TOGIAK RIVER SPORTFISHING STUDIES

By

Mark Lisac
USFWS Biological Technician

and

R. Eric Minard
ADF&G Research Biologist

Key Words: Anadromous Salmon, rainbow trout, char, arctic grayling. Togiak River, Bristol Bay, Southwest Alaska. Sportfishing, C.P.U.E., creel census, public use.

U.S. Fish and Wildlife Service
Togisk National Wildlife Refuge
P.O. Box 10201
Dillingham, Alaska

November 1984

TOGIAK RIVER SPORTFISHING STUDIES

By

Mark Lisac
USFWS Biological Technician

and

R. Eric Minard
ADF&G Research Biologist

Key Words: Anadromous Salmon, rainbow trout, char, arctic grayling. Togiak River, Bristol Bay, Southwest Alaska. Sportfishing, C.P.U.E., creel census, public use.

U.S. Fish and Wildlife Service
Togisk National Wildlife Refuge
P.O. Box 10201
Dillingham, Alaska

November 1984

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

In the spring of 1984 the Alaska Department of Fish and Game (ADF&G) entered into a cooperative agreement with the U.S. Fish and Wildlife Service (USF&WS) to conduct studies on sport fishing activities in the Togiak National Wildlife Refuge. These data are needed to determine current use patterns on the Refuge and to aid in preparation of a comprehensive Refuge Management Plan. The Togiak National Wildlife Refuge covers 4.3 million acres, including 2.3 million acres designated as wilderness, and is a site of expanding sport fishing effort from both commercial operators and private recreational users. Recent data (Mills, 1983) suggests angling effort has undergone a two-fold increase in the Bristol Bay area since 1977. The effects of increased effort upon use patterns on the Togiak River, as well as upon the fishery resources, are not yet understood.

Specific objectives of this study were to:

1. estimate angling effort on the Togiak River and associated tributaries; and
2. estimate harvest by species taken by sport fishermen on the Togiak River and associated tributaries.

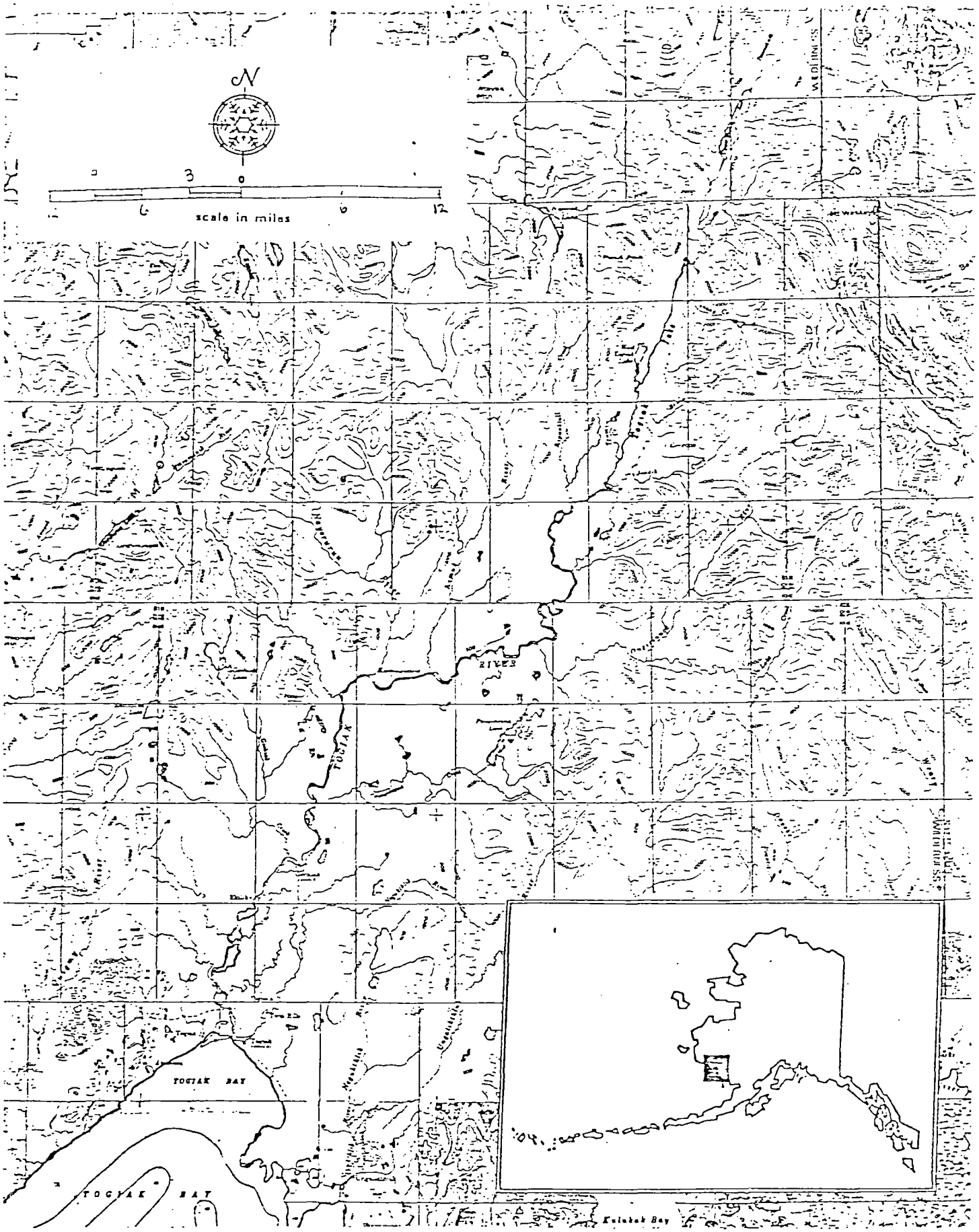

Figure 1. Togiak River drainage, Bristol Bay, Alaska.

METHODS

Aerial surveys, used to determine angling effort, were conducted by USF&WS personnel, while collection of creel census data was accomplished by a fisheries technician hired by USF&WS and housed in an ADF&G field camp. The USF&WS fisheries technician obtained records concerning number of clients and catches from professional guiding operators who maintained camps on the river. Additionally, the technician conducted angler interviews of guided and unguided parties encountered on the river during surveys. Sample design and data analysis were provided by the research staff of the Alaska Department of Fish and Game.

Sportfishing Effort Surveys

Sport fishing effort, reported as angler days was estimated from aerial surveys of the entire Togiak River drainage. Survey dates were selected randomly over a four (4) month period, starting in June and continuing through September. A minimum of five (5) aerial surveys per month were scheduled. Survey observations were recorded by the Refuge manager during low altitude flights in a float equipped Cessna 185, piloted by the assistant Refuge manager. Numbers of sportfishing parties, anglers per party, and location were recorded during each survey.

Monthly sportfishing effort was estimated using the following equation:

$$y_h = \frac{\sum_{i=1}^{n_h} (y_{hi})}{n_h} \times N_h$$

where: y_h = effort in angler days for the h^{th} month sampled,

y_{hi} = number of anglers observed in the h^{th} month on i^{th} survey,

n_h = number of surveys flown in h^{th} month, and

N_h = number of days in h^{th} month.

Total sportfishing effort was estimated using a stratified random sample design:

$$Y_{st} = (N)(\bar{y}_{st}) \quad \text{(Cochran, 1977)},$$

where: N = total number of days over all strata (months), and

$$\bar{y}_{st} = \sum_{h=1}^{L} W_h \bar{y}_h,$$

where: $W_h = \frac{N_h}{N}$ (strata weight),

N_h = number of days in h^{th} strata (month), and

$$\bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{hi}}{n_h} \quad \text{(sample mean)}.$$

Sportfishing Catch Estimates

Sportfishing catch data were collected during angler interviews throughout the sampling period. Data recorded included number of fishes caught, number of fishes kept, number of days fished, and whether the trip was commercially guided or unguided. An angling day was defined as any day an angler fished regardless of actual fishing time. Throughout the study a distinction was made between fish caught and fish kept. Fish caught was the total number of fish an angler landed, while fish kept was the number landed and killed. Since many anglers subscribe to self-imposed catch and release practices, it was felt that to accurately document fishing success both parameters should be obtained.

Mean monthly catches (total caught or total kept) for each species and strata were estimated by:

$$\bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{hi}}{n_h},$$

where: y_{hi} = number of fish caught or kept, and

n_h = number of angler day interviews.

Estimated total fish caught and total estimated fish kept by species were derived from the same relationship:

Total fish = $(\bar{y}_{st})$ (Y) (Cochran, 1977),
1. Caught
2. Kept

where: $\bar{y}_{st}$ = mean catch over all strata,

and $\bar{y}_{st} = \sum_{l=1}^{L} W_h (\bar{y}_h)$,

where: $W_h = \frac{N_h}{N}$,

N_h = (mean number of angler days in h^{th} strata), and

N = total number angler days over all strata (months).

RESULTS

Sportfishing Effort

Eighteen aerial surveys were flown during which 433 fishermen were observed (Table 1, Figure 1). An estimated 2,807 angler days were spent on the Togiak River in 1984. Peak months of angling effort were August and September, which accounted for 1,036 and 930 angler days, respectively.

A large proportion of the sportfishing effort was associated with commercial guiding oeprations. Interview data indicated that 71% of the fishermen contacted were with professionally guided trips and that the remaining 29 percent were private recreational users (Table 2). Peak months of professional usage occurred in July while peak private - unguided usage occurred in September.

Sportfishing Catches

Interviewed anglers landed 9,148 fishes representing eight (8) species (Table 3). Of these, 876 fishes were kept. Interviewed anglers were most successful in catching Arctic char and coho salmon, which accounted for 35% and 33% of the total catch, respectively.

Peak months of angling success were September, when catch for interviewed anglers tallied 3,491 fishes (38% of total), and July, when the catch was 3,110 fishes (34% of total). In both months, salmon species accounted for most of the landings (70% in September, 61% in July). During the season mean catch per individual angler averaged 8.74 fishes landed per angler day (Table 4). Anglers kept approximately 0.84 fishes per angler day.

When creel census data from interviews was expanded to obtain total season estimates, results indicated that anglers hooked and landed 24,873 fishes, representing eight (8) species. Of these, 2,418 fishes, 10% of the total catch, were kept and killed. Coho salmon and Arctic char accounted for 39% and 36% of the total catch, respectively (Table 5). Over 13% of all sockeye, chinook and coho salmon caught were kept and killed. Less than 5% of all pink salmon, rainbow trout and Arctic char caught were kept and killed.

Table 1. Sportfishing effort on the Togiak River estimated from aerial surveys, June - September, 1984.

Month	Surveys Flown	Total Number Fishermen Seen	Mean Number Fishermen per Survey	Estimated Monthly Effort (Angler Days)
June	1	12	12.00	360
July	8	125	15.62	484
August	7	234	33.43	1,036
September	2	62	31.00	930
Totals	18	433	Mean = 23.01[1/]	2,807[2/]

1/ Seasonal mean was determined from stratified sampling scheme.

2/ Total effort was determined from stratified sampling scheme.

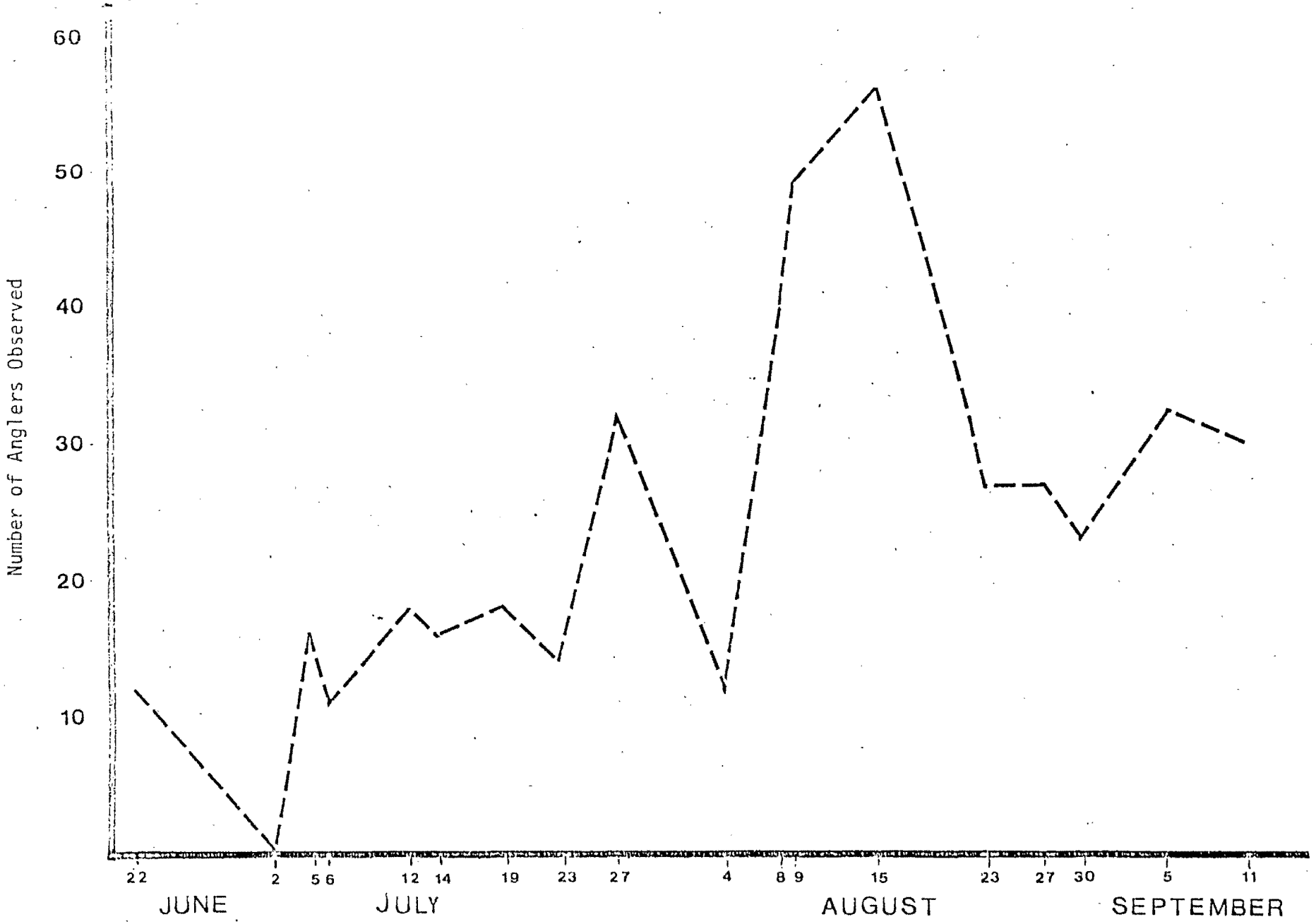

Figure 2. Sport fishing effort observed during aerial surveys of the Togiak River, June-September, 1984.

Table 2. Sport fishing effort data obtained from angler interviews, Togiak River, June-September, 1984.

Month	Interviewed Effort	Professional-Guided Effort		Private-Unguided Effort	
		No. Angler Days	Percent of Use	No. Angler Days	Percent of Use
June	113	104	92.0%	9	8.0%
July	378	313	82.8%	65	17.2%
August	238	148	62.2%	90	37.8%
September	318	179	56.3%	139	43.7%
Totals	1,047	744	71.1%	303	28.9%

Table 3. Numbers of fishes caught and kept by anglers interviewed on the Togiak River, June-September, 1984.

Month	Angler Days Represented By Interviews	NUMBER FISH Caught/Kept								
		Chinook	Sockeye	Chum	Pink	Coho	Rainbow	Char	Greyling	Total
June	113	6/ 2	90/10	84/ 4	1/ 1	0/ 0	68/ 2	41/ 10	16/3	306/ 32
July	378	202/28	355/61	1,184/44	143/19	4/ 0	103/ 5	1,110/148	9/1	3,110/306
Aug.	238	12/ 1	33/ 5	45/ 2	306/ 7	686/153	61/ 1	1,086/ 78	12/2	2,241/249
Sept.	318	0/ 0	0/ 0	0/ 0	130/ 0	2,308/216	101/ 5	940/ 68	12/0	3,491/289
Season Totals	1,047	220/31	478/76	1,313/50	580/27	2,998/369	333/13	3,177/304	49/6	9,148/876

Table 4. Mean number of fishes caught and kept by anglers interviewed on the Togiak River, June-September, 1984.

Month	MEAN NUMBER OF FISH CAUGHT/KEPT								Monthly Mean 1/
	Chinook	Sockeye	Chum	Pink	Coho	Rainbow	Chum	Greyling	
June	.05/.018	.80/.088	.74/.035	+/+	.00/.000	.60/.018	.36/.088	.14/.027	2.70/.280
July	.53/.074	.94/.160	3.13/.120	.38/.050	.01/.000	.27/.013	2.84/.390	.02/.003	8.23/.810
Aug.	.05/.004	.14/.020	.19/.008	1.29/.029	2.88/.640	.26/.004	4.56/.330	.05/.008	9.42/1.05
Sept.	.00/.000	.00/.000	.00/.000	.41/.000	7.26/.680	.32/.016	2.96/.210	.04/.000	10.98/.910
Seasonal Mean	.12/.017	.32/.047	.70/.028	.68/.021	3.46/.460	.32/.011	3.21/.270	.05/.007	8.74/.840 2/

1/ Monthly Mean = $\frac{\text{Total fish caught or kept per month estimated from creel census data}}{\text{Number of angler days represented by interviews}}$

2/ Seasonal Mean = $\frac{\text{Total fish caught or kept estimated from creel census data}}{\text{Total number of angler days represented by interviews}}$

Table 5. Estimated total fishes caught and kept by anglers on the Togiak River, June-September, 1984.

Species	Total Caught	Percent of Total	Total Kept	Percent Kept
Chinook	329	1.37	46	13.98
Sockeye	883	3.53	131	14.8
Chum	1,975	7.99	78	4.0
Pink	1,894	7.57	58	3.1
Coho	9,726	39.18	1,295	13.3
Rainbow	908	3.64	32	3.5
Char	9,008	36.13	758	8.4
Greyling	150	0.60	20	16.7
TOTALS	24,873	100.00	2,418	$\bar{x}$ 9.72

DISCUSSION

Nearly three thousand angler days of effort was estimated to have been spent on the Togiak River in 1984. Effort was clearly dominated by the professional guiding operators (71%) while the recreational private sector made up the balance (29%). Fishermen caught eight species of fishes with Arctic char and coho salmon comprising the largest component of the catches.

Most anglers fishing the Togiak apparently subscribe to a self-imposed catch and release philosophy. This was evidenced by the small fraction (9.7%) of the total catch being killed and kept. Coho salmon were the most likely fish to be kept by anglers. The estimated sportfish harvest of 1,295 coho salmon is less than one-half a percent of the 1984 total run (261,000) of coho to the Togiak River. It would, therefore, appear that little, if any, negative impacts are incurred upon salmon populations returning to the Togiak drainage by sport fishermen.

The effects of the continued fishing at current effort levels are not clearly understood. For example; although anglers documented killing only 32 rainbow (3.5% of that species catch) an unknown fraction of those released are going to die as a result of hooking and handling mortality. Because these fish are resident species they would be theoretically available year after year to anglers for catch and release., With each capture the individual fish again risks the chance of mortality due to hooking or handling.

To assess impacts of use levels, studies need to be continued and data accumulated on angling effort. Additionally, biological data should be collected (age, weight, and length) to monitor effects of angling effort upon catch rates and average size of fishes being caught. Perhaps sampling efforts need only address the resident freshwater species as anadromous species (salmon) are presently sampled by ADF&G.

Sportfishing effort will probably increase on the Togiak River drainage in the future as this area gains in popularity with professional fishing guides and private recreational users. Increased user demands will make growing inroads upon the fishery resources and could result in detrimental effects upon the environment (bank erosion, litter) and decrease the quality of angler trips.

LITERATURE CITED

Cochran, W. G. 1977. Sampling techniques. John Wiley and Sons, New York. 48 p.

Mills, M. J. 1983. Alaska statewide sportfish harvest studies (1982). Federal Aid in Fish Restoration Annual Report of Progress, 1981-82, Project F-9-14, 23 (SW-I-A). Alaska Department of Fish and Game, Juneau. 118 p.