Fishery Data Series No. 94-27

Creel Surveys Conducted in Interior Alaska During 1993

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ABSTRACT

Creel surveys were conducted on two of the major fisheries within the Tanana River drainage, Alaska, during 1993. These fisheries included the Salcha River chinook salmon *Oncorhynchus tshawytscha* fishery and the Chatanika River whitefish spear fishery. Angler effort, harvest and the distribution of harvest of whitefish by angler trip, and angler demographic composition were estimated for the Chatanika River whitefish spear fishery. Angler demographic composition along with effort, catch, and harvest were estimated for the Salcha River chinook salmon fishery.

At the Chatanika River, anglers expended a total of 578 hours (SE = 124) to harvest an estimated 609 least cisco *Coregonus sardinella*, (SE = 62) and 87 humpback whitefish *Coregonus pidschian*, (SE = 18). Fifty-three percent (SE = 10.0%) of all anglers harvested one or more whitefish. Only 2.5% (SE = 1.0%) of all anglers harvested the daily bag limit of 15 whitefish.

The creel survey at the Salcha River chinook salmon fishery was conducted from July 11 through the July 18 which covered only a portion of the entire fishery. During this period anglers expended an estimated 2,595 (SE = 199), angler-hours of effort to catch a total of 77 chinook salmon (SE = 17), of which 54 (SE = 8), were harvested.

KEY WORDS: Creel survey, catch, harvest, angler effort, distribution of harvest, angler demographics, interior Alaska, Tanana River drainage, Chatanika River, Salcha River, spear fishery, humpback whitefish, least cisco, chinook salmon.

INTRODUCTION

The Arctic-Yukon-Kuskokwim (AYK) Region encompasses an area that covers almost two-thirds of the State of Alaska and includes all of Alaska north of Bristol Bay and the Alaska Range (Figure 1). Within this area, the state's largest river systems (Yukon, Kuskokwim, Colville, and Noatak) are found, along with thousands of lakes and thousands of miles of streams. These waters support a large number of recreational fisheries for both freshwater and anadromous fish species that include Arctic cisco *Coregonus autumnalis*, Arctic char *Salvelinus alpinus*, Arctic grayling *Thymallus arcticus*, anadromous chinook salmon *Oncorhynchus tshawytscha*, anadromous and land-locked coho salmon *O. kisutch*, anadromous chum salmon *O. keta*, burbot *Lota lota*, Dolly Varden *S. malma*, humpback whitefish *C. pidschian*, lake trout *S. namaycush*, least cisco *C. sardinella*, northern pike *Esox lucius*, rainbow trout *O. mykiss*, round whitefish *Prosopium cylindraceum*, and sheefish *Stenodus leucichthys*.

For sport fishery management purposes the AYK Region was divided into two areas, the Tanana River drainage (includes all waters within the Tanana River drainage), and the AYK area (includes all waters outside the Tanana River drainage; Figure 1). Even though the AYK Region encompasses a very large area, the majority (approximately 75%) of the recreational angler-effort and harvest occurs near the major population centers (Fairbanks, Delta Junction, and Tok) within the Tanana River drainage (Mills 1979-1993; and Figure 2).

From 1977 through 1982, harvest of all fish species increased about 19% annually to a peak of about 179,000 for the Tanana River drainage. A record harvest for the entire AYK Region, of 274,541 fish occurred in 1982 (Figure 2). From 1983 to 1987, harvest decreased in both the Tanana River drainage and AYK Region. The decrease in harvest that occurred in 1983 was probably the result of the overharvest of the major species in the Tanana River drainage in prior years. Because of this decline, restrictive management regulations were instituted for the major fisheries in the Tanana River drainage in 1987 and 1988. In spite of restrictive regulations, harvest and angler effort increased in 1988. Harvest of all sport fish species in the Tanana River Drainage dropped by 5 percent from 1988 to 1989, and more than 31% from 1989 to 1990. During this same period effort levels continued to rise from 1988 to 1989 and then decreased slightly from 1989 to 1990. While effort decreased a second straight year from 1990 to 1991, harvest in both the Tanana River drainage and the AYK area increased by 19% and 27%, respectively, during this same time. Harvest of all sport fish species in the Tanana River Drainage declined by 44%, to a record low while the total harvest of fish in AYK dropped 41% to the lowest since 1977. Angler effort in AYK and the Tanana River Drainage in 1993 dropped for the second consecutive year by 41% and 44%, respectively (Mills 1993).

The stocking program in interior Alaska continues to contribute significantly to the sport harvest. Data obtained from the Statewide Harvest Survey (Mills 1993) indicate that stocked rainbow trout account for 44% of all fish harvested in the Tanana River drainage, and that the contribution from all stocked species including Arctic char, Arctic grayling, coho salmon, and lake trout made up more than 64% of the fish harvested.

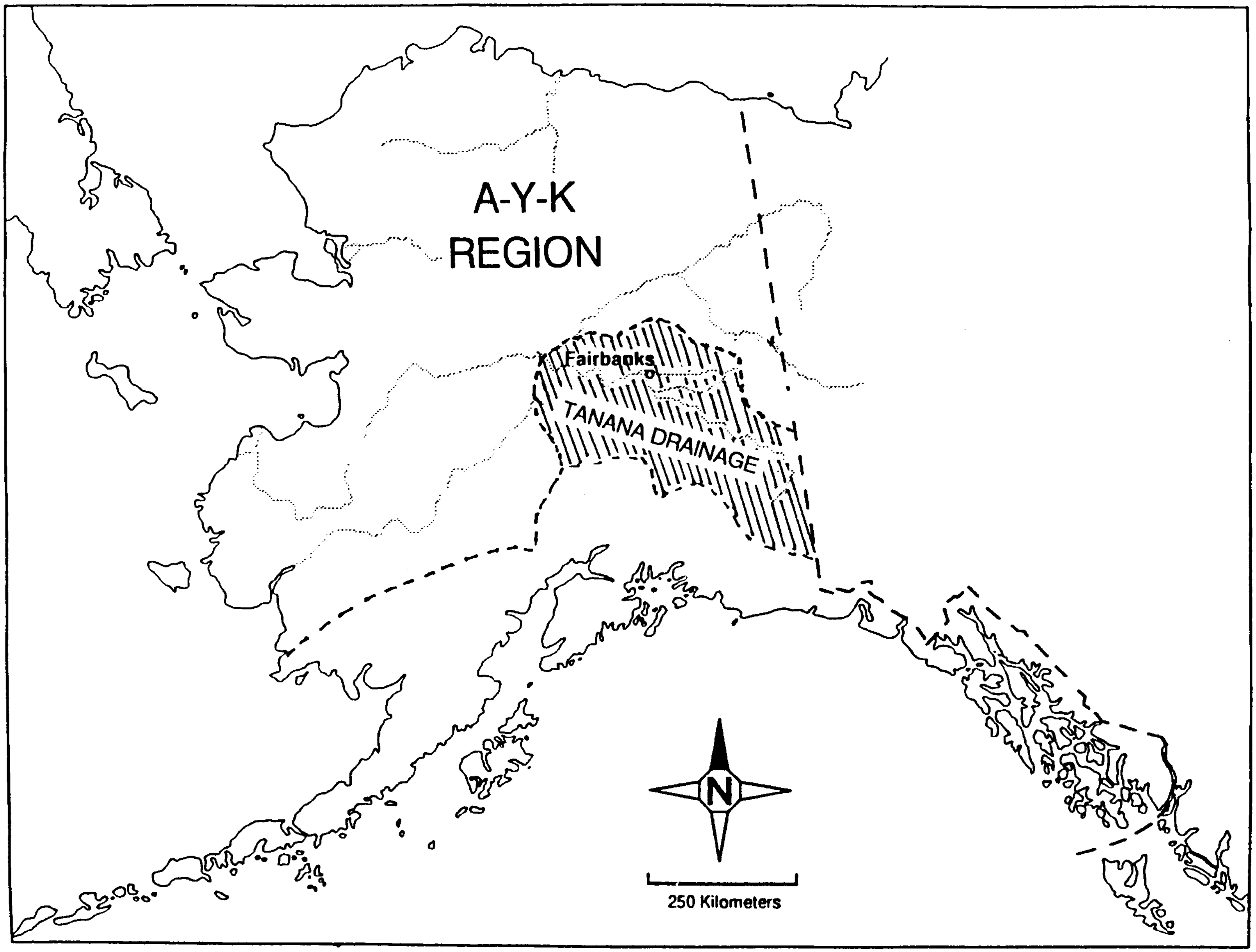

Figure 1. Map of Arctic-Yukon-Kuskokwim (AYK) Region and Tanana River drainage, Alaska.

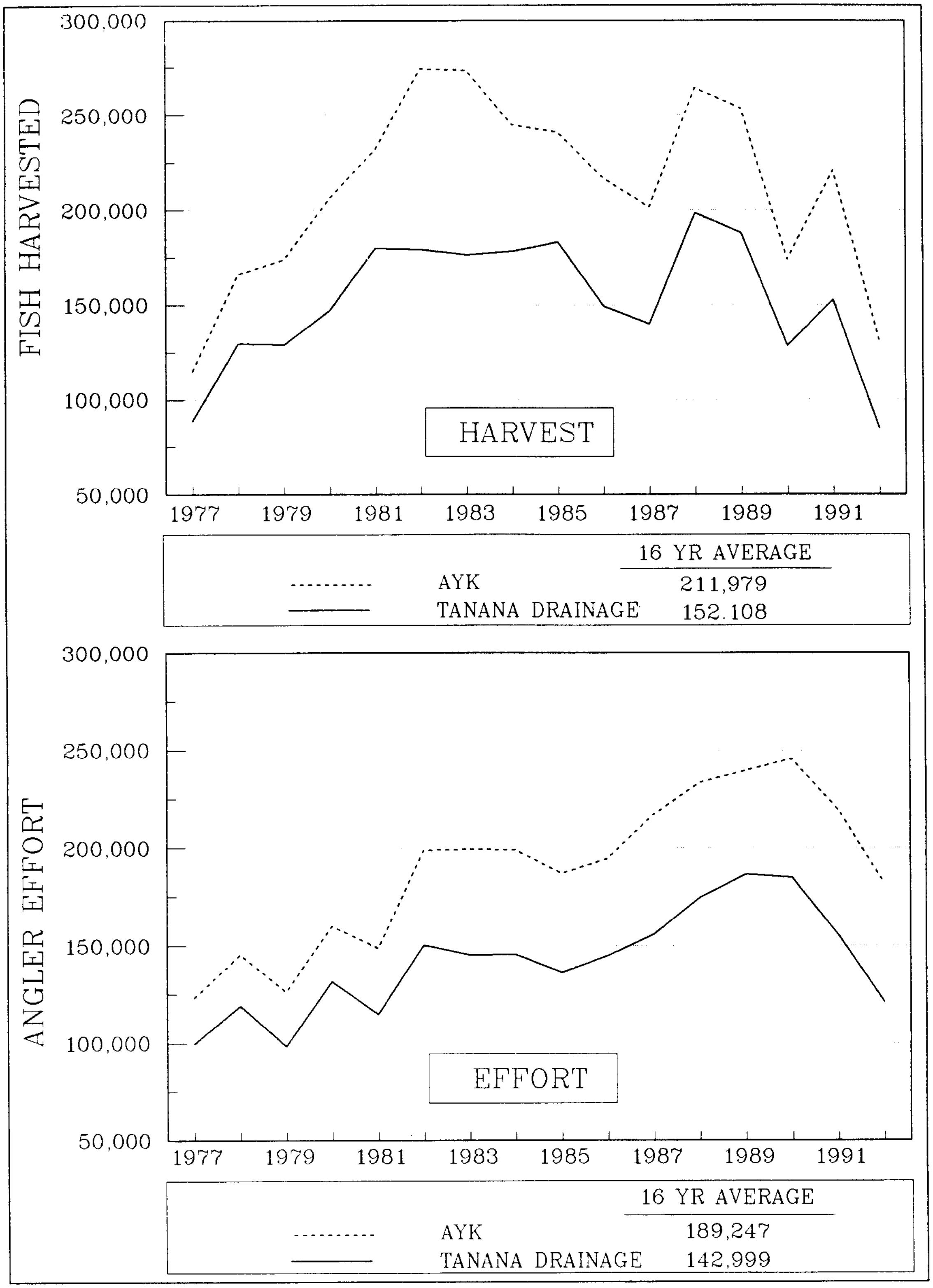

Figure 2. Effort and harvest by recreational anglers in the AYK Region (includes Tanana River drainage) and Tanana River drainage sport fish management areas, 1977-1993.

Monitoring of the Tanana River drainage recreational fisheries is important to evaluate the effectiveness of the stocking program, and to assess the consequences of newly-imposed restrictive regulations on indigenous stocks. Conservation of indigenous stocks is desired in interior Alaska, through use of restrictive regulations and by diverting fishing pressure to stocked species. One method of assessing the success of conservation efforts is through the use of creel surveys.

The long term goals of the creel survey program are to: (1) develop historical data bases to allow monitoring of both the recreational fisheries and the exploited fish populations; (2) develop regulations that reflect the desires of the angling public while ensuring the sustained health of the resource; and (3) estimate the effects of management regulations on the fisheries, fish populations, and recreational angling public.

A comprehensive analysis of the creel surveys that were conducted by the Alaska Department of Fish and Game (ADF&G) in the AYK Region during 1993 is presented in this report.

SALCHA RIVER CHINOOK SALMON FISHERY

Introduction

The Salcha River is located about 67 km southeast of Fairbanks on the Richardson Highway (Figure 3). The Salcha River supports a popular chinook salmon recreational fishery that occurs during the month of July. The chinook salmon run in the Salcha River is the largest documented run in the middle Yukon River drainage (Barton 1985). From 1977 to 1992, the chinook salmon harvest from the Salcha River has ranged from 62 to 808 annually, averaging 436 (Mills 1979-1993). Until 1987, salmon fishing was allowed in the lower 29 km of the river. However, chinook salmon are known to spawn in this lower portion of the river. In 1988 the Alaska Board of Fisheries restricted the area open to salmon fishing to the lower eight km of the Salcha River and also established a guideline harvest range for the Salcha River recreational chinook salmon fishery of 300-700 fish. In order to ensure that the recreational harvest does not exceed the allocated range, and because the Yukon River salmon stocks are being fully utilized by all user groups, it is imperative that the sport harvest on the Salcha River is monitored.

The specific objectives of the Salcha River creel survey in 1993 were to estimate:

1. the harvest of chinook salmon, such that the final postseason harvest estimate is within ± 200 fish of the true value 95% of the time when the harvest is projected to be 500 fish;

2. the angler effort for, and catch of chinook salmon; and

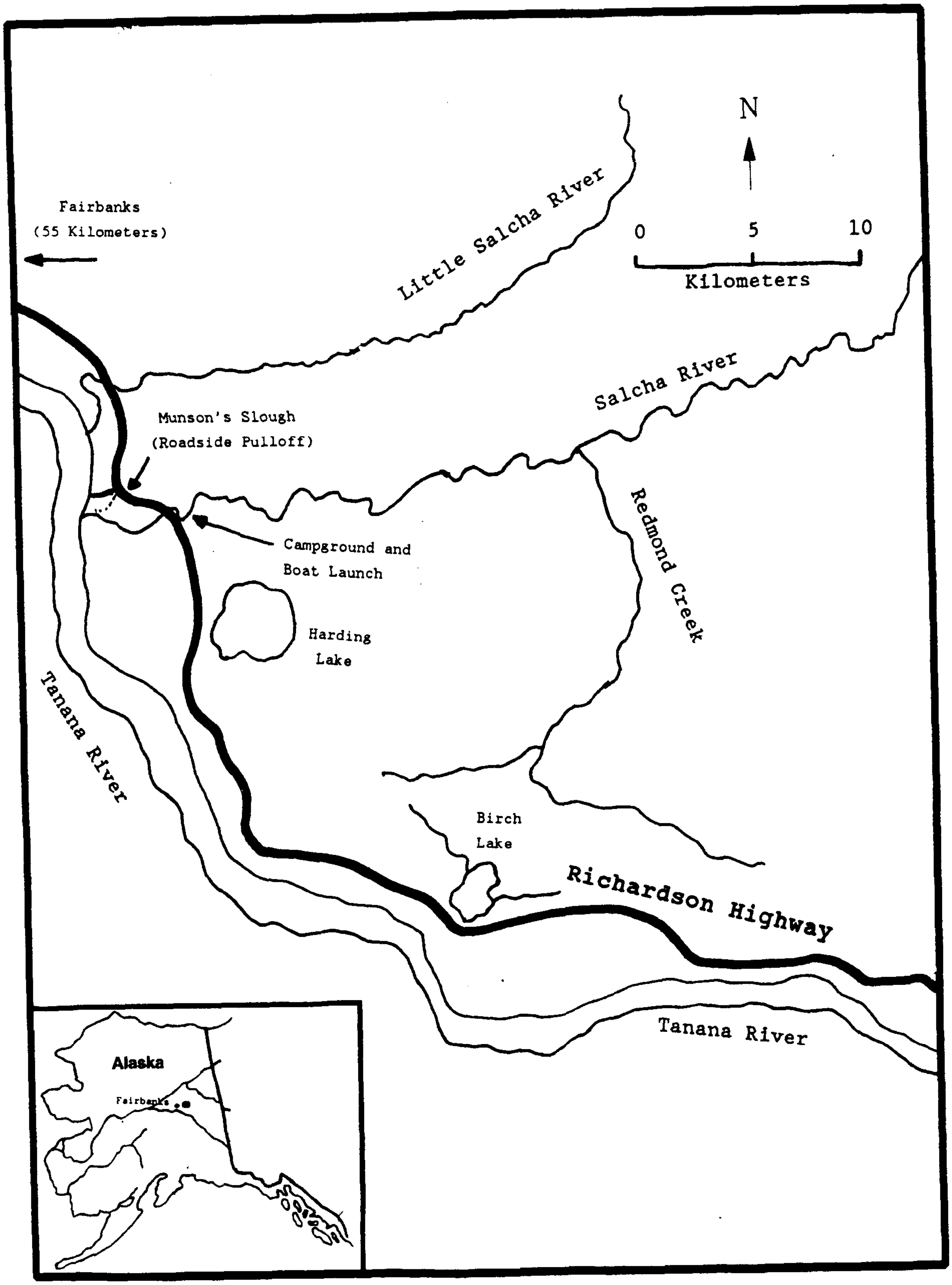

Figure 3. Map of the Salcha River, Tanana River drainage, Alaska.

3. the percent composition within the following demographic categories (AD) of anglers interviewed at the Salcha River:

   a) male/female,
   b) adult/youth,
   c) resident/nonresident,
   d) military/nonmilitary; and,
   e) terminal fishing gear (spinner/bait/flies/jigs/trolling/spear).

Chinook salmon usually begin arriving at the Salcha River in the second week of July. The majority of the anglers at the Salcha River fish for chinook salmon from shore and exit the area at the Munson Slough parking lot on the Richardson Highway. Historically, the peak of the harvest occurs from 15 July to 20 July. During the years 1990 and 1991, approximately 75% of the chinook salmon harvest had occurred by 17 July (Hallberg and Bingham, 1991 and 1992). Accordingly, in 1993 the creel survey began on 9 July and continued through 28 July.

Study Design

The Salcha River chinook salmon creel survey in 1993 was of the single access direct expansion type. Estimates of angler effort for, and catch and harvest of chinook salmon were estimated from the information obtained from interviews of completed-trip anglers.

The creel survey was scheduled to occur from 9 July through 28 July. The survey period was split into an early season portion from 9 July to 18 July, and a late season portion after 18 July. The survey was designed such that if the total seasonal harvest was estimated to reach 500 fish, then the absolute precision of the estimate would be approximately ± 200 fish. As such a one-sided confidence interval estimate of the total harvest estimate would approximate the upper range of the guideline harvest range (700 fish). If the harvest of chinook salmon during the early season portion of the survey was estimated to be at least 375 fish (75% of 500), then inseason management action may be taken to curtail the harvest of chinook salmon. If the inseason management action results in the closure of the fishery, then the late season portion of the creel survey will be canceled. Similarly, if no management action is taken (i.e., the early season estimate is less than 375 fish) then the creel survey may also be canceled. The late season portion of the creel survey will occur only if an inseason management action is taken that stops short of closure of the fishery (e.g., area-time restrictions).

The fishing and sampling day was defined between the hours of 1000 to 0200 (i.e., overlapping calendar days). This definition of the angling day was designed to encompass the majority of anglers exiting the fishery. Some angler effort and presumably some catch and harvest was missed between the hours of 0200 and 1000. The proportion missed was likely small.

As noted above, the survey was a direct expansion completed-trip type of survey. A stratified 2-stage sample survey was conducted for estimation of angler effort, catch and harvest. The strata are defined below.

Stratum		Total Number of Days in Stratum	Number of Days Sampled
Early Season - July 9-18			
1. Early Day	1000 to 1800 hours	10	4
2. Late Day	1800 to 0200 hours	10	6
Late Season - July 19-28			
3. Early Day	1000 to 1800 hours	10	2
4. Late Day	1800 to 0200 hours	10	3

Within each stratum, days to sample represented the first sampling stage. The sampled days were selected at random without replacement from all available days within each stratum. The selection of days to sample was not conducted independently between the early versus late day levels of stratification. The procedure followed to select days for sampling involved: (1) selecting the necessary number of days at random without replacement from all available days within each portion of the season (early and late), then (2) assigning these days in the random order in which they were drawn to either the early or late day stratum within each portion of the season (chosen at random). Within each sampled day, anglers exiting the fishery at the surveyed location represented the second stage sampling units.

Data Collection

The creel survey at the Salcha River in 1993 emphasized the collection of catch, harvest, and effort information from completed-trip angler interviews. The creel clerk attempted to interview all anglers who completed fishing and exited the Salcha River at the Munson Slough parking area. All noninterviewed exiting anglers were counted.

During each interview, the following information was collected from individual anglers:

1) the amount of time he or she spent fishing;
2) the number of chinook salmon caught;
3) the number of chinook salmon harvested;
4) angler gender (male/female);
5) age class (youth/adult);
6) resident or non-resident;
7) military or non-military; and,
8) type of terminal fishing gear used (e.g., spinner, bait, etc.).

All interview data were recorded on standard ADF&G ANGLER INTERVIEW FORM (Version 1.1). Creel clerks recorded the hourly counts of anglers exiting the fishery of the "Exit Angler Count Form" (Appendix A). All interview data has been archived (Appendix B).

Data Analysis

Harvest, Catch, and Angler Effort Estimates:

Estimation of harvest of chinook salmon for each stratum in the fishery (and in total) involved the direct expansion of sampled interview data by factors dependent upon the number of anglers "missed" (second-stage units) and days not selected (first-stage units). The following procedures were used to estimate harvest:

$\hat{H}$ = estimated harvest for stratum h;

$$= D_h \bar{\hat{H}}_h ; \qquad (1)$$

where:

D_h = the number of possible days within each stratum available for sampling;

$\bar{\hat{H}}$ = mean harvest estimate over all days sampled in stratum h;

$$= \frac{\sum_{i=1}^{d_h} \hat{H}_{hi}}{d_h} ; \qquad (2)$$

$\hat{H}_{hi}$ = estimated harvest exiting the fishery during day i within stratum h;

$$= M_{hi} \bar{h}_{hi} ; \qquad (3)$$

M_{hi} equaled the number of anglers counted exiting the fishery during sampled day i within stratum h (including both interviewed and "missed" anglers);

$\bar{h}_{hi}$ = mean harvest by all exiting anglers interviewed during day sampled i within stratum h;

$$= \frac{\sum_{j=1}^{m_{hi}} h_{hij}}{m_{hi}} ; \qquad (4)$$

m_{hi} equaled the number of exiting anglers interviewed during day i within stratum h; and h_{hij} is the harvest by interviewed angler j during day i within stratum h.

The variance for the estimated harvest for stratum *h* was obtained by the two-stage variance equation (Cochran 1977, equation 11.24, page 303):

$$\hat{V}\left[\hat{H}_h\right] = \left\{(1 - f_{1h})D_h^2 \frac{S_{1h}^2}{d_h}\right\} + \left\{f_{1h} \frac{D_h^2}{d_{2h}^2} \sum_{i=1}^{d_h}\left[(1 - f_{2hi})M_{hi}^2 \frac{s_{2hi}^2}{m_{hi}}\right]\right\}; \qquad (5)$$

where: f_{1h} and f_{2hi} equaled the first and second stage sampling fractions, respectively (i.e., $f_{1h} = d_h/D_h$, and $f_{2hi} = m_{hi}/M_{hi}$); d_{2h} equaled the number of days sampled in which the second stage variance term could be estimated (i.e., number of days with either all anglers that exited were interviewed or at least two exiting anglers were interviewed);

S_{1h}^2 = between day sampling variance calculated by the usual variance equation for random sampling;

$$= \frac{\sum_{i=1}^{d_h}\left(\hat{H}_{hi} - \bar{\hat{H}}_h\right)^2}{(d_h - 1)}; \text{ and} \qquad (6)$$

s_{2hi}^2 = between angler sampling variance calculated by the usual variance equation for random sampling;

$$= \frac{\sum_{j=1}^{m_{hi}}\left(h_{hij} - \bar{h}_{hi}\right)^2}{(m_{hi} - 1)}. \qquad (7)$$

Total harvest across all strata (or select combinations of strata) and the associated variances were obtained by summing the respective stratum estimates (assuming independence). Standard errors were obtained by taking the square root of the variance estimates. Similarly, estimates of catches of chinook salmon as well as angler effort were obtained by substituting the appropriate catch and effort statistics into equations 1-7, above.

Angler-trip Proportions by Demographic Category and Gear Type Estimates:

Estimates of the proportion of angler-trips by demographic or gear type categories were calculated as described below. Each proportion associated with each parameter (e.g., various angler demographic categories) were calculated as follows:

$\hat{p}_u$ = estimated proportion of the "angler-trips"[1] that are category u[2];

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[1] Angler-trip as used here is defined as one trip on and then off the river, as measured from counts and interviews of anglers exiting the river at the surveyed location.

[2] Where category refers to the different classifications, dependent upon the parameter being estimated.

$$= \frac{m_u}{m'}; \tag{8}$$

where:

m_u = number of anglers categorized as "type u" over the entire survey; and

m' = number of anglers interviewed over the entire survey, which could be categorized (i.e., does not include anglers who do not respond to particular question of interest).

The variance of the estimated of proportion (for each parameter) were obtained using a the usual equation for proportions (Cochran 1977):

$$\hat{V}[\hat{p}_u] = \frac{\hat{p}_u((1 - \hat{p}_u)}{m' - 1}. \tag{9}$$

The estimates for each proportion and its variance were calculated as noted above, as if the interviews were obtained by a simple random sample of all angler-trips exiting the fishery throughout the survey period. As such sampling strata and stages were ignored in the calculations. This approach is appropriate if either the sampling of angler-trips was "self-weighting", that is an equal proportion of angler-trips exiting the fishery each day were interviewed throughout the survey; or the proportions being estimated did not vary from strata to strata or stage to stage. Estimates calculated from procedures utilizing sample and stratum weights during the 1990, 1991, and 1992 surveys were re-calculated using the procedures outlined above. The self-weighted estimates all agreed closely with the weighted estimates (maximal absolute difference of 2 percentage points). As such the treatment of the interview data as a simple random sample of all angler-trips was determined to be appropriate for this survey.

Assumptions:

The general assumptions necessary for unbiased point and variance estimates of angler effort, catch and harvest, obtained by the procedures described above were:

1. interviewed anglers accurately reported their hours of fishing effort and the number of fish by species released;

2. no significant fishing effort occurred during the hours not included in the fishing day;

3. all anglers participating in the defined fishery exited the fishery through the surveyed access site; and,

4. all counted individuals that were not interviewed were properly classified as an angler (i.e., missed anglers truly have been fishing).

Similarly, unbiased point and variance estimates of angler demographics and gear type proportions depended upon the validity of the above assumptions as well as the following additional assumptions:

5. the creel clerk accurately classified anglers and the interviewed anglers accurately reported their demographic characteristics and the gear type used during the trip; and

6. either the interview data was self-weighting, that is an equal proportion of the total angler-trips were sampled throughout the survey <u>or</u> the parameters of interest do not vary throughout the survey.

There were no direct ways of evaluating or testing the first assumption. Anglers are expected to have fairly good recollection of the time spent fishing and the total number of fish caught. Numbers of fish harvested was directly observed and recorded by the creel clerk, and as such no similar assumption is listed for the estimation of harvest. Similarly, anglers were expected to accurately report their demographic characteristics (assumption 5).

As noted above, information from previous surveys indicate that virtually all anglers exit the fishery at the surveyed location, between the hours of 1000 and 0200. However, the nature of the fishery changed in 1993 such that this assumption (number 3, above) was invalid. A complete description of this "problem" is outlined in the Results section, below.

The creel clerk only counted exiting individuals as "missed anglers" that appear to have been fishing (i.e., have the requisite gear or are within a group of anglers).

As noted above, the sixth assumption was determined to be valid by an analysis of similarly collected interviews during the 1990, 1991, and 1992 surveys of this fishery.

Since no attempt was made to correct for avidity bias[3], then the estimates of angler demographics and gear usage will only relate to the proportion of angler-trips not to the proportion of individual anglers.

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[3] Avidity bias is due to the fact that anglers who fish more often during the survey period have a higher probability of being interviewed than anglers who fish less often.

Results and Discussion

The 1993 creel survey began on 9 July and was terminated on 18 July. The harvest of chinook salmon at the end of the early portion of the season was estimated to be less the 50 fish. Concurrently, the research staff had counted nearly 7,000 chinook salmon (the department's biological escapement goal is 7,100 fish) past the Salcha River counting tower (Skaugstad *In press*). Only after it was determined that the upper limit of the guideline range for the sport fishery was not going to be exceeded and when the biological escapement objective for Salcha River was assured, was the creel survey terminated.

On 9 July the creel technician was stationed at the Munson Slough turnout area where he was to interview all completed-trip anglers exiting the fishery at this location. After 2 days of monitoring the fishery at the Munson Slough parking lot the creel clerk had interviewed only 17 anglers and had yet to document any harvest. The fishery which normally takes place in the lowest mile of the Salcha River had shifted upstream to the area near the Richardson Highway bridge. Poor angling success and low effort was attributed to the fact that a slough of the glacially fed Tanana River had flooded the lower 1 mile of the Salcha River with silty water, thus making sport fishing difficult if not impossible. At the same time ADF&G personnel working on the counting tower, which in this case was the Richardson Highway Bridge, reported increasing angling activity in the vicinity of the bridge. The Salcha River in this area remained clear and was not affected by the flooding Tanana River.

In an attempt to obtain some level of catch, effort and harvest information for the 1993 fishery, the creel survey was moved up to the Richardson Highway Bridge on 11 July. Completed-trip anglers exiting the fishery via an access road located on the downstream side of the bridge on the north side of the river were interviewed. Many anglers were fishing from a large gravel bar which is accessed from this one way road. While this entry point is considered to be one of the heaviest used roads for which to gain access to the river here at the Richardson Highway Bridge area, it was not the only point for which to enter or exit the fishery. Consequently, estimates of effort, catch and harvest of chinook salmon in 1993 are partial estimates for a limited area for an eight day period (11-18 July).

During this period a total of 357 anglers who had completed their fishing trip and were exiting the fishery via this access road near the Richardson Highway bridge were interviewed. A total of 2,595 (SE = 199) angler-hours were expended to catch an estimated 77 (SE = 17) chinook salmon of which 54 (SE = 8) were harvested (Table 1).

The majority of the anglers interviewed at the Salcha River were male (77%; SE = 22%), adult (90%; SE = 15%), and residents of the State of Alaska (63%; SE = 25%). Seventy-two percent (SE = 23%) were military personnel and all anglers 100% (SE = 0%) used spinners or artificial lures as their terminal gear type.

Table 1. Estimates of angler effort for and catch and harvest of chinook salmon during the 1993 Salcha River chinook salmon creel survey, 11-18 July. (Coverage of the creel survey in 1993 was limited to only a portion of the entire fishery.)

	Number of days sampled	Number of anglers Interviewed	Estimated Angler Effort (hours)	SE	Estimated Catch of Chinook Salmon	SE	Estimated Harvest of Chinook Salmon	SE
Early day	2	68	1,014	99	34	16	21	5
Late day	6	289	1,581	172	42	7	33	6
Total	8	357	2,595	199	77	17	54	8

If in the future, the silty water conditions in the lower 1 mile of the Salcha River persist and the fishery again occurs in the vicinity of the Richardson Highway bridge, the Department will need to redesign its creel survey here to more accurately monitor the sport fishery.

CHATANIKA RIVER WHITEFISH SPEAR FISHERY

Introduction

The Chatanika River supports a large fall spawning run of least cisco and humpback whitefish. Because of its proximity to Fairbanks and the large size of this spawning run, a fall whitefish spear fishery has developed at the Chatanika River. In 1987, this fishery accounted for over 90% of the whitefish harvest in the Tanana River drainage and over 75% of the Statewide whitefish harvest (Mills 1988). Most of the whitefish harvested during the Chatanika River spear fishery are least cisco and humpback whitefish. A few round whitefish are harvested along with incidental spearing of sheefish, Arctic grayling, burbot, and longnose suckers *Catostomus catostomus*.

The whitefish spear fishery in the Tanana River drainage began in 1969. Historically, whitefish were pursued by recreational anglers with conventional rod and reel. However, because of the difficulty of catching whitefish on rod and reel, these users began to seek other means of harvesting whitefish. The result was the establishment of a spear fishing season for whitefish within the Tanana River drainage. The spear fishery on the Chatanika River developed rather slowly. A creel survey in 1970 estimated a harvest of 400 whitefish (Hallberg 1985). Estimates of harvest from 1972-1977 averaged around 2,000 whitefish. Harvest levels continued to increase in the early 1980's and by 1985 more than 14,000 whitefish were reported taken in the Chatanika River (Mills 1986).

Concern over this rapidly expanding fishery and potential effects on the stock status of whitefish prompted ADF&G to initiate an in-depth research project in 1986 that has continued through 1992. The goal of this research was to estimate population abundance, harvest levels, species composition of the runs, and exploitation rates of whitefish in the spear fishery. Part of this research was a creel survey that provided information on angler-effort, harvest, and HPUE. Since 1988, age and length composition data for the harvest have been obtained during mark-recapture experiments conducted prior to the creel survey. It was found that composition data did not significantly differ between that observed during mark-recapture experiments and in the creel survey.

In 1986, the estimated harvest of whitefish was 19,686 fish, with estimated exploitation rates of 23% and 17% for least cisco and humpback whitefish, respectively (Clark and Ridder 1987, Hallberg and Holmes 1987). In 1987, an onsite creel survey estimated harvest at 28,591 whitefish, with exploitation rates estimated to be 43% for least cisco and 17% for humpback whitefish (Hallberg 1988; Baker 1988). This made the Chatanika River the fastest growing recreational fishery in the Tanana River drainage. Because of the high exploitation rates in 1986 and 1987, a fifteen whitefish daily bag and possession limit was instituted in 1988. Prior to 1988, there was no bag and possession limit for whitefish in the Tanana River drainage. Harvest of whitefish from the Chatanika River in 1988 was substantially reduced (about 8,000 reported in Mills 1989) by the imposition of possession limits. In 1989 the harvest of whitefish nearly doubled to 15,542 (Mills 1990).

In 1990 the spear fishery was closed by Emergency Order on October 10, when it was determined that whitefish abundance, harvest and recruitment had declined significantly. Poor recruitment as result of weak year classes along with dramatic decreases in abundance for both humpback whitefish and least cisco, led to the decision to once again close the spear fishery on 9 September 1991. During a meeting of the Alaska Board of Fisheries in February 1992, the time of year and the area of the Chatanika River open to the consumptive harvest of whitefish was made more restrictive. This was done in an effort to protect whitefish stocks in the Chatanika River from overharvest and to avoid, further inseason "emergency closures" of the fishery.

The ADF&G developed a Chatanika River Sport Fishery Management Plan which identified criteria for which to allow a consumptive whitefish fishery to occur while not jeopardizing sustainable yields. The plan identifies a threshold population abundance level of 10,000 humpback whitefish and 40,000 least cisco. These minimum abundance levels must be present annually before a spear fishery can occur. Secondly, based upon population dynamic modeling conducted by ADF&G staff, annual exploitation levels of 15% and 25% for humpback whitefish and least cisco, respectively, are not to be exceeded to insure sustained the health of the resource. According to the plan, stock assessment of Chatanika River whitefish are to be done annually to provide estimates of abundance. Onsite creel surveys are also to be conducted annually to monitor the harvest of whitefish.

The specific objectives of the 1993 creel survey at the Chatanika River whitefish spear fishery were to estimate:

1. the harvest of least cisco and humpback whitefish in the Chatanika River whitefish spear fishery, such that the final postseason estimates are within $\pm$ 15% of the true value 95% of the time;

2. the distribution of harvest of whitefish by angler-trip in the Chatanika River whitefish spear fishery; and

3. the percent composition within the following demographic categories of anglers interviewed at the Chatanika River:

    a) male/female;
    b) adult/youth;
    c) resident/nonresident; and
    d) military/nonmilitary.

Study Design

The creel survey in 1993 was conducted at the State run Whitefish Campground, where the Elliott Highway Bridge crosses the Chatanika River, and at the entrance to the Olnes Pond Campground (Figure 4). Most anglers enter and exit the fishery from these two locations. The major portion of the fishery is confined to a 5 km section of the river near these two sites. The majority of the fishing is from shore. There is a small amount of effort from boat anglers.

The spear fishery officially opened on 1 September, and occurred during the evening hours from 2000 to 0200 hours. Historical records indicate that spearing activity and harvest of whitefish actually begins around mid-September. For this reason, the harvest survey began 17 September and continued until the fishery terminated (by regulation) on 30 September. The sample period for the fishery was six hours in duration during each day.

The survey was a direct expansion completed-trip type of survey. The sampling design is of the stratified 2-stage type. Two strata are defined as the two locations noted above. The amount of effort and harvest exiting the fishery at the Olnes Pond campground location has recently been substantial in comparison to the other location (94% of the total harvest of whitefish in 1992). Within each stratum, days to sample represent the first sampling stage. Days to sample were systematically sampled from the available days of the survey (with the starting day chosen at random from the first set of possible days). Optimal allocation procedures as outlined in Bernard et al. (*In prep*) were used to determine the amount of sampling resources to direct at each of these two strata. The results of these analyses indicated that every one of the 14 days of the survey period should be sampled within the Olnes Pond site stratum, while every fourth day (25% of the days) should be sampled within the other stratum. The resulting realized allocations of sampling effort were 22.2% at the State campground and 77.8% at the Olnes Pond area. These realized allocations are approximately equivalent to the optimal allocations calculated for total whitefish harvest of 16.8% and 83.2% for the State campground and Olnes Pond strata, respectively.

Within each stratum (day-location combination), vehicle parties[4] exiting the fishery represented the first-stage sampling units. Creel technicians attempted to stop all exiting vehicles. All "missed" vehicle parties were counted. All stopped vehicle parties were interviewed, and their spear fishing effort (in hours) and harvest by species were recorded. For estimation of harvest, individual spearfisher information was not necessary[5], however information on harvest by species was separately recorded by individual in each vehicle party for use in estimating distribution of harvests by fisher-trip. Additionally, individual angler information was needed for estimation of angler demographics. Information from parties who had not been fishing was recorded, since the mean harvest over all parties

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[4] A vehicle party was defined as all anglers leaving the fishery in one car or truck.

[5] Harvest of the entire party were needed.

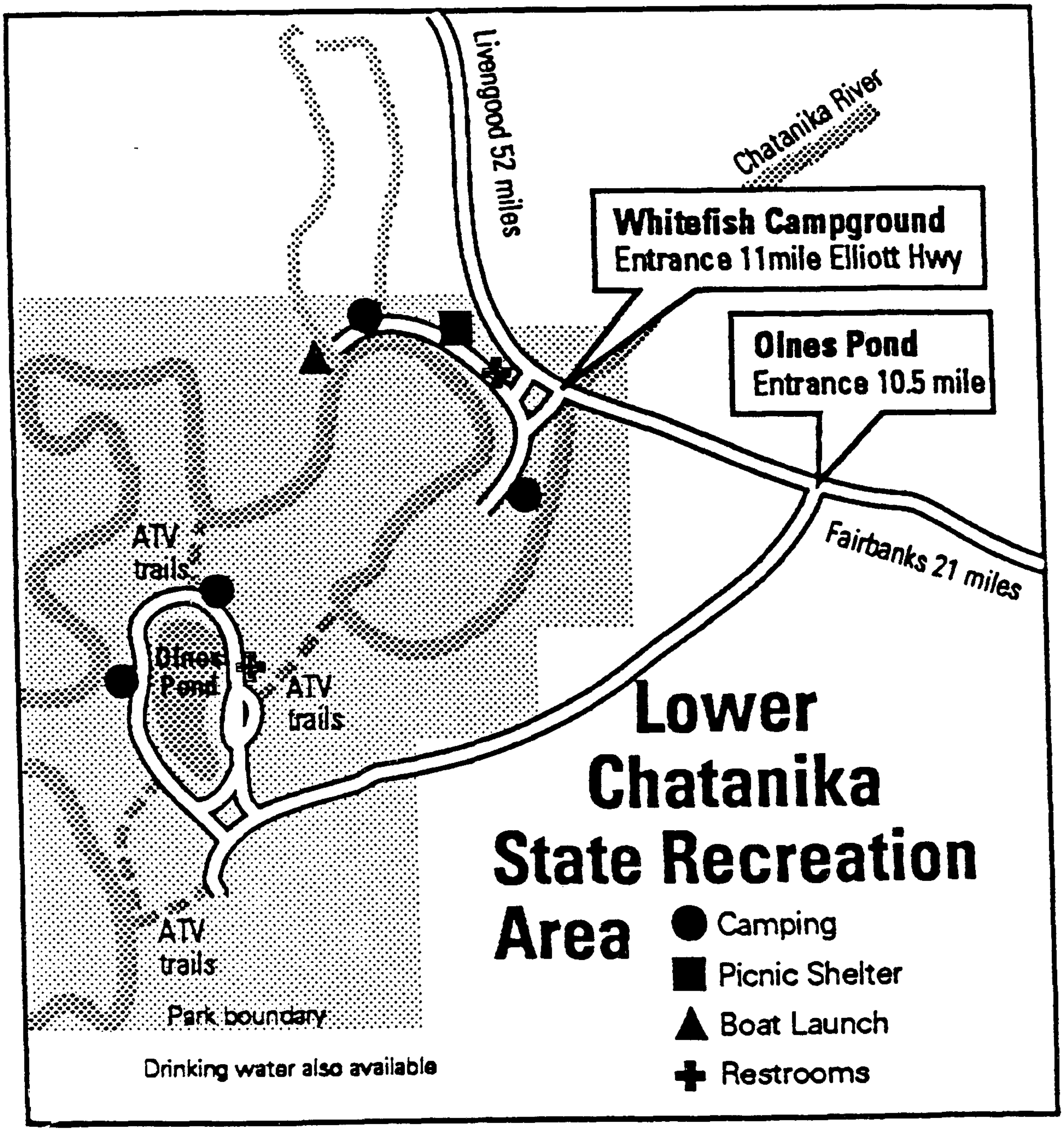

Figure 4. Map of the Chatanika River with Whitefish and Olnes Pond Campgrounds along the Elliott Highway, Tanana River drainage, Alaska.

stopped needed to be estimated, in order to expand for the vehicle parties that were not stopped. Every attempt was made to stop and interview all vehicle parties regardless of whether or not the party had been fishing.

Data Collection

The creel survey at the Chatanika River in 1993 emphasized the collection of harvest and effort information from completed-trip vehicle party interviews. Daily inseason estimates of harvest were obtained, so as to facilitate any inseason management actions that may have been required. Two creel clerks were assigned to conduct the angler interviews during the Chatanika River whitefish spear season. One clerk was responsible for the State campground area near the Elliott Highway and the other was assigned the area near the entrance of Olnes Pond campground. The creel clerk attempted to stop and interview all vehicles exiting their respective areas and interview all anglers, within each vehicle. Those vehicles failing to stop were counted.

During each interview, the following information was collected from individual anglers:

1) the amount of time he or she spent fishing;
2) the number of whitefish harvested, by species;
3) fisher gender (male/female);
4) age class (youth/adult);
5) resident or non-resident; and
6) military or non-military.

All interview data were recorded on to ADF&G ANGLER INTERVIEW FORM VERSION 1.1, mark sense forms.

Data Analysis

Harvest and Effort Estimates:

Estimation of harvest of whitefish by species for each location in the fishery (and in total) involved the direct expansion of sampled interview data by expansion factors dependent upon the number of vehicle parties "missed" (second-stage units) and days not selected (first-stage units). The following procedures were used to estimate harvest:

$\hat{H}$ = estimated harvest for stratum h;

$$= D_h\bar{\hat{H}}_h; \tag{10}$$

where: D_h equaled the number of possible days within each stratum available for sampling;

$\bar{\hat{H}}$ = mean harvest estimate over all days sampled in stratum *h*;

$$= \frac{\sum_{i=1}^{d_h} \hat{H}_{hi}}{d_h}; \tag{11}$$

$\hat{H}_{hi}$ = estimated harvest exiting the fishery during day *i* within stratum *h*;

$$= V_{hi}\bar{h}_{hi}; \tag{12}$$

V_{hi} equaled the number of vehicle parties counted exiting the fishery during sampled day *i* within stratum *h* (including both interviewed and "missed" vehicle parties);

$\bar{h}_{hi}$ = mean harvest by all exiting vehicle parties interviewed during day sampled *i* within stratum *h*;

$$= \frac{\sum_{j=1}^{v_{hi}} h_{hij}}{v_{hi}}; \tag{13}$$

v_{hi} equaled the number of exiting vehicle parties interviewed during day *i* within stratum *h*; and h_{hij} is the harvest by interviewed vehicle party *j* during day *i* within stratum *h*.

The variance for the estimated harvest for stratum *h* was obtained by the two-stage variance equation:

$$\hat{V}\left[\hat{H}_h\right] = \left\{(1 - f_{1h})D_h^2 \frac{S_{1h}^2}{d_h}\right\} + \left\{f_{1h} \frac{D_h^2}{d_{2h}^2} \sum_{i=1}^{d_h}\left[(1 - f_{2hi})V_{hi}^2 \frac{s_{2hi}^2}{v_{hi}}\right]\right\}; \tag{14}$$

where: f_{1h} and f_{2hi} equaled the first and second stage sampling fractions, respectively (i.e., $f_{1h} = d_h/D_h$, and $f_{2hi} = v_{hi}/V_{hi}$); d_{2h} equaled the number of days sampled in which the second stage variance term could be estimated (i.e., number of days with either all vehicle parties that exited were interviewed or at least two exiting vehicle parties were interviewed);

S_{1h}^2 = between day sampling variance calculated by the variance equation for suggested by Wolter (1985) for systematic sampling;

$$= \frac{\sum_{i=2}^{d_h}\left(\hat{H}_{hi} - \hat{H}_{h(i-1)}\right)^2}{2(d_h - 1)}; \text{ and} \tag{15}$$

s^2_{2hi} = between vehicle party sampling variance calculated by the usual variance equation for random sampling;

$$= \frac{\sum_{j=1}^{v_{hi}} \left(h_{hij} - \bar{h}_{hi}\right)^2}{\left(v_{hi} - 1\right)}. \qquad (16)$$

Note that equation 15 represents the between day variance term that is estimated by the equation recommended by Wolter (1985) for systematic sampling.

Total harvest across all strata (or select combinations of strata) and the associated variances were obtained by summing the respective stratum estimates (assuming independence). Standard errors were obtained by taking the square root of the variance estimates. Similarly, estimates of spearfisher effort was obtained by substituting the appropriate effort statistics into equations 10-16, above.

Harvest Distribution and Angler Demographics Estimates:

The distribution of harvests for the fishery were estimated as described in the following text. The "distribution of harvests" was defined as the fraction p_k of fisher-trips in which "k" or more fish were harvested, then "k" can be expressed as k = 1 to k_{max}. If k_{max} = 16, then one set of data was analyzed at least 16 times to obtain all possible fractions p_k in a set. Additionally, the harvest distribution for k = 0 was defined to be the proportion of fisher-trips that resulted in the harvest of no fish.

The value of k_{max} was set to one fish more than the bag and possession limit for whitefish in effect during the survey (i.e., 15 fish so k_{max} = 16).

Harvest distribution was to be estimated as if the interview information was collected as a simple random sample of the fishery. As such the proportion of fisher-trips for each harvest distribution category (e.g., zero fish, 1 or more fish, 2 or more fish, etc.) was simply calculated by the usual equation for proportions given in equation 1, above. Its variance was also to be calculated as if the data were obtained by a simple random sample as in equation 2.

Estimates of the proportion of fisher-trips by the various demographic categories were also calculated as outlined in equations 1 and 2.

The estimates for each of the proportions (for harvest distribution and demographic categories) and their variances were to be calculated as noted above, as if the fisher-trips were obtained by a simple random sample of all fisher-trips exiting the fishery throughout the survey. As such sampling strata and stages are ignored in the calculations. As noted previously (see Salcha River survey Data Analysis section), this approach is appropriate if either the sampling of fisher-trips is "self-weighting", that is an equal proportion of fisher-trips exiting the fishery each day are interviewed throughout the survey; or the proportions being estimated do not vary from strata to strata or stage to stage. Estimates calculated from procedures utilizing sample and stratum weights during the 1992 survey were re-calculated using the procedures outlined above. During this re-calculation only a comparable subsample of the State campground data was used to approximate the sampling realized in 1993. The unweighted estimates agreed in general with the weighted estimates. The primary difference being in the estimate of the proportion of fisher-trips with zero whitefish harvested (the weighted estimate being 38.1% of the trips versus the unweighted estimate of 30.4% of the trips). The reason for this difference was related to the poorer success of fishers exiting the fishery at the campground site compared to the Olnes Pond site. All other harvest distribution estimates compared quite closely (maximum absolute difference of 1.5%). Since the harvest distribution estimates associated with the values of "k" for 1 or more fish harvested are of most interest in evaluating the current bag and possession limits, then the disparity of the estimates at the zero fish harvested level was not judged as critical. Similarly, the demographic parameter unweighted estimates compared favorably with the weighted estimates (maximum absolute difference of 3.0%). As such the treatment of the interview data as a simple random sample of all fisher-trips was determined preseason to be appropriate for this survey.

However, since comparatively few days are sampled at the campground versus Olnes Pond (4 of 14 compared to 14 of 14) chi-squared contingency table tests of the numbers of interviews by category (harvest distribution and demographic types) versus the location of interview (Olnes Pond site versus the State campground) were conducted. If the results of the test(s) indicated that substantial and statistically significant (at $\alpha = 0.05$) differences in the parameter estimates existed between the two sites, then estimates would be calculated separately for the two sites (using equations 1 and 2). Combined estimates of each parameter along with variances would then be calculated by applying stratum weights as follows.

$\hat{p}_u$ = the estimated fraction of completed fisher-trips with the characteristic u across all strata;

$$= \sum_{h=1}^{s} \hat{W}_h \hat{p}_{uh} ; \tag{17}$$

$\hat{V}[\hat{p}_u]$ = variance estimate, using Goodman's (1960) formula;

$$\approx \sum_{h=1}^{s} \left\{ \hat{W}_h^2 \hat{V}[\hat{p}_{uh}] + \hat{p}_{uh}^2 \hat{V}[\hat{W}_h] - \hat{V}[\hat{p}_{uh}] \hat{V}[\hat{W}_h] \right\}. \tag{18}$$

where, s = number of strata (in this case = 2);

$\hat{p}_{uh}$ = estimated proportion for each category for each stratum as calculated from equation 1;

$\hat{V}[\hat{p}_{uh}]$ = estimated variance for the stratum estimates for each proportion as calculated in equation 2;

$\hat{W}_h$ = estimated relative stratum weight of stratum *h* (equivalent to the ratio of the estimated number of fisher-trips for the stratum compared to the total number of fisher-trips);

$$= \frac{\hat{M}_h}{\hat{M}}; \qquad (19)$$

$\hat{M}$ equaled the total estimated number of fisher-trips participating in the fishery (equal to the sum of fisher-trips across all strata);

$\hat{M}_h$ = estimated number of fisher-trips participating in the fishery within stratum *h*;

$$= D_h\bar{\hat{M}}_h; \qquad (20)$$

$\bar{\hat{M}}_h$ = mean number of fisher-trips estimate over all days sampled in stratum *h*;

$$= \frac{\sum_{i=1}^{d_h} \hat{M}_{hi}}{d_h}; \qquad (21)$$

$\hat{M}_{hi}$ = estimated number of fisher-trips exiting the fishery during day *i* within stratum *h*;

$$= V_{hi}\bar{M}_{hi}; \qquad (22)$$

$\bar{M}_{hi}$ = mean number of fisher-trips within each stratum for day *i* over all interviewed vehicle parties;

$$= \frac{\sum_{j=1}^{v_{hi}} M_{hij}}{v_{hi}}; \qquad (22)$$

M_{hij} = number of fisher-trips observed for each vehicle party interviewed;

$\hat{V}[\hat{W}_h]$ = estimated variance of the estimated stratum weight, obtained approximately, via the Delta method;

$$= \left\{\frac{\hat{M}_h}{\hat{M}}\right\}^2 \left\{\frac{\hat{V}[\hat{M}_h]}{\hat{M}_h^2} + \frac{\hat{V}[\hat{M}]}{\hat{M}^2} - \frac{2\hat{V}[\hat{M}_h]}{\hat{M}_h \hat{M}}\right\}; \quad (24)$$

$\hat{V}[\hat{M}_h]$ = estimated variance of the estimated number of fisher-trips per stratum;

$$= \left\{(1 - f_{1h})D_h^2 \frac{S_{1h}^2}{d_h}\right\} + \left\{f_{1h} \frac{D_h^2}{d_{2h}^2} \sum_{i=1}^{d_h}\left[(1 - f_{2hi})V_{hi}^2 \frac{s_{2hi}^2}{v_{hi}}\right]\right\}; \quad (25)$$

where: f_{1h} and f_{2hi} equaled the first and second stage sampling fractions, respectively (i.e., $f_{1h} = d_h/D_h$, and $f_{2hi} = v_{hi}/V_{hi}$); d_{2h} equaled the number of days sampled in which the second stage variance term could be estimated;

S_{1h}^2 = between day sampling variance;

$$= \frac{\sum_{i=2}^{d_h}\left(\hat{M}_{hi} - \hat{M}_{h(i-1)}\right)^2}{2(d_h - 1)}; \text{ and} \quad (26)$$

s_{2hi}^2 = between vehicle party sampling variance;

$$= \frac{\sum_{j=1}^{v_{hi}}\left(M_{hij} - \bar{M}_{hi}\right)^2}{(v_{hi} - 1)}. \quad (27)$$

and all other terms were as defined above.

Assumptions:

The general assumptions necessary for unbiased point and variance estimates of harvest, obtained by the procedures outlined above are:

1. no significant fishing effort occurred during the hours not included in the fishing day; and

2. all participants in the defined fishery exited the fishery through the surveyed access sites.

Similarly, unbiased point and variance estimates of angler demographics depend upon the validity of the above assumptions as well as the following additional assumption:

3. creel clerks accurately classified participants and the people interviewed accurately reported their demographic characteristics.

Finally, unbiased point and variance estimates of both the demographic parameters and the harvest distribution proportions depend upon the validity of the above assumptions as well as the following additional assumptions:

4. either the interview data was approximately self-weighting, that is an equal proportion of the total fisher-trips were sampled throughout the survey <u>or</u> the parameters of interest did not vary throughout the survey.

As noted above, information from previous surveys indicated that virtually all anglers exit the fishery at the surveyed location, between the hours of 2000 and 0200. The creel clerk as well as the project leader periodically evaluated the exit patterns of the fishery to ensure that the first two assumptions were still valid for the 1993 survey.

There are no direct ways of evaluating or testing the third assumption. Participants were expected to accurately report their demographic characteristics.

As noted above, the fourth assumption was determined to be valid by an analysis of similarly collected interviews during the 1992 survey of this fishery. However, the assumption was evaluated by conducting the chi-squared contingency table tests noted previously. If the results of the test(s) indicated that substantial and statistically significant differences in the parameter estimates existed between the two sites, then estimates would be calculated by the weighting procedure described previously.

Since no attempt will be made to correct for avidity bias, then the estimates of demographics will only relate to the proportion of fisher-trips not to the proportion of individual anglers.

<u>Results</u>

The whitefish research stock assessment program had completed its abundance estimates for least cisco and humpback whitefish in the Chatanika River by 1 September 1993. The study indicated that there were approximately 46,500 least cisco and 13,100 humpback whitefish spawners, present in the Chatanika River at that time (Fleming *In prep*). Since number of both species in 1993 exceeded the defined threshold abundance levels, the fishery was allowed to proceed. Based upon these abundance estimates, ADF&G was prepared to hold the harvest of least cisco and humpback whitefish to 9,300 and 1,600, respectively. These harvests represent the maximum number of each species that can be taken, and still remain within the recommended ranges of exploitation.

During the 17-30 September 1993 creel survey 209 interviews were obtained from anglers who had completed their fishing trip and were exiting the fishery at one of two areas. Anglers expended a total of 578 (SE = 124) hours of spear fishing to harvest a total of 609 (SE = 62) least cisco, and 87 (SE = 18) humpback whitefish (Table 2).

Appreciable and significant (χ^2 = 28.2, df = 2, P < 0.001) differences between the harvest distribution for anglers exiting the fishery at the two different sites existed. For example, about 75% of all anglers exiting at the Whitefish campground location harvested no whitefish, in comparison to about 30% of the Olnes Pond anglers. Accordingly, estimates of harvest distribution were calculated separately for each location and then combined using the estimated number of fisher trips at each location as stratum weights. The resultant combined estimates indicated that approximately 53% (SE = 10.0%) of all anglers harvested at least one or more whitefish (Table 3). The distribution of whitefish harvests among anglers interviewed shows that about 47% of the anglers harvested no whitefish (Figure 5).

Of the anglers interviewed at the Chatanika River, the typical fisher was male (87%, SE = 2%), adult (97%, SE = 1%), a resident of Alaska (100%, SE = 0.00%), and are non-military (92%, SE = 2%) (Table 4). No significant or appreciable differences in demographic characteristics were observed between anglers exiting at the two different locations (χ^2 = 0.126, df = 1, P = 0.722 for sex of fisher; χ^2 = 1.29, df = 1, P = 0.257 for adult versus youth category; and χ^2 = 0.397, df = 1, P = 0.534 for military status).

Discussion

When the 1993 whitefish spear season opened on 1 September, heavy rains had left the Chatanika River with high muddy water conditions that persisted for the first two weeks of the season. When the Department begin monitoring the fishery on September 17, fishing effort was very light due to poor visibility and high water. On 18 and 19 September the Fairbanks area received more than an inch of rain which now brought the water level in Chatanika River drainage to near flood stage, essentially putting an end to all spear fishing for the time being. Between the 17 and 23 September, creel technicians had interviewed a total of 22 spear fishermen who had harvested a total of 7 least cisco and no humpback whitefish. By 24 September water levels in the Chatanika River dropped significantly and spear fishing effort and harvest increased steadily between the 24th and the end of the season. While water conditions improved they were far from ideal and the estimated total harvest of both least cisco and humpback whitefish in 1993 was considered very low.

Only 2.5% of the anglers achieved the legal bag limit of 15 whitefish as compared to nearly 8% reported in 1992 (Hallberg and Bingham 1993). No anglers interviewed had harvested more than the legal bag limit.

The majority (83%) of the interviews were obtained at the Olnes Pond area, and 69% of the fishing effort and 91% of the harvest of all whitefish occurred at this location.

The 1993 estimated abundance of 13,100 least cisco and 46,500 humpback whitefish exceeded the department's established threshold abundance levels of

Table 2. Individual stratum with total estimates of effort for and harvest of least cisco, humpback whitefish, and round whitefish in the 1993 Chatanika River whitefish spear fishery from 17 to 30 September.

	Number of days in survey	Number of days sampled	Number of anglers inter-viewed	Number of parties inter-viewed	Number of parties counted	Estimated effort (angler-hours)	SE of effort	Harvest of least cisco	SE of least cisco harvest	Harvest of humpback whitefish	SE of humpback whitefish harvest	Harvest of round whitefish	SE of round whitefish harvest
Whitefish Campground	14	4	36	23	23	179	124	53	59	11	18	0	0
Olnes Pond	14	14	173	130	149	399	10	556	20	76	4	23	2
Total	14	18	209	153	172	578	124	609	62	87	18	23	2

Table 3. Estimates of harvest distribution for the 1993 Chatanika River whitefish spear fishery from 17 to 30 September, with the estimated number of trips equal to 320 (SE = 115).

Number of Whitefish	Proportion of Trips With Noted Harvest of Whitefish	SE	Proportion of Trips With At Least the Noted Harvest of Whitefish	SE
0	47.4%	8.1%	---	---
1	11.4%	2.9%	52.6%	10.0%
2	9.9%	2.6%	41.2%	8.3%
3	6.7%	2.0%	31.3%	6.7%
4	6.0%	1.8%	24.6%	5.6%
5	4.9%	1.6%	18.6%	4.5%
6	3.2%	1.2%	13.7%	3.5%
7	1.8%	0.8%	10.5%	2.8%
8	1.4%	0.7%	8.8%	2.4%
9	1.4%	0.7%	7.4%	2.1%
10	2.1%	0.9%	6.0%	1.8%
11	0.7%	0.5%	3.9%	1.3%
12	0.4%	0.3%	3.2%	1.2%
13	0.4%	0.3%	2.8%	1.1%
14	0.0%	0.0%	2.5%	1.0%
15	2.5%	1.0%	2.5%	1.0%
16	0.0%	0.0%	0.0%	0.0%

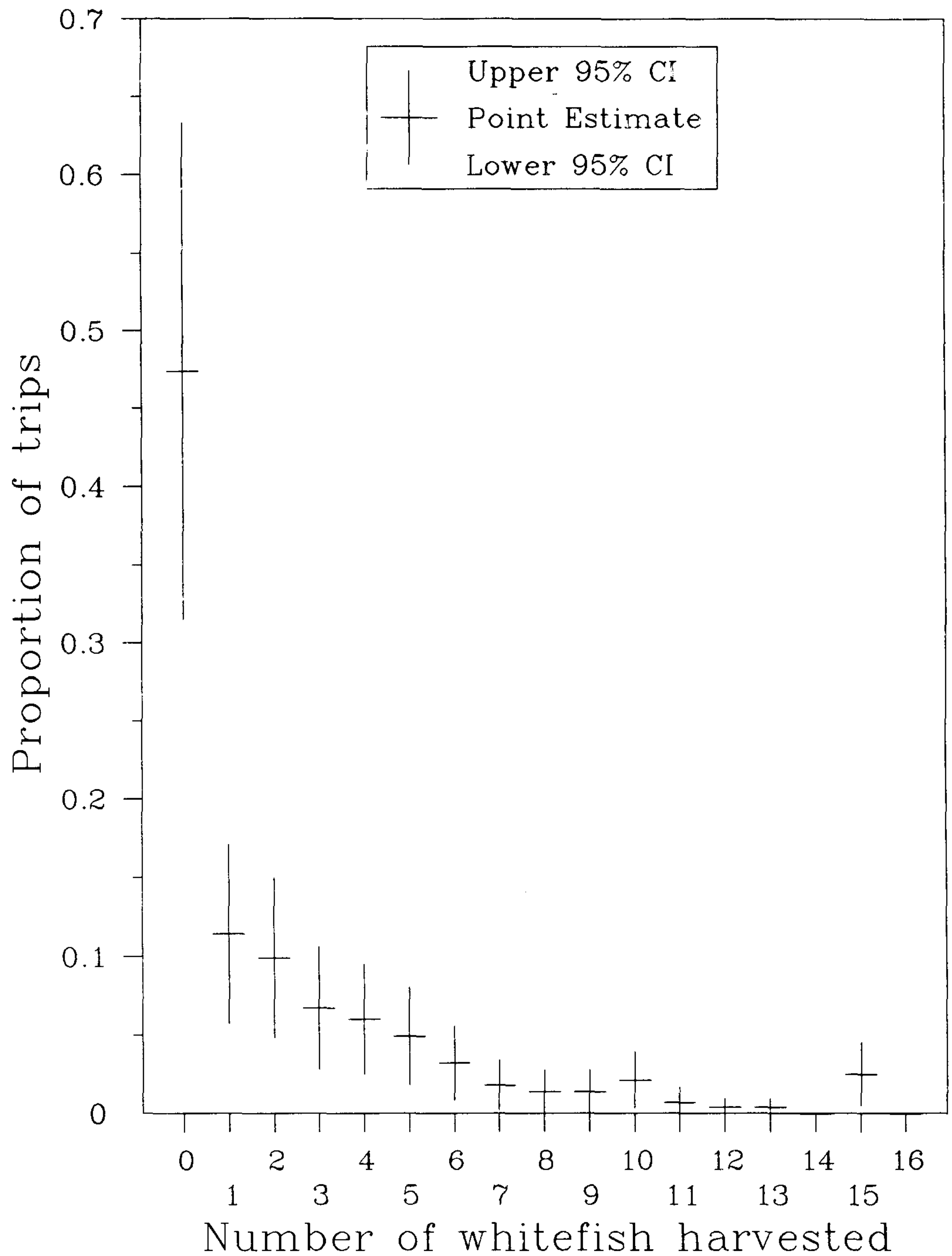

Figure 5. Distribution of whitefish harvest among fishers interviewed at the Chatanika River, Tanana River drainage, Alaska, 17 to 30 September, 1993.

Table 4. Estimated proportion of trips by various demographic categories for the 1993 Chatanika River whitefish spear fishery from 17 to 30 September.

	Number Interviewed	Proportion	SE
Male	182	0.87	0.02
Female	27	0.13	0.02
Youth	6	0.03	0.01
Adult	203	0.97	0.01
Resident	209	1.00	0.00
Non-resident	0	0.00	0.00
Military	17	0.08	0.02
Non-Military	192	0.92	0.02

10,000 and 40,000 fish respectively. While the population abundance for both species was of a sufficient level to allow the fishery to proceed as per the management plan, the Department became concerned because the 1993 estimates represented a 35% decline in least cisco population (down from 20,180 fish in 1992) and a 46% reduction in the humpback whitefish abundance (down from 86,989 fish in 1992) as reported in Fleming (1993). With such a precipitous decline in abundance, and to a level very close to our threshold abundance, the fishery needed to be monitored closely. The poor spearing conditions persisted throughout the 1993 season which resulted in a greatly reduced harvest.

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APPENDIX A

Appendix A. Exit angler count form.

1990 REGION III SPORT FISH CREEL SURVEY - EXIT ANGLER COUNT FORM

FORM NUMBER (Assigned by keypuncher): ____________________

Site: ____________________ Date (YY MM DD): ____ ____ ____

Technician: ____________ Hours surveyed (HH MM): ____ ____ to ____ ____

Hours from to	Number of Anglers Counted Exiting Fishery at Site During Indicated Hours
midnight (0000) - 0059	
0100 - 0159	
0200 - 0259	
0200 - 0359	
0300 - 0359	
0400 - 0459	
0500 - 0559	
0600 - 0659	
0700 - 0759	
0800 - 0859	
0900 - 0959	
1000 - 1059	
1100 - 1159	
1200 - 1259	
1300 - 1359	
1400 - 1459	
1500 - 1559	
1600 - 1659	
1700 - 1759	
1800 - 1859	
1900 - 1959	
2000 - 2059	
2100 - 2159	
2200 - 2259	
2300 - 2359	

APPENDIX B

Appendix B. Angler interview, angler count, and biological data files developed for creel surveys in Interior Alaska in 1993[a].

U0050IA3.DTA	Salcha River chinook salmon fishery, creel survey angler interview data.
U0040IA3.DTA	Chatanika River creel survey angler interview data. Interviews with anglers who had completed there fishing trip and were exiting the Chatanika River at the Whitefish campground.
U004AIB3.DTA	Chatanika River creel survey angler interview data. Interviews with anglers who had completed there fishing trip and were exiting the Chatanika River at Olnes Pond.

[a] These data files are archived with the Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services section, 333 Raspberry Road, Anchorage, Alaska 99518.