THE HARVEST OF FISH AND WILDLIFE FOR SUBSISTENCE BY RESIDENTS OF MINTO, ALASKA

by

Elizabeth F. Andrews

Technical Paper No. 137

Alaska Department of Fish and Game
Division of Subsistence
Juneau, Alaska

July 1988

This research was partially supported by ANILCA Federal Aid funds administered through the U.S. Fish and Wildlife Service, Anchorage, Alaska, SG-1-4 and SG-1-5.

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ABSTRACT

This study describes the harvest of fish and wildlife in the community of Minto in central Alaska. Minto's population in 1984 was 179 people in 48 households. Members of all but three households were interviewed. Minto's population is almost entirely Athabaskan Indian. Wildlife harvest and socioeconomic data were collected from May 1984 through 1986. Major research techniques included systematic household surveys, key respondent interviews, direct observation, and literature reviews.

This report includes a description of the historical development of Minto from the late nineteenth century to present including a description of historic and contemporary settlement patterns and annual round of subsistence activities. The socioeconomic conditions of the community during 1983-84 are described also. During the study period 80 percent of Minto households had at least one member who worked for wages at some time during the year. There was no income from commercial fishing. In 1983-84 the average household income was $9,252. Seventy-one percent of households were below the 1984 poverty income guideline.

Hunting and fishing makes a major contribution to Minto's economy. The harvest of fish and wildlife occurs within a 2,400-square mile area of Minto Flats and the adjacent hills and streams. The extent of land use is remarkably similar to that of the early 20th century. Household participation in wildlife harvest activities was high during 1983-84 -- 91 percent hunted small game, 82 percent hunted waterfowl and collected berries, 78 percent fished for salmon, 73

percent fished for freshwater fish, 53 percent hunted large game, and 49 percent trapped fur animals.

The harvest of fish and wildlife as shown by the quantities harvested during the household survey in July and August 1984 were among the highest in the state. For the 12-month period, Minto households harvested an average of 3,971 pounds dressed weight of wild fish, game, and plants with a per capita harvest of 1,015 pounds. Salmon and other fish species accounted for nearly 85 percent of the harvest.

This study found that the production of fish and wildlife for subsistence is highest among the larger mature households which tend to have older household members, older-aged children, and the most equipment directly related to subsistence harvesting and processing, such as boats, outboards, and fish nets. In addition, the households with the greatest subsistence production are those extended families with members of three generations residing in a single residence. These households harvested nearly twice that of any other kinship type. The highest producing households also had the highest average income.

Minto's economy is based on a combination of cash and subsistence components. Variety in income sources and fish and wildlife harvests typifies the individual household economy and that of the community as a whole.

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ACKNOWLEDGEMENTS

I am grateful to all of the residents of Minto for their generosity, patience, hospitality, cooperation, and interest during this study and since then. Members of every household contributed to this work as well as numerous people who now reside in Fairbanks, but lived much of their life in Minto Flats. Their number exceeds 100. I also wish to thank the Minto Village Council and the Tanana Fish and Game Advisory Committee for their support of the project. I was glad to have had the opportunity to return to Minto after my first visit there in 1974 and my work recording Athabaskan place-names with Chief Peter John in 1979. Special thanks go to the elders of Minto who provided invaluable information on the use of fish and wildlife and the country of which they are so knowledgeable.

This report benefitted from the work of several members of the Division of Subsistence in terms of statistics, typing, editorial review, and field work assistance. Maps and figures were prepared by the author or private contractor. Any errors in this report are my own.

CHAPTER 1

INTRODUCTION

PURPOSE OF THE STUDY

This report describes the patterns of fish and wildlife harvest and use in the community of Minto in central Alaska. The study was initiated to provide baseline documentation of wildlife harvests and geographic use areas, and to develop information to address issues which may affect the harvest of fish and wildlife by Minto residents. Minto is an Athabaskan Indian community of 179 people (in 1984) situated about 40 air miles northwest of Fairbanks at the edge of Minto Flats (Fig. 1). The Alaska Department of Fish and Game, (ADF&G), Division of Subsistence collected information on wildlife harvests and other socioeconomic data in Minto primarily in the latter half of 1984, but also periodically in 1985 and in 1986.

The research conducted in Minto was in response to requests by the Alaska Board of Game, the Tanana Fish and Game Advisory Committee, and the Alaska Department of Natural Resources (ADNR) for information on the subsistence uses of fish and wildlife in Minto Flats and vicinity by residents of Minto. The information was expected to address regulatory issues related to moose hunting in the Minto Flats Management Area and salmon fishing in the Tanana River, but also to provide some basis for evaluating the potential impact on subsistence uses of proposed land and water management plans in Minto Flats and placer gold mining in the Tolovana River drainage.

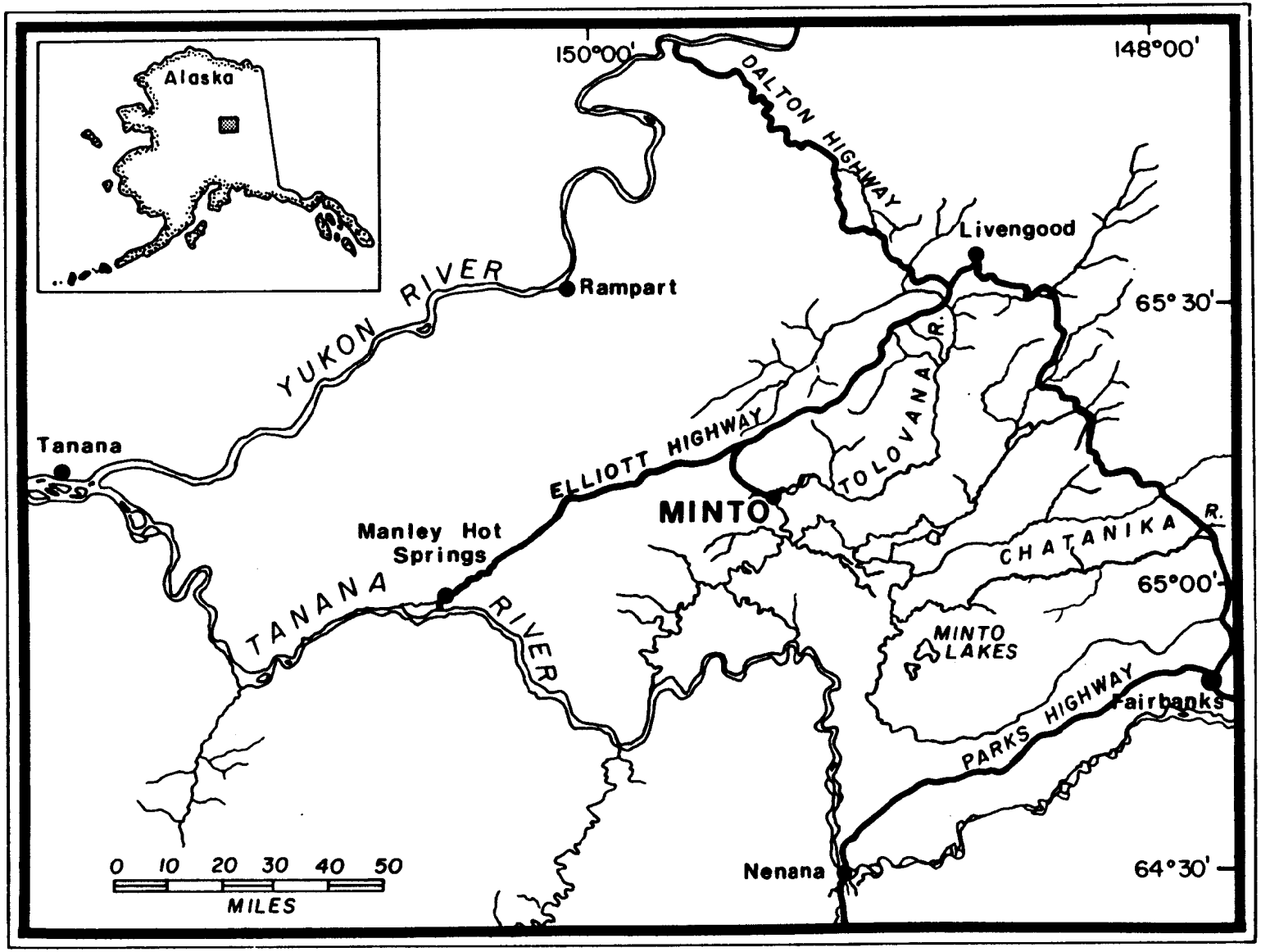


Fig. 1. Location of Minto, Alaska.

Almost yearly since 1979 the Alaska Board of Game has had to address the allocation of moose harvest in the Minto Flats Management Area. A report was prepared in 1985 which provided information to the Board of Game on moose hunting in the permit hunt area (Andrews and Napoleon 1985). In 1980, the Alaska Department of Natural Resources initiated programs which made certain state lands in the vicinity of Minto Flats available for settlement by the public. Some of these lands are used by Minto residents for harvesting wildlife. Land planning activities for other state lands in Minto Flats and the surrounding area are currently addressed in ADNR's (1984) "Tanana Basin Area Plan." Subsistence uses continue to occur in this area where other uses are being planned for. In 1983 and 1984 community residents continued to express concern over the effects of placer mining activities on fish and wildlife resources and subsistence uses in Minto Flats (Tanana Chiefs Conference, Inc. 1983, 1984; Neve 1983). Several sportsmen's groups and fish and game advisory committees supported protection of the wildlife and habitat in Minto Flats which resulted in a proposal for a state wildlife refuge. This proposal was submitted to the 15th Alaska Legislature in January 1987 as Senate Bill 55 and was passed in spring 1988.

Prior to this study, the subsistence uses of fish and wildlife in this area were not extensively or systematically documented. In 1964, an economic development study of (Old) Minto was conducted (Kozely 1965). The study focused on the community economy in terms of manpower and resources with potential for development such as wildlife, timber, and arable land. Dog-food manufacture and tourism were identified as two industries with potential for the area (Kozely 1965). Ethnographic

research in 1967 in the community of (Old) Minto documented historical influences on group identity and some aspects of subsistence activities (Olson 1968, 1981). The study described the community facilities, population, and economy in 1964. In 1970-73, a demographic study of Minto's population was undertaken by a resident of the community (Slaby 1981). The study examined the changes in demography from the mobile hunting and gathering band of the previous century to village settlement during the 20th century. In 1976, historical sites in Minto Flats were inventoried (Andrews 1977). In 1979, Athabaskan place names in the traditional territory of the Minto people were documented and mapped (Andrews et al. 1980). A 1985 study examined the impacts of resource development and use of wildlife by the public on Minto's use of Minto Flats (Shepherd and Matthews 1985).

The present report describes the findings of the 1984-86 subsistence study, including information derived from several of the studies of Minto mentioned above and from historical literature. The intent is to provide a description of contemporary fish and wildlife harvests by Minto residents in the 1980s, but also to provide an historical context of wildlife use and community development useful in understanding contemporary patterns. It is expected that this information will continue to be useful in fish and game regulatory issues, and be useful to the village council and village corporation, government agencies, and interested researchers and individuals.

OBJECTIVES

The primary objectives of this study are:

1. to provide an historical description of settlement, land use, and human population trends in Minto Flats;
2. to describe contemporary settlement and land use patterns;
3. to document the quantities of fish and wildlife resources harvested annually and the methods and means of harvest;
4. to describe the seasonal round of subsistence activities; and
5. to describe the contemporary social and economic characteristics of the community within which subsistence activities take place.

METHODOLOGY

The Minto Village Council was contacted in May 1984, at which time the proposed study was presented, discussed, and subsequently, approved. Fieldwork began in May 1984 but extended periodically through 1986. The majority of the research was conducted by the author, a Subsistence Resource Specialist III, with the assistance of two Native employees of the Alaska Department of Fish and Game -- a Fish and Game Technician III and a College Intern IV. The technician assisted with field research in May and June and the intern in August and September 1984 and in January and May 1985.

A Subsistence Resource Specialist II assisted with fieldwork in July 1984. Each of these assistants had worked on subsistence studies in other communities in the state during the previous year. The author first visited Minto in 1974 as a graduate student, had done other research in the community in 1976 and 1979, and had conducted subsistence studies of other communities in the state. This previous

research experience and familiarity with Minto people themselves enabled researchers to gain the support and confidence of the Minto people and to conduct the research without difficulty. Several field trips were made to Minto for the purpose of contacting knowledgeable residents in Minto Flats prior to conducting the harvest surveys and land use mapping sessions. During the 1984-86 research period, several data collection methods were used depending upon the information needs of the project and the time available to collect information.

Information on population, household composition, and wage employment opportunities was collected in June and August 1984 with the assistance of key respondents, village council employees, and health clinic employees. Public facilities and household subsistence processing facilities were recorded by direct observation. Household and individual income data were recorded during household surveys as were selected average monthly household expenses. Food and fuel costs were recorded by conducting a survey of selected foods in the village store. Information on social composition of the community was developed through key respondent interviews to compile a community census and genealogy.

Quantities of fish and wildlife harvested by households, use of these resources, and work group composition were recorded using a systematic survey administered to each household. All but three Minto households were interviewed. The interviews took place in August 1984 to record information for the July 1, 1983 through June 30, 1984 period.

A survey of subsistence salmon fishing activities and harvest was administered to primary salmon fishing households. All households that maintained their own fish camp in summer 1984 or fished at the community

fish camp were interviewed. Most all of these interviews took place at the households' fish camps. All Minto fish camps were located on U.S. Geological Survey topographic maps (scale 1:63,360) by direct observation traveling by boat to the fish camps. Fish camp facilities (smokehouses, drying racks, tent frames, and other structures) were recorded by visiting camps. Families that maintained their own fish camp were interviewed about the historical use of their fish camp and other fish camps they had used. Most of these interviews also took place at fish camps. Other subsistence activities that took place during salmon fishing were noted by direct observation.

Geographic areas used for subsistence activities were recorded during mapping sessions with a sample of key respondents representing 25 percent of all Minto households. The individuals interviewed were those recommended by key individuals and elders in the community and included those who are considered particularly active in resource harvesting. Mapping sessions took place between August and October 1984. Geographic use areas were recorded on a specially prepared U.S. Geological Survey map, scale 1:125,000, and on 1:63,360 topographic maps for salmon fishing and fish camp locations noted above. Traplines and travel routes were recorded on U.S.G.S. maps, scale 1:125,000. The methodology was designed to insure that some member of each large family in the community was interviewed about their geographic use areas. A composite map was prepared and posted for review in the village council office.

Other contemporary use areas were recorded by direct observation of and participation in subsistence activities during various field trips by the author between September 1984 and February 1987. Current use areas were recorded when mentioned to the author during this same

time period. Data on historic use areas were derived from key respondents, previous land use research by the author (Andrews 1977; Andrews et al. 1980), and the historic and ethnographic literature (see individual chapters in this report).

A survey of moose hunting activities and harvests by permit holders for the Minto Flats Management Area for the fall 1984 and winter 1985 seasons was administered following each hunting season. Systematic interviews were conducted with each permit holder to record information on methods and means, geographic areas used, campsites, composition of hunting parties, estimated cost of fuel and supplies, number of days afield, harvests numbers, and distribution and use of the moose harvest. The data collection was augmented by direct and participant observation by the author during the 1984 fall hunt. Other information on moose hunting was recorded by direct observation during fall 1985 and winter 1987 hunts.

Some observations on other subsistence activities were recorded in the field by participant observation, including data on berry picking, summer freshwater fishing, spring muskrat and waterfowl hunting, and salmon fishing.

Socioeconomic, demographic, and harvest data were entered onto computer files and analyzed with the Statistical Package for the Social Sciences (SPSS) software with assistance by statistical staff of the Division of Subsistence.

Since the study took place primarily between May 1984 and June 1985 and recorded harvest data for the July 1983-June 1984 period, the results reflect subsistence activities and harvests for a two-year period of time only. Fish and wildlife resources vary from year to year

as do the patterns and level of harvest. Similarly, climate, wage employment opportunities, and personal circumstances are also factors that affect subsistence activities and harvests. Therefore, caution should be applied when extending the interpretation of subsistence activities to other time periods.

THE NATURAL ENVIRONMENT

Geographical Features

The Minto Flats and surrounding hills form part of the Tanana-Kuskokwim Lowland physiographic division of the Intermontane Plateau of Alaska (Wahrhaftig 1965:22, 29). The area is unglaciated, but is underlain in most areas by permafrost. This low-lying basin is surrounded by ridges that generally reach 1,000 to 1,500 feet in elevation. Several isolated hills, roughly 300 to 350 feet in elevation, are found in the Flats. The sand dunes that occur in Minto Flats represent the northernmost extension of the large field of stabilized sand dunes that extend between Nenana and McGrath (Wahrhaftig 1965:29). The Flats extend about 47 miles from the upper Tolovana in the north to south of the Tanana River and about 35 miles from Dugan Hills in the west to the base of Murphy Dome in the east. Minto Flats is drained by five major streams -- the Tolovana, Chatanika, and Tatalina rivers, and Goldstream and Washington creeks (Fig. 1). The latter three streams all flow into the Chatanika River which flows into the Tolovana River, thence into the Tanana River. During periods of high water the Minto Flats can be inundated. Few geologic studies have

been made of Minto Flats, but include surficial mapping (Pewe et al. 1966) and gravity and earthquake studies (Barnes 1961; Wolff 1982). An analysis of the factors contributing to the formation, change, and maintenance of Minto Flats habitat is found in a study by Shepherd and Matthews (1985). Tectonic activity, hydrology, climactic forces, and wildfire are discussed in terms of how they relate to present-day habitat conditions in Minto Flats and their possible effects on wildlife abundance and distribution (Shepherd and Matthews 1985:80-101).

Climate

Minto Flats, at approximately 65 degrees north latitude and 149 degrees west longitude, exhibits a continental climate typical of Interior Alaska. Northeast and easterly winds, often extreme, affect the area especially in winter and result in severe wind chill factors. Average daily temperatures at nearby Manley Hot Springs for the five-year period, 1980 through 1984, are shown in Table 1. Precipitation data are shown in Tables 2 and 3. Data were derived from National Weather Service records in Fairbanks.

For the recent five-year period average monthly temperatures ranged between -14.6 degrees Fahrenheit in December to 58.5 degrees in July (Table 1). Average minimum daily temperatures were lowest in December 1980 at -39.8 whereas average maximum daily temperatures were highest in June 1984 at 74.9 degrees Fahrenheit (National Weather Service). The range in extreme temperatures is great. For example, in 1980 the lowest recorded temperature was -58 degrees (in December) and was 84 degrees (in August). Also typical of continental climates is low precipitation.

TABLE 1. AVERAGE DAILY TEMPERATURES, MANLEY HOT SPRINGS, 1980-84[a] (in degrees Fahrenheit)

Month	Year 80	81	82	83	84	4- or 5-Year Average
January	-16.2	16.0	-17.5	-17.7	-14.9	-10.60
February	10.1	0.4	-6.7	n/a	-20.5	-4.18
March	14.4	23.7	9.6	n/a	11.6	14.83
April	31.4	27.7	24.3	31.9	23.5	27.76
May	49.3	51.5	43.0	44.8	45.2	46.76
June	55.5	55.8	56.2	57.4	59.6	56.90
July	59.2	54.8	60.9	59.2	n/a	58.53
August	52.3	51.7	53.9	51.2	52.0	52.22
September	39.2	41.4	46.2	35.5	n/a	40.58
October	28.3	27.6	13.4	21.2	22.4	22.58
November	5.7	7.6	0.1	8.4	-4.0	3.56
December	-32.7	-10.8	n/a	-5.7	-9.0	-14.55

[a]Source: National Weather Service Office, Fairbanks

TABLE 2. ANNUAL PRECIPITATION, MANLEY HOT SPRINGS, 1980-84[a]

Year	Annual Precipitation (inches)	Annual Snowfall (inches)
1980	12.00	36.8
1981	16.62	45.8
1982	17.17[b]	84.2[b]
1983	12.67[b]	31.5[b]
1984	11.50[b]	63.8[b]

[a]Source: National Weather Service Office, Fairbanks.
[b]Incomplete data

TABLE 3. AVERAGE ANNUAL PRECIPITATION AND SNOWFALL, MANLEY HOT SPRINGS, 1980-84

Month	4- or 5-Year Average Precipitation[a] (inches)	4- or 5-Year Average Snowfall[a] (inches)
January	.59	8.78
February	.37[b]	6.23[b]
March	.45[b]	6.15[b]
April	.54	5.40
May	.76	.52
June	1.53	0
July	3.24[b]	0
August	3.02	0
September	2.07[b]	.05[b]
October	1.46	8.34
November	.63	9.82
December	.77[b]	12.03[b]

[a]Source: Computed from statistics at the National Weather Service Office, Fairbanks.
[b]4-year average

Based on data from the Manley Hot Springs observer station, annual precipitation ranged from 11.5 inches in 1984 to 17.2 inches in 1982 (Table 2) with snowfall ranging between 31.5 inches in 1983 to 63.8 inches in 1984. Average monthly precipitation for the five-year period was lowest in February and greatest in July whereas snowfall was greatest in December (Table 3). Breakup of ice usually occurs in early May in Minto Flats; freeze-up occurs in late October. During the past five years in the area between Nenana and Manley Hot Springs, breakup occurred as early as May 2 and as late as May 12 (Table 4). Freeze-up began as early as September 30 and as late as October 18 and ice was frozen solid between October 21 and October 31 (Table 4). Lakes in Minto Flats and portions of streams, such as the Tolovana River, melt at different rates depending upon the depth of the stream or lake bed.

TABLE 4. DATES OF BREAKUP AND FREEZE-UP IN THE VICINITY OF MINTO FLATS, 1980-84.[a]

Year	Breakup In Full Progress	Freeze-up (Beginning-Frozen Solid)
1980	May 3	October 9-21
1981	May 7	October 4-31
1982	May 12	October 7-26
1983	May 2	September 30-October 26
1984	May 8	October 18-29

[a]D. MacFarlane, National Weather Service, Anchorage

Plant and Animal Communities

Minto Flats is situated within the boreal forest of northern North America. Four vegetation types or ecosystems occur in Minto Flats and the surrounding hills. Predominate is the "treeless bog" ecosystem characterized by wet areas of sedges and grasses with willows, alders, resin birch, and scatterings of black spruce and tamarack (Viereck and Little 1972). Secondarily, closed spruce-hardwood forests occur with white and black spruce, birch, aspen, and balsam poplar. Within 20 miles of the current village site there occur two other ecosystems, comparatively small areas of open, low-growing spruce forests and alpine tundra. Similar to the rest of Interior Alaska, the vegetation types in the vicinity of Minto and their pattern are "related in part to past fire history, to slope and aspect, and the presence or absence of permafrost" (Viereck and Little 1972:15). The area supports numerous species of willow, spruce, birch, aspen, popular, and tamarack, alder, several berry plant species, and other woody plants (Viereck and Little 1972:15-23). Wildlife species include large game including bear and moose; small game such as hare and game birds; numerous species of waterfowl; and furbearers such as marten, mink, otter, lynx, wolf, beaver, muskrat, and red fox. Fish include three species of salmon and eleven freshwater fish species. The species harvested by Minto residents are described in subsequent chapters on hunting, fishing, trapping, and gathering activities. It has been found that plant associations in Minto Flats have resulted primarily from periodic fire and flooding (Shepherd and Matthews 1985:100). The level of abundance and diversity of the animals present is linked to these and other natural forces as well as cultural activity.

CHAPTER 2

THE COMMUNITY OF MINTO

HISTORICAL DEVELOPMENT

Currently, Minto is situated on the west bank of the Tolovana River at the northwestern limit of Minto Flats approximately 70 river miles from Nenana and 130 road miles (40 air miles) from Fairbanks. In 1980, there were 141 residents in 31 households (Tanana Chiefs Conference, Inc. 1983). In August 1984 there were 179 people residing in 48 households based on a census taken for this study as described below. Since then, new home construction has enabled some additional 46 people, mostly former residents, to re-establish themselves at Minto during winter 1985.

The residents of Minto are predominantly Athabaskan Indian. Most of the village's bilingual residents speak the Minto-Nenana dialect of the Tanana Athabaskan language as well as English, although some also are conversant in Koyukon Athabaskan. The current site of Minto (Menan' k'oget -- "his face gets chapped [by the wind]") has been occupied as a permanent year-round settlement since 1970 when most residents resettled there from the site of Old Minto located on the Tanana River, about 40 river miles to the south. Before 1970, the present site of Minto was occupied intermittently as a seasonal settlement in fall and winter since the early 1900s (Andrews 1979; Olson 1968, 1981). Old Minto (Mentee khughottheet -- "river side of among the lakes") was founded in 1917 as a permanent settlement when some members of the Minto band built

log structures there, while continuing to occupy other settlements throughout Minto Flats. Still others settled at Old Minto on a seasonal basis, living in canvas tents when there. The community of Old Minto represented a consolidation of families from other major settlements associated with different bands, and the immigration of people from neighboring settlements such as Nenana, Toklat, Crossjacket, and Chena. During the past 47 years, the population of Minto fluctuated, but has remained moderately stable. In 1937 there were 127 people, 147 in 1950, 155 in 1960, 168 in 1970, 141 in 1980, and 179 in 1984 (Slaby 1981; Andrews 1984) (Fig. 2; Table 5).

The occupation and use of Minto Flats and vicinity during the historic period (late 1800s and early 1900s) and prehistoric times is evidenced in the historic and ethnographic literature (Crane 1916; Olson 1968; Andrews 1977, 1980) and in the archeological materials recovered from prehistoric sites in the area (Olson and Schledermann 1969; Derry 1974, 1976). Seasonal settlements were situated throughout Minto Flats, but most were located in the eastern and northern areas along the Tolovana and Chatanika rivers, and along Goldstream and Washington creeks. Even older settlements are reported east of Minto Flats along the Chatanika River. The primary seasonal settlements were situated on whitefish and salmon-bearing streams, where fish weirs and traps were constructed for harvesting these and other fish species. Other seasonal settlements along streams and lakes were used in the spring when the once plentiful muskrat and waterfowl were major subsistence resources.

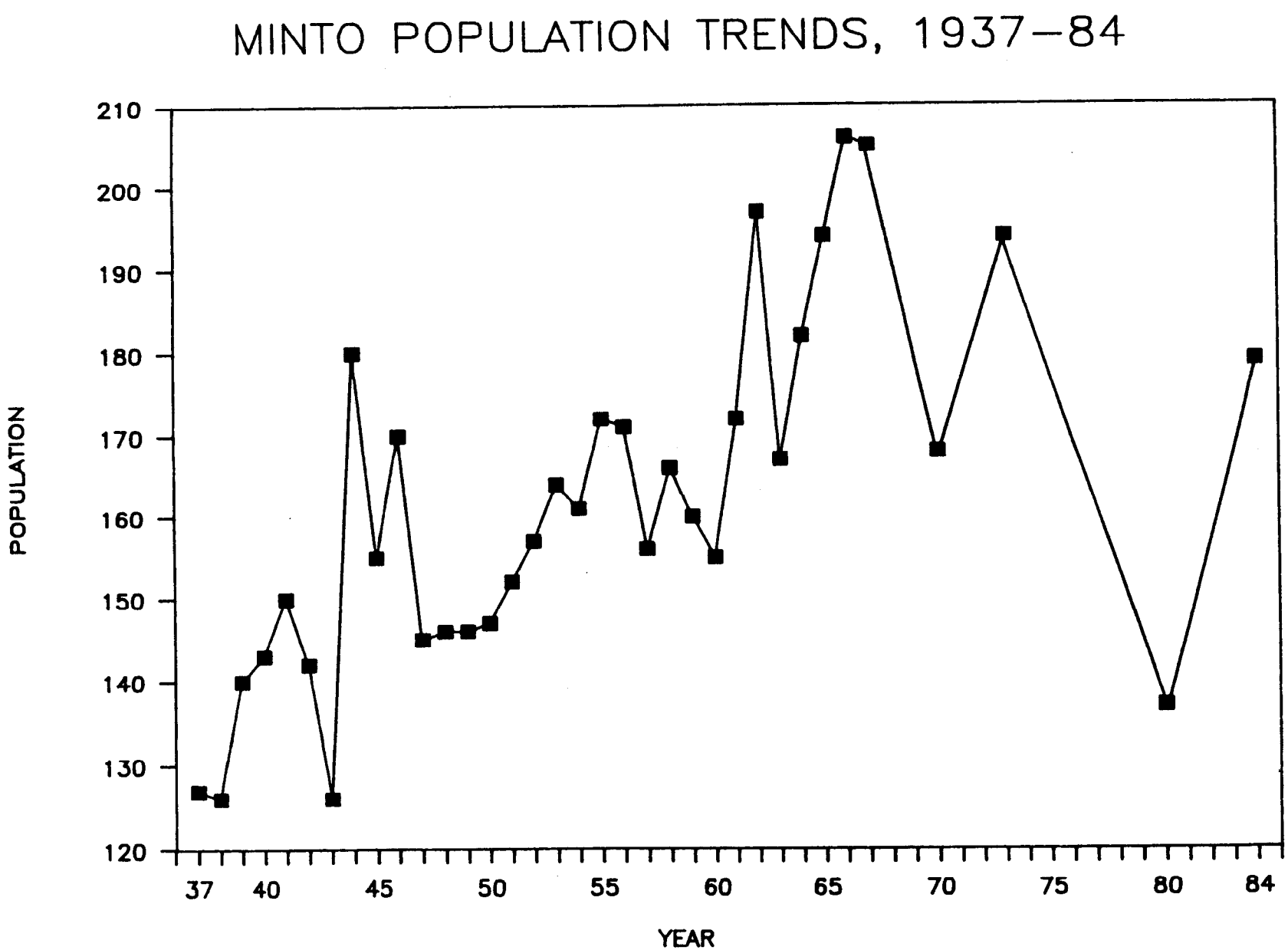


Fig. 2. Minto Population Trends, 1937-84.

TABLE 5. MINTO POPULATION TRENDS, 1937-84

Year	Population[a]	U.S. Census	Year	Population[a]	U.S. Census
1937	127		1961	172	
1938	126		1962	197	
1939	140	135	1963	167	
1940	143		1964	182	
1941	150		1965	194	
1942	142		1966	206	
1943	126		1967	205	
1944	180		1968		
1945	155		1969		
1946	170		1970	168	168
1947	145		1971		
1948	146		1972		
1949	146		1973	194	(Slaby 1981)
1950	147	152	1974		
1951	152		1975		
1952	157		1976		
1953	164		1977		
1954	161		1978		
1955	172		1979		
1956	171		1980	137	137
1957	156		1981		
1958	166		1982		
1959	160		1983		
1960	155	161	1984	179	(Andrews 1984)

[a]Source: Bureau of Indian Affairs census unless noted otherwise.

1850-1900

During the early contact period the Minto people, like other Indian groups along the Tanana River, had little direct contact in their own area with non-Natives. In his 1885 expedition along the Tanana River, Lieutenant Henry T. Allen did not report seeing any Indians along the river during the few days he traveled through the area customarily used by the Minto people (Allen 1900). As noted above, their primary

settlements were located beyond the main river along the clearwater streams at that time. Oral accounts by elderly Minto residents note that some members of the Minto band traveled along inter-regional trails and the Tanana and Yukon rivers to settlements such as Tanana, Rampart, and Fort Yukon, where they traded furs in exchange for some manufactured goods and small amounts of imported food staples such as tea and flour. These trails continued to be used throughout the first half of the 20th century as Minto people continued to maintained contact with those settlements.

1900-50

During this period a number of economic and social changes began to occur in the immediate homeland of the Minto people. Trading posts, roadhouses, telegraph stations, and commercial centers were established in the Tanana River valley. A telegraph line along the Tanana was in operation from 1902 to 1918. With the discovery of gold north of Fairbanks in 1902, steamboats began to navigate the Tanana River, bringing goods and new residents into the area. The people of Minto traded at posts on the Yukon River such as Fort Hamlin near present-day Stevens Village (Anonymous 1904), at Tanana, and at the newly-established posts at the mouth of the Tolovana River and at Nenana. Furs were traded, and as dog teams and steamboats increased in importance, dried fish and cordwood also were sold. The territory used by the Minto band remained essentially the same, as did the seasonal round of subsistence activities. These included fishing, trapping,

large and small game hunting, and berry picking. Their land use area extended from near Livengood and Sawtooth Mountain in the north to the mouth of the Kantishna River in the south, and from Murphy Dome and the middle Chatanika River in the east to the Dugan Hills in the west (Fig. 3). Additionally, some people used other areas as far north as Beaver Creek and as far south as the Toklat River. During this period more intensive salmon fishing took place along the Tanana River. In 1917 some members of the Minto band began to settle along the Tanana at Old Minto, although most families did not reside there year-round until later in the middle of the 20th century. In 1938 there were 18 occupied cabins at Old Minto and in 1940 11 families continued to reside in canvas tents (Olson 1968).

During this same time period, development of natural resources for commercial purposes occurred on the periphery of Minto Flats, particularly to the north and east. For example, gold discoveries on two tributaries of the Tolovana River resulted in the establishment of mining operations and communities at Fairbanks, Chatanika, and Livengood in 1902, 1904, and 1914 respectively (Orth 1967:201, 324, 590; Olson 1981). In the late 1920s Episcopal church officials began schooling on an irregular basis for three years, and in 1937 a federal Bureau of Indian Affairs day school was opened (Slaby 1981:38). This period marked the change from a mobile hunting and gathering band population to semi-permanent settlement in a village (Slaby 1981:28).

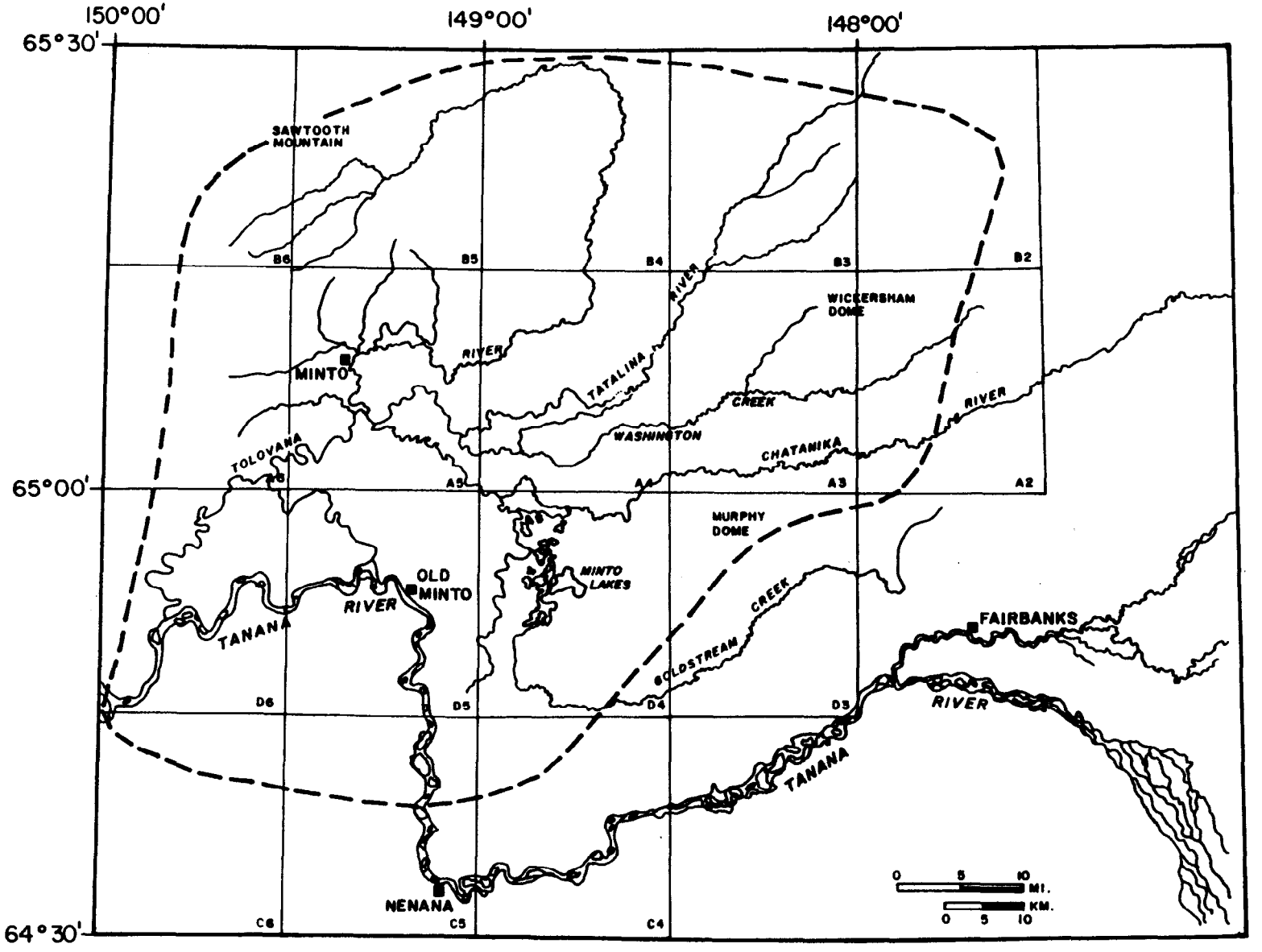


Fig. 3. Historic Land Use Area of Minto Indians.

1950-85

The Minto people, particularly since 1950, have continued to use the land and resources in much of their customary territory despite changes in resource abundance throughout this century. The community again relocated, this time to its current site on the Tolovana River in the northwestern portion of Minto Flats. This resettlement in a planned community occurred between 1969 and 1971 when repeated flooding and riverbank erosion at Old Minto necessitated relocation to more stable ground. New Minto serves as the primary base for hunting, fishing, trapping, and gathering activities. However, several families seasonally occupy settlements on the Tanana River and Goldstream Creek for fishing salmon, whitefish, and pike and for trapping. Numerous campsites throughout the flats are still used during fall moose hunting, spring muskrat and waterfowl hunting, and spring and fall whitefish and pike fishing. Unlike earlier periods, imported and manufactured goods are obtained primarily from Fairbanks, which is reached either by air taxi services or by motor vehicle on the gravel road and paved highway that connects Minto with Fairbanks. As in the past, social relations are maintained with people of the Yukon River communities of Tanana, Rampart, Ruby, Stevens Village, and the Tanana River communities of Manley, Nenana, Fairbanks, and Tanacross. Frequent contact is maintained with former Minto residents who reside in Fairbanks, and a few families have residences in both communities. Former residents of Minto often return to the village and join their relatives in subsistence activities in Minto Flats.

CONTEMPORARY MINTO

Demographics

During 1983-84 Minto had a population of 179 distributed among 48 households with an average household size of 3.73. The frequency of household sizes is depicted in Figure 4. Fourteen years earlier, in 1970, average household size in Minto was 4.31. The frequency of single-person households has remained about the same accounting for about one-fifth of all households (Table 6). Three-person and five-person households have about doubled in proportion, whereas six-person and eight-person households have significantly declined (Table 6).

Household heads ranged in age from 26 years of age to 96 with most aged 60 to 69 years of age (Fig. 5). Approximately 50 percent of household heads were less than 50 years of age and 50 percent older, however, most household heads (25 percent) are between 60 and 69 years of age (Fig. 5).

Minto households are typically composed of nuclear family groups (43 percent) or extended family groups (35 percent), however, solitary adults account for one-fifth (21 percent) of all households (Table 7). Adopted and foster children occur in about 23 percent of the homes, and most are grandchildren of the household head. There are only five cases where a single parent resides alone with children or grandchildren. All adults living alone are male. For those households with children, many (42 percent) have some children older than 18 years of age (Table 8). More specifically, households with heads 60-64 years of age have the

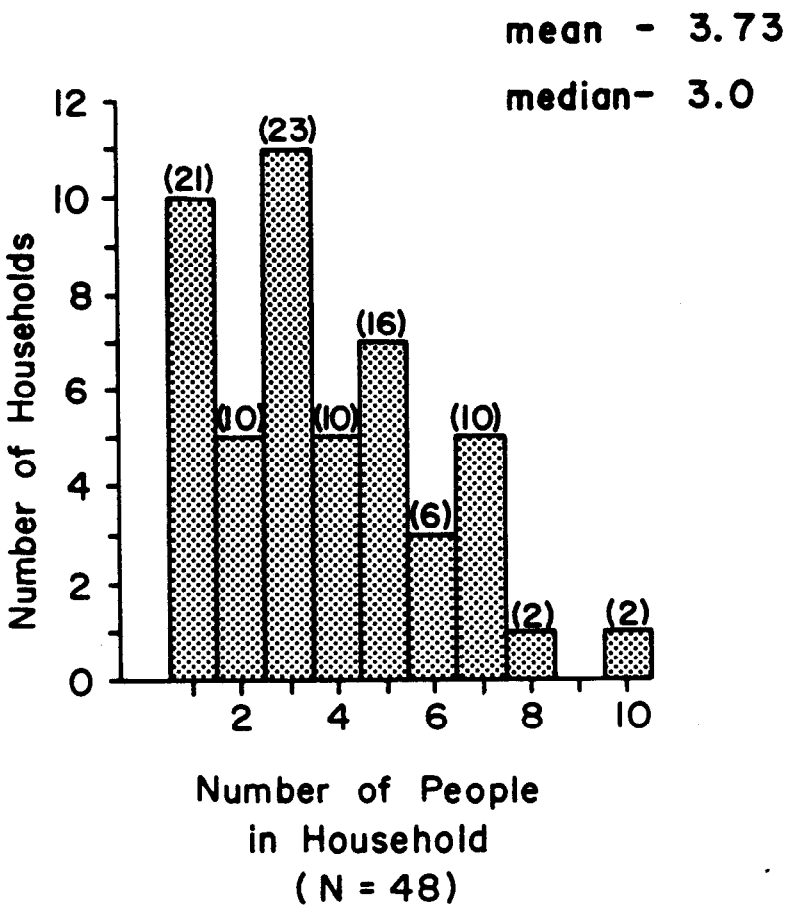


Fig. 4. Frequency of Household Sizes, 1984.

TABLE 6. FREQUENCY OF MINTO HOUSEHOLD SIZES, 1967, 1970, AND 1984

Number of Persons Per Household	Number of Households		
	1967[a]	1970[b]	1984
1	7 (20%)	9 (23%)	10 (21%)
2	3 (9%)	4 (10%)	5 (10%)
3	4 (11%)	4 (10%)	11 (23%)
4	1 (3%)	6 (15%)	5 (10%)
5	5 (14%)	3 (8%)	7 (16%)
6	5 (14%)	5 (13%)	3 (6%)
7	1 (3%)	3 (8%)	5 (10%)
8 or more	9 (26%)	5 (13%)	2 (4%)
Total	35	39	48
Population	181	168	179
Average Persons per Household	5.17	4.31	3.73

[a]Source: Olson 1968:219
[b]Source: Slaby 1981:70

largest percentage of adult children at home, followed by those 65 years and older (Table 9). Households containing one person are composed of single adult males whose ages range from 26 to 70, with one-half less than 40 years of age and the remainder aged 51 to 70.

In 1984, Minto's 48 households represent people who are descendants of 13 families; that is, people in Minto can trace their ancestry to one of 13 married couples. As several of these ancestral couples were closely related, such as siblings, the number of large family groupings is 8, thus members of one family are related to at least one other family, if not through close bloodlines then through marriage. But kin relationships are even more extensive because in Minto cousins are

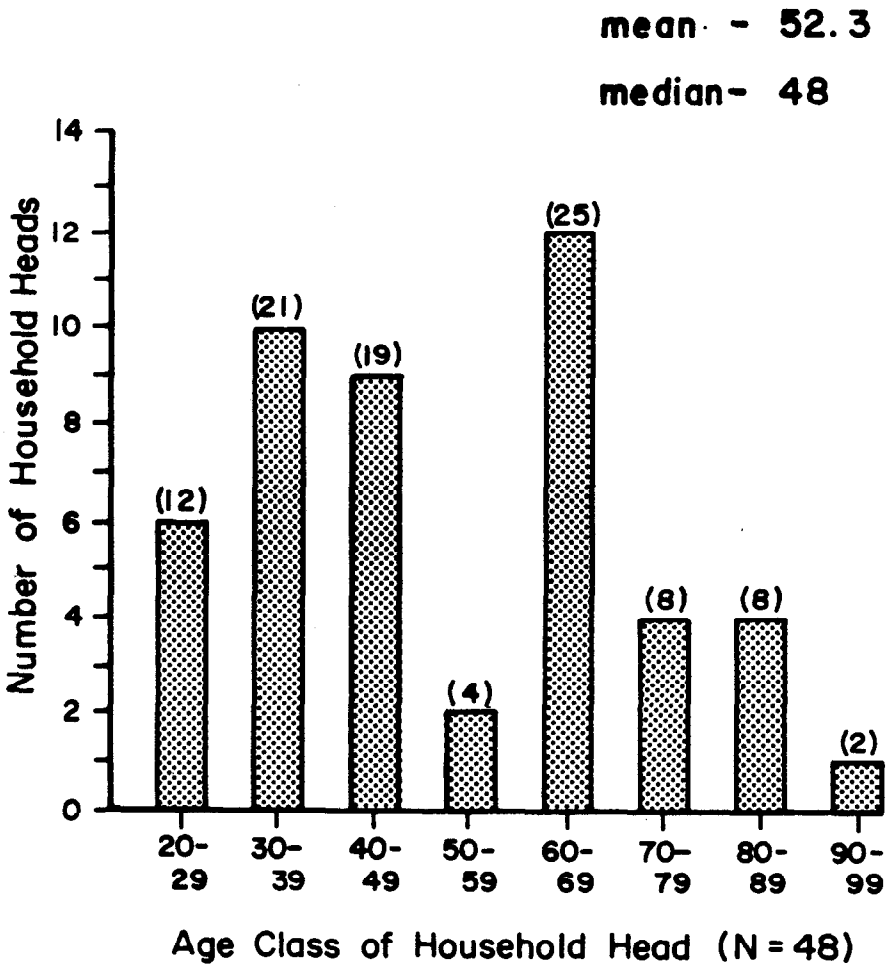


Fig. 5. Frequency of Age Classes of Household Heads, 1984

TABLE 7. SOCIAL COMPOSITION OF MINTO HOUSEHOLDS, 1984.

Household Composition	Number of Households	
I. Nuclear Family		
Married couple with children	17	(35%)
Married couple, no children	1	(2%)
Single parent with children	3	(6%)
Subtotal	21	(43%)
IIa. Extended Family--Lineal		
Married couple, children, grandchildren	7	(15%)
Single parent, children, grandchildren	2	(4%)
Married couple, children, other relatives	1	(2%)
Single adult, grandchildren	2	(4%)
Single adult, nephew	1	(2%)
IIb. Extended Family--Collateral		
Siblings	3	(6%)
Other	1	(2%)
Subtotal	17	(35%)
III. Other Household Types		
Solitary adults	10	(21%)
Total	48	(99%)

TABLE 8. OCCURRENCE OF ADULT CHILDREN OR ADULT GRANDCHILDREN IN MINTO HOUSEHOLDS, 1984

Number of Households With Adult Children (18+ years)	19	(40%)
Adult males only	10	
Adult females only	0	
Adult males & females	9	
Number of Households With No Adult Children	14	(29%)
Number of Households Without Children	15	(31%)
Total	48	(100%)

TABLE 9. NUMBER OF HOUSEHOLDS WITH ADULT DEPENDENTS BY AGE RANGE OF HOUSEHOLD HEAD

Age Range of Household Head		Number of Households With Adult Dependent (18+ years)
20-29	(n=6)	1 (17%)
30-39	(n=10)	1 (10%)
40-49	(n=9)	2 (25%)
50-59	(n=2)	1 (33%)
60-64	(n=5)	4 (80%)
65+	(n=16)	11 (69%)
Total	(N=48)	20 (42%)

considered almost like siblings and the terms generally used for cousins (both parallel and cross) are "brother" and "sister." Thus, it is common for a person to mention that he or she went hunting or fishing with a "brother" or "sister" in reference to collateral kin such as cousins.

The population structure of Minto in 1984 in terms of age and sex is shown in Figure 6. About 61 percent of the population is male (108) and 40 percent is female (71), resulting in a sex ratio of 152. Interestingly, this is the same ratio estimated for the contact period of the 1880s, 100 years ago (Slaby 1981) (Table 10) when differential female mortality accounted for the imbalance. As the nomadic band became settled in the semi-permanent village of Old Minto, this sex ratio became more balanced to about 105 for the 1937 to 1967 time period (Slaby 1981) (Table 10). The return to an imbalanced sex ratio in the past 17 years, unlike the late 19th century, is probably not due to differential female mortality, but to emigration of reproductive age females from the community, although no systematic study has been done

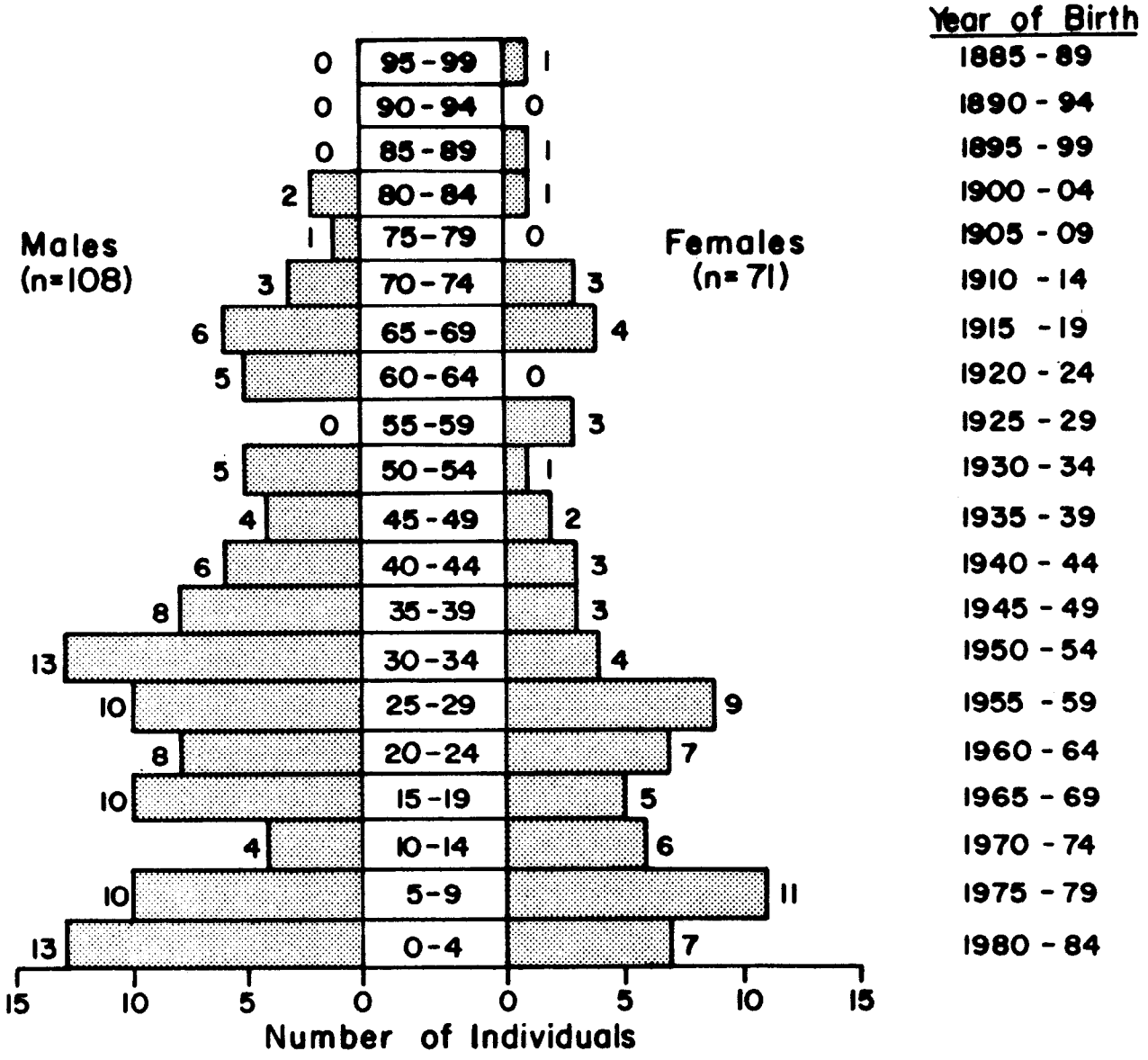


Fig. 6. Age and Sex Structure of Minto's Population, 1984.

TABLE 10. MINTO SEX AND DEPENDENCY RATIOS, 1937-84

Index	Nomadic Band[a] (Seasonal Settlements) ca. 1885-1915	Semi-Permanent Village[a] (Old Minto) 1937	1964	1967	Year-Round Village (New Minto) 1970[a]	1984
Sex Ratio	150.0	104.8	105.6	105.7	112.7	152.1
Dependency Ratio[b]	28.3	67.0[c]	155.8	174.2	142.9	96.7

[a]Source for 1885-1970 data: Slaby 1981
[b]Dependency ratio calculated as ((pop. § 20yrs. + pop. ¶ 65 yrs.)) x 100/pop. 20-64 yrs., except for 1937.
[c]This dependency ratio reflects those 16 years and younger, and 65 years and older; rather than those 19 years and younger, and 65 years and older (Slaby 1981).

to demonstrate this. Another possibility is the return of reproductive age males, some of whom were in military service during the late 1960s and early 1970s.

In 1984, one-half of Minto's population (50.8 percent) was between the ages of 20 and 64; that is, non-dependents compared to dependents accounted for the largest percentage of the population for the first time in the past 20 years (Table 11). Conversely, those under 20 years of age accounted for 36.9 percent of the population, the smallest percentage during the same time period. Elderly (aged 65 years and older) in 1984 comprised the largest percentage for this group with 12.3 percent, more than twice that of any other time in the past 20 years (Table 11). This entire situation also reflects the low dependency ratio of 96.7 (Table 10) which approaches the even lower dependency ratio of 67.0 reflected in the 1937 population structure. However, the formula for 1937 somewhat exaggerates the number of producers, defined as older than 16 years (Table 10). The dependency ratio for other years is calculated in the following manner:

$$\frac{\text{population under 20 years of age + population 65 years and older X 100}}{\text{population aged 20 to 64 years of age}}$$

In a demographic study of Minto in the early 1970s, it was found that the increased dependency ratio in 1964 compared to 1937 reflects the immigration of families into Minto and decreased infant mortality due to improved health care (Slaby 1981:57). The decreased dependency ratio in 1970 which continued to show a decrease in 1984 could reflect

TABLE 11. MINTO POPULATION COMPOSITION BY AGE RANGE, 1964-84

Age Range	0-19 Years	20-64 Years	65+ Years
1964 % of total population	55.5	39.1	5.0
1967 % of total population	58.6	36.4	5.0
1970 % of total population	54.8	41.7	4.8
1984 % of total population	36.9	50.8	12.3

increased use of birth control measures among the reproductive segment of the population, delayed rearing of children, and outmigration of families with dependent children. Interestingly, the low dependency ratio cannot be attributed to outmigration or increased mortality among the elderly, as they account for the largest percentage of this group at any time in the past 20 years and possibly this century (Table 10). Therefore, it is the dramatic reduction in individuals less than 20 years of age that contributes to the low dependency ratio in 1984. Table 12 shows the small number of dependents aged 19 or under for families with elderly household heads. This is expected as children mature and begin their own families and have separate residences. It may also reflect the relatively low number of married couples in the population in the 40- to 59-year-old age group.

TABLE 12. NUMBER OF DEPENDENTS PER HOUSEHOLD
BY AGE RANGE OF HOUSEHOLD HEAD, 1984

Age Range of Household Head	Number of Dependents (age 19 or under) 0	1	2	3	4	5
	Number of Households with Dependents					
20-29 (N=6)	1	2	1	1	0	1
30-39 (N=10)	5	1	3	0	0	1
40-49 (N=8)	1	2	1	3	0	1
50-59 (N=3)	2	0	1	0	0	0
60-64 (N=5)	1	1	0	0	1	2
65+ (N=16)	11	4	1	0	0	0

During the past 20 years, the population structure of Minto shows some noteworthy changes. First, during three of the four censuses, individuals in the 0- to 9-year-old age category have accounted for the largest percentage of the population (Table 13 and Fig. 7). In 1984, those 10 to 19 have accounted for the smallest proportion compared to the three other times, while those aged 20 to 29, 30 to 39, and 65 years and older represent a larger percentage than at any other other time in the past 20 years.

As a final note, the population trend of Minto during the 47-year-period from 1937 through 1984 shows continual fluctuation between about 140 people and 210 people. In the demographic study mentioned earlier, Slaby (1981:57) attributed these 7- to 10-year cycles to the high degree of mobility of Minto's population rather than being

TABLE 13. MINTO POPULATION STRUCTURE, 1964-84

Age Range		0-9 Years	10-19 Years	20-29 Years	30-39 Years	40-49 Years	50-59 Years	60-64 Years	65+ Years	Total
1964	Males	29	30	17	7	11	11	4	4	113
	%	13.2	13.6	7.7	3.2	5.0	5.0	1.8	1.8	51.4
	Females	36	28	12	8	9	7		7	107
	%	16.4	12.7	5.5	3.6	4.1	3.2	0.0	3.2	48.6
	Total	65	58	29	15	20	18	4	11	220
	%	29.5	26.4	13.2	6.8	9.1	8.2	1.8	5.0	100.0
1967	Males	26	27	8	5	7	12	5	3	93
	%	14.4	14.9	4.4	2.8	3.9	6.6	2.8	1.7	51.4
	Females	23	30	7	6	7	8	1	6	88
	%	12.7	16.6	3.9	3.3	3.9	4.4	0.6	3.3	48.6
	Total	49	57	15	11	14	20	6	9	181
	%	27.1	31.5	8.3	6.1	7.7	11.0	3.3	5.0	100.0
1970	Males	29	17	13	7	9	11	1	4	91
	%	17.3	10.1	7.7	4.2	5.4	6.5	0.6	2.4	54.2
	Females	18	28	9	3	7	8	2	4	79
	%	10.7	16.7	5.4	1.8	4.2	4.8	1.2	2.4	47.0
	Total	47	45	22	10	16	19	3	8	170
	%	28.0	26.8	13.1	6.0	9.5	11.3	1.8	4.8	101.2
1984	Males	23	14	18	21	10	5	5	12	108
	%	12.8	7.8	10.1	11.7	5.6	2.8	2.8	6.7	60.3
	Females	18	11	16	7	5	4	0	10	71
	%	10.1	6.1	8.9	3.9	2.8	2.2	0.0	5.6	39.7
	Total	41	25	34	28	15	9	5	22	179
	%	22.9	14.0	19.0	15.6	8.4	5.0	2.8	12.3	100.0

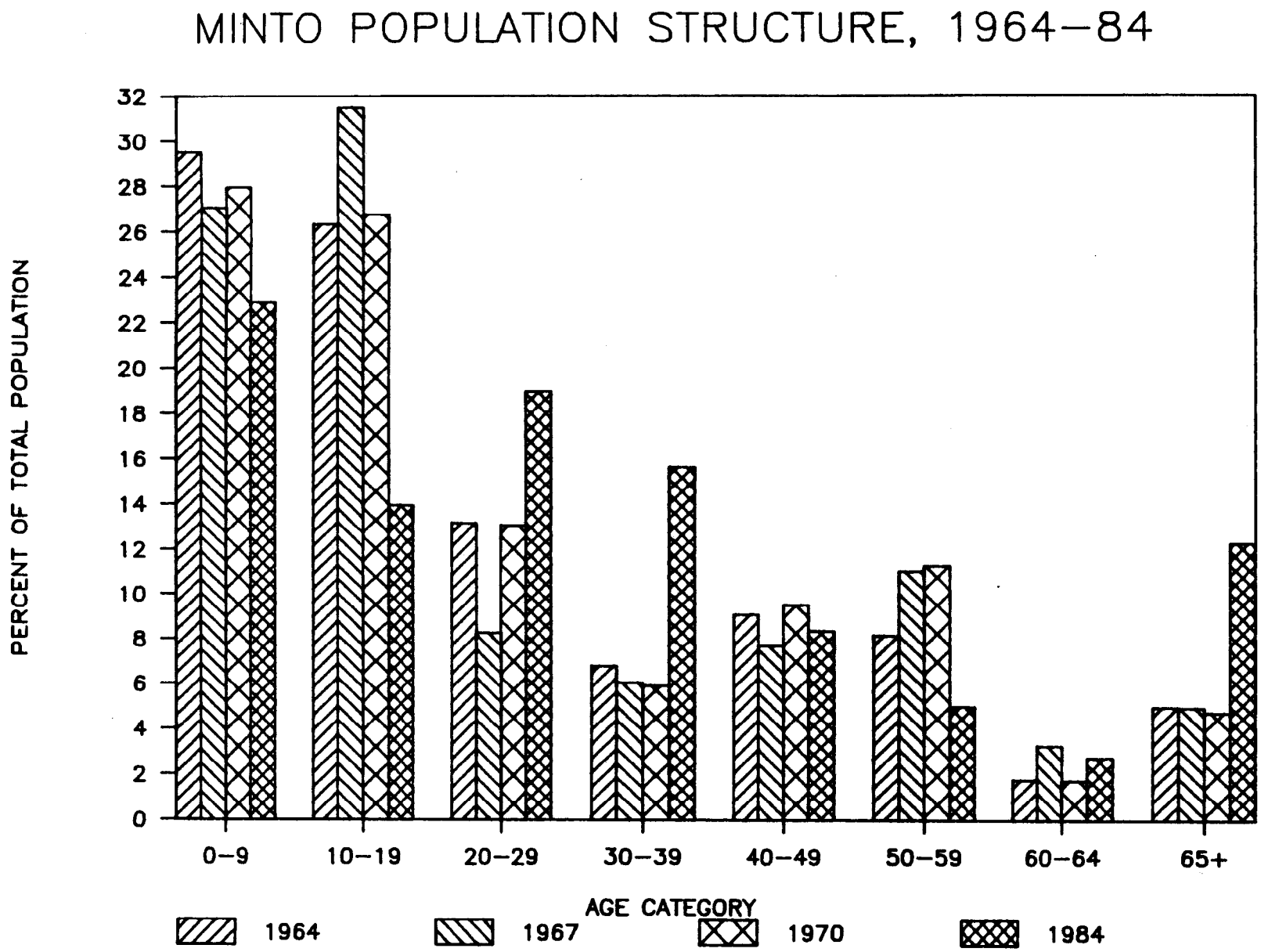


Fig. 7. Minto Population Structure, 1964-84.

due to changes in birth and death rates. In particular, he observed that the population system of Minto in the 1970s was "characterized by a permanent resident core population and a mobile population segment which alternates residency between Minto and Fairbanks through a system of migration" (Slaby 1981:68). My own observations from 1984 through 1986 support this observation. An informal census the author conducted in October 1985 showed the population of Minto to be 225, an increase of 46 people being a result of relocation of Minto families residing in Fairbanks returning to live in Minto when new housing became available.

The ethnic composition of Minto is almost entirely Native Alaskan and Athabaskan Indian. Two individuals are non-Native and one is Native American. Most (90 percent) individuals were raised in Minto with the remainder from Nenana, Tanana, Ruby, Fairbanks, English Bay, or outside the state of Alaska. There were no non-Native couples permanently residing in Minto in 1984.

Government and Public Facilities and Services

Minto is an unincorporated municipality of the State of Alaska, but was incorporated in 1938 under the provisions of the Indian Reorganization Act (IRA) applied to Alaska in 1936 (Act of May 1, 1936; 49 Stat. 1250). The first meeting of the elected village council was in January 1940 and today Minto's five-member IRA Council continues to be the sole form of government in the community. The Council has been active throughout its nearly 50-year history and continues to receive and administer grants for capital projects as well as programs for the elderly and others. Minto was recognized under the Alaska Native Claims

Settlement Act (P.L. 92-203; December 18, 1971; 85 Stat. 688) and the Seth-de-ya-ah Corporation represents the shareholders of this profit-making entity. The corporation has an eight-member board of directors. Minto is also represented by Doyon, Ltd., the regional profit-making corporation. Tanana Chiefs Conference, Inc. is the regional non-profit organization which administers certain social services to Minto, such as basic health care and village police.

Beginning in 1941, the Minto IRA Council started a cooperative store through the Alaska Indian Service which in March 1943 was reorganized as a "Modified Joint Stock Corporation" (Minto Village Council 1943). Apparently capital for the initial investment for the cooperative was made when the village received an offer to sell firewood to fuel riverboats and "the entire village worked for three months cutting 1,060 cords of wood and put the proceeds from the sale into the store" (Kearns and Kozely 1965:45). Later, in 1956 the cooperative joined the Alaska Native Industries Cooperative Association (ANICA) (Olson 1968:202). By the time the village moved from its site on the Tanana River to its present location on the Tolovana River, the cooperative was no longer in operation. In more recent years, the Seth-de-ya-ah Corporation has its headquarters in Fairbanks and operates a general store and fuel station in Minto. The Seth-de-ya-ah Corporation started a store at the new village site in 1972. In 1974, they leased the business and until 1986 different Minto residents ran the operation. In August 1986, the corporation resumed operation of the store and fuel station.

Transportation facilities at Minto include a 2,000-foot gravel runway, a boat landing area, and an 11-mile gravel road which links the village with the Elliott Highway. There is no barge service to Minto due to the shallowness of the Tolovana River. The airstrip has no navigational aids so air transport and travel are restricted by weather, especially fog and wind. The ridge atop which the village sits is one of the windiest localities in all Minto Flats, hence the Native name for the site, Menan'k'oget, meaning "his face gets chapped (by the wind)." Travel along the Elliott Highway is restricted in winter due to drifting snow and ice glaciering. Although the highway is passable during most of the winter, people returning from town are sometimes forced to camp enroute until the highway is cleared. Minto receives mail service three times a week by means of small aircraft from Fairbanks, weather permitting.

The State of Alaska's Yukon-Koyukuk School District operates an elementary and secondary school in the village providing education from the kindergarten level through grade 12. The first school in the old village was operated intermittently in the late 1920s and 1930s by the Episcopal mission. Later, in 1937, as noted above, the Bureau of Indian Affairs began a day school marking the beginning of compulsory education. Thirty years later, in 1968, the school was transferred to the State of Alaska, Department of Education (Olson 1968:177).

Currently, there are two churches in Minto, the Episcopal Church, St. Barnabas, and the Assembly of God. Minto people and their ancestors have a long history of involvement with the Episcopal Church dating to the beginning of the 20th century. Some Minto elders attended St. Mark's Mission in Nenana prior to 1920. In 1928, a Native Athabaskan

minister established an Episcopal mission in Old Minto and remained for a few years. It was not until 1954 that the village again had a resident Episcopal missionary (Olson 1968, 1981). Since then four Minto residents, including one woman, have been ordained into the priesthood of the Episcopal Church, three of whom continue to reside year-round in the village. The Assembly of God has had a pastor reside in Minto nearly continuously since 1954. Several residents attend both churches.

The majority of the 48 occupied homes in Minto in 1984 were constructed either by the Alaska State Housing Authority or the Bureau of Indian Affairs in 1970-71. Several homes are owner-built and occupied. The housing project of the early 1970s resulted in homes built of frame construction, most 20 x 24 feet. Insulation was less than adequate and it was not until 1984 that a "weatherization" program provided improvements. While these homes were plumbed and outfitted for running water, the water and sewer system failed and was not again made operational. Therefore, residents continued to use outdoor privys, hauled their water from a U.S. Public Health Service well facility, and collected rain water when possible. A laundry facility was constructed in 1983 at the firehouse facility. In 1984-85 a new housing project provided 49 additional homes of log construction complete with an oil-fired hot water baseboard heating system. All but one have been connected to a new water and sewer system. This system was not operational until fall 1986. Individual payment plans have been set up for residents to pay for these homes which cost approximately $80,000 each.

The Alaska Village Electrical Cooperative operates a power plant in the village and nearly all homes are connected to this facility (Table 14). Power costs about 41 cents per kilowatt hour. United Utilities, Inc. has a telephone facility, however, those homes with telephones are in the minority, roughly 38 percent in 1984. The community has a volunteer fire department, the fire station having been constructed in 1983. There is no cable television service, however, some homes can receive local Fairbanks television stations with special antennas. The Rural Alaska Television Network can be picked up as well as two Fairbanks radio stations. A few residents have citizen radios, so this means of communication is extremely limited. A full-time health aide provides basic health care and emergency services. A health clinic is located in the village council's lodge. One Village Public Safety Officer is resident in the village.

The village council operates a lodge with 14 rooms and serves family-style meals in its dining room. A portion of the building is leased for use as a health clinic. The lodge also houses the offices of the Minto Village Council. In 1985, a senior citizen center and craft sales outlet was constructed, but is not yet fully operational.

Personal and Household Facilities and Equipment

Minto households were surveyed as to their possession of selected facilities and equipment. One-half of all households have one boat, and two had two boats. Boat sizes ranged from 14 to 24 feet in length with the majority being 18- and 20- foot boats. These boats were equipped

TABLE 14. PUBLIC SERVICES IN MINTO, 1984

Service	Present
Electricity	Yes
Household Sewage System	No
Household Water System	No
Telephones	Yes
Cable Television	No
Fire Station	Yes
Laundromat/Washeteria/Showers	Yes
School System	Yes
Airfield	Yes
Post Office	Yes
Village Library	No
Health Services	Yes
Garbage Pickup	No
Cemetery Maintenance	No
Fuel Storage	Yes
Village Police	Yes
Hotel/Motel	Yes
Community Hall	Yes
Boat Landing	Yes
General Store	Yes
Gas Station	Yes

with outboard engines of 18 to 55 horsepower, the majority being 25 horsepower or less. It is noteworthy that the number and size of boats and outboards in 1984 was nearly identical to those of 1967 when the village was located on the Tanana River (Olson 1968:226).

Most households (all but 10) had at least one fishnet, 9 (20 percent) had a king salmon net, 22 (49 percent) a chum net, and 27 (60 percent) at least one whitefish net. Twenty-nine households (40 percent) had at least one snowmachine and six (13 percent) had a 3-wheeler. About one-third of the households had a functioning car or truck in 1984.

The majority of households (60 percent) have at least one husky-type dog. Nearly one-half of all households (49 percent) have four or more dogs. The largest dog team numbered 50 dogs. In 1984 there were a total of 384 dogs in Minto.

Minto households also maintain outdoor processing and storage facilities related to the subsistence use of wildlife. Forty-seven percent of the households had a cache on their lot in the village, and 44 percent had a smokehouse. A few households (18 percent) had a permanent meat and fish drying rack; however, households construct these as needed during the year or use the racks in the smokehouse for drying wild food. Thirty-six percent of the households also have processing facilities at a salmon fishing camp along the Tanana River. Not all households have a freezer in Minto, but the majority do (64 percent).

Cost of Living

The costs of goods and services in Minto are high compared to Fairbanks, which are high compared with the prices in the continental United States. The village store carries a limited supply of food staples and the fuel station sells gasoline and propane and provides a tire repair service. A price listing of selected food and non-food items is shown in Table 15. These items are 1.8 times the cost of the same items purchased in Fairbanks (Stetson 1988). Many individuals purchase groceries in Fairbanks although access is not easy. As noted earlier, only one-third of the households own a motor vehicle. Individuals sometimes get a ride to town with others, usually paying $20 each way for transportation. The three-times weekly scheduled air service

TABLE 15. PRICE LISTING FOR SELECTED GOODS AVAILABLE AT THE MINTO VILLAGE STORE AND GAS STATION, SUMMER 1984

Item	Cost U.S. Dollars
Cereal and Bakery Products	
flour, 10 lbs.	6.00
rice, 14 oz.	1.00
corn flakes, 18 oz.	2.45
oatmeal, instant, 15 oz.	3.40
bread, white, 1 lb.	1.90
crackers, Sailor Boy, 2 lbs.	3.20
cookies, Fig Newtons, 1 lb.	2.45
Meat, Poultry, Fish	
hamburger, 1 lb.	2.40
steak, 1 lb.	4.00
pork chops, 1 lb.	3.50
bacon, 1 lb.	2.10
wieners, 1 lb.	2.30
bologna, 8 oz.	1.65
chicken, 1 lb.	1.50
tuna, canned, 6-1/2 oz.	1.75
Dairy Products	
butter, 1 lb.	3.10
margarine, 1 lb.	1.60
cheese, 12 oz.	3.10
grated parmesan cheese, 8 oz.	1.55
evaporated milk, 13 oz.	1.05
powdered milk, for 20 qts.	12.10
eggs, 1 doz.	1.80
Fruits and Vegetables	
apples, each	.40
oranges, each	.40
potatoes, 1 lb.	.80
onions, 1 lb.	.80
Processed Fruits and Vegetables	
canned pears, 17 3/4 oz.	2.05
canned peaches, 16 oz.	1.15
fruit cocktail, 17 oz.	1.50
canned corn, 17 oz.	1.10
canned tomatoes, 14-1/2 oz.	1.30
dried beans, 2 lbs.	2.55
raisins, 15 oz.	2.70

TABLE 15. continued

Item	Cost U.S. Dollars
Miscellaneous	
salad dressing, 8 oz.	1.00
mayonnaise, 1 qt.	4.15
sugar, 25 lbs.	21.10
instant cocoa, 8 oz.	2.95
coffee, 3 lbs.	13.55
soda pop, 6-pack, 12 oz. cans	2.90
Prepared and Partially Prepared	
tomato soup, 10-1/2 oz.	.60
mushroom soup, 10-1/2 oz.	.75
chicken noodle soup, 1 lb. 10 oz.	1.50
peanut butter, 18 oz.	2.95
spaghetti, 22 oz.	1.70
catsup, 32 oz.	3.00
mustard, 16 oz.	1.40
Housekeeping Supplies	
dishwashing liquid, 22 oz.	2.65
laundry detergent, 5 lbs. 4 oz.	7.65
liquid disinfectant, 28 oz.	3.55
toilet bowl cleaner, 34 oz.	1.50
floor cleaner, 54 oz.	2.50
dust mop	4.60
toilet tissue, 4 rolls	2.70
paper towels, 100 sq. ft.	1.70
aluminum foil, 37-1/2 sq. ft.	2.70
waxed paper, 100 sq. ft.	1.50
light bulbs, pk. of 2	1.85
Toiletries	
toothpaste, 5 oz.	2.35
toothbrush	.95
shampoo, 16 oz.	2.25
shaving cream, 11 oz.	3.20
lotion, 8 oz.	3.90
Over-the-counter Drugs	
aspirin, bottle of 50	3.85
Tobacco	
cigarettes, pack	.95
cigarettes, carton	9.50
snuff, can	1.00

TABLE 15. continued

Item	Cost U.S. Dollars
Fuel	
gasoline, gal.	2.00
stove oil, 55-gal.	82.50
propane, 100 lbs.	48.00
2-cycle oil, 32 oz.	2.00

costs $80 for a round-trip ticket and air charter services out of Fairbanks charge about $150 to pick up or drop off people traveling to or from Fairbanks.

Electrical service is provided at a cost of about 41 cents per kilowatt hour. For 31 households that reported their average monthly electrical costs, the average cost was $82 per month, however, costs ranged from $25 to $300 on the average for individual households. Most households reported using one 100-pound bottle of propane every two months at a cost of $48 per 100 pounds (Table 15). For the few households that used stove oil for heating their homes rather than wood, the average use was 22 drums per year at a cost of $82.50 per drum. The harvest and use of wood for heat is described in Chapter 11.

Employment

Wage employment in Minto is limited and can fluctuate dramatically from year-to-year in part dependent upon state and federal revenues. Virtually all employment is directly or indirectly government-funded. The wage employment positions available in Minto between July 1983 and July 1984 are shown in Table 16. During this one-year period there were

TABLE 16. WAGE EMPLOYMENT OPPORTUNITIES
IN MINTO, JULY 1983-JULY 1984

Employer and Job	Number of Positions	Number of Hours per Week	Number of Months per Year
Yukon-Koyukuk School District (N=9)			
Bilingual/Bicultural Program	2	4	5
Bilingual Aide	2	20	9
Teacher Aide	1	30	9
School Maintenance	1	10	9
Special Education Aide	2	30	9
Janitor	1	20	9
Village Corporation Leasee (N=3)			
Gas Station Attendant	1	36	12
Store Manager	1	36	12
Store Clerk	1	18	12
Village Council (N=23)			
Equipment Operator	1	40	12
Cook	1	20	12
Cook	1	20	9
Maintenance	1	40	12
Senior Citizen Coordinator	1	40	12
Bookkeeping Clerk	1	30	12
Recreation Aide	1	20	10
Laundromat Attendant	1	40	12
Projects Director	1	20	10
Director	1	40	12
Lodge Manager	1	as needed	12
Cook's Helper	1	20	12
Nutrition Aide	1	20	10
Construction	1	60	5
	2	40	1
	1	70	1
	1	50	2
	2	40	2
	2	40	4
	1	40	5

TABLE 16. continued

Employer and Job	Number of Positions	Number of Hours per Week	Number of Months per Year
Federal Government (N=1)			
Postmistress	1	24	12
State Government (N=12)			
Alcoholism Counselor	1	20	12
Land Surveyor	1	40	2
Firefighter	9	84	1
Firefighter	1	84	2
Tanana Chiefs Conference, Inc. (N=2)			
Village Public Safety Officer	1	40	12
Health Aide	1	40	12
Alaska Village Electrical Cooperative (N=1)			
Power Plant Operator	1	35	12

50 wage employment opportunities for village residents hired in the community. Nine of these were with the school district, 22 with the Minto Village Council (including 10 seasonal construction jobs), 12 with state government (including 10 seasonal firefighting jobs), 1 with federal government (U.S. Postal Service), 3 with a business leased from Seth-de-ya-ah Corporation, 2 with Tanana Chiefs Conference, Inc., and 1 with the Alaska Village Electrical Cooperative (AVEC) (Table 16). The two businesses operated by the Seth-de-ya-ah Corporation leasee and AVEC represent the only private enterprise in the community, the remainder being government funded. All are service oriented. Less than one-fourth of these jobs are full-time year-round positions (Table 17). Nearly one-half are seasonal with hours ranging from 4 to 84 hours per week and the job lasting from 1 to 5 months per year (Table 16). The

TABLE 17. TYPE OF JOB AND NUMBER EMPLOYED
IN MINTO, JULY 1983-JULY 1984

Job Type	Number Employed
Full-time, year-round	
30-40 hours per week	13 (7 males, 6 females)
12 months per year	
Part-time, year-round	
18, 20, or 24 hours per week	5 (5 females, 0 males)
12 months per year	
Part-time, semi-year-round	
10, 20, or 30 hours per week	10 (5 males, 5 females)
9 or 10 months per year	
Seasonal	
Construction-related	
40, 50, or 70 hours per week	11 (11 males, 0 females)
1 to 5 months per year	
Firefighting	
84 hours per week	10 (10 males, 0 females)
1 or 2 months per year	
School program	
4 hours per week	2 (2 females, 0 males)
5 months per year	

remainder are part-time positions, year-round or nearly year-round in duration (Table 17). During the study year, two individuals worked outside of the community.

Some positions were held by more than one individual during the year and several people held more than one job during the same time period. From July 1983 to July 1984, 47 Minto residents worked for wages either in the village or out-of-town. Fourteen individuals had two or three jobs during the same time period and this primarily is

represented by men who worked on construction and firefighting crews during summer 1983. In addition, some women earn money babysitting and from the sale of handicraft items and some men earn money cutting and hauling cord wood. These types of self-employment were not systematically recorded during the study. Trapping is another form of self-employment which is discussed in Chapter 10. Some income is derived annually from the sale of pelts as described later in this report. The one commercial salmon fishing permit holder in the community does not fish commercially each year and did not during summer 1983.

The analysis of wage employment opportunities in Minto during the study year show that women were employed almost as equally as men except in seasonal construction-related and firefighting jobs (Table 17). The latter were held exclusively by men. The 12 full-time year-round positions in the village were held by seven men and five women. Women held all of the part-time year-round jobs, whereas part-time semi-year-round jobs were held by an equal number of men and women (Table 17).

The average individual earnings from wage employment for the 47 individuals who held a job either in or outside the village during the study year was $8,858 while the median income was $6,800 (Table 18). Most employed individuals earned in the $5,000-$7,500 category. Sixty-four percent of those employed earned less than $10,000. No one earned more than $21,000. Employed individuals ranged in age from 19 to 73 years of age, with an average age of 39 years (Table 19). Over three-fourths were between 19 and 50 years of age.

TABLE 18. INCOME RANGES FOR EMPLOYED INDIVIDUALS, JULY 1983-JULY 1984

Earned Wages (U.S. Dollars)	Number of Wage Earners	Percent	Cumulative Percent
1-2,499	3	6.4	6.4
2,500-4,999	7	14.9	21.3
5,000-7,499	16	34.0	55.3
7,500-9,999	4	8.5	63.8
10,000-12,499	7	14.9	78.7
12,500-14,999	3	6.4	85.1
15,000-17,499	2	4.3	89.4
17,500-19,999	4	8.5	97.9
20,000-22,499	1	2.1	100.0
Total	47		
Average = $8,858 Median = $6,800			

The average annual wage of those with full-time positions was $14,826 (Table 20), somewhat higher than the overall average. Males averaged $15,555 and females averaged $13,660 in earnings from these positions. These individuals averaged 37 years of age, about the same as the average of all employed individuals. Most positions were held by those less than 50 years of age (Table 21). Full-time wage employment accounts for 46 percent of all wage earnings by community residents, yet those employed in year-round full-time positions account for only 28

TABLE 19. AGE RANGES FOR EMPLOYED INDIVIDUALS, JULY 1983-JULY 1984

Age Range	Number of Wage Earners	Percent	Cumulative Percent
Less than 20 years	1	2.1	2.1
20-29 years	10	21.3	23.4
30-39 years	16	34.0	57.4
40-49 years	10	21.3	78.7
50-59 years	4	8.5	87.2
60-69 years	5	10.6	97.9
70-79 years	1	2.1	100.0
Total	47		
Average = 39.6 years Median = 36.0 years			

percent of the jobs held by Minto's residents. Therefore, while individuals employed in full-time year-round positions have average earnings about twice that of those not employed year-round, these earnings represent the smaller segment of employed workers and of jobs held.

In contrast to full-time wage earners, the part-time and seasonally employed have average annual earnings of $6,576. Earnings of individuals employed part-time averaged $8,435 compared to the $5,360 average earnings of those seasonally employed. Individuals employed part-time had an average age of 45, somewhat greater than those employed full-time, whereas those employed seasonally averaged 38 years of age.

TABLE 20. INCOME RANGES FOR INDIVIDUALS WHO HELD A YEAR-ROUND, FULL-TIME JOB, JULY 1983-JULY 1984

Earned Wages	Number of People Earning	Percent	Cumulative Percent
7,500-9,999	1	7.7	7.7
10,000-12,499	4	30.8	38.5
12,500-14,999	3	23.1	61.5
15,000-17,499	1	7.7	69.2
17,500-19,999	3	23.1	92.3
20,000-22,499	1	7.7	100.0
Total	13		

Average = $14,826
Median = $13,824

TABLE 21. AGE RANGES FOR INDIVIDUALS WHO HELD A YEAR-ROUND, FULL-TIME JOB, JULY 1983-JULY 1984

Age Range	Number of People Earning	Percent	Cumulative Percent
20-29	5	38.5	38.5
30-39	3	23.1	61.5
40-49	3	23.1	84.6
50-59	1	7.7	92.3
60-69	1	7.7	100.0
Total	13		

Average = 37.0 Years
Median = 30.0 Years

The analysis of household wage earnings was done in addition to the individual wage earnings analysis. From July 1983 to July 1984, 80 percent of Minto households had at least one member who worked for wages at some time during the year. Twenty percent had no earned income. Average household income ranged from 0 to $26,880 with a mean household income of $9,252 and a median of $6,200 (Table 22). Most households earned between $5,000 and $7,500; 62 percent earned less than $10,000. It is interesting to note that household income during the study year differed little overall from that in 1979 (Table 22), although median household income in 1979 was greater. In 1979, most households earned between $2,500 and $5,000, however, like 1983-84, nearly the same percentage of households (roughly 62 percent) earned less than $10,000 (Table 22). This is not adjusted for inflation between 1979 and 1984.

Estimated household income from earned and unearned sources is shown in Table 23. Nearly 50 percent of all households had a total income of less than $10,000. More significantly, the total income of 32 (71 percent) of 45 Minto households fell below the poverty income guidelines for Alaska for 1984 (Table 24). Generally, earned and unearned income combined and household size are used by the federal government as the basis for determining poverty income guidelines shown in Table 24 (Federal Register 1984). These guidelines apply to all Alaska and no correction factor has been developed for rural communities in Alaska to accommodate differences in cost of living, for example. Smaller and larger Minto households tend to fall below the poverty guidelines.

TABLE 22. INCOME RANGES FOR MINTO HOUSEHOLDS, 1979 and JULY 1983-JULY 1984

Income Range	1979[a] Number of Households	1979[a] Percent	1979[a] Cumulative Percent	1983-1984[b] Number of Households	1983-1984[b] Percent	1983-1984[b] Cumulative Percent
0				9	20.0	20.0
1-2,499	9	18.4	18.4	1	2.2	22.2
2,500-4,999	11	22.4	40.8	4	8.9	31.1
5,000-7,499	5	10.2	51.0	13	28.9	60.0
7,500-9,999	6	12.2	63.2	1	2.2	62.2
10,000-12,499	4	8.2	71.4	3	6.7	68.9
12,500-14,999	3	6.1	77.5	1	2.2	71.1
15,000-17,499	4	8.2	85.7	2	4.4	75.6
17,500-19,999	2	4.1	89.8	6	13.3	88.9
20,000-22,499	0	0	89.8	1	2.2	91.1
22,500-24,999	3	6.1	95.9	2	4.4	95.6
25,000-27,499	2	4.1	100.0	2	4.4	100.0
TOTAL	49			45		
Median = $7,250				Median = $6,200 Average = $9,252		

[a]Source: U.S. Bureau of the Census 1980
[b]Source: this study

TABLE 23. TOTAL HOUSEHOLD INCOME (EARNED + UNEARNED) RANGES, JULY 1983-JULY 1984

Earned Plus Unearned Income Range	Number of People Earning	Percent	Cumulative Percent
0	1	2.2	2.2
1-4,999	6	13.3	15.6
5,000-9,999	14	31.1	46.7
10,000-14,999	7	15.6	62.2
15,000-19,999	8	17.8	80.0
20,000-24,999	5	11.1	91.1
25,000-29,999	2	4.4	95.6
30,000-34,999	2	4.4	100.0

Average = $13,304
Median = $12,240

TABLE 24. POVERTY INCOME GUIDELINES COMPARED TO TOTAL HOUSEHOLD INCOME AND HOUSEHOLD SIZE, 1984.

Household Size	Poverty Income Guideline, 1984[a]	Number of Households Below Guideline	Number of Households Above Guideline
1	6,240	7	0
2	8,410	5	0
3	10,580	5	5
4	12,750	2	4
5	14,920	4	3
6	17,090	3	0
7	19,260	5	0
8	21,430	0	1
9	23,600	0	0
10	25,770	1	0
Total		32 (71%)	13 (29%)

[a]Source: Federal Register, February 27, 1984, p. 7,151.

CHAPTER 3

SETTLEMENT PATTERNS AND SEASONAL ROUND OF SUBSISTENCE ACTIVITIES

The seasonal round of subsistence activities required movement by people throughout the year to harvest a variety of fish and wildlife species in and around Minto Flats. Aboriginally, and in the earlier part of this century, this movement was nearly constant and settlements were temporary and semi-permanent. As noted in Chapter 2, the shift to semi-permanent and permanent settlements occurred in the middle 50 years of the 20th century. Yet, as described below and in the following chapters, the harvest of fish and wildlife for subsistence use continues to require use of temporary camps and seasonal settlements. Historic and contemporary patterns of subsistence activities in Minto Flats are described below.

HISTORIC SETTLEMENT PATTERNS AND ANNUAL ROUND

Aboriginally, the people of Minto Flats traveled in small bands (extended family groups) in and about Minto Flats to harvest the various wildlife resources. Beginning in late fall, people left the whitefish fishing camps and dispersed in family groups to moose or caribou fences, camping enroute and nearby (Olson 1968:41). They remained in these areas until mid- or late December. Often, the larger group gathered for a potlatch at a central place, staying for several weeks. These potlatches were occasions to honor the dead "and give presents in their

memory" (Olson 1968:68). It was also a time for trading and in some years Minto people gathered with their neighbors near Nenana at "Togotthele Hill." After gathering, the smaller groups again dispersed to hunt caribou and moose; and to trap and snare game. Some individuals and possibly families traveled south to the upper Kuskokwim River area and returned after three months (Olson 1968:41). It is noteworthy that the Minto Athabaskan language is closest to the Upper Kuskokwim Athabaskan language indicating an even closer tie in proto-historic times (Krauss 1981:75). In spring, people moved to certain lakes to trap beaver and muskrat and to hunt waterfowl. These activities continued after breakup. In late spring and early summer, people settled at summer fishing stations, primarily harvesting whitefish and hunting waterfowl. Few families harvested salmon on the Tanana River; salmon are not abundant in Minto Flats which was the focal area of subsistence activities.

The aboriginal pattern of movement is not too unlike that described for the first quarter of this century, although there were some important changes. Travel to trading posts on the Yukon River at Tanana, Rampart, and Fort Hamlin near present-day Stevens Village were included as well as travel to stores in Nenana. Trapping also had assumed greater importance as a commercial trade activity. In August, people stayed in the eastern part of Minto Flats near the Minto Lakes and harvested several species of whitefish, along with pike and salmon, gathered blueberries and cranberries, and hunted moose and waterfowl. In earlier times, when caribou migrated through the area, men hunted these animals as far north as the White Mountains. After the rivers and creeks froze, people moved to another locality where they fished through

the ice and men hunted bear in their dens in the area, and continued to hunt moose. "Rabbit" (hare) drives were common at this time of year and usually took place on small islands. Families then stayed in one area, although they made many camps from December through February when they moved out of the Flats into the hills for moose hunting. In the past, families stayed in the flats and nearby hills from November through February, and concentrated on trapping while they pursued other subsistence activities such as hunting moose and snaring hare. In March, numerous camps were set up throughout the Flats for hunting and trapping muskrats. Blackfish were also plentiful and were harvested in fish traps placed under the ice. Commonly, at that time of year, people from the villages of Tanana and Stevens Village came to Minto Flats to hunt muskrat. In spring, people harvested waterfowl and beaver before and after breakup. After the ice went out of the creeks, several families again grouped together for whitefish fishing and waterfowl hunting. Later in summer, some families went to the Tanana River to fish for salmon. A good description of this seasonal round in the Minto language with translations is found in a recent work by a Minto woman (Frank 1983).

As noted in the previous chapter, Minto people began incorporating the trapping of furbearers for sale into their seasonal round of activities as well as harvesting and drying salmon for trade, cutting wood for sale to steamboats, and hauling freight by dog team in winter. Yet, the subsistence activities were centered around the seasonal settlements in Minto Flats rather than on the Tanana River, even though the settlement of Minto was being established during this time period on the Tanana.

The extent of use and knowledge of the land and its resources during this period is made abundantly clear in the record of Minto Athabaskan place names for Minto Flats and vicinity (Appendix 1). These names identify fish and wildlife resources, harvesting areas, landmarks, portages, trails, and other features of the natural environment.

Five seasonal settlements were occupied by Minto families roughly between 1901 and about 1935. These were "Cache" (Dukhtso Dedhloden); "Four-Cabin" (Tr'enotekhekhugheeɬch'eɬden); "Chatanika" (Dradlaya-chaget); "North Fork" (Mena' K'oget); and (Old) Minto (Mentee Khughot-theet). The subsistence activities at these areas are described in detail in Chapter 5. "Cache" was a summer and fall fishing settlement where seven caches were constructed. Many of Minto's elders today spent many seasons at this locality as youth and adolescents, and one elder lived there through his mid-40s. Similarly, many lived at the other seasonal settlements. At "Four-Cabin," there were four cabins constructed early in the century and later another two. At "Chatanika" there were six cabins, and at "North Fork" (the current site of Minto) there were two cabins built in 1901 and another four constructed between then and 1930. At (Old) Minto the first cabin was built in 1917 and another eight were built the following year. None of these sites were occupied year-round until about the 1940s when Minto became the permanent settlement of the Minto people (see also Chapter 2).

The seasonal use of these settlements required using a network of trails in winter, and canoe routes at other times, many of which are noted in Figure 8. The major routes provided access to hunting and fishing areas between (Old) Minto and the Minto Lakes areas and between it and the North Fork area. These routes were first recorded in 1962 in

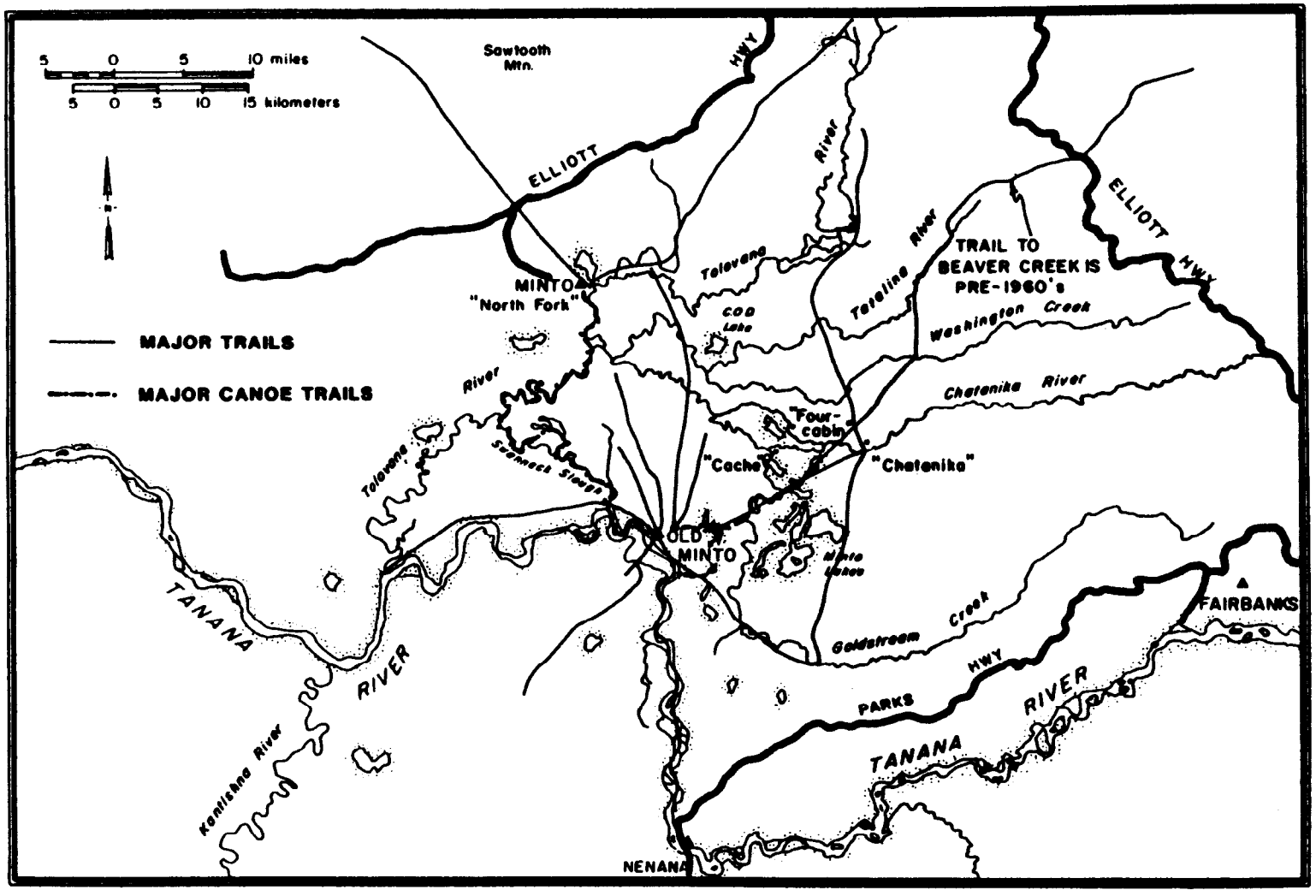


Fig. 8. Major Trails and Canoe Routes of the Minto Indians.

the Native language by one Minto man (Charlie and Krauss 1962). The 20 Native place names that refer to trails and portages (Appendix 1) also provide some indication of the travel routes used during the annual round of subsistence activities. Many other canoe routes exist during high water and most older people in Minto can describe them and refer to them even though their use has diminished. Some of these are still used in some years of high water, particularly when people are hunting muskrat and waterfowl in spring. In exceptional years, such as 1985, this is possible while fall moose hunting. The major overland trails within Minto Flats are used regularly now both by those traveling by dog team and snowmachine (Fig. 8). Additional trails are used for east-west travel.

Another description of the seasonal round is derived from Bureau of Indian Affairs records for the late 1930s (see Olson 1968:170). Although brief, it notes the same basic round of activities based in (Old) Minto. Hunting in fall included moose, caribou, and duck hunting and wood cutting for personal use. In November, people began cutting wood for steamboats, trapping, and rabbit hunting and snaring. Woodcutting for boats and trapping continued in January and February. As earlier in the century, in March, April, and May, people went out to spring camps for muskrat and beaver trapping and hunting. Summer activities focused on salmon fishing and gardening, a change from the early 20th and late 19th centuries. As noted in Chapter 2, in 1940, it was reported that 11 families still resided in canvas tents at (Old) Minto.

CONTEMPORARY SETTLEMENT PATTERNS AND SEASONAL ROUND

Today, Minto people incorporate seasonal movements in their round of subsistence activities. The contemporary seasonal round includes nearly all of the same resources as in the past with the exception of caribou which are no longer present in the area. Muskrat, whitefish, pike, waterfowl, and moose are resources that have declined significantly since the 1950s according to local respondents (see also Shepherd and Matthews 1985). At present, harvest activities are based from the current village site at (New) Minto and temporary camps rather than seasonal settlements with the exception of fish camps for salmon fishing and spring camps used for muskrat and waterfowl hunting and whitefish and pike fishing; seasonal movements are commonly done in concert. In 1967, one researcher reported a typical phenomenon he observed among Minto people with regard to subsistence moves:

> "A chain reaction is often initiated when two or more families go to one location. For example, on an exceptionally nice weekend, two families left to go fishing on the Tolovana River. A man predicted...that soon there would be a mass exodus from the village. Within 24 hours, 13 families or approximately 50 people had left to camp in the same area" (Olson 1968:227).

This same phenomenon was reported to and observed by this author at different times between 1984 and 1986 particularly for waterfowl hunting, moose hunting (see Chapter 6), berry picking, king salmon fishing (see Chapter 4), and spring whitefish fishing, although the numbers camping was somewhat less.

Seasonal Round of Subsistence Activities

Minto residents harvest a variety of fish, game, and plant resources throughout the year (Fig. 9). Harvest is influenced by the seasonal availability of resources, species abundance, regulations imposed by the Alaska Boards of Fisheries and Game, wage employment opportunities, and personal circumstances. The annual round of activities indicates that Minto people harvest several species of salmon (chinook or king, summer chum or "dog," fall chum or "silver," and coho or "chinook"); several freshwater non-salmonid fish species (whitefish, burbot or "lush" or "lingcod," northern pike, blackfish, sheefish, longnose sucker); large game (moose, black and brown bear); small game (hare, porcupine, ptarmigan, grouse, muskrat); furbearers (red fox, mink, otter, marten, wolf, lynx, and beaver); waterfowl; berries (blueberries, lowbush and highbush cranberries); wild edible plants (rhubarb); and wood. All of these resources can be harvested within Minto Flats.

In examining the seasonal round of subsistence activities by species and month (Fig. 9), it is clear that the types of activities fluctuated from month to month. From May through October most harvest activities involved fishing and processing of nearly all fish species available in Minto Flats and the Tanana River. These activities were augmented by spring muskrat and waterfowl hunting, bear hunting, fall moose hunting, grouse and hare hunting and snaring, and summer berry picking. These are the six busiest months of the year in terms of subsistence harvest activities, yet it is the same period of time when seasonal wage employment is available, if at all.

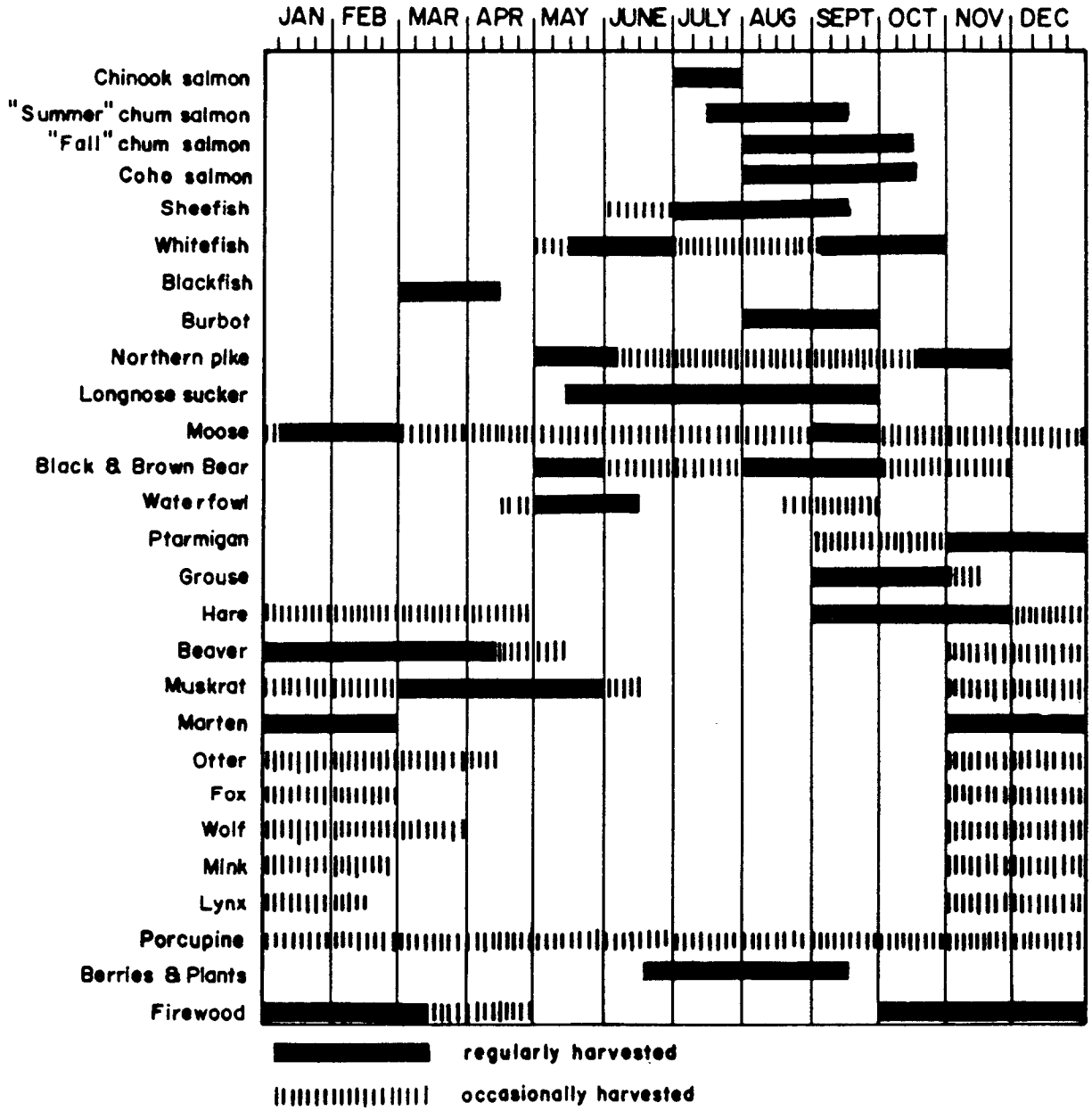


Fig. 9. Seasonal Round of Subsistence Activities, 1960-84.

Beginning in May families and individuals occupy seasonal or temporary "spring camps" where they harvest muskrat, waterfowl, whitefish and pike, primarily. Some men periodically check black bear dens at this time and take bear when encountered. By mid-June people are making arrangements for salmon fishing on the lower Tolovana and Tanana rivers. These activities require the harvest of wood for smoking fish and for the construction and repair of fishwheels and structures related to fish processing, such as drying racks, smokehouses, caches, and dwellings. Nets are set near the village for harvesting other freshwater species -- pike, whitefish, sucker, burbot, and sheefish. By late July and during August berry picking is incorporated into the weekly harvest activities. While the salmon fishing activities of summer (July and August) are relatively localized and based from fish camps or the village, the gathering of berries involves travel between fishing activities to other areas in the Flats.

In late August and early September, hunters focus on waterfowl hunting, making day trips or trips of a few days away from the village or fish camp to hunt ducks. By mid-September, during moose hunting season, families focus all their attention on the moose hunt. Fish camps are temporarily abandoned and moose hunting becomes the sole subsistence activity. After the season, some families and individuals continue salmon fishing on the Tanana River and others set up fall camp in the eastern Minto Flats for whitefish fishing. Small game hunting and snaring for grouse and hare, including "rabbit" drives, take place generally in late September and October. As rivers and lakes freeze over in late October, fishing becomes restricted to northern pike by "jigging" using hooks and lines. Firewood is collected and trappers

prepare for the winter trapping season. In winter, resource harvesting activities are limited by availability of species, fish and game regulations, severe low temperatures, and weather. As early spring emerges in March and April, activities shift to muskrat trapping and hunting and waterfowl hunting (Fig. 9).

Geographic Use Areas

In each of the following chapters which describe hunting, fishing, trapping, and gathering are maps which depict geographic areas used for the 1967-84 time period. This time period reflects the modern period including the few years just prior to the relocation of the village from the southern area of the Flats to the northwestern area. While this move resulted in shifts in the intensity of use of certain areas, the same areas are used as prior to the relocation. These also include most of the same areas used throughout the century as described in Chapter 2 and the Appendix.

Household Participation

The level of household harvest of game, fish, furbearers, waterfowl, and berries from July 1983 through June 1984 was measured in a survey of 45 of 48 Minto households in August 1984. Over 70 percent of all households successfully harvested each of five categories of resources -- waterfowl (82 percent), small game (including muskrats) (91 percent), berries (82 percent), salmon (78 percent), and freshwater fish

(73 percent) (Fig. 10). Household harvest levels for big game was lower (53 percent) yet participation was considerably higher for one species (84 percent for moose) as described in Chapter 6. Extent of households harvesting these resources and harvest totals are described in each of the subsequent chapters and are discussed in the final chapter.

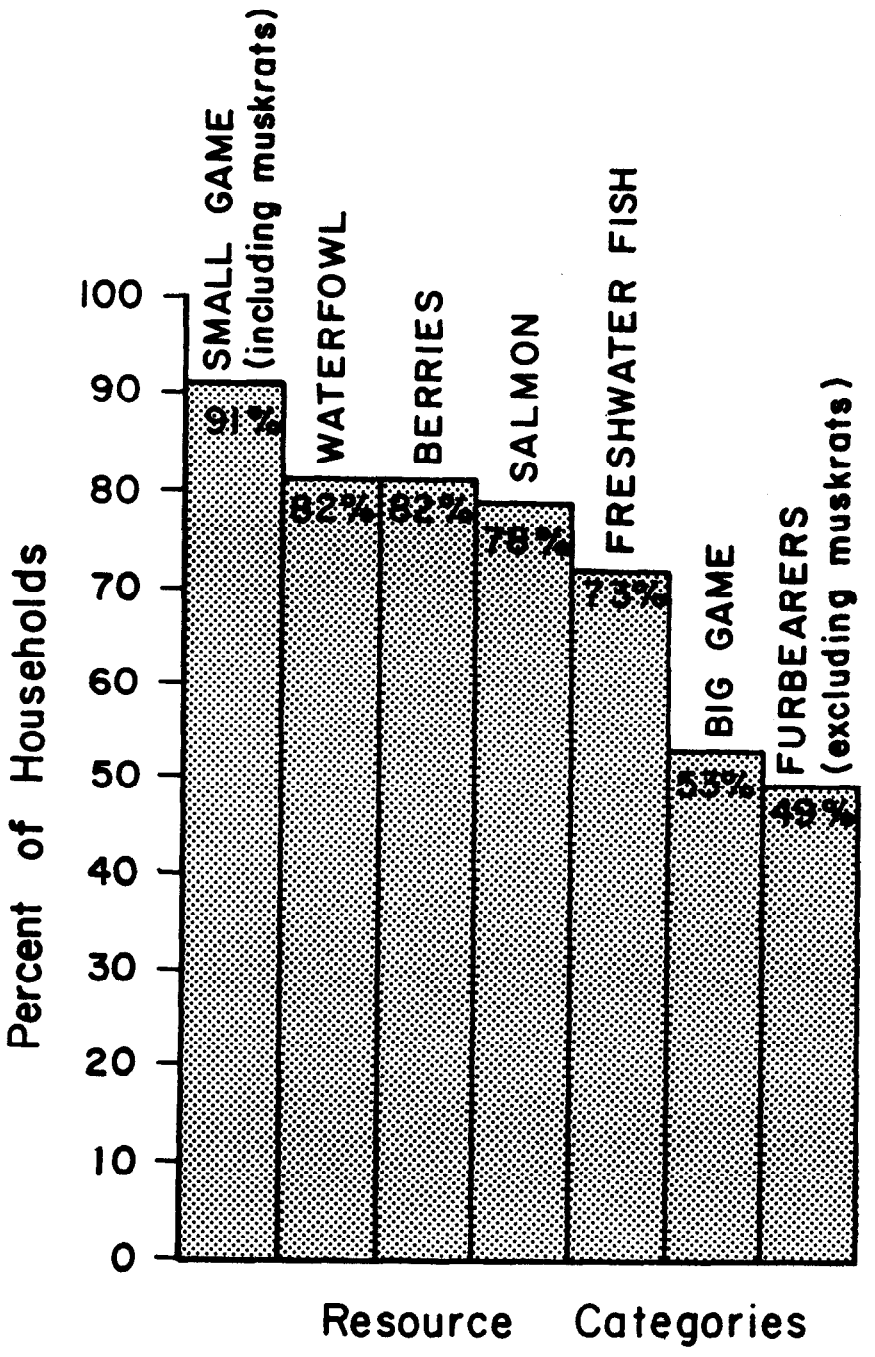


Fig. 10. Percent of Minto Households Harvesting Fish and Wildlife, 1983-84.

CHAPTER 4

SALMON FISHING

The salmon fisheries of the middle Tanana River have played a variable role in the subsistence and market economy of the Minto Flats area throughout the 20th century. Subsistence salmon harvest has been ever-present but its importance to the subsistence economy has fluctuated with changes in the natural environment locally (weather, water level, shifting river courses), variations in the strength of the annual run of the different salmon species, alterations in local cash (non-subsistence) economic conditions (such as opportunities for obtaining cash or credit), changes in settlement (shifting village locations), social and cultural circumstances (composition of work groups and sociocultural characteristics), and non-locally imposed circumstances (fishing regulations). The way salmon fishing is conducted in any one season or period of time by the community of Minto and individual Minto households will be seen, then, to depend upon a variety of factors and circumstances. Minto residents harvest four salmon species. The harvest and use of these species is described first in an historical context, followed by a description of contemporary salmon fishing activities.

TERMINOLOGY

Any researcher involved in the description of salmon resources utilized by human populations in Alaska has been faced with the variety

of terms used by local residents and fishermen throughout the state to refer to specific salmon species. Often, there are both local English terms and local terms in the Native language. Biologists, anthropologists, and linguists are among those who have had to deal with this reality to insure that both scientists and local residents are referring to the same species. The situation is no different when researching salmon fishing among Minto residents. For this reason, this section clarifies the scientific, local English terms, and local Native Athabaskan terms for the four species of salmon that Minto residents harvest and use. They are described in the order in which the different salmon runs occur during the salmon fishing season.

The first salmon to occur in the area are the king salmon. In English, scientists commonly refer to this species as chinook salmon and secondarily as king salmon. Minto residents, when using English, call it "king" salmon, whereas the term "chinook" is the English term they use for another salmon species described below. The Minto Athabaskan term is gath and the scientific or Latin name is Oncorhynchus tshawytscha.

The next run of salmon is locally referred to in English as "dog" salmon, a term also used by scientists who also refer to this species as the summer run of chum salmon (Oncorhynchus keta). Native Minto Athabaskan terms for this run of salmon are noolaghee and gath k'edenadloyoyee, the latter meaning "the one right behind king salmon."

The third run of salmon are also chum salmon (Oncorhynchus keta), but biologists refer to this as the fall run of chum salmon or "fall chum" run. Minto residents refer to this run in English as "silvers" or "silver" salmon. In their own native language they call this species

san'look'a meaning "summer fish." Local residents are quick to point out that these fish are "bright" and "silvery" in color. It is on this basis they are distinguished by Minto people from other salmon of the same or different species which are closer to the spawning stage and display typical characteristics such as reddened skin and water marks.

The final run of salmon are locally-termed in English as "chinook" salmon. Scientists do not distinguish a fourth run of salmon per se, but note instead that a fourth species of salmon, coho salmon (Oncorhynchus kisutch) run with the later (latest) running fall chum. These salmon are termed nathdlaghee and khuyts'enlook'a, in the Minto Athabaskan language. The latter term means "fall fish" another English term local residents use to refer to this run of salmon. These salmon are described as having skin and meat that is red in color and display hooked jaws characteristic of salmon close to the spawning stage. It is worth noting that this local nomenclature is at least 60 years old. During a 1920 investigation of the Yukon River salmon fisheries, scientists reported the local use of the term "chinook" to refer to coho salmon and described their appearance much the same, whereas they noted also the bright, silvery earlier running chums of the summer run were termed "silvers" and were distinguished from "dog" salmon which were closer to the spawning stage (Gilbert and O'Malley 1921:131-137). They also noted the use of the term "silvers" referring to "the last chums to run, late in August and early in September" (Gilbert and O'Malley 1921:137). For Minto residents, king salmon and the "bright" summer and fall chum salmon serve as the primary salmon species used for human consumption. For purposes of this report common English names used by the scientific community are used when referring to the different salmon

species. These are king or chinook salmon, summer chum, fall chum, and coho.

MINTO SALMON FISHERIES THROUGH TIME

Participation and involvement in the harvest and processing of salmon for subsistence use by any human population is influenced by natural and environmental constraints, technology, sociocultural constraints, and externally imposed regulations. Together these factors influence the actual salmon fishing activities of any one season, but also the nature or character of salmon fishing throughout a period of time, such as the 20th century.

Natural and Environmental Influences

The harvest of salmon is necessarily dictated by the timing of the different runs. Minto salmon fishing camps are located about 835 river miles from the mouth of the Yukon where salmon first enter the Yukon drainage from the Bering Sea. King salmon, the largest species averaging 20 to 25 pounds per fish, enter the mouth of the Yukon soon after the river ice breaks up, generally during late May (ADF&G 1984:1). Some king salmon begin their migration prior to breakup running under the ice and have been caught in nets set under the ice in May (J. Walker pers. comm., 1984). During the past 25 years (1961-1985), king salmon have been caught in considerable numbers near the mouth of the Yukon as early as June 1 (in 1967) and as late as June 19 (in 1984) based on the first commercial fishing opening (ADF&G 1974, 1984). The commercial

opening is usually about 10 days after the first appearance of king salmon in subsistence nets. They generally run until the end of June, although some are caught in early July. Because of the lengthy distance from the mouth of the Yukon to Minto fishing areas on the Tanana River and the average speed at which king salmon travel in the Yukon River (40 miles per day), it takes about 21 days for king salmon to begin to occur in the area. Therefore, king salmon generally are first caught as early as the last week in June and as late as July 11 near Old Minto on the Tanana River. This is the historical range of variation in harvest timing. In 1885, king salmon were caught by Indian fishermen on the lower Tanana before June 24 (Allen 1900:451), whereas one hundred years later, in 1985, king salmon were not caught until mid-July in the same area (Andersen pers. comm., 1986).

The summer run of chum salmon generally follows the king run but with some overlap, although in 1985 and 1986 both species entered the river at nearly the same time (ADF&G 1985; Andersen pers. comm., 1986). In general, these salmon which average 6 to 7 pounds, enter the river in early June and run through mid-July in the lower Yukon River. They have been caught in appreciable numbers as early as June 2 (in 1969) and as late as June 18 (in 1984) (ADF&G 1974, 1984), again later than when they are first caught in subsistence nets. In the middle Tanana they are usually caught from mid-July until mid-August.

The fall run of chum salmon begins following the summer run with some overlap. Again, in general, the fall chum enter the mouth of the Yukon around mid-July and continue to run until early September. Historic commercial catches show they have been harvested in considerable numbers as early as July 11 (in 1969 and 1972) and as late

as August 1 (in 1961) near the mouth (ADF&G 1974, 1984). Along the middle Tanana, fall chum are caught from early September until freeze-up, generally in mid-October. In the past, some Minto families seasonally harvested fall chum in November at the spring-fed spawning area on the Toklat River, a tributary of the Tanana (see also Shinkwin and Case 1984). Fall chum are somewhat larger than the summer run of chums and average 7 to 8 pounds per fish.

Coho salmon runs are only slightly later than those of fall chum, and mostly run coincidentally with the major portion of the fall chum run. As noted in the earlier section on terminology these are the latest running salmon and last harvested by Minto fishermen.

Clearly, the run timing of the different salmon species puts natural parameters on salmon fishing activities of Minto people. When considered within the context of the seasonal round of subsistence activities, it is apparent that salmon fishing preparations must occur soon after spring waterfowl hunting. King salmon fishing, at least in earlier times, coincided with the major run and harvest of whitefish in early summer, as discussed in Chapter 5. The lapse between the summer and fall runs of chum salmon in late August customarily afforded the opportunity for fall waterfowl and moose hunting. However, with the current hunting regulations, fall salmon fishing must coincide with fall hunting, both major subsistence pursuits, thus limiting the full extent to which individuals can participate in both as they could in the past.

In addition to the natural timing of salmon runs, other natural occurrences influence salmon fishing activities. Of particular importance are weather, water level, and shifting river channels. During a 50-year period, fisheries scientists for the Yukon drainage

have, on occasion reported the effect that some of these factors have had on subsistence salmon fishing along the Tanana River. As early as 1920, one scientific investigation of the Yukon and Tanana subsistence fisheries noted that in the Tanana valley there is less rainfall than in other areas of the Interior. This, coupled with the fact that the salmon are less oily or contain less fat by the time they reach the Tanana, salmon can be more easily preserved without having to smoke the fish during the preservation process (Gilbert and O'Malley 1921:144). In general, the lower annual precipitation is characteristic of a continental climate which characterizes much of interior Alaska with the Tanana Valley at its heart (Wahrhaftig 1965:11).

Although rainfall directly affects water level and therefore the ability to catch salmon and effectively process it, the winter snowpack also influences water level. High water levels make it difficult to intercept fish using either a fishwheel or by setting a net as the fish travel upstream since the river channels become flooded and their travel is less confined. In 1922, it was reported that the subsistence salmon catch was one of the smallest to date as the water level was as high as the bank and the winter had the highest precipitation on record (Bower 1923:58). Climatological data recorded at Nenana for 1922-76 also show that the greatest precipitation in the month of July was recorded in 1922 when 7.10 inches fell at that locality compared to an average of 2.06 inches for July during that 45-year period (AEIDC 1976). As noted earlier, July is the month when king salmon run in the Tanana and summer chum begin to run. In 1924, continuous rains from July 3 to August 10 resulted in a heavy loss of fish due to spoilage (Bower 1925:133). It is necessary to air-dry the salmon for preservation with or without the

smoking process. Again, in 1926, it was reported that "On account of extremely high water, the catch on the Tanana River was small" (Bower 1927:265), whereas in 1927 an unusually low water level resulted in good salmon catches on the Tanana (Bower 1928:100).

Variation in harvests during the salmon fishing season is possible also, as shown by the report of the 1930 conditions on the Tanana River where "the catch of chums and kings was light as water was over the bank all summer and prevented operation of the wheels, but the catch of cohos was the best in years, and favorable drying conditions after the first of September facilitated the curing of the fish" (Bower 1931:23). As in 1924, the 1931 season brought continuous rains through the summer and "both rivers [Yukon and Tanana] were at flood stage most of the time the salmon run was on" (Bower 1932:33).

Breakup poses additional problems. High water resulting from a heavy snowpack and ice jams can cut away at river banks and destroy fish camps in the process. Old-timers in Minto consistently mentioned spring 1937 when spring camps had to be moved to the few prominently elevated areas in Minto Flats because the water was so high due to an extremely heavy snowpack coupled with spring rains. In fact, while traveling in the Minto Flats in 1984, one elderly man made a point of noting places of higher ground where people had to camp in spring 1937. Consistent with these accounts are those found in the climatological and fisheries records for the same year. The greatest snowfall on record between 1922 and 1976 at the Nenana weather station was in January 1937 when a 74-inch snowfall was recorded compared to an average of 9.3 inches for that month between 1922 and 1976 (AEIDC 1976). The fisheries report noted the effect on fishing activities of this record high water

level at breakup: "Nearly every fish camp along the Tanana and Yukon rivers for a distance of about 200 miles [from Nenana] was either washed away or broken up by the ice" (Bower 1938:88).

Fisheries records are sketchy or non-existent for the next 25 years. However, we know that the same factors of weather and water level influence summer salmon fishing in the same way. In fact, in 1962 Alaska Department of Fish and Game biologists reported the impact the 1961-62 heavy snowpack had on salmon fishing. They stated the snowpack "caused flooding throughout June, July, and August from Nenana on the Tanana River downstream to the mouth of the Yukon. Many fish camps and fishing locations were rendered inoperable due to high water" (ADF&G 1962:35). Perhaps the worst fishing season on record on the Tanana was in summer 1967 due to the August flood (a record 8.26 inches fell compared to a 2.49 average for the 1922-76 period at Nenana [AEIDC 1976]). This resulted in a near-total loss of the catch for that season during the flood of the Tanana River with most Tanana River fishermen also being evacuated to Fairbanks (ADF&G 1967:54, 58).

High water and rainfall not only influence the ability to effectively fish and process salmon, but have the effect of contributing to the shift of river channels. These changes can noticeably occur during the season, but also occur over a period of several years. In either situation, the result is that fishermen are faced each year with having to assess sites where fishwheels and gill nets are set. A change in river course affects the harvest of salmon at any one particular location. For this reason, it is common to find fishwheel and set net locations changing from one year to the next and at times, changing during the season. When these fishing sites, of necessity, become too

distant from the fish camp, the entire operation is often moved closer to the fishing site. This is one reason for changes in fish camp locations during this century as noted below. The middle Tanana River and the area between Nenana and the mouth of the Tolovana River is particularly vulnerable with respect to shifting channels as the Tanana River meanders across the flats. There are no stretches of river where solid rock along either bank provides for areas of consistent channeling of the water.

Technology

The ability to harvest salmon in the silt-laden waters of the middle Tanana has changed as technology or salmon harvesting gear has changed throughout the century. In the earliest part of this century, families traveling out of Minto Flats to the Tanana for summer salmon fishing generally used dip nets. The same type of dip net was used for all salmon species. The type of dip net used was called gaththth'atl'ool meaning "wave of the fish [salmon] dip net." This net had an elliptical-shaped frame approximately three feet across lengthwise, with a relatively short handle, five feet in length. It was used as an individual floated or drifted in a canoe along the Tanana near the edges of mid-stream sandbars, where the fisherman watched for ripples resulting from a salmon travelling upstream. The fisherman then lowered his dip net into the water to intercept the salmon. It was reported that one of these sandbars which yielded productive amounts of salmon was located in the Tanana in front of Old Minto.

Another type of dip net was used by immersing the net into the water from a canoe and drifting downstream. This type had a circular opening about three feet in diameter. Short set nets were used in eddies for taking chum and coho salmon, but not king salmon.

Salmon fishing stations along the middle Tanana were first reported during Lieutenant Allen's 1885 expedition. In particular, he noted fish camps along the banks between the present site of Nenana and Swanneck Slough. He and his party camped just downstream of Swanneck Slough on June 22, 1885 (Allen 1900:451). At that time, no one was at the fish camps, although he encountered an occupied fish camp two days later at the mouth of the Cosna River, some 60 miles downstream. Unfortunately, he did not record the type of gear those Indians used to harvest the king salmon (Allen 1900:451). Two years earlier, however, on the upper Yukon River, Lieutenant Schwatka (1893:256) described in detail the method of salmon fishing used by the Han Athabaskans near the present site of Eagle. Of special interest, he noted the use of a dip net which he described as having a "reniform" or kidney-shaped frame like that earlier described as elliptical. He reported it was used directly in front of the village where the water was approximately nine or ten feet deep. Similarly, he reported that fishers watched for some evidence of the salmon beneath the surface by observing changes in the water's surface. Of further interest is Schwatka's notation that further downriver, in the "ramparts" area between Rampart and Tanana, a larger and more circular-shaped dip net was used (Schwatka 1893:256). It is likely that these descriptions correspond with the two types of dip nets used by Native fishermen on the middle Tanana near Old Minto.

The introduction of fishwheels for harvesting salmon is customarily attributed to the non-Native settlers in the Fairbanks-Chena area in the early 1900s. It is believed that this type of technology was used as early as 1903 or 1904 on the Tanana when the Fairbanks-Chena gold boom occurred. A similar type of technology was already being used on the used on the Columbia River in Washington and Oregon for harvesting salmon, where it has been in use since 1879, having been adapted from fishwheels used since 1829 in the southeastern United States (Donaldson and Cramer 1971). As settlers from the Pacific Northwest made their way north, they realized the applicability of the fishwheel technology for human food, also its usefulness for harvesting comparatively large quantities of salmon to process for use as dog food. The use of dog teams for hauling freight overland in winter was emerging at this time.

It has been difficult to verify the exact year or years during which fishwheels first came into use in this area. An early verifiable reference to fishwheels is in Dr. Ferdinand Schmitter's account of the Native customs of the Indians living at Eagle on the upper Yukon (Schmitter 1910:7). In 1906, Schmitter, a medical doctor stationed at the U.S. Army's military post of Fort Egbert, three miles from the Indian village, reported that the Indians there caught salmon using dip nets (as described by Lt. Schwatka 23 years earlier at the same village site) and fishwheels. In particular he noted, "To catch salmon they generally use hand-nets which are let down to the bottom of the river in rather deep places... This method, however, is gradually being replaced by fish-wheels" (Schmitter 1910:7). Clearly, fishwheels were in use at least by 1906 but had not yet replaced other salmon fishing methods.

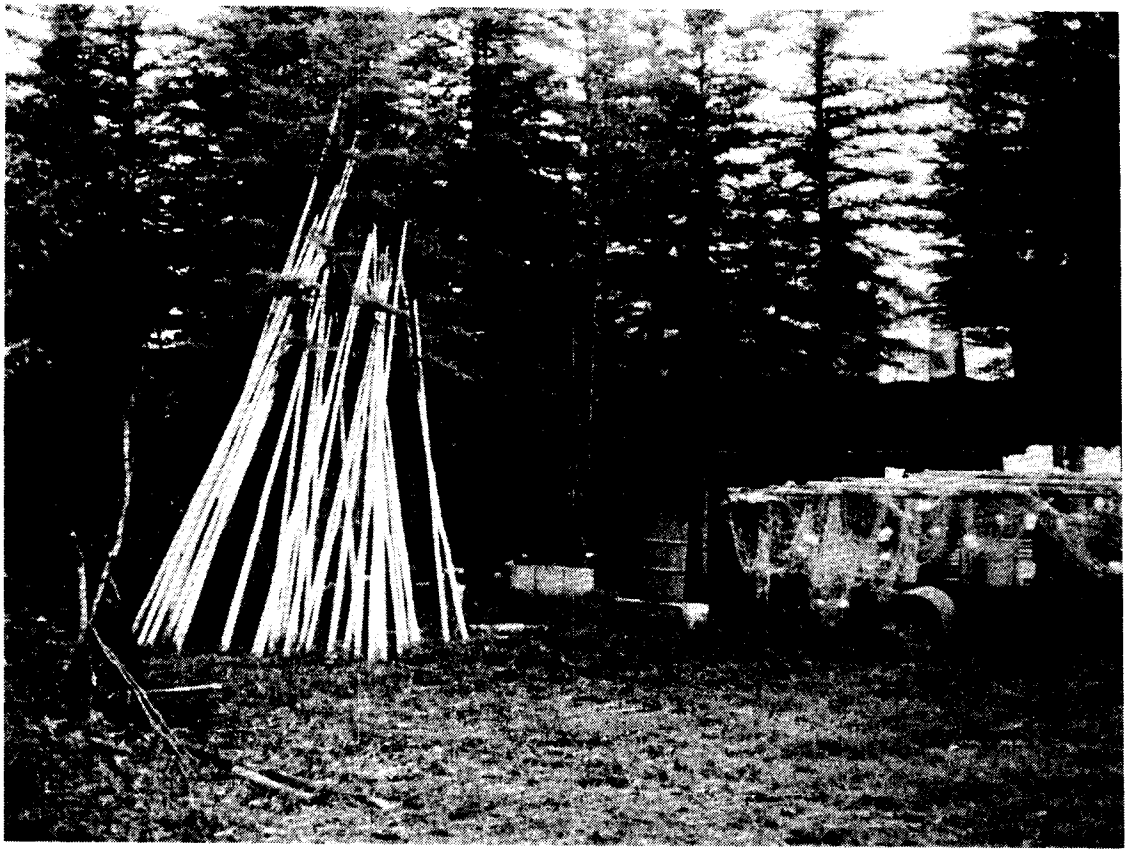
In Archdeacon Hudson Stuck's account of his travels throughout interior Alaska in 1914 and 1915, the Episcopal missionary wrote, "The fish-wheel on the Yukon dates back no farther than the last twelve years and came as an incident of the stampede to Fairbanks...so soon as the settlement at Fairbanks created a large demand for dried fish, wheels were set out in the Tanana..." (Stuck 1917:113).

Within the next 10 years, the use of fishwheels had increased on the Tanana, but still had not totally replaced other methods. References to their use also appear more frequently in journals and reports of the time. In 1914, Matthew Sniffen conducted an investigation of conditions of the Natives along the Tanana and Yukon rivers for the Indian Rights Association. One photograph in his report shows a fishwheel operating on the Tanana River. It was relatively small compared to the fishwheels used in the same area today but was constructed with two "chutes" and two boxes into which the salmon were funnelled (Sniffen 1914:20-21). He also reported dried fish sold for 20 or 25 cents per pound, on the average, and were mostly caught in "the large net-wheels" (fishwheels) (Sniffen 1914:4). By 1916, the use of fishwheels on the Tanana was so common that one Episcopal missionary who traveled considerably throughout the Tanana and Yukon valleys commented, "One of the common sights to a traveler through the interior of Alaska is that of a fish-wheel, turning in the turbid waters of the Yukon or Tanana River" (Madara 1916:84). About the same time, another Episcopal missionary, Hudson Stuck, reported that along the Tanana River upriver from Nenana "the fishing camps grow in number and size as we approach Fairbanks, supplying the demand at that place for dried fish as feed for dogs" (Stuck 1917:291). At this time, Minto people continued to have

their primary settlements out in Minto Flats and salmon fishing stations along the Tanana River. Some families fished for salmon on the Tanana River during 1900-15 as will be discussed below. Other families had access to salmon in the Flats where they were sometimes caught in traps made for whitefish used in the Chatanika River, a salmon spawning stream.

The construction and use of fishwheels is not simple. Their use can be more productive than the use of set nets in some areas and they were certainly more productive than the use of dip nets in the Tanana. The modern construction of fishwheels in interior Alaska has been aptly described in several works such as a recent subsistence study in the Upper Kuskokwim region (Stokes 1985). Frequent care and attention is required to maintain the operation of the fish wheel as water levels change and the amount of drift increases in the stream where the wheel is set. Even the briefest stay at a modern fish camp along the Tanana or Yukon River where a fishwheel is used will impress the visitor with the regular attention required to insure a continued and productive operation during the salmon runs.

Sometimes two years in advance, standing spruce trees are ringed (peeled of some bark) so they are dry enough to serve as material for the raft for floating the wheel baskets and boxes. Also, right after breakup fishermen watch for particularly good spruce trees that drift downriver. These are snagged with ropes and brought to shore for use in making the raft for the fishwheel. Green straight spruce timbers, all of consistent dimensions must be selected, cut, and peeled for use in building the frame for the wheel and the baskets (Fig. 11). Once all the materials are prepared, construction generally takes at least two



(Brian Allen Photograph)

Fig. 11. A Minto Fish Camp and Peeled Spruce Poles for Fishwheel Construction, ca. 1979.

days for the skilled fishwheel builder. Use of manufactured materials such as nails, screws, steel strapping, and heavy wire mesh for the basket cost between $500 and $1,000 at the time of the study, depending upon the type of wire mesh used, freight costs, and the size of the wheel constructed.

Even today, however, fishwheels are not the only type of gear used by Minto people for harvesting salmon. Typically, short gill nets are set at strategic locations prior to and during the run. This is particularly true when king salmon fishing prior to the placement and full operation of fishwheels. The set nets provide camp residents with fresh fish to eat early in the run, and also give some indication of the nature and timing of the run. For the especially elderly people with small families, set nets generally serve as the sole method of harvesting king salmon. In certain fishing areas where fishwheels cannot effectively turn, set nets are the only gear used for all species of salmon.

Cultural Influences

Participation and involvement in salmon fishing has been shaped by a variety of social, cultural, and economic circumstances during the 20th century. As discussed in Chapter 2, the seasonal round of subsistence activities in fall and spring includes customary summer fishing activities for whitefish in Minto Flats. At that time, some families also fish for salmon along the Tanana River. Beginning as early as Lt. Allen's 1885 exploration up until 1915, there were "fishing stations" (seasonal fish camps) along the Tanana River, but no large

semi-permanent settlements to which families returned periodically during the year, such as those Allen (1900:451) described near present-day Nenana. In Sniffen's 1914 travels described above on the Tanana River between Nenana and the mouth of the Tanana River, no settlement near Old Minto is mentioned, although the village of Tolovana, some 30 miles below Old Minto is described (Sniffen 1914:15). Similarly, Archdeacon Stuck, who described his travels of 1915 and 1916 mentioned the trading post at Tolovana and the "abandoned" telegraph station called "Minto" opposite Totchaket Slough but no other settlements until one reached Nenana (Stuck 1917:281, 283). We know, however, that some Minto families including Chief Charlie's maintained semi-permanent residences at Nenana at least as early as 1907 (Anonymous 1907:11).

By 1917 commercial economic conditions were such that the Minto Flats population chose to establish semi-permanent settlements on the Tanana River proper to participate in the new regional economy of the Tanana Valley. Old Minto was established about that time (see Chapter 2) and salmon fishing began to take on a new role in both the subsistence economy and the market economy of Minto. In 1917, the closest trading stations were at Tolovana, about 30 miles downstream of Old Minto and at Nenana, 30 miles upstream from Old Minto. Hudson Stuck described how people along the Tanana River were involved in new economic opportunities and how they were interrelated:

> Wood-camps and fish-wheels are much more plentiful along the Tanana than along the Yukon or any other of its tributaries; the greater steamboat traffic encourages the one and the complete opacity of the water the other; and both Indians and whites often combine wood-chopping and fishing as summer avocations (Stuck 1917:271).

Wood contracts at the time were for 100 to 150 cords and paid $6 to $8 per cord (Stuck 1917:271), whereas dried fish was sold for approximately 25 cents per pound (Sniffen 1914:4). In 1941 a cooperative store opened in Minto (Minto Village Council 1941).

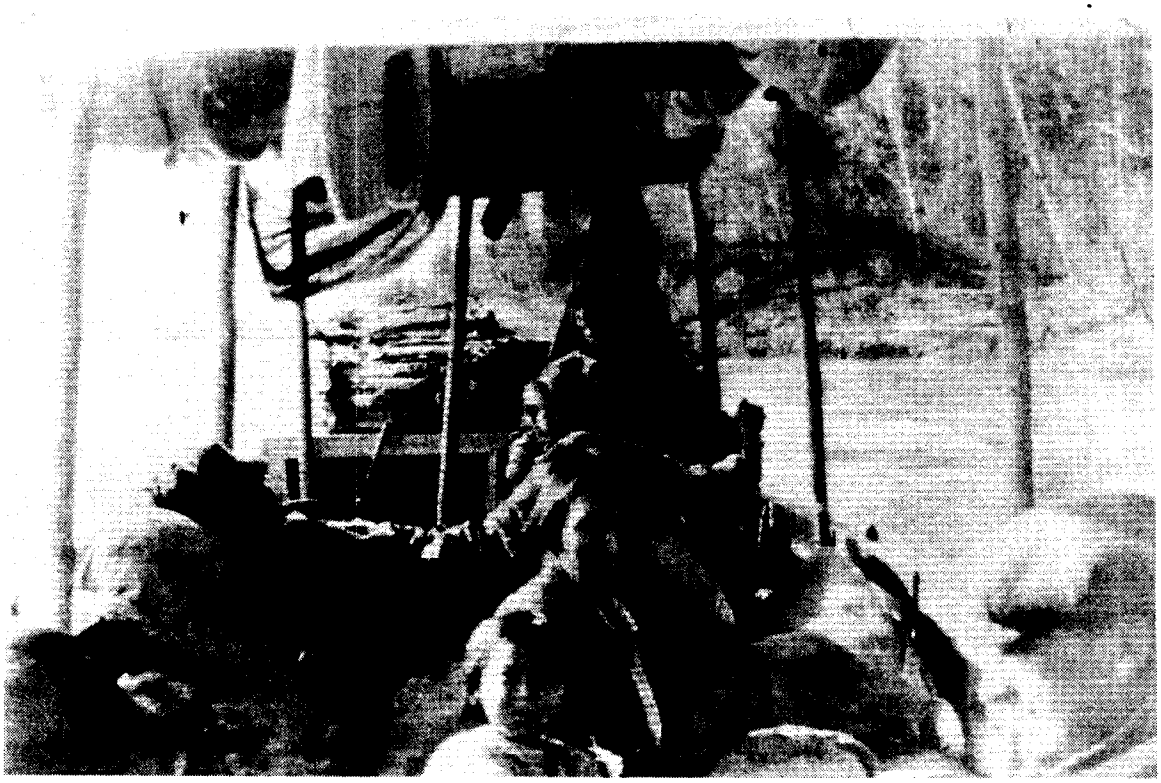
The tenuous nature of these economic enterprises was evidently apparent to Natives and non-Natives alike. Archdeacon Stuck noted the passing of the steamboats as a loss of the means of steady income for woodcutters: "The day of the wood-camp will pass with the opening of the Nenana [Healy] coal-field by the new railroad [completed in 1923]...and with it one of the ready means of making a living which interior Alaska has afforded since steamboating began" (Stuck 1917:271).

Even in the 1920s and 1930s few Minto people remained year-round at Old Minto on the Tanana River, but instead continued to travel in tents and stay at cabins at seasonal settlements in Minto Flats. This is hardly surprising when one considers the natural fluctuations in the salmon fishery described earlier. It is important to consider also the extreme shortages of salmon during 1918 to 1920 apparently due to commercial salmon fishing operations at the mouth of the Yukon River. For the 1919 fishing season, an Episcopal missionary noted that the Natives were only able to harvest "barely enough to feed themselves, their families and dogs from day to day, so that they have nothing to store for the winter" (Anonymous 1920:36). Further, it was noted that "at the Chena Native Village (just downstream from Fairbanks) there is hardly one good dog team left. Here at Nenana there are at least five families stuck and not able to get out to the hunting grounds because their dogs have all starved" (Anonymous 1920:36). The effect of commercial cannery

operations at the Yukon River mouth on subsistence fishing were subsequently investigated in summer 1920, and the commercial fishery was shut down after the 1921 season (Wolfe 1984).

From 1920 to 1940 salmon fishing continued along the Tanana River in varying degrees for feeding one's family, one's dog team, and for sale as dried fish for other's dog teams (Fig. 12). Contracts for hauling mail overland in winter by dog teams were let out for bid to local residents in 1942 and probably until 1952 when the first landing field was constructed (Minto Village Council 1942) (U.S. Bureau of Land Management 1960). In 1944 the Minto Cooperative Store bought bales of dried fish for 15 cents per pound and sold them for 20 cents per pound (Minto Village Council 1944), and in 1946 the store purchased 100 bales (50 fish per bale) for subsequent resale (Minto Village Council 1946). Salmon were necessary to feed dog teams which were used extensively during this "heyday" of trapping activity when furs brought some of the best prices of the century (Nelson 1973:166). As noted in Chapter 10 a variety of other subsistence activities took place in conjunction with trapping; hence, dog teams served both the subsistence and commercial interests of the trapping family.

Clearly, the decision to engage in salmon fishing for subsistence and non-subsistence purposes has shifted with the economic waves of the Tanana Valley and these shifts have continued to the present day. Other wage earning opportunities in the area have consisted of working on firefighting crews beginning in 1966 (Olson 1967); surveying land for the Bureau of Land Management beginning in the early 1960s; and working on various construction crews both within the village and outside of the village beginning in the early 1970s. None of these has been a



(Richard Frank Collection, University of Alaska Archives)

Fig. 12. A Minto Family Returning Home from Summer Fish Camp with Dried Salmon, 1928.

consistent source of income during the summer season nor from year to year. The extent to which a person is involved in any of these activities influences the extent to which that person and his family is involved in salmon fishing. For four seasons, 1974 through 1977, cash could be earned from the sale of roe from subsistence-caught salmon on the Tanana River (ADF&G 1977:23). This wage-earning opportunity enabled Minto people to earn cash and at the same time, fishing from the base fish camp, provide for subsistence. In fact, to provide such an opportunity was one premise stated among the reasons for allowing the sale of salmon roe: "The rationale behind this action was an attempt to enable rural Alaskans to benefit economically from a by-product of a resource which would otherwise be thrown away" (ADF&G 1977:23).

Unlike other areas on the Yukon River where commercial salmon fishing affords an opportunity, cash-earning activities Minto residents have not become involved in commercial fishing (see Wolfe 1981). Only one Minto resident held a commercial salmon fishing permit issued by the Commercial Fisheries Entry Commission (CFEC) at the time of the study. The circumstances surrounding the lack of applications from Minto residents for permits made available in the early 1970s is not documented. Occasionally, a permit to fish the area is available for purchase on the open market. Currently, a fishwheel permit for commercial salmon fishing on the Tanana River can be bought for about $12,000 (CFEC 1986) and a gill net permit for about $11,000.

The present location of Minto is another factor that influences participation in salmon fishing. As noted in an earlier chapter, the community of Minto relocated its settlement from the Tanana River to a site on the Tolovana River in the northwestern portion of Minto Flats in

the early 1970s. Unlike the Tanana, the Tolovana is not a major salmon-bearing stream although some salmon occur in its lower reaches, 26 and more miles below the village, and in the Chatanika River in even smaller numbers. Salmon do not occur where the village currently is situated. Thus, to harvest salmon, people must travel at least 43 river miles to the Tanana River where most of the fish camps are located. Several trips are generally necessary to transport people, gear, provisions, and dogs in order to set up the seasonal settlement. At the same time, families which set up camps continue to maintain their home in the village and some family members often remain at the village house in order to be able to take advantage of wage-earning opportunities which become available, often on short notice. There are no means of communication between the camps and homes in the village as few households have citizen band radios and there are none at the camps or in the riverboats used. The most important messages are transmitted by people travelling by boat to the camps or by means of messages sent over the airwaves on a local radio station that broadcasts messages twice a day from Fairbanks. There are no means of communication from camp to village except in person.

Regulatory Influences

The regulation of salmon fishing in Alaska has a nearly 100-year history, however, its regulation in the Yukon River drainage dates from 1920. The Alaska Fisheries Service of the U.S. Department of Commerce, Bureau of Fisheries, was established in 1911 (Evermann 1912:5). Alaskan salmon fisheries were regulated by the Department of Commerce until 1940

when management and regulation were transferred to the U.S. Department of Interior, Fish and Wildlife Service. In 1957 management and regulation were turned over to the Territory of Alaska and in 1959 to the newly formed State of Alaska. For nearly one-half of the management history of the Yukon drainage salmon fishery, the State of Alaska has managed and regulated salmon fishing.

The first commercial fishing operations were at the mouth of the Yukon River in 1918 when four companies had commercial operations (Bower 1919). Natives and non-Natives dependent on salmon for subsistence use and residing along the Yukon River and its tributaries, including the Tanana River, strongly protested the establishment of these commercial operations because they did not believe there were sufficient numbers of salmon to provide for use other than that needed to meet local requirements (Bower 1920:28, 29; Wolfe 1984). A public hearing was held in Seattle in November 1918 to take testimony on the matter. As a result, a limit was placed on the number of salmon that could be harvested commercially at the mouth of the Yukon for export from the area (Bower 1920:28). At the same time, the Alaska Fisheries Service began to investigate and report on the harvest of salmon by residents of the Yukon and Tanana rivers. In their first report they noted the local concerns about commercial interceptions at the mouth of the Yukon stating that area residents "alleged that a continuance of such activities meant the destruction of the salmon runs, without which the natives would be unable to survive as self-supporting people" (Bower 1920:28). Further, they reported on the non-commercial salmon fishing activities of the time:

> Various industries of interior Alaska, such as mining and trapping, are more or less directly or indirectly dependent upon salmon...The natives, however, spend part of their summers in catching salmon and drying them for winter food for themselves and their dogs. Some of them prepare annually quantities of fish over and above their own needs and sell them to trappers, prospectors, military telegraph stations, and commercial companies at various places along the river" (Bower 1920:28-31).

The extremely poor fishing season in 1919 prompted further protests over the commercial operations at the mouth of the river. As a result, the Bureau of Fisheries launched an investigation into the salmon fisheries of the Yukon River drainage in summer 1920 for the purposes of examining the salmon runs into the mouth of the river, examining the commercial export operations at the mouth, and describing "the consumption of fresh and dried salmon by the resident population of the Yukon Valley and to estimate the importance to them of this salmon supply" (Gilbert and O'Malley 1921:128). The objective result was to determine whether cannery operations could be supported "in addition to meeting the needs of the local population and providing a sufficient spawning reserve" (Gilbert and O'Malley 1921:128). As a result of the investigation it was recommended "that all commercial fishing for export be prohibited in the Yukon River and its tributaries..." (Gilbert and O'Malley 1921:154).

Following hearings on the subject in November 1920 in Seattle, the Bureau of Fisheries closed commercial fishing for export in the Yukon drainage beginning September 1, 1921 (Bower 1922:26). This decision was reinforced in 1924 by an amendment to the 1906 act "for the protection and regulation of fisheries of Alaska" which prohibited all commercial salmon fishing for export in the Yukon area (Public Law 298, Chapter

3547 [1906] amended as Public Law 204, Chapter 272 [1924]). The law clarified that the prohibition would "not prevent the taking of fish for local food requirements or for use as dog feed" (Bower 1925:81; Public Law 204 [1924]). These restrictions were in place until the 1932 season when two commercial operators were allowed to harvest and process salmon (Bower 1933:21). In 1934 the Alaska Fisheries Act was again amended to permit commercial fishing for king salmon for export from the Yukon and Kuskokwim rivers by "native Indians and bona fide permanent white inhabitants along the said rivers" (Bower 1935:5; Public Law 106, Chapter 146 [1934]). The regulations restricted the methods and means of salmon fishing and placed a limit on the commercial harvest (Bower 1935:8). Nearly 20 years later, in 1952, and again in 1956 commercial fishing for chum and coho was allowed in addition to king salmon fishing. Under management and regulation by the State of Alaska commercial fishing for all three species has been allowed since 1961 (ADF&G 1971:68).

Minto fishing families fish for salmon for subsistence along the Tanana River between Nenana and the mouth of the Tolovana River. Presently this area is situated within the Alaska Department of Fish and Game's Yukon area management subdistrict 6B ("Y6B") which extends about 100 miles along the Tanana River from the mouth of the Kantishna River upriver to the mouth of the Wood River, about 30 miles upstream of Nenana (Alaska Board of Fisheries 1985) (Fig. 13). Throughout this century and continuing until 1974, essentially there were no restrictions on subsistence salmon fishing in this area in terms of gear types, fishing times, fishing areas, or quotas. Beginning with the 1974 fishing season, the Tanana River drainage was made a separate fisheries

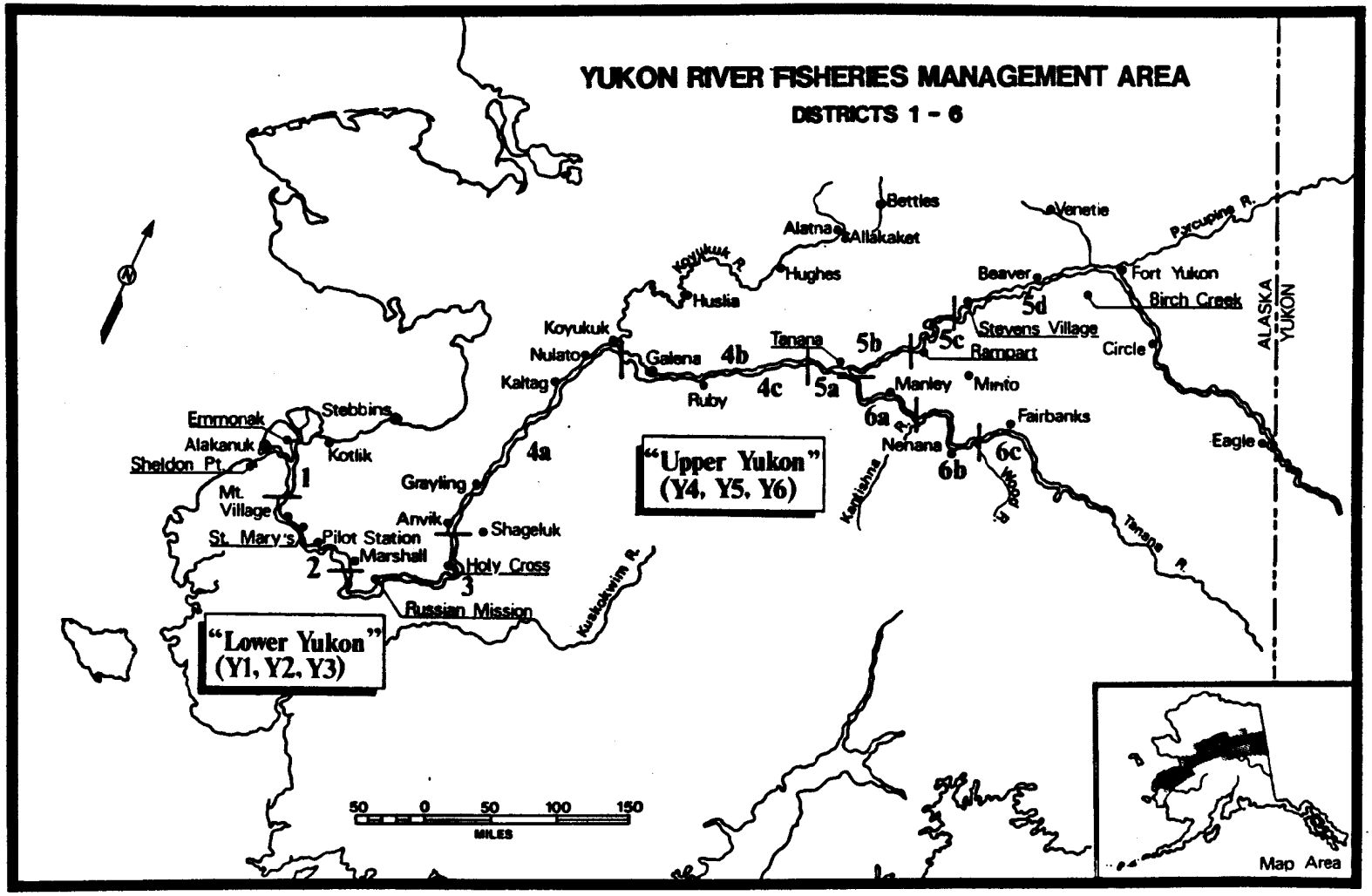


Fig. 13. Yukon River Drainage Salmon Fisheries Management Districts, 1984.

management district (Y6) for the purpose of managing the commercial fishery. In the same year, commercial fishing time was reduced from seven days per week to five days per week (Fig. 14; Alaska Board of Fisheries 1974:19). This time restriction also affected subsistence fishing time since all subsistence fishing was required to take place only during the commercial fishing openings (Alaska Board of Fisheries 1974:27). Basically, subsistence fishing was allowed Tuesday through Saturday and closed for Sunday and Monday (Fig. 13). Beginning with the 1974 fishing season, gear was restricted to the use of set gill nets or fishwheels (Alaska Board of Fisheries 1974:21).

Concurrent with this time period, the Commercial Fisheries Entry Commission (CFEC) was accepting applications from individuals who wanted to fish commercially and had to qualify for a limited number of permits. The final year for submitting applications was 1977. Only five Minto residents applied to CFEC and two qualified for a "permanent" permit (CFEC 1986). In 1978, one individual sold his permit, thus, today only one resident of Minto holds a commercial fishing permit. It is puzzling why more Minto residents did not apply for a permit, given that Minto residents had engaged in the sale of processed (dried) salmon during much of the century as noted earlier, and from 1974-77, Minto fishing families participated in the sale of roe from subsistence-caught salmon which was legal during those four fishing seasons. During that time 36 to 90 permits were issued for Tanana River roe sales and the average income ranged from $396 per permit holder per year to $619 (ADF&G 1978:34). Data specific to Minto is not available in public documents. One commercial fisherman in Nenana remarked "they didn't believe it was really going to be limited."

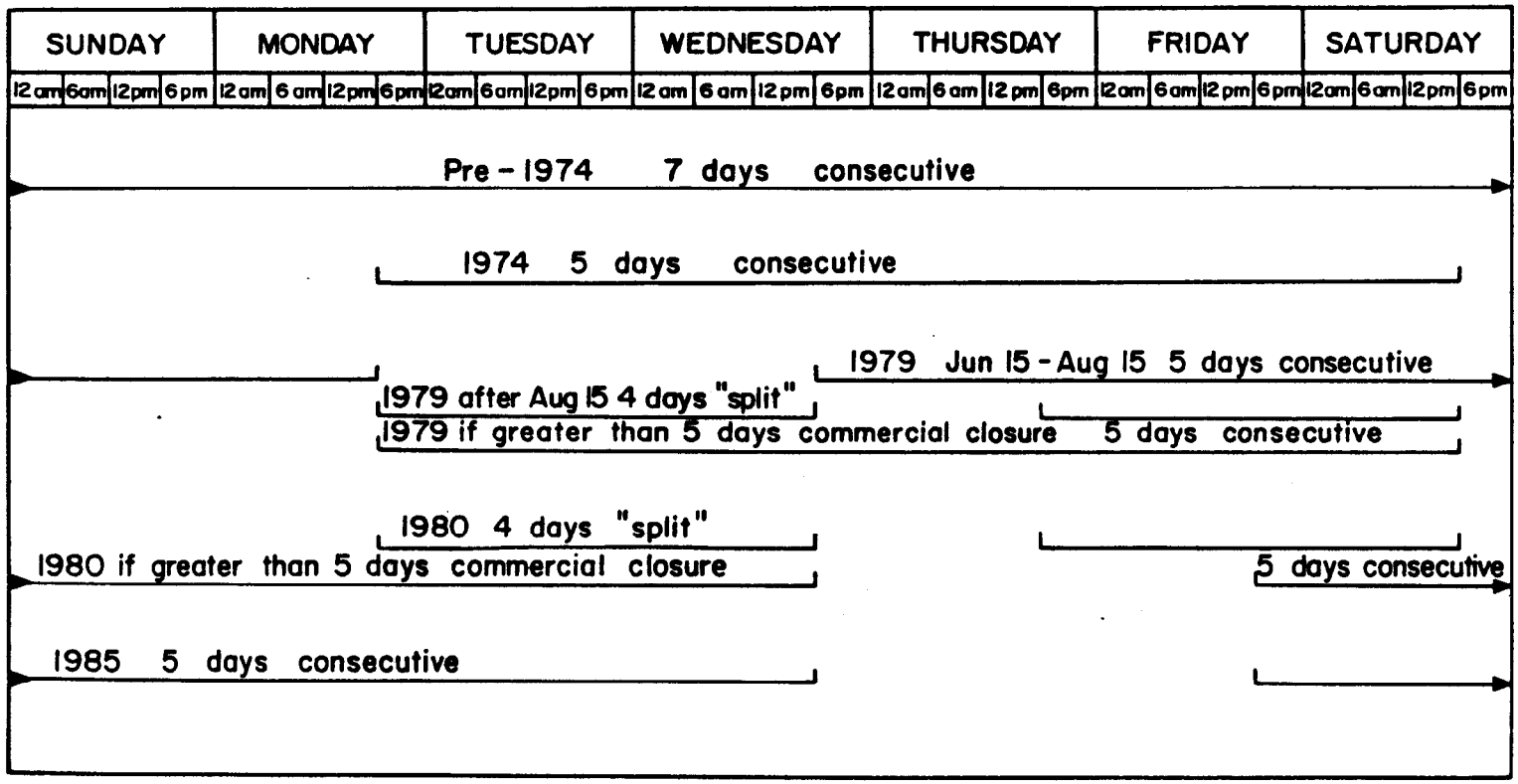


Fig. 14. Weekly Subsistence Salmon Fishing Schedule, pre-1974 to 1985, in the Vicinity of Minto Fish Camps.

As the commercial fishery developed in the Manley area below Old Minto and the Nenana and Fairbanks areas upriver from Old Minto, additional restrictions were made to manage the commercial fishery. In 1976, District 6 (the Tanana drainage) was divided into three subdistricts (Alaska Board of Fisheries 1976:20). The fishing areas used by Minto and Nenana residents fell within subdistrict 6B (Kantishna River to Wood River). In 1979, further fishing time restrictions were instituted. For the king and summer chum runs (June 15 to August 15), fishing periods were allowed on five consecutive days, approximately Thursday through Monday (Fig. 14). For the fall chum season (after August 15), the fishing period was reduced to four days split into two periods (Tuesday and Wednesday and Friday and Saturday) (Fig. 14). Each of these commercial restrictions also applied to the subsistence fishing. Only during commercial closures of more than five days, such as between the summer chum run and the opening of the fall chum commercial fishery, and after the season closure of the fall chum commercial season, could subsistence fishing resume to five consecutive days (Fig. 14).

In 1984, Minto representatives on the Tanana Fish and Game Advisory Committee proposed changing subsistence salmon fishing regulations in a portion of Y6B to five consecutive days of fishing time. This was because the flexibility required for subsistence production had become hampered by the commercial fishery regulations. The "split" fishing week (two 48-hour fishing periods) significantly restricted subsistence fishing, not simply because of an additional one day per week reduction in fishing time over a five-day period; but because of the requirement to have fishing gear (nets and wheels) removed from the water or shut

down. Subsistence fishing activities were repeatedly interrupted throughout most of the fishing season by the split periods making an inefficient subsistence harvest and processing operation. The inefficiencies were compounded by the vagaries of weather and water levels. If high water or rain coincided with the four days of "open" fishing time in any particular week, subsistence fishing and processing (drying) were negatively affected. The three days of fishing closure could coincide with good fishing and processing conditions, but subsistence fishing families would be prohibited from fishing during those days.

Nenana representatives also proposed eliminating the requirement to remove the dorsal fin from subsistence-caught salmon. In 1980 subsistence fishermen in District 6 were required to "immediately" remove the dorsal fin of all salmon caught (Alaska Board of Fisheries 1980:20) in order to prohibit subsistence fish from being sold on the commercial market. For some Minto fishing families this meant that the dorsal fin had to be removed from some 1,000 salmon during the season. This was considered to be a burdensome requirement.

The Tanana Fish and Game Advisory Committee endorsed these recommendations and proposed changes in regulations to the Alaska Board of Fisheries in November 1984. Beginning with the 1985 season, the Board of Fisheries provided for five days of consecutive fishing time for subsistence in the portion of Y6B where most salmon fishing by Minto families takes place (Alaska Board of Fisheries 1985:57). The requirement to remove the dorsal fin, however, was left in effect until 1987.

FISHING AREAS AND ACTIVITIES

Currently salmon fishing occurs in the silt-laden waters of the Tanana River and its sloughs where the use of set gill nets and fishwheels are effective means for harvesting salmon (Fig. 15). Most family fishing camps are located along the Tanana River primarily within 10 miles upriver and downriver from Old Minto (Figs. 16, 17). Another is situated along the Tanana closer to Nenana about 20 miles upstream of Old Minto. A community fish camp is located opposite the mouth of Swanneck or "Tanana" Slough where people fish in the murky waters within three miles downstream from the camp (Fig. 16). Three family-owned fish camps are located here also, one on each side of the mouth of the slough and one opposite. Anyone in the community is allowed use of these campsites.

The "Tanana" (Swanneck) Slough Fish Camps

Travel by outboard-powered riverboats to the Tanana River fishing areas and camps generally takes about two hours from the village. The distance ranges from about 43 to 60 river miles depending upon the exact location of the fish camp (Fig. 15). Travel to the fish camps and fishing areas at "Tanana" Slough takes about one hour and is about 26 river miles from the village.

The area at "Tanana" Slough is favored by families and individuals who fish for salmon intermittently during the season or who are involved in wage-earning or homemaking activities in the village that precludes extended fishing or does not warrant the additional travel time and

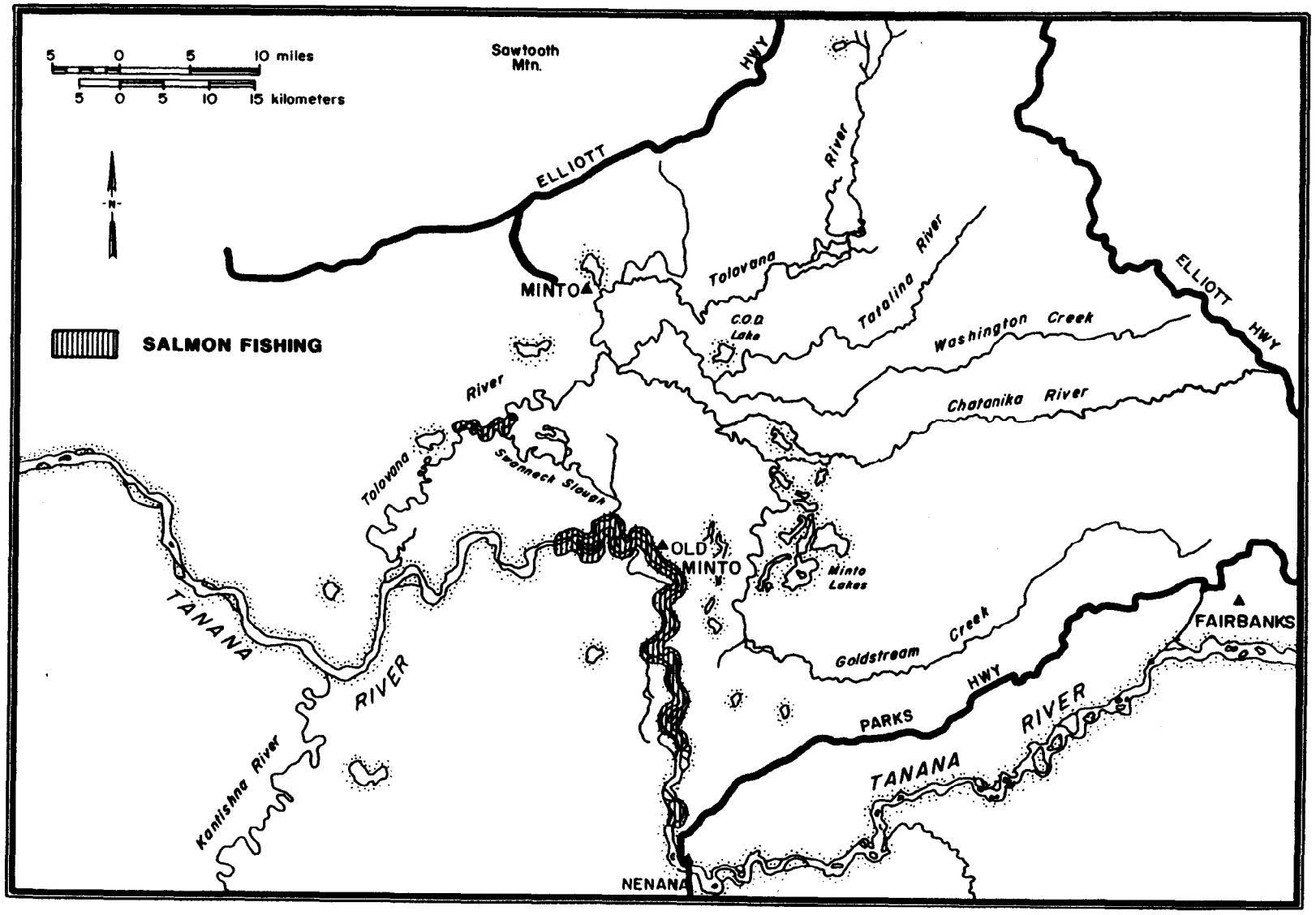


Fig. 15. Minto Salmon Fishing Area, 1960-84.

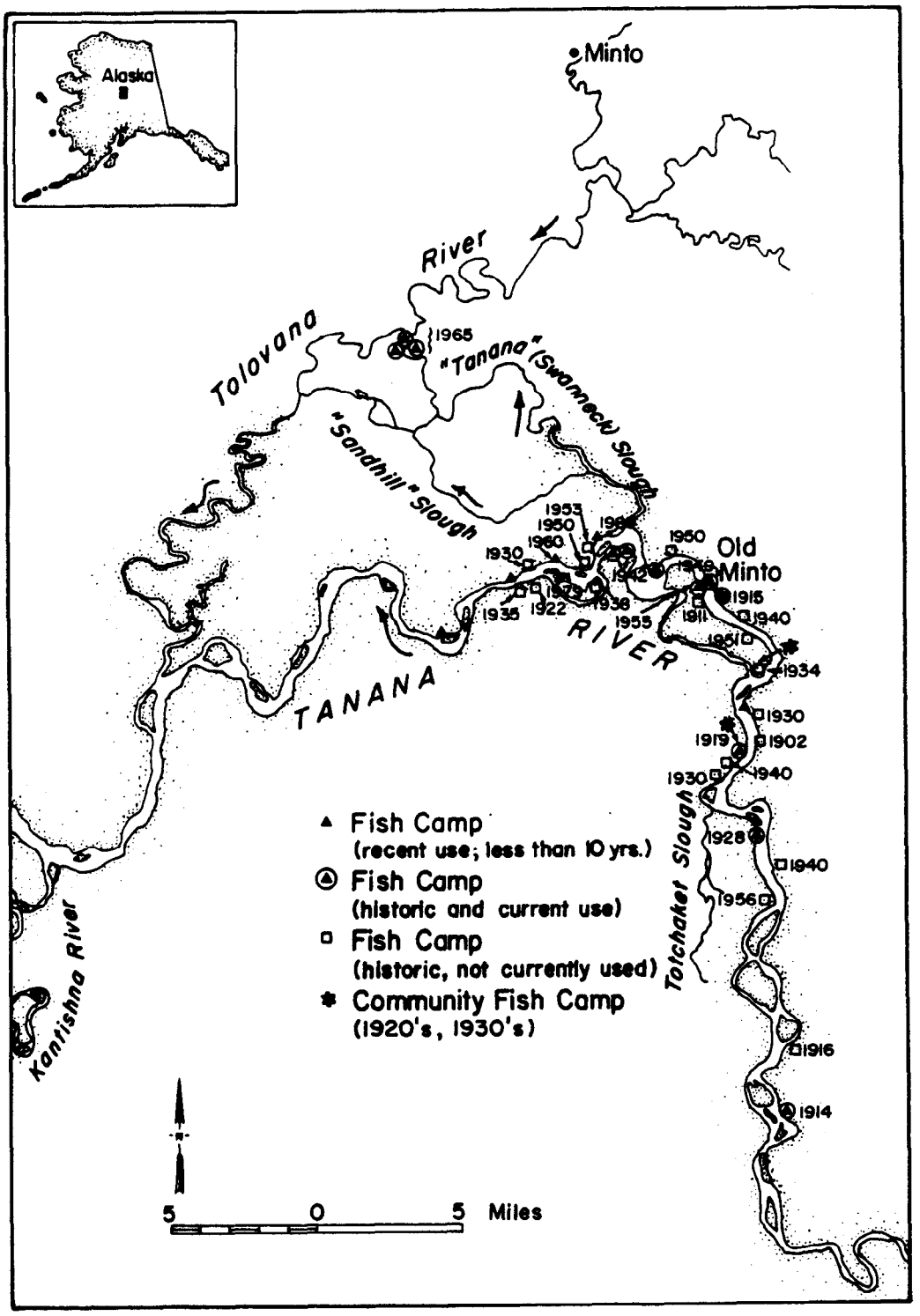


Fig. 16. Minto Fish Camps Used Historically and at Present.

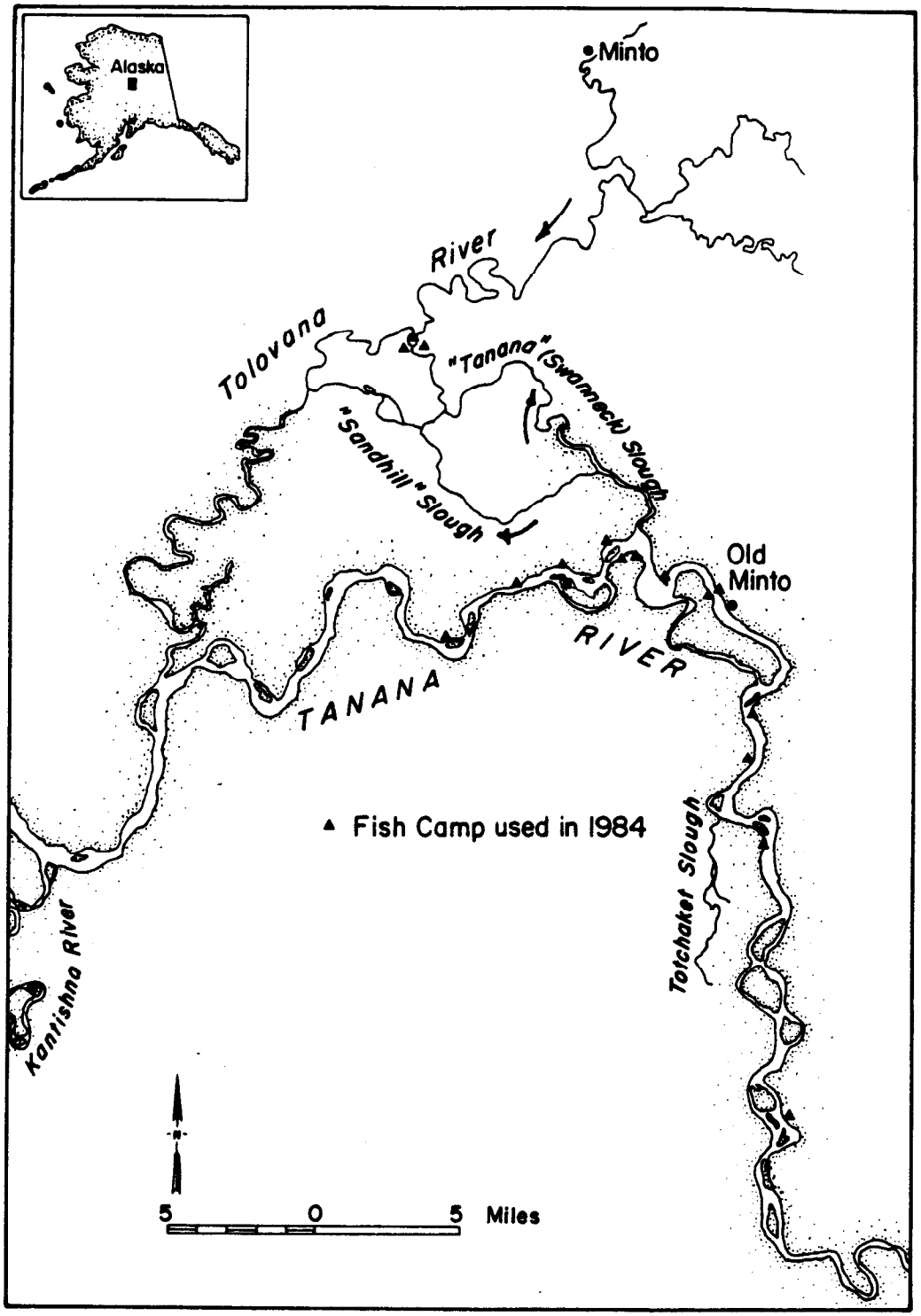


Fig. 17. Minto Fish Camps Used in 1984.

expense. Some families travel to the "Tanana" Slough fishing area and camp there for several days or a week and fish prior to moving on to the family fishing camp on the Tanana River. The "Tanana" Slough area generally is used beginning just prior to the king salmon season when whitefish and sheefish are caught in nets and extending throughout the king salmon season to the onset of the summer chum run. Often, by early August the water level of the river has risen to the point that the camping locations are flooded or nearly flooded. This was the case in 1984 and 1985. The use of this fishing area, therefore, is limited to the early half of the summer.

The use of the "Tanana" Slough is further restricted since the mouth of the slough has recently filled in making "Sandhill Slough" the main channel for the slough from the Tanana River during much of the season, particularly in periods of low water (Fig. 17). How this will affect salmon fishing activities remains to be seen.

In 1984 all salmon fishing in this area (to three miles below the mouth) was done with set gill nets. Most nets were 50-foot chum (dog) salmon nets although shorter, 20 to 25-foot nets were also set and a short whitefish net was set. At least one 50-foot net was a king (chinook) net and a longer 65-foot net was a silver (coho) net. King salmon nets are 8-1/4 inch stretched mesh, 25 meshes in depth; chum nets are usually have 5-3/8 inch mesh by 28 meshes in depth; and silver nets generally have 5-7/8 inch mesh by 28 meshes in depth (Donalson 1985). A 60-foot prehung net costs $120 plus freight from Anchorage (Donalson 1985). Although fishwheels were not used in 1984 at this location, at least one man had built and operated a fishwheel just below the mouth of the slough. The current, however, is not as swift as the Tanana River

and with shorter term fishing taking place, does not appear to warrant the cost and time required to maintain a fishwheel operation.

The camping area at Swanneck or "Tanana" Slough is used for other subsistence activities in addition to salmon fishing. It is frequently used in late summer and fall as a resting place where Minto people traveling to and from the Tanana River stop and make tea and take a break from river travel. There are no enclosed structures, such as a cabin at this location. However, the frames for a makeshift drying rack and fish smoking structure are there and require simply the use of a tarp or "visqueen" plastic sheeting over the ridgepole to prepare a roofed shelter. The camping area is used also when families are picking blueberries a few miles upriver from the campsite. This site is used sometimes during the fall moose hunting season. Generally, by fall time, the water level has dropped making the ground suitable for camping. On occasion whitefish nets are set here in fall for whitefish, pike, and sheefish. They are set on the way to moose hunting areas downriver and are checked on the return trip and removed from the water. The site is also used as a resting area when traveling to the slough later in fall when people drive "rabbits" (hare) at places along the slough.

This area has been used for multiple subsistence activities at least since 1937, but its use for salmon fishing is more recent and dates from about 20 years ago. As noted in an earlier chapter, and in another section of this chapter, the community of Minto was situated along the Tanana River from about 1930 (but beginning as early as 1915 for some families) at the site of Old Minto until about 1971. During that time salmon fishing camps were situated primarily within 10 miles

of the village, considerably closer to the year-round settlement than they are today. Beginning in 1971 the community relocated to its present site on the Tolovana River. With this relocation the mouth of Swanneck or "Tanana" Slough became more accessible to the new year-round settlement for the purposes of salmon fishing. At least one family has used the site nearly continuously each season during these 15 years.

The primary camping site at this locality consisted in 1984 of two 10 x 12 foot timber structures which were used for smoking salmon. One doubles as a drying rack before being used to smoke fish. The only other processing structure is a 4 x 30 foot timber rack to hang fish on to dry. Salmon are typically hung on the brush and any other timbers that may be at camp. There is a cold-storage pit and a privy concealed by brush at the site. There are no permanent or semi-permanent shelters. Fishing families either set up canvas wall tents, "pup" tents, or construct lean-tos for shelter. Several outdoor cooking fires are made as needed.

In 1984 during the height of the king salmon season, this locality had four canvas tents that ranged in size from a small pup tent to a 10 x 12 foot wall tent. They housed members of six households, consisting of nine adults and five children.

On the opposite bank, another campsite consisted of a 12 x 18 foot canvas tent used for cooking and doubled for smoking fish. There was also an 8 x 10 foot canvas tent for sleeping and a "pup" tent. Three Minto households were using this camp consisting of four adults and two children.

On the other bank opposite (Fig. 15), another campsite consisted simply of two sleeping tents. At the time, two adults and one child were staying overnight at this camp.

During field research, at one time 23 people from 10 households occupied the camps. Members of three other Minto households were using the area for fishing, but commuted to and from the village. Thus, for a few days at least, 29 percent (13 of 45) of Minto households had at least one member fishing for salmon from this locality.

The temporary nature of this salmon fishing locality is noteworthy. One elder widowed man was fishing alone at the camp for four days before the remainder of the people arrived to camp and fish. He was the first to set up camp there in 1984. Members of three other households were in transit to their more permanent summer fishing camps on the Tanana River and departed this site within a day or two. The remainder returned to the village. At the time people, men especially, were awaiting recruitment for wage-earning jobs on construction projects that were about to begin in the village. The widowed man also departed, but returned a week later for several more days of fishing.

Demographic Aspects

During its greatest concentration of people, the population composition of the "Tanana" Slough area sheds some light on which Minto households are likely to use the area. The residents of these camps essentially consisted of young adult couples and their children, elders, or single adults. Of the 15 adults, 5 were single (widowed, divorced, unmarried) ranging in age from 31 to 81 years (Table 25). The

households in which they are members ranged from 1 to 5 persons. The other 10 adults consisted of five couples (married and unmarried). Four of these couples included young adults less than 31 years of age who lived in households of 3 to 6 persons (Table 25). The other couple was an elderly couple in their late 60s. Each of the young couples brought their young children (ages 1 to 8) and the elderly couple brought two of their grandchildren (ages 5 and 14). Notably absent were members of households of larger sizes (6 or more persons), households headed by individuals 31 to 64 years of age, and small-sized households with one or two members. Of the younger couples, with one exception, one spouse was closely related (uncle-niece or uncle-nephew relationship) to one of the elders. The two single individuals who were not elders themselves were both nephews of the widowed elder man.

TABLE 25. DEMOGRAPHIC ASPECTS
OF "TANANA" SLOUGH FISH CAMP, 1984

Adults	Marital Status	Age	Number of People in Household
Individuals			
1	widowed	66	1
2	single	31	5
3	single	50	3
4	widowed	81	3
5	divorced	67	2
Couples			
1	married	69, 67	5
2	married	30, 28	4
3	married	27, 25	3
4	unmarried	30, 29	6
5	unmarried	27, 21	4

The Tanana River Fish Camps

Fish Camps

The oldest salmon fishing camps of the Minto people are situated along the Tanana River and are located both upriver and downriver of the former village location at Old Minto as noted earlier (Fig. 15). The travel distance to these camps is between 43 and 68 river miles from the present village site. Several of these camp locations date to the early 20th century (1900 to 1920) (Fig. 16). Three locations continue to be used as salmon fishing camps and have been used intermittently over the course of several decades between the earliest recorded use and the present (1984) time. One of these sites was certified as a "homestead" (160 acres) in 1932 under provisions of the Alaska Native Allotment Act of 1906 (34 Stat. 197; see also Case 1984:131-138).

Several other locations were initially established between 1920 and 1950 (Fig. 16). Four of these were used in the 1984 season while the majority are no longer used, having been used until the early 1950s (Fig. 16). Most of the remaining camps were established between 1950 and 1980 of which three were used in the 1984 season (Fig. 17). Almost all fish camps have been applied for as Native allotments by a Minto resident (alive or deceased; current or former resident of Minto) and many have been certified (U.S. Department of Interior, 1986; Shepherd and Matthews 1985). Several of the camps, however, which are used at present and used consistently throughout much of the fishing season are

not yet certified. Others are being used by individuals other than the current landowner, and some have public land status.

During the first third of the 20th century, most Minto people who fished for salmon camped at one of two locations (indicated by a "star" symbol on Figure 16). One now elderly resident noted that "almost half the Minto people" were at a site about three miles upstream from the old village and added that "the other half were upriver," at a site another three miles distant. One of these locations continues to be used as a fish camp. The other fell into disuse when river channel changes stimulated bank erosion and made the fishing area no longer a productive fishing site. Changes in river channels have been the primary reasons for changes in fish camp locations and continue to affect the location of camps and fishing sites today. For example, in 1979, 1980, and 1984 three different families had to relocate their camp and fishing sites because of channels filling in and/or bank erosion. Even though each spouse had a certified Native allotment, changes in river channels necessitated relocation to public lands or an agreement to use another family's fishing camp or fishing site.

On the other hand, other locations have been used for nearly 70 years and continue to be used (Fig. 16). Others were used by families for a quarter century before changes in river channels necessitated relocation. Clearly, fishing camp locations and fishing sites are dynamic and fishing families must cope with the vagaries of natural changes of the shifting channels of the turbid Tanana River. In the 1984 season, 14 locations were used for fish camps along the Tanana River (Fig. 17).

Gear

Typically, for families which begin to set up camp along the Tanana River at the onset of the king salmon run, short 60-foot nets (either king or chum mesh size) are set at a few sites. This provides people with the opportunity to harvest salmon for consumption while setting up camp, and finishing fishwheel construction or repair. The set nets also are used to assess the nature of the run. Although not all families set a net, those that do share the catch with other families situated in the area but not at the same camp. One elderly couple and their grandchild only harvested king salmon with a set net. Most salmon fishing for all species is done using a fishwheel. The size of the baskets or "dippers" generally measure 8 x 8 or 9 x 9 feet, although one measured 9 x 12 feet. The frame is made from green peeled spruce timbers (Fig. 11) using heavy-gauge "chicken" wire for the basket. Once the necessary materials are assembled, construction of a fishwheel by a skilled craftsman generally takes two days, as noted earlier. The number of seasons a wheel can be used is highly variable. Drifting timber can jam a wheel in use and virtually destroy it overnight or at least necessitate repairs. At the end of the season, wheels are towed to areas away from the main river channels and secured. However, any spring breakup or river ice can bring ice, log jams, and high water which can destroy or free a wheel. A new wheel then has be constructed at the beginning of the next fishing season.

Fish Camp Facilities and Use

Minto fish camps along the Tanana River consist of facilities for cutting, drying, and smoking salmon in addition to temporary and permanent structures for residence. In 1984, the facilities at 10 of the 14 camps used that season were recorded. Generally, people reside in canvas tents which are transported to the camp. The spruce timbers which comprise the frame for these tents usually are at the camp. In fact, tent frames account for more structures at fish camps than anything else. One camp included frames for four tents ranging in size from 12 x 12 to 12 x 24 feet, the latter is used to put two tents back-to-back. In addition, there was a frame for a 10-foot square tent used for cooking. Other camps had frames for canvas tents 8-foot square, 8 x 10, 10 x 12, 12 x 16, and 16 x 24 feet. Of the 27 tents and/or frames observed, all were constructed using spruce timbers, with one cook tent set up on a frame constructed of 2 x 4-inch milled lumber. In most cases, one frame served for a tent used as a cook tent. Generally, Yukon-style stoves are used for cooking, although one camp had a small propane oven/stove for cooking. Three of the camps had no separate facilities for cooking in a tent, with all cooking done on an outdoor campfire. Each camp had a campfire area for outdoor cooking and for drying wet clothing. Three camps had a plywood structure, 10 x 12 feet in two cases and 12 x 16 in the third, used as sleeping quarters. One camp had a 16 x 20 foot log cabin used as a residence. This camp, like another with a plywood cabin, is used as the base for trapping activities in the winter. The family that used the camp with the cabin

often remains at camp until after freeze-up and then returns by dog team in late October or early November to the village.

Each camp also has one to four racks used for drying cut salmon. These are of variable dimensions. Some are narrow racks 4 feet wide with lengths from 10 to 24 feet. At one camp, the narrow rack was used solely for drying the backbones of fileted salmon. Other racks range from 10 to 24 feet in width and 10 to 75 feet in length. The largest racks were 16 x 75 feet and 24 x 28 feet. Most are approximately between 10 and 20 feet wide and 20 and 24 feet long. A couple of racks were constructed to allow for placing a tarp or "visqueen" plastic sheeting roof over the rack. One rack was constructed in this fashion so fish could also be smoked as there was no smokehouse at the camp.

Smokehouses varied in size, but not to the extent that drying racks did. They ranged between 12 and 14 feet in width and 12 and 24 feet in length. Most were "two-story" or two racks in height made of metal sheeting and one had four levels of smoking racks. The largest was 18 x 24 feet. Three of the 10 camps had two smokehouses and two had none.

Other regular features of the fish camp include a fish cutting area and cutting tables. Other features are more variable such as a picnic table, rope swings, caches, a "puppy yard," and a cold storage pit. One camp had a hand "pitcher" water pump and two other camps derived their drinking water from this source. Others rely on collected rainwater and water from the Tanana River. Occasionally, some water is hauled from clear water streams enroute to the fish camp.

Few fish camps are occupied throughout the entire summer by the same group of people. The composition of camps changes weekly, but generally there is a core of people that maintain the fishing operation from the fish camp. In 1984, most of these individuals were 50 years

and older and were joined by at least one grandchild and one or several children. Teenage and older children both from Minto and Fairbanks joined parents for varying periods of time during the fishing season. People frequently "hitch" rides with others who are traveling by boat to or near the fish camp or return with the parents when they travel to the village for supplies, to haul dried fish, or for other activities such as village meetings, church revivals, and funerals. Some camps were used on weekends by some family members who had wage employment in the village during the week. Other camps were used almost entirely during the fall run of chum salmon and another was used during the king run and then again during the fall chum run. The effect is that camps which appear totally abandoned one day will be in nearly full operation the next day and dotted with canvas tents, a burning campfire, and other signs of activity. By the following week virtually all evidence of fishing may be gone until sometimes weeks later when the camp is once again set up for fishing. Similarly, even camps which have been used throughout the entire season will, after the season, appear to the unenlightened observer, as if they have not been used for years. In part, camps appear this way because few material goods are used at camp and consist of a limited number of items such as cooking pots, knives, axe, and tents, which are transported to the camp.

Lastly, another common feature at fish camp is the presence of at least one dog. People keep a dog in camp to warn them of bears and to eat "scrap" food. Fish heads, fins, tails, and guts of salmon are cooked or given raw to the dogs. As noted earlier, one family generally keeps their dog team staked at camp and two camps had fenced in areas for puppies kept at camp.

Access

Tanana River fishing camps are accessed entirely by river primarily from Minto and on a rare occasion from Nenana. Flat bottom aluminum river boats which are used for other subsistence activities and travel are used for salmon fishing. These generally are 18 to 24 feet in length and are equipped with 25 to 50 hp outboard motors. Some families who take their dog teams to camp equip the boat with short tethers to keep the dogs in place. As noted earlier, travel to the Tanana River camps from Minto takes about two hours if the shortest route through the "Tanana" or Swanneck Slough during periods of high water can be navigated.

Participation and Harvests

The dynamics of Minto people's participation in salmon fishing throughout this century has been noted in the previous sections of this chapter. The participation in salmon fishing in 1983 was determined from interviews with virtually all Minto households using a survey questionnaire that addressed the harvest of all wild resources. In addition, some information on the 1984 salmon fishing season was collected by direct observation at fish camps and in the village and through post-season interviews.

In 1983, 78 percent of Minto households surveyed fished for at least one species of salmon. Thirteen of these (37 percent) fished based at a fish camp while 22 (63 percent) based their fishing from the

village or fished over the course of a few days or week at a fish camp. The number of households fishing for any one species of salmon was consistent: 24 fished for king salmon, 26 for summer chum, and 24 for fall chum and coho (Table 26). Salmon harvests for the 1983 season were 659 king salmon; 15,842 summer chum salmon; and 6,348 fall chum and coho (Table 26). The fall chum and coho harvest has been combined since they are harvested concurrently and fishermen rarely account for these harvests separately, although they distinguish them from each other linguistically as noted in the earlier section on terminology.

The harvest data presented here differs from that reported in the annual report of the Division of Commercial Fisheries for the 1983 fishing season (ADF&G 1983). The difference is most likely attributable to different methods used to collect the information. Because this study surveyed all but three households, the harvest by any household that fished for salmon has been reported, whereas the Commercial Fisheries Division surveyed fewer households using a mail-out survey. The results of the latter estimate that 9 fishing households harvested 275 king salmon; 7,414 summer chum; and 6,489 fall chum and coho (ADF&G 1983). These figures considerably underestimate the participation and harvest of king and summer chum by Minto residents in 1983 as shown in Table 26, but are about the same for fall chum and coho. This is probably accounted for by their contacting only some of the fall chum and coho fishermen and expanding catch totals to an estimated nine total fishermen.

Minto salmon fishing households in 1983 differ in few respects from households that did not fish for salmon in 1983 in terms of household size, age of household head, and wage employment (Tables 27, 28).

TABLE 26. 1983 SALMON HARVESTS AND PARTICIPATION BY MINTO HOUSEHOLDS

	King Salmon	Summer Chum	Fall Chum and Coho
Number of households fishing for species	24	26	24
Number harvested	659	15,842	6,348
Average harvest for fishing households	27.4	609.3	264.5
Range	2-100	2-2,500	1-1,000
Total number of fishing households = 35			

Note: The information in this table is derived from a post-season survey of all Minto households.

TABLE 27. SELECTED CHARACTERISTICS OF SALMON FISHING AND NON-FISHING HOUSEHOLDS, 1983

Characteristic	Salmon Fishing Households (N=35)	Non-Fishing Households (N=10)	All Households (N=45)
Average Age of Head of Household	51.7	55.2	52.3
Average Number of People in Household	4.1	3.1	3.7
Average Number of Dogs per Household	10.37	1.4	8.3

TABLE 28. RELATIONSHIP OF SALMON FISHING AND WAGE EMPLOYMENT, 1983

	Households with Employed Member	Households without Employed Member	Total
Salmon Fishing Households	27 (77%)	8 (23%)	35
Non-Fishing Households	6 (60%)	4 (40%)	10
Total	33	12	

However, this does not mean there were not important social differences between households which were productive and non-productive for salmon as discussed in Chapter 12. In fact, probably the social maturity of the household, its position in the multi-household domestic group, the technology owned by that household, and the number of dogs are the important factors related to the salmon fishing patterns of households in Minto. There was little difference in the average age of household heads and average number of people per household for salmon fishing households compared to non-salmon fishing households (Table 27). They did differ in the average number of dogs owned. Non-salmon fishing households had considerably fewer dogs per household (Table 27). Households that fished for salmon were as likely to have a member who had some type of wage employment (77 percent) as households that did not fish for salmon (60 percent had a member employed) (Table 28). There is no statistically significant relationship between wage employment and whether or not a household participated in salmon fishing.

Among households that did fish for salmon for subsistence there are several noteworthy aspects in the level of harvest by species. For the 24 households that harvested king salmon, nearly 71 percent of them harvested 25 or fewer king salmon (Table 29). The remainder harvested between 25 and 100 king salmon.

Similarly, nearly 81 percent of households that fished for summer chum, harvested between 1 and 999 fish with the remainder harvesting between 1,000 and 2,499 summer chum (Table 30). Over one-half harvested fewer than 500 summer chums.

One-half of all households fishing for fall chum and coho harvested fewer than 100 fish, while the remainder harvested between 100 and 1,000 (Table 31).

TABLE 29. FREQUENCY OF KING SALMON HARVEST BY MINTO FISHING HOUSEHOLDS, 1983

Number of King Salmon Harvested	Number of households harvesting (n=24)
1-24	17 (70.8%)
25-49	3 (12.5%)
50-75	1 (4.2%)
76-100	3 (12.5%)
Total	24 (100%)

TABLE 30. FREQUENCY OF SUMMER CHUM HARVEST BY MINTO FISHING HOUSEHOLDS, 1983

Number of Summer Chum Harvested	Number of Households Harvesting (n=26)
1-99	9 (35%)
100-499	6 (23%)
500-999	6 (23%)
1,000-1,499	1 (4%)
1,500-1,999	3 (11%)
2,000-2,499	1 (4%)
Total	26 (100%)

TABLE 31. FREQUENCY OF FALL CHUM AND COHO HARVEST BY MINTO FISHING HOUSEHOLDS, 1983

Number of Fall Chum and Coho Harvested	Number of Households Harvesting (n=24)
1-99	12 (50%)
100-499	9 (38%)
500-999	3 (12%)
Total	24 (100%)

Processing and Use

Salmon processing takes place both in the fish camp and in the village. Most salmon that are dried are processed in camp, although some families have drying and smoking facilities in the village in addition to their facilities at camp. For these people salmon are sometimes dried and partially smoked at camp with the smoking process

completed at facilities in the village. For others, some salmon species are processed in the village and others processed at the camp. In 1984, at least three households processed king and summer chum salmon in the village, but processed fall chum and coho at fish camps on the Tanana River. Similarly, many fishing households dry most of their salmon, but freeze some in freezers located in the village. The latest running salmon in the Tanana caught in late fall are cut and "freeze-dried" out of doors when they are cut and hung in sub-freezing temperatures. Sometimes they are simply stacked and frozen out of doors and transported to the village after freeze-up. Fish processed by either of these methods are used as food for dogs.

Salmon are cut, dried, and smoked and require about a week to process, provided conditions are optimum. Generally, salmon are hung two to three days to dry, depending upon temperature and humidity. Continued rain will virtually destroy the catch that has been cut and hung to dry. As noted earlier, people will avoid fishing when rainy conditions prevail since rain promotes spoilage.

In 1983, all salmon for human consumption were cut into halves or fileted, scored, and hung to dry (Fig. 18). No brine was used in the process. King salmon were cut in the same fashion and were not cut into "strips" produced by making longitudinal cuts in the filets, a common processing method in other villages. In fact, salmon fishing households that reported having strips had purchased them from individuals in other communities -- Nenana, Fairbanks, and Stevens Village.

Salmon are smoked by burning dry "cottonwood" (Populus balsamifera), sometimes mixed with some green cottonwood. Stands of dead cottonwood occur along the Tanana and although they may not occur

(Brian Allen Photograph)

Fig. 18. Processing Salmon at a Minto Fish Camp, ca. 1979.

at each fish camp, they are usually in close proximity. A fire is built on the ground in the center of the smokehouse and a large piece of sheet metal is placed over the fire to disperse the smoke and to keep the fire from getting too hot. As noted earlier, most smokehouses have two levels of racks. This allows salmon to be smoked first when they are hung on the lower racks and then moved to the upper rack as more salmon are cut, dried, and transferred into the smokehouse to begin the smoking process. When the smoking process is complete the processed salmon are packed into cardboard boxes or baled and transported to the village where it is stored in caches until used.

The use of salmon is varied and extensive, so much so that one man commented that salmon (referring to their use) "is better than gold." Salmon, including the meat, organs, and other parts, are used for consumption by humans and dogs. Fresh salmon are eaten after being cooked in camp or in the village, are shared with others, and are given to close relatives and elders for their immediate use or processing. The first salmon caught by a family, typically is given away for use by another family. Processed salmon is consumed in the home, shared, given away, traded, purchased, and sold for limited cash exchange. Most processed salmon is shared among extended family members in different households.

Throughout the salmon fishing season fresh salmon are cooked primarily by boiling, both at camp and in the village. "Slabs" or filets of fresh salmon meat, particularly king salmon, are often fried as are the fish hearts and livers of king salmon. The backs of king salmon which are removed are dried and smoked. After being smoked they are soaked in water before being cooked. Salmon eggs are eaten fresh,

boiled, or mashed and cooked with highbush cranberries. They are also dried and used for dog food. King salmon heads are split and dried for later use both as food for people and as dog food. The heads of other salmon as well as the guts, tails, and fins are cooked as dog food along with rice and commercially dried dog foods like "Purina".

Drying salmon is the primary method of processing salmon for use for human consumption as well as for dogs. Households that harvest a few king salmon (less than 10) tend to freeze these for later use. A few households freeze some even when nearly all of the remainder of the catch are dried. Rarely are summer chum and fall chum and coho frozen.

The greater part of the king salmon and summer and fall chum dried for human consumption were used for ceremonial occasions during the study year. Based on responses to questions about use of salmon, households that harvested and processed more than 10 king salmon used either all or a major portion of their harvest in this manner. Several households responded that their entire store of dried salmon (eating quality) was used for a memorial or funeral potlatch of an immediate family member (wife, son, daughter). Other households "donated" portions of their dried salmon to these same potlatches. Dried salmon was also donated for use at memorial and funeral potlatches in other villages where an individual had a deceased relative. This is a customary practice but varies from year to year depending upon whether there are funeral and memorial potlatches.

Dried salmon is often served by households that customarily "make tea," that is, serve tea following Sunday church services. Dried salmon accompanies other foods served at community events associated with other religious events such as Christmas and Easter, and non-religious

gatherings such as New Year's, spring carnival, and birthday celebrations.

In addition to the ceremonial sharing of dried salmon, both in religious and non-religious contexts, dried salmon is comsumed at home with immediate family members, including those who do not reside in the same house but who commonly eat meals at the home, such as one's parents or children. Dried salmon, similarly, are given to immediate family members such as a daughter, brother, sister, or parent. Finally, dried salmon commonly are given to elders. Salmon dried for human consumption is rarely sold in Minto, however, it is occasionally purchased from individuals outside of the community. Sometimes it is traded for gasoline needed during the fishing season.

Frozen salmon is used almost exclusively for eating on ceremonial occasions and holidays when it is shared with others. The freezing of salmon to be used strictly for feeding household members is rare.

Fresh salmon is commonly given to elders and to other families that have not at the time been successful in harvesting salmon at the beginning of the season or salmon run. When catches are exceptional or families have more than they will be able to process, fresh salmon is given away to others. This is especially true when exceptionally large and unexpected runs occur, such as the 1983 summer run of chum salmon. Fishwheel boxes were filled to capacity in comparatively short periods of time.

Salmon cut and dried for use as dog food constitutes a major portion of the summer and fall chum and coho harvests. Generally, these salmon are used within the household or immediate family for feeding dogs. In years when an unusually large run results in a greater than

average catch, surplus dried salmon may be sold. As noted earlier, baled dried salmon for dog food was sold or traded for items throughout much of this century into the 1960s. Specifically, it was sold or traded for items (such as gasoline) at the native store in Old Minto and to three stores in Nenana. One fisherman reported that "even one year it was legal to trade dried salmon for gas" but no further details were given.

Dried salmon is occasionally purchased by Minto residents from people in other villages. Purchased salmon includes both salted king salmon strips as well as some dried summer and fall chum. In 1983, four households reported purchasing some dried salmon. Only one of these did not fish in 1983. Dried salmon was purchased from individuals in Fairbanks, Nenana, Ruby, and Stevens Village.

CHAPTER 5

FRESHWATER FISHING

Fish species other than salmon seasonally inhabit the lakes and streams of Minto Flats. Ten species of fish have been and continue to be harvested to varying degrees in terms of fishing effort and harvest quantities. Among these the whitefishes were and still are an important fish harvested in late fall prior to freeze-up and in spring following breakup. In fact, during the early part of this century and the late nineteenth century, the major settlements of the Minto people were situated at key whitefish fishing locales near the Big Minto Lakes and along the Chatanika River.

SPECIES ACCOUNTS

The Whitefishes

The whitefish (tsabaya) populations of the Minto Flats consist of migratory and non-migratory stocks. The basic characteristics and movements of whitefish species contribute to our understanding of the fishing patterns of the Minto Flats people described below. More specific knowledge of migrations and overwintering patterns are not documented. Foremost among these are the broad whitefish (netsoolook'a; Coregonus nasus) and the humpback whitefish (kholekhga; Coregonus pidschian). The broad whitefish is the largest among Alaska whitefishes. These fish are present throughout Minto Flats generally in

late May and continue to move up into the Flats from the Tanana River in June and July to feed on lake and slough bottoms (Kepler 1973:68). By late August they are ready to spawn and begin to move out of the area to their spawning grounds elsewhere (Kepler 1973:70). Broad whitefish average four to five pounds in size (K. Alt pers. comm., 1986).

The smaller humpback whitefish averages two and one-half to three and one-half pounds and begins its movements in mid- to late June (K. Alt pers. comm., 1986; Townsend and Kepler 1974:70) with mature fish leaving the larger lakes immediately north and east of Minto village in July and August (Townsend and Kepler 1974:70; Kepler 1973:68). The larger mature fish are those caught in the streams, particularly the Chatanika River as they make their upriver migration to the spawning grounds in late summer, whereas smaller fish are caught in Minto Flats during summer. In late September "schools of several hundred fish are on or close to the spawning areas" (Morrow 1980:36) particularly along the middle Chatanika River where they spawn in the vicinity of the Elliott Highway crossing.

The least cisco whitefish (tokobedza; *Coregonus sardinella*) varies from nine to 18 inches in length and averages one and one-half to two pounds (K. Alt pers. comm., 1986). Again, size is dependent upon whether the migratory mature fish are caught or the rearing immature fish in lakes, the latter being smaller. Similarly, the mesh size of the gear used in fishing results in harvests of a certain size. The patterns of movement of the least cisco in Minto Flats are like those for the humpback whitefish described above (Townsend and Kepler 1974:70; Kepler 1973:68; K. Alt pers. comm., 1986). They spawn throughout September in the Chatanika River (Kepler 1973:68, 70).

Less is known about the biological characteristics of the round whitefish (dradlaya; Prosopium cylindraceum) found in the Minto Flats area. Interestingly, the Athabaskan Indian name for the Chatanika River, Dradlayaneek'a, refers to this species of whitefish. These fish range in size from seven to about 12 inches in length and average less than one pound in weight (K. Alt pers. comm., 1986). They spawn in late September and early October in the same area of the Chatanika where humpback whitefish and least cisco spawn. These fish, however, "do not show the concentrated migrations characteristic of ciscos and humpback whitefish" (Morrow 1980:33) and are mostly found in the middle and upper Chatanika rather than near the mouth in Minto Flats (K. Alt pers. comm., 1986).

The sheefish (sreesr; Stenodus leucichthys) is another member of the whitefish subfamily present in the Minto Flats. Minto Flats supports one of five local migratory sheefish populations in the state (Alt 1984). They spawn in the Chatanika River during early September (Kepler 1973:68). It is believed they overwinter in the lower Tolovana River or Tanana River (Alt 1968:309). These fish in Minto Flats are generally five to 14 pounds, but 22-pound sheefish have been caught (K. Alt pers. comm., 1986). Samples from Minto subsistence nets in July and August 1972 showed sheefish averaged eight pounds (Kepler 1973:79).

Northern Pike

The northern pike (ch'ulkoya; Esox lucius) of the Minto Flats constitutes, along with the whitefishes noted above, a substantial freshwater fish used by local residents. Biological studies of pike in

Minto Flats have shown that pike ascend the rivers "beneath the ice and as ice begins to melt, they begin to spawn in the shallower waters" (Cheney 1972:5, 21). They disperse throughout the Flats in summer and, in late August when the water level and water temperature usually drops, they begin to move downstream (Cheney 1972:5). Because of the shallowness of most Minto Flats lakes, few retain any water in the winter; additionally, the main rivers lose dissolved oxygen when ice forms (Cheney 1972:21). A study of pike migration patterns using radio telemetry is currently underway in Minto Flats by the Alaska Department of Fish and Game. By the end of November, pike have moved out of the shallow waters to the wintering areas in the lower Tolovana (below Swanneck Slough) and Tanana rivers (Hallberg 1982). In a recent study, Minto Flats pike were found to weigh from one and one-half to 20 pounds with an average weight of six pounds (Hallberg 1982; Kepler 1973:79). In the previous decade world-class size pike have been taken from Minto Flats (Shepherd and Matthews 1985:50). Similarly, large mature pike up to 22 pounds can and have been caught in recent years in Minto Flats (K. Alt pers. comm., 1986).

Burbot

Burbot (ts'oneeya; Lota lota) commonly referred to as "lingcod" or "lush" is a member of the cod family. Unlike the other freshwater species, burbot spawn in winter where they reside in relatively deep waters (Williams 1984). In the Minto Flats area, this takes place in the turbid waters of the Tanana River (Hallberg 1982). They are rarely found in the larger streams of the Minto Flats, such as the Tolovana,

Chatanika, and Tatalina rivers. Minto Flats burbot average four and one-half pounds (K. Alt pers. comm., 1986).

Longnose Sucker

Similar to pike, the longnose sucker (dots'ekhdee; Catostomus catostomus) spawns in the spring beginning in May. It is a bottom-feeder like the broad whitefish and burbot, but shows no definite migrations other than moving from lakes into inlet streams and moving downstream in fall out of the upper reaches of tributaries and away from the spawning grounds (Morrow 1980:174,175). They are prevalent enough in some areas that nets set near Minto village during the study year yielded catches that were almost entirely suckers. These fish average two pounds in weight (K. Alt pers. comm., 1986).

Alaska Blackfish

As the single member of the mudminnow family in Alaska, the blackfish (oonyey or toolona; Dallia pectoralis), another bottom-dwelling fish, thrives in the dense vegetation found in lowland swamps, rivers, and lakes (Armstrong 1982). In the fall and spring they migrate to their summer habitat where they spawn between May and August. They are rarely longer than eight inches. Blackfish are particularly unique in their ability to utilize atmospheric oxygen and therefore are able to survive the winter in the shallow oxygen-depleted lakes such as those in Minto Flats by seeking open water areas and atmospheric oxygen (Armstrong 1982). This characteristic results in large concentrations

of blackfish at open water holes in later winter and in spring. This unique feature plays a significant role in the harvesting of this species by Minto people as described below.

Arctic Grayling

This white-fleshed fish occurs in some of the rivers in the Minto Flats area. Grayling (ts'at'ana; Thymallus arcticus) spawn in spring immediately after breakup migrating up clearwater streams even before breakup (Morrow 1980:147). Grayling weigh generally less than one pound. Throughout the summer, mature grayling occupy pools feeding on surface insects and mid-depth foods (Morrow 1980:147). They migrate downstream to deeper waters where they overwinter.

FISHING AREAS AND ACTIVITIES

Most fishing by Minto residents for freshwater fish occurs in the lakes and streams of Minto Flats (Fig. 19). Pike, sheefish, and whitefish are caught along the Tanana in fishwheels and nets operated primarily for catching salmon although nets are set specifically for whitefish in at least one locality. Most of these areas have been used throughout the century for freshwater fishing and this use continues today. It is noteworthy that the major seasonal settlements of the Minto people have been located at or near four of these fishing localities -- "Cache," "Four-Cabin," "Chatanika" or "Dradlayachaget," and "North Fork." These were mentioned in Chapter 3, but a description

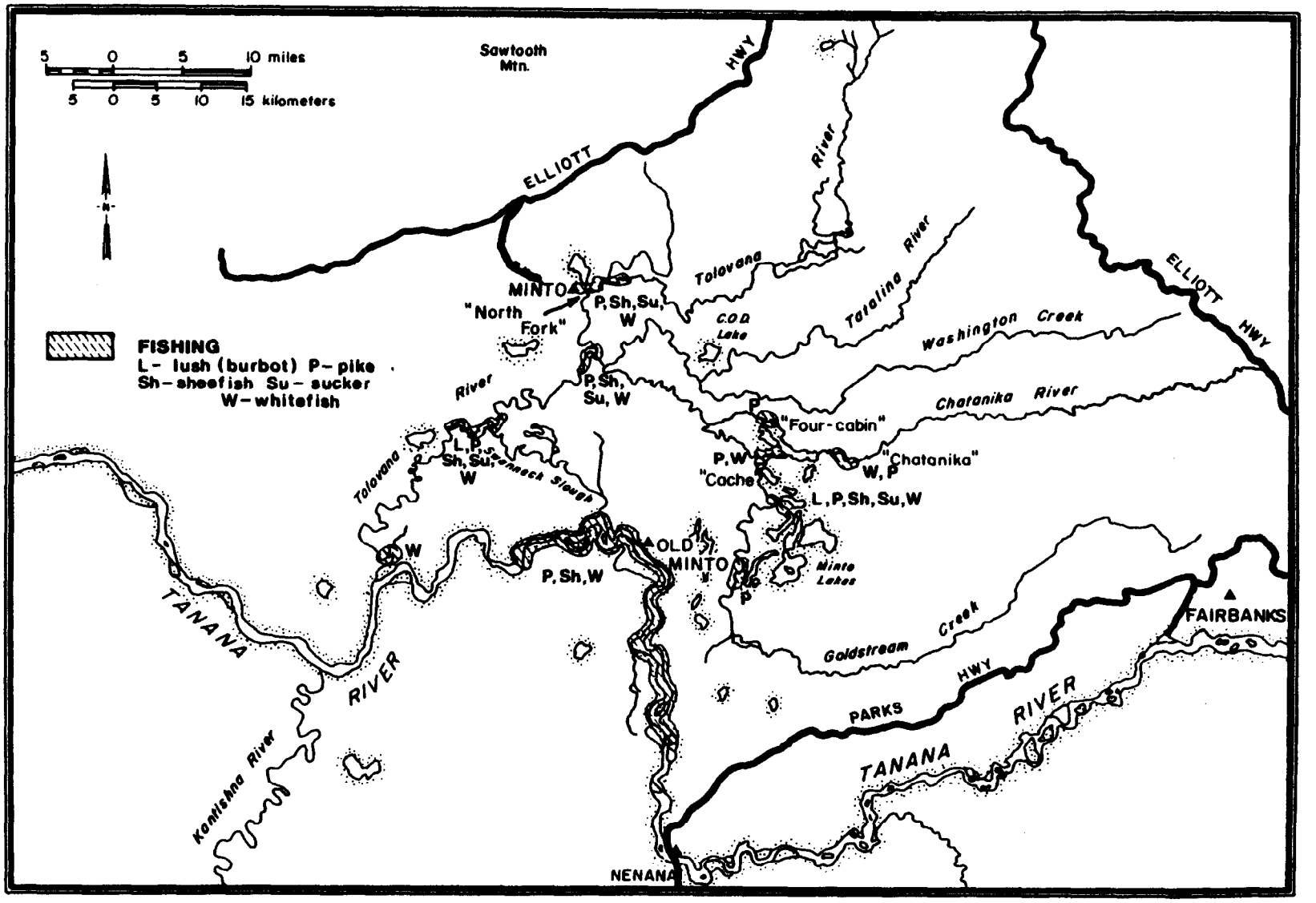


Fig. 19. Minto Freshwater Fishing Areas, 1960-84.

of the freshwater fishing activities which historically occurred there and takes place today is presented below for each locality.

The site of "Cache" is located at the outlet of the Minto Lakes at its confluence with Goldstream Creek (Fig. 19). This site was used from June throughout the summer until about the end of August. At this locality a fish fence with trap (khutreth) was constructed of willow brush held in place by vertical poles pounded into the creek bed. The fence was not perpendicular to the bank but at an angle and narrowing downstream. From the end of each fence there was built a corral-like pen area with a narrow opening generally 10 to 12 feet in diameter at the downstream end. At this opening a two-handled "basket" or "sack" net (tadhtonee) was used to catch the fish and remove them from the stream. Other fishing gear were used at the same locality at the same time. A long-handled dip net (tanee'oyee) was used for catching pike and whitefish by dipping the net into the corral or pen area. This differed from those used on the Tanana River for catching salmon as described in Chapter 4. Another type of dip net was used when sitting on the bank and holding the dip net in the creek to intercept pike and whitefish as they "floated with the current" in the spring. Additionally, short, five-foot gill nets (tabeel) were set in the stream perpendicular to the bank. Finally, in early June people sometimes used bows and arrows to catch whitefish in the early morning before sunrise. At this time of day whitefish reportedly are near the water surface at lake edges. From "Cache" two trails led to fishing sites on the Chatanika River used primarily in the fall and described below.

Three other fishing locations are in the vicinity of Cache and featured the same type of fishing activities. One is within one mile

below Cache and another about four miles below Cache where the Minto Lakes outlet reaches the Chatanika River. The first of these was used in the fall just after freeze-up for catching whitefish by constructing a fence in the ice leaving an opening for using a dip net to get the fish. A third area is about one mile east of Cache called "Midnight Island." Here people fished in spring but no fence was constructed.

Fences were constructed each year, but it is reported that this type of fishing using fences and traps was discontinued in the late 1930s. Nevertheless, families continued to use the area but mostly used set nets and dip nets as they do today. Fish were stored in above-ground caches adjacent to the primary locality appropriately called Cache where several still remain.

Today, the locality at Cache is used for fishing primarily using set nets, 25 or 50 feet in length, in June and late August. This same type of fishing was reported by a fisheries biologist during summer 1972 (Kepler 1973). Dip nets are also used and some individuals fish through the ice "hooking" or "jigging" for pike. Rods and reels are used by some people when camping at the site or during breaks from river travel to and from Minto Lakes and Minto village. The area is also a popular sport fishing area where a local air charter company transports fishermen during the summer for pike fishing. Minto residents report that the area no longer supports the whitefish population it once did because the Minto Lakes have become shallower. Earlier in the century, several families could sustain themselves at this location throughout the summer. It continues to be, however, one of the primary whitefish fishing localities for Minto residents.

After fishing at Cache concluded in early fall, families moved to the Chatanika River where they fished for whitefish using another type of fence and trap structure. Two traps were reportedly constructed at "Dradlayachaget" or "Chatanika." They were constructed similar to the one at Cache but willow poles were used in constructing the fence rather than thinner willow brush with leaves. This fence consisted of a basket trap from which the fish were removed when it filled. Both of these areas are some 35 to 40 miles downstream of the major whitefish spawning areas described earlier. While these areas were used primarily in late fall some families remained at Cache. The predominate species caught in the traps was whitefish. This site is currently used on occasion in late fall and early winter. At "Four-Cabin" people also fish through the ice "hooking" or "jigging" for pike. Nets are sometimes set under the ice before it becomes too thick.

The "North Fork" area is important for freshwater fishing as well as other subsistence activities such as trapping and spring muskrat and waterfowl hunting. "North Fork" specifically refers to the locality where the village is presently located and as noted in Chapter 3 it was a primary seasonal settlement earlier in the century. For the purposes of this discussion it refers to all fishing localities within the vicinity which are situated within seven river miles above and below the village. These areas were used in the past primarily using set gill nets in the ice-free months and using hook and line for fishing through openings in the ice after freeze-up in late fall.

Today, these areas are used in virtually the same way. While in the past, freshwater fishing was concentrated in the Minto Lakes and Chatanika River areas, now it is concentrated on the Tolovana River. At

the village at the northern edge of a bluff along the Tolovana River, gill nets are set during the summer. Pike, whitefish, sucker, and occasionally sheefish and burbot are caught in these nets. The nets are short, 15 to 20 feet in length, and during spring and summer 1984 up to seven nets were observed at the locality at one time. The same types of fish are caught in nets set further upriver in Cooper or "Windy" Lake, in the lakes east of the Tolovana River two to two and one-half miles from the landing.

In June, five to seven miles below the village nets are set where the Chatanika River enters the Tolovana River, at "Big Eddy" on the Tolovana River near the mouth of "Rock Island Slough," and in the mouth of Rock Island Slough. In fall, whitefish nets are set in the mouth of the Tatalina River. Rock Island Slough is also popular among Minto residents for fishing with rod-and-reel for pike. Often several people spend several hours at the locality and build a campfire, make tea, and have lunch or dinner. Occasionally, some people camp overnight. The boat landing is another popular area for rod-and-reel fishing in summer, particularly for male youth. These areas exhibited the same extent of use in 1971, 1972, and 1973 when fisheries biologists reported the use of set nets for freshwater fishing at these locations by Minto residents (Cheney 1972; Kepler 1973; and Townsend and Kepler 1974).

In fall, after freeze-up, people "jig" for pike in the Tolovana River at "Big Eddy," by the boat landing at the village, at Minto Lakes when fish migrate out of the lakes of Minto Flats to overwinter in deeper waters near the mouth of the Tolovana River, as noted earlier, and along the Chatanika River near "Four Cabin." On occasion, nets are

set under the ice at the landing for catching burbot, pike, or whitefish in late fall. Pike fishing tends to be most productive in June after the high waters go down following breakup and in late August when the water again drops. In summer 1984 and 1985 the water level was unseasonably high and consequently pike fishing was less productive than usual. Earlier this century lures were used by jigging through the ice to attract pike nearer the surface and then a two-pronged leister was used to spear the fish.

Even though these four areas have been used throughout this century for freshwater fishing by Minto people, several other areas have been used in the past 50 years, some of which are also used at present or are used intermittently. Twenty-six river miles below Minto, on the Tolovana River, is the Swanneck or "Tanana" Slough area where Swanneck Slough, a slough of the Tanana River, empties into the Tolovana River. It is reported that this slough "broke through" in the 1920s subsequently resulting in silt-laden water mixing with the formerly clear water of the Tolovana River below this point. Like the "North Fork" area, this area is used for other subsistence activities such as salmon fishing, moose hunting, and waterfowl hunting as described in other chapters. Short, 15- to 20-foot gill nets are set along the bank of the Tolovana River at this juncture mostly in early summer (late June-early July). Many families camp and fish here awaiting the salmon run. During this time whitefish, sheefish, sucker, pike, and burbot can be caught in set nets. On occasion, in fall when moose hunting, some hunters set a net at this locality while they are hunting in the vicinity, checking the net on their return to their camp or the village.

One hunter reported using his "salmon" net for catching sheefish and pike here while he was moose hunting further downriver.

Near the mouth of the Tolovana River at "Three-Mile Slough," whitefish nets are sometimes set in the spring. Similar to the Swanneck site, moose hunters in fall occasionally set a net here during their hunting trips. In the past, Three-Mile Slough was another place where a fishtrap and fence were constructed. It was reportedly constructed like the one used at "Cache."

In summer and early fall, whitefish, sheefish, and pike are incidentally caught in set nets and fishwheels used for salmon fishing along the Tanana (Fig. 15). In June and prior to the king salmon run, whitefish nets are occasionally set at the mouth of Totchaket Slough about ten miles above Old Minto. This area was used more frequently when Old Minto was the year-round settlement.

Finally, pike and whitefish were gillnetted along Goldstream Creek upstream from the Minto Lakes. It was reported that in summer 1953 during a four- to six-week period, Minto people maintained a fish camp about eight miles above Big Minto Lake where eight nets were set (Hinman 1953). The area along lower Goldstream Creek is still used when people are at spring and fall camps.

As noted earlier, few freshwater fish overwinter in Minto Flats because of the shallowness of the lakes which results in oxygen-depletion as ice forms. While pike and whitefish can be caught under the ice as they migrate out of the Flats in winter and are thought to overwinter in the lower Tolovana, only blackfish occur in the Minto Flats during winter. No biological studies of blackfish have been conducted in Minto Flats, yet this was reportedly an important resource

throughout the first half of the century during late winter and spring. The reduction in blackfish is said to be associated with the overall reduction in muskrat numbers described in the chapter on trapping. When blackfish were plentiful, so were muskrat and they both comprised a significant component of the spring diet during those times. Blackfish reach their largest size in March and April, according to local residents.

As noted above, blackfish are found in concentrations at open holes in the ice. These openings are created primarily by muskrats at their "pushups" where they pile small mounds of vegetation on the ice over an opening. Muskrat pushups where significant concentrations of blackfish occur can be identified at a distance by two methods. Several individuals noted that "you can hear them" referring to the sound of hundreds of blackfish as they break water for atmospheric oxygen. Another indication is the presence of fox tracks leading to a muskrat den or pushup where the fox, by scratching the thin ice over the ice opening, pluck fish from the water. A way of identifying openings which would be productive was described also. One middle-aged woman remarked that her mother used to take the outermost layers of birchbark, bundle several together, light them, and then hold the smoking bark over one of the openings. If lots of blackfish congregated as a result of this, then it was considered a productive area for setting blackfish traps. It was reported that at places where blackfish are particularly concentrated, four or five traps can be set in one hole. While certain lakes are known for blackfish, they can also be found in several creeks in the area, notably "Hot Slough" above Old Minto, "Birch Creek" along

the Chatanika River, and "Willow Creek," a tributary of lower Washington Creek.

Blackfish traps were made from straight-grained spruce wood strips constructed in a cylindrical fashion, closed at one end, and inserted with a funnel arrangement at the other. The body of the trap was held together using willow-bark lashing. Then the traps would be set under the ice through openings. More recently, blackfish traps have been constructed by fastening two five-gallon kerosene or white-gas cans together and inserting and attaching a three-pound size coffee can fashioned into a funnel into one end. On occasion when trapping, a trapper will set a blackfish trap at an opening where blackfish are concentrated, as some have done in the past five years.

ACCESS

Fishing areas are reached in several ways -- by boat, snowmachine, dog sled, airplane, and on foot. Because almost all freshwater fishing occurs during the ice-free months when fish are present in Minto Flats, outboard-powered boats are the primary means of transportation. These boats are typically flat-bottom aluminum river boats, 18 to 24 feet in length, powered by outboards usually 20 to 50 horsepower as described in the chapter on moose hunting. These are the same boats used for hunting, gathering, salmon fishing, and other fishing activities. The fishing area near the village at the boat landing is accessed on foot for rod-and-reel fishing during the summer and for fishing through the ice in late fall using hooks and lines and gill nets. Snowmachines are used also when trapping and therefore are used when setting fish traps

for blackfish in spring. They are also used by some individuals who go to "spring camp" in the Minto Lakes area where they remain for several weeks to a month prior to and after breakup from mid-April to mid-May. At spring camp, as described in other chapters, people fish for freshwater fish, trap and hunt muskrat and beaver, and hunt waterfowl. Some of these individuals reach spring camp by airplane chartered from a company in Fairbanks. They return either by boat or airplane to the village usually after mid-May.

PARTICIPATION AND HARVESTS

Freshwater fishing has been noted to occur in a variety of contexts generally from late April through November, with the exception of setting fish traps for blackfish in March and April. Correspondingly, individual participation varies. Elderly people and middle-aged women are among those who "hook" or "jig" for pike at the landing after freeze-up and fish at spring camp at Minto Lakes and at Swanneck Slough using nets before the salmon run. Youngsters and young to middle-aged men using rods and reels fish at the landing, Rock Island Slough, and at Cache. Young and middle-aged men set and check fish nets above and below the village, at Swanneck Slough, on the lower Tolovana River, and on the Tanana River.

Whitefish, northern pike, longnose sucker, burbot, and sheefish were harvested by members of 73 percent (33 of 45) of Minto households during the study period. The predominance of whitefish fishing is noted in that all but two of these fishing households (31 of 33) harvested whitefish (Table 32). Households that fished for whitefish also fished

TABLE 32. HOUSEHOLD PARTICIPATION IN FRESHWATER FISHING AND HARVESTS, 1983.

Species Harvested	Number of Fishing Households	Percent of Village Total (N=45)	Total Number Harvested	Range	Mean for Fishing Household
Any species harvested	33	73	-		
Whitefish sp.	31	69	6,072	3-1,200	195.8
Pike	27	60	3,003	2-500	111.2
Sucker	18	40	1,532	2-240	85.1
Sheefish	12	27	357	1-100	29.7
Burbot	14	31	142	2- 25	10.1
Blackfish	0	0	0		
Grayling	0	0	0		
All species harvested except blackfish and grayling	7	15			

for other freshwater fish with one exception. While whitefish can be targeted for fishing at some localities and at certain times, the harvest of pike, sheefish, sucker, and burbot occurs simultaneously during the summer. That is, a single set net will result in mixed harvests of these species depending upon their distribution in the Flats. Thus, while a single net may yield several hundred sucker and pike over the course of summer fishing, it might catch only 10 burbot and no sheefish, while another net set in the same general area might yield several sheefish and no burbot. Even though most households that fished for whitefish also fished for other species, the harvest for species other than pike is variable (Table 32). Of the 33 fishing households 27 (87 percent) harvested pike (Table 32). Over one-fifth of all fishing households harvested all species available except blackfish and grayling. During the study year neither blackfish nor grayling were reported as being harvested.

Similar to the degree of success in harvest and the availability of various freshwater fish in the fishing areas, the relative harvest shows that more whitefish were harvested than the other species followed by pike, sucker, sheefish, and burbot in that order (Table 33). However, in computing the total round weight of the harvests it is shown that northern pike and whitefish species account for 82 percent of the total weight of freshwater fish harvested (Table 33).

USES

Freshwater fish are prepared for eating primarily by boiling, but some species are cut and dried for consumption at a later date. These include the larger whitefish, sheefish, and pike. Some freshwater fish, particularly sucker, are fed to dogs. Eggs of whitefish are considered a delicacy and are made into speciality dishes. The entrails of whitefish are boiled; oil derived from this processing is used in cooking. Berries are also mixed with the oil and then frozen for later use.

TABLE 33. COMPARATIVE HARVESTS AND TOTAL WEIGHT OF FRESHWATER FISH HARVESTED, 1983

Species	Number Harvested	Round Weight	Total Weight In Pounds	Percent of Total Weight
Whitefish sp.	6,072	2.4[a]	14,755	37
Northern pike	3,003	6.0	18,018	45
Longnose sucker	1,532	2.0	3,064	8
Sheefish	357	9.5[b]	3,391	8
Burbot	142	4.5	639	2
Total			39,867	100

[a]Average weight of four species of whitefish in Minto Flats.
[b]Midpoint of average weight.

CHAPTER 6

MOOSE HUNTING

Moose hunting in Minto Flats has been an integral part of the seasonal round throughout the twentieth century. Up until the late 1930s, both moose and caribou game species were hunted by Minto residents. The population of moose in Minto Flats has fluctuated during this time, yet scientific data have been collected only during the past seven years and these data show continuing change. This chapter describes moose hunting by Minto residents primarily in 1983 and 1984, based on systematic interviews and direct observation. Information is presented on historic and contemporary moose hunting, geographic areas used, hunting methods and means, harvest levels, hunting party composition, and distribution and use of moose. An earlier report described moose hunting activities by Minto residents with hunting permits for the 1984-85 season (Andrews and Napoleon 1985). Key findings from that study will be included here, however, the reader should consult that report for information on specific aspects of that hunt.

MINTO MOOSE HUNTING THROUGH TIME

Availability of Moose

Throughout the twentieth century, inhabitants of the Minto Flats have hunted moose during their seasonal round of subsistence

activities. In the past, as today, moose were intentionally hunted following late summer and early fall fishing activities. The occupants of seasonal settlements at the major fishing locales described in Chapters 3 and 5 dispersed themselves throughout the Minto Flats. Moose hunting also was a major activity in February and March when temporary base camps were established in the same areas and moose were hunted by groups of men on snowshoes and driven to waiting hunters (Drane 1916). At other times of the winter moose were harvested coincidentally with maintenance of family traplines.

Moose are known to have been present in the area at least during the past 100 years. As early as February 1889, one pioneer reported trading a lynx skin to the chief at Baker Creek (just west of Minto Flats on the Tanana River) for moose meat (Davis 1967:63). Later, in spring 1900, this same pioneer wrote that on his trip down the Tanana River from Chena he killed one moose and four bear, the meat of which he sold for 50 cents a pound to the military post, Fort Gibbon, upon arriving at Tanana. At that time the meat served as a trade and sale item in addition to subsistence. As noted above, moose were important in the annual round of subsistence activities during this century. One recorded account of moose hunting by Minto Indians in March 1916 describes winter-spring moose hunting techniques in Minto Flats where the Minto Indians camped in two different areas of the Flats to hunt moose over the course of several weeks (Drane 1916:120).

Linguistic work also indicates moose are not recent arrivals to the Minto Flats. The Minto Athabaskan language has at least nine terms for moose that distinguish the animals by their age, sex, and size: moose (<u>deneegee</u>); largest bull (<u>ch'eyedra'</u>); second largest bull

(noochoonee); middle-aged bull (dedaya); four-year-old bull (deto'tth'ena' khenee'eelyoyee); two-year-old bull (ch'eelgezra); cow moose with first young (choltayee); cow moose (deyozree); calf (detseegee) (Krauss 1974:4-5).

Although moose have been present in Minto Flats during most of this century their abundance has varied. While the late 1950s and 1960s are described as times when moose were abundant, the 1970s and early 1980s marked periods of especially low density. In general, moose numbers have been shown to increase dramatically in localized areas in response to the creation of range caused by fire and their numbers decrease as range matures (LeResche et al. 1974:144). Low moose numbers tend to occur where there has been an absence of fires for a prolonged period of time and where vast stands of spruce are dominant (LeResche et al. 1974:144). Forest fires in Minto Flats have been limited throughout this century. In 1981, a 72,500-acre fire burned in the eastern and central portions of the Flats, creating range that is expected to enhance moose numbers in the area.

Additionally, Minto Flats and the surrounding hills provide a variety of habitats that are important to moose at different times of the year. Minto hunters are knowledgeable about the movements of moose between these areas. Providing access by surface means is possible in a particular season, hunters know where to look for moose. They also know the accessible routes that moose traditionally follow in their movements. In spring, pregnant cows are found in the lowland areas or spruce and bog habitats where they bear their calves and remain in

small home ranges throughout the summer following calving (LeResche et al. 1974:152; LeResche 1974:395). In Minto Flats, people report cows with calves tend to inhabit islands so as to keep their calves away from bears. The willow thickets along the streams provide spring and summer browse as do the sedges and grasses of the ponds and meadows. Bulls and cows without calves tend to remain in the upland areas in summer where herbaceous vegetation of the shrubby birch and willow is important habitat (LeResche et al. 1974:163). This type of habitat is typical of the higher hills that surround Minto Flats to the north and to the east. In late summer and early fall, these moose move down to the lowlands. The rut occurs in fall after which bull moose again scatter into the hills and in old burn areas (LeResche et al. 1974:152). In the deep of winter the willow areas along streams, creeks, and ponds of the lowlands become important winter habitats (LeResche 1974:163). In Minto Flats, several areas containing ridges of old sand dunes and their accompanying vegetation are key wintering areas according to local hunters.

Moose numbers in Minto Flats appear also to be affected by mortality due to predation by black bear and wolves. A study by the Alaska Department of Fish and Game followed 10 radio-collared cow moose over a one-year period beginning in late March 1984. All collared moose were in the lowlands of Minto Flats between the Tatalina and Tanana rivers (Crain and Haggstrom 1985:83, 84). Each adult cow bore at least one calf in spring and typically displayed a small home range, generally less than eight square miles. Only two of these moose moved into an upland area during the course of a year; the remainder staying in the lowlands during the entire one-year period (Crain and Haggstrom

1985:83, 84). Black bears killed nearly one-third of the calves produced during the year-long period and over 50 percent of the calves had been killed from all causes during their first six months (Crain and Haggstrom 1985:78). One adult moose was killed by a wolf during the study period. Movement of moose between the Flats and the uplands has not been studied, but it is believed that the moose in the Flats and the surrounding uplands form a single population (D. Haggstrom pers. comm., 1986). This belief is consistent with local reports of moose movements in the area.

Minto hunters report that bull moose are in the hills before the rut. After their antlers have lost their "velvet" they move to the higher elevations where mild winds "dry out the horns," making them "stronger" (firm) prior to the rut. After the rut, bull moose remain together in small groups. One expert moose hunter in Minto observed "moose know the country better than humans. It's like a map to them. You watch. They know where to go. They stay in the same area where they were born and raised."

A third major factor affecting moose population in addition to habitat and predation is human hunting pressure. The major human populations hunting Minto Flats moose are residents of Minto, Nenana, and the Fairbanks area. During 1960 when moose reportedly were abundant, the population of the Fairbanks area was 43,412 people. In 1970 and 1980, when moose populations declined, human population of the Fairbanks area rose to 45,864 in 1970, 53,983 in 1980, and to 72,474 by 1985 (Alaska Department of Labor 1987). Moose hunting pressure in areas around Fairbanks, such as Minto Flats increased accordingly. The populations of Minto fluctuated between 220 in 1960, 170 in 1970, and

179 in 1984 as described in Chapter 2; while the population of Nenana increased from 286 in 1960 to 362 in 1970, 470 in 1980, and to 544 in 1985 (Brown 1972; Alaska Department of Labor 1987). Access by road was improved in the early 1970s when a road to Minto village was completed connecting it with the Elliott Highway, and in 1982 when the Fairbanks-Murphy Dome Road was extended to the Chatanika River.

This moose population in a 3,879 square-mile area west of Fairbanks to Manley Hot Springs and including Minto Flats is estimated at 2,600 moose based on recent aerial surveys (D. Haggstrom pers. comm., 1986). It is expected to increase following the 1981 fire that created seral habitat and the killing of 26 wolves from the area in 1984 and an additional 32 in 1985 by a predator-control program. In recent years, moose hunting has been restricted by government regulation (described below) and these regulations are expected to help improve moose numbers in the area. Additionally, the community of Minto has initiated informal measures to control harvests at the local level to help improve the moose population.

Technology

Prehistoric evidence of big game hunting has been recovered from hillside lookouts still in use today near the Tatalina River at "Little C.O.D." Stone tools, particularly microblade fragments, had a widespread use throughout interior Alaska from as early as 12,000 years ago (Powers et al. 1983) near Healy south of Minto Flats to as recent as 500 years ago in the upper Tanana River valley (Shinkwin 1979). Microblades typically were inset into the sides of bone to make an

arrow used to pierce large game such as bison, caribou, moose, and bear. The stone tools found at the "Little C.O.D." lookout in 1968 (Schledermann and Olson 1969) are similar to those found elsewhere in the Tanana valley, however, no specific age could be assigned. Nevertheless, the presence of these stone tools demonstrates that Minto Flats has been used for big game hunting prehistorically and that this lookout site has been important for big game hunting from the present-day well into the past.

In more recent times, moose were snared in addition to being hunted with bow and arrow. Linear fences constructed from spruce timbers had rawhide snares hung intermittently at openings in the fence. Moose attempting to cross through the openings were intercepted and dispatched. This type of fence was used also in the upper Tanana valley into the early part of the century (Andrews 1977 and fieldnotes). Minto elders report the use of two fences in Minto Flats -- one located near the current site of the village and another in the area to the south of Minto Lakes in the vicinity of Dunbar.

In the 1890s reliable repeating rifles were first manufactured (Barnes et al. 1980) and gradually became available in trading posts and stores in interior Alaska (Alaska Commercial Company records). By winter 1903, men from Minto are reported trading furs for manufactured goods at the Fort Hamlin post on the Yukon River near present-day Stevens Village (Anonymous 1903-04). Among the items received in trade were .30-.30 and .30-.40 cartridges. The .30-.30 cartridges were made for use in the Winchester Model 1894 Repeating Rifle which was available in August 1895 (Barnes et al. 1980:41). This lever-action rifle was made with different barrel lengths including the popular

16-inch barrel that was "a favored length among woodsmen around the turn of the century" (Barnes et al. 1980:42) and had styles chambered for using three, four, six, or eight cartridges. The Model 1894 has also been called the "Klondike Model" thought to refer to its popularity in the 1898 Klondike gold rush (Barnes et al. 1980:42). Not surprisingly, this rifle was probably in use in interior Alaska at the same time as bullets known to have been purchased by Minto Indians shortly thereafter. This rifle was used for all big game available in the Minto Flats area, caribou, moose, brown and black bear. With few changes, the Model 1894 has been manufactured continuously to the present day. This rifle continues to be the most extensively used rifle by Minto hunters for moose and bear. Each hunter owns at least one and many own several. It is also the rifle that is typically given to others in ceremonial contexts such as funeral and memorial potlatches. Some have been inscribed "in memory of (name of deceased)" and bearing the date of the memorial before being given away in the potlatch ceremony. These rifles are subsequently used, handed down, or traded locally.

The Winchester Model 1895 Repeating Rifle was first available in February 1896 and was chambered for the .30-.40 Krag (Barnes et al. 1980:45). This was also a popular rifle among Minto hunters although it was not manufactured after 1931.

In addition to the popular .30-.30 Winchester, a few Minto hunters have .30-.06, .270, .30-.40, and 7 mm rifles. With the exception of the latter, the rifles used generally are not equipped with a scope. With continued use of less technologically advanced rifles, Minto

hunters rely upon their knowledge of the local environment and moose behavior to achieve success in moose hunting.

MOOSE HUNTING REGULATIONS

Moose hunting today by residents of Minto primarily occurs within the Minto Flats Management Area which was established by the Alaska Board of Game in 1979 (Fig. 20). From 1961 through 1981 this area was included within portions of Game Management Subunits 20(B) and 20(C), although it was situated mostly within GMU 20(B). Hunting regulations between 1961 and 1975 generally allowed 63 to 79 hunting days between late August and late November with a bag limit of one bull in GMU 20(B) or one moose in GMU 20(C) (Table 34). These were relatively liberal seasons at a time when hunting pressure was increasing in the Minto Flats area due to increasing human populations in nearby Fairbanks and Nenana areas outlined above. Concern about increasing hunting pressure relative to moose populations led to restrictions on all moose hunting in the Flats. In 1975, season length was considerably restricted with a one bull bag limit and by 1978 the season was further reduced to 11 hunting days (Table 34). When the Minto Flats Management Area was established for the 1979 hunting season, additional parameters placed on the hunt included a registration permit requirement with an unlimited number of permits issued in three locations -- Fairbanks, Nenana, and Minto. Later, in 1980, the number of permits that could be issued was limited to 100 and a quota established that specified 15 bull moose could be taken (Table 35). Permits were allocated by issuing location -- 25 each to Fairbanks and Nenana, and 50 to Minto.

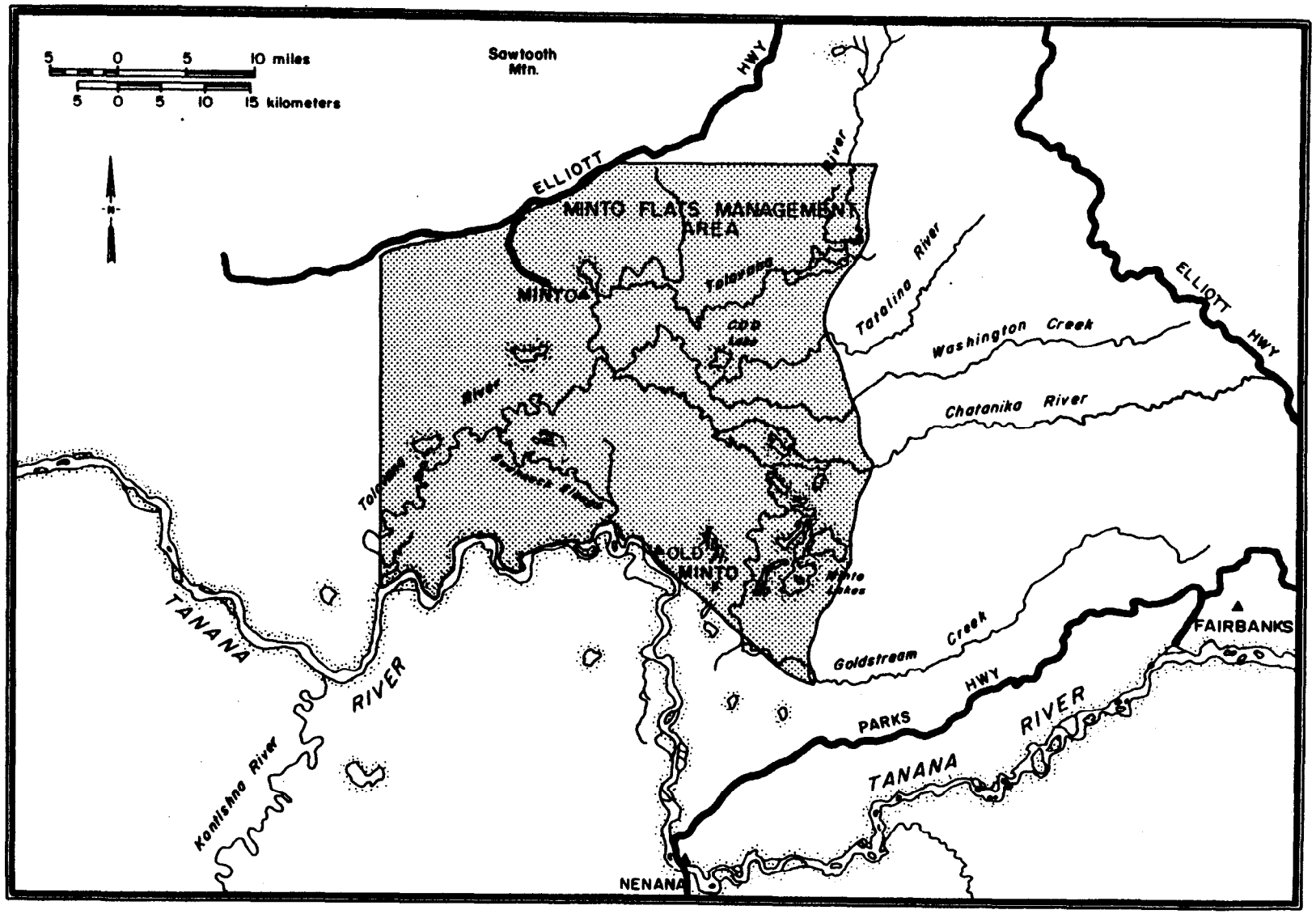


Fig. 20. Minto Flats Management Area for Moose Hunting.

TABLE 34. MOOSE HUNTING SEASONS, BAG LIMITS, AND SEASON LENGTH FOR THE AREA NOW DESIGNATED AS MINTO FLATS MANAGEMENT AREA, 1961-86*

Regulatory Year	Month							Bag Limit[1]	Days
	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.		
1961-63	xx	xxxx		xxx				1 bull	63
1963-64	xx	xxxx		xxxx				1 bull	72
**	xx	xxxx		xxxx				1 moose	72
1964-66	xx	xxxx		xxxx				1 bull	72
**	xx	xxxx	x	xxxx				1 moose	74
1966-67	xx	xxxx		xxxx				1 bull	72
**	xx	xxxx	x	xxxx				1 moose	75
1967-71	xx	xxxx		xxxx				1 bull	72
**	xx	xxxx	x	xxxx				1 moose	76
1971-72	xx	xxxx		xxxx				1 bull	72
**	xx	xxxx	x	xxxx				1 moose[2]	79
1972-73	xx	xxxx		xxxx				1 moose[3]	72
**	xx	xxxx	x	xxxx				1 moose[2]	79
1973-75	xx	xxxx	x	xxxx				1 moose[2]	79
**	xx	xxxx	x	xxxx				1 moose[2]	79

*This information is derived from Alaska hunting regulation booklets for each regulatory year.

**Regulations for the portion of Subunit 20(C) that currently is included in the management area.

[1]As defined in 5 AAC 90.020.

[2]Bull moose only from Aug. 20-Sept. 30 and Nov. 1-30; antlerless moose only Oct. 1-7.

[3]100 antlerless moose may be taken by permit only.

TABLE 34. Continued

Regulatory Year	Month							Bag Limit	Days
	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.		
1975-76	x	xxx						1 bull	20
**	x	xxx		x				1 bull	30
1976-77		x						1 bull	11
**		xx						1 bull	20
1977-78		xx						1 bull	20
**		xx						1 bull	20
1978-79		x						1 bull	11
**		x						1 bull	11
1979-80[4]		x						1 bull[5]	11
1980-81		x			x			1 bull[5,6]	12
1981-82		x		x				1 bull[5,6]	12
1982-83		x						1 bull[5,6,7]	16
1983-84		x		x[8]				1 bull[5,6,7]	17
1984-85		x				xxx	xxxx	1 bull[5,6,7]	50
1985-86		xx				xxx	xxxx	1 bull[5,6,7]	66

[4]First year of Minto Flats Management Area; regulations noted here apply only to those portions of 20(B) and 20(C) designated as the Minto Flats Management Area.

[5]Registration permit hunt.

[6]15 bulls may be taken.

[7]Season subject to closure by Emergency Order.

[8]In 1983 the November season was cancelled since the quota was taken in September.

TABLE 35. MINTO FLATS MANAGEMENT AREA, PERMIT AND HARVEST SUMMARY, 1979-86.[1]

Regulatory Year		Number of Permits Allocated				Number Issued				Harvest				
		Fbks.	Minto	Nenana	Total	Fbks.	Minto	Nenana	Other	Fbks.	Minto	Nenana	Non-Res.	Unk.
1979-80		--	--	--	--	113	65[2]	10	--	4	2	0	0	0
1980-81		25	50	25	100	25	28	25	--	2	0	0	0	3
1981-82		25	50	25	100	25	34	25	--	5	2	0	0	0
1982-83		25	50	25	100	25	41	25	--	4	2	0	1	0
1983-84		25	50	25	100	25	50	25	--	8	7	1	0	0
1984-85	fall	10	30	10	50	10	29	10	--	4	6	1	0	0
	winter		50		50	0	30	0	--	0	1	0	0	0
1985-86	fall & winter	"Tier II Subsistence Only"			60	19	31	3	7	2	4	0	0	0

[1]This information is derived from the Big Game Data Index Files, Alaska Department of Fish and Game, 1979-86.

[2]48 listed Minto as their residence.

The season could be closed by Emergency Order when the quota was reached. At the same time, the Department commenced annual sex and age composition surveys in Minto Flats. In 1984 a moose population and movement study was undertaken and a wolf predator control program in the area was also initiated by the Division of Game as described earlier.

In 1984, the Board of Game modified aspects of the permit hunt following a request from the Tanana Fish and Game Advisory Committee for a winter hunt which was a traditional hunting period for Minto residents. The overall number of permits and the quota remained the same. However, more permits were made available for issuance in Minto, a winter hunt in January and February was established, and the November hunt deleted (Tables 34 and 35). Reported harvests generally remained the same for Fairbanks permittees and increased somewhat for Minto and Nenana permittees during the seven-year period since the management area and permit hunt went into effect (Table 35). It is not clear how much the reported increases reflect actual increases or simply better reporting of moose kills to the state monitoring system. An exception to this occurred in 1983 when Fairbanks permittees harvested eight moose, about twice their average take.

In 1985, Alaska State Court of Appeals action required the Board of Game to adopt subsistence hunting regulations, statewide, following a lawsuit which questioned the implementation of the state's 1978 subsistence priority statute. In the Minto Flats Management Area it was determined that the moose population could sustain only a "subsistence" hunt (defined at that time as hunting by state residents for food) and not a "general" hunt (defined as hunting by non-state

residents). Further, the Board of Game determined that the low moose population could not meet the total demand by all "subsistence hunters" (as defined above). Therefore permits would only be issued to those applicants who qualified on the basis of three criteria: customary and traditional use of the resource, local residency, and lack of alternative resources. This type of hunt was referred to as a "Tier II hunt" with parameters established by the 1978 State law which provided for a priority use of wildlife for subsistence purposes when the game population cannot sustain harvest for all uses (SLA Ch. 151, 1978). In 1985, 60 permits were allocated for subsistence hunting of moose in the Minto Flats Management Area. Of these, 31 permits were issued to Minto residents who met the prescribed qualifications. The remaining 29 permits were issued to qualifying applicants who resided in Nenana (3), Fairbanks (19), Delta Junction (2), and Fort Yukon, Lake Minchumina, Manley Hot Springs, McKinley Park, and North Pole (all one each).

In 1986, a newly amended state subsistence law (SCS CSHB 288 Ch. 52, 1986) required limiting subsistence hunts to residents of rural communities only. Action by the Board of Game resulted in creation of a registration permit hunt in the Minto Flats Management Area in which only residents of Minto and Nenana could apply for a permit. Hunting by Fairbanks area residents was determined to be sport hunting because it was by residents of a non-rural area. There was no limit on the number of subsistence permits that could be issued, however, quotas of seven bull moose in the fall season and eight bull moose in the winter season still applied. For the fall 1986 moose hunt, 47 residents of Minto and 51 residents of Nenana were issued a permit.

Clearly, the allocation of moose harvest in the Minto Flats is not a recent issue, nor one that has come about with the enactment of the state's subsistence law in 1978. Rather, this has been an issue for nearly as long as the state has actively managed moose hunting in Minto Flats during the past 25 years (Table 34). For the past 20 years, at least, the major competition for Minto Flats moose has been between the resident of the Fairbanks area, and the residents of Minto and Nenana. In February 1963, the Alaska Department of Fish and Game first discussed with Minto villages, the Department's proposal for a road into Minto Flats (Tundra Times, Feb. 18, 1963). Opposition was expressed by the village chief, who, in looking to the future, noted the importance of adequate moose numbers in Minto Flats: "We don't mind Fairbanks hunters coming down and getting moose. But if a whole bunch of people move in, what will happen to my people. They will be out" (Tundra Times, Feb. 18, 1963). A missionary who had been resident in the village for nine years added, "If a road is put in, the main danger is for moose. The families all depend upon it for their winter meat...It will place a severe hardship without question on them because people driving to the lake will hunt in the natives' hunting area. When the surplus is cut down, I wonder what the village will do." (Tundra Times, Feb. 18, 1963). Although this road was never built, another road was constructed in 1982 to the far eastern portion of Minto Flats, against the same kinds of concerns voiced by Minto residents to the Fairbanks North Star Borough Assembly in 1982. This same road is planned to be upgraded and a boat landing constructed at its terminus in 1987.

In 1973, the Commissioner of the Alaska Department of Fish and Game reported to the Board of Game, the Department's concern about conflicts between sport and subsistence hunters in Minto Flats where he stated that "in general the problem is too many urban hunters with little regard for common 'outdoor ethics'" (Brooks 1973:6).

It was not until the 1980s that these allocation issues with regard to moose hunting began to be addressed using management tools available to the state as described above. First, the Alaska Board of Game determined that the harvestable surplus of moose in Minto Flats was sufficient only to allow a harvest of 15 bull moose (Table 34). A registration permit hunt was instituted. In 1986, the Board of Game, implemented the newly revised subsistence law; limiting the harvest to 15 bull moose to be taken by permitted residents of the rural communities of Minto and Nenana.

MOOSE HUNTING AREAS AND ACTIVITIES

In general, Minto moose hunters use the same areas today for moose hunting that they and their ancestors have used throughout the twentieth century. With the regulation of moose hunting seasons by the government and changes in settlement pattern, hunting areas are somewhat more confined to areas adjacent to waterways, traplines, and major trails (Fig. 21). Most moose hunting occurs in Minto Flats proper north of the Tanana River, however, hunting does extend into areas further north and south.

In the fall, moose hunters typically travel up to 80 river miles hunting along the way. Hunting extends as far as Nenana on the Tanana

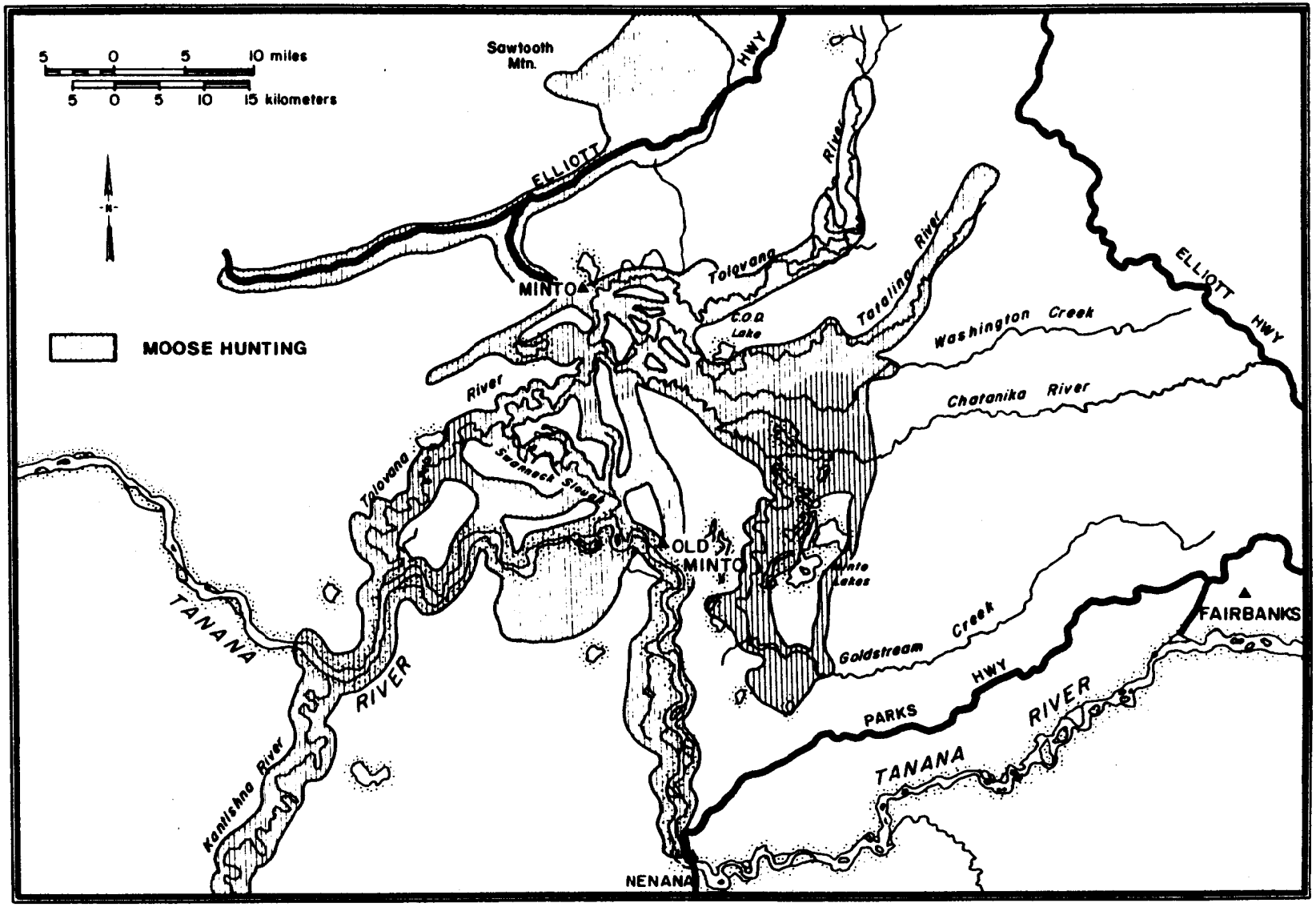


Fig. 21. Minto Moose Hunting Areas, 1960-84.

River and to areas on the lower Kantishna River (Fig. 21). On a regular basis, hunters travel up to 60 and 70 river miles to areas along the lower Tolovana River and Goldstream Creek. The extent of hunting up the Tatalina and Tolovana rivers is generally limited by low water levels in September. The road system extending from Minto to the Elliott Highway both east toward Livengood and west toward Manley Hot Springs is used by those having a motor vehicle. Virtually all moose hunting initially occurs within Minto Flats and secondarily along the road system and to more distant areas near the Kantishna River and Nenana. All moose hunting, by residents of Minto begins at the village. Minto hunters do not access the area from the Murphy Dome Extension road nor by aircraft. Most hunting occurs within the Minto Flats Management Area (Fig. 20).

Hunters and their families depart from the village to hunting areas where temporary campsites are established as base camps. In fall 1984 some individuals hunted from as many as three base camps and in fall 1985 the longer hunting season enabled people to hunt from as many as five base camps. Hunters generally place themselves in areas where they are familiar with the terrain and existing animal and human trails, where they have been successful in the past, and where during the summer they have observed or heard of moose or signs of moose.

Most Minto hunters, men and women, are familiar with the network of major trails, lookout sites, and lookout or "climbing" trees in key areas of the flats used for moose hunting throughout much of this century. Notable lookout sites are located at several points along the Tolovana River downriver of Minto as well as upriver and along the lower Tatalina River. Many of these lookouts are conspicuous by worn

trails extending up them. Lookout trees are less noticeable yet the proficient hunter is familiar with the location of many of them. For the physically able, nearly every opportunity to climb one of these trees when hunting is taken. These large spruce trees are characterized by proximity to large meadows which moose are known to frequent, their relative straight branches perpendicular to the trunk, and their unusually tall height. One prominent "climbing" tree reportedly has been climbed by nearly every elder in the community, indicating its use for this purpose since at least 1910. Some of the best situated lookout trees afford excellent visibility of meadows extending to at least one-half mile distant. People also climb small and large birch trees where they occur on the edges of meadows for the added viewing they provide even when this may be only 20 feet off the ground. It is not unusual to see even elder people climbing these small trees, with a rifle slung over their shoulder, to watch for moose and direct hunters to certain areas.

One hillside lookout along the lower Tatalina provides nearly a 270-degree view of the surrounding lowlands. This particular lookout is about 550 feet in elevation. Five other hillside lookouts are about 300 to 350 feet in elevation and provide nearly a 180-degree view of the surrounding low-lying lakes and meadows over a distance of at least one mile. These hillside lookouts are kept clear of trees and brush to afford maximum visibility. They are also kept clean of trash and other debris. Occasionally, some tool made for calling moose, as described below, is left at the site.

Those who hunt moose in trapping areas are familiar with animal and human trails. Knowledge of these trails enables the hunter and

those working with him to effectively stalk the moose or force the moose to escape toward one of the trails where a hunter may be waiting. Knowing the trails so that one can approach the moose or intercept it on its escape attempt obviously improves the likelihood of a successful hunt. The hunting group that includes a member who intimately knows the area, usually from trapping there, has a distinct advantage in the hunt.

Adept hunters also know how to use the existing terrain to their advantage. This is especially true where repeated bends in the river contain meadows. Knowledge of where the river bends enables a hunter to target several points where a moose can be easily intercepted so as to minimize stalking and reduce the distance to pack any moose shot down. Hunters also improve their likelihood of success by clearing out extraneous brush from trails in and around camp. This improves the visibility when watching for moose in the vicinity of camp and can hasten one's pursuit of a moose that has been spotted since obstructions have been removed.

Among hunters atop trees and hillside lookouts, usually one individual uses binoculars to assist in spotting moose when hunting in fall. Other techniques are used to detect and "call" moose when hunting in fall. Moose tracks are always noted and assessed as to how recent they are and the sex of the animal. This technique is also used during winter hunts. Areas where moose tracks indicate repeated crossing are generally searched. Other signs of moose include spotting areas where moose have bedded down, raked their antlers against trees or brush, chewed willow or birch branches, or pawed the ground. Skilled hunters are adept at spotting moose during fall in the earliest

morning hours when a light frost glistening on the velvet of the antlers make them stand out.

Other signs used in fall to track moose are sound and odor. In camp and on the trail whether tracking or not, people listen constantly for any sound of moose. These sounds include bull and cow moose calls, raking of antlers against brush or trees, and disturbance to trees or brush as moose move along. People are cautious about making noise themselves when tracking moose or when in camp, particularly in the early morning. They are careful to wear clothing that is made primarily of natural fibers which, unlike synthetic fabrics, do not make noticeable noise as one moves or brushes against vegetation. Whenever possible, they burn wood in campfires that does not crackle much, such as dry cottonwood. When a moose is spotted, other hunters in the area are alerted by a sharp whistle rather than by hollering. The advantages of taking these measures are two-fold. They allow people to be able to hear any sounds of moose in the area and they keep the moose from being distracted or made wary by the sounds of human activity.

Hunters make certain sounds to attract moose toward them. Vocalizations imitating bull or cow moose are made. This is one of the first things a skilled hunter will do after disembarking a boat at a hunting area. In camp, one of the earliest to rise in the morning makes a moose call. At camp, only one individual makes the moose calls so as not to "confuse" the moose who can distinguish differences in their sounds. Moose are said to get wary if different sounds are made in the same area around the same time. Other sounds are made to imitate the sound of scraping moose antlers. A well-dried moose

scapula or shoulder bone is scraped in a certain fashion against the brush or a tree trunk. Sometimes an empty plastic one-quart two-cycle oil container with the bottom cut out and affixed to a handle is used as it produces a resonance which when rubbed against a tree or a brush is also like that of moose antlers being scraped. In the absence of either of these tools, a hunter can use a wooden boat paddle to produce a similar scraping sound or can rap the handle of an axe against the trunk of a standing dead tree.

People can also smell the presence of certain moose at times. Bull moose often rub their neck and shoulders in areas where cow moose have urinated which results in a distinctive odor on their skin that can be detected at relatively close range. People also listen for the sound of bull moose digging the ground where a cow moose has urinated. Also, bull moose in rut have an odor which can be readily noticed.

Moose hunting in fall tends to occur in groups -- both groups of individuals travelling in a single boat, and several groups who meet and hunt together from the same base camp. At the onset of the season, hunting groups distribute themselves to various key localities during the hunting season, but do not necessarily confine themselves to one particular area. Information about moose sightings, the location of other hunting parties and their success or failure, is frequently exchanged between hunting groups as they travel from one area to another and encounter each other along the waterways and at base camps. As noted earlier, hunting groups generally operate from several base camps throughout the season. Whether or not a moose has been harvested, hunting groups continue to move about the area joining and assisting others. Some families and individuals spend the entire

season out hunting and moving from camp to camp. Many elders follow this pattern of movement and even if they are physically limited in the extent to which they can actively hunt, their knowledge of moose behavior and the local terrain is particularly beneficial to hunting groups. As shown below, it is typical for hunting parties to include people whose ages span a wide range.

Hunting parties often camp together at customary campsites which are located in the northeast, east, southeast, and southwestern areas of Minto Flats. Some families also operate from their fish camps located along the Tanana River, particularly those families who are still fishing for salmon during the moose hunting season (see Chapter 4).

In fall, all access to hunting areas in Minto Flats was by means of riverboat and on foot. Most boats used were aluminum flatbottom boats 16 to 18 feet in length outfitted with prop-equipped outboards ranging from 20 to 50 horsepower. Although hunting parties search the river corridors for moose or moose sign while in transit, stops are frequently made to hunt certain meadows and to use lookouts and climbing trees to aid in the hunt. One hunter attached a snowhook to the bow line of his boat, so that he could secure his boat quickly after landing and take off in pursuit of a moose spotted while traveling on the river. On occasion, boats will be hauled over beaver dams blocking creeks in order to access more remote areas. Extensive hunting on foot occurs especially when moose have been spotted from more distant locations, such as from tree tops or hillside lookouts. Often one or two people are detailed to one of several strategic points where the moose could be intercepted while another person stalks the

moose. At these times the elders' knowledge of certain meadows, terrain, and tributaries is especially useful. They can readily describe the key placement point for hunters and how it can be reached on foot and by boat. Such a hunt is a remarkably coordinated effort made possible by the innumerable "maps" elder individuals have in their minds. In this manner, hunting parties group together to watch for, track, pursue, and coax a moose toward the main hunter. The same techniques are used in winter moose hunts.

Access to hunting areas used in winter is by snowmobile and then on snowshoes or simply by means of snowshoe. Hunting parties generally base their operations from their residence in the village, but at times men hunt from their more remote trapping camps. Some individuals hunt periodically during the January-February season by walking on snowshoes to hunting areas near the village. Others hunt incidentally when out checking traplines. Winter hunting areas tend to be different than those used in fall, in part due to the different distribution of moose in winter and because different areas are accessible once waterways are frozen and certain trails can be used for more direct travel. Also, at least one hillside lookout is rarely accessible during the open water season, but is a major lookout during winter. A series of sand dunes located east of the village between the Tolovana and Tatalina rivers and south of the village between "Sandhill Slough" and the Tanana River area areas commonly is used by moose in winter.

Winter moose hunting is less a group activity than the fall hunt. While some men hunt alone, two men generally hunt together. In winter 1985 the two pairs of hunters hunting in that season consisted each of an elder man and a young man. Both parties used a moose hunting

strategy commonly described in the historic literature and during interviews with key respondents. When a pair of hunters encounter moose tracks, they first determine whether or not the tracks are fresh and sometimes the sex of the animal. The sex of antlerless moose can also be determined by the coloring of the hair in winter (females being blonder) and the pattern of willows which have been eaten. The direction of the wind and the direction of travel the moose might take are also assessed. Then they proceed on snowshoes downwind from the tracks to avoid the possibility of their scent being picked up by the moose. Characteristically the moose eventually circles back downwind from its route before it beds down. At the point where the moose has reversed its course, the hunters wait in the estimated path of the moose and once it appears it can be shot. This same technique has been described in greater detail for other interior Alaskan Athabaskan groups (Paul 1957; Nelson 1973; Stokes 1983). Snowmachines that are used to access the areas are parked along trails from which the hunters then proceed on snowshoes.

PARTICIPATION AND HARVESTS

Subsistence moose hunting by Minto residents occurs primarily in fall and involves individuals of a wide range of ages. It is an individual activity for some, a family activity for many, and a hunting activity consisting of two or three men for others. Most households have at least one member who hunts moose at some time during the year, however, not all are successful. Participation in moose hunting and harvests were recorded for two years as described below.

1983-84 Moose Hunting

In the one-year period from July 1983 through June 1984, 38 Minto households (84 percent) reported having at least one member who hunted moose, whether successful or not. Information on this hunting year was derived from the comprehensive survey of wildlife harvests administered to all households which forms the basis of information presented in this report. It is limited in terms of composition of hunting parties, but some general statements can be made. More detailed information on the harvest of moose for subsistence use is described later for the 1984-85 hunting year. For the year 1983-84, harvest information was derived by asking simply whether anyone in the household hunted moose during that time period and whether or not they were successful. The time or season of harvest was not asked, nor was the purpose for hunting moose (such as for household use or funeral or memorial potlatch), although most individuals provided information on how the moose was used.

Of the 38 hunting households, 18 (47 percent) were successful in harvesting one moose. One household harvested two moose for a total annual harvest of 19 moose for the community. Thirteen of these households (72 percent) reported donating moose meat and parts for use in a funeral potlatch (9 cases) and a memorial potlatch (4 cases) that occurred in that year. The use of moose in religious ceremonies is common and expected.

In 1983-84, households that participated in moose hunting were not characteristically different from households that did not with respect to age of household head or household size. For both groups the mean

age of household heads was 52 and household size averaged four person for hunting households compared to three persons for non-hunting households. The lack of difference between hunting and non-hunting households can probably be attributed to the fact that a significantly large percentage (84) of households hunt moose, therefore the characteristics of the households on a community level are the same as those for moose hunting households (Table 36). Therefore, age class of household head had no bearing on whether or not household members hunted moose. Similarly, household size has no relationship on whether or not a member hunted moose (Table 37).

Some information on the composition of 1983-84 moose hunting parties was derived from the survey. Most individuals, but not all, hunted with at least one other person. For many, these included people from the same household as well as other households. Kinship appeared to be the basis for hunting groups more than household residence. Typical hunting groups included husband, wives, and sons; uncles and nephews; brother-in-laws, brothers, and cousins. Younger married men tended to hunt with their father or brother whereas younger unmarried adult men tended to hunt with an uncle. Minto hunting groups are also characterized by groups of elders, several of whom hunt together. Included in the groups are spouses and sons or nephews.

1984-85 Moose Hunting

In fall 1984, 31 (69 percent) Minto households had a member participating in moose hunting during the five-day season from September 17-21. Members of about five households hunted during the

TABLE 36. AGE CLASS OF HOUSEHOLD HEAD
OF MOOSE HUNTING AND NON-HUNTING HOUSEHOLDS, 1983

Age Class (Years)	Hunted Moose	Did Not Hunt Moose	Total
20-29	4	1	5
30-39	7	3	10
40-49	9	0	9
50-59	1	0	1
60-69	11	1	12
70-79	3	0	3
80-89	2	2	4
90-99	1	0	1
Total	38	7	45

TABLE 37. HOUSEHOLD SIZE AND
PARTICIPATION IN MOOSE HUNTING, 1983

Household Size	Hunted Moose	Did Not Hunt Moose	Total
1	6	1	7
2	4	1	5
3	8	3	11
4	4	1	5
5	6	1	7
6	3	0	3
7	5	0	5
8	1	0	1
9	0	0	0
10	1	0	1
Total	38	7	45

winter season, January 10-February 28. Participation in moose hunting activities by Minto residents during the fall season were recorded based on direct observation and participation by the author in the fall hunt. A systematic survey of all households to determine hunting levels at other times of the year was not administered as it was for the previous year, although 1984 fall moose hunters were interviewed. Some information on moose hunting for funeral potlatches was derived from direct observation and informal discussion.

For the 31 households hunting during fall, nine (29 percent) harvested a moose and two households harvested two moose per household. Two moose are known to have been harvested during the winter hunt. An additional 16 moose are known to have been taken for several funeral potlatches during the one-year period from July 1984 through June 1985. No memorial potlatches were held during that same period. Certain parts of moose taken during the fall and winter seasons were likely donated to these funeral ceremonies, as is customary. In total, an estimated 27 moose were harvested during 1984-85.

The Hunting Party

As described earlier, moose hunting for the people of Minto is primarily a group activity. People tend to hunt with people from their own household and with close relatives in other households. Often they hunt together in a single boat. Throughout the season, several camps are used and several boats of people often join together at a camp and then work together as an even larger hunting party. For example, in

fall 1984, one typical hunting camp consisted of ten groups (boats) of people who camped and hunted together. Several people periodically stationed themselves on the relatively steep hillside at two different lookout sites, one at about 350 feet in elevation and the other at about 500 feet. Several elders, male and female, watched for moose from the lower site, whereas adult men and women scanned the area from the higher lookout. After one bull moose had been spotted some people stayed at the lookouts to watch the movements of the moose while five boats of hunters, including men and women, elders, and a teenage boy headed upriver to the meadow where the moose was spotted. Four elders (men and women) and some young adults stayed in camp. The hunters detailed to the meadow stationed themselves at points around the meadow. Two elder men were particularly knowledgeable about this specific area having trapped here many years and therefore knew where people should be stationed with the likelihood of intercepting an escaping moose. Two others (an elder man and his wife) each armed with a rifle, climbed two small birch trees to enhance their visibility along the brushy fringes of one meadow. Two other elder men were positioned at other points. A young adult man, following instructions given by the two elder trappers proceeded along a particular route toward the moose.

This type of coordinated camping and hunting effort was observed at other times during the fall 1984 season and again during the fall 1985 season. While the composition of the camp and the larger hunting group changes daily, the approach, strategy, and cooperation remains the same. In fact, in fall 1985, a professional video recording was made of the moose hunting activities of the Minto people at one of

these camps (Madison 1986). When boats of people camp together, they hunt together utilizing all personnel. Younger men climb lookout trees and are detailed to areas where they can pursue a moose swiftly on foot if necessary; elders participate and direct, and others stay in camp in the event a moose comes into camp or is seen there. Persons at camp also provide the most up-to-date information to newly arriving hunting parties as to the whereabouts of hunters so that they can join the ones afield. If hunters are successful in taking a moose it is then divided among all "boats" (hunting groups) that worked together both in the field and in camp. Thus, the successful hunt described above in fall 1984 was divided among eight boats of people.

The Organization of Moose Hunting

The five-day fall 1984 moose hunting season provided the opportunity to observe the organization of hunting groups of Minto residents hunting in Minto Flats. The author was able to travel to different hunting camps in the Flats and record the hunting activities. All moose hunting in Minto Flats took place using flat-bottom river boats for transportation to hunting areas. As noted above, groups of hunters travel together in boats, but often join other groups at different camp sites from which the larger group proceeds to hunt. Individual groups of hunters also hunt at point while in transit to a primary hunting area.

In fall 1984, hunting groups traveled in boats 14 to 24 feet in length, outfitted with propeller-equipped outboards which ranged from

20 to 50 horsepower. The majority of boats were 16 or 18 feet long with 20 or 25 horsepower outboards. Twenty-seven hunting groups (boats) were afield during the five-day hunt. Most (24) were residents of Minto and three included former Minto residents now residing in Fairbanks. Numbers of individuals in a boat ranged from one to five with most containing either two (14 cases) or three (9 cases) people. Hunting groups included people from either the same household (46 percent) or members from two households (50 percent), with one including people from three separate households. More than half of the hunting groups in boats included adult men and women traveling together. This characterized 58 percent (15 cases) of the groups while 42 percent (11 cases) of the hunting groups in boats consisted only of adult males. Groups of males only were primarily made up of adult men less than 40 years of age, almost all married men. In contrast, groups of adult males and females consisted of spouses, in fact, almost all men over 40 years of age who went moose hunting at this time did so in the company of their wife. School-age children were generally absent from hunting groups in part because the hunting season coincided with the school week (Monday through Friday). It is noteworthy that of the 61 adults (18 years and older) in the field during the season, 14 (25 percent of hunters) were women, all married. Women ranged in age from 28 to 73 years of age and most were over 50 years of age (Table 38). Adult men ranged in age from 18 to 83 years of age, with an average age of 45 (Table 38). Thus, hunting groups tend to have older middle age women and middle age men, yet elders (males and females) are significantly represented, but not to the exclusion of younger adults, particularly males (Table 38). Whereas more males than females between

TABLE 38. FREQUENCY OF PARTICIPATION IN MOOSE HUNTING BY MALES AND FEMALES IN DIFFERENT AGE SETS, MINTO, FALL 1984

	Males			Females		
Age Range	Number in Population	Number Moose Hunting	Percent in Age Set Hunting	Number in Population	Number Moose Hunting	Percent in Age Set Hunting
0-9	23	0	0.0	18	0	0.0
10-19	14	3	21.4	11	0	0.0
20-29	18	7	38.9	16	1	6.3
30-39	21	10	47.6	7	1	14.3
40-49	10	4	40.0	5	2	40.0
50-59	5	5	100.0	4	4	100.0
60-69	11	9	81.8	4	4	100.0
70-79	4	3	75.0	3	2	66.7
80-89	2	1	50.0	2	0	0.0
90+	0	0	0.0	1	0	0.0
Total	108	42		71	14	
Average Age	31	45		29	55	

ages 10 and 39 years are more likely to hunt moose, females and males ages 40 to 79 hunt at the same rate, after which participation in moose hunting drops quickly for both males and females (Fig. 22).

The 1984 hunting camp described earlier provides a good example of the age composition of the larger hunting group. Ten boats included 16 adults whose ages ranged from 19 to 83 years of age with most (69 percent) over 60 (Table 39). Another typical camp in fall 1985 consisted of 11 adults ages 19 to 70, in five boats, but with a larger proportion of younger people. Nevertheless, 36 percent of the larger group included elders (Table 40). In both cases the larger hunting group typifies fall moose hunting. Manpower (sheer numbers) allows use

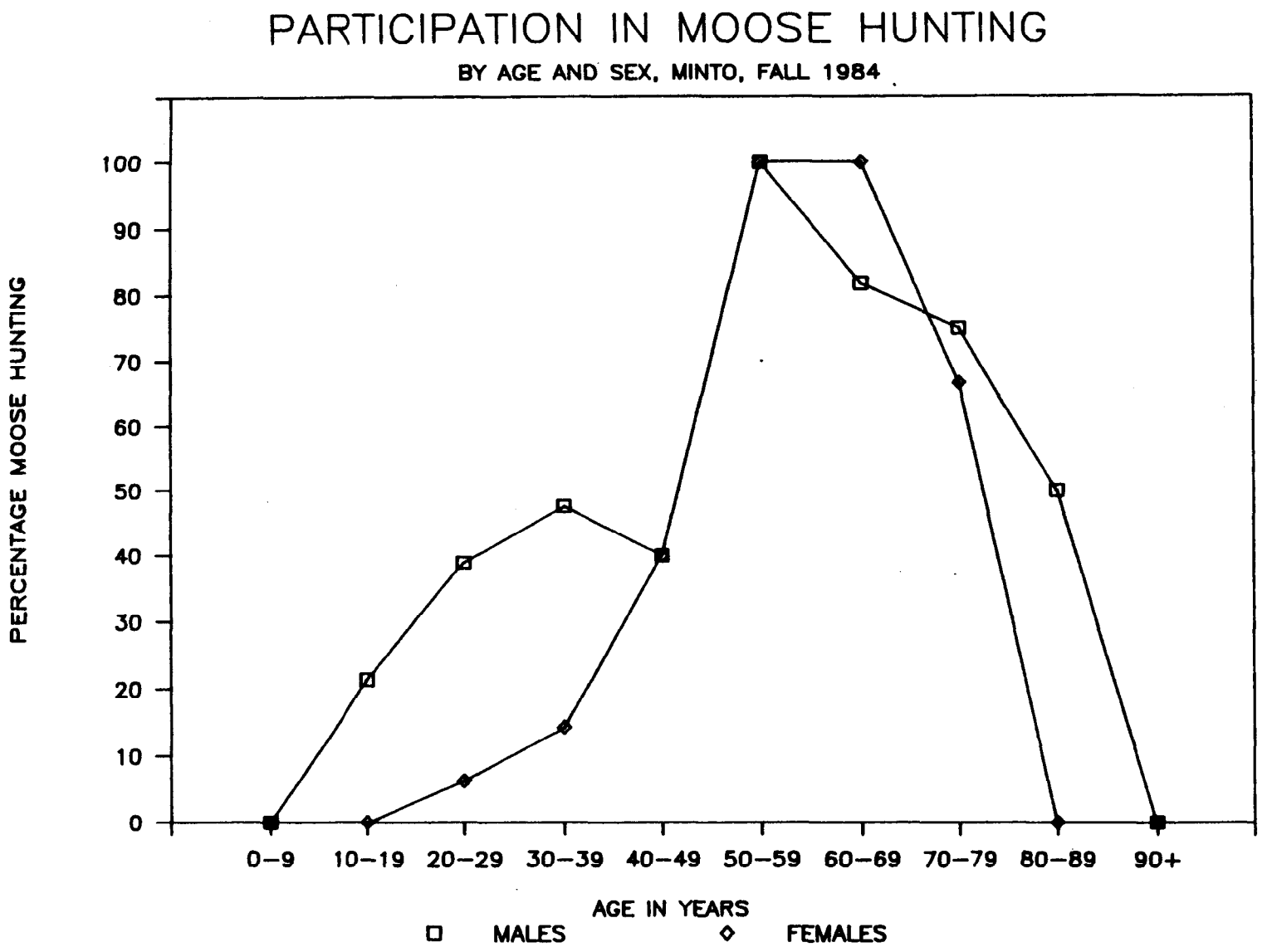


Fig. 22. Percentage of Males and Females by Age Set Participating in Moose Hunting, Minto, Fall 1984.

TABLE 39. AGE CLASS DISTRIBUTION OF ADULTS AT A MINTO HUNTING CAMP, FALL 1984

Age Class	Number
19 and under	1 (6%)
20-29	0 (0%)
30-39	1 (6%)
40-49	1 (6%)
50-59	2 (13%)
60-69	7 (44%)
70-79	3 (19%)
80-89	1 (6%)
Total	16 (100%)
Average=60 years	

TABLE 40. AGE CLASS DISTRIBUTION OF ADULTS AT A MINTO HUNTING CAMP, FALL 1985

Age Class	Number
19 and under	1 (9%)
20-29	2 (18%)
30-39	3 (27%)
40-49	1 (9%)
50-59	0 (0%)
60-69	3 (27%)
70-79	1 (9%)
Total	11 (99%)
Average=43 years	

of a variety of hunting techniques to be used simultaneously: lookouts on hillsides and in trees, in-camp monitoring, moose calls, adequate number of personnel to assign to different interception sites, and knowledge (general and specific to the exact hunting locality). Of the 31 boats used for hunting moose in 1984, two-thirds had at least one

member in the boat with a hunting permit and certainly each larger hunting group had several members with a permit. Given the limited number (30) of permits available for the fall 1984 season, permits appeared to have been relatively evenly distributed among hunting households and hunting parties.

Finally, almost all hunting groups consisted of close consanguineal relatives (mother, father, brother, son, and/or daughter). Of the 27 boats used for hunting moose, 13 (48 percent) were used by husbands and wives and in several cases included children (adult and adolescent). Three groups (11 percent) consisted of brothers, three of uncles and nephews, and two of brothers and a cousin. One group consisted of two first cousins, one included a man who hunted alone and a third included two husbands and their wives who were distantly related. There were three parties of unknown composition.

DISTRIBUTION AND USE

It is customary for successful hunters to share moose meat with all hunting groups ("boats") camped at the campsite where the successful hunter and his party were based. Furthermore, hunting parties, as noted above, group together to watch for, track, pursue, and coax a moose toward the main hunter. Thus, the meat of the moose which has been shot is shared with the other individuals who contributed to the successful harvest. Moose meat is also shared with any nearby hunting parties who may not have been directly involved in

the hunt customary with a belief that the act of sharing will contribute to the hunter's future success in hunting moose.

Moose meat is often redistributed later to other households and individuals, particularly to elder members of the community and also during ceremonial occasions, both religious and non-religious. The brisket, head, ribs, and backbone (referred to together as "potlatch meat") and stomach (tripe) generally are reserved for use during these occasions when the entire community comes together. Marrow and fat obtained from leg bones are used in preparing foods for religious ceremonies such as funeral and memorial potlatches. Fat which is used in making various types of "Indian ice-cream" is prepared by pounding and rendering. The hooves are boiled to loosen the toe bones which are then removed and eaten. The hoof proper is sometimes used in manufacturing handicrafts. Inner organs such as liver, heart, and kidney, are consumed also; however, the liver, kidney and stomach of bull moose in rut are considered inedible. Intestines are sometimes cut and cleaned and added to soup. In the past, during stringent times, moose brains were boiled and eaten or cut into small pieces, roasted, and added to soup. They were used also in the process of tanning moose hides. Rarely today, parts of the lungs are boiled and eaten, or roasted in a campfire and the inner part eaten. Usually, the lungs are used for dog food.

CHAPTER 7

WATERFOWL HUNTING

Today, as in the past, the Minto Flats region is considered to be one of the most important areas for waterfowl and migratory birds in interior Alaska. The Minto Lakes area, in particular, in the eastern portion of the Flats, is one of the largest marsh areas in the Interior where large numbers of waterfowl breed annually. It is equally important for molting waterfowl and migratory birds which feed there as they pass through the area in late summer and fall (Hooper 1952). A study of waterfowl production in the Minto Lakes demonstrated the significance of this area (Hooper 1952) which is a focal point of much waterfowl hunting by Minto residents. Waterfowl are moderately abundant elsewhere in Minto Flats as evidenced by additional key hunting areas.

WATERFOWL SPECIES

A variety of waterfowl species occur in the Minto Flats and are harvested by Minto residents. The following list indicates which species are of economic importance during the spring and/or fall harvests. Scientific names are derived from Armstrong (1983) whose pictorial guide was the reference for identifying waterfowl used or seen by Minto residents in the Flats. Native names were derived using Krauss' (1974) Minto-Nenana Athabaskan dictionary as a guide for spelling and to cross-check common English names for waterfowl. There were few discrepancies. Working individually with several older people (age

55+), male and female, identification occurred while reviewing Armstrong's guide (1983), and Krauss' dictionary (1974). The common name is presented first, followed in parentheses by the Minto Athabaskan name and the scientific name.

Mallard (not'ugheechukh; Anas platyrhynchos). This is a common spring and fall duck which many consider "the best" [tasting] of the ducks, particularly in fall.

Northern Pintail (tr'edranedha; Anas acuta). Another common spring and fall bird. Relatively large numbers of these birds are taken compared to other species.

Green-winged Teal (ts'etsoo1tena; Anas crecca).

Northern Shoveler (nedre1do'; Anas clypeata). Can be seen in spring, summer, and fall, but are considered by some too small to hunt.

American Wigeon (bedo'lek'ulee; Anas americana, or Mareca americana). Common in spring, summer, and fall. Another less common English term for this bird is the Bald Plate. Their numbers are said to fluctuate throughout the season; when present they are abundant.

Canvasback (taneedret khuch'edets'ena; Aythya valisineria). This species is not very common, but are generally seen in spring.

Lesser Scaup (noltthooya; Aythya affinis). These are common in spring and fall as well as the Greater Scaup (Aythya marial) and are said to be the last birds to leave the area. More are harvested than of other species.

Common Goldeneye (ttheek'oneya; Bucephala clangula). Common in spring, summer, and fall.

Bufflehead (tl'a1tal; Bucephala albeola). Common in spring, summer, and fall.

Oldsquaw (ohoya; Clangula hyemalis). These are only taken in spring when they are present during migration. It is said that some years there are many and others there are few. In spring 1984, many were reported.

White-winged Scoter (ch'eneghudadlguya; Melanitta fusca;) and Surf Scoter (dets'eneezrena; Melanitta perspecillata). Very common in early June when they are actively hunted. Surf scoters are not resident in the Flats. Referred to as "black ducks" and the smaller ones are called dotro'ela in Minto Athabaskan. These

reportedly occur the same time as the oldsquaw ducks and in the same numbers, whether high, average, or low.

White-fronted Goose (khukh; Branta canadensis). This bird is common in spring and fall.

Snow Goose (ts'elozrena; Chen caerulescens). These are sometimes common in spring only when they are migrating north. In some years, such as spring 1984, there are many, whereas at other times none are seen for several years.

The following species also occur in the area, but are rarely harvested, if at all.

Redhead (Aythya americana). This bird is seen rarely in Minto Flats.

Barrow's Goldeneye (tthatokhulaya; Bucephala islandica). Common in spring and fall, but it was not determined with certainty whether these are harvested.

Common Merganser (treghuth; Mergus merganser). These birds are seldom seen in the Flats and are not harvested.

Yellow-billed loon (dodzenee; Gavia adamsii). These birds are present but not harvested. They are mentioned in several folktales.

Trumpeter Swan (tobo; Cygnus buccinator). These occur from spring through fall, but are not harvested. Young swans are called delt'ooya.

Sandhill Crane (dał; Grus canadensis). Common in spring, summer, and fall, they are rarely harvested.

The occurrence of almost all of the waterfowl species noted above has been corroborated by at least one scientific study of waterfowl at Minto Lakes (see Hooper 1952). That study demonstrated a preponderance of scaup, wigeon, pintail, and white-winged scoters at the Minto Lakes study sites during summer 1951. Some 680 birds banded as part of that study showed that birds banded in July and August at Minto Lakes were recovered in October, November, or December in the following states or provinces: pintail and wigeon -- Alberta, British Columbia, Idaho, Washington, Oregon, California (one wigeon was recovered in Mexico);

Shoveler -- British Columbia, Oregon, California; Green-winged Teal -- Alberta, British Columbia, Nebraska, Louisiana, Oregon, Utah, California; and Greater Scaup -- Ontario, Maryland, Kansas, and Texas. Two bands recovered from a Canada goose and a pintail taken in Minto Flats in 1982 and 1984 revealed that both birds were banded in Saskatchewan in the 1970s.

Of the most common ducks at Minto Lakes, pintail and white-winged scoters are largest, although wigeon and scaup are moderate in size compared with other duck species (see Hines 1978).

HUNTING ACTIVITIES AND GEOGRAPHIC USE AREAS

Waterfowl are harvested from the village as well as from spring muskrat hunting and fishing camps and fall moose hunting camps temporarily set up in the Minto Lakes area. They are intentionally hunted, but also harvested as an adjunct to other harvest activities such as fishing, muskrat hunting, berry picking, and moose hunting. At these times, waterfowl are taken either in close proximity to the camping site or while in transit to other hunting, gathering, or fishing areas. Waterfowl hunting areas are accessed primarily by riverboat or canoe (both manufactured aluminum canoes and hand-crafted canvas-covered canoes). Occasionally a canoe is left at a remote campsite which can be used by hunters from the village. Some harvest occurs beginning in mid-April with the first arrival of geese in the Flats. Prior to their arrival, snowmachines and snowshoes are used to break a trail into a customary stopover area. These areas subsequently are accessed on snowmachine until lake and river ice conditions become hazardous for

travel. Twelve-gauge shotguns and .22 caliber rifles are standard hunting equipment along with No. 4 and No. 2 shells. Shells cost $15 per box in the village, when available, and about $10 per box if purchased in Fairbanks.

Spring breakup of rivers and lakes in Minto Flats is variable and often depends on lake depth, current, and water and snow levels resulting from the previous winter. Thus, in the spring, waterfowl hunting areas are not all accessible at the same time. The Tolovana and Tatalina rivers tend to break up earlier than the Chatanika River and thus waterfowl hunting which often coincides with muskrat hunting can occur earlier in the open streams and adjacent lakes. The occupants of more remote spring camps near Minto Lakes are confined to nearby areas until the Chatanika River and Goldstream Creek break up making the Minto Lakes area accessible. During spring 1985, a year with an exceptionally late breakup, the Chatanika River below Goldstream Creek was not ice-free until May 23. Waterfowl arrived later than usual about a week to 10 days, including scoters ("black ducks") which in normal years appear during the first week of June. Local residents report that these birds do not nest in the area and only stop over on their way to nesting grounds further north. The harvest of "black ducks" essentially concludes "spring" waterfowl harvest as Minto residents cease hunting when waterfowl begin nesting in late June and early July (see Hooper [1952] for the waterfowl chronology of species observed at Minto Lakes). No waterfowl eggs were harvested.

A second waterfowl hunting period tends to commence with the state established season opening on September 1, though often numerous birds flock together prior to that date and people prefer to hunt at that time

in late August. In fall 1984, virtually all waterfowl hunting ceased on the second day of the season. Customary religious observances began with the announcement of the death of the village's oldest resident and therefore residents remained in the village. A week later, after the funeral and associated ceremonial activities, considerably fewer birds were present in the Flats.

The Minto Lakes area is a popular sport hunting area for Fairbanks waterfowl hunters, and the sounds of shotguns and float planes is nearly constant during daylight hours the first two weeks of the fall season. Minto residents rarely hunt waterfowl at the same time in the same areas as the sport hunters primarily due to competition and relative dispersal of waterfowl making hunting less efficient. Incidental harvest of ducks and geese occurs at this time during other hunting and fishing activities as noted earlier in Chapter 3. Sport waterfowl hunting is aptly described in a recent study of urban use of Minto Flats by Shepherd and Matthews (1985) and in a feature article in the Fairbanks Daily News-Miner (Berry 1985).

Minto residents concentrate spring and fall waterfowl hunting along major tributaries of the Tanana River such as the Tolovana River; approximately 20 direct miles east up the Tatalina River; and 20 direct miles southeast up the Chatanika River (Fig. 23). They also hunt along Goldstream Creek extending south from its confluence with the Chatanika River, and along Swanneck and Sandhill sloughs, some 30 river miles below the village. Utilizing these waterways, hunters access the surrounding lakes and ponds, and principal "slough" such as the Minto Lakes, the flats east of Swanneck Slough, and the flats south of the Tanana River (Fig. 23). During years of spring and/or fall high water,

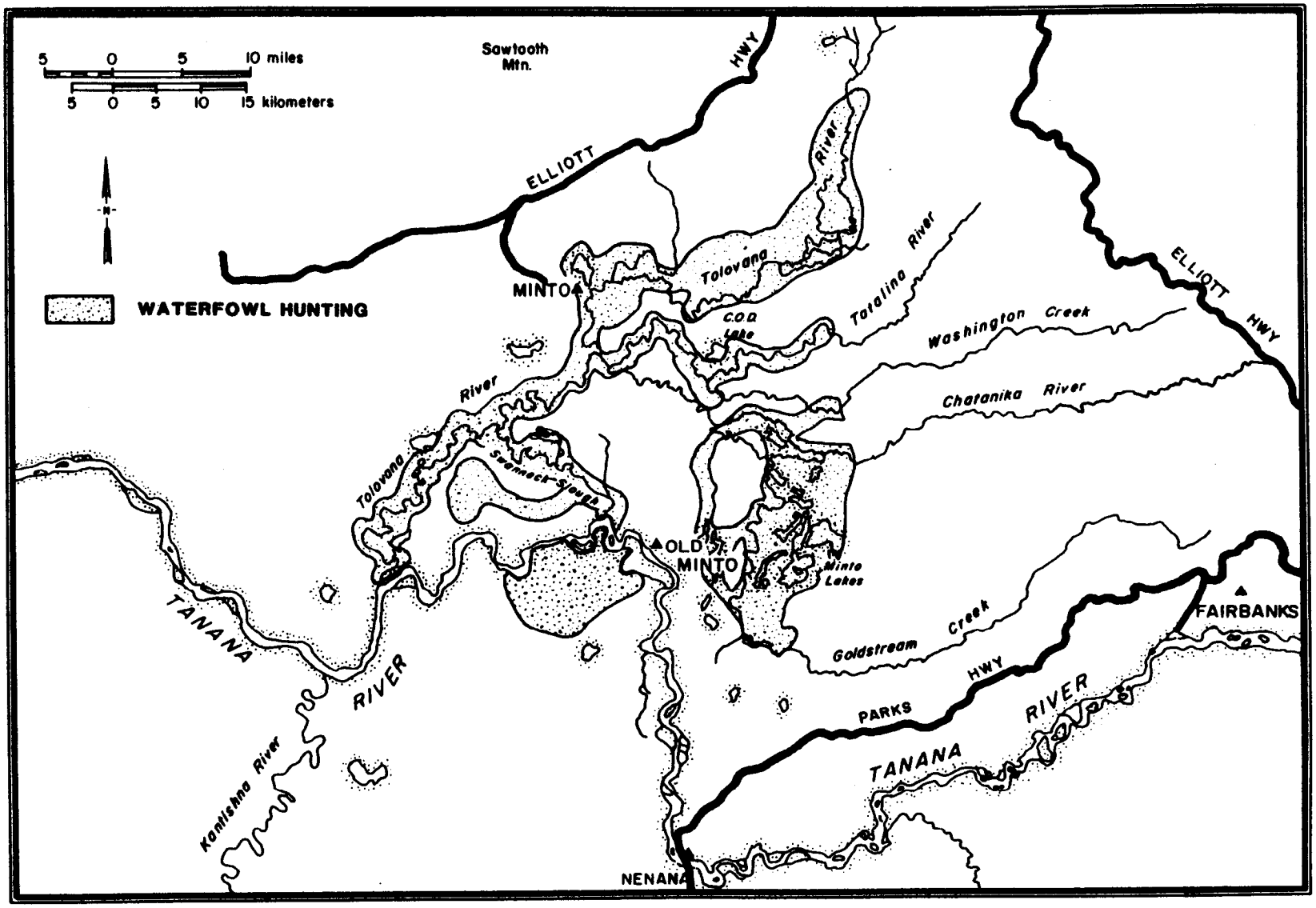


Fig. 23. Minto Waterfowl Hunting Areas, 1960-84.

such as spring 1984 and spring and fall 1985, waterfowl hunters can reach otherwise remote lakes and sloughs. Furthermore, Minto waterfowl hunters report fluctuations in numbers of different species from year to year -- sometimes one species is more prevalent than others and the next year the situation may reverse itself.

PARTICIPATION AND HARVESTS

Hunting for ducks and geese is an activity in which nearly every Minto household participates. As noted earlier, waterfowl hunting occurs both as a primary activity (that is, the sole intent is harvesting waterfowl) and during the course of other subsistence activities, particularly muskrat hunting and moose hunting. Eighty-two percent (37 of 45 Minto households) had at least one member who participated in waterfowl hunting, either as the person who actually shot the waterfowl or the person who accompanied another and provided the transportation by boat. Most (81 percent) of the participating households included a person who actually shot the waterfowl. For 11 waterfowl hunting parties for which we have information, 8 (73 percent) consisted of individuals from different households. Similarly, 8 (73 percent) were close relatives and included fathers and sons, brothers, and grandparents and grandsons. The other parties were also composed of men who were relatives and included an uncle and nephew, first cousins, and second cousins. Apparently women only occasionally join men in hunting parties which target waterfowl. However, women are commonly found as members of muskrat and moose hunting parties, occasions when waterfowl are harvested also.

Waterfowl hunting in the Minto Flats was undertaken by males from 15 to 69 years of age (Table 41). The average age of the waterfowl hunters was 35 with the greatest proportion (34 percent) of hunters between 30 and 39 years of age. Similarly, the greater proportion, 68 percent, of persons hunting waterfowl was less than 40 years of age (Table 41). Males aged 30-49 are most likely to hunt waterfowl (based on the year 1983) with 66 to 80 percent of those ages participating. Of males aged 20-29, 61.1 percent hunted; males aged 50-59, 40.0 percent hunted. One-third of males aged 15-19 hunted while 27.3 percent of males aged 60-69 years hunted. It is worth noting here there is only one household in the community in which there is not at least one male age 15 or older. Similarly, there are few households (six in total) in which there is an elder male, age 60 or older, but no male age 15 or older. Three of these six households, and the one lacking any males, account for 4 of the 7 households which did not actively participate in waterfowl hunting. Thus, virtually every household having a male member between the ages of 15 and 59 actively engaged in hunting waterfowl.

During the period from July 1983 through June 1984, 39 Minto households harvested a total of 1,255 ducks and 475 geese averaging 32 ducks and 12 geese per hunting household. Less than 5 crane were reported as taken and no swans were harvested.

USE

Minto residents process and use waterfowl in a variety of ways. They are eaten fresh, but are also frozen and occasionally dried for later use. Almost all households that harvested waterfowl ate some

TABLE 41. FREQUENCY OF PARTICIPATION IN WATERFOWL HUNTING BY MALES IN DIFFERENT AGE SETS, MINTO, 1983

Age Range	Number in Population	Number Waterfowl Hunting	Percent of Hunters	Percent in Age Set Hunting
0-9	23	0	0	0.0
10-14	4	0	0	0.0
15 - 19	10	3	7	33.3
20 - 29	18	11	27	61.1
30 - 39	21	14	34	66.7
40 - 49	10	8	5	80.0
50 - 59	5	2	7	40.0
60 - 69	11	3	0	27.3
70-79	4	0	0	0.0
80-89	2	0	0	0.0
90+	0	0	0	0.0
Total	108	41	100	

fresh, and most (85 percent) stored some for future use by freezing them. Ducks and geese are frozen unplucked and whole. Many ducks and geese which are taken when moose hunting and muskrat hunting are plucked at camping sites and eaten during those expeditions both by boiling and roasting them over an open campfire. After being plucked (except for the head and wings) the birds are singed over the campfire making the resultant soup or roast "tastier" by slightly charring the skin. In the past, the unplucked skin and feathers of the mallard were used in making hats for small children. Some ducks are plucked and then hung to dry for several days before being stored for later use. They are soaked in water before being cooked. It is not uncommon in the spring for the community to have a community-wide picnic which features duck soup which has been cooked in large quantities over open fires in the village. Similarly, duck soup often is served to residents and guests during the

course of funeral and memorial potlatch ceremonies. It is noteworthy that 46 percent (17 of 37 households) that harvested waterfowl reported giving away most of their harvest for potlatches. Most (73 percent) hunting households gave ducks and/or geese either to other households or for potlatches.

CHAPTER 8

BEAR HUNTING

Two bear species occur in and around Minto Flats, black bear (sresr; Ursus americanus) and brown bear (tsonee; Ursus arctos); black bear are encountered more often and are hunted. Brown bear are seen on rare occasions in the flats and people avoid taking them unless they pose a threat. Minto hunters often mention "cinnamon bear" (sresrtseek) which some consider a result of a cross between a black bear and a brown bear. These bears are taken since they inhabit the same areas and dens as black bear. Other than moose, black bear is the only other large game species harvested by Minto people (caribou were harvested pre-1940).

BEAR HUNTING ACTIVITIES AND HARVEST AREAS

Currently, black bear are generally encountered during other activities in spring, summer, and early fall. In the past, Minto men actively hunted bears in dens during fall after the rivers froze over. For example, one elder man noted when he was young, he checked bear dens located off his trapline trail after he placed his sets. Also, he noted that men joined together after freeze-up when the bears start to hibernate. These activities typically occurred using residences at Old Minto as a base prior to the move to the new village site in the early 1970s.

At present, bear are taken if they become a nuisance at fishcamps during the summer and early fall or during the course of other subsistence activities as noted above. People are always cautious of bears and always carry a weapon suitable for defense while hunting, camping, or berry picking. Usually when people stop to make tea and eat while in the flats or to camp overnight, someone checks the surrounding area for any sign of the presence of bear. Similarly, when moose hunting and berry picking, any recent bear sign is noted. Some men will stop and check a bear den for any evidence of its use, such as the abundance and "combed" appearance of grass at the entrance of the den; and several men have current knowledge of bear den locations in the Flats.

Fall black bear are favored because of the large amount of fat they contain prior to hibernation. Bear meat and its parts (including fat) are considered "specialty foods" and are customarily eaten by elders and served at funeral and memorial potlatches to revered persons in the community and highly respected guests. Bear fat, meat, and other parts are saved from fall hunts to be used at Christmas and New Year community-wide meals. As one man stated, "Any part of the bear is special." Bear fat is especially favored for frying mixtures of flour and water to produce a "fry bread" or bannock, locally called "beejee."

In the past, hunting bear in their dens required special skills in the use of spears and knowledge of many taboos associated with the hunting of bear and care and use of bear meat and parts (Olson 1968). Successful bear hunting with a spear was considered prestigious. Women were reported to have killed bear with a spear in the past, and as one elder stated, the important thing to know is where to strike the bear,

regardless of the weapon. Hunting bears in their dens involved blocking the entrance with a large birch or spruce tree, and then having the men create a lot of loud noise outside the den. When the aroused bear discovers its entrance is blocked, it will attempt to exit, and as it does, the waiting hunters strike it.

Currently, men usually use .30-.30 caliber rifles to shoot bear. During summer they are encountered primarily along the major tributaries of the area. They are often harvested between the village and Montana Creek to the east; up the Tolovana River; along the Chatanika to the mouth of Goldstream Creek (about 46 river miles distant; and along the lower Tatalina River (Fig. 24). Bear have also been hunted at the eastern limit of the River north toward the Elliott Highway. Bear dens occur at Little C.O.D. Hill and in the vicinity of Old Minto among other places. Bear have also been taken in an area near Old Minto and one to six miles below Swanneck Slough along both sides of the Tanana River (Fig. 24).

PARTICIPATION AND HARVESTS

In the Minto Flats area, 9 households had at least one member who hunted bear. In six cases, men hunted the animal alone, and in 3 cases they hunted with another man. Typically, men hunted with close relatives. These hunting pairs included a man and his 19-year-old son; an older man and his middle-aged "nephew" (second cousin, once removed); and two younger men who are "brothers" (first cousins through their fathers).

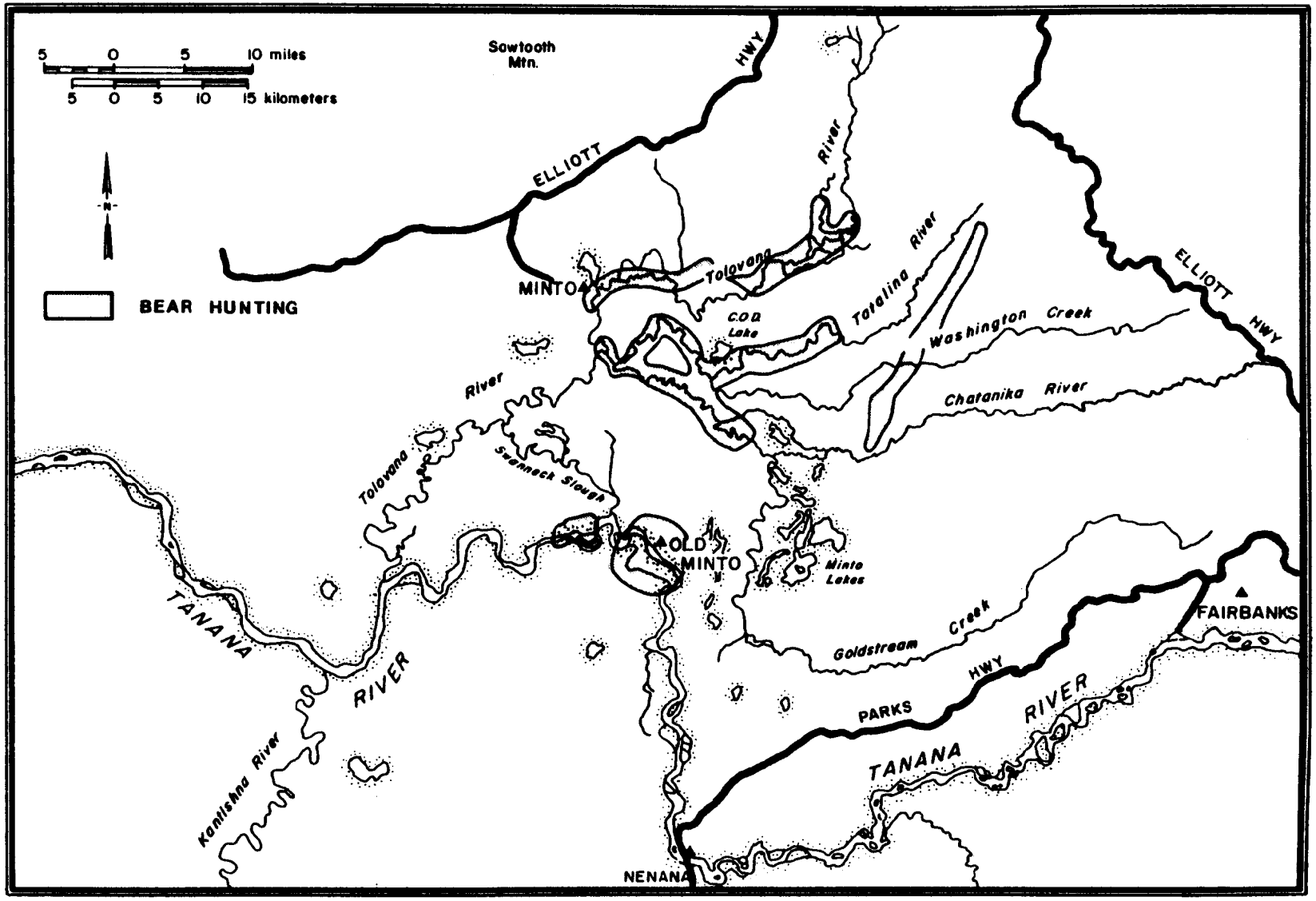


Fig. 24. Minto Bear Hunting Areas, 1960-84.

The 12 men who hunted bear ranged in age from 19 years of age to 66, with an average age of 40. Two-thirds were between the ages of 30 and 49 (Table 42). Nearly one-fourth of men aged 30 to 39 and one-third of those 40-49 years of age hunted black bear (Table 42). Younger men (ages 20 to 29) are not as active in bear hunting as those older.

The nine households which hunted black bear took a total of 15 animals for an average harvest of 1.67 bears per hunting household. Seven animals were harvested in the spring, five in the late summer or fall. The time of harvest for three animals was not reported. Four men each took two bear and two groups of two men also took two bear. Two men individually took one bear, and one group of two men took a single bear. Twenty-four percent of Minto households harvested bear during the study year.

USE

Despite the use of modern technology in hunting bear, the use of bear has remained much the same. As with most large game, the bear which has been killed is butchered by first cutting the animal skin lengthwise from the lower abdomen to the neck so that the hide and fat can be separated from the remainder of the carcass. After skinning and gutting, the arms and legs are severed from the rest of the body. Each limb is cut into three pieces along the joint, each of which goes to an individual or household. The ribs, backbone, and brisket are saved for use at a potlatch. The heart, tongue, and kidneys are cleaned, then cut

TABLE 42. FREQUENCY OF PARTICIPATION IN BEAR HUNTING BY MALES IN DIFFERENT AGE SETS, MINTO, 1983

Age Range	Number in Population	Number Bear Hunting	Percent in Age Set Hunting
0-9	23	0	0.0
10-14	4	0	0.0
15-19	10	1	10.0
20-29	18	1	5.5
30-39	21	5	23.8
40-49	10	3	30.0
50-59	5	0	0.0
60-69	11	2	18.2
70-79	4	0	0.0
80-89	2	0	0.0
90+	0	0	0.0
Total	108	12	

into small pieces and boiled or roasted and eaten shortly after the kill. The skull is discarded, although in the past elders roasted the skull over an open campfire. The remainder of the bear meat is frozen or dried if it is to be used later. The liver is not used. Bear meat is cooked either by roasting or boiling with other ingredients to make a soup. The fat removed from the hide is favored as a cooking oil but is also used with wild berries and whitefish to make an "Indian ice cream" dish. Bear meat should only be eaten by men and older women. Women of child-bearing age should not go near bear dens or even be present when bears are killed or skinned.

In the past, the brains from bears were used in tanning moose hides. The brain was put in a bag with warm water and left until it soured, at which time it turned a creamy yellowish green color. The hide was placed in the mixture and left until the hide absorbed it and

the remaining water was clear. The hide was then ready for tanning.

Historically, bear hides were placed on the floor of canoes by men to kneel and sit on. They were also used in the home as rugs to sit upon the floor. The fur was used in making clothing such as mittens. Bear teeth were used as sharpeners such as knives and arrows. The claws were used in making necklaces, bracelets, and as charms. It was reported also that bear hide was used for medicinal purposes as a cure for tuberculosis. The hide was burned and then it was boiled; the resulting broth was then to be drunk by the patient. Currently, the use of bear is limited to being a source of food and fat. Of the 15 bear harvested during the study year, at least six (40 percent) were donated for use at a potlatch, and at least six others were shared with people in other households, particularly parents. While this initial distribution may reach relatively few households, bear meat is frequently redistributed to older people.

CHAPTER 9

SMALL GAME HUNTING

Several small game species occur in the region used by the Minto people during the year. These include grouse, ptarmigan, hare ("rabbit"), and porcupine. Each of these plays a role in the subsistence activities of community residents.

Three species of grouse are well-known to the Minto region. Spruce grouse (dey; Dendragapus canadensis; "spruce hen") inhabit relatively limited white spruce environments, black spruce bogs, and birch woodlands for most of their lives (Armstrong 1983:100). However, in September and October they move to roads, dried streams, and lakes where they can get grit needed for the digestive change in their diet which occurs in fall (Armstrong 1983:100). Ruffed grouse (trouguda; Bonasa umbellus) are found among aspen and birch trees, particularly on the drier south-facing slopes and among willow and alder thickets along streams. Minto hunters report that they are common in certain areas of the Flats, but are not found throughout the region. Sharp-tailed grouse (cheltegi; Tympanuchus phasianellus; "pintail") inhabit willow and spruce thickets. These are reported as being relatively fewer in numbers in the Flats than the other grouse species.

Both rock ptarmigan (k'otth'eba; Lagopus mutus) and willow ptarmigan (k'otth'eba; Lagopus lagopus) occur in the vicinity of Minto Flats. Rock ptarmigan inhabit the upland areas surrounding the Flats while willow ptarmigan are found in the lower elevations and in the Flats.

Snowshoe hare (gukh; Lepus americanus; "rabbit") are found in mixed spruce forests, wooded swamps, and willow thickets (Ernest 1978) which occur throughout the area used by Minto residents. Porcupine (noonee; Erethizon dorsatum) occur throughout the boreal forest of Alaska where they can feed on spruce bark, birch, and in summer green leaves, buds, and aquatic plants (Bromley 1978). They use a variety of natural cavities for shelter such as dens, deadfalls, stumps, and hollow logs (Bromley 1978).

ACTIVITIES AND HARVEST AREAS

Grouse and Ptarmigan Hunting

Grouse are hunted principally during the fall along the 11-mile gravel road which connects the village with the Elliott Highway as well as about 24 miles west along the Elliott Highway (Fig. 25). This area combines each of the prime habitats noted above as well as suitable gravel required by grouse for its digestive change. The area is also popular for grouse hunting by sport hunters from Fairbanks, according to local reports. Grouse are sought also along the Chatanika River toward the hills, a distance of some 25 river miles from the village and along the lower reaches of Tatalina and Washington Creeks, a similar distance from Minto (Fig. 25). They are also hunted in the vicinity of the sled road along the eastern limit of Minto Flats from the mouth of Washington Creek south to Dunbar on Goldstream Creek and southwest toward Two-mile Lake (Fig. 25). Women who hunt grouse do so along the Minto Road while men who hunt do not restrict themselves only to roadside hunting and

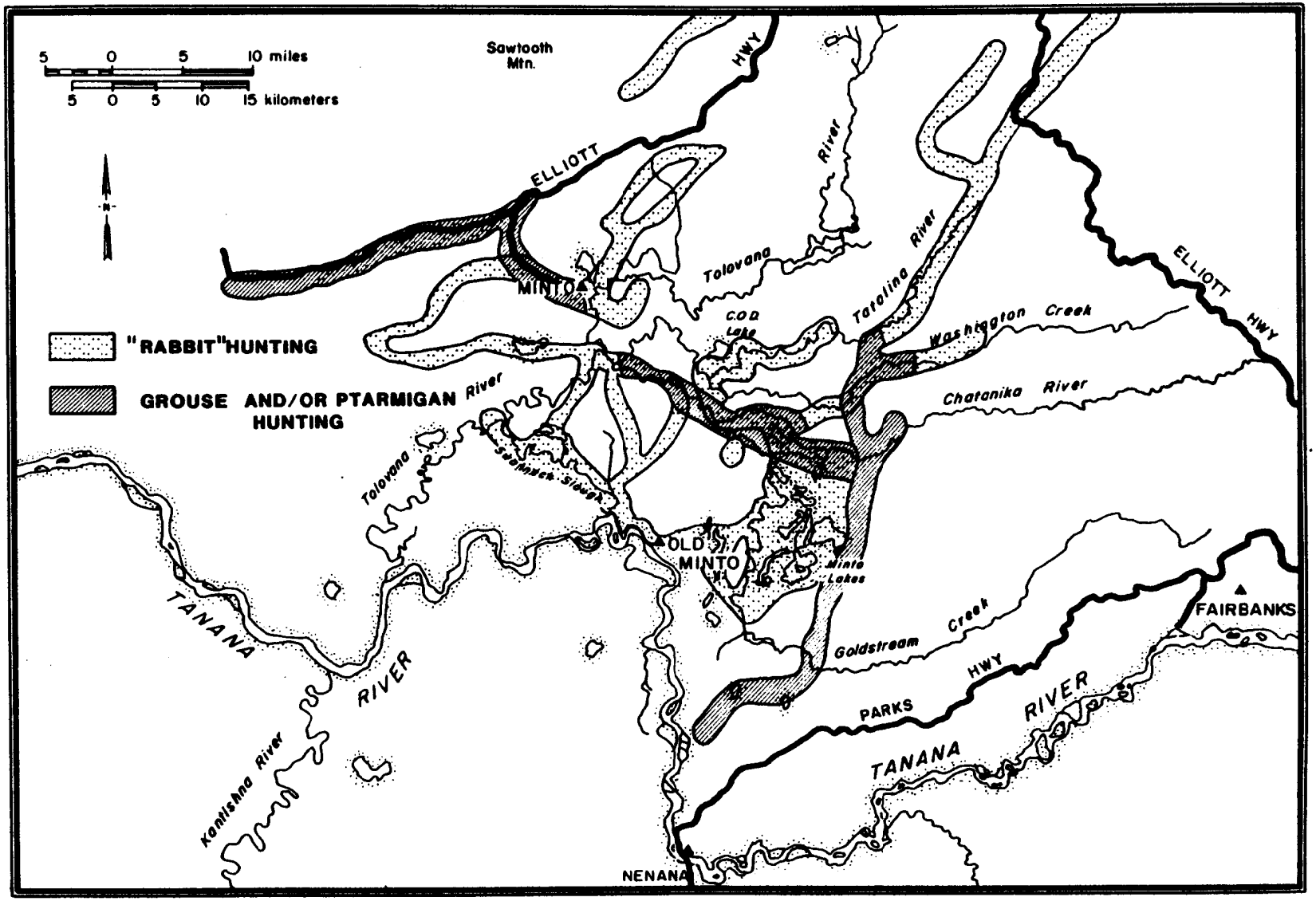


Fig. 25. Minto Small Game Hunting Areas, 1960-84.

often hunt along trails used as travel routes and trapline trails. Grouse and ptarmigan are harvested using .22 rifles, .410 shotguns, and snares.

Ptarmigan are taken on the 2,400-foot "Ptarmigan Hill" which is intersected now by the Elliott Highway about 10 miles from the junction with the Minto Road. This was once a customary hunting area for ptarmigan but is more commonly hunted by sport hunters from Fairbanks, based on local reports. Minto hunters take them along trails headed into the hills north of the village, and south along the trail to Old Minto.

Hare and Porcupine Hunting

Snowshoe hare are frequently taken during fall when "rabbit" drives are conducted in willow thickets along Swanneck Slough, about 30 river miles from the village, along the Elliott Highway west of the intersection with the Minto road, and on small islands in lakes and streams (Fig. 25). They are also sought in the winter along trapline trails extending 18 miles west and southwest of the village to the northeast some 24 miles; to the area east of C.O.D. Lake; in the eastern section of Minto Flats in the vicinity of Minto Lakes; as well as up the Tatalina River near the mouth of Globe Creek (Fig. 25). Snares are set along trapline trails for hare. Women and elders set snares near the village in winter.

Porcupine are not actively sought but are often taken when encountered. They are clubbed or when found in a tree, shot in the head with a .22 rifle.

PARTICIPATION AND HARVESTS

Grouse and Ptarmigan Hunting

During the study year, a total of 32 households (73 percent) had a member who hunted grouse or ptarmigan. In only one household did two members hunt, although they did so independently. Three of the 32 households hunted ptarmigan in addition to grouse. Most grouse were hunted in fall, although some people also hunted in winter and all ptarmigan were taken during the winter season.

Unlike waterfowl hunting, grouse hunting is not solely a male activity. Three women hunted together and one woman was accompanied by her young son. The three-woman party consisted of two sisters and their sister-in-law, all of whom are originally from other communities and are married to Minto men and live in separate households. These women were between the ages of 25 and 28. With one exception, men hunted grouse alone. One man hunted with his brother from Fairbanks. The ages of male grouse hunters ranged from 19 to 83 years of age with an average age of 44. Most hunters (39 percent) were between 30 and 39 years of age; roughly one-half of the male grouse hunters were less than 40 years of age (Table 43). The percent of males hunting grouse is relatively large (between 36 and 75 percent) in all ages above 30 years of age (Table 43).

Grouse hunters harvested a total of 528 grouse. Household harvests ranged from 4 to 55 with an average of 16 per hunting household. Three ptarmigan hunters harvested a total of 18 ptarmigan.

TABLE 43. FREQUENCY OF PARTICIPATION IN GROUSE HUNTING BY MALES IN DIFFERENT AGE SETS, MINTO, 1983

Age Range	Number in Population	Number Grouse Hunting	Percent in Age Set Hunting
0-9	23	0	0.0
10-14	4	0	0.0
15-19	10	1	10.0
20-29	18	3	16.7
30-39	21	12	57.1
40-49	10	5	50.0
50-59	5	2	40.0
60-69	11	4	36.4
70-79	4	3	75.0
80-89	2	1	50.0
90+	0	0	0.0
Total	108	31	

Hare and Porcupine Hunting

A number of households engaged in harvesting hares and some also took porcupine when encountered. Twenty-seven of the 45 village households (60 percent) took hares using snares or by shooting them during hare drives. During times other than the drive almost all (one exception) used snares to harvest hares. The drive technique when employed is used during late September, otherwise snared hare were generally taken from October through February. During the study year, snaring hare was solely a male activity undertaken by men from the ages of 19 through 83, with an average age of 41 (age missing in three cases), but in some years women set their own snares for hare. Like grouse hunting, most men who snared hare are between 30 and 39 years

(Table 44). Between 40 and 50 percent of the male population aged 30-59 hunted hare in 1983 (Table 44).

The 28 households harvested a total of 375 hare, which ranged from 2 to 50, and averaged 13 hare per hunting household.

Eight households (18 percent) reported taking porcupine. Since porcupine are taken solely on an opportunistic basis, data on harvesters was not collected. These households took 1 to 3 porcupine during the year, with a total of 12 porcupine taken.

TABLE 44. FREQUENCY OF PARTICIPATION IN HARE HUNTING BY MALES IN DIFFERENT AGE SETS, MINTO, 1983

Age Range	Number in Population	Number Hare Hunting	Percent in Age Set Hunting
0-9	23	0	0.0
10-14	4	0	0.0
15-19	10	1	10.0
20-29	18	3	16.7
30-39	21	10	47.6
40-49	10	5	50.0
50-59	5	2	40.0
60-69	11	3	27.2
70-79	4	0	0.0
80-89	2	1	50.0
90+	0	0	0.0
Total	108	25	

DISTRIBUTION AND USE

Most grouse and ptarmigan are eaten fresh shortly after harvest, although some are frozen for use at a later time. Over one-third (36 percent) of those who hunted grouse gave some to close relatives (gener-

ally parents) or to elders in the community. Two hunters also contributed grouse for use at a potlatch. Nearly the same percentage (35 percent) of men who snared hare gave some to close relatives (again, parents or siblings) or elders and one contributed some for use at a potlatch.

After cleaning, grouse and hare are boiled with purchased foods such as rice or macaroni to make a soup or are roasted, particularly in a campfire when in the field, such as on hunting trips or when operating a trapline.

CHAPTER 10

FURBEARER TRAPPING AND HUNTING

During the 1983-84 trapping season, Minto residents harvested eight furbearing species in the Minto Flats area. The bulk of the harvest consisted of marten and beaver, with mink, otter, fox, lynx, weasel, wolf, and muskrat accounting for the remainder. Trapping has been and continues to be a limited source of income for some. In addition, many furs are retained for local use rather than sold. Trapping provides raw furs which are tanned locally and used in making clothing. Beaver and muskrat are also used as a meat source. Because muskrat are taken currently primarily by hunting rather than trapping, and the patterns of harvest differ significantly from those for targeting other furbearing species, this activity is described in a separate section at the end of this chapter.

TRAPPING AREAS

Areas used currently for trapping furbearers extend throughout most of Minto Flats and some of the upland areas west and north of Minto Flats (Fig. 26). They occur in the southeastern area between Dunbar and Old Minto and Nenana; in the eastern area between Old Minto and the mouth of Goldstream Creek; in the northeast area between the Tatalina River and the Chatanika River; in central Minto Flats between the Chatanika and Tanana rivers; in the south between Swanneck Slough and the lower Tolovana River; and in the west between the present site of

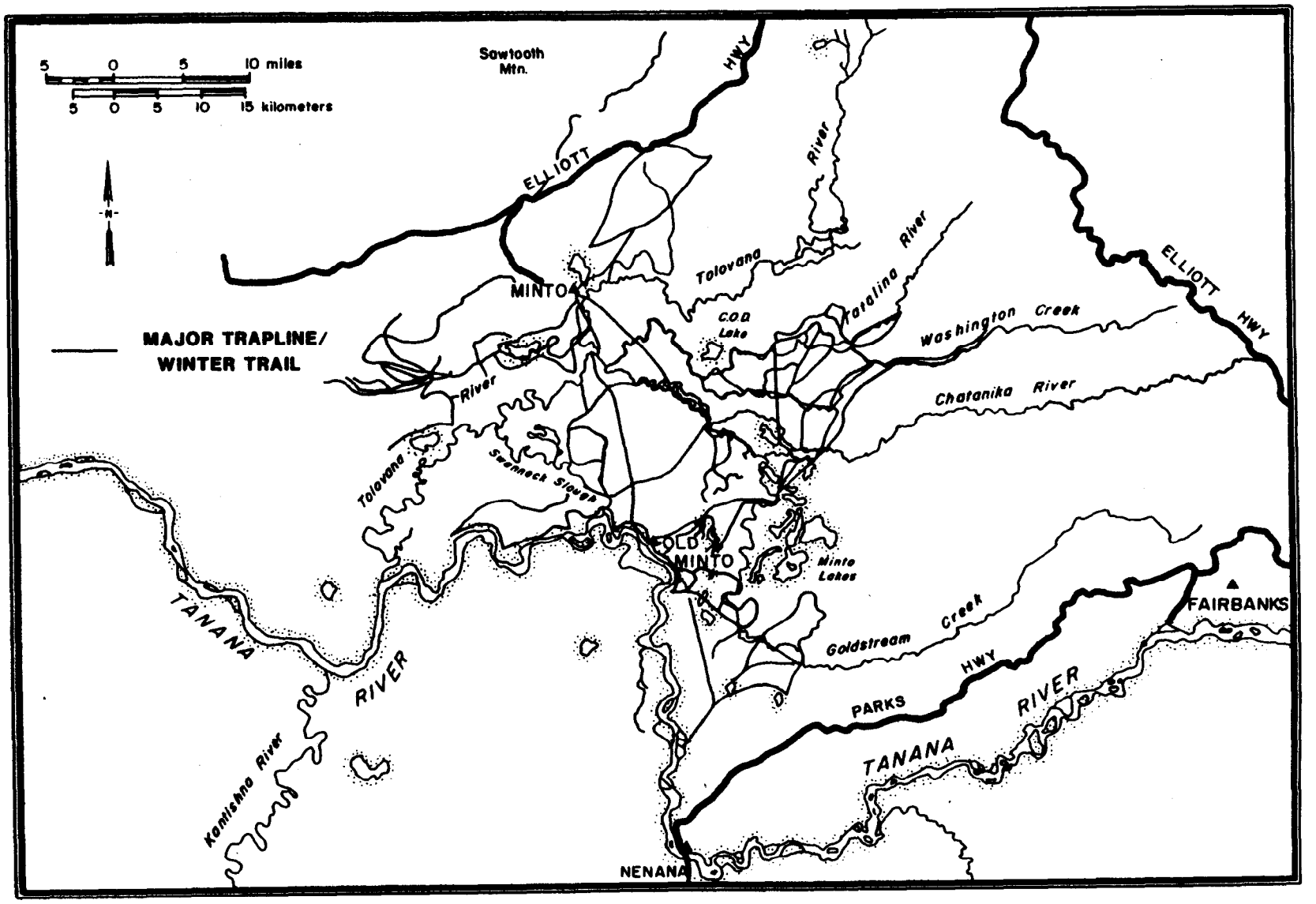


Fig. 26. Selected Traplines Used by Minto Trappers, 1960-84.

Minto and the Dugan Hills (Fig. 26). Upland areas include the West Fork valley of the Tolovana; the area between the Minto Road and the Dugan Hills; and Montana Creek area west of Tolovana Hot Spring Dome (Fig. 26). Additional areas used but not mapped specifically during this study include the "Green Hills" area south of the Tanana River opposite the head of Swanneck Slough and the eastern margin of Minto Flats east of the Minto Lakes. Traplines are relatively evenly distributed throughout the area except in the vicinity of the northern Dugan Hills and between the Tatalina and Chatanika rivers.

Traplines and Registration

For this study, traplines used by members of 15 households were mapped during interviews, with a sample of households for the purpose of recording geographic use areas as noted in Chapter 1. However, the number of trappers during the 1983-84 season was greater. These traplines are included in those shown in Figure 26 and provide some indication of areas used during that single trapping season. Not all trappers are active during each season or for the entire period, but trapping areas are frequently monitored during the course of other subsistence activities in winter and spring and when traveling to and from Minto, Old Minto, Nenana, the Minto Lakes, and the C.O.D. Lake areas. From observations and by information sharing, people are usually aware of use by others who are not residents of Minto.

Many men trap areas which were used by their fathers and one man with two lines reported that one was his uncle's (mother's brother's) trapline. A non-Native man married to a woman from Minto has been using

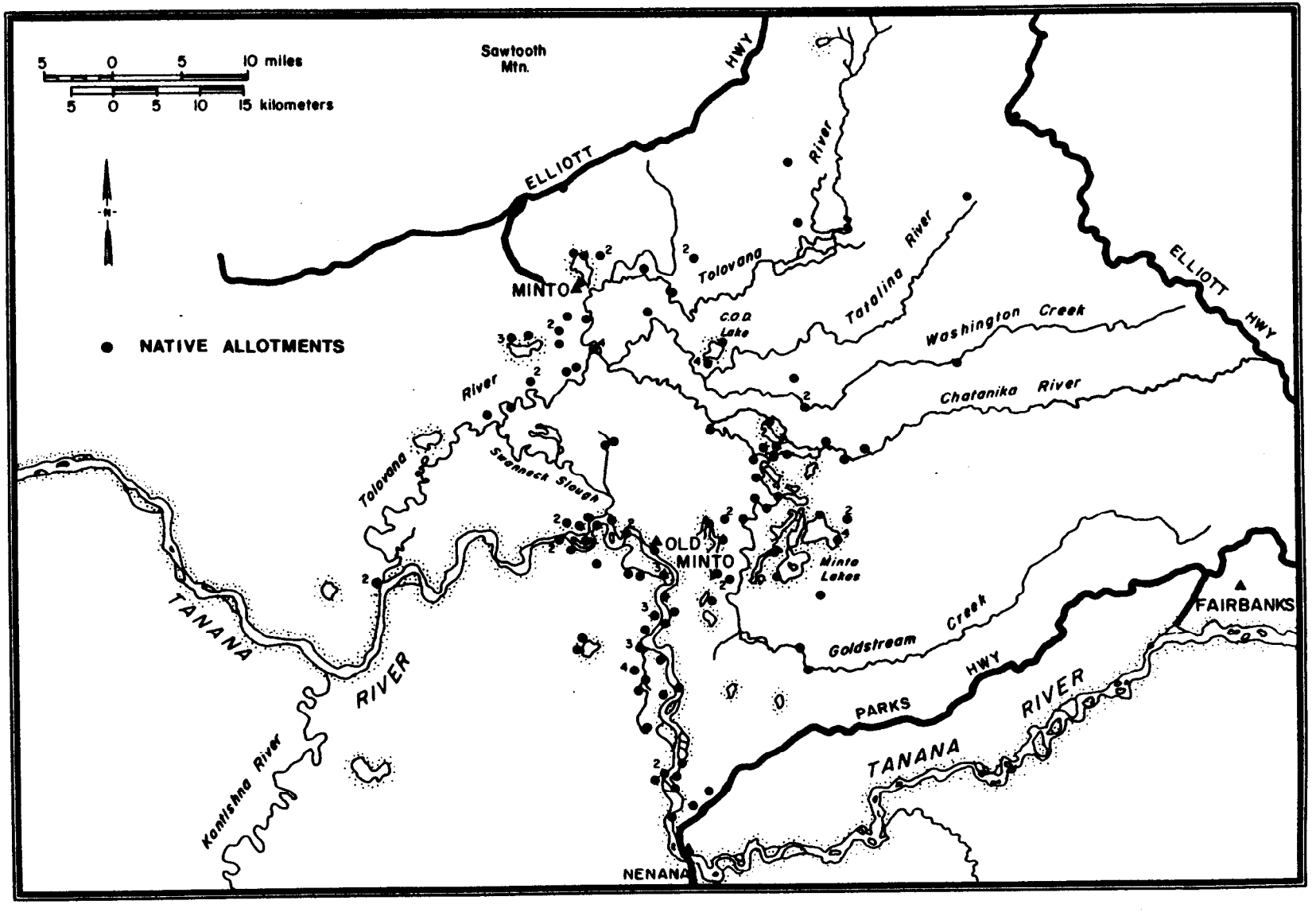


Fig. 27. Distribution of Minto Native Allotments (Patented and Applied For).

Presently, non-local trappers enter the Flats by aircraft or snowmachine for short periods of time to trap. These trappers rarely, if ever, come into contact with local trappers from Minto or Nenana who have customarily used a particular area. However, they compete for furs with established trappers.

In the interests of protecting individual customary trapping areas and conserving the furbearing resources within it, two voluntary trapline registration programs have been established, one by the Alaska Trappers' Association and the other by the Minto Village Council. Both programs are based on the principle of mutual respect and are intended to avoid conflicts by arbitration. Whereas the Alaska Trappers' Association program carries no legal force, the program of the Minto Village Council (1984) is codified as an ordinance. Registration with the Council requires use and renewal stipulations in order to keep registration current with activity. During May 1984, 38 Minto residents indicated an interest in the Minto trapline registration program (Minto Trapline Registration 1984). As of December 1, 1985, approximately 25 to 30 Minto residents had registered their trapline with the Village Council program (P. Titus pers. comm., 1985). As will be shown below, 22 men used their trapping area sometime during the 1983-84 season.

Five Fairbanks residents registered their traplines in the Minto Flats with the Alaska Trappers' Association. Portions of these lines overlap some of the lines registered with the Minto Village Council and most are located in the eastern portion of Minto Flats. Additionally, several men from Nenana trap in Minto Flats. Their long-term use of the area and adherence to the same customary system of use rights generally avoids conflicts (Shinkwin and Case 1984).

Access and Trapping Activity

Minto residents access trapping areas and run their traplines primarily by means of dog team or snowmachine, and rarely on foot or by automobile. During the 1983-84 trapping season, eight (36 percent) trappers used dog teams; nine (41 percent) used snowmachines; one (4.5 percent) used a car; and one (4.5 percent) traveled solely on foot. Means of transportation were unreported for three (14 percent) trappers. Generally, traps were checked three times a week, although a few trappers checked their line once or twice a week. Traplines range from 15 to 50 miles in length (Fig. 26), and at least two trappers used two lines during the 1983-84 season. Most men trapped alone, although three pairs of brothers and three fathers and sons trapped together some of the time, and one man reported that his wife accompanied him on occasion. One man's second cousin accompanied him sometimes during the season. Most men have trapped the area they now use since they were teenagers. Exceptions include two non-Native trappers included in the survey who also are residents of Minto, and have trapped the area they now use less than five years, and one middle-aged Native man who established an area he now uses three years ago.

Minto trappers primarily trapped marten, beaver, and fox during the 1983-84 season. In addition, otter, mink, lynx, weasel, and wolf were taken. The trapping season for all species, with the exception of beaver, opened November 1 in that portion of Game Management Unit 20(B) customarily used by Minto trappers. Beaver trapping in this area opened February 1. Some individuals have traplines which extend to the south

side of the Tanana River in Subunit 20(C) where the beaver trapping season opened on November 1 (Alaska Board of Game 1983a). Recent revisions in the regulations have provided for beaver trapping to begin in most of Subunit 20(B) on November 1 (Alaska Board of Game 1985a). However, due to declines in the lynx populations, the lynx trapping season now opens December 1 (Alaska Board of Game 1985a). Nevertheless, trapping regulations allow for concurrent trapping of most fur animals in the Minto Flats area with no limit on the harvest, with the exception of the 25 beaver limit (Table 45). The marten, mink, and red fox trapping seasons ended on February 28 while the remainder continued for varying periods of time into late winter (Table 45). Currently, lynx trapping ends on January 31 (Alaska Board of Game 1985a). Same-date openings enable trappers to set traps for many species at the same time, as a single trapline tends to be used during one season for harvesting multiple species of furbearers. Trappers do not maintain one line, for example, for trapping beaver and another for marten trapping. In recent years trapping has been limited in the early part of the season due to unseasonably warm temperatures in November and December which makes overland travel hazardous when overflowing water develops on otherwise frozen streams and lakes.

Lynx and wolf can be hunted or trapped. During the 1983-84 season, two lynx could be taken by hunting from November 1 through March 31, and an unlimited number of wolves could be taken from August 10 through April 30 (Alaska Board of Game 1983b). The same regulations are currently in effect (Alaska Board of Game 1985b), although lynx and wolf are rarely hunted by Minto residents at present.

TABLE 45. TRAPPING REGULATIONS, MINTO FLATS AREA, 1983-84.

Species	Season Dates[a]	Bag Limit
Beaver	February 1 - April 15 (November 1 opening effective 1985-86)	25
Lynx	November 1 - March 15 (December 1 - January 31 season effective 1985-86)	no limit
Marten	November 1 - February 28	no limit
Mink	November 1 - February 28	no limit
Otter	November 1 - April 15	no limit
Red Fox	November 1 - February 28	no limit
Weasel	November 1 - February 28	no limit
Wolf	November 1 - March 31	no limit

[a]Source: Alaska Board of Game 1983a, 1985a

PARTICIPATION AND HARVESTS

Nearly every household (88 percent) in Minto has at least one member who is knowledgeable about trapping, has engaged in trapping at some point in his or her lifetime, and is capable of trapping should the need or desire arise. Actual participation in trapping in the 1983-84 season was somewhat less, however, with 49 percent of all households having an individual who trapped during the season. All trappers in the study year were male. Market value of fur, food needs, suitability of equipment for trapping and transportation, individual inclination, and personal circumstances are some of the factors affecting trapping

participation in any one season. Trappers harvested at least two furbearer species during the season, with the exception of three individuals who trapped only one.

In total, 22 trappers harvested a total of 498 furbearers (Table 46). Marten account for the greatest number of animals (280) taken, representing 56.2 percent of the total followed by beaver (138) accounting for 27.7 percent. The other six species taken include mink (24), red fox (19), weasel (17), otter (15), lynx (4), and wolf (1) which together account for 16.1 percent of the furbearer harvest (Table 46).

TABLE 46. FUR ANIMAL HARVESTS, 1983-84 TRAPPING SEASON.

Species	Number Taken	Number of Trappers	Average Harvest per Trapper	Range
Marten	280	21	13.3	1-35
Beaver	138	17	8.1	3-20
Mink	24	6	4.0	1-11
Red fox	19	10	1.9	1-4
Land otter	15	5	3.0	1-9
Weasel	17	4	4.2	1-12
Lynx	4	3	1.3	1-2
Wolf	1	1	1.0	1
Total	498			

Harvest and Participation by Age

The 22 men who trapped ranged in age from 19 to 73, with an average age of 44. Over 50 percent of men aged 60-69 trapped, followed by men 40-49 (30 percent) (Table 47). Between one-fifth and 59 percent of all males aged 20-79 trapped.

TABLE 47. FREQUENCY OF PARTICIPATION IN TRAPPING BY MALES IN DIFFERENT AGE SETS, MINTO, 1983

Age Range	Number in Population	Number Trapping	Percent in Age Set Trapping
0-9	23	0	0.0
10-14	4	0	0.0
15-19	10	1	10.0
20-29	18	4	22.2
30-39	21	6	28.6
40-49	10	3	30.0
50-59	5	1	20.0
60-69	11	6	54.5
70-79	4	1	25.0
80-89	2	0	0.0
90+	0	0	0.0
Total	108	22	

Trappers in the 30- 39-year-old age group account for the greatest number of furs taken of all species except for wolf (Table 48). The only wolf taken was by a 62-year-old man and was caught incidentally in a lynx snare. Men in the 20-29 age group took the second greatest number, but almost the entire harvest was marten and beaver (Table 48). Trappers aged 30-39 also had the highest average number of animals trapped per trapper. This average is only exceeded by one individual represented in the 70- to 79-year-old age group. With this exception, trappers aged 30-39 on the average trapped more marten (16.3) whereas those in the 20-29 age group averaged more beaver (10.2) per trapper. Overall, this same younger age group accounted for the greatest average harvest of marten and beaver combined (25.4) with the exception of the 73-year-old trapper who, by himself, accounted for 31.0 percent of the average harvest (Table 48). Nevertheless, for all furbearer species

TABLE 48. DISTRIBUTION OF TOTAL FURBEARER HARVEST BY AGE CLASS, 1983-84.

Age Class	Number of Trappers	Species Trapped							Total
		Marten	Beaver	Mink	Fox	Otter	Lynx	Wolf	
15 - 19	1	2	3	0	0	0	0	0	5
20 - 29	4	61	41	1	3	0	0	0	106
30 - 39	6	98	26	12	7	9	3	0	155
40 - 49	3	45	26	0	1	1	1	0	74
50 - 59	1	4	3	2	1	0	0	0	10
60 - 69	6	45	33	6	3	3	0	1	91
70 - 79	1	25	6	3	4	2	0	0	40
Total	22	280	138	24	19	15	4	1	481

furbearer species combined, the average per trapper harvest for trappers between 20 and 49 years of age is about the same although number of trappers for each age group varies (Table 48). Males in the 60-69 year-old age group had the greatest percentage (54.5 percent) of trappers per age group followed by those 40-49 (30 percent) (Table 47).

Harvest and Participation by Household Size

As noted above, 49 percent (22 of 45) of Minto households had at least one member who trapped during the 1983-84 season. One household had two young men who trapped. More households (8) with a size of five or six persons per household participated in trapping than any other size (Table 49), although households with four or fewer persons (10) nearly equals the number of households with more than four persons (12) (Table 49). Average household catch of furs based on household size shows households with three of four persons and five or six persons average a greater fur catch than households of one or two persons and seven or more persons (Table 50).

Marten Trapping

Marten (*tsoogee*; *Martes americana*) account for more furbearers trapped than any other species (Table 46). These solitary animals inhabit black spruce thickets and bogs; when foraging they follow stream edges and edges of bog meadows where spruce thickets occur (Shepherd 1978). Consequently, traplines often extend through such areas to

TABLE 49. DISTRIBUTION OF TOTAL FURBEARER HARVEST BY HOUSEHOLD SIZE, 1983-84.

Household Size	Number of HH	Species Trapped							
		Marten	Beaver	Mink	Fox	Otter	Lynx	Wolf	Total
1 or 2	6	59	39	0	7	9	0	0	114
3 or 4	4	66	12	16	5	2	2	0	103
5 or 6	8	129	66	2	6	1	1	0	205
7 or more	4	26	21	6	1	3	1	1	59
Total	22	280	138	24	19	15	4	1	481[a]

[a]This does not include 17 weasel that were taken.

TABLE 50. DISTRIBUTION OF AVERAGE FUR HARVEST BY HOUSEHOLD SIZE, 1983-84.

Household Size	Mean Number Species Trapped Per Household							Total Avg. Harvest
	Marten	Beaver	Mink	Fox	Otter	Lynx	Wolf	
1 or 2	9.8	6.5	0	1.2	1.5	0	0	19.0
3 or 4	16.5	3.0	4.0	1.2	.5	.5	0	25.7
5 or 6	16.1	8.2	.25	.75	.12	.12	0	25.6
7 or more	6.5	5.2	1.5	.25	.75	.25	.25	14.7

intercept marten on the move. Some Minto trappers report that, in general, marten are more abundant than they were in the early 1970s and their range appears to be expanding. In the late 1950s, their numbers were so low there was no marten trapping season. In the early 1930s, marten and beaver were abundant and residents of nearby Tolovana and Tanana petitioned the Alaska Game Commission to open the then-closed marten and beaver seasons and appoint a sentry officer at Tolovana (Alaska Game Commission 1931: 67, 68). In 1904, marten are known to have been traded by Minto trappers at Fort Hamlin near Stevens Village on the Yukon River where they received between $4 and $5 in trade for the raw fur (Anonymous 1904). In winter 1902, 11 sled loads of fur from Minto were traded at Rampart (Smith 1967:154) and these likely included numerous marten pelts. The abundance of marten in Minto Flats has apparently fluctuated throughout the century, but also fluctuates from area to area within the Flats. Where specific areas exhibit fluctuating numbers, some trappers temporarily shift their use to another trapline.

More men trapped marten during the 1983-84 season than any other species. A total of 21 trappers (95 percent) harvested 280 marten with an average take of 13.3 marten per trapper (Table 46). Seventeen (80 percent) of 21 trappers reported whether they either sold or retained their marten catch. Of the 204 marten taken by these 17 trappers, 129 (63 percent) were reported as being sold and 75 (37 percent) were retained. Six trappers retained their catch, six sold their catch, and five kept some and sold some. Most furs which are retained are tanned at home and used in making marten fur hats, rather than being held to be sold in another year. During the 1983-84 season, marten pelts sold for $45 on the average, a price considered particularly good (Table 51).

TABLE 51. AVERAGE PRICES PAID FOR RAW FUR IN INTERIOR ALASKA, 1983-84 SEASON.[a]

Species	Average Price Paid in U.S. Dollars	Reported Harvest	Sold or Sealed	Percent Sold
Marten	45	280	176	63.0
Beaver	24	138	35	25.4
Mink	18	-	-	-
Red Fox	65	-	-	-
Land Otter	35	15	1	6.7
Lynx	312	4	1	25.0
Wolf	250	-	-	-

[a]Sources: Joe Mattie (pers. comm. 1986); Herb Melchior (pers. comm. 1986)

Beaver Trapping

Beaver (tso'; Castor Canadensis) account for the second largest number of furs taken by Minto trappers. The species is both a source of cash and of fur used locally in making clothing and footwear. The meat is used as food. Beaver trapping in spring is primarily for the purpose of obtaining meat, however, meat from beaver taken at any time is used. Currently, beaver are considered relatively plentiful compared to the early 1920s when there were few in the area. In the early 1930s, area residents petitioned the Alaska Game Commission to open the beaver season from February 1 to May 31 (Alaska Game Commission 1931:68), as noted above. Beaver dens are readily seen on many of the major waterways in the Minto Flats such as the Chatanika and Tatalina rivers where the animals construct bank dens. Where the water is more stable, individual and two-family lodges can be observed. Beaver dams can be found throughout the Flats particularly at the upper reaches of lesser

tributaries and small sloughs at lake outlets. Currently, the dens are not so large as to prevent access of humans or migrating fish into key areas. Minto trappers seek to "trap" or snare the largest beaver (ch'echugha') of a den, preferring to leave the smaller two-year-olds (ch'eɬno'). Beaver sets generally are removed from a den after two large beaver have been taken. This practice reportedly avoids taking younger animals and trapping out dens or an area.

Seventeen (77 percent) Minto trappers harvested beaver during the study year. A total of 138 beaver were taken with an average of 8.1 beaver taken per trapper (Table 46). Beaver commanded an average price of $24 during the 1983-84 season (Table 51). However, records indicate only a total of 35 beaver were sealed, probably indicating that most were retained for local use or trade, or retained for sale the following year in anticipation of improved fur prices.

Other Fur Animals

Six other furbearing species were taken by Minto trappers and participation and harvests were considerably less than for marten and beaver described above. Mink (tats'oodza; *Mustela vison*) were taken by six trappers. Combined harvest was 24 mink, with one trapper's harvest accounting for 11 of the 24 mink taken. Some Minto trappers report that mink are not as abundant in the Minto Flats as they were in the late 1940s; one trapper noted that as the marten population has increased and expanded its range, the mink population has decreased. During 1983-84, mink pelts sold for an average price of $18 (Table 51). In the

mid-1940s, Minto Flats mink sold for $8 to $12 (Minto Village Native Council 1944).

Red fox tend to inhabit broken country which characterizes much of Minto Flats and the lower elevations of the surrounding hills. There are three color phases of red fox (Vulpes vulpes) each of which carries a different term in the local Native language: nogeddhagezra (red); beteech'enat'onee (cross); and nogeddhazrena (silver-gray). Locally, fox are considered relatively prevalent at the present time. Ten (45 percent) of the trappers took fox, ranging from 1 to 4 per trapper. A total of 19 fox were taken by the 10 trappers (Table 46). Fox commanded a good price of $65 per pelt on the average (Table 51). During the mid-1940s, red fox sold for $6 to $10 and cross fox for $10 to $14 at the Minto Store (Minto Village Council 1944).

Land or river otter (bezreeya'; Lutra canadensis) are also found in Minto Flats where these aquatic animals are sometimes taken by Minto trappers. Five trappers caught 15 otter, ranging from 1 to 9 per trapper (Table 46). Currently, otter average $35 (Table 51), a considerable increase from the late 1960s when otter pelts averaged $15 (Nelson 1973:248), nearly the same as was paid in the mid-1940s when Minto Flats otter sold for $12 to $14 (Minto Village Council 1944). Otter require sealing, however, only one taken by Minto trappers was sealed in 1983-84.

Two species of weasel occur in Alaska and apparently both occur in Minto Flats as two Native Athabaskan terms are used to distinguish them. One is the short-tailed weasel (choghozrena; Mustela erminea) and the other is the least weasel (chesrga; Mustela rixosa). Weasel are found in the forested and brushy areas, not in the wet sedge or grass meadows

which occur in much of the Minto Flats. Their take is incidental as they are often found in traps set for other animals such as marten. Four men took 17 weasel of which 12 were taken by a single trapper (Table 46).

Lynx (Lynx canadensis) inhabit spruce forests, subalpine brush fields, and marshes where hare are common, and their numbers are known to fluctuate with those of hare (Berrie and Ernest 1984). Currently, there are reportedly very few lynx in the Minto Flats area compared to ten years ago. Recent restrictions on the lynx season discussed earlier also attest to this decline. One trapper noted that as lynx numbers increase, marten numbers decrease. In the past, lynx fur was used in making winter clothing such as hats, mittens, and coats. Today their use is in making mittens. They are caught primarily in snare sets, although sometimes they are shot if the opportunity arises. Three trappers harvested four lynx in the 1983-84 season (Table 46). One of these was sealed. The average price paid for Alaska lynx on the Seattle Fur Exchange was $312, although prices paid locally probably were somewhat less (Table 51). This is a considerable increase over the $15 to $40 per pelt range of the late 1960s (Nelson 1973:234) and the $20 to $40 range of the mid-1940s (Minto Village Council 1944). Locally, lynx are known by three Athabaskan terms: nodooyee; ch'ekooda; bek'ahkulayee.

Currently wolf (tookonee; Canis lupus) are abundant in the Minto Flats; they are considered to pose a threat to the already low moose population in the area (Alaska Department of Fish and Game 1985). In fall 1984, prior to initiating a wolf predation control program in western Subunit 20B, which roughly corresponds to the study area in this

report, wolf numbers were estimated at 87 to 101 animals in 13 to 16 packs (Alaska Department of Fish and Game 1985). Twenty-six wolves were taken as part of the predator control program during late fall 1984. Continued predator control was approved by the Alaska Board of Game for the 1985-86 winter season as wolf numbers were still considered high enough to be a threat to sustained yield of the moose population. Thirty-two wolves were taken by the Department personnel during that season.

Minto trappers rarely trap or shoot wolves. During the 1983-84 season, one trapper succeeded in unintentionally taking a wolf that got caught in a snare set for lynx. Wolves are especially difficult animals to trap, are rarely seen, and currently bring a relatively low price of $250 per pelt compared to earlier years (Table 51).

POTENTIAL VALUE OF FURS AND TRAPPING

Because pelts from fur-bearing species can be sold on the commercial market, trapping can be considered a limited source of income for an individual or a family. As noted earlier, nearly every Minto household has at least one member who has the knowledge and physical capability to do at least some trapping during the year. It was shown that in 49 percent of households, one household member does chose to trap. One man who spent a considerable part of his life trapping noted he "never got rich by trapping, but lived pretty good" whereas nowadays "you can't make a living by trapping" [in Minto Flats]. Trapping does not require simply knowledge and fitness, but adequate transportation with snowmachines or dog teams, and the associated costs of gasoline and

oil or dog food. Furthermore, it requires having familiarity with a particular trapline, obtaining permission to use it (if one does not already "own" it), clearing it, or in some cases establishing a new line. A variety of trapping equipment is also required which at a minimum includes cold-weather clothing, a tent and associated camping equipment, traps and/or snares, rifles, and ice chisels. In addition to these requirements, a trapper obviously needs to have time away from other commitments such as village leadership, family obligations, and seasonal employment. A few Minto trappers spend extended periods of time based on their trapline, while most operate out of the village. Still, most check their lines two or three times a week.

The potential and actual value of the fur harvest to a trapper varies considerably from household to household. This was alluded to earlier when it was shown, at least for marten furs, that essentially an equal number of households retain furs as sell them, while others retain some and sell some. Similarly, the low number of sealed beaver skins compared to the total harvest points to local use either in local trade or manufacture (Table 51). Only 25 percent of the beaver taken were sealed. Retained pelts are traded locally or manufactured into something which is used by a family member, given as a gift, exchanged or sold locally, or sold outside of the community. An estimate of the potential fur value can be computed to compare it with other sources of income available in the community to individuals. In addition, the replacement value of beaver meat can be computed.

Based on average prices paid for furs in the 1983-84 trapping season (Table 51), the potential value of raw furs taken by Minto trappers was $19,602 or $852 per trapper (or $891 per trapping household).

To this can be added the value of meat of the 138 beaver taken using a replacement cost method (Usher 1976). Using an edible weight of 28 lbs per beaver (40 lbs round weight [Shepherd 1984] x .70 conversion factor) and multiplying by a nutritional factor of 1.4 (21.8 grams protein per 100 grams beaver divided by 15.7 grams protein per 100 grams imported domesticated animal products), and then multiplying by a mean local retail replacement cost of $3.42 per pound imported, meat, fish, and poultry, assuming that imported meat are equivalent substitutes for wild foods (Table 52), that people have the money to buy the foods, and that an infrastructure exists (freezers, transportation, stores) to provide the substitutes. This computes to a replacement value of $18,501 (Table 52) which approaches the $19,602 potential raw fur value of all fur animals taken. It is worth keeping in mind that the edible meat of 138 beaver equals approximately 3,864 lbs, roughly 21.7 lbs per capita. The contribution of beaver meat compared to other wild foods is presented in the final chapter.

The variability of potential raw fur value among households and trappers is worth noting. This potential value ranged from $120 to $2,397 per trapper, and from $120 to $2,851 per household. The catch for most is valued at less than $500 per trapping household with a value of less than $500 for 68 percent of all trapping households (Table 53). In comparing the potential income from furs to a household's total income as described in Chapter 3 (Table 23), income from trapping contributes between 1 and 23 percent of the average household income. These values are nearly doubled when one considers the replacement cost value of beaver meat per trapping household which nearly equals the potential raw fur value (Table 54).

TABLE 52. REPLACEMENT VALUE OF BEAVER MEAT

Catch		Dressed Weight Per Beaver[a]		Nutritional Factor[b]		Local Retail Price: Meat-poultry[c]		Total
138	X	28 lbs	X	1.4	X	$3.42/lb	=	$18,501

[a].70 conversion from round weight
[b]Wild meat has 1.4 times more protein per unit weight than domesticated meat and poultry
[c]Average cost per pound of four types of meat and poultry available at the village store in June 1984 (this report)

TABLE 53. POTENTIAL RAW FUR VALUE PER TRAPPING HOUSEHOLD.[a]

Potential Value in U.S. Dollars	Number of Trapping Households
Less than 500	10 (45%)
500 - 999	5 (23%)
1,000 - 1,499	2 (9%)
1,500 - 1,999	2 (9%)
2,000 - 2,499	2 (9%)
2,500 - 2,999	1 (5%)
Total	22 (100%)

[a]Potential raw fur value is the gross monetary value to trappers if all furs were sold at the average market price on export markets. It is a conservative estimate of the actual value, as a portion of furs are returned for local use or local trade.

TABLE 54. REPLACEMENT COSTS FOR BEAVER MEAT PER TRAPPING HOUSEHOLD.

Replacement Cost in U.S. Dollars	Number of Trapping Households
0 (no beaver taken)	6 (27%)
Less than 500	4 (18%)
500 - 999	6 (27%)
1,000 - 1,499	3 (13%)
1,500 - 1,999	1 (4%)
2,000 - 2,499	2 (9%)
Total	22 (100%)

MUSKRAT HUNTING AND TRAPPING

Minto Flats is one of the major muskrat areas in the entire state (Ernest 1984). Muskrat (dzen; Ondotra zibethica) feed on aquatic and shoreline plants such as the roots and stems of cattails, sedges, and grass (Ernest 1984). They are subject to wide variation in population size as their shelters are particularly influenced by water, snowfall, and temperature conditions. Cold winters with little snowfall cause entrances to their houses or "pushups" to freeze while a mild winter with heavy snowfall can result in near flooding conditions in spring, disrupting bank den shelters and caches (Shepherd and Matthews 1985:103). The latter occurred during spring 1985. Currently, muskrat can be hunted and trapped between November 1 and June 10 with no limit on take (Alaska Board of Game 1985). These season dates accommodate customary uses and periods of harvest.

Because the patterns of muskrat hunting and trapping differ from those for harvesting other furbearers, this activity is described separately. In many respects, spring muskrat hunting is similar to waterfowl hunting patterns described earlier and at times the two activities commonly coincide.

In the late 1930s, muskrat were reportedly plentiful and, as in earlier times, people set up camps throughout the flats to trap and hunt muskrat from March through May. Some families from other areas such as Tanana, Rampart, Stevens Village, and Nenana also came to Minto Flats, camped, hunted, and trapped muskrats at this time of year. For families with school-age children, the men moved out into the flats first. If women joined the men at camp, they worked on the skins and dried the

meat for human consumption and set and check muskrat traps close to camp. Then men checked traps in more distant areas and returned to camp when they had a sufficient load to be processed. Spring muskrat hunting and trapping by Minto people has been thoroughly described in two works by Minto residents (see Frank 1983 and Charlie 1962). In May, school-age children were taken from school and with the other women joined people at the camps. Beaver were also taken during this time during late April and May (Olson 1968:170). At that time, the beaver skins were sold or traded to a man who operated a roadhouse and trading post below Old Minto (Olson 1968:172). Later, in the 1940s, they were sold or traded primarily to the village cooperative store (Minto Village Council 1944).

Thirty years later, in 1967, an anthropology student who was resident in the village, reported that in late April through May, "entire families, even those with school-age children, leave for the flats to trap and shoot muskrats" (Olson 1968:230). But by this time, the muskrat population in the Minto Flats had reportedly declined significantly, although in the early 1980s, residents report it "seems to be coming back." In 1967, a Bureau of Indian Affairs report estimated Minto residents harvested 3,000 muskrats. In the early 1960s, a wildlife biologist/trapper estimated his partner took 600 muskrats in Minto Flats; at that time, the only other "high year" since 1952 when he was able to take 2,000 rats. About 80,000 muskrats were taken that season in 1952 (Shepherd pers. comm., 1985). This differs dramatically from the 1984 harvest of 533 (discussed below) for the entire community during about a one-month period.

Hunting Areas and Camps

Muskrat hunting continues to be primarily a family activity. Currently there is little muskrat trapping, but muskrat hunting begins for most as soon as major tributaries such as the Chatanika, Tatalina, and Tolovana rivers are free enough of ice to provide access to muskrat habitat. These areas at a minimum include the Minto Lakes area, "Grassy Slough," and "Willow Creek", tributaries of lower Washington Creek, the "Crow Found Creek" near the Tolovana River north of Minto, and the "Rock Island Slough" area south of the village (Fig. 28). In some years, high water and ice jams make many other areas throughout the flats accessible by boat and/or canoe. In other years, such as the 1985 season, a near record late date of breakup hampered access to many areas until late in the season. One group of people from four families had been camped at a "spring camp" site in one of these areas since mid-April and had access to muskrat hunting areas throughout the season. Members from two other families took five days to reach that camp during mid-May due to ice jams they encountered enroute during the exceptionally late breakup. Despite the late breakup, the spring hunt reflected a pattern where members from different families joined together at a spring camp for muskrat hunting. When traveling and hunting in the flats, adults frequently point to or describe places that were used for spring camps in particular years. Some still have evidence of the intense activity: long tables on which to skin muskrats, and evidence of large pieces of birchbark stripped from trees on which to skin muskrats. Other places are still used as muskrat hunting camps in some years.

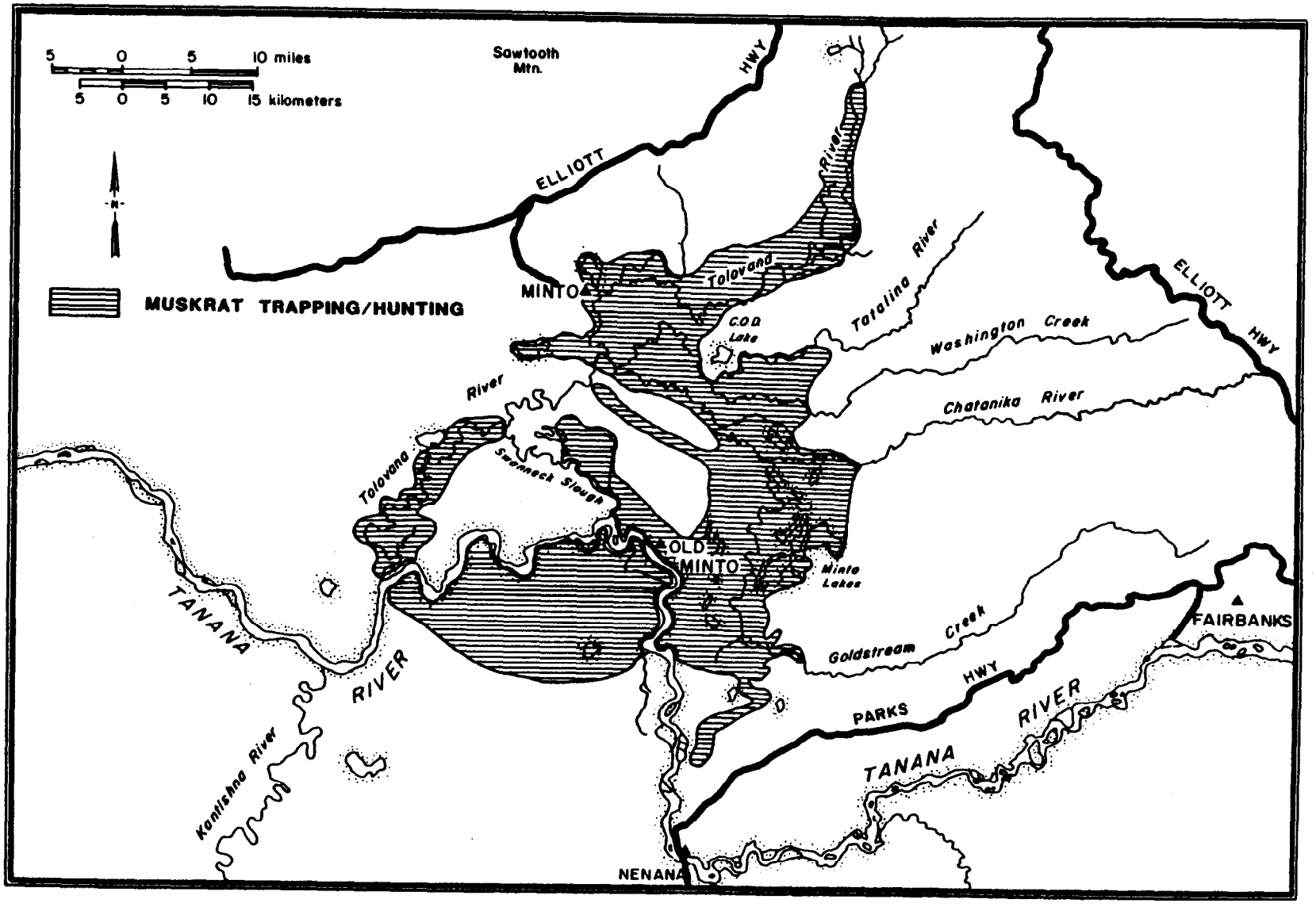


Fig. 28. Minto Muskrat Hunting Areas, 1960-84.

Access to muskrat hunting areas is by motorized river boat. Hunting with .22 caliber rifles occurs from the boat and at times from land when at camp. Occasionally, if a canoe has been cached at a campsite, it is used to reach lakes and sloughs too shallow for motor-driven boats.

Since river and lake ice are still present at this time of year, access is often possible or restricted depending upon wind. Muskrat hunters constantly monitor the occurrence of wind and its direction. Ice jams in rivers, sloughs, and lakes come and go with the wind and rising and falling water levels can leave a hunter stranded either at camp or at a more remote hunting area. Although the lightweight flat bottom river boats are advantageous for "jumping" the smaller ice and log jams, large jams extending 1,000 yards and more are considerably more disruptive for access to hunting areas.

Hunting takes place in the evening until dark, which at this time of year can be as late as midnight. Today, six continuous hours of hunting is not unusual. In the past, such as the 1930s, people reported being able to get 50 to 65 rats in 1-1/2 to 2 hours in the evening. And in the 1950s and 1960s, families could, in a typical year, get 300 to 500 rats during a three-week hunting period after which they returned to the village. Muskrats are skinned and gutted the following morning. The meat and skin are hung to dry and the entrails are placed in areas near the waters edge where mink can feed on them. Muskrat carcasses and half-dried meat can be preserved in snow banks until used for human consumption and before returning to the village. In the recent past and for families at spring camp, the meat, skins, and gear were transported by airplane to the village.

Participation and Harvests

People from 18 households (40 percent) reported hunting muskrat during the 1984 season. The composition of the hunting groups for that season was not recorded, but based on observations during the 1985 season, they generally consist of household or close family members. Eight hunting parties observed during a two-day period included a married couple and some of their children and/or grandchildren (six cases). Children and grandchildren were males as well as females in nearly equal numbers. One of these parties included the woman's "uncle" (her father's first cousin). Another party included a man, his daughter and son-in-law who were to join the man's wife camped with others at a distant spring camp, and the other included two young men who are second cousins and a young male friend (non-relative) of theirs. Similarly, the individuals at spring camp consisted of an elderly married couple, their granddaughter, and two young men who were related to the elder man through one of their parents (a cousin to the elder man). Of the people who were joining this group after the ice went out, two were closely related to the elder woman, one as a cousin and the other as another cousin's daughter. The other elder woman in camp was distantly related to the rest of the people at camp. Of the 12 households observed, muskrat hunting in 1985, seven also reported hunting in 1984.

In 1984, muskrat hunters harvested 533 muskrats. Household harvests ranged from 1 to 125. The average household size of muskrat hunters was 4.5 persons, although there was no relationship shown between household harvest of muskrat and household size. A relationship was seen, however, between muskrat hunting and ownership of a boat and

motor. That is, individuals from households without a boat generally did not harvest muskrat (Table 55). Of the five that did hunt, three had a parent or sibling with a boat they used to hunt. It is difficult to assess harvest on the basis of age of hunter since people of nearly all ages participate in shooting to some extent.

TABLE 55. HOUSEHOLD HARVESTS OF MUSKRAT IN RELATION TO BOAT OWNERSHIP.

	Equipment Ownership		
	Boat	No Boat	Total
Harvested Muskrat	13 (50.0%)	5 (22.7%)	18 (37.5%)
Did Not Harvest Muskrat	13 (50.0%)	17 (77.3%)	30 (62.5%)
Total	26	22	48

CHAPTER 11

PLANT GATHERING

Several species of edible and non-edible plants are used by people in Minto, primarily berries, wild rhubarb, and wood. The harvest activities, areas, and harvest levels are described below. The common English name is followed in parentheses by the Minto Athabaskan name as cited in Krauss' (1974) Minto-Nenana Athabaskan dictionary, and the scientific name as noted in Hulten (1968). Discussions about less commonly occurring berries were prompted by looking at color photographs in a popular wild berry identification guide (Alaska Northwest Publishing Company 1982).

BERRIES

In the Minto Flats area, three species of cranberries and one of blueberries occur and are collected by area residents. The cranberry plants include the lowbush cranberry (neetl'et; Vaccinium vitis-idaea); swamp cranberry (chenk'uch'eneltodhee; Oxycoccus microcarpus); and the highbush cranberry (tronelttha; Viburnum edule). The blueberry species is the bog blueberry (jega; Vaccinium uliginosum). Blueberries and cranberries are harvested in summer and fall in key areas along major tributaries in the Minto Flats, the Tanana River, Minto Road, and the Elliott Highway (Fig. 29). In the past, swamp cranberries were actively harvested in spring, particularly right after breakup along edges of

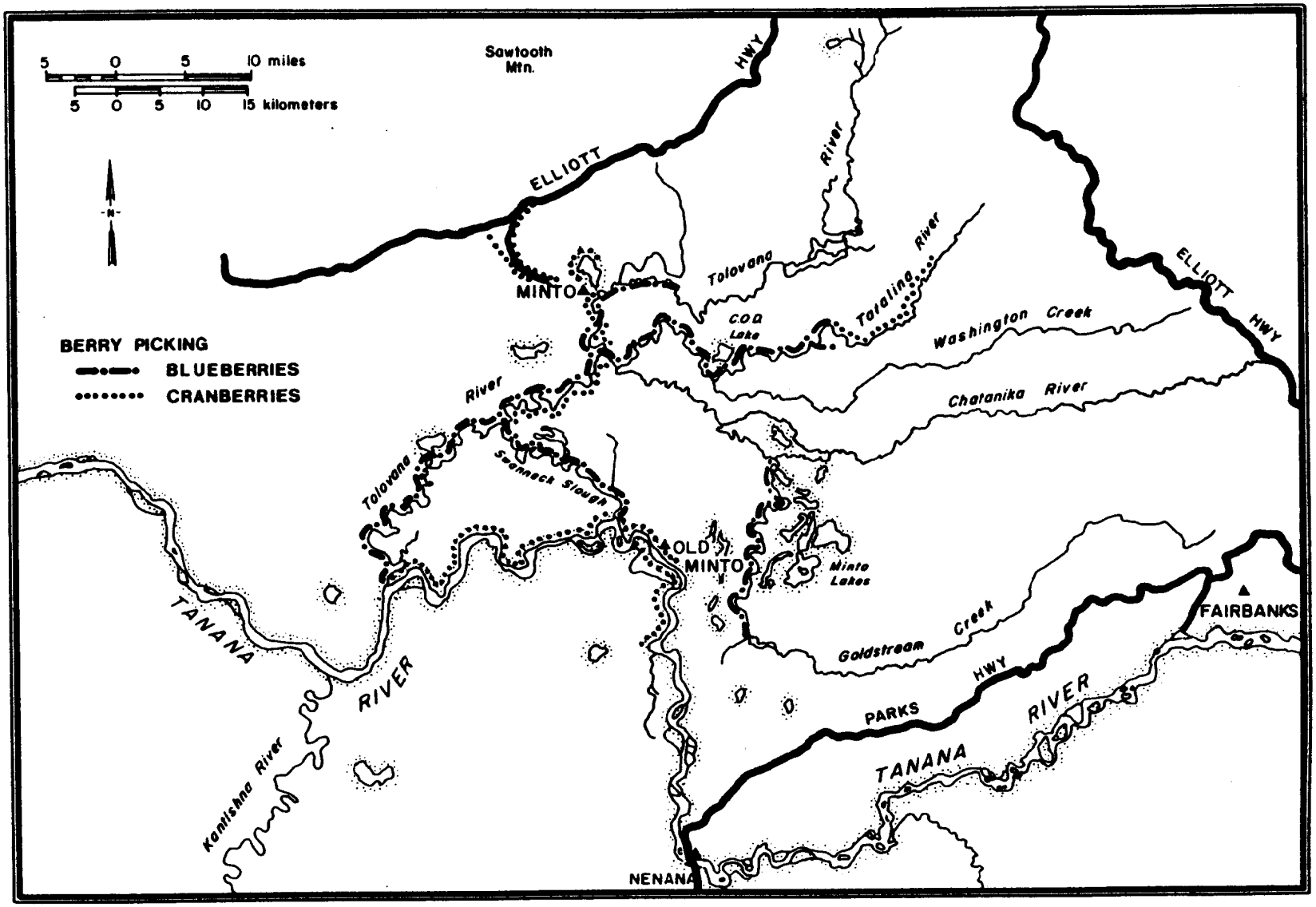


Fig. 29. Minto Berry Picking Areas, 1960-84.

swamps. Today, some individuals still collect some swamp cranberries at that time of year, but not necessarily every year.

Blueberries are harvested beginning in July and sometimes continuing through August. The occurrence of blueberry patches is not continuous, rather they occur sporadically along the river system. Their locations are easily observed to those with trained eyes as one travels along the river. Throughout the early summer, river travelers will periodically stop and check the patches to determine the growth of the blueberries and their abundance as the time of their ripening nears. They are harvested where they occur in patches along the Tolovana River extending from the mouth of the Tolovana River, 57 river miles below the village, to about 10 river miles above the village; along Swanneck Slough and along the north bank of the Tanana River; up the Tatalina River to a distance of about 30 river miles, and along Goldstream Creek in the eastern portion of Minto Flats (Fig. 29). Blueberries are also harvested along the Elliott Highway to the west midway between the Minto Road turn-off and Manley Hot Springs (Fig. 29). Some residents noted increased siltation in streams resulted in loss of some berry picking areas. During high water stages, the areas are inundated; when water level drops, the silt becomes deposited in these areas. People believe the increase in the amount of silt has had an adverse effect on the growth of berry plants because it "dries out" the soils in which the plants normally thrive.

Lowbush cranberries are harvested generally beginning in mid-August into September. Harvest areas are along rivers, in specific areas different from those of blueberries. Lowbush cranberries are gathered along the Tolovana River to its mouth; north of the village around the

edge of "Windy" Lake; along the Tatalina and lower Washington Creek; and along Goldstream Creek (Fig. 29). Lowbush cranberries are gathered also along the Minto Road and adjacent trails. Highbush cranberries do not occur in the Minto Flats proper; instead they occur along the Tanana River and often are harvested from fish camps which are situated between Totchaket Slough and the mouth of the Tolovana River (Fig. 29).

Swamp cranberries can be harvested along swamp/lake edges in the Minto Lakes area and north of the lakes near the Chatanika River. Swamp cranberries were important in the past as a food resource, in spring when other resources were not available and "people were really hungry!" They were harvested after breakup as the snow began to melt enough to expose them. People also spread ashes over areas where the swamp berries were located in order to facilitate the snowmelt process. People went into water up to their hips in order to harvest them. Swamp cranberries were also harvested during October as ice forms on lake edges.

Blueberry and cranberry gathering areas are reached primarily by means of river boat and then on foot. Access to berry patches along the road system is by vehicle and then on foot, although people often walk to cranberry patches along the road and trails near the village. These nearby areas are used primarily by people who have no other means to reach berry patches in the Flats. Similarly, other berry picking areas along the road are used primarily by individuals without access to a boat to reach places in Minto Flats, but also as a secondary harvest area by others.

Several other berry plants occur in the area and some are collected on occasion. Their use today has diminished from earlier times. These

plants are: crowberry (ne/teneenagha'; Empetrum nigrum); raspberry (nekotl; Rubus idaeus); red currant (nodzekhtl'oona; Ribes triste); wild rose (nechooy [= rose hips]; Rosa acicularis); bear berry (joozranagha'; Arctostaphylos uva-ursi); and another bear berry (deney; probably Arctostaphylos rubra). Some people are familiar with salmon berries (dets'eneenekodla'; Rubus chamaemorus) although they do not occur in the Minto Flats, but are said to be found downriver near Tanana and upriver near Tanacross. Another type of berry some older people are knowledgeable of is called denbo' and is probably the silver berry (Elaeagnus commutata), which was not eaten.

Participation and Harvests

The gathering of berries, more than any other subsistence activity, is a family affair. People of all ages pick berries, from the young to the elderly, men and women, girls and boys. People often go to pick berries with close relatives (parents, children, and grandchildren), regardless of whether they reside in the same household. They go in a single boat or in a group with several boats. Some people go out for the sole purpose of gathering berries, or pick berries enroute to or from the more distant fish camps. On some days, several groups of people in boats venture to a general area to pick berries and later join together for a "picnic," setting up a temporary campsite for cooking food and making tea over an open fire. At other times, the berry picking group will make a campfire at the berry picking site. Everyone helps pick berries. For many young children, berry picking is the first subsistence activity that introduces them to travel in the Minto Flats

and family and community fellowship in the out of doors. Travel in the Flats for berry picking in August also provides people with the opportunity to watch for signs of moose as the September hunting season nears. Many berry picking areas coincide with or occur enroute to favored moose hunting grounds.

During the study year, 37 of 45 households harvested berries, representing 82 percent participation by the community. With one exception, households which did not harvest berries consisted of unmarried men who are not part of a family unit which extends across two or more household, and have no means of transportation.

Most households gathered blueberries (36 households). Twenty-seven households or 60 percent collected lowbush cranberries; and 15 households or 33 percent also collected highbush cranberries. Fifty-eight percent (26 households) collected both blueberries and lowbush cranberries. The harvest consisted of a total of 155 gallons of blueberries, ranging from 1 to 15 gallons per household, 112 gallons of lowbush cranberries (ranging from 1 gallon to 10 gallons); and 31 gallons of highbush cranberries (ranging from 1 to 5 gallons).

Use

Blueberries and lowbush cranberries are stored by freezing for use later or are cooked into jams or a type of pudding. Some blueberries, when fresh, are made into pies, mixed with pancake batter, or eaten with evaporated milk. Many blueberries and lowbush cranberries which are frozen are later donated for potlatches when they are made into traditional dishes. Fifty-seven percent of the households that gathered

berries donated them for use at a potlatch. The berries are mixed with Crisco and sugar and sometimes whitefish or whitefish eggs to make one type of "Indian ice cream" or nonathdlodee; or made into a type of cooked pudding mixed with flour and sugar. These dishes typically are served as a dessert during the potlatch meals. In the past, berries mostly were cooked with grease made from rendering bear fat or oil derived from cooking the guts of whitefish or pike. On occasion, people today cook berries with these types of grease.

Many women make some berries into jams. Highbush cranberries are almost always cooked and stored in jars, and less often used in making the speciality dishes noted above. Blueberries and lowbush cranberries are also made into jam. Several women each year enter their berry jam products in the annual Minto agricultural fair sponsored by the village council.

OTHER EDIBLE PLANTS

Rhubarb

Wild rhubarb (gooth; *Polygonum alaskanum*) is gathered in late spring and early summer at a few locations within a few miles of the village. During the study year, 17 households (or 38 percent) picked a total of 37 "bunches" (approximately a gallon per bunch) of wild rhubarb. The young, tender stalks are commonly cooked with some sugar and water and then stored in jars if not eaten immediately. On occasion, cooked rhubarb will be served as a dessert at potlatch meals, where it is prized because of its rarity.

"Indian Potatoes;" "Indian Carrots;" "Wild Potatoes"

In the past, "Indian potatoes" were collected in the spring time when the root of the *Hedysarum alpinum* or *troth* in the Minto language was gathered and cooked by boiling. Although no one reported collecting this edible root during the study year, several older people are familiar with locations where they were customarily dug in the past. One location well-known to the Minto people, and that which their ancestors used, is the lower hill where the University of Alaska-Fairbanks is situated.

Domestic Plants

Home gardening for growing a variety of vegetables is a part of summer's activities for several families in Minto. During the study year, 12 households (27 percent) maintained a garden for growing potatoes, turnips, several kinds of squash, tomatoes, beets, cucumbers, cabbage, broccoli, cauliflower, lettuce, onions, and carrots. A few people also grew celery, herbs, melons, or rutabagas. All grew potatoes. The quantity of garden produce was not recorded; however, one person indicated his family produced 200 pounds of potatoes. Three households also had a greenhouse. At least three other families have garden plots. During the following summer, fewer people were able to have gardens because of new housing construction. The construction activities required the preparation of level surfaces for the new house sites using bulldozers. The leveling generally occurred on or across areas where people had their garden plots. Minto residents typically

have had an interest in producing food from gardens, as evidenced by their earlier participation in the agricultural programs sponsored by the non-profit organization, Tanana Chiefs Conference, since the late 1970s; the preparation of a one-acre community garden plot on village corporation land near the village; and the annual Minto agricultural fair sponsored by the village council.

NON-EDIBLE PLANTS AND TREES

Several other types of plants occur in the Minto Flats area, many of which are not eaten but are used or have been used for many different purposes. Some of these include grasses, Labrador tea, moss, herbs, and a birch fungus. The reader is referred to the Minto-Nenana Athabaskan Dictionary (Krauss 1974) for a list of these and to ethnographic sources for other Tanana River groups (Andrews 1975; McKennan 1959; Guedon 1975) for a description of these plants and their customary uses.

Trees serve a variety of purposes, particularly as construction materials and for fuel, both when people are out in the Flats during day trips and overnight excursions, and in the permanent home settlement at Minto.

Spruce

Probably the most widely-used tree species is the spruce (ts'eba; *Picea glauca* and *Picea mariana*). Spruce trees are cut and used for firewood and for construction, but have other uses as well.

Woodcutting Areas

Near the village people reach woodcutting areas either on foot or by car, truck, snowmachine, or dog team and then on foot. People rarely access woodcutting areas by boat, as suitable stands occur off the road and trail system linked to the village. Usually beginning in September and continuing through October, spruce trees are cut and limbed. Sometimes they are cut into about 8-foot lengths and hauled to a place at the road or trail edge where they are stacked, to be retrieved at a later time in the fall and during the winter. Often, the felled trees are allowed to dry out for a year before they are cut into sections and hauled out the following fall. Sometimes the bark is peeled from spruce trees with large diameters (12 inches or more) to hasten the drying process. Spruce trees with large diameters are more common along the Tanana River, particularly in fish camps, than they are in currently accessible areas near Minto. There are, however, spruce stands of marketable quality on village-owned lands within 12 miles of the village (R. Charlie pers. comm., 1985). In the lowlands of the Flats proper, however, stands of spruce are not common, rather spruce trees occur in areas mixed with birch, cottonwood, and willow. They are more common on the lower elevations of the hillsides which surround the Minto basin.

Spruce wood is cut at hunting, trapping, or fishing camps, within walking distance of the camp. Wood cut in excess of immediate need is left stacked at the campsite for use by others in the future.

Use as Fuel

Most people use spruce wood over other types for heating their homes and for heating with Yukon stoves when out hunting, trapping, and fishing, to heat canvas wall tents or cabins for overnight shelter. Every home in Minto, including those which were constructed in 1984-85, has a wood-burning stove. Only the newly-constructed houses have an alternative heating source, hot water baseboard heat, however people prefer to use the wood stoves if possible, because of their dual purpose for cooking, which reduces their use of propane needed for the cooking stoves and to save on the cost of fuel oil needed to generate the furnace for the baseboard heating system. During the study year however, none of the new houses had been constructed and people resided in frame homes of 2 x 4-inch lumber stud construction, which were built in the early 1970s or in a log owner-built home. In summer 1984, the frame houses were "weatherized" with an additional insulating layer of "thermax" and "T-1-11" plywood. The quantity of spruce wood cut and used during the study year therefore refers to this earlier period before the frame homes were upgraded and the new and larger houses with alternative heating systems were constructed.

During the study year 42 households reported using wood for heat during all or part of the year. Forty of these households use only wood for heat, the remaining two also use oil during part of the year. Two households reported using <u>only</u> oil for heating their homes (Table 56). Data for four households are not included because residence is in a community facility rather than a private dwelling.

TABLE 56. TYPE OF FUEL USED FOR HEATING MINTO HOMES, 1983-84.

Type of Fuel Used	Number of Households
Wood Only	40
Wood and Some Oil	2
Oil Only	2
Not Applicable	4
Total	48

Thirty-three of the 42 households reported using a minimum total of 365 cords of wood (Table 57). Annual use ranged from five cords to 20 cords. Houses of local log construction used an average of five cords per year less than those of 2 x 4-inch stud frame construction averaging 8.43 cords per year for log homes and 13.17 cords per year for frame houses (Table 57). Some people cut and haul their own wood, others buy all of their wood from people who haul it by the pick-up truck load (about $65 per load); others haul some of their own and buy some; and still others cut and haul their wood to the roadside or trailside and then pay someone to haul it to their home for them. Often wood is hauled in pick-up trucks, but wood loads are also transported using snowmachines or dog teams.

Wood-burning stoves used in Minto homes include the Yukon-style sheet metal box stove; the barrel-stove fabricated from an oil drum; and any one of several kinds of the less expensive brick-lined wood stoves.

Additional spruce wood is used for heating at fish camps and hunting and trapping camps as noted above. Probably the greater amount is used at fish camps, where Yukon stoves are used for heating in cabins and canvas wall tents and also used out-of-doors for cooking.

TABLE 57. AMOUNT WOOD OR OIL USED TO HEAT MINTO HOMES, 1983-84.

House Type	Oil or Number of Cords Used	Range	Average	Households Reporting
Log home constructed with local timber [1]				
Those reporting annual use	59 cords	5-12 cords	8.43 cords	7
Those reporting winter use (November - March)	56 cords	7.5-16 cords	11.20 cords	5
Missing cases (unreported)	-	-	-	4
Frame House with 2 x 4 Construction [1]				
Those reporting annual use	158 cords	10-20 cords	13.17 cords	12
Those reporting winter use	92.5 cords	7.5-18.75 cords	11.56 cords	8
Those using only oil heat	42 drums	20-22 drums	21 drums	2
Missing cases (unreported or not interviewed)	-	-	-	10
Minimum amount of wood used	365.6 cords	by		32
Minimum amount of oil used	42 drums	by		2
Missing cases (unreported or not interviewed)	-	-	-	13

[1] One household also uses oil heat

It is worth mentioning that in all cases wood-burning stoves are used for cooking to some extent. Some individuals cook virtually all of their food in containers placed on wood stoves, but everyone at least uses the surface of the stove for boiling water for tea. The use of the wood-burning stove for cooking food is not surprising when one considers that boiling meat, fish, and bones and other ingredients in water to make soups and stews is a primary cooking method both at home and in camps. The types of dishes that are prepared in camp by boiling are the same as those prepared at home on the wood stove.

In addition to providing heat for warmth and for cooking, the heat from woodstoves is used to dry meat hung along a spruce pole extended above the wood stove and also to dry work clothes, particularly gloves, socks, and felt insoles for winter boots.

Uses in Construction

Spruce wood is used both in the form of logs, poles, and planks for a variety of construction and handicraft purposes, ranging from homes to boat paddles. Spruce logs are used primarily to construct homes and cabins and as upright posts for fish drying racks, net hanging racks, and smokehouses; caches; and dog yard fences. They are used also to make rafts for fishwheels and as foundation supports for outbuildings such as outhouses, caches, and sheds. Similarly, peeled spruce poles from small-diameter spruce trees are used to meet a variety of construction needs. Spruce poles are carried in virtually every riverboat

and are used for poling the boat, but also serve a dual purpose as a ridgepole for supporting a canvas wall tent. Radio, CB, and television antenna poles are made from spruce. Fences made of spruce poles surround puppy yards and gardens, both in the village and at some fishcamps, and are used as stakes for dog tethers. They are seen on every fish drying rack and smokehouse rack in fish camps and are found at hunting camps, and when moose meat and moose fat are hung to dry. Similarly, they form a variety of supports for hanging tarps and "visqueen" plastic when people need temporary roofs for their outdoor eating, sleeping, and work areas. Spruce poles are used to construct trap sets for marten, as handles for tools such as dip nets, and to stir large quantities of food, such as soup, as it is cooked on outdoor campfires in modified 55-gallon tubs. This is customary when preparing cooked food for potlatches. Spruce wood is occasionally crafted for use in making the frame for canoes and are covered with canvas, and it is crafted into dance paddles used by youth and adult dancers on ceremonial occasions. Spruce sticks are used when small peg-like materials are needed, and longer ones are used when skins are stretched over boards to keep the pelt from sticking to the board.

Other Uses

Spruce trees serve several other purposes which are evident in a variety of subsistence activities today. Particularly important is their use as lookouts when hunting moose in the fall. Not all tall spruce trees are suitable for this purpose, as their use is in part dependent upon their location near meadows where a moose could be

pursued if spotted, and the type of limbs necessary for unobstructed views and ease in climbing. When stopping at hunting and camping sites, people often assess the quality of a spruce tree for this purpose. There are a number of well-known spruce trees which have been used at one time or another by Minto hunters, and there is one in particular that has been used throughout most of this century. Based on my own observations, the extensive wear on this tree from repeated climbing attests to the antiquity of its use.

Spruce roots today are used almost solely in the manufacture of birch bark baskets, platters, and other crafts although their use was more extensive in the past. Several women are adept at making these items, both for their home use and for sale as a source of cash income. They are dug in early summer and are then carefully and skillfully split so as to make the long strips consistently the same width and thickness. They are then rolled into bundles and stored for later use when making the basket or other craft with birchbark. The technique for collecting and preparing spruce roots is described and photographed in a publication prepared by a man and a woman from Minto and the Alaska Native Language Center (Titus and Titus 1981).

The use of spruce boughs is an important material when living and working out-of-doors. When at camp, spruce boughs are cut and placed around the perimeter of the campfire and working area to sit or walk on. They keep the dust and dirt from kicking up and provide a clean, comfortable and dry surface to sit and work on. They are used for making a ground cover when sleeping out-of-doors whether under a canvas tent, tarp, or under the open sky. At times, during particularly muddy seasons and periods of extremely low water, spruce boughs are carried in

boats and placed on the shore to help prevent your feet from sinking into the mud as you climb out of the boat and up to the bank. If people know they will be camping at a site where spruce trees are few or non-existent, they will stop enroute where there is a good stand of spruce and collect spruce boughs to take with them for later use. In one of the photographs in the work mentioned above, it is shown how spruce boughs typically are also used to make a work mat on the ground surface when living and working outdoors at camp (Titus and Titus 1981:10).

Spruce pitch continues to be used both as a medicine taken internally and used externally. Clear pitch is scraped from the tree and either heated in water and drunk as a broth or warmed and softened before it is applied to cuts and wounds. It is used to draw out any infection and is sometimes applied to aching muscles. Spruce pitch is also used as a chewing gum and mouth cleanser. In the past, its use was more extensive and was particularly important in sealing seams of birchbark canoes.

Birch

Birch (k'eey; *Betula papyrifera*) is more sparsely distributed throughout the Minto Flats than spruce, however, it too has a variety of uses. It is rarely used as firewood probably because stands of birch are not nearly as accessible or as prevalent as spruce. Birch wood is used mostly to construct snowshoe frames and sleds. Anyone who hunts or traps in the winter must be adept at walking with snowshoes on. Sleds are used extensively both to haul equipment, materials such as wood, and

people. The sleds are towed behind a snowmachine and are hooked up to dog teams used when hauling wood, trapping, fishing, traveling, and racing. Birch wood is also fashioned into large ladle-like spoons used at home and when camping to stir and serve soups and stews.

Birch bark was mentioned earlier as a material used in crafting baskets, platters, and other handicrafts such as the traditional baby carrier or baby basket. While birch baskets were used widely for storage of many foods and food products such as berries, grease, and "Indian ice cream," they are now used primarily as a source of income and for more limited uses at home and as collection plates at church. The collecting of bark in the spring and how it is fabricated into baskets has been detailed in the work by two Minto residents noted above (Titus and Titus 1981). Birch trees peeled of bark can be seen throughout Minto Flats. In the past and now occasionally, birch bark is used for a surface on which to skin muskrats while at spring camp and as a surface on which to clean fish. It provides a clean, non-slip surface. When camping and cooking out of doors, dry birch bark is the sole material used as tinder to start a campfire.

Occasionally birch trees are used like spruce trees as lookouts when moose hunting. Even a relatively small lone birch in a meadow when climbed gives an added visual advantage for spotting a moose or determining its direction of travel. Larger and taller birch are used in the absence of spruce trees to scan larger areas.

Blocks of peeled birch wood are used as a surface on which moose fat is pounded before it is rendered into oil and made into "Indian ice cream." Birch wood is reportedly used instead of spruce wood, out of respect for the moose, as birch is one of the plant species that moose

feed upon. It was said that either birch or willow could be used when preparing moose fat.

Willow

As with birch, willow (k'uy'; Salix sp.) and its bark was used more extensively in the past, however, it continues to have some important uses today. Like spruce roots and birch bark, it is an important material used in reinforcing articles made into baskets and platters and is used much like twine to keep bundles of birchbark from unrolling (see Titus and Titus 1981). The kind of willow used for reinforcing is a tall willow with dark red bark called k'olajoosr (Salix arbusculoides) (Titus and Titus 1981:24). Willow branches are used widely when camping, cooking, and working outdoors. They are used as wall supports for canvas wall tents and to support each end of the ridge pole. They are instrumental in cooking (called "jook" or tea poles) as they support containers of water over the campfire when making tea, soups, and stews, and to support damp clothing such as gloves, socks, and insoles as they are placed near the fire for quick drying. Branches with their leaves are used to camouflage and protect moose meat that is hung to dry when hunters cache their kill as they continue hunting. Small sticks made from willow are used at fish camps where they are placed by inserting them horizontally across drying salmon filets to prevent curling, which inhibits adequate air circulation necessary to keep the meat from getting moldy.

Cottonwood

Cottonwood (t'egheth) is a term applied to two species of poplar trees: Populus balsamifera -- balsam poplar; Populus tremuloides -- quaking aspen. Balsam poplar is more commonly used than quaking aspen. Most important, balsam poplar or cottonwood is the sole wood used for smoking fish and meat. The preferred wood is that from standing dead trees which are cut shortly before they will be used for smoking fish and meat. Stands of these trees occur along the Tanana River near the fishing camps, but also at scattered locations in the Flats and are generally accessible along the river system.

Other Trees and Plants

The only other tree species which occur in the Minto Flats are the tamarack or larch (łat'adhya; Larix alaskensis) and alder (Alnus sp.) Tamarack is rare and no specific uses of it were determined. In the list of Athabaskan place names, a single name makes reference to tamarack (#43--łat'adhyaden). Grasses are collected and used primarily as bedding for dogs and occasionally for insulating boots. Alder is sometimes added to fires when smoking fish.

CHAPTER 12

DISCUSSION

THE ECONOMY OF MINTO

Minto, with a population of 179 in 1984, situated 130 road miles and 40 air miles from the regional center of Fairbanks, is an Athabaskan Indian community whose modern economy consists of both cash and subsistence components. Like many other rural communities in Alaska, these two sectors of the economy are not independent of each other, rather they are intertwined, hence the term "mixed economy" is often used to describe these modern Alaskan village economies (Wolfe 1982).

In Minto, cash is derived from year-round and seasonal wage employment, self-employment such as trapping and handicrafts sales, and government transfer payments. Commercial fishing is not a source of income for this community. Most wage employment is seasonal or part-time with full-time year-round jobs accounting for only one-fourth of the jobs. Eighty-two percent of all households had at least one member who was employed for some period of time during the year; most positions were held by individuals less than 50 years of age. The cash sector of Minto's economy is not well developed. Minto's median household income of $6,200 is far below the median income of $38,238 for a four-person family in Alaska in 1983 (Alaska Department of Labor 1986:90) and nearly three-fourths of Minto's households fell below the poverty income guideline (see Table 24, Chapter 2).

The subsistence component is derived from the harvest and processing of fish and wildlife from Minto Flats and surrounding hills.

Hunting, gathering, fishing, and trapping contributed to a household's subsistence stores. Harvest activities took place primarily during the six-month portion of the year from May through October, the same period during which seasonal wage employment opportunities generally occur, if at all. Yet households were able to combine participation in both activities.

Integration of the cash sector and subsistence sector is not a recent practice for Minto's population. As described in earlier chapters, the sale of wood, dried salmon, and fur animal pelts were important at other times during the 19th and 20th centuries. Hauling freight by dog team was another source of income. Public works projects, firefighting, and surveying have been sources in more recent years.

Minto residents historically and today are "occupational pluralists" (Andersen 1978) both in the cash sector and the subsistence sector. This refers to the multiple jobs an individual may engage in during the year or multiple sources from which to derive income as well as the several harvest activities engaged in during the same period of time. It was shown for the study year that over 70 percent of all Minto households harvested resources from five categories. In short, the principle of diversity applied to the harvest of fish and wildlife for subsistence use is the same principle applied to the derivation of cash, and this pattern has remained essentially the same throughout this century. Sources of cash, like fish and wildlife resources of the boreal forest, fluctuate significantly from year to year, making diversification an economic approach for achieving long-term stability in a household's production and income.

Minto's proximity to Fairbanks both by air and road does not appear to have led to local development of the wage sector. Also it does not lead to community or spill-over of wealth from the nearby urban area. Minto residents tend to periodically migrate from Minto to Fairbanks residing there for several months to several years (see Slaby 1981:68). This pattern of mobility appears to be reflected in the population fluctuations of 7- to 10-year cycles and seems to account for changes in the composition of the the population in terms of age and sex as described in Chapter 2. The increases and decreases of males and females aged 20-49 contribute to the dynamic quality of Minto's economy with the availability of wage-earning jobs for individuals in this use range. This may contribute to the need for a pluralistic approach for securing sources of cash and wildlife resources today.

LAND USE AND THE SEASONAL ROUND

Minto Flats is the homeland of the Minto people whose name for themselves, Menteekhut'ana "people of the lakes," reflects the environment which they use and occupy. It has been shown that the primary seasonal settlements were situated in the Flats and among the lakes. Even when a new village was established on the Tanana River at (Old) Minto, the Native name applied to the site, Mentee Khugottheet meaning "river side of among the lakes," continued to be oriented to the lakes. With settlement and occupation of (Old) Minto beginning in 1917, there were still about one-third of the families living in canvas tents at the village site on the Flats in 1940. Use and occupancy of the Flats, the lake-studded area north of Minto, persisted in spite of

economic developments that prompted settlement of (Old) Minto on the Tanana River and fostered its continuation at least until the 1950s. The Native place names (Appendix 1) and historical and cemetery sites (Andrews 1977) verify this use and occupancy in Minto Flats and the surrounding hills. Native allotment sites also indicate the extent of occupation and use of the area historically and in modern times (Fig. 27, Chapter 10).

Most Minto elders spent their youth and adolescence at the primary seasonal settlements among the lakes. These localities continue to be the focus of subsistence activities at certain times of the year used by young and middle-aged adults as well as the older people. Today, these areas are used primarily as bases for freshwater fishing and waterfowl hunting. Other areas used historically are used also at particular times of the year. These include moose hunting areas, notably lookout hills and trees and certain campsites and meadows. As in the past, many families continue to focus their hunting in areas where their traplines are situated and their knowledge of the locality is intimate. Similarly, people generally trap areas they have used over decades or use lines their parents once trapped. Waterfowl and muskrat hunting areas and campsites are largely the same as those elders today recall using with their families in their youth. Not all areas are used in any one season, but people move among them over the years.

Similarly, the patterns of movement throughout the year for fish and wildlife harvesting, continuity with the past and an orientation toward the Minto Flats. These similarities are demonstrated primarily in the six-month period from May through October when residents conduct waterfowl and muskrat hunting, freshwater fishing, salmon fishing, berry

picking, and moose hunting. These activities are based from the village as well as seasonal and temporary camps in the Flats. Several families or individuals commonly move out to a particular area for hunting and fishing and several other families join them over the next few days. In winter, families no longer move about the Flats setting up camps from which they hunt and trap. Instead, the village serves as the base for the more limited moose hunting and fishing that occurs during winter. Some men operate traplines both from the village and from temporary camps they set up along their trapline.

Intra-regional movement outside of the Flats occurs by traveling and visiting people in communities where trade and exchange was customary -- Nenana, Tanana, Rampart, and Stevens Village. These travels are often in the context of religious ceremonies, such as funeral and memorial potlatches, but the social ties reinforced at these times continue at other times of the year as well. In fact, some individuals from some of these communities periodically reside in Minto for several months and sometimes one or several years.

The extent of land use and occupancy today has changed little from earlier times in the century. However, the intensity and duration of use is more limited. The factors contributing to this situation are several but include fishing and hunting regulations, especially in regard to salmon fishing and moose hunting (see Chapters 4 and 6), changes in fish and wildlife abundance (see Shepherd and Matthews 1985), mandatory education (see Olson 1968), planned relocation (see Slaby 1981; Olson 1981), levels of cash income (see Chapter 2), and the Alaska Native Claims Settlement Act and Alaska Statehood Act which prohibited Minto people from being able to claim their homeland in the Minto Flats

as Native Corporation land. Each of these factors separately and as a group have influenced the involvement of Minto people in subsistence activities.

HARVEST AND USE OF FISH AND WILDLIFE

The harvest of fish and wildlife by Minto residents took place in about a 2,400 square-mile area in Minto Flats and the surrounding hills. A large percentage of Minto households harvested most categories of the major wildlife resources. This harvest engaged adults of all age categories. Salmon, freshwater fish, and moose comprise most of the harvest, but other resources contributed notably at certain times of the year. The per capita harvest of wildlife by Minto residents was found to be among the highest in the state (Wolfe and Walker 1987). Minto households harvested over 30 species of fish and wildlife during the study year (Table 58). More households (82 percent) harvested ducks than any other resource, followed by blueberry harvests (80 percent) (Fig. 30) (Table 58). These were activities that more household members and people of all ages participated in than any other subsistence activity (Chapters 7 and 11). Between 60-69 percent harvested pike and whitefish. Between 53 and 58 percent of households harvested salmon. The percentage of households participating in subsistence activities was even greater than the percent of harvesting households, since many worked with the successful harvesters.

In terms of resource categories, birds (waterfowl, grouse, ptarmigan) and land mammals were harvested by the greatest percentage of households, 84 percent each (Table 59). On the other hand, the largest

TABLE 58. LEVELS OF HOUSEHOLD HARVEST AND PER CAPITA HARVESTS OF FISH, GAME, AND PLANT RESOURCES, MINTO, JULY 1983-JUNE 1984

	Percent of Households Harvesting	Mean Harvesting Household Harvest in Pounds	Mean Household Harvest In Pounds (N=45)	Per Capita In Pounds (N=176)	Total Pounds	Percent of Total Pounds	Total Village Harvest Numbers
Moose	40	738.89	295.56	75.57	13,300.0	7.4	19
Bear	20	291.67	58.33	14.91	2,625.0	1.5	15
Hare	60	37.85	22.71	5.81	1,022.0	0.6	365
Beaver	36	241.50	85.87	21.95	3,864.0	2.2	138
Muskrat	40	20.73	8.29	2.12	373.1	0.2	533
Marten	44	n/a	n/a	n/a	n/a	n/a	280
Red Fox	20	n/a	n/a	n/a	n/a	n/a	19
Otter	11	n/a	n/a	n/a	n/a	n/a	15
Mink	11	n/a	n/a	n/a	n/a	n/a	24
Weasel	9	n/a	n/a	n/a	n/a	n/a	17
Lynx	7	n/a	n/a	n/a	n/a	n/a	4
Wolf	2	n/a	n/a	n/a	n/a	n/a	1
Wolverine	0	n/a	n/a	n/a	n/a	n/a	0
Porcupine	18	29.40	5.23	1.34	235.2	0.2	12
Ducks	82	50.88	41.83	10.70	1,882.5	1.0	1,255
Geese	64	81.90	52.78	13.49	2,375.0	1.3	475
Ptarmigan/Grouse	71	8.53	6.07	1.55	273.0	0.1	546
Blueberries (gal)	80	17.22	13.78	3.52	620.0	0.4	155
Lowbush Cranberries (gal)	60	16.59	9.96	2.55	448.0	0.3	112
Highbush cranberries (gal)	33	8.27	2.76	0.70	124.0	0.1	31
Rhubarb (bunches)	38	8.71	3.29	0.84	148.0	0.1	37
King salmon	53	411.88	219.67	56.16	9,885.0	5.3	659
Summer chum salmon	58	3,046.54	1,760.22	450.06	79,210.0	44.3	15,842
Fall chum and coho salmon	53	1,322.50	705.33	180.34	31,740.0	17.8	6,348
Whitefish sp.	69	391.74	269.87	69.00	12,144.0	6.8	6,072
Pike	60	500.50	300.30	76.78	13,513.5	7.6	3,003
Sucker	40	127.67	51.07	13.06	2,298.0	1.3	1,532
Sheefish	27	178.50	47.60	12.17	2,142.0	1.2	357
Burbot ("lush")	31	34.49	10.73	2.74	482.8	0.3	142

n/a not eaten

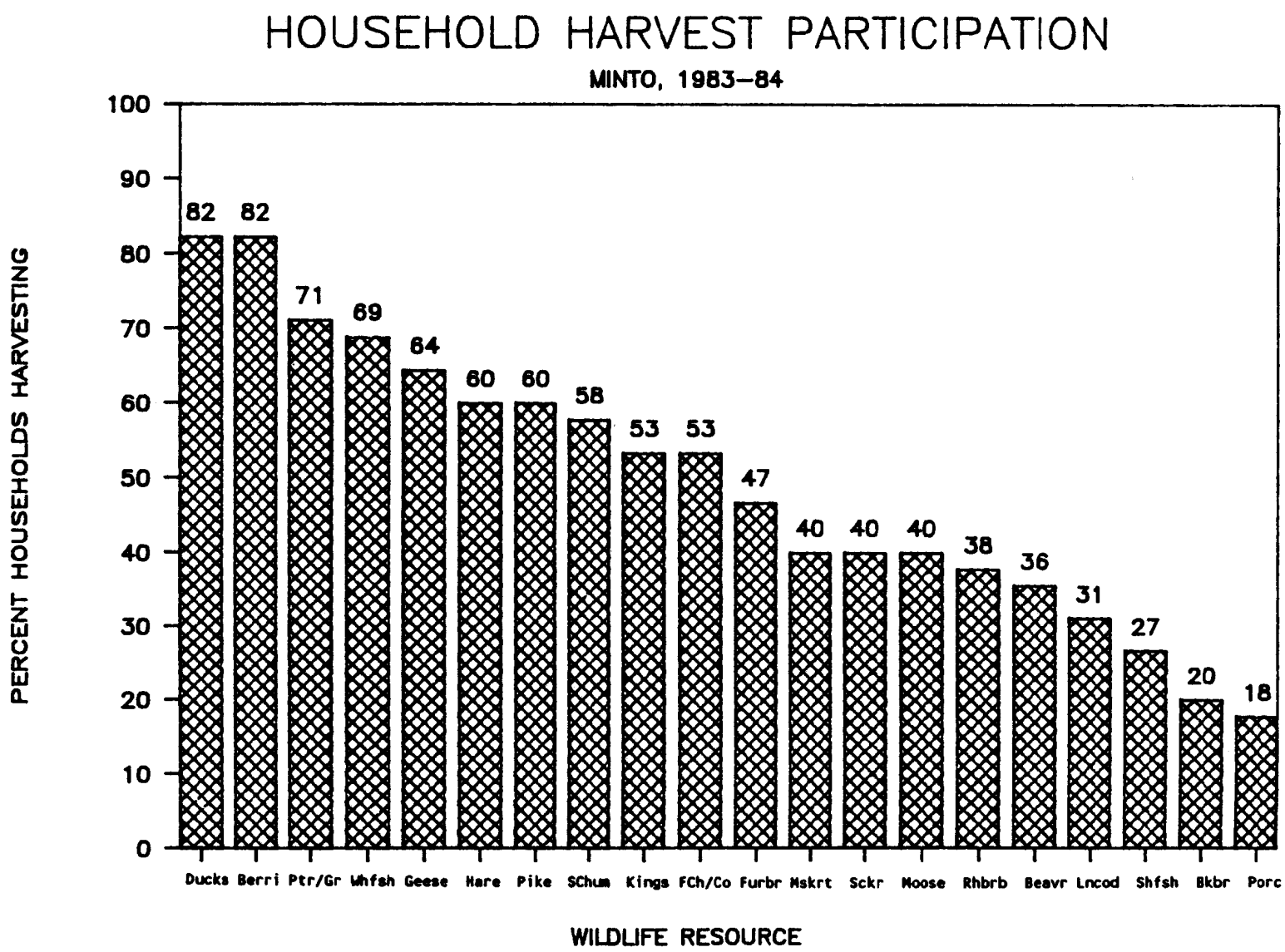


Fig. 30. Household Participation in Wildlife Harvests in Minto, 1983-84.

TABLE 59. LEVELS OF HOUSEHOLD HARVEST AND PER CAPITA HARVESTS BY RESOURCE CATEGORY, MINTO, JULY 1983-JUNE 1984

Resource Category	Percent Households Harvesting	Mean Harvesting Household Harvest In Pounds	Mean Household Harvest In Pounds (N=45)	Per Capita Harvest In Pounds (N=176)	Total Pounds	Percent of Total Pounds
Salmon	78	3,452.43	2,685.22	686.56	120,835	67
Other Fish	73	926.68	679.56	173.75	30,580	17
Land Mammals	84	563.67	475.98	121.70	21,419	12
Birds	84	119.22	100.68	25.74	4,531	3
Plants	82	36.22	29.78	7.61	1,340	1
Total	96	4,155.93	3,971.22	1,015.37	178,705	100

percentage of edible weight (in pounds) harvested derived from salmon (67.6 percent), followed by freshwater fish (17.1 percent) (Table 59). Fish, therefore, accounted for nearly 85 percent of all wild food harvested.

Average household harvests of each species are shown in Table 58. The mean household harvest of all species was 3,971 lbs in 1983-84 (Table 59). For harvesting households, summer and fall chum salmon made the greatest contribution in terms of edible weight (in pounds), followed by moose (Table 60).

Total community output was 178,705 pounds of wild foods in 1983-84. The per capita harvest was 1,015 lbs (Table 59). This output is comparable to most other Alaskan Athabaskan communities in the boreal forest where harvest data have been collected in recent years (Tables 60, 61). Like several of these communities -- Nondalton, Allakaket, Alatna, and Hughes -- fish (salmon and freshwater) accounts for over 80 percent of the edible weight of the total community harvest (Table 60). The contribution of freshwater fish is greatest in Minto, Allakaket, and Alatna. This is consistent with Minto's history of land and resource use in Minto Flats described above. The relatively low contribution of land mammals likely reflects the low moose density and population abundance in Minto Flats described in Chapter 6, and the current absence of caribou from this region of Alaska.

UNDERSTANDING MINTO'S WILD FOOD HARVESTS

Several factors which influence wild food harvests have been discussed in previous chapters. Information is included on the ages of

TABLE 60. HARVEST LEVELS AMONG MODERN ATHABASKAN COMMUNITIES IN ALASKA

Community	Study Year	Mean Household Harvest (In Pounds)	Per Capita Harvest (In Pounds)	Percent Total Pounds				Sample Size (Percent)	Source
				Salmon	Other Fish Species	Land Mammals	Other		
Minto	1983-84	3,971	1,015	67.6	17.1	12.0	3.3	94	this study
Huslia	1983	3,652	1,082	51.2	8.4	38.8	2.8	98	Marcotte 1986
Hughes	1982	6,443	1,511	77.8	4.8	15.3	2.1	86	Marcotte and Haynes 1985
Allakaket/ Alatna	1982	3,528	908	61.5	19.7	15.3	3.5	87/100	Marcotte and Haynes 1985
Nondalton	1980	4,959	1,036	80.3	2.6	16.4	0.7	40	Behnke 1982
Nondalton	1981	4,195	738	68.7	4.9	23.1	3.3	54	Behnke 1982
Tyonek	1983	964	272	71.0	3.0	21.0	5.0	100	Fall, Foster, and Stanek 1984

TABLE 61. POUNDS EDIBLE WEIGHT OF SIX FISH AND WILDLIFE RESOURCES HARVESTED BY INTERIOR VILLAGES

Resource	Per Capita Harvest (In Pounds)			
	Minto	Huslia	Hughes	Allakaket and Alatna
Summer chum salmon	450.1	487.7	423.6	955.7
Fall chum and coho	180.3	43.2	90.1	98.8
Pike	76.8	28.8	8.2	7.2
Moose	75.6	311.1	102.6	202.0
Whitefish sp.	69.0	21.1	32.0	23.5
King salmon	56.2	21.2	42.7	112.1

harvesters, size of households, kinship relationship of household members, age composition of major work groups (such as moose hunting parties and salmon fishing groups), household participation in wage employment, total household income (earned and unearned), and household facilities and equipment related to harvesting and processing fish and wildlife. In some chapters, characteristics of the harvesters were presented with respect to the particular harvesting activity being described. For example, it was shown that salmon fishing groups and hunting parties typically include people of several generations.

Because households generally participate in several hunting, fishing, and gathering activities, it is worthwhile to examine the totality of subsistence production in terms of the characteristics of the harvesting household. This analysis follows that of Wolfe (1987) in which household harvest or output can be explained in terms of harvesting for dog teams, the household development cycle, and subgroups of populations in a culturally diverse community. Household subsistence production in Minto will only be analyzed from the aspect of the

household developmental cycle. Specific information on harvesting for dog teams was not collected in this study, although some observations worth noting are presented below. As Minto is a culturally homogeneous community, analysis based on subgroups (Wolfe 1987) has no bearing on subsistence production.

Specialization

Household harvest of fish and wildlife species were recorded during interviews with members of all Minto households. These harvests were converted into pounds dressed weight using region-specific live weights for species multiplied by a conversion factor (Table 62). The sum of all harvests is an estimate of each household's total subsistence output. Most households, (96 percent), harvested some wild foods during the study year 1983-84. The maximum percentage of households that participated in any single activity was 82 (Fig. 30).

Household harvests ranged from 0 to 17,855 pounds (Fig. 31). Thirteen (29 percent) harvested less than 1,000 pounds; twelve (27 percent) between 1,000 and 2,999 pounds; eight (18 percent) between 3,000 and 4,999 pounds; three (7 percent) between 5,000 and 6,999 pounds; four (9 percent) between 7,000 and 8,999 pounds; and five (11 percent) greater than 9,000 pounds (one each -- 9,681; 12,881; 15,840; 16,905; and 17,855 pounds (Fig. 31). Twelve households (27 percent) harvested 5,000 pounds or more of wild food (Fig. 31) and these accounted for about 70 percent of the community's total fish and wildlife subsistence production (Fig. 32). This is consistent with Wolfe's (1987) finding that there is specialization in modern Alaskan

TABLE 62. ESTIMATED LIVE AND DRESSED WEIGHTS OF FISH AND WILDLIFE IN MINTO FLATS

Resource	Estimated Live Weight In Pounds	Conversion Factor	Dressed Weight In Pounds
Fish			
King salmon	20.0	0.75	15.0
Summer chum	6.7	0.75	5.0
Fall chum/coho	6.7	0.75	5.0
Whitefish sp.	2.7	0.75	2.0
Sucker	2.0	0.75	1.5
Pike	6.0	0.75	4.5
Sheefish	8.0	0.75	6.0
Burbot	4.5	0.75	3.4
Land Mammals			
Moose	1,000	0.70	700.0
Black bear	250	0.70	175.0
Beaver	40	0.70	28.0
Hare	4	0.70	2.8
Muskrat	1	0.70	0.7
Porcupine	28	0.70	19.6
Birds			
Ptarmigan/Grouse	--	--	0.5[a]
Ducks	--	--	1.5[a]
Geese	--	--	5.0[a]
Plants			
Berries	--	--	4 lbs/gal[a]
Rhubarb	--	--	1 lb/bunch[a]

[a]based on actual weights

subsistence systems, that is, most of the wild food is harvested by a relatively small percentage of households. Wolfe (1987) attributes this to the "superhousehold" phenomenon which as noted above can be explained primarily by the household's developmental cycle.

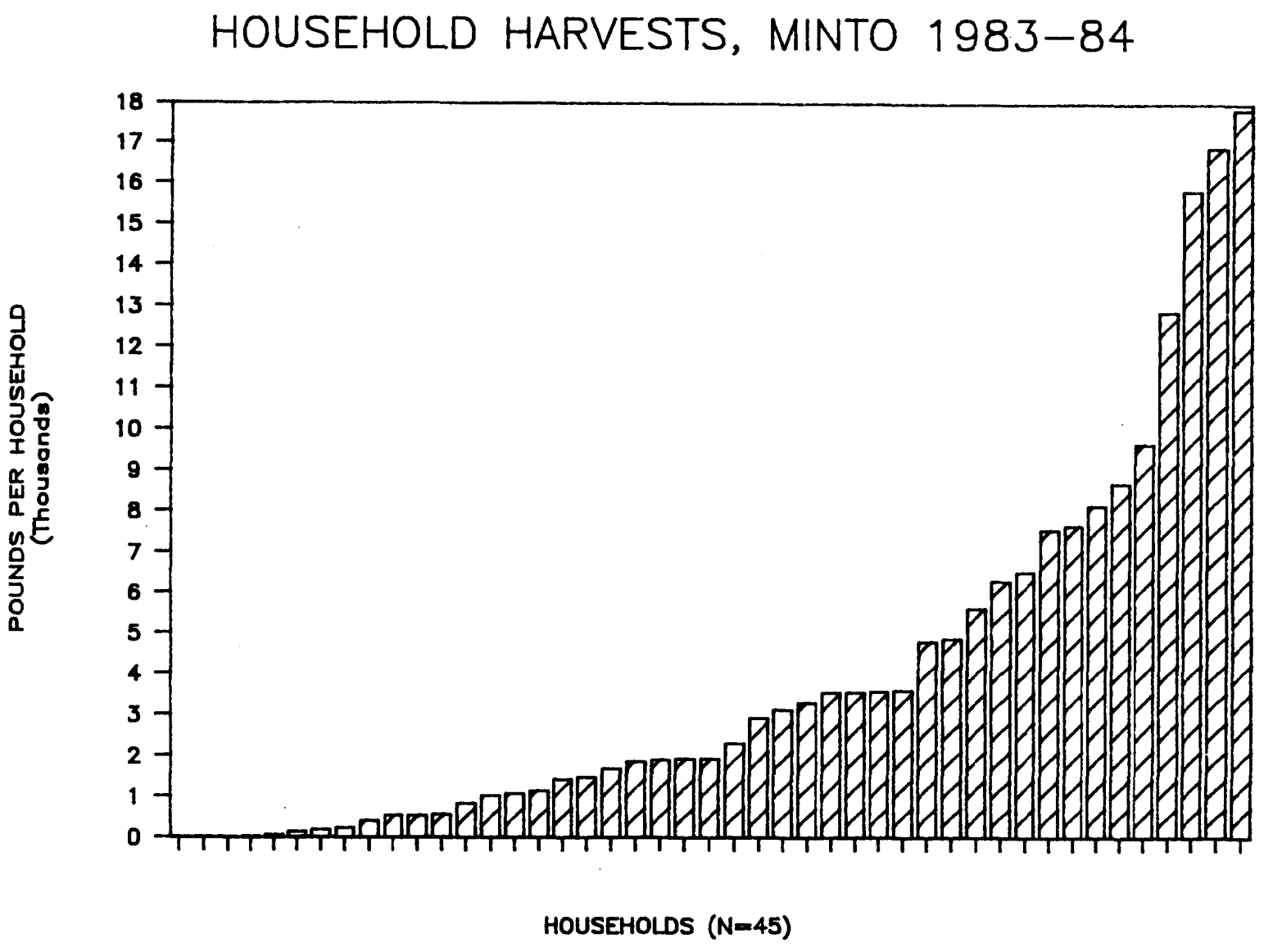


Fig. 31. Household Subsistence Harvests for Minto, 1983-84.

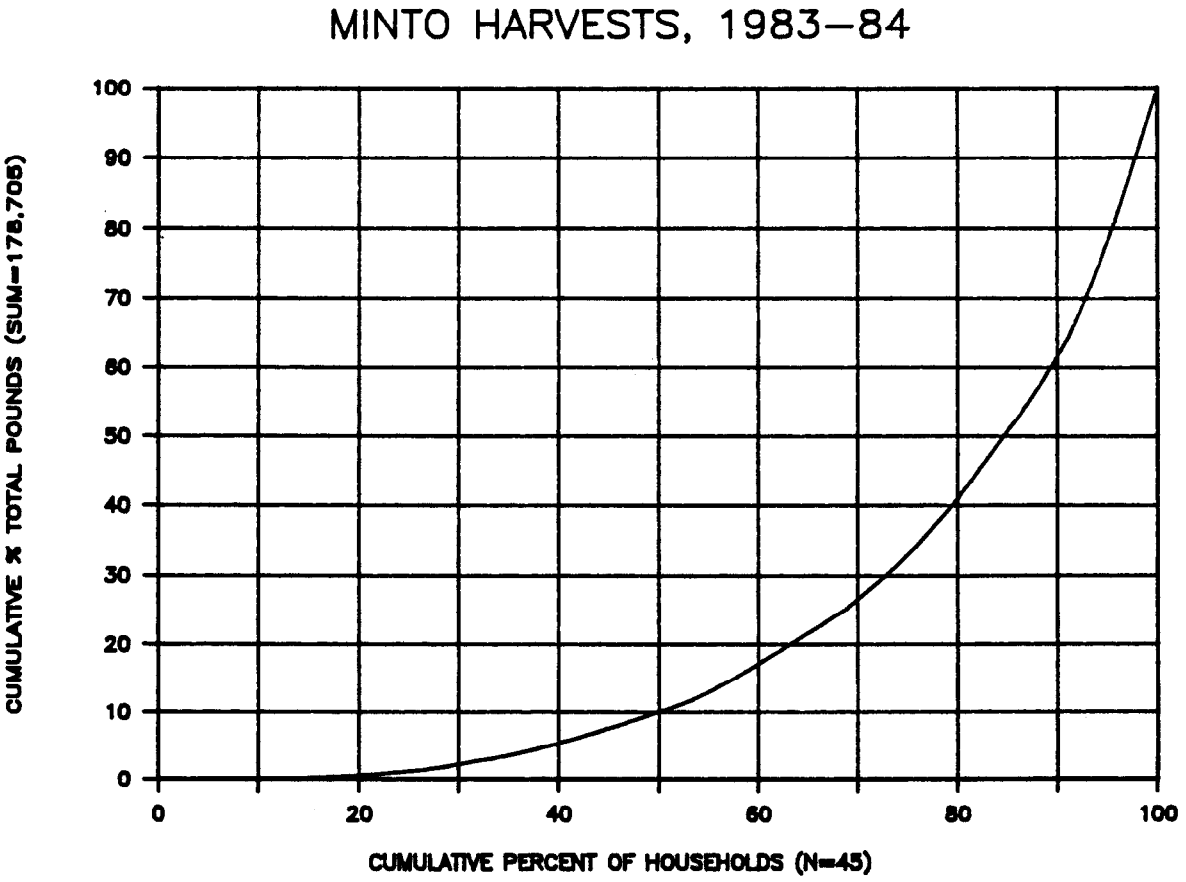


Fig. 32. Cumulative Household Subsistence Harvests for Minto, 1983-84.

Household Developmental Cycle and Subsistence Production

Households, like individuals, have a life cycle of birth, growth, maturity, and death. Newly established households tend to have younger heads of households, young children, little equipment, and few social obligations (Wolfe 1987:9). On the other hand, older or "mature" households tend to have larger sizes, older individuals (both older heads of household and older dependent members), more equipment for use in subsistence activities, and more social obligations.

With respect to subsistence production these mature households possess knowledge based on experience, complete equipment holdings, and a physically capable labor pool. It is expected that these characteristics result in the highest subsistence harvests (Wolfe 1987). First, since mature households tend to be larger, it is expected that households with the greatest harvests will be larger. In Minto, the third highest producing households had an average household size of 4.9 persons, which is greater than the community average of 3.9 and greater than either the lower or middle third of households based on household harvests (Table 63). This is not statistically significant. Second, it is also the case that the highest producing households in Minto have a more mature labor pool in addition to a larger pool noted above. Table 64 shows the average ages of household members for low, middle, and high producing households. The highest producing households tend to have older members (Table 64). This difference is statistically significant. In addition, they also have, on the average, two additional members who are greater than 12 years of age. This provides a more physically capable labor pool and likely contributes to the

TABLE 63. WILD FOOD HARVESTS OF LOW, MIDDLE, AND HIGH PRODUCING HOUSEHOLDS, MINTO, 1983-84

Household Productivity	n	Average Household Size	Average Household Harvest In Pounds	Contribution to Total Village Harvest		Average Household Income
				Pounds	Percent	
Low Third	15	3.2	377	5,653	3	$10,911
Middle Third	15	3.6	2,392	35,879	20	$12,561
High Third	15	4.9	9,145	137,171	77	$13,485
Total	45	3.9	3,971	178,705	100	$12,319

household's ability to harvest and process wild food (Fig. 33). Third, production was analyzed on the basis of equipment holdings. This analysis shows high producing households had the most equipment in almost all equipment categories directly related to subsistence harvesting and processing (Table 65). The only pieces of equipment which the high producers do not have more of are cars, trucks, and three-wheelers which are not used solely for subsistence pursuits.

Two other analyses of household harvests were performed in order to determine characteristics that may contribute to higher subsistence production in Minto. The first examined household composition in terms of kinship type. All households were classified into one of six types. The first type is the solitary household with one person. These included single men of various ages and widowers. Two of these individuals are legally disabled or handicapped. Nuclear families consisting of a single parent with a child or children is the second type. Third are nuclear families with a married couple with children,

TABLE 64. AVERAGE AGE OF MEMBERS OF LOW, MIDDLE, AND HIGH PRODUCING HOUSEHOLDS, MINTO, 1983-84

Household Productivity	Average Age of Household Members in Descending Order (Years)							
	1	2	3	4	5	6	7	8
Low Third	49.8	34.5	15.1	11.4	7.3	3.5	3.0	1.0
Middle Third	54.6	41.8	26.2	13.7	9.4	1.7	1.0	0.0
High Third	53.7	43.1	21.1	17.0	15.6	12.2	6.3	13.0

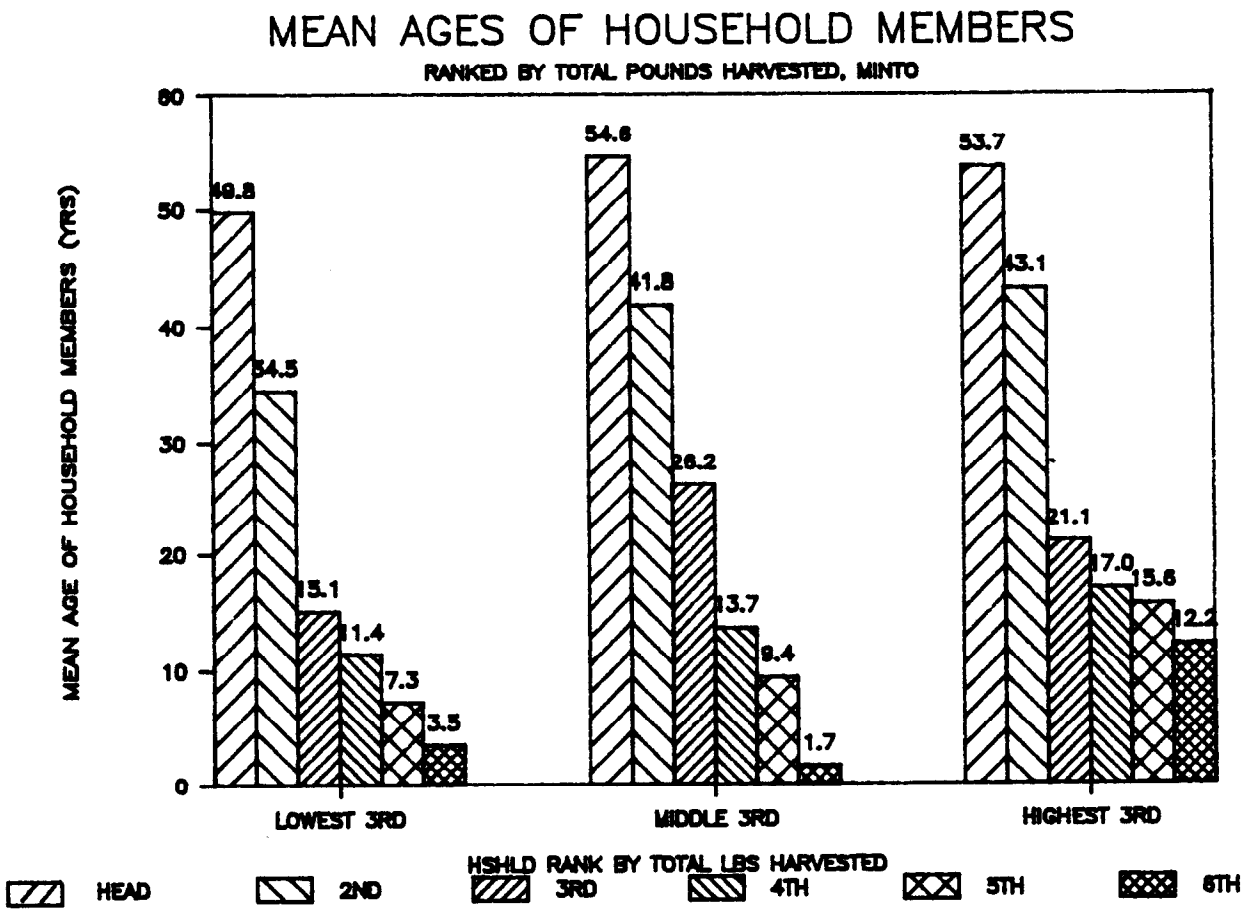


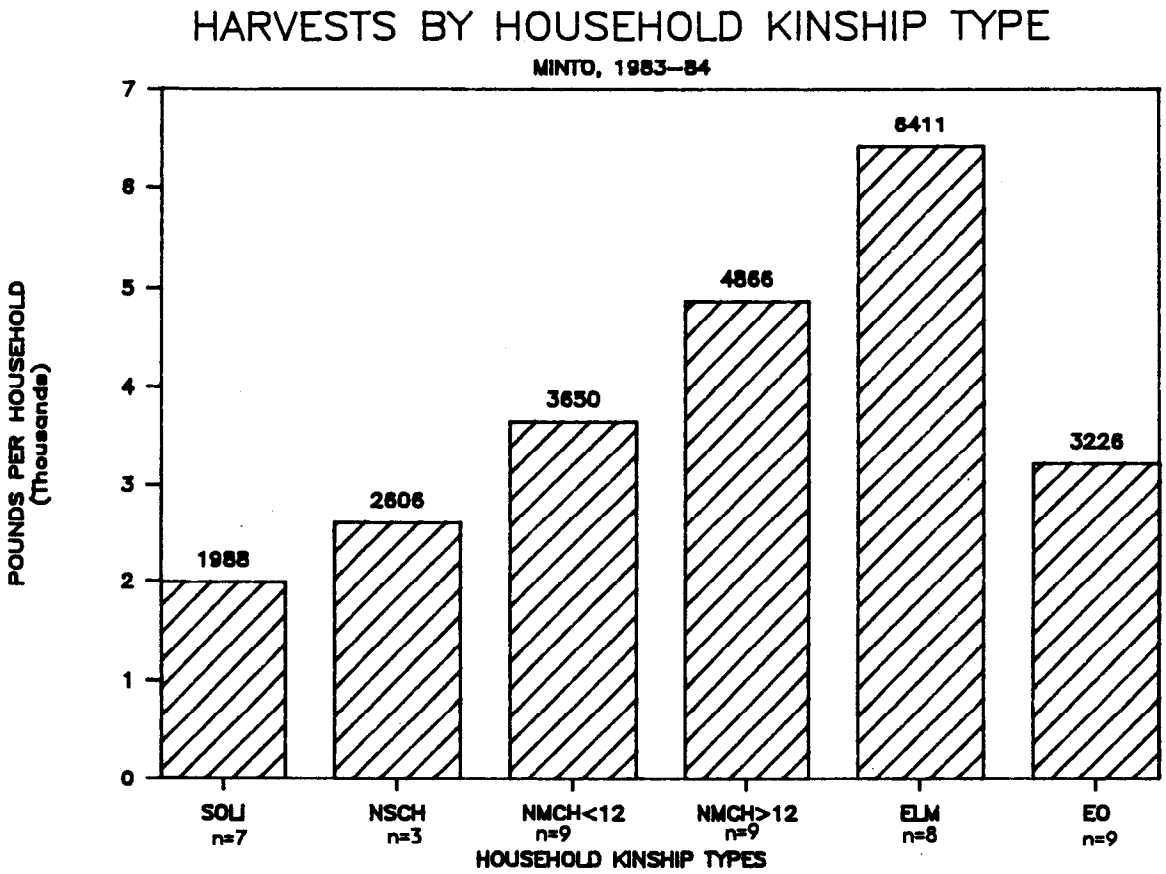
Fig. 33. Mean Ages of Household Members of Households Ranked by Subsistence Productivity, Minto, 1983-84.

TABLE 65. EQUIPMENT HOLDINGS OF LOW, MIDDLE, AND HIGH PRODUCING HOUSEHOLDS, MINTO, 1983-84

Equipment	Household		
	Low Third	Middle Third	High Third
Boats	0.4	0.6	0.9
Outboards	0.3	0.5	0.9
Fish wheels[a]	0.0	0.1	0.5
Fish nets[a]	0.8	1.4	2.1
Fish camps	0.1	0.4	0.6
Freezers	0.6	0.7	0.8
Dogs[a]	1.7	9.6	14.3
Snowmachines	0.3	0.6	0.6
Three-wheelers	0.3	0.1	0.0
Cars or Trucks	0.4	0.3	0.4

[a]Statistically significant at 0.05 level.

all less than 12 years of age. Fourth are nuclear families with a married couple with children, at least one of whom is 12 years or older. The fifth type are households with an extended family which includes individuals of three generations. The final type includes other extended families such as a married couple and their grandchild, siblings, cousins, or a single parent with children and grandchildren residing together. As shown in Figure 34 the most productive households are those with extended families of three generations residing in a single residence. These households had an average harvest of 8,411 pounds per household, nearly twice that of any other household kinship type (Fig. 34). These are "mature" households with complete work



KINSHIP TYPES

soli=solitary

nsch=nuclear family
single parent with child(ren)

nmch<12=nuclear family
married couple with children less than 12 yrs. of age

nmch>12=nuclear family
married couple with children, one at least 12 yrs. of age

elm=extended family
three generations included

eo=extended family
other types of extended families, lineally or collaterally

Fig. 34. Wildlife Harvests by Household Kinship Type in Minto, 1983-84.

forces. Maturity of the household kinship type is shown in the average ages of household members, and the lineally extended family with a married couple tends to have older members (Fig. 35). The presence of a married couple in the household also appears to contribute to productivity. Households with married couples all have higher harvests than those without (Fig. 34) These data support Wolfe's (1987) hypothesis that newly established households tend to have lower productivity than maturing and longer established households. However, these households generally are not independent, but are linked in multi-household groups, and the overproduction by the mature household is shared with other smaller producing units.

Finally, total subsistence production was analyzed in terms of total house hold income (earned plus unearned). Households with the highest productivity also had the highest average income (Table 65), $13,485 compared to $12,561 for the middle third and $10,911 for the lowest third.

It was noted earlier that another explanation for the "super-household" phenomenon is harvesting for dog teams. Data were not collected in Minto to document amounts of fish used to feed dog teams however, the effects of dog ownership on harvest can be examined. In 1983-84 there were 394 dogs in Minto or 2.2 dogs to every one person. In Minto, several fish species are used to feed dog teams -- summer and fall chum salmon, coho salmon, northern pike, several whitefish species, and longnose sucker. These species are used also for human consumption. In addition, commercially manufactured dog food is used to feed dog teams. Highly productive households also owned the most dogs. Households in the highest third in terms of subsistence output owned the

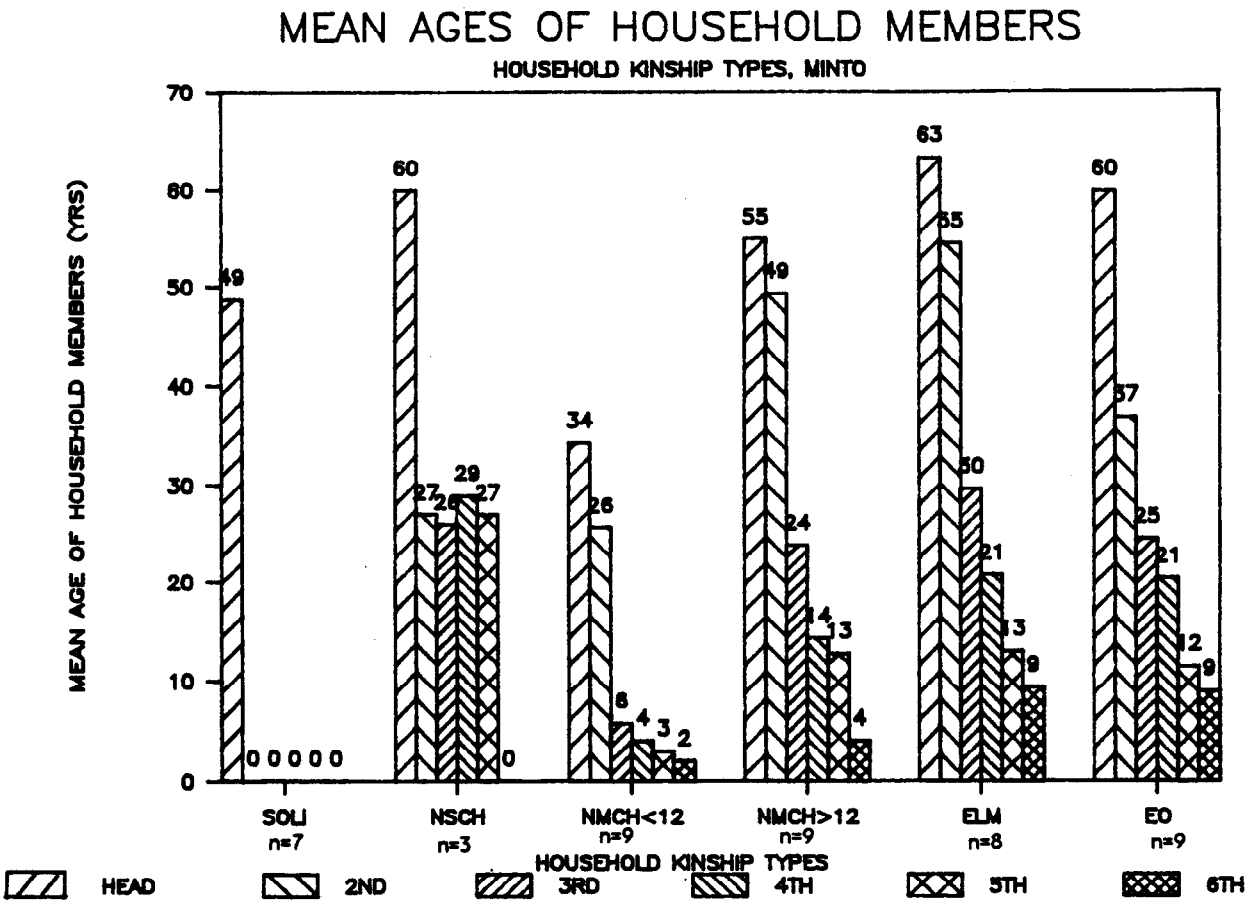


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Fig. 35. Mean Ages of Household Members by Household Kinship Type in Minto, 1983-84.

greatest number of dogs -- an average of 14.3 per household compared to 9.3 for middle producing households and 1.5 for low producing households (Fig. 36). Higher production may, in part result from fishing for dog teams. It could also be argued that the other characteristics of high producing households (larger size, an older labor pool, larger equipment holdings) enable the household to maintain a dog team. The most highly productive kinship types, the lineally extended household, on average had 7.9 dogs (Fig. 37). Three other household kinship types had, on the average, larger dog teams (Fig. 37). Wolfe (1987:8) also found that harvesting for dog food does not explain all high producing households.

It is noteworthy in Minto that the maintenance of dog teams contributes to continued subsistence pursuits and continuing education in fishing, hunting, and trapping. Several younger men have dog teams and spend considerable time caring for the animals and working the teams. Cooking for and feeding a team of 12 dogs requires several hours a day exclusive of harvesting and processing the food used to feed them. Often several younger men visit together and exchange various types of information while dog food is cooked out-of-doors in large pots over campfires. Dogs are worked on trails near the village, on trapline trails, and on travel routes to the old village site, four hours distant by dog team trail. These sojourns contribute to the dog handler's knowledge of the terrain, wildlife movements, distribution, and behavior, harvesting, travel, and survival techniques. For many Minto residents, maintenance of dog teams goes hand-in-hand with continuing subsistence activities.

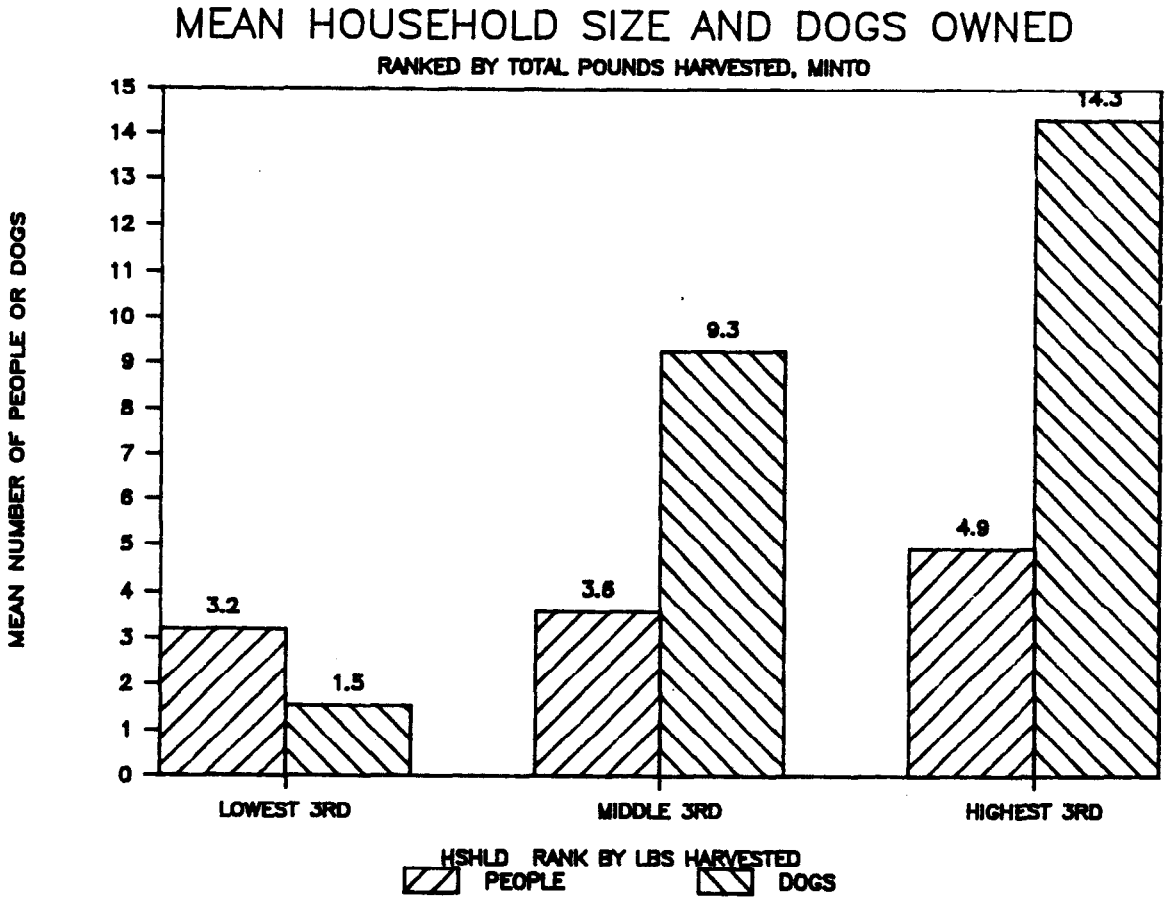

Fig. 36. Mean Household Size and Mean Number of Dogs Owned Per Household of Households Ranked by Subsistence Productivity, Minto, 1983-84.

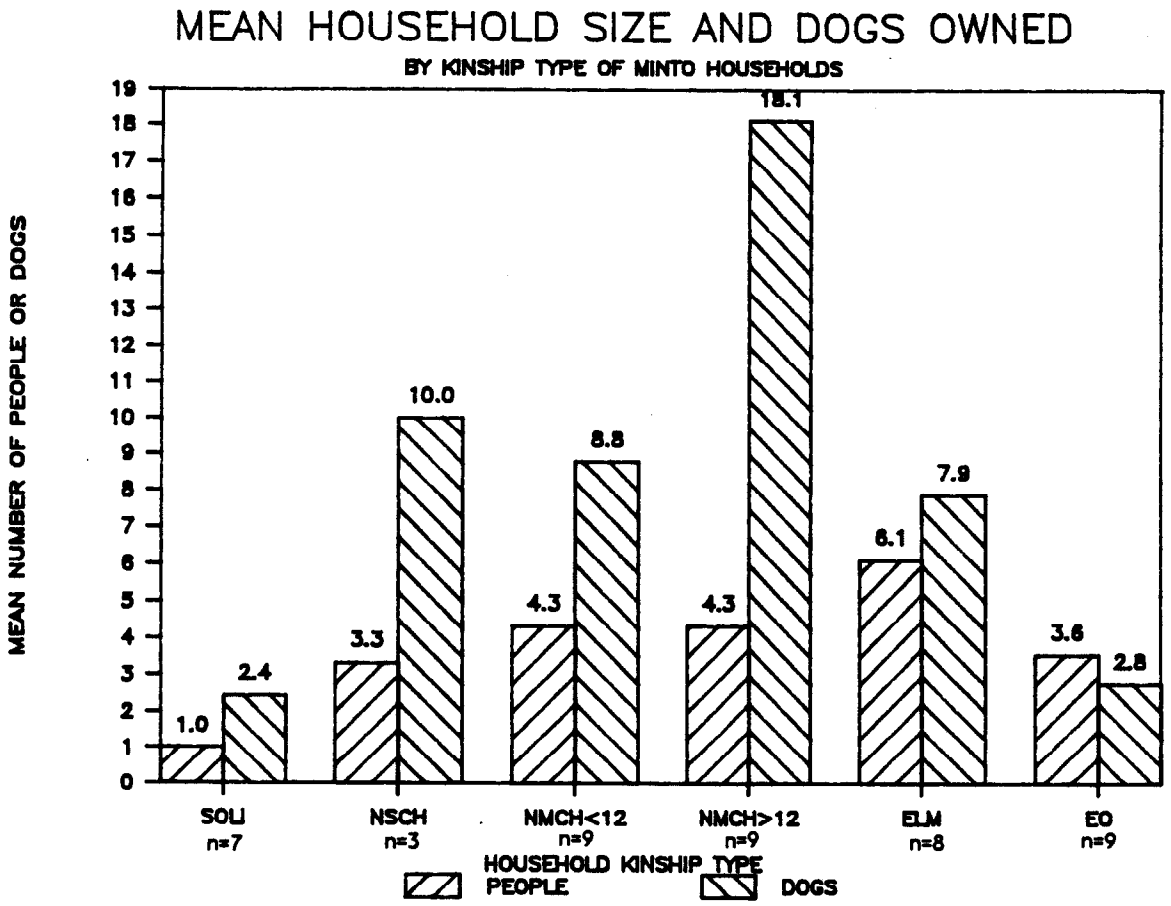

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Fig. 37. Mean Household Size and Mean Number of Dogs per Household by Household Kinship Type in Minto, 1983-84.

Summary

In summary, Minto's economy is based on a combination of cash and subsistence components. Variety in income sources and fish and wildlife harvests typifies the individual household economy and that of the community as a whole. Fluctuations in sources of income and wild foods occur from year to year. Most cash employment, like many subsistence activities, is village-based.

In spite of two primary settlement relocations (the year-round village) during a 53-year period, people continued to use much of the area they used when they occupied seasonal settlements and camps rather than the permanent village. The distribution of fish and wildlife resources still requires seasonal movement away from the village in order to secure wild food sources. Although specific areas used varies from year to year, continuity in use is maintained in the long-term.

Minto's fish and wildlife harvests for subsistence use are among the highest in the state on a per capita basis. While the greatest percentage of households participated in hunting birds and land mammals, the largest contribution of wild food was derived from fish.

A large percentage of Minto's total community harvest was produced by a relatively smaller percentage of households. This specialization has been found to characterize subsistence production in other modern Alaskan rural communities. It can be explained by the size of the household and the ages of household members. In Minto, as in some other communities, it was found that households producing the most wild foods typically have a larger and more mature labor pool in addition to complete equipment holdings and more extensive social obligations which include sharing fish and game. The most productive households are also

characterized as having extended families of three generations residing in one home. Similarly, these households tend to have the greatest household income, an expected relationship given the greater number of mature individuals in the household and the equipment necessary to harvest fish and game.

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APPENDIX 1. MINTO ATHABASKAN PLACE NAMES OF MINTO FLATS AND VICINITY

In March 1979, Tanana Chiefs Conference, Inc. requested that the author record Native place names for the Minto Flats area. At that time the author was self-employed. The purpose of that work was twofold: 1) to record traditional Native place names as a contribution to lacal heritage and history, and 2) to indicate the traditional territory of the Minto band of Athabaskan Indians. Arrangements were made for a linguist familiar with Athabaskan languages to work with the author to record the Minto Athabaskan names as told by Peter John of Minto. Peter John, an elder and the traditional chief of Minto. He is considered a local expert. He is particularly knowledgeable of the traditional Native places, use areas, and place names of the Minto People. Chad Thompson of the Alaska Native Language Center of the University of Alaska, Fairbanks and I worked with Peter John for two intensive days tape recording the names which were keyed to U.S. Geological Survey maps (scale 1:63,360). Two hundred fifty-five place names were recorded for an area approximately 2,700 square miles in size. These names, their translations, and maps were compiled and appeared in a report prepared for the Minto Village Council and Tanana Chiefs Conference, Inc. (Andrews et al. 1980). For the current report, the maps were redrafted and the locations renumbered to make it easier to locate the named places on maps. No additions or changes were made to the original list of names. The Native names are numbered and keyed to the maps

(Figs. 38-46). Figure 37 depicts the area within which the recorded names occur.

Great care was taken in 1979 to locate the Native named places on U.S. Geological Survey maps when recorded. Previous work by the author in Minto in 1976 resulted in some familiarity with Minto Flats and the maps of the area. During this study from 1984 through 1986, the author periodically field checked the Native names for many locations while traveling in Minto Flats. This was accomplished by asking traveling companions the names of certain locations as we saw them and then comparing the reported name with the previously recorded name. Also, when Minto residents used Native place names in the field, the map location was verified providing a second method for field checking the accuracy of locations on the map. Few changes in location were necessary, testifying to Peter John's intimate knowledge of the area, his knowledge of the Minto Athabaskan names, and his skill in applying his lifelong experience in the Minto Falts area to U. S. Geological Survey maps. The author, however, accepts responsibility for any errors in locating places on the maps.

In the following list, English names without quotation marks are those which appear on U. S. Geological Survey maps (scale 1:63,360) and are spelled as they are on those maps. Other English names commonly used by Minto residents are noted in quotation marks. The translation of the Minto Athabaskan name appears in quotation marks directly below the Athabaskan name. In some cases there is no known translation.

Below is a chart showing the orthography used for these names. It follows the same orthography developed and used by Dr. Michael Krauss,

Alaska Native Language Center, University of Alaska, Fairbanks (Krauss 1974b).

plain stops		d	dl	ddh	dz	dr	j	g
aspirated stops		t	tl	tth	ts	tr	ch	k
glottalized stops		t'	tl'	tth'	ts'	tr'	ch'	k'
voiceless continuants			ɬ	th	s	sr	yh	kh
voiced continuants	m	n	l	dh	z	zr	y	gh
long vowels	ee[i˙], oo[˙], a[ae], o[˙]							
short vowels	e[ə], u[v]							

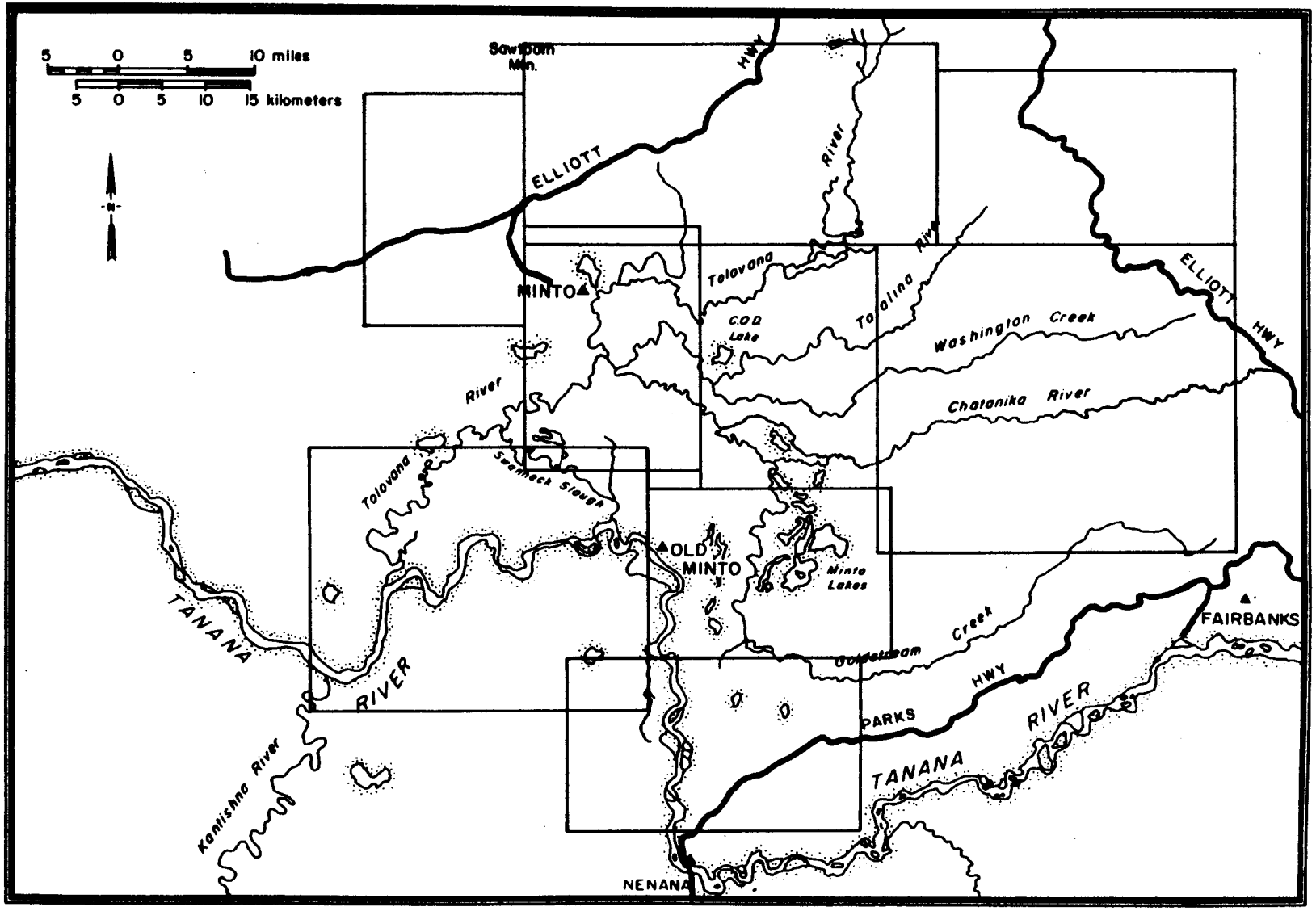

Fig. 38. Orientation of Figures Showing Locations of Places with Minto Athabaskan Names in Minto Flats and Vicinity.

MINTO PLACE NAMES -- FIGURE 39

	Minto Athabaskan	English Name or Description
1.	Dradlaya Chaget mouth of round whitefish river	area where Chatanika River comes out of the hills
2.	Dradlaya Chaget mouth of round whitefish river	place where the Chatanika River comes out of the hills
3.	K'ey Ntoł'oden water extends into birch place	along the Chatanika River 1-1/4 miles below 2 into the flats
4.	Be'ot Nayghee łdheden Tth'en K'at his wife killed him grave	north side of Chatanika River; 1 mile north of 5
5.	K'ey Ghoy Mena' birch point lake	lake south of Chatanika River opposite 4
6.	Nogeddha Kan' fox den	south side of Chatanika River 3/4 east of "Four Cabin"
7.	Tr'enotekhekhughee łch'e ł the water cut through	creek between "Four Cabin" and "Cache"
8.	Tr'enotekhekhughee łch'e łden where the water cut through place	"Four Cabin"
9.	Bezreya' Tr'enoteegheetonden where the otter has a trail out	south side of Chatanika River, 1-1/4 miles below "Four Cabin"
10.	Mendasr Mena' shallow lake lake	north of Chatanika River, 1-1/2 miles east of mouth of Goldstream Creek
11.	Men Tee Khuno' Dochaget mouth of creek among the lakes	mouth of Goldstream Creek
12.	Men Tee Khuno' creek among the lakes	Goldstream Creek (part of) "Minto Slough"
13.	Khudok'edze Mena' lake between (the creek)	1/2 mile southwest of mouth of Goldstream Creek
14.	T'atodadh'oya, T'atodh'oya (?) extends into water	1-1/2 miles west of mouth of Goldstream Creek

	Minto Athabaskan	English Name or Description
15.	Tey Logha Mena' point of the hill lake	2 miles west of mouth of Goldstream Creek
16.	Bek'et Tabeel K'at Khuloy Mena' there are set fish net spots on it lake	lake 4 miles north of Clear Lake
17.	K'ey Teyden birch hill place	hill south of 16 and 3 3/4 miles north of Clear Lake
18.	K'ey Tey Tonee'oden birch hill extends into water	extends between 17 and 58
19.	Ttheeyatth'ena' No' jaw bone river	Narrow Lake southeast of 15
20.	K'uy'nega Mena' willow uplands lake	"Willow Lake"
21.	Dechen Tlakh Teya' (?) soft stick hill	"Midnight Island"
22.	Tukhchedha ?	flats 1 mile east of "Midnight Island"
23.	K'ey Tey Tonee'oden birch hill extends into water place	"Birch Island"
24.	Toko Sedha' hill (on the flats)	elevation 1,306'; 2 miles south of 1
25.	Dalbee Neek'a (?) goose river	"Sam George Creek"
26.	Toko Sedha' Tsetl'a little hill (in the flats)	2 miles southeast of 24
27.	Sresr Chaget bear river mouth	creek coming out of hills south of 26
28.	Sresr Chaget bear river mouth	creek flowing out of hills
29.	Khugezret Khuno' notched creek	creek flowing out of hills 2-1/2 miles southwest of 229
30.	San Tena summer trail	extending southeast from 32 into hills

	Minto Athabaskan	English Name or Description
31.	Nonoodalyoden where islands go across	area between southern and northern portions of Minto Lakes
32.	Dets'enee Trona' duck shit	lake which 28 flows into
33.	Tsoo T'ekh Mena' ?	northern portion of Minto Lakes
	Dets'enee Trona' Mena' duck shit lake	"Duck Shit Lake"
34.	Ben Tee, Men Tee among the lakes	Minto Lakes
35.	K'uy' Ch'eda' tough willow	1 mile southeast of 40
36.	Khudodleeya Neek'a ?	"Big Goldstream"
37.	Ch'elk'uy' Tey Labrador tea hill	place near the northeastern end of 38 west of 36
38.	Dechenlayet Gheelen Mena' current flows (in the brush lake)	2 miles east of the Indian Cemetery west of 36
39.	Tr'ekhudetthatlden we chopped a creek through place	1/4 mile above 40
40.	Dalbee Dochaget (?) goose river mouth	creek flowing out of Minto Lakes
41.	Dechen Tlakh No' (?) stick river	1/4 mile east of "Cache"
42.	Dukhtso Dedhdloden where elevated caches are located	"Cache"
43.	Łat'adhyaden tamarack place	first bend downstream of mouth of Goldstream Creek
44.	Toltthugha Dochaget mouth of brown water	junction of Goldstream Creek at "Cache"

	Minto Athabaskan	English Name or Description
45.	Dukht'ukh elevated nest place (nests in the trees)	1 mile above "Cache" east of Goldstream Creek
46.	Khole*l*yeth Notodalyoden floating grounds go across place	flats between Goldstream Creek and "Big Goldstream"
47.	Khuy Tena Mena' winter trail lake	lakes in bend of river south of 48
48.	Ttheeyatth'ena' No' jawbone river	bend in Goldstream Creek 1 mile south of "Jack Hill"
49.	Beyee Ch'edesk'adee Mena' in it (?) lake	1/2 mile south of "Jack Hill"
50.	Jack Toghee'oden Jack extends into water place	"Jack Hill"
51.	K'uy'yeetr'ela Teeneelenkhu current among little willows area	1 mile north of Indian Cemetery
52.	Tey Teth hill portage	terminus at Indian Cemetery
53.	Dotr'ey-detlek Mena' (?) boats customarily go inside lake	Beaver Dam Lake
54.	Tey K'ech'eedet'otthden something cut through the hill	"All Hand Hill"
55.	Tey Yee Todeghoden water in the hill place	All Hand Help Lake
56.	Tonelzren Mena' black water lake	
57.	Tonelzren No' black water river	stream flowing out of 56
58.	K'uy'tr'eela Tee Neelen current flows among small willows	2 miles north of Clear Lake
59.	Beghu*l*chee Khakhudeneelenkhu water flows (?) area	2 miles north of Grassy Lake

	Minto Athabaskan	English Name or Description
60.	Khughutonee'o Mena' extends through it lake (lakes go through together)	3/4 mile west of 18
61.	Nomen-tr'edeeltonee the lake which we found again	lakes 1-1/2 miles northwest of Clear Lake
62.	Tr'adanee'oyee the one (lake) whose mouth extends out	Long Lake
63.	Tonelkun' Mena' clear lake	Clear Lake
64.	Men Tee Khughottheet river side of among the lakes	Old Minto
65.	Ten Dona' trail upriver	Tanana Valley
	Tth'eetoo' straight water	Tanana River
66.	Noongu Tr'edagheedhot long slough	Sawmill Slough
67.	Tey T'ekh Deghee'oya the one which extends under the hill	south of Sawmill Slough
68.	Men Tee Khughottheet river side of among the lakes	place at the lower mouth of Twenty four Mile Slough, east of the Tanana River
69.	Tl'ukh Layden where there is grass	1/2 mile south of 68
70.	Ts'eba Toteth spruce tree portage	trail extending 1 1/2 miles east from 69, then 1 mile northeast to Big Lake
71.	Neetl'ek'o Ten Mena' cranberry trail lakes	lakes 1 mile southeast from the upper mouth of Twenty Four Mile Slough
72.	Ts'eba Yee Katadleno' spruce trees (on both sides) river	"Hot Slough"
73.	Men K'ekhuchukh big lake	Big Lake

	Minto Athabaskan	English Name or Description
74.	Taghulghuk (waves)	at northeastern end of Big Lake
75.	Dechen Tr'ey Mena' wooden canoe lake	Wooden Canoe Lake
76.	Toltthugha Neek'a; Toltthughano' brown water river	Goldstream Creek (part of)
77.	Khunokhjetden rotten (creek) place	between southern portion of Minto Lakes and Goldstream Creek
78.	Kheenk'enoo' (?) island	peninsula 1/4 mile south of 31
79.	Batr'a Tr'eel'an' Teya' we get obsidian hill	1/2 mile east of 38
80.	Nokhulton' Mena' thunder lake	south of 31; 1 mile east of 78
81.	Cho Mena' (?) lake	southern limit of Minto Lakes
82.	Beth Nelk'uʎden where the bluff is white	place 3-1/2 miles northwest of elevation 2005' ("standard")
83.	Khulaya Ddhela' (end mountain)	ridge extending to northwest from Dunbar

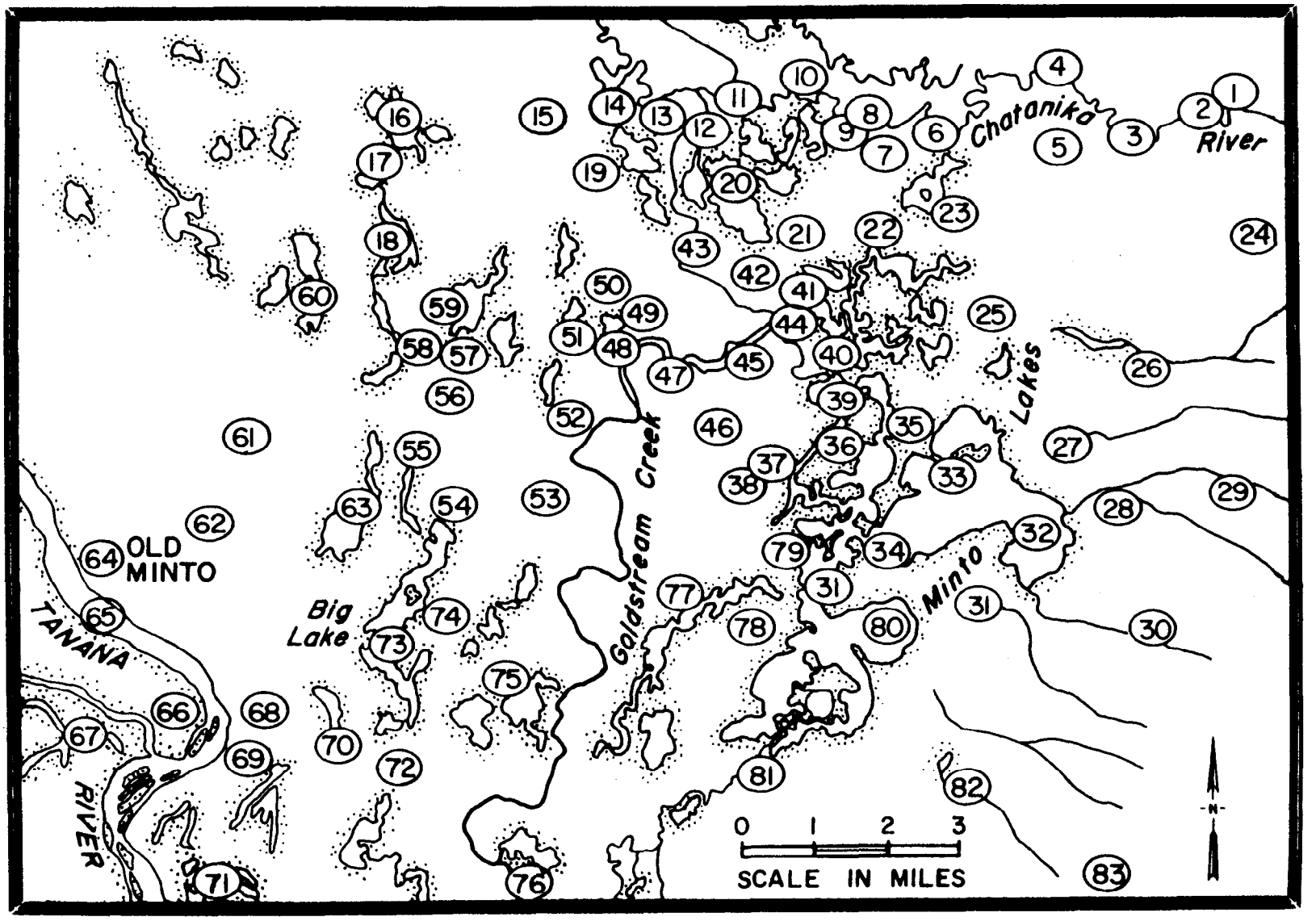

Fig. 39. Locations for Places with Minto Athabaskan Names, Numbers 1-83.

MINTO PLACE NAMES -- FIGURE 40

	Minto Athabaskan	English Name or Description
84.	Khudega Mena' lake behind	3-1/2 miles west of the lower mouth of Totchaket Slough
85.	Noghuya Mena' frog lake	1-1/2 mile east of 84
86.	Dedelanee (green, no water)	area 7 miles west of Linder Lakes
87.	Tochaget water mouth	Totchaket Slough
88.	Dets'enee Tr'ooghosr Mena' ducks making noise lake	1 mile northeast of Sawmill Island, east of the Tanana River
89.	Dets'enee Tr'ooghosr Noo' ducks making noise island	Sawmill Island
90.	Nook'a Ch'eedet'otthden island where somebody tried to cut her (his wife)	island on the southeastern extension of Sawmill Island
91.	Totth'eyo Mena'; Tottheeya Mena' (dry trees) lake	Linder Lakes
92.	Ts'eba Yek'a Tadhdlen No' creek that flows on spruce	Little Goldstream Creek (part of)
93.	Ta'othtrey Mena' loon lake	"Six-Mile Lake," "Loon Lake"
94.	Ton'kaǀch'ekadodlo Mena' lily pads lake	1-1/4 miles east of 93
95.	Nodh'oya bucket	1/2 mile north of 96
96.	Tobo Mena' swan lake	1 mile north of fork of Little
97.	Neeǀk'at Ch'eneedetl'oon Mena' snares set on both sides lake	3-1/2 miles west of Dunbar
98.	Beghuntadhdlenee; Begheneet Tadhdlenee the one that flows behind it (hill)	hill 1,326' elevation north of Dunbar

	Minto Athabaskan	English Name or Description
99.	Toolono Mena' small blackfish lake	"Anderson Lake"
100.	Sroteya' Mena' sun hill lake	Twomile Lake

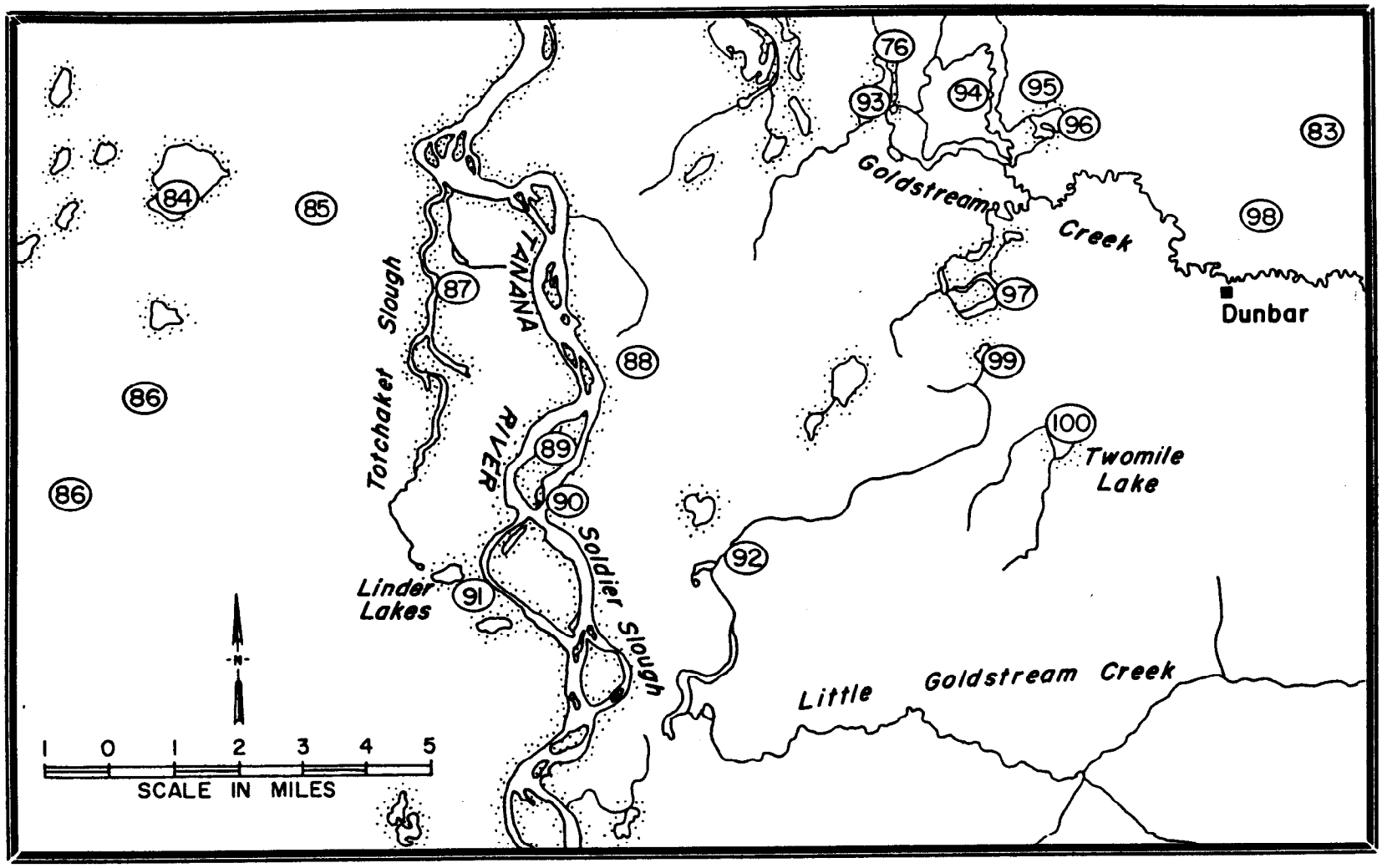

Fig. 40. Locations for Places with Minto Athabaskan Names, Numbers 84-100.

MINTO PLACE NAMES -- FIGURE 41

	Minto Athabaskan	English Name or Description
101.	Tthaych'edroddha rocks sticking out	Dugan Hills
102.	Ch'edrodheth Tenadht'eyden something's leg skins are stretched out	slope which extends into Tolovana River
103.	Jega T'on' Yet Tr'etoghee'oden where water extends to berry leaf place	3-3/4 miles south of 107 on the west of the Tolovana River
104.	K'ey Nto*l*'oden water extends into birch place	1-1/2 mile south of "Twenty-Mile Lake"
105.	K'ey Nto*l*'o No' water extends into birch river	south of "Twenty-Mile Lake"
106.	Jega T'on' Yet Tr'etoghee'oden where water extends to berry leaf place	flats 3/4 mile southeast of 107 and west of Tolovana River
107.	K'ey Nto*l*'o Mena' water extends into birch lake	"Twenty-Mile Lake"
	K'ey Khuyee Mena' lake in the birch	
108.	Too Chukh Khoolan No' big water exists (was born) river	stream which enters Tolovana River from the north, about 5 miles below mouth of Swanneck Slough
109.	Noghuya Ch'edonden where the frog eats (had supper)	area at the right of the mouth of Swanneck Slough
110.	Sray Trela Telekh No' (?) wet knife fish run river	Swanneck Slough; "Tanana Slough"
111.	Tocho Look'a fish (in the brush)	lake on left bank of Tolovana River
112.	Tocho Look'a Ddhela' fish (in the brush) hill	hill 2 miles southwest of the mouth of Rock Island Slough
113.	Tone*l*kun' Mena' clear lake	lakes 4-1/2 miles southwest of the mouth of the Chatanika River

	Minto Athabaskan	English Name or Description
114.	Sraytrela Telekh Teya' (?) wet knife fish river	hills east of Grassy Lake
115.	Tr'edhayka' Noongu person caught slough	slough of the Tanana opposite Swanneck Crossing
116.	Łat'ath Mena' tamarack lake	Lunch Lake
117.	Khutrela' wet area	4 miles southwest from the western end of Lunch Lake
118.	Ch'etelekhkhu something (fish) swim up area	stream above 119
119.	Deetalegeth No' forked river	mouth of stream flowing into the Tanana from the south
120.	Tolboden grey water place	Tolovana
121.	Detreth Tlakh No' (?) fish weir creek	"Three-Mile Slough"
122.	Nedetth'eya (something hanging)	east facing slope at southeast limit of Dugan Hills west of Caribou Crossing
123.	Ch'eton-tthukh No' brown water river	stream east of Caribou Crossing
124.	Khenteyeth No'; Khenteeth No' (?) high ground river	Kantishna River

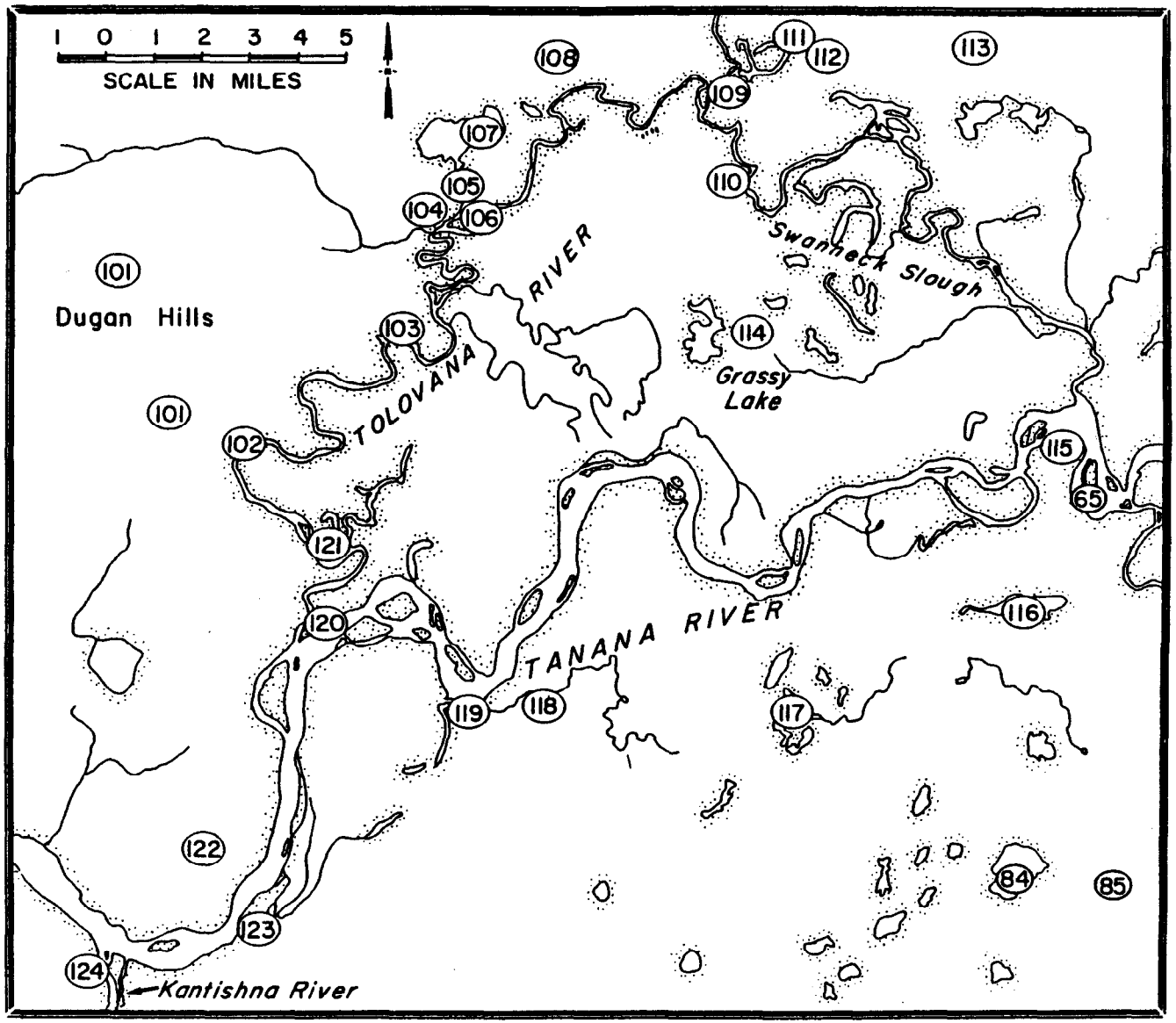

Fig. 41. Locations for Places with Minto Athabaskan Names, Numbers 101-124.

MINTO PLACE NAMES -- FIGURE 42

	Minto Athabaskan	English Name or Description
125.	Datl'ukhdadhoda long grass, big meadow	north of Elliott Highway, 36 miles from Eureka
126.	K'osr Tr'ooney we pick stone	hill at elevation 1,715'; north of 130
127.	Tr'elk'onee something burns	hills east of "Windy Creek"
128.	T'egheth Yozra' Neelanee there are little cottonwood trees	hill west of the mouth of Idaho Creek
129.	Tr'elkonee No' something burns river	"Windy Creek"
130.	Mendasr Mena' shallow lake lake	lake 2 miles north of New Minto; "Fish Lake"
131.	K'osr Tr'ooney No' we pick stone river	stream flowing from hills of 126
132.	Khuno'; Khono' creek	Uncle Sam Creek
133.	Nondenadekuya something sticking up	hill 1-1/2 miles west of New Minto
134.	Nondenadekuya Chukhododee little something sticking up	hill 2-1/4 miles west of New Minto
135.	Menan'k'oget, Mena'k'ogeda; Menan'k'oget his face gets chapped (by wind)	(New) Minto
136.	Mendasr No' shallow lake river	lake extending north from the Tolovana River to "Fish Lake"
137.	Yosr Kan' little den	"Grandma Hill"
138.	Tokodroya' Mena' spider lake	1/2 mile east of (New) Minto
139.	Ts'etsekhkhuga Mena' (lake in the moss)	lake 1 mile southeast of (New) Minto

	Minto Athabaskan	English Name or Description
140.	Ts'eba Noo' spruce tree island	peninsular area 1-1/4 miles north of the mouth of Montana Creek
141.	Thoot'al No' (little brush) river	Montana Creek (part of)
142.	Tr'etl Yee Mena' lakes in the brush	lakes south of the month of Montana Creek
143.	Dets'ebadhton' spruce trees are there	hill northeast of 145
144.	Denach'eghuthchenayee bottom of our head, occiput	hill 1 mile northwest of the mouth of Ripple Creek
145.	Mandoodayee ?	hill 2-1/2 miles east of the mouth of Montana Creek
146.	Khuleghunghodeghusden (all split up) place	"Ripple Creek Mouth"
147.	Tonelkun' Mena' clear water lake	lake 2 miles southeast of the mouth of Montana Creek
148.	Tr'etey-gheedle'o hill sticks out	hill 2 miles southwest of 146
149.	Tl'ukhtekno' (?) grass river	Tatalina River (part of)
150.	Tl'ukhtal wide grass	flats between the Tatalina River and the Chatanika River
151.	Tsooga Tl'ugha' marten grass (flats)	flats south of the Chatanika River
152.	Tl'ukhtek No' Dochaget mouth of (?) grass river	mouth of Tatalina River
153.	Noneelen No' current flows across	Chatanika River (lower part of)
154.	Tolbono' Dochaget mouth of grey water river	mouth of Chatanika River
155.	Tolbono' grey water river	Tolovana River
156.	Seth Ghoyet point of the hill	point of the hill 2 miles north of the mouth of Rock Island Slough (159)

	Minto Athabaskan	English Name or Description
157.	Seth T'ekh Mena' lake under the hill	lake 2 miles northeast of Rock Island (161)
158.	Men Deghechogha lots of lakes	lakes west of the mouth of Rock Island Slough (159)
159.	Khedega Mena' No' lake above river	"Rock Island Slough"
160.	Łatagheetothden (short cut)	"Big Eddy"
161.	Ttha Nooden rock island place	"Rock Island"
162.	Khedega Mena' lake above	"Rock Island Lake"
163.	Negheedhot Toyana' long straight stretch	Tolovana River (part of)

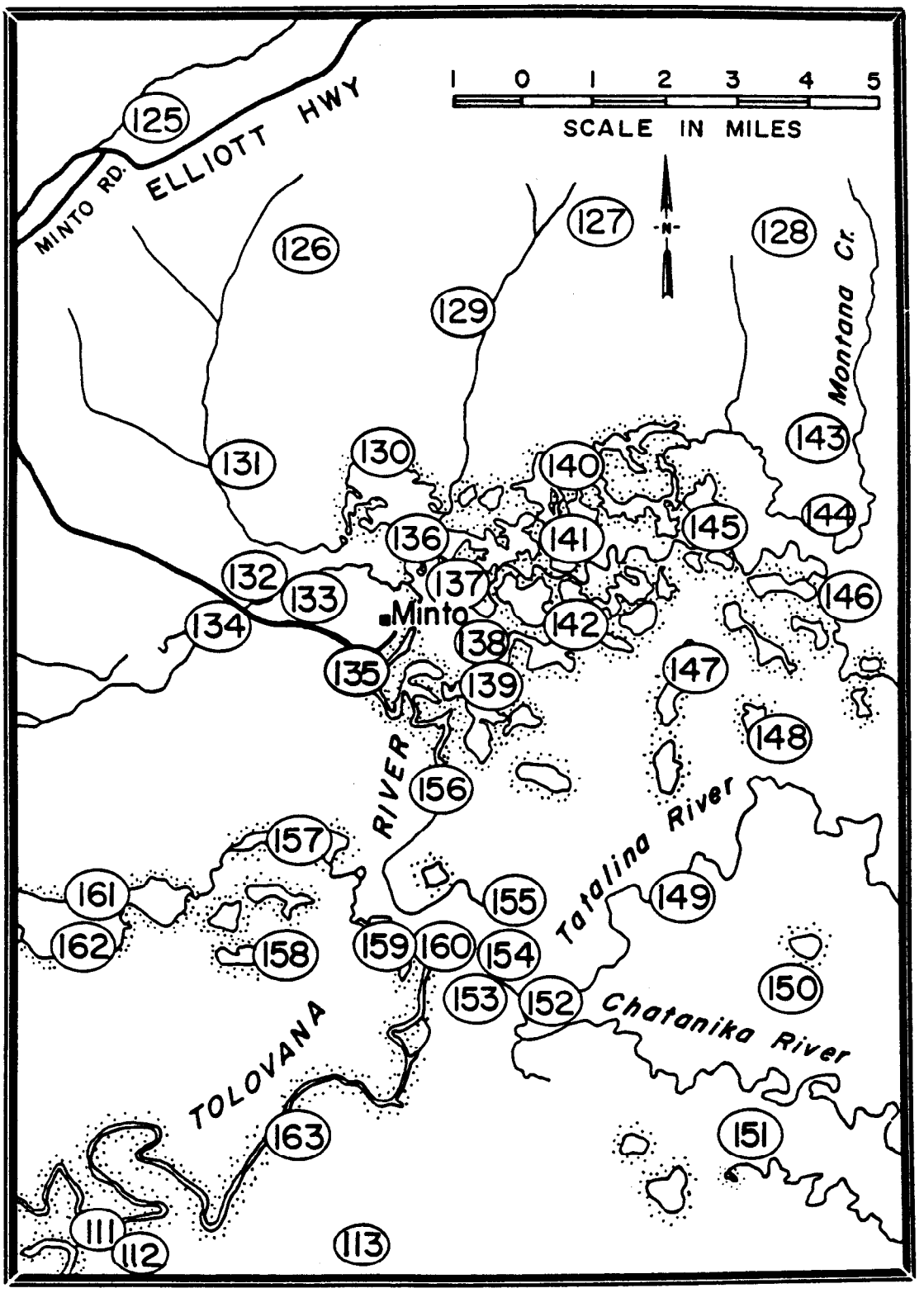

Fig. 42. Locations for Places with Minto Athabaskan Names, Numbers 125-163.

MINTO PLACE NAMES -- FIGURE 43

	Minto Athabaskan	English Name or Description
164.	Totthadengheeloye rocks fell in the water	hills east of Idaho Creek
165.	Tey Yee Todeghee'oden water in the hill place	hill 5-1/2 miles east of the mouth of Idaho Creek
166.	Dotron' Tr'eeltan No' we found crow	place 3-1/2 miles east of 146
167.	K'uy'zrusr Yee Mena' in the narrow fine willow lake	1-1/2 miles northeast of "Willow Lake"
168.	Tobo Goya Tr'anach'ekhelyayden where they packed a young swan out	"Willow Lake"
	K'ey Noo' Mena' birch island lake	
169.	Ch'etoch'o No' long ways river	creek along the Tolovana River
170.	Ts'ebadela' Neelaneeno' there are spruce trees river	river flowing into the Tolovana
171.	Ts'ebadala' Neelanee there are spruce trees	ridge west of Tatalina River, southwest of Twin Creek
172.	Nolideth Mena' great grey owl lake	"Owl Lake"
173.	Noghusk'atth'iga ?	ridge north of Tatlina River and north of "Big COD"
174.	Tho'odee all the time (one hears wind)	"COD Hill"
175.	Tho'odee Chukh big all the time	"Big COD"
176.	Tho'odee Mena' all the time lake	COD Lake
177.	Tho'odee Tsetl'a little all the time	"Little COD"
178.	Akhoya Mena' oldsquaw duck lake	

	Minto Athabaskan	English Name or Description
179.	Łokhultonnee'o Khu lots of branches in the water area	"Muskrat Slough"
180.	Tho'odee No' all the time river	Tatalina River (part of) Slough"
181.	Nothdodedadle'oden (the timber) extends (out of the creek) place	
182.	Khutl'o Mena lake at the end of it	lake 2 miles southeast of 172 and at head of "Muskrat
183.	Noodh'on No' island is there river	Washington Creek (part of)
184.	Noodh'on Mena' island is there lake	lake 1-1/2 miles northwest of 187
185.	Noodh'on No' island is there river	
186.	K'uy' Yee Tr'aneelenden current out of willows	Washington Creek (part of)
187.	Nok'edotl'a Mena' (?) lake	lake 1 mile northeast of 190
188.	Tobo Mena' swan lake	lake west of Sled Road 2 miles north of 2
189.	Tobo Mena' No' swan lake river	creek flowing out of 188
190.	Tobo Mena' swan lake	2 miles east of 192
191.	Tr'at'oleeno' flows out under	1 mile east of 192
192.	Menchemena' (?) lake one the flats	1-1/2 miles north of mouth of Goldstream Creek
193.	Nen' Yekh Tth'enden bones under the ground place	north of Chatanika River, 4-1/2 miles below mouth of Goldstream Creek
194.	Mentolee Chaget; Mentolee No' creek comes out of lake river	small Creek flowing into the Chatanika River

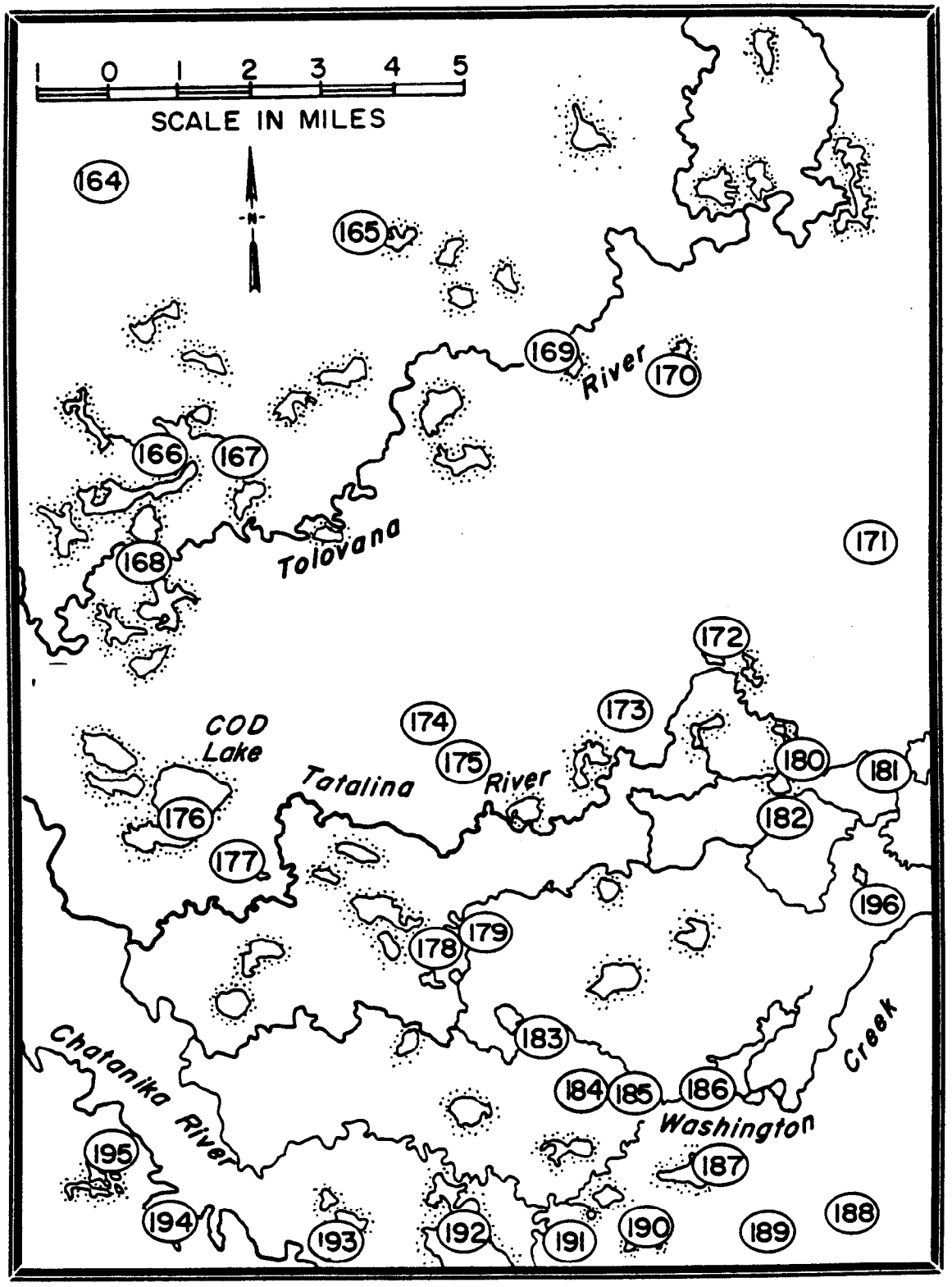

Fig. 43. Locations for Places with Minto Athabaskan Names, Numbers 164-196.

MINTO PLACE NAMES -- FIGURE 44

	Minto Athabaskan	English Name or Description
197.	Bek'et K'oladeetayee Khoolanee cattails are on it	lake 4-1/2 miles north of 201; east of Tatalina River
198.	Tat'aleeno' ?	Washington Creek (part of)
199.	Dzon Nogheetl'enden muddy water	stream flowing west into Washington Creek
200.	K'ey Tretr Choghuna' lots of birch wood	at the end of the north fork of 199
201.	Mena' Tukh Tena Yee No' river in the trail among the lake (bridge across the creek)	stream flowing north into Washington Creek
202.	Nondenadekuya something sticking up	hill 1,323' elevation north of Washington Creek
203.	San Tena summer trail	trail along ridge 111
204.	Nondenadekuya Tsetl'a little something sticking up	hill 502' elevation north of Washington Creek
205.	Tr'edhdo' somebody sitting	ridge extending southwest from Wickersham Dome north of Aggie Creek
206.	Teyeddha No' large hill river	Aggie Creek
207.	Teyeddha' large hill	ridge between Washington Creek and Aggie Creek
208.	Tthadenelde/den rocks (?) place	Wickersham Dome
209.	Khutethmenden portage lake place	south of Elliott Highway
210.	Khendega Kayekh used to be village	north of Chatanika River 3/4 mile west of mouth of Sargent Creek
211.	K'ey Ttha Neelanee there are young birch	hill northeast of mouth of Hayes Creek

	Minto Athabaskan	English Name or Description
212.	Ghenaɬ Tena people move trail	trail between Chatanika River and Washington Creek
213.	Tr'atthadenaneelo No' he took rocks out or where we floated out river (?)	creek flowing into Chatanika River west of Hayes Creek
214.	Ch'enogetth (salt)	north of Chatanika River 3 miles southeast of 2470' "Hayes"
215.	Neɬtreeth Toteth wolverine portage	north of Chatanika River south of 216
216.	Dedenach'eelok something hurt us	hills between Washington Creek and Chatanika River
217.	ɬeyeth Toteth dwarf birch portage	north of Chatanika River 1 mile east of mouth of Shovel Creek
218.	Tok'eygheeɬ'oden birch extends into water place	south of Chatanika River 1 mile east of mouth of Shovel Creek
219.	Detth Toteth driftwood portage (log jam)	Shovel Creek "Log Jam"
220.	Teetosethghee'oden ridge extends into the water	north of Chatanika River 3/4 mile west of mouth of Shovel Creek
221.	Khuneets'ebaghee'oden where the timber goes up	hill north of Chatanika River opposite mouth of Shovel Creek
222.	Toteth Men Dalyoden where lakes go over portage	north of Chatanika River 2 miles west of mouth of Shovel Creek
223.	Dradlay Neek'a (?) creek	Chatanika River (part of)
224.	Dradlay Sedha' (?) hill	hill on north side of Chatanika River
225.	Tthat'o Toyana' straight stretch under rocks	Chatanika River (part of)

	Minto Athabaskan	English Name or Description
226.	Tthat'o Khuno' under rocks creek	Hard Luck Creek
227.	Neenotr'ey-leyayden where canoes are pulled up	1/2 mile below mouth of Hard Hard Luck Creek
228.	Tthat'o Toteth under rocks portage	across bend of Chatanika River opposite mouth of Hard Luck Creek
229.	Tr'ey Khut'anee the one like a canoe	VABM 2,807' "Luck"
230.	Bedzey T'ukhno' Khutl'ot headwaters of river under caribou	Murphy Dome
231.	Bedzey T'ukhno' under caribou river	Murphy Creek

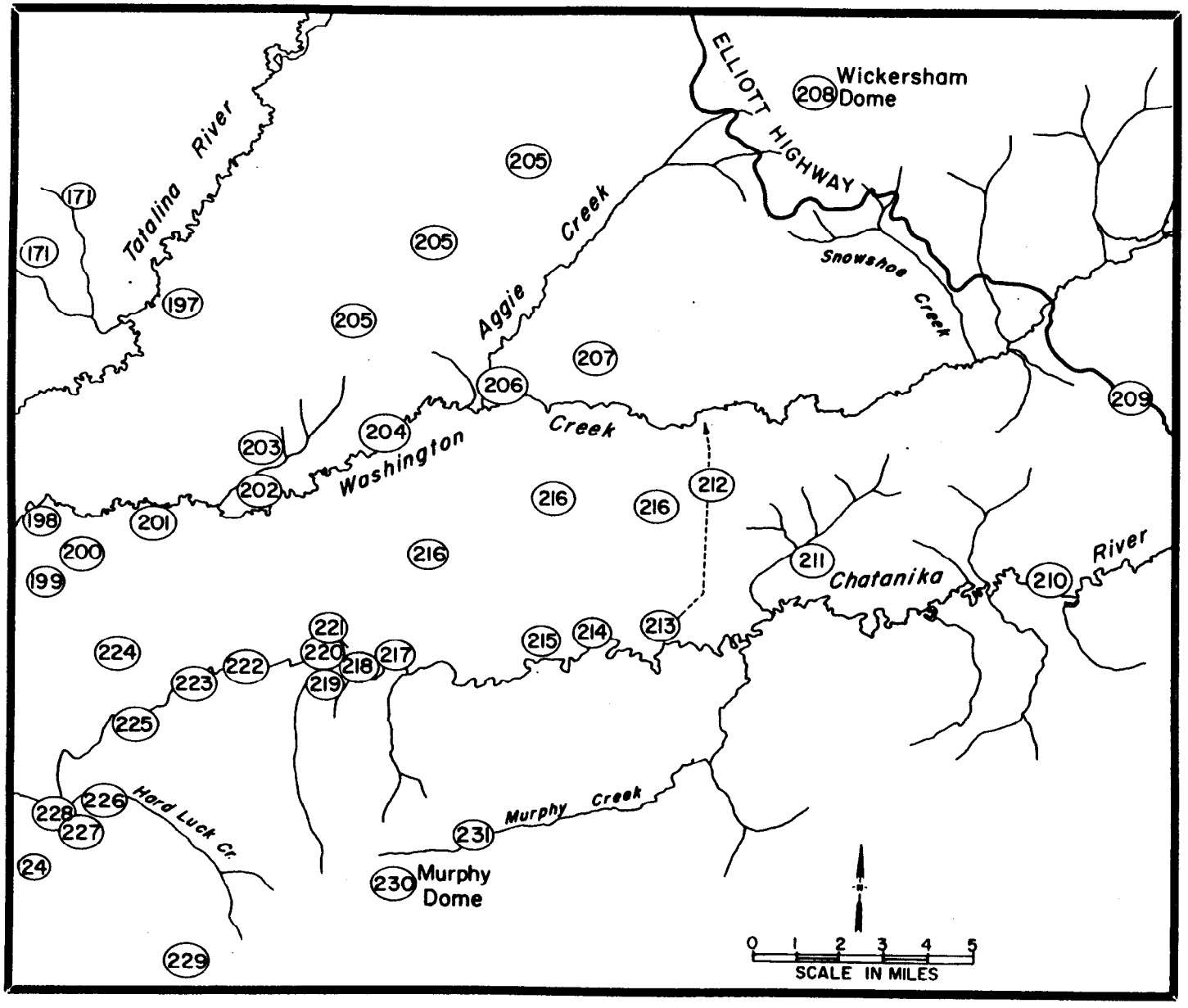

Fig. 44. Locations for Places with Minto Athabaskan Names, 197-231.

MINTO PLACE NAMES -- FIGURE 45

	Minto Athabaskan	English Name or Description
232.	Beloghe Noldlenee current flows around it	hill east of Beaver Creek at the southwest limit of the White Mountains
233.	Tsogha Neek'a beaver creek	Beaver Creek
234.	Dathdlazree Dena'eełghełden brown bear knock us down	hill between Tatlina River and Slate Creek near elevation 1,345'
235.	Tsonee Tr'eełan' No' we found brown bear river	Slate Creek
236.	Bek'et Notr'ey-tr'edełgoya we dry out canoe on it	hill west of Slate Creek mouth at elevation 968'
237.	Ttha Yee Chaget river mouth in the rocks	Globe Creek
238.	Ttha Yee Chena' flat in the rocks	flats southwest of 239, north of Globe Creek
239.	Noochoonee Ddhela' bull moose hill	hill between the Tatalina River and Globe Creek south of Elliott Highway
240.	Tth'eetl'o'etl'oyee No' straight river	creek near mouth of O'Brien
241.	Khantthandenadh'oden rocks sticking up place	"Grapefruit Rocks"
242.	Khantthandenadh'o No'; Khatthodenandh'o No' rocks sticking up river	Globe Creek

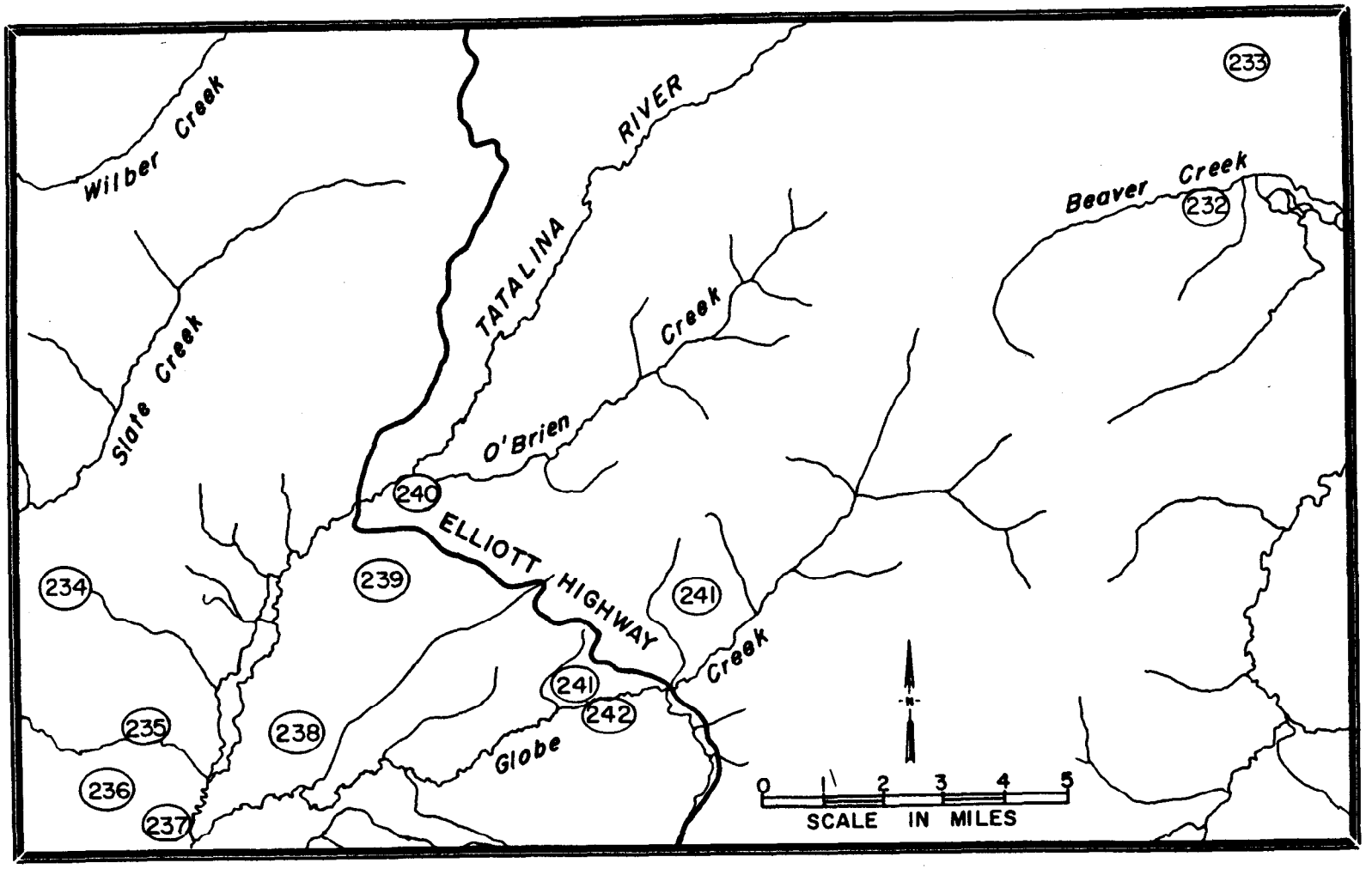

Fig. 45. Locations for Places with Minto Athabaskan Names, Numbers 232-242.

MINTO PLACE NAMES -- FIGURE 46

	Minto Athabaskan	English Name or Description
243.	Netsey Bonotr'eteth when one climbs, (his) nose is to the ground	hill northwest of 254
	Netsey Bonotr'eteth No' when one climbs, (his) nose is to the ground creek	Goose Creek
244.	K'otth'eba Seth ptarmigan hill	"Ptarmigan Hill"
245.	Ch'ettha' Neelanee something's rocks which are there	Tolovana Hot Springs Dome "Tolovana Dome"
246.	Too Naldhełden warm water place	Tolovana Hot Springs
247.	Tobo Mena' swan lake	northwest of the mouth of Brooks Creek
248.	Chen Chukh big meadow	west of the Tolovana River, between West Fork and 249
249.	Tobo Mena' No' swan lake river	river flowing south from 247 into the Tolovana River
250.	Nokhutldenadedlen sled (is slanted)	Vigor Creek
251.	Tso' Ch'ekan' beaver lodge	ridge east of the Tolovana River
252.	K'athnodadelenden; K'anodadelen No' where the current goes backwards	West Fork Tolovana River

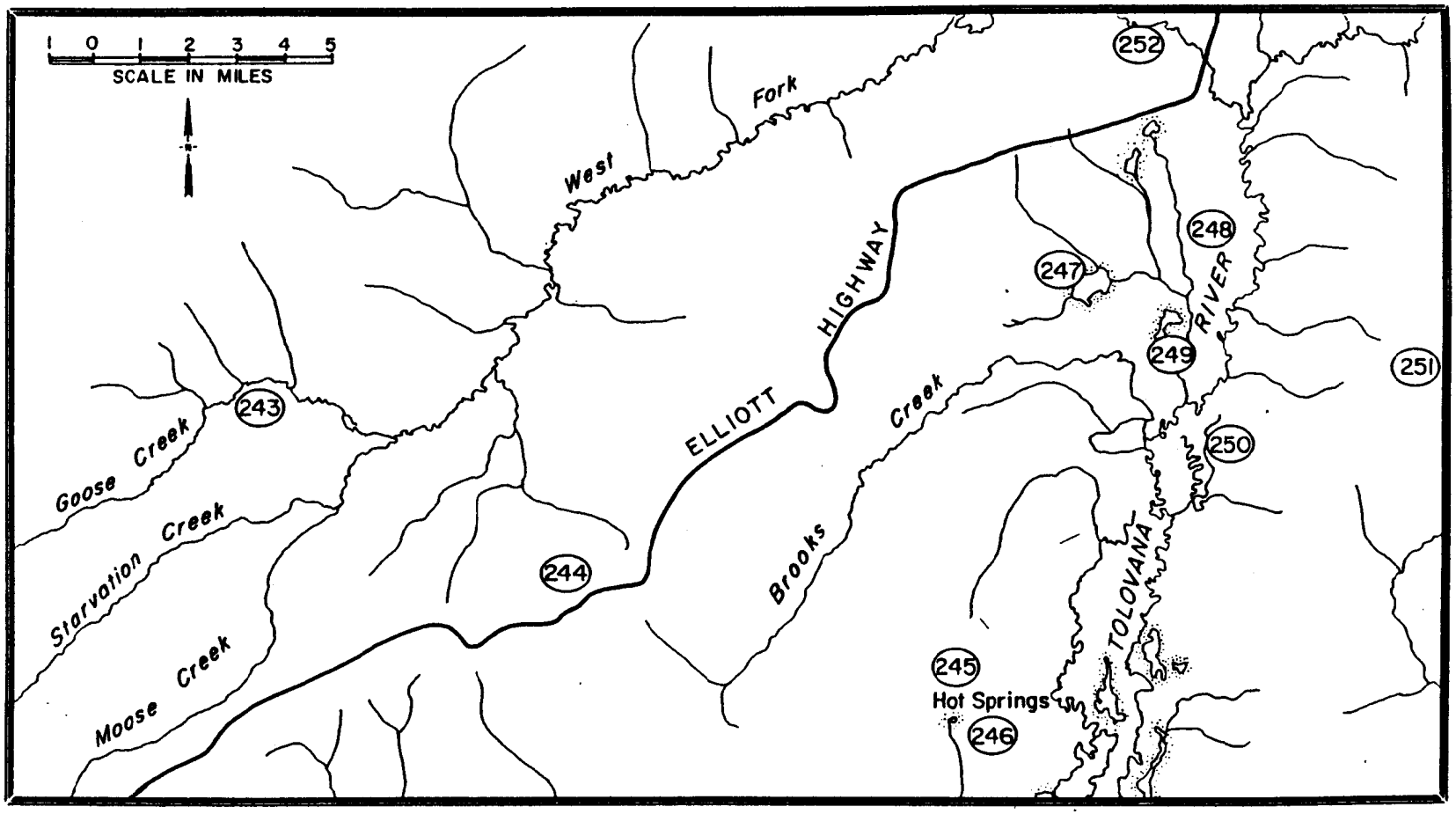

Fig. 46. Locations for Places with Minto Athabaskan Names, Numbers 243-252.

MINTO PLACE NAMES -- FIGURE 47

	Minto Athabaskan	English Name or Description
253.	Seth Jeda sinewy or tough hill	Sawtooth Mountain
	Sethdeghee'on hill extending (after Chief Charlie's name Khedeghee'o)	
254.	Tr'ey Khut'anee like a canoe	hill at elevation 3,145' ("Starve")
255.	Bek'et Tthadloya rocks lie on it (the hill)	hill at elevation 1,925' at the northeastern head of Niggerhead Creek

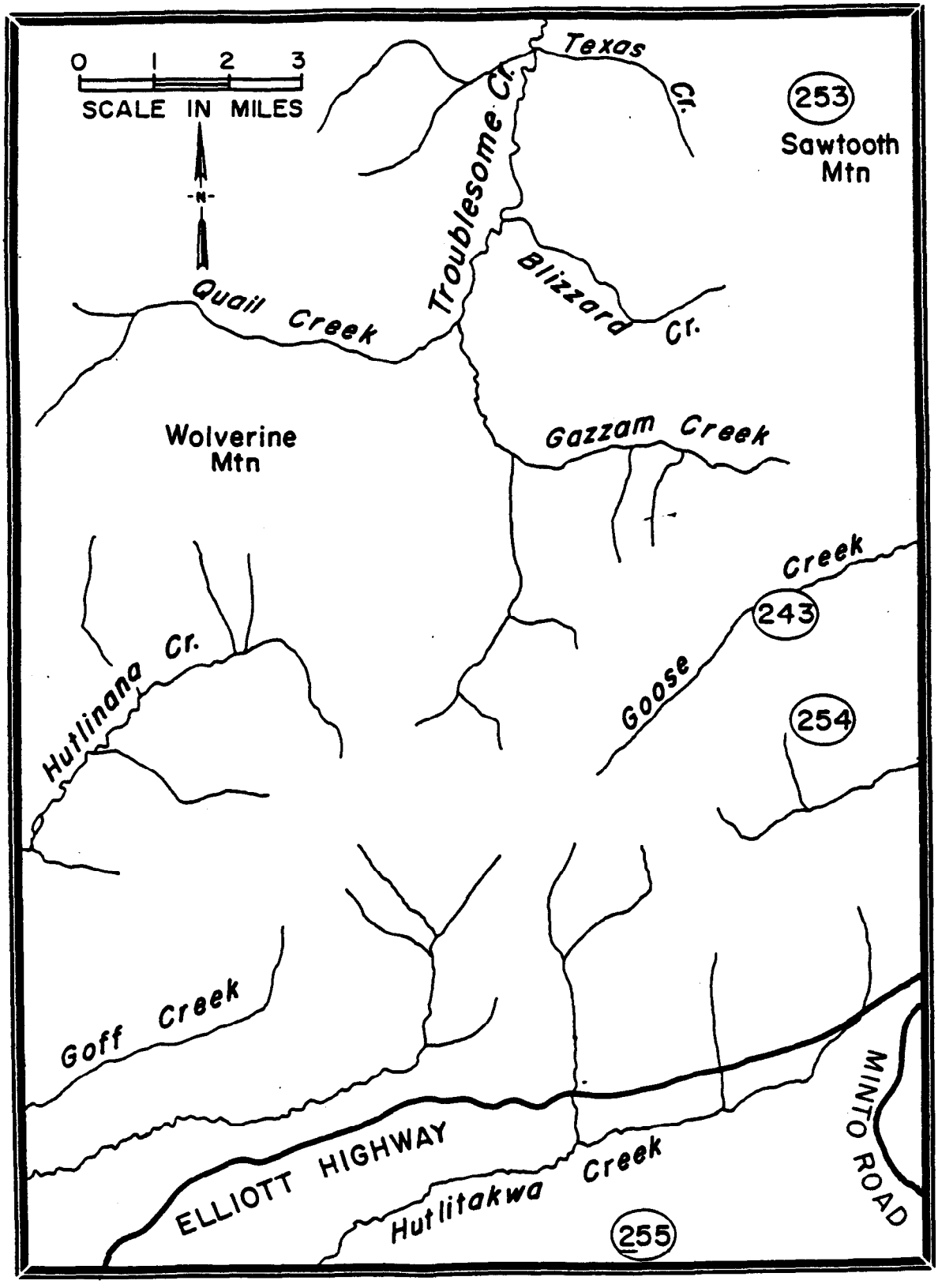

Fig. 47. Locations for Places with Minto Athabaskan Names, Numbers 253-255.