SUBSISTENCE FISHING PATTERNS ON THE TOGIAK RIVER AND THE IMPACT OF SPORT FISHING

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ABSTRACT

This report presents the findings of a study of subsistence salmon fishing on the Togiak River, southwest Alaska, conducted in 1987 and jointly funded by the Division of Subsistence of the Alaska Department of Fish and Game and the Togiak National Wildlife Refuge, U.S. Fish and Wildlife Service. The study had two primary goals. The first was to document subsistence salmon fishing patterns by Togiak and Twin Hills residents, including harvest quantities, targeted species, timing of effort, methods of harvest, and location of fishing activities. The second purpose was to understand the interactions between the subsistence fishery of the Togiak River and the recreational fishery which had grown substantially since 1979. The study was initiated because of growing concerns about conflicts between the two fisheries.

The study used two primary methods of data collection: household interviews and on-river observations and interviews. Subsistence fishermen, village leaders, and sport fishing guides were included in the interviews.

A major section of the report describes subsistence salmon fishing by residents of the Togiak River drainage. The most important species in terms of numbers of fish caught and pounds useable weight were king (chinook) salmon, sockeye (red) salmon (both fresh and spawning), and coho (silver) salmon. Methods of harvest included set gill nets, seines, drifting with gill nets, spears, and rod and reel. Except for spawning sockeye and some fishing for silver salmon, most of the subsistence fishing effort occurred in the lower 12 miles of the Togiak River. A map shows the locations of subsistence gill net sites along the river in 1987, and another depicts Yup'ik place names. The research found that harvest reports based on returned subsistence fishing permits underestimate the total subsistence salmon harvest by Togiak and Twin Hills residents.

Sport fishing effort (angler days) along the Togiak River more than doubled in the late 1970s and peaked dramatically in 1985. Effort has since been lower and relatively stable, but still far exceeds pre 1977 levels. Most sport fishing in the Togiak River is guided. Sport fishers were mobile along the river corridor using skiffs. For the most part in 1987, sport fishermen were flown by their guides to the river each morning for a day's fishing. Anglers target king and silver salmon and Dolly Varden. A map depicts the

location of guided fish camps and observed sport fishing activities along the Togiak River in 1987. Much of this activity was concentrated in the lower river, where most of the subsistence fishing also occurred.

The research documented four kinds of conflicts between the subsistence fishery and the sport fishery. These were:

1. Biological impacts. Togiak residents believed that sport fishing using catch and release methods resulted in a high mortality rate for salmon. They also believed that sport fishermen disrupt spawning salmon and dislodge eggs from spawning areas. They further alleged that hook and release fishing, especially for Dolly Varden, reduces catch rates for villagers using rod and reel to harvest fish for food.

2. Displacement. Sport fishing generally took place at or near areas traditionally used for subsistence fishing. Subsistence fishermen reported that this presence interfered with the operation of nets. Also, incidents of confrontation, such as shouting and throwing rocks, were reported. Such incidents became well-known and resulted in the perception that the sport fishermen were aggressively using traditional sites. Consequently, about half of the interviewed households, many of whom were elders, reported "passing by" such sites when strangers were present to avoid confrontations. They moved to other spots or returned home without fishing. Such incidents also led to the view that sport fishing with rod and reel and subsistence fishing with nets were incompatible.

3. Trespass. In interviews, Togiak residents cited cases of trespass on Native lands and allotments by sport fishermen. This has led to a feeling of a loss of control over these lands and other traditional use areas.

4. Catch and release. Respondents from Togiak expressed strong cultural objections to the practice of catch and release, viewing it as "playing with fish." Such an activity is believed to be offensive to the fish and is contrary to the Yup'ik belief that the proper use of fish is for food. It is further believed that a consequence of such offensive behavior may be the disappearance of the fish.

The report concludes with a summary of the issues and some of the solutions which have been suggested to resolve the conflicts. One suggestion has been for the village corporation itself to develop guided sport fishing operations. This might, it is suggested, provide the village with more control over the uses of the land along the river and the river's resources. Another suggestion, developed by the Togiak Fish and Game Advisory Committee, has been to close a segment of the lower river to sport fishing. It is reasoned that such a closure in the area where most subsistence fishing occurs would separate the incompatible gear types thus addressing the issue of displacement while leaving most of the river still available to recreational fishing.

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PREFACE

This report, based on fieldwork conducted in 1987, was released in draft form in December 1987 in time for a meeting of the Alaska Board of Fisheries. The report provided essential background information on regulatory proposals before the board at that meeting.

Subsequently, the draft report received extensive review. This revised report incorporates the reviewers' comments which helped improve the organization and clarity of the original draft. Updated information on recreational use levels along the Togiak River has been added. Also, the section on mortality rates following the catch and release of salmon has been rewritten using data provided by the Division of Sport Fish, Alaska Department of Fish and Game. The appendix which explains methods for estimating the subsistence harvest of salmon by Togiak residents is also new. Other than these additions, the overall contents of draft report and its conclusions remain virtually unchanged.

Those responsible for the final editing of this report are James Fall, Robert Wolfe, and Janet Schichnes of the Division of Subsistence, Alaska Department of Fish and Game. If there are questions about the report, they should be addressed to the offices of the division in Anchorage, Dillingham, or Juneau.

CHAPTER ONE: INTRODUCTION

STUDY OBJECTIVES

Each spring and summer people from outside the Bristol Bay area arrive in the Togiak Bay region to participate in the commercial fishing industry. For the most part, their activities are restricted to the Bay and to a lesser extent the villages. On the other hand, the Togiak River and Togiak Lake have been largely the sole domain of the local inhabitants even during the commercial fishing season. The residents of Togiak and Twin Hills utilize the river and lake for a variety of subsistence resources and, most importantly during the summer, for the harvest of salmon.[1] As one local person from Togiak told us, "We are not used to seeing strangers on the river."

Since 1979, this picture has been complicated by the development of another activity, sport fishing, which is dominated by people from outside the region. Although recreational fishermen have fished on the river for years, the numbers were relativity low until 1979 when increased effort was recorded. In the ensuing years, effort has fluctuated, with peak numbers of fishermen recorded in 1984. In no subsequent year, however, have numbers of sport fishermen been as low as the pre-1979 levels. The Togiak River has been particularly attractive to lodges and their wilderness camps as the river is situated in the heart of the Togiak National Refuge and is easily accessible by aircraft capable of landing on the river. As a consequence of the large influx of outsiders utilizing the river during the summer and fall, increased tensions and conflicts have been reported between the local subsistence users and the sport fishermen over a variety of issues. This study was commissioned, in part, to investigate the sources of the tensions and conflicts between the two user groups.

The study, which was jointly funded by the Alaska Department of Fish and Game, Division of Subsistence, and the Togiak National Wildlife Refuge, had two general objectives. Because the data on subsistence salmon fishing in the area were incomplete, a primary aim was to document the patterns of

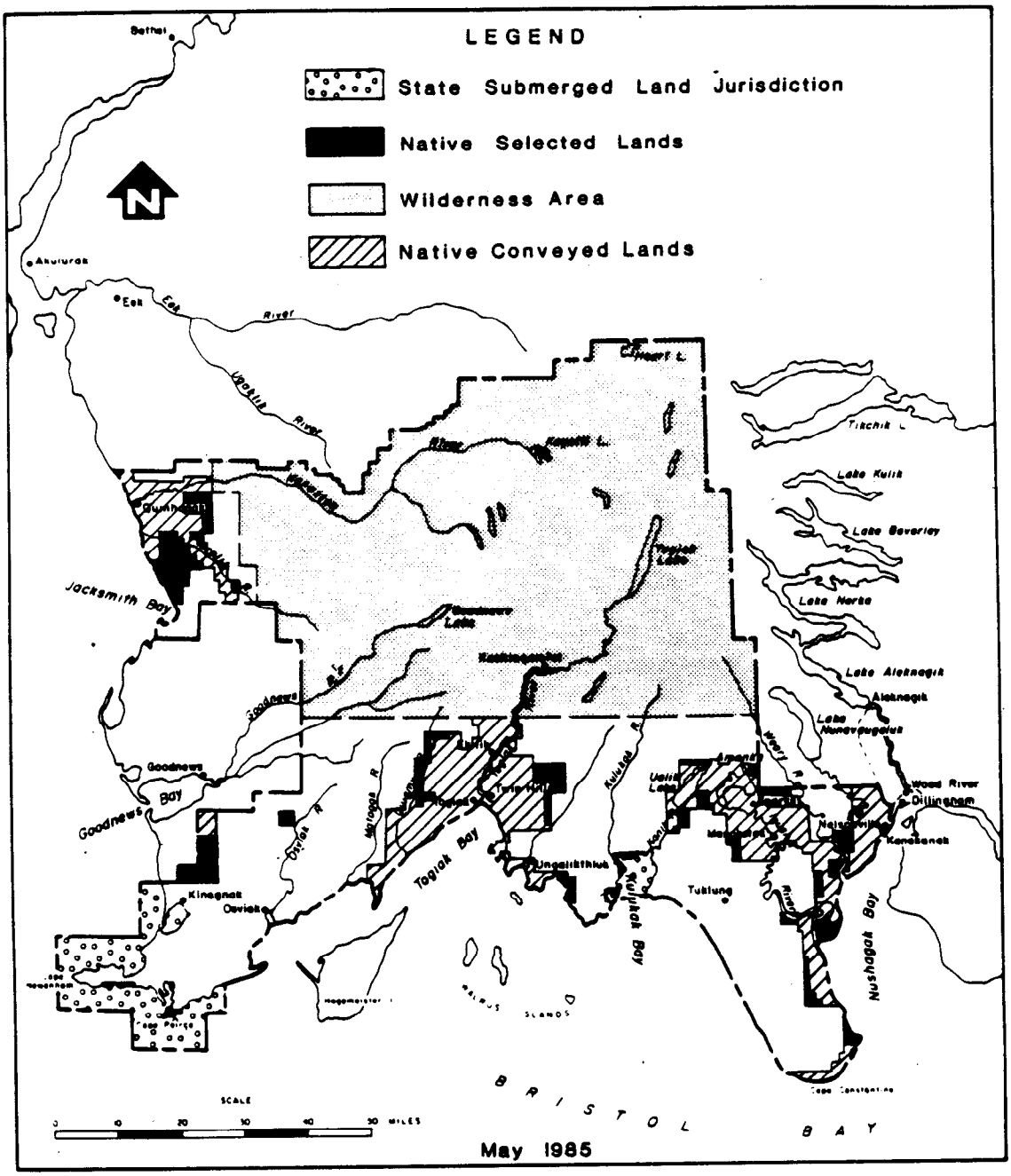
[1] Descriptions of subsistence hunting, fishing, and gathering by residents of Togiak can be found in Wolfe et al. (1984). Wright et al. (1985:32-40) contains a summary of subsistence uses in the Togiak Subregion of Bristol Bay (Togiak, Twin Hills, and Manokotak) including a seasonal round of harvest activities and maps depicting harvest areas. Additional information on the subsistence-recreational conflicts on the Togiak River is contained in Wolfe (1989, 1990).

subsistence fishing in the bay, river, and lake. The goals included data on timing and general locations of subsistence fishing; the species targeted; the means of harvesting various species; and accurate harvest estimates for all salmon species. Special attention was also given to establishing the timing of the sport fishery in relationship to the subsistence fishery. This focus relates very closely with the second objective which was to identify the nature, types, and extent of the impact of the growing sport fishery on subsistence fishermen in the river and lake. In investigating this issue, experiences of local subsistence fishermen were sought that would elucidate the nature of the conflicts and provide a better understanding of the impacts.

SETTING

The Togiak River and Togiak Lake are situated in the heart of the Togiak National Wildlife Refuge, which is located in the northern portion of Bristol Bay region (Fig. 1). The refuge is divided into two parts. The northern part is designated a wilderness area which includes all of the lake and the upper two-thirds of the river. These lands are managed by the U.S. Fish and Wildlife Service. At the time of the study (1987), the wilderness portion had special restrictions on use and required permits for guides to camp along the banks of the lake and river and for air taxis to land. The restrictions included no motorized machinery such as generators and chain saws, although planes, outboards, and snow machines were permitted.

The southern part is a non-wilderness wildlife refuge. The same restrictions do not apply in the refuge's non-wilderness area, and as a consequence all but two of the guided sport fishing camps in 1987 were situated along the southern portion of the Togiak River below Pungokepuk Creek (*Pengurpak*). Nearly all the land in the southern portion, particularly along the river and bay, is held either privately through Native allotments or by two village profit corporations through the Native land selections. The lower river column and all lands that are flooded at mean high tide are state lands and fall under state statutes governing the use of navigable waters and associated sandbars. The state agency managing state lands, including the water column and land below the mean high water mark on navigable rivers is the Alaska Department of Natural Resources (ADNR). At the time of the study, the navigability of the northern



a/ This figure does not indicate the location of Native allotments or the navigability status of rivers in Togiak Refuge. Submerged lands beneath navigable waters are under the jurisdiction of the State of Alaska. The navigability status of many of the water bodies in Togiak Refuge has not been determined.

Figure 1. Togiak National Wildlife Refuge (Source: USFWS 1986)

portion of the Togiak River had not been legally determined. Finally, the fish and game on the refuge are managed by the state. Management of the fish is divided mainly between the Division of Commercial Fisheries and the Division of Sport Fish of the Alaska Department of Fish and Game. The regulations for recreational fishing, commercial fishing, and subsistence fishing are determined by the Alaska Board of Fisheries. It is readily apparent that legal rights and control over the Togiak River and lake areas and wild resources are indeed complex, leaving room for debate and questions.

While flying out to the Togiak River to begin this study, the pilot of the plane informed me that the Togiak River was particularly attractive from guides' and pilots' points of view. The river, he said, is one of the easiest to fly people in and out of with their gear because of long stretches that are relatively straight and deep. Furthermore, he added, it is an easy place to set up a camp with the easily accessible sandbars that rarely flood. Finally, he related, although there are better rivers for rainbow trout, Togiak is an excellent fishing river for king salmon, silver salmon, and Dolly Varden. Subsequent interviews with sport fishing guides and fishermen along with my own observations have supported his claims.

The Togiak River winds gently down to the Togiak Bay from its beginnings in Togiak Lake, which lies approximately 75 river miles from the mouth. The actual depth of the river varies according to the seasons. There are occasions when the lower river is at flood stage, giving the appearance of a lake dotted by small islands, and the channel is almost non-existent. During a long dry period, the river rapidly becomes shallow, making upriver trips hazardous for props and lower units for the inexperienced. Over the years the channel of the river has changed many times and as a consequence many islands, sandbars, side creeks, and false channels characterize the lower portion of the river. Although the upper half of the river has fewer false channels and islands, shifting boulders and debris make it hazardous to navigate, often requiring the use of a jet type outboard by the inexperienced. On the other hand, there are no dangerous white-water stretches which could make raft floating hazardous, even for novices. In fact, the river is relatively calm and flat. This feature makes the Togiak particularly attractive to some of the commercial bush airlines and thrifty fishermen. The airlines simply outfit the fishermen for a fishing float trip and fly them to the upper river to float to the mouth without a professional guide. The price is less than half of guided trips and these trips usually last from four days to a week.

Access to the river from either Togiak or Twin Hills is easiest during higher tides. Even so, a fairly good knowledge is required of the river channels that are difficult to locate when the water only covers the sandbars but not deep enough to cross. Togiak Bay is very shallow, requiring larger vessels with drafts two or three feet to limit their entry to higher tides of over 17 feet. As a consequence, most of the commercial fishing that takes place in the bay by set or drift gill nets is done from skiffs and shallow draft Togiak skiffs (Wolfe et al. 1984). The larger salmon boats that characterize the other districts of Bristol Bay are few in number and usually fish in the deeper bays to the east of Togiak, such as Kulukak Bay.

The village of Togiak is situated on the western shore of Togiak Bay, approximately one mile to the southwest of the Togiak River's mouth. Twin Hills is located about a mile almost due east of the river's mouth and is situated on a major tributary of the river that breaks off from the main channel about 12 miles upriver. This tributary is not navigable running upstream, particularly during shallow periods, although it can be run by experienced boatmen during the early part of the summer. Most of the villagers from Togiak can gain access to the river at anytime because the channel runs very close to the beach at the northern end of the village. However, access to the slough (called *Nasaurluq*) that borders the northern and western half of the village is largely conditioned by the tides. A commercial salmon processing plant is located on the northern end of the village and utilizes the slough to unload fish tenders and fishing boats at high tide.

At the time of the study, the population of Togiak was 635 persons, according to the tally kept by the city administration. Most of the residents are Yup'ik-speaking Alaska Natives whose ancestors have long utilized the region. The present village of Togiak began to significantly increase in population after 1950 with the development of a salmon cannery next to the site of Old Togiak on the eastern side of the bay, and the establishment of a Bureau of Indian Affairs (BIA) school. People began to move into what is now Togiak from small villages up-river as well as small communities south of Togiak and north along the Kuskokwim River. There are many people presently in the village who were born and raised along the Togiak River. The population of Twin Hills, is approximately 75 persons and consists primarily of Yup'ik speakers, many of whom came from Togiak and Quinhagak.

Togiak, like Twin Hills, is not connected to any other community by road. There is a road which connects the cannery at Old Togiak with Twin Hills. Transportation into the villages is primarily by air.

Access by boat is possible but rarely feasible. Running by boat from Dillingham, the nearest regional population center to Togiak, takes many hours requiring substantial fuel and it can be very dangerous. During the spring, summer, and fall, skiffs are the major form of transportation between the villages and to the interior. During the winter, after the river and bay freeze over, travel with snow machines and dog teams is possible, but during the summer and fall, the river is the main route that allows one to get from the coast to the interior regions. The only other form of transportation into the interior region is by plane or helicopter, and the latter is not allowed in the wilderness area. This seeming isolation of the Togiak River from the rest of the world has its appeal to sportsmen, particularly to those wishing to experience a "wilderness" environment. An interesting point in this regard is that the Togiak is one of the few wilderness rivers in the Togiak Wildlife Refuge that is easily accessible by float plane.

DATA COLLECTION METHODS

Field Period and Personnel.

The data for this study were collected by two investigators each conducting field research at different periods in the summer and fall of 1987 (Table 1). The first investigator, Robert J. Wolfe, a member of the research staff of the Division of Subsistence, concentrated on interviews of Togiak residents concerning sport fishing in the river (Wolfe 1989, 1990). This phase of the study was completed during the first part of July 1987. The second investigator, Joseph Gross, on contract with the Division of Subsistence and the author of this report, focused on collecting subsistence and sport fishing information from key respondents in addition to collecting subsistence salmon harvest information from a sample of households. A major focus during this second phase of the research was to make systematic river observations of sport and subsistence fishing activities.

Two local Yup'ik-speaking assistants were hired, one from each of the villages of Togiak and Twin Hills with funds allocated by the Alaska Department of Fish and Game, Division of Subsistence, and the Togiak National Wildlife Refuge. The initial assistants were selected by the respective village councils. The assistant from Twin Hills was to act as the main translator while the one from Togiak was to act as the river

TABLE 1. DATA GATHERING METHODS AND SAMPLE SIZES

METHOD: INTERVIEWS

Topic: Issues

Number of Interviews: 53 persons representing 48 households (35 percent of village households), including 21 elders

Timing of Interviews: Mostly June and July 1987

Topic: Harvest Data and Fishing Activities

Number of Households Approached:	96 (68.6 percent)
Number of Households Interviewed:	52 (37.1 percent)
Number of Usable Interviews:	50 (35.7 percent); 11 HHs headed by elders
Refusals:	6
"Didn't Fish":	38

Timing of Interviews: Mid August; some updated in September 1987

METHOD: OBSERVATIONS ON THE TOGIAK RIVER

Months	Number of River Trips
June and July	4
August and September	23

During August and September, Observed:
135 boats from Togiak with 404 people
55 Togiak boats engaged in fishing activities
30 boat groups were interviewed
504 sport fishermen

guide. However, it was difficult to bring the translator from Twin Hills to assist in Togiak due to uncooperative weather and tides. As a consequence, a second translator was hired in Togiak to assist in interviewing Togiak residents. The Togiak translator was used primarily in the interviewing of persons in regards to sport fishing and in the collection of subsistence salmon harvest data. The funds for this position were allocated by the Division of Subsistence. A fourth assistant from Togiak was hired to replace the guide after the latter injured himself with little over two weeks left in the field study. Funds for this position came from the Togiak National Wildlife Refuge.

It is particularly important to remark that the last assistant hired was extremely important to the successful completion of the study. The principal reasons were that the assistant was a married, middle-aged man with children who not only was an able translator but who was highly skilled and knowledgeable concerning subsistence activities. He knew the river and lake intimately, including the names of important subsistence and cultural places along the river and lake. Most importantly, he was highly respected in the community. In interviewing, he inspired confidence and trust of the interviewee in contrast to the suspicion and often outright hostility we encountered with younger translators. From experiences in the same village with other translators, it became very clear that the effectiveness of a study was dependent not only on the assistant's language skills but more directly on the position that person holds in the community. This point is particularly important if the information one is trying to elicit is sensitive from the villagers' point of view, such as subsistence harvest data. Most of the translators that agencies hire are too young and/or immature from the village's perspective to be effective. Given the fact that most community studies are funded by outside regulatory agencies that are not particularly trusted in respect to fish and game issues, the selection of a research assistant is critical to a successful outcome.

The data collection for this study was primarily based on participant observation, informal interviews of persons, river observations of sport and subsistence fishing activities, and an initial attempt to map the river and lake according to use sites and local names. Although some data were collected in interviews with Twin Hills residents, the majority of the data come from Togiak. The main reason for this was the problem of getting from one village to the other because of bad weather. When the weather was good, most of the time was spent on the river. Therefore, the data used for this study are derived from

Togiak. However, the data collected in Twin Hills are not inconsistent with that collected in Togiak; there were just too few cases to warrant an individual treatment.

Household Interviews

Interviews with the villagers occurred throughout the study, but sport fishing data and harvest information were mainly collected during two different time frames. The first series of interviews focused primarily on sport fishing issues because this period of the study occurred between an active period of king and sockeye salmon and the commencement of a more moderate fishing period for chums. Sport fishing issues also were one of the topics of subsequent interviews during later periods of the study. During later periods, the views of office holders and the other persons involved in the issues were sought. A second series of household interviews was conducted in mid-August in order to establish a base line of subsistence harvest information as well as actual subsistence salmon harvests. Therefore these data are more aptly discussed under two separate headings: data on sportfishing issues, and subsistence salmon harvest data.

Data on Sport Fishing Issues

The general strategy was to interview members of as many households as possible with a view to establishing the nature, types, and extent of the problems local residents had or perceived in regard to sport fishing on the river. An informal, open ended questioning approach was utilized in order to discover the issues of concern and their sources. From the responses given in these interviews, other questions were generated in the open ended manner. Generally the questions asked covered the following four major topical areas:

1. Personal experiences on the river involving encounters with sport fishers. The objective was to get as much information as possible of a personal nature rather than just hearsay material.

Information on each experience included the approximate date of each occurrence, the frequency of such encounters, and the outcome.

2. Perceived problems between subsistence and sport fishing. The questions here related more generally to problems and issues thought to exist between sport fishers and local subsistence users. Many of the problems that surfaced in the interviews were illustrated by experiences of others. Topics included public perceptions of sport fishing, cultural issues, property concerns, and many others. The information gathered through queries into perceived problems often provided specific questions to the next interviewee.

3. Perceptions of certain specific issues. Here we asked specific directed questions about catch and release fishing, rod and reel fishing, rights on the river, and types of interference with subsistence and other local activities. The objective was to elicit responses to these questions if they were not volunteered earlier in the interview. We learned early on that these issues were of central concern to the elders and it was important to determine to what extent their views were generally held.

4. Sources of the concerns. The objective of the questioning here was to determine why certain perceptions were a problem. For instance, why was catch and release fishing believed to be "bad" for the fish and subsistence users? Often this required probing into cultural beliefs and values as well as examining the motivations of subsistence users engaged in fishing activities.

There was a final set of questions asked particularly of the office holders and others concerned with the sport fishing issues. These questions concerned perceived solutions to the problems. This area will be more fully developed in the last section of the report.

The sample of persons interviewed was 53 representing 48 households (Table 1). The 48 households represented 35 percent of the total number of households in Togiak containing 42 percent of the village population. Of the households contacted only five refused to be interviewed. The refusals were mostly women who preferred that we interview their husbands. The sample consists of 21 elders, 16 office holders (some of whom were also elders), and 19 others. The sample included 35 men and 18 women. The ages of the respondents ranged between early 20s to mid-80s. Although the sample was not collected

in a random manner, we consider it to be representative of the experiences and perceptions of the villagers as a whole. In fact, the more we talked with different people, in interviews or just in conversation, it become quite clear that there are certain concerns that were pervasive among the villagers of all ages.

Subsistence Salmon Harvest Data.

As easy as it was to gather information about perceptions of sport fishing, the collecting of information on subsistence salmon harvest levels was as difficult, and for some households, impossible. Of the 94 households approached for interviews on this topic, only 52 provided the harvest information requested, six refused to provide any information, and the remainder either claimed that they had not harvested salmon or that we should return "later." A number of those that claimed to have caught "no fish" we later discovered had harvested salmon. Of the 52 respondent households, only 50 were used in the analysis because two households of the sample received their salmon as gifts from other households.

The reasons for the strong resistance to providing harvest information probably stem from a complex of sources of which two stand out the most regularly: a fear of restrictive regulations, and cultural beliefs relating to animals and the ethic of gift giving. In the interviews, a number of people said that they were reluctant to give subsistence harvest information because the data would be incorporated into the salmon escapement goals and thereby reduce the commercial fish harvest. Others simply believed that harvest information will lead to further regulations restricting the subsistence harvest of salmon. In this case, Round Island was often cited as the case in point. According to a number of the villagers, subsistence harvests of walrus were restricted after harvest data and locations were provided by villagers. The elders often ask, "In the past we didn't have to count, why is it necessary now if not to regulate us?" Second, there is the cultural objection based on a belief that the counting of fish can result in their leaving the area or refusing to be caught. The basis of this belief appears to be that the salmon gives itself as a gift to those that respect and take care of nature and, simply put, one does not count gifts. The resistance, then, to providing harvest information is based on a combination of an absence of trust in the agencies that regulate fish and game resources and cultural beliefs about the negative moral consequences of counting

fish. Although not all of these views are held equally by all persons of the community, they are held by enough to make data collection difficult indeed.

The sample of 50 households comprises 36 percent of the households in Togiak and approximately 43 percent of the population. An effort was made to secure the harvest data from households composed of elder couples and their dependents. The hypothesis was that elders would be much more involved in the harvest of salmon either as subsistence fishermen themselves or by receiving help from offspring. Moreover, past studies at Togiak have indicated that elder couples are nearly always involved in the preparing of subsistence foods, and storing them in a central cache from which foods are drawn by number of interdependent households (Wolfe et al. 1984). However, we were able to secure data only from 11 households headed by elders due, in part, to a reluctance to provide harvest information. Data indicate that the households headed by elder couples do, on the whole, harvest a substantial quantity of the subsistence salmon. In general, the sample appears to be representative of the village pattern as a whole in terms of differential rates of production between households. That is, most of the salmon are harvested by about 30 percent of the households which seems to be an Alaska-wide pattern for villages (Wolfe 1987).

A final difficulty in the harvest survey is in the accuracy of the retrospective recall on salmon harvest for 1987. It was established toward the end of the study that a more accurate estimate could be secured from those respondents willing to provide such information by phrasing the question in terms of "racks" (*initat*) of fish or freezers of fish. *Initaq*[2] refers to the cross-poles on which fish are hung to dry. The entire frame with cross-poles is made up of so many *initat* or "racks". Thus a question may be phrased as, "How many racks of kings did you put up this year" or "How many freezers did you fill with salmon this year?" The draw back is that racks and freezers are not all the same size, requiring measurement of each rack or freezer in order to establish numbers of fish. Generally, each structure has at least four crosspoles for hanging fish but their length may vary as well as the actual number. More work needs to be done in developing a methodology, including language, for the collection of such data.

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[2] An *initaq* (plural *initat*) is a fish rack pole, the part of the rack structure on which the fish are directly hung. *Ker'aq* refers to the fish rack structure itself, including the frame.

The household interviews were conducted over a period of one week, attempting to collect data from as many households as possible. An instrument was developed for the survey by the subsistence staff of ADF&G in Dillingham. Rather than formal elicitation, the information was collected through a more conversational approach. A copy of the instrument appears as Appendix A at the end of the report. The information gathered during the interview included the number of salmon harvested by species, where harvested, who was involved in the harvest, gear used, number of fishing trips, and any problems encountered with sport fishers. People for the most part did not remember the number of trips and the exact timing of the trips although the exact month was routinely remembered. General locations were not a problem as people have fairly regular set net locations that they use depending on the species, but there is a reluctance by many to provide specific set net sites. Nets are mainly used when a large number of fish are desired. Smaller amounts, under ten according to informants, are usually caught with a rod and reel or spear. Recall of net catches was fairly good, but rarely did they include salmon that were caught for immediate consumption or for the weekly meals by these other gear types. Yet all are subsistence harvests in the view of local residents.

Because the harvest survey was done in the middle of August, data on silver salmon harvests and spawned (spawning) sockeye were minimal as the silver run was very late and flies were present in sufficient quantities to make splitting and drying fish not feasible until after mid-September. As a consequence, the data on these two species are limited and most of them were collected casually on the river through observation of racks, and in conversation. Originally, we had planned to return a number of times to specific households to collect additional harvest data, but people did not like that idea and many indicated that twice was enough! In sum, then, the harvest data represent a minimum estimate of the salmon catch rather than a complete tally as many of the households interviewed had not yet finished subsistence fishing. People were still going to Togiak Lake in October to catch spawned sockeye as well as silvers and Dolly Varden.

River Observations.

Another goal of the study was to observe fishing on the river. The intent was to be on the river for at least 4-5 days per week if weather and other factors permitted. During the study period, we made 23 river trips over the six weeks of field research in August and September (Table 1). One of the trips was to the far end of Togiak Lake, about a seven hour round trip. Most of the trips were in the lower portion of the river, below Pengokepuk Creek, although we went to the Geemaq River (*Kiimaq*) four times and the Agulurak River (*Angauryaraq*) a number of times. Toward the end of the study we would only cover the first ten miles of the river as the sport fishing was decreasing above that point and most of the silver salmon subsistence fishing was taking place in this section of the river during the evening high tides.

A Togiak River Observation Guide was developed by the subsistence staff (ADF&G) in Dillingham. It appears as Appendix B at the end of the report. The object of the guide was to gather information not only on catches by species but also to gain as much information as possible concerning fishing methods used, strategies used in site selection, level of sharing sites, and to what extent subsistence fishermen had to deviate from their initial plans. Thus we were able to chart the locations of sites and in many cases learn which sites were better for particular species of fish.

During the course of the 23 days on the river in August and September, 135 boats from the villages were observed holding 404 persons (Table 1). Of these 135 boats, 55 (41 percent) were engaged in some sort of harvesting activity (including rod and reel fishing) at the time observed. The remainder were running the river or a side stream, probably to engage in a subsistence activity or simply to camp and enjoy the river. The number of boats actually interviewed on the river was 30, 55 percent of those observed who were engaged in some form of subsistence activity.

Although interviewing of sport fishermen was not an integral part of the study, a frequent occurrence during river trips was talking to the commercial guides concerning experiences with subsistence users, fishing locations, level of catch by species for themselves as well as the guests, issues concerning catch and release, location of fishing sites, and general problems that they perceive. As a whole, the guides were friendly and cooperative although a few had misgivings about subsistence harvests

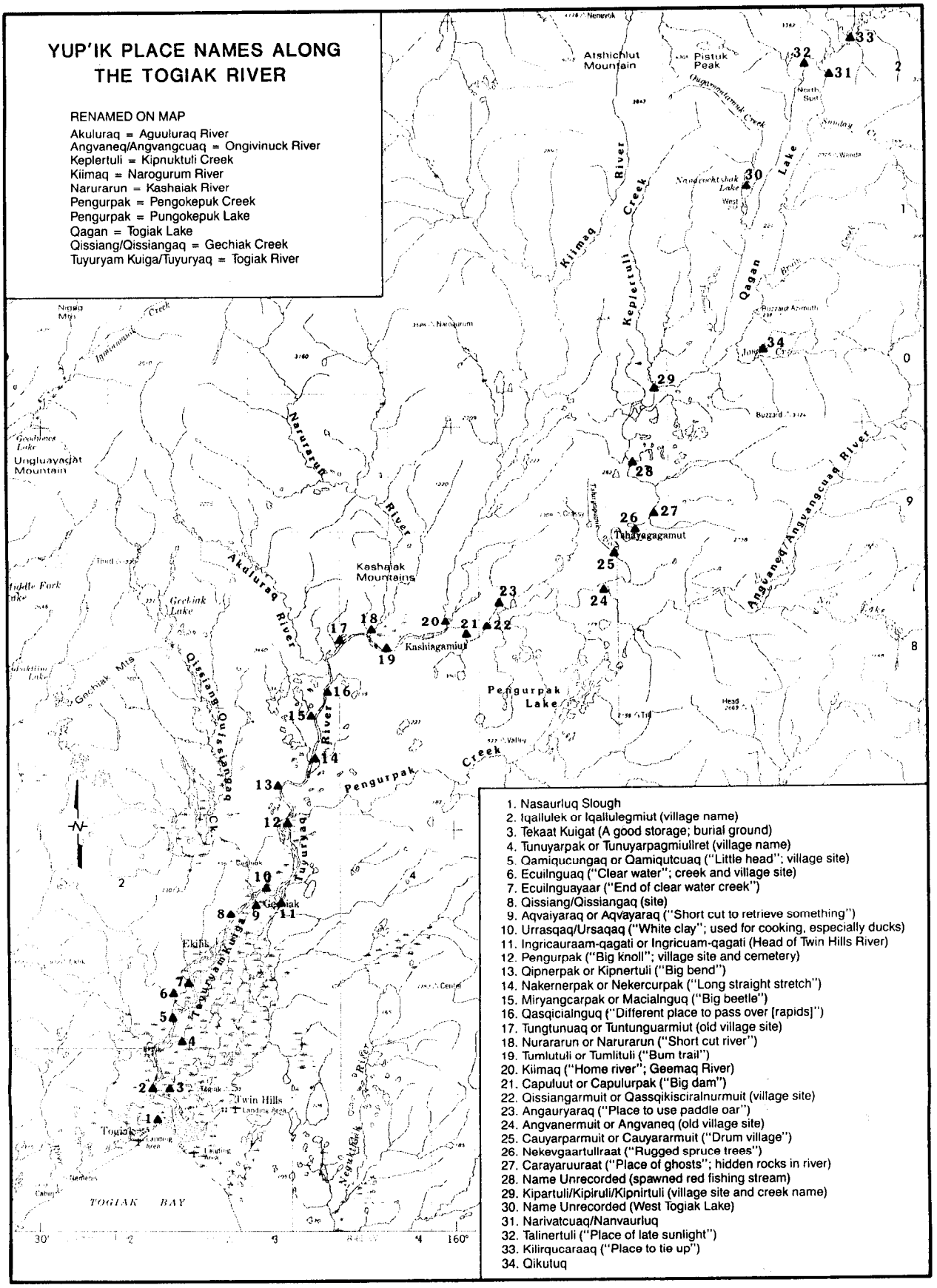
with nets. Many of the guides had been working in the Togiak River for a number of years and had experienced the changes that had taken place since 1979.

Observations were made over the 23 days spent on the river between the July 2 and September 18, 1987. During that period, 504 sport fishermen were observed fishing on the river, floating on the river or in one of the permanent or temporary camps. In order to assist in the observations, the subsistence staff (ADF&G) in Dillingham developed an Observation Guide for Recreational Uses (Appendix C). The major intent of the form was to indicate the nature of activity and the location, with the weather and time of the day noted. Whether a group was guided or not and their numbers were also noted. From this we were able to develop a sense of timing and concentration of sport fishing activities.

Mapping Fishing Sites and Yup'ik Place Names

In the course of running the river an effort was made to map the river according to the Yup'ik names given various sites by the villagers. Upon examining the USGS quadrangle maps available, it was discovered that many of the rivers and village sites are misnamed or not properly located on the USGS quadrangles. Therefore an effort was made to correct this problem. Through the use of two experts, working independently, an incomplete but more accurate map of sites, locations, and names was developed. The method was to first point to problems on the maps, correct them, add other names and sites that were not listed, and then go on the river for an actual sighting. While on the river, other names of other locations would be remembered and noted. From this work, a map was constructed using the new place names (Fig. 2). Although not central to the study, the map of named places does indicate the level and nature of use by the villagers. For example, there are numerous burial sites along the river in addition to named village sites and camp sites known for a subsistence resource and regularly frequented by the villagers.

FIGURE 2



SOURCE: Gross, J., Subsistence Fishing Patterns in the Togiak River Drainage and the Impact of Sport Fishing, 1987. Report to the Division of Subsistence, Alaska Department of Fish and Game, and the Togiak National Wildlife Refuge, U.S. Fish and Wildlife Service.

Reviewed by: Molly Chythlook, Division of Subsistence, Dillingham and John Dyasuk, Togiak National Wildlife Refuge, Dillingham.

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Department of Fish and Game
Subsistence Division

CHAPTER TWO: SUBSISTENCE FISHING PATTERNS

The following three sections contain summaries of the findings from the research conducted in the Togiak National Wildlife Refuge in 1987. This and the next chapter pertain to subsistence fishing and sport fishing respectively. Each will be examined in terms of a number of variables including timing, frequency, types of activities, species targeted, location, and gear types used. The discussion will be organized according to general characteristics of the subsistence salmon fishing and then according to the particular species of salmon (chinook, sockeye, chum, and coho). This is done because to a large extent the other variables are contingent upon specific species targeted. This point appears to hold for both subsistence and sport fishers. After these two descriptive chapters is an examination of the interrelationships between the two user groups as they engage in their respective activities.

GENERAL PATTERNS OF SUBSISTENCE FISHING

Salmon fishing for Togiak and Twin Hills is crucial not only as a source of food but also as a source of income. A study conducted in 1983 (Wolfe et al. 1984) found that the primary source of income for Togiak was the commercial fishing industry. Moreover, the major source of food was found to be fish. It also was shown that the commercial and subsistence fisheries were not only intertwined, but were compatible culturally and economically. For example, fish are used for food in both fisheries, gear in one can be used in the other, the necessary skills are similar, and often those people who commercial fish also fish for subsistence foods. As will be shown, most of the fishing in Togiak Bay is done by fishers with commercial permits, and a substantial percentage of fish used for subsistence are retained from commercial nets. In short, if one is a commercial fisherman, one can be always assured of subsistence catch if one chooses to keep part of the fish for home use.

There are also village residents who are not involved in the commercial fishery of Togiak Bay but who are dependent on the river for their subsistence fish resources. In 1982 (Wolfe et al. 1984:260) there were 43 households out of a total of 108 households that did not have commercial permits. With the

increase in the number of households in Togiak since 1982, the number of households without a commercial permit has increased. Most of the community's subsistence fish are caught in the river by such fishers.

The strategies that are used to harvest salmon are dependent on the species targeted, the time of the season, the nature of the run, the gear to be employed, and the location (Table 2). Other factors such as weather and tides also enter into the equation. A more recent variable has been the presence of sport fishing in traditional subsistence fishing locations. For the elder villagers, among the more common subsistence harvesters along the river during the summer, this is very disquieting. The newcomers are unfamiliar with the fishing traditions on the river or the recognition of rights to given locations based on traditional use or actual ownership of the lands.

The harvest data upon which much of the analysis is based are given in Table 3 and are further broken out in other tables. There were 50 households interviewed that provided data upon which this sample is based. The average size of the household was 5.24 persons which is slightly larger than the average of 4.5 persons per household for Togiak as a whole, based on a population of 630 persons and approximately 140 households.

Participants in the Subsistence Salmon Fishery.

For the most part the residents of Togiak and Twin Hills are the main participants in the subsistence fishery on the Togiak River and Togiak Lake. In general, residents that fish the bay are also commercial fishermen, while those that fish the river particularly during the months of June through August are elders, their young helpers, and those villagers that are not involved directly in the commercial harvest of salmon. Husband and wife teams are common among the elders. However, elder widows often have sons or sons-in-law take them to subsistence fish. The actual social pattern is highly dependent upon the structure and composition of the domestic extended family group (see Wolfe et al. 1984).

TABLE 2. MEANS AND LOCATIONS OF SUBSISTENCE SALMON FISHING, TOGIAK, 1987

SPECIES	TIMING	LOCATION	PREDOMINANT GEAR TYPE	SECONDARY GEAR TYPE	PRIMARY PARTICIPANTS
Kings	Late May through July, but esp. in mid-June to early July	Togiak Bay Togiak River, esp. lower 5-6 miles, at known king holes	Commercial drift nets Subsistence set nets (mesh size = 6-8 3/4")	Rod and reel Drift nets Beach seine	Togiak and Twin Hills residents Commercial fishers Subsistence fishers Elders, with grandchildren Mothers/sons Mother-in-law/sons-in-law
Sockeyes	Late June to mid-August, but esp. from late June to mid-July	Togiak Bay Togiak River, esp. in lower ten miles	Subsistence set nets (mesh size = 5") Commercial set nets	Drift nets Beach seines	Same as kings
Chums	July and early August	Togiak Bay Togiak River	Incidental catch or Targeted with set or seine nets (mesh size = 5")	Spear	When targeted, elders and persons with dogs
Silvers	Mid-August to end September	Togiak River, esp. in lower ten miles	Set nets (mesh size = 5")	Rod and reel Beach seines Drifting	Same as kings and reds but also entire families
Spawning Sockeye	Late- September end of October	Upper Togiak River, Togiak Lake	Beach seines (mesh size = 6-8 3/4")	Rod and Reel Spear	Family-oriented (often multi-purpose) Elders participate less

TABLE 3. REPORTED SALMON HARVEST BY SPECIES, HOUSEHOLD, AND HOUSEHOLD MEMBER, TOGIAK 1987, INTERVIEWED HOUSEHOLDS (n = 50)

Species	Number of HH Interviewed	Average HH Size	Total Harvest	Harvest Per Household	Harvest Per Person
King	50	5.24	505	10.10	1.92
Sockeye	50	5.24	2,256	51.12	9.75
Chum	50	5.24	860	17.20	3.26
Coho	16	5.75	786	49.12	8.50
Spawned Sockeye	7	5.49	195	27.86	5.07
Total	50	5.24	4,602	---	--

Timing of Salmon Fishing

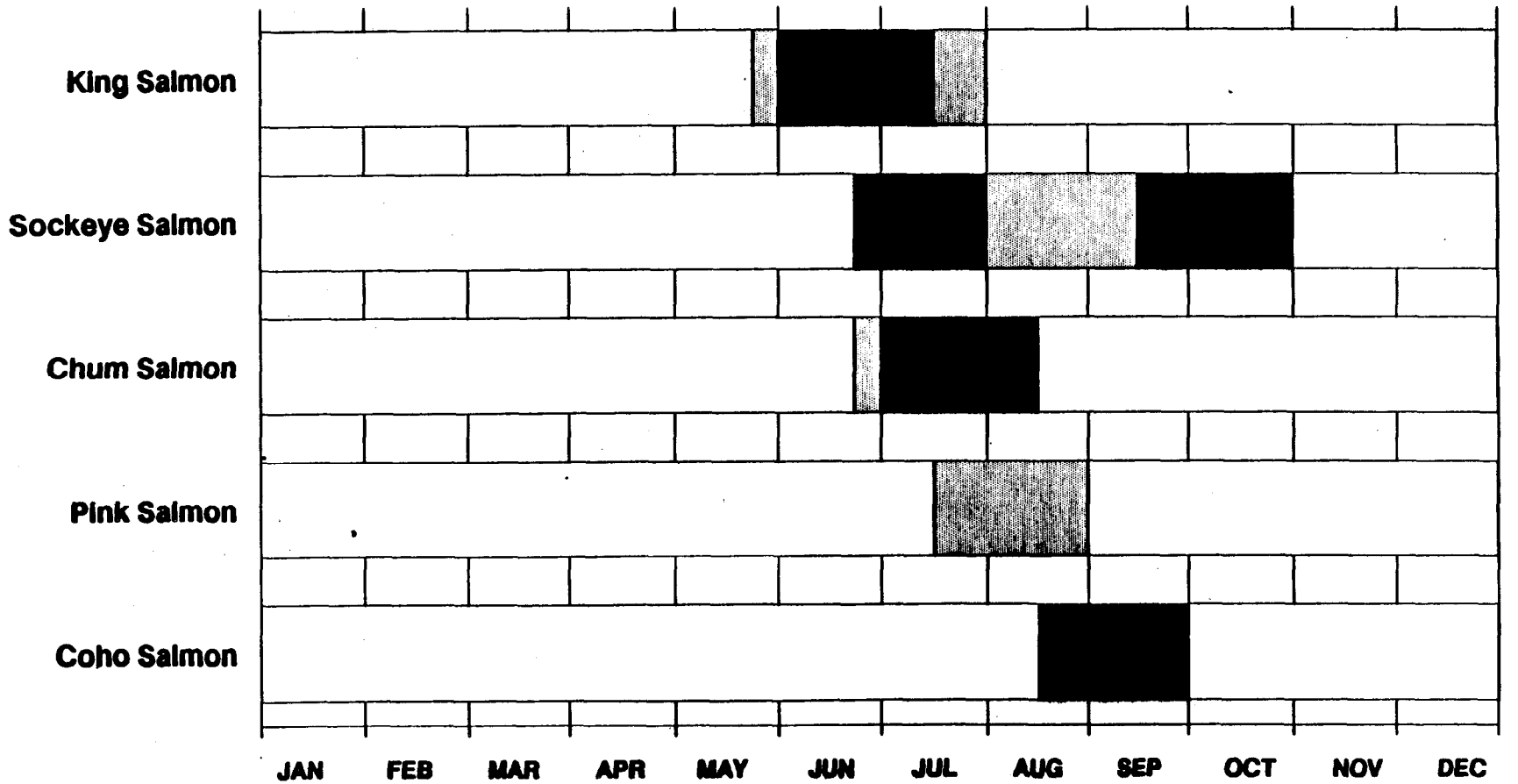
For both Togiak and Twin Hills, subsistence fishing for salmon often begins toward the latter part of May and can last well into October (Fig. 3). During this time frame subsistence fishing occurs more intensely during some periods than others. This variability is due in part to the arrival of targeted species migrating into Togiak Bay and the Togiak River as well as other factors such as weather, conditions required to dry fish, and the strength of the salmon run. As an indication of this variability, we found that 54 percent of the sample fished in June, 66 percent fished in July, 20 percent fished in August, and at least 24 percent fished between the 1st and 17th of September. (The last figure is based only on river observations and rechecks of selected households, not on interviews with all 50 households.)

June and July are the major months during which the king and sockeye runs are present in the bay and the river. Nearly all of the bay fishing is done from commercial nets during commercial open periods. Some fish, usually in small quantities, are retained from commercial nets and brought back to the village for subsistence use based largely upon need. We suspect that the selection of subsistence fish from a commercial net is based upon species targeted at a certain point, household requirements, and personnel available to process fish as well as time to complete tasks, and the weather conditions at the time of the catch.

On the river, most subsistence fishing occurs during tidal floods, as salmon push with the tide into the river and its tributaries, moving to spawning locations. Subsistence fishers for kings and reds, the early targeted fish, are seeking mainly "brights" (fresh fish) since their flesh is the most firm and produces a good dried product. As a consequence, most of the subsistence fishing takes place from the mouth through the first ten miles of the river, rarely farther than Gechiak Creek (*Qissiang*) or *Urrasqaq* (Fig. 4).

In general, subsistence nets are set in the first few hours of the flood and checked or picked at high points in the tide. The length of time a net may be kept in the water fishing is variable, and depends upon the number of fish required, the strength of the run, the size of the tide, and the weather. For example, in early July we went with a subsistence fishermen up river to check and pick a net that had been set in the water the day before. The ten fathom net was loaded with approximately 80 fish, mostly sockeye salmon.

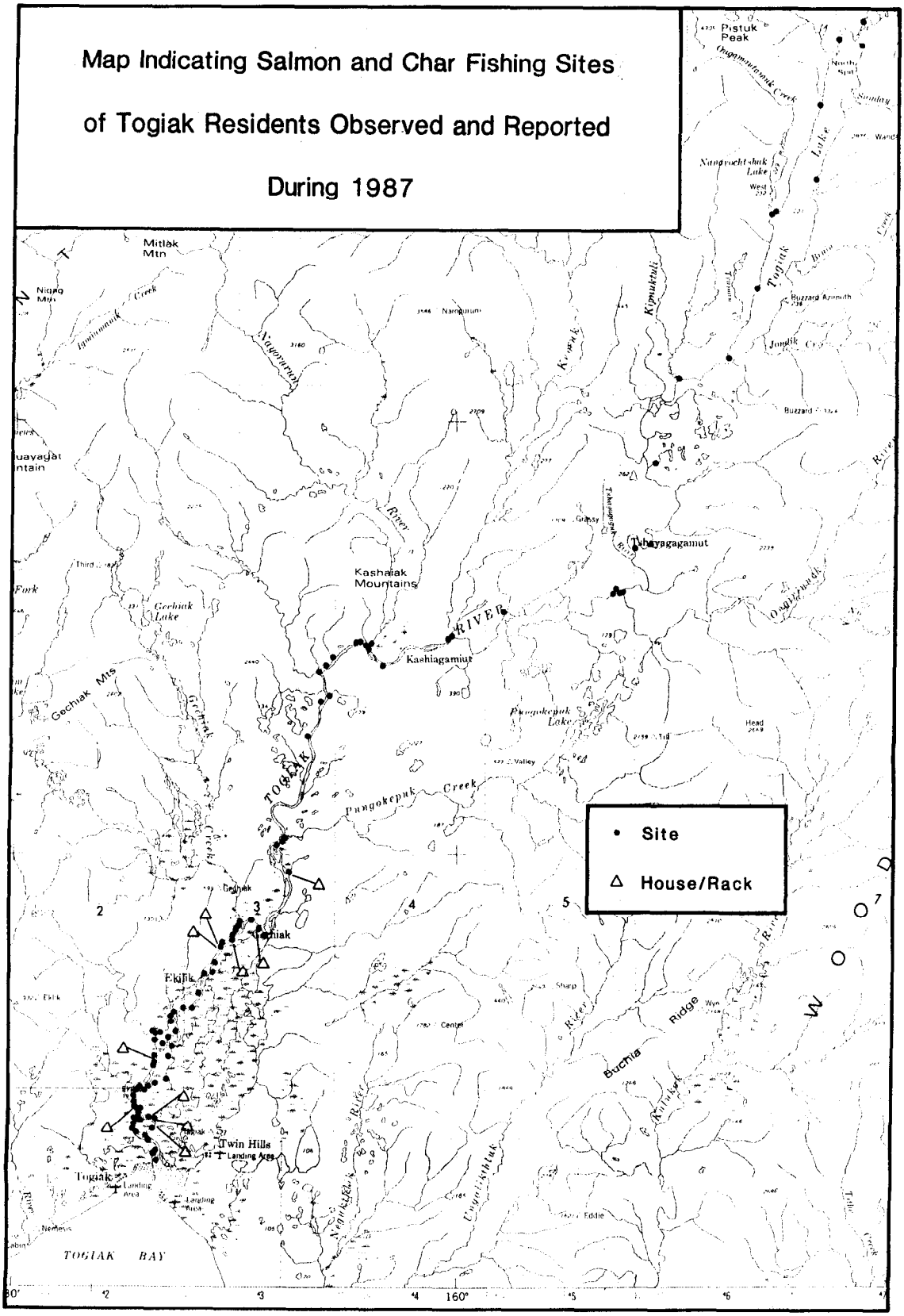
Figure 3. Timing of Subsistence Salmon Fishing, Togiak River



Dark Shading = Usual Harvest Period
Light Shading = Occasional Harvest Period

FIGURE 4

Map Indicating Salmon and Char Fishing Sites of Togiak Residents Observed and Reported During 1987



MAP LOCATION

SOURCE

Gross, J., Subsistence Fishing Patterns on the Togiak River Drainage and the Impact of Sport Fishing, 1987.

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Department of Fish and Game
Subsistence Division

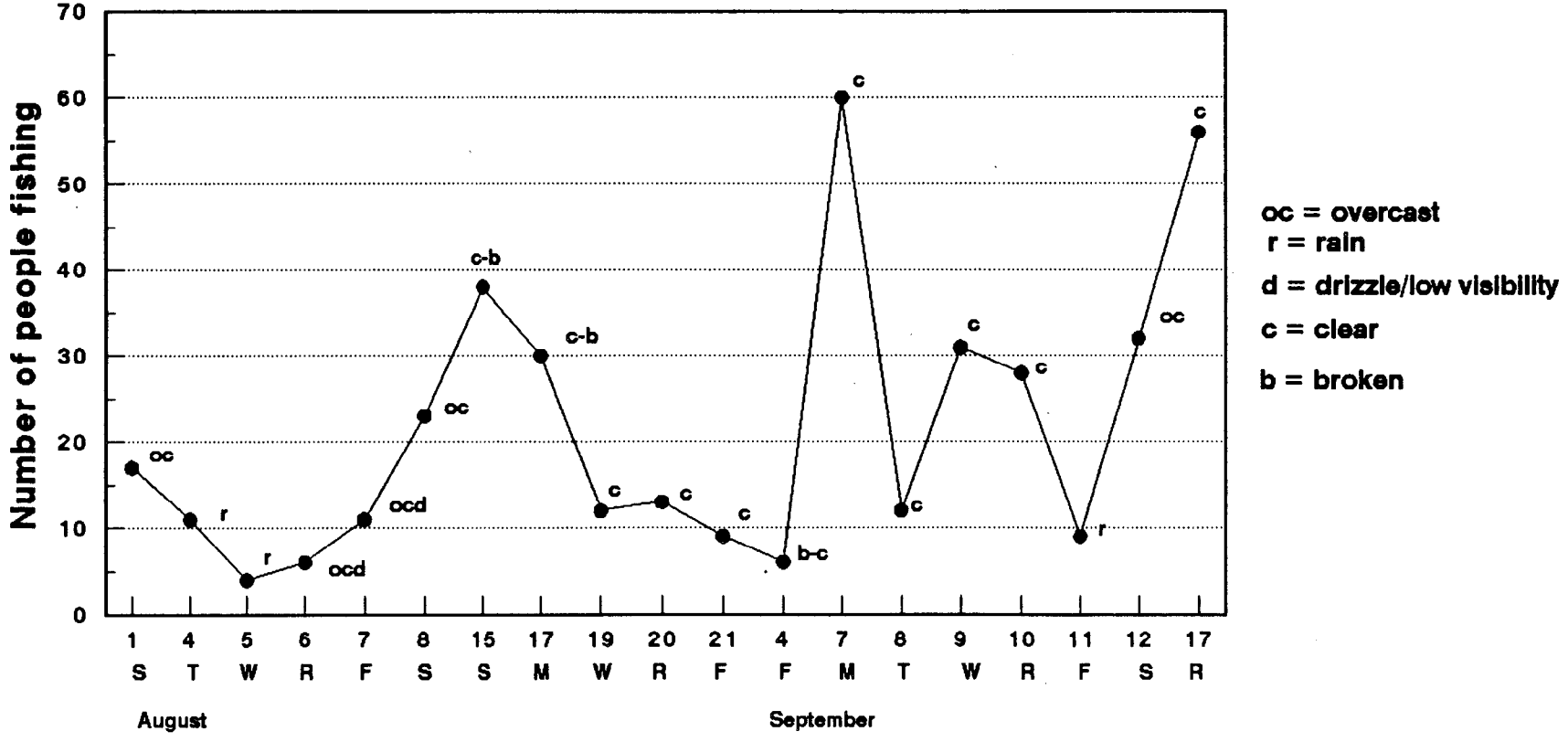
In this case, he had made an earlier harvest the day before. In another case, the net was set at low water, picked at high water six hours later, and checked again approximately 24 hours later during the next similar large, high tide. In this case the fish were not running strong and the assumption was that a small flood would not bring many fish into the river.

Thus, the number of trips made by a household to the river to place and check nets varies considerably. We found that some villagers make only one trip and others made as many as 22 trips to harvest king, sockeye, and chum salmon. On the whole, the average number of trips per household to harvest kings, sockeye, and chum was 5.4. (Not calculated into this figure are the number of trips to check or make commercial sets in Togiak Bay from which subsistence fish were retained.) In fishing the river, many factors determine the productiveness of a set and the need to repeat or quit. Most villagers fish with an idea of the number of "racks" of each species of fish they will need to get through the year. Such targets condition where and when they will fish and such issues as the number of trips are contingent upon these sought goals..

We observed that during commercial closures and weekends or holidays, river activities such as gathering firewood for steam baths, mid-season rod and reel fishing for Dolly Varden, berry picking, herb gathering, hunting, and checking allotments dramatically increased. These are intermittent activities that can be fit into such an irregular schedule. In contrast, subsistence salmon fishing did not necessarily increase at such times (Fig. 5). Subsistence salmon fishing with the intent of harvesting enough fish to get through the year is a more planned activity requiring the coordination of a number of persons. Villagers will leave at any time during the week whenever conditions are best to do subsistence fishing. Even short trips near the mouth of the river are planned in advance. The point is that subsistence salmon fishing, for the villagers, is a serious activity and is not casually done.

During the month of August, we found that subsistence fishing was substantially reduced; 20 percent of the sample fished in August compared to 54 percent and 66 percent respectively for the previous two months. At this time and until the arrival of silvers, chum salmon dominate the run in the river. In 1987 there was an exceptionally high run of chum and the absence of high subsistence salmon fishing activity may not reflect the more regular pattern for subsistence fishing in the river during August. We

Figure 5. Subsistence Activity Observed on the Togiak River, 1987



encountered five subsistence net salmon fishermen during August, two of whom were fishing with set nets. The majority of these fishermen were catching mostly chum salmon as part of the winter food supply for their dog teams.

The run of cohos (silvers) was late in 1987 and, in the beginning, very weak. As a consequence, both the subsistence and commercial fishing patterns were affected. The commercial fishery was closed for the season by the middle of August. Subsistence fishing for cohos did not commence in any major way until the first part of September, when we encountered subsistence nets fishing each time we went up the river for observations. The regular pattern probably is to fish cohos from the latter part of August through September and into the early part of October.

An important point regarding coho salmon fishing is that there is often considerable latitude in determining when to fish. Although the weather may affect the timing of fishing for coho, it is not nearly so determinate as it is in regard to kings and sockeyes that are primarily dried. Coho are either frozen whole or split, dried for a few days, and then frozen. To adequately dry fish, the weather must be cooperative, and villagers say that the fall is too unpredictable to count on enough good weather for thorough drying of salmon. Thus, most of the salmon caught in the fall are dried for only a short period of time and then stored in a freezer rather than in a traditional cache.

Spawned (spawning) sockeyes are the last of the salmon harvested in the fall. Sockeyes spawn in the streams and creeks of the rivers surrounding Togiak Lake where they run in large numbers. It is at the lake that most of the villagers harvest the spawned sockeye. At this time, Dolly Varden also are harvested. This activity takes place by beach seining in the upper portion of the river, usually from the Pengokepuk Creek area on toward the lake. In fact, we encountered families that harvested spawned sockeye, silvers, and Dolly Varden on the same trip, while other households pursued each of the different fish during different trips. The harvesting of spawned sockeyes begins as early as the last week in August and may go as late as the latter part of October. There appears to be considerable latitude in the timing of going to the lake to harvest spawned sockeye as well as in the harvesting of fall Dolly Varden. We found that many people wait until the flies have gone for the year before harvesting and splitting fish in the fall. In 1987, the flies were nearly gone by the middle of September, although this varies between years.

Table 4 shows the timing of species during August and September based on the observed subsistence catches on the river by day. In early to mid August, chums were taken, followed by silvers later in the month. In August nearly all of the fish were caught by rod and reel (Table 5). Respondents reported that there were too few silvers in the river for net fishing and the flies were still out in force preventing people from splitting and drying fish. However in September, as the silver run increased and the flies were reduced in number, the opposite pattern is evident (Table 5). More use of nets developed and use of rod and reel decreased.

In sum, subsistence harvesting of salmon begins in late May to early June in Togiak Bay and ends at Togiak Lake in late October. During that broad time frame, the main salmon pursued respectively are chinook, sockeye, chum, coho, and spawned sockeye salmon. Chums are more incidental than a targeted species except for persons with dog teams. Although sockeye are for most the targeted salmon species, a few villagers reported they prefer chums for drying. There is some variability as to when a salmon species may be harvested but in general kings and sockeye are targeted in June and July, chum, if targeted, in July and August, coho in the latter part of August through September, and spawned sockeye from late August through October. There is a considerable decrease in subsistence gill net fishing activity for salmon between the latter part of July to the latter part of August, a period of approximately one month. The major form of subsistence fishing during this period is with a rod and reel. Harvesting is for more immediate consumption.

Location of Salmon Fishing

Subsistence salmon are harvested in both the bay and the river especially during the months of June through August. As pointed out above, some commercial fishermen harvest subsistence salmon in the bay. Of 50 households for which locational information was obtained, 17 households (34 percent) harvested their subsistence fish strictly from the bay (Table 6). According to villagers, these commercial fishers will split the catch between sale and subsistence until the quantity desired for the latter is reached. There are a number of female commercial set netters that consistently take a portion of their catch for

TABLE 4. TIMING OF SPECIES CAUGHT IN THE TOGIAK RIVER BASED ON CATCH OBSERVED BY DAY[a]

	King	Sockeye	Silver	Pink	Chum	Dolly Varden	Spawning Sockeye
August							
1					8	4	
8	2	4			4		
15		1	2		6	3	15
18			20		5		
September							
4			90				
7			49				1
9			36				
10			30				
11			28	1			1
12			75	1			2
16			15				
17			163			50	30

[a] Number of fish observed caught by groups of local origin during on-the-river field observations. As discussed in the text, 23 trips were made by the researchers on the river over a six week period.

TABLE 5. GEAR TYPES OBSERVED BY MONTH, TOGIAK RIVER, 1987[a]

	July and August	September
Set net	4	19
Seine net	1	2
Spear	4	1
Rod and Reel	20	10
Drift Net	2	0

[a] Number of groups of local origin observed using particular gear types during on-the-river field observations. As discussed in the text, 23 trips were made by the researchers on the river over a six week period. Three of these trips were made at the beginning and one at the end of July.

TABLE 6. LOCATION OF SALMON HARVESTED BY HOUSEHOLD, TOGIAK 1987

	Number of HHs	Percent of Total HHs
Bay Only	17	34%
River Only	22	44%
River and Bay	11	22%
Total	50	100%

TABLE 7. LOCATION OF SALMON HARVESTED BY SPECIES, TOGIAK 1987

	Percent of Harvest					
	King	Sockeye	Chum	Silver	Spawned Sockeye	Total (All Salmon)
Bay Only	11%	11%	9%	7%	0	10%
River Only	43%	47%	30%	93%	100%[a]	51%
River and Bay	46%	42%	61%	0	0	39%

[a] River and Togiak Lake

subsistence purposes. Of the subsistence kings and sockeyes which came from commercial nets, most were harvested by women. Those that harvested subsistence fish strictly from the bay accounted for only ten percent of the salmon catch (Table 7).

On the other hand, 44 percent of all the households did their subsistence fishing only in the river (Table 6). These households caught 51 percent of all the salmon (Table 7). As shown in Table 4, almost all silver salmon are taken in the river beginning in late August. Further, all spawned-out red salmon are harvested in the river near Togiak Lake or in the lake itself. This suggests that subsistence fishing is predominantly a river activity.

Table 8 indicates the distribution of the subsistence net fishing sites observed and reported to the investigators. Figure 4 shows many of the locations utilized by village subsistence fishers over the course of the salmon harvest. There were 95 subsistence net fishing sites observed or reported along the Togiak River during the field study. These are sites where nets are operated for harvesting salmon for subsistence uses. Nets were concentrated in several areas. The largest concentration was in the first 12 miles of the river, from the river mouth upriver to about Gechiak Creek (*Qissiang*). In the lower 12 miles there were 55 net sites or 4.6 net sites per river mile.

The concentration of nets diminished substantially in the remaining 61 miles of the drainage. Above Gechiak Creek to Pungokepuk Creek (*Pengurpak*), a five mile stretch, there were seven net sites, or about 1.4 per river mile. This includes three nets at 17 mile at the mouth of Pungokepuk Creek. Above there, the frequency of net sites is less than one net site per river mile. There are net clusters at 27 mile at the Nayorurun (also called "Kashaiak") River (*Narurarun*) mouth (five nets) and 41 mile at the Ongivinuck River mouth (*Angvaneq*) (four nets). Otherwise, the nets are spaced along the river, typically occurring at the mouths of rivers and sloughs entering the main Togiak channel. There are at least nine fishing locations recorded along the 15 miles of Togiak Lake.

Most subsistence fishing for the early run of kings and reds occurs in the first ten miles of the river, between the mouth and the Gechiak Creek and *Urrasqaq* areas. The elderly, especially, tend to fish closer to the mouth while the younger and more agile fishermen may go to more out-of-the-way locations. Most fishermen do not fish from their own allotments but rather select sites for their ease of accessibility and

TABLE 8. TOGIAK RIVER SUBSISTENCE NET FISHING SITES OBSERVED AND REPORTED

Stretch of River[a]	Number of Net Sites	Nets Per River Mile	Number of Houses or Racks	River Miles	Cumulative Miles
River Mouth to Gechiak Creek	55	4.6	8	12	12
Gechiak Creek to Pungokepuk Creek	7	1.4	2	5	17
Pungokepuk Creek to Ongivinuck River	19	0.8	1	24	41
Ongivinuck River to Togiak Lake	5	0.3	0	17	58
Togiak Lake	9	0.6	0	15	73
Total	95	1.3	11	73	73

[a] The Yup'ik names for these places are as follows (see also Figure 2):

Gechiak Creek = Qissiang or Qissiangaq
Pungokepuk Creek = Pengurpak
Ongivinuck River = Angvaneq or Angvangcuaq

known production capabilities. If a site is located on someone's allotment, permission is obtained or some other local etiquette is used. We have not heard of disputes arising between villages over the use of fish sites or temporary use of allotments.

Although most of the net fishing for kings, reds, and chums takes place in the lower portion of the river, use of the entire river and lake is a regular feature of village subsistence throughout the spring, summer, and fall. The portion used or site utilized to a large extent is dependent upon the type of activity of the subsistence user. Table 9 indicates some of the activities observed during the months of August and September. During the month of August much of the activity centered on rod and reel fishing, collecting firewood, and pleasure trips on the river. Subsistence net fishing was not common as the data on types of gear in Table 5 indicate. However, in September the picture changes dramatically not only to an increasing number of fishing activities observed on the river (Table 9) but there is a shift to more subsistence fishing with nets (Table 5) as well as many more cases of hunting and berry picking with a reduction in rod and reel fishing.

Gear Used in Salmon Fishing.

Residents of Togiak and Twin Hills use a variety of gear types to harvest subsistence fish. The type of gear selected depends upon the species targeted and the purpose of the harvest. Table 2 indicates that over the course of the field study at least five distinct types of gear or methods were used for subsistence fishing. For the most part, we found that the set net was the most usual method for harvesting salmon for the purposes of splitting and drying or freezing salmon for winter consumption. It was the predominant method observed during September for the harvest of silvers. According to interviewed households, it also was the predominant method used in the river during June and July for harvesting kings and reds, and for harvesting spawned reds in September and October. Because the net is set in one area and left for at least a tide or two, it is a slower method of catching fish unless the run is particularly strong at the time the net is set in the water. The set net is placed at the mouth of a side channel perpendicular to the main one with the assumption that some of the fish will move in that direction. The productiveness of a set net requires a

TABLE 9. ACTIVITIES OBSERVED BY SEASON, TOGIAK RIVER 1987[a]

Activity	July and August	September
Fishing	23	29
Hunting	1	8
Berry Picking	1	3
Collecting Firewood	11	1
Picnics	8	6

[a] Number of groups of local origin observed engaged in activities during observations on the river. As discussed in the test, 23 trips were made by the researchers on the river over a six week period. Four trips were made in July.

knowledge of the more productive side channels, when to use them, and length of set required. In some cases, 24 hours is not unusual to leave a set net without checking. In other cases, when the run was fairly strong, six hours was the more common interval between net checks. We have observed a 25 fathom net, located six miles above the mouth, "plugged" with silver salmon in a single set of four hours.

Set nets range in length from 10 to 25 fathoms, and the length used is determined to some extent by the site location and the number of fish desired. Only so many salmon can be caught or gilled on a ten fathom set before it fills up or is "plugged". Thus even if one left a net out 24 hours in a heavy run, it would not continue to fish after a certain percentage of the mesh were filled with fish.

The size of the mesh varies according to species targeted. If kings are primarily sought early in the season or spawned reds toward the end of the season, king gear is used, generally with a mesh size of 6-8 3/4 inches. If reds and silvers are targeted, red gear is used with a mesh size near five inches.

Beach seining (also called round-hauling) is commonly used for harvesting Dolly Varden in the April-May and September-October, and spawned reds at Togiak Lake in the fall. Some respondents reported beach seining is occasionally done with salmon when the fishing is primarily for dog food. It is also done in cases where there is a limited amount of time and many fish are required. At certain times it is very quick and efficient requiring at least two persons, one in the boat and the other on the beach. This technique is particularly good for "holes" where fish hold-up to "rest" before running upstream or in areas where they rest after spawning.

In beach seining Dolly Varden, mesh size is approximately three to four inches. The reason fishers give for not using seine webbing (about 1-2 inches) is that the small Dolly Varden cannot escape if such small meshed net is used. They believe this would dangerously reduce the river's Dolly Varden population. It is said that a number of years ago village residents fished for Dolly Varden with seine webbing but stopped the following year when they observed a large decrease in the number of large Dolly Varden. They attributed this decrease to an over harvest of small fish which would have been the larger ones the following year. Villagers were aware that this conservation measure was needed to insure continued harvests of Dolly Varden.

Drifting a net, like seining, is a method used by some people who want to catch most of their subsistence fish in one trip. Most drifting took place near the mouth of the river. Usually a main channel is selected with a long straight run to a point of an island. We have only observed four cases where drifting was done, of which two cases involved the same people.

Although rod and reel fishing is not classed by state regulations as a subsistence method, the way in which the villagers use this gear type and the underlying motivations are not different from net fishing. We were told by a large number of villagers that they use the rod and reel when only a few fresh fish are required for consumption within a few days. If large quantities of fish are desired to be dried or frozen then nets are used. For almost all respondents, the motivation for using rod and reel techniques is to catch small quantities of food and not to catch a fish for the joy of the struggle or other recreational values. Thus, rod and reel is a more conservative approach to subsistence fishing when the goal is immediate consumption.

The use of spears in Togiak is legal and they are used for similar purposes as rod and reel, selective fishing of fresh fish for immediate consumption. However, we observed that they were used primarily to harvest spawned reds and, occasionally, silvers.

SALMON SPECIES AND SUBSISTENCE PATTERNS

As just shown, the timing, location, gear type, and personnel of subsistence fishing vary to a large extent with targeted species. In order to provide a more detailed picture of subsistence fishing, each of the four salmon species will be discussed in turn.

Chinook (King) Salmon.

King salmon are a highly prized fish at Togiak. They are sought by both commercial and subsistence fishermen. The first king of the season is usually not sold but consumed by the fisherman and friends. Those harvested for subsistence are often cut into strips and dried on racks for most of the

summer. It takes a considerable amount of time for kings to properly dry. Those not dried are frozen and consumed later in the winter.

Kings constitute a high percentage of the subsistence fish harvest if converted from actual numbers to pounds. Table 10 presents the reported salmon harvests by the interviewed households and other households with subsistence permits (cf. Table 3). Assuming that this sample is fairly representative of the village in terms of the relative number of high, low, and inactive producers, we expanded these reported harvests to the village as a whole (Table 11). (Appendix D describes the expansion procedure.) In terms of numbers, kings constitute 10.1 percent of the total salmon harvest estimated for Togiak in 1987. On the other hand, if the estimated numbers are converted to useable pounds, kings constitute approximately 23.0 percent of the total estimated salmon harvest. Thus kings currently are an important and major part of the subsistence diet for the village.

King salmon are the first salmon to enter Togiak Bay (Fig. 3). They can begin running into the bay as early as the latter part of May and continue intermittently into September. However, the major run is in June and July. As the run progresses, usually close to the middle of June, subsistence fishing picks up in the river and lasts for kings well into the month of July. From the sample of households, we found that 70 percent of the kings were caught during the month of June.

There is not any special time during the day or week for king fishing. Timing is really a matter of river conditions, nature of the run, location, and commercial fishing openings. Occasionally the river is at flood stage which inhibits subsistence fishing. If the run is weak, villagers may wait until the run strength increases or rely on commercial catches to see them through the beginning.

As noted above, the early kings are generally caught in the bay and, as the run progresses and builds, river subsistence fishing becomes more common. In the bay, subsistence harvests of kings are taken from both drift and set gill nets. While observing the commercial deliveries at Togiak Fisheries processing plant at the end of July, we saw three boats sell their reds and chums and keep their kings. Villagers have told us that keeping part of the commercial catch for personal consumption, especially the kings, is a common practice. Catch information from the sample indicates that 11 percent of the subsistence kings harvested were caught by fishermen who fished only in the bay (Table 7). As Table 7

TABLE 10. REPORTED TOGIAK SUBSISTENCE SALMON HARVESTS, 1987.

Group:	N	Kings	Sockeyes	Chums	Pinks	Cohos	Spawned
High Harvesters:							
Permit and Interview[a]	8	319	1,118	399	1	354	45
Interview Only	8	142	557	397	2	475	110
Sub Total	16	461	1,675	796	3	829	155
Means for High Harvesters:		**28.8**	**104.7**	**49.8**	**0.2**	**55.3[b]**	**d**
Other Harvesters:							
Permit and Interview[a]	5	51	348	52	1	53	0
Permit, No Interview	7	59	215	164	0	259	8
Interview Only	29	130	740	149	5	122	10
Subtotal	41	240	1,303	365	6	434	18
Means for Other Harvesters		**5.9**	**31.8**	**8.9**	**0.2**	**24.1[c]**	**d**
Reported Harvest Totals	**57**	**701**	**2,978**	**1,161**	**9**	**1,263**	**173**

[a] When a discrepancy existed between the two data sources, the higher harvest figure was used for each species.
[b] N = 15 households for whom data are available. Some interviews were completed before fishing for silvers began.
[c] N = 18 households for whom data are available. Some interviews were completed before fishing for silvers began.
[d] Because of the small sample size, spawned sockeyes are not included in expanded harvest totals.

TABLE 11. ESTIMATED SALMON HARVESTS BY TOGIAK RESIDENTS, 1987

A. Based on reported harvests (Table 10)

Species	Number	% of Total	Pounds[a]	% of total
King	701	11.5	9,807	25.7
Sockeye	2,978	48.7	15,188	39.8
Chum	1,161	19.0	6,386	16.7
Pink	9	0.1	26	0.1
Coho	1,263	20.7	6,732	17.7
Total	6,112	100.0	38,139	100.0

B. Based on Expanded totals (See Appendix Table 2, Method D)

Species	Number	% of Total	Pounds[a]	% of total
King	1,363	10.1	19,068	23.0
Sockeye	6,005	44.4	30,626	37.0
Chum	2,233	16.5	12,282	14.8
Pink	20	0.1	57	0.1
Coho	3,903	28.9	20,803	25.1
Total	13,524	100.0	82,836	100.0

[a] Numbers of salmon were converted to pounds useable weight using the following factors. The source for the average round weight of commercially-taken salmon in the Togiak District is the Bristol Bay Annual Management Report (ADF&G 1989:253-255).

	Average Round Weight, 1987, Lbs	Factor	Useable Weight, Lbs
King	19.43	.72	13.99
Sockeye	6.89	.74	5.10
Chum	7.43	.74	5.50
Pink	3.91 (1986)	.73	2.85
Coho	7.11	.75	5.33

indicates, those that fish both the bay and river harvested 46 percent of the subsistence kings in the sample, thus the exact percentage caught in the bay is not known. Those that fished only the river caught 43 percent of the kings (Table 7).

Within the river, there are a number of well known "king holes" where villagers set their subsistence nets. Most of the king fishing takes place at these sites within the first 5-6 miles of the river. Figure 4 shows the various sites used by villagers. The elderly frequently use the closest sites for fishing as they are located near the main channels, while others may use king sites farther up and out of the way requiring agile maneuvering of the boat. The good king sites, because they are few in number, are used by a number of people who share according to local tradition and planning. Villagers know in advance who is going and where, so that conflicts over sites are not at issue. On the other hand, the sport fishermen also like to fish these sites and they are not on the same site tenure system. Thus many conflicts between the two user groups are reported during the king fishery. River fishing for kings requires careful timing and access to the limited number of king holes in order to maintain customary subsistence uses.

The most common type of gear for king fishing is gill nets of about 6-8 3/4 inch mesh. Although after the 15th of June king gear is generally restricted in the commercial fishery, it still may be used in the subsistence fishery. When king gear is used the incidental catches of sockeye and others are reduced to only the very large ones. Although we have heard comments to the effect that beach seining techniques are occasionally used with a gill net for kings or reds, we never observed it. Similarly, drifting a gill net for kings in the river is probably rare because kings would be difficult to select for in the river channel. Basically, the most common form discussed by villagers is the set gill net positioned off of entrances to various "king holes".

In August, we did encounter two cases of villagers using the rod and reel method to catch kings at one of the "holes". In fact, one villager interviewed told us that he caught 35 kings for subsistence use in June and July with rod and reel. On the whole, however, most rod and reel fishing is used for Dolly Varden, silvers, and to snag spawned reds.

We have not found any particular type of people who would be more likely to subsistence fish for king salmon. Generally, commercial fishermen, both men and women, retain subsistence fish from their

commercial nets. Elderly couples, or grandparents and grandchildren, commonly set subsistence nets in the river during the commercial season especially during the king and red runs. Sons and sons-in-law may take their mothers or mothers-in-law to a site on a weekend. The minimum pattern of harvesting and processing is for a pair of villagers, one of which is usually a female for splitting and making strips, to work together. Generally a male will run the boat, set the net, and pick the fish from the net usually with the help of his spouse or one of his male children, grandchildren, or other relative. Occasionally others may be included in the project but the core of the operation is a pair, allowing for the traditional division of labor according to sex. On the other hand, if fish are retained for subsistence purposes from a commercial set net, the entire process may be done by a lone female. That is, she will harvest the fish from the net, and split and dry them by herself.

Sockeye (Red) Salmon.

Overall, sockeye salmon are the most harvested fish in Togiak, especially if the early season fresh sockeyes and spawned sockeyes are combined. Average household catch from the interviewed sample is 51 sockeyes or nearly 10 sockeye per person, excluding spawned-outs (Table 3). Expanded to the village, Table 11 estimates that the sockeye harvest, excluding spawned-outs, comprised 44.4 percent of the salmon harvest. Converted into useable pounds, early sockeye comprise 37.0 percent of the total pounds harvested estimated for Togiak during the 1987 season. For the village as a whole, the sockeye harvest was 218.8 pounds per household. From the sample, the average household harvest was over 240 pounds per household. Only eight households in the sample did not catch any sockeye. If spawned sockeye are included in this figure, then seven households did not harvest sockeye. Of these seven households, four had fresh fish given to them, and the other three are dependent on parental households for most of their processed subsistence fish, although they did catch a few kings. In short, sockeye, like kings, are highly desired fish.

Togiak Bay's sockeye run begins slowly toward the end of June and peaks somewhere in the second week of July (Fig. 3). In 1987, sockeye were still being caught in the bay well after the middle of

August. As with kings, the early reds are often caught in commercial nets and as the run progresses and increases in volume the river is fished more regularly. By fishing for the reds early in the season, one can also avoid catching a large number of chum which arrive in force later than the reds. The exact number of reds caught in the bay is not known, but from the sample of those fishing only in the bay, 11 percent of the reds were caught, while those fishing only the river caught 47 percent of the reds (Table 7). Thus, similar to kings, more reds are caught in the river. Even though a sizable number of commercial fishermen harvest fish for subsistence uses, many more fish are harvested by those engaged in strictly subsistence fishing. Yet there are a number of female commercial set netters that consistently take a portion of their commercial catch for subsistence purposes.

Reds, like kings, are caught, split, and hung on the racks early in the summer. Wet weather may inhibit the process. Mold, flies, and other insects can also be problematic. Although some reds are frozen, villagers report that most are spilt and dried. In August, one could still find reds drying on racks that were caught in June or July.

Most of the river fishing for sockeyes is done in relation to the tides. A net is set during the first few hours of the flood and then picked after the high or sooner or much later depending on the strength of the fish run and to what extent other fish such as chum are also running. The actual timing for catching reds is dependent upon the run itself and thus is variable from year to year. Generally, the red pattern is very similar to that discussed for the kings. Most reds in June and July are taken in the lower ten miles of the river, from the mouth to *Urrasqaq*. In contrast to the kings, villagers never spoke of good "red holes". Most reds are caught off points close to the main channels of the river and other known holding spots. There are a number of side creeks or rivers above nine mile in which reds spawn and where some of the subsistence harvesting is done as well as closer to the mouth.

Each year during the months of September and October, villagers travel by skiff to Togiak Lake or a few select spots just below the lake to catch spawned sockeye. Only the humped males are sought so a king net is used to catch them thus allowing the smaller females to slip through the mesh. The most desirable are those that have just turned red and before any white begins to show. The flesh is white and

is considered by the locals to be very delicious. Often the hump is eaten raw on the spot while the fish are being split.

Most of the villagers were beginning to go to the lake as the study was drawing to a close so we were unable to observe and record the quantity of the spawned reds harvested. From a sample of seven households that had already fished for spawned reds before the close of the study, the average harvest was 28 fish per household or approximately five per person (Table 3). The extent to which these figures are representative of other household catches is unknown but they do indicate the beginning of the season for extensive use of the upper reaches of the river and lakes by the local subsistence users. Nearly all of the reds caught by the seven households were caught the last week in August or the first two weeks of September (Table 4). The last day on the river, September 17, we observed at least 12 boats running up river to the lake, reportedly to fish for spawned reds.

The gear used to catch sockeyes are nets with a mesh size close to five inches. The length of the net varies between 10 and 25 fathoms depending on location of the site and the number of fish desired. Because of limited observation time during June and July, the researchers observed only one case where reds were the primary target. This occurred in the first week of July which would be the period where the red run is increasing. The gear used was a ten fathom set net that was set the day before and picked during the flood. Other methods such as beach seining and drifting were not observed as techniques for reds though reportedly they may be employed. We have observed the use of rod and reel to harvest spawned reds by snagging them. We also have observed the use of spears to harvest spawned reds. Many of these cases were observed in August long before the annual run to the lake to harvest spawned reds on a much larger scale.

The number of trips a subsistence fisher makes up the river to harvest sockeyes is a function of quantity required, run strength, and fishing conditions. If one has a goal of 100 reds, for example, and one begins to fish in early June, numerous trips will no doubt be made before the goal is achieved. On the other hand, many of the elders that we talked to indicate that they wait until the run builds in the river before they begin to fish.

The technique used to catch the spawned reds at the lake is by beach seining, according to many villagers. After they are caught and split they are dried for a few days. Then they are taken back to the village and stored in freezers or refrigerators if for immediate consumption. A few will dry them over a longer period if the weather is good, that is, not too moist and some wind. By and large they are not handled as are fresh sockeye that are moist from the oils and require more time to dry.

Similar to king fishing and processing, the division of labor for producing reds as a finished food usually includes at least one female. Harvesters can be either male or female but processors tend to be female. Thus coordination of personnel is a basic requirement for large scale salmon subsistence fishing and processing. On the other hand, fishing for spawned salmon is a more family oriented activity. Families go to the lake to harvest salmon as well as to relax and enjoy the lake and its surroundings. Other activities such as hunting and berry picking may be included on the trip. We have had a few of the elders tell us that they do not go to the lake anymore because of stress and strain of such a long trip. In such cases, we have been told, others will bring them spawned reds. Moreover, many people who have not been directly involved in subsistence fishing for kings and reds go to the lake to harvest the spawned reds. In short, there is a shift in the make-up of the participants for lake fishing in that elderly villagers are not so involved.

Chum (Dog) Salmon.

Chum salmon are an incidental catch to fishing for sockeye and king salmon. Although 1987 proved to be one of the biggest chum runs in the monitored history of Togiak Bay and Togiak River, it is neither a major money fish for commercial fishermen nor is it a fish with high demand for subsistence uses. The 50 households in the sample (Table 3) caught an average of about 17 chums, primarily during the months of July and early August. In the interview sample, this compromises 18 percent of the total catch. Expanded to the village as a whole, the estimated chum harvest is about 16.5 percent of the total catch (Table 11). Converted into pounds of useable food, chum constituted 14.8 percent of the harvest (Table 11). If chum were a targeted species, many more pounds could have been easily caught in the bay or

river. In fact, the chum dominated the run from mid July until about mid August when silvers begin to appear in large numbers.

In the past, chum were used in greater quantities to feed dogs. But the number of dog teams in Togiak and Twin Hills are few and do not require comparably large numbers of fish to maintain them. During August, as the river became shallow from lack of rain, more and more spawned chum could be found dead on the recently exposed sandbars.

There is no special gear used to catch chums. If chums are targeted, red gear is suitable. We have encountered villagers, usually teenage boys and slightly older, attempting to spear chum after they had spawned. Reportedly, they were practicing and the speared chum would be fed to their dogs. There are a few elders who claim to prefer chum for drying over reds, but this view does not appear to be widely held in the village. In sum, chum salmon appear to be an incidental catch to other salmon, particularly kings and reds. Should the latter two not materialize in sufficient quantity to harvest for subsistence uses, chum and silver would be the targeted species.

Coho (Silver) Salmon

The coho salmon run for 1987 was late and the strength was considered very weak by Division of Commercial Fisheries of ADF&G. The parent year, reportedly, was poor so the expectation was not good. Because of poor in-season run strength, ADF&G closed both commercial and sport fisheries from harvesting any silvers from the 15th of August through the 1st of November of 1987. Escapement goals were subsequently met only by closing the commercial fishery and restricting the sport fishery to catch and release (ADF&G 1988:79).

By the end of the study we had interviewed 16 households that had subsistence fished for silvers by mid September (Table 3). We do not know the number of other households that had harvested silvers during the study but there were some. In the sample, the 16 households averaged a catch of 49 silver salmon (Table 3). As the study was drawing to a close, many villagers were heading up river and to the

lake to fish for silvers, spawned reds, and Dolly Varden. Therefore, villagers were still subsistence fishing for silvers and would be for yet a few weeks.

Table 11 reflects our estimated figures for the silver harvest for the village as a whole. We estimate that the average catch is approximately 28.9 percent of the salmon catch for the village excluding spawned reds. In terms of pounds, silvers made up 25.1 percent of the estimated village harvest.

Silvers generally begin to arrive in the bay after the middle of August (Fig. 3). They may hold up in the bay from a few days to much longer before running into the river. Silvers spawn in the river, side creeks, and sloughs, from the mouth to the upper reaches of the river. They tend to move into the river in schools and on the fronts of storms or strong winds. Otherwise they sometimes mill around the bay for days.

In 1987, the silver season did not achieve any strength until the last week in August. At the end of the third week of August only 400 silvers a day were passing the sonar counter located at 20 miles upriver. Table 4 indicates the beginnings of the subsistence silver harvest for the village occurred at least by August 15. During the month of September it was very common to find subsistence set nets in the river on every trip made, but in August it was rare to encounter a set net in the river. After the closure of the commercial season in mid August, nearly everyone fishing was doing so with a rod and reel.

The subsistence silver fishing we observed was timed to fit the tides. Similar to the others, a net was set the first few hours of the flood and picked from 12 to 24 hours later. Toward the end of the study, there were a few days that we went out on the river just before the evening high tide so that we could talk with the subsistence fishers.

Commercial fishing had been closed before the run started, so there was little bay fishing for subsistence silvers. Most of the fishing for silvers took place in the first 10 miles or so of the river (Figure 4). There was some fishing above the Fish and Wildlife Service camp, between mile 25 and 30. We did observe one user, who was catching salmon for his dogs, take a set net to a bay site 4-5 miles below the village. Many different sites are used for taking silvers. Many of the sites are at entrances to false channels, side creeks, and sloughs. Some silvers are harvested in the slough behind the village. Those that fished for silvers in the upper reaches of the river also were harvesting other subsistence resources at

the same time. In short, if only silvers were sought, the lower river was fished. If other fish such as Dolly Varden and spawned reds were also sought, silvers might be harvested in the upper river.

Most of the silvers are caught with gill nets, although we have seen villagers catch a few silvers with rod and reel. Most of the gill nets were used as set nets. The length varied from 10 to 25 fathoms and they were set on a point at the entrance to streams off the main channel. Beach seining and drifting were strategies also employed although to a much lesser extent. We encountered two cases of beach seining in September. One was employed to catch Dolly Varden, but mostly silvers were caught, so silvers in some cases are incidental catches. We did not observe any drift fishing for silvers in September, though reportedly some use this method. Nearly every case of net fishing was with a set net (Table 5). The mesh size was the same as for reds. In fact, they tended to be the same nets.

Most of the division of labor observed fishing silvers in the lower river was structured like work groups for harvesting kings and reds. However, the upper river exhibited patterns similar to those associated with groups fishing for spawned red salmon, that is, families with children and grandparents as well as younger adults.

CHAPTER THREE: THE GUIDED SPORT FISHERY

The study was not designed to do an in depth descriptive analysis of the sport fishery. The essential aim of the study in regard to sport fishing was to observe and record sport fishing activities on the river including camps, numbers of fishermen, boats, planes, timing and location of fishing, and relations with subsistence users. Through observations and interviews, impacts might be discerned.

GROWTH OF THE TOGIAK RIVER SPORT FISHERY

The primary recreational use of the Togiak Wildlife Refuge is sport fishing. Up until the mid-1970s only a few nonlocal fishermen visited the area that was to become the refuge. In the mid-1970s use began to increase as interest in the area grew and more guided parties began to use the river during this period. In the early 1980s use grew rapidly, due primarily to an increase in the number of guides operating on the river, the expansion of existing guide services, and the creation of a refuge (USFWS 1986:127). As shown in Table 12, there were dramatic increases in use of the Togiak River between 1970 and 1985. Guided use accounted for most of the increases. During that time period, the number of guides doubled from four to eight. Guides also increased the number of members in their party from four to seven. The number of float groups rose from four to 30; fly-in groups increased from 11 to 200; and motorboat groups went from two to 12. Where there were no camps in 1970, 6 were present in 1985. The 1985 use levels were identical to 1984 due to a temporary moratorium imposed by the Togiak Wildlife Refuge. The increase in unguided use was not nearly as significant. Unguided float groups peaked in 1983 when 21 were recorded but dropped in the next two years until only 10 groups were noted in 1985. While there were 25 unguided fly-in groups in 1970, the number rose to 55 in 1984 but dropped down to 30 the following year.

Starting in 1984, the Togiak Refuge began collecting information on use days by user type. Data are available from 1984-1988 (Figure 6). These data indicate a declining trend in guided use during this five year period. Some of this may be explained by the moratorium on guides which continued to be in effect

Table 12. Estimates of recreational use on the Togiak River, 1965-1985.[a]

	1965	1970	1975	1980	1982	1983	1984	1985
Guided Groups								
No. of guides[b]	2	4	4	5	5	6	8	8
No. of float groups avg. trip length[c]	2/4	4/4	14/5	15/5	8/5	14/5	30/7	30/NA
No. of fly-in-groups avg. trip length[d]	3/1	11/1	12/1	40/1	95/1	131/1	200/1	200/NA
No. of motorboat groups avg. trip length[e]	5/2	5/2	10/2	12/2	10/2	10/2	20/7	20/NA
No. of motorboats	2	2	3	4	4	8	12	12
No. of camps[f]	0	0	0	0	2	3	6	6

(continued)

a. Use level estimates from 1965-1980 are based on discussions with ADF&G, local residents, guides, and air taxi operators. The 1982-1985 levels are estimates based on Service special use permits, refuge user counts, and all of the above sources. NA = estimates were not available. Average trip lengths were not estimated for 1985.

b. Several guides work more than one river, so the number of guides in Tables 12-14 exceeds the actual number of guides using the refuge.

c. Floaters use nonmotorized craft (e.g., rafts, canoes) to go downriver; they may have small kickers, less than 15 horsepower. In 1984 the average guided float groups had an estimated 8 people.

d. Fly-in-groups go to a specific destination on river and fish that area from one to several days. Most of the guided fly-in groups are from nearby lodges; many stay at guide camps on the river. The average guided fly-in group in 1984 was estimated at five people.

e. Includes all boats with an inboard or outboard motor greater than 15 horsepower. The averagae guided motorboat group in 1984 had 8 people.

f. These are temporary camps used by the guides' clients under special use permits. They consist of several weatherports or tent frames on the river banks.

Table 12. Estimates of recreational use on the Togiak River, 1965-1985 continued.

Unguided Groups (Nonlocal Use)

No. of float groups								
avg. trip length[h]	0/0	2/5	3/5	5/5	5/5	21/5	15/6	10/NA
No. of fly-in groups								
avg. trip length[i]	10/1	25/2	25/2	30/2	30/2	15/2	55/1	30/NA
No. of motorboat groups								
avg. trip length[j]	N/A	N/A	N/A	N/A	N/A	N/A	36/7	10/NA
No. of motorboats	0	0	1	1	2	2	2	2

Source: USFWS 1986:126

h. The average unguided float group size in 1984 was estimated to be 3 people.

i. The average unguided fly-in group size in 1984 was estimated to be 3 people.

j. These are primarily boats chartered from the villages by non-local fishermen. The average unguided motorboat group size in 1984 was 3 people.

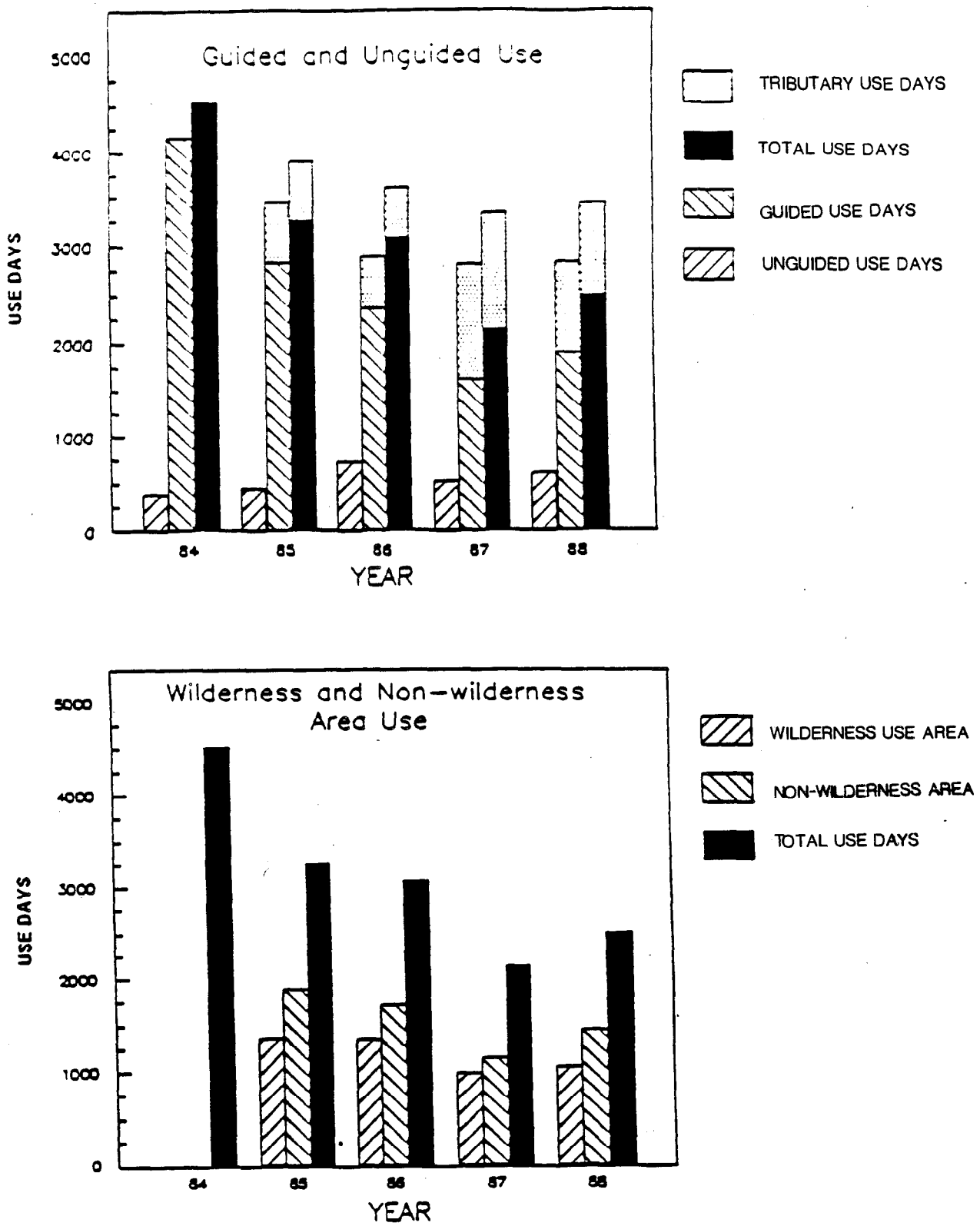


Figure 6. Estimated public use by guided and unguided users for the Togiak River and tributaries and use within the wilderness and non-wilderness areas of the main Togiak River, Alaska, 1984 – 1988.

in the refuge. Unguided use showed a slight increase. Use in the non-wilderness area showed a slightly declining to steady trend.

Data are also available on sport fishing effort on the Togiak River from 1977 to 1988 as shown in Figure 7. Effort more than doubled between 1977 and 1979. Overall effort again showed a tremendous increase in 1984 when nearly 3,500 angler days were recorded. This was perhaps a result of a record return of coho salmon and excellent conditions for sport fishing, such as clear, low water. That level was not repeated in any year since and the effort appears to have stabilized between 1,100 and 1,300 angler days.

THE SPORT FISHERY IN 1987

Participants

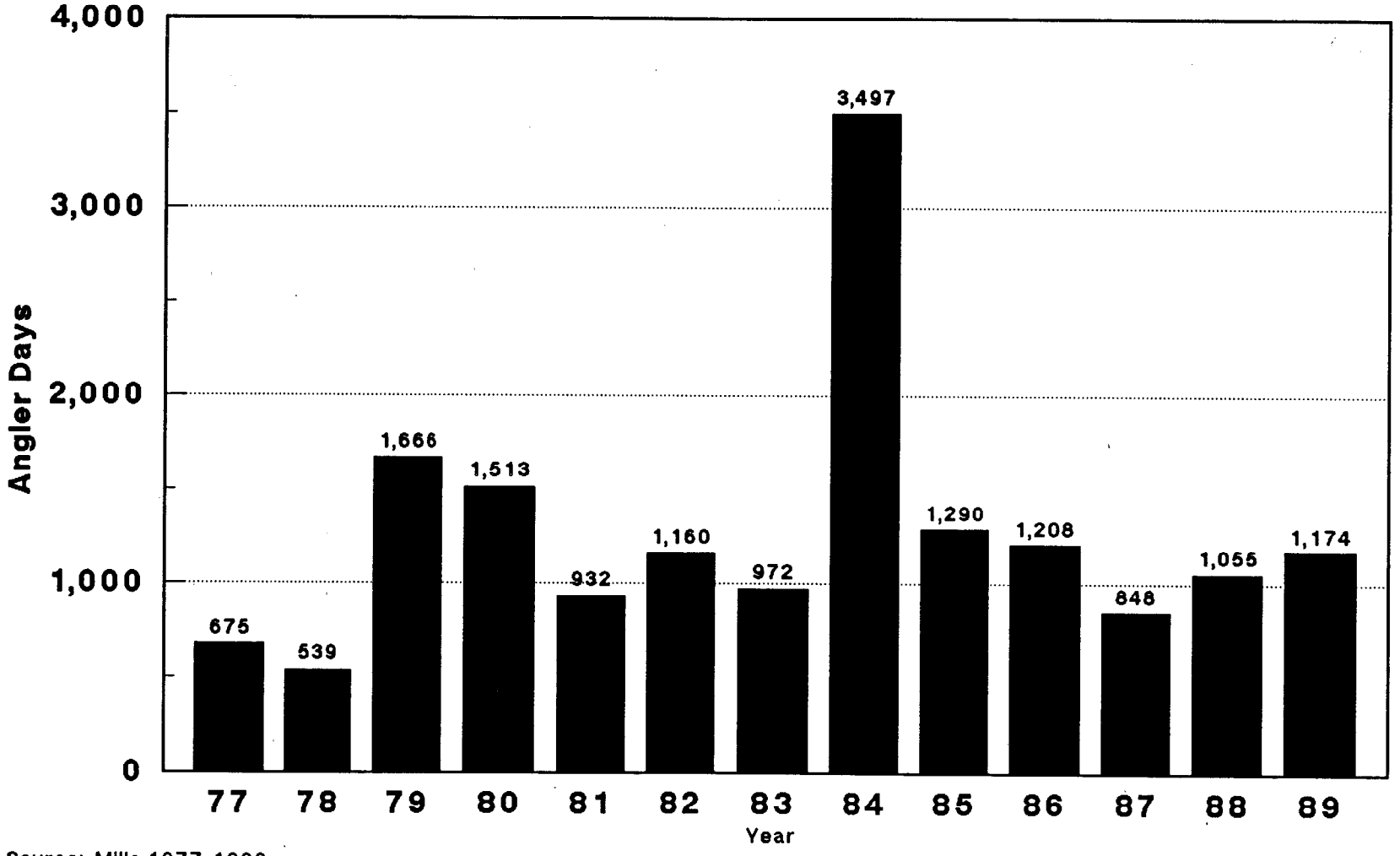
The primary groups that are involved in the commercial aspect of the sport fishery in Bristol Bay are guides, lodges, and outfitters. Outfitters supply and fly sport fishermen to the upper reaches of rivers for float trips and/or day fishing trips. They generate income from the clients by supplying them with essential equipment for the trip in addition to the cost of the flight. These clients are generally not guided. As a consequence the costs are considerably less.

Lodges, on the other hand, generally book clients months in advance for week-long stays at a lodge on one of the lakes not located in the refuge. Most of the lodges are located within the Wood-Tikchik drainages above Dillingham. Included in the price are day trips to various rivers in Bristol Bay, Kuskokwim Bay, and the Peninsula. On the Togiak River in 1987, five lodges had day camps to which they brought their clients for fishing and river travel during the daylight hours. Lodge guides live at the day camps during the client season which lasts between June and September.

There are number of independent, very seasonal, family-run, smaller guided operations that have permanent camps on rivers. In these cases clients will spend the entire week on the river fishing, camping, and traveling. On the Togiak River there was one such operation in 1987 that had all the comforts possible in such remote area. Not only were the sleeping accommodations comfortable, with only two persons to a

Figure 7. Sport Fishing Effort

Togiak River, 1977-1989



Source: Mills 1977-1990

large weather-port tent, but there were showers, steam baths, toilets, and other first class accommodations.

Such camps can be very expensive as are lodge stays which require day excursions by float plane. The price to clients for a week's stay is highly variable, but ranges from about $1,700 to $3,300. The final price depends on the extras requested.

Finally, there are the guided and unguided river raft float trips that can last from a few days to two weeks. On the whole, these operations have decreased since 1984 (Table 12). We observed only 14 rafts over the course of our river trips between the first of August and the middle of September. Most of these were guided by lodge or river camp personnel.

Location of Guided Camps

There were seven guided fishing camps observed along the Togiak in 1987. Five of the guided fishing camps were located on the lower 19 miles of the river (Fig. 8). This portion of the river is within non-wilderness lands of the Togiak National Wildlife Refuge (TNWR) and within the privately-held lands of Togiak Native Limited (TNL), the Native profit corporation of the community of Togiak. Two additional guided fishing camps operated at approximately 27 mile and 31 mile, located on privately-held native allotments within the wilderness lands of the TNWR. The guided fishing camps along the lower river leased land from TNL (Tikchik Lodge, Wood River Lodge, Golden Horn Lodge, Bristol Bay Lodge, and Andy's Alaska Fishing Safaris). The two upriver wilderness area camps, Tikchik Lodge and Bristol Bay Lodge, leased land from two residents of the community of Togiak.

In 1987, most of the guided camps were located on the islands and sand bars of the lower 19 miles of the river, that portion below Pungokepuk Creek (*Pengurpak*) and the wilderness area. As noted earlier, the major reason for this is that there are a number of restrictions on camping in the wilderness area, such as that no motors other than boats, snowmachines, and planes are allowed to operate. Of the two lodge day camps in the wilderness portion of the refuge, one was located on the downriver side at the mouth of the Nayorurun River, and the other was located on the upriver bank at the mouth of the Kemuk River

(*Kiimaq*). Both of these camps had guides who lived there during the season. Planes flew in guests daily. The land upon which the camps were located was private allotments belonging to two Togiak villagers. A special use permit was required by the USFWS of all guided operations in the refuge. It is not clear what restrictions in fact apply to camps located on private property yet located in the wilderness lands area of the refuge.

In 1987, the remaining guided camps were located between the Pungokepuk Creek on the north (upriver end) and approximately 3 1/2 miles above the mouth (Figure 8). The lands on which the camps were located were parcels leased from Togiak Native Limited. In fact, all the land along the river from the mouth to the Pungokepuk Creek was either held as a private allotment or as land of the village corporation (TNL). In the lease agreements, only one camp was to have overnight guests and the remainder were to have only day guests. The goal here, according to the TNL management, was to keep the numbers of the people on the river low, particularly in the evenings when villagers were said to use the river for subsistence. There is a lot of air traffic between 5 p.m. and 7 p.m. landing and taking-off from the river.

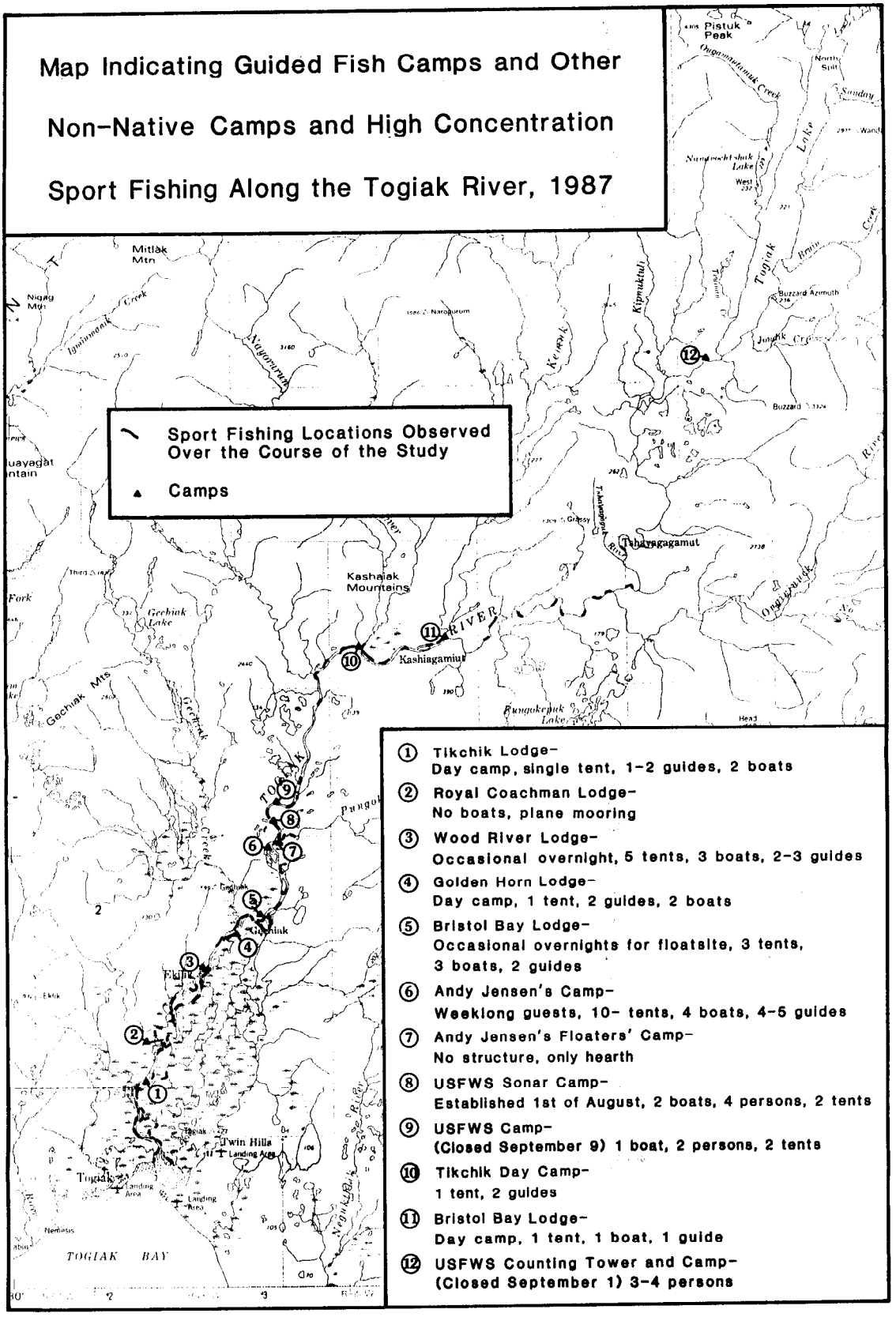
The size and the elaborateness of the camps varied considerably. Two camps had only a single tent for the guides. Two other camps had the facilities along with four tents to keep guests overnight in case weather prevented them from returning to the lodges. The fifth camp, the one described above, had 15 tents and other structures for the guides and guests. Four of the camps usually had two to three guides each while the larger camp usually had five staff. These camps had a total of 16 boats. Thus, on the lower river there were minimally 13 permanent campers with their boats and gear.

Guided Sport Fishing Patterns: Season and Timing

On the Togiak River, the sport fishings season begins with the king run toward the latter part of June and continues through the silver season that ends toward the later part of September. In 1987, most of the camps had reduced their size or pulled out by the 20th of September. The main seasons for the sport fishery are the king and silver runs. Most of the guests are scheduled during these periods. In fact, many of the lodge camps have repeat business that return periodically for the king run or just for the silver

FIGURE 8

Map Indicating Guided Fish Camps and Other Non-Native Camps and High Concentration Sport Fishing Along the Togiak River, 1987



1. Tikchik Lodge-
   Day camp, single tent, 1-2 guides, 2 boats
2. Royal Coachman Lodge-
   No boats, plane mooring
3. Wood River Lodge-
   Occasional overnight, 5 tents, 3 boats, 2-3 guides
4. Golden Horn Lodge-
   Day camp, 1 tent, 2 guides, 2 boats
5. Bristol Bay Lodge-
   Occasional overnights for floatsite, 3 tents, 3 boats, 2 guides
6. Andy Jensen's Camp-
   Weeklong guests, 10- tents, 4 boats, 4-5 guides
7. Andy Jensen's Floaters' Camp-
   No structure, only hearth
8. USFWS Sonar Camp-
   Established 1st of August, 2 boats, 4 persons, 2 tents
9. USFWS Camp-
   (Closed September 9) 1 boat, 2 persons, 2 tents
10. Tikchik Day Camp-
    1 tent, 2 guides
11. Bristol Bay Lodge-
    Day camp, 1 tent, 1 boat, 1 guide
12. USFWS Counting Tower and Camp-
    (Closed September 1) 3-4 persons

MAP LOCATION

SOURCE

Gross, J., Subsistence Fishing Patterns on the Togiak River Drainage and the Impact of Sport Fishing, 1987.

State of Alaska
Department of Fish and Game
Subsistence Division

run. Nearly all of the guests have advanced reservations for specific times. This means that if the guests wanted to fish silvers and there were none, then they would simply have to fish whatever species was available.

Each day guests were flown in by float plane to the lodges' camps for a single day of fishing, except for the one camp with week-long guests. The same guests may be brought back to the Togiak River for a number of days in a row. Guests usually arrived between 9 a.m. and 10 a.m. Departure time from the river was around 6 p.m. During the intervening hours the guests were taken by boat to various fishing holes on the river. We observed lodge or camp fishermen fishing at spots between the mouth of the Togiak to above the Ongivinuck River some 40 to 45 miles upriver. In short, sport fishermen and their guides were found along all parts of the river. They had great mobility, traveling by skiff to where ever the fish were biting.

The one camp with week-long guests often fished later into the evening. We observed them near the mouth of the river, almost 20 miles below their camp, a number of times after 7 p.m. Also, in the evenings guides occasionally would be found fishing. In the evening and on their day off, guides would fish areas to find good fishing holes and determine their condition for guest fishing during the weekdays.

The recreational fishing pattern is to work holes until the fish no longer bite, then move on to another and so forth. Although fishing holes are not, as a rule, depleted of fish, as they use a catch and release method, nonetheless the fish stop biting. Because of increasing sport fishing effort on the river, guides find they must take their clients further from the regularly used spots. This means time lost from fishing in traveling.

Each of the camps had a day during the week in which there were no guests. It was a day when the lodge or camp would take one set of guests to the airport and bring in another for the following week's fishing. Five of the camps (lodges) had the guest change on Saturday, while the other two changed clientele on Sunday. As a consequence, the weekends tended not to be big sport fishing days on the river. Although there were exceptions, Saturdays tended to have the fewest anglers due to the change over guest pattern of the lodges. There were also days owing to weather that planes could not bring in guests. These days and guest change over days were the periods when the number of sport fishermen were few in

number on the river. However, guides were often observed fishing during such down times. Down times were also occasions for guides to run into Togiak to make store purchases. However, for those guest fishermen camped on the river, fishing occurred every day.

We found during the course of making river observations that there was a high level of sport fishermen on the river from August through the middle of September. During August, we spent 11 days on the river during which time we encountered 205 sport fishermen in 62 boats. In September we were on the river only eight days but encountered 224 fishermen and 57 boats. The increase over August was due, in part, to the greater number of advance reservations for September silver fishing but also lodges were bringing more guests to the day camps because silver fishing was considered excellent on the Togiak in spite of the restrictions on harvest (catch and release only) (Figure 9).

To give a sense of the numbers the following example will suffice. On September 9, we traveled to the lake. We were on the river by 9 a.m., close to the time that clients are air taxied onto the river. During the trip we counted over 70 sport fishermen, most of whom were spotted in the morning as they were just disembarking from the planes or preparing to go fishing. In addition to those spotted at the seven camps, we encountered six rafts with fishermen.

During the same time frame, subsistence users were on the river in force. Weekends and holidays are prime time for villagers. This is reflected in high peaks on Saturdays and Labor Day (Figure 5). On the other hand, if they are going after a winter subsistence harvest of fish, the day of the week is immaterial. For example, the 17th of September was a Thursday but the river was full of villagers traveling upriver to fish for spawned-out reds, silvers, and Dolly Varden. The schedualing of commercial fishing openings probably also affects the timing of subsistence fishing efforts in the river.

Location of Sport Fishing Activities

In examining the map showing areas fished and the guided camps (Figure 8) it is clear that in 1987 most of the fishing occurred in the lower portion of the river. There were only two day camps located in the wilderness area and five camps in the lower 19 miles of the river. The maps indicate a sixth camp on the

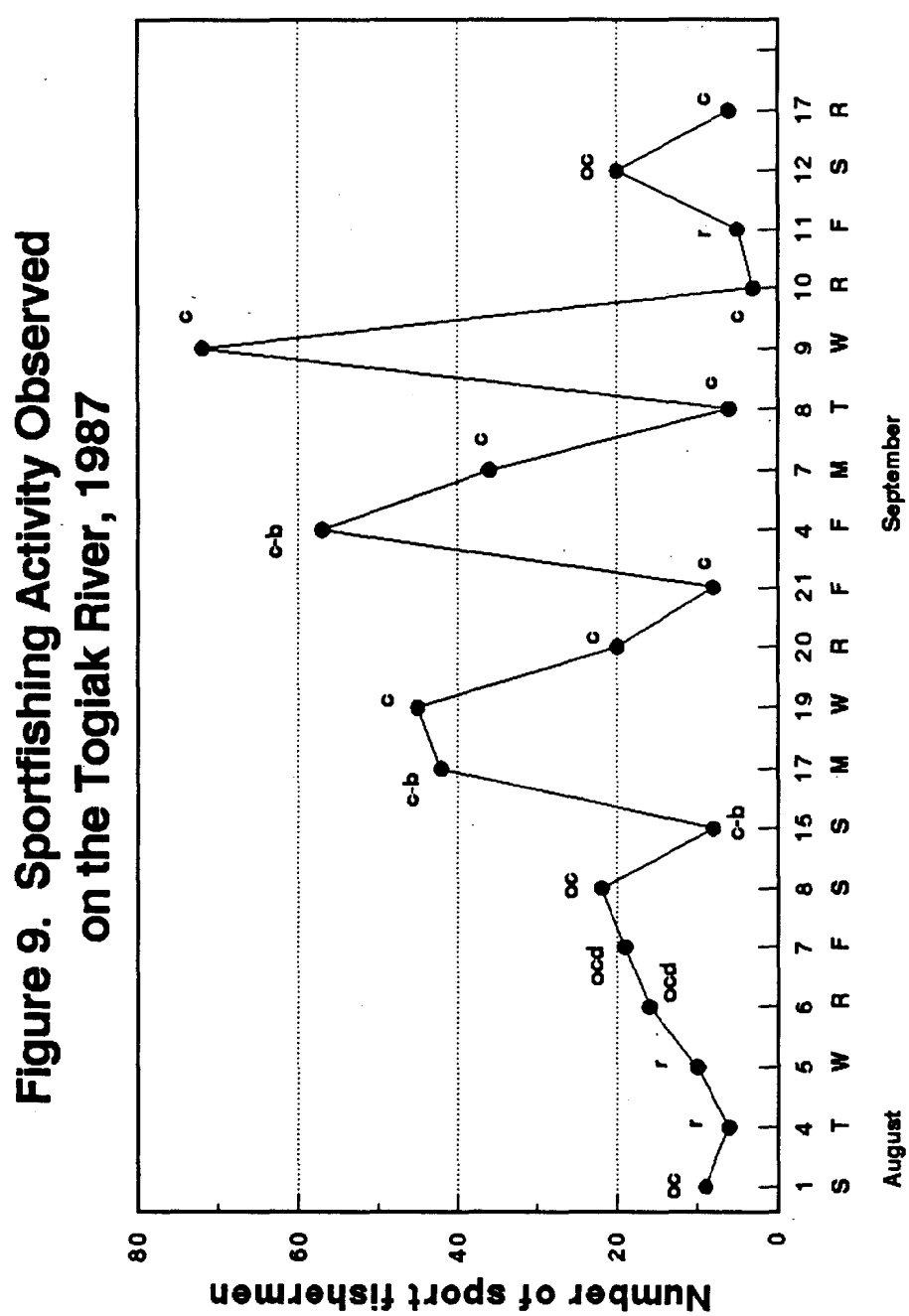


Figure 9. Sportfishing Activity Observed on the Togiak River, 1987
oc = overcast
r = rain
d = drizzle/low visibility
c = clear
b = broken
Number of sport fishermen
0
20
40
60
80
August
September
S T W R F S S M W R F F M T W R F S R
1 4 5 6 7 8 15 17 19 20 21 4 7 8 9 10 11 12 17

lower river but it had no structures and was used only as a place to moor a float plane. In this case the plane was moored to the sandbar and the guest fishing was done from the water's edge. Although we observed guides from the lower camps a number of times above the Pungokepuk, we never saw them above the Nayorurun.

Location generally depends upon the species of fish targeted and where that fish is found given the season. King fishing begins near the mouth of the Togiak and eventually works into the side creeks and streams where they spawn. In fact, most of the king fishing is done in the same areas as the subsistence fishing. Later in the season, in July and into August, kings are caught further up the river as well as close to the mouth. So, as the king run builds in the river, the sport fishermen fish less around the mouth and more often around their camps and many of the false channeled streams and creeks near their camps.

Fishing holes change as the water level drops or rises in the river. In 1987, the river became very shallow by late August. As a consequence, fishing holes and strategies changed. In fact, good fishing holes were reduced in number making guides travel more often and farther to provide their guests with successful fishing trips. The strength of the run also conditions location. During the early part of the silver run, guides fished for silvers close to the mouth. After a big surge of silvers entered the river, fishing took place up river. While the run was strong, many guides had their guests fishing in the river next to the camps. It was common to see this situation for the first four camps up the river from the mouth during the month of September. On the other hand, with the arrival of the silvers, the Dolly Varden were to be found more in the side rivers and above the Aguuluraq (*Akuluraq*) River than in the lower portions. It is not clear why this was the case. The villagers have remarked upon this situation which is not usual for the river. This point will be taken up later in the report.

Most of the guides have a patterned route of holes to visit over the course of a week. Guides emphasized to us a problem in 1987 of too many fishermen on the river. They noticed it particularly during the weak early silver run with the shallowness of the river and everyone trying to fish the same areas. If the fishing is good one day it tends not to be the next because the holes have been over fished or the fish have been "spooked," even with catch and release and the migration patterns of salmon.

Gear and Methods Used by Guided Sport Fishermen.

All the sport fishing is done with a rod and reel. The rods vary between casting rods and fly rods. Lures vary between flies and spinners. Guided camps use barbless hooks and if the spinner has a treble hook two are removed in addition to the barbs. In this way, they attempt to reduce problems that can occur with catch and release practices. Generally, the caught fish is worked into shore to where the guide or the fisher can free it from the hook.

Fishing is done from a boat or a bank, or by wading in the river. We often observed fishermen wading to the channels or holes to fish. Trolling from a boat or a raft was also a common observation particularly in the wilderness area. Near the mouth most of the fishing was done either from the bank or by wading into the river near the channel. Fly fishing was most commonly associated with wading, while casting rods were more associated with boat or bank fishing.

Most of the fish caught are released back into the river. Prior to the closure of the silver harvest for the sport fishery in 1987, an ADF&G creel census reports that 409 coho were harvested. After the closure, silvers were still targeted but they were released. To the guests it made little difference as they were mostly there for the fishing and not the eating of fish. This is the perspective provided by most of the guides. Thus, they were catching numerous silvers and each camp felt they had a successful silver season.

Species Targeted by the Guided Sport Fishery.

According to a number of sport fishing guides and pilots that we talked with, the Togiak is an excellent river for fishing kings and silvers. Dolly Varden are also good. Guides have told us that there are very few rainbow trout in the river so they are only caught incidentally. The greatest effort is for silvers in late August to mid September. According to a creel survey conducted by the U.S. Fish and Wildlife Service in 1987, 5,152 silvers were caught, of which 409 were retained. The remaining 4,743 fish were released back into the river. The number retained would have been much higher except for the catch and release restriction which was put on the fishery mid-season. For example, in 1986 a USFWS creel survey indicated

that 13,805 silvers were caught, of which 5,651 were kept, and 8,154 released. Kings are the primary fish targeted in June and July. More than half of the fish caught are also released. During the study year, 1987, 338 kings were harvested of the 796 which were caught (USFWS n.d.).

Sockeye and chum are generally incidental catches, especially during the king run. In 1987, 27 sockeye and 27 chum were harvested (ADF&G, Division of Sport Fish, Dillingham Office Files).

Dolly Varden appear to be a fish that is sought for camp food, particularly in August when edible kings and reds are not easily caught. They are also targeted for guests as a sport fish at least during the months of August and September. We do not have any data on the Dolly Varden catch before August.

Essentially, the three fish targeted in Togiak by guides are the kings, silvers, and Dolly Varden. The location is dependent on run strength and numerous other factors some of which were discussed previously. The guided fishermen are taken to whenever the fish targeted are located in numbers. Before the run builds in the river, most fishing occurs near the mouth. As the fish move up, so do the fishermen. We have observed some tendency to fish the mouth if bright fish are desired. However, silvers readily strike at all stages which makes them exciting for the sport angler.

CHAPTER FOUR: THE IMPACTS OF THE SPORT FISHERY ON SUBSISTENCE FISHING

As shown in the last chapter, although there has been a guided sport fishery on the Togiak River for over 20 years, its size has greatly increased during the 1980s. This fishery is largely a new commercial development on fisheries with older commercial and subsistence uses. This chapter will show that subsistence fishing in the Togiak River is now feeling the stress and strain of a new fishery. The commercial and subsistence fisheries are well integrated and complimentary in terms of personnel, equipment, and knowledge (Wolfe et al 1984). On the other hand, in 1987 the rapid growth of the guided sport fishery was a recent phenomenon of the past five to six years. The personnel are different, gear and equipment are different, and the methods and motivations are different. The question arises as to what are the impacts of this new fishery on the subsistence fishery.

The following discussion of the impacts will be organized around four issues which respondents brought up during the research. These are biological impacts, displacement, trespass, and catch and release. Table 13 summarizes the extent to which these issues were raised by respondents during 31 interviews.

BIOLOGICAL IMPACTS ON THE FISH

The actual biological impacts of the sport fishery on salmon and other fish in the Togiak River are a major issue for Togiak residents, who maintain that these topics require further study. No catch and release studies to determine mortality rates have been conducted on the Togiak River or any other river in the refuge. When questioned by villagers, managers have generally reported a fairly low catch and release mortality rate of between five and ten percent. The response from villagers has been one of skepticism.

According to a literature review conducted by ADF&G Sport Fish (Vincent-Lang, Alexandersdottir, McBride and Hepler, n.d.), little quantitative information is available describing catch and release mortality in salmon fisheries. In an effort to better inform management practices, the Division of Sport Fish has conducted two studies which may be pertinent to the Togiak River sport fishery. The first investigation

TABLE 13. CONTENT ANALYSIS OF INTERVIEWS CONDUCTED IN TOGIAK, 1987. (N = 31 INTERVIEWS)

Topic	Number	Percent of Total
General		
There has been too much growth in the sport fishery	8	25.8%
Displacement		
Sport fishermen are fishing where Togiak subsistence fishermen use nets	23	74.2%
Subsistence fishermen are being displaced	16	51.6%
Sport fishermen get in the way of fishing nets and boats	13	41.9%
Sport fishermen and subsistence fishermen have exchanged heated words; conflict	9	29.0%
Biological Issues Regarding Catch and Release		
Catch and release deforms, injures, and kills fish	23	74.2%
Have seen dead fish caused by catch and release	10	32.3%
Cultural Issues Regarding Catch and Release		
General objections to catch and release	24	77.4%
Caught fish should be used, not scattered about	17	54.8%
Catch and release is "playing with fish" and is disrespectful	12	38.7%
Rules for handling fish violated, unused fish keeps other fish away	8	25.8%
Trespass		
Sport fishermen are fishing without permission	12	38.7%
Sport fishermen fish from native allotments without permission	10	32.3%

targeted salmon in the Kenai River (Bendock and Alexandersdottir 1990). Mortality was found to be 13 percent for males and 7 percent for females, and 10 percent in total. Variables other than sex, such as fish size, hook location, and bleeding also may have affected mortality rates, but no conclusions could be reached due to the small sample size. The methods and gear used in the Kenai River fishery, that is, fishing from drifting boats, and using two single hooks that combines bait and a lure, typically resulted in superficial wounds, giving the fish a much better chance to survive. Another consideration is that fish were never removed from the water. Some similarities with the Togiak sport fishery are that most fishing is conducted in the main stem of the river and hooks are drifted from boats or the river banks. Most fishing is baitless although some people do use salmon eggs.

The second study (Vincent-Lang et al. n.d.) focused on coho salmon in the Little Susitna River. Here the key finding demonstrated that coho are very vulnerable in intertidal water where mortality rates averaged 69 percent. Mortality rates in the freshwater were much lower at 12 percent. Of the factors that could influence rates of hook-induced mortality, hook location was found to be most critical. How fish were handled by the fishermen, a view usually stressed at public meetings, appears to be much less important as the cohos have little tolerance for stress until they are well into the freshwater (McBride, personal communication 1990)

Togiak residents often complained that they have observed many dead bright silvers as well as other types of salmon in the river and along the sandbars (32.3 percent of interviews; Table 13). They believed these fish are those that have died from catch and release practices, a point discussed further below. The intertidal influence is estimated to be between five and ten miles on the Togiak River. If mortality is higher in intertidal areas, this may partly explain why Togiak residents have seen what they consider to be large numbers of dead fish, at least during the early part of the coho run.

A second potential biological impact raised by the villagers is that sport fishermen disrupt the spawning fish and the spawn when they catch and fight with fish in spawning streams and holes. Villagers claim that by wading in spawning areas the fishermen dislodge the eggs and thus reduce the salmon population. As one elder reports:

> When there are sport fishermen upriver . . . the fish can't go up the little creeks [because] they are bothered . . . Even some areas on the river . . . don't have salmon in them anymore, such as *Urrasqaq*.

Urrasqaq is an area heavily fished by sport fishermen. Two guide camps are located next to the area.

In sum, there is a concern by villagers, that when sport fishermen fish and wade in spawning areas, they not only disorient the fish with catch and release but they also destroy buried spawn by dislodging the buried eggs from the bottom of the streams through wading and fighting with the large salmon.

The king run has been weak over the past few years not only in Togiak but in Bristol Bay region as a whole. Commercial fishing for early kings has been severely reduced and at times closed until the red run commences. The villagers report they are concerned that sport fishing for kings up river may be disrupting their spawning and creating pressure on the resource. Some villagers suggest that fish caught or disrupted at their spawning areas, even though released, are damaged, die, and do not complete their spawn. They also suggest that wading in water and bringing in fighting fish in areas of spawn displaces eggs already laid.

Another biological impact mentioned by Togiak residents is the effect of catch and release on catch success rates. One local belief is that Dolly Varden cease to bite when they have been previously caught and released. Some respondents used the term "sore mouth" to describe why the fish no longer were interested in feeding. The "sore mouth" purportedly resulted from being caught by a lure. The rod and reel is used frequently by Togiak residents to catch small numbers of fish for immediate consumption, as pointed out earlier in this report. During the month of August, many villagers fish for Dolly Varden with a rod and reel. Most of the fishing takes place in the lower river area below Pungokepuk Creek. Particularly during the last few weeks of August and into September, we heard a number of people remark that the Dolly Varden were not in the old holes they traditionally fished. Fishermen were forced to travel above the Pungokepuk to catch any. In fact, one dismayed villager said that on a family outing the eight members of his family caught only one Dolly Varden in over two hours of fishing. He just shrugged his shoulders, remarking that he was stumped as to why. We have traveled with fishermen attempting to catch Dolly Varden at a large number of different Dolly Varden holes but were unsuccessful until we were close to the

Nayorurun. On one occasion, we traveled to the lake, fished eight traditional Dolly Varden holes and caught none. Our guide pointed to the Dolly Varden swimming in the same holes. One could see them but they were not biting. The villagers had no explanation for the situation except to note that it was not normal to not catch at least a few Dolly Varden given the effort.

This concentration of fishing effort in the lower river enhances the concerns of local residents about biological impacts. As noted above, most of the fishing for subsistence fishermen was below Pungokepuk Creek (Table 8, Fig. 4) with a majority below the area known as *Urrasqaq*, situated just north of Gechiak Creek (*Qissiang*). In addition, most of the sport fishing was in this same region, below Pungokepuk Creek (Fig. 8). This suggests that the area received a high degree of traffic from both subsistence and sport fishing groups. Moreover, as the river shallowed, and fishing holes were reduced in number the area became even more congested. During the early part of September, even the guides were complaining of there being too many fishermen on the river. Thus, from our observations, villagers' comments, and guides' comments, there appears to be heavy pressure on the river for fishing spots and fish resources.

As more and more pressure is being put on the normal fishing spots in the lower 19 miles of the river, subsistence fishermen find it necessary to travel to fishing sites well above the Pungokepuk because they are unable to catch targeted fish with a rod and reel, in traditional spots. The data indicate that there are large numbers of sport fishers working the lower portion of the river so that the normal fishing holes are unproductive. They are in effect forced to travel greater distances in order to successfully harvest Dolly Varden during the months of August and September. As a result, the subsistence fisherman now must expend more money, time, and energy to catch the same number of fish as he was able to prior to the development of the sport fishery. They conclude that these impacts are occurring as a result of the increasing sport fishing pressure.

DISPLACEMENT

The issue of displacement is a central one for the villagers. As shown in Table 13, 74.2 percent of the interviewed sample said that sport fishing was occurring at traditional fishing sites, and 51.6 percent reported that, consequently, displacement of subsistence fishermen was occurring. Many feel that they must avoid the sport fishermen. But why should this be the case? The following discussion will address this question.

As noted above, most of the subsistence fishing with gill nets or seines takes place in the first 19 miles of the river, below Pungokepuk Creek. Within this general area, the villagers have many preferred fishing sites for salmon. Set net sites are often in different locations than drift net areas as each require different methods of fishing with different physical conditions. This also holds for seining. Most of the villagers report that they do not like to see fishermen in this part of the river. One villager described to us why:

> The people fishing below *Qissiang* (Gechiak Creek), they don't like sport fishermen below that area. This is because they tend to get in the way with subsistence fishermen.

They "get in the way" because "some of them fish in places where they have subsistence nets" according to another villager. This means that one cannot fish normally. If drift fishing with a net, one has little control if the current is strong. As one villager told us,

> When [villagers] drift and [sport fishermen] are in the way, they are dangerous, [because] they almost run into the sport fishermen themselves, and people get wet.

Villagers say they do not like to see sport fishermen in the lower portion of the river because they not only get in the way but they also are dangerous to themselves and the people fishing. They also do not want the sport fishermen to know the better fishing holes and areas in the area. As one villager observed, fish guides watch where they fish and then mark the spot to return later for sport fishing:

> In another place, a guide pulled in with a skiff after I was through netting. The guide marked it with surveyor's tape. I asked what he was doing, and the guide said it was his spot for fish guiding.

The sites and places often used by the villagers are, in many cases, associated with traditional fishcamps, old village sites, cemeteries, and allotments. For the villagers, use of these places is governed by customary rules which are well known among them. They have no problem among themselves in regard to using such areas for fish sites or other subsistence activities. But sport guides and fishermen do not follow the customary rules. From the villagers' perspective, these outsiders go where ever they want, when they want, without regard to the fishing ethic that governed river use long before the sport fishing industry developed on the river. Such disregard for the customary rules cause villagers to view the sports fishermen as "pests". We have never heard of a complaint from villagers that other villagers encroach on their sites, but it is quite common to hear complaints concerning the sport guides and fishermen using sites and allotments without permission. One villager related her experience at her allotment where she observed that,

> The sport fishermen are camped . . . around *Pengurpak* (Pungokepuk Creek) . . . on shore, and this is an old village place. Some sport fishermen fish on the allotments. When I see sport fishermen, I can't go to the areas I want to go to [fish] . . . we have to pass it by and go to another area. People of this area have been saying the sport fishermen are in the way. They would like to see them taken away.

This reaction to sport fishermen on their sites and allotments is quite common from those we interviewed (Table 13). Because the sport fishermen operate outside the customary rules used by the villagers, communication and cooperation is limited.

To complicate the pattern even more, sport fishermen fish in the same places as the local subsistence fishermen. Villagers constantly report this situation. For example, one elder told us that whenever he goes out on the river to subsistence fish he encounters sport fishermen. He feels that there are too many on the river. He further observes that:

> They are in the way. The sport fishermen are fishing where we used to go, and where we want to go [for subsistence net fishing].

In addition to fishing, the camps are located where the villagers traditionally fish. One elder told us that the area they go to net fish and split them is now occupied by sport guide camps. He said this is near Gechiak Creek.

> My wife owns an allotment there. Where we used to stay, [sport fishermen] are staying. It is irritating to see them at our fishcamps. The tents were a little ways down from my wife's allotment. And sometimes we'd split fish there [where the sport fishermen's tents were].

Of the five fishing camps located on the lower portion of the river, four of them are located in prime subsistence fishing locations. Although the camp on the island near the mouth of Pungokepuk Creek is not in a prime subsistence fishing area, the floater camp used by them was. It was located near the mouth of the Pungokepuk (Figure 8) on the old village site. A cemetery is located near it.

We observed that the guided camps were only starting points for fishing. Although on occasion we observed sport fishermen fishing from the banks and the water's edge next to the camps, for the most part they were fishing up and down the river. Again, Figure 8 indicates the areas of sport fishing we observed over the course of the study and clearly shows the mobility on the river of the sport fishery. According to USFWS counts, most of the clients and use days were on the lower reaches of the river (Fig. 6). Thus, our observations are probably indicative of the areas fished particularly in the lower part.

We observed that most of the sport fishing is done in the same places as subsistence fishing, as shown in Figures 4 and 8. These two maps clearly show that the location of the subsistence net sites observed and reported for the lower portion of the river are basically the same areas utilized by the sport fishermen. Moreover, we found that there are only a limited number of significant king holes, spawning creeks, and fish holding areas depending on the season and depth of the water. As the water depth decreases the number of good fishing holes also decreases in the lower portion. The side creeks and false channels become too shallow to travel and fish. The fish attempt to go to deeper holes or run to the lake depending on species. As a consequence, there is more competition between fishermen for these spots.

We found evidence that the gear types, nets versus rod and reel, are incompatible when fished at the same time in the same location. Both groups complain against the other. Sport fishermen are concerned that net fishing catches too many fish at once and can wipe out entire fish holes. On the other hand, subsistence fishermen see the sport fishermen as getting in the way and causing problems while they are trying to set their nets or drift. One lady from the village commented that when she goes up river she finds that there are too many sport fishermen up there.

> When we are catching fish, the sport fishermen see the fish and say they don't like the netters to have the fish. These are the silver fish that we go to get.

Further, village respondents maintained that because the sport guides do not like to fish where netters are, they attempt to chase them out. One villager told us that:

> Sport guides have told him not to fish in an area last year. This happened a couple of times. Once, the sport fishing guide said the area was a reserved area for his fishermen. He said it was for the exclusive use of the fishermen from his lodge.

There are a number of incidents such as these that have become well publicized among the villagers. One villager described the situation where he wanted to fish his site on his allotment but there were a number of sport fishermen fishing off the bank nearby. So he asked them to move or leave so that he could set his net. They refused, telling him that they were there first. He waited for a while and asked them again but they refused. So he started the boat, came into shore, and set his net between the fishermen, getting them wet in the process. The result was that hostile words were exchanged. The actual number of incidents like this is not known, however about 29 percent of the interviewed Togiak residents reported such encounters (Table 13).

The point here is that the two gear types are not compatible. If they were, the sport fishermen would have just moved over to let the man set his net. But they feel that nets catch too many fish and make areas poor for rod and reel fishing. Thus, it has been alleged, that they attempt to chase the net fishermen away or prevent them from fishing certain areas they feel are good holes for their clients. The

villagers recognize this and they do not like it. They say, "It is our land and we should be able to fish from it as we need to."

The consequence of these well-known incidents and experiences is, first of all, confrontation, as just described. Villagers report numerous cases where they have been cursed, had rocks thrown at their boats, and were buzzed by airplanes. This was reportedly done by sport fishermen trying to get them out of an area. One lady related her experience as follows:

> I was cussed at by a sport fisherman. He was swearing at us with a rock in his hand exactly at *Pengurpak* (Pungokepuk Creek). It was my grandfather's place. When we were going to stop at the sandbar, he started cussing at us.

Another villager reported that as he was trying to use a set net for subsistence fishing, a sport guide took out his lure and tried to hit him, casting it out two feet from the boat he was in. These incidents become well known in the communities and become the basis of the perception that sport fishermen are extremely aggressive and are confrontational. A general feeling, often stated was that "there have been a lot of problems with sport fishermen and guides bothering subsistence fishing."

This perception develops in the villagers a level of intimidation, particularly among the elders. As one elder told us, "It is embarrassing to go fish around the sport fishermen's areas." They avoid those areas where there are sport guides, camps, and fishermen. He claims, "It is embarrassing to fish in front of the sport fishermen". Others say the same thing, that they will avoid an area where there are sport fishermen. One lady told us that when they go fishing, though they would like to set on that area, they feel they must pass it by and go to another area if sport fishermen are near there.

To be "embarrassed" (Yup'ik *tunrirtut*, "they feel embarrassed") can be another expression for fear. The subsistence fisher is afraid to set his net around sport fishermen for fear of their reaction. What the villager is attempting to avoid is a direct confrontation with the recreational users. It is not that he is afraid physically, but rather, consistent with Yup'ik customary values and behavior, direct confrontation with anyone should be avoided if possible unless directly provoked. Thus, the expression "we do not mean to

go against them" indicates their efforts to avoid confrontation. The added expression, "we pass them by" underlies their attempt to avoid a confrontation with the sport fishermen.

The result of the conflict is that subsistence fishermen may cease using the preferred areas for fishing even if sport fishermen are in the general area and not at the specific site. This may mean that they must go to a site quite removed from the area where they originally intended to fish. In other cases, this may mean returning to the village because there are too many sport fishermen upriver at the productive fishing sites to net fish. Furthermore, no longer are they able to fish their traditional sites, but now must move away from where sport fishermen are camped and fishing. This takes up a good portion of the lower river. The result is frustration at not being able to use the river and their land as they customarily did.

TRESPASS: WHO IS IN CONTROL?

A major concern is expressed by many of the villagers (38.7 percent of interviews; Table 13) as follows: Who gave the sportsmen a right to fish on the river from their land? As one elder observed, the sportsmen did not come to the elders and ask their permission to fish on the river -- so where did they get permission? They must be on the river without permission, he reasoned. For the villagers, this raises the question of who is in control.

As discussed earlier, management authority over the river and land is divided between federal, state, and Native entities (Fig. 1). Management and control over the upper portion of the river column and lands, the wilderness portion, is under the jurisdiction of the Togiak National Wildlife Refuge, established in 1980 under ANILCA. Special permits are required for sport fishing guides and air taxis. Since 1984, there has been a moratorium on the issuing of new permits. Also, there are restrictions on the operation of the generators and other motorized equipment in the wilderness area. Apparently these requirements have increased pressure along the lower river. It is more attractive for the guides to set up camps that retain some the modern conveniences for their clients. Initially, attempts were made to establish sport camps on sandbars but flooding is a regular feature of the river during June and July.

The river column below the wilderness area and the land below mean high tide are under the authority of the Alaska Department of Natural Resources (ADNR). All of the land along the river above mean high water belongs to villagers and the village corporations through Native land selections. Consequently, the villagers are unable to regulate the river's use, even though it flows through their lands. This has become a great source of frustration to them. In addition, nearly all the major subsistence sites are located in this lower portion of the refuge (Fig. 4, Table 8). The inability to regulate river use has been a source of tension and conflict between the villages and the other user groups and regulatory agencies. The villagers feel that their rights under ANILCA are being ignored because they own the land bordering the river and under ANILCA subsistence uses have priority over other uses of fish and game

In 1987, one of the ways the village corporation used to attempt to regulate river use was to lease land to six sport fishing guide operations. The objective was to control timing of river use, numbers of persons, and location of camps through the lease arrangements. Under these arrangements, five of the lodges were only to have day camps, flying clients in and out daily. The sixth could have week-long guests but the lease price was double the day camp rate. Each day camp paid $1,500 monthly and the sixth paid $3,000. In addition, there was a strong suggestion that the camps should patronize Togiak stores so that the local community could begin to benefit from the new commercial guided fishery. A point that was clarified for the guides and their clients with the lease arrangement, that was not clear to them before, was that the lands bordering on the river were all owned by the local villagers and held by the village corporations.

During fieldwork in 1987, mixed feelings were expressed in Togiak and Twin Hills villages in regard to the leasing of land to the sport guides and lodges. However, according to the Togiak village corporation, the alternative would not have prevented the camps and sport fishing on the river. Because the water column is under state authority, all people can fish on the water and from sand bars not above mean high tide. In August 1987, for example, this would have included numerous sandbars that would be good for camping. (In contrast, in July, most fishing was done either from a boat or the high cut banks because the river was more-or-less at flood stage and the sandbars were covered with water.)

It does not appear that the leases reduced the numbers of sport fishermen on the river or changed where they fished. Sport fishermen continued to fish up and down the river whenever they found fish, from the banks and the exposed sandbars. The leases simply gave both parties a structure within which they could interact with each other. Through their right to deny leases to lodges, villages might exert some influence over the camps as to location and the condition of the camps sites. In this sense, their influence is largely based on a landlord/tenant relationship to the sport guides.

In interviews and discussions about the management of Togiak River, villagers evidenced a sense of impotence in regard to their own lives and future on the river. They felt that they have no authority to deal with the way in which the river is used by others. From their perspective, not only do the regulatory agencies not appreciate the local residents' understanding of the river and its resources, but their requests for specific use regulations on the river are often ignored. The issue becomes the degree to which village residents can protect their economic and cultural future as they believe it must be protected. Accordingly, perceived loss of control over this future is a serious impact of the growth of recreational uses of the Togiak River.

It is important for this report to establish a clear picture of the interests the subsistence users have on and along the river. This means not only concern for the natural resources but also the land and its history. First, it must be emphasized that many of the elders who now reside in Togiak were born along the river. One elder, in describing the villagers' interest in the river, explained that the villagers used to live up the Togiak River. The areas where they subsistence fish today were fishcamps. Most of the people used to live in upriver sites year round or seasonally, but they moved down to live in Togiak when the elders died off. Many of the present day elders were not only born along the river but lived upriver through their early adult years. Togiak itself was not heavily populated until after 1950. Prior to that there were still villages on the river and on the bay near Osviak that were inhabited year round. With this perspective it is clear that the river and its environs are more than a place to fish and hunt for the villagers. Their roots, so to speak, are located upriver.

As a consequence, a significant proportion of the eligible villagers have selected their allotments on the river near the locations where their parents were born or their grandparents lived, or where they

were themselves born. The allotments form almost a solid block between the mouth of the Togiak and Pungokepuk Creek. Also, old village sites and cemeteries are found intermittently along the entire length of the river (Fig. 2). These places are now many of the subsistence fishing sites that the villagers use.

As noted above, villagers get upset when they see sport fishermen use these areas without permission and when some of them show a disregard for the area by leaving trash, trampling the area down, cutting trees, and the like. For example, one villager told us that the sport fishermen have been using their allotment, and that:

> Every year there have been a lot of fishermen there. [My] tent frames and fish racks have been taken down and damaged.

Another villager reported:

> The sport fishermen left a lot of junk and trash at *Iqallulegmiut* (Ekiligamuit; see Fig. 2, Place #2). They are trampling paths on old village sites and on allotments. One place is at *Pengurpak* (Pungokepuk Creek). Another is near the mouth at *Iqallulegmiut*.

Another said:

> The sport fishing guides are on people's land, their allotments. They tear the trees down, leave garbage, trash, and litter.

The places named above are two old village sites that are surrounded by allotments. Moreover, it marks an area where nearly all of the land bordering the river is owned either through native allotments or held by the village corporation.

Villagers say that they complain to the authorities and regulatory agencies but to no avail. One villager described the situation as follows:

> The wildlife refuge is chasing the sport guides closer to the village. But they won't help the village. No one will help the corporations to patrol the lands. BIA won't, ADF&G won't, USFWS won't, the troopers won't. None will. The troopers are supposed to, but they say they can't deal with illegal sport fishing camps.

The inability to do anything about this situation is one of the more frustrating aspects for Togiak residents. They own land but can do nothing about trespass. One villager concluded that no one wants to take responsibility for enforcing trespass rules. Another reported that he went to the Bristol Bay Native Corporation (BBNC, the native regional for-profit corporation) and the Bureau of Land Management (BLM)

to report a trespass, but got no response. Consequently, these and other villagers have lost their trust of the regulatory agencies.

CATCH AND RELEASE: THE YUP'IK COSMOLOGY OF BIOLOGICAL ETHICS

Perhaps more than any other issue, catching fish and then releasing them back into the water is the most problematic for many Togiak villagers. The practice strikes right at the core of their cosmology concerning wild resources and their relationships to nature. During interviews, young and old alike agreed that catch and release is wrong (77.4 percent of interviews; Table 13). Moreover, they maintained that it is dangerous in that it may create a condition where the fish will diminish in numbers and size. This idea is not new to the villagers. One elder lady told us that:

> . . . her ancestors [had] a saying that catching fish and letting them go is not good, the fish decrease. The fish tend to decrease if they are played with like that.

These perceptions and beliefs derive from a Yup'ik biological ethic that produces conservation guidelines for humans' continuing dependence on nature. In this section, we will outline the two principles that underlie villagers' perceptions regarding catch and release and then examine the implications.

The first principle is that fish are food. Fish, of course, have been a major staple for the Togiak Yup'ik for centuries. Indeed, the Yup'ik term for fish and food is the same, *neqa*. A common statement in the interviews is that "fish (food) is not supposed to be played with". "If they catch them, they should keep them, not just play with them," a villager instructs. Fish are not objects to struggle with, to play with, or to abuse in any form. The fear the elders have is that if such abuse of the fish occurs there will be no more fish for subsistence food. Why is this so? What is the source of the fish? What affects their relative abundance?

In this complex belief system, the details of which are not well understood by non-Yup'ik people, fish either give themselves to the fishermen or a kind of spirit caretaker offers them to humans. An important facet of this relationship is that the captured fish are a gift to the fishermen. As long as the fishermen treat the fish with "respect" and use the fish for its intended purpose -- food -- more fish will be given as the need arises. Greed, waste, and "playing with" fish are signs of disrespect which can diminish

the gifts or stop them altogether. One woman observed that "where the sport fishermen have fished and leave fish, the fish go away from those areas and they are not able to fish there."

It is important not to "scatter" the fish around (54.8 percent of interviews; Table 13). This is another term for waste. A villager told us that:

> Starting from our ancestors, we are not supposed to scatter fish everywhere . . . from the ancestors' tales, we take care of the fish to provide us with food. The fish don't come back, and tend not to increase, they don't come back here to the bay anymore if they scatter it around.

Therefore, it is extremely important to take only what is needed, and those taken must not be wasted. A number of villagers told us that even the bones must be properly disposed of in a hole in the ground or given to the dogs for food.

The villagers' opposition to "scattering" fish and throwing them back into the water whether they were alive or dead is not directed just at sport fishermen. An earlier example occurred a few years ago in the commercial herring fishery. In 1982, a large number of herring were caught in gill nets but their roe count was low so many of the non-local fishermen threw the dead fish into the bay. The people of Togiak became extremely upset because of the waste that was taking place. Moreover, many were concerned because, as one elder observed:

> When there is stinky fish in the water, the fish don't swim around that area. That's only when human beings cause them to be laying around

The herring were being wasted by not being used properly, for food. They were being abused. By being released back into the water, alive or dead, they could cause other fish to avoid the area. This position also shows how the commercial fishery is compatible with this cosmology. All the salmon caught in the commercial fishery are to be used for food. That is the proper function for fish. It does not matter if natives or non-natives are the recipients or, for that matter, non-humans such as dogs.

In the Yup'ik cosmology, then, fish have a proper role to perform. Nature is in harmony when all relationships support the function of each other. As one villager related, "even grass is alive and should not be abused. If you respect it, it will one day help you." In this perspective fish must be used for food. If not, nature may get out of balance and the fish will go away.

Imbedded in these ideas is a second principle of the Yup'ik cosmology. When humans take a fish from the river, it becomes contaminated with the "prints" of human beings. If released back into the river, the fish will die or become disoriented and not spawn. Consequently, fish diminish in numbers. In the Yup'ik cosmology, there is a clear division between the human sphere of activity and the natural spheres of other creatures. It appears that each entity has its sphere in which it conducts it normal life. It has purposes, relationships, and other things similar to the human sphere. In addition, there are rules that regulate the relationships between entities in different spheres. In a sense, each has a set of expectations in regard to the other. As long as they are met, nature is in harmony. Correspondingly, once a human takes an entity from its natural state, certain responsibilities fall to the human. The major responsibility, in regard to fish is to insure that it is used for food. Once an entity, such as a fish, enters the human sphere, it can never return to its natural state. As one elder told us, "It is contaminated". Thus, the remains of fish must not be thrown back in the river; they must be buried or given to the dogs or other fish will avoid the spot. Fish caught and thrown back in the river become disoriented, because of "contamination." They cannot find their proper "spirit guide" (*qayaamyua*, literally "kayak spirit") to take them to the proper spawning creeks. Some of the elders who were born and raised on the river have told us they believe that many of the creeks no longer have salmon spawning in them because of sport fishing using the catch and release method which either kills the fish, makes them ill so they will not eat, or disorients them so they do not spawn.

To summarize, the Togiak villagers have a complex cosmology that clearly sets out humans' relationship with nature, including fish. Fish are food. If not used for food, fish should not be harvested. Once humans harvest something from nature it is to be taken care of properly and not left to be scattered about to scare other fish away. If the fish allows you to catch it, so the saying goes, then you should have proper respect and eat it. This is why it gave itself to you. One of the responsibilities of the elders is to teach the young the way in which the harmony and balance with nature is maintained. Sport fishermen with their practice of catch and release violate the basic premises of the villagers' cosmology. It is an act against nature from the villagers' perspective. Such a violation has a very powerful impact indeed.

The implication of this cosmology is that it is a clear guideline to conserve nature. Take only from nature what one needs for food, clothing, shelter, warmth, and so forth. All that one gets from nature is a gift and must be treated as such. One does not reject gifts, nor for that matter, does one count gifts. It is something one receives and proper respect must be returned. The person who receives a gift has the responsibility to see that proper respect is given. This means insuring that it is properly taken care of and the proper rules are followed.

In contrast, it is felt that sport fishermen do not perceive fish as food but as a "game" or a "sport". They catch the fish not to eat, but for a thrill or some other motive. From the village perspective, they are killing the fish and, according to one elder, "When the children grow up [in the village] they will not be able to fish" for there will be no more fish. That which is taken from its natural state cannot be returned to the same natural state with impunity. The outcome is to scatter them about rather than to return them to their normal, natural existence.

CHAPTER FIVE: SUMMARY AND DISCUSSION

In the previous chapters, we presented a summary of the findings of the study concerning local subsistence uses of Togiak River salmon and their interactions with recreational uses of these fish. In this final section, we will summarize the types of problems that were documented and some solutions to the present issues which villagers have offered .

TYPES OF PROBLEMS

The results of the study suggested that a large portion of Togiak residents disliked the sport fishery, in part because sport fishing interfered with their subsistence use of the Togiak River. From 1979 - 1984, the number of guide services and sport fishermen grew rapidly. The villagers reacted to this growth with irritation mixed with a deep concern. They reported that there are too many sport fishermen on the river causing a disruption to fish spawning and subsistence activities. The evidence they used to support their claims are the experiences they and their neighbors have had with sport fishing in the 1980s. Many of the guides offered similar conclusions that the Togiak River had too many sport fishermen putting pressure on fishing holes and the fish. The problems that arise from conditions of over crowding are numerous, and are compounded by cultural, social and political differences. Most of the problems revolve around three major themes: displacement, catch and release, and trespass, each of which will be summarized in turn

Displacement

The gear used by subsistence fishermen, gillnets, are incompatible with the rod and reel gear used by sport fishermen. Both user groups emphasize this point. On the one hand, sportsmen feel that net fishing depletes an area of fish. On the other hand, subsistence fishermen argue that sport fishermen get in the way when subsistence fishers attempt to use nets while fishing the same area. Nets are used in several ways during the season -- as set nets, as seines, and as drift nets.

Often, the result of such encounters is that there is a heated exchange of words between sport and subsistence fishermen. Cases are reported where the former have actually hurled rocks and cast spinners at subsistence fishermen. Sport fishermen have reported that net fishermen have run their boats and nets too close and have sprayed them with their wake. The outcome of such encounters is tension between the two user groups. If each group is to maximize its catch in the most efficient way, they are often put in situations of potential conflict and confrontation as the numbers of good fishing areas decreases as the season progresses and the water level drops after the snow has melted above the lake.

Villagers, on the whole, tend to avoid conflict whenever possible. As discussed above, their values underpin this tendency to avoid confrontational situations. As a consequence, villagers will often "pass by" their traditional subsistence fishing spots if sport fishermen are in the area. The villagers, especially the elders, are intimidated by the sport fishermen. Numerous people have reported that they will not even stop at their allotments to check them out or to picnic if sport fishermen are in the area because, they remark, they are "afraid" of the reaction of sports fishermen. They tell us they are afraid to "socialize" with the sport fishermen for fear of confrontation. In their efforts to avoid a potential confrontation with sport fishermen, subsistence users and villagers, generally, often find it necessary to go to areas on the river other then their primary or even secondary choices. In general terms, this means that they are being displaced, their traditional subsistence patterns of salmon harvesting are disrupted, and their sense of stability is jeopardized. This is a difficult situation for a people who have used the river and lake areas for countless generations.

Villagers emphasized that this is a problem with which they are deeply concerned. The elders, who fish close to the mouth of the river, find it difficult not to be able to use their traditional fish sites when they discover sport fishermen on or near it. Some report that they return to the village without fishing. This causes disruption in their subsistence fishing schedule because the catching, splitting, and drying of salmon are conditioned by the weather and other factors. The ability to fish when the conditions are right is critical. Thus, subsistence fishermen perceive the disruption in timing and location of harvesting salmon as a threat to the success of subsistence salmon fishing and their future livelihood.

Catch and Release

Sportfishing raises other concerns that are grounded in traditional Yup'ik beliefs. As just noted, the elders, among others, are concerned when they find sport fishermen fishing on or near their fishing sites because it forces them to go elsewhere. But also, many of the people interviewed perceived such activities as a basic threat to the continuing productivity of the site, if not the river as a whole. The practice of catch and release is disliked by almost every villager with whom we talked. They dislike such a practice because they believe it abuses fish by injuring them, causing them suffering and serious injury in some way, and because it critically disorients the fish and often prevents them from spawning. From the villagers' perspective, catch and release is wasteful and causes the fish population to decrease. They cite many cases where they have seen bright, silver fish, dead from catch and release. Such coloring suggests to them that the fish died before it spawned. They further cite the disruption of spawning stream beds by wading fishermen fighting with the large salmon. Large fish such as salmon, they argue, will dislodge eggs buried in the stream bed if they fight to escape the angler's hook. Such "playing with fish" is not only disrespectful of the proper function of fish as food, according to the villagers' perspective, but it threatens the future of salmon runs in the river. Elders assert that many streams that were used by salmon in the past in which to spawn no longer have salmon returning to them. These streams, they observe, are near sport fishing camps. The villagers also point as evidence to the decrease in king salmon runs over the past few years in the Togiak River.

Trespass

Togiak residents find that their customary rules are breached by sport fishers in regard to fishing methods and locations. Sport fishermen are fishing from villagers' allotments, often without permission of the owner. Some villagers have had the experience where sport guides have chased them from their own allotments and traditional fishing sites. Upon complaining to the regulatory agencies, they say they received no assistance or enforcement of laws against trespass. The local residents report that allotments

and fishcamps are disturbed. Old village sites reportedly have been left with garbage and other litter. As a consequence, villagers feel powerless to protect their own lands and resources against trespass and the use and abuse of them that takes place.

This perception of powerlessness to protect their lands, resources, and the river against unrestricted use and abuse has caused much concern among the villagers. Because their subsistence and cultural existence is in a large measure tied to the river and its adjacent lands, the inability to influence their use has caused much frustration. It is not clear to them how to handle such situations. The majority of the villagers we talked with do not want a confrontation with sport guides or fishermen. Yet, they feel strongly that something must be done about the unrestricted use of the lower portion of the river. Permits and restrictions are placed on the use of the wilderness portion of the river but none on the non-wilderness portion where the villagers own nearly all of the lands and islands above the mean high water mark.

Summary

In summary, the types of problems that subsistence users perceive as resulting from sport fishermen fishing on the Togiak River are very basic. They are concerned with access to traditional fishing sites, protection of the fish resource, and protection of their land. Further, the villagers believe that the regulatory agencies have not offered, to date, any acceptable solutions to their problems. Consequently, the villagers feel a sense of frustration with the current pattern of regulation, or lack of, on the river, and a mistrust of the regulatory agencies involved.

SUGGESTIONS FOR SOLUTIONS

Villagers with whom we talked would, on the whole, prefer a return to the situation of the pre-1980s where there were very few sport fishermen using the Togiak River and no guided sport fishery. Yet, they realize that the probability of this happening is very low. Moreover, sport fishermen have different goals and motivations as well as a different perception of fish biology than traditional villagers, and these are

unlikely to change. In a sense, there may be no clear way to resolve the differences in the respective world views between subsistence and sport fishermen. However, villagers have attempted to generate some solutions to the problems. The following is a discussion of some of the solutions suggested by the local residents of Togiak during the study.

One of the first solutions we encountered in the study was the suggestion by a few villagers that they would like to develop, individually and through the assistance of the village corporation, guided fishing operations. Their idea was to restrict the guided operations to local village owned and operated outfits. In this way they could promote sport fishing without disrupting local subsistence use. Fish caught would be turned over to the local villagers for subsistence use rather than releasing them. In this way, customary rules of river use and fishing handling would not be violated. The fishing operations would be either a village corporation project employing local residents or individually owned and operated projects. The villages would then benefit economically and, at the same time, protect the river and its resources from degradation.

A second suggestion that the villagers offered was to redefine the lower portion of the river column to non-navigable. In this way the local villagers and the refuge staff could co-manage the use of the river column and the adjacent lands. The villagers feel that they could work more productively with the refuge than with the state regulatory agencies. Moreover, there could be a similar policy and enforcement along the entire river column rather than the situation that now exists.

Another suggestion from the local fish and game advisory committee and others has been to restrict the sport fishery from fishing in the Togiak River below the Gechiak Creek/*Urrasqaq* area. This covers approximately the first ten miles of the river. Because nearly all the subsistence fishing for salmon during the sport fishing season takes place within this area, confrontation and displacement could be nearly eliminated. Moreover, the numerous spawning streams in the lower portion would be less impacted, from the villagers' perspective. The problems of trespass also would be reduced. In sum, the restriction of the sport fishery from the first ten miles of the river could reduce some of the tensions and conflicts that now exist between the two user groups without elimnating the sport fishing operations from the entire river.

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APPENDIX A SALMON HARVESTER SUMMARY REPORT

Date _____ Done By: _____
Permit # _____ Fishing period covered _____

During this period, did you fish for subsistence? yes ___ no ___

Did you fish at a site here in the village (below the mouth of the river)? yes ___ no ___

How many fish did you catch in your subsistence net?
Kings ____ Reds _____ Chums_____ Pinks _____ Cohos _____

Did you remove any fish from your commercial catch or get any in the Bay?
Kings ____ Reds ____ Chums _____ Pinks _____ Cohos _____

During this period, did anybody from your household go and fish up the river? yes ___ no ___

Trip 1	Who	When	Where	Did you plan to fish there?	# locations Tried first?	Why did you change locations?	# & species caught by HH	gear used
								___ net ___ seine ___ spear ___ R & R ___
Trip 2								___ net ___ seine ___ spear ___ R&R ___ other
Trip 3								___ net ___ seine ___ spear ___ R&R ___ other

If respondent was interviewed on the river during any of those trips, place * to indicate which ones.
Use back if needed.

SALMON HARVESTER SUMMARY REPORT (con't)

	Who	When	Where	Did you Plan to fish there?	# locations tried first?	Why did you change locations?	# & species caught by HH	gear used
Trip 4								____ net ____ seine ____ spear ____ R & R
Trip 5								____ net ____ seine ____ spear ____ R & R
Trip 6								____ net ____ seine ____ spear ____ R & R
Trip 7								____ net ____ seine ____ spear ____ R & R
Trip 8								

APPENDIX B: TOGIAK RIVER OBSERVATION GUIDE

Date_____ Observer _____ Time started _____

Weather _____ Time ended _____

For subsistence (local) parties, note the following:

in party _____ location _____
How will the location be gathered? rt. bank, lt. bank side channel, main channel, back eddy, pool? 2 mile upstream/ mile?

Gear type used: ___ set net __ seine ___spear __ rod & reel __other/specify

Note structures: __cabin __racks ___tent ___smokehouse ___other/specify

Is it an allotment? _____yes ___no
(ask user)

Activity: ____fishing ___hunting ___ berry picking __other/specify

Questions to ask the fishermen:

1. Catch: #_____kings _____reds ____silvers ____chums ___pinks

____pike _____char _____whitefish ____grayling ___rainbow

2. How often do you come to this spot?

___ always ____often ___sometimes ___rarely ___never before

3. Was this the location you were headed for? yes___ no ___

4. If not, how many locations did you have to try first?

5. Why did you change your plans?

___ other subsistence fishermen got there first

___ people not from the village were fishing or camping there

___ water level too high or too low

___ other (explain)

6. Do you share this spot with other families? yes ____ no ___ How many? _____

7. Why did you choose this spot?

8. Is this the only location you use for subsistence salmon fishing? yes ___ no ___

9. Is it a good or bad spot? Why?

10. Number of days trip will last:_____

11. Do other villagers sometimes take spots you prefer to fish? ___yes ___no

12. Have you ever had to move on because sportfishermen or other users were already using a site you planned to fish?

____often ____sometimes ___never

13. Do you like to fish with other people?

If yes, ___family ___friends ____strangers

If no, ___nobody

THANK YOU

APPENDIX C: OBSERVATION GUIDE FOR RECREATIONAL USERS

Date_____

Observer_____ Weather _____

Time	#In Party	Guided or Unguided (if known)	#Planes	#Boats	#Floats	Activity	Location

APPENDIX D. SUBSISTENCE SALMON HARVEST DATA AND EXPANSION ESTIMATES

As explained in Chapter One, one goal of the Togiak River project was to obtain more precise estimates of subsistence salmon harvests by Togiak residents. Although estimates of subsistence harvests are available based on returned permits, as reported in the Bristol Bay Area Annual Management Reports and contained in the Division of Subsistence Historical Subsistence Salmon Data Base, it was known that many households in Togiak who take salmon for subsistence purposes, including high harvesting households, do not regularly obtain or return permits. Some reasons for this are discussed in Chapter One. Thus, it was suspected that estimates of the total subsistence harvest based on the permit data would be underestimates.

As shown in Appendix Table 1, there were two sources of information on harvest numbers: permit returns and household interviews. In total, 50 households provided harvest data through interviews. Of these, 13 also returned subsistence permits to the department. In addition, 7 households returned permits but were not interviewed. Besides these 57 fishing households, 13 households reported that they "did not fish" when they were approached for interviews. Eleven others, who declined to be interviewed and did not have permits, were known to harvest large quantities of salmon. For the remaining 59 households, there was no information other than that they were probably not high harvesters.

Table 10, in Chapter 3, summarizes the reported harvests of salmon for the interviewed households and those who returned permits (N = 57). Excluding spawned sockeyes (for which only very limited data are available), the reported total salmon harvest was 6,112 fish.

Appendix Table 2 reports the reported subsistence salmon harvests for Togiak households for 1987 from two sources: the 20 returned permits only (the first column of numbers) and permits and interviews combined (the fourth column, which matches Table 10). Appendix Table 2 also contains four estimates of total subsistence salmon takes for Togiak, labeled A, B, C, and D. These methods are defined below:

Expansion Method A: This method relies only on permit returns. It assumes that all households who fish in Togiak obtain permits. Since 40 households obtained permits in 1987, the catch rates for the 20 who returned their permits were applied to all 40 to estimate that total catch. The estimated total harvest is 6,018 salmon. This is the estimate that regularly appears in the Annual Management Report. For reasons noted above and in the text, this is an underestimate of total take.

Expansion Method B: This method also relies solely on permit data and assumes that the catch rate for households that return permits is representative of the entire community (N = 140 households). The estimated total take is 21,063 salmon, the highest of any method. Since it is known that some Togiak households harvest no salmon, and others harvest relatively low amounts, this is likely to be an overestimate.

Expansion Method C: This method uses reported harvests from both permits and interviews. It assumes that the catch rate for the 57 known fishing households is representative of all 140 households in the village. The estimated total is 17,268. This may be a more realistic estimate than those based on permits alone, but may be an overestimate because it is known that Togiak households harvest at different rates.

Expansion Method D: This method also uses reported harvests from permits and interviews. It is based on dividing the 140 Togiak households into three strata. The first are "high harvesters." There were 27 such households in Togiak in 1987, and harvest data are available for 16 of them (Appendix Table 1). The second group are "other harvesters," which total 93. Harvest data are available for 34 of these. Finally, there are the 13 "non-fishing" households. Mean household harvests were calculated for the three groups. The estimated total subsistence salmon harvest method using this procedure is 13,524. This is slightly more than double the estimate obtained from focusing just on the permitted households (Method A) and is probably the most realistic of the four estimates.

APPENDIX TABLE 1. HARVEST DATA SOURCES, TOGIAK, 1987 SUBSISTENCE SALMON HARVESTS

Type	Number of Households	Percent of Total
Interviewed and Permit Returned	13	9.3%
(High Harvesters)	(8)	(5.7%)
(Other Harvesters)	(5)	(3.6%)
Interviewed, no Permit Returned	37	26.4%
(High Harvesters)	(8)	(5.7%)
(Other Harvesters)	(29)	(20.7%)
Permit Returned, Not Interviewed	7	5.0%
Known High Harvests, No Harvest Data	11	7.9%
Non-Fishing Households[a]	13	9.3%
Other Harvesters, No Harvest Data	59	42.1%
TOTAL	140	100.0%

[a] Self designation when approached for interview. This represents almost all the non-harvesters in the community. Low harvesters are included in the "Other Harvesters" group.

APPENDIX TABLE 2. COMPARISON OF EXPANDED HARVEST TOTALS, TOGIAK SUBSISTENCE SALMON FISHERY, 1987

Species	A Reported Harvest, Permittees N = 20	A Expanded Harvest, Permittees N = 40	B Expanded Harvest, All HHs N = 140	C Reported Harvest, Permittees & Interviews N = 57	C Expanded Harvest, Using One Set of Means N = 140	D Expanded Harvest, Using Three Srata N = 140
Kings	414	828	2,898	701	1,722	1,363
Sockeyes	1,527	3,054	10,689	2,978	7,314	6,005
Chums	552	1,104	3,864	1,161	2,852	2,233
Pinks	2	4	14	9	22	20
Silvers	514	1,028	3,598	1,263	5,358	3,903
Total	3,009	6,018	21,063	6,112	17,268	13,524

Method A: Assumes that only the 40 households with subsistence permits harvested subsistence salmon.

Method B: Assumes that all households in Togiak harvest subsistence salmon at same rate as those that return permits.

Method C: Assumes that all households in Togiak harvest subsistence salmon at same rate as those that were interviewed or returned permits.

Method D: Expands to entire population using three strata: high harvesters, other harvesters, and non-harvesters.