fish. Pink salmon were the most common species caught in the upstream section with a catch of 10,532 fish.

Summary:

The estimated total angler-effort in the downstream and upstream sections of the Kenai River during the coho salmon fishery was 281,070 angler-hours (Table 26). Estimated total harvest and catch of coho salmon during the coho salmon fishery were 42,574 fish and 43,102 fish, respectively (Table 26). An additional 2,651 coho salmon were harvested during the chinook salmon fishery. Unguided anglers exerted 84.9% of the effort and harvested 74.1% of the coho salmon while guided anglers exerted 15.1% of the effort and harvested 25.9% of the fish. The majority of the effort (85.7%) and coho salmon harvest (91.6%) were estimated to occur in the downstream section of the fishery (Figure 10). In contrast to the chinook salmon fishery, where an estimated 40% of the chinook salmon caught were released, less than 2% of the coho salmon caught were released.

Biological Data:

The most abundant age groups in the early run harvest were ages 2.1 and 3.1 coho salmon which composed 78.2% and 17.4% of the sample, respectively (Table 27). Ages 2.1 and 3.1 coho salmon were the most abundant age groups in the late run harvest, also, contributing 77.0% and 22.0% to the sample, respectively (Table 27). The mean lengths at age for each sex were greater in late run fish than in early run fish for all age groups (Table 28).

Discussion:

The assumptions examined for the chinook salmon creel survey were also examined for the coho salmon creel survey. Only data from the downstream section were examined as the majority of the coho salmon harvest and catch occurred in this section. Unfortunately, the assumption that incomplete-trip angler interviews provide an unbiased estimate of completed-trip angler harvest and catch rates could be examined only for guided anglers. During the coho salmon creel survey, all angler interviews were collected by a roving boat creel survey clerk; no creel survey clerk was stationed at major access sites as during the chinook salmon creel survey. As a result, relatively few completed-trip angler interviews were collected when compared to the chinook salmon creel survey. Insufficient numbers of completed-trip interviews with unguided anglers were collected during the roving creel survey for a comparison with incomplete-trip angler interviews. Less than 10% of the unguided angler interviews during the coho salmon fishery were completed-trip interviews.

About 25% of the guided anglers interviewed in the downstream section during the coho salmon fishery were completed-trip anglers. HPUE by guided anglers for incomplete-trip interviews is compared to that estimated from completed-trip interviews in Table 29. The completed-trip HPUE is greater than the incomplete-trip HPUE in every strata which indicates

Table 26. Summary of estimated angler-effort, coho salmon harvest, and coho salmon catch by all anglers for each river section of the Kenai River coho salmon fishery, 1986.

Run	Downstream Section	Upstream Section	Total	95% Confidence Interval
Chinook Season				
Harvest	2,609	42	2,651	2,187 - 3,115
St. Err.	236	20	237	
Catch	2,654	42	2,696	2,220 - 3,172
St. Err.	242	20	243	
Early Run				
Effort	162,804	21,363	184,167	166,412 - 201,922
St. Err.	8,871	1,835	9,059	
Harvest	26,375	1,281	27,656	23,946 - 31,366
St. Err.	1,886	158	1,893	
Catch	26,520	1,383	27,903	24,175 - 31,631
St. Err.	1,895	170	1,902	
Late Run				
Effort	78,127	18,776	96,903	84,071 - 109,735
St. Err.	6,418	1,293	6,547	
Harvest	12,631	2,287	14,918	12,483 - 17,353
St. Err.	1,222	224	1,242	
Catch	12,631	2,568	15,199	12,750 - 17,367
St. Err.	1,222	261	1,250	
Early and Late Runs Combined				
Effort	240,931	40,139	281,070	259,166 - 302,974
St. Err.	10,948	2,244	11,176	
Harvest	39,006	3,568	42,574	38,135 - 47,013
St. Err.	2,248	274	2,265	
Catch	39,151	3,951	43,102	38,642 - 47,562
St. Err.	2,254	312	2,275	
Grand Total				
Harvest	41,615	3,610	45,225	40,762 - 49,688
St. Err.	2,260	275	2,277	
Catch	41,805	3,993	45,798	41,313 - 50,283
St. Err.	2,267	312	2,288	

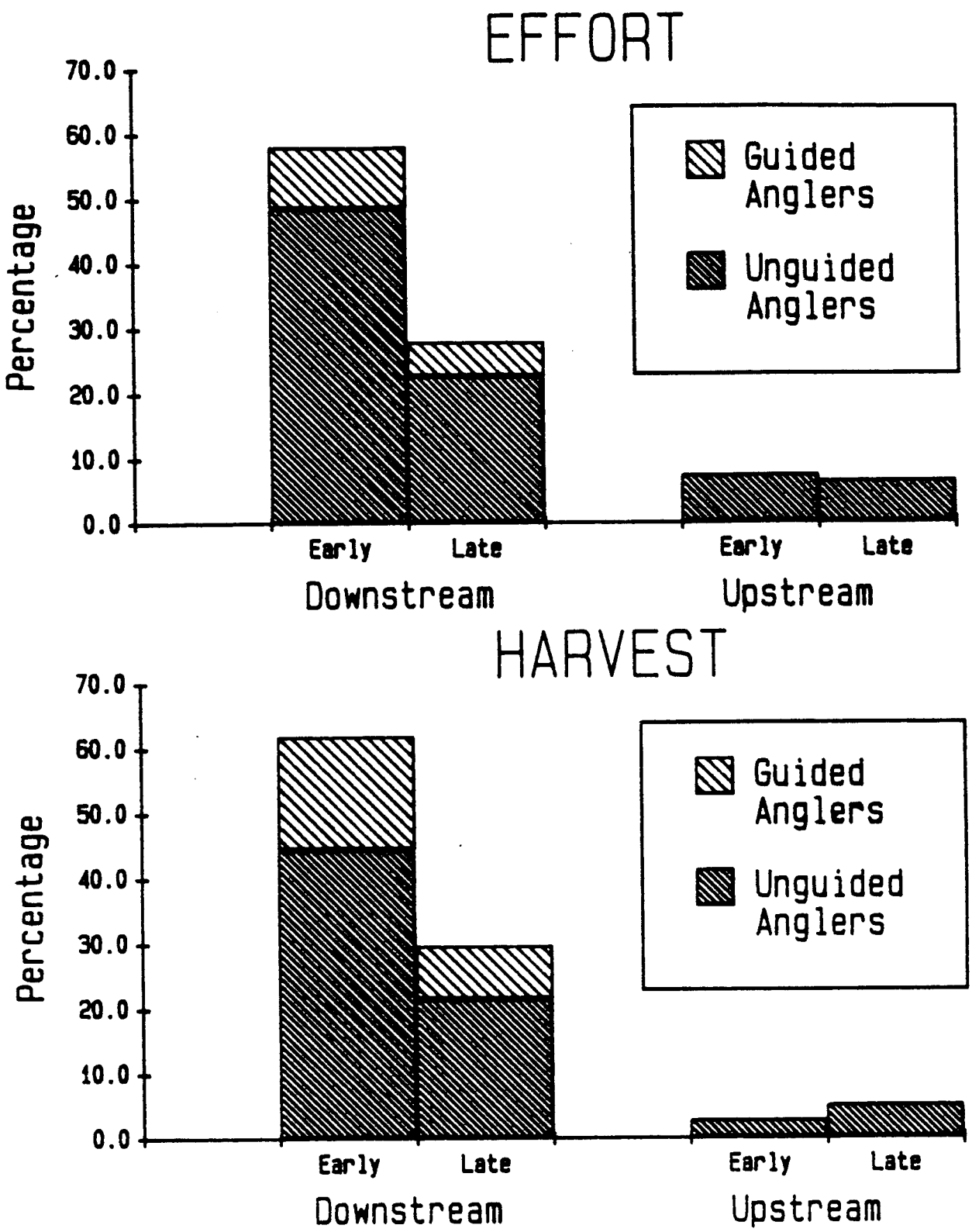

Figure 10. Percent of total angler-effort and coho salmon harvest by unguided and guided anglers for each run and river section in the Kenai River coho salmon fishery, 1986.

Table 27. Age composition of coho salmon sampled from the harvest during the early and late runs of the Kenai River coho salmon fishery, 1986.

RUN	Sex		Age Group 1.1	2.1	3.1	Total
EARLY	Male	Percent	1.6	36.5	9.9	48.0
(n=252)[1]	Female	Percent	2.8	41.7	7.5	52.0
	Combined	Percent	4.4	78.2	17.4	
		St. Error	1.3	2.6	2.4	
LATE	Male	Percent	0.5	37.8	11.0	49.3
(n=217)	Female	Percent	0.5	39.2	11.0	50.7
	Combined	Percent	1.0	77.0	22.0	
		St. Error	0.6	2.9	2.8	

[1] n = sample size.

Table 28. Mean length (mm) by age group of coho salmon sampled from the harvest during the early and late runs of the Kenai River coho salmon fishery, 1986.

Sex		Age Group 1.1	2.1	3.1
EARLY RUN				
Male	Mean Length	626	621	629
	Standard Error	13	5	12
	Sample Size	4	92	25
Female	Mean Length	581	628	633
	Standard Error	25	4	10
	Sample Size	7	105	19
LATE RUN				
Male	Mean Length	640	656	660
	Standard Error		5	11
	Sample Size	1	82	24
Female	Mean Length	670	648	653
	Standard Error		5	9
	Sample Size	1	85	24

Table 29. Comparison of coho salmon harvest per unit effort (HPUE) by guided anglers as estimated from incomplete-trip angler interviews and from completed-trip angler interviews for each of the strata in the Kenai River downstream coho salmon fishery, 1986.

Stratum	Incomplete-trip			Completed-trip		
	Number of Interviews	HPUE	Standard Error	Number of Interviews	HPUE	Standard Error
EARLY RUN						
Guided weekdays	275	0.2569	0.03285	110	0.4009	0.03744
Guided weekends	236	0.1622	0.02189	56	0.3108	0.03645
LATE RUN						
Guided weekdays	195	0.2305	0.03513	98	0.3074	0.05475
Guided weekends	198	0.1817	0.01714	44	0.2305	0.07534

that the incomplete-trip interview data may not be providing unbiased estimates of completed-trip harvest rates.

The assumption that both unguided and guided anglers are interviewed in proportion to their abundance on any day sampled was examined. Figure 11 shows the relationship between the number of anglers interviewed and the estimated effort for each stratum. The number of anglers interviewed is approximately proportional to effort for guided anglers in the downstream and upstream creel surveys and for unguided anglers in the upstream creel survey. The relationship for unguided anglers in the downstream section does not appear to be proportional, however. The greatest number of unguided anglers were interviewed during the stratum with the smallest effort estimate (the late run weekend stratum). Because there is only one aberrant data point, and interviews appear to have been conducted in proportion to effort in all other strata, we conclude that this was not a major source of error.

SUMMARY

Creel surveys were conducted from 17 May through 28 September in the downstream section and from 3 June through 28 September in the upstream section of the Kenai River. The estimated total effort by recreational anglers in the Kenai River between the outlet of Skilak Lake and Cook Inlet was 709,411 angler-hours (Table 30). This is a minimum estimate of effort as it does not include the effort by shore anglers during the period 17 May through 31 July or the effort in the mid-stream section of the river during the period 1 August through 28 September. Most fishing effort occurred in the downstream section of the Kenai River (Figure 12). About 80% of the estimated total effort was by unguided anglers and 20% by guided anglers. Effort during the coho salmon fishery was the largest recorded since the creel survey program began in 1977.

The harvest of chinook salmon was the largest and the harvest of coho salmon the second largest recorded since 1977. Pink salmon were the most frequently caught species in the survey area (Table 31), followed by coho salmon and chinook salmon. More coho salmon were harvested than any other species in the survey area (Table 31), followed by chinook salmon and pink salmon. The total harvest of all species was greatest during the early run of the coho salmon fishery than at any other time (Figure 13).

RECOMMENDATIONS

Based upon our analyses of the 1986 lower Kenai River creel survey data, we recommend the following changes to the sample design and data analyses for 1987.

1. After 31 May, when the 12 hour restriction for guided anglers begins, stratify the guided angler day into two periods: a morning period and an afternoon period (Appendix E). The exact hours of these periods will probably be different in June and July. The hour when the majority of the guides return to drop off their first charter of the day and pick up their second charter should be used to separate the periods.

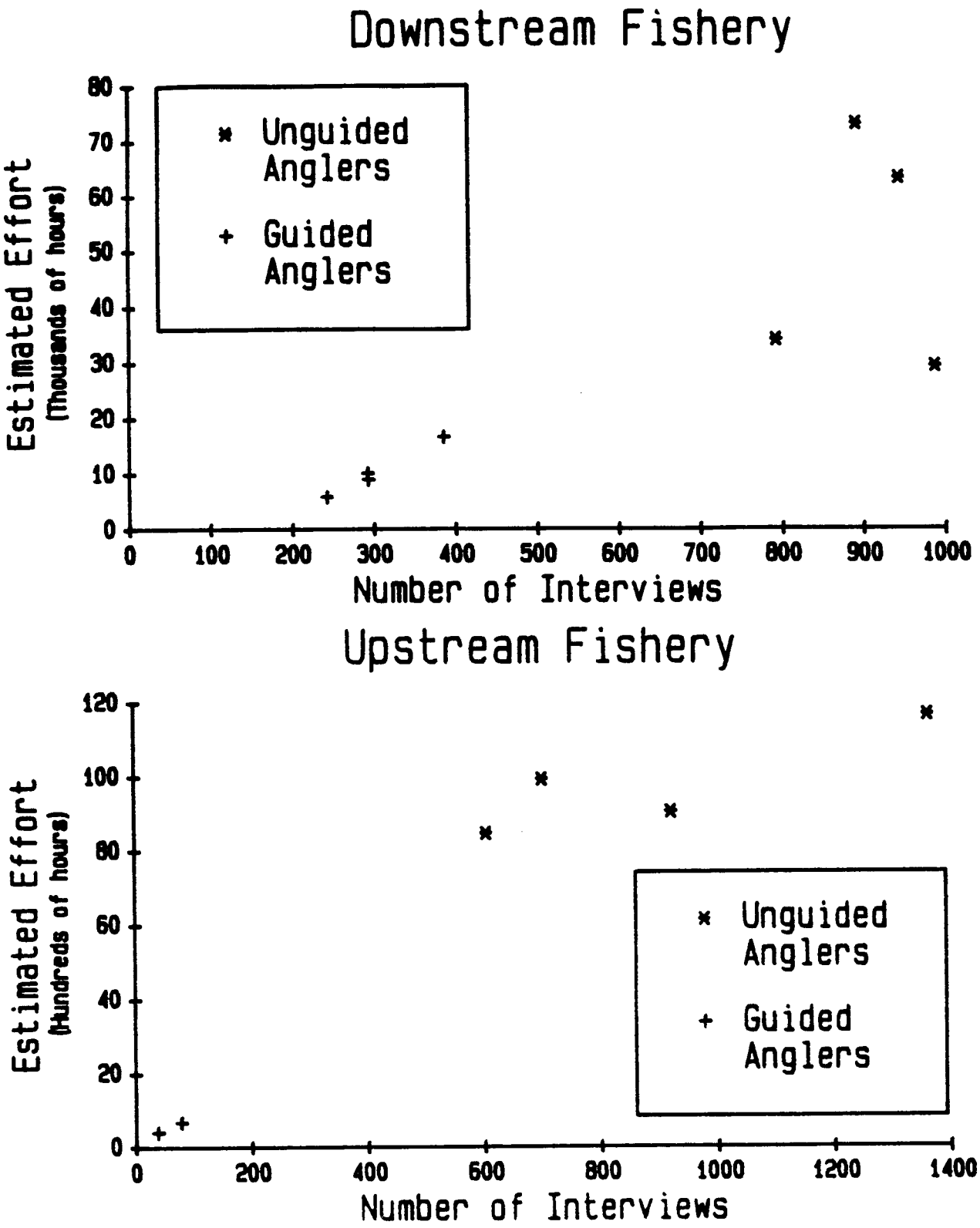

Figure 11. Number of unguided and guided anglers interviewed during each stratum versus the effort estimated for the stratum in the downstream and upstream sections of the Kenai River coho salmon fishery, 1986.

Table 30. Summary of the number of angler-hours of fishing effort estimated for each of the major strata in the lower Kenai River creel surveys, 1986.

Stratum	Estimated Effort	Standard Error
Chinook Salmon Fishery[1]		
Early Run - Downstream - Unguided anglers	100,371	7,342
- Guided anglers	41,724	1,945
- Upstream - Unguided anglers	18,313	1,694
- Guided anglers	1,425	272
- Midstream - Unguided anglers	16,184	1,475
Guided anglers	5,884	469
Late Run - Downstream - Unguided anglers	159,943	9,323
- Guided anglers	47,379	2,830
- Upstream - Unguided anglers	13,069	1,437
- Guided anglers	338	86
- Midstream - Unguided anglers	18,585	2,191
Guided anglers	5,126	616
Coho Salmon Fishery[2]		
Early Run - Downstream - Unguided anglers	136,187	8,264
- Guided anglers	26,617	3,223
- Upstream - Unguided anglers	20,682	1,825
- Guided anglers	681	186
Late Run - Downstream - Unguided anglers	63,326	5,970
- Guided anglers	14,801	2,353
- Upstream - Unguided anglers	18,365	1,286
- Guided anglers	411	136
Sub-totals		
Unguided anglers	565,025	16,176
Guided anglers	144,386	5,334
TOTAL	709,411	17,032

[1] Estimates are for boat anglers only.

[2] Estimates are for both boat and shore anglers.

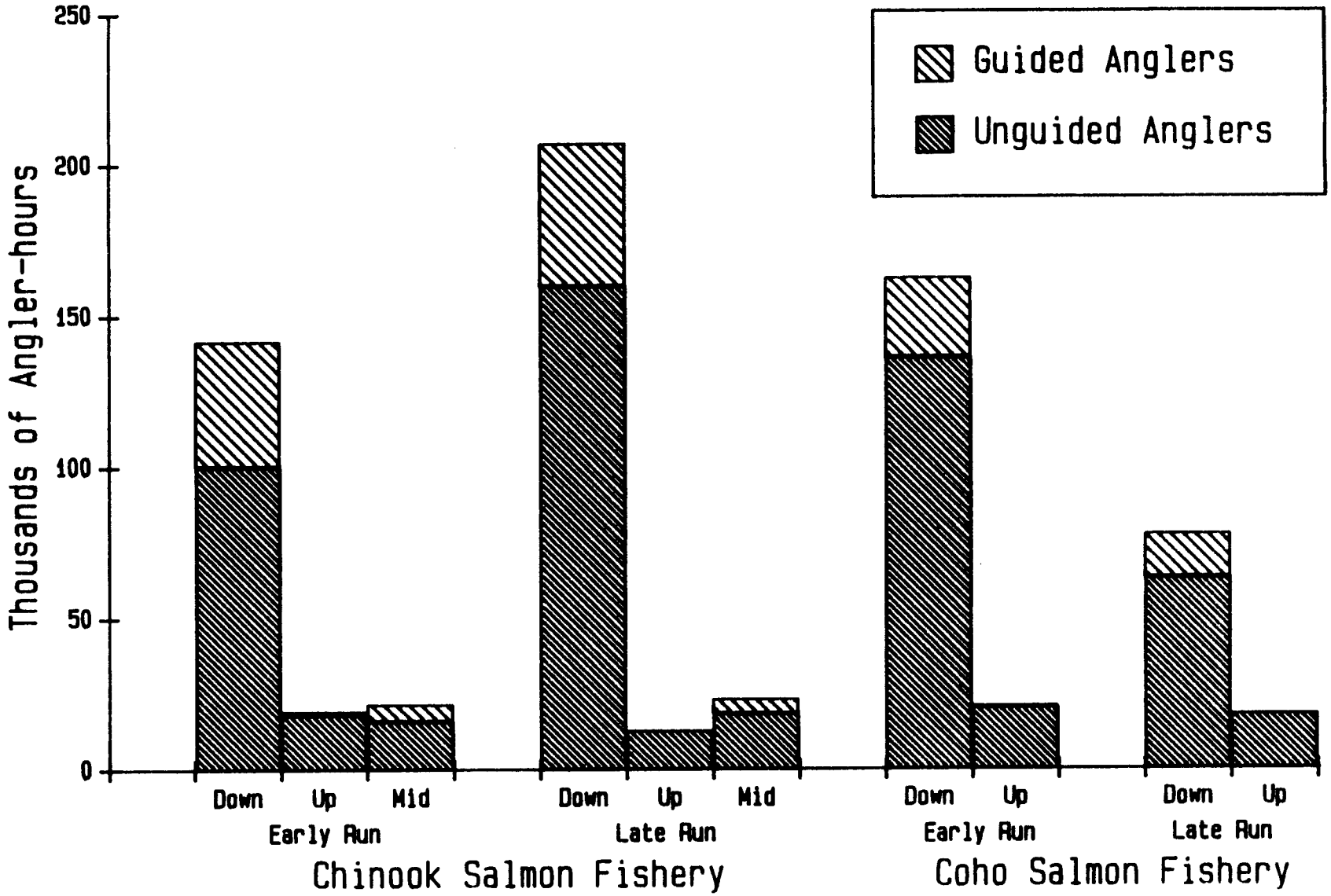

Figure 12. Estimated effort by unguided and guided anglers for each of the major strata in the lower Kenai River creel surveys, 1986.

Table 31. Estimated harvest and catch of the major species by recreational anglers in the the lower Kenai River fisheries, 1986.

Species	Estimated Harvest	Standard Error	Estimated Catch	Standard Error
Chinook salmon	16,565	656	27,448	1,022
Coho salmon	45,225	2,277	45,798	2,288
Sockeye salmon	4,013	390	9,029	874
Pink salmon	9,555	1,136	60,662	6,098
Rainbow trout	737	104	1,497	166
Dolly Varden char	3,496	289	5,272	444

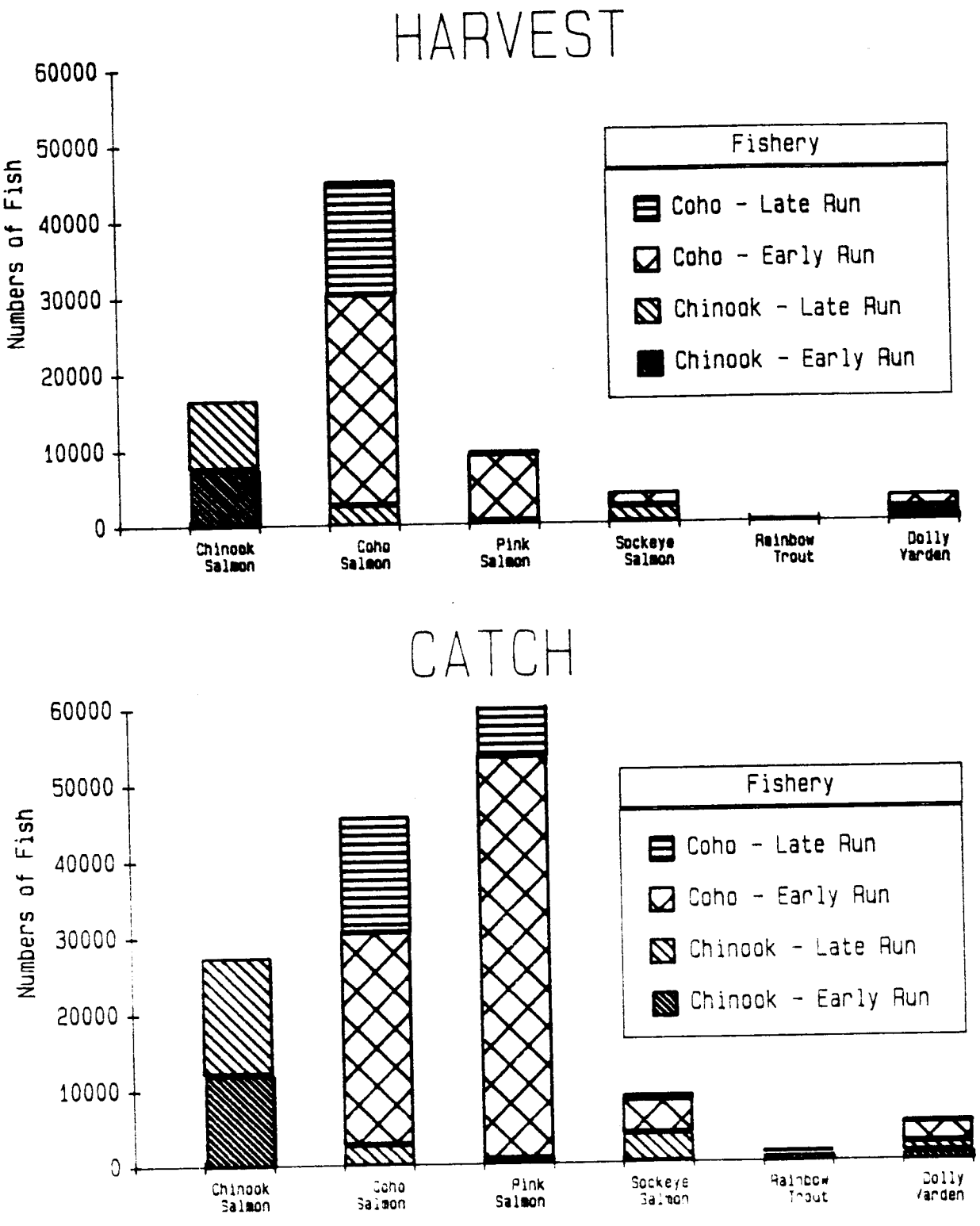

Figure 13. Estimated harvest and catch of the major species by recreational anglers in the lower Kenai River fisheries, 1986.

2. When generating the schedule for conducting angler counts, minimize the covariance between same-day angler counts by ensuring that: (1) either there is a constant number of hours between same-day angler counts made within 12 hours of each other or there are at least 8 hours between counts, and (2) counts are not made on consecutive days in the same period (Appendix E).

3. Stratify the effort and harvest estimates by two-week periods so that temporal trends in the fishery can be detected.

4. Angler interviews should no longer be collected using a roving boat creel survey. To maximize the number of completed-trip interviews collected, all angler interviews should be conducted at access sites. The sample design for the access site survey should be such that a random sample of the unguided and guided angling populations is collected.

5. Compare the normal theory variance estimates for harvest-per-unit-effort (HPUE) and catch-per-unit-effort (CPUE) to bootstrap (Efron 1982) estimates of these quantities to determine if any bias exists.

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APPENDIX A

Boat angler counts during the Kenai River chinook salmon fishery, 1986

Appendix Table A1. Unguided boat angler and guided boat angler counts during the early run of the Kenai River downstream chinook salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	D	E	GUIDED ANGLERS Period A	B	C	D	E
517	We										
518	We			30	20				0	0	
520	Wd										
521	Wd										
522	Wd		19				12	39			
523	Wd	18	26				20	10			
524	We		36	59				10	22		
525	We		116	75				31	27		
526	We	53	50				36	14			
527	Wd				13	26				6	3
528	Wd	9	23				29	20			
529	Wd			27	36	20			30	18	6
530	Wd				39	21				35	7
531	We	41		98	51	26	96		56	11	0
601	We		74	94	26	19		51	54	22[2]	
603	Wd			55		13			38		
604	Wd				93	24					
605	Wd			128					78		
606	Wd	133					181				
607	We	270	313	229	338		216	170	157	76	
608	We		308	255	183	171		175	92	52	
610	Wd		222	116				184	127		
611	Wd			165		96			118		
612	Wd			127	157				73	63	
613	Wd	292	356	158	324		208	195	85		
614	We	230	490	243	297			179	100		
615	We	345	380	316		206	139	139	64		
617	Wd	167	204	228	124			169	137	111	
618	Wd	88	135	146	69		168	180	105		
619	Wd	86	67				135	84			
620	Wd										
621	We	134	208	296	136			129	81		
622	We		168	149	148	34		67	37		
624	Wd	145		99	101	62			39		
625	Wd	129	190		149	37		175		88	
626	Wd			163	152				95	97	
627	Wd	94		143					95		
628	We	179	197	311	150		164	146	111	94	
629	We	110		305	180				89	75	

[1] Hours for unguided anglers: A 0400-0759; B 0800-1159; C 1200-1559; D 1600-1959; E 2000-2359

[2] Hours for guided anglers in June: A 0600-0759; B 0800-1159; C 1200-1559; D 1600-1759

Appendix Table A2. Unguided boat angler and guided boat angler counts during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	D	E	GUIDED ANGLERS Period[2] A	B	C	D
701	Wd	136	166		100	83		149		50
702	Wd				112	38				35
703	Wd	94	135	256	147			116	63	29
704	We	137		291					110	
705	We	257	309	363	327			138	70	66
706	We	95	151	43	155					
708	Wd	287	214				172	223		
709	Wd	123	207		101			183		45
710	Wd			126	161				109	93
711	Wd	54	270		197			207		84
712	We	48	536	323		234		274	141	
713	We		631	472		159				
715	Wd	285	454	338	429			266	95	
716	Wd	118	304					295		
717	Wd	513		390	395	355	296		208	
718	Wd				472	188				203
719	We									
720	We	650	473		379					
722	Wd				209	152				194
723	Wd	316		320	321	296	153		164	197
724	Wd		442	318	336	424		283	183	
725	Wd	390	460					281		
726	We			606	659	297			213	247
727	We	441	828		439	176				
729	Wd		43	509				343	212	
730	Wd	340	487	316		274		292	174	
731	Wd	421	402	425			162	255	146	

[1] Hours for unguided anglers: A 0400-0759; B 0800-1159; C 1200-1559; D 1600-1959; E 2000-2359

[2] Hours for guided anglers: A 0700-0759; B 0800-1159; C 1200-1559; D 1600-1859

Appendix Table A3. Unguided boat angler and guided boat angler counts during the early run of the Kenai River upstream chinook salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	D	E	GUIDED ANGLERS Period[2] A	B	C	D
603	Wd									
604	Wd			5	2				0	
605	Wd									
606	Wd		11			6		0		
607	We		31		19			2		
608	We		7	13				0	0	
610	Wd				6	4				
611	Wd			10		0			2	
612	Wd									
613	Wd			16	14				2	0
614	We	0		61					0	
615	We			139	32				0	
617	Wd			20		20			5	
618	Wd	0			22		2			8
619	Wd		25			8		9		
620	Wd									
621	We				92	60				8
622	We		60	47				9	0	
624	Wd									
625	Wd		33	27				13	3	
626	Wd	2	49					15		
627	Wd			31		32			2	
628	We				53	37				3
629	We		62		28			0		
701	Wd			21	27				1	3
702	Wd	0		19					0	
703	Wd			50		26			4	
704	We									
705	We	2				66				
706	We		31		23					
708	Wd				19	29				5
709	Wd		14		24			9		3
710	Wd									
711	Wd	10			31					3
712	We		2		77			3		0
713	We	8		66						

[1] Hours for unguided anglers

A	0400-0759
B	0800-1159
C	1200-1559
D	1600-1959
E	2000-2359

[2] Hours for guided anglers

	June	July
A	0600-0759	0700-0759
B	0800-1159	0800-1159
C	1200-1559	1200-1559
D	1600-1759	1600-1859

Appendix Table A4. Unguided boat angler and guided boat angler counts during the late run of the Kenai River upstream chinook salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	D	E	GUIDED ANGLERS Period[2] A	B	C	D
715	Wd									
716	Wd	0			19					2
717	Wd			48	29				5	
718	Wd			48	22				2	1
719	We		90			128		2		
720	We				58	36				
722	Wd									
723	Wd									
724	Wd		49		63			3		
725	Wd		64			16		0		
726	We		52			86		1		
727	We	13	84							
729	Wd									
730	Wd				34	26				3
731	Wd	3			43					2

[1] Hours for unguided anglers

A	0400-0759
B	0800-1159
C	1200-1559
D	1600-1959
E	2000-2359

[2] Hours for guided anglers

A	0700-0759
B	0800-1159
C	1200-1559
D	1600-1859

APPENDIX B

Daily summary statistics for fishing effort, harvest rate, and catch rate for anglers interviewed during the Kenai River chinook salmon fishery

Appendix Table B1. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by unguided anglers interviewed during the early run of the Kenai River downstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
518	We	58	2.8	0.18	0.02	0.017	0.006	0.03	0.024	0.012
520	Wd	12	6.5	1.05	0.00	0.000	0.000	0.00	0.000	0.000
522	Wd	10	2.5	0.25	0.10	0.100	0.041	0.10	0.100	0.041
523	Wd	83	3.2	0.34	0.01	0.012	0.004	0.01	0.012	0.004
524	We	66	2.9	0.22	0.03	0.021	0.010	0.06	0.030	0.021
525	We	78	3.1	0.24	0.04	0.022	0.012	0.09	0.037	0.029
526	We	48	1.5	0.15	0.00	0.000	0.000	0.00	0.000	0.000
527	Wd	27	2.2	0.44	0.00	0.000	0.000	0.00	0.000	0.000
528	Wd	20	1.7	0.28	0.10	0.069	0.058	0.15	0.082	0.087
529	Wd	38	2.4	0.45	0.00	0.000	0.000	0.03	0.026	0.011
530	Wd	34	2.4	0.26	0.03	0.029	0.012	0.03	0.029	0.012
531	We	81	4.4	0.34	0.01	0.012	0.003	0.02	0.017	0.006
601	We	26	5.5	0.54	0.08	0.053	0.014	0.12	0.064	0.021
605	Wd	19	3.5	0.35	0.16	0.086	0.046	0.21	0.123	0.061
606	Wd	53	1.8	0.28	0.08	0.037	0.042	0.17	0.059	0.096
607	We	141	2.6	0.11	0.11	0.026	0.042	0.16	0.032	0.061
608	We	203	3.0	0.14	0.12	0.023	0.039	0.18	0.033	0.058
610	Wd	66	3.4	0.27	0.15	0.044	0.045	0.53	0.104	0.158
611	Wd	256	2.5	0.10	0.11	0.020	0.046	0.20	0.027	0.079
612	Wd	96	3.2	0.22	0.17	0.038	0.052	0.28	0.055	0.088
613	Wd	195	2.2	0.11	0.09	0.023	0.042	0.13	0.028	0.061
614	We	218	2.5	0.15	0.06	0.017	0.025	0.11	0.031	0.043
615	We	188	2.4	0.11	0.10	0.022	0.042	0.13	0.024	0.053
617	Wd	196	2.8	0.17	0.03	0.012	0.011	0.03	0.012	0.011
618	Wd	135	3.2	0.21	0.02	0.013	0.007	0.03	0.015	0.009
619	Wd	44	1.9	0.25	0.09	0.044	0.048	0.09	0.044	0.048
620	Wd	5	3.8	0.07	0.20	0.200	0.053	0.20	0.200	0.053
621	We	187	2.5	0.14	0.04	0.014	0.015	0.06	0.017	0.024
622	We	152	2.9	0.19	0.11	0.025	0.037	0.12	0.026	0.041
624	Wd	139	2.1	0.12	0.12	0.028	0.058	0.15	0.030	0.072
625	Wd	202	2.2	0.14	0.09	0.021	0.043	0.16	0.030	0.074
626	Wd	78	4.0	0.29	0.13	0.038	0.032	0.14	0.040	0.035
627	Wd	91	2.0	0.16	0.18	0.040	0.088	0.32	0.064	0.159
628	We	148	3.2	0.21	0.09	0.023	0.028	0.22	0.054	0.068
629	We	139	2.9	0.22	0.02	0.012	0.007	0.08	0.025	0.027

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table B2. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by guided anglers interviewed during the early run of the Kenai River downstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
520	Wd	5	3.1	0.91	0.40	0.245	0.129	0.40	0.245	0.129
522	Wd	36	2.2	0.27	0.06	0.039	0.025	0.08	0.047	0.038
523	Wd	67	2.3	0.27	0.09	0.035	0.038	0.12	0.040	0.051
524	We	50	3.0	0.17	0.14	0.050	0.047	0.18	0.055	0.061
525	We	65	3.6	0.20	0.15	0.045	0.043	0.22	0.060	0.060
526	We	53	2.0	0.15	0.04	0.026	0.019	0.04	0.026	0.019
527	Wd	5	4.3	0.64	0.60	0.245	0.140	0.60	0.245	0.140
528	Wd	53	2.5	0.16	0.09	0.041	0.038	0.19	0.054	0.076
529	Wd	42	2.3	0.28	0.21	0.064	0.092	0.26	0.077	0.113
530	Wd	31	4.0	0.36	0.32	0.085	0.081	0.35	0.087	0.089
531	We	108	3.3	0.15	0.12	0.031	0.037	0.22	0.040	0.068
601	We	3	3.7	0.88	1.00	0.000	0.273	1.33	0.333	0.364
605	Wd	25	3.4	0.34	0.68	0.095	0.202	1.24	0.233	0.369
606	Wd	60	4.3	0.27	0.38	0.063	0.090	0.68	0.094	0.160
607	We	90	3.0	0.18	0.24	0.046	0.081	0.34	0.057	0.114
608	We	101	3.9	0.18	0.45	0.050	0.113	0.65	0.076	0.166
610	Wd	30	2.3	0.36	0.20	0.074	0.088	0.27	0.082	0.117
611	Wd	80	3.2	0.22	0.47	0.056	0.148	0.82	0.094	0.256
612	Wd	92	3.0	0.20	0.23	0.044	0.077	0.42	0.064	0.143
613	Wd	96	4.3	0.19	0.38	0.050	0.086	0.72	0.091	0.165
614	We	102	3.5	0.18	0.26	0.044	0.075	0.35	0.051	0.100
615	We	117	3.7	0.19	0.34	0.044	0.092	0.44	0.052	0.120
617	Wd	169	2.6	0.09	0.12	0.025	0.048	0.13	0.026	0.050
618	Wd	118	3.1	0.15	0.13	0.031	0.040	0.20	0.037	0.065
619	Wd	70	3.6	0.20	0.30	0.055	0.084	0.41	0.063	0.117
620	Wd	17	4.3	0.49	0.47	0.125	0.110	0.59	0.150	0.137
621	We	102	3.5	0.21	0.15	0.035	0.042	0.22	0.053	0.062
622	We	45	2.8	0.21	0.47	0.075	0.166	0.58	0.087	0.206
624	Wd	86	2.7	0.17	0.17	0.041	0.065	0.34	0.059	0.125
625	Wd	57	2.3	0.15	0.19	0.053	0.085	0.40	0.066	0.177
626	Wd	76	3.7	0.28	0.32	0.057	0.084	0.42	0.068	0.112
627	Wd	61	2.3	0.24	0.25	0.056	0.108	0.69	0.113	0.302
628	We	103	2.2	0.13	0.30	0.045	0.137	0.43	0.051	0.194
629	We	63	2.1	0.16	0.13	0.042	0.062	0.17	0.053	0.085

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table B3. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by unguided anglers interviewed during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
701	Wd	138	2.4	0.18	0.09	0.024	0.036	0.12	0.033	0.051
702	Wd	56	3.1	0.33	0.07	0.035	0.023	0.07	0.035	0.023
703	Wd	139	2.2	0.13	0.04	0.017	0.019	0.11	0.026	0.048
704	We	131	2.4	0.13	0.02	0.011	0.006	0.08	0.027	0.034
705	We	210	2.3	0.12	0.07	0.017	0.029	0.10	0.021	0.043
706	We	186	1.7	0.09	0.03	0.012	0.016	0.08	0.019	0.044
708	Wd	124	2.0	0.16	0.05	0.019	0.024	0.15	0.039	0.072
709	Wd	124	2.1	0.18	0.02	0.014	0.012	0.04	0.018	0.019
710	Wd	73	3.6	0.27	0.11	0.037	0.030	0.11	0.037	0.030
711	Wd	104	1.6	0.10	0.10	0.029	0.061	0.15	0.038	0.098
712	We	284	2.4	0.12	0.02	0.008	0.007	0.02	0.009	0.010
713	We	273	3.2	0.12	0.12	0.020	0.037	0.33	0.051	0.103
715	Wd	260	3.0	0.15	0.26	0.027	0.087	0.58	0.051	0.195
716	Wd	132	3.1	0.20	0.13	0.031	0.042	0.18	0.037	0.059
717	Wd	322	2.4	0.13	0.06	0.013	0.023	0.10	0.016	0.040
718	Wd	148	3.7	0.24	0.09	0.023	0.024	0.11	0.026	0.030
719	We	212	4.7	0.23	0.07	0.018	0.015	0.08	0.019	0.018
720	We	277	3.1	0.11	0.04	0.012	0.013	0.04	0.012	0.013
722	Wd	97	5.4	0.43	0.03	0.018	0.006	0.08	0.028	0.015
723	Wd	287	3.1	0.16	0.08	0.016	0.025	0.11	0.020	0.035
724	Wd	204	3.2	0.19	0.10	0.021	0.032	0.13	0.023	0.040
725	Wd	160	3.0	0.21	0.11	0.025	0.038	0.21	0.043	0.070
726	We	194	3.1	0.16	0.07	0.019	0.023	0.11	0.024	0.035
727	We	281	2.6	0.13	0.08	0.016	0.032	0.12	0.022	0.048
729	Wd	168	4.2	0.19	0.22	0.032	0.052	0.39	0.060	0.091
730	Wd	148	2.0	0.10	0.09	0.023	0.044	0.22	0.038	0.111
731	Wd	132	2.4	0.17	0.14	0.030	0.057	0.28	0.058	0.118

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table B4. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by guided anglers interviewed during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
701	Wd	65	3.0	0.22	0.12	0.041	0.041	0.25	0.058	0.081
702	Wd	33	5.3	0.18	0.18	0.068	0.035	0.48	0.124	0.092
703	Wd	56	3.0	0.27	0.16	0.050	0.054	0.20	0.059	0.066
704	We	39	3.9	0.41	0.26	0.071	0.065	0.46	0.137	0.118
705	We	105	2.9	0.15	0.06	0.023	0.020	0.13	0.033	0.046
708	Wd	69	3.5	0.25	0.19	0.047	0.054	0.39	0.059	0.112
709	Wd	124	3.6	0.19	0.15	0.032	0.040	0.19	0.037	0.053
710	Wd	70	3.8	0.29	0.09	0.034	0.022	0.14	0.047	0.037
711	Wd	68	2.5	0.17	0.19	0.048	0.075	0.24	0.052	0.093
712	We	68	3.2	0.24	0.10	0.037	0.032	0.15	0.043	0.046
715	Wd	76	3.2	0.21	0.25	0.050	0.078	0.58	0.105	0.180
716	Wd	70	2.6	0.18	0.30	0.055	0.114	0.57	0.072	0.217
717	Wd	44	4.8	0.15	0.30	0.070	0.061	0.59	0.104	0.123
718	Wd	54	3.3	0.25	0.37	0.066	0.112	0.43	0.073	0.129
719	We	92	4.1	0.18	0.22	0.043	0.053	0.28	0.052	0.069
722	Wd	25	4.4	0.32	0.36	0.098	0.082	0.36	0.098	0.082
723	Wd	121	3.3	0.20	0.13	0.031	0.040	0.17	0.036	0.050
724	Wd	128	3.6	0.20	0.25	0.038	0.069	0.27	0.041	0.075
725	Wd	101	4.2	0.23	0.35	0.050	0.082	0.46	0.064	0.108
726	We	92	4.3	0.21	0.22	0.043	0.051	0.35	0.059	0.082
729	Wd	116	3.1	0.22	0.52	0.048	0.168	0.73	0.067	0.239
730	Wd	86	2.1	0.17	0.30	0.050	0.146	0.43	0.059	0.208
731	Wd	58	1.8	0.17	0.28	0.059	0.155	0.40	0.069	0.223

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table B5. Daily summary statistics for sockeye salmon, rainbow trout, and Dolly Varden char harvest and catch by unguided anglers interviewed during the early run of the Kenai River downstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
518	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
520	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
522	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
523	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
524	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
525	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
526	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
527	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
528	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
529	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
530	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.03	0.029	0.012	0.03	0.029	0.012
531	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
601	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.038	0.007	0.04	0.038	0.007
605	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
606	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
607	We	0.01	0.010	0.006	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
608	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
610	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
611	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
612	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
613	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
614	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
615	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
617	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
618	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.007	0.002	0.01	0.007	0.002
619	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
620	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
621	We	0.00	0.000	0.000	0.01	0.005	0.002	0.01	0.005	0.002	0.00	0.000	0.000	0.01	0.005	0.002
622	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
624	Wd	0.01	0.007	0.003	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
625	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
626	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
627	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
628	We	0.00	0.000	0.000	0.01	0.007	0.002	0.01	0.007	0.002	0.00	0.000	0.000	0.00	0.000	0.000
629	We	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.007	0.002	0.01	0.007	0.002	0.01	0.007	0.002

[1] No sockeye salmon were reported as released.

Appendix Table B6. Daily summary statistics for sockeye salmon, rainbow trout, and Dolly Varden char harvest and catch by guided anglers interviewed during the early run of the Kenai River downstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Rainbow Trout			Rainbow Trout			Dolly Varden[2]		
	Wd/	HARVEST			HARVEST			CATCH			HARVEST		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
520	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
522	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
523	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
524	We	0.02	0.020	0.007	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
525	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
526	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
527	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
528	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.019	0.008	0.00	0.000	0.000
529	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.05	0.033	0.021
530	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.06	0.045	0.016
531	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.03	0.021	0.008
601	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
605	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
606	Wd	0.02	0.017	0.004	0.00	0.000	0.000	0.00	0.000	0.000	0.03	0.033	0.008
607	We	0.03	0.019	0.011	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
608	We	0.01	0.010	0.003	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
610	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
611	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
612	Wd	0.01	0.011	0.004	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
613	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.010	0.002
614	We	0.01	0.010	0.003	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
615	We	0.01	0.009	0.002	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
617	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.006	0.002
618	Wd	0.00	0.000	0.000	0.01	0.008	0.003	0.01	0.008	0.003	0.00	0.000	0.000
619	Wd	0.00	0.000	0.000	0.04	0.024	0.012	0.07	0.037	0.020	0.00	0.000	0.000
620	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
621	We	0.04	0.019	0.011	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
622	We	0.02	0.022	0.008	0.00	0.000	0.000	0.02	0.022	0.008	0.00	0.000	0.000
624	Wd	0.02	0.016	0.009	0.01	0.012	0.004	0.02	0.016	0.009	0.00	0.000	0.000
625	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
626	Wd	0.01	0.013	0.004	0.00	0.000	0.000	0.00	0.000	0.000	0.03	0.018	0.007
627	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
628	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.010	0.004
629	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

[1] No sockeye salmon were reported as released.

[2] No Dolly Varden were reported as released.

Appendix Table B7. Daily summary statistics for sockeye salmon and coho salmon harvest and catch by unguided anglers interviewed during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon			Sockeye Salmon			Coho Salmon			Coho Salmon		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
701	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
702	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
703	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
704	We	0.01	0.008	0.003	0.01	0.008	0.003	0.00	0.000	0.000	0.00	0.000	0.000
705	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
706	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
708	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
709	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.008	0.004	0.01	0.008	0.004
710	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
711	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
712	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.004	0.001	0.00	0.004	0.001
713	We	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.006	0.003	0.01	0.006	0.003
715	Wd	0.01	0.005	0.003	0.01	0.005	0.003	0.00	0.004	0.001	0.00	0.004	0.001
716	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.003	0.001	0.00	0.003	0.001
718	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
719	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.005	0.001	0.00	0.005	0.001
720	We	0.00	0.000	0.000	0.01	0.007	0.002	0.00	0.004	0.001	0.00	0.004	0.001
722	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.010	0.002	0.01	0.010	0.002
723	Wd	0.01	0.007	0.004	0.01	0.007	0.004	0.03	0.013	0.011	0.03	0.013	0.011
724	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.05	0.022	0.015	0.05	0.022	0.015
725	Wd	0.04	0.022	0.015	0.04	0.022	0.015	0.09	0.029	0.030	0.09	0.029	0.030
726	We	0.07	0.021	0.021	0.07	0.021	0.021	0.28	0.044	0.091	0.29	0.046	0.094
727	We	0.01	0.008	0.004	0.01	0.008	0.004	0.06	0.018	0.022	0.06	0.018	0.022
729	Wd	0.01	0.006	0.001	0.01	0.006	0.001	0.11	0.030	0.025	0.11	0.030	0.025
730	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.09	0.033	0.044	0.09	0.034	0.047
731	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.23	0.051	0.096	0.23	0.054	0.099

Appendix Table B8. Daily summary statistics for pink salmon, rainbow trout, and Dolly Varden char harvest and catch by unguided anglers interviewed during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Species:		Pink Salmon			Pink Salmon			Rainbow Trout[1]			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			CATCH			HARVEST			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
701	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.007	0.003	0.01	0.007	0.003
702	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.018	0.006	0.02	0.018	0.006
703	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
704	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.008	0.003	0.01	0.008	0.003
705	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
706	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
708	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.008	0.004	0.01	0.008	0.004
709	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
710	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
711	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.010	0.006	0.00	0.000	0.000	0.00	0.000	0.000
712	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.005	0.003	0.01	0.005	0.003
713	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.004	0.001	0.02	0.013	0.007	0.02	0.013	0.007
715	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
716	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.011	0.005	0.02	0.011	0.005
717	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.006	0.003	0.00	0.003	0.001	0.00	0.003	0.001
718	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
719	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
720	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.004	0.001
722	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.010	0.002	0.01	0.010	0.002
723	Wd	0.00	0.003	0.001	0.00	0.003	0.001	0.00	0.000	0.000	0.01	0.006	0.003	0.01	0.006	0.003
724	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.010	0.006	0.02	0.010	0.006
725	Wd	0.02	0.014	0.006	0.02	0.014	0.006	0.00	0.000	0.000	0.01	0.006	0.002	0.01	0.006	0.002
726	We	0.03	0.014	0.010	0.08	0.030	0.026	0.00	0.000	0.000	0.02	0.009	0.005	0.02	0.009	0.005
727	We	0.02	0.012	0.007	0.04	0.031	0.017	0.01	0.005	0.003	0.00	0.004	0.001	0.00	0.004	0.001
729	Wd	0.04	0.023	0.010	0.07	0.027	0.015	0.00	0.000	0.000	0.02	0.010	0.004	0.02	0.010	0.004
730	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
731	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.017	0.010	0.02	0.017	0.010

[1] No rainbow trout were reported as released.

Appendix Table B9. Daily summary statistics for sockeye salmon, coho salmon, and pink salmon harvest and catch by guided anglers interviewed during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Coho Salmon[2]			Pink Salmon[3]		
	Wd/	HARVEST			HARVEST			HARVEST		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
701	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
702	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
703	Wd	0.02	0.018	0.006	0.00	0.000	0.000	0.00	0.000	0.000
704	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
705	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
708	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
709	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
710	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
711	Wd	0.01	0.015	0.006	0.00	0.000	0.000	0.00	0.000	0.000
712	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
715	Wd	0.00	0.000	0.000	0.03	0.018	0.008	0.00	0.000	0.000
716	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	0.00	0.000	0.000	0.02	0.023	0.005	0.00	0.000	0.000
718	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
719	We	0.00	0.000	0.000	0.01	0.011	0.003	0.00	0.000	0.000
722	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
723	Wd	0.00	0.000	0.000	0.02	0.014	0.007	0.01	0.008	0.002
724	Wd	0.01	0.008	0.002	0.04	0.023	0.011	0.02	0.011	0.004
725	Wd	0.01	0.010	0.002	0.11	0.040	0.026	0.02	0.020	0.005
726	We	0.07	0.030	0.015	0.36	0.078	0.084	0.04	0.021	0.010
729	Wd	0.00	0.000	0.000	0.05	0.021	0.017	0.06	0.028	0.020
730	Wd	0.00	0.000	0.000	0.10	0.044	0.051	0.01	0.012	0.006
731	Wd	0.00	0.000	0.000	0.09	0.037	0.049	0.02	0.017	0.010

[1] No sockeye salmon were reported as released.

[2] No coho salmon were reported as released.

[3] No pink salmon were reported as released.

Appendix Table B10. Daily summary statistics for rainbow trout and Dolly Varden char harvest and catch by guided anglers interviewed during the late run of the Kenai River downstream chinook salmon fishery, 1986.

Species:		Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
701	Wd	0.02	0.015	0.005	0.02	0.015	0.005	0.00	0.000	0.000	0.00	0.000	0.000
702	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
703	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
704	We	0.03	0.026	0.007	0.05	0.036	0.013	0.00	0.000	0.000	0.00	0.000	0.000
705	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
708	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
709	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.008	0.002	0.02	0.016	0.004
710	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
711	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
712	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
715	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
716	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	0.02	0.023	0.005	0.02	0.023	0.005	0.00	0.000	0.000	0.00	0.000	0.000
718	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
719	We	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.011	0.003	0.02	0.015	0.005
722	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
723	Wd	0.00	0.000	0.000	0.02	0.017	0.005	0.00	0.000	0.000	0.00	0.000	0.000
724	Wd	0.02	0.011	0.004	0.02	0.011	0.004	0.03	0.019	0.009	0.03	0.019	0.009
725	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.010	0.002	0.01	0.010	0.002
726	We	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.011	0.003	0.01	0.011	0.003
729	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.03	0.019	0.008	0.03	0.019	0.008
730	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
731	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

Appendix Table B11. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by unguided anglers interviewed during the early run of the Kenai River upstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
604	Wd	9	9.7	3.13	0.00	0.000	0.000	0.00	0.000	0.000
606	Wd	24	1.5	0.20	0.00	0.000	0.000	0.00	0.000	0.000
607	We	75	1.9	0.12	0.00	0.000	0.000	0.00	0.000	0.000
608	We	27	1.7	0.16	0.00	0.000	0.000	0.00	0.000	0.000
610	Wd	23	2.5	0.36	0.00	0.000	0.000	0.00	0.000	0.000
611	Wd	33	2.3	0.37	0.00	0.000	0.000	0.00	0.000	0.000
613	Wd	43	2.2	0.15	0.00	0.000	0.000	0.00	0.000	0.000
614	We	117	1.7	0.09	0.02	0.012	0.010	0.03	0.017	0.021
615	We	146	2.8	0.24	0.00	0.000	0.000	0.01	0.007	0.002
617	Wd	61	3.4	0.51	0.03	0.023	0.010	0.03	0.023	0.010
618	Wd	65	2.3	0.20	0.03	0.022	0.013	0.12	0.041	0.053
619	Wd	69	2.3	0.24	0.09	0.034	0.038	0.16	0.044	0.069
621	We	142	2.3	0.17	0.01	0.010	0.006	0.01	0.010	0.006
622	We	151	1.8	0.08	0.03	0.015	0.019	0.05	0.017	0.026
625	Wd	84	2.0	0.13	0.06	0.026	0.030	0.11	0.038	0.055
626	Wd	67	2.0	0.14	0.09	0.035	0.045	0.10	0.038	0.052
627	Wd	83	2.3	0.19	0.00	0.000	0.000	0.01	0.012	0.005
628	We	129	2.2	0.17	0.01	0.008	0.004	0.04	0.026	0.018
629	We	125	2.3	0.13	0.02	0.014	0.010	0.06	0.025	0.028
701	Wd	71	2.3	0.15	0.04	0.024	0.018	0.10	0.050	0.042
702	Wd	57	1.5	0.14	0.02	0.018	0.012	0.12	0.056	0.081
703	Wd	123	2.1	0.15	0.04	0.018	0.020	0.09	0.026	0.043
705	We	176	2.6	0.17	0.01	0.008	0.004	0.03	0.014	0.013
706	We	101	1.7	0.10	0.02	0.014	0.012	0.07	0.029	0.040
708	Wd	73	2.7	0.25	0.07	0.030	0.026	0.14	0.041	0.051
709	Wd	85	2.2	0.17	0.01	0.012	0.005	0.01	0.012	0.005
711	Wd	66	2.4	0.18	0.02	0.015	0.006	0.05	0.026	0.019
712	We	135	2.4	0.16	0.01	0.007	0.003	0.01	0.010	0.006
713	We	105	1.9	0.17	0.02	0.013	0.010	0.02	0.013	0.010

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table B12. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by guided anglers interviewed during the early run of the Kenai River upstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
607	We	6	2.0	0.45	0.00	0.000	0.000	0.00	0.000	0.000
608	We	3	2.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
611	Wd	6	1.3	0.34	0.00	0.000	0.000	0.00	0.000	0.000
613	Wd	2	7.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
614	We	2	1.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
617	Wd	5	5.4	0.87	0.40	0.245	0.074	0.40	0.245	0.074
618	Wd	19	2.9	0.57	0.21	0.096	0.073	0.21	0.096	0.073
619	Wd	13	2.5	0.22	0.31	0.133	0.121	0.31	0.133	0.121
621	We	8	3.3	0.34	0.63	0.183	0.190	0.63	0.183	0.190
622	We	22	3.1	0.47	0.23	0.091	0.073	0.23	0.091	0.073
625	Wd	21	1.7	0.23	0.62	0.109	0.369	0.62	0.109	0.369
626	Wd	25	2.9	0.33	0.16	0.075	0.056	0.28	0.092	0.098
627	Wd	2	8.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
629	We	6	1.8	0.25	0.67	0.211	0.364	0.83	0.307	0.455
701	Wd	5	2.2	0.49	0.00	0.000	0.000	0.20	0.200	0.091
702	Wd	5	0.9	0.10	0.20	0.200	0.222	0.20	0.200	0.222
703	Wd	14	2.1	0.49	0.50	0.139	0.233	0.50	0.139	0.233
708	Wd	5	9.0	0.50	0.00	0.000	0.000	0.00	0.000	0.000
709	Wd	20	1.9	0.12	0.00	0.000	0.000	0.00	0.000	0.000
711	Wd	3	8.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
712	We	9	1.8	0.22	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 B13. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by unguided and guided anglers interviewed during the late run of the Kenai River upstream chinook salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
Unguided Anglers										
716	Wd	36	1.8	0.22	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	96	2.2	0.13	0.02	0.015	0.009	0.04	0.021	0.019
718	Wd	116	2.0	0.12	0.01	0.009	0.004	0.02	0.012	0.009
719	We	241	2.4	0.10	0.01	0.007	0.005	0.02	0.011	0.009
720	We	123	2.2	0.12	0.02	0.014	0.011	0.03	0.016	0.015
724	Wd	129	2.2	0.16	0.01	0.008	0.003	0.01	0.008	0.003
725	Wd	79	2.5	0.16	0.01	0.013	0.005	0.03	0.018	0.010
726	We	241	2.4	0.12	0.00	0.004	0.002	0.02	0.010	0.007
727	We	142	1.8	0.10	0.01	0.007	0.004	0.01	0.007	0.004
730	Wd	85	3.5	0.38	0.05	0.023	0.013	0.09	0.032	0.027
731	Wd	67	2.6	0.20	0.01	0.015	0.006	0.01	0.015	0.006
Guided Anglers										
716	Wd	4	5.3	2.74	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	10	5.4	0.72	0.00	0.000	0.000	0.00	0.000	0.000
718	Wd	3	0.7	0.17	0.00	0.000	0.000	0.00	0.000	0.000
719	We	2	2.5	0.00	0.00	0.000	0.000	0.50	0.500	0.200
724	Wd	9	4.7	1.10	0.00	0.000	0.000	0.11	0.111	0.024
725	Wd	2	2.8	0.25	1.00	0.000	0.364	1.00	0.000	0.364
726	We	2	2.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
730	Wd	3	3.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
731	Wd	3	3.0	0.00	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 B14. Daily summary statistics for sockeye salmon, rainbow trout, and Dolly Varden char harvest and catch by unguided anglers interviewed during the early run of the Kenai River upstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
604	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
606	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.042	0.028	0.04	0.042	0.028
607	We	0.00	0.000	0.000	0.00	0.000	0.000	0.03	0.027	0.014	0.07	0.035	0.035	0.07	0.035	0.035
608	We	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.037	0.022	0.07	0.051	0.043	0.07	0.051	0.043
610	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.17	0.102	0.069	0.13	0.072	0.052	0.13	0.072	0.052
611	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
613	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.14	0.053	0.064	0.09	0.056	0.043	0.14	0.063	0.064
614	We	0.00	0.000	0.000	0.00	0.000	0.000	0.19	0.051	0.113	0.03	0.017	0.021	0.09	0.040	0.057
615	We	0.01	0.010	0.005	0.21	0.048	0.072	0.43	0.083	0.152	0.08	0.030	0.029	0.14	0.036	0.048
617	Wd	0.00	0.000	0.000	0.02	0.016	0.005	0.03	0.023	0.010	0.03	0.023	0.010	0.05	0.028	0.014
618	Wd	0.00	0.000	0.000	0.05	0.026	0.020	0.12	0.078	0.053	0.05	0.026	0.020	0.05	0.026	0.020
619	Wd	0.00	0.000	0.000	0.01	0.014	0.006	0.01	0.014	0.006	0.01	0.014	0.006	0.01	0.014	0.006
621	We	0.00	0.000	0.000	0.06	0.022	0.024	0.13	0.036	0.055	0.08	0.025	0.034	0.08	0.025	0.034
622	We	0.00	0.000	0.000	0.05	0.017	0.026	0.05	0.017	0.026	0.06	0.021	0.034	0.06	0.021	0.034
625	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.012	0.006	0.00	0.000	0.000	0.01	0.012	0.006
626	Wd	0.00	0.000	0.000	0.03	0.021	0.015	0.07	0.039	0.037	0.03	0.021	0.015	0.03	0.021	0.015
627	Wd	0.00	0.000	0.000	0.05	0.024	0.021	0.17	0.080	0.074	0.14	0.049	0.063	0.22	0.071	0.095
628	We	0.00	0.000	0.000	0.07	0.025	0.032	0.15	0.043	0.068	0.19	0.053	0.086	0.23	0.057	0.108
629	We	0.00	0.000	0.000	0.03	0.019	0.014	0.05	0.022	0.021	0.10	0.029	0.042	0.10	0.030	0.045
701	Wd	0.00	0.000	0.000	0.15	0.055	0.067	0.15	0.055	0.067	0.21	0.063	0.091	0.21	0.063	0.091
702	Wd	0.00	0.000	0.000	0.02	0.018	0.012	0.02	0.018	0.012	0.11	0.048	0.070	0.11	0.048	0.070
703	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.018	0.012	0.17	0.063	0.082	0.28	0.079	0.133
705	We	0.01	0.008	0.004	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.015	0.015	0.04	0.015	0.015
706	We	0.01	0.010	0.006	0.01	0.010	0.006	0.01	0.010	0.006	0.09	0.032	0.052	0.09	0.032	0.052
708	Wd	0.00	0.000	0.000	0.04	0.023	0.015	0.04	0.023	0.015	0.05	0.027	0.020	0.05	0.027	0.020
709	Wd	0.00	0.000	0.000	0.07	0.033	0.032	0.07	0.033	0.032	0.20	0.076	0.089	0.25	0.088	0.111
711	Wd	0.00	0.000	0.000	0.05	0.026	0.019	0.06	0.030	0.025	0.14	0.083	0.057	0.15	0.084	0.063
712	We	0.00	0.000	0.000	0.01	0.010	0.006	0.07	0.027	0.031	0.10	0.028	0.040	0.21	0.047	0.089
713	We	0.01	0.010	0.005	0.00	0.000	0.000	0.00	0.000	0.000	0.11	0.039	0.060	0.18	0.055	0.094

[1] No sockeye salmon were reported as released.

Appendix Table B15. Daily summary statistics for sockeye salmon, rainbow trout, and Dolly Varden char harvest and catch by guided anglers interviewed during the early run of the Kenai River upstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
607	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
608	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
611	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
613	Wd	0.00	0.000	0.000	0.00	0.000	0.000	1.50	0.500	0.214	0.50	0.500	0.071	0.50	0.500	0.071
614	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
617	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.20	0.200	0.037
618	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.05	0.053	0.018
619	Wd	0.08	0.077	0.030	0.08	0.077	0.030	0.31	0.133	0.121	0.00	0.000	0.000	0.00	0.000	0.000
621	We	0.00	0.000	0.000	0.13	0.125	0.038	0.13	0.125	0.038	0.00	0.000	0.000	0.00	0.000	0.000
622	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.05	0.045	0.015	0.05	0.045	0.015
625	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
626	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
627	Wd	0.00	0.000	0.000	1.00	0.000	0.125	1.00	0.000	0.125	2.00	1.000	0.250	2.00	1.000	0.250
629	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
701	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
702	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
703	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.07	0.071	0.033	0.00	0.000	0.000	0.00	0.000	0.000
708	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
709	Wd	0.00	0.000	0.000	0.20	0.117	0.108	0.20	0.117	0.108	0.00	0.000	0.000	0.00	0.000	0.000
711	Wd	0.00	0.000	0.000	3.33	0.882	0.417	3.33	0.882	0.417	1.33	0.882	0.167	2.67	0.882	0.333
712	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

[1] No sockeye salmon were reported as released.

Appendix Table B16. Daily summary statistics for sockeye salmon, coho salmon, pink salmon, rainbow trout, and Dolly Varden char harvest and catch by unguided anglers interviewed during the late run of the Kenai River upstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon			Sockeye Salmon			Coho Salmon[1]			Pink Salmon[2]		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
716	Wd	0.00	0.000	0.000	0.03	0.028	0.015	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	0.06	0.029	0.028	0.06	0.029	0.028	0.00	0.000	0.000	0.00	0.000	0.000
718	Wd	0.14	0.034	0.070	0.16	0.040	0.078	0.00	0.000	0.000	0.00	0.000	0.000
719	We	0.04	0.014	0.018	0.07	0.023	0.030	0.00	0.000	0.000	0.00	0.000	0.000
720	We	0.34	0.069	0.154	0.63	0.115	0.282	0.00	0.000	0.000	0.01	0.008	0.004
724	Wd	0.33	0.055	0.146	0.56	0.107	0.251	0.00	0.000	0.000	0.00	0.000	0.000
725	Wd	0.37	0.081	0.145	0.77	0.174	0.305	0.00	0.000	0.000	0.01	0.013	0.005
726	We	0.33	0.043	0.138	0.61	0.100	0.254	0.02	0.008	0.007	0.00	0.004	0.002
727	We	0.50	0.066	0.277	0.92	0.144	0.511	0.01	0.007	0.004	0.00	0.000	0.000
730	Wd	0.56	0.105	0.162	1.75	0.283	0.503	0.05	0.029	0.013	0.02	0.017	0.007
731	Wd	0.66	0.129	0.251	1.46	0.401	0.558	0.01	0.015	0.006	0.00	0.000	0.000

Species:		Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
716	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.06	0.039	0.031	0.08	0.047	0.046
717	Wd	0.00	0.000	0.000	0.03	0.018	0.014	0.20	0.064	0.089	0.52	0.199	0.234
718	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.033	0.039	0.11	0.040	0.057
719	We	0.00	0.004	0.002	0.02	0.008	0.007	0.05	0.013	0.019	0.07	0.018	0.032
720	We	0.00	0.000	0.000	0.04	0.024	0.018	0.11	0.032	0.048	0.17	0.049	0.077
724	Wd	0.00	0.000	0.000	0.02	0.017	0.010	0.04	0.020	0.017	0.12	0.049	0.056
725	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.06	0.038	0.025	0.28	0.172	0.110
726	We	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.010	0.010	0.04	0.012	0.016
727	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
730	Wd	0.00	0.000	0.000	0.02	0.024	0.007	0.01	0.012	0.003	0.01	0.012	0.003
731	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.025	0.017	0.09	0.046	0.034

[1] No coho salmon were reported as released.

[2] No pink salmon were reported as kept.

Appendix Table B17. Daily summary statistics for sockeye salmon and pink salmon harvest by guided anglers interviewed during the late run of the Kenai River upstream chinook salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Pink Salmon[2]		
	Wd/	HARVEST			HARVEST		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE
716	Wd	0.00	0.000	0.000	0.00	0.000	0.000
717	Wd	0.10	0.100	0.019	0.00	0.000	0.000
718	Wd	0.00	0.000	0.000	0.00	0.000	0.000
719	We	0.00	0.000	0.000	0.00	0.000	0.000
724	Wd	0.00	0.000	0.000	0.11	0.111	0.024
725	Wd	0.00	0.000	0.000	0.00	0.000	0.000
726	We	0.00	0.000	0.000	0.00	0.000	0.000
730	Wd	1.33	0.333	0.444	0.00	0.000	0.000
731	Wd	2.67	0.333	0.889	0.00	0.000	0.000

[1] No sockeye salmon were reported as released.

[2] No pink salmon were reported as released.

APPENDIX C

Boat angler counts during the Kenai River coho salmon fishery, 1986

Appendix Table C1. Unguided angler and guided angler counts during the early run of the Kenai River downstream coho salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	D	GUIDED ANGLERS Period A	B	C	D
801	Wd	141	173			121	116		
802	We			449	730			61	75
803	We								
804	Wd								
805	Wd				215				69
806	Wd			256	217			21	7
807	Wd			122	137			19	3
808	Wd	129	151			19	76		
809	We	624			492	77			10
810	We			462	733			53	18
811	Wd			209	195			48	24
812	Wd								
813	Wd								
814	Wd			234	190			13	0
815	Wd	241						98	
816	We	559		640		123		60	
817	We			358	321			19	5
818	Wd		148				18		
819	Wd		302	309			72	61	
820	Wd								
821	Wd								
822	Wd	115				64			
823	We	330	240			128	74		
824	We	241			195	66			6
825	Wd			165	139			57	50
826	Wd		213		196		29		26
827	Wd								
828	Wd			199	193			31	8
829	Wd								
830	We		538		260		91		11
831	We		582				87		

[1] Period Hours:
A 0600-0959
B 1000-1359
C 1400-1759
D 1800-2159

Appendix Table C2. Unguided angler and guided angler counts during the late run of the Kenai River downstream coho salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	GUIDED ANGLERS Period A	B	C
901	We						
902	Wd						
903	Wd	249	175		61	35	
904	Wd		160	167		64	26
905	Wd						
906	We	587		246	111		25
907	We		87	113		82	58
908	Wd						
909	Wd		145	142		34	11
910	Wd						
911	Wd			167			42
912	Wd	324		231	152		38
913	We	580		320	105		38
914	We			283			37
915	Wd						
916	Wd	121	103		27	15	
917	Wd						
918	Wd			135			8
919	Wd		133			20	
920	We	300	207		66	46	
921	We		171	107		39	2
922	Wd		50	32		19	5
923	Wd		106	49		19	6
924	Wd						
925	Wd	103	61		38	25	
926	Wd						
927	We		143	127		25	11
928	We		124	53		16	17
929	Wd						
930	Wd						

[1] Period Hours: A 0800-1159
B 1200-1559
C 1600-1959

Appendix Table C3. Unguided angler and guided angler counts during the early run of the Kenai River upstream coho salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	D	GUIDED ANGLERS Period A	B	C	D
801	Wd	26		95		0		2	
802	We		108		124		0		0
803	We	39	145			0	5		
804	Wd								
805	Wd								
806	Wd	7		23		0		2	
807	Wd			49	11			12	0
808	Wd	3	32			0	3		
809	We		42	114			0	0	
810	We			96	24			3	0
811	Wd			22	27			9	3
812	Wd								
813	Wd	6	42			0	0		
814	Wd								
815	Wd	5		51		0		0	
816	We	38			61	0			0
817	We	38		118		0		0	
818	Wd		26	27			0	0	
819	Wd								
820	Wd								
821	Wd			47	50			0	0
822	Wd	8		55		0		12	
823	We								
824	We	22			33	4			4
825	Wd		23	33			0	0	
826	Wd								
827	Wd								
828	Wd			27	11			6	0
829	Wd								
830	We		47		49		0		0
831	We		184	46			0	2	

[1] Period Hours:
A 0600-0959
B 1000-1359
C 1400-1759
D 1800-2159

Appendix Table C4. Unguided angler and guided angler counts during the late run of the Kenai River upstream coho salmon fishery, 1986.

Date	Wd/ We	UNGUIDED ANGLERS Period[1] A	B	C	GUIDED ANGLERS Period A	B	C
901	We						
902	Wd						
903	Wd						
904	Wd		28	38		8	0
905	Wd						
906	We	55	142		0	0	
907	We		71	12		0	0
908	Wd						
909	Wd		45	39		0	0
910	Wd	42		46	0		0
911	Wd	24		21	0		0
912	Wd						
913	We	85		100	0		4
914	We	56		74	0		0
915	Wd						
916	Wd	65	48		7	0	
917	Wd		55	19		0	0
918	Wd						
919	Wd	82	58		3	5	
920	We		130			2	
921	We		70	42		3	0
922	Wd		19	20		0	0
923	Wd						
924	Wd						
925	Wd		46	65		0	0
926	Wd	47	45		4	0	
927	We			103			0
928	We		125	40		3	0
929	Wd						
930	Wd						

[1] Period Hours: A 0800-1159
B 1200-1559
C 1600-1959

APPENDIX D

Daily summary statistics for fishing effort, harvest rate, and catch rate for anglers interviewed during the Kenai River coho salmon fishery

Appendix Table D1. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by unguided anglers interviewed during the early run of the Kenai River downstream coho salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
801	Wd	31	2.2	0.18	0.35	0.127	0.163	0.35	0.127	0.163
802	We	126	2.9	0.16	0.35	0.063	0.120	0.35	0.063	0.120
805	Wd	70	3.0	0.23	0.39	0.104	0.130	0.39	0.104	0.130
806	Wd	61	3.3	0.29	0.69	0.141	0.208	0.69	0.141	0.208
807	Wd	74	2.8	0.34	0.27	0.073	0.096	0.27	0.073	0.096
808	Wd	39	1.8	0.20	0.44	0.136	0.246	0.44	0.136	0.246
809	We	104	3.6	0.26	0.40	0.086	0.113	0.40	0.086	0.113
810	We	89	3.0	0.21	0.13	0.048	0.045	0.13	0.048	0.045
811	Wd	72	4.1	0.43	0.13	0.048	0.030	0.13	0.048	0.030
814	Wd	52	2.5	0.23	0.42	0.114	0.170	0.42	0.114	0.170
815	Wd	61	2.5	0.24	0.59	0.131	0.232	0.59	0.131	0.232
816	We	133	2.3	0.12	0.19	0.049	0.082	0.19	0.049	0.082
817	We	83	3.3	0.20	0.31	0.082	0.094	0.31	0.082	0.094
818	Wd	67	3.6	0.30	0.54	0.109	0.147	0.54	0.109	0.147
819	Wd	73	3.4	0.22	0.79	0.125	0.235	0.79	0.125	0.235
822	Wd	70	1.6	0.13	0.40	0.105	0.251	0.46	0.130	0.287
823	We	92	2.4	0.12	0.65	0.106	0.277	0.65	0.106	0.277
824	We	30	3.5	0.39	0.30	0.085	0.085	0.30	0.085	0.085
825	Wd	63	4.6	0.36	0.46	0.115	0.101	0.46	0.115	0.101
826	Wd	100	3.4	0.20	0.63	0.098	0.183	0.65	0.103	0.189
828	Wd	111	2.9	0.23	0.40	0.078	0.138	0.40	0.078	0.138
830	We	156	3.0	0.17	0.53	0.074	0.174	0.53	0.074	0.174
831	We	79	2.9	0.19	0.41	0.095	0.139	0.41	0.095	0.139

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table D2. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by guided anglers interviewed during the early run of the Kenai River downstream coho salmon fishery, 1986.

Date	Wd/We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
801	Wd	42	3.0	0.15	0.79	0.134	0.258	0.81	0.133	0.266
802	We	34	2.6	0.40	0.41	0.120	0.157	0.41	0.120	0.157
805	Wd	23	5.0	0.35	0.57	0.216	0.112	0.57	0.216	0.112
806	Wd	21	4.9	0.56	1.43	0.321	0.290	1.43	0.321	0.290
807	Wd	12	4.5	0.74	1.58	0.379	0.349	1.58	0.379	0.349
808	Wd	35	2.6	0.21	1.03	0.223	0.398	1.03	0.223	0.398
809	We	29	2.8	0.24	0.69	0.205	0.244	0.69	0.205	0.244
810	We	5	8.0	0.00	0.20	0.200	0.025	0.20	0.200	0.025
811	Wd	24	4.2	0.55	0.25	0.138	0.060	0.25	0.138	0.060
814	Wd	8	5.9	0.26	1.75	0.491	0.298	1.75	0.491	0.298
815	Wd	15	4.2	0.44	1.60	0.363	0.384	1.60	0.363	0.384
816	We	56	3.7	0.26	0.79	0.163	0.213	0.79	0.163	0.213
817	We	23	8.2	0.22	1.70	0.304	0.207	1.70	0.304	0.207
818	Wd	24	3.3	0.42	1.58	0.306	0.475	1.58	0.306	0.475
819	Wd	31	4.0	0.35	1.23	0.248	0.310	1.23	0.248	0.310
822	Wd	55	2.1	0.10	0.91	0.173	0.431	0.91	0.173	0.431
823	We	53	2.8	0.12	0.60	0.151	0.215	0.60	0.151	0.215
825	Wd	28	5.1	0.33	2.07	0.252	0.404	2.07	0.252	0.404
826	Wd	45	4.5	0.31	1.44	0.190	0.318	1.44	0.190	0.318
828	Wd	22	7.0	0.41	2.82	0.125	0.403	2.82	0.125	0.403
830	We	47	4.2	0.32	1.02	0.186	0.244	1.02	0.186	0.244
831	We	45	3.7	0.36	0.87	0.197	0.237	0.87	0.197	0.237

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table D3. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by unguided anglers interviewed during the late run of the Kenai River downstream coho salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
903	Wd	93	3.4	0.18	0.96	0.120	0.284	0.96	0.120	0.284
905	Wd	87	3.8	0.29	0.47	0.086	0.123	0.47	0.086	0.123
906	We	161	3.8	0.19	0.25	0.048	0.067	0.25	0.048	0.067
907	We	78	3.0	0.29	0.60	0.114	0.198	0.60	0.114	0.198
909	Wd	70	4.1	0.34	0.59	0.099	0.142	0.59	0.099	0.142
911	Wd	33	2.1	0.28	0.58	0.151	0.279	0.58	0.151	0.279
912	Wd	54	5.0	0.52	0.70	0.114	0.140	0.70	0.114	0.140
913	We	88	3.4	0.21	0.36	0.083	0.108	0.36	0.083	0.108
914	We	30	4.7	0.82	0.47	0.124	0.100	0.47	0.124	0.100
916	Wd	81	2.9	0.17	0.64	0.101	0.224	0.64	0.101	0.224
918	Wd	80	4.6	0.38	0.47	0.091	0.104	0.47	0.091	0.104
919	Wd	80	3.3	0.25	0.96	0.101	0.296	0.96	0.101	0.296
920	We	201	3.3	0.14	0.45	0.050	0.138	0.45	0.050	0.138
921	We	133	3.6	0.23	0.38	0.059	0.105	0.38	0.059	0.105
922	Wd	53	3.5	0.30	0.57	0.106	0.162	0.57	0.106	0.162
923	Wd	87	2.9	0.20	0.34	0.075	0.118	0.34	0.075	0.118
925	Wd	74	3.8	0.22	0.58	0.086	0.153	0.58	0.086	0.153
927	We	200	3.4	0.15	0.38	0.047	0.110	0.38	0.047	0.110
928	We	96	2.9	0.22	0.22	0.054	0.075	0.22	0.054	0.075

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table D4. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by guided anglers interviewed during the late run of the Kenai River downstream coho salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
903	Wd	36	3.7	0.34	2.14	0.208	0.579	2.14	0.208	0.579
905	Wd	55	3.1	0.35	0.29	0.112	0.094	0.29	0.112	0.094
906	We	23	4.1	0.38	0.17	0.102	0.042	0.17	0.102	0.042
907	We	49	5.8	0.31	1.57	0.191	0.269	1.57	0.191	0.269
909	Wd	40	6.0	0.09	1.23	0.219	0.206	1.23	0.219	0.206
911	Wd	6	4.5	0.67	2.17	0.167	0.481	2.17	0.167	0.481
912	Wd	21	5.2	0.47	1.38	0.212	0.264	1.38	0.212	0.264
913	We	31	4.3	0.41	1.26	0.207	0.294	1.26	0.207	0.294
914	We	10	3.0	0.37	0.20	0.200	0.067	0.20	0.200	0.067
916	Wd	29	4.9	0.39	1.52	0.196	0.310	1.52	0.196	0.310
918	Wd	13	3.7	0.29	1.15	0.337	0.313	1.15	0.337	0.313
919	Wd	21	4.4	0.44	1.52	0.190	0.346	1.52	0.190	0.346
920	We	52	3.7	0.25	0.60	0.107	0.163	0.60	0.107	0.163
921	We	23	5.0	0.42	0.83	0.162	0.165	0.83	0.162	0.165
922	Wd	27	4.2	0.21	1.19	0.142	0.281	1.19	0.142	0.281
923	Wd	16	4.0	0.52	0.25	0.112	0.063	0.25	0.112	0.063
925	Wd	29	4.8	0.31	0.83	0.165	0.172	0.83	0.165	0.172
927	We	24	3.6	0.38	1.04	0.195	0.287	1.04	0.195	0.287
928	We	30	4.3	0.39	0.27	0.095	0.063	0.27	0.095	0.063

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table D5. Daily summary statistics for sockeye salmon and pink salmon harvest and catch by unguided anglers interviewed during the early run of the Kenai River downstream coho salmon fishery, 1986.

Species:		Sockeye Salmon			Sockeye Salmon			Pink Salmon			Pink Salmon		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
801	Wd	0.10	0.071	0.044	0.10	0.071	0.044	0.00	0.000	0.000	0.00	0.000	0.000
802	We	0.00	0.000	0.000	0.00	0.000	0.000	0.07	0.028	0.025	0.16	0.073	0.055
805	Wd	0.01	0.014	0.005	0.03	0.020	0.010	0.24	0.082	0.082	0.37	0.100	0.125
806	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.048	0.025	0.80	0.222	0.243
807	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.23	0.087	0.082	0.50	0.140	0.178
808	Wd	0.05	0.051	0.029	0.05	0.051	0.029	0.05	0.036	0.029	0.21	0.157	0.116
809	We	0.00	0.000	0.000	0.00	0.000	0.000	0.26	0.074	0.073	2.04	0.415	0.571
810	We	0.00	0.000	0.000	0.00	0.000	0.000	0.39	0.088	0.131	3.28	0.441	1.094
811	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.83	0.144	0.201	4.65	0.740	1.124
814	Wd	0.02	0.019	0.008	0.02	0.019	0.008	0.19	0.073	0.077	1.38	0.453	0.556
815	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.054	0.032	0.69	0.220	0.270
816	We	0.00	0.000	0.000	0.00	0.000	0.000	0.14	0.050	0.059	0.95	0.152	0.416
817	We	0.00	0.000	0.000	0.00	0.000	0.000	0.12	0.050	0.036	1.59	0.312	0.478
818	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.25	0.075	0.070	0.93	0.162	0.254
819	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.21	0.070	0.061	1.21	0.222	0.356
822	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.19	0.082	0.117
823	We	0.00	0.000	0.000	0.00	0.000	0.000	0.10	0.047	0.042	0.16	0.070	0.069
824	We	0.00	0.000	0.000	0.00	0.000	0.000	0.23	0.141	0.066	0.87	0.395	0.245
825	Wd	0.05	0.048	0.010	0.08	0.057	0.017	0.11	0.051	0.024	1.32	0.305	0.288
826	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.21	0.066	0.061	0.91	0.199	0.264
828	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.039	0.028	0.25	0.080	0.088
830	We	0.00	0.000	0.000	0.00	0.000	0.000	0.05	0.024	0.017	0.24	0.068	0.081
831	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

Appendix Table D6. Daily summary statistics for rainbow trout and Dolly Varden char harvest and catch by unguided anglers interviewed during the early run of the Kenai River downstream coho salmon fishery, 1986.

Species:		Rainbow Trout[1]			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
801	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
802	We	0.00	0.000	0.000	0.06	0.037	0.022	0.06	0.037	0.022
805	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
806	Wd	0.00	0.000	0.000	0.03	0.033	0.010	0.03	0.033	0.010
807	Wd	0.00	0.000	0.000	0.05	0.038	0.019	0.07	0.040	0.024
808	Wd	0.03	0.026	0.014	0.00	0.000	0.000	0.00	0.000	0.000
809	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
810	We	0.00	0.000	0.000	0.01	0.011	0.004	0.01	0.011	0.004
811	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
814	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
815	Wd	0.00	0.000	0.000	0.02	0.016	0.006	0.02	0.016	0.006
816	We	0.00	0.000	0.000	0.01	0.008	0.003	0.01	0.008	0.003
817	We	0.02	0.017	0.007	0.00	0.000	0.000	0.00	0.000	0.000
818	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
819	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
822	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
823	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
824	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
825	Wd	0.00	0.000	0.000	0.05	0.048	0.010	0.05	0.048	0.010
826	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
828	Wd	0.00	0.000	0.000	0.03	0.027	0.009	0.03	0.027	0.009
830	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
831	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

[1] No rainbow trout were reported as released.

Appendix Table D7. Daily summary statistics for sockeye salmon, pink salmon, rainbow trout, and Dolly Varden char harvest and catch by guided anglers interviewed during the early run of the Kenai River downstream coho salmon fishery, 1986.

Species:		Sockeye Salmon[1]			Pink Salmon			Pink Salmon			Rainbow trout[2]			Dolly Varden[3]		
	Wd/	HARVEST			HARVEST			CATCH			HARVEST			HARVEST		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
801	Wd	0.00	0.000	0.000	0.07	0.040	0.023	0.14	0.064	0.047	0.00	0.000	0.000	0.07	0.053	0.023
802	We	0.03	0.029	0.011	0.18	0.079	0.067	0.29	0.108	0.112	0.03	0.029	0.011	0.03	0.029	0.011
805	Wd	0.00	0.000	0.000	0.52	0.207	0.103	0.52	0.207	0.103	0.00	0.000	0.000	0.04	0.043	0.009
806	Wd	0.00	0.000	0.000	0.24	0.153	0.048	0.24	0.153	0.048	0.00	0.000	0.000	0.00	0.000	0.000
807	Wd	0.00	0.000	0.000	0.33	0.225	0.073	0.33	0.225	0.073	0.00	0.000	0.000	0.00	0.000	0.000
808	Wd	0.00	0.000	0.000	0.06	0.057	0.022	0.06	0.057	0.022	0.00	0.000	0.000	0.00	0.000	0.000
809	We	0.00	0.000	0.000	0.03	0.034	0.012	2.17	1.735	0.768	0.00	0.000	0.000	0.00	0.000	0.000
810	We	0.00	0.000	0.000	1.40	0.678	0.175	3.80	2.154	0.475	0.00	0.000	0.000	0.00	0.000	0.000
811	Wd	0.00	0.000	0.000	0.88	0.271	0.210	3.33	1.001	0.800	0.00	0.000	0.000	0.08	0.083	0.020
814	Wd	0.00	0.000	0.000	1.13	0.441	0.191	1.13	0.441	0.191	0.00	0.000	0.000	0.00	0.000	0.000
815	Wd	0.00	0.000	0.000	0.00	0.000	0.000	1.07	0.581	0.256	0.00	0.000	0.000	0.00	0.000	0.000
816	We	0.00	0.000	0.000	0.05	0.040	0.014	0.68	0.186	0.184	0.00	0.000	0.000	0.00	0.000	0.000
817	We	0.00	0.000	0.000	0.35	0.162	0.043	0.35	0.162	0.043	0.00	0.000	0.000	0.00	0.000	0.000
818	Wd	0.00	0.000	0.000	0.17	0.078	0.050	2.08	0.312	0.625	0.00	0.000	0.000	0.00	0.000	0.000
819	Wd	0.03	0.032	0.008	0.06	0.045	0.016	1.55	0.499	0.392	0.00	0.000	0.000	0.00	0.000	0.000
822	Wd	0.00	0.000	0.000	0.02	0.018	0.009	0.02	0.018	0.009	0.00	0.000	0.000	0.00	0.000	0.000
823	We	0.00	0.000	0.000	0.11	0.052	0.040	0.15	0.063	0.054	0.00	0.000	0.000	0.00	0.000	0.000
825	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
826	Wd	0.00	0.000	0.000	0.18	0.073	0.039	1.02	0.419	0.225	0.00	0.000	0.000	0.00	0.000	0.000
828	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
830	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
831	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

[1] No sockeye salmon were reported as released.
[2] No rainbow trout were reported as released.
[3] No Dolly Varden char were reported as released.

Appendix Table D8. Daily summary statistics for pink salmon and rainbow trout harvest and catch by unguided anglers interviewed during the late run of the Kenai River downstream coho salmon fishery, 1986.

Species:		Pink Salmon HARVEST			Pink Salmon CATCH			Rainbow Trout[1] HARVEST		
Date	Wd/ We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
903	Wd	0.04	0.030	0.013	0.17	0.071	0.051	0.00	0.000	0.000
905	Wd	0.00	0.000	0.000	0.17	0.080	0.045	0.00	0.000	0.000
906	We	0.02	0.011	0.005	0.07	0.035	0.020	0.00	0.000	0.000
907	We	0.03	0.026	0.008	0.05	0.036	0.017	0.00	0.000	0.000
909	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
911	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
912	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
913	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
914	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
916	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
918	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
919	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
920	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
921	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
922	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.019	0.005
923	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.016	0.008
925	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
927	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
928	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

[1] No rainbow trout were reported as released.

Appendix Table D9. Daily summary statistics for pink salmon and rainbow trout harvest and catch by guided anglers interviewed during the late run of the Kenai River downstream coho salmon fishery, 1986.

Species:		Pink Salmon HARVEST			Pink Salmon CATCH			Rainbow Trout[1] HARVEST		
Date	Wd/We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
903	Wd	0.00	0.000	0.000	0.08	0.083	0.023	0.00	0.000	0.000
905	Wd	0.00	0.000	0.000	0.04	0.036	0.012	0.00	0.000	0.000
906	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
907	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
909	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
911	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
912	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
913	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
914	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
916	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
918	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
919	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
920	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
921	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
922	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
923	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
925	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
927	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
928	We	0.00	0.000	0.000	0.00	0.000	0.000	0.07	0.046	0.016

[1] No rainbow trout were reported as released.

Appendix Table D10. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by unguided anglers interviewed during the early run of the Kenai River upstream coho salmon fishery, 1986.

Date	Wd/We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
801	Wd	116	1.9	0.13	0.03	0.015	0.014	0.03	0.015	0.014
802	We	210	2.5	0.13	0.04	0.015	0.015	0.04	0.016	0.017
803	We	157	1.7	0.09	0.09	0.026	0.052	0.09	0.026	0.052
806	Wd	115	2.2	0.17	0.05	0.021	0.024	0.06	0.022	0.027
807	Wd	64	2.4	0.21	0.05	0.027	0.020	0.06	0.030	0.026
808	Wd	53	1.9	0.17	0.19	0.061	0.100	0.19	0.061	0.100
809	We	146	2.2	0.10	0.12	0.031	0.056	0.14	0.032	0.062
810	We	126	3.1	0.19	0.10	0.033	0.030	0.10	0.033	0.030
811	Wd	62	1.9	0.12	0.11	0.047	0.060	0.13	0.049	0.069
813	Wd	47	1.8	0.15	0.19	0.078	0.109	0.19	0.078	0.109
815	Wd	63	1.3	0.12	0.03	0.022	0.024	0.03	0.022	0.024
816	We	123	2.4	0.17	0.15	0.041	0.060	0.16	0.042	0.066
817	We	166	2.8	0.14	0.10	0.027	0.036	0.14	0.033	0.049
818	Wd	70	2.3	0.18	0.19	0.051	0.079	0.19	0.051	0.079
821	Wd	99	3.3	0.27	0.17	0.043	0.053	0.17	0.043	0.053
822	Wd	103	2.4	0.17	0.22	0.048	0.093	0.22	0.048	0.093
824	We	64	3.5	0.34	0.22	0.065	0.062	0.22	0.065	0.062
825	Wd	75	2.1	0.16	0.13	0.040	0.063	0.13	0.040	0.063
828	Wd	54	2.7	0.27	0.30	0.086	0.110	0.31	0.087	0.117
830	We	158	2.4	0.14	0.40	0.055	0.167	0.47	0.068	0.198
831	We	212	1.9	0.08	0.19	0.036	0.101	0.19	0.036	0.101

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table D11. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by guided anglers interviewed during the early run of the Kenai River upstream coho salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	EFFORT (hours) SE[3]	HARVEST Mean	HARVEST SE	HARVEST CPUE	CATCH Mean	CATCH SE	CATCH CPUE
801	Wd	2	2.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
803	We	5	1.3	0.12	0.00	0.000	0.000	0.00	0.000	0.000
806	Wd	2	3.0	0.00	0.50	0.500	0.167	0.50	0.500	0.167
807	Wd	12	5.5	0.45	0.25	0.131	0.045	0.25	0.131	0.045
808	Wd	6	2.8	0.56	0.00	0.000	0.000	0.00	0.000	0.000
810	We	5	2.9	0.37	0.00	0.000	0.000	0.00	0.000	0.000
811	Wd	11	4.1	0.55	0.27	0.195	0.067	0.36	0.203	0.089
813	Wd	3	1.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
822	Wd	13	2.3	0.40	0.31	0.175	0.133	0.31	0.175	0.133
824	We	10	5.2	1.59	0.00	0.000	0.000	0.00	0.000	0.000
828	Wd	7	6.2	0.54	0.43	0.202	0.069	0.43	0.202	0.069
831	We	2	3.5	0.00	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 D12. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by unguided and guided anglers interviewed during the late run of the Kenai River upstream coho salmon fishery, 1986.

Date	Wd/ We[1]	SS[2]	EFFORT (hours) Mean	SE[3]	HARVEST Mean	SE	CPUE	CATCH Mean	SE	CPUE
Unguided Anglers										
902	Wd	44	2.2	0.21	0.25	0.098	0.112	0.30	0.101	0.132
904	Wd	36	2.8	0.27	0.11	0.066	0.039	0.11	0.066	0.039
906	We	106	2.3	0.13	0.30	0.070	0.130	0.36	0.077	0.154
907	We	39	3.2	0.21	0.15	0.086	0.048	0.15	0.086	0.048
909	Wd	64	3.1	0.23	0.28	0.088	0.090	0.70	0.272	0.224
910	Wd	70	2.7	0.21	0.34	0.091	0.128	0.34	0.091	0.128
911	Wd	39	2.8	0.37	0.46	0.142	0.164	0.49	0.151	0.174
913	We	99	2.8	0.27	0.16	0.055	0.059	0.16	0.055	0.059
914	We	77	3.2	0.26	0.21	0.062	0.064	0.32	0.093	0.100
916	Wd	107	2.2	0.12	0.30	0.064	0.135	0.30	0.064	0.135
917	Wd	40	3.4	0.32	0.28	0.101	0.081	0.30	0.103	0.088
919	Wd	116	2.9	0.14	0.36	0.075	0.125	0.36	0.075	0.125
920	We	80	3.9	0.24	0.42	0.097	0.109	0.44	0.097	0.112
921	We	60	2.2	0.17	0.28	0.086	0.127	0.28	0.086	0.127
922	Wd	28	3.2	0.35	0.46	0.150	0.144	0.50	0.167	0.156
925	Wd	90	3.0	0.23	0.58	0.100	0.190	0.64	0.119	0.212
926	Wd	66	2.7	0.19	0.36	0.088	0.134	0.38	0.094	0.139
927	We	76	4.3	0.29	0.59	0.111	0.139	0.59	0.111	0.139
928	We	67	3.4	0.28	0.63	0.127	0.182	0.66	0.139	0.191
Guided Anglers										
902	Wd	6	4.0	0.00	0.67	0.422	0.167	0.67	0.422	0.167
904	Wd	6	5.5	0.00	0.83	0.477	0.152	0.83	0.477	0.152
906	We	8	1.5	0.38	0.00	0.000	0.000	0.00	0.000	0.000
916	Wd	7	0.7	0.10	0.43	0.297	0.600	0.43	0.297	0.600
919	Wd	7	4.2	0.61	0.86	0.459	0.203	1.00	0.535	0.237
926	Wd	4	2.5	0.00	2.00	0.707	0.800	2.00	0.707	0.800

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

[2] Sample size, number of anglers interviewed.

[3] Standard error.

Appendix Table D13. Daily summary statistics for sockeye salmon and pink salmon harvest and catch by unguided anglers interviewed during the early run of the Kenai River upstream coho salmon fishery, 1986.

Species:		Sockeye Salmon			Sockeye Salmon			Pink Salmon			Pink Salmon		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
801	Wd	0.41	0.068	0.219	1.04	0.156	0.551	0.00	0.000	0.000	0.03	0.027	0.018
802	We	0.37	0.049	0.148	0.94	0.188	0.375	0.00	0.000	0.000	0.01	0.010	0.004
803	We	0.45	0.062	0.262	0.85	0.131	0.491	0.00	0.000	0.000	0.01	0.006	0.004
806	Wd	0.46	0.082	0.208	1.15	0.208	0.518	0.00	0.000	0.000	0.04	0.023	0.020
807	Wd	0.28	0.075	0.118	0.59	0.183	0.248	0.00	0.000	0.000	0.11	0.059	0.046
808	Wd	0.23	0.092	0.120	0.62	0.232	0.330	0.02	0.019	0.010	0.02	0.019	0.010
809	We	0.20	0.055	0.090	0.34	0.092	0.156	0.01	0.010	0.006	0.24	0.084	0.109
810	We	0.19	0.049	0.061	0.35	0.101	0.111	0.04	0.029	0.013	0.37	0.107	0.116
811	Wd	0.29	0.093	0.155	0.76	0.192	0.405	0.00	0.000	0.000	0.08	0.048	0.043
813	Wd	0.13	0.058	0.073	0.45	0.177	0.255	0.00	0.000	0.000	0.04	0.043	0.024
815	Wd	0.06	0.031	0.048	0.35	0.102	0.262	0.05	0.027	0.036	0.16	0.082	0.119
816	We	0.01	0.008	0.003	0.14	0.099	0.056	0.03	0.020	0.013	0.28	0.060	0.113
817	We	0.03	0.013	0.011	0.19	0.054	0.068	0.02	0.010	0.006	0.34	0.068	0.120
818	Wd	0.07	0.042	0.030	0.30	0.139	0.128	0.06	0.035	0.024	0.30	0.077	0.128
821	Wd	0.06	0.037	0.019	0.15	0.056	0.047	0.02	0.014	0.006	0.36	0.126	0.112
822	Wd	0.00	0.000	0.000	0.08	0.033	0.032	0.00	0.000	0.000	0.31	0.063	0.130
824	We	0.03	0.031	0.009	0.09	0.094	0.027	0.20	0.078	0.058	1.95	0.763	0.553
825	Wd	0.05	0.032	0.025	0.05	0.032	0.025	0.13	0.044	0.063	0.95	0.159	0.447
828	Wd	0.00	0.000	0.000	0.63	0.228	0.234	0.04	0.037	0.014	1.11	0.308	0.412
830	We	0.00	0.000	0.000	0.03	0.017	0.013	0.10	0.038	0.042	1.58	0.188	0.659
831	We	0.00	0.000	0.000	0.13	0.041	0.068	0.01	0.007	0.005	0.97	0.121	0.516

Appendix Table D14. Daily summary statistics for rainbow trout and Dolly Varden char harvest and catch by unguided anglers interviewed during the early run of the Kenai River upstream coho salmon fishery, 1986.

Species:		Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
801	Wd	0.03	0.015	0.014	0.03	0.015	0.014	0.08	0.037	0.041	0.09	0.038	0.046
802	We	0.00	0.005	0.002	0.01	0.007	0.004	0.05	0.018	0.019	0.05	0.018	0.019
803	We	0.01	0.006	0.004	0.04	0.024	0.022	0.03	0.016	0.015	0.03	0.016	0.015
806	Wd	0.02	0.012	0.008	0.02	0.012	0.008	0.12	0.057	0.055	0.20	0.063	0.090
807	Wd	0.00	0.000	0.000	0.03	0.022	0.013	0.16	0.056	0.065	0.19	0.070	0.078
808	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.09	0.041	0.050	0.17	0.059	0.090
809	We	0.01	0.010	0.006	0.05	0.018	0.022	0.08	0.022	0.034	0.36	0.083	0.162
810	We	0.00	0.000	0.000	0.01	0.008	0.003	0.14	0.037	0.046	0.29	0.059	0.094
811	Wd	0.02	0.016	0.009	0.02	0.016	0.009	0.11	0.057	0.060	0.11	0.057	0.060
813	Wd	0.00	0.000	0.000	0.02	0.021	0.012	0.06	0.047	0.036	0.06	0.047	0.036
815	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.19	0.075	0.143	0.22	0.080	0.167
816	We	0.01	0.008	0.003	0.02	0.014	0.010	0.31	0.073	0.126	0.47	0.104	0.193
817	We	0.03	0.016	0.011	0.07	0.033	0.023	0.12	0.034	0.043	0.29	0.085	0.102
818	Wd	0.03	0.020	0.012	0.07	0.037	0.030	0.00	0.000	0.000	0.07	0.071	0.030
821	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.32	0.097	0.099	0.80	0.235	0.245
822	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.019	0.016	0.11	0.043	0.045
824	We	0.00	0.000	0.000	0.00	0.000	0.000	0.14	0.091	0.040	0.22	0.103	0.062
825	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.023	0.019	0.07	0.029	0.031
828	Wd	0.00	0.000	0.000	0.04	0.026	0.014	0.30	0.141	0.110	0.67	0.287	0.247
830	We	0.00	0.000	0.000	0.01	0.006	0.003	0.11	0.035	0.048	0.16	0.044	0.066
831	We	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.019	0.020	0.09	0.045	0.048

Appendix Table D15. Daily summary statistics for sockeye salmon and pink salmon harvest and catch by guided anglers interviewed during the early and late runs of the Kenai River upstream coho salmon fishery, 1986.

Species:		Sockeye Salmon			Sockeye Salmon			Pink Salmon			Pink Salmon		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
Early Run													
801	Wd	2.00	0.000	1.000	2.00	0.000	1.000	0.00	0.000	0.000	0.00	0.000	0.000
803	We	0.60	0.245	0.462	0.80	0.374	0.615	0.00	0.000	0.000	0.00	0.000	0.000
806	Wd	0.00	0.000	0.000	0.50	0.500	0.167	0.00	0.000	0.000	0.00	0.000	0.000
807	Wd	0.08	0.083	0.015	0.08	0.083	0.015	0.17	0.112	0.030	0.75	0.411	0.136
808	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
810	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
811	Wd	0.09	0.091	0.022	0.09	0.091	0.022	0.00	0.000	0.000	0.45	0.247	0.111
813	Wd	0.33	0.333	0.333	1.00	0.577	1.000	0.00	0.000	0.000	0.00	0.000	0.000
822	Wd	0.00	0.000	0.000	0.62	0.290	0.267	0.00	0.000	0.000	1.46	0.627	0.633
824	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.60	0.427	0.117
828	Wd	0.29	0.184	0.046	1.86	0.937	0.299	0.00	0.000	0.000	3.43	0.649	0.552
831	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	1.00	0.000	0.286
Late Run													
902	Wd	0.00	0.000	0.000	3.50	2.062	0.875	0.17	0.167	0.042	1.50	0.806	0.375
904	Wd	0.00	0.000	0.000	1.33	1.333	0.242	0.17	0.167	0.030	2.33	1.382	0.424
906	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.75	0.491	0.500
916	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
919	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
926	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

Appendix Table D16. Daily summary statistics for rainbow trout and Dolly Varden char harvest and catch by guided anglers interviewed during the early and late runs of the Kenai River upstream coho salmon fishery, 1986.

Species:		Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
Early Run													
801	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
803	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
806	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.50	0.500	0.167
807	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.083	0.015	0.17	0.112	0.030
808	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
810	We	0.00	0.000	0.000	0.00	0.000	0.000	0.20	0.200	0.069	0.20	0.200	0.069
811	Wd	0.09	0.091	0.022	0.09	0.091	0.022	0.00	0.000	0.000	0.00	0.000	0.000
813	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
822	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.54	0.215	0.233	0.54	0.215	0.233
824	We	0.00	0.000	0.000	0.10	0.100	0.019	2.80	0.696	0.544	3.30	0.920	0.641
828	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
831	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
Late Run													
902	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
904	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	1.33	1.333	0.242
906	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
916	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
919	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
926	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000

Appendix Table D17. Daily summary statistics for sockeye salmon and pink salmon harvest and catch by unguided anglers interviewed during the late run of the Kenai River upstream coho salmon fishery, 1986.

Species:		Sockeye Salmon			Sockeye Salmon			Pink Salmon			Pink Salmon		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
902	Wd	0.00	0.000	0.000	0.32	0.194	0.142	0.02	0.023	0.010	2.07	0.500	0.924
904	Wd	0.00	0.000	0.000	0.47	0.244	0.167	0.08	0.083	0.029	1.39	0.520	0.490
906	We	0.01	0.009	0.004	0.12	0.087	0.053	0.09	0.043	0.040	2.29	0.317	0.984
907	We	0.00	0.000	0.000	0.03	0.026	0.008	0.36	0.140	0.112	3.74	0.840	1.163
909	Wd	0.00	0.000	0.000	0.30	0.147	0.095	0.05	0.035	0.015	3.34	0.515	1.065
910	Wd	0.00	0.000	0.000	0.29	0.163	0.106	0.03	0.020	0.011	2.21	0.368	0.824
911	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.18	0.109	0.064	2.18	0.523	0.776
913	We	0.00	0.000	0.000	0.51	0.165	0.183	0.03	0.022	0.011	1.33	0.288	0.484
914	We	0.00	0.000	0.000	0.01	0.013	0.004	0.06	0.047	0.020	1.30	0.282	0.401
916	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.06	0.029	0.025	0.66	0.187	0.300
917	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.65	0.305	0.190
919	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.20	0.101	0.068
920	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.028	0.010
921	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.07	0.067	0.030
922	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
925	Wd	0.00	0.000	0.000	0.01	0.011	0.004	0.00	0.000	0.000	0.00	0.000	0.000
926	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.062	0.028
927	We	0.00	0.000	0.000	0.04	0.039	0.009	0.00	0.000	0.000	0.08	0.079	0.019
928	We	0.00	0.000	0.000	0.01	0.015	0.004	0.00	0.000	0.000	0.00	0.000	0.000

Appendix Table D18. Daily summary statistics for rainbow trout and Dolly Varden char harvest and catch by unguided anglers interviewed during the late run of the Kenai River upstream coho salmon fishery, 1986.

Species:		Rainbow Trout			Rainbow Trout			Dolly Varden			Dolly Varden		
	Wd/	HARVEST			CATCH			HARVEST			CATCH		
Date	We	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE	Mean	SE	CPUE
902	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
904	Wd	0.00	0.000	0.000	0.03	0.028	0.010	0.11	0.087	0.039	0.11	0.087	0.039
906	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
907	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
909	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.02	0.016	0.005	0.03	0.022	0.010
910	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
911	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
913	We	0.00	0.000	0.000	0.00	0.000	0.000	0.06	0.037	0.022	0.18	0.097	0.066
914	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
916	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.01	0.009	0.004	0.01	0.009	0.004
917	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
919	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
920	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
921	We	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
922	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
925	Wd	0.00	0.000	0.000	0.01	0.011	0.004	0.03	0.033	0.011	0.03	0.033	0.011
926	Wd	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.08	0.076	0.028
927	We	0.00	0.000	0.000	0.00	0.000	0.000	0.04	0.039	0.009	0.04	0.039	0.009
928	We	0.01	0.015	0.004	0.30	0.170	0.087	0.15	0.105	0.043	0.40	0.188	0.117

APPENDIX E

Analysis of angler count data for the downstream section of the Kenai River chinook salmon fishery

APPENDIX E

The majority of the angler effort occurs in the downstream section of the Kenai River. The angler count data for this section of the river during the chinook salmon fishery are examined in Appendix E to determine if the current sampling design is optimal for reducing variance and if certain assumptions necessary for the effort estimates are met. It is assumed that any conclusions from these analyses are applicable to the downstream section during the coho salmon fishery and the fisheries in the upstream section.

Independence of Angler Counts

A major assumption necessary for the effort estimates is that the angler counts are independent, random counts of the angler population. Logically, this is probably a poor assumption. If 200 unguided anglers are counted at 1100 during a weekday, there is a high probability that there will about 200 unguided anglers again for a count at 1200 because the size of the angling population does not change rapidly. One might hypothesize that the greater the number of hours between same-day counts, the poorer the relationship between the counts. To examine this hypothesis, the correlation coefficients between same-day angler counts were calculated for counts from 1 hour to 14 hours apart using the 1986 data. Counts from weekends and weekdays and the early and late runs were combined to provide the maximum number of observations for each cell. It was assumed that the relationship between counts i hours apart would not be influenced by weekly day type (weekday or weekend) or run (early or late). A visual inspection of the data showed this to be true.

Appendix Table E1 summarizes the correlations between angler counts for unguided and guided anglers. For unguided anglers, every count but one between 1 and 8 hours apart had significant ($P \leq 0.05$) correlations. Generally, the correlation decreased as the number of hours between counts increased (Appendix Figure E1). The correlations of guided angler counts between 2 and 6 hours apart were all significant ($P \leq 0.05$).

It is clear that there is a high degree of correlation between angler counts made within 8 hours of each other. As was stated previously, a basic assumption of experimental designs based on stratified, random sampling is that the sample units are independent. This is clearly not the case for the angler counts. As a consequence, there is a covariance term between same-day angler counts that needs to be accounted for when estimating the variance of the effort estimates. Because the correlations are positive, the covariance term would increase the variance of the estimates. Unfortunately, under the current experimental design the covariance cannot be estimated because there are too many different combinations of hours between counts in the data. Therefore, the variances of the effort estimates are underestimated.

Weekdays versus Weekends/Holidays Stratification

Weekdays and weekends/holidays were considered separate strata for the unguided angler effort estimates. This is commonly done in creel surveys because angler counts during weekends/ holidays are typically much higher than on weekdays and treating these as separate strata reduces the

variance of the effort estimate. Effort estimates for guided anglers were not similarly stratified because an analysis of 1985 data indicated this was an unnecessary stratification.

The mean count (for all daily periods) of unguided and guided anglers for each weekday and weekend is shown in Appendix Figure E2. The weekday and weekend means are presented in chronological order. For unguided anglers, the means of the weekend angler counts are usually greater than the means of the weekday angler counts (left side of Appendix Figure E2). This is not true for the guided angler counts (right side of Appendix Figure E2) where the weekday and weekend means are generally very similar and the 95% confidence intervals are overlapping. The means of the weekend counts are greater in nine of the 11 weekday/weekend comparisons of unguided anglers. For guided anglers, however, only three of the nine weekend mean counts are greater than the weekday mean counts.

This makes sense intuitively. The unguided portion of the angling population is basically infinite and more of it is able to fish the river on the weekends. There are a finite number of guides on the river, however, and they are able to accommodate a finite number of anglers. The data suggest that the majority of the guides have full bookings of clients each day, regardless of whether the day is a weekday or a weekend. The number of guided anglers is then a function of the number of guides operating during a particular temporal strata. Because the number of guides on the river does not change rapidly from day to day, there are not large day to day differences in the number of guided anglers. Because there are not large and consistent differences between weekday and weekend guided angler counts, the weekday/weekend stratification for this component is superfluous.

Definition of Daily Time Periods

Appendix Figures E3 and E4 show the mean unguided and guided angler count by hour and range of counts for each run in 1986. The horizontal line on each graph indicates the grand mean of all counts in the component.

For unguided anglers, it is obvious that there are large variations in counts throughout the defined angler day (Appendix Figure E3). The only pattern evident is that the early morning counts (0400-0500 hrs) and late evening counts (2100-2300 hrs) are nearly always below the grand mean. Between these two periods the counts fluctuate with no apparent pattern about the mean.

A very consistent pattern is evident in the means of the counts of guided anglers (Appendix Figure E4). The means of the counts before 1200 hours are nearly always greater than the grand mean while the means of the counts after 1200 hours are nearly always less than the grand mean. This pattern is a result of the standard half-day trip length used by the guides for booking clients. Apparently there is a much greater demand for morning trips than for evening trips. Because of the consistency of guided angler counts prior to 1200 hours and after 1200 hours, stratifying the guided angler day by 4-hour periods is inefficient and unnecessary. It would be more appropriate to stratify the guided angler day by two 6-hour periods defined by the usual hours booked by most guides.

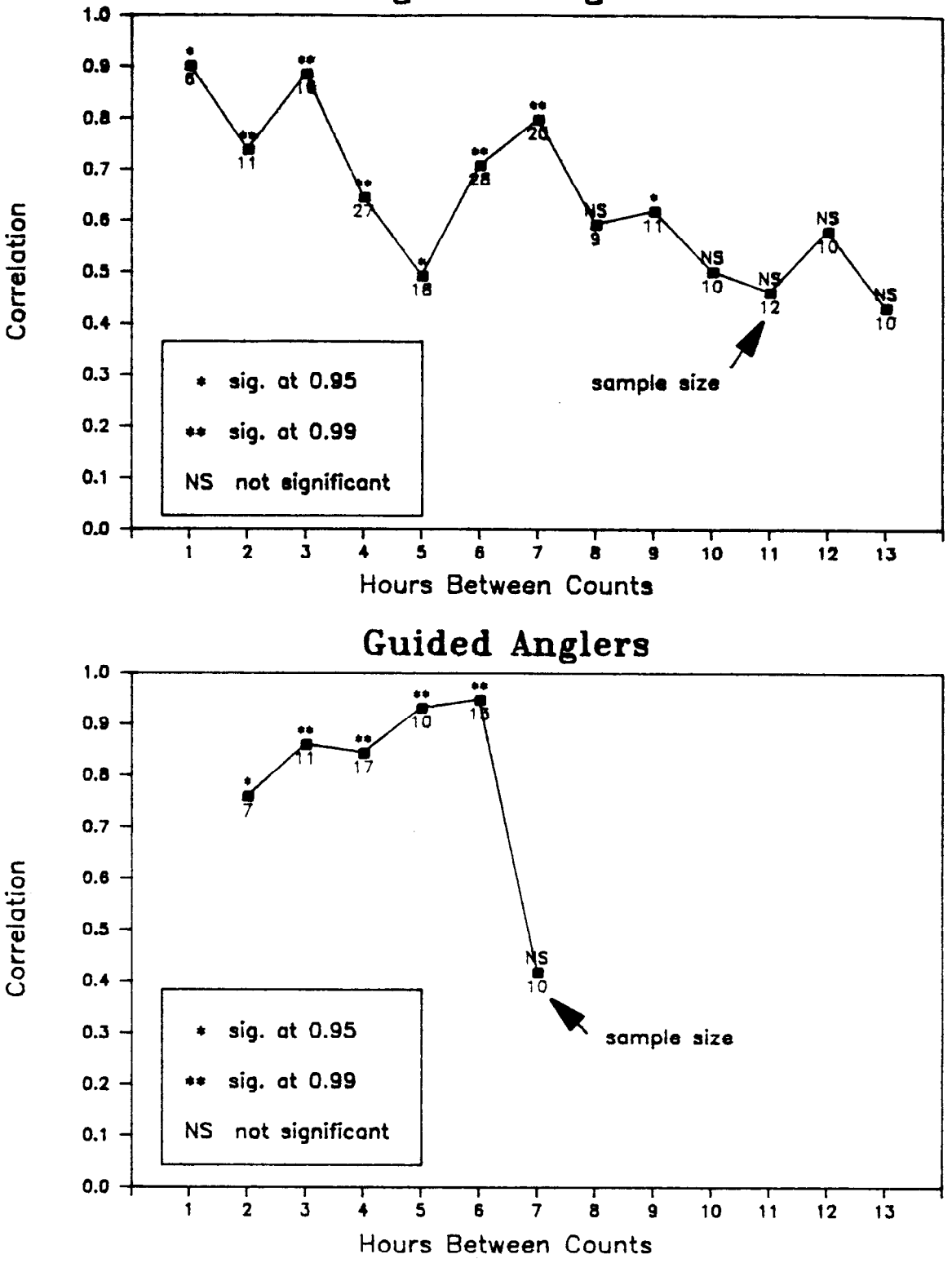
Appendix Table E1. Correlations between angler counts made during the Kenai River downstream chinook salmon creel survey. The correlations are for pairs of counts conducted during the same day at the indicated number of hours apart.

Hours Between Counts	Unguided anglers			Guided angler		
	r	Sample Size	Signif-icance	r	Sample Size	Signif-icance
1	0.903	6	*[1]			
2	0.740	11	**[2]	0.761	7	*
3	0.887	16	**	0.852	11	**
4	0.646	27	**	0.835	17	**
5	0.494	18	*	0.933	10	**
6	0.709	28	**	0.949	13	**
7	0.799	20	**	0.419	10	NS[3]
8	0.594	9	NS			
9	0.620	11	*			
10	0.503	10	NS			
11	0.463	12	NS			
12	0.581	10	NS			
13	0.433	10	NS			

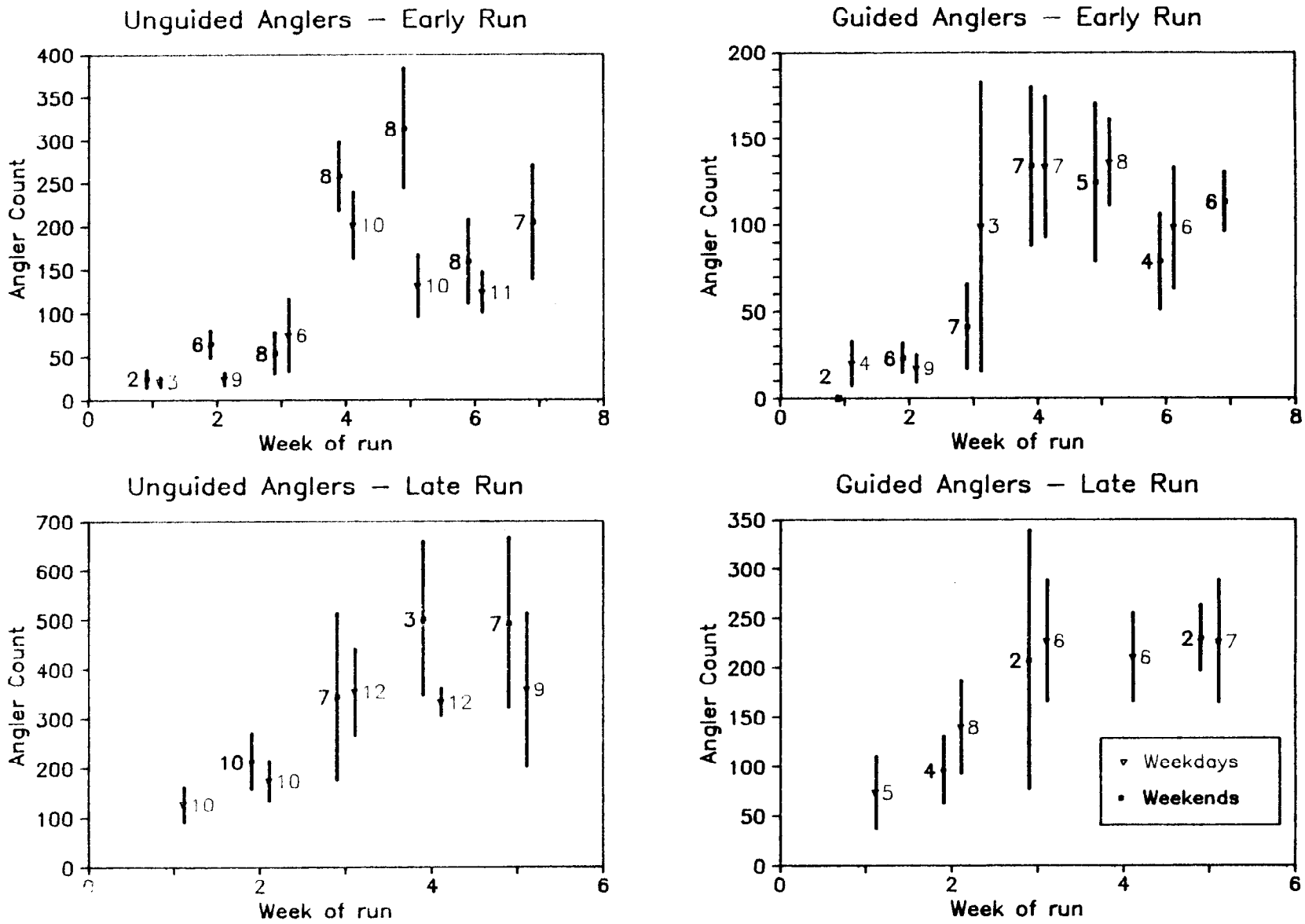
[1] * = significant at $P \leq 0.95$.

[2] ** = significant at $P \leq 0.99$.

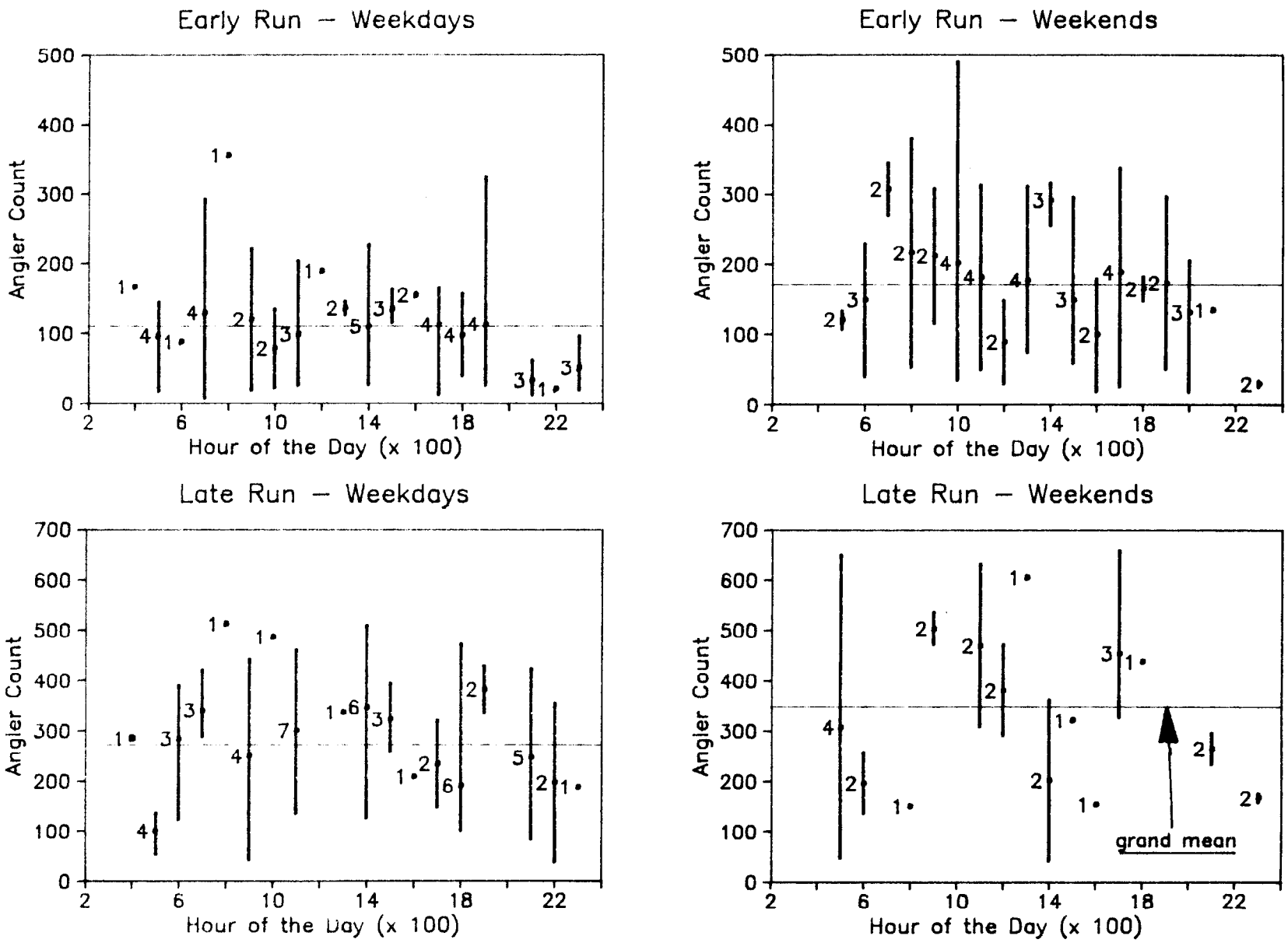
[3] NS = not significant.



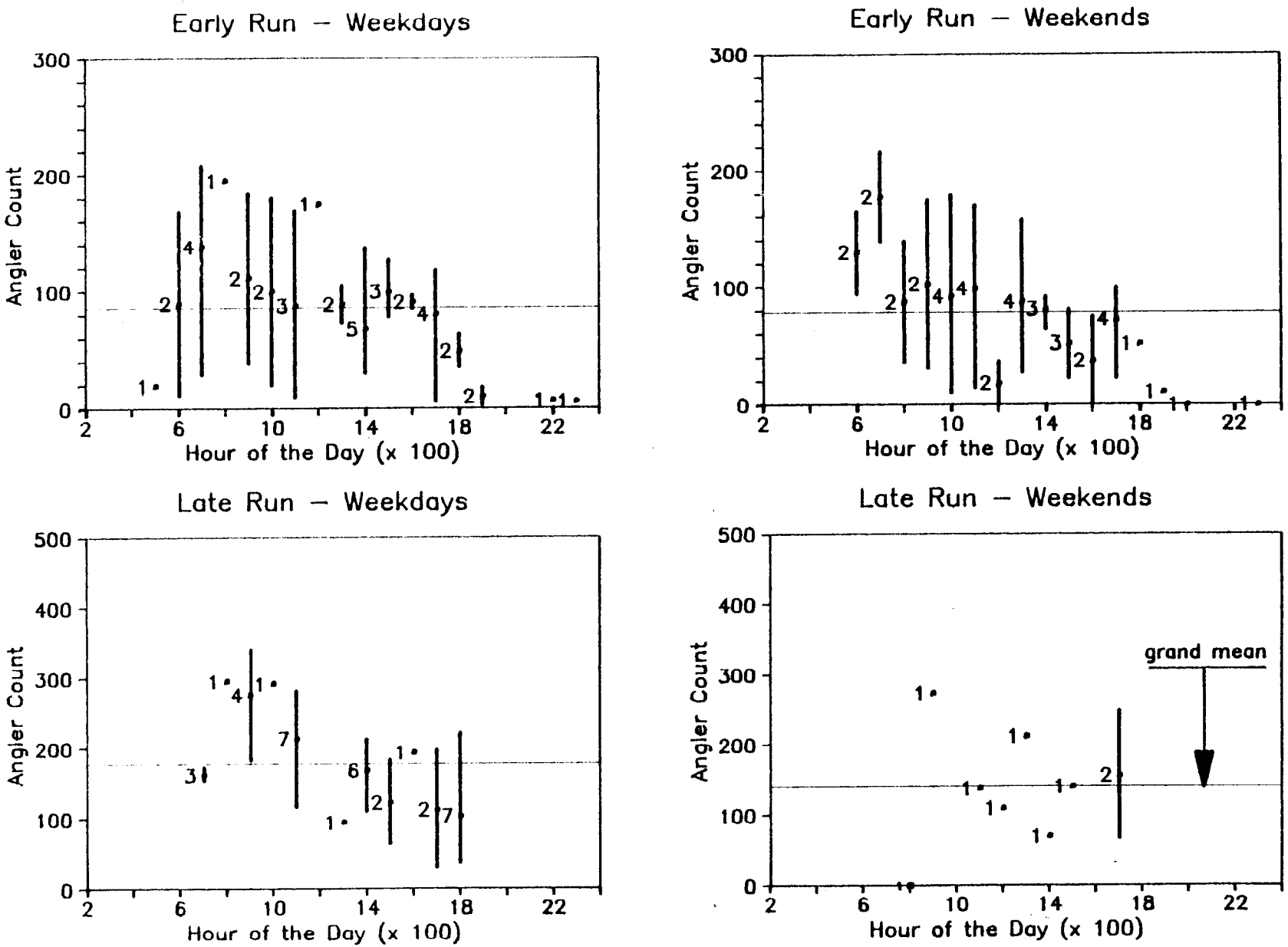
Appendix Figure E1. Correlations between same-day counts of unguided and guided anglers in the Kenai River downstream chinook salmon fishery, 1986. The significance of the correlation and sample size are shown, also.



Appendix Figure E2. Mean weekly angler counts during the Kenai River downstream chinook salmon fishery, 1986. Sample size and 95.0% confidence interval are shown, also.



Appendix Figure E3. Mean angler count by hour of day for unguided anglers during the Kenai River downstream chinook salmon fishery, 1986. Sample size and range of counts are shown, also.



Appendix Figure E4. Mean angler count by hour of day for guided anglers during the Kenai River downstream chinook salmon fishery, 1986. Sample size and range of counts are shown, also.