

HUMAN ECOLOGY OF TWO CENTRAL KUSKOKWIM
COMMUNITIES: CHUATHBALUK AND
SLEETMUTE

by
Susan Charnley

Technical Paper Number 81

Alaska Department of Fish and Game
Division of Subsistence
Juneau, Alaska
December 1984

ABSTRACT

This report describes hunting, fishing, trapping, and gathering in Chuathbaluk and Sleetmute and is based on fieldwork that took place between June 1982 and June 1983. Chuathbaluk and Sleetmute are located in the central Kuskokwim River area, which has been defined as a region in relatively recent times based on introduced sociopolitical criteria. The central Kuskokwim region is an area of cultural and linguistic interface between the Yup'ik-speaking Eskimos of the Yukon-Kuskokwim delta and the Athabaskans of Interior Alaska. Chuathbaluk is primarily composed of Yup'ik Eskimos while Sleetmute contains individuals of primarily Yup'ik and Athabaskan descent. Current patterns of resource harvest observed in Chuathbaluk and Sleetmute have probably been influenced by several cultural traditions over time, including the Yup'ik Eskimos from the lower Kuskokwim River (Kusquqvagmiut) and lower Yukon River (Kwikpagmiut), the Ingalik Athabaskans from the middle Yukon River, the Dena'ina Athabaskans of the Stony River drainage, and the Upper Kuskokwim-speaking Athabaskans of the Upper Kuskokwim River drainage.

An annual round of resource harvest activities may be identified in Chuathbaluk and Sleetmute. Both communities have access to basically the same resource base composed of salmon and non-salmon fish and terrestrial mammal species and implement harvest methods and processing techniques that are similar. The distribution and exchange of resources along kinship lines occurs in both communities. Community residents have settlement patterns that revolve around resource harvest

activities and include the use of fish camps, berry camps, hunting camps, and trapping camps. A system based on traditional land use and occupancy relating to resource harvest activities exists in each community. Both communities integrate the cash and subsistence sectors of the local economy. Chuathbaluk and Sleetmute are viable, dynamic subsistence-based socioeconomic systems.

Chuathbaluk and Sleetmute exhibit differences in resource orientation and settlement patterning that may be attributed to cultural background, ecological differences in resource accessibility, and demographic differences in the composition of production units for harvesting and processing resources. Chuathbaluk residents target on salmon and moose. Many households disperse to fish and berry camps in summer. The population concentrates in the winter village throughout the rest of the year. Sleetmute residents target on salmon, moose, and furbearers. Salmon are harvested in smaller quantities and moose are harvested in greater numbers in Sleetmute as compared with Chuathbaluk. Many Sleetmute residents disperse to trapping camps in winter. The population concentrates in or near the winter village during summer. Cultural orientations may also contribute to differences in resource selection and settlement patterning but are not explored here.

TABLE OF CONTENTS

Abstract.....	
Table of Contents.....	ii
List of Figures.....	vii
List of Tables.....	xii
Acknowledgements.....	xiii
CHAPTER 1. INTRODUCTION.....	1
Objectives.....	5
The Regional Setting.....	5
Methodology.....	8
CHAPTER 2. HISTORIC SETTLEMENT OF THE CENTRAL KUSKOKWIM RIVER REGION...16	
Historic Cultural Distributions.....	16
Russian and Euroamerican Penetration.....	19
Population Trends.....	27
CHAPTER 3. THE WINTER VILLAGES.....	30
Chuathbaluk.....	30
Historic Development of Chuathbaluk.....	30
Contemporary Chuathbaluk.....	32
Sleetmute.....	42
Historic Development of Sleetmute.....	42
Contemporary Sleetmute.....	45
Community Comparisons.....	53
CHAPTER 4. SETTLEMENT PATTERNS AND THE ANNUAL ROUND.....	56
Historic Settlement Patterns and Annual Round.....	56
Contemporary Settlement Patterns.....	62
The Annual Round of Resource Harvest, June 1982 - May 1983.....	68
Resource Use Areas.....	71
Transportation Methods.....	72

CHAPTER 5.	SALMON FISHING.....	78
	Introduction.....	78
	Fishing Technologies.....	81
	Historic Fishing Technologies.....	81
	Contemporary Fishing Technologies.....	83
	Summer Settlement Patterns -- The Fish Camp (<u>Neqlivik; Neqsurcurvik</u>).....	88
	Historic Use.....	88
	Contemporary Use.....	91
	Fish Camp Sites.....	92
	Fish Camp Facilities.....	94
	Salmon Processing.....	96
	Dried and Smoked Salmon.....	96
	Other Salmon Products.....	105
	Production Units.....	107
	Case Studies of Salmon Fishing Strategies.....	108
	Distribution and Exchange.....	119
	Salmon Harvest Estimates, 1982.....	124
	1970-1982.....	128
	Participation in Salmon Fishing.....	135
	The Commercial Salmon Fishery.....	139
CHAPTER 6.	NON-SALMONID FISH SPECIES FISHING.....	143
	Historical Harvest Methods.....	144
	Species Accounts.....	146
	Arctic Lamprey.....	146
	Sheefish.....	148
	Least Cisco.....	149
	Round Whitefish.....	150
	Broad Whitefish.....	150
	Humpback Whitefish.....	151
	Rainbow Trout.....	152
	Arctic Char.....	153
	Arctic Grayling.....	153
	Boreal Smelt.....	154
	Alaska Blackfish.....	155
	Northern Pike.....	156
	Longnose Sucker.....	157
	Burbot.....	157
	Harvest Areas.....	162

CHAPTER 7.	MOOSE HUNTING.....	179
	Hunting Methods.....	179
	Seasonal Techniques.....	179
	Production Units.....	188
	Processing and Use of Moose.....	190
	Preservation.....	190
	Moose Products.....	192
	Distribution.....	193
	The 1982-83 Moose Hunting Seasons.....	203
	Harvest Results.....	203
	Importance of Moose.....	211
	Moose Hunting Areas.....	213
CHAPTER 8.	CARIBOU AND BEAR HUNTING.....	220
	Caribou Hunting.....	220
	Population Status.....	221
	Harvest Methods.....	222
	Hunting Areas.....	225
	Brown Bear Hunting.....	230
	Black Bear Hunting.....	232
	Hunting Areas.....	235
CHAPTER 9.	SMALL GAME AND WATERFOWL HUNTING.....	241
	Small Game Hunting.....	242
	Snowshoe Hare.....	242
	Porcupine.....	244
	Great Horned Owl.....	244
	Spruce Grouse.....	244
	Ruffed Grouse.....	245
	Willow Ptarmigan.....	245
	Waterfowl Hunting.....	246
	Harvest Areas.....	249

CHAPTER 10. TRAPPING.....	254
Introduction.....	254
Trapping Patterns, Chuathbaluk.....	259
Trapping Patterns, Sleetmute.....	263
Furbearers.....	268
Beaver.....	268
Muskrat.....	274
Marten.....	277
Mink.....	281
Land Otter.....	282
Wolverine.....	285
Wolf.....	287
Red Fox.....	288
Lynx.....	290
Short-tailed Weasel.....	291
Squirrels.....	291
Trapping Areas.....	292
CHAPTER 11. PLANT GATHERING.....	298
Introduction.....	298
Species Accounts.....	299
Alaska Potato.....	299
Wild Rhubarb.....	300
Fireweed.....	300
Labrador Tea.....	301
Wild Rose.....	301
Water Berry.....	301
Stinkweed.....	302
Wild Celery.....	303
Punk.....	303
Mushrooms.....	304
Grasses.....	304
Moss.....	305
Berries.....	305
Cloudberry.....	306
Alpine Blueberry.....	307
Lingonberry.....	308
Crowberry.....	309
Highbush Cranberry.....	309
Raspberry.....	310
Northern Black Currant and Northern Red Currant.....	310
Berry Harvests.....	310
Case 1. Chuathbaluk.....	312
Case 2. Sleetmute.....	315
Berry Harvest Areas.....	317
Trees and Shrubs.....	320
Agriculture.....	328

CHAPTER 12. ECONOMIC DYNAMICS.....	330
Introduction.....	330
The Mixed Economy.....	330
Case 1. Chuathbaluk.....	335
Case 2. Chuathbaluk.....	337
Case 3. Chuathbaluk.....	340
Case 4. Sleetmute.....	342
Case 5. Sleetmute.....	344
Case 6. Sleetmute.....	345
The Annual Round of Resource Harvest.....	347
Domestic Mode of Production.....	348
Distribution and Exchange Networks.....	349
Traditional Systems of Land Use and Occupancy.....	352
CHAPTER 13. CONCLUSIONS.....	354
References Cited.....	369
Appendix A: Resource Harvest Questionnaire -- September 1982.....	374
Appendix B: Moose Hunting Questionnaire -- November 1982 Season.....	376
Appendix C: Perceived Issues in Game Management Unit 19A.....	377
Appendix D: Interview Form Administered to Individuals Who Trapped During 1982-83.....	387
Appendix E: Furbearer Species Information Form.....	389

LIST OF FIGURES

Figure 1. The central Kuskokwim River region.....2

Figure 2. Game Management Units 19A and 19B.....4

Figure 3. Biotic provinces (from Oswalt 1967).....9

Figure 4. Aboriginal ethnic group distribution in western Alaska (ca.1830) (from Oswalt 1980b).....17

Figure 5. Western Alaska (from Oswalt 1980b).....20

Figure 6. Russian Settlements on the central Kuskokwim River (from Oswalt 1980b).....23

Figure 7. Population trends occurring in the central Kuskokwim region, 1830-1979.....29

Figure 8. Frequency of household sizes, Chuathbaluk.....33

Figure 9. Age-sex pyramid, Chuathbaluk residents.....35

Figure 10. Frequency of household sizes, Sleetmute.....46

Figure 11. Age-sex pyramid, Sleetmute residents.....48

Figure 12. Historic Kuskokwim River settlements between Tuluksak and Ohagamiut (1800-1983) (from Oswalt 1980a).....63

Figure 13. Historic Kuskokwim River settlements between Avaucharak and Little Mountain (1800-1983) (from Oswalt 1980a).....64

Figure 14. Historic Kuskokwim River settlements between Toohayukfuktooli and Sergies (1800-1983) (from Oswalt 1980a).....65

Figure 15. The annual round of resource harvest in Chuathbaluk and Sleetmute, June 1982-May 1983.....69

Figure 16. Kuskokwim State Fisheries Management Districts 1 through 5 (from Alaska Department of Fish and Game 1982e).....80

Figure 17. Fishwheel, set net, drift net, fish camp, and single-family settlement sites used by Chuathbaluk residents during 1982.....89

Figure 18.	Set net, drift net, and single-family settlement sites used by Sleetmute residents during 1982.....	90
Figure 19.	King salmon "blanket fish".....	98
Figure 20.	"Flat fish".....	99
Figure 21.	"Dog fish".....	100
Figure 22.	King salmon backbones.....	101
Figure 23.	Red and silver salmon backbones.....	102
Figure 24.	Salmon production unit, Sleetmute.....	112
Figure 25.	Salmon production unit, Chuathbaluk and Aniak.....	114
Figure 26.	Salmon production unit, Chuathbaluk and Aniak.....	116
Figure 27.	Distribution of dried salmon between fishing and non-fishing households, Chuathbaluk, 1982.....	122
Figure 28.	Distribution of dried salmon to non-fishing households, Chuathbaluk, 1982.....	123
Figure 29.	King salmon harvest estimates, Chuathbaluk, 1970-1982.....	130
Figure 30.	King salmon harvest estimates, Sleetmute, 1970-1982.....	131
Figure 31.	Combined chum, red, silver, pink, and small king salmon harvest estimates, Chuathbaluk, 1970-1982.....	132
Figure 32.	Combined chum, red, silver, pink, and small king salmon harvest estimates, Sleetmute, 1970-1982.....	133
Figure 33.	Burbot trap used on the central Kuskokwim River, 1983.....	159
Figure 34.	Production unit for harvesting burbot, Chuathbaluk, 1982.....	161
Figure 35.	Areas used by Chuathbaluk residents for harvesting burbot with traps prior to moving to Chuathbaluk.....	163
Figure 36.	Areas used by Chuathbaluk residents for harvesting burbot with traps since moving to Chuathbaluk through 1983.....	164

Figure 37.	Areas used by Chuathbaluk residents for harvesting whitefish with nets prior to moving to Chuathbaluk.....	165
Figure 38.	Areas used by Chuathbaluk residents for harvesting whitefish with nets since moving to Chuathbaluk through 1983.....	166
Figure 39.	Areas used by Chuathbaluk residents for harvesting blackfish with traps prior to moving to Chuathbaluk.....	167
Figure 40.	Areas used by Chuathbaluk residents for harvesting blackfish with traps since moving to Chuathbaluk through 1983.....	168
Figure 41.	Areas used by Chuathbaluk residents for hooking non-salmonid fish species prior to moving to Chuathbaluk.....	169
Figure 42.	Areas used by Chuathbaluk residents for hooking non-salmonid fish species since moving to Chuathbaluk through 1983.....	170
Figure 43.	Areas used by Sleetmute residents for harvesting burbot with traps prior to the use of snowmachines.....	171
Figure 44.	Areas used by Sleetmute residents for harvesting burbot with traps since the use of snowmachines through 1983.....	172
Figure 45.	Areas used by Sleetmute residents for harvesting whitefish with nets prior to the use of snowmachines....	173
Figure 46.	Areas used by Sleetmute residents for harvesting whitefish with nets since the use of snowmachines through 1983.....	174
Figure 47.	Areas used by Sleetmute residents for hooking non-salmonid fish species prior to the use of snowmachines.....	175
Figure 48.	Areas used by Sleetmute residents for hooking non-salmonid fish species since the use of snowmachines through 1983.....	176
Figure 49.	Distribution of moose meat by a Chuathbaluk hunter.....	196
Figure 50.	Distribution of moose meat by hunters from Aniak and Chuathbaluk.....	198

Figure 51.	Distribution of moose meat by a Sleetmute hunter.....	200
Figure 52.	Distribution of moose meat by Sleetmute hunters.....	201
Figure 53.	Seasonal moose harvests and efforts.....	204
Figure 54.	Participation in moose hunting.....	206
Figure 55.	Areas used by Chuathbaluk residents for hunting moose prior to moving to Chuathbaluk.....	215
Figure 56.	Areas used by Chuathbaluk residents for hunting moose since moving to Chuathbaluk through 1983.....	216
Figure 57.	Areas used by Sleetmute residents for hunting moose prior to the use of snowmachines.....	217
Figure 58.	Areas used by Sleetmute residents for hunting moose since the use of snowmachines through 1983.....	218
Figure 59.	Areas used by Chuathbaluk residents for hunting caribou prior to moving to Chuathbaluk.....	226
Figure 60.	Areas used by Chuathbaluk residents for hunting caribou since moving to Chuathbaluk through 1983.....	227
Figure 61.	Areas used by Sleetmute residents for hunting caribou prior to the use of snowmachines.....	228
Figure 62.	Areas used by Sleetmute residents for hunting caribou since the use of snowmachines through 1983.....	229
Figure 63.	Areas used by Chuathbaluk residents for hunting bear prior to moving to Chuathbaluk.....	236
Figure 64.	Areas used by Chuathbaluk residents for hunting bear since moving to Chuathbaluk through 1983.....	237
Figure 65.	Areas used by Sleetmute residents for hunting bear prior to the use of snowmachines.....	239
Figure 66.	Areas used by Sleetmute residents for hunting bear since the use of snowmachines through 1983.....	240
Figure 67.	Areas used by Chuathbaluk residents for hunting waterfowl prior to moving to Chuathbaluk.....	250
Figure 68.	Areas used by Chuathbaluk residents for hunting waterfowl since moving to Chuathbaluk through 1983.....	251

Figure 69.	Areas used by Sleetmute residents for hunting waterfowl prior to the use of snowmachines.....	252
Figure 70.	Areas used by Sleetmute residents for hunting waterfowl since the use of snowmachines through 1983....	253
Figure 71.	Locations of trapping cabins used by Sleetmute trappers and trapping areas used by Sleetmute and other trappers during 1982-83.....	264
Figure 72.	Areas used by Chuathbaluk residents for trapping prior to moving to Chuathbaluk.....	293
Figure 73.	Areas used by Chuathbaluk residents for trapping since moving to Chuathbaluk through 1983.....	294
Figure 74.	Areas used by Sleetmute residents for trapping prior to the use of snowmachines.....	295
Figure 75.	Areas used by Sleetmute residents for trapping since the use of snowmachines through 1983.....	296
Figure 76.	Extended family group harvesting "salmonberries," Chuathbaluk and Aniak.....	313
Figure 77.	Extended family group harvesting "lowbush cranberries," Sleetmute and Aniak.....	316
Figure 78.	Areas used by Chuathbaluk residents for harvesting berries prior to moving to Chuathbaluk.....	318
Figure 79.	Areas used by Chuathbaluk residents for harvesting berries since moving to Chuathbaluk through 1983.....	319
Figure 80.	Areas used by Sleetmute residents for harvesting berries prior to the use of snowmachines.....	321
Figure 81.	Areas used by Sleetmute residents for harvesting berries since the use of snowmachines through 1983.....	322
Figure 82.	Areas used by Chuathbaluk residents for harvesting wood since moving to Chuathbaluk through 1983.....	326
Figure 83.	Areas used by Sleetmute residents for harvesting wood since the use of snowmachines through 1983.....	327

LIST OF TABLES

Table 1.	Chuathbaluk Population Totals, 1900-1982.....	32
Table 2.	Price Listing for Selected Goods Available at the Chuathbaluk Village Store, Fall 1982.....	39
Table 3.	Wage Employment Opportunities.....	40
Table 4.	Sleetmute Population Totals, 1900-1982.....	44
Table 5.	Price Listing for Selected Goods Available at the Sleetmute Village Store, Fall 1982.....	49
Table 6.	Wage Employment Opportunities, Sleetmute, 1982-83.....	51
Table 7.	1982 Salmon Harvest Estimates from Chuathbaluk and Sleetmute.....	127
Table 8.	1982 Salmon Harvest Estimates per Household and Individual.....	135
Table 9.	Annual Moose Harvest Levels per Household Interviewed, Estimated Five-Year Average.....	212
Table 10.	Participation in Trapping by Chuathbaluk and Sleetmute Residents, Winter 1982-83.....	257
Table 11.	Average Raw Fur Prices -- Kuskokwim Region, 1982-83....	259
Table 12.	Furbearer Harvests at Chuathbaluk, 1982-83 Season.....	262
Table 13.	Furbearer Harvests at Sleetmute, 1982-83 Season.....	268
Table 14.	Residency of Hunters and Hunting Success in GMU 19A, 1980-81 and 1981-82 Regulatory Years.....	381
Table 15.	Areas within Unit 19A Used for Hunting Moose by Non-Residents of Unit 19A During the 1980-81 and 1981-82 Regulatory Years.....	383

ACKNOWLEDGEMENTS

I would like to express deep appreciation to the people of Chuathbaluk and Sleetmute for welcoming me into their communities and sharing with me their knowledge upon which this report is based. Special thanks go to Sophie and Sinka Sakar of Chuathbaluk and Pete Mellick of Sleetmute for the support and assistance they provided me with during field visits. Raymond Peterson provided invaluable assistance and companionship throughout the course of the fieldwork as my research assistant. I am most grateful to Robert J. Wolfe for his guidance and encouragement without which this study would have suffered greatly. This final report has benefited from the review of earlier drafts by him as well as Elizabeth Andrews and Linda Ellanna. The work by Joyce Hannan and Victoria Leffingwell in typing this report in its final form is gratefully acknowledged. Final thanks go to Gregory de Nevers for patiently bearing with me while I allowed this work to dominate my life to the exclusion of other things and for his unwavering support throughout the course of the study.

NOTE: Maps in this report which depict geographic areas used for harvesting fish and wildlife are available upon request at a scale of 1:250,000.

CHAPTER 1
INTRODUCTION

This study was initiated for the purpose of providing descriptive baseline documentation of the harvest and use of wild resources in the central Kuskokwim River region. The central Kuskokwim River region for purposes of this report is that portion of the Kuskokwim River drainage stretching from Lower Kalskag to Stony River, including the surrounding major tributaries and mountains (Fig. 1). The central Kuskokwim area has been defined relatively recently by introduced sociopolitical criteria. The communities of Chuathbaluk (population 132) and Sleetmute (population 101) were chosen to provide examples of subsistence patterns found within the region. This is a descriptive report outlining general characteristics of resource harvest patterns found in these communities. The assumption is made that these communities represent examples of socioeconomic systems within the larger, relatively recent geographic and social region. This report does not purport to analyze the data and examine or explain in detail differences occurring in the socioeconomic or ecological adaptations of the study communities. A systemic, community-based approach to the social, economic, and ecological aspects of resource use has not been previously undertaken in the central Kuskokwim area.

The Division of Subsistence began work in the central Kuskokwim in 1979 in response to concerns expressed by local residents, the Central Kuskokwim Fish and Game Advisory Committee, and Nunam Kitlutsisti (a

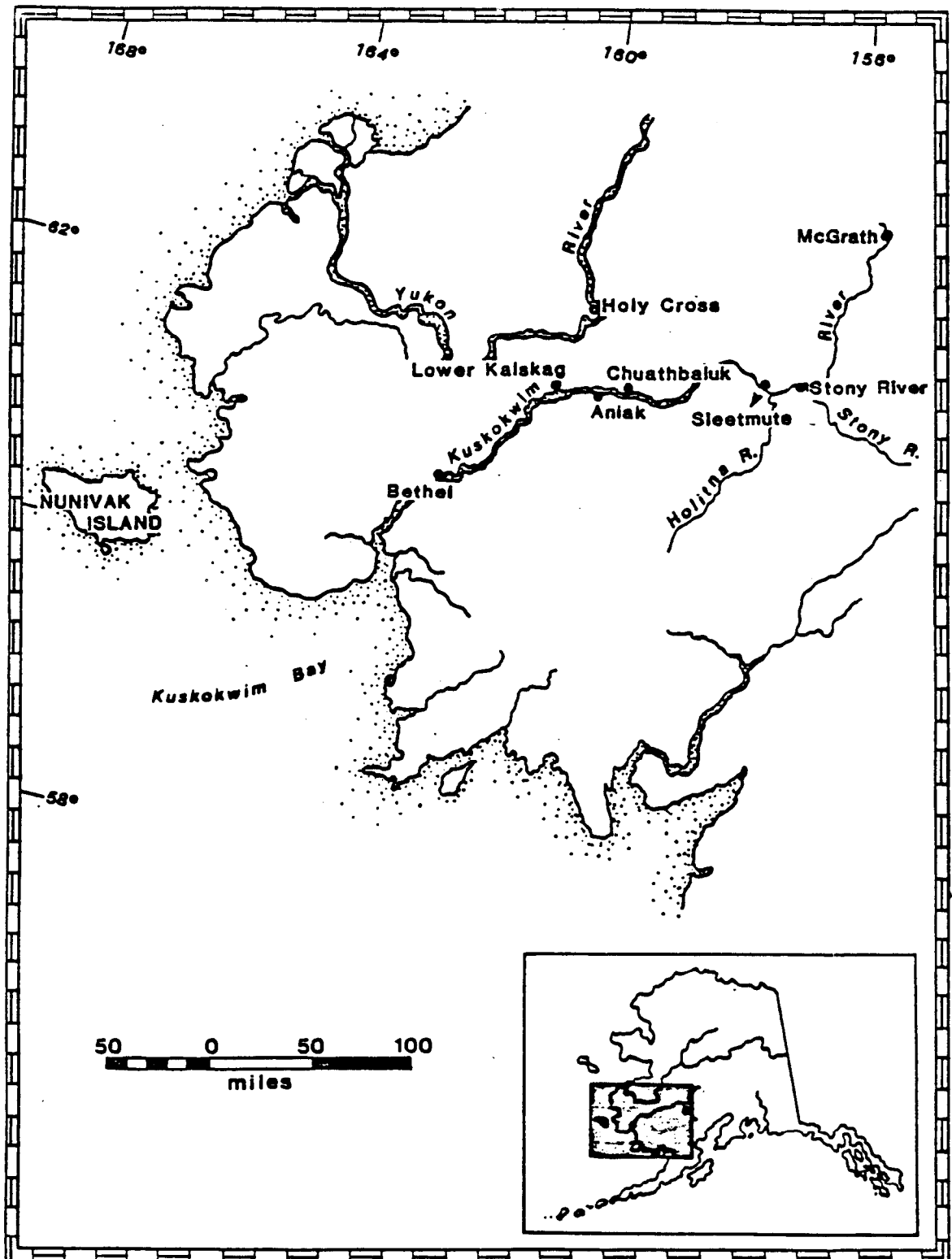


Fig. 1. The central Kuskokwim River region.

branch of the regional non-profit corporation, Association of Village Council Presidents) over increased competition for moose in Game Management Unit (GMU) 19A (Fig. 2). In 1979 and 1981 food surveys were conducted in seven communities between Lower Kalskag and Stony River (Jonrowe 1979; Stickney 1981). These surveys provided preliminary general data on resource use in the central Kuskokwim area. Continuing requests from the Central Kuskokwim Fish and Game Advisory Committee and Nunam Kitlutsisti for more precise and comprehensive documentation of resource use in the central Kuskokwim area instigated the present study. Field studies were conducted in Chuathbaluk and Sleetmute between June 1982 and June 1983 by two research staff of the Division of Subsistence producing the data forming the basis of this report.

Timely information on resource uses in the central Kuskokwim is desirable in light of potential decisions by land and resource managers which may affect the culture, economy, and resource base existing within the region. Current development plans by state and federal agencies with the potential to impact resource use by central Kuskokwim communities include the opening by the Bureau of Land Management of two areas designated "Nyac" and "Upper Kuskokwim" to mineral leasing and settlement entry; State of Alaska oil and gas lease sale number 46 in the Holitna River basin; and numerous proposed "land disposals" by the State Department of Natural Resources. Other directions regional development may take include agriculture, commercial timber harvest, livestock raising, reindeer herding, mineral extraction, gravel mining, and road building (Cooperative Extension Service 1982).

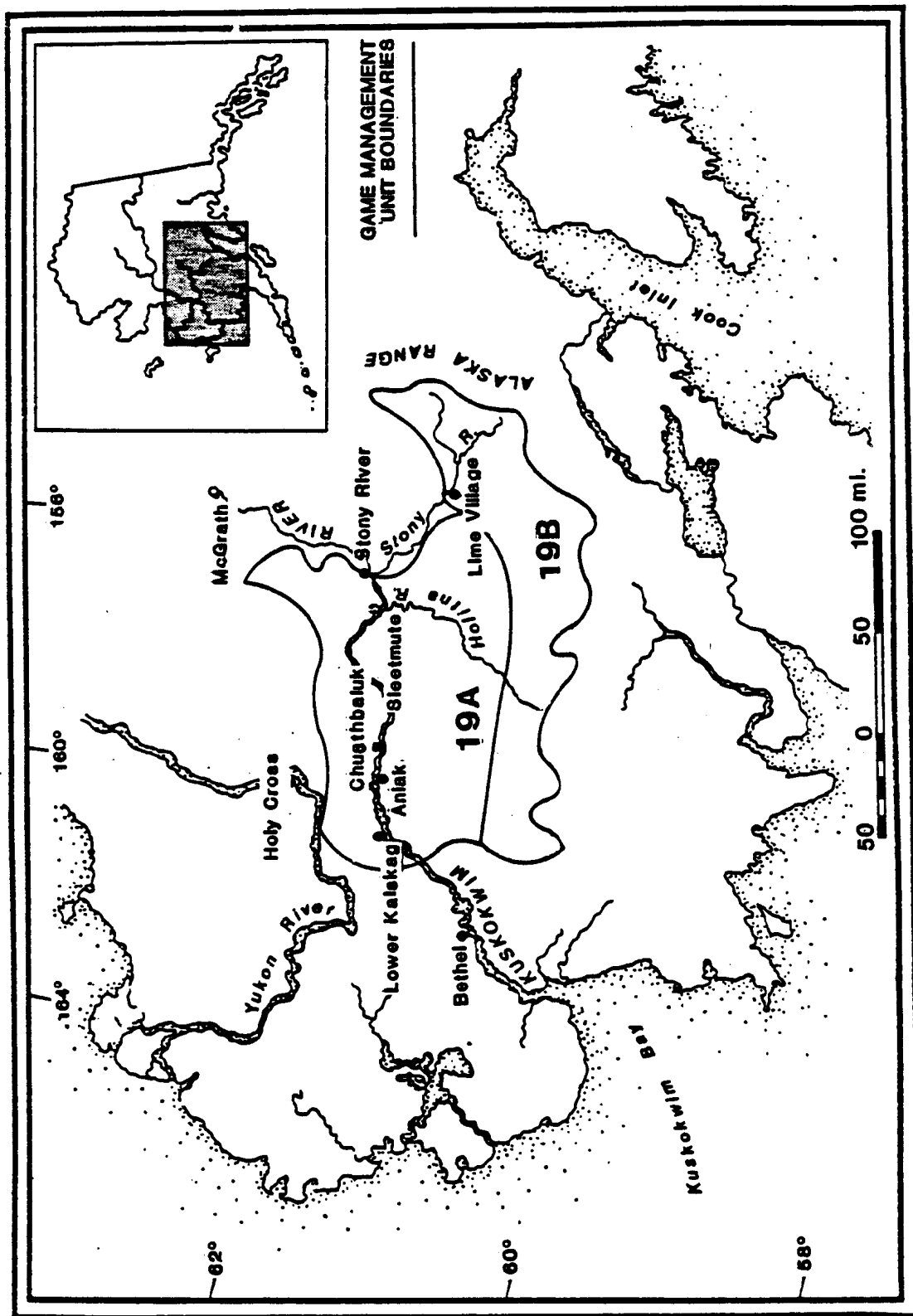


Fig. 2. Game Managment Units 19A and 19B.

OBJECTIVES

This study has the following objectives:

- (1) to provide a short historical description of settlement and population trends in the central Kuskokwim area;
- (2) to describe contemporary permanent and seasonal settlement patterns;
- (3) to describe the annual round of resource harvest;
- (4) to describe methods of resource harvest and use;
- (5) to identify ecological factors influencing resource harvest;
- (6) to describe the social and economic framework within which resource harvest occurs;
- (7) to map areas used for resource harvest by each community; and
- (8) to identify and discuss issues related to resource management and use.

THE REGIONAL SETTING

The central Kuskokwim region refers to that portion of the Kuskokwim River drainage system between the communities of Stony River at the upriver limit and Lower Kalskag, approximately 140 miles downriver. Nine communities, locally termed "villages," are situated within this area. These include Lime Village, Stony River, Sleetmute, Red Devil, Crooked Creek, Chuathbaluk, Aniak, Upper Kalskag and Lower Kalskag.

The central Kuskokwim is an area of cultural and linguistic interface between the Yup'ik-speaking Eskimos of the Yukon-Kuskokwim Delta and the Athabaskans of Interior Alaska. The central Kuskokwim was not recognized as a distinct sociopolitical region in historic times but rather was a geographic area where several social groups converged, including Yup'ik Eskimo, Ingalik Athabaskan, Dena'ina Athabaskan, non-Native, and to a lesser extent, Upper Kuskokwim-speaking Athabaskans, as will be discussed below. Lower and Upper Kalskag and Chuathbaluk are composed primarily of Yup'ik Eskimos. Sleetmute, Stony River, and Crooked Creek include individuals of both Yup'ik and Athabaskan descent. Red Devil and Aniak, the regional center, are composed of both non-Native and Yup'ik people. Lime Village residents are primarily of Dena'ina descent.

The central Kuskokwim represents a discrete region which has gained its identity in recent decades based on geographic and sociopolitical criteria. Spatially, the villages in the area are relatively close to one another. Well-established air and river transportation networks connect the villages with the exception of Lime Village. The Kuskokwim Corporation and Kuskokwim Native Association, the profit and non-profit corporations representing the rural Native population of the region, have adopted a social, political, and economic organizational format which administers to these villages as a unit. The communities, with the exception of Lime Village, have their own unified school district, the Kuspuk School District. All are within Alaska Municipal District 4 either as second class cities (Upper and Lower Kalskag, Aniak, and Chuathbaluk) or as unincorporated communities (Crooked Creek, Sleetmute,

Red Devil, Stony River, and Lime Village). Each unincorporated community is represented by a traditional council, which acts as the governmental unit for non-municipal matters. All communities are represented by the Central Kuskokwim Fish and Game Advisory Committee.

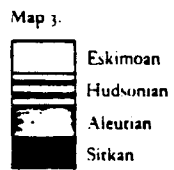
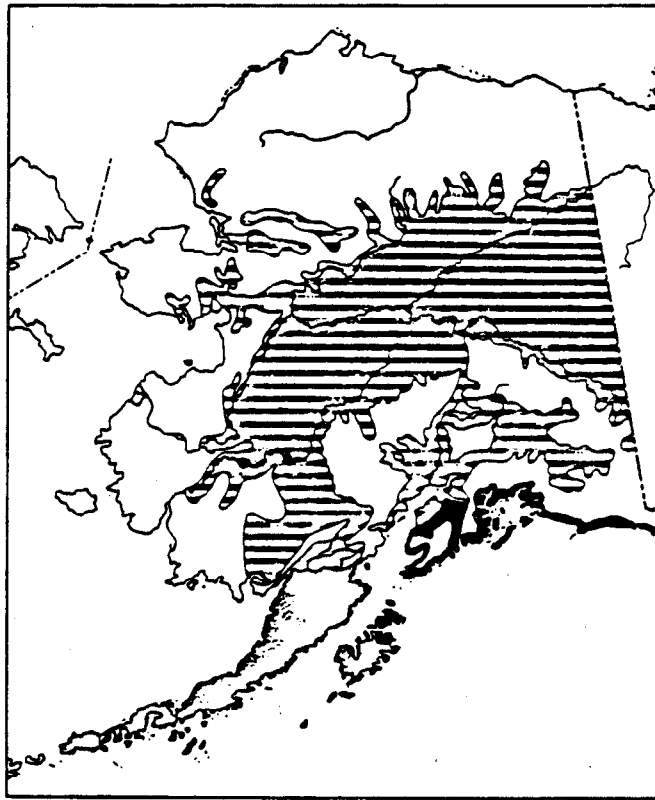
The central Kuskokwim falls within the Hudsonian biotic province, which is characterized by spruce forests at the lower elevations, tundra vegetation above treeline, and associated fauna (Oswalt 1967). The Hudsonian biotic province dominates Interior Alaska. The central Kuskokwim River floodplain is surrounded by the low-lying foothills of the Kuskokwim Mountains and is characterized by spruce and mixed deciduous forest, including paper birch, cottonwood, and aspen. Alpine tundra occurs in the upper elevations of the surrounding foothills and mountains. Willow and alder are found along riverbanks, islands, and creek beds. The region supports moose; caribou; black and brown bear; the major Alaskan furbearer species, including marten, beaver, muskrat, red fox, lynx, wolf, wolverine, mink, and otter; several species of small mammals and upland game birds; seasonal waterfowl populations; five species of salmon; and at least 16 non-salmonid fish species. Temperatures in Chuathbaluk and Sleetmute range between -58°F and 90°F with snowfall measuring 85 inches and rainfall averaging 19.5 inches annually (Darbyshire and Associates 1979).

The Hudsonian biotic province has a more limited natural resource potential than the Sitkan and Aleutian biotic provinces in Alaska (Oswalt 1967). The Sitkan biotic province occurs in the southeastern part of the state and includes coastal areas bordered by rugged mountains containing glaciers, and islands surrounded by bays and sounds,

both dominated by Sitka spruce and western hemlock forests. The Aleutian biotic province includes the Alaska peninsula and most of Kodiak Island. It is generally treeless and is characterized by low mountains with willow, alder, and grasses at the lower elevations and tundra vegetation at the upper elevations. Both provinces are rich in terrestrial and marine resources. The Hudsonian biotic province provides greater terrestrial resource opportunities than the Eskimoan biotic province (found along the coast from Bristol Bay to the northern Canadian border) but it has no marine species. The Eskimoan biotic province is typified by low relief, tundra vegetation, and abundant marine species (Oswalt 1967) (Fig. 3).

METHODOLOGY

Village and city councils in the two study communities were contacted and met with during April 1982 concerning the proposed study, and each gave approval for the project. A residence was maintained in each village between June 1982 and June 1983 to facilitate the field-based focus of the study. Transportation at the study sites was by boat during months of open water and by snowmachine in winter months. Field research was carried out by Susan Charnley, Resource Specialist II, and Raymond Peterson, Technician III, between June 1982 and June 1983. Field trips were interspersed with periods of time focused on compiling, synthesizing, and writing up field data and conducting a review of historical data at the Bethel Regional Office of the Division of Subsistence.



• Indicates study communities

Fig. 3. Biotic provinces (from Oswalt 1967).

A variety of field techniques were implemented to carry out the objectives of the study. These included participant observation, whereby researchers gathered information by participating in resource harvest and processing with residents; informal interviews involving detailed discussions with residents in an informal setting covering a wide range of topics related to the research objectives; formal interviews to systematically gather specific data with the use of questionnaire-surveys; and mapping sessions during which the male head of each household having a male household head, indicated areas used by his household for resource harvest activities. Most households contained male household heads. A pertinent literature review was conducted. Data from the literature search are included in the appropriate sections which follow.

Raw data were compiled, synthesized, and used to generate drafts of final reports including two interim reports which preceded the present document (Charnley 1982 and 1983). Following a review procedure within the Division of Subsistence, final reports will be distributed to village councils, local organizations, and interested persons for their review and comment.

Information on salmon fishing, berry-picking, and the use of plant species was gathered during June, July, and August 1982. The researchers traveled to fish camps and conducted informal interviews with residents to obtain information on fishing techniques, fish processing, fish camp characteristics, and production units. Informal interviews also were held with families fishing from the village. Sketches were drawn of fish camp facilities. Researchers participated in salmon

harvest and processing activities. A methodology, described in Chapter 5, was developed for systematically estimating salmon harvest levels for each community. During July and August, information on land use patterns was gathered in response to proposed land disposals on the Aniak and Oskawalik rivers (Charnley 1982).

Information on plant gathering was collected by accompanying household groups on gathering excursions. While researchers assisted households in picking berries, information was obtained on preservation techniques and utilization. Information regarding the harvest, use, and natural history of other plant species was gathered through informal interview and participation in harvest and processing, when possible. Edible plants were identified and key respondents questioned as to whether they knew of any uses relating to these species.

The month of September focused on big game harvest activities. Researchers accompanied residents on moose, caribou, and bear hunting trips and recorded hunting and processing techniques. Following the open September moose season, a questionnaire was administered to all participants to obtain information on harvest levels, hunting effort, and distribution of moose, bear, and caribou (Appendix A). Natural history information on big game species was gathered through informal interview.

The month of October involved compiling data collected during the summer season. Field time during November and December focused on mapping land use areas in Chuathbaluk and participating in moose hunting activities during the open November season. A questionnaire was administered to hunters who participated in moose hunting following the

November season to collect data on harvest levels and effort (Appendix B). The mapping effort documented land areas used for resource harvest by community residents for three time periods: during the past three years, since their time of residence in Chuathbaluk and prior to 1979, and prior to moving to the village. The first family moved to Chuathbaluk in 1954 and others joined them throughout the 1960s and 1970s. Changing place of residence was anticipated to influence land use by Chuathbaluk residents and was therefore used as a marker for documenting the historic time depth of resource use areas. The male head of every household was asked to indicate the land use areas of his household on 1:250,000 USGS topographic maps with mylar overlays, using color pens to distinguish between species harvested. The male head of household was considered to be the household member most active in resource harvest and was therefore selected for interviewing. Other household members provided supplemental data. Individual maps were later aggregated, resulting in one map to represent the land use areas of the entire community within two given time frames: before moving to the village and after moving to the village. The periods including the time since moving to the village and prior to 1979 and the past three years were combined to promote accuracy in representing harvest areas used in the more recent past. Twenty individuals representing 19 households (65 percent) were interviewed in Chuathbaluk.

Data relating to moose harvest and use were synthesized during January 1983 and a draft report on moose hunting in Chuathbaluk and Sleetmute prepared for the spring meeting of the Alaska Board of Game (Charnley 1983). Mapping sessions to document the land use areas of

Sleetmute residents were held during January and February. The areas used for resource harvest by Sleetmute residents were documented within three time periods: the past three years, since the use of snowmachines (the early to mid-1960s) and prior to 1979, and during the time when dog teams were used for transportation. Because most Sleetmute residents had lived in or near the community for most of their lives, a different marker was chosen for documenting the historic time depth of resource use areas. The shift from dog teams to snowmachines as a means of winter transportation was anticipated to influence land use patterns and was therefore chosen as a temporal marker. Individual maps were later aggregated to produce a single map representing land use areas of the entire community during two time periods: before the advent of snowmachines and after the advent of snowmachines. The two latter time periods (during the past three years; and since the use of snowmachines but prior to 1979) were combined to promote accuracy in representing resource harvest areas used in the more recent past. Seventeen individuals representing 16 households (57 percent) were interviewed in Sleetmute. Researchers participated in moose hunting activities during the open February season. Moose harvest data and hunting efforts from the February season were documented in March and a final report on moose hunting in Chuathbaluk and Sleetmute prepared for the spring Board of Game meeting (Charnley 1983).

Information on trapping activities was gathered at winter trapping camps maintained by village trappers during February. Participant observation and informal interview yielded data relating to methods of

trapping and processing furbearers; natural history information on furbearers; production units; and winter settlement patterns. A questionnaire was administered to trappers in April following the trapping season to obtain data on harvest levels, furbearer population trends, trapping strategies, and the economic role of trapping (Appendix D). Formal interviews were conducted with key respondents to provide additional information on trapping methods and natural history (Appendix E).

Throughout the fall, winter, and spring, data were collected on fishing for non-salmonid fish species and hunting for small game and bird species using participant observation and informal interview techniques. Technologies utilized, species harvested, processing methods, natural history information, and types of uses were recorded.

A review of literature pertaining to historic settlement and resource use in the central Kuskokwim area was conducted throughout the year. Agencies were contacted to provide data to round out the demographic, political, social, and economic characterizations of each village. Discussions of resource management policies in GMU 19A and Kuskokwim fishing District 2 are based on information obtained from the Department of Fish and Game, the Central Kuskokwim Advisory Committee, and local residents.

April, May, and June were primarily spent in Bethel compiling and analyzing data, preparing a draft of the final report, and revising and preparing the final report to be completed by the end of June 1983. Occasional field trips were made to fill in data gaps.

Data analysis for this study primarily involved categorizing and synthesizing field notes, compiling questionnaire data, and classifying

both quantitative and qualitative results. Mapped data was compiled by separating use areas by major resource categories and time period and drawing community use areas to encompass those of individual members interviewed on single mylar overlays. Maps for the final report were drafted. Yup'ik terms presented in the report were recorded using a tape recorder. The orthography was worked out by Ida Alexie of the Yup'ik Language Center, Bethel.

It should be noted that this study took place during 1982-83 and presents demographic and resource harvest data that represent conditions existing during a one-year period only. The availability of resources, harvest patterns, and community structure vary from year to year. A historic perspective is provided when possible from the literature and local informants. The characteristics described for 1982-83 should not be viewed as static but as reflective of socioeconomic and ecologic systems existing in Chuathbaluk and Sleetmute during one point in time. The depth, completeness, and accuracy of the information presented here are limited by the number of researchers participating in the study and the amount of time it was possible to devote to field research.

CHAPTER 2

HISTORIC SETTLEMENT OF THE CENTRAL KUSKOKWIM RIVER REGION

HISTORIC CULTURAL DISTRIBUTIONS

The aboriginal distribution of peoples within the Kuskokwim River drainage has been reconstructed by Oswalt (1962, 1980b). Figure 4 presents the distribution of aboriginal ethnic groups along the Kuskokwim River, circa 1830, according to Oswalt (1980b). The following orthography will be used when referring to cultural groups inhabiting the Kuskokwim River drainage: Kusquqvagmiut (Kuskowagamiut); Dena'ina (Tanaina); and Upper Kuskokwim (Kolchan). Yup'ik Eskimos were exclusive residents of the Kuskokwim River from its mouth upriver to the site of Crow Village, approximately 20 miles downriver from Chuathbaluk. The central Kuskokwim River between the Kolmakof River and Sleetmute was jointly occupied by Eskimos and Ingalik Athabaskans who had migrated from the Yukon River and are referred to as the Georgetown Ingalik (Oswalt 1962). These two groups co-existed peacefully (Oswalt 1962). Georgetown Ingalik also occupied the Holitna and Hoholitna river drainages, although, according to Ackerman (1981), the Kusquqvagmiut penetrated these drainages following the decline of the caribou population in the 1870s. The Stony River drainage was inhabited by Dena'ina Athabaskans. The territory above the Stony River and throughout the upper Kuskokwim was occupied by Athabaskans who spoke a language termed "Upper Kuskokwim" (Krauss 1974).

According to one historical reconstruction, Yup'ik Eskimos residing along the Kuskokwim River, collectively referred to as the Kusquqvagmiut, are thought to have penetrated inland from the central Bering Sea coast during some as yet unspecified time period (Oswalt 1962). Oswalt (1962) explains this penetration in relation to the subsistence-based economy and the ecological context existing at the time. The subsistence economy of coastal-dwelling Eskimos was based on caribou hunting, sea mammal hunting, and salmon fishing. As the Eskimos moved along the coast toward the mouth of the Kuskokwim River, the ecological setting changed. Sea mammals became less diverse and salmon became increasingly abundant as they concentrated at the river mouth before running upriver to spawning grounds. The coastal Eskimos already possessed technology for exploiting these runs, a cultural preadaptation to a riverine subsistence pattern. Salmon became more essential than sea mammals in the diet of these Eskimos. According to Oswalt's theory, abundant and predictable salmon runs allowed Eskimos to perpetuate the stable, community-based life they had known along the coast. Inland penetration along the river system followed, with salmon continuing to provide a basis for the subsistence economy.

Linguistic evidence suggests that central Kuskokwim Eskimos have historic ties with the Eskimos along the Yukon River and Lake Iliamna. A "peripheral" subdialect of General Central Yup'ik is spoken along the Yukon River, on the Kuskokwim River above Aniak, and at Lake Iliamna (Woodbury 1983). The Eskimos living along the Kuskokwim River below Aniak and on the coast from the mouth of the Kuskokwim River south to Bristol Bay speak the "core" subdialect of General Central Yup'ik

(Woodbury 1983). Although linguistic evidence suggests affinities between the Central Kuskokwim, Yukon River, and Iliamna Lake Eskimos, the question of where the central Kuskokwim Eskimo migrated from remains as yet unresolved.

The community of Stony River and the Stony River drainage continue to be predominantly occupied by Dena'ina Athabaskans, while Upper Kuskokwim-speaking Athabaskans are the primary occupants of communities upriver from Stony River in the upper Kuskokwim drainage.

RUSSIAN AND EUROAMERICAN PENETRATION

Since the time of historic contact, non-Natives of several ethnic backgrounds, including Russian, German, Scandinavian, French, and American, have become residents of the Kuskokwim River drainage. The following account of non-Native penetration into the central Kuskokwim River region is derived from Oswalt (1980b) unless otherwise indicated. The first Russians entered the central Kuskokwim area in the 1790s when a group of traders traveled up the Nushagak River from Lake Iliamna and portaged to the Hoholitna River drainage (Fig. 5). From here they traveled to the Kuskokwim, continued downriver as far as Ohagamiut, approximately 20 miles downriver from Aniak, and portaged to the Yukon River. In 1799 the Russian American Company was founded. Subsequent explorations in the region were sponsored by the Russian American Company, which sought to establish commercial enterprise there. In 1818 seven men traveled by skin boat from Lake Clark to the Hoholitna River which they descended to the Kuskokwim River and

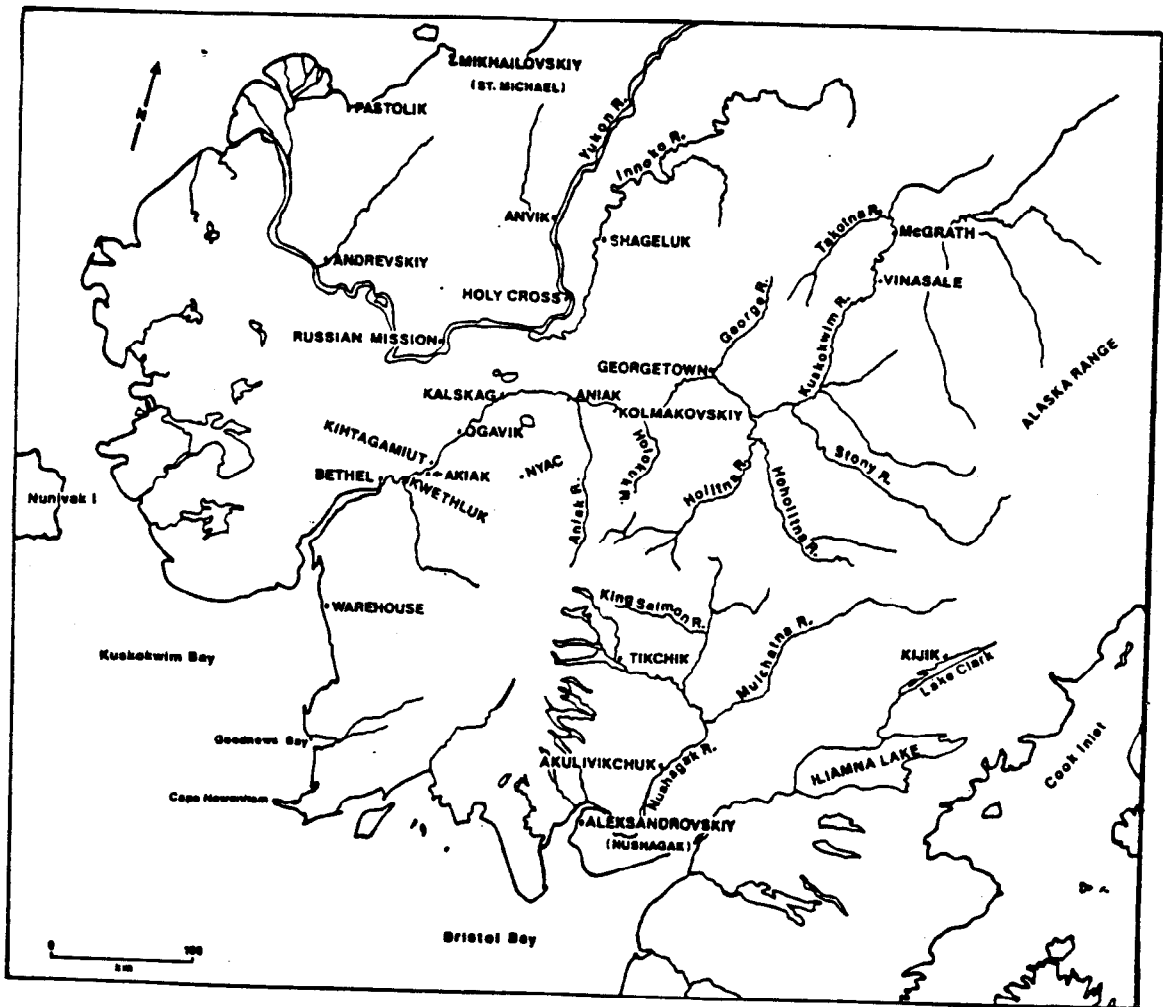


Fig. 5. Western Alaska (from Oswalt 1980b).

followed to Ohagamiut. In 1833 Glazunov approached the Kuskokwim River from the Yukon River. He ascended the Stony River in the hope of crossing into Cook Inlet, but was unsuccessful (VanStone 1970). Lt. Zagoskin explored along the Yukon and Kuskokwim rivers between 1842 and 1844 (Michael 1967).

By 1819 a trading post known as Aleksandrovskiy Redoubt and run by Fedor L. Kolmakov had been established at the head of Nushagak Bay. The Russians were primarily interested in obtaining beaver and land otter pelts for European and Chinese markets. For approximately ten years, numerous beaver and land otter were received into the Redoubt from Native inhabitants of the Nushagak region. As these resources became depleted, the Russians began searching for a means by which to exploit new territory. They had heard that the Kuskokwim River drainage was rich in beaver and land otter. In 1830 a party led by Vasilev set out from Nushagak Bay to explore the potential for expanding the Russian fur trade to the Kuskokwim River.

Vasilev's party ascended the Nushagak River, portaged to the Holitna River drainage, and descended the Holitna to the Kuskokwim. After descending the Kuskokwim, they portaged back to Nushagak Bay. Vasilev's party confirmed reports that the Kuskokwim River drainage was rich in fur resources. As a result, a trading party led by Kolmakov was sent up the Nushagak River and down the Holitna River to the Kuskokwim in 1832. This party brought with them trade goods and sought to obtain pelts and induce Kuskokwim River inhabitants to increase their trapping efforts.

Kolmakov and Lukin, a member of his party, built a cabin at the confluence of the Holitna and Kuskokwim rivers during their first journey. This later was expanded to become a warehouse and a way station for travelers coming from and going to the Nushagak River and was called Kolmakov's Townlet (Fig. 6). In 1833 a second settlement, referred to as Lukin's Odinochka, was established at the confluence of the Kolmakof and Kuskokwim rivers. These two settlements became administrative units from which a Russian fur trade could develop. The Russians recognized that a larger and more permanent station along the Kuskokwim would be necessary to facilitate the growth of the fur trade. In 1841 Kolmakovski Redoubt was founded opposite Lukin's Odinochka for this purpose.

The Russians attempted to establish and maintain peace between the Eskimo and Athabaskan groups and non-Native residents of the central Kuskokwim villages in order to allow the fur trade to expand along the River. The Russian American Company was primarily interested in obtaining beaver pelts but also bartered for otter, lynx, dark fox, wolf, wolverine, and fall caribou skins. Red fox, mink, muskrat, marten, and squirrels were considered undesirable and were not traded. Kolmakovski Redoubt was in operation until 1866 when it was shut down in anticipation of Alaska becoming a territory of the United States in 1867. The Russian American Company was later taken over by the Alaska Commercial Company.

In 1870 Kolmakovski Redoubt was reopened by the Alaska Commercial Company. Supplies were now brought by boat up the Kuskokwim River from Kuskokwim Bay. The fur trade expanded along the river, and by 1890 the

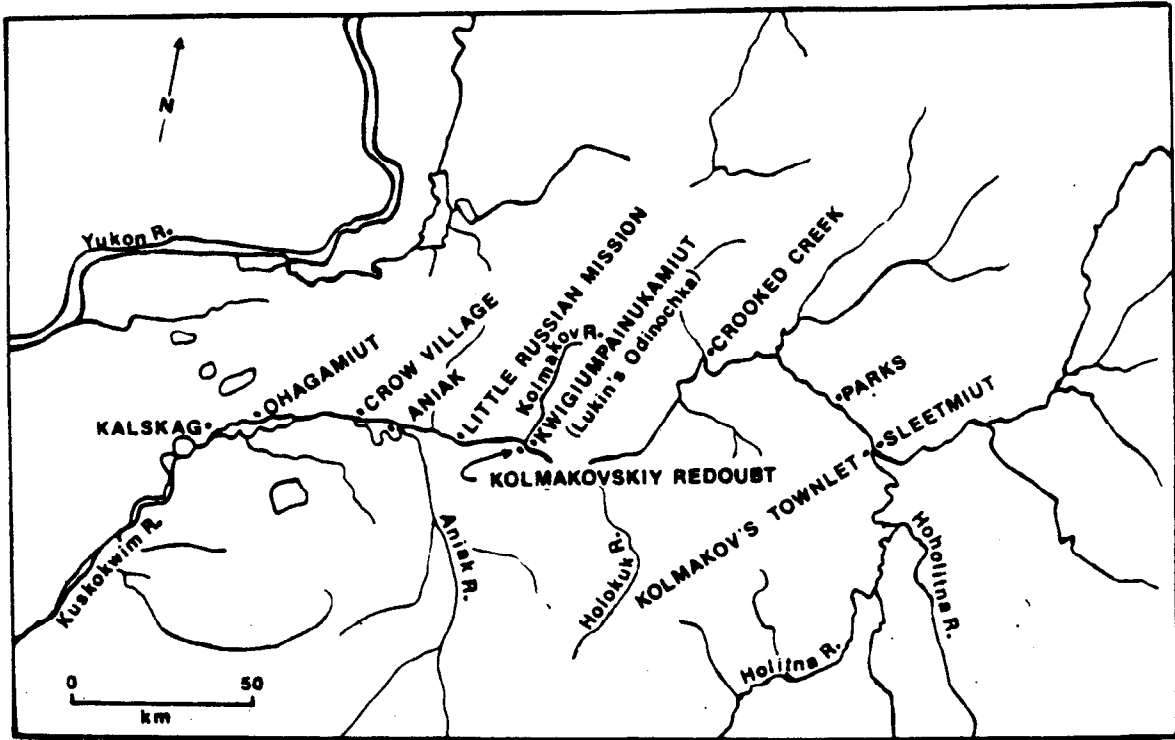


Fig. 6. Russian settlements on the central Kuskokwim River (from Oswalt (1980b)).

trade center shifted from Kolmakovskiy Redoubt to Bethel. Furbearer populations in the central Kuskokwim River region were substantially depleted by 1880.

During the Russian period, Russian priests came to the central Kuskokwim area to introduce the local population to Russian Orthodoxy. Though there were converts, the Russian Orthodox influence appeared superficial (Oswalt 1963). In the 1880s Moravian missionaries began to arrive on the Kuskokwim River (Oswalt 1963). As a result, the Russian Orthodox Church attempted to strengthen its presence in the region (Oswalt 1963). Competition between the two religions ensued (Oswalt 1963). Russian Orthodox chapels were built along the Kuskokwim in the late 1890s, and the first Russian Orthodox church had been constructed at the present-day site of Chuathbaluk by 1905. The central Kuskokwim communities remained primarily Russian Orthodox and the lower Kuskokwim communities became predominantly Moravian.

Rumors that small amounts of gold had been found by the Russians along the Aniak River drew Euroamerican gold-seekers into the central Kuskokwim area around 1896. In 1906 gold was discovered along the upper Innoko River, and in 1907-1908 gold was found along the upper Tuluksak River. Prospectors were worked on the George River and Crooked Creek in 1909. By 1913 the search for gold in the central Kuskokwim region was complete, although negligible gold had been obtained.

Two attempts to mine cinnabar near Kolmakovskiy Redoubt were made in 1880 and 1895. Neither attempt was lucrative. In 1906 cinnabar was discovered at Parks approximately 10 miles downriver from Sleetmute, and about 100 flasks were processed from deposits. In 1939 a cinnabar

mine began operating at Red Devil and eventually became the most productive along the river. This mine entered a decline in 1950 and has since been operated intermittently (Cooperative Extensive Service 1982).

Euroamericans began fur trapping in the central Kuskokwim area in the early 1900s concurrent with a rise in fur prices. Between 1907 and 1909 the number of non-Native fur trappers and prospectors along the Kuskokwim rose from 12 to 200. In 1917 Kolmakovskiy Redoubt was abandoned as the result of a decline in fur prices brought on by World War I and widespread epidemics and disease along the Kuskokwim.

In 1900 and 1901 epidemics of measles, influenza, whooping cough, and pneumonia spread throughout the Kuskokwim River decimating the riverine population (Wolfe 1982). Earlier smallpox epidemics had occurred in 1838 and 1839 (Oswalt 1978). Each of these epidemics produced high mortalities. Following these epidemics the population between Akiak and Sleetmute was described as having been composed of younger generations only, with the exception of an occasional middle-aged person. Many of the the well-populated villages were abandoned or contained only 25 to 30 persons. It is possible that these epidemics influenced the movement of Eskimos further upriver along the Kuskokwim into areas of Athabaskan occupancy.

In 1902 reindeer were introduced into the Kuskokwim area by Moravians, who sought to train local people as reindeer herders (Cooperative Extension Service 1982). Two herds were introduced into the Kuskokwim Mountains, one into the Beaver Mountains having about 5,000 animals, and one larger herd into the Aniak River drainage (Alaska Department of Fish and Game 1976). These herds grew until the 1930s

when there were about 40,000 animals along the Kuskokwim River (Oswalt 1978). The reindeer herds crashed throughout the 1940s due to poor management, habitat destruction, and wolf predation (Cooperative Extension Service 1982). The remaining animals were sold, removed, or became feral (Alaska Department of Fish and Game 1976).

Salmon have been harvested for commercial sale on outside markets in the Kuskokwim Bay region at least since 1913 (Oswalt 1980a). Salmon fishing for export in Kuskokwim Bay was prohibited between 1926 and 1929. After commercial fishing was again legalized in 1935, two processors began operating near the mouth of the Kuskokwim River. By 1949 floating processors began operating on the Kuskokwim River. The commercial salmon fishery was closed on the Kuskokwim in 1952 in response to complaints by area residents that commercial salmon fishing was impacting the subsistence salmon fishery. In 1954 the Kuskokwim was reopened to commercial fishing for king salmon, but there were no participants until 1959. Improved air freight services between Bethel and Anchorage were introduced in 1958, providing better access for commercially harvested salmon to non-local markets (Oswalt 1980a). The regulated commercial salmon fishery has been operative on the Kuskokwim River since 1961 (Alaska Department of Fish and Game 1980a).

Oswalt (1980b) gives an assessment of the impacts Russian and Euroamerican expansion had on central Kuskokwim Eskimo culture. He suggests that Russian expansion influenced the loss of Eskimo autonomy but did not result in a forfeiture of their independence. Eskimos were not well integrated into the Russian fur trade because of their relative isolation, low fur potential, and limited rewards compared

with other economic options. Russians introduced the local population to a number of new material items, especially fabrics for making clothing. Cloth garments came to supplant fur garments because furs had become valuable to the fur trade. Russians did not significantly alter the seasonal subsistence patterns of central Kuskokwim Eskimos, although they did introduce new harvest methods. The Russian Orthodox priests were largely unsuccessful at altering the religious beliefs of the local population because many people blamed them for causing the smallpox epidemics.

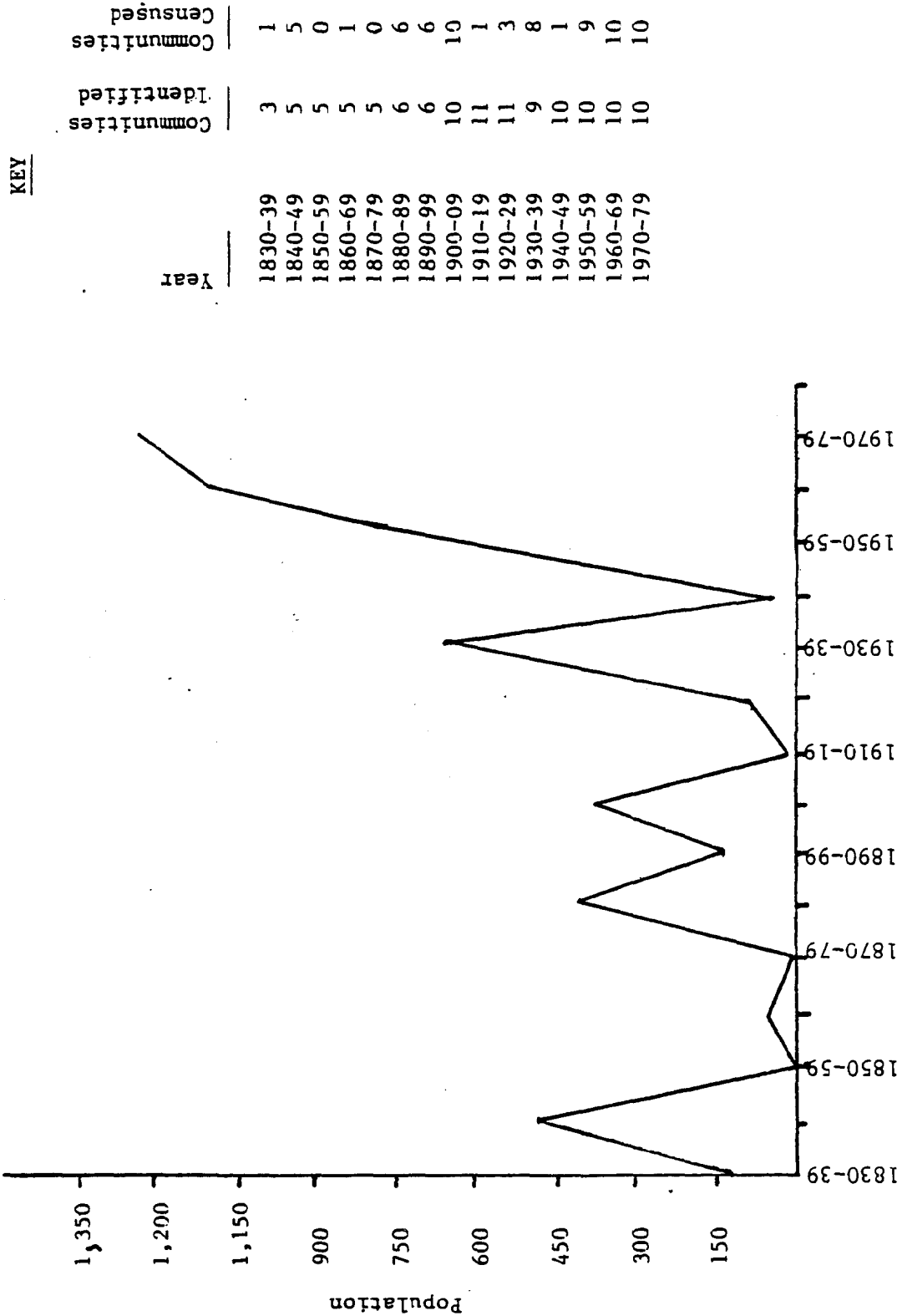
Oswalt (1980b) suggests that dramatic changes in the local economy did not occur until the turn of the century. Widespread epidemics removed most of the older generations from the population. The remaining individuals were more inclined to adopt aspects of Euroamerican culture. Major changes in material culture, especially in food procurement technologies, occurred during the present century. The introduction of twine, cotton, and nylon for use in making fishnets and fishwheels, chickenwire for use in making fishtraps, plank and aluminum boats, outboard motors, snowmachines, and steel traps affected subsistence patterns, although the influence of this new technology on fishing and hunting patterns has yet to be fully understood.

POPULATION TRENDS

Oswalt and VanStone (1967) provide population estimates for the central Kuskokwim River area for the years 1843-44. They estimate that

271 individuals resided within 30 kilometers downstream and 30 kilometers upstream of Crow Village. This same area is estimated to have had a population of 346 in 1880 and 350 in 1890 (Oswalt and VanStone 1967). At that time neither Chuathbaluk nor Sleetmute had yet been established. The area of joint Athabaskan and Eskimo occupancy was estimated by Oswalt (1967) to have included 200 Eskimos and 200 Athabaskans in 1880. A later report (Oswalt 1980b) gives aboriginal population estimates of 500 individuals in the vicinity of Kolmakovskiy Redoubt, with nearby communities containing not more than 150 people. The accounts of von Wrangell (VanStone 1970) note that fewer than 100 Ingalik Athabaskans inhabited the Holitna River.

Figure 7 represents general population trends for the central Kuskokwim River region between 1830 and 1979 based on Oswalt (1980a). Census data are incomplete for the years 1830-39, 1850-79, 1910-29, and 1940-49, accounting for major dips in the curve. These data indicate that historical populations were at their lowest in the early 1900s, probably a result of the epidemics of 1900 and 1901. Since that time, regional population levels have risen steadily. Since early historic population estimates were not uniformly accurate and populations were more dispersed, it is difficult to assess the extent to which contemporary populations compare to precontact levels. The apparent increase occurring since 1950 may be due to a population influx into the area.



KEY

Fig. 7. Population trends occurring in the central Kuskokwim region, 1830-1979.

CHAPTER 3

THE WINTER VILLAGES

CHUATHBALUK

Historical Development of Chuathbaluk

The name Chuathbaluk (Curarpalek) translates as "one with big blueberries" in Yup'ik and refers to the abundance of blueberries to be found around the village in late summer. The Deg Hit'an Athabaskan name is Ch'inihay dinechoxdi, meaning "that which we pick is big" (Kari 1980). Chuathbaluk has also been called "Little Russian Mission," "Kuskokwim Russian Mission," "Russian Mission Kuskokwim," and "St. Sergius Mission" in its earliest years (Oswalt 1980a). Within the past 20 years the name was changed to Chuathbaluk because the village was often confused with the community of Russian Mission located on the lower Yukon River (Oswalt 1980a). The first documentation of settlement at the current village site was by Glazunov in 1833-34, who described it as a summer village called "Tschukwack" used by Ingalik Athabaskans (VanStone 1959). In the early 1890s a Russian Orthodox bishop visiting Kolmakovskiy Redoubt, where a Russian Orthodox Church was under construction, decided that the church should be built at Chuathbaluk instead because Kolmakovskiy Redoubt was subject to flooding (Oswalt 1980a). A priest was assigned there in 1894 (Smith 1980). Church construction began in 1897 and was completed by 1905 (Smith 1980). This church, named after

St. Sergius, had jurisdiction over the smaller Russian Orthodox chapels that were built elsewhere along the Kuskokwim River (Smith 1980).

In 1895-96 many individuals who had previously resided in the community of Kukuktuk, three miles upriver from Chuathbaluk, moved to the site (Oswalt 1980a). At that time it may have been jointly occupied by Eskimos and Athabaskans and formed an ethnic boundary between the Eskimos that had settled downriver on the Kuskokwim and Athabaskans who resided upriver. In 1900 many of these inhabitants are thought to have died in a major measles and influenza epidemic, and by 1908 only two individuals resided in Chuathbaluk. In 1912 it was described in the literature as a Native village where Russian Orthodox church services were held occasionally and where one family remained through 1929. Shortly thereafter the site was abandoned, though area residents continued to hold services in the church and bury their dead at the cemetery (Oswalt 1980a).

In 1954 the village site was reoccupied by a family from Crow Village, approximately 20 miles downriver from Chuathbaluk, whose head was to assume the role of Chief of the Church at Chuathbaluk. This family was soon followed by others who moved from Aniak (10 miles downriver from Chuathbaluk), Napaimute (approximately 20 miles upriver from Chuathbaluk), and Crooked Creek (approximately 55 miles upriver from Chuathbaluk) (Oswalt 1980a). The recorded population levels for Chuathbaluk are shown in the Table 1.

TABLE 1. CHUATHBALUK POPULATION TOTALS, 1900-1982.

Year	Population
1900	16
1968	95
1977	119
1978	123
1982	132

Local residents reported that many individuals had settled along the riverbank opposite the village site prior to 1954, but flooding caused them to move either to the present site or to other central Kuskokwim communities. A new church was built in the late 1950s. A state elementary school opened in 1967 and a high school in 1976. In 1975 Chuathbaluk became a second class city. One store opened in 1972 and a second store in 1975 (Oswalt 1980a).

Contemporary Chuathbaluk

During 1982-83 Chuathbaluk had a population of 132 distributed between 29 households with an average household size of 4.5. The frequency of household sizes is depicted in Figure 8. Household size ranged between one and ten. Households in Chuathbaluk are typically comprised of nuclear family groups or extended family groups containing one married couple with children and/or grandchildren or single parents

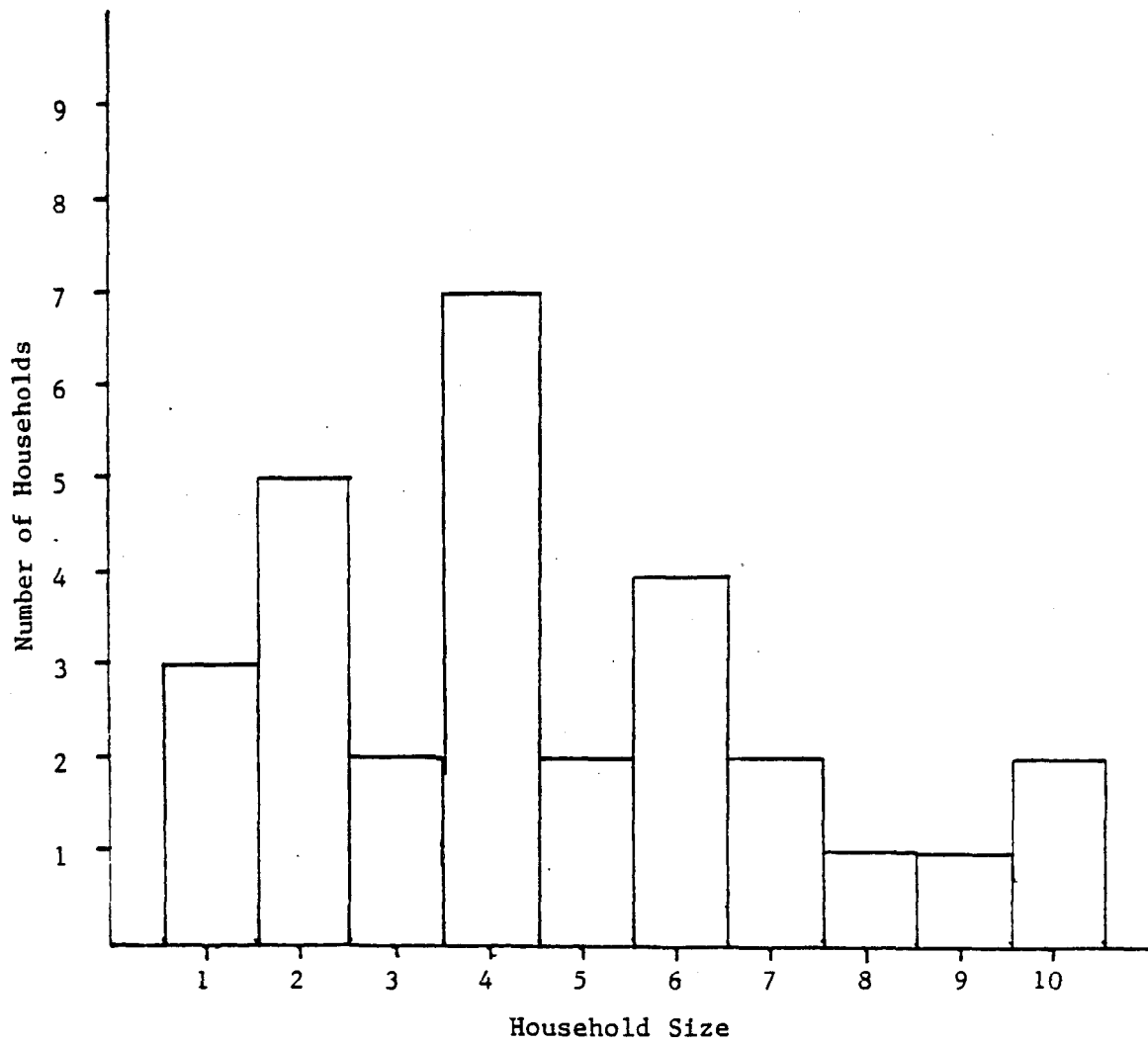


Fig. 8. Frequency of household sizes, Chuathbaluk.

with children and/or grandchildren. Several households contain adopted children. Households containing one person are composed of single, elderly people or single males. Almost every village household has kinship ties through blood or marriage with at least one other village household.

Figure 9 presents an age-sex pyramid describing the population structure of Chuathbaluk in 1982-83. The age-sex pyramid shows that 59 percent of the population is male and 41 percent female, resulting in a sex ratio of 1:1.4. Fifty-nine percent of the population is under age 25, 33 percent is between ages 25 and 60, and 8 percent is over 60. Figure 9 shows that the mode for the Chuathbaluk population occurs between the ages 15 and 24. Of the total population, 28.8 percent falls within this ten-year age range. Of the individuals between the ages 15 and 24, 65.8 percent are male. Thus, of the total population in Chuathbaluk, 18.9 percent are males between the ages 15 and 24. Below the age of ten, 57.5 percent of the individuals is male and 42.5 percent is female. It appears from Figure 9 that above age 25, the male to female ratio for Chuathbaluk overall is fairly balanced. There are clearly more males in the population than females under the age of 25, but whether this is due to differential birth, mortality, adoption, migration, or a combination of these factors is not precisely known.

Of the total Chuathbaluk population, nine individuals are non-Native. Six of these individuals live in two village households and are employed in teaching jobs at village schools; the remaining three are males married to Native women. The ethnic composition of

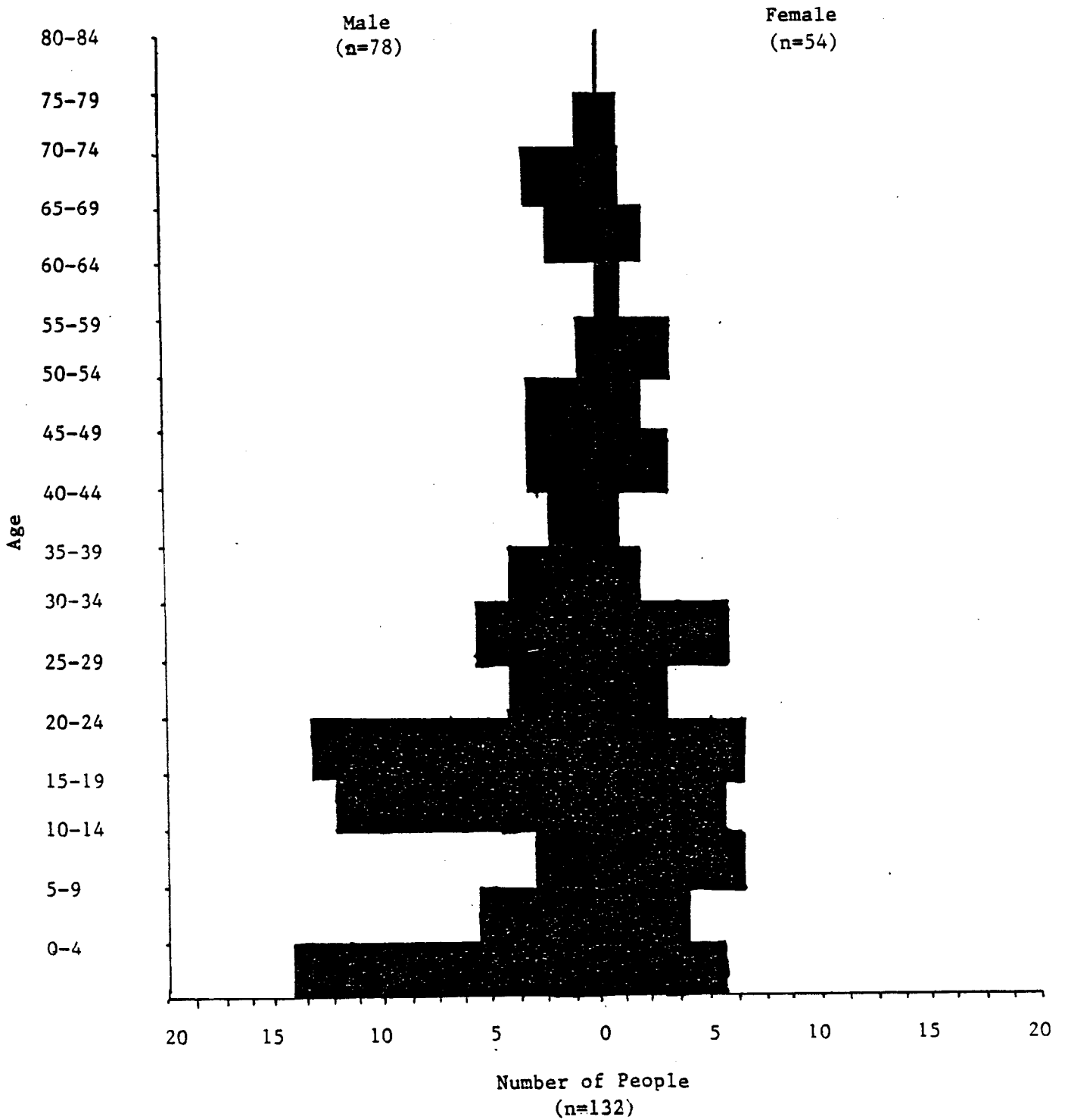


Fig. 9. Age-sex pyramid, Chuathbaluk residents.

the Native population cannot be easily classified, as many individuals are of mixed descent including Eskimo, Athabaskan, Russian, and other European influences. While Chuathbaluk is located in an area which historically included both Eskimo and Athabaskan settlements in which intermarriage occurred, the Native component is primarily Yup'ik Eskimo. Yup'ik and English are the predominant languages. Most community residents under age 30 speak only English, while those older than 30 are generally bilingual. Most village households have ties of kinship with other village households.

According to local reports, between 1954 and the early 1970s the Chief of the Russian Orthodox church led the community in both religious and secular matters and was considered the "village chief," independent of community councils. The original Chief of Chuathbaluk, as discussed earlier, founded the village as it is known today. Since this individual passed away, Chuathbaluk has not had a central village leader. Political matters and community affairs are currently handled by the Chuathbaluk City Council and Chuathbaluk Traditional Council, each having different members.

Chuathbaluk lies within the Calista Region and is represented by The Kuskokwim Corporation, the area's regional profit-making corporation. The Kuskokwim Native Association, based in Aniak, is the local non-profit corporation which administers certain social services to Chuathbaluk. Aniak, ten miles downriver from Chuathbaluk, serves as the regional center for the central Kuskokwim area and provides a supply network to the central Kuskokwim villages. Chuathbaluk residents have easy access to the goods and services available in Aniak. Most

households have members who make weekly trips to Aniak by boat or snowmachine to obtain supplies. Mail service is by boat, snowmachine, or truck during winter months when the river ice has settled and a graded road along the river connects the two communities. There is air transportation between Chuathbaluk and Aniak. The first gravel airfield was completed in fall 1982, although airplanes also land by the village using floats and skis.

The community of Chuathbaluk is located on 40 acres of land owned by the Russian Orthodox Church. Permission to build on church land must be received prior to construction. Most community dwellings and structures have been built on church land and are of log construction. Ten houses were built in Chuathbaluk in 1970, sponsored by the Bureau of Indian Affairs (Darbyshire and Associates 1979). Eleven additional houses were built by the Bureau of Indian Affairs between 1973 and 1975 (Darbyshire and Associates 1979). Community structures other than individually-owned dwellings, smokehouses, caches, and steambath houses include a store and post office located in separate sections of one building, community hall, alcohol treatment facility and city offices located in one building, health clinic, Russian Orthodox Church, elementary school, and high school. The schools are operated by the Kuspuk School District. A water and sewer system constructed by the Public Health Service in 1974 to service the housing project remained inoperative during 1982-83. Honey buckets and outhouses comprise the current sewage system. In 1972 the Public Health Service built a community water system; this was later shut down due to maintenance problems (Darbyshire and Associates 1979). Water is currently obtained

from the Kuskokwim River, a creek running through the village, or the school well. Generators providing village-wide electricity began operation in September 1982. Electricity costs are partially subsidized by the State of Alaska power cost assistance program. The current cost of electricity is 42.5 cents per kilowatt hour, with a \$20.00 per month minimum charge.

Food staples and gasoline are the major items stocked at the village store, although a limited supply of hardware and household items are available. Table 2 presents a price listing for gasoline and selected food items that were available from the Chuathbaluk village store during fall 1982. Many individuals purchase groceries and gasoline in Aniak.

A limited number of year-round, part- and full-time wage employment opportunities were available in Chuathbaluk during 1982-83. Virtually all employment is directly or indirectly government-funded and service-oriented. These jobs, the hours per week they require, and hourly wages are presented in Table 3. Those jobs associated with the school district are available August through May and are indicated with an asterisk in Table 3. Table 3 indicates that there are 17 jobs available in Chuathbaluk employing 19 of the 66 adults in the community. Of the 17, 1 is privately funded and 14 are state-funded through the University of Alaska, the Kuspuk School District, the Yukon-Kuskokwim Health Corporation, and grants through the Kuskokwim Native Association and the traditional and city councils in Chuathbaluk. Two jobs are provided by the United States Postal Service.

TABLE 2. PRICE LISTING FOR SELECTED GOODS AVAILABLE AT THE
 CHUATHBALUK VILLAGE STORE, FALL 1982.

Item	Cost
1 gallon gasoline	\$2.50
1 lb. canned butter	\$4.49
1 lb. margarine	\$1.30
2 lbs. Tillamook cheese	\$7.90
10 lb. bag white flour	\$5.50
2 lb. can coffee	\$8.35
3 lb. can Crisco	\$4.35
1 gallon Wesson oil	\$10.35
2 lb. box spaghetti	\$2.50
1 lb. 12 oz. bag rice	\$3.30
10 lbs. potatoes	\$5.69
1 lb. peanut butter	\$3.10
2 lb. 3.2 oz. can jam	\$5.15
12.5 oz. can tuna fish	\$3.55
12 oz. can Spam	\$2.90
1 lb. can green beans	\$1.05
1 lb. 1 oz. can corn	\$1.00
14 oz. can condensed milk	\$1.90
1 box pilot bread	\$3.30
6-pack soda pop	\$4.50

TABLE 3. WAGE EMPLOYMENT OPPORTUNITIES,
CHUATHBALUK, 1982-83.

Job	Number Employed	Hours/Week	Hourly Wage
Community Health Aide	1	30	8.07 certified 4.48 uncertified
Alternate Health Aide	1	15	3.66
Cook, Kuspuk School District*	1	20	7.50 temporary 8.30 permanent
Janitor, Kuspuk School District*	1	35	8.00 temporary 8.85 permanent
Daycare for teachers' children*	1	35	
Preschool Instructor*	1	15	9.00
Store Clerk**	2	10-15	5.00
Post Mistress	1	15	6.25
Mail Haul	1	10	paid by the pound
Power Plant Operator	2	25	6.50
Village Recreation Director	1	15	6.00
Village Project Director	1	10	5.00
City Administrator	1	30	13.87
City Equipment Operator	1	40	8.00
City Janitor/Maintenance Person	1	40	8.00
Village Library Aide*	1	10	7.77
Adult Basic Education Aide*	1	20	12.31

*Job available between late August and May

**Privately funded

Two private enterprises are operative in Chuathbaluk -- a sawmill for which timber is harvested, processed, and commercially sold along the Kuskokwim River and a village store. Both enterprises provide a few jobs for other Chuathbaluk residents. In addition, temporary seasonal jobs are often available during summer months. These include fire-fighting, Comprehensive Employment and Training Act (CETA) positions, construction work, and employment on summer barges. Some individuals go to Bethel during summer months to work at fish processing plants or other temporary jobs. Limited employment opportunities are also available in Aniak. Residents working in Aniak may commute or temporarily reside in that community.

Transfer payments provide an additional source of income to Chuathbaluk residents. These occur in the form of Old Age Assistance (OAA), Aid to Permanently Disabled (APD), Aid to Families with Dependent Children (AFDC), and Food Stamps. Data available from June through October 1982 show that there was an average of ten combined cases of OAA, APD, and AFDC every month totalling an average of \$2,730 monthly for the community of Chuathbaluk (Shuler 1983). Data available from August 1982 through January 1983 reflect an average of 61 individuals receiving food stamps every month representing 13 households for an average income of \$4,377 per month for the community or \$337 per month per recipient household (Shuler 1983).

The median earned household income for 27 households in the community of Chuathbaluk during 1979 was \$4,375 ranging from less than \$2,500 to \$12,499 (U.S. Bureau of the Census 1980). These

figures do not include salaries earned by elementary and high school teachers employed by the Kuspuk School District. Fifteen village households earned under \$5,000 during 1979 with nine of these households earning less than \$2,500 (U.S. Bureau of the Census 1980). Six households earned between \$5,000 and \$10,000, and six households earned between \$10,000 and \$12,500 (U.S. Bureau of the Census 1980).

SLEETMUTE

Historical Development of Sleetmute

Apparently there was no village at the current site of Sleetmute when Zagoskin explored the region in 1844 (Oswalt 1980a). One family resided there in 1900 and in the ensuing years a community grew quickly. Sleetmute was presumably founded by Ingalik Athabaskans, but Yup'ik Eskimos gradually moving upriver for the previous 50 years jointly occupied the site (Oswalt 1980a).

According to local residents, Sleetmute was originally a summer fish camp site used by two Holitna River families who fished along the Kuskokwim River because of better salmon quality and fewer mosquitoes. The tip of the island below Sleetmute provided an excellent location for placing salmon fish traps. As members of these families married, new families were started and the settlement became larger and more stable. Other families joined them from settlements along the Holitna, Hoholitna, and Kuskokwim rivers with the enforcement of laws requiring mandatory school attendance for children.

In 1907 Gordon spent three days in Sleetmute and made the first recorded description of the village (Oswalt 1980a). Of a population that numbered approximately 150, Gordon (1917) reported that in his opinion most individuals bore Athabaskan physical characteristics, although he observed Eskimo and mixed Eskimo-Athabaskan features. Conversely, Yup'ik was the predominant language at this time. The village itself was patterned as an Yup'ik village, although the houses were of Athabaskan style. Both Yup'ik and Athabaskan influences were reflected in the material culture. Squirrel, marmot, arctic hare, muskrat, mink, beaver, otter, marten, wolf, wolverine, caribou, and reindeer were all used for clothing (Gordon 1917).

Sleetmute means "the settlement of the people of the whetstone" (Cellitmiut) in Yup'ik, referring to an outcropping of slate close to the village which was historically used in making whetstones and was valued as a trade item (Oswalt 1980a). The Deg Hit'an Athabaskan term is Tovishq'vI ghunh, meaning "whetstone place" (Kari 1980). The recorded population estimates for Sleetmute are shown in Table 4. These figures reflect a population decrease between 1907 and 1939 and population fluctuations between 1950 and 1978. These variations may be due in part to incomplete census figures. It is interesting to note that overall population levels in Sleetmute have remained relatively constant between 1907 and 1978.

The rise in population observed between 1970 and 1978 may be accounted for by a 1973 opening of federal land to homesteaders along the Holitna River. Thirty individuals originally applied for 5 to 160

TABLE 4. SLEETMUTE POPULATION TOTALS, 1900-1982.

Year	Population
1900	9
1907	150
1930	133
1939	86
1950	120
1954	130
1960	122
1970	109
1978	157
1982	101

acre homesteads on the Holitna River (Grant Fairbanks pers. comm., May 1983). Half of the applicants dropped out within the first two years, and their land reverted back to federal ownership. Seven of the original homesteaders and their families remained on the Holitna River in residence year-round. The major reason given for the general failure of homesteading on the Holitna River is that 75 percent of the original applicants claimed that the land was located on a floodplain (Grant Fairbanks pers. comm., May 1983). The current homestead residents of the Holitna River have not been included in the 1982-83 population estimate or in the present study.

Contemporary Sleetmute

During 1982-83 Sleetmute had a population of 101 distributed between 28 households having an average household size of 3.6. Household size ranged from one to eight. Figure 10 depicts the frequency of household sizes for Sleetmute. Most Sleetmute households have a household size of four and consist of a married couple with children. The nuclear family unit forms the core of most household groups. There are a relatively large number of single-member households in Sleetmute. Those households having one or two individuals are typically single males living alone or two related males living together. Households that contain three or more individuals are typically married couples with children. Large households are relatively uncommon in Sleetmute. However, there are some extended families containing grandparents, grandchildren, nephews, nieces, and brothers-in-law. Some households include adopted children. Almost every village household has ties of kinship through blood or marriage with at least one other village household.

Of the total population, 13 individuals are non-Native and 88 individuals are Native. Nine non-Natives resided in three Sleetmute households and were associated with teaching positions at the village schools. The four remaining non-Natives, two men and two women, are married into Native families. As discussed earlier, the precise ethnicity of the Native population is difficult to classify. The Athabaskan component, characterized by ethnic background and cultural contact, is more evident in the Sleetmute population than in that of

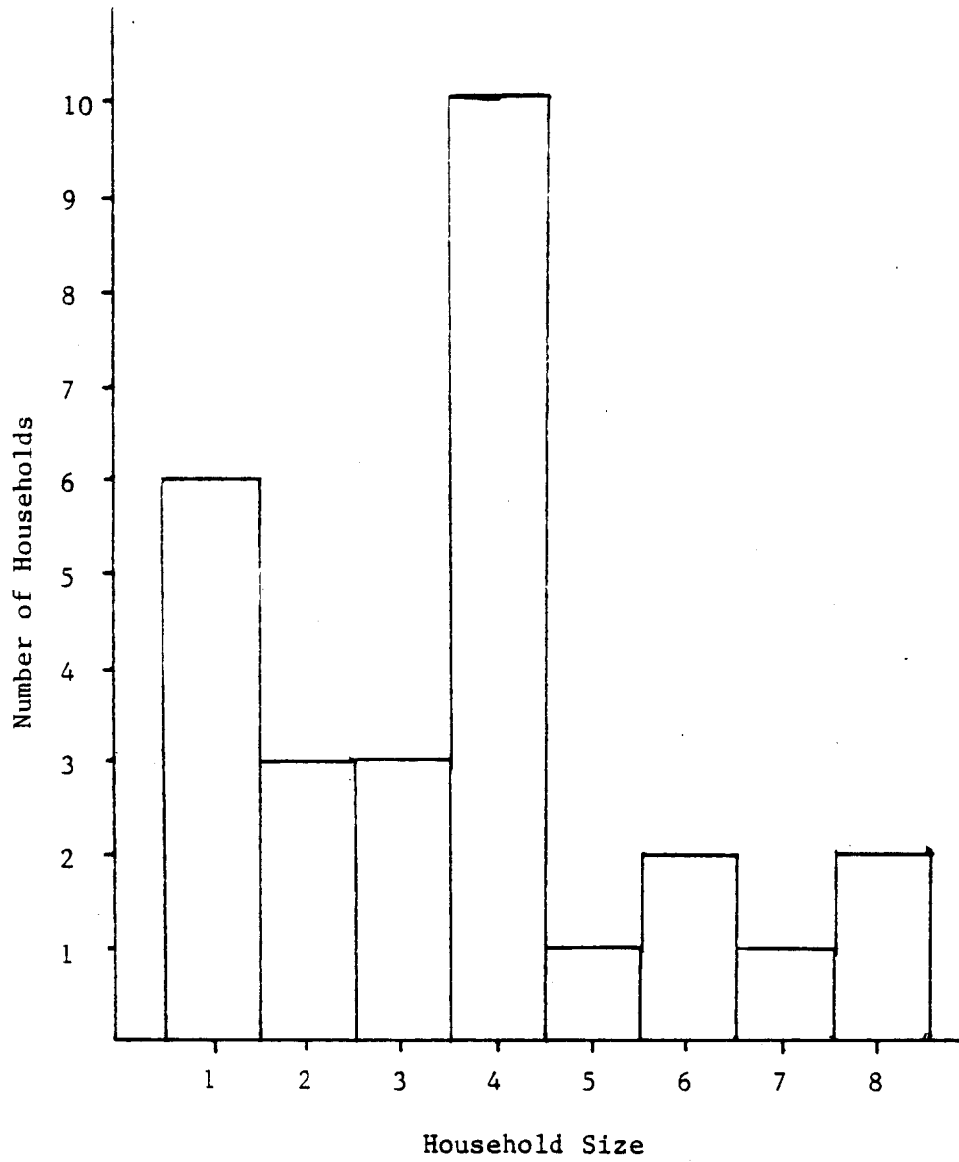


Fig. 10. Frequency of household sizes, Sleetmute.

the Chuathbaluk population. While Yup'ik and English are the spoken languages, some individuals have a limited command of Athabaskan. Sleetmute is locally considered a Yup'ik community.

Figure 11 presents an age-sex pyramid showing the population structure of Sleetmute in 1982-83. Fifty-nine percent of the total population is male and 41 percent is female, resulting in a sex ratio of 1:1.46 in favor of males. Forty-eight percent of the population is under age 25, 43 percent is between ages 25 and 60, and 9 percent of the population is over 60. Figure 11 indicates that the mode for the Sleetmute population falls between the ages 15 and 24. Of the total population, 30.7 percent is between the ages 15 and 24. The percent of males in this ten-year age range is 54.8. The male to female ratio for the Sleetmute population is balanced above age 55. Below age 55 there are consistently more males than females in each age category, with the exception of ages 40-49. Below age ten, 67 percent of the individuals are male and 33 percent are female.

Sleetmute is within the Calista Region, is represented by The Kuskokwim Corporation, and receives social services through the Kuskokwim Native Association in Aniak. Sleetmute is an unincorporated village having a village council and a traditional council composed of different members, both of which administer community matters and political affairs. Similar to Chuathbaluk, a village chief, who was also Chief of the Russian Orthodox Church, resided in Sleetmute through the late 1970s.

Gasoline, food staples, and a limited number of commodities are available at the Sleetmute store. Table 5 presents a price listing

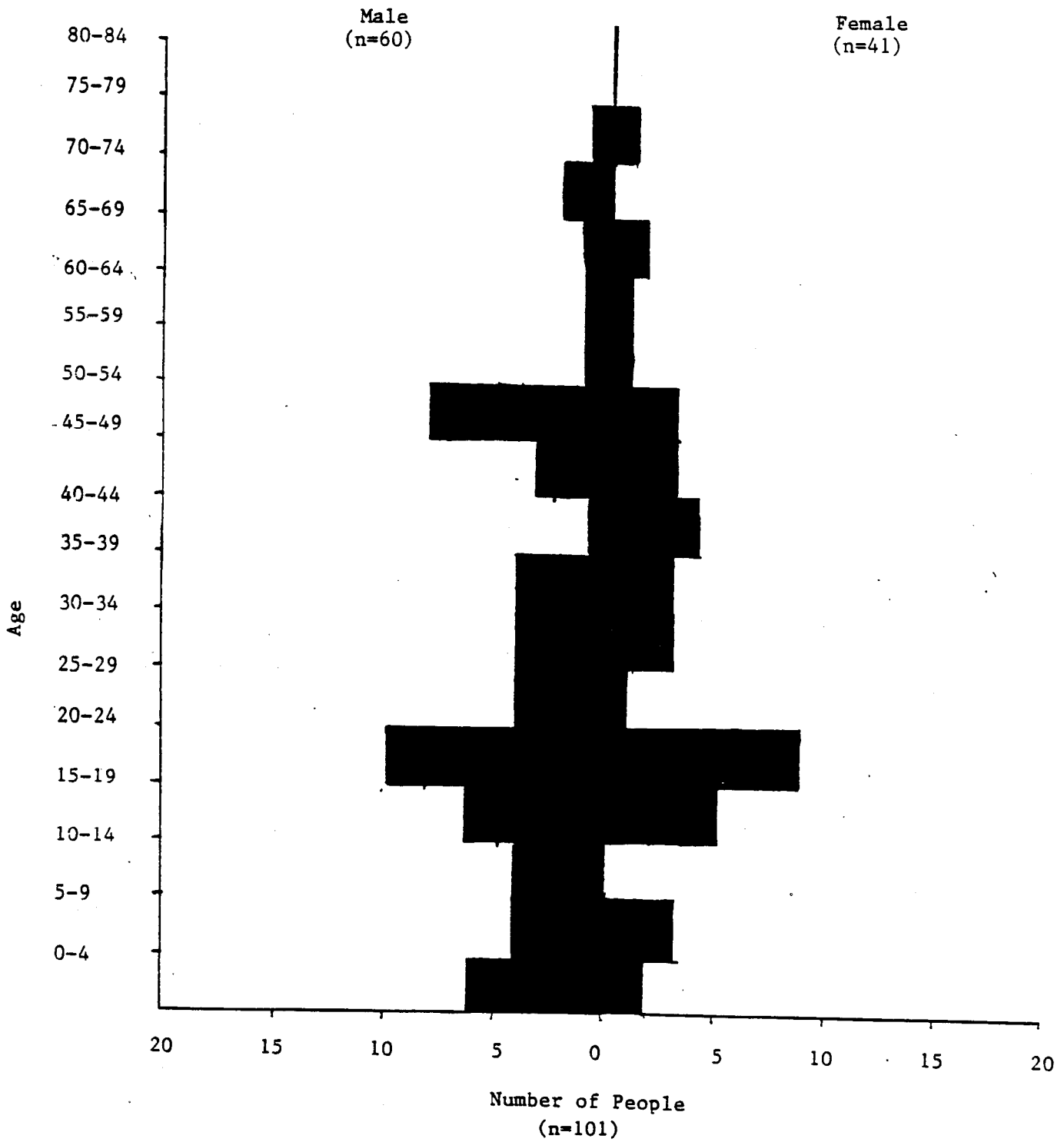


Fig. 11. Age-sex pyramid, Sleetmute residents.

TABLE 5. PRICE LISTING FOR SELECTED GOODS AVAILABLE AT THE
SLEETMUTE VILLAGE STORE, FALL 1982.

Item	Cost
1 gallon gasoline	\$2.25
1 lb. can butter	\$3.83
2 lb. 3.2 oz. can jam	\$4.59
1 dozen eggs	\$1.80
13 fl. oz. can condensed milk	\$.85
3 lb. can coffee	\$11.29
7 oz. can Spam	\$1.58
9.5 oz. can tuna fish	\$2.64
2 lb. bag rice	\$2.19
1 lb. bag spaghetti	\$1.89
10 lb. bag potatoes	\$4.79
1 lb. onions	\$.53
46 fl. oz. can juice	\$2.39
1 lb. box Saltines	\$1.26
1 lb. 1 oz. can peas	\$.96
17 oz. can fruit cocktail	\$1.52
1 lb. chicken	\$1.69
1 lb. pork chops	\$3.40
1 lb. hamburger	\$2.81

of gasoline and selected food items available at the Sleetmute village store during fall 1982. When goods at the Sleetmute store are depleted, residents often fly to Aniak to purchase supplies. A mail plane servicing Sleetmute from Aniak once a day, five days a week, provides regional transportation and a means of receiving food staples and commodities which are commonly ordered in bulk from Anchorage. A local charter service also provides regional transportation and freight service. Sleetmute has a 2,000-foot gravel runway (Calista Corporation n.d.).

The houses in Sleetmute are of log or plywood construction. Ten houses were built by the Bureau of Indian Affairs in 1973 (Darbyshire and Associates 1979). In addition to individually-owned houses, caches, smokehouses, and steambath houses, Sleetmute has a health clinic; combination community hall, post office, and library; school and preschool; and Russian Orthodox Church. Most houses have wells and well heads which are typically non-functional. Residents generally obtain water from the Kuskokwim and Holitna rivers or nearby streams. Outhouses and honey buckets constitute the village sewer system. Electricity became available to Sleetmute in September 1982 at the rate of 42.5 cents per kilowatt hour, with a minimum charge of \$20.00 per month.

Table 6 presents a listing of full- and part-time wage employment opportunities available during 1982-83 in Sleetmute and indicates hours per week and hourly wages associated with each job. As in the case of Chuathbaluk, school district jobs are only available between late August and May. Table 6 shows that there were 15 wage employment

TABLE 6. WAGE EMPLOYMENT OPPORTUNITIES,
SLEETMUTE, 1982-83.

Job	Number Employed	Hours/Week	Hourly Wage
Community Health Aide	1	30	8.07 certified 4.48 uncertified
Alternate Health Aide	1	15	3.66
Janitor, Health Clinic	1	10	7.50
Cook, Kuspuk School District*	1	20	7.50 temporary 8.30 permanent
Janitor, Kuspuk School District*	1	35	8.00 temporary 8.85 permanent
Teacher's Aide*	1	20	7.50 temporary 8.30 permanent
Daycare for teachers' children*	1	35	
Preschool Instructor*	1	15	9.00
Post Mistress	1	15	6.25
Wien Airlines Agent**	1	10	6.25
Power Plant Operator	2	25	6.50
Manager, MKEC***	1	30	8.33
Bookkeeper, MKEC***	1	20	7.50
Maintenance Person, MKEC***	1	20	
Village Public Safety Officer	1	37.5	8.23

*Job available late August through May

**Privately funded

***Middle Kuskokwim Electric Company (MKEC)

opportunities available in Sleetmute employing 16 of the 59 adults in the community. One was privately funded and 13 were directly or indirectly state funded -- three through the Yukon Kuskokwim Health Corporation, five through the Kuspuk School District, four through a grant to the Kuskokwim Native Association, and one through the Association of Village Council Presidents. The U.S. Postal Service funds one job.

One Sleetmute household is engaged in private enterprise, operating the village store, an airplane charter service, a lodge, and a guide service for sport fishermen. These enterprises provide occasional employment opportunities to other Sleetmute residents. Additional temporary seasonal employment includes village construction jobs and fire-fighting. Some village residents find summer jobs downriver at Red Devil or Bethel. Some Sleetmute residents spend several months or more in Anchorage engaged in wage-earning jobs, as will be discussed later.

Transfer payments, including Old Age Assistance (OAA), Aid to Permanently Disabled (APD), Aid to Families with Dependent Children (AFDC), and Food Stamps, provide an additional source of monetary income to Sleetmute residents. Between June and October 1982 there were an average of nine cases of combined OAA, APD, and AFDC per month, village-wide, totaling a village average monthly income of \$3,074 (Shuler 1983). Between August 1982 and January 1983 an average of 42 Sleetmute residents representing 13 households received food stamps every month for a total average monthly income of \$3,117 village-wide, or \$240 per recipient household (Shuler 1983).

The median household income for 23 Sleetmute households during 1979 was \$5,417, ranging from less than \$2,500 to \$17,499 (U. S. Bureau of the Census 1980). These figures do not include salaries earned by elementary and high school teachers employed by the Kuspuks School District. Thirteen Sleetmute households earned under \$5,000 with eight of these households earning less than \$2,500 (U.S. Bureau of the Census 1980). Eight households earned between \$5,000 and \$10,000 and two households earned between \$12,500 and \$17,499 (U.S. Bureau of the Census 1980).

COMMUNITY COMPARISONS

Chuathbaluk and Sleetmute show similarities and differences in terms of history, population structure, and socioeconomic infrastructure. Both Eskimos and Athabaskans have occupied Chuathbaluk from the early 1800s to 1927. After a hiatus of about 25 years, Chuathbaluk was reoccupied in 1954 and since that time has grown steadily to assume its present population size of 132. Historically, Sleetmute seems to have had a much stronger Athabaskan influence than has Chuathbaluk which has persisted into the present time. Sleetmute was first occupied around 1900 and has varied in size from 86 to 157 since 1907. The overall population size and permanent nature of the community has not changed radically since it was established, although the current population of 101 is low in contrast with historic levels.

In terms of population structure, the male to female sex ratios are nearly identical for each community with a predominance of males.

The mode for both populations is between the ages 15 and 24. While the percentage of the total population over age 60 is similar for both communities, 59 percent of Chuathbaluk's population is under age 25 compared with 48 percent for Sleetmute. Sleetmute has proportionately more people in the middle age classes than Chuathbaluk. The high number of males in relationship to females in Chuathbaluk occurs mainly among individuals under age 25. In Sleetmute the imbalance of males is distributed throughout most of the age categories. Sixty-seven percent of the Sleetmute residents below age ten are male while 57.5 percent of the Chuathbaluk residents below age ten are male, suggesting differential birth, mortality, adoption, migration, or combinations of these factors. Average household size is somewhat higher in Chuathbaluk than in Sleetmute, although in both communities four is the most common household size and household size has been influenced by the varying impacts of new housing programs. A household size of four or smaller predominates in Sleetmute, while household size is more evenly distributed in Chuathbaluk and larger households are not uncommon. In both communities functional family groups may cross household lines.

Chuathbaluk and Sleetmute have similar community infrastructures. Both communities have traditional councils. Chuathbaluk is a second class city and has a city council. Sleetmute is unincorporated and has a village council. Traditional councils are recognized by the federal government while village councils are recognized by state government. Both communities are represented by The Kuskokwim Corporation and the Kuskokwim Native Association. Access to Chuathbaluk by air is limited, but Chuathbaluk residents have access to more goods and services than

Sleetmute residents through Aniak. Both communities have been influenced by the sociopolitical and religious orientations of the Russian Orthodox Church.

Employment opportunities in the Chuathbaluk and Sleetmute economies are similar. Private enterprise comprises a small component of the cash sector. Monetary income is derived mainly from limited wage employment opportunities or temporary, seasonal jobs which, for the most part, are either directly or indirectly governmentally funded. Some jobs are provided in Chuathbaluk through the city, a funding source lacking in Sleetmute. Transfer payments account for a proportion of many household incomes in both villages. Overall Sleetmute received a greater amount of income from Old Age Assistance, Aid to Permanently Disabled, and Aid to Families with Dependent Children in comparison with Chuathbaluk, while Chuathbaluk received a higher income from food stamps than Sleetmute. Subsequent chapters will indicate the significance of historical development, demography, community organization, and the cash sector in relationship to resource harvest activities.

CHAPTER 4

SETTLEMENT PATTERNS AND THE ANNUAL ROUND

This chapter presents a general discussion of contemporary settlement patterns occurring in Chuathbaluk and Sleetmute and historic settlement patterns by five cultural groups that may have been antecedents to the current patterns described for these communities. Settlement patterns are generally associated with an annual round of resource harvest activities. A set of seasonal hunting, fishing, trapping, and gathering activities is practiced by members of each community in response to annual cycles occurring in fish, wildlife, and plant populations. The seasonal cycles of resource availability and desirability repeat themselves annually, providing local residents with opportunities to participate in harvest activities. These seasonal harvest activities constitute an annual round. Following a description of the annual round is a general discussion of principles involved in the use of geographic resource harvest areas. The chapter concludes with a description of transportation methods used in resource harvest.

HISTORIC SETTLEMENT PATTERNS AND ANNUAL ROUND

Historic data suggests that the current patterns of resource harvest and settlement observed in Chuathbaluk and Sleetmute probably have been influenced by several cultural traditions over time. As described earlier, the central Kuskokwim area represented a crossroads

through which historic migration and trade occurred between several groups of people. In recent historic times these groups included the Yup'ik Eskimos (Yu'it) from the lower Kuskokwim River (Kusquqvagmiut) and lower Yukon River (Kwikipagmiut), the Ingalik Athabaskans from the middle Yukon River, the Dena'ina Athabaskans of the Stony River drainage, and the Upper Kuskokwim-speaking Athabaskans from the upper Kuskokwim River. Yup'ik-speaking Eskimo intrusions appear to be the most recent of these historic movements of people and trade items. Each of these cultural groups may have influenced the sociocultural patterns of the central Kuskokwim region. The antecedents to the current cultural patterns in Chuathbaluk and Sleetmute may be found in the historic subsistence and settlement patterns of one or more of these Yup'ik and Athabaskan groups. It is therefore worthwhile to briefly examine the different cultural traditions from which historic reconstructions are possible.

Aboriginally, the Kusquqvagmiut spent part of the year in large, stable settlements composed of several extended family groups and part of the year away from this central base in smaller nuclear or extended family groups (Oswalt 1967). A local population with access to locally abundant wild food resources such as salmon, which could be preserved and stored, was able to maintain a semi-permanent central base or village (VanStone 1974). Seasonal moves were made from the village to harvest more widely distributed resources.

In the 1860s winter villages typically were occupied by the Kusquqvagmiut between September and April. During this period adult male members of the community commonly left the winter village to

fish, hunt, and trap for anywhere between two days and two months (Oswalt 1967). Those who remained at the winter village harvested resources in the immediate environs. In early spring, family members as a group traveled by dog sled from the winter settlement to spring camps in the mountains where they hunted caribou and furbearers (Oswalt 1980b). Boats were taken on the sleds and used for transport back to the winter village or summer fish camp following breakup (Oswalt 1980b). Families harvested and processed salmon at summer fish camps or at the winter settlement site. Following the salmon season in late August to early September, families returned to the winter village. Thus, the village served as a base of operations from which families ranged seasonally in order to conduct resource harvest activities.

The upriver Kwikpagmiut moved between four seasonal settlements but maintained relatively large winter villages along the lower Yukon River which served as the basis for economic activities (Wolfe 1979). Salmon, a primary food resource, was harvested from summer fish camps or the winter village. King and chum salmon were of particular importance. Family groups dispersed to fall camps located in tundra areas to harvest whitefish and blackfish, returning to the winter village in late fall. Spring camps were also maintained in tundra areas for harvesting waterfowl and muskrat. Caribou were taken when traveling along lowland migration routes. Seal and belukha products were obtained through trade networks and were important to the local diet and economy (Wolfe 1979).

The Ingalik adaptation from the middle Yukon River resembled that of the Kwikpagmiut, although hunting was a more predominant activity

(Osgood 1970). Relatively large winter villages were maintained along rivers, and movements between seasonal settlements were made for resource harvest activities. Families moved to summer fish camps to harvest salmon, the staple of the local diet (Osgood 1958). Chum salmon were the most important source of food to the Ingalik. In fall beaver were harvested. Lampreys were taken in late fall, and grayling, trout, burbot, and blackfish were taken during winter. Families moved to spring camps in late March to harvest blackfish, waterfowl, and muskrats. Caribou were harvested during fall in the hills and along the river. Some households occasionally spent entire winters at hunting camps in the hills harvesting caribou. Bear, caribou, and moose were also harvested throughout the year but were less important in the local diet than were fish species (Osgood 1958).

Dena'ina Athabaskans from the Stony River drainage traditionally were semi-nomadic, maintaining relatively small winter villages which served as base camps from which groups ranged seasonally to procure resources (Kari 1983). Contemporary patterns of settlement and resource harvest are described by Kari (1983) and represent a modification of traditional patterns. Moose, caribou, beaver, salmon (red salmon in particular), and whitefish were all important resources, although meat formed the staple of the diet and fish were used as dietary supplements. Salmon were harvested in summer from fish camps or the winter village. In late summer and fall, groups moved to inland lake areas where whitefish, waterfowl, caribou, moose, and black bear were harvested and to mountainous areas where Dall sheep were taken. In winter, individuals ranged from the winter village to procure furbearers and large and

small game animals. Groups again moved to inland lake areas and established spring camps between April and June for harvesting whitefish, grayling, pike, suckers, waterfowl, and muskrats (Kari 1983).

The Upper Kuskokwim-speaking Athabaskans were also semi-nomadic and regularly visited different areas within a 2,500 square mile territory during an annual round of resource harvest activities (Hosley 1966). Small, extended family bands containing from 15 to 30 individuals ranged within this territory. Bear, caribou, and Dall sheep formed the basis of the diet with salmon and non-salmonid fish species of secondary importance. Winters were spent in semi-permanent dwellings in seasonal camps along lakes or streams from which hunting and fishing activities took place. These camps were abandoned in March when bands travelled to hunting grounds in mountainous areas where caribou, bear, and Dall sheep were procured. Summers and falls were typically spent in upland montane hunting grounds, although occasionally groups descended to harvest whitefish in summer (Hosley 1966).

At the time of historic contact, winter villages along the central Kuskokwim had been occupied for many years (Oswalt 1980b). These villages were typically located on high riverbanks that were not prone to flooding and had beaches below them upon which boats could land. Locations were also chosen with easy access to summer salmon fishing sites along the main river and winter whitefish sites along nearby tributaries or sloughs. The typical winter village consisted of about seven houses of log and sod construction in which closely related females and their young male offspring resided. The central structure in the village was a qasgiq (men's house) in which the male members of

the community resided between adolescence and old age. The qasgiq served as bath house, workshop, and place for holding social and ceremonial activities (Oswalt 1980b).

Salmon was the most important wild resource in terms of reliability, volume harvested and consumed, with caribou of secondary importance in terms of volume harvested and consumed (Oswalt 1980b). Whitefish and blackfish were harvested in spring and fall. Caribou were taken in late fall and early winter, as well as in spring. Black bear were harvested during fall and winter months. Beaver, mink, muskrat, and otter were taken year-round for their meat and fur, while wolf, wolverine and marten were taken for their fur only. Migratory waterfowl were harvested throughout the summer, and ptarmigan and spruce grouse were taken in late fall and early spring. Some goods were received through trade. Central Kuskokwim Eskimos received seal oil and seal skins for crafting boot soles, rope, and containers from the coastal Eskimos in exchange for wolverine furs to be used in making parka ruffs, beaver pelts for parka trim, marmot skins for making parkas, and caribou leggings for skin boots. Birch bark canoes and raw slate came from Eskimos in the Sleetmute area. These goods were exchanged through trading partners in adjacent villages and part-time traders who traveled between the villages. At the time of Russian penetration into the central Kuskokwim area, the Kusquqvagmuit were practicing a subsistence strategy that appeared to be extremely successful, with death from starvation or food-related stress being rare (Oswalt 1980b).

Winter village sites along the central Kuskokwim River have shifted since the time of initial Euroamerican contact. Flooding and a change in the river channel causing erosion led to settlement abandonment (Oswalt 1980a). The epidemics of 1900 and 1901 are estimated to have decimated about half of the riverine population and contributed to settlement abandonment. The locations of villages, seasonal settlements, and single family settlements known to have existed along the central Kuskokwim since the late 1700s are shown in Figures 12, 13, and 14 (Oswalt 1980a). Prior to 1900, 15 of the settlements located between Old Kalskag and Sleetmute were occupied; between 1900 and 1955, 24 settlements were occupied; and since 1955, 10 of the settlements shown between Old Kalskag and Sleetmute have been occupied. According to Oswalt (1980a), during the past century semi-permanent settlements have become more consolidated while the annual round of resource harvest activities has remained relatively similar. The resources that provided the basis of the aboriginal diet are the same as those that compose the current diet, although with varying degrees of abundance (Oswalt 1980b).

CONTEMPORARY SETTLEMENT PATTERNS

The contemporary settlement patterns of Chuathbaluk and Sleetmute residents still incorporate seasonal movements. People move between two or three different locations which serve as focal points for conducting different fishing, hunting, trapping, and gathering activities. In addition to the winter village, settlements include summer fish

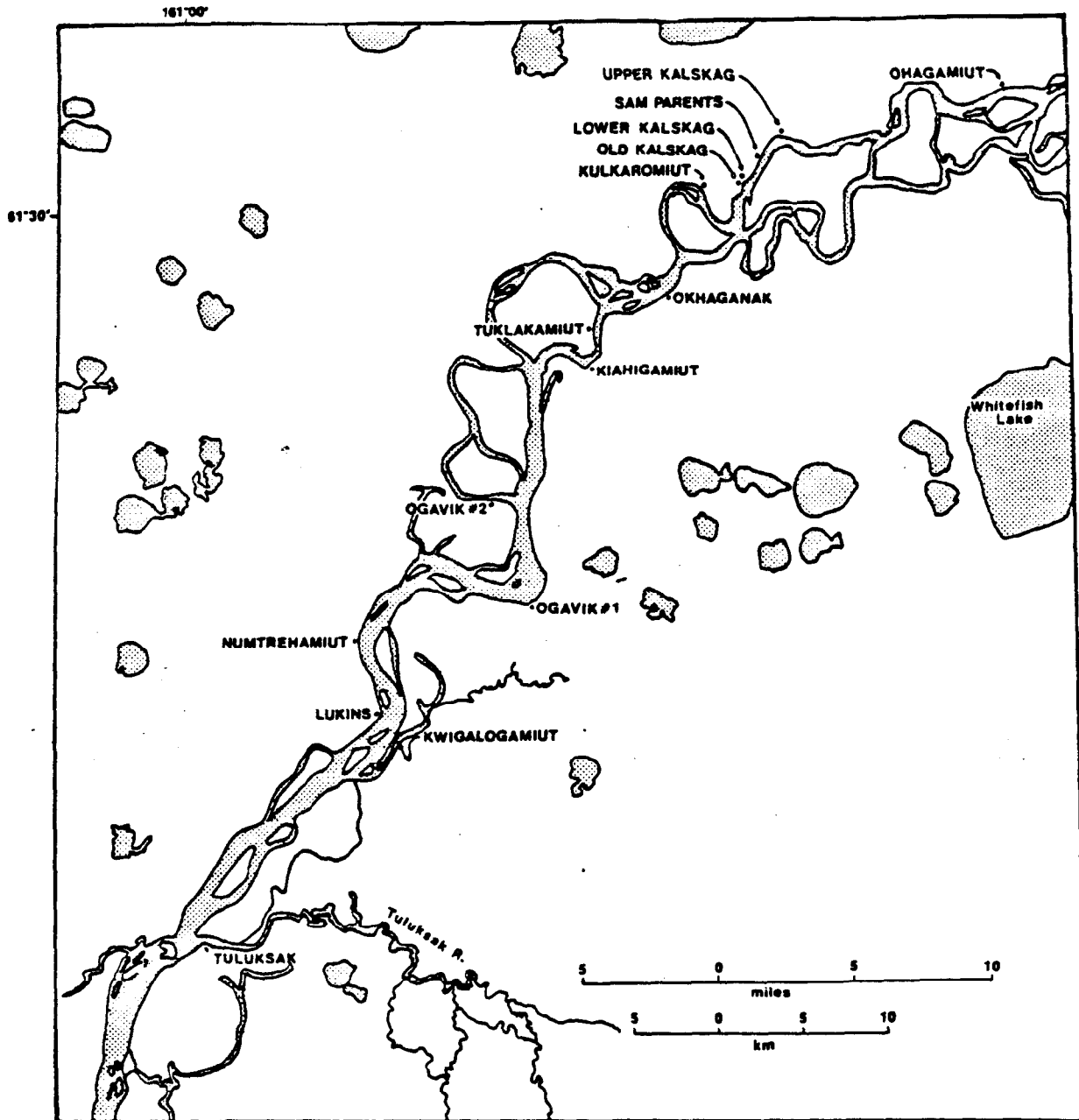


Fig. 12. Historic Kuskokwim River settlements between Tuluksak and Ohagamiut (1800-1983) (from Oswalt 1980a).

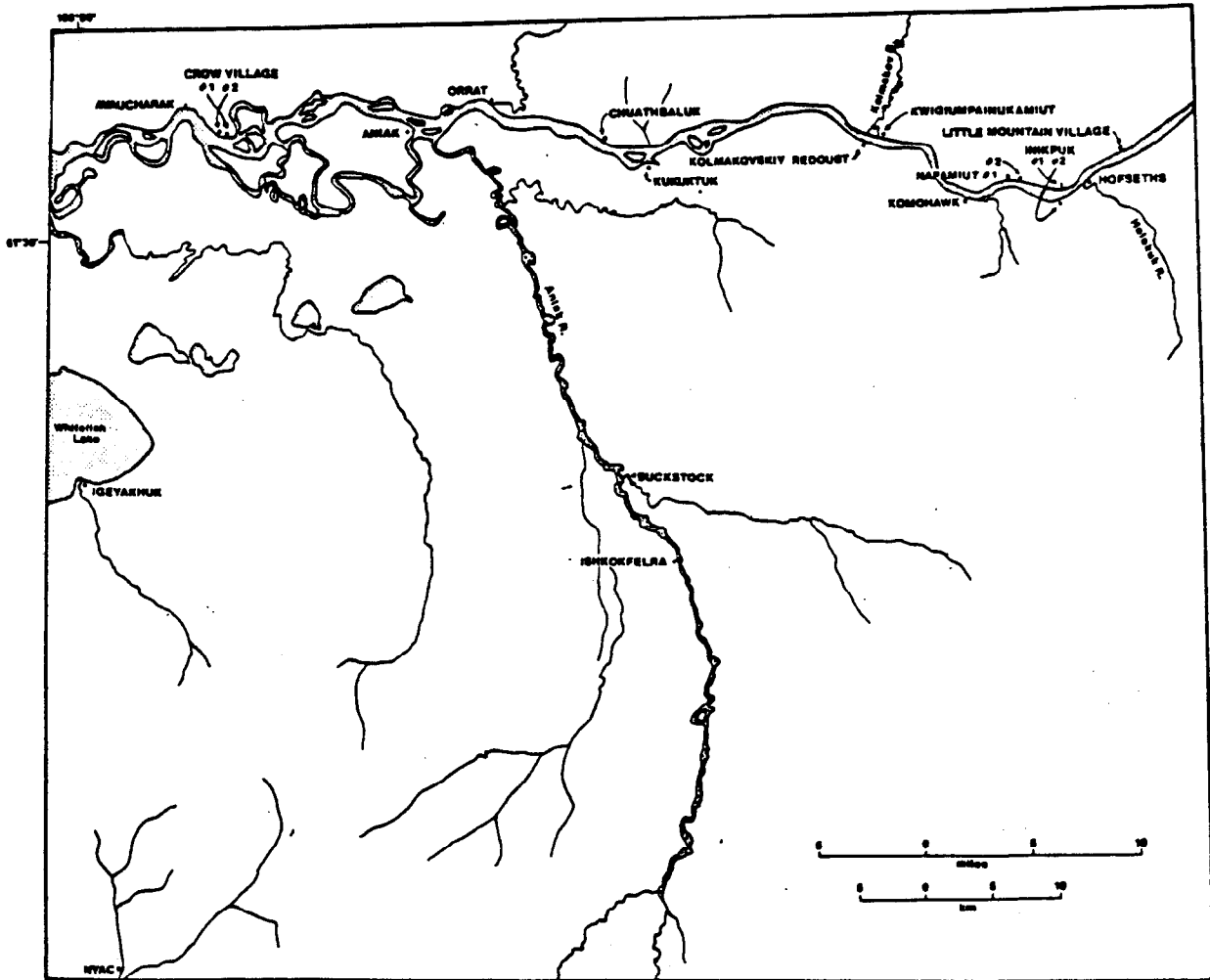


Fig. 13. Historic Kuskokwim River settlements between Avaucharak and Little Mountain Village (1800-1983) (from Oswalt 1980a).

camps and winter trapping camps which households use annually. In addition, other temporary, short-term camps are established during the year by some households: spring camps where muskrat are harvested, seasonal hunting camps used for the harvest of moose, bear, and/or caribou, and fall berry-picking camps. The specific settlement patterns observed in Chuathbaluk and Sleetmute vary somewhat, and are described below.

Chuathbaluk has a total of 29 households resident in the community at least part of the year. During 1982-83 Chuathbaluk residents typically resided at the winter village from September through May. Members of eight households (28 percent) moved to fish camps in June to harvest and process salmon throughout the summer. One household (3 percent) spent the summer traveling outside the state. Seventeen households (59 percent) remained in the winter village, six of these harvesting and processing salmon from the village. Three of the 29 Chuathbaluk households (10 percent) resided in single-family settlements within two miles of the winter village. Two households remained at these settlements year-round and conducted trapping and fishing activities from these sites. The other household moved to a summer fish camp. Trappers tend to base their operations from the winter village during November through April. Most trappers set up temporary tent camps along their traplines which were used periodically throughout the winter.

In 1982 to 1983 there were 28 total households resident in the community of Sleetmute for at least part of the year. Three general settlement patterns occurred in Sleetmute during 1982-83. Thirteen

of the 28 households (46 percent) remained in the winter village year-round and fished and trapped from their homes. One additional household (4 percent) maintained a summer fish camp. Six households (21 percent) maintained single family settlements separate from but within five miles of the winter village. Fishing and trapping activities were typically conducted from these settlements year-round. Eight households (29 percent) moved to trapping cabins on the Holitna and Hoholitna rivers in September prior to freezeup and remained there until the following May. These households returned to the winter village after breakup to fish for and process salmon throughout the summer and take advantage of seasonal employment opportunities. These were typically households containing single males or married couples with one child.

Many of the current Sleetmute residents were raised in several settlements composed of one or two households that were scattered along the Holitna, Hoholitna, and Kuskokwim rivers upriver from Sleetmute, including Kasheglok, Nogamut, and Cotton Village. At that time these households were oriented around winter trapping activities, which necessitated dispersed, low density settlement patterns, allowing traplines to be distributed throughout the Holitna and Hoholitna drainages. Many individuals stated that they had to move to Sleetmute once the law required children to attend school. Some individuals found wage employment in the village, causing them to remain there on a more permanent basis.

THE ANNUAL ROUND OF RESOURCE HARVEST, JUNE 1982 - MAY 1983

The annual round of resource harvest by Chuathbaluk and Sleetmute residents is influenced by the seasonal availability of resources, species abundance, habitat distribution, time of year at which resources are most palatable or valuable, and regulations imposed by the Department of Fish and Game. Species selected for harvest vary from year to year in response to a combination of the above variables. Figure 15 presents a list of resources currently harvested and used by Chuathbaluk and Sleetmute residents and indicates the usual months that harvest takes place.

Figure 15 represents a generalized annual round for Chuathbaluk and Sleetmute. Minor variations in the annual round occur in each community. Rainbow trout, smelt, and blackfish are harvested only by Chuathbaluk residents. Migratory fish species, such as salmon, lamprey, sheefish, and burbot, arrive in Sleetmute up to two weeks later than they arrive in Chuathbaluk. Households in each village may select different species, and the two communities exhibit different general orientations around the resource base. These variations will be discussed in detail in later chapters.

Salmon, greens, and berries are the target resources during summer and early fall months. Several non-salmonid fish species are harvested as well. Bear, moose, and caribou are sought in late summer and early fall. Bear are occasionally taken in late spring and summer. Caribou are harvested between November and February during the legal hunting season. Moose are taken during the open September, November, and

Species	Month of Harvest											
	Ja	Fe	Ma	Ap	Ma	Ju	Ju	Au	Se	Oc	No	De
Moose	-	---	-	-	-	-	-	-	---	-	-	-
Caribou	---	---	-	-	-	-	-	---	---	-	---	---
Black and brown bear					---	-	-	---	---			
Porcupine	-	-	-	-	-	-	-	-	-	-	-	-
Snowshoe hare	---	---	---	---						---	---	---
Grouse	---	---	---						---	---	---	---
Ptarmigan	---	---	---	---								
Waterfowl				---		-	-	---				
Mink	---	---									---	---
Marten	---	---									---	---
Wolf	---	---	---								---	---
Wolverine	---	---	---								---	---
Land otter	---	---	---	---							---	---
Red fox	---	---									---	---
Lynx	---	---	---								---	---
Beaver	---	---	---	---							---	---
Muskrat	---	---	---	---	---	---					---	---

_____ concentrated harvest efforts

----- occasional harvest efforts

Fig. 15. The annual round of resource harvest in Chuathbaluk and Sleetmute, June 1982 - May 1983.

Species	Month of Harvest											
	Ja	Fe	Ma	Ap	Ma	Ju	Ju	Au	Se	Oc	No	De
Salmon						—	—	—	—			
Lamprey											—	
Sheefish					—	—	—	—	—			
Least cisco	-	-	-	-	-	-	-	-	—	—	-	-
Whitefish	-	-	-	-	—	—	—	—	—	—	—	-
Rainbow trout												
Arctic char												
Grayling												
Smelt					—							
Blackfish										-	-	-
Pike												
Sucker						—	—	—	—			
Burbot	—	—	—							—	—	—
Greens					—	—	—	—	—			
Berries						—	—	—	—			

— concentrated harvest efforts

- - - - - occasional harvest efforts

Fig. 15: -- continued.

February seasons. Both moose and caribou are occasionally harvested in other months as well. The harvest of small game animals typically occurs between fall and spring. Waterfowl are generally harvested during their spring and fall migrations but may be taken in summer. Non-salmonid fish species are harvested throughout the year, depending on local and seasonal abundance. Furbearers are harvested between November and June during the legal trapping season for each species. Each of these activities is discussed in depth in subsequent chapters.

RESOURCE USE AREAS

Included in the discussions of resource use are maps presenting the areas which depict resource use areas for Chuathbaluk and Sleetmute residents within two periods of time. A discussion of some general principles guiding the choice of harvest areas may be useful here. In aboriginal times the Kusquqvagmiut exhibited a strong attachment to the places in which their ancestors had resided, and the territories used by them for hunting and trapping were considered as "belonging" to their descendents (VanStone 1970). Land use patterns in the central Kuskokwim continue to be influenced by customary laws and traditions relating to land use. Local residents state that there were areas characteristically occupied and used by residents of particular villages, so that each central Kuskokwim community had recognized "territories." Use areas generally included Kuskokwim River tributaries in proximity to each respective village. Residents of one community could use the hunting areas of another community if

they exhibited close ties of kinship or friendship there or if they were born there and demonstrated a history of using the area. In this regard, use areas were frequently associated with particular kinship lines independent of place of residence. Otherwise, villagers respected the use areas of other villages and harvested resources only within their own use areas.

Customary laws of land tenure have been penetrated somewhat by an influx of new residents ascribing to legal systems of land tenure developed outside the region. Non-local people tend to harvest in the use areas of long-term residents without recognition of customary concepts of land tenure. Currently, long-term residents generally recognize and maintain a sense of respect for the resource harvest areas used by members of each village. Chuathbaluk and Sleetmute residents tend to concentrate their activities within their respective use areas.

Specific shifts in land use areas pertaining to each resource activity will be discussed in the related chapter and in the conclusions. It should be noted that land use concepts are complex. In this context, the customary system of land use rules have not been described or understood completely.

TRANSPORTATION METHODS

Currently, transportation in the central Kuskokwim for the purpose of resource harvest takes place primarily by boat during months of open water and by snowmachine during winter months when waterways are frozen.

In historic times summer travel was by birch bark canoe and skin boat, while dog teams and man-pulled sleds were used in winter months. The shift from man- to motor-powered watercraft took place in the early 1920s. Snowmachines began to supplant dog teams as a mode of transportation in the early to mid 1960s. Rivers and creeks continue to be the major travel corridors used for resource harvest activities in the central Kuskokwim. A thorough knowledge of river navigation and the ability to travel under varying ice conditions are essential for success in harvest activities. Access to resource use areas is dependent on travel capabilities.

Canoes used in historic times were made from birch bark, which was bound around ribs of birch using rope made from spruce roots (Oswalt 1978). Poles held in each hand were used to push the canoe upstream. According to local informants, skin boats were crafted from the hides of bear, caribou, or moose that were bound around willow frames. Both single person and family-size skin boats were made and used for transporting meat (Oswalt 1978). Local informants described travelling to fall hunting camps on foot or by birch canoe where moose, caribou, and bear were harvested. Skin boats were constructed using hides from these animals and hunters drifted with their supply of meat back downstream to the winter village. Birch canoes remained at the hunting camp and new ones were built the following spring.

Boat motors arrived in the central Kuskokwim in the early 1920s according to accounts by local residents. Although the first motors had few horsepower, they were perceived as wild and fast-moving devices. Technological development brought motors with higher horsepower. Most

individuals currently use 14- to 20-foot wooden or aluminum boats powered by 15 to 35 horsepower motors, although motor size ranges from 7.5 to 70 horsepower. Individuals involved in commercial fishing use boats up to 24 feet in length.

The majority of Chuathbaluk and Sleetmute residents use locally hand-crafted wooden boats for summer travel. Wooden and aluminum boats are cited as having various advantages and disadvantages. Wooden boats, which are heavier than aluminum boats, are considered advantageous for harvesting salmon with drift nets. Wooden boats dull sounds produced by people and objects moving in the boat and therefore allow an individual to be quieter than do aluminum boats, an advantage to men hunting moose, caribou, or bear along rivers by drifting. Wooden boats can be made locally. Aluminum boats are necessary for travel when the ice is running during freeze-up in the fall and spring breakup. They sustain collisions with floating ice cakes well. Aluminum boats can easily be slid across shorefast ice and can be pulled onto the ice without freezing to it due to a series of ridges on the bottom of the boat. Heavy, flatbottomed wooden boats freeze to the ice and are difficult to transport.

Dog teams were historically used for winter travel and have persisted into the present day, although they are currently used by only a few households. Those households having dog teams often use them for recreational racing events as well as for work purposes. Snowmachines are currently used by most households, including those households having dog teams. Small snowmachines are generally preferred to larger ones, as they are more versatile and can be used

for overland travel with a lesser risk of becoming stuck in snow drifts. Many local informants stated that they have traveled shorter distances from the winter village for shorter periods of time since the advent of snowmachines. They perceive snowmachines as much less reliable than dog teams and fear becoming stranded far from the village on a snow-machine which potentially could break down. Because of this tendency for snowmachines to break down, individuals traveling more than 20 miles or so from the winter village generally travel in pairs. Fuel must be carried on long-distance snowmachine trips, thereby limiting the distance that can be traveled by the weight of the fuel. Fuel far outweighs the bundles of fish required to fuel dog teams.

Travel conditions are largely influenced by prevailing weather conditions. Wind conditions creating waves in the water limit one's ability to travel. Tidal influences are not present in Chuathbaluk and Sleetmute. High water prevails following break-up and water levels drop prior to freeze-up. Summer water levels are influenced by the amount of rainfall at the headwaters of Kuskokwim tributaries. Low water prevents access by boat to many of the smaller Kuskokwim tributaries and the headwaters of larger Kuskokwim tributaries. Local residents do not have jet units for their motors. They cannot travel in extremely shallow water because their motor shafts and propellers scrape the gravel river bottom and damage lower units and propellers. Extremely high water makes travel dangerous by causing timber and debris to be washed into the water which can damage propellers. Water level also exerts a major influence over land use patterns by determining accessibility of resource harvest areas.

Most hunters develop an ability to follow the main channel of a river. Environmental signs indicate the course of a main channel and can be used to guide travelers. Deep water is usually indicated by the presence of swirling circles and small bubbles on the water surface or floating foam. Deep water generally occurs along cut banks. Small ripples on the water surface and a whitish hue indicate shallow water. Points and island tips tend to cause areas of shallow water.

Hunting along shallow creeks is preferred by some individuals. There is less competition for resources resulting from the difficulty in navigating the shallow waters. These individuals use hip boots to walk in the creeks and push their boats through shallow stretches. Other strategies for passing shallow spots include pulling up the motor and poling upstream using oars and pulling the boat upstream with a rope by walking along the riverbank. One passenger generally travels at the bow of the boat to look for shallow places and guide the driver around them and to dislodge the bow from gravel bars using an oar. Travelers usually drift downstream along shallow creeks. Log jams and underwater sweepers created by trees and shrubs that have fallen into the water but remain attached to shore as the result of storms and erosion make creek travel dangerous.

Travel by boat takes place close to the riverbank rather than down the middle of a river. In addition to the safety features of traveling close to shore, the water is usually deepest along shore. There is less resistance by the river current, which is strongest in the center. Most individuals prefer to travel upstream when hunting from the winter village as opposed to downstream, knowing that if their

motor fails they can drift home. An old, spare propeller is taken and used on journeys in which collisions with the river bottom are anticipated.

Winter travel is influenced by snow and ice conditions. The swiftness of the river current causes Kuskokwim ice to freeze in a rough and jagged fashion making travel difficult. Snowfall gradually levels the river to make passage easier. The accessibility of tributaries is determined by the amount of open water and overflow found there. Rapid currents in many tributaries cause areas of open water to remain throughout the winter, especially toward the headwaters. Temperatures above 0° Fahrenheit can cause frozen areas to open up. Ice surrounding these areas can be dangerous. Travelers often dismount their snowmachines and test questionable ice with ice picks before crossing. A snowmachine traveling at high speed can often cross areas of thin ice more safely than an individual on foot. Overflows, mainly caused by warm temperatures, make river travel dangerous. When temperatures rise above freezing during winter warm spells, river surfaces melt and become watery, making travel unsafe.

Overland trails become regularly traveled routes when snow accumulations are sufficient. These often provide short cuts to places which would require lengthy trips by waterway. Below zero temperatures are highly favored for overland travel, as they maintain packed trails and cause them to be hard and fast. Temperatures warming above 20°F can cause snow to soften and increase the likelihood of snowmachines becoming stuck in snow drifts. Snow and ice conditions play a major role in determining where individuals conduct winter hunting and trapping activities.

CHAPTER 5
SALMON FISHING

INTRODUCTION

Salmon have been the primary staple in the diet of the Kuskokwim River Eskimo since aboriginal times (Oswalt 1978). The abundance and relative predictability of this resource have enabled the Kusquqvagmiut to form permanent settlements along the river (Oswalt 1978). Annual summer fish camp settlements were operative at the time of historic contact (circa 1830) and, as previously described, have persisted into the present day. Historically, the winter village has also served as a summer salmon fishing site for some households, a pattern which also persists today. Salmon continue to be a staple in the diet of central Kuskokwim River residents.

The non-commercial salmon fishery is based on king (taryaqvak; Oncorhynchus tshawytscha), chum (iqalluk; Oncorhynchus keta), red (sayak; Oncorhynchus nerka), and silver (qakiiyaq; Oncorhynchus kisutch) salmon. King, red, and chum salmon run simultaneously, with king salmon preceding the other species by a few days. These species arrive in the central Kuskokwim around the middle of June and continue to run through late July. Salmon arrive in the Sleetmute area approximately one week following their arrival near Chuathbaluk. The peak of salmon fishing activities occurs in the first two weeks of July, corresponding to the peak in salmon runs. A later "fall run" of small, three-year-old

chum salmon occurs in September. According to local accounts, silver salmon begin to run when the summer rains set in. Silver salmon reach the central Kuskokwim around the second week of August and continue to run through late September. There is a small run of pink salmon (amaqaiyak; Oncorhynchus gorbuscha) in the Kuskokwim River, peaking approximately a week following the climax of the king salmon run. Pink salmon are typically in poor condition by the time they reach the central Kuskokwim and are fed to dogs when harvested incidentally.

Central Kuskokwim River residents begin to prepare for summer salmon fishing in May. Most households move to their fish camps sometime in June. Salmon fishing activities take place between June and September. Most households complete their fishing activities by mid-August, limiting their harvest of silver salmon in part because of the difficulty in drying them during August and September when heavy rains may prevail. The school year commences in mid-August, and berry-picking and hunting become focal resource harvest activities, also curtailing salmon harvest. Silver salmon are usually harvested by households who failed to harvest an adequate supply of king salmon, as was the case for many Sleetmute households during 1982.

Subsistence salmon fishing by Chuathbaluk and Sleetmute residents occurs within State Fishery Management District 2 on the Kuskokwim River (Fig. 16). There are currently no regulations regarding the timing at which subsistence fishing may take place in District 2. Regulations restrict type and operation of gear. Commercial fishing also occurs on a small scale within District 2 and provides a source of cash income for a limited number of households in the lower central

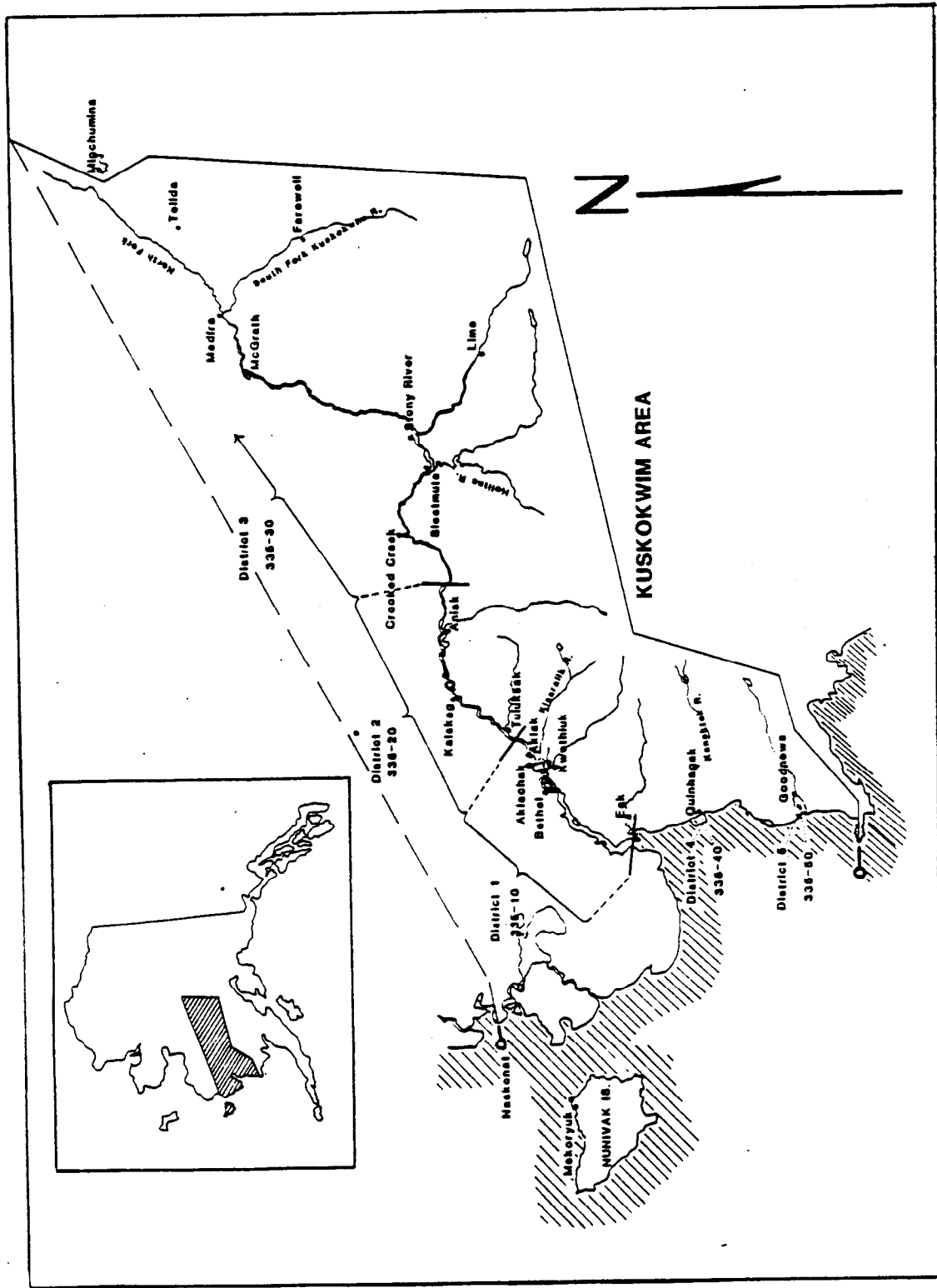


Fig. 16. Kuskokwim State Fisheries Management Districts 1 through 5 (from Alaska Department of Fish and Game 1982e).

Kuskokwim River communities. Commercial fishing periods and gear types are regulated. The subsistence salmon fishery is the predominant fishery in this region in terms of volume of fish harvested, number of fishermen involved, and value to local fishermen.

This chapter describes the nature of salmon harvest, processing, and use that currently exists within the communities of Chuathbaluk and Sleetmute, including a historic perspective when these data are available from the literature.

FISHING TECHNOLOGIES

Historic Fishing Technologies

In aboriginal times salmon were taken in weirs and traps, set nets, drift nets, dip nets, and with spears and harpoon darts on the central Kuskokwim. Oswald (1980b) describes fish weirs as having been constructed from poles and brush and built across the main river in locations where the water was shallow. Fish traps made from splints of spruce wood were placed at openings in the weir. Set and drift nets were made from moose sinew and had floats made from pieces of spruce stump and sinkers made from pieces of bone or antler (Michael 1967). Set nets were placed in river eddies and drift nets were floated from canoes or kayaks at a right angle to the river current (Oswald 1980b). Zagoskin (Michael 1967) describes a type of dip net that was used in the central Kuskokwim for taking king salmon in deep water when they first ran upriver. The dip net was made from strips of seal

skin that had been frozen and thawed several times. It was mounted on a willow hoop up to four feet in diameter and suspended from a pole that was driven into the riverbank and extended up to five meters in length. Individual salmon were also harpooned from a boat or the riverbank with harpoon darts (Oswalt 1980b). Local informants report that spear fishing was a primary method used by individuals fishing during days on clear Kuskokwim tributaries. In these areas, nets could be seen by fish and had to be set at night.

Around 1900 a major change in salmon fishing technology took place along the central Kuskokwim River (Oswalt 1980b). Oswalt (1980b) reports that miners who came to the area in search of gold introduced the fishwheel, which had been used for a short time in the northwestern United States and in the eastern states prior to that. By 1912 the fishwheel was in use on the Kuskokwim, where it is assumed to have come from the Yukon. A description of the fishwheel is given in Oswalt (1978):

This device is a log raft with a large opening at the center over which is mounted a horizontal axle hung with large baskets and paddles. The river current propels the paddles and baskets which rotate in the direction of the current. Fish swimming upstream within reach of the baskets are lifted from the water into them and then slide down a chute into a box at the side of the raft. The fish wheel is an extremely effective method of taking fish, for it does not require constant tending. However, it can be used successfully only under certain circumstances. The water must be opaque and must flow rather fast, and the fish must swim relatively close to the shore. This means that only in regions above tide-water would this device be practical.

According to local informants, the fishwheel was a primary salmon fishing technology on main, muddy channels in the central Kuskokwim district

through the mid-1960s. After the mid-1960s, the use of fishwheels declined. As described below, some were still in use in 1982.

In the early 1900s cotton twine was introduced by non-Natives and came to be used for crafting fishnets, replacing moose sinew (Oswalt 1980b). Residents stated that to be used in clear water, cotton nets had to be boiled with the bark of alder in order to dye them a dark reddish-brown, thus camouflaging them from view by salmon.

In 1977, certain gear types that were thought by the Department of Fish and Game to be no longer in use along the Kuskokwim River were prohibited by regulation (Ron Regnart pers. comm., May 1983). The gear types excluded were spears (except on the Holitna River), harpoon darts, fish weirs blocking more than half the width of a river, and certain types of fish traps.

Contemporary Fishing Technologies

Salmon currently are harvested in the central Kuskokwim using set gill nets (civvluku; kuvyaq); drift gill nets (kuvyaq); fishwheels (akalria); and occasionally rod and reel (manassuun). King salmon were taken with spears (aggsuq) at Kasheglok on the Holitna River up until recent years. By state regulation, set and drift gill nets may not exceed 50 fathoms in length and 45 meshes deep for gill nets with a mesh size smaller than 6 inches and 35 meshes deep for gill nets with larger than 6-inch mesh (Alaska Department of Fish and Game 1982b). Most Chuathbaluk and Sleetmute households combine two of these methods. River conditions influence methods used and fishing site locations.

During summer 1982 five fishwheels were operated by Chuathbaluk residents, while none were in use by Sleetmute residents. Fishwheels offer several advantages. It is a very productive method for harvesting salmon for households desiring large quantities of fish. Materials used in fishwheel construction are relatively inexpensive. The cost of constructing a medium-size fishwheel is estimated by local informants to be about \$200. A well-maintained fishwheel is reported to last about five years. Fishwheels catch all salmon species, so a household need not invest in several different sizes of gill net. Also, a relatively small amount of gasoline is consumed in the fishing process. While fishwheels require an initial investment of time and effort in construction, they require relatively little time and effort to maintain throughout the fishing season, unless floating debris interferes with them in the water and breaks a basket. Like set nets, they catch fish without requiring the continual presence of the fishermen.

Fishwheels are made with frames constructed from 2 X 2's, 2 X 4's, spruce poles, or a similar material. Wood-framed baskets are covered with chicken wire. The wheel rotates on a log and rests on a floating log raft. The baskets may average approximately 6 feet long and 4 feet wide, with a wheel diameter of approximately 10 to 12 feet. Fishwheels are typically placed within 15 feet of shore. Underwater fences running from the shore out to the fishwheel aid in its effectiveness by guiding fish from the riverbank into the basket. These are constructed on the downriver side of the fishwheel by attaching chicken-wire to a series of wooden poles that have been driven into the river bottom from the shore out to the fishwheel, perpendicular to the shore.

A favorable fishwheel site is one which has deep water close to shore, a strong current, and no underwater stumps or other wooded debris. Individuals currently place fishwheels in front of or across from their fish camp sites in locations exhibiting favorable characteristics. Local respondents stated that traditionally, individuals used fishwheel sites which they were recognized as having tenure over throughout their lifetimes. A similar system of tenure over fish camp sites was in effect during 1982 among those households who continued to use fishwheels. Fishwheels were often moved from one side of the river to the other, according to the location of the strongest salmon runs and river characteristics.

Local residents report that from the early 1930s until approximately 1965, fishwheels were in use at virtually every bend in the central portion of the Kuskokwim River. Some households maintained two fishwheels simultaneously. Informants gave several explanations for the decline in popularity of fishwheels. Some stated that few good fishwheel sites currently exist, due to the amount of debris strewn on the river bottom. Some stated that they are difficult to construct and move around if fishing sites must be moved during the fishing season. Some individuals correlated the decline in fishwheel use with the decline in dog team travel. Fishwheels are capable of catching several hundred fish daily. Because most households no longer need to catch, process, and store dry fish to be used as dog food, they have no need for a fishing technology as productive as the fishwheel. As will be discussed later, Chuathbaluk residents overall exert a more intensive salmon harvest effort than Sleetmute residents, which may account for

the persistence of some fishwheels in Chuathbaluk and the lack of fishwheels in Sleetmute. Those households using fishwheels in Chuathbaluk maintain fish camps throughout the summer. Only one Sleetmute household maintained a summer fish camp.

Between 5-inch and 6-inch stretch mesh nets 25 to 35 fathoms in length are commonly used for harvesting red, chum, and silver salmon. Nets with 8 1/2-inch mesh size and from 25 to 35 fathoms in length are typically used for king salmon. Most drift nets are 45 meshes deep. Set nets and drift nets are both used for all salmon species. Set and drift gill nets are either hung on float lines by the individuals using them or directly purchased or ordered pre-hung through Anchorage suppliers. A net reportedly has an average life of two to three years.

Set net sites are commonly located in eddies and at the mouth of sloughs and silty water streams. Some set net sites have been passed along kinship lines from one generation to another. Specific individuals are therefore recognized as having tenure over these sites. Other set net sites are used by a variety of individuals, with the understanding that no one will place a net too close to the location of where another person has already put a net. These sites are often equally as productive as those over which other individuals have tenure. Set nets are usually placed within one mile of where the fish are cut and dried and are checked once a day. High water, causing an abundance of debris to float in the river, prevents individuals from setting their nets, as the debris gets caught in nets and tears them.

A favorable drifting site is a straight, relatively shallow stretch of river close to shore and without underwater snags. These

areas often occur by islands. Salmon tend to swim close to shore, according to local accounts. The shallow water allows the net to pass close to the river bottom making it more difficult for fish to swim under the net. Drifting sites sometimes vary depending on the desired species of salmon. One Sleetmute respondent stated that different salmon species favor different travel routes and therefore can be most productively harvested in different locations along the river. Access to drifting sites is not limited to particular individuals or kinship groups. Most people drift within a mile or two of where they cut and dry the fish, although they will travel further if there are reports of strong runs in specific locations. For instance, Chuathbaluk fishers may travel to the mouth of the Aniak River where salmon congregate prior to their run up the river. Drifting often takes place at night when fish reportedly swim closer to the water surface and can be intercepted more readily by a drifting net. Kuskokwim waters also tend to be calmer at night. The number of drifts and length of time individuals drift during a day vary according to fishing success. Most fishers try from two to four drifts lasting a total of two to three hours.

Drift and set nets allow households to fish more selectively. They can target species by using a desired mesh size, typically 8 1/2 inches for kings and between 5 and 6 inches for red, silver, and chum salmon. Households having difficulty in scheduling fishing activities around summer jobs and other activities can control the timing and quantity of salmon harvest by using drift and set nets more easily than would be possible with the use of a fishwheel. The regularity of fishwheel fishing demands a time commitment from fish harvesters and

processors that is predictable and reliable. The changing emphasis in fishing technologies from fishwheels to gill nets may be reflective of a complex set of variables including many of those discussed here.

The fishwheel, set net, drift net, fish camp, and single-family settlement sites used by Chuathbaluk residents during 1982 are shown in Figure 17. Set net, drift net, and single-family settlement sites used by Sleetmute residents are depicted in Figure 18. These figures show that fishing sites are located along the Kuskokwim both upriver and downriver from the winter villages. Fishing sites used by Chuathbaluk residents in 1982 span approximately 55 river miles. Those used by Sleetmute residents in 1982 span approximately 15 river miles. The distribution of fishing sites can be correlated with the distribution of fish processing sites, including fish camps and single family settlements, as indicated in Figures 17 and 18. Drifting sites mostly occur along islands. Set net sites are typically located by the mouths of sloughs.

SUMMER SETTLEMENT PATTERNS--THE FISH CAMP (NEQLIVIK; NEQSURCURVIK)

Historic Use

As previously stated, in aboriginal times most central Kuskokwim River residents moved out of their winter villages during the salmon runs to summer fish camps which were scattered along riverbanks and sloughs from which they conducted salmon fishing activities. These fish camps were within an hour or two of travel by canoe from the

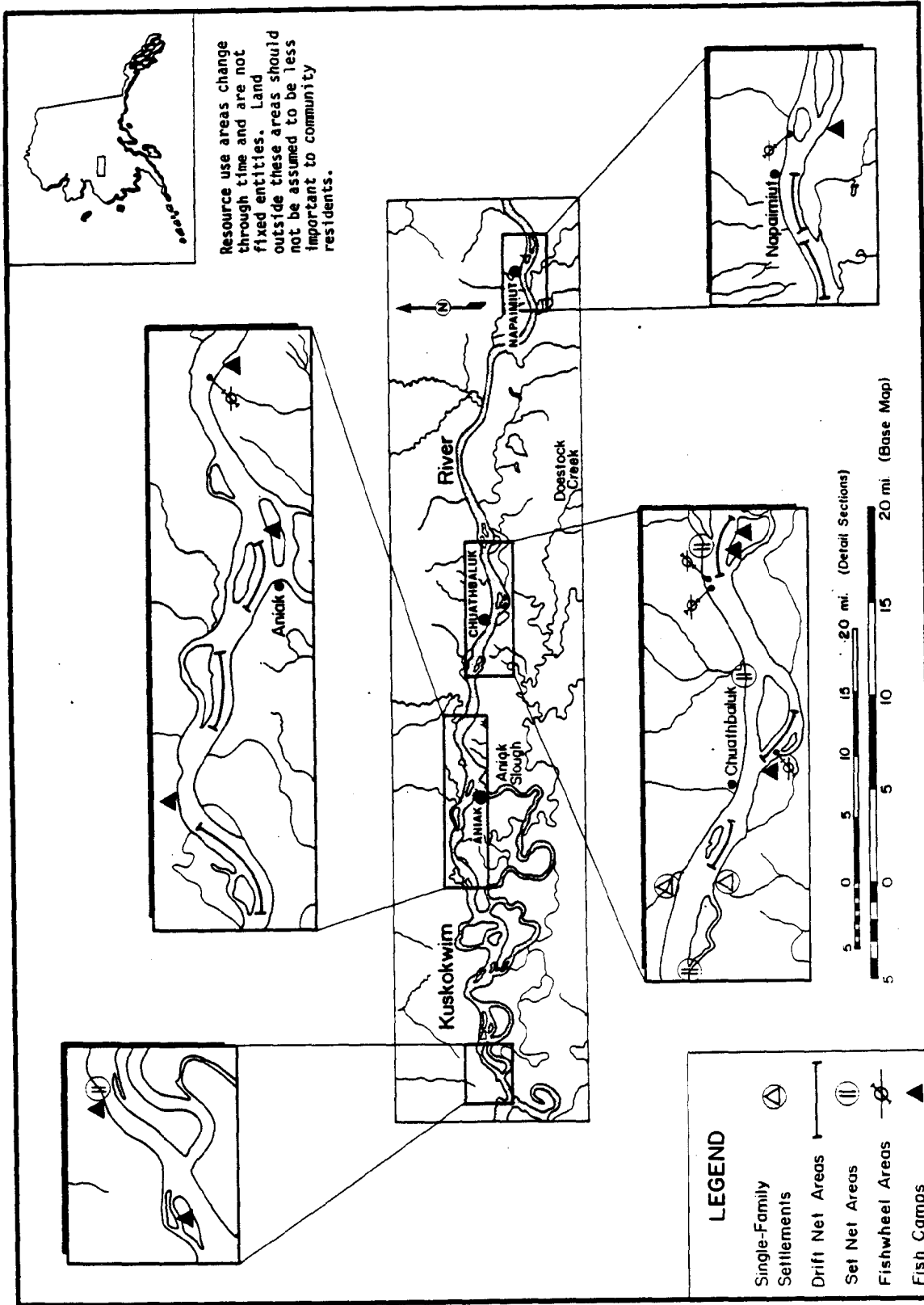


Fig. 17. Fishwheel, set net, drift net, fish camp, and single-family settlement sites used by Chuathbaluk residents during 1982.

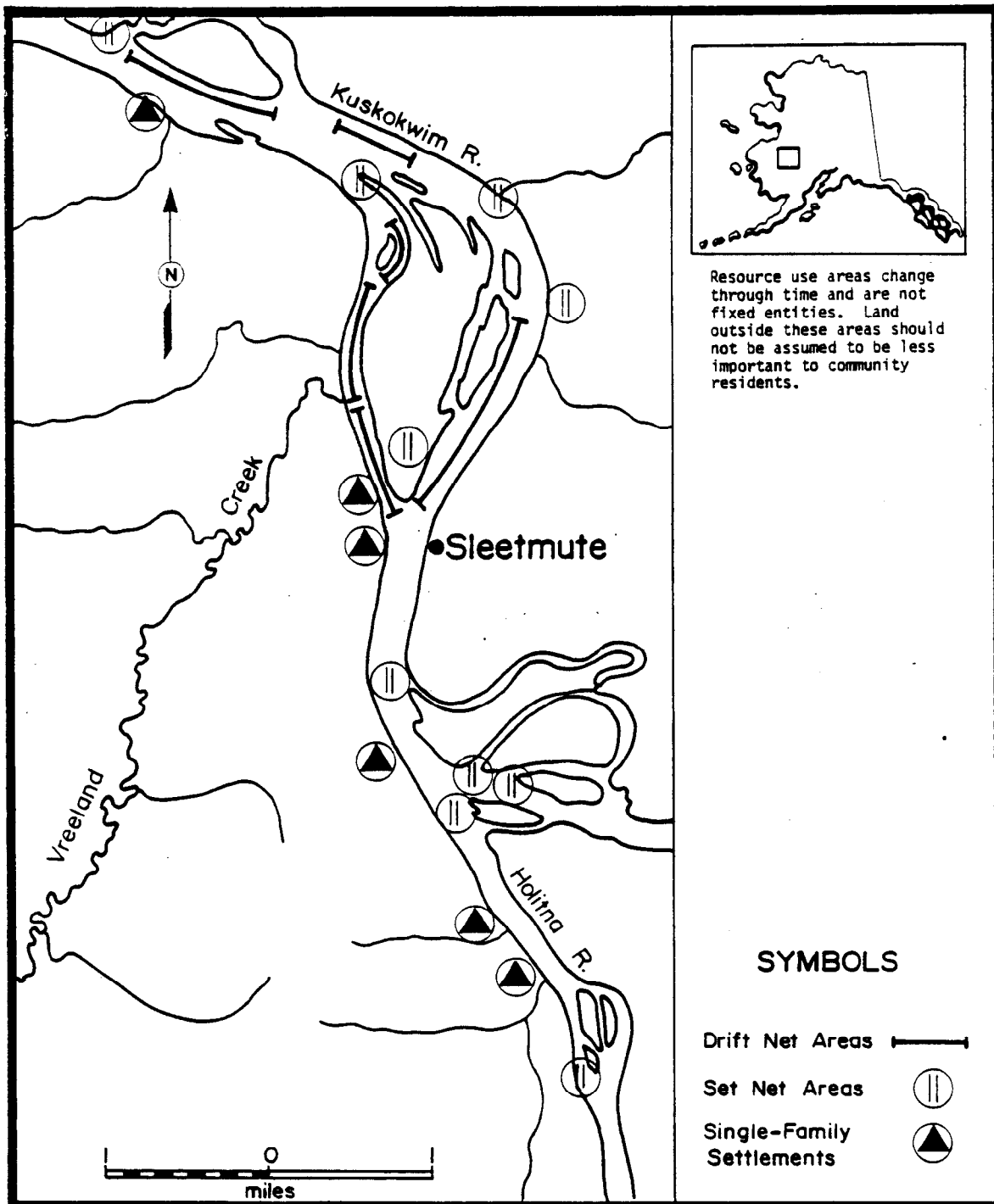


Fig. 18. Set net, drift net, and single-family settlement sites used by Sleetmute residents during 1982.

winter village and were closer to the resident village than to the neighboring villages unless close kinship ties prevailed in the latter village (Maddox 1975). Oswalt (1978) gives a general description of the fishing patterns which occurred in the central Kuskokwim area. Fish camps were located along the river in places where shallow water ran over a gravel bottom. Weirs were constructed across these channels with fishtraps placed at intervals for catching salmon, whitefish, and pike. Fishtraps (taluyaq) were also set in narrow clearwater streams that flowed from lakes into sloughs and rivers. Households returned to the winter village at the end of fishing season and cached their supply of dry fish. Those families that remained in the winter village to fish for salmon moved into temporary structures. These structures were of pole frame construction covered with spruce and birch bark and bundles of grass. They were round, about ten feet in diameter, and had a hole in the roof by which smoke from the indoor fireplace could escape.

Contemporary Use

The occupation of summer fish camps has persisted into the present time along the central Kuskokwim. Local informants claim that fish camps were numerous in this region throughout the mid-1960s. This is evidenced by the number of abandoned fish camp sites that can be observed along the river banks. Since that time more households have begun to fish from a winter village base. During the summer of 1982, one Sleetmute household moved to a summer fish camp, six households

fished from single family settlements, and seven households fished from the winter village. In Chuathbaluk, nine households moved to summer fish camps, two households fished from single family settlements, and six households fished from the village or helped out at one of the fish camps during 1982. Single-family settlements are established sites which households occupy year-round that are located across from or within a few miles up or down river of the winter village. These include permanent structures used in processing salmon and enable the household to fish from the year-round habitation site.

Fish Camp Sites

Fish camp site selection in Chuathbaluk and Sleetmute is based on a variety of ecological and cultural determinants. Fish camps are typically within ten miles of the winter village. Figure 17 shows locations of the fish camps used by Chuathbaluk residents during the summer of 1982. One fish camp used by a Sleetmute household during 1982 was located approximately seven miles upriver from the winter villages.

The following physical characteristics were described by local informants as being important in fish camp site selection and were indicated by the physical characteristics of fish camps observed in 1982. Close proximity to good sites for fishwheels, set nets, and/or drift nets is a primary factor influencing locations of fish camps. A high, level riverbank conducive to building fish camp facilities and providing protection to permanent structures against damage by spring

floods is desirable. A good site for boat mooring is desirable. A nearby or surrounding stand of cottonwood trees which can be used as firewood for smoking salmon and close proximity to a small stream that supplies the household with fresh water and that may create an eddy at its confluence are also favorable characteristics.

Many fish camps used in 1982 had been in use by the same household for many years and some had been held within the family line. Prolonged use of a fish camp site by one household group and the presence of permanent structures indicate that a particular group holds tenure over the fish camp site. This group uses the site every year. Some individuals and households that do not establish their own fish camp sites share fish camps used by other households with whom they have kinship ties or become part of an established production unit in exchange for salmon products. Fish camp site selection is also influenced by household economic strategies. Households having members who maintain jobs in the winter village throughout the summer and who wish to harvest and process salmon use fish camps that are close to the winter village, enabling them to commute between locations. Some households choose fish camp sites close to a village in order to have easy access to supplies.

Maddox (1975) noted an additional characteristic influencing fish camp site selection in the central Kuskokwim. He states that a good fish camp site is one which provides access to other wild resources which are harvested throughout the summer months, including berries, greens, broad and humpback whitefish, grayling, and arctic char. Broad and humpback whitefish, which are most effectively harvested

using set nets, are important resources to the Kusquvagmiut (Maddox 1975). Set net sites are typically located in eddies occurring at the tips of islands and sandbars and at the mouths of creeks and sloughs. The two major determinants of whitefish fish camp site selection in the central Kuskokwim, according to Maddox (1975), are a stretch of river favorable to fishwheel or drift net fishing and the close proximity of this area to an eddy or slough in which whitefish can be netted. During 1982 whitefish harvest took place primarily during late summer and early fall when whitefish species are most abundant. Many households returned from fish camp before the whitefish runs. Most households were eager to harvest whitefish in late August and September, and some maintained their fish camps until an adequate number had been harvested in set nets or fishwheels. While good access to set net sites for harvesting whitefish may be a characteristic influencing historic fish camp site selection, it was not observed to be a major determinant in Chuathbaluk or Sleetmute during 1982.

Fish Camp Facilities

The types of facilities and buildings at fish camps reflect the length of occupancy. Fish camps that have been in use for a few years may have temporary structures which are set up seasonally, while long-term fish camp sites may have several permanent structures. Fish camps typically include a smokehouse (puyurcivik), fish drying racks (agarcivik), a floating "fishpond" (essegvik) to hold the fish,

described below, a fish cutting table, a household dwelling such as cabin, tent, or house, an outhouse, and perhaps a steambath or a cache.

According to local informants, in the past, smokehouses were built to last one year. They were of pole construction with sidings made from large sheets of spruce bark. The siding lasted for one season and had to be reapplied each year. Temporary smokehouses are currently constructed using pole frames hung with plastic tarps or Visqueen. Permanent smokehouses used by Chuathbaluk residents are typically built from planed spruce planks manufactured at the local sawmill that are placed approximately one inch apart from one another for siding which does not create a solid wall. Sleetmute residents usually make siding from corrugated sheet metal, but sometimes use a combination of corrugated sheet metal, scrap wood, and spruce planks. The average smokehouse measures 16 feet by 20 feet.

Racks for sun-drying salmon are made from pairs of spruce timbers that are raised parallel to one another approximately five feet off the ground. They are located on the beach or on top of the river bank in an open area exposed to sunshine and wind. "Fishponds" are floating log rafts with a chickenwire basket attached and suspended from the open, square center. The raft is tied to the bank so that the basket is under water. Salmon are held in the basket until they are cut. A table for cutting salmon is located either on the beach near the holding device, or on the fishpond itself, which has a platform large enough to support a table.

Household dwellings at the fish camp site can be canvas wall tents, nylon camping tents, cabins, or a combination of these. Some

fish camps have temporary or permanent steambath houses. Households fishing from the winter village typically have permanent smokehouses and drying racks adjacent to their dwellings. They set up fishponds and cutting tables in front of the village during the salmon season.

SALMON PROCESSING

In Chuathbaluk and Sleetmute, salmon is eaten fresh and processed through drying and smoking, jarring, salting, and pickling, as will be discussed below. Several parts of the fish are utilized. Processing is done by a group of persons usually related through kinship.

Dried and Smoked Salmon

The primary salmon product prepared by residents of Chuathbaluk and Sleetmute is dried and smoked salmon. Fish are preserved by drying and smoking to last throughout the following year. Because salmon have a decreased fat content by the time they reach the central Kuskokwim River, they are less likely to mold and keep fairly well in dried condition until the following salmon season. The following description of salmon processing for the production of dried, smoked fish is based on observation.

Salmon obtained from fishwheels or gill nets are taken by boat to the village or fish camp and placed in the center of a "fishpond" where they are kept cool by the river water. They are typically left in the fishpond overnight and allowed to "soften," making them easier to cut

the following day. A gaff hook is used to lift salmon out of the fish-pond. They are placed on a cutting table and typically cut from a standing position with the use of an uluq (woman's knife).

Each species of salmon is cut in a different way, depending on the particular method that allows that species to dry most effectively and the way the individual prefers to eat the fish. Large king salmon are typically processed as "blanket fish" (inglupiaq) (Fig. 19) or "strips" (taryiqitat). An average of eight strips can be obtained from one king salmon. Small king, red, silver, and some chum salmon are typically cut as "flat fish" (essepiaq) (Fig. 20). Red salmon are often cut as "split fish" (qupanglak) which do not become as dry as flat fish. Chum salmon that are not intended for human consumption are usually cut as "dog fish" (Fig. 21). "Blanket fish," "strips," "flat fish," and "split fish" are collectively referred to as "eating fish." These provide the household supply of dried salmon for human consumption for the coming year. "Dog fish" are used as dog food, as are king salmon backbones which have been removed, cut, and dried (Fig. 22) and backbones (ingluruaq) from other species of salmon that are cut differently from king salmon backbones (Fig. 23). Salmon eggs and heads are also saved and dried, boiled, or salted (heads only) for human consumption.

Cut salmon are often soaked in a brine solution for a few minutes to add flavor to the fish and to deter flies. The fish are then hung over spruce poles which average ten feet in length and undergo an initial drying period lasting about two days. Salmon are either dried by the sun on the outdoor fishrack or hung in the smokehouse close to

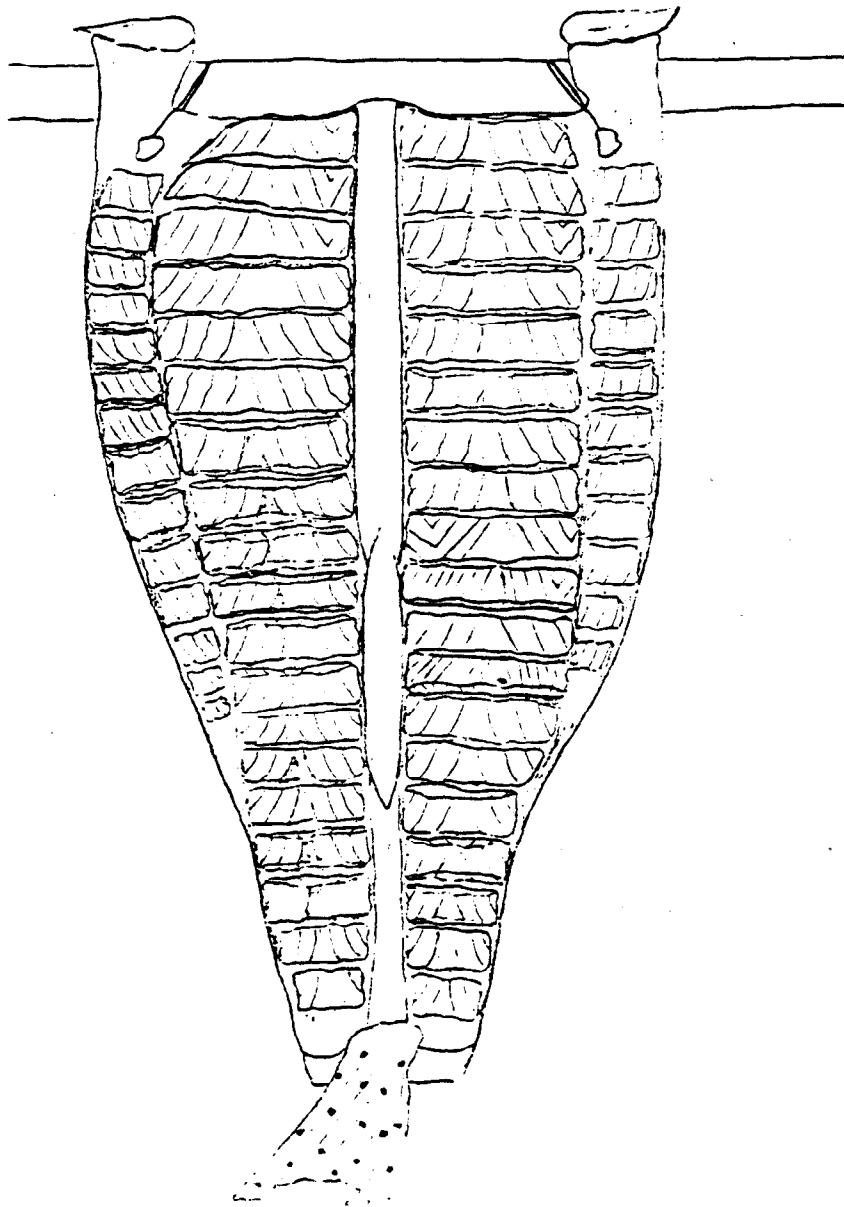


Fig. 19. King salmon "blanket fish."

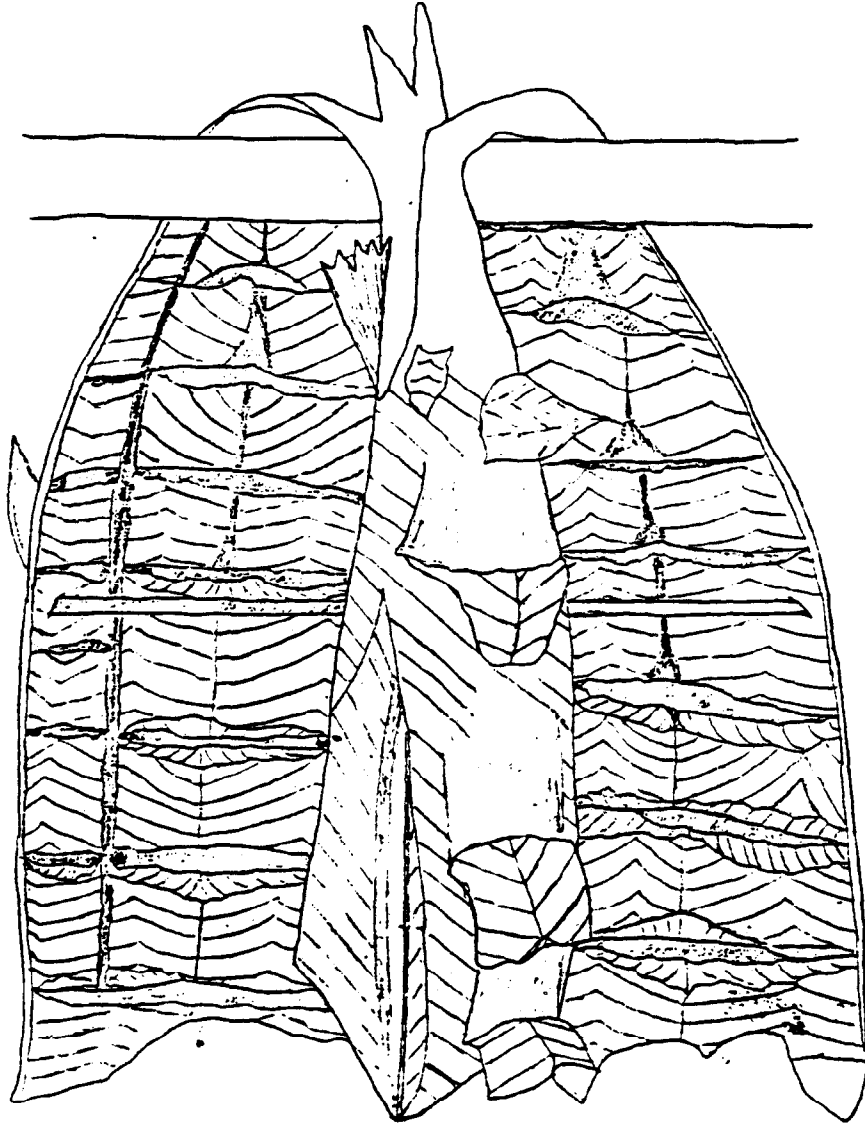


Fig. 20. "Flat fish."

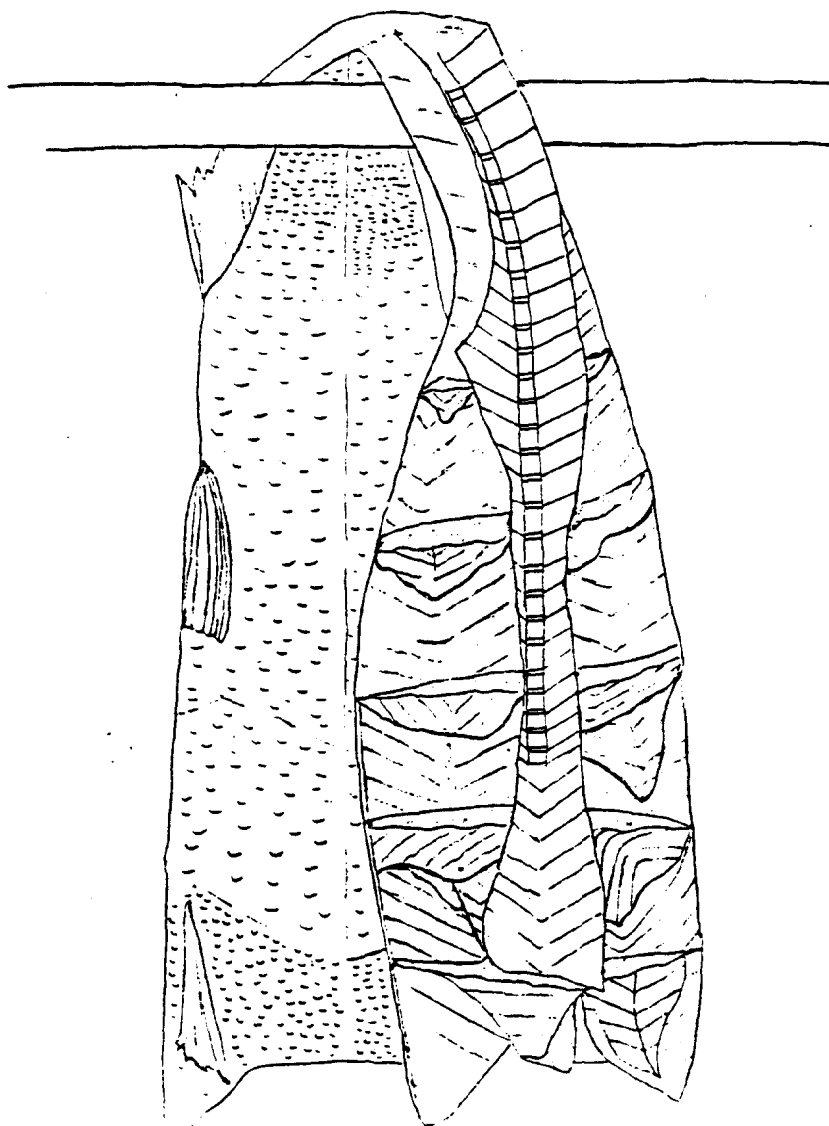


Fig. 21. "Dog fish."

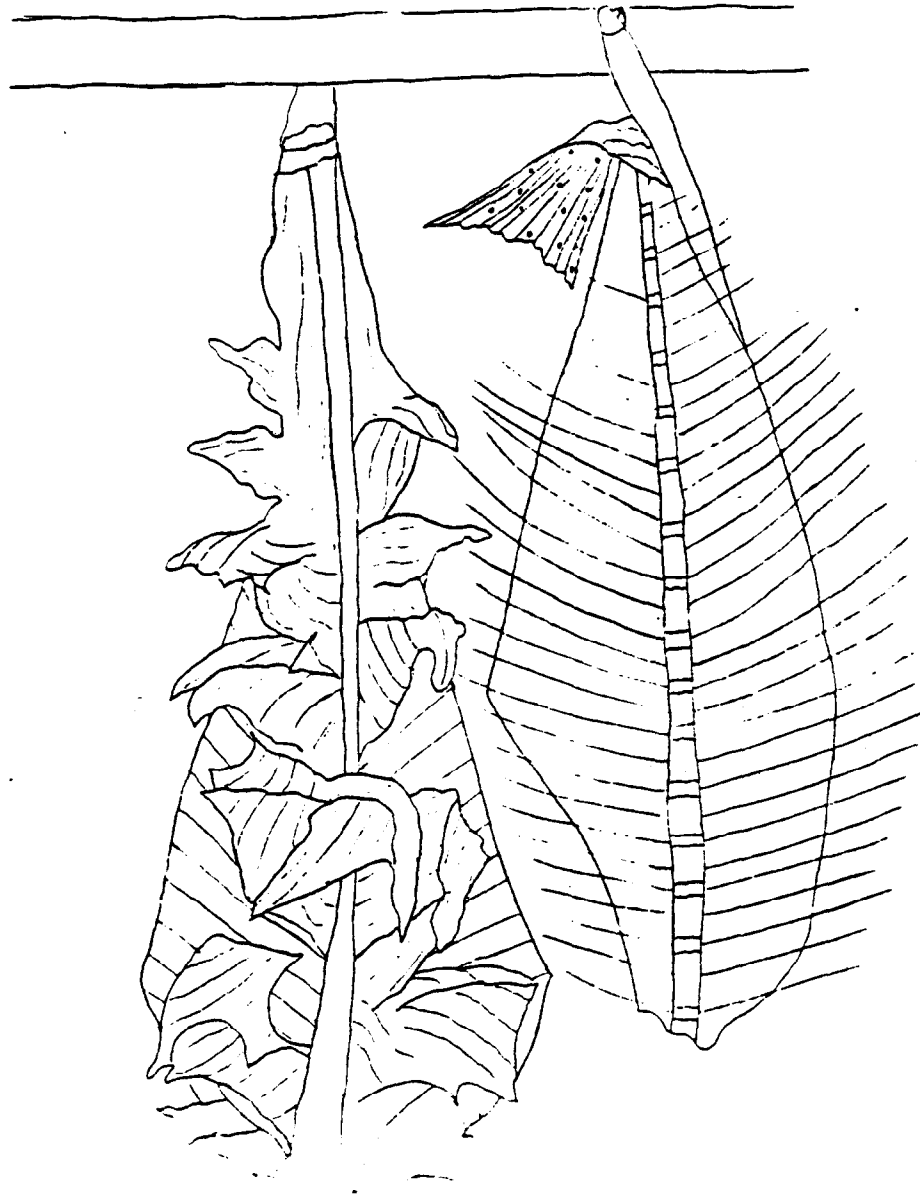


Fig. 22. King salmon backbones.

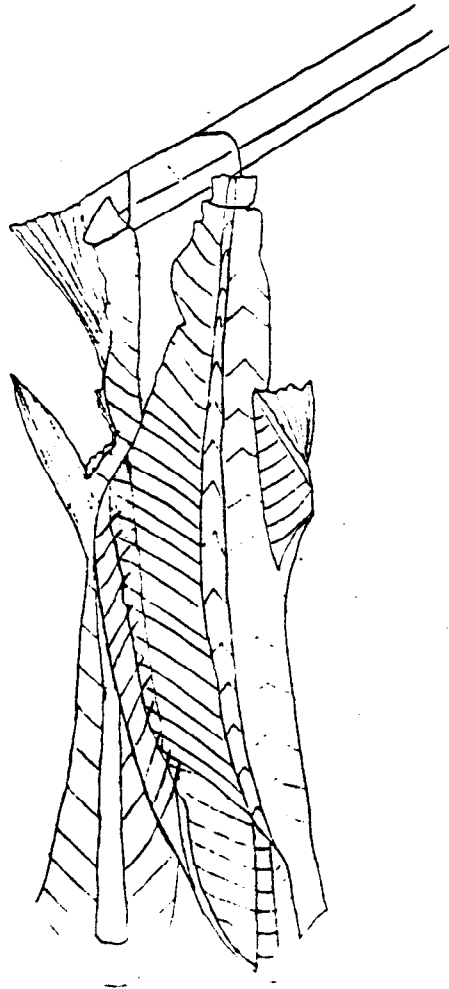


Fig. 23. Red and silver salmon backbones.

the heat source. The former method prevails in Chuathbaluk, while the latter prevails in Sleetmute. After the initial drying period, the salmon poles are placed on racks in the smokehouse to be dried and smoked slowly over the following months. The average smokehouse has three to four racks. The first fish of the season are hung on the top rack. As the season progresses and the upper racks fill, poles of fish are placed on lower racks. The salmon remain in the smokehouse throughout the summer. The fish at the top of the smokehouse receive a small amount of smoke over a long period of time, while the fish on the lower racks receive a greater amount of smoke over a shorter period of time. Once the fish are dry they are "crowded," 40 fish per pole, at the top of the smokehouse to provide room for more fish to smoke.

Salmon are smoked in the smokehouse with the use of a "smudge pot" (puyuq) in which a fire is built. The smudge pot serves two purposes. In warm, sunny weather, salmon in the smokehouse dry by themselves, but flies swarm around the fish and lay eggs, producing maggots that eat the flesh and spoil the fish. Under these conditions the smudge pot is prepared to produce smoke which deters flies and causes maggots to fall off of the hanging fish. In damp, rainy weather when flies are not a problem the smudge pot is prepared with a burning fire that produces heat instead of smoke, drying the fish and preventing mold and rotting. Each smokehouse has two or three smudge pots which are distributed evenly below the fish and are constructed from recycled 55-gallon drums that are laid on their sides and have the upper half removed. A fire is built in the drum from which smoke and heat freely rise. A piece of sheet metal may be laid over the drum to spread out

the smoke and keep a low, even heat. The smudge pot must be carefully attended and maintained daily throughout the summer until the salmon dry, a process taking approximately two months.

Individuals have varying preferences for the type of wood they use in the smudge pot and the resulting flavor it produces in the salmon. Dry and green cottonwood have the most widespread use. Dry cottonwood is used for heat production on rainy days, and green cottonwood is used for slow combustion, producing smoke on warm, sunny days. Many individuals are of the opinion that spruce has too much pitch and flavors salmon poorly. Alder and birch may be used if no cottonwood is available. Wood and bark are the only materials used in the smudge pot, as paper products produce a peculiar flavor in the fish.

Once salmon are dry, they may remain hanging in fish camp smokehouses through mid-October until being gathered and taken back to the village to be cached. Fish may remain hanging in village smokehouses throughout the winter. When dog teams were in use and large quantities of salmon were dried for dog food, bundles of 40 fish were produced and often sold. Dried salmon are seldom bundled in this fashion now, but are stored in cardboard boxes or stacked in the household cache.

Dried salmon is eaten at meals throughout the winter as a regular protein supplement or table item (like bread) or as a snack. It is especially valued as a protein source on extended hunting, berry-picking, and trapping trips when individuals plan to camp for several nights. The oil in dried salmon serves as a valued source of fuel for producing body heat. Many local informants stated that eating dried

fish for breakfast in winter months enabled them to remain outdoors all day on the trapline or gathering wood without feeling cold or hungry. Dried salmon becomes less oily as the year progresses and may later be eaten with seal oil or bear tallow.

Other Salmon Products

Dried fish is one of many salmon products. Fresh salmon is prepared in a variety of ways, as are heads and roe (meluk). Other preservation methods include jarring, salting, and pickling.

Many households jar one or two cases containing 12 one-quart jars of red or silver salmon through the canning process. King salmon are considered too oily to jar. Fish are typically filleted and cut in small pieces. These are tightly packed into a jar with a teaspoon of salt and cooked at 15 pounds of pressure for 1 1/2 hours. Jarred salmon (pangkaluk) lasts throughout the following year.

Many households prepare one or two 25-pound butter kegs of salted fish (sulunaq). King salmon are preferred for processing as salted fish, although red and silver salmon are also used. A layer of rock salt is placed on the bottom of the wooden barrel. A layer of fish cut in steaks or filleted is then placed in the barrel, flesh side down. Layers of rock salt and fish, flesh side up, are then alternately placed in the barrel. Fish heads are also salted. They can be prepared in a separate barrel, or in alternate layers with the salmon steaks or fillets. The barrel is covered with a scrap of plywood. Salted fish usually keeps throughout the year. The fish is removed

from the barrel and soaked in water for a day or two before being eaten. Salted fish can be eaten raw, boiled, or mixed with rice and onions and baked in a crust to become a dish that is referred to as "Russian pie."

Pickled salmon is made from pieces of salted or fresh fish. The salmon is placed in a jar with onions, jarred hot peppers, and other spicy vegetables and their juice, vinegar, and pickling spices. The jars are sealed and the salmon and vegetables are preserved for long-term use.

Fresh salmon is eaten daily throughout the summer. It is baked, boiled, fried, and used in soups. Salmon roe and hearts are also used in soups. According to local informants, salmon eggs were traditionally saved and stored in caches in the ground to be eaten throughout the winter as a food source valued for internal heat production. Salmon eggs are currently dried and fed to dogs. Salmon heads and tails are dried and can be fed to dogs or eaten "half-dried," as can the rest of the fish. Salmon that has been dried and smoked until it is about half dry is boiled to make a popular dish termed egamaarlluk. The viscera from salmon are typically fed to dogs.

Salmon heads are used in preparing a dessert specialty referred to as "stinkheads" or uqsunaaq. The heads from king, chum, or red salmon are buried in a hole in the ground that is lined with grass or plastic and covered. The fish heads are allowed to soften and spoil for approximately two weeks, at which time they are dug up, rinsed, and eaten in their entirety.

Methods used for preparing and preserving salmon are essentially the same in Chuathbaluk and Sleetmute. Households exhibit variations in processing techniques according to individual preferences. The standard methods used for producing dried and smoked, jarred, salted, pickled, and fresh salmon are the same, yet no two households produce salmon that is identical in taste.

Production Units

Production units involved in the harvest and processing of dried and smoked salmon include members from one or more household groups. Two households comprising an extended family group sometimes cooperate in salmon production. This practice is more common in Chuathbaluk than in Sleetmute. The roles defined in salmon processing are age- and sex-related. Production units observed in Chuathbaluk and Sleetmute are similar in nature.

Male roles typically include salmon harvest, maintenance of fishing gear, cutting firewood to be used in the smudge pot, carrying buckets of cut fish to drying racks, hanging poles of drying fish on smokehouse racks, and monitoring the smudge pot. Males build and install fishwheels and move them if necessary; hang or order gill nets; set nets; drift for salmon; repair nets; and maintain the boat and motor in working condition. Males deliver harvested salmon to household fishponds. Sons begin to accompany their fathers on fishing trips in early adolescence and learn to fish by assisting those who are knowledgeable. Sons assist their father in drifting, which is

most easily accomplished by two people. By the age of 15 a son may be required to be responsible for checking set nets and drifting.

Female roles typically include cutting fish, hanging it on poles for drying, and assisting in monitoring the smudge pot. Daughters learn to cut fish by imitating their mothers. By the age of 12 a female has probably experimented with cutting "dog fish." These attempts are sporadic at first, but gradually become more serious and persistent. By the age of 20 a female is usually adept at cutting fish. Females are also responsible for preparing fresh salmon, salted fish, pickled salmon, and jarred salmon, though males sometimes assist in the preparation process.

Sex roles in salmon processing are not rigidly adhered to. Males sometimes cut fish and females occasionally assist in salmon harvest. Children of both sexes assist in a variety of activities, independent of sex-related roles. While males and females occasionally cross the boundaries of age- and sex-related roles, a household lacking a male or female household head to take primary responsibility for harvesting or cutting salmon may have a dramatically altered pattern of salmon harvest, and may not process salmon at all.

Case Studies of Salmon Fishing Strategies

The following case studies of fish camp groups provide examples of production units involved in the harvest and processing of dried and smoked salmon. The case studies presented here provide examples of salmon fishing strategies used by households from Chuathbaluk and

Sleetmute during summer 1982. These data were gathered through observation and informal interview. Salmon fishing patterns are discussed within the context of seasonal settlement patterns of select households. Two cases are portrayed for each study community.

Case 1. (Sleetmute)

This household, consisting of a 68-year-old man, his 62-year-old wife, a son, age 25, and an adopted daughter, age 16, maintained the sole fish camp that was operative at Sleetmute during 1982. The seasonal settlement patterns of this household have varied over the past ten years. The household maintains a dwelling in the village of Sleetmute and a dwelling on the Holitna River. During some years the household remains at their cabin on the Holitna River year-round, harvesting and processing salmon at this location. In other years, the household has overwintered on the Holitna River and returned to Sleetmute following breakup to harvest and process salmon from the village or at a fish camp site along the Kuskokwim River. During 1981 and 1982 the household overwintered at their cabin in Sleetmute and settled at a fish camp site on an island approximately seven miles upriver from Sleetmute during the summer. This was the third summer the present fish camp site was in use. Its location is opposite an old

fish camp site used annually by this household for fish-wheel fishing in the 1960s and earlier.

Temporary structures located at the fish camp site reflect the short-term use it has received. These include a 12-foot by 14-foot canvas wall tent used by the household members as a common dwelling quarters, a "pup" tent in which the son sleeps when present at camp, a makeshift steambath house constructed from scrap wood and tarps, and two smokehouses -- one of pole construction covered by plastic tarps, and one having planed spruce plank siding with a plastic tarp serving as roof.

In 1982, this household arrived at fish camp in early July. A set net placed in a channel behind the island served as the primary fishing method used by this household. The household chose not to drift for salmon because rapid river currents make drifting dangerous when nets catch on underwater snags. The father was primarily responsible for fishing as the son stayed at fish camp periodically. The father, an elderly man, did not wish to risk drifting alone. During strong salmon runs the harvest averaged 50 fish per day, although 15 fish per day was the norm. This household harvested red, chum, and silver salmon. The fish camp was maintained by the husband, wife, and daughter, who took trips to Sleetmute once or twice a week to obtain

groceries and mail. The son spent the summer in Sleetmute, but typically visited his family once a week to assist with fish camp chores. The son's first cousin (father's brother's son) occasionally accompanied him to help out at the fish camp. The daughter assisted with fish-cutting and fish camp chores.

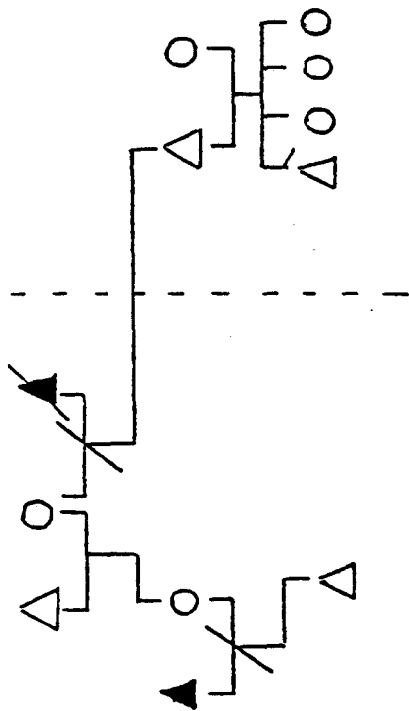
This household remained at their fish camp through mid-September in order to harvest whitefish during the fall runs. Some dried salmon stored by this household was distributed to sons and daughters residing in Anchorage.

Case 2. (Sleetmute)

Two households residing year-round in Sleetmute cooperated in harvesting and processing dried salmon from the village between June and late August. These households have ties of kinship (Fig. 24). The 69-year-old male in Household 1 has a smokehouse in the village and used his boat, motor, and nets to harvest salmon by drifting. He enlisted the assistance of his 47-year-old stepson from Household 2 in drifting. The stepson also assisted in wood harvest and in monitoring the smudge pot. The son did not have a smokehouse, boat motor, or nets. The mother in Household 1 cut most of the fish, with some help from her daughter and her son's wife. The dried fish were stored in the

Household 1

Household 2










-  = male
-  = female
-  = deceased
-  = non-participant
-  = married
-  = divorced
-  = household boundaries

Fig. 24. Salmon production unit, Sleetmute.

smokehouse belong ing to Household 1. Fish were given to Household 2 as payment in exchange for labor.

Case 3. (Chuathbaluk)

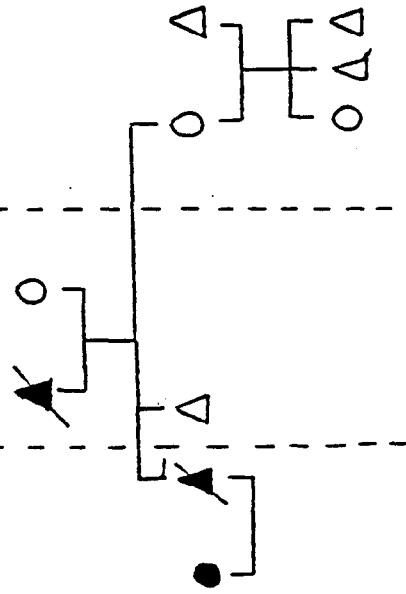
A Chuathbaluk household and an Aniak household shared a fish camp site located three miles below Aniak in 1982. These households have kinship ties demonstrated by Figure 25. The fish camp site was originally used by a son of the mother in Household 1. When he died his wife no longer wished to use the fish camp. The 68-year-old mother, whose husband had also died, continued to harvest and process dried salmon with her 22-year-old daughter's household from Aniak. This was the fourth year these households fished cooperatively. The households occupied the fish camp site between June and mid-September and resided in their respective winter villages throughout the rest of the year. The fish camp is composed of permanent structures, including a smokehouse, drying racks, dwelling, and outhouse.

The two households harvested salmon using a set net owned by the Aniak household and drift nets owned by the Chuathbaluk household which are also used by the mother for commercial fishing. A fishwheel was under construction by the son-in-law to be used the following summer. Both households owned boats and motors.

Household 1 Household 2

Chuathbaluk

Aniak



- △ = male
- = female
- ▲, ● = non-participant
- ⊘ = deceased
- ⊗ = married
- ⋮ = household boundaries

Fig. 25. Salmon production unit, Chuathbaluk and Aniak.

Salmon were harvested by the son and son-in-law, who was also responsible for harvesting firewood and maintaining the smudge pot. The mother and daughter cut fish. The son-in-law owns a dog team and was primarily responsible for harvesting and processing chum salmon to be used as dog food. Occasional trips were made to Chuathbaluk throughout the summer, but most supplies were obtained from Aniak. Members of each household engaged in part-time cash earning activities away from the fish camp. The mother fished commercially and the daughter ran the Aniak Public Library. Members of each household took turns overseeing the fish camp when members of the other household were away.

Dried fish remained in the fish camp smokehouse throughout the winter. Quantities were taken and stored at each household's cache in the winter village, as needed. The "dog fish" were used exclusively by the Aniak household. The eating fish were shared between the two households.

Case 4. (Chuathbaluk)

Two Chuathbaluk households having kinship ties and one non-kin related Aniak household maintained two neighboring fish camp sites on opposite riverbanks at Napaimute and formed a single production unit during 1982 (Fig. 26). A 70-year-old man and his wife, age 64,

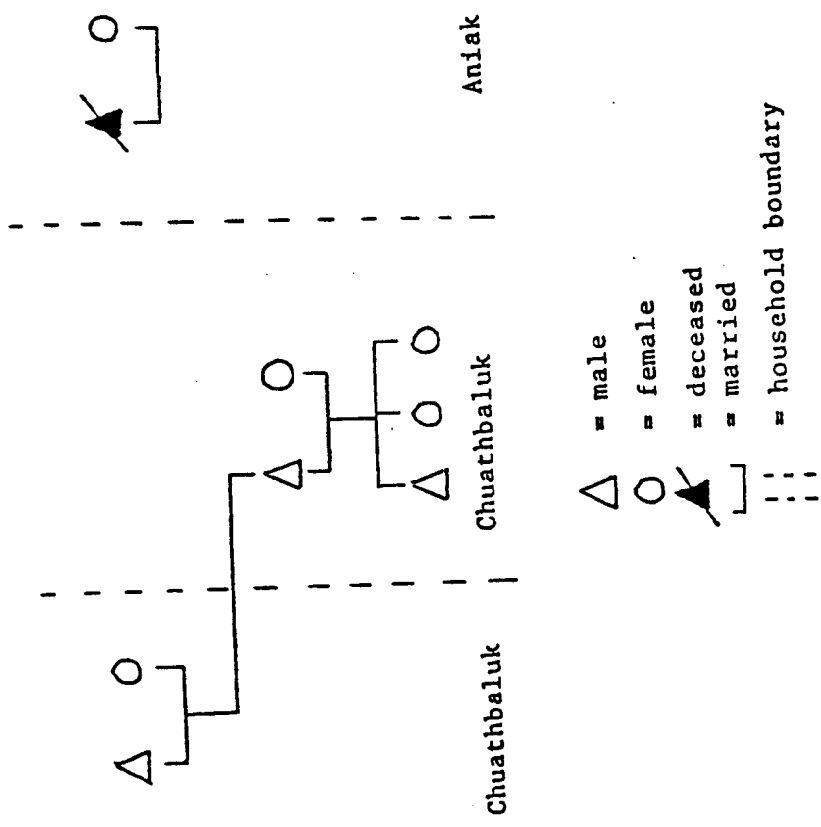


Fig. 26. Salmon production unit, Chuathbaluk and Aniak.

shared a fish camp site with their 37-year-old son and his household containing his 35-year-old wife and their two daughters and one son, ages 10, 11, and 15. This fish camp site had been in use by the man, a former resident of Napaimute, for approximately 30 years. His son had used the site for most of his life. The fish camp site contained two smokehouses, a permanent and a temporary dwelling, fish racks, an outhouse, and a garden. A widow from Aniak, age 68, also a former resident of Napaimute, continued to maintain a dwelling at the second site in which she resides during summer months in order to harvest and process fish. She also maintained a smokehouse, cache, fish racks, steambath house, and garden. This woman had a friendship relationship with the Chuathbaluk households and resided in Aniak between September and May. The Chuathbaluk households resided there throughout the rest of the year, though father and son maintained a temporary trapping camp in winter months.

During 1982 the Chuathbaluk households fished primarily with a fishwheel and the Aniak household fished with a set net. Drifting took place occasionally. Both Chuathbaluk households owned their own boats and motors and shared them for use in fishing activities. The fishwheel and drift nets were owned by the father's household. The woman from Aniak owned her own set net

and relied on the Chuathbaluk households for transportation. The son helped his father in harvesting salmon and wood. He also harvested salmon and wood for the Aniak woman. Father and son maintained the smudge pots. The son's wife assisted her mother-in-law and occasionally the Aniak woman in cutting fish. Their children performed chores for both households and occasionally assisted in salmon and wood harvest and in cutting fish. The son's household resided intermittently at his father's fish camp and at the Aniak woman's dwelling. All three households frequently shared meals. Trips were made to Chuathbaluk or Aniak once every few weeks for supplies. Dried salmon processed by the Chuathbaluk households was stored in the father's cache in the winter village and was shared by both households throughout the winter. The Aniak woman took her supply of fish to Aniak; however, dried salmon were distributed and exchanged between all three households.

Of the 15 Chuathbaluk households that harvested and processed salmon in 1982, 7 households were self-sufficient production units and the other 8 cooperated with other households. Cooperative production units were usually formed from two household groups, although one contained a third household from Aniak. Four sets of cooperative fishing groups comprising nine households were established in 1982.

In all cases but one, cooperative households focused on parent-offspring relationships. Three of these production units included parent-son households and one production unit had parent-daughter households. One production unit also included a non-kin related household. Of the 14 fishing households from Sleetmute, 8 fished independently as self-sufficient units and 6 formed 3 cooperative production units focused on parent-offspring or sibling relationships. One production unit included parent-daughter households, another parent-son households, and another the households of a brother and his married brother and unmarried sister. Salmon processing in Chuathbaluk and Sleetmute is undertaken by households who either fish independently or cooperate with other households with which they have kinship ties, most typically parent-offspring relationships.

DISTRIBUTION AND EXCHANGE

The distribution and exchange of fresh and dried salmon in central Kuskokwim communities was documented by Mason (1967) and is currently a common practice in Chuathbaluk and Sleetmute. Local informants stated that prior to the use of snowmachines, the commercial sale of dried fish to miners and other individuals traveling by dog team and requiring dog fish was widespread. Many local residents also traded bundles of dried fish for imported supplies obtained at local stores. Dried fish was sold or exchanged by households who produced a surplus (Mason 1967). Village households that neglected to process and store dried salmon often bought fish from these households (Mason 1967). The commercial

sale of dried salmon on local markets is currently conducted on a limited scale. The dried product sold was not dog fish, but dried fish for human consumption. In 1982 king salmon strips sold in Aniak stores and stores outside the state for \$15 per pound, and red salmon "split fish" sold for \$10 per pound.

The distribution and exchange of fresh and dried salmon among friends, relatives, and visitors, independent of monetary value standards, was, and continues to be, common in central Kuskokwim communities (Mason 1967). Mason (1967) reports that gifts of fresh salmon were common throughout the summer without expectations of reciprocity. In 1982 it was observed that in Sleetmute and Chuathbaluk, fresh salmon were commonly given as gifts to both friends and relatives who did not participate in salmon fishing. Individuals often were invited to take fish from the set nets or fishwheels of other individuals.

In the mid-1960s dried salmon was not given as freely as fresh salmon, due in part to its greater value from the labor invested in processing (Mason 1967). An expectation of reciprocity in the form of goods or labor typically accompanied gifts of dried salmon (Mason 1967). Similarly, in 1982 dried salmon was observed to be distributed less extensively than fresh salmon. Individuals who assisted other households at their summer fish camps received a share of the dried salmon in exchange for their labor. Cooperative fishing households often shared a common cache from which both households drew fish. Salmon was distributed to non-fishing households by fishing households with which they shared kinship ties. Salmon was also exchanged between two fishing households with kinship ties. Dried salmon was freely offered

to household visitors and distributed to extended family groups on camping trips. Dried salmon also was given to close kin relations such as brothers, sisters, sons, daughters, and grandchildren residing outside of the central Kuskokwim region. It was observed that dried fish was given in exchange for favors or manual labor provided by other individuals. Dried fish was distributed community-wide during Russian Orthodox celebrations of weddings, Slavic, and 40-days feasts.

Figures 27 and 28 are examples of distribution networks from Chuathbaluk which demonstrate the distribution of dried salmon along kinship lines between both fishing and non-fishing households. In Figure 27, households 3, 4, and 5 produced dried salmon which was exchanged between themselves. Household 2 did not produce salmon, but received some from Household 1 and Household 3. Figure 28 shows distribution by a fishing household (no. 2) to the households of two of its sons (nos. 1 and 3), both of whom assisted the fishing household at their their fish camp periodically but did not process dried salmon themselves.

The four contexts in which salmon distribution takes place in the central Kuskokwim documented by Mason (1967), including commercial sale of fresh fish, commercial sale or trade of dried fish, distribution of fresh fish with no expectation of reciprocity, and distribution of dried fish with some expectation of reciprocity, continue to function in Chuathbaluk and Sleetmute. The distribution of dried salmon does not always occur with an expectation of reciprocity, however. Salmon distribution and exchange occurs both along and independent of kinship lines.

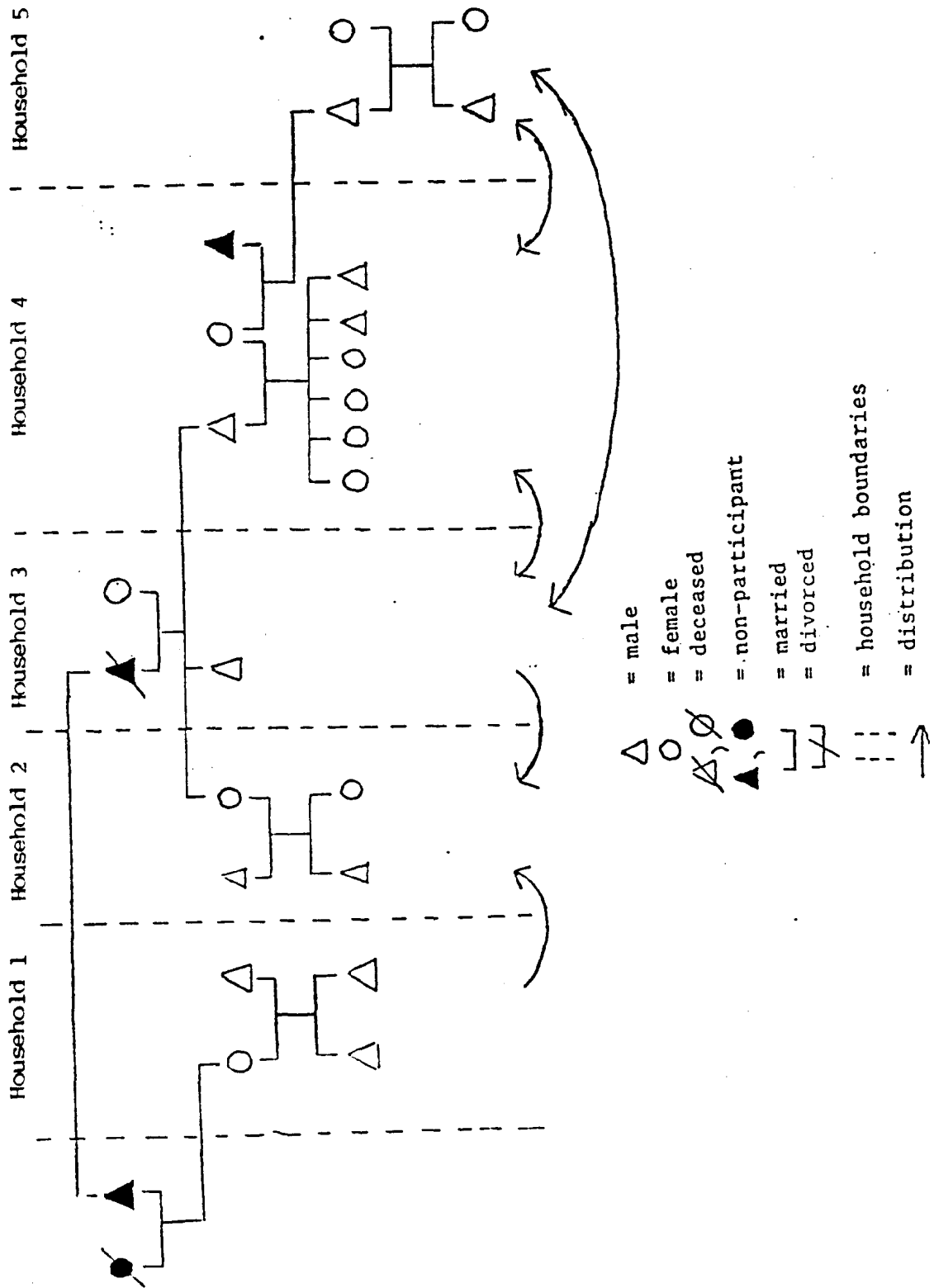


Fig. 27. Distribution of dried salmon between fishing and non-fishing households, Chuathbaluk, 1982.

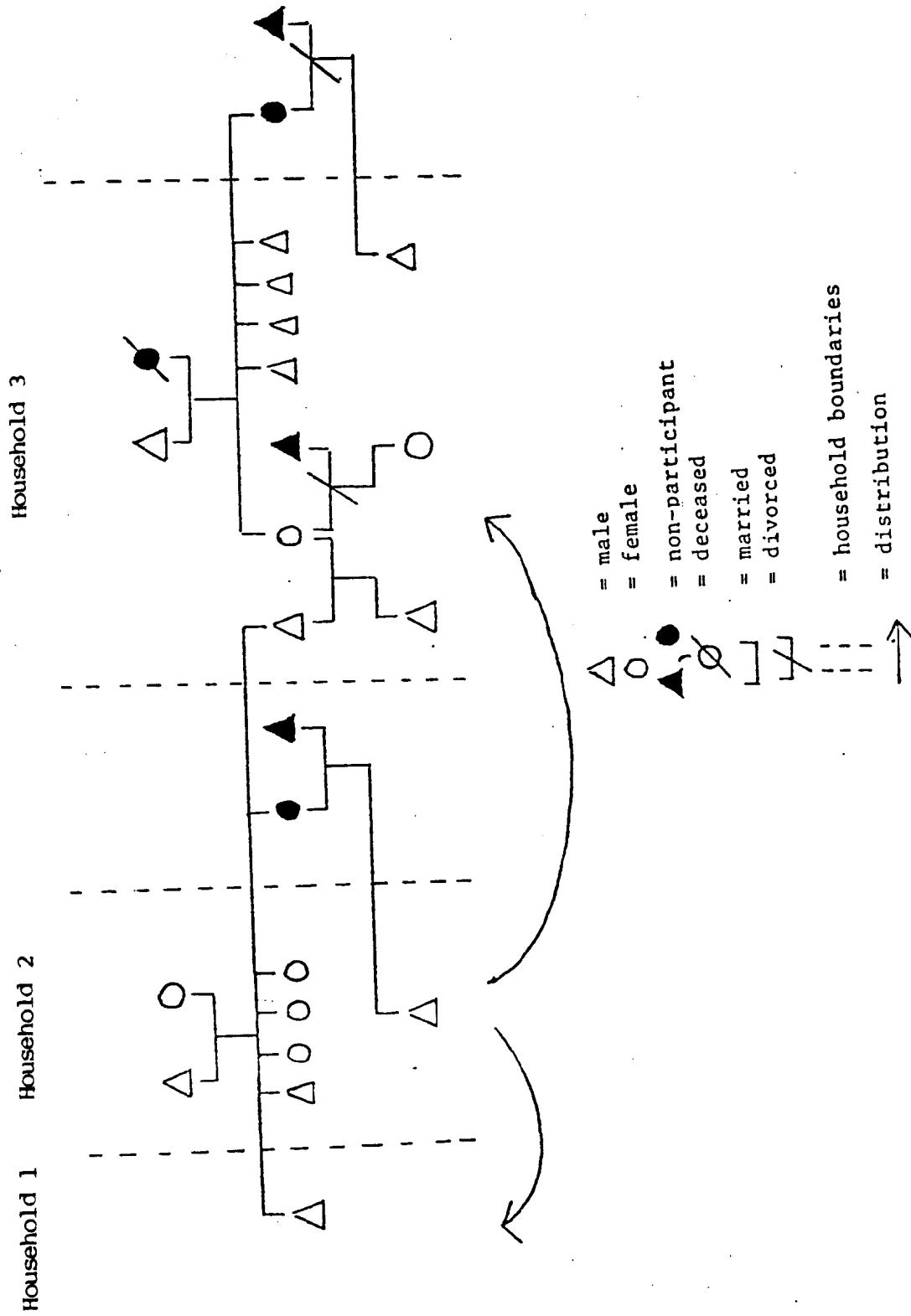


Fig. 28. Distribution of dried salmon to non-fishing households, Chuathbaluk, 1982.

SALMON HARVEST ESTIMATES, 1982

The Alaska Department of Fish and Game, Division of Commercial Fisheries, has conducted subsistence salmon surveys along the Kuskokwim River since 1960. These surveys were designed to document salmon harvest for non-commercial use in all of the Kuskokwim River villages between Eek and Telida. The subsistence surveys are described in the Annual Report of Survey - Inventory of Activities of the Division of Commercial Fisheries, and methods involve smokehouse counts, catch calendars, and interviews. Calendars upon which fishermen can enter their daily catch of salmon and non-salmon species are distributed to fishermen preceding the fishing season. During July and August, Department of Fish and Game personnel travel along the Kuskokwim River by boat collecting catch calendars from each village and counting fish in smokehouses, as necessary. The resulting data are expanded to include households known to have fished during the summer but from whom no harvest data were recorded.

In addition to subsistence harvest data collected by the Division of Commercial Fisheries, salmon harvest data were collected from Chuathbaluk households during 1982 by the Division of Subsistence between August 18 and 23, 1982 and from Sleetmute households between August 26 and 30, 1982. Every household that was known to be involved in salmon fishing was interviewed. The primary means of estimating salmon harvest was by counting the number of dried fish hanging in each smokehouse.

Fish were counted according to the manner in which they were cut, as described earlier. The different methods of cutting fish made it fairly easy to distinguish between most species. The exception was the "flat fish" cut. Red and chum salmon were difficult to distinguish when cut as "flat fish." The combined total of red and chum salmon was therefore broken down into individual totals for chums and reds in a ratio of 3:1. For every 100 combined red and chum flat fish counted, it was estimated that 75 were chums and 25 were reds. This ratio was determined by asking several informants to estimate their proportional catch of chums to reds. The number of each type of fish on a pole was counted, the number of poles bearing that type of fish were counted, and the two numbers multiplied to arrive at a total.

Counting the number of dried fish in a smokehouse was not always sufficient to arrive at a reasonable estimate of salmon harvest for a household. Some households had already put up some of their dried fish for winter by the survey dates and some households were still fishing for silver salmon. Other methods of processing salmon were used in addition to drying the fish. These included jarring and salting. Households were asked to estimate the numbers of salmon that had been jarred or salted and the number of fish they planned to catch if still fishing. These figures were included in the harvest totals. When salmon strips were counted, eight strips were judged to comprise one king salmon. This figure is based on the estimates of several informants who were experienced at cutting fish.

Included in the harvest figures are estimates of the number of fresh salmon used by villagers on a daily basis during the summer.

Fresh salmon compose a major portion of the summer diet. In the course of cutting salmon for drying, fish cutters were commonly observed setting one or two fish aside to be used for a meal that day. Often fresh fish were given to other households in the community who did not fish. Some fresh fish were also used as dog food if they were damaged or had begun to spoil. Also, toward the end of July, people began consuming dried salmon from the summer catch. Figures estimating the number of fresh fish used by villagers were arrived at in the following manner. Each fishing household was assumed to set aside one fish per fishing day to be either used in a meal, given to another household, or fed to a dog. Sixty fishing days were used as an average number of days spent fishing by each family. One-third of the fish used were assumed to be chum salmon, one-third red salmon, and one third silver salmon. King salmon were generally dried rather than eaten fresh and are not included in these estimates. The number of fresh fish used was calculated by multiplying the number of fishing families by sixty fishing days, and dividing the total by three to obtain figures for additional chum, red, and silver salmon harvested.

Table 7 presents the number of fishing households and salmon harvest estimates from Chuathbaluk and Sleetmute arrived at by both the Division of Commercial Fisheries and the Division of Subsistence using the methods discussed above. Estimates by the Division of Commercial Fisheries are taken from Alaska Department of Fish and Game (1982d). The table includes factor differences for the harvest estimates made by both Divisions which are calculated by dividing the Division of Subsistence estimate by the Division of Commercial Fisheries estimate.

TABLE 7. 1982 SALMON HARVEST ESTIMATES
FROM CHUATHBALUK AND SLEETMUTE.

Village	Chuathbaluk		Sleetmute		Factor Differences	
	Div. of Commercial Fisheries	Div. of Subsistence	Div. of Commercial Fisheries	Div. of Subsistence	Chuathbaluk	Sleetmute
No. HH Surveyed	15	15	14	14	0.0	0.0
No. of Fishing HH	16	15	21	14	.94	.67
Estimated King Salmon Harvest	1,491	1,503	242	180	1.01	.74
Estimated Chum, Red, & Pink Salmon Harvested	6,952	11,420	2,936	2,785	1.64	.95
Estimated Chum Salmon Harvest	*	7,905	*	1,970		
Estimated Red Salmon Harvest	*	3,515	*	765		
Estimated Pink Salmon Harvest	*	0	*	50		
Estimated Silver Salmon Harvest	275	1,110	2,793	1,085	4.04	.39

*Includes chum, red, pink, and some small king salmon combined.

An equal number of households were surveyed by both Divisions. The Division of Commercial Fisheries' estimate of 21 fishing families from Sleetmute includes households residing year-round on the Holitna River. The Division of Subsistence' estimates include Sleetmute residents only. The higher king, silver, and combined chum, red, pink, and small king salmon harvest figures for Sleetmute reported by the Division of Commercial Fisheries may be partially attributable to this difference, though the combined salmon harvest figures for 21 Sleetmute households are not significantly higher than those figures given for 14 Sleetmute households by the Division of Subsistence. The king salmon harvest estimates from Chuathbaluk are comparable. The larger silver salmon harvest figure from Chuathbaluk reported by the Division of Subsistence can be attributed to the fact that the survey was conducted at the end of August while the Division of Commercial Fisheries' survey was conducted in early August. Village residents harvest silver salmon throughout August and into September. A later survey would therefore include fish harvested since the time of the earlier survey. The combined chum, red, pink, and small king salmon harvest estimates for Chuathbaluk made by the Division of Subsistence are significantly higher than those made by the Division of Commercial Fisheries. These discrepancies suggest that one or both methods of estimating harvest figures may not be fully accurate.

1970-1982

Subsistence salmon harvest figures estimated by the Division of Commercial Fisheries for Chuathbaluk and Sleetmute between 1970 and

1982 are presented in Figures 29 through 32 (Alaska Department of Fish and Game 1982d). Figures 29 and 30 suggest general trends in king salmon harvest levels for these years. Overall king salmon harvest levels are consistently higher in Chuathbaluk than in Sleetmute. In both communities harvest figures fluctuate from year to year. Between 1972 and 1980 similar harvest level fluctuations are exhibited for Chuathbaluk and Sleetmute, with years of high and low harvests occurring simultaneously in both communities. This pattern suggests that subsistence salmon harvests fluctuate due to run strength.

During 1982 king salmon harvest levels rose from the previous year in Chuathbaluk and dropped in Sleetmute. The 1982 harvest figure of 1,503 king salmon for Chuathbaluk estimated by the Division of Subsistence is higher than the harvest average for the preceding five years of 1,456 king salmon. The harvest estimate for Sleetmute made by the Division of Subsistence of 180 king salmon for 1982 is lower than the harvest average for the preceding five years of 617 king salmon. This trend is in line with local sentiments expressed in Sleetmute during 1982 that the availability of king salmon was low.

Figures 31 and 32 reflect harvest levels of combined chum, red, silver, pink, and small king salmon in Chuathbaluk and Sleetmute years, between 1970 and 1982. These figures also exhibit fluctuations between these shifts occurring more dramatically in Chuathbaluk than in Sleetmute. Between 1970 and 1974, harvest levels were higher in Chuathbaluk than in Sleetmute. Between 1975 and 1981, harvest levels in Sleetmute were higher than those in Chuathbaluk, with the exception of 1976 when estimates are slightly higher for Chuathbaluk. This

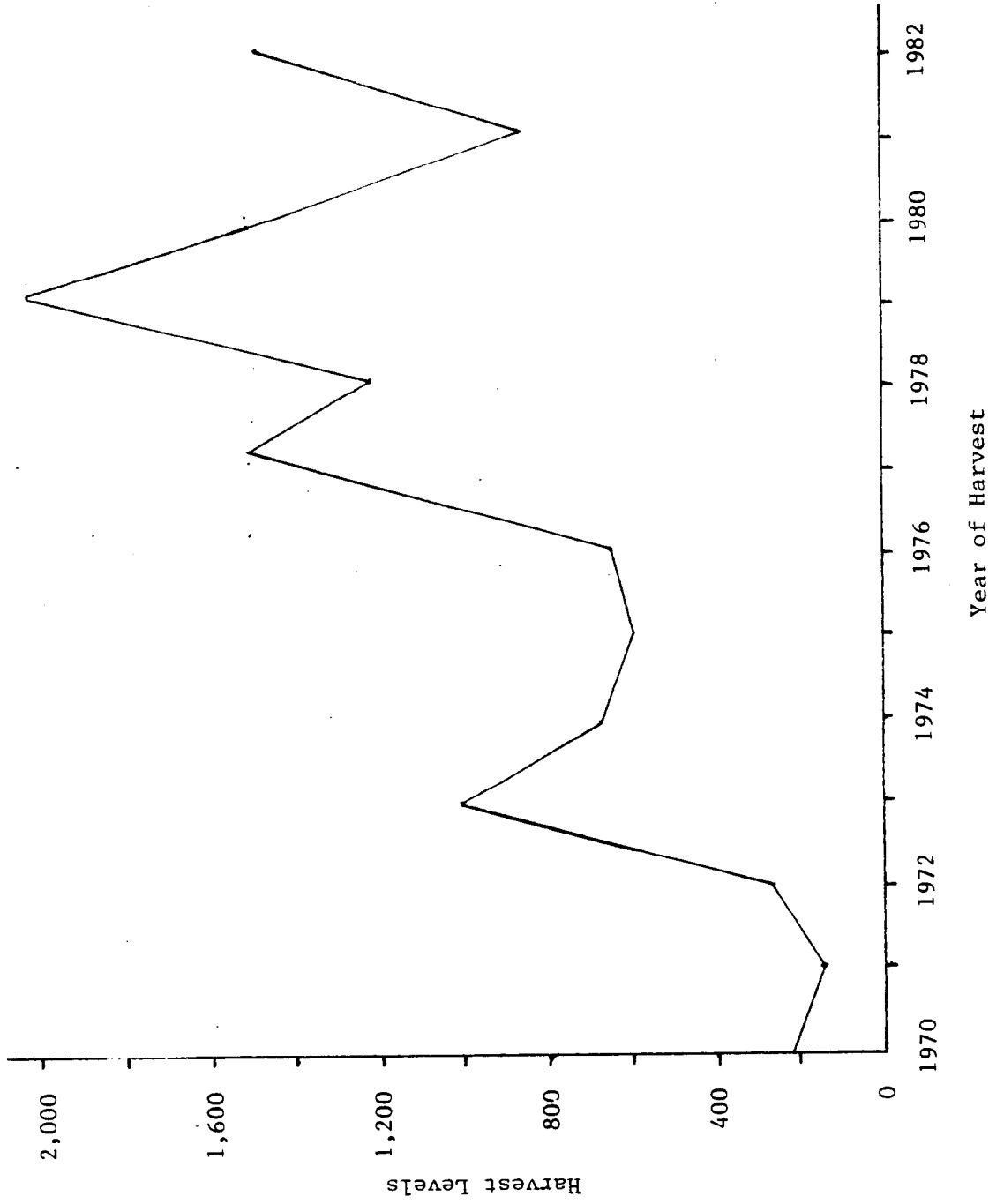


Fig. 29. King salmon harvest estimates, Chuathbaluk, 1970-1982.

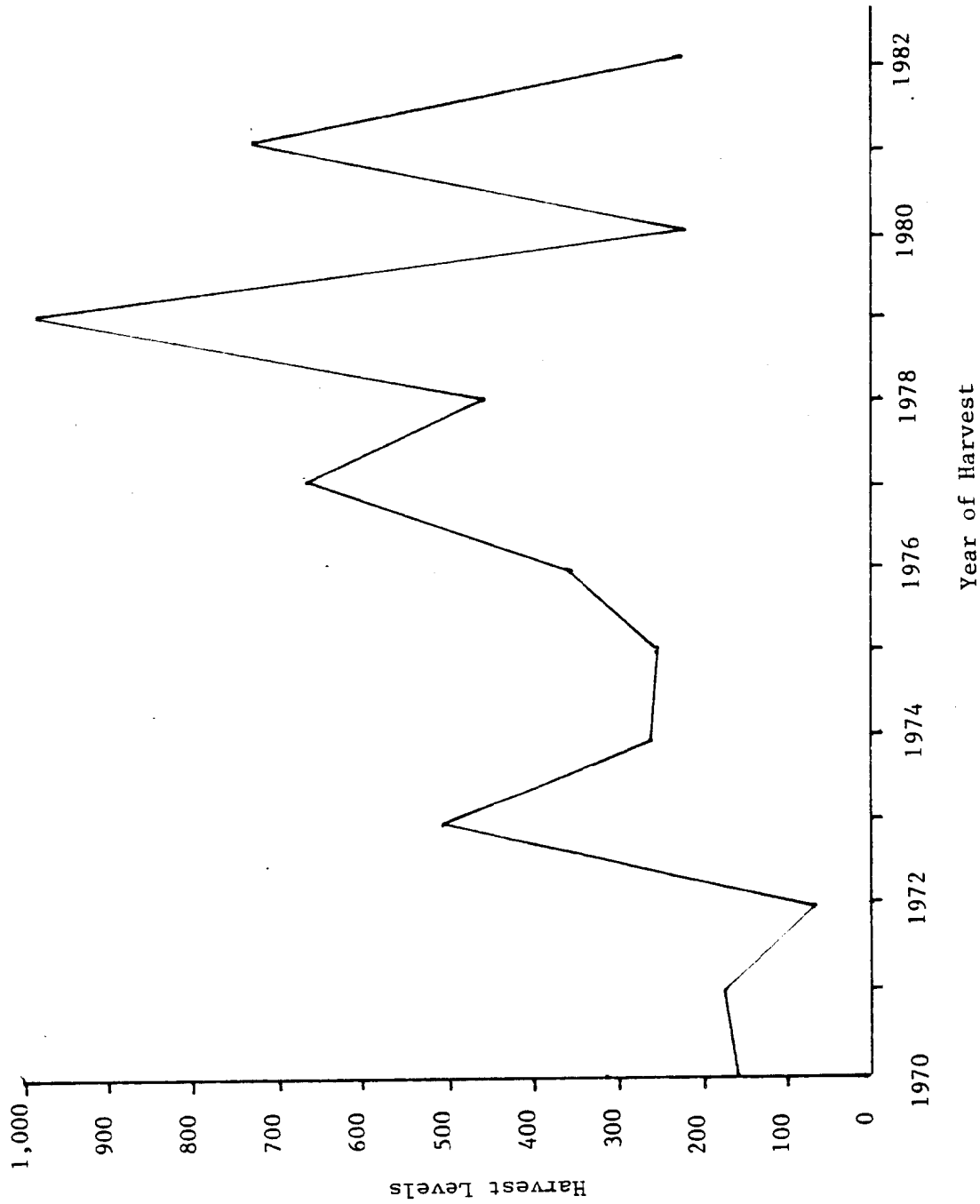


Fig. 30. King salmon harvest estimates, Sleetmute, 1970-1982.

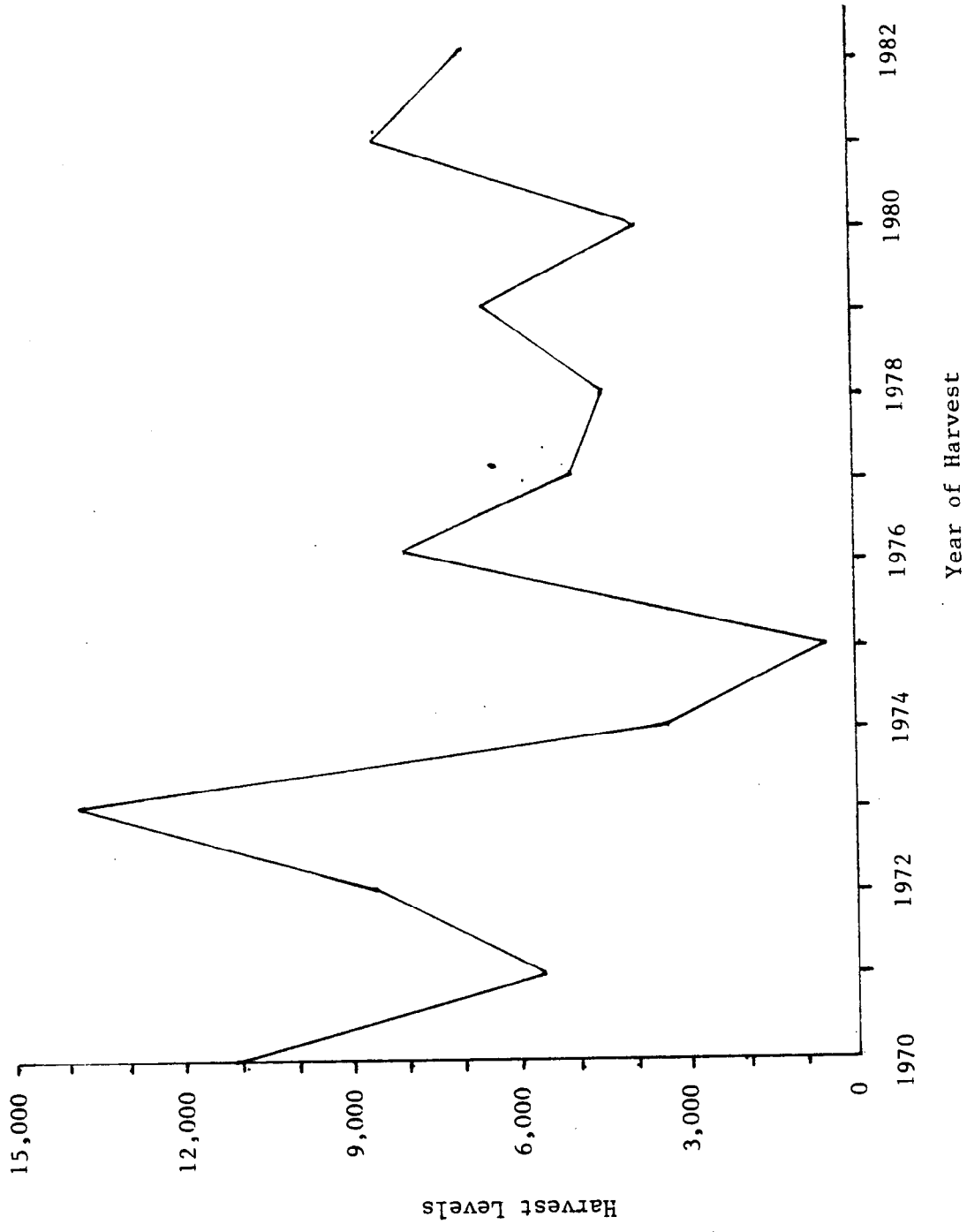


Fig. 31. Combined chum, red, silver, pink, and small king salmon harvest estimates, Chuathbaluk, 1970-1982.

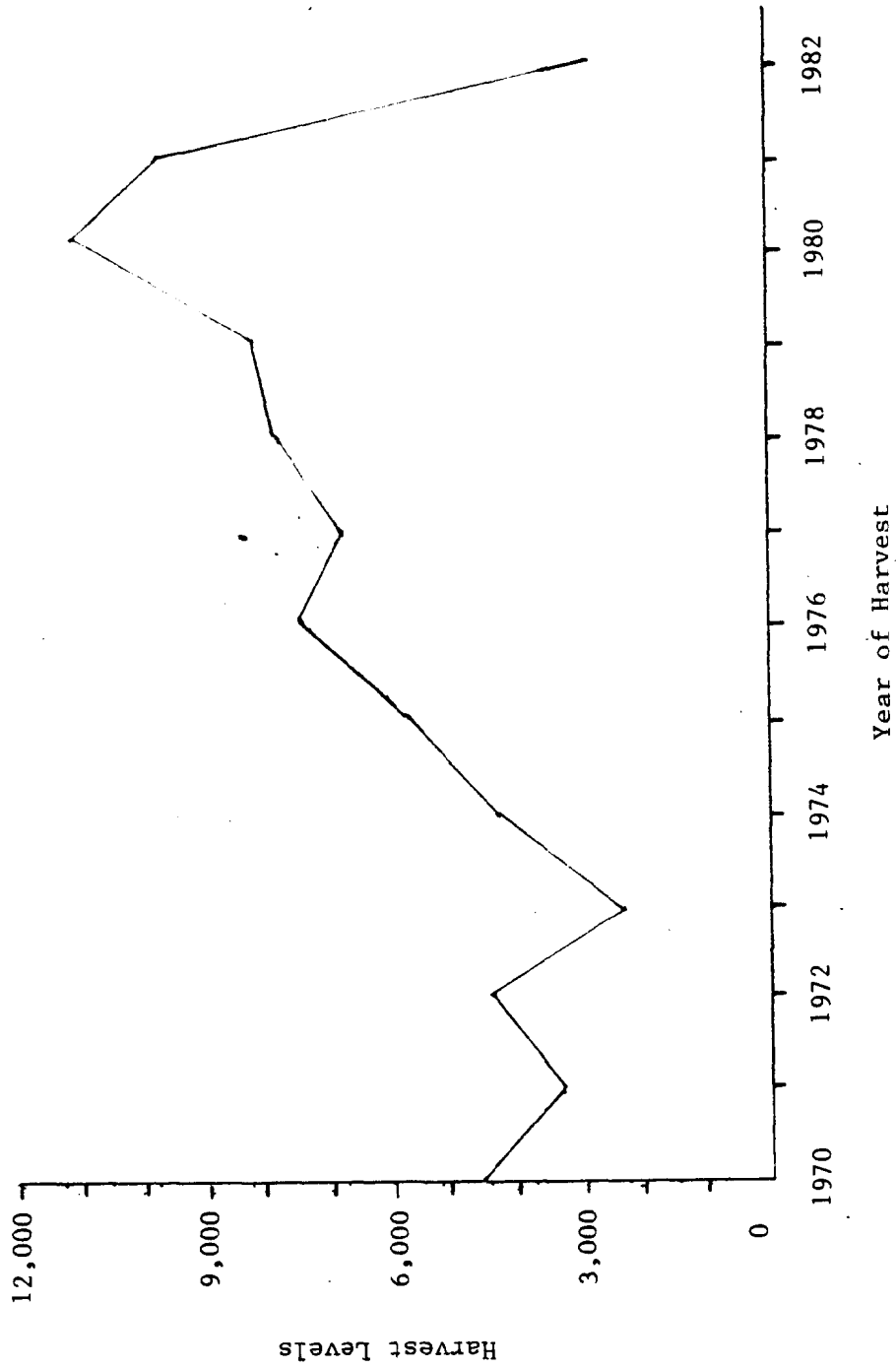


Fig. 32. Combined chum, red, silver, pink, and small king salmon harvest estimates, Sleetmute, 1970-1982.

change in balance may have resulted from the large number of homesteaders who settled on the Holitna River in 1973 as a result of the homesteading program discussed earlier. The homesteaders added a new component to the Sleetmute population and increased harvest levels for the community. In 1982 this pattern again shifted, resulting in higher harvest figures for Chuathbaluk. Combined salmon harvest estimates made by the Division of Subsistence of 12,530 fish for Chuathbaluk are much higher than the average for the preceding five years of 5,877, while the Sleetmute estimate of 3,870 fish is lower than the preceding five-year average of 8,718 fish.

According to Division of Subsistence figures, both king and other salmon species harvest levels in Chuathbaluk rose in comparison with the previous year. In comparison with the five-year average figures, 1982 appears to have been a productive year for salmon harvest in Chuathbaluk. Division of Subsistence harvest figures show that in Sleetmute in 1982, the harvest of king and other salmon species decreased in comparison with 1981. Additionally, the 1982 harvest levels were lower than the five-year averages for all species. Sleetmute appears to have had a relatively poor year for salmon production. Cultural and environmental variables influencing participation in salmon production are discussed below and a possible explanation for higher harvest levels in Chuathbaluk is given.

PARTICIPATION IN SALMON FISHING

During the summer of 1982, 15 Chuathbaluk households (51.7 percent) and 14 Sleetmute households (50.0 percent) participated in harvesting and processing dried salmon. Overall, harvest levels per household were significantly higher in Chuathbaluk than in Sleetmute (Table 8) based on the harvest estimates made by the Division of Subsistence. Table 8 shows that the total number of salmon harvested in Chuathbaluk was almost 3.5 times greater than the number of salmon harvested in Sleetmute during 1982. The average number of salmon harvested per community household was more than 3 times greater in Chuathbaluk than in Sleetmute, with approximately 2.5 times as many salmon harvested per Chuathbaluk resident.

TABLE 8. 1982 SALMON HARVEST ESTIMATES PER HOUSEHOLD AND INDIVIDUAL.

	Village	
	Chuathbaluk	Sleetmute
Total Number of Salmon Harvested	14,033	4,050
Number of Salmon Harvested per Fishing Household	935.5	289.3
Average Number of Salmon Harvested per Household	483.9	144.6
Average Number of Salmon Harvested per Resident	106.3	40.1

Several factors may influence whether or not a household participates in harvesting salmon and the level of harvest by each fishing household. Non-fishing households from Chuathbaluk and Sleetmute typically held several characteristics in common. Households lacking Native members (two from Chuathbaluk, three from Sleetmute) did not participate in salmon fishing. Several non-fishing households were single-person households containing single males or elderly persons. These households participated in fishing with other household units. Other non-fishing households contained widows, widowers, or divorced individuals with offspring who had not yet substituted for the absent adult. Newly formed households containing young couples in their 20s with newborn children typically did not participate in salmon fishing unless they assisted an established household of one of the couples' parents. Several non-fishing households stated that they did not participate in salmon fishing because they lacked boats and/or operable motors and could not afford fishing gear. A few households did not process salmon due to scheduling conflicts caused by summer cash employment.

These observations suggest that if a household lacks the members necessary to form a complete production unit -- usually including a male to harvest salmon and maintain related fishing equipment and fish camp facilities and a woman to cut fish -- a household is less likely to participate independently in salmon harvest and processing. One of the 14 fishing Sleetmute households and 2 of 15 fishing households from Chuathbaluk lacked a male or female household head. These households were able to process salmon by fishing cooperatively with

related households or by receiving assistance from other community members. The remaining fishing households from Chuathbaluk and Sleetmute all contained couples to harvest and process salmon. Certain young adults may not have yet gained the experience and proficiency to conduct salmon fishing activities as an independent production unit. A single person or young couple is at an additional disadvantage if their close kin relations, such as parents or siblings, do not participate in salmon harvest and therefore do not offer them a group with which to fish cooperatively or to assist in exchange for dried salmon products. This scenario occurred in both Chuathbaluk and Sleetmute.

Environmental differences between Chuathbaluk and Sleetmute may be associated with differences in harvest levels between communities. Sleetmute is almost 100 miles upriver from Chuathbaluk. The strength of salmon runs and the quality of the fish are diminished in the time it takes them to get from Chuathbaluk to Sleetmute, as salmon spawn in tributaries between the villages. Shifting river channels and river bottom characteristics can alter the availability of good fishwheel, set net, and drifting sites. However, this is probably not an important factor, as local informants did not report a shortage of fishing sites in Chuathbaluk or Sleetmute.

The availability of alternate resources also influences salmon productivity. Easy access to non-salmonid fish species throughout the year and to moose, caribou, or bear limit a household's need for large quantities of dried salmon. For instance, three of the eight Sleetmute households which overwinter at trapping cabins on the Holitna and Hoholitna rivers only processed and stored small quantities of dried

salmon in 1982. These households stated that large stores of dried fish were not a necessity because of the greater access they had to alternate resources along the Holitna and Hoholitna rivers throughout the winter. Moose, beaver, pike, grayling, arctic char, and occasionally caribou are all locally available to households living in this area. Households overwintering at trapping camps return to Sleetmute during summer to harvest salmon and to take advantage of seasonal employment opportunities. The latter activity takes priority for most of these households.

Households remaining in the winter village have less ease of access to alternate resources during winter. Therefore, they rely more heavily on their store of salmon than do dispersed households. Almost all Chuathbaluk households overwinter in the village, with the exception of a few individuals who set up temporary trapping camps for short-term use. Consequently, the reduced access to alternate resources associated with seasonal settlement patterns may account for some of the larger salmon harvests in Chuathbaluk than Sleetmute.

Lower salmon harvests in Sleetmute may also reflect a more inland ecological adaptation oriented toward land mammals in contrast to Chuathbaluk. Later chapters will show that ecological parameters made moose and caribou more available to Sleetmute residents during 1982. Sleetmute residents compensated for the reduced salmon harvest occurring in Sleetmute by harvesting greater quantities of land mammals. These cultural and environmental variables are discussed at greater length in subsequent chapters.

THE COMMERCIAL SALMON FISHERY

In 1961 three fishing districts were established along the Kuskokwim River for regulatory and management purposes (Fig. 16). District 1 included the lower Kuskokwim between the northernmost point of Eek Island at the downriver boundary and Mishevik Slough at the upriver boundary. District 2 began at Mishevik Slough and extended upriver as far as the Kolmakof River. District 3 included that portion of the Kuskokwim between the Kolmakof River and Medfra. District 3 was open to regulated commercial fishing until 1966. After that time it was closed to commercial fishing. There was low participation in the commercial fishery because the poor quality of salmon in this area made them difficult to market (Rae Baxter pers. comm., 1982).

Chuathbaluk is situated within the boundaries of District 2 described above, while Sleetmute is approximately 75 miles upriver from District 2. Commercial king, chum, and silver salmon fishing is regulated by fishing periods and gear types and managed within harvest guidelines. Commercial harvest guidelines for District 2 in 1982 were 2,000 to 4,000 king salmon; 4,000 to 8,000 chum salmon; and 2,000 to 4,000 silver salmon (Alaska Department of Fish and Game 1982a). These harvest guidelines are the lowest of any fishing district in the Yukon-Kuskokwim delta. The timing and duration of fishing periods are established during the season by the "emergency order" of area biologists broadcast over the radio. The length and number of periods are adjusted depending on in-season estimates of run strength and escapement. In 1982 drift gill nets were restricted to 50 fathoms in length and

had to be reduced from 8-1/2 inch mesh size to 6-inch or smaller after June 26 (Alaska Department of Fish and Game 1982a). Prior to June 26th there was no mesh size restriction, and nets having 8-1/2 inch mesh size were commonly used for king salmon. Commercial salmon harvests in District 2 during 1982 were 2,785 king salmon, 1,921 red salmon, 11,760 silver salmon, 7 pink salmon, and 19,052 chum salmon based on harvest tickets from commercial processors (Alaska Department of Fish and Game 1982d).

Access to the commercial fishery along the Kuskokwim is regulated by "limited entry" permit. Nineteen Commercial Fisheries Entry Commission (CFEC) permits are held by residents of the central Kuskokwim communities (Mark Williams pers. comm., 1982). Three of these permits are held by Chuathbaluk residents. No Sleetmute residents have a limited entry permit. The three Chuathbaluk permit holders are close relatives living in three separate households -- a 68-year-old woman, her 47-year-old son, and his 27-year-old stepson. During summer 1982 the woman fished in partnership with her grandson, her son fished with his wife, and the stepson fished alone. The households of all three permit holders also are active in the subsistence salmon fishery. The households of the man and his stepson cooperate in subsistence fishing, while the woman cooperates with her daughter's household in subsistence fishing.

Several reasons are given for the small number of limited entry permits in the central Kuskokwim region: the failure to apply for them at the proper time; misunderstanding regarding the renewal of permits; and inability to qualify for them. Because there was never a large participation in commercial fishing in the central Kuskokwim due to

the difficulty in marketing fish, many individuals had not been active participants in the fishery in the years preceding the time at which the limited entry system was established. Therefore they were uneligible in the permit allocation system in which past participation was highly considered (Rae Baxter pers. comm., 1982).

The permit holders residing in Chuathbaluk fish commercially both in Districts 1 and 2. They prefer fishing in District 2 because they report fishing localities are more abundant and produce more fish than those in District 1. Furthermore they maintain that there is less competition from other commercial fishers. Still, low harvest guidelines and fewer than 50 percent as many commercial periods in District 2 as compared with District 1 result in Chuathbaluk fishers fishing in District 1 from time to time. Fishing in District 1 entails certain economic risks, because of the uncertainty as to whether the catch will cover the cost of gas used in traveling to Bethel and back and be profitable as well. Chuathbaluk fishers generally do not fish in District 1 during the first few periods of a run, because run strength is weak and commercial catches are too low to be profitable.

Chuathbaluk permit holders report that in a good year they may gross up to \$12,000 from commercial salmon fishing. The 1982 season was considered a poor to average year, with permit holders averaging \$7,049, with 89.5 percent of these earnings coming from District 2 sales.

Most of the salmon harvested commercially by fishers residing and fishing in District 2 are sold to two fish buyers in Aniak. Local fishers state that Aniak buyers pay an average of \$.10 per pound less

— than Bethel buyers, because the quality of salmon is diminished by the time they reach District 2. These fish are shipped to Anchorage in the round. In 1982 Aniak buyers paid the following average prices per pound for commercially harvested salmon: king salmon, \$.78; chum salmon, \$.22; silver salmon, \$.51; red salmon, \$.40; pink salmon, \$.05 (Alaska Department of Fish and Game 1982e). Alaska Department of Fish and Game commercial catch data for 1982 shows the average earning per fisher fishing in District 2 to be \$1,940 as compared with the \$4,147 average earning for fishers fishing in District 1. Some of these fishers fish in both districts.

These data suggest that the District 2 commercial fishery is not as lucrative as the District 1 commercial fishery. Commercial fishing is a limited economic alternative to central Kuskokwim River residents. However, it does provide a major source of income to the few households with limited entry permits.

CHAPTER 6

NON-SALMONID FISH SPECIES FISHING

Non-salmonid fish species, including the arctic lamprey; sheefish; least cisco; round, broad, and humpback whitefish; rainbow trout; arctic char; arctic grayling; boreal smelt; Alaska blackfish; northern pike; longnose sucker; and burbot are harvested year-round in Chuathbaluk and Sleetmute and are particularly important as a food source in months when fresh salmon are unavailable. These species have formed part of the central Kuskokwim Eskimo diet since aboriginal times (Michael 1967). Rod and reel, hook and line, fish traps, set nets, dip nets, and fish leisters are currently used for harvesting non-salmonid fish species. Individuals representing all age and sex groups often participate in the harvest of at least one of these species, though males are more active participants than females. Fish processing usually takes place by the female members of a household, though males will assist in cutting, cleaning, and occasionally in preparation.

The scientific and common names used here are based on Morrow (1980). The common name is followed by the Yup'ik term and scientific name in parentheses. Natural history information presented in the species accounts was provided by Rae Baxter (pers. comm., 1983) unless otherwise noted.

HISTORICAL HARVEST METHODS

Zagoskin (Michael 1967) describes the harvest of non-salmonid fish by residents of central Kuskokwim communities in the vicinity of Crow Village in 1843 with the use of fish traps and fish fences in combination. Fish fences or weirs were constructed by driving poles into the river bottom approximately six feet apart, forming a line perpendicular to the river bank. Ten or more "screens" were attached to the poles, with the furthest "screen" from shore set parallel to the river bank. The "screens" were made from spruce wood splints bound by spruce root and willow bark. Four stakes were driven into the river bottom close against the inner side of the transverse screen. A fish trap was lowered and set in between the stakes.

Fish traps were constructed in a manner similar to the fish screens described above. Long spruce wood splints were tied together with spruce root rope and willow bark. Fish trap size varied with the size of the fish it was intended to catch. These traps were typically four feet in diameter, with a mouth that might be up to six feet in diameter and about ten feet in length. Traps having one-half inch wide wood splints were used for sheefish, whitefish, and burbot as well as for salmon. A long and narrow tail or sleeve was attached to the rear end of the trap when fish runs were abundant. Fish crowded into the sleeve from the main trap. This sleeve prevented the trap from breaking and assisted the fisherman in pulling in his catch. Fish nets also were used in harvesting lampreys and anadromous fish, with mesh

size varying according to the size of the fish to be caught (Michael 1967). Fish traps made from wood and chickenwire are currently used for harvesting burbot.

Fishing through a hole in the ice with hook (manaq) and line is a method used both historically and presently during months of frozen waters for harvesting non-salmonid fish. Zagoskin noted the use of antler pickaxes in opening holes in the ice, as a hole made by using a hatchet or iron pickaxe was believed to attract fewer fish (Michael 1967). Local informants report that bone hooks were used for catching fish before commercially made hooks were available. Commercially sold hooks with lures attached to plastic or nylon line held by a short piece of wood are currently used for hooking. Ice forming on the line must be removed periodically to prevent the line from breaking. Holes in the ice are opened with ice picks that are bought commercially and usually made of iron or with homemade ice picks having spruce pole handles and iron points. Holes tend to be approximately eight inches in diameter. A taboo against making holes in the river ice with an axe persists, since this practice is considered to bring bad luck to the fisher.

A good hooking spot is one in which the water is at least five feet deep, the river current is dead, and there are no underwater snags. The lower tip of an island which has swift currents that flow downstream on either side of the island is also a good hooking locale. These spots occur toward the headwaters of central Kuskokwim tributaries. Hooking is most fruitful during early morning and evening hours when fish are hungry and have a greater tendency to bite.

Reportedly, fish seldom bite when a storm is approaching and on days when the weather is bad.

Men and women of all ages were observed to participate in hooking. Individuals take a day trip by snowmachine or dog team to productive hooking spots for the express purpose of fishing. Individuals commonly spend a few hours each day hooking in front of the winter village when fish are running. Also, persons stop to hook in the course of other activities, such as trapping and hunting. Additional harvest methods currently in use will be discussed in the species account for which the method is most applicable.

SPECIES ACCOUNTS

Arctic Lamprey (nemeryaq; Lampetra japonica)

Nemeryaq are also known locally as "eels" or "suckers." This is an anadromous species that has a spawning run in the Kuskokwim River in November. Arctic lampreys remain at the spawning grounds which are in southern tributaries to the Kuskokwim River between the Aniak and Holitna rivers until June, where they die after spawning. The young hatch in fall and begin a slow trip downriver to the ocean, which may take two years. During this phase lampreys are detritus feeders. They remain in areas where the river bottom is muddy and sandy and are preyed upon by pike and burbot. Upon reaching the ocean, lampreys become parasitic on other fish. Some lampreys may remain in the Kuskokwim River throughout their life span and become parasites on whitefish.

The arctic lamprey is harvested by residents of central Kuskokwim communities during its fall spawning run in the Kuskokwim River. Few are taken in the lower Kuskokwim because they swim deep in the river until they reach the vicinity of Tuluksak, where they rise and swim in shallow water (Rae Baxter pers. comm., 1983). Lampreys are harvested by Chuathbaluk and Sleetmute residents immediately following freeze-up in November. They run by the winter village for a few days only, during which time the annual supply must be taken.

Lampreys are caught close to the river bank in water approximately five feet deep. A trench approximately 4 feet long and 1-1/2 feet wide is made in the river ice. Lampreys swimming underwater beneath the trench are scooped out onto the ice with an "eel stick." An eel stick has a wooden handle about one inch by two inches and approximately nine feet in length. The bottom of the stick is planed off at an angle and contains about five nails spaced a few inches apart and protruding about two inches from the stick. There exist variations on this general construction. However, the purpose is always to extend the bottom end of the stick into the river and lift the lampreys out of the water on the nails. The nails catch the underside of the body and the lamprey bends over the nail while being quickly lifted from the water and tossed onto the ice. Several may be caught with one stroke of the stick. Lampreys may be harvested during the day or at night with the aid of a gas lamp.

Lampreys may be preserved by freezing out-of-doors. They are eaten boiled, fried, and baked. They are also used as dog food. Historically, oil was rendered from the lampreys, but this practice is no longer in use.

Few lampreys were harvested in Chuathbaluk and Sleetmute during 1982 despite persistent efforts made by village residents. Local people stated that 1981 and 1982 were the only years within their memories in which lampreys were scarce. Most households had previously harvested large numbers of lampreys. Local observers were unable to provide specific explanations for the decline of lampreys. One suggestion was that the timing of the spawning run may not have corresponded with the traditional time of harvest following freeze-up, causing fishers to either miss or anticipate the run. Another explanation provided by local residents suggested that lampreys may have altered their travel route to swim up the middle of the river rather than along the shore. Fishers also suggested that the lamprey population may have dwindled or no longer spawns as far upriver as the central Kuskokwim tributaries.

Sheefish (cii; Stenodus leucichthys)

Sheefish are a migratory species, overwintering in the lower portion of the Kuskokwim River and commencing the upriver migration around March. The migration to spawning grounds may last for six months, with the fish feeding in Kuskokwim tributaries as they go. Spawning occurs around September in southern tributaries upriver from the Stony River. After spawning, sheefish return to their wintering grounds in the lower Kuskokwim River, which they reach within a month of traveling downriver.

The first run of sheefish reaches the central Kuskokwim following break-up in May and June. The fish are fat and their meat firm and most desirable at this time. Chuathbaluk and Sleetmute residents set nets that are typically under 5 fathoms in length having approximately 5 7/8-inch mesh size for sheefish in eddies following break-up. They also use drift nets for harvesting this species. Sheefish may be caught occasionally during summer months with rod and reel. In late August and September the second run of sheefish passes through the central Kuskokwim River, during which time additional fish are harvested in set nets and with rod and reel. An occasional sheefish may be taken while hooking during winter months.

Sheefish are preserved through freezing by households owning freezers, jarring, and drying. Sheefish are cut and dried in the household smokehouse in a manner similar to salmon. They are commonly eaten dried, boiled, baked, and mixed into akutaq.

Least Cisco (iituliq; Coregonus sardinella)

The least cisco has an upriver spawning migration in September and October that lasts for approximately three weeks. During this run Chuathbaluk and Sleetmute residents harvest the greatest numbers of this species using set nets with one inch mesh size or dip nets (galussuun) in the main river. Least cisco may also be taken in fish-wheels. During winter, least cisco occasionally appear in fish traps set for burbot. In summer they may be taken with rod and reel in creeks and other Kuskokwim tributaries.

Least cisco are fried, baked, boiled, and "half-dried" and boiled for eating. They may be used in making akutaq. Least cisco are preserved through freezing and jarring. They may also be processed into "stinkfish."

Round Whitefish (Prosopium cylindraceum)

Round whitefish are year-round residents of central Kuskokwim tributaries. While they were not observed in use by Chuathbaluk and Sleetmute residents during 1982-83, they are probably harvested on occasion using hook and line or rod and reel.

Broad Whitefish (qaurtuq; Coregonus nasus)

Broad whitefish spend the summer in tundra lakes and sloughs. In August and September they run through the central Kuskokwim River in migration to tributaries where they spawn around October. They overwinter in the main Kuskokwim River, and run again following break-up in migration to summering grounds.

Broad whitefish are primarily harvested during their spring and fall migrations in set nets having 2 1/2- to 3 1/2-inch mesh that are approximately 5 fathoms in length. These nets are placed in eddies. During summer broad whitefish are sometimes taken in nets set for chum and red salmon having from 5- to 6-inch mesh, by rod and reel around salmon fishponds, and in fishwheels. During the fall migration when ice is running in the Kuskokwim River and the waters are clear,

Chuathbaluk and Sleetmute residents harvest broad whitefish using leisters, locally referred to as "spears." The leisters are typically five to six feet in length and have between three and six barbed, iron prongs. "Spear fishing" typically occurs at night when the fish swim close to the water surface and the edge of the shorefast ice. Individuals drift by boat to a good fishing area or spear from the edge of the ice. Open water with a swift current and a depth of about three feet is most desirable. The fisher stands with a gas lantern which attracts fish and makes them visible and spears them as they swim by. When the water is high, spearing becomes difficult. Nets may occasionally be set for broad whitefish under the ice during winter months although they are not usually productive. None were set by Chuathbaluk and Sleetmute residents during 1982.

Broad whitefish are preserved through freezing, jarring, and drying in the salmon smokehouse. They are eaten boiled, baked, fried, dried, half-dried and boiled, in soups, and in akutaq. The stomach is also saved and eaten boiled or fried. Reportedly, care must be taken not to pierce the gall bladder when cutting broad whitefish, as the contents render the flesh bitter-tasting if they come into contact.

Humpback Whitefish (Coregonus pidschian)

Humpback whitefish are a migratory species over-wintering in the main Kuskokwim River and moving to tundra lakes, sloughs, and Kuskokwim tributaries for summer feeding. Spring runs to summering grounds and fall runs to the spawning grounds correspond with those of the broad

whitefish. Spawning takes place in October and November in the main Kuskokwim River.

Methods used for harvesting, preserving, and preparing humpback whitefish are the same as those described for broad whitefish. This species is more commonly taken during summer months, however.

Rainbow Trout (tagaurak; Salmo gairdneri)

Rainbow trout occur in southern tributaries of the Kuskokwim River downriver of and including the Aniak River. This species has restricted habitat requirements and is a year-round resident of those rivers in which it occurs. Rainbow trout spawn in April and May.

Rainbow trout are harvested by Chuathbaluk residents from the Aniak River primarily during winter when rivers are frozen and travel is by snowmachine. Sleetmute residents do not get rainbow trout because their range does not extend into tributaries easily accessible from the village. This species is taken through holes in the ice using hook and line in winter and occasionally with rod and reel in months of open water. Chuathbaluk residents may travel to the Aniak River via overland trails by snowmachine for the express purpose of harvesting rainbow trout or may take them in the course of hunting and trapping activities. Preservation is through freezing. Rainbow trout are most commonly fried for eating, though they can be boiled, baked, and made into soups.

Arctic Char (culugpauk; Salvelinus alpinus)

Culugpauk, locally referred to as "Dolly Varden," are year-round residents of Kuskokwim tributaries. They do not occur in tundra areas, but prefer rivers with gravel and rock bottoms and high lakes. This species spawns in August and September.

Arctic char are primarily harvested in winter by Chuathbaluk and Sleetmute residents, although they may be taken year-round in tributaries close to the winter village. In winter they are taken by hook and line and in summer with rod and reel. Arctic char are commonly preserved through freezing. Preparation methods include frying, baking, boiling, and soups.

Arctic Grayling (culugpauk; Thymallus arcticus)

Grayling generally overlap into the same habitat as arctic char. Grayling feed in the smaller Kuskokwim tributaries during summer. With the onset of freeze-up they migrate from these streams to larger tributaries which remain oxygenated throughout winter. In spring grayling move to spawning grounds where spawning takes place in May and June. Local observers noted that grayling runs appear to have dwindled over the past several years.

Grayling are harvested in the greatest numbers by Chuathbaluk and Sleetmute fishers during the fall migration. This species runs in the Kuskokwim for a couple of weeks in late October to early November when ice is running in the river. Individuals break holes in the shorefast

ice or stand at the edge of the ice in front of the winter village and catch grayling by hooking. Large quantities of grayling can be harvested at this time. Grayling are taken in tributaries close to the winter village by hook and line during months of frozen water and with rod and reel in months of open water. Grayling were historically harvested with set nets made specifically for this species. They may also be speared using leisters during the fall migration when the ice is running in the Kuskokwim and individuals are out spearing whitefish. Grayling are preserved through freezing. They are commonly fried, baked, boiled, used in soups, and fed to dogs.

Boreal Smelt (qusuuq; Osmerus eperlanus)

The boreal smelt is an anadromous species that runs in the Kuskokwim following breakup in late May to early June to spawn in the main river between Tuluksak and Kalskag. The eggs hatch in summer and the fish return to the sea. Smelt run for a few days only past each village.

Smelt are harvested by some Chuathbaluk residents who travel down-river by boat as far as Kalskag and below to obtain this species. They are taken in dip nets by standing on the river bank or from boats and canoes. Smelt are usually preserved through freezing by households owning freezers or dried. Smelts may be boiled, fried, sun-dried and eaten dried with seal oil, or fed to dogs.

Alaska Blackfish (can'giiq; Dallia pectoralis)

Blackfish are a tundra species found in still and slow water and shallow lakes. They overwinter in sloughs and deeper lakes that do not freeze to the bottom. With spring break-up and high water they move to shallow lakes and potholes where they breed and spawn in June and July. As these bodies of water freeze in the fall, blackfish move out of them and back into the overwintering areas. Scattered populations of blackfish occur in the central Kuskokwim region, but this species is limited by the lack of tundra habitat. Blackfish populations in the area have declined in the past five years, according to local observers, due to an increase in the beaver population. Beaver dams on creeks flowing out of tundra lakes obstruct blackfish travel routes.

Chuathbaluk residents only occasionally harvest blackfish. Place of residence prior to moving to Chuathbaluk appears to be related to whether or not an individual harvests blackfish. Individuals who were once residents of Kalskag, Crow Village, and Aniak had generally harvested blackfish at some time during their lives, whereas individuals coming from communities upriver from Chuathbaluk had virtually no experience with blackfish. This can be explained by the fact that suitable tundra habitat occurs further downriver, making blackfish more abundant in the vicinity of downriver communities. Sleetmute residents interviewed were unaware of any harvest of blackfish occurring historically or presently within the community.

Blackfish were taken during the fall migration from summer lakes to deeper waters. Large quantities of blackfish could be harvested with wire fish traps set in narrow, shallow streams flowing out of lakes. Gunny sacks having a wire rim around the mouth to hold it open were also used as a type of dip net. The gunny sack was submerged in the stream so that blackfish could swim into it. This fish is commonly boiled or fried for consumption and may be dipped in seal oil for flavoring.

Northern Pike (qalruq; Esox lucius)

Pike occur in slow-moving and still waters having fairly shallow, weedy bottoms, including lakes and sloughs along the Kuskokwim tributaries and the main Kuskokwim River. They move out of tundra areas that become anaerobic in winter into deeper waters and return in spring following break-up. Spawning occurs in Kuskokwim tributaries during May and June. Pike do not exhibit wide movement patterns and remain in one general area throughout their life span. Adult pike are predators on other fish species.

Pike are harvested year-round by Chuathbaluk and Sleetmute residents, as their meat is always firm and desirable. They are taken on hook and line in winter through the ice and with rod and reel during summer. Pike are generally harvested in Kuskokwim tributaries and are preserved through freezing. They are a dietary staple in winter to several Sleetmute households who reside at trapping cabins on the Holitna River, where pike can be harvested in abundance. Pike are commonly boiled for eating or used in akutaq.

Longnose Sucker (cungartak; Catostomus catostomus)

Suckers reside in the main Kuskokwim River and its tributaries. Spawning runs occur in the tributaries in May and June. Suckers are harvested during summer months with rod and reel and incidentally in fish wheels and salmon nets. They may be cut and dried in the salmon smokehouses by older people. These fish are used as dog food and are not consumed by local residents.

Burbot (manignaq; Lota lota)

Little is known about the habits of burbot, known locally as "lush fish," upriver from Aniak. They are thought to spend the summer in lakes and Kuskokwim tributaries or on the Yukon-Kuskokwim delta. There is an upriver spawning migration that begins when the river ice starts to run in late October to early November. Spawning occurs in shallow sloughs around January. Burbot overwinter in the main Kuskokwim and its tributaries. In spring burbot return to their summering grounds. Local observers report that these fish are most abundant in the Kuskokwim River in November, January, and March. Burbot prey on other fish species.

Both Chuathbaluk and Sleetmute residents harvest burbot in the main Kuskokwim River. Harvest commences immediately following freeze-up. They are speared using leisters through holes or trenches in the river ice at night using a gas lantern to attract fish to the water surface.

They also are taken with hooks that are baited with blackfish and set beneath the river ice close to the river bottom, attached to a line.

Burbot are most commonly taken in fish traps (Fig. 33). Fish traps are currently constructed from wood, wire cable, and chicken wire and are approximately six feet long and two feet in diameter. The frame for the body of the trap is typically made from wooden one inch by two inch boards which are arranged as a cylinder having circular pieces of wire cable at intervals along the length of the cylinder to provide support for the boards. The frame is covered with chickenwire to form the cylindrical body of the trap. Two boards extend above the entrance to the trap and chicken wire is placed between them to prevent fish from swimming over the trap.

A fish fence extending perpendicular to the river bank for approximately 20 feet out into the river is constructed by attaching chicken wire or a small mesh fish net to birch and spruce timbers which are spaced about 3 feet apart and driven into the river bottom. The fence is placed through a trench that is cut in the ice using ice picks and a chainsaw. A second fence approximately ten feet in length is constructed parallel with the river bank extending from the offshore end of the first fence. This fence may extend either upriver or downriver. The object of the fish fences is to guide burbot into the fish trap. The trap is set at the juncture of the two fences and extends underwater in the opposite direction of the fence which is parallel to shore. Two more timbers are driven into the river bottom at an angle to the place where the fish fences meet, with two additional timbers inserted about six feet away from these. A trench is dug in the ice

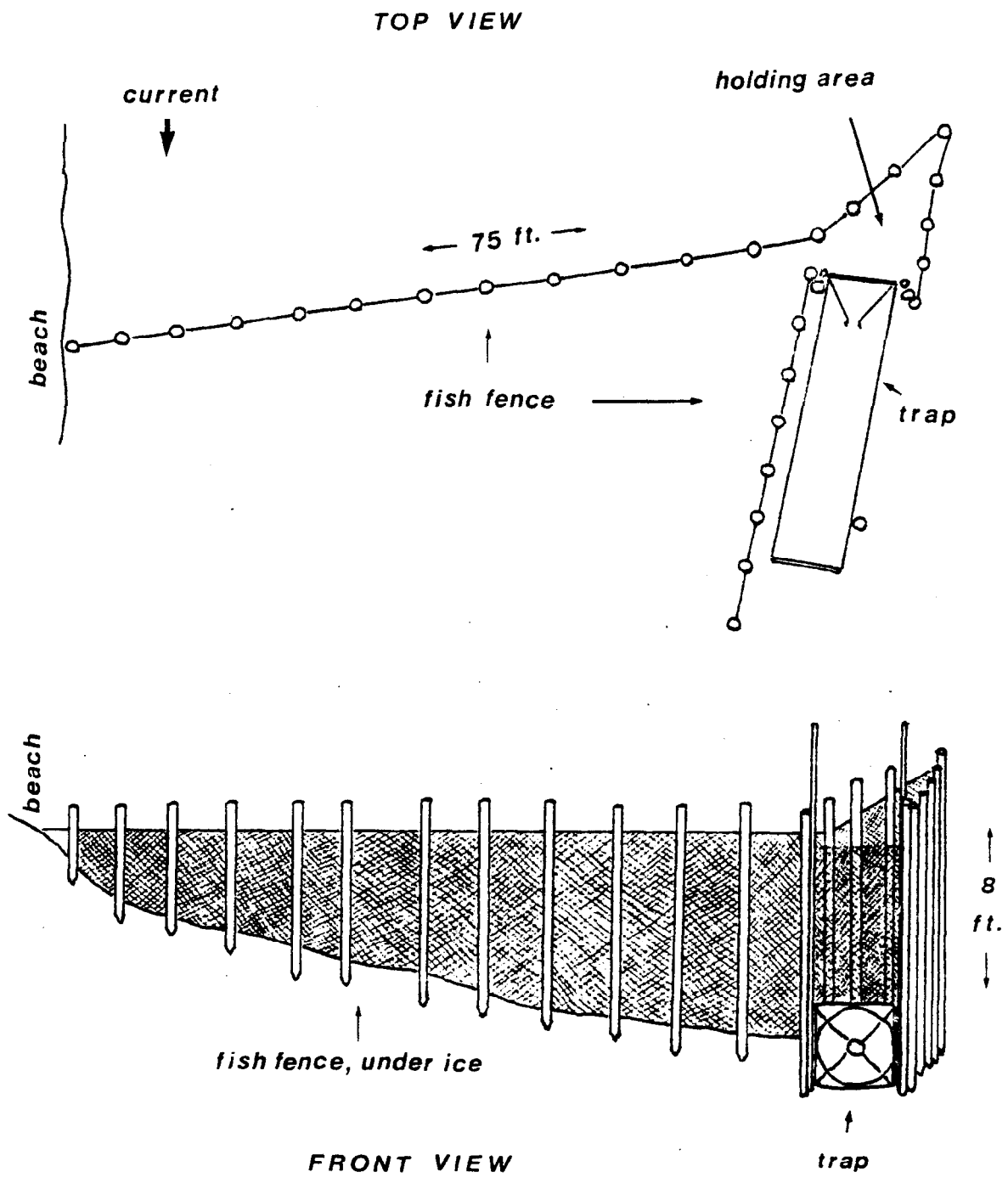


Fig. 33. Burbot trap used on the central Kuskokwim River, 1983.

which extends parallel to the riverbank in the direction opposite to the second fish fence. The fish trap is submerged in between these four stakes to which it is secured to rest on the river bottom. It takes one to two days of work to set a fish trap in the river ice and construct the fence with necessary materials on hand. A fish trap generally lasts from one to two years.

Fish traps can be used in the central Kuskokwim, because the tidal influence is not felt and the river current is swifter than on the lower Kuskokwim. Fish traps are set in areas where the river current is swift and the water is about ten feet deep close to shore. Traps set in November must be placed in deep water to avoid becoming grounded as the river level drops beneath the ice throughout the winter. Traps are checked every day when the fish runs are strong. Ice forming over the trench in which the trap is placed must be removed with an ice pick. The trap is lifted up onto the ice, and the fish removed through a door which opens at the rear of the fish trap. During slow runs, traps harvest about ten fish daily. When burbot runs are strong, 150 fish may be taken daily.

Fish traps are typically set between November and March. They may be taken out of the water during slack periods or moved if the water level becomes too low. During the winter of 1982-83, two burbot traps were set in Chuathbaluk and one trap was set in Sleetmute. Village households cooperated in constructing, setting, and monitoring the fish traps. For example, in Chuathbaluk, one fish trap was constructed by Household B, while members of Households A and C assisted in setting and checking the trap (Fig. 34). Fish were regularly shared

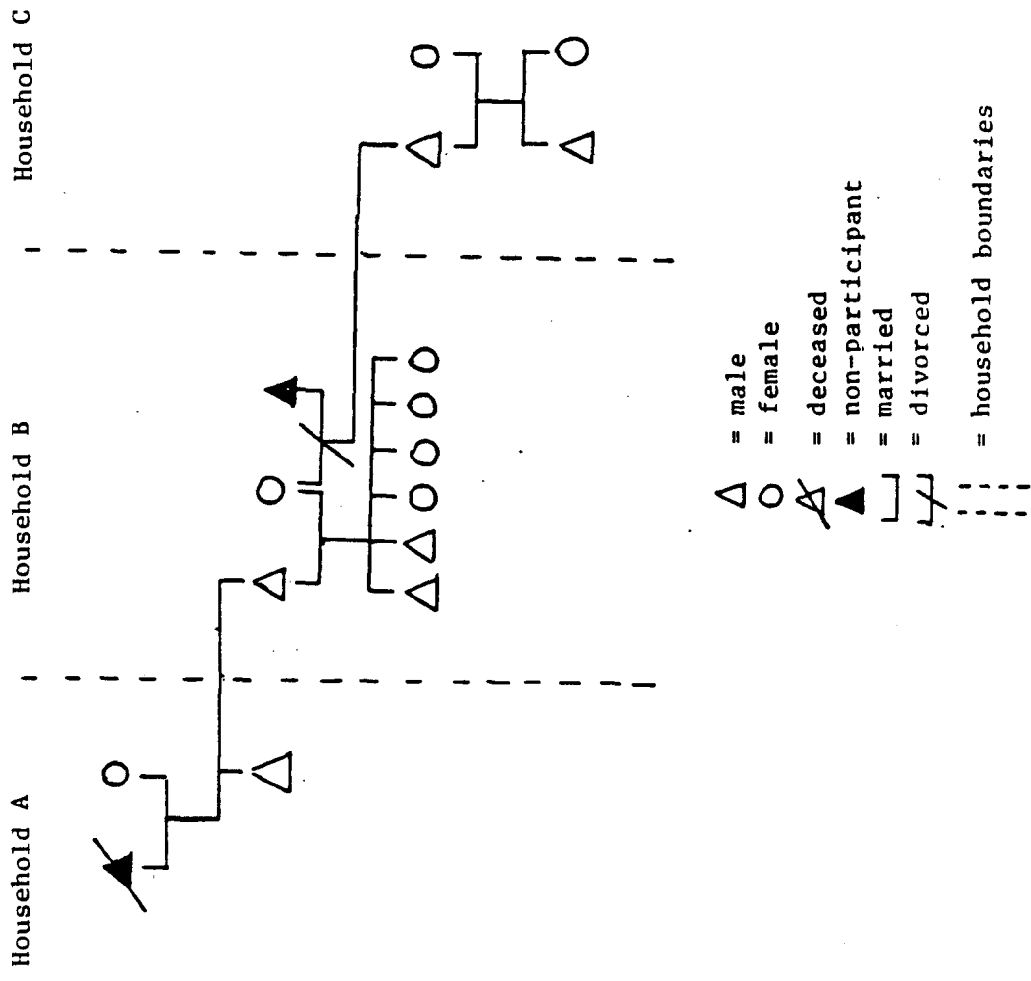


Fig. 34. Production unit for harvesting burbot, Chuathbaluk, 1982.

between these three households, and at times distributed to other village households. Sleetmute residents set a community fish trap every year. During 1982-83 the materials for the trap were purchased by one household, the trap was constructed by an individual from another household, and members of nearly every household overwintering in the village assisted in setting the trap. Those individuals who assist in setting the trap are permitted to harvest fish from it. Residents take turns checking the trap from day to day, keep as many fish as they care to, and distribute the remainder to other village households.

Burbot are commonly fried, baked, and boiled for eating. The head, roe, and liver are saved for consumption. Livers may be used in making soups and stuffings, as well as boiled, baked, and fried. Many individuals feed burbot to their dogs, though others believe that they cause dogs to be sluggish.

HARVEST AREAS

Figures 35 through 48 depict the locations in which Chuathbaluk and Sleetmute residents have harvested sheefish, whitefish, rainbow trout, arctic char, grayling, blackfish, pike, and burbot with the use of set nets, fish traps, and hook and line during two selected time periods. The harvest of non-salmonid fish species, particularly with the use of hook and line, takes place in many locations, and not all of these are indicated on these maps. The hooking areas included in these maps are those commonly used by village residents.

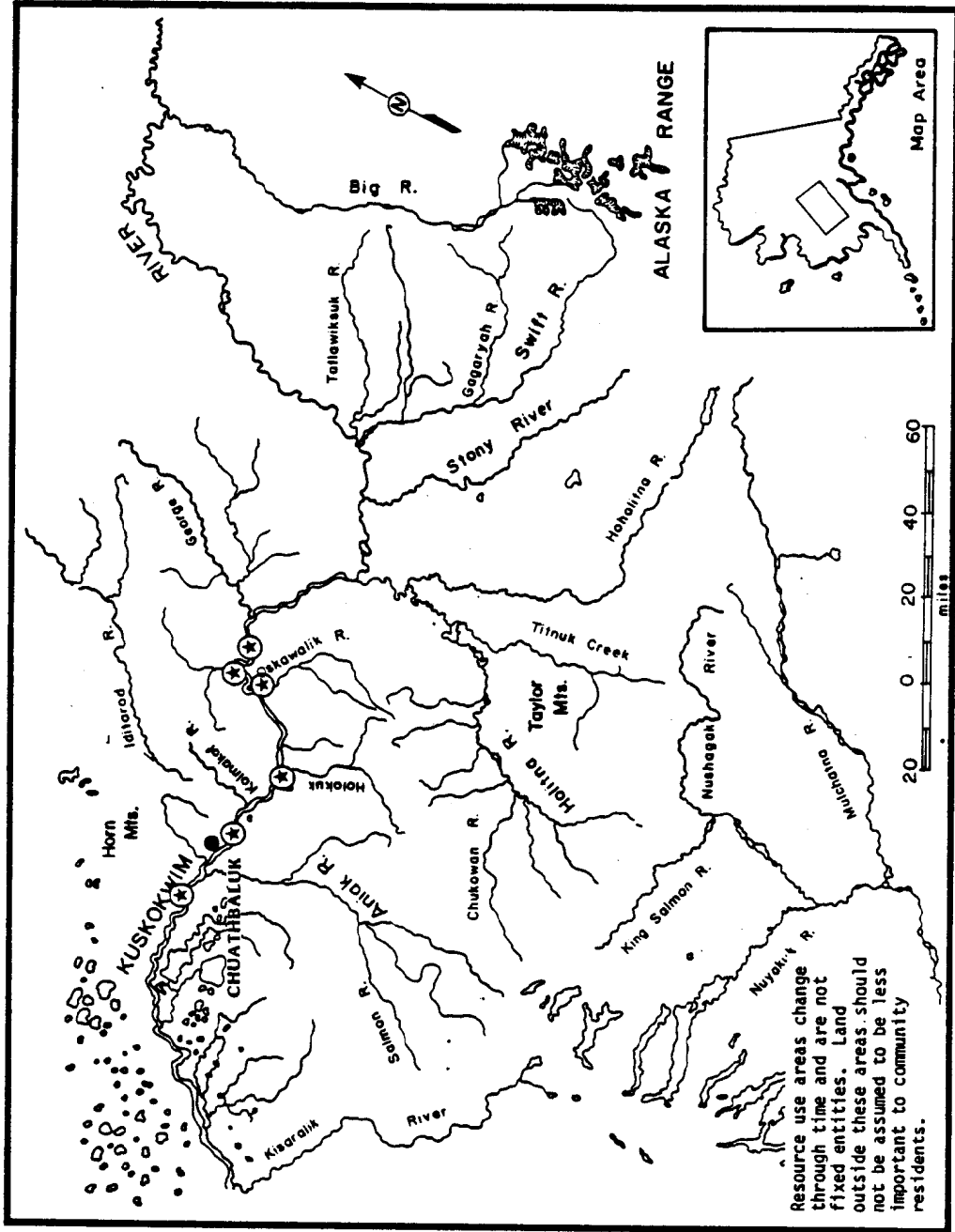


Fig. 35. Areas used by Chuathbaluk residents for harvesting burbot with traps prior to moving to Chuathbaluk.

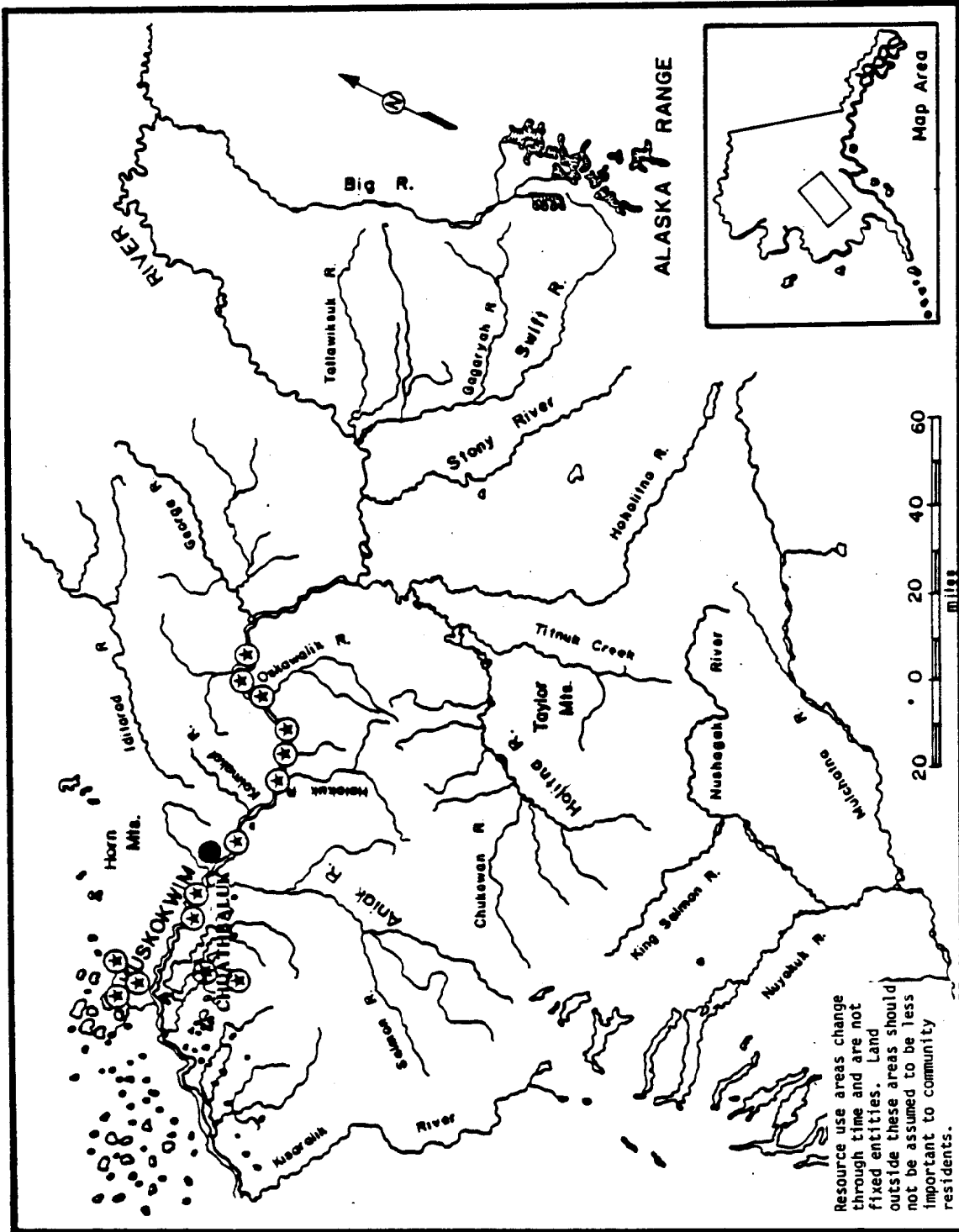


Fig. 37. Areas used by Chuathbaluk residents for harvesting whitefish with nets prior to moving to Chuathbaluk.

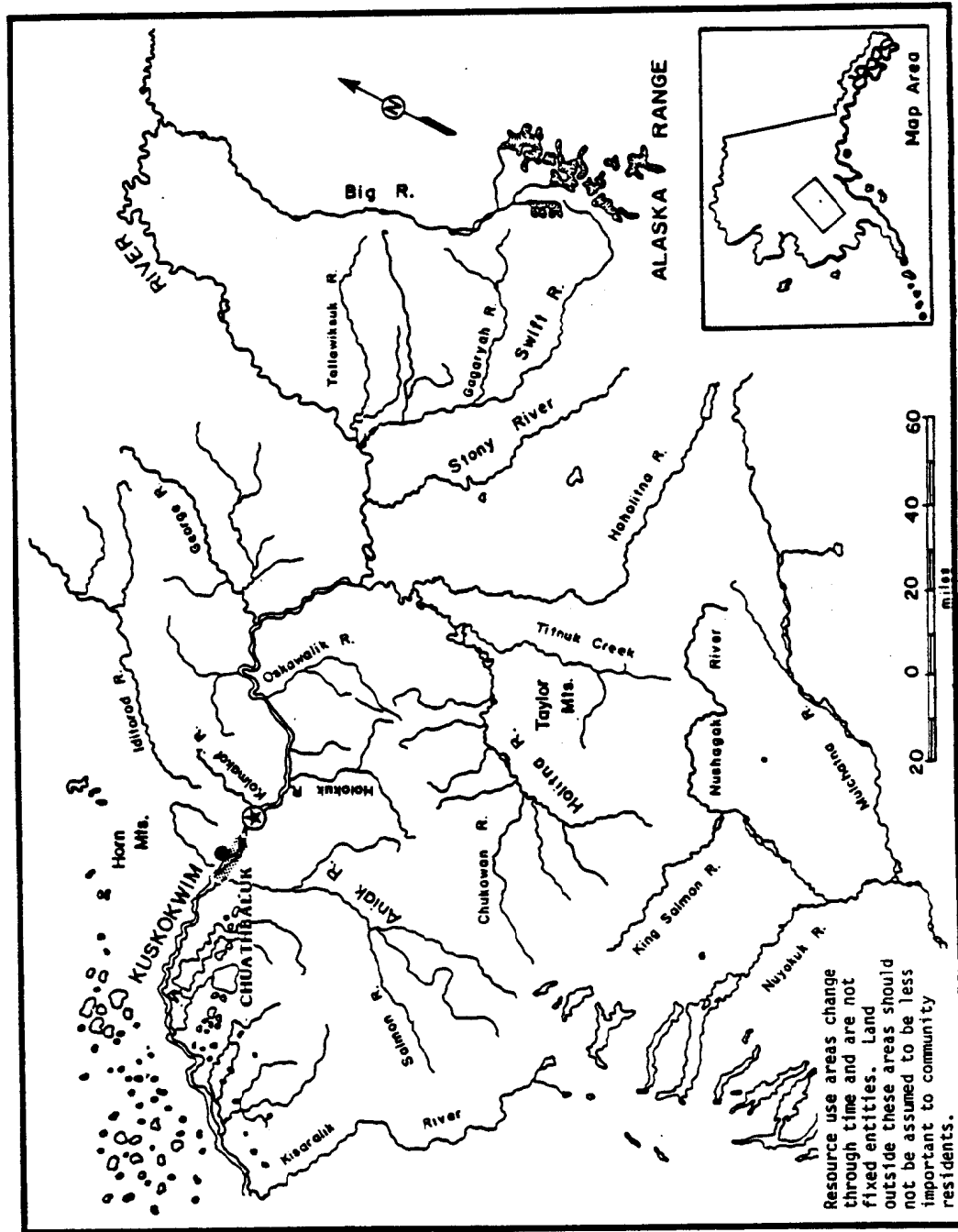


Fig. 38. Areas used by Chuathbaluk residents for harvesting whitefish with nets since moving to Chuathbaluk through 1983.

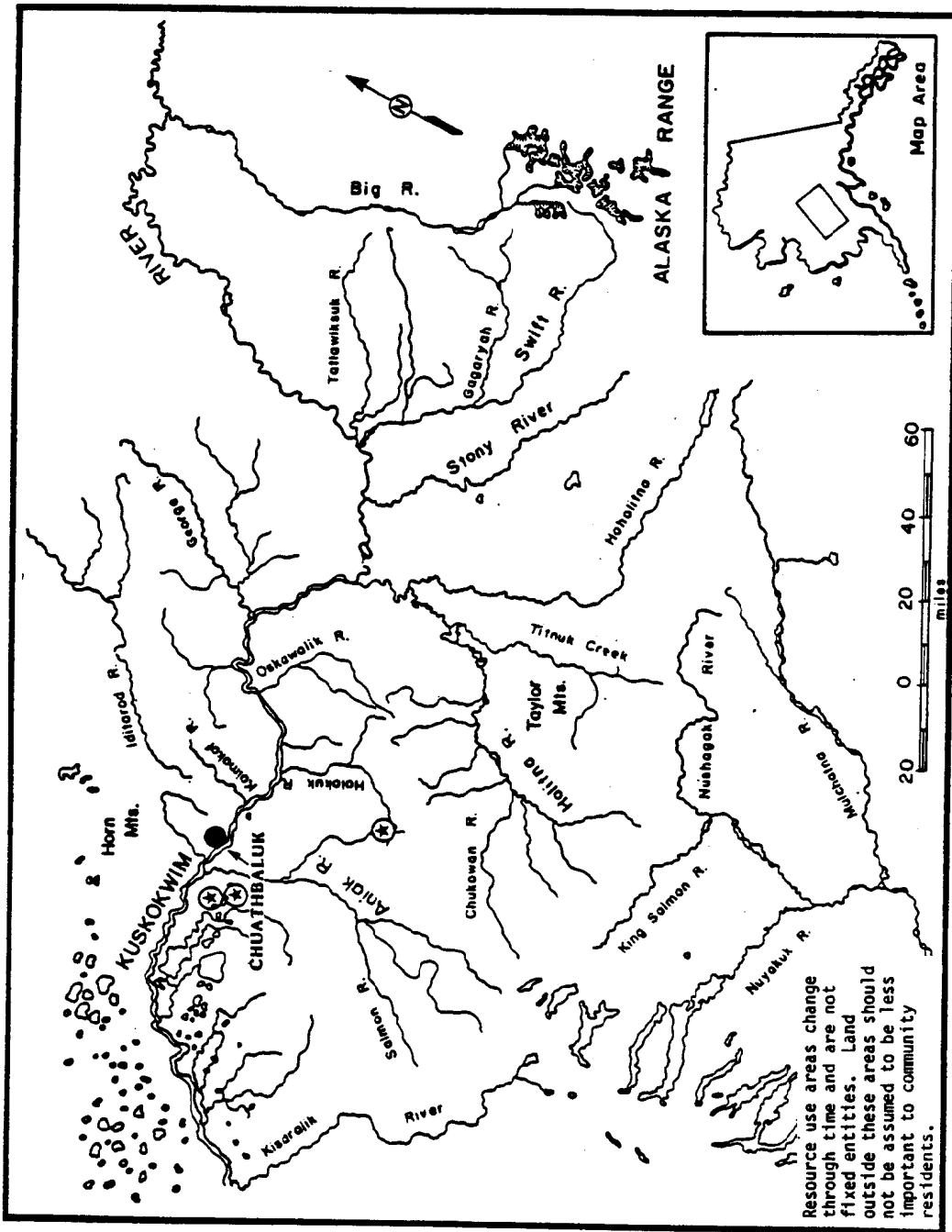


Fig. 39. Areas used by Chuathbaluk residents for harvesting blackfish with traps prior to moving to Chuathbaluk.

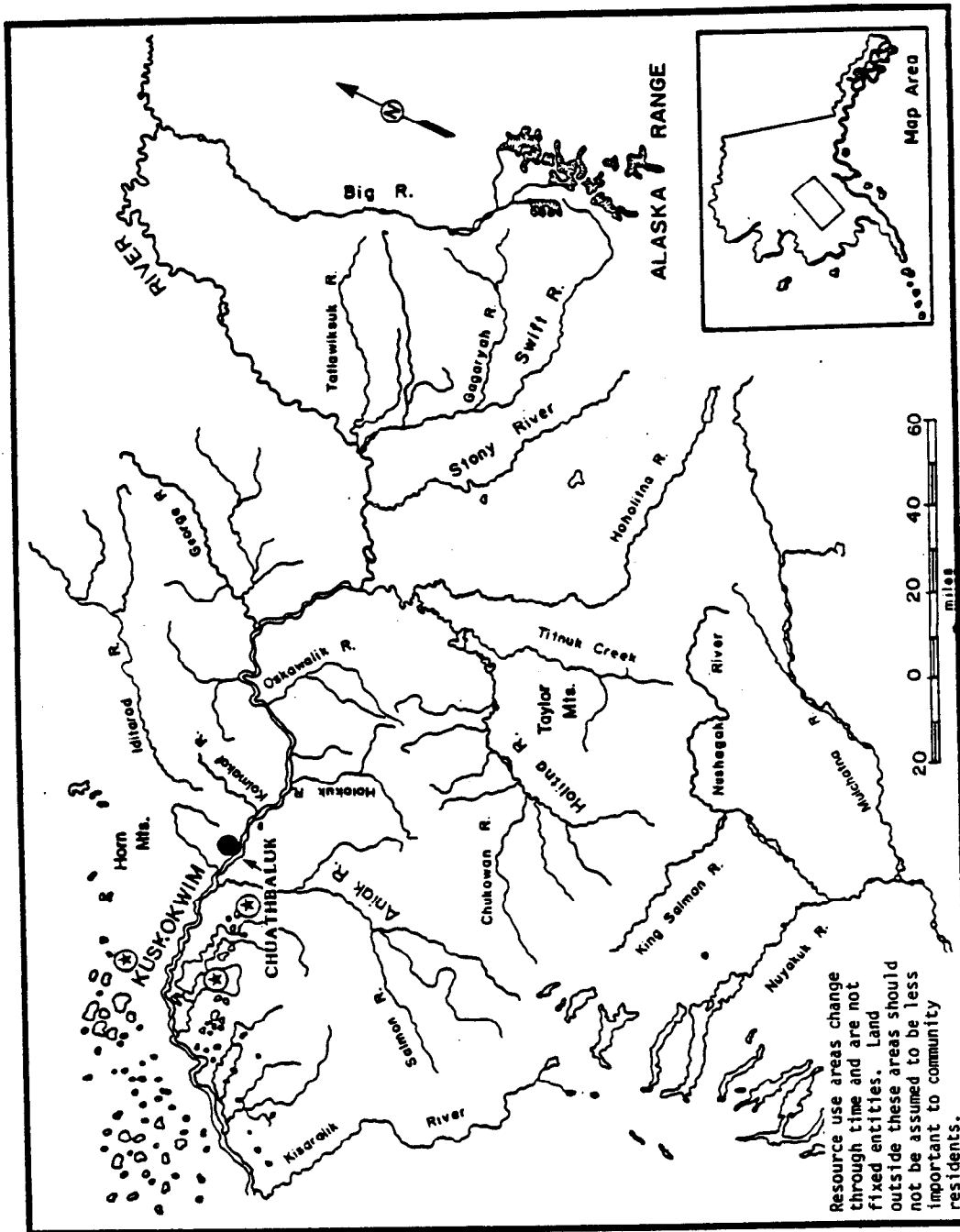


Fig. 40. Areas used by Chuathbaluk residents for harvesting blackfish with traps since moving to Chuathbaluk through 1983.

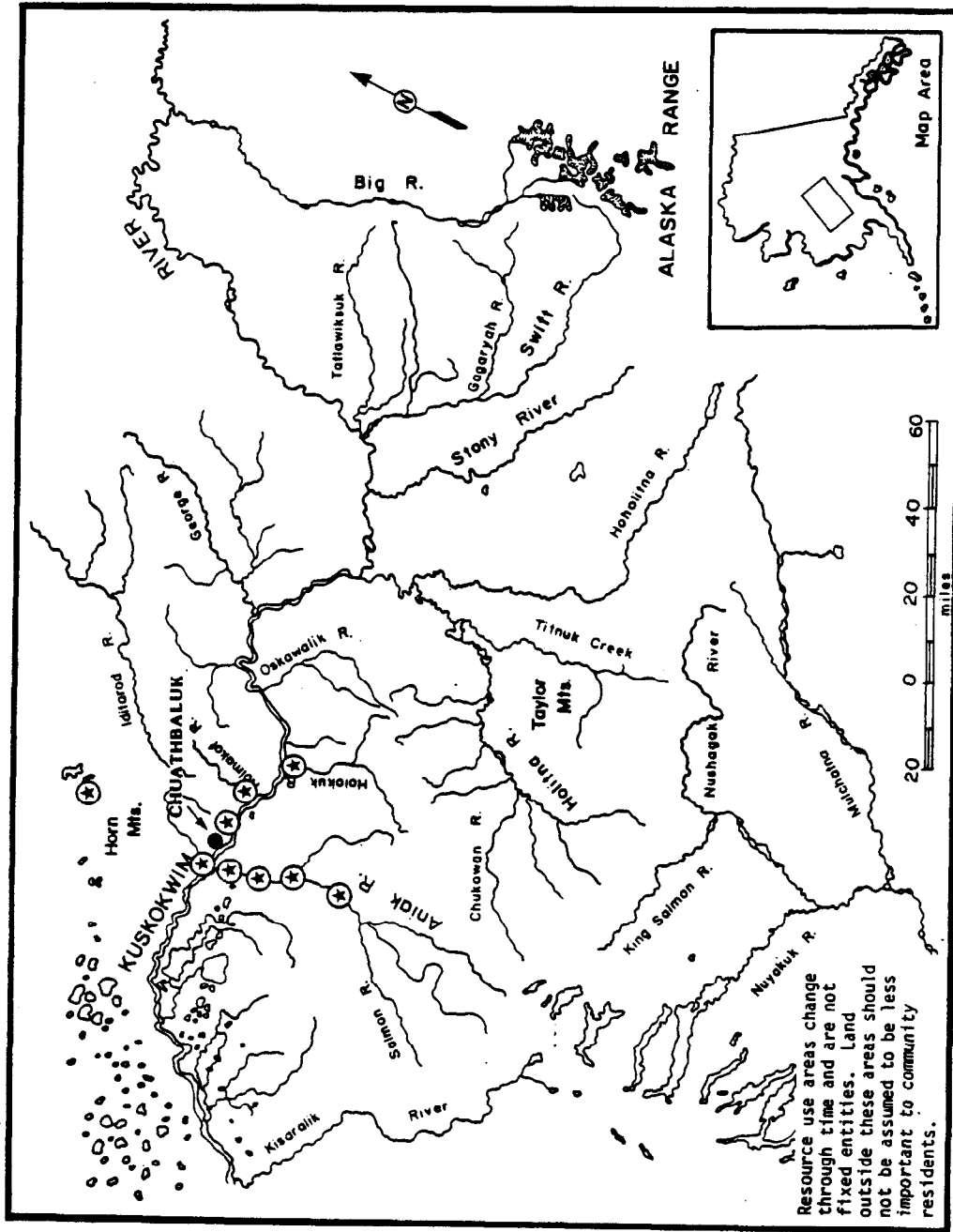


Fig. 41. Areas used by Chuathbaluk residents for hooking non-salmonid fish species prior to moving to Chuathbaluk.

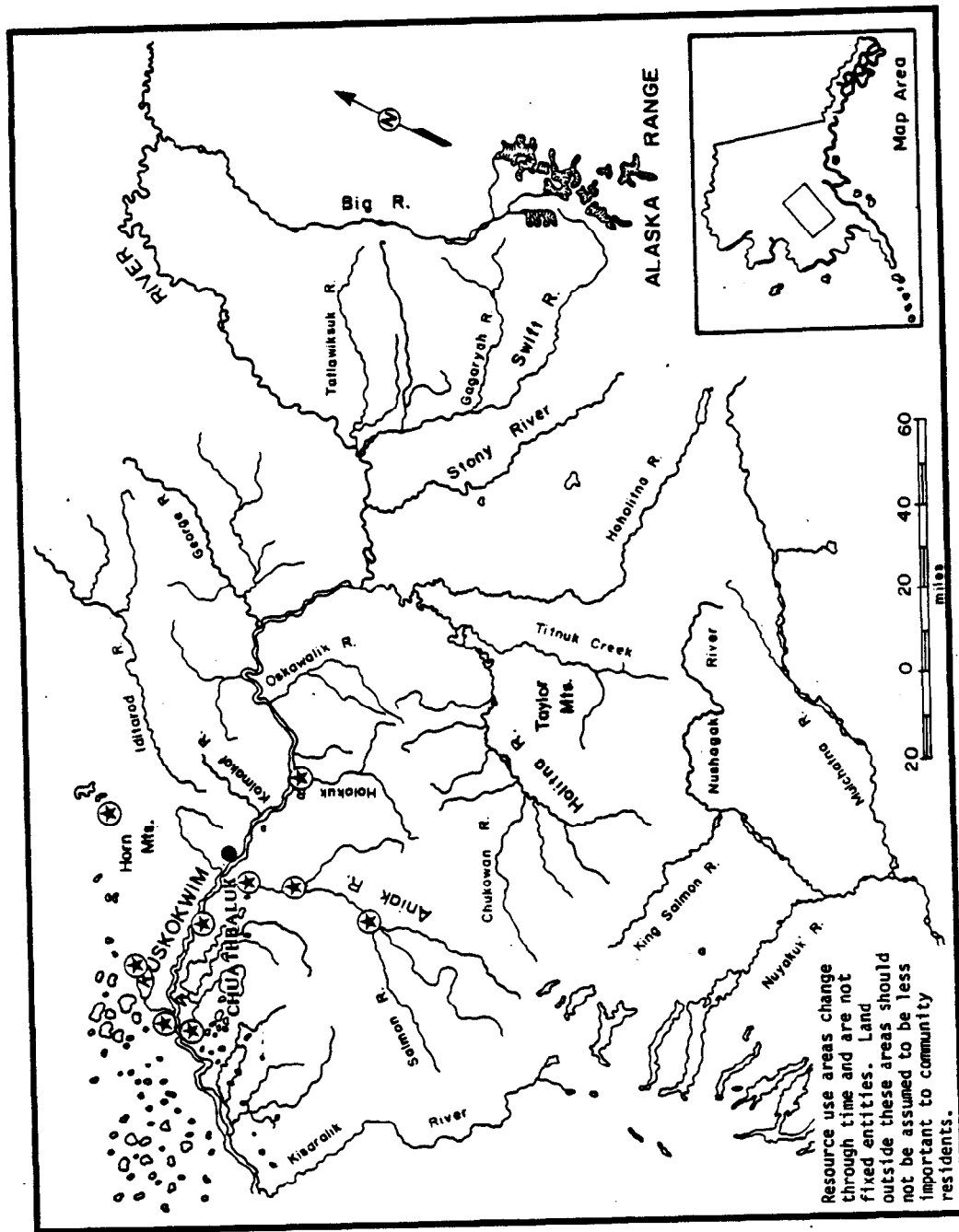


Fig. 42. Areas used by Chuathbaluk residents for hooking non-salmonid fish species since moving to Chuathbaluk through 1983.

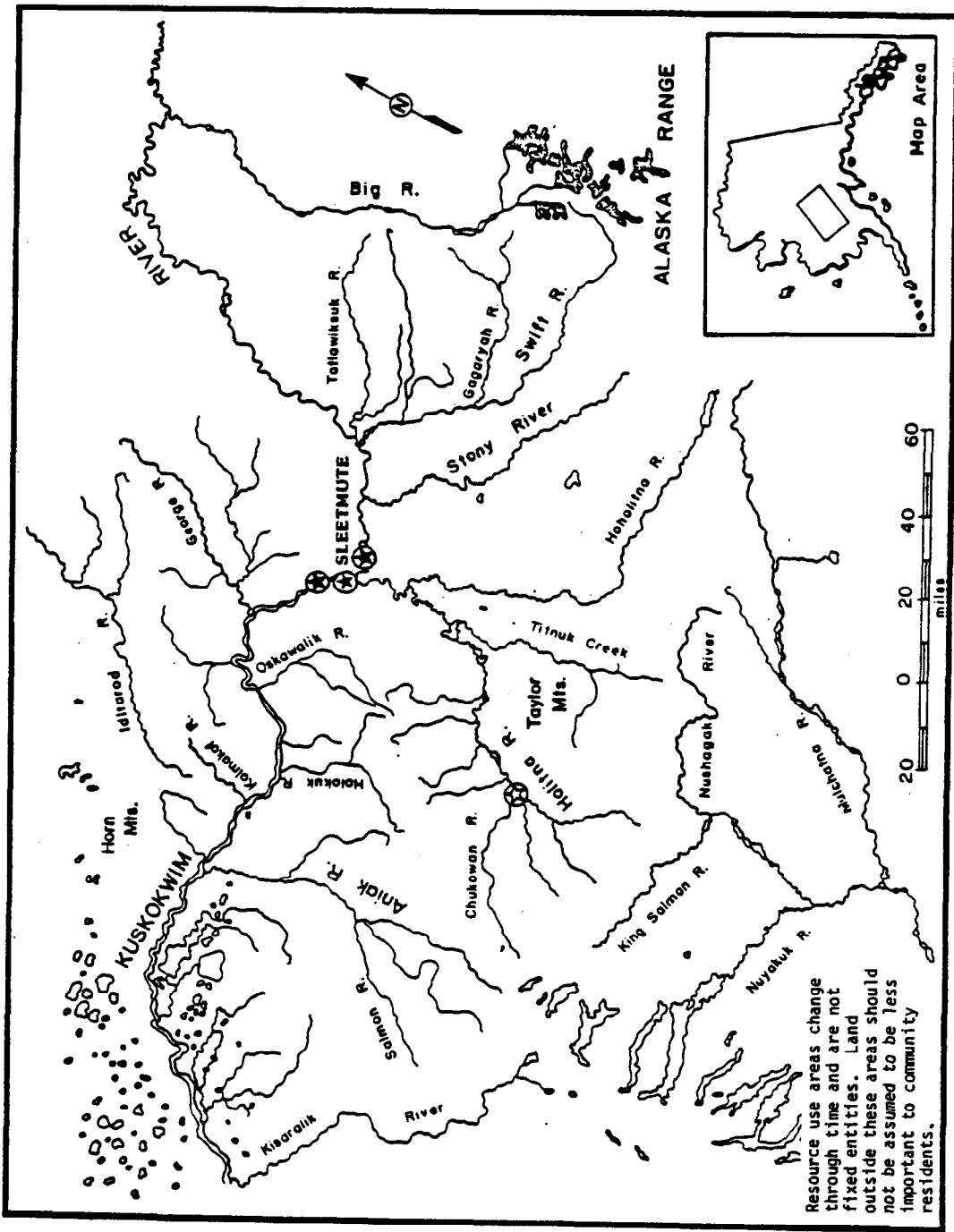
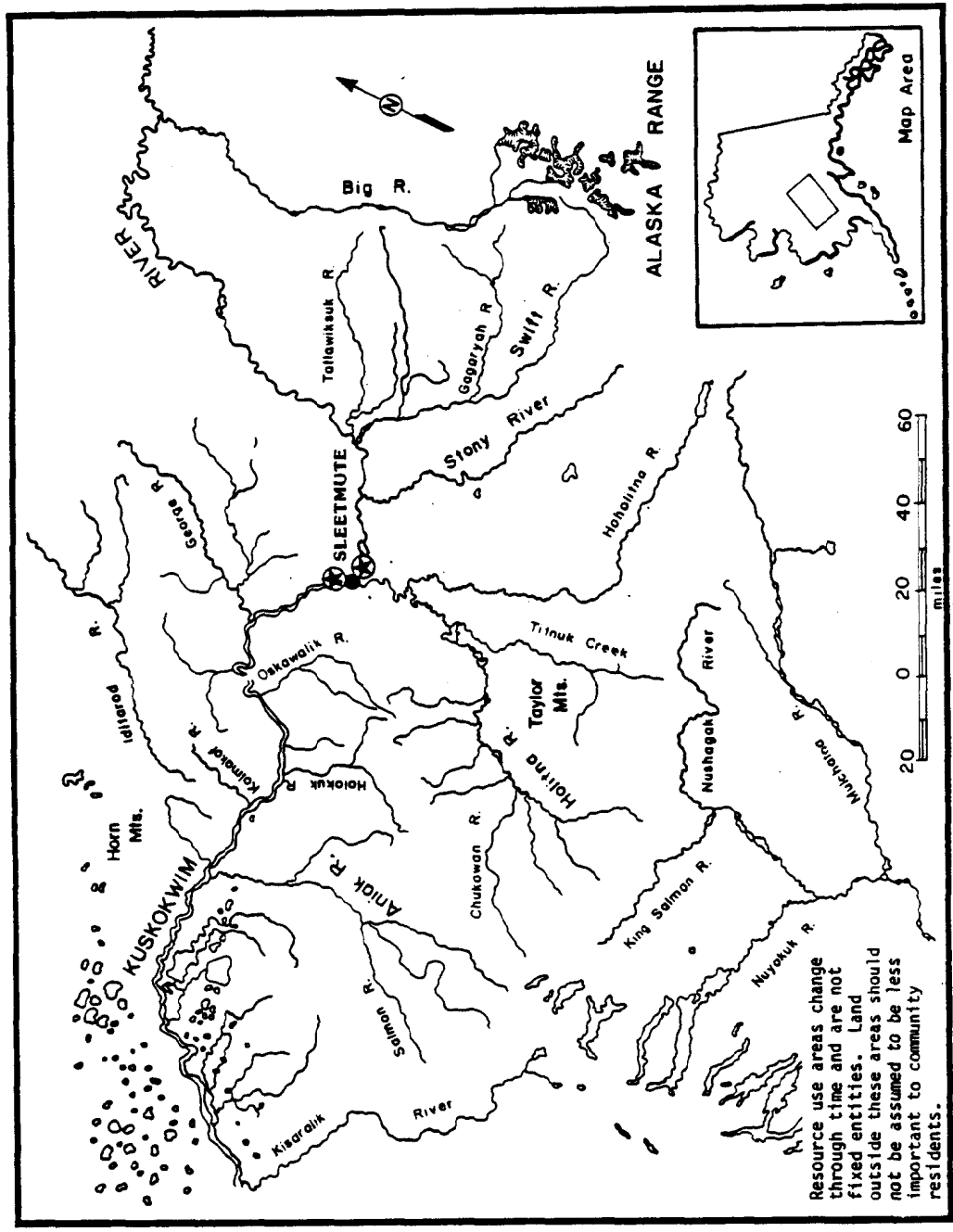


Fig. 43. Areas used by Sleetmute residents for harvesting burlap with traps prior to the use of snowmachines.



Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.

Fig. 44. Areas used by Sleetmute residents for harvesting burbot with traps since the use of snowmachines through 1983.

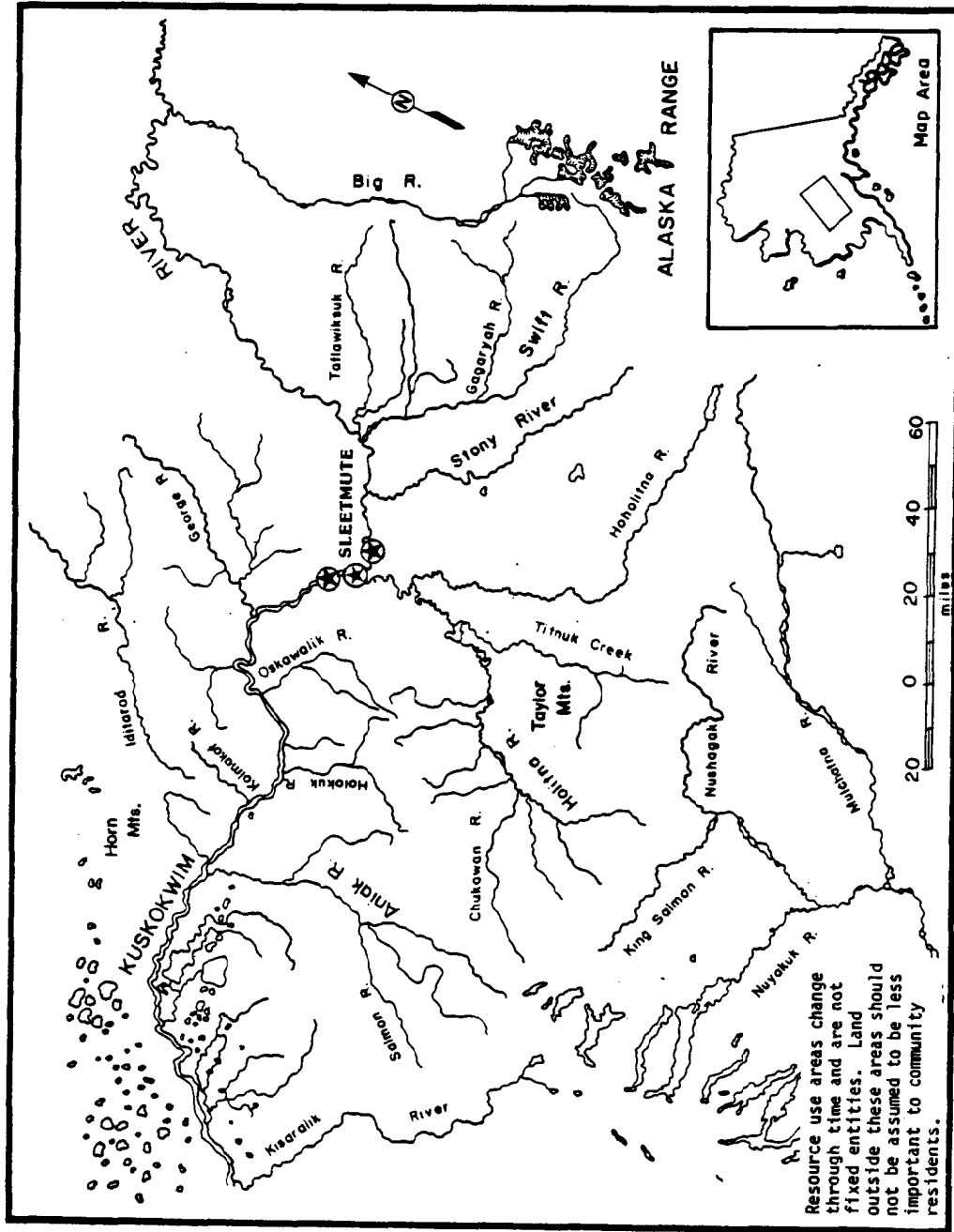
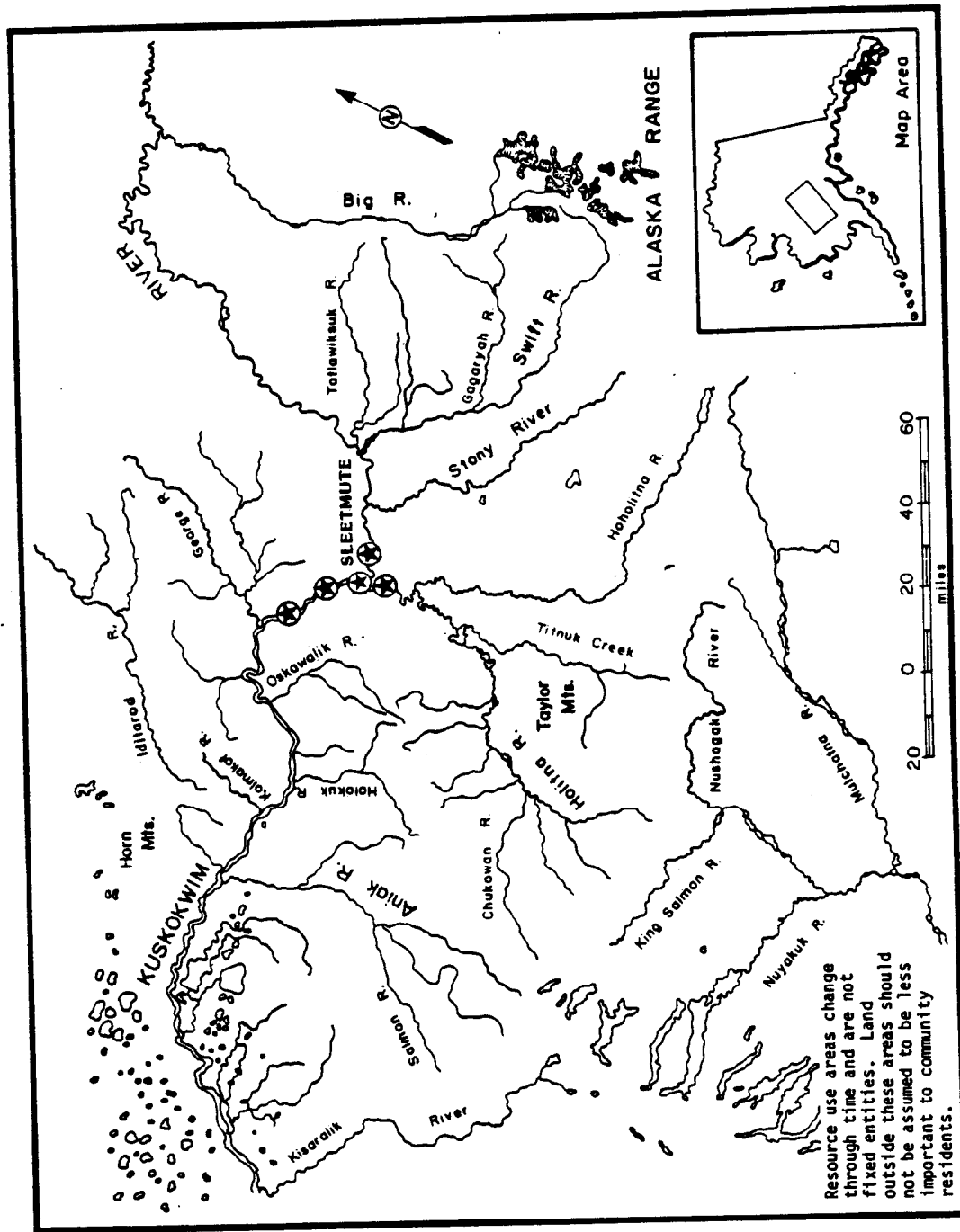


Fig. 45. Areas used by Sleetmute residents for harvesting whitefish with nets prior to the use of snowmachines.



Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.

Fig. 46. Areas used by Sleetmute residents for harvesting whitefish with nets since the use of snowmachines through 1983.

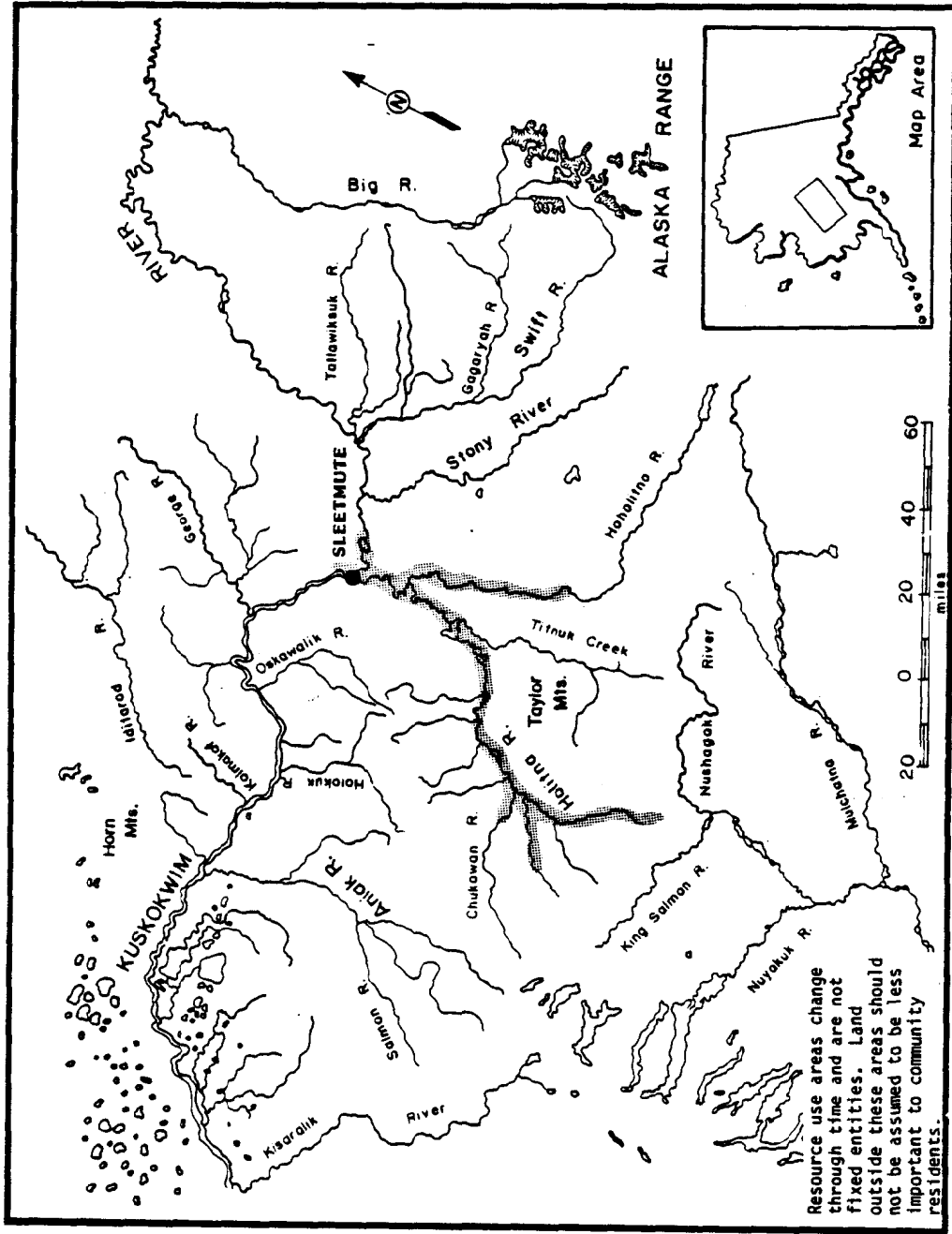


Fig. 47. Areas used by Sleetmute residents for hooking non-salmonid fish species prior to the use of snowmachines.

Figures 35, 37, and 39 show that burbot traps, whitefish nets, and blackfish traps were set along the Kuskokwim River in the vicinity of the communities in which individuals previously resided, between Kalskag and Crooked Creek, before residents settled in Chuathbaluk. It is apparent from Figures 36, 38, and 40 that since living in Chuathbaluk, residents have set burbot traps, whitefish nets, and blackfish traps closer to Chuathbaluk. The change in harvest areas is largely due to changing place of residence. Blackfish trap areas were not as extensively located as burbot or whitefish areas during the two time periods. A few locations in tundra areas have been used for placing blackfish traps. As depicted in Figures 41 and 42, hooking areas have not been altered significantly during the two time periods, though the figures possibly reflect a trend toward a more restricted area of harvest, occurring in closer proximity to Chuathbaluk in the recent past as compared with the more distant past.

Figures 43, 44, 45, and 46 demonstrate that whitefish nets and burbot traps have been set by Sleetmute residents in the same locations in both time periods selected. Nets and traps are set close to the winter village. No blackfish traps have been set by Sleetmute residents. Figure 47 shows that prior to the use of snowmachines, Sleetmute residents hooked throughout the Holitna and Hoholitna drainages, to the headwaters. Residents commonly traveled these distances by dog team. Since the use of snowmachines, Sleetmute residents have continued to use these areas, and in addition, have used the George River (Fig. 48). The Oskawalik River was used by one Sleetmute resident who previously resided in Crooked Creek. The use of hooking

areas is influenced by other resource harvest activities, as hooking is often conducted in the course of pursuing other resources. It is these activities, and not the use of snowmachines, that account for the expanded area used for harvesting non-salmonid fish species.

CHAPTER 7
MOOSE HUNTING

Moose are considered a staple in the central Kuskokwim diet, comprising a major portion of the protein consumed by Chuathbaluk and Sleetmute residents. This chapter discusses hunting methods, production units, preservation and preparation methods, the distribution of moose meat among community members, the importance of moose, land use patterns, and regulatory concerns. A review of assessments of moose population levels, the 1982 and 1983 moose seasons, and a brief regulatory history of moose in GMUs 19A and 19B are also presented.

HUNTING METHODS

Seasonal Techniques

According to local residents, traditionally moose were harvested throughout the year in the central Kuskokwim drainages, often when encountered in the course of pursuing other activities. Moose were actively sought in late August and September when men from the community moved to fall hunting camps. From these camps, bear and caribou were also harvested. Typically, a group of men traveled up a tributary of the Kuskokwim River by birch bark canoe or traveled overland on foot and established a hunting camp from which moose, caribou, and black and brown bear were harvested over the course of several weeks. A fire was kept going at the camp for the purpose of drying and smoking the

meat. When enough animals had been taken, skin boats were constructed using the animal hides and the hunters drifted back downstream and returned to the winter villages with the supply of meat. The birch bark canoes were left at the hunting camp site.

Moose were traditionally harvested in spring as well, often in April, at which time they provided the best quality hide for making babiche (rawhide line) which was used in manufacturing snowshoes. Spring moose were also valued for the production of dry meat. Dry moose meat was a favorite food among area inhabitants. It was utilized throughout the summer when families were at fish camp.

Moose hunting currently takes place during the September, November, and February seasons, as established by regulation. During the September season, transportation to hunting areas is usually by means of 16 to 23-foot wooden skiffs powered by 15 to 70 hp. motors. Wooden boats are preferred to aluminum as they are considered quieter and more capable of hauling larger loads. Smaller motors give the hunters easier access to shallow creeks, sloughs, and the upper reaches of Kuskokwim River tributaries. Longer boats are advantageous when traveling in waterways where poling is necessary, as they are more easily moved in a straight line. During the November and February seasons, transportation is by snowmachine. Individuals who are in good physical condition and lack boats or snowmachines may hunt on foot near the village using snowshoes. Rifles commonly used for shooting moose are the .30-.30 and .22 caliber, although anything from a .22 to .300 magnum caliber rifle may be used.

Some individuals have the reputation of being "sharp-shooters," usually killing a moose with one shot. This ability is considered a special gift that has been bestowed upon certain individuals by others and in turn may be passed on once the bearer no longer feels a need to retain the ability. It is unknown ahead of time who this gift will be passed on to. The bearer typically gives it to whomever he considers the most deserving close relative, such as a son or nephew.

Some hunting traditions applied to the harvest of moose as well as bear and caribou. Many Chuathbaluk and Sleetmute hunters consider it bad luck to take a female hunting with them. It is considered good luck for hunters to take a steambath on the night preceding a hunt. Both of these hunting traditions are currently in practice. Historically, every hunter did something to commemorate each animal he killed (VanStone 1970). The animal was either depicted on the bow of the hunter or one of its teeth was removed and strung onto a belt which held the teeth of all animals killed by the hunter to be worn at gatherings (VanStone 1970). These practices no longer prevail. The bones of animals hunted were traditionally thrown into the river to prevent dogs from chewing on them and offending the spirits of the animals, making it difficult to hunt them in the future (Oswalt and VanStone 1967). This also is no longer a common practice, which is cause for worry among some village elders who fear the consequence may be a depletion of game populations.

Environmental conditions and seasonal habits of moose influence hunting locations and techniques as well as hunting effectiveness. Knowledge of the behavioral patterns of moose and their responses to

environmental stimuli is instrumental to success on the part of the hunter. While many local people attribute hunting success primarily to "good luck," technical skills are also integral components of hunting effectiveness.

During the summer and early fall months of open water, moose are distributed throughout the spruce-birch forest, along rivers, on sand bars, around lakes, in open wet meadows, and on ridges with browse cover. Willows which border rivers, creeks, and lakes are a major food source, and moose are often found in these riparian habitats. Moose tend to feed during early morning and evening hours, at which times they are more likely to be encountered by hunters, as compared with during the day when they tend to rest in the brush. On calm and humid days when mosquitoes are especially dense in the woods, moose often seek relief on sand bars and riverbanks. Bulls and cows are especially fat in July, August and September.

In late September bulls enter the rut. At the onset of below freezing temperatures in late September, moose concentrate along river flood plains in search of food which becomes less available in the upper elevations. At this time of year bulls are on the move in search of cows and respond to sounds with bold curiosity. This proves to be beneficial for the hunter, who can generate sounds that arouse and attract bulls. It also allows the hunter to move into closer proximity of the animals, providing better vantage points from which to shoot. At this time, small, mixed age and sex groups of moose can be encountered. It is comparatively easy to hunt in late September and early October when animals are concentrated along rivers where hunters have access

to them by boat and on foot. The meat of bull moose is considered edible while the animals are in rut. It is not until after the rut that the meat is considered ill-tasting.

Abundant rains during fall cause the Kuskokwim River and its tributaries to rise, allowing hunters greater access to otherwise shallow and impenetrable waters. However, moose tend to remain sedentary in rainy weather, decreasing the likelihood that they will be encountered by hunters. In addition, high water causes sand and gravel bars to become partly or entirely submerged, diminishing favorable foraging habitat for moose. This forces moose away from riverbeds where hunters may be travelling or drifting in search of game. Leaf fall, triggered by cold weather, increases hunting success by improving visibility in the woods.

Techniques implemented in moose hunting during the September season include moose calls, drifting along rivers in boats, tracking on foot, and lying in wait. Moose calls are commonly made by scraping a moose scapula against a tree trunk, by pulling a string through a small hole in the center of the bottom of a tin can from which the top has been removed, or by making a vocal utterance. Moose may also respond to the sound of an axe chopping wood.

Feeding moose are encountered by hunters in the course of travelling by boat during hunting trips. The sounds produced by boat motors tend to frighten animals away from the river and into the brush, making drifting a preferred hunting method. The hunting party employs the motor in traveling toward the headwaters of a river or creek. The motor is then shut off and the boat is allowed to drift downstream

with the current, being guided by the oars. Hunters can then quietly approach and dispatch a moose along the river bank. If fresh tracks are encountered or a distant moose is sighted while drifting, the party usually stops to search for the animal on foot. The group of hunters split up and circle the area where the animal is expected to be.

Most moose hunting takes place within one mile of either side of the waterway which is being hunted. Hunters are reluctant to take moose more distant from their boats due to the time and effort involved in packing the parts of an animal that may weigh up to 1,000 pounds or more. Hunters will often search for moose on foot around meadows or lakes within a hunting area. Another strategy used is to climb a hill 50 to several hundred feet high that is close to the waterway and survey the surrounding countryside with binoculars in an attempt to locate animals which can be then pursued on foot. A hunter may situate himself on a ridge or hillside for several hours waiting for an animal to move. Hunters also may station themselves at good vantage points along the Kuskokwim River and wait several hours to locate a swimming moose, which can be taken once it reaches the opposite shore. Aircraft are seldom used in moose hunting by local residents. One Sleetmute household uses private aircraft for hunting moose.

In mid- to late October following the rut, mixed age and sex groups of moose disperse. According to local residents, the meat of the bull moose becomes tough and ill-tasting at this time, making cows the preferred target during the November season.

During cold winter months the movement patterns of moose are largely influenced by snow cover. When there is little snow, the

animals remain distributed throughout open upland areas and the spruce-birch forest. Crusted snow in open areas causes moose to favor the forest where snow tends to be softer. Deep and drifted snow on ridges and in upper elevations drives moose down into riverbeds where they can often be found on islands and in sloughs. Willows are an important winter food source for moose. When moose sense a storm coming they move down to the rivers. Moose may remain solitary at this time of year. Others move in groups of two or three, such as a cow with a yearling, two cows, or two bulls together. Bulls drop their antlers around February, when animals begin to congregate in large mixed or single sex groups that can number up to 20 animals. Bulls may be seen fighting with one another at this time.

During the November and February hunting seasons, ice and snow conditions influence hunting patterns. Freeze-up along the middle Kuskokwim usually occurs in November. Around Sleetmute the river and lakes tend to freeze around Thanksgiving, while the waters near Chuathbaluk freeze approximately two weeks prior to this. Ice conditions often make it unsafe to travel during the November season, because it coincides with freeze-up when there is still open water and overflow. Hunting may be restricted to overland areas in which activities become influenced by snow conditions. Deep snow creates improved hunting conditions in overland areas. These conditions make it difficult for moose to run and increase the effectiveness of snowmachine travel for the hunter. Warm spells during winter months cause ice melt, snow melt, and overflow, creating unsafe travel conditions overland and on rivers and creeks and preventing hunters from hunting.

During the November and February seasons, snowmachines are the primary means of transportation in moose hunting. Rivers and creeks become major travel corridors along with overland trails which are used during winter months. Hunting methods involve traveling to an area by snowmachine where moose are likely to be found and looking for fresh tracks in the snow. Once fresh tracks are located, they are followed either on foot or by snowmachine. In open tundra areas where moose can be spotted, they are approached by snowmachine until the hunter is within shooting range. If the moose is feeding it usually will not run from a snowmachine, thereby increasing hunter success.

If there is deep snow and a fair wind, moose can be tracked on foot with the use of snowshoes to beds where they are resting during the day. The hunter must remain downwind of the animal. Strategies for hunting moose on foot involve splitting up with one's hunting partner(s) and circling the brush in opposite directions, attempting to flush out the moose toward one of the hunters.

During months with snow, tracking moose on foot depends on prevailing weather conditions. Windy and stormy weather allows a hunter to track moose to the beds in which they are resting without being heard. Calm, still weather enables animals to detect the sound of an approaching hunter and move off before he arrives. Deep, powdered snow allows a hunter to approach noiselessly. Icy or crusted snow amplifies sound, causing the hunter to be heard by the moose.

Islands can be circled and searched for tracks or traversed down the middle in hopes of intersecting tracks. If fresh tracks are found on the island banks, an island drive technique may be employed, assuming

that the moose is resting in the brush on the island. The hunters can enter the brush in the location of the tracks or at one end of the island, anticipating where the animal lies. One hunter remains at the opposite end of the island. The hunters in the brush walk toward him in an attempt to flush the moose in the direction of the waiting hunter, who then shoots it. Tracking techniques require an ability to distinguish between fresh and old tracks. A hunter may feel the tracks he is following every few minutes to determine whether the snow is loose, soft, and powdery, indicating fresh tracks, or if it is crusted, hard, and frozen over, signifying old tracks.

When tracks are difficult to locate, feeding signs are examined to determine how recently moose have been in an area as well as what sex of moose have fed there. In places where moose have been eating willows, the tips of the stems are split using a knife. If the stem is green close to the tip, moose have fed there recently. However, if the stem is dried out an inch or more below the tip, moose have not fed there for some time. Bull moose eat brush that is wider in diameter than that eaten by cows. Cows eat the tips of the stems, while bulls break off stems well below the tips. If feeding signs indicate that moose have been in an area recently, the hunters will remain and look for fresh tracks. This hunting method was used more widely in earlier decades when moose populations in the central Kuskokwim were sparse. It was not observed in use as a hunting method in the 1982 and 1983 seasons, during which time tracks were easily located.

Animals disperse back into the open and/or forested upper elevations gradually following the melting of snow. Parturition occurs from late May to early June. Cows and newborn calves tend to remain along the rivers, which provide routes of escape from predators. By mid- to late summer, moose are distributed throughout their summer habitat. Knowledge of the seasonal distributions of moose is important, allowing hunters to anticipate where animals will be during different seasons and influencing where local people go to hunt. Climatic variables influence water, ice, and snow conditions as well as moose behavior, affecting hunting patterns and hunting success.

Production Units

Moose hunting is almost always engaged in by adult and adolescent males. During the September season an extended family group, including relatives and in-laws such as wives, sisters, mothers, and/or daughters of the hunters, often camps together for up to a week. During this time the females pick crowberries and lowbush cranberries, while the males hunt moose and black bear. Sometimes two or three households that may or may not be related will camp together in one area. These camps are typically in locations where individuals have had berry camps in previous years. The November and February hunting excursions usually involve males. Hunting may be pursued in the course of checking a trapline or may take place during day or overnight trips from the village. Extensive camping during these latter seasons is limited by cold weather.

The average size of hunting parties during the September 1982 season was 2.8, ranging from 1 to 5 persons. Hunting parties were most typically composed of brothers, fathers, and sons, but included cousins, nephews and uncles, or friends. Individuals between the ages of 11 and 78 participated in documented hunts. The average size of the hunting party during the November season was 1.4 persons, ranging from 1 to 3. Hunting party composition did not differ from that of the September season.

The average monetary expenditure for hunting moose during the September season was \$163 with a range of 0 to about \$500. The average monetary expenditure for hunting during the November season was \$59. Data on the size of hunting parties and monetary expenditure during the February 1983 season were not gathered systematically. General observations indicate however that these figures would be comparable to those given for the November season.

Once a moose is killed it is butchered at the kill site by the members of the hunting party. The meat is divided among the party members and taken back to the winter village. There the meat is further processed by either male or female members of the household for storage and distribution. The female members of the household are primarily responsible for preparing the meat for eating.

PROCESSING AND USE OF MOOSE

Preservation

Once a moose is harvested, a portion of the meat is set aside to be eaten fresh over the next few days. The remainder may be preserved by a variety of techniques. The primary means of preserving moose meat is by freezing out-of-doors. Most villagers depend on the weather to prevent their meat from spoiling. For this reason, hunting seasons that occur during months when temperatures have already fallen below freezing are preferred. Butchered sections of the moose such as hind and front quarters and rump are commonly hung in the salmon smokehouse owned by the household if located in the village or suspended from a rack approximately ten feet high constructed from birch or spruce timbers. The meat is wrapped with a material such as burlap to prevent damage from birds. Sections of the moose may sometimes be placed in the household's cache. If a household lacks a storage area, members may place the meat in the smokehouse or cache of a close kin such as parents. Cold temperatures freeze the meat and preserve it through the winter. During warm months, meat may be placed in garbage bags and submerged underwater in rivers or creeks to be kept cool.

Most residents of Chuathbaluk and Sleetmute do not own freezers, as electricity was not made available to these villages until September 1982. Many individuals consider freezers to be too great an expense and do not plan on acquiring them. Those households which do own freezers may not have enough room in them to store a large quantity of moose

meat, since freezers may be already full of fish, berries, birds, and other wild foods. When moose meat is to be stored in a freezer, it is first cut into portions that fit into one-gallon "zip-lock" bags.

Three additional meat preservation methods are smoking, drying, and jarring. Salting moose meat by placing it in a barrel in layers with rock salt was reported to be a traditional method of preserving meat but is no longer in use. In the past, this preservation method predominated during summer. A more current practice is to brush a brine solution onto hanging meat to discourage flies from laying eggs.

Currently smoking is a method of preserving moose meat under warm weather conditions. The large, butchered parts of the animal, such as legs, rump, and ribs, are smoked over a fire in the smokehouse to create a hardened outer layer over the meat. The meat is not cured all the way through, but a protective outer layer is formed allowing the inner meat to remain soft and fresh. When pieces are cut for use in eating, the smoke causes a new outer crust to form. This protective layer keeps flies off of the meat.

Dry meat is considered a specialty and appears to be more prevalent as a preservation method in Sleetmute than in Chuathbaluk. Dry meat was traditionally made during spring but also during summer when freezing was not possible. April and May are considered the best times to dry meat. Meat with a cross-grain is preferred for drying, usually from the rump, although meat can be taken from any part of the body that lacks tough sinew. The meat is cut into long, thin strips, and either placed on a suspended bed of chickenwire, hung over poles, or suspended from poles on pieces of string. The meat can be dried by

the sun in spring before flies hatch out, over a fire in the smoke-house in summer, or indoors over a stove during winter. Meat that has been frozen during the winter can be thawed and dried in spring or summer.

Jarred meat is made through the canning process, utilizing a pressure cooker. Several cases containing 12 one-quart jars may be prepared by a given household.

Moose Products

Residents of Chuathbaluk and Sleetmute seek to utilize nearly the entire moose. Wasting meat is considered unethical by most local residents. Often the animal will not be skinned prior to butchering in order to keep the meat clean and fresh. Some households are not concerned with saving the hide. Others give it to their dogs to eat, the texture functioning to clean and deworm their intestines. Some individuals cut the hide into small pieces and use it for trapping bait. Moose leggings are often saved and used in the manufacture of skin boots. Pieces of moose hide with the hair removed, preferably from the belly, are used in making bottoms for these boots. Babiche (raw-hide line) previously was used in making snowshoe webbing, but it is no longer being made.

Moose sinew was traditionally made into thread for use in sewing clothing. It was also woven into fishnets, for which pieces of the antler or bone were used as sinkers. In the past, bone was used for making awls, fish hooks, and net sinkers (Oswalt and VanStone 1967).

Antler was used in the manufacture of net sinkers, arrowheads, wedges, woman's knife (uluuq) handles, sidebladed knife handles, adz heads, and kayak shoes (Oswalt and VanStone 1967). Most of these uses have now been superseded by modern technology. Antler is still used occasionally for making uluuq handles. The moose scapula is sometimes saved and used for making moose calls when hunting.

Moose meat is most commonly boiled for eating, although it is sometimes fried, roasted, and barbequed. Moose that has little sinew is sometimes ground into "hamburger." Often the meat is used in soups and stews to make it last longer. The leg bones and hooves are generally used in soups. Marrow from the leg bones is considered a delicacy. Moose head soup is a favorite dish, the nose, tongue, cheek meat, and brains being the most desirable parts. The liver, heart, kidneys, part of the stomach muscle, and one of the four stomachs are all eaten. Other viscera may be fed to the dogs.

Moose fat is a highly valued commodity. Up to 100 pounds of fat may be cleaned out of the stomach area of a fat moose. The fat may be fried, cooled, and eaten in small pieces. It is also rendered into oil and used for making akutaq, which may have moose meat, fish, Crisco, sugar, and berries mixed into it.

Distribution

The distribution of meat both within and between communities along kinship and friendship lines is common in Chuathbaluk and Sleetmute. Food sharing provides wild meat to both unsuccessful hunting households

and households lacking hunters. Moose meat was also observed being distributed to other successful hunting households. A significant amount of distribution occurs when the meat is fresh. If a household is unsuccessful in harvesting moose during a particular season, it may be "loaned" meat by a successful hunting household. An equivalent amount of meat will be returned to the lending household following a subsequent season in which the latter household is successful. When an individual kills his first moose during his lifetime, all of the meat is given away to other households. Residents report that this practice ensures the hunter with good luck and prosperity in future hunting endeavors. Some families give small portions of every kill to village elders in order to bring luck in the future, according to local accounts. Village elders stated that when they were young, every game animal harvested by a community member was shared with the entire community. An array of wild game species was harvested and consumed at "potlatches" in which several communities participated. Wild game is currently shared village-wide during Russian Orthodox celebrations of Slavic (Russian Orthodox Christmas), weddings, and "40-days feasts."

The distribution of moose meat following the September and November 1982 seasons was documented using questionnaires (Appendices A and B). Ten responses which provided adequate data for analysis revealed complex patterns of distribution, including parents, siblings, offspring, cousins, nephews, aunts, and/or non-relatives. Distribution was also documented through direct observation. The following cases provide examples of the variations that occurred in meat distribution.

Case 1

After several unsuccessful hunting forays with his father and various unrelated hunters during the September season, one hunter harvested a moose along the Kuskokwim River in the vicinity of his fish camp, approximately 20 miles upriver from Chuathbaluk. The hunter's household shares a fish camp site with his parents. There is another fish camp across the river presently used by a widow from Aniak, with whom they are friends. All three households cooperate in harvesting and processing salmon during the summer. The moose was shared between these three households (Fig. 49). Distribution also took place to the households of the hunter's sister and the hunter's mother's brother, all residents of Chuathbaluk who had hunted unsuccessfully during the fall season.

Case 2

In the course of traveling on the Kuskokwim between Aniak and Chuathbaluk, a man from Aniak sighted a swimming moose. This person lacked a gun. Shortly thereafter another boat with two brothers from Chuathbaluk approached. One man was carrying a gun. The moose was pointed out by the man from Aniak and was shot on the riverbank upon emerging from the water by the man from

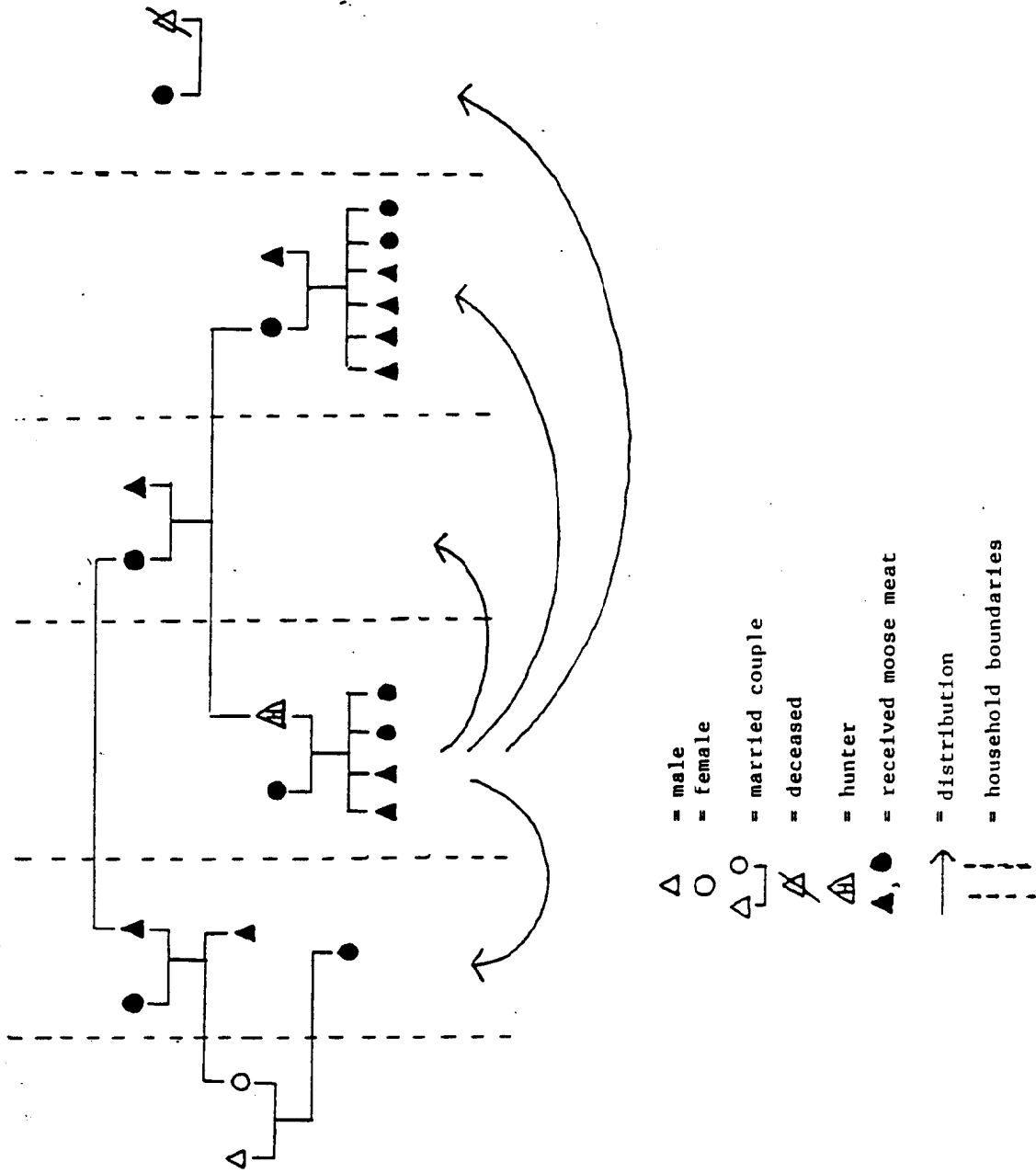


Fig. 49. Distribution of moose meat by a Chuathbaluk hunter.

Chuathbaluk. There were no kinship ties between these Aniak and Chuathbaluk residents. By this time three other boats with two more Chuathbaluk residents and one Bethel resident maintaining a temporary household in Chuathbaluk had stopped to observe the fallen animal. One of these Chuathbaluk residents was the stepson of the Aniak man's brother. This individual was proficient at butchering and proceeded to do so, with some help from the man who shot the animal. Following the butchering, everybody present was invited to help themselves to any part of the animal they desired. The Aniak resident who originally spotted the moose and the Chuathbaluk resident who shot the animal were considered the hunters in this case. The hunters insisted that everyone take part in the distribution, and were critical of those who only took small portions of meat. Distribution to the households of each individual present at the kill and butchering is shown in Figure 50. The Aniak resident gave meat to his mother and brother, residents of Chuathbaluk. The Chuathbaluk hunter gave meat to his parent's household, which included father's sister's household, who were all residents of Chuathbaluk.

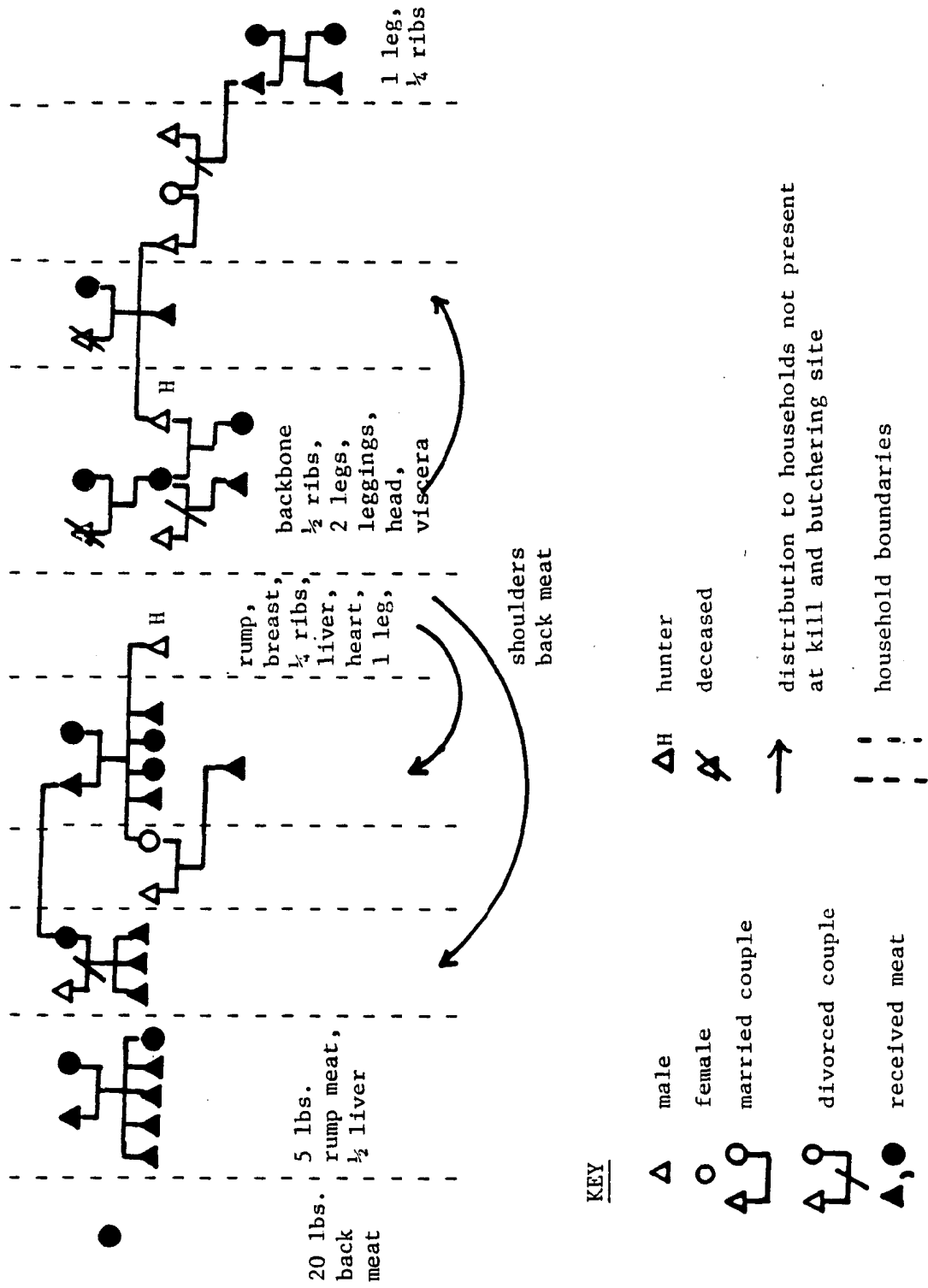


Fig. 50. Distribution of moose meat by hunters from Aniak and Chuathbaluk.

Case 3

One Sleetmute couple maintaining a household went hunting for three days with the man's brother from Crooked Creek, using the brother's boat. The man is originally from Crooked Creek and the woman is originally from Sleetmute. Two moose were harvested. The brother from Crooked Creek took one moose back to that community and the Sleetmute couple took one to their home in Sleetmute. Meat from this latter animal was shared with the woman's parents' household who were unsuccessful in their hunting endeavors. Figure 51 illustrates this example of distribution.

Case 4

Two Sleetmute residents, a man (labelled no. 1 in Fig. 52) and his wife's cousin (labelled no. 2 in Fig. 52) went hunting during the February season on the Holitna River. They hunted unsuccessfully for two days and stopped on their return trip to Sleetmute to visit a friend of theirs, also a Sleetmute resident, at his trapping cabin on the Holitna. The friend had already been successful at harvesting a moose and gave the hunters most of his kill, reasoning that he had greater access to moose than they because he overwinters away from the village in an area where he frequently encounters moose. The two returned to Sleetmute and divided

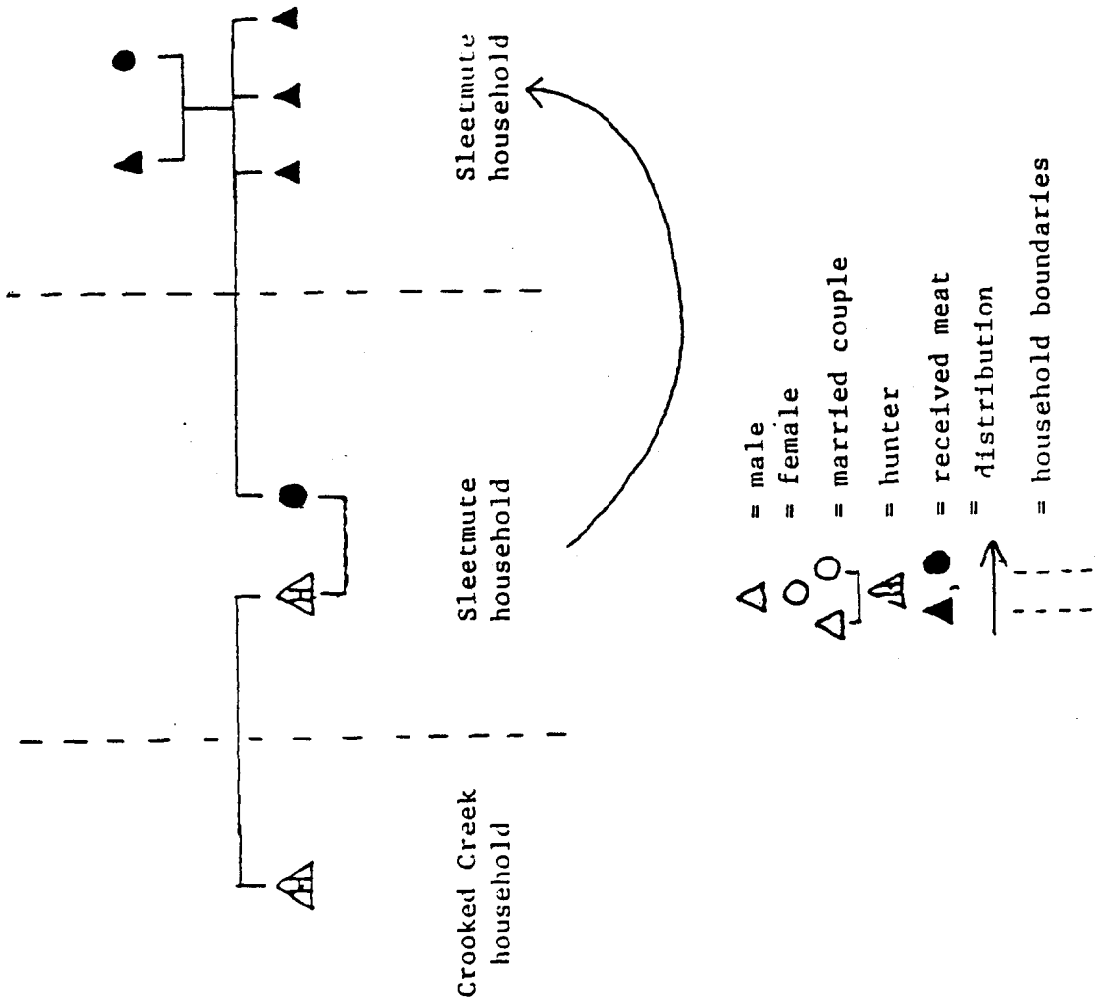


Fig. 51. Distribution of moose meat by a Sleetmute hunter.

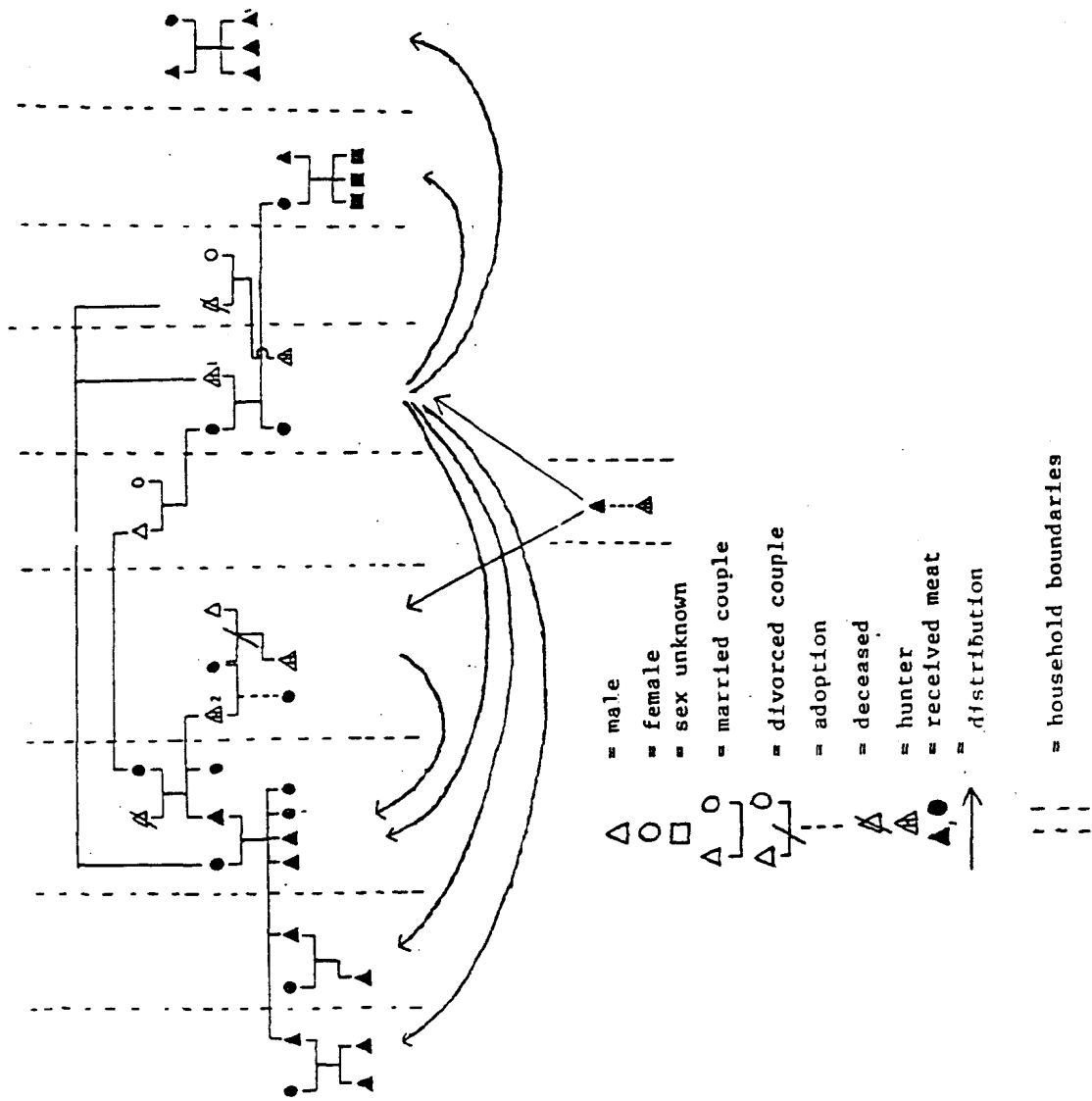


Fig. 52. Distribution of moose meat by Sleetmute hunters.

the meat. Subsequently, the nephew of one of the men and a member of the same household successfully harvested a moose. Meat from both animals was distributed by this man's household to his sister's household, to two of his sister's sons' households, to his daughter's household in Napakiak, and to the household of a friend in Sleetmute (Fig. 52). The man's wife's cousin was later successful in harvesting a moose with his stepson, a friend from Aniak, and a friend from the Holitna River. Most of this meat went to the man from Aniak who had the greatest need for it. Meat was later given by the household head to the household of his brother and sister.

The case studies provide examples from Chuathbaluk and Sleetmute which illustrate the extent to which meat distribution occurs and examples of the relationships of kinship and friendship that exist between individuals sharing meat. Distribution may have taken place by the individuals described in these examples following the time at which the questionnaires were administered and the observations were made.

THE 1982-83 MOOSE HUNTING SEASONS

Harvest Results

Chuathbaluk and Sleetmute residents who participated in moose hunting following the September and November seasons were formally interviewed to collect comparative data on harvest efforts and hunter success (Appendices A and B). Similar data were collected in interview sessions without the use of a questionnaire following the February season. Each hunter who was active during the seasons was interviewed, except for a few Sleetmute residents who were unable to be contacted. Figures 53 and 54 present the results of these interviews compiled for each village. The total number of moose harvested during the three 1982-83 open seasons represent minimum harvest levels for each community. It should be noted that the data from Sleetmute were collected from village residents only and do not include harvests of people who reside year-round along the Holitna and Hoholitna rivers.

Figure 53 shows that overall, Sleetmute hunters harvested a greater number of moose and a greater number of moose per village household than do Chuathbaluk hunters. Better success can be attributed to the September season in which Sleetmute hunters harvested twice as many moose as Chuathbaluk hunters. Chuathbaluk hunters spent a significantly greater number of hunting person days harvesting moose, overall, than did Sleetmute hunters. These data indicate that Sleetmute residents were able to harvest more moose with less effort than Chuathbaluk residents during the study period. A variety of reasons may account

Season	September		November		February		Totals	
	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute
Village								
Number of moose harvested	6 bulls	12 bulls	3 cows	1 cow	3 cows 2 bulls 2 unsp.	6 cows	16	19
Number of moose harvested per village household	.21	.43	.10	.04	.24	.21	.55	.68
Number of hunting person-days	411	118	96	1	66	61	573	180
Number of hunting person-days per moose harvested	68.5	9.8	32.0	1.0	9.4	10.2	35.8	9.5

Fig. 53. Seasonal moose harvests and efforts.

for these differences, as will be discussed later. These include ecological variables, competition for the moose resource, and seasonal settlement patterns.

Figure 54 shows that a greater number of individuals and households from Chuathbaluk participated in moose hunting as compared with Sleetmute. The greatest number of participants hunted in the September season. Bad weather and poor travel conditions during the November season account for the lack of participation in this season by Sleetmute hunters. The 25-day September season probably allowed more hunters to participate than did the 10-day November and February seasons. The lower percentage of households with members who hunted during the November and February seasons may reflect the fact that some hunters had already obtained the one moose bag limit. The percentage of successful hunting households was consistently higher among Sleetmute households. Few hunting households from Chuathbaluk were successful during September and November. Increased success during the February season may be related to good weather, travel, and snow conditions that prevailed during this season, along with a lack of competition from non-unit residents. The findings from Figures 53 and 54 will be discussed in light of seasonal conditions.

The September 1982 season was one of abnormally high rainfall. It rained virtually every day of the season. The first frosts occurred in early September, but temperatures did not fall consistently below freezing until the end of September. Waters in the Kuskokwim River and its tributaries were extremely high. Weather conditions did not prevent

Season	September		November		February	
Village	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute
Number of hunters	41	28	18	1	16	17
Number of hunting households	21	16	15	1	12	11
Percentage of village households that were hunting households	72.4	57.1	51.7	3.6	41.4	39.3
Percentage of successful hunting households	33.3	75.0	20.0	100.0	75.0	63.6

Fig. 54. Participation in moose hunting.

hunters from going out, but they limited the amount of time some individuals were willing to spend camping. Many local people, particularly Sleetmute residents, normally do not hunt until the latter half of the September season. This allows cooler weather to set in which causes flies to die off and minimizes chances of meat spoilage for those who lack freezers. Leaf fall progresses throughout September and favors hunting conditions later in the month. During September 1982, local hunters reported persistent foul weather, numerous small aircraft that disturbed animals, an abundance of competing hunters who were non-residents of Game Management Units 19A and 19B, and a predominance of cow moose with bulls being scarce. Heavy rains cause moose to travel less and keep them away from river beds where high waters flood their feeding habitat. Further, a lack of cold weather during September prevents moose from concentrating on river floodplains during the open season. These factors combined to cause low harvest levels during the September season.

The November 1982 season was a poor one for moose hunting. In Sleetmute the season coincided with freezeup. The Kuskokwim was mostly frozen over, but the ice was only an inch thick making travel unsafe. Only those villagers who were situated at their trapping cabins on the Holitna River, which had frozen late in October, had suitable conditions for hunting. During the first five days of the November season, the weather warmed to above freezing temperatures bringing rain. Ice and snow melt made travel over land and on rivers difficult and unsafe. Temperatures dropped to between -20 and -40 degrees Fahrenheit during the last five days of the season. Travel

conditions were icy and noisy, with overland hunting nearly impossible due to a lack of snow, which enabled moose to run easily and curtailed snowmachine travel. Extreme cold weather prevented individuals from staying out for prolonged periods of time.

Favorable hunting and travel conditions prevailed during the February 1983 season. Temperatures were near 20 degrees Fahrenheit with mostly cloudy weather and occasional light snowfall. Overflow and open water were a problem for some Chuathbaluk hunters along the Aniak and Kolmakof rivers due to unseasonably warm temperatures. Deep snow in the Holitna drainage caused moose to be numerous along the main river, making them accessible to Sleetmute hunters.

Harvest results show that during the 1982-83 seasons, Chuathbaluk residents invested more time with fewer moose harvested as compared with Sleetmute hunters (Fig. 53). The following variables influence hunting success for both communities but do not fully explain why Sleetmute hunters were more successful than Chuathbaluk hunters. Low harvest success during the September season can be partially attributed to the unfavorable weather conditions that occurred during that time, negatively influencing hunting conditions. The same situation occurred during the November season when a thaw set in and there was little snow, particularly a problem for Sleetmute residents who were unable to travel due to freeze-up conditions. The abundance of non-local hunters in September may be a factor influencing harvest success. This issue is addressed in detail in Appendix C. However, because hunting pressure exerted by these individuals is extreme both within the Holitna and Hoholitna drainages and along the Kuskokwim between

Aniak and Sleetmute and its tributaries, both communities are likely to be impacted. Alternate resources accessible to both communities are fairly comparable. Sleetmute hunters may have easier access to caribou than do Chuathbaluk hunters, but this species is rather scarce in both areas. Chuathbaluk residents process and store a larger quantity of salmon per household and have better access to higher quality and greater numbers of salmon species than do Sleetmute residents. This may compensate for their smaller harvest of moose.

Discrepancies in harvest success may be primarily attributable to ecological variables. Local observations by hunters indicate that moose are present in higher densities within the Holitna and Hoholitna drainages where Sleetmute residents hunt than within those drainages commonly hunted by Chuathbaluk residents, such as the Aniak, Kolmakof, Holokuk, and Oskawalik rivers, as well as along the Kuskokwim between these drainages. Travel conditions are typically more favorable on the Holitna and Hoholitna rivers during open seasons than within the latter drainages, because deeper water in September makes them more accessible by boat than the drainages used by Chuathbaluk hunters. The Holitna and Hoholitna rivers have a lesser tendency to overflow and to contain open water following freeze-up as compared with the Aniak, Kolmakof, Holokuk, and Oskawalik rivers, making them more accessible during the November and February seasons as well. There is typically a greater amount of snowfall in the Holitna and Hoholitna drainages as compared with other central Kuskokwim tributaries, making

travel easier during the November and February seasons and causing moose to concentrate along the rivers where they are more accessible to Sleetmute hunters.

Sleetmute residents may experience less local competition for the moose resource during open seasons than do Chuathbaluk residents. Chuathbaluk residents are hunting in areas which overlap somewhat with the hunting areas of Aniak and Crooked Creek residents, particularly the former. Aniak is a community having a population of over 400 residents in 1982 (John Hale pers. comm., 1982). Local competition may make it more difficult for Chuathbaluk residents to obtain moose. Sleetmute residents, on the other hand, maintain their own range which is locally shared with the year-round residents of the Holitna and Hoholitna rivers. Fewer people distributed throughout a drainage that is larger than the Aniak River make local competition less of a problem for Sleetmute residents. Because 30 percent of the Sleetmute households reside at trapping cabins on the Holitna and Hoholitna rivers between September and May, they have easier access to moose which are present in greater abundance near their cabins than they are in the vicinity of the village itself. Frequent encounters with these animals make seasonal harvest easier. With little exception, Chuathbaluk residents remain in the village throughout the winter, decreasing their likelihood of encountering moose and reducing their harvest levels.

Because of these factors, moose are generally a more reliable resource for Sleetmute residents than for Chuathbaluk residents, as most Sleetmute households can rely on harvesting at least one animal

during the year. This, in turn, may influence the orientation that individuals from both communities have toward other resources. Ecological factors, including accessible habitat, moose population density, and climatic conditions, combine with social and cultural factors, including local competition and seasonal settlement patterns, to make Sleetmute hunters more successful than Chuathbaluk hunters in harvesting moose.

Importance of Moose

It is apparent that moose is a staple in the central Kuskokwim diet. Both the 1979 and 1981 food surveys performed by the Division of Subsistence (Jonrowe 1979; Stickney 1981) found that quantitatively, moose and salmon were the two major food sources in the diets of central Kuskokwim villagers. During the 1982-83 field studies, Chuathbaluk and Sleetmute residents were asked (Appendix A) to estimate the number of moose they had harvested during the open seasons over the past five years and the number of moose they felt their households needed to harvest annually in order to have what they consider "enough" moose meat for the year (Table 9).

In Chuathbaluk 30 individuals representing 26 households were interviewed and in Sleetmute 11 individuals representing 11 households were interviewed. The sample size in Sleetmute was considerably smaller (39 percent) than that in Chuathbaluk (90 percent) due to the difficulty in contacting households who had moved to trapping cabins prior to the time at which the survey was conducted. The households surveyed in

TABLE 9. ANNUAL MOOSE HARVEST LEVELS PER HOUSEHOLD INTERVIEWED,
ESTIMATED FIVE-YEAR AVERAGE.

	Chuathbaluk	Sleetmute
Number of individuals interviewed	30	11
Percent village households interviewed	90	39
Number of moose harvested, past five years	72	45
Average number of moose harvested annually	0.60	0.82
Average size of households interviewed	4.70	4.40
Number of moose desired by average household per year	2	2

Chuathbaluk had an average household size of 4.7 persons. Those surveyed in Sleetmute had an average household size of 4.4. persons. Households from both communities reported that they needed an average of two moose per year to have what they considered enough meat for the year. Table 9 shows that the actual in-season harvest levels are considerably lower than this. Based on harvest estimates during the open seasons over the past five years, .60 moose per household interviewed were harvested in Chuathbaluk, while .82 moose per household interviewed were harvested in Sleetmute. The 1982-83 open seasons harvest of .55 moose per Chuathbaluk household and .68 moose per Sleetmute household were similar to the estimated five-year averages of sampled households, although Sleetmute harvests were somewhat lower during the 1982-83 season. There is an apparent trend for Sleetmute residents to harvest a greater number of moose per household than do Chuathbaluk residents. It is clear from these data that community residents included in this sample are not harvesting what they consider to be enough moose meat during the open season.

MOOSE HUNTING AREAS

The moose hunting areas used by Chuathbaluk residents presented in Figures 55 and 56 exhibit some variation within the two time periods. Prior to residency in the current village (circa 1959 to 1970), hunting occurred along the Kuskokwim River between Kalskag and the Selatna River and along the major tributaries that flow into the Kuskokwim between these locations -- the Aniak, Holokuk, Oskawalik, George,

Holitna, and Hoholitna rivers (Fig. 55). This can be understood in light of the fact that current residents of Chuathbaluk were born and raised in other central Kuskokwim communities and utilized hunting areas that were recognized as being within the respective "use areas" of these communities.

Once individuals settled in Chuathbaluk, use areas shifted somewhat (Fig. 56). Many of the former hunting areas continued to be used, but some areas such as the George and Hoholitna rivers were no longer utilized. Certain hunting areas expanded to include drainages close to Chuathbaluk, such as the Owhat and Kolmakof rivers and Veahna Creek, and more extensive use was made of the Aniak river drainage. Hunters have also extended their use of the Kuskokwim River as far upriver as McGrath. The overall expansion of moose hunting areas since Chuathbaluk residents have lived in the village may be due to several factors. Drainages close to the village have received greater use because the local population is more concentrated there in comparison with the earlier time period. Local residents stated that increased competition for moose within their traditional hunting areas by non-residents of Game Management Unit 19, especially during the fall season, requires them to go further from home to hunt moose successfully.

Moose hunting areas used by Sleetmute residents before and after the introduction of snowmachines to village residents (Figs. 57 and 58) do not differ greatly from one another. Some individuals have gone further down the Kuskokwim since they began using snowmachines than they did previously to utilize the George River drainage. Overall, moose hunting areas have been concentrated primarily within the

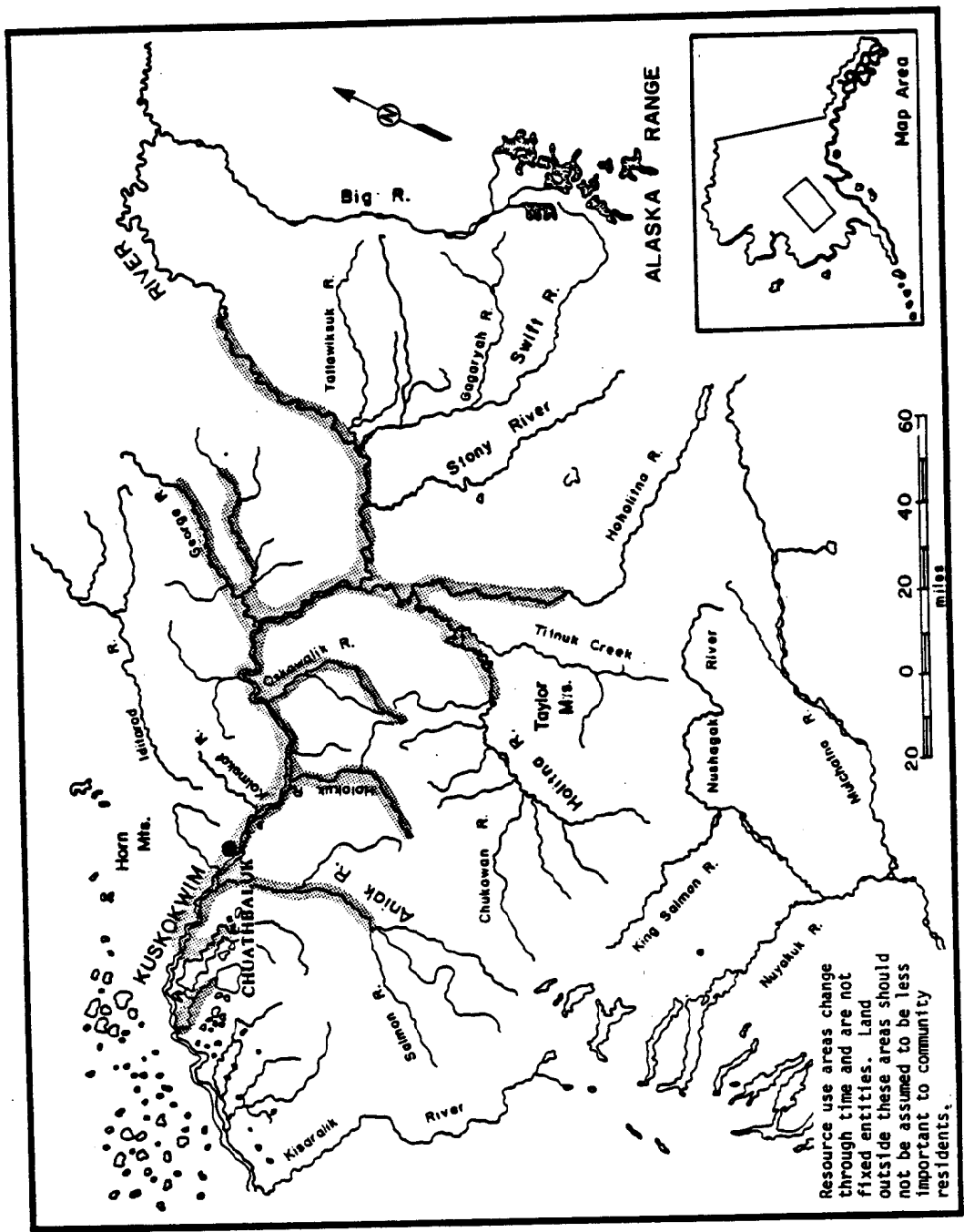


Fig. 55. Areas used by Chuathbaluk residents for hunting moose prior to moving to Chuathbaluk.

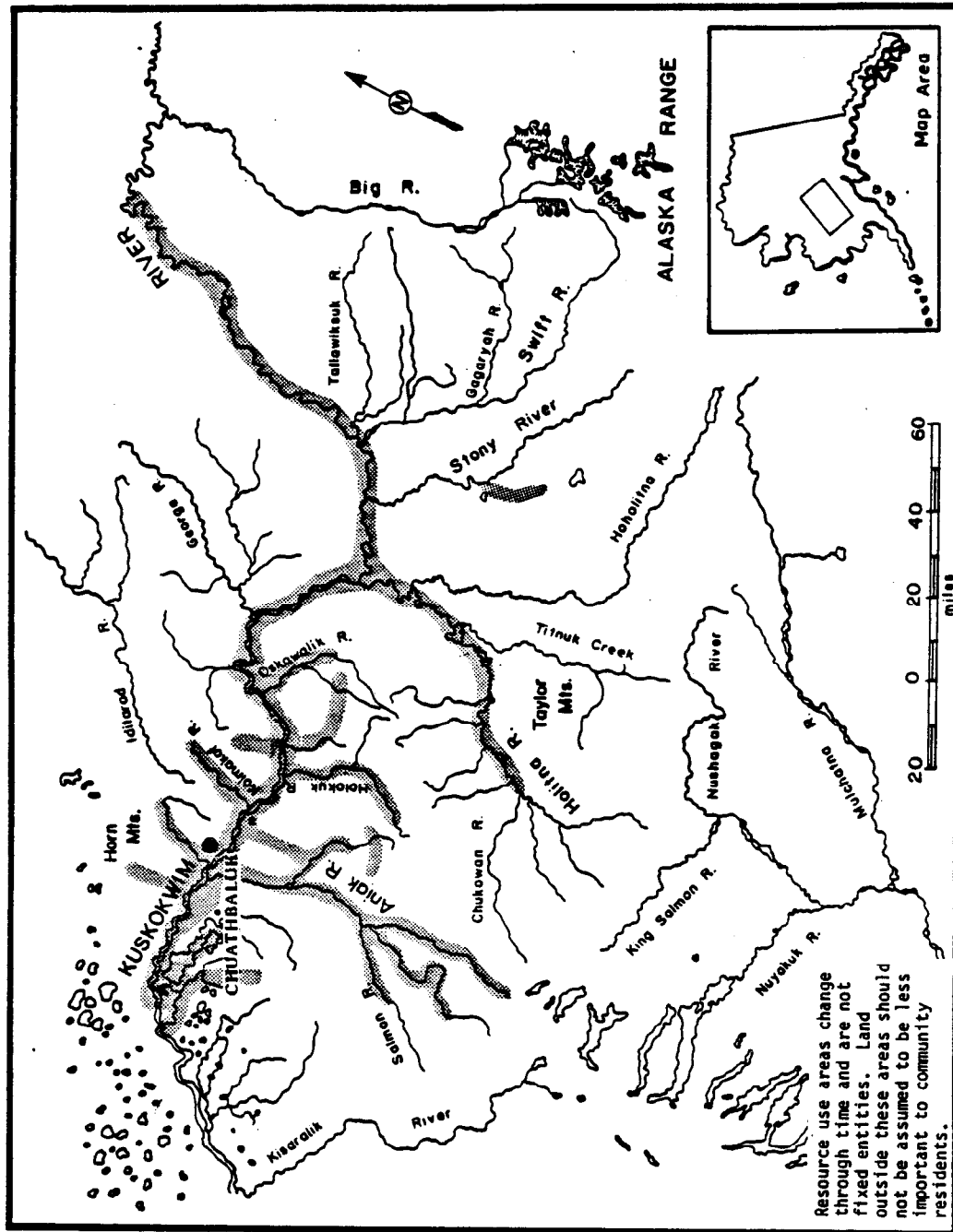


Fig. 56. Areas used by Chuathbaluk residents for hunting moose since moving to Chuathbaluk through 1983.

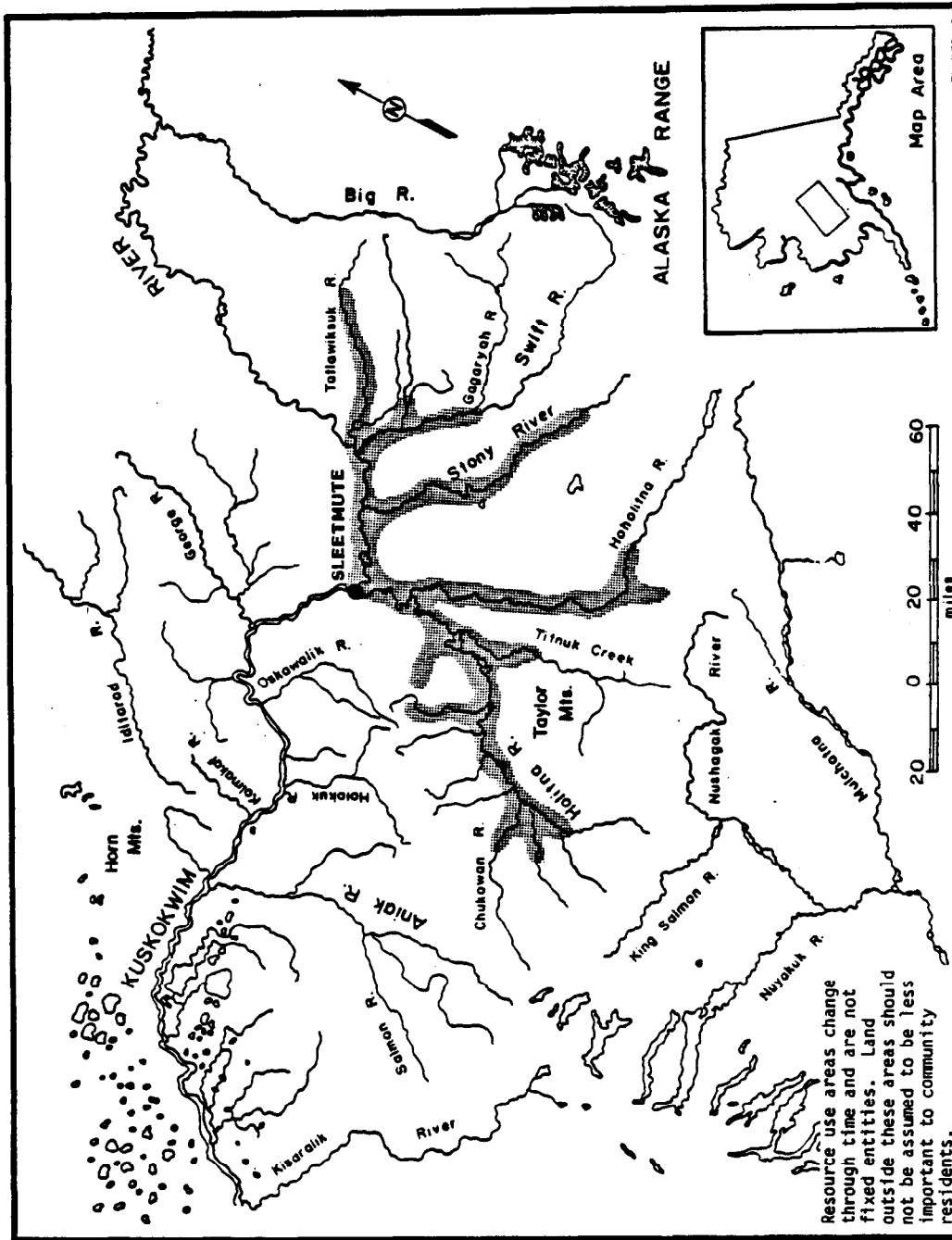
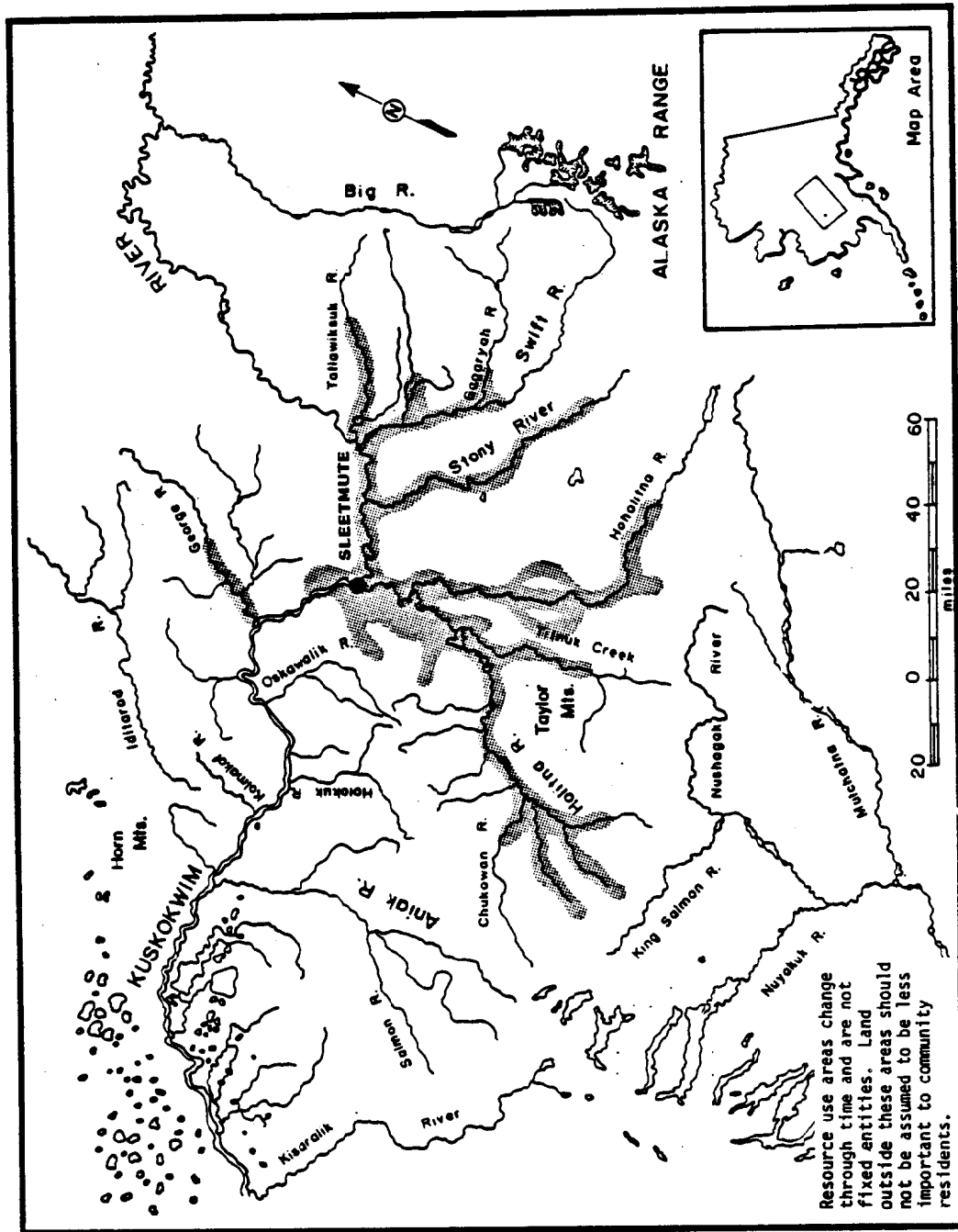


Fig. 57. Areas used by Sleetmute residents for hunting moose prior to the use of snowmachines.



Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.

Fig. 58. Areas used by Sleetmute residents for hunting moose since the use of snowmachines through 1983.

Holitna and Hoholitna river drainages throughout the lifetimes of current Sleetmute residents and within the Stony, Swift, and Tatlawitsuk river drainages to a lesser extent.

CHAPTER 8

CARIBOU AND BEAR HUNTING

Caribou (tuntuq; Rangifer tarandus), black bear (tan'gerliq; Ursus americanus), and brown bear (taqukaq; Ursus arctos) are large game species occurring in the central Kuskokwim River area in addition to moose. All three species are harvested and used by Chuathbaluk and Sleetmute residents. The general term for bear is ungungssiq, with male bears referred to as angucaluq and female bears referred to as arnaqatak. Each species will be discussed separately.

In the mid-1800s, bear were harvested during fall and winter in the central Kuskokwim River area (Oswalt 1980b). Caribou were actively sought out in late fall and early winter when the meat was considered best, the fat layer thickest, and the skins prime for clothing. Caribou were also harvested at spring hunting camps. Families traveled to caribou hunting camps using sleds and remained until breakup, at which time they moved to summer fish camps or the winter village by boat (Oswalt 1980b). Formal regulations currently define the seasons in which these species are to be harvested.

CARIBOU HUNTING

During the 1982-83 season, caribou could be harvested between August 10 and September 30 and between November 1 and February 28, with a bag limit of two caribou (Alaska Department of Fish and Game

1982c). Caribou hunting is an activity which is seldom participated in by most Chuathbaluk and Sleetmute residents. Hunters must travel long distances from the winter village and invest a significant amount of effort and money in order to obtain caribou. Many local residents believe that the investment in specifically hunting caribou is not worth the returns that are limited by a bag limit of two animals. Hunters would prefer to harvest at least five or six animals to justify the distance they must travel and the investment of time and money required for caribou hunting. Generally, caribou are harvested incidentally when stray animals are encountered as hunters pursue other activities such as moose hunting, trapping, or traveling.

Population Status

Historic population levels of caribou have fluctuated in the central Kuskokwim region (Alaska Department of Fish and Game 1976). Caribou were the most abundant ungulate in the lower Yukon-Kuskokwim region prior to 1900. Several forest fires occurring in the early 1900s destroyed a significant amount of caribou habitat, which was characterized by white spruce with a lichen understory, and restricted the range of this species. Additional stress was placed upon limited caribou habitat with the introduction of reindeer in the early 1900s into the lower Kuskokwim River region and the Kuskokwim Mountains. Two herds were established in the Kuskokwim Mountains with one group of 5,000 animals near the Beaver Mountains west of McGrath and a larger group in the mountains within the Aniak River drainage. By this time

moose were establishing themselves along the upper Kuskokwim. In the late 1930s the reindeer were either sold and removed or became feral. Some of these cross-bred with caribou. There are no domestic herds in this area today.

Caribou populations in the central Kuskokwim area are currently small and scattered. The Mulchatna herd partially occurs within the Stony River drainage and may concentrate along the upper Hoholitna River in late winter (Alaska Department of Fish and Game 1976). Populations hunted by Chuathbaluk and Sleetmute residents primarily occur in the Buckstock, Horn, and Taylor mountains. While caribou was the primary game animal harvested by central Kuskokwim River residents aboriginally, moose have come to replace this species as a staple in the central Kuskokwim diet.

Harvest Methods

Caribou were traditionally harvested using bow and arrow. They were taken either by a group of men who would surround a herd or by individuals encountering single animals (Oswalt 1980b). According to local informants, rawhide snares were also set for caribou in trees along riverbanks. These would become entangled in the antlers of the animal and hold it in place until the snare was checked and the animal dispatched.

Two harvest patterns currently prevail in Chuathbaluk and Sleetmute. During months of open water, transportation for caribou hunting is by boat and on foot. During winter, caribou hunting takes place by

snowmachine. Fly-in hunting occasionally occurs by the few individuals owning aircrafts or hunters who are invited to hunt by aircraft in exchange for labor. This occurs primarily during the fall season. Individuals specifically hunting caribou tend to hunt during winter months when travel is easier.

There are two primary methods of hunting caribou during the months of open water. Individuals hoping to encounter animals along rivers (the upper Hoholitna and Stony rivers in the case of Sleetmute residents, the Kolmakof River in the case of Chuathbaluk residents) employ the technique of drifting on the river by boat. According to local hunters, caribou are most likely to be encountered along rivers during early morning and evening hours, feeding, or escaping mosquitoes following heavy rains when mosquitoes are especially numerous in wooded areas. Travel up rivers to hunting areas and drifting downstream without the aid of a motor in hopes of quietly surprising an animal on the riverbank are usually planned during these times.

Individuals planning to hunt on foot must travel by boat to the location from which they have the easiest access to caribou herds. From this point they hike between five and ten miles into the mountains to reach the animals. In some areas existing trails worn from past caribou hunts make travel on foot over land easier. Caribou feed on lichen growing on open tundra and ridges during the morning and late afternoon, and rest in the brush during the day. It is advantageous to hunt when the animals are feeding, as they are more easily located at this time. A hunter anticipates the movements of caribou, which have a tendency to travel in the direction from which the wind is

blowing. The hunter must also remain downwind of the animals so that they do not detect his scent. The hunter advances on foot until he comes within shooting range of the herd. The fallen animals are packed back to the boat, a process which may take several days, depending on the distance traveled, the number of animals harvested, and the size of the hunting party.

During winter months travel into mountainous areas where caribou occur is by snowmachine. Once animals are located, the hunter attempts to approach the herd by snowmachine to within shooting range. Wind is an important factor determining winter hunting success. The hunter must remain downwind of the caribou to prevent them from detecting the sound of the snowmachine and dispersing. The fallen animals can then be transported back to the winter village on snowmachine sleds.

Hunting parties are typically composed of two related males between the ages of 18 and 50 who are capable of the physical exertion that may be required. These men are often brothers or first cousins. Once the meat is procured, it is quartered and taken back to the winter village to be further processed by female members of the household. Females occasionally participate in caribou hunting. Caribou meat obtained during the fall season may be frozen in a freezer by those households owning one, or frozen out-of-doors if weather permits. It also may be cut into strips, smoked, and dried for the production of dried meat or jarred through the canning process. Caribou harvested during winter months are usually frozen out-of-doors. In Chuathbaluk and Sleetmute, distribution of caribou meat between households commonly occurs along lines of kinship and friendship. All of the meat from

the first caribou harvested by an individual is reportedly distributed to other households in order to bring luck in future hunting endeavors.

Harvest estimates based on data collected through questionnaire surveys and direct observation total 2 caribou for the community of Chuathbaluk and 13 caribou for the community of Sleetmute during the 1982-83 season. Sleetmute residents have greater access to caribou than do Chuathbaluk residents and typically harvest comparatively more of this species.

Hunting Areas

Figures 59 through 62 show the areas in which Chuathbaluk and Sleetmute residents have hunted caribou during the two selected time periods. Figures 59 and 60 indicate that Chuathbaluk residents have used basically the same caribou hunting areas prior to and following the time at which they established residency in the village. Those areas used before moving to Chuathbaluk continue to be used, with the exception of Titnuk Creek. The localized nature of caribou populations in the central Kuskokwim area probably account for the continued use of old hunting areas. Hunters must use the same areas because caribou are restricted to a limited range near the village. Titnuk Creek is too far from the village for Chuathbaluk hunters to travel. Caribou hunting on the Iditarod River (Fig. 60) took place with the use of aircraft, a transportation method seldom used by Chuathbaluk hunters.

Figures 61 and 62 show that Sleetmute residents have expanded their range of areas used for hunting caribou since the introduction

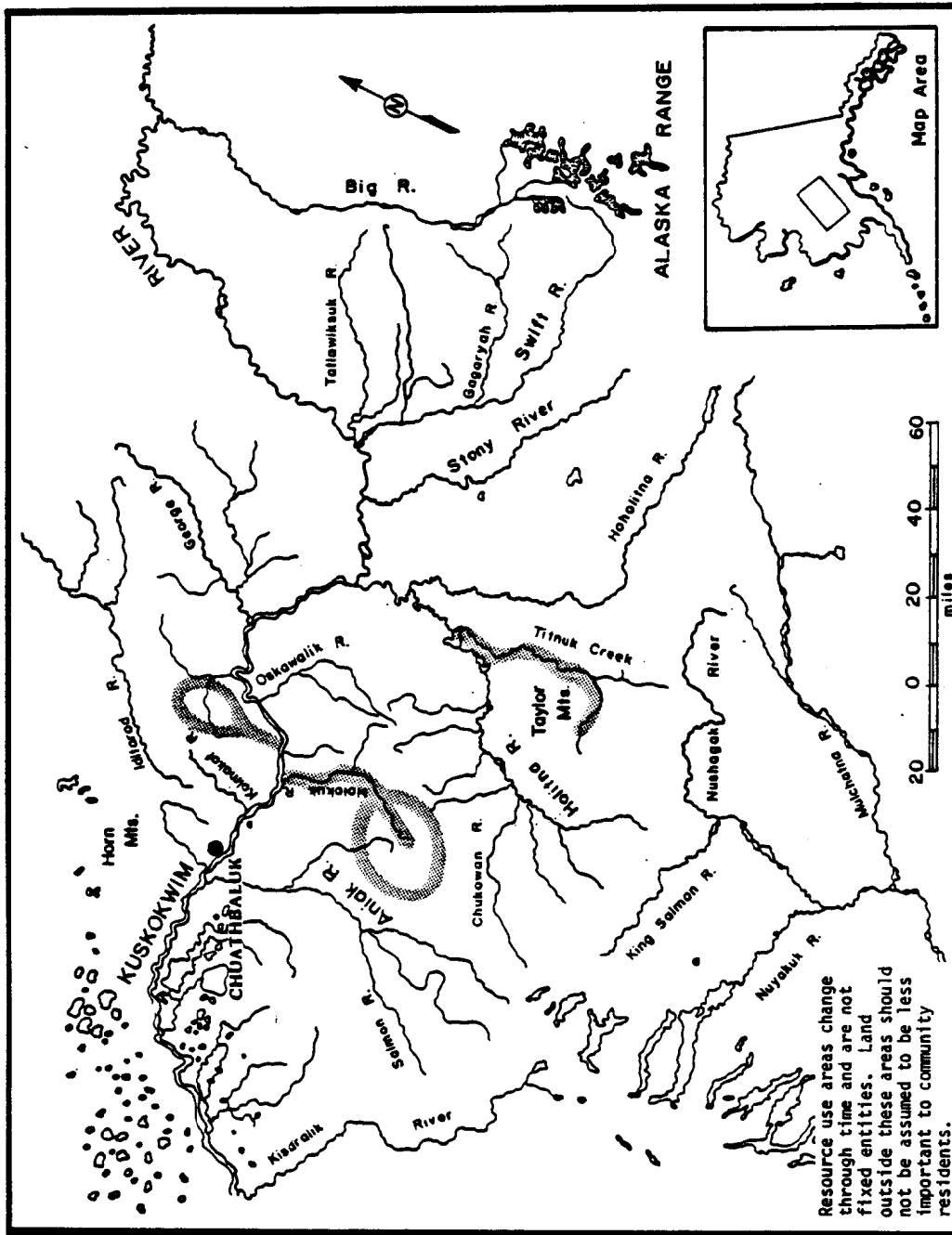


Fig. 59. Areas used by Chuathbaluk residents for hunting caribou prior to moving to Chuathbaluk.

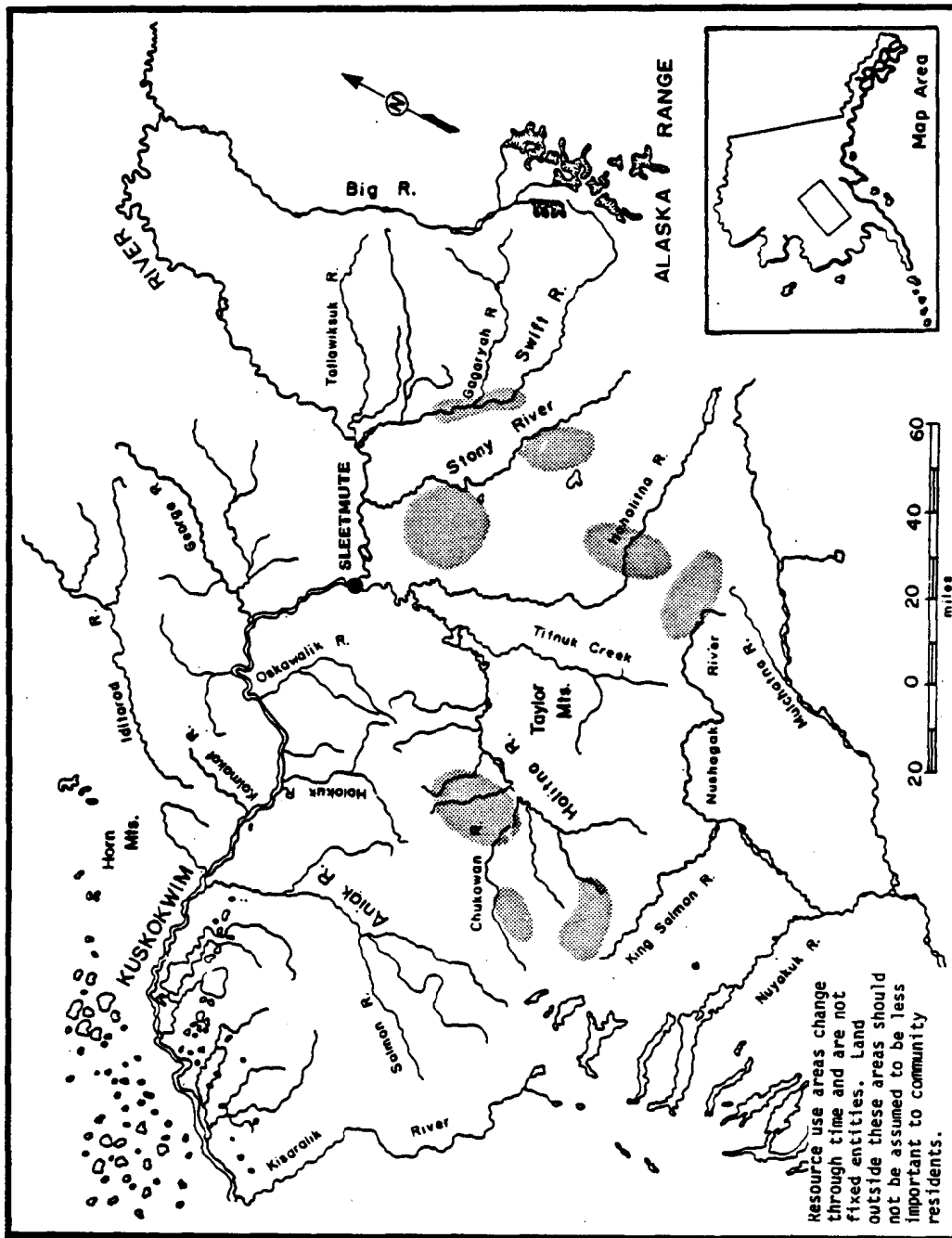


Fig. 61. Areas used by Sleetmute residents for hunting caribou prior to the use of snowmachines.

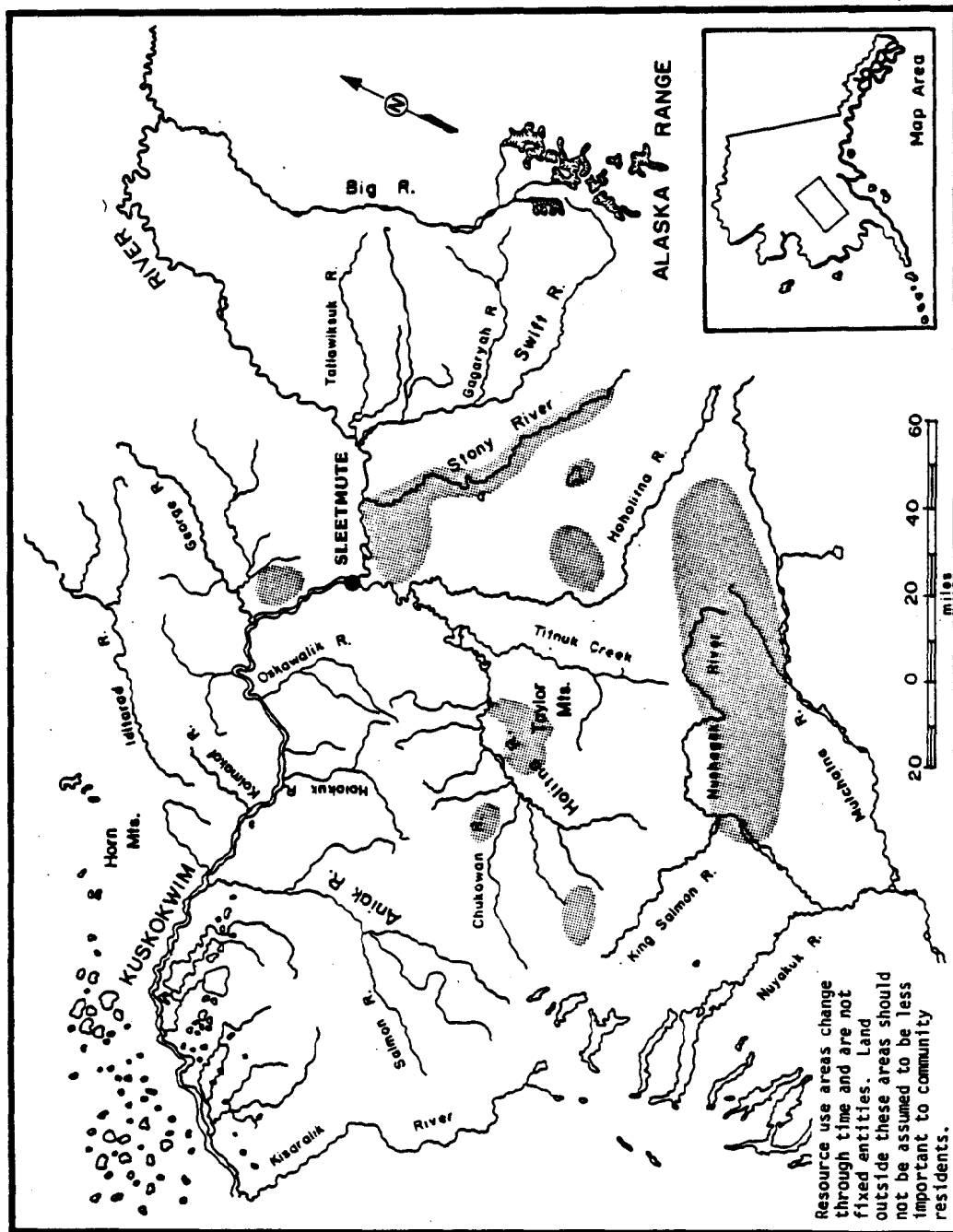


Fig. 62. Areas used by Sleetmute residents for hunting caribou since the use of snowmachines through 1983.

of snowmachine transport to the community. Most of the areas used for caribou hunting prior to the use of snowmachines continued to be used. This is probably due to the localized nature of caribou populations, as described above. Use of the Nushagak Hills for caribou hunting (Fig. 62) results from the use of aircraft by a few individuals associated with the Sleetmute based air charter service for transportation in hunting.

BROWN BEAR HUNTING

Brown bear are distributed throughout tundra areas and along rivers and creeks in the central Kuskokwim region, including Whitefish Lake, the Aniak, Oskawalik, Holokuk, Kolmakof, upper Holitna, and Hoholitna rivers. During summer months, brown bear concentrate along rivers and feed on salmon enroute to spawning grounds. They may occasionally steal dried salmon from fish camps at this time. During August and September, brown bear concentrate in areas where ripe berries are abundant.

While brown bear generally hibernate between late October and late April, local residents report that they may remain somewhat active and periodically leave the winter den to walk about. The seasonal behavioral patterns of brown bear influence the hunting methods used to harvest this species.

Historic harvest technologies used in autumn included snare nets and spears (Oswalt 1980b). Local informants report that deadfall traps were also used. Brown bear were hunted with iron-tipped spears

approximately six feet in length. Upon sighting a bear, the hunter would make noise in order to draw the animal toward himself. He would then sink to his knees and continue to emit sounds while hidden in the brush. The object was to lure and anger the bear, causing it to charge. As the bear charged, the hunter would kneel with the spear held out in front of him. The bear then impaled itself upon contact.

Brown bear also were harvested at their winter dens when they were not fully hibernating. Brown bear dens have one open entryway which the animal uses throughout the winter. The hunter stood on top of the den and threw sticks and debris in front of the hole to pique the animal's curiosity. When the bear emerged from the den to investigate, it was speared or shot from above.

During the 1982-83 season, the open periods for hunting brown bear set by regulation were September 10 to October 10 and May 10 to May 25, with a bag limit of one bear every four regulatory years (Alaska Department of Fish and Game 1982c). The taking of cubs or females accompanied by cubs was prohibited (Alaska Department of Fish and Game 1982c).

No brown bear were harvested by Chuathbaluk and Sleetmute residents during the 1982-83 seasons. The adults are taken for their hides only, which are thick and warm and used as sleeping mats. The meat is considered tough and ill-tasting. The meat from brown bear cubs is desirable, however, reportedly being similar in taste to black bear meat. Currently, most brown bears killed are nuisance animals around fish camps or those animals considered to be a threat to the safety of local residents. They are taken using rifles or snares.

The areas used for brown bear harvest are presented below in conjunction with those used for hunting black bear.

BLACK BEAR HUNTING

Black bear are common in the spruce woodlands along the central Kuskokwim River and its tributaries. Black bear hibernate between late October and late April to early May. After emerging from hibernation, they often become a nuisance to local people as they search for food. In early summer they feed primarily on salmon and greens. At this time they often invade fish camp smokehouses in search of drier fish. Berries form the basis of the black bear diet throughout August and September. The bears become increasingly flighty as summer progresses, avoiding human contact. During 1982-83 there was no closed season on black bear (Alaska Department of Fish and Game 1982c). The bag limit was three bears, although cubs and females accompanied by cubs could not be taken (Alaska Department of Fish and Game 1982c).

Black bear are hunted and shot with rifles in spring following hibernation and in late August and September when the meat is especially sweet from a diet of blueberries and the animals are fat. Black bear are shot or taken in No. 2 snares during summer only when presenting a threat or nuisance to local residents. The diet of fish reportedly causes bear meat to taste poorly at this time. Black bear were historically harvested during winter from their hibernation dens. This is no longer a common practice.

Black bear were traditionally harvested in snare nets, deadfall traps, or with spears from their hibernation dens (Oswalt 1980b). Black bear were smoked out of their dens during winter. The hunter covered the entrance of the den with brush and dropped a lit piece of birch bark or burning cigarette in through the top breathing vent. As the den filled with smoke, the bear emerged to be shot by the waiting hunter. Bear also were shot inside their hibernation dens. Upon locating a den, the hunter poked a long, thin stick in through the entrance until he touched the bear. He then probed the animal's body until the heart was located, identified by feeling the stick move and vibrate in response to the heart's beating. The hunter pointed his rifle into the den and shot the bear in the heart. Neither of the above methods were observed or reported to be in use during the winter of 1982-83.

During months of open water, swimming bears previously were taken from boats. A noose was made from the free end of a rope that was attached to the boat. The boat was driven close to the swimming bear and the noose looped around its neck. The boat was then quickly propelled by the motor, dragging the bear behind it. The bear choked and drowned from this method within a few minutes. Once the bear was pulled to shore, it was allowed to lay there for several minutes to ensure that it would not return to life. This hunting method was not observed in use during 1982.

Bears harvested during 1982 were taken with snares or rifles at fish camps, with rifles along rivers in the course of traveling by boat in pursuit of other activities, or were hunted on foot with rifles.

Bear hunting in late summer often occurs in conjunction with berry-picking trips. Black bear are often sighted feeding in berry patches in open tundra areas during this time. Hunters travel on foot until they are within range of the bear and shoot. The animal is then butchered and packed back to the boat. Some individuals travel by foot from the winter village to mountainous areas where black bear are known to feed in fall. The hunting party may camp for several days until the desired number of bear are harvested. These are then packed back to the winter village. Bear hunting trips typically are activities of males between the ages of 15 and 35. The average hunting party is composed of three individuals.

Once a black bear is killed, its head is traditionally buried in the ground. If it is an individual's first bear, all of the meat is given away to other village households to ensure good luck in future hunts. The distribution of bear meat along kinship lines and to village elders is common. The bear hide is commonly nailed to the side of the household smokehouse for stretching and drying and is later used for a rug, sleeping mat, or for making skin boots. Bear gut was traditionally used in manufacturing raincoats and summer coats that protected individuals from harassment by mosquitos. Bear gut was also used in making drum heads. Gut was not observed or reported to be in use during 1982.

Female members of the household are responsible for processing bear meat. The meat may be preserved through freezing, smoking, and jarring. It is commonly boiled, barbequed, or broiled for consumption. Bear fat is rendered into oil to be used in making akutaq and for

eating with dried fish. Bear tallow serves as the central Kuskokwim substitute for seal oil.

From observation and questionnaire data, it was estimated that six bears were harvested by Chuathbaluk residents and no bears were harvested by Sleetmute residents during the 1982-83 season. Residents of both villages reported moderate participation in black bear harvest. Several bears harvested in Chuathbaluk were animals encountered by individuals at their fish camps. Fewer bears may be harvested by Sleetmute residents in part because fewer households utilize fish camps to harvest salmon. Also, local observers note that in general bears appear to be more abundant in the vicinity of Chuathbaluk than Sleetmute, perhaps due to the higher density and occurrence of berries near Chuathbaluk. In addition, Sleetmute residents may harvest fewer bear because moose and caribou are more available to them.

Hunting Areas

According to Figures 63 and 64, the areas used by Chuathbaluk residents for bear hunting have shown certain changes over time. Since moving to the village, Chuathbaluk residents have discontinued use of the George River drainage for bear hunting and have utilized more fully areas in closer proximity to Chuathbaluk. These changes are probably due to changing place of residence. Many of the other areas used in the earlier time period continue to be used, signifying that Chuathbaluk residents have maintained some ties with traditional bear hunting areas. Sleetmute residents have hunted bear in essentially

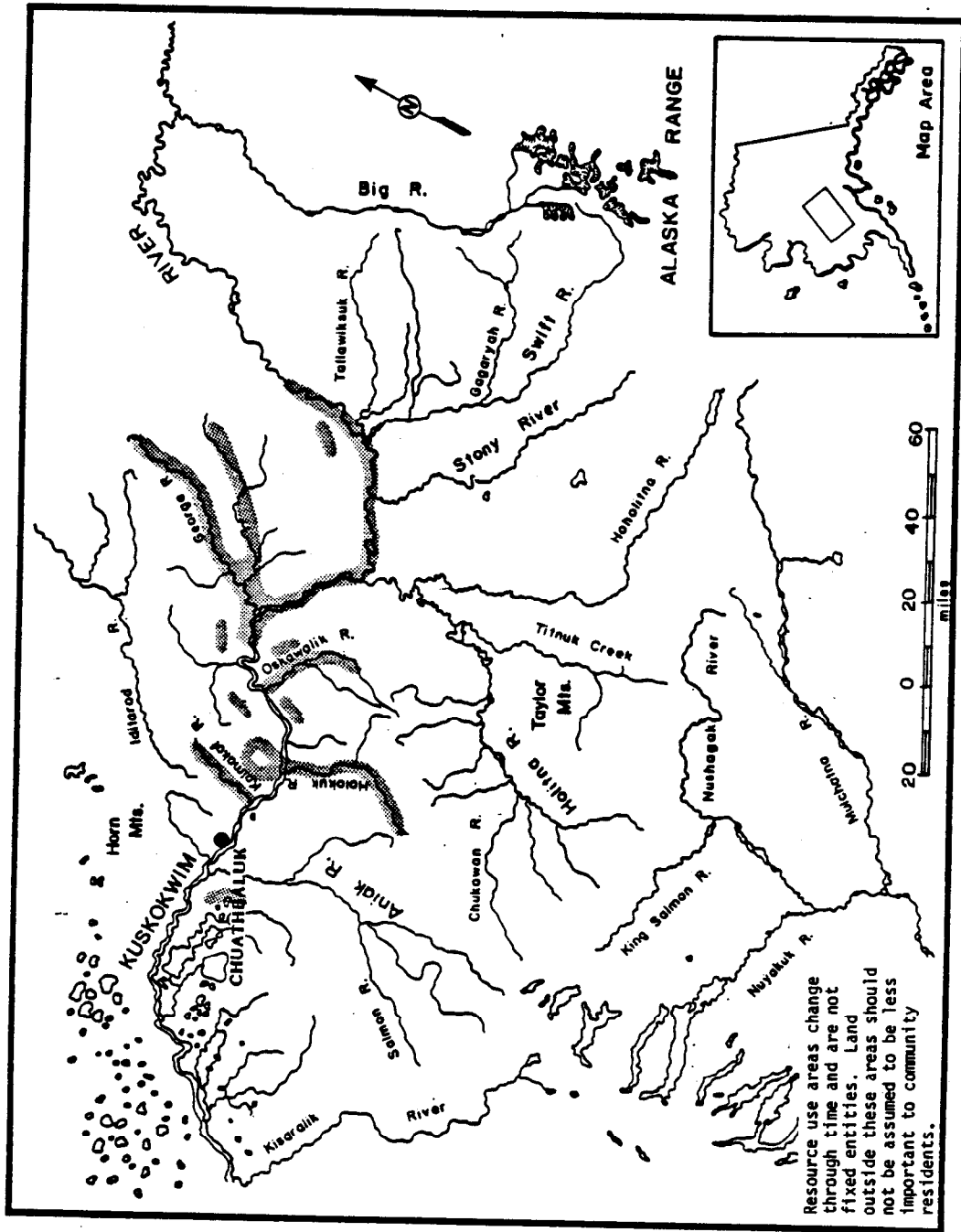


Fig. 63. Areas used by Chuathbaluk residents for hunting bear prior to moving to Chuathbaluk.

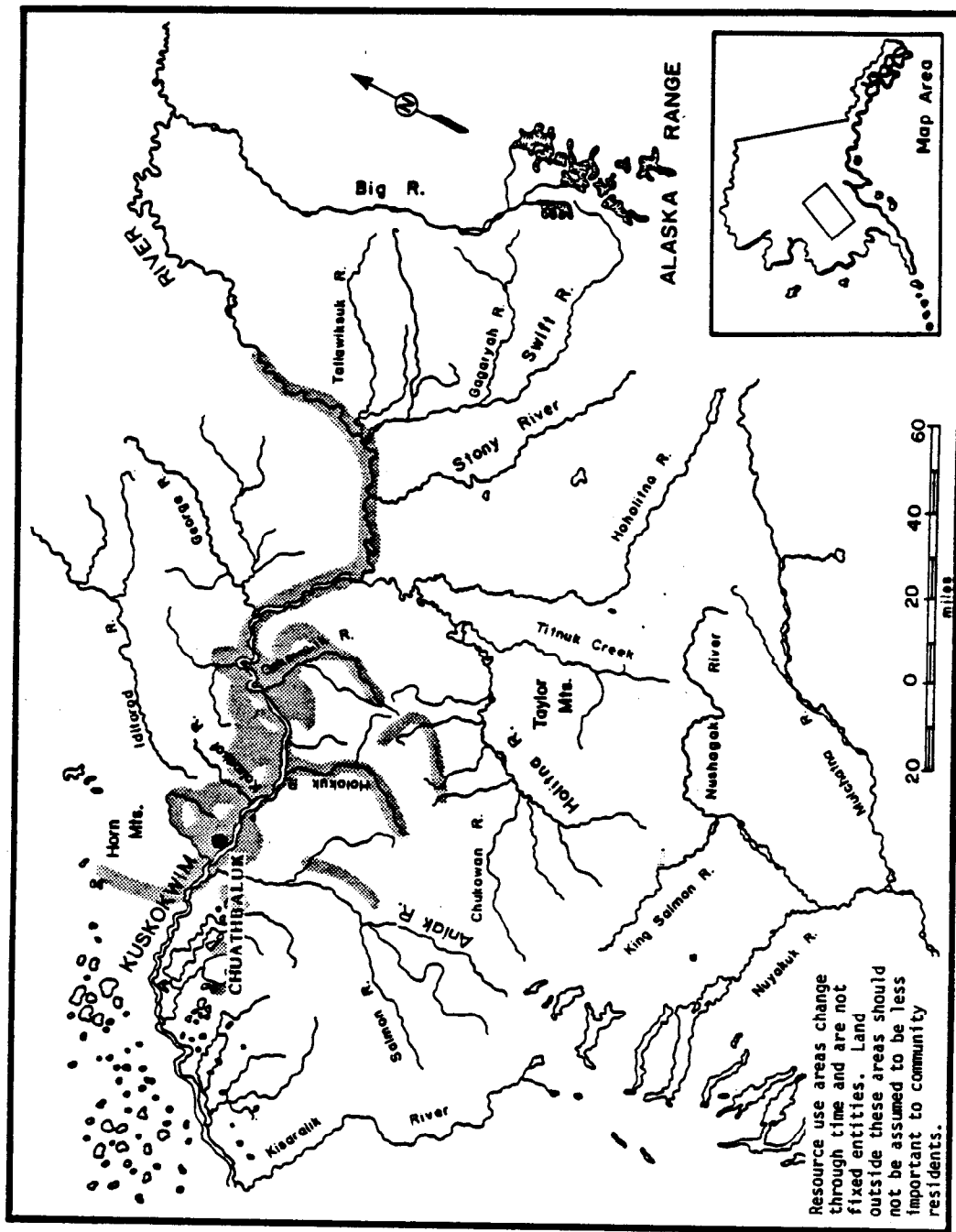


Fig. 64. Areas used by Chuatbaluk residents for hunting bear since moving to Chuatbaluk through 1983.

the same locations during both time periods (Figs. 65 and 66). The Hoholitna River has received more extensive use since the use of snowmachines for transportation.

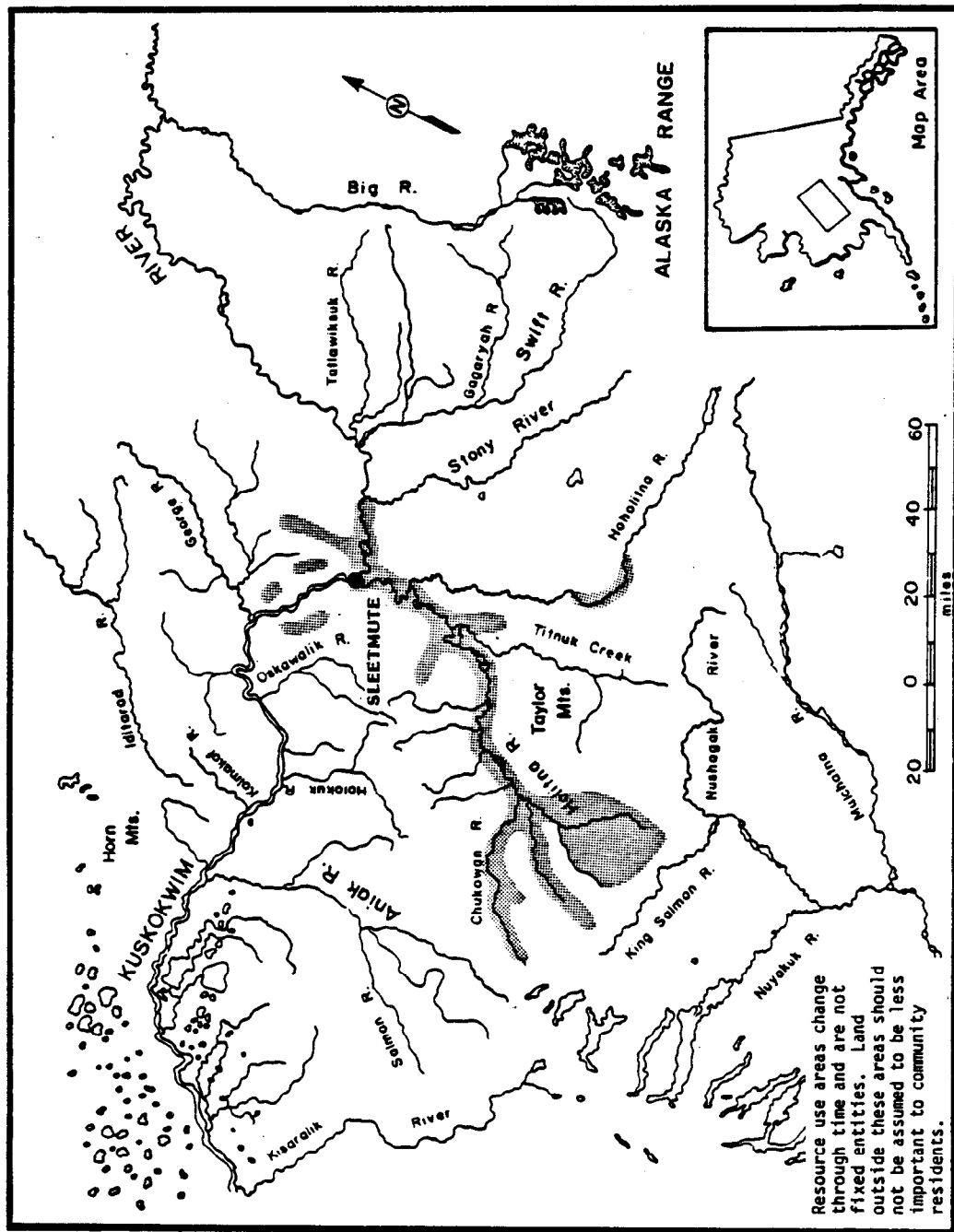


Fig. 65. Areas used by Sleetmute residents for hunting bear prior to the use of snowmachines.

CHAPTER 9

SMALL GAME AND WATERFOWL HUNTING

Small game species harvested seasonally in the central Kuskokwim are the snowshoe hare, porcupine, spruce and willow grouse, ptarmigan, great horned owl, and multiple species of migratory waterfowl including ducks, geese, swans, and cranes. Small game species are generally obtained close to the winter village or in the course of traveling or conducting other resource harvest activities such as trapping or moose hunting. These species are often relied upon as primary food sources during camping trips and are taken to provide variation in the usual diet, which is based on moose and fish species. Male household members harvest and often process small game, while female members of the household typically prepare it for eating or storage. Adolescent males are particularly active in the harvest of small game species. The following accounts describe the harvest and use of small game by Chuathbaluk and Sleetmute residents. Areas used for small game harvest are not presented here. The harvest of small game typically occurs in close proximity to the winter village, trapping camp site, or in areas used for harvesting other resources such as moose, caribou, bear, and furbearer species.

SMALL GAME HUNTING

Snowshoe Hare (maqaruaq; Lepus americanus)

Snowshoe hares occur in willow thickets along riverbanks and on islands during fall and winter when they are typically harvested. Hares are most abundant between October and December. This species, according to local traditions, is only taken when its fur contains some white coloring. Snowshoe hare populations in the central Kuskokwim River area are reportedly not subject to dramatic cycles as are populations elsewhere in Alaska, although they do vary in abundance from year to year. Environmental variables reportedly influence the population levels of snowshoe hares and include mosquitoes and spring flood conditions. According to local accounts, summers having heavy rains and high water cause mosquitoes to become especially dense and prey on snowshoe hares to the extent that they can kill them. The young of the year, in particular, are vulnerable to mosquitoes. Snowshoe hares inhabiting islands at the time of spring break-up may be drowned by high water and flood conditions. Snowshoe hare populations during 1982-83 were considered low by local residents.

Snowshoe hares were historically harvested using nets and sinew snares. Old fish nets were draped over willows low to the ground and entangled the animals as they traveled through the brush. Spring snares were made from moose sinew and long willow poles.

Snowshoe hares are currently harvested using noose snares, 12 or 20 gauge shotguns, .410 shotguns, or .22 magnum rifles. Prior to freeze-up

in the fall when the river ice starts running, Chuathbaluk and Sleetmute hunters may conduct island drives in search of hares. Those animals that have been confined to islands throughout the summer are vulnerable to hunters, as they have no route of escape before freeze-up. In an island drive, an average of five hunters space themselves in a line approximately 30 to 40 feet apart at one end of the island. They walk through the brush, maintaining a straight line, flushing and herding hares as they go. These animals are shot. During the fall of 1982 very few hares were found on islands, making drives largely unsuccessful.

Following freeze-up, wire snares are set among the willows bordering rivers and islands. Snares are set along hare trails which are easily identifiable. Most hares are snared when snow conditions are powdery, deep, and soft, causing the animals to adhere to their trails. Hard, crusted snow enables hares to travel anywhere across the snow surface, off of the trails where snares are set. Snowshoe hare populations drop as winter progresses due to the effects of predation by foxes and lynx. Snares must be checked frequently to prevent hares from being consumed by foxes. Snares are set far enough from the winter village to prevent dogs from interfering with them. By spring, snowshoe hares become easy to hunt as long days lead to snow blindness in the animals. When encountered along the river, they tend to remain in one location or move slowly away from the approaching hunter. Snowshoe hares can easily be shot at this time.

Hares are usually made into soups. The lungs are considered good for eating. This species is also used for bait in trapping lynx. The furs are often saved.

Porcupine (issaluuq; Erethizon dorsatum)

Porcupine are distributed throughout the spruce-birch forest. They are harvested year-round, although they are preferred during summer and fall when they are fat and lack the spruce flavor acquired in winter. Porcupine move slowly and are easily harvested using rifles or clubs. This animal sometimes climbs trees, in which case it can be shot. When a porcupine takes refuge in an underground hole, it is extremely difficult to smoke out or retrieve. Because they are easily harvested, porcupine are considered a valuable resource in emergency situations when an individual may be out in the woods without food.

There are two primary methods of preparing porcupine. Elderly people prefer to let them dry and singe the quills and fur from the animal, causing the meat to have a smoked or barbequed flavor. Younger people tend to skin the animal and boil the meat. The tail is considered a delicacy.

Great Horned Owl (iggaiyuliq; Bubo virginianus)

Local informants report that great horned owls were harvested historically but are no longer taken.

Spruce Grouse (egtuk; Canachites canadensis)

Spruce grouse are distributed throughout the spruce-birch forest and concentrate along gravel bars and rocky shores in September in

order to ingest grit which enables them to grind and digest spruce needles. Spruce grouse are considered best for eating in fall but are harvested during winter as well. They are easily accessible in September along waterways and are commonly harvested while residents are traveling, hunting moose, or picking berries. They are often taken on foot with shotguns near the winter village.

Spruce grouse are commonly boiled and eaten in soups, though they may be fried and baked as well. Legs, wings, breasts, back, neck, head, rump, heart, liver, and gizzard are eaten.

Ruffed Grouse (temtemtaa; Bonasa umbellus)

Locally referred to as "willow grouse," this species occurs along islands and riverbanks in willow thickets during fall and winter. Ruffed grouse feed in early morning and evening atop willow bushes where they are exposed to hunters and can be easily shot. This species is generally harvested between September and March. Ruffed grouse are larger and fatter than spruce grouse and are considered by local residents to be the preferred species for eating. Preparation methods are similar to those described for spruce grouse.

Willow Ptarmigan (agesgik; Lagopus lagopus)

Willow ptarmigan are typically tundra dwelling birds, whose seasonal movement patterns are influenced by snow cover. When deep snows prevail in tundra areas, ptarmigan move down to rivers and creeks

where they occur in the willows along riverbanks. As the snow recedes in spring, ptarmigan return to the tundra. Ptarmigan are harvested locally when they are accessible to hunters along rivers and creeks between January and April, depending on snow conditions. Ptarmigan were historically harvested with sinew snares or old fishnets which were draped over willows to entangle flying birds. They are currently shot. Ptarmigan are most commonly boiled for soups or fried.

WATERFOWL HUNTING

Ducks (yaqulget), geese (neqlet), whistling swans (qugyuk), sandhill cranes (qutvauk), and other species migrate through the central Kuskokwim River area between late April and mid-May and between late August and mid-September. The spring migration is a major one, bringing waterfowl to the region in abundance. Most species nest in tundra areas, around lakes, and along small creeks during summer. Waterfowl do not pass through the central Kuskokwim in great abundance during the fall migration. Local observers note that for approximately the past 15 years great flocks of migrating waterfowl have not passed through the region as they did in earlier years. One local account linked the decline of the fall waterfowl population with changing salmon harvest practices. In the mid-1960s and earlier, most households went to fish camps along the river and fished throughout the summer. Every year river waters rose during late August and early September, allegedly in order to wash and cleanse the river shores on which fish had been cut throughout the salmon season. High waters in early autumn

have not occurred since the mid-1960s because the decline in salmon fishing activities has made it unnecessary to cleanse beaches. High waters attract waterfowl. Because there is no longer high water in fall as there once was, the size of fall waterfowl migrations has dwindled. Others attribute this decline to increased harvest by hunters in southern wintering grounds.

Each type of waterfowl has preferred landing areas while resting in the course of migration: geese frequent sandbars in the Kuskokwim River and its tributaries; ducks land in sloughs and on the rivers; cranes rest in hilly, tundra areas; and swans frequent marshy areas and bodies of water. Because the spring migration is the predominant one in the central Kuskokwim, residents traditionally have harvested waterfowl at this time. If they were to wait until fall, waterfowl harvests would be minimal. The spring migration occurs at a time of year when alternative resources are limited. Other small game species such as snowshoe hare, grouse, and ptarmigan are no longer available. Supplies of moose and caribou meat have dwindled and salmon are not yet available. Spring waterfowl are valued for providing food to village residents at a time of year when resources harvested during winter months are in short supply and summer resources are as yet unavailable.

Resting waterfowl are most commonly harvested on sandbars and in sloughs along the Kuskokwim and its major tributaries. Swans are rarely harvested and cranes are primarily taken in the fall. Migratory waterfowl species currently utilized by Chuathbaluk and Sleetmute residents include white-fronted, Canada, and emperor geese; mallard, pintail, canvas-backed, and Harlequin ducks; green-winged teals; red-breasted

mergansers; and black scoters. Waterfowl are seldom harvested during summer. In fall local residents may travel to tundra lakes for harvesting waterfowl. A few ducks remain throughout the winter in the upper reaches of some Kuskokwim tributaries that have open water year-round. The meat on these ducks is considered to be too tough for eating purposes in winter.

Traditionally, waterfowl were harvested when households went to spring camps to hunt muskrat in April and May. Several baskets of eggs also were collected. While most households discontinued the practice of going to spring camps in the 1940s, spring waterfowl harvest from the winter village and in the course of traveling has persisted. Waterfowl were historically harvested using spruce bows and arrows having either two-pronged, double-pointed arrowheads made from bone or blunt arrowheads formed from the base of a moose antler.

Waterfowl were historically preserved in pokes of seal oil if available, or through salting or drying. A bird that was to be salted was first skinned, gutted, and singed on the outside to burn the down feathers, crisp the skin, and cause fat to drip. The body cavity was then sprinkled with salt and a small amount of salt was spread on the outside of the bird. Salt served as a deterrent to flies and preserved the bird. During spring and summer, waterfowl were skinned and dried in smokehouses and stored in caches. In preparation for eating they were soaked overnight, softened, and boiled.

Waterfowl are currently harvested using .410 and 12-gauge shotguns. They are plucked and gutted, and frozen in freezers. Waterfowl are

commonly boiled, baked, pot-roasted, and made into soups. Eggs are seldom collected. Goose down is used locally by a few individuals in making coats.

Harvest Areas

Areas used by Chuathbaluk and Sleetmute residents for waterfowl harvest are depicted in Figures 67 through 70. Figure 67 shows that prior to moving to Chuathbaluk, waterfowl harvest took place mainly around tundra lakes and small tributaries where households had their spring camps. The areas used by Chuathbaluk residents for waterfowl harvest since living in the village include tundra lakes, the Aniak and Johnson rivers, and the Kuskokwim as far upriver as the Tatlawiksuk River (Fig. 68). Figure 68 suggests that hunters currently harvest waterfowl in the course of traveling and also maintain harvest areas previously used at spring camps. This extensive range of harvest areas used since moving to the village may mean that residents are traveling further to harvest waterfowl which are no longer as locally abundant.

Figures 69 and 70 show that Sleetmute residents have primarily used the Holitna, Hoholitna, and Kuskokwim rivers close to the village for harvesting waterfowl. The ranges show little change over time. Spring camps and small, scattered settlements along the Kuskokwim and Hoholitna rivers are no longer used as sites of waterfowl harvest. Waterfowl are currently taken by Sleetmute hunters in the course of traveling along the Holitna, Hoholitna, and Kuskokwim rivers, and pursuing other resource harvest activities.

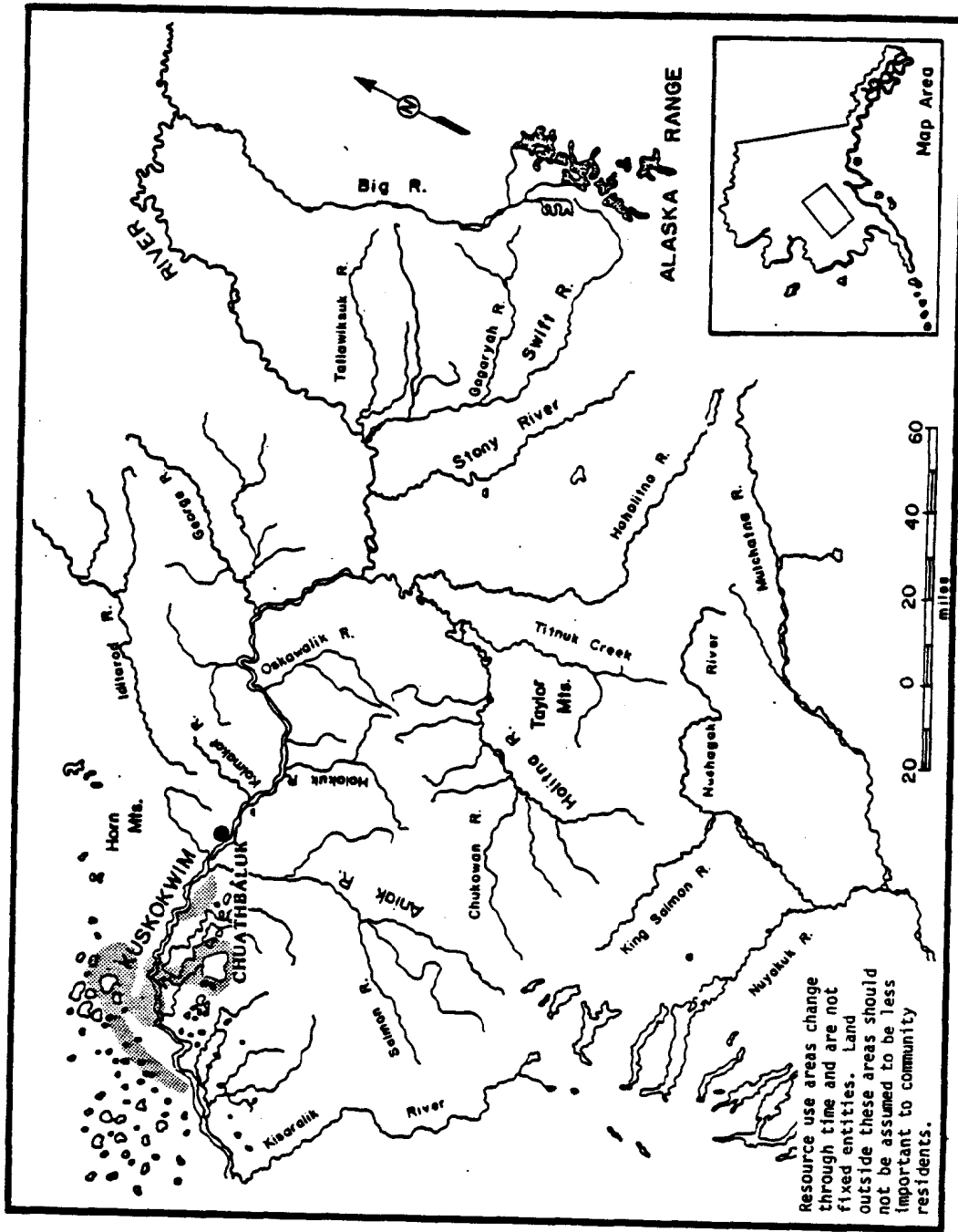


Fig. 67. Areas used by Chuathbaluk residents for hunting waterfowl prior to moving to Chuathbaluk.

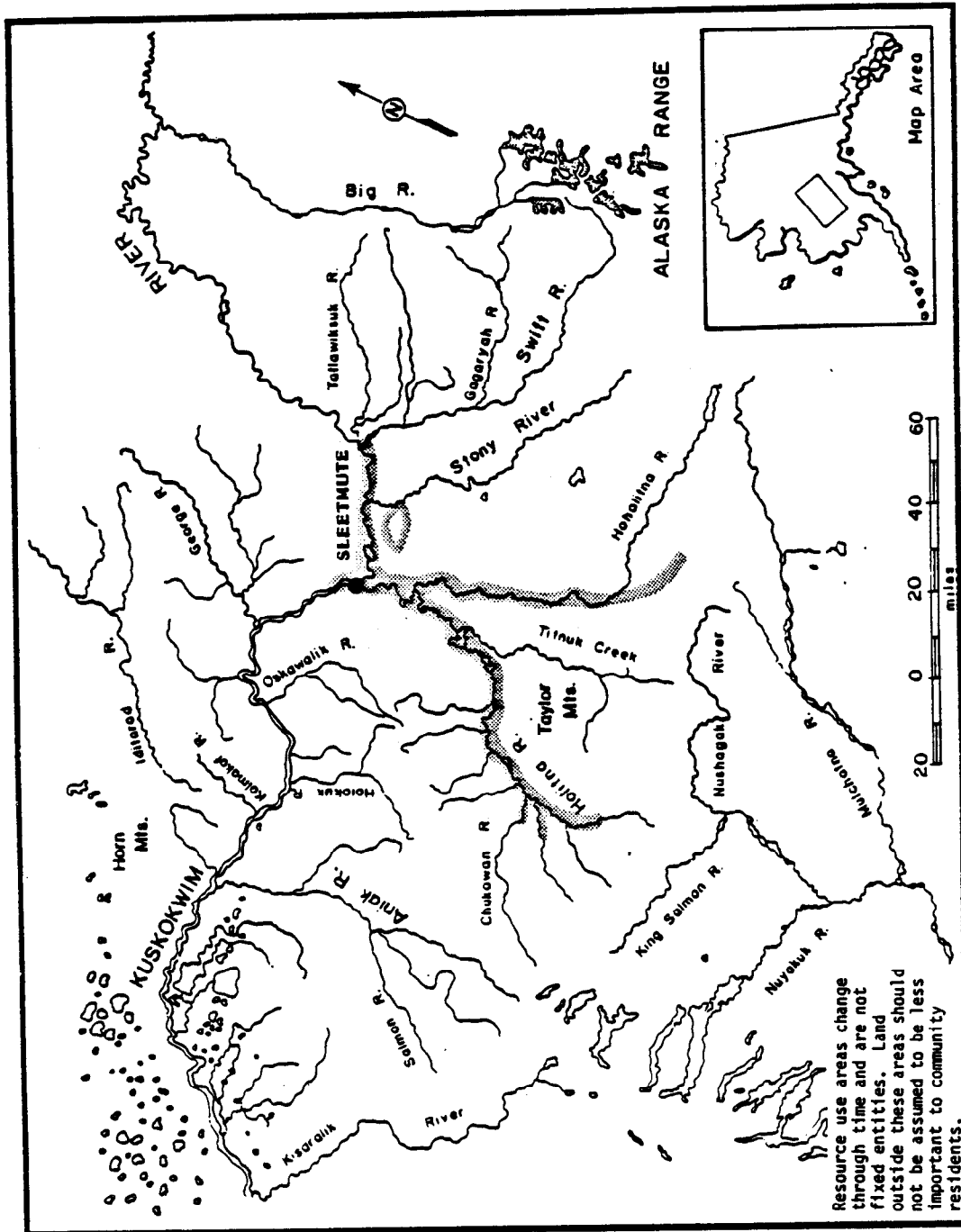


Fig. 69. Areas used by Sleetmute residents for hunting waterfowl prior to the use of snowmachines.

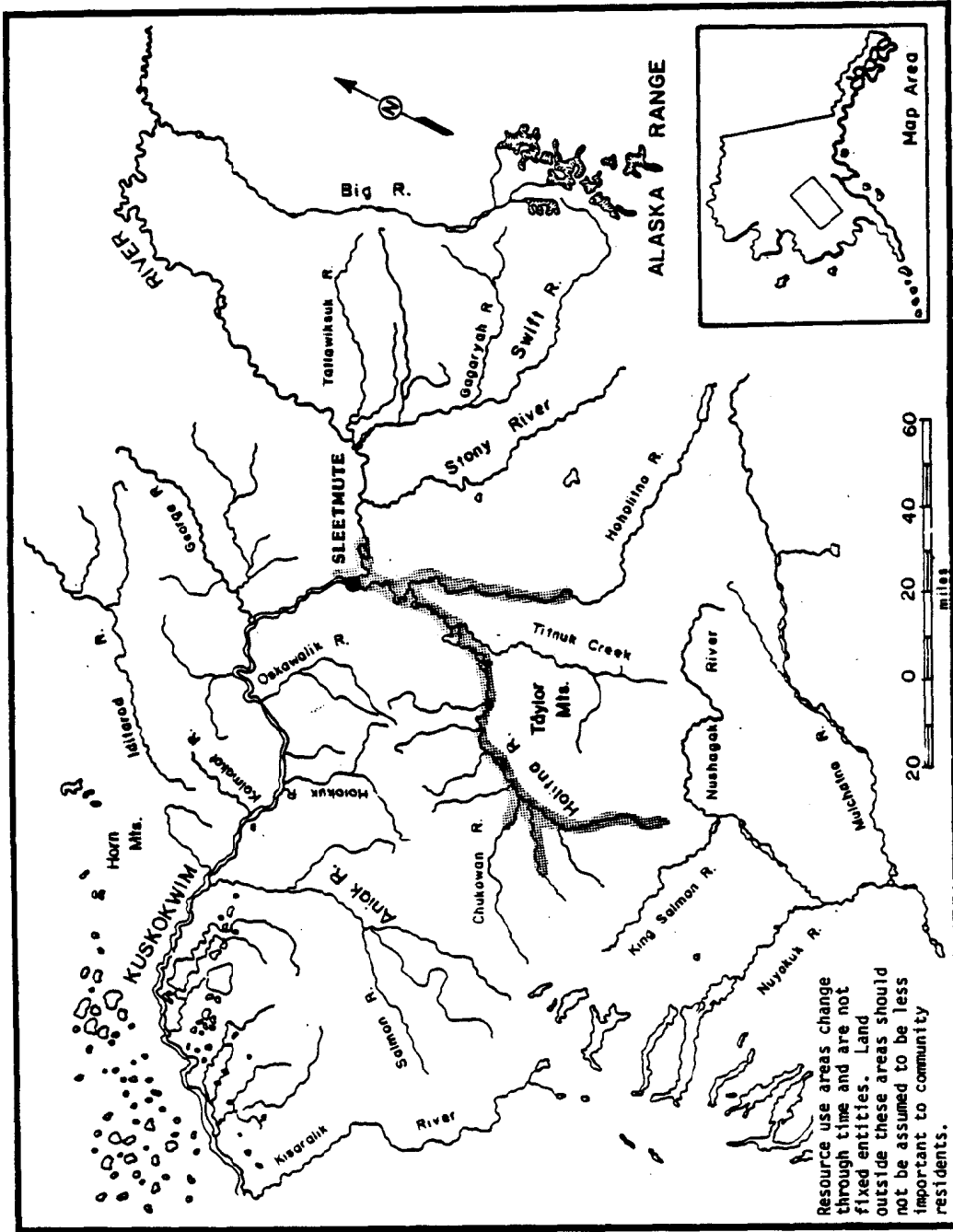


Fig. 70. Areas used by Sleetmute residents for hunting waterfowl since the use of snowmachines through 1983.

CHAPTER 10

TRAPPING

INTRODUCTION

As previously discussed, the harvest of furbearer species for commercial sale and export in addition to local use has occurred in the central Kuskokwim River region at least since the era of the Russian fur trade in the mid-1830s. At that time, beaver held the greatest importance in the fur trade. The annual take from Kolmakovskiy Redoubt, located across from the mouth of the Kolmakof River between 1845 and 1860, ranged from approximately 1,000 to 3,000 animals, most of these being beaver (Oswalt 1980b). While Kolmakovskiy Redoubt was operative, approximately 30,000 beaver were exported. The following furbearer harvest estimates were made by Petroff for the Kuskokwim River between 1845 and 1860: beaver, 23,696; red fox, 3,590; marten, 2,096; otter, 1,075; lynx, 327; arctic fox, 320; bear, 93; wolf, 1 (Oswalt 1980b). These figures reflect the comparative importance of furbearer species to the Russian fur trade. Marten did not become important to the fur trade until 1856 (Oswalt and VanStone 1967). The level of exploitation of furbearers in the Kuskokwim River region was not great during the Russian period (Oswalt 1980b). Nevertheless, by 1880 the furbearer population in the central Kuskokwim region was largely depleted. By 1883 the order of importance of furbearer species to the fur trade had shifted to muskrat, mink, marten, beaver, fox, otter, and black bear (Oswalt 1980b).

Marten and beaver currently form the backbone of the commercial trapping economy in the central Kuskokwim River region. Most trappers direct their activities toward the harvest of these two species. Although mink, land otter, red fox, wolf, wolverine, lynx, and muskrat occur within the region, these species are trapped in small numbers, if at all, and only supplement the cash income which is primarily derived from trapping marten and beaver. A small number of wolf, wolverine, muskrat, marten, and beaver are usually kept for domestic use by the trapper's household or by the household of a close kin relation such as parent, sibling, or offspring. Some trappers target their seasonal activities on both marten and beaver, while others focus on one or the other species. Different locations are generally used for the harvest of each species due to its habitat requirements, causing trappers to use two separate areas for trapping during a season.

Trapping efforts and harvest success fluctuate from year to year within the central Kuskokwim River region and are influenced by many variables. Animal population levels and distributions shift annually, as does the market value of furs. Weather conditions influence the activity patterns of furbearers and the likelihood of their becoming trapped. The best trappers in a community are reputed to be those who can trap furbearers under adverse environmental conditions when other trappers are unsuccessful. Some individuals are said to have a special "gift" or "charm" for trapping a particular species such as beaver or marten. This gift has been bestowed upon them by a previous bearer, and they in turn pass it on to a son or close relative who traps actively when they have aged and no longer feel a need for it.

Individuals do not reveal from whom they have received this gift or to whom they intend to pass it on. Individuals bearing one of these charms are able to trap the particular species whenever they set for it, regardless of success rates of other trappers.

During the 1982-83 season, Sleetmute residents participated more actively in trapping than did Chuathbaluk residents, with trapping comprising a substantial component of the local cash economy in Sleetmute. Most individuals choosing to trap in Sleetmute did so as a full-time winter activity, adapting their winter settlement patterns to facilitate trapping activities. With few exceptions, most Chuathbaluk trappers participated in trapping as a part-time activity from the winter village. Trapping provided most Sleetmute trappers with their primary source of annual monetary income, while trapping played a smaller role in the cash economy of Chuathbaluk.

A formal survey was administered to a sample of individuals who trapped during the 1982-83 season (Appendices D and E). For the purposes of this survey, trappers were considered to be any individual who set traps during the season with the intention to harvest furbearers for commercial sale. Some village residents set a few traps in order to obtain furs for domestic use. These individuals were not included in the survey. Some individuals who are considered active trappers in Sleetmute did not participate in trapping during the 1982-83 season and are not included here.

The average length of traplines run by Chuathbaluk residents was greater than those run by Sleetmute residents (Table 10). "Trapline" is a general term which refers to the area in which an individual sets

TABLE 10. PARTICIPATION IN TRAPPING BY CHUATHBALUK AND SLEETMUTE RESIDENTS, WINTER 1982-83.

	Communities	
	Chuathbaluk	Sleetmute
Number of trappers (percentage of total population)	19 (14.4)	18 (17.8)
Number of households having trappers (percentage of village households)	17 (58.6)	13 (46.4)
Number of trappers interviewed (percentage of total # of trappers)	9 (52.9)	5 (27.8)
Average length of trapline (range)	27.9 miles (4-60)	20.4 miles (10-32)
Average earnings from trapping (range)	\$537 ¹ (\$70-\$2,000)	\$2,875 (\$2,000-\$3,500)

¹Some trappers had not yet sold their pelts at the time data were gathered. These data then are incomplete.

traps and does not necessarily imply a single line along which traps are systematically set. The length of individual traplines run by Sleetmute trappers ranged between 10 and 32 miles, with a fairly even distribution of trapline lengths between these ranges. The length of individual traplines run by Chuathbaluk trappers ranged between 4 and 60 miles, with just under 50 percent of the trappers interviewed having lines between 20 and 30 miles in length.

Several Chuathbaluk trappers had not yet sold their furs at the time of interviewing, making average income data unavailable from the total sample interviewed in Chuathbaluk. All of the Chuathbaluk trappers interviewed earned under \$2,000 while all of the Sleetmute trappers earned over \$2,000. Table 11 presents the average prices paid to trappers by regional fur buyers for each fur species.

While trapping patterns exhibited by each village differed, methods used for trapping each species were similar. The general patterns observed in each village will be discussed separately, followed by a description of the methods and strategies used by Chuathbaluk and Sleetmute trappers for harvesting each species. Population trends in furbearer species will also be discussed. This information is based on informal interviews and formal surveys conducted with trappers from both villages (Appendices C and D). Surveys were administered in April 1983 to those trappers who were accessible at the village and did not include those still at remote trapping camps. Data regarding muskrat harvest levels were unavailable, as the muskrat season was beginning at the time the survey was administered.

TABLE 11. AVERAGE RAW FUR PRICES -- KUSKOKWIM REGION, 1982-83.

Species	Company 1	Company 2	Company 3
Marten	\$35-\$40	\$35	\$40
Mink	\$30-\$35	\$30	\$35
Otter	\$25	\$40	\$25
Beaver (medium size)	\$22	\$20-\$25	\$25
Lynx	\$150	\$210	\$235
Wolf	n.d.	\$125	n.d.
Wolverine	\$120	\$240	\$225
Red fox	\$35	\$50	\$65
Muskrat	n.d.	\$2	\$2

TRAPPING PATTERNS, CHUATHBALUK

During 1982-83, 19 Chuathbaluk residents representing 17 households set traps. All of the trappers were male, with ages ranging from 20 to 71 years. Over 50 percent of the trappers were between the ages of 20 and 40. Most trappers skinned and stretched their own furs, although in some cases the trapper's wife assisted in skinning and stretching. Individuals running traplines within a few miles of the winter village usually trapped alone, while those having traplines a greater distance from the winter village trapped with a partner.

Trapping partners most commonly were brothers, fathers, and/or sons, but included cousins, uncles, and nephews. Four pairs of trapping partners were fathers and sons, two pairs were brothers, one pair was cousins, one pair was a nephew and uncle, and four trappers trapped alone. Trapping partners exhibited different cooperative strategies. Some partners shared the costs of buying traps and owned them collectively but ran separate lines and kept the fur obtained on their own line. Some ran the same lines and kept the fur from their own sets. Other partners ran the same lines and divided the fur and meat equally between them. Others bought and owned their own traps separately from one another, ran the same lines, and kept fur obtained from their own traps and sets. Most trappers learned to trap from their fathers, though grandfathers and other trappers were additional teachers and a good deal of knowledge came from trial-and-error. Most trappers began trapping when they were in their teens, although their trapping efforts had varied from year to year depending on individual circumstances.

Eight individuals trapped close to the winter village throughout the season. Most of these individuals had wage-earning jobs in the village and were unable to travel far distances in order to trap on a larger scale. Individuals lacking snowmachines, who had to travel and check their lines on foot with the use of snowshoes or by dog team, also trapped in close proximity to the winter village. These individuals could make a round trip to check their traps in one day and based themselves from their homes in the winter village. Three trappers resided in single-family settlements apart from the village and ran traplines close to their settlements. Individuals trapping further

from the winter village set up wall tents to make temporary camps in which they remained overnight while checking traplines for periods lasting from two nights to three weeks, regularly traveling back and forth from the winter village. Some individuals who only trapped beaver were flown by air charter into their trapping areas for approximately one month, typically in March, to trap from a temporary base camp throughout the beaver season.

Harvest areas used by Chuathbaluk trappers during 1982-83 had a history of use by the individual trapper or his partner which ranged from 1 to approximately 30 years. Individuals exhibiting short-term use of a trapping area stated that they chose their area because it was not being used by another trapper. By using unoccupied land, they avoided conflict with other trappers. Individuals who had used a given trapping area for ten years or more stated that they had acquired their harvest area by having used it repeatedly over the course of many years. These areas were used by the fathers of some trappers who continued to use them and are areas in which these individuals learned to trap with their fathers when they were young.

Trappers begin setting for marten in November soon after the season opens. Trapping takes place close to the winter village until freeze-up, after which individuals can travel further on the Kuskokwim River by snowmachine. The river ice remains rough and difficult to travel on into December, however, limiting the distance trappers can travel easily. During 1982-83, trapping efforts appeared to increase in January and continue through March, with the focus shifting from marten to beaver in February. Most trappers harvest some beaver early in the season as a source of food.

Table 12 shows the average and range of furbearer harvest levels by species, the average number and range of sets made for each species, and the months in which each species was primarily harvested for trappers interviewed from Chuathbaluk. It is apparent from these data that overall furbearer harvest levels were low. Marten and beaver were the primary species taken, with lynx and red fox of secondary importance. Wolf, wolverine, mink and otter were harvested occasionally. The bones of furbearers were traditionally thrown in the river (Oswalt and VanStone 1967), but this practice is no longer in effect. Every household saved beaver and lynx carcasses in order to eat the meat or distribute it to other households. Other carcasses were either disposed of or used for trapping bait. Not all trappers had sold their furs at the time of interviewing. Those who had, sold their furs mainly to a company in Aniak or a furbuyer from Kalskag. Average earnings per trapper for the 1982-83 season came to \$537, with a range of \$70 to \$2,000.

TABLE 12. FURBEARER HARVESTS AT CHUATHBALUK, 1982-83 SEASON.

	Marten	Mink	Otter	Beaver	Lynx	Wolf	Wolver- ine	Red Fox
Average number of sets per trapper	8 (0-12)	.67 (0-3)	0	36.5 (0-100)	11.3 (0-100)	.33 (0-2)	3.8 (0-12)	5.4 (0-20)
Average number of animals harvested per trapper	7.2 (0-20)	.33 (0-2)	.22 (0-1)	8.3 (0-20)	1.0 (0-8)	.1 (0-1)	.1 (0-1)	1.4 (0-5)
Primary months of harvest	Dec. Feb.	Feb.	Feb. Mar.	Dec. Jan. Feb. Mar.	Dec. Jan. Feb. Mar.	Dec. Jan. Feb. Mar.	Dec. Jan.	Dec. Jan. Feb.

TRAPPING PATTERNS, SLEETMUTE

Eighteen Sleetmute residents representing 13 households trapped during the 1982-83 season (Table 10). Of these, one individual was female and the rest were male. Trappers' ages ranged between 21 and 72 years. Over 50 percent of these trappers fell within the age classes 20 to 29 or 50 to 59.

All but two individuals trapped with a trapping partner. The composition of trapping partnerships is shown below.

Father:son	3
No kin relation	2
Married couple	1
Brother:brother	1
Nephew:uncle	1

Partners typically bought and owned their own traps, kept furs caught in their own traps, and ran lines separately or together. However, some individuals shared traps, lines, and furs. Individuals usually skinned and stretched their own furs, with occasional skinning assistance from a trapper's wife. Beaver carcasses were saved for food and other carcasses were used as bait. Individuals had trapped since their teens, learning to trap mostly from their fathers and through trial and error.

Eight of the 13 Sleetmute households (61.5 percent) participating in trapping during the 1982-83 season, comprising 15 individuals, conducted their trapping activities from trapping camps on the Holitna and Hoholitna rivers (Fig. 71). Ten of the 15 trappers overwintering

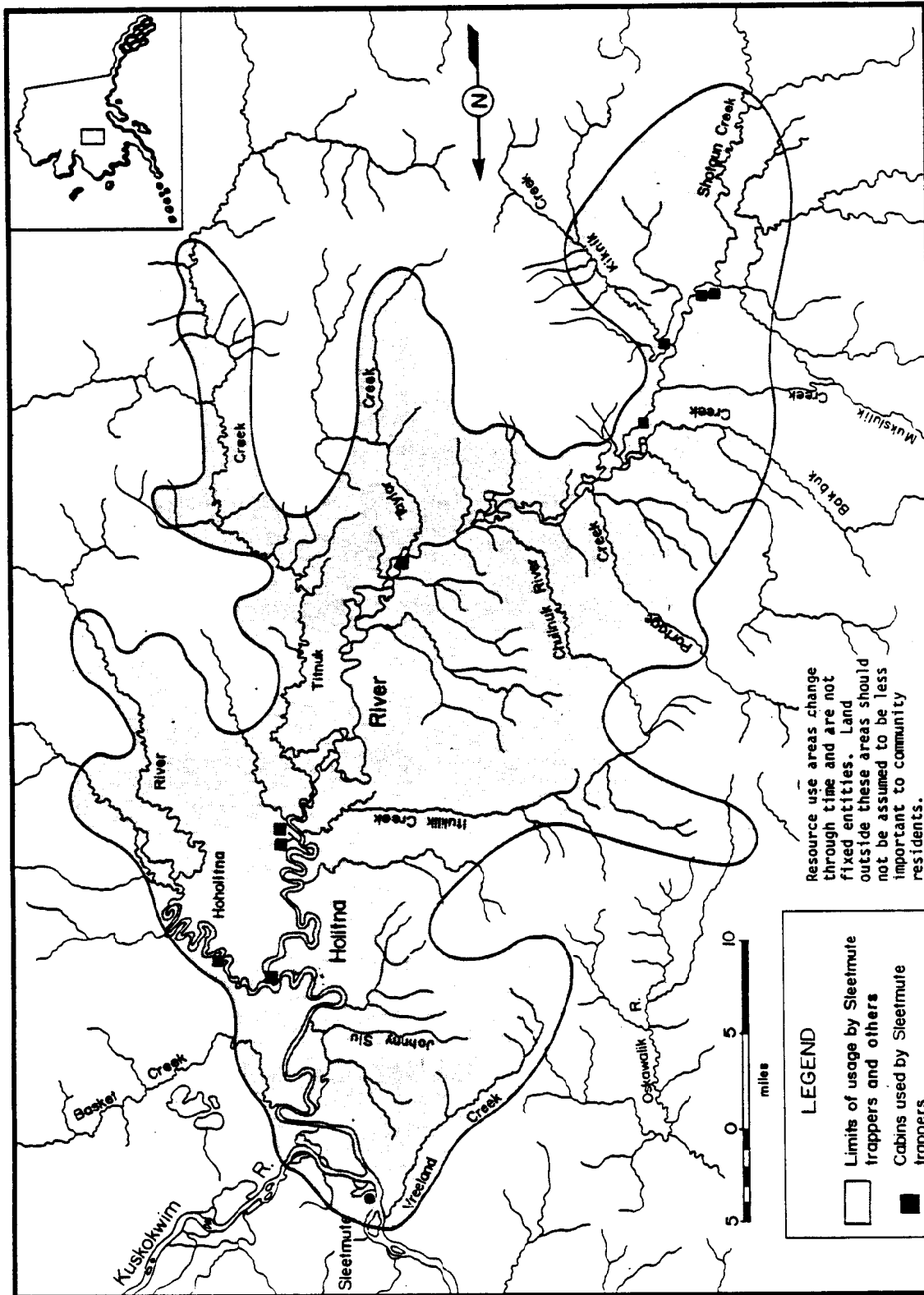


Fig. 71. Locations of trapping cabins used by Sleethmute trappers and trapping areas used by Sleethmute and other trappers during 1982-83.

at trapping cabins on the Holitna River were single males, many of whom derive most of their annual cash income from trapping. All but one of these individuals were based out of permanent cabin sites from which they ran their traplines. The remaining individual overwintered in a wall tent. Trapping partners usually shared a cabin. Often trappers had an additional temporary camp site with a wall tent at the far end of their traplines in which they overnighted while checking their lines. Lines were run with the use of snowmachine or on foot using snowshoes. Seven households moved to their trapping cabins prior to freeze-up in September, traveling by boat or airplane charter, and remained there until break-up, at which time they returned to the winter village by airplane, boat, or on home-made log rafts. Snowmachines remained at the winter cabin. Two trappers had wives and children and moved their entire household to the trapping cabin. Their children attended school through a correspondence program. One other married trapper remained separated from his household throughout the winter, though household members visited him periodically at his cabin site. Occasional trips to Sleetmute were made in the course of the winter for purposes of obtaining supplies. In addition to trappers who are considered to be Sleetmute residents, at least 12 additional trappers overwintered on the Holitna and Hoholitna rivers during the 1982-83 season to trap from permanent, year-round settlements or seasonal cabin sites. Some of these individuals were interviewed informally but were not included in this sample.

Two Sleetmute residents trapped on a small scale from their homes in the winter village. One household trapped on a larger scale from

their settlement on the riverbank opposite the winter village. Most households overwintering in Sleetmute had household members with wage-earning jobs in the village and chose to take advantage of wage employment opportunities rather than spend time away from the community to trap. Many of these households also had children whom they preferred to send to the village school rather than have them participate in the correspondence study program, an additional reason they chose to remain in the winter village. The remaining households overwintering in Sleetmute did not have adult male members who formed the typical production unit involved in trapping.

Many Sleetmute residents trapping from winter trapping cabins used areas in which they, their fathers, or brothers had a personal history of use. Cabins were either built by the individuals using them within their traditional use areas or had been built by kin relations who no longer used them. Individuals using cabins and areas that were not traditionally used within their kinship groups had been invited to do so by the individual to which the area "belonged," enabling trappers to establish partnerships or to maintain a mutually beneficial relationship. Trapping partnerships shifted from year to year and were not necessarily long-term relationships between specific individuals. Often a young man established a partnership with an older man to serve as an "apprentice" and learn from the older trapper, and to provide the older trapper with the strength and vitality necessary to conduct trapping activities. Some trappers do not trap every winter. Annual fluctuations in fur market prices influence a trapper's decision concerning whether or not to trap. Most trappers use an area for a few

years and allow it to "rest" for a year by altering the course of their lines. This practice is done to enable furbearer populations to replenish themselves.

Local observers report that more Sleetmute residents have participated in trapping within the past five years than did during the mid-1970s and predict an increasing trend in trapping village-wide over the coming years based on the recently renewed interest in this activity. Prior to the 1970s, many trappers were flown by the air charter service located in Sleetmute into areas within the central and upper Kuskokwim region and the Nushagak River drainage known to be productive for marten or beaver, as marten were not as abundant in the Holitna and Hoholitna river drainages until about the mid-1960s. Temporary camps were established in these more remote areas from which the given species was trapped intensively for up to several months. This is no longer a common practice in Sleetmute.

Table 13 presents the average number and range of sets made per furbearer species by Sleetmute trappers interviewed, the average number and range of species harvested, and the primary months of harvest. It is clear from Table 13 that marten was the major furbearer species harvested during the 1982-83 season. Beaver are abundant in the area and are widely taken in years when prices are good. Beaver have yielded small profits within the past few years and therefore have not been harvested as intensively as they have been in years when prices are high. Mink, otter, wolverine, and red fox are occasionally harvested. Most Sleetmute trappers sell or trade their furs to the Sleetmute village store in exchange for groceries, supplies, and items such as

snowmachines. Furs are also sold or traded for groceries to a buyer in Red Devil.

TABLE 13. FURBEARER HARVESTS AT SLEETMUTE, 1982-83 SEASON.

	Marten	Mink	Otter	Beaver	Lynx	Wolf	Wolver- ine	Red Fox
Average number of sets per trapper	55.4 (30-100)	0 0	3 (0-6)	28.8 (12-48)	0 0	1.6 (0-8)	5.2 (0-12)	8.2 (0-25)
Average number of animals harvested per trapper	56.4 (40-87)	2 (0-10)	2 (0-4)	15.4 (3-40)	0 0	0 0	1.2 (0-3)	1.6 (0-2)
Primary months of harvest	Nov. Dec.	Dec.	Dec.	Jan. Feb. Mar.			Dec. Jan.	Dec.

FURBEARERS

Beaver (paluqtaq; Castor canadensis)

Beaver occur along tributary rivers, creeks, and lakes in the central Kuskokwim River region. They inhabit houses located in areas where food is plentiful in winter months. Beaver build dams in shallow areas of slow running water to create deep pools for winter use. Beaver houses generally contain from one to ten animals which comprise a family. Large beaver are referred to as ucingvak, medium-sized beaver are referred to as ucinglluar,

and small beaver are referred to as aqsatuyaaq. Mating occurs in January and February and young are born around May. During summer months beaver feed on grasses, roots, and tree bark and are active nocturnally. By fall beaver are active day and night gathering materials to repair dams and houses and building underwater "feed piles" for winter use. "Feed piles" consist mainly of willows and young cottonwoods and provide the animals with a winter supply of food. Underwater exits from the beaver house and regularly traveled routes provide access to the feed piles. Most beaver houses also have an above-ground exit in the vicinity of a willow stand that serves as a food resource in case the feed pile is depleted in the course of a winter. High water and flood conditions in fall can cause feed piles to be washed away. This may damage local beaver populations by leading to winter starvation and increasing the effects of predation on beavers feeding above ground during winter. When beaver populations exceed the carrying capacity of an area, downriver migrations occur following break-up in spring. Large numbers of beaver dispersing to find new homes can be seen swimming downstream with high spring waters.

Local observers report that beaver are abundant and increasing within the drainages of the central Kuskokwim River tributaries. Abundant food supplies and reduced trapping pressure resulting from low fur prices are thought to be contributing factors to this population increase.

Aboriginally, there were three methods of harvesting beaver (Michael 1967). Swimming animals were shot in early April upon leaving their houses and moving to large rivers for the summer. During winter

thaws, beaver emerge above ground to feed in willow groves, thus conserving their feed piles. On these occasions animals were clubbed by hunters lying in wait. Beaver were also hunted under the ice in winter months. Hunters noted locations of good beaver houses in fall and returned to them in winter, breaking the ice in front of the underwater exits and lowering a rawhide net which entangled the animals as they emerged from underwater exits. When these exits were not discernable, air holes leading to tunnels in the beaver house were located. Beaver were known to appear by these air holes when ice froze over them and to melt it with their breath. Traps were placed along the side corridors of the tunnel leading to the air hole. Other activities, such as fishing, setting snares for fox and marten, and setting nooses for caribou, were conducted concurrently with beaver hunting (Michael 1967).

One method for harvesting beaver that was extremely destructive to the population was introduced by the Russians (Michael 1967). In late fall, winter, or early spring, hunters located beaver houses by beaver dams. The dam was broken open and all exits and air holes leading from underground passageways in the beaver house were plugged. The roof of the house was broken open. A heavy iron hook attached to a long handle was extended into the beaver house and used to locate and extract animals hiding in the passageways.

Russians further contributed to damaging beaver populations by shooting them with firearms (Oswalt 1980b). Approximately three out of every ten beaver shot were retrieved, the rest drowning or escaping to die later. Firearms caused beaver to go into seclusion and migrate

out of heavily hunted areas, making them less accessible. Steel traps were imported to Kolmakovskiy Redoubt during the Russian period but did not gain widespread use as a trapping method. Local people preferred to convert these into implements such as knives, hatchets, and rings.

Local residents report that beaver were historically taken in deadfall traps; with spears; with bows using arrows having two-pronged iron points; and in sinew snares that hung from wooden hooks attached to bent poles, which flung snared beaver into the air by releasing the hook, as described for snowshoe hares, where they dangled and choked. Beaver were taken following break-up in spring by hunters using guns who waited for them to emerge from their houses in canoes or on land. This method was extremely efficient but was recognized as damaging local populations and was therefore discontinued. According to customary law, only old and large beaver were harvested. The young ones were preserved as a means of conserving populations. Young and old beaver could be distinguished from one another by the tendency for young animals to float on top of the water, whereas only the heads were visible on older animals. Regulations governing beaver harvest were accompanied by disregard for this customary law.

During the 1982-83 season, beaver could be harvested in Game Management Unit 19 between November 1 and April 15, with a bag limit of 40 animals (Alaska Department of Fish and Game 1982d). It is currently illegal to disturb or destroy beaver houses or to harvest beaver with the use of firearms (Alaska Department of Fish and Game 1982d). Beaver are primarily taken using snares and steel traps. These are placed

under the ice, under water, and above-ground. Pelts are prime for commercial sale around January or February. Most trappers harvest beaver after this time, though some are harvested earlier in the season for food. Beaver were traditionally harvested for food in late summer and early fall, providing variation from the summer diet which consisted mostly of salmon.

Currently beaver snares may be set in a variety of places. Thompson 1-XX-60" length snares are commonly used. These can be set using an ice pick or shovel inside beaver houses in tunnels which are located above ground. Beaver houses lacking feed piles are good places for setting snares, as these beaver must come above ground to feed. Snares also are placed around underwater exits from beaver houses or along channels leading to feed piles. Such paths are commonly used by beaver and can be identified in clear water by noting the alignment of suspended excrement near exits from the beaver house. When a beaver dam is located, a hole may be made in the middle of it and underwater snares placed around the hole. Beaver will go to repair the dam that evening and may be caught in the snares. Underwater snares also are set beneath the ice away from feed piles but within range of a beaver house. A hole is cut in the ice and bait is placed under water, extending to the river bottom. Birch, willow, or small cottonwood are used for bait. Two or four snares are set around the bait. Beaver become snared upon investigating this new food source in their territory.

Number 2 spring traps are commonly used for taking beaver. In fall traps are set above-ground along beaver trails. These are covered well and purged of human scent. In winter, traps are nailed to dry

logs. One end of the log rests on the riverbank and the other end extends through a hole in the ice and rests on the river bottom. Beaver do not disturb dry timber. Willow and birch are used for bait. Live trapped animals are usually clubbed or shot in the head with a .22 magnum rifle.

Recently set traps and snares are left alone for several days, enabling beaver to become accustomed to a new presence in their environment. After this they are checked regularly. Snares are checked daily, as live beaver avoid snares in which other beaver have lain dead for a number of days. Older animals are difficult to catch and often eat bait while avoiding traps and snares. Beaver are skinned soon after being caught. Skins are nailed onto boards and stretched round and taut. Skins also are tied with sinew or string to a round frame crafted from willow having bent nail hooks. Beaver skins may also be stretched around the base of a large, broad tree and nailed to the trunk.

Beaver pelts traditionally have been used in the local manufacture of clothing and blankets. Most pelts are sold commercially or traded for household goods. Others are kept and used by the trapper's household in making hats, mittens, and trim for parkas and skin boots. Beaver castors are saved and dried and are valued for medicinal purposes. Parts of the castor are chewed, placed over cuts and infections, and are reported to contain antibiotic healing properties. Castor oil is extracted and ingested to soothe sore throats and coughs. It is also used for scent around traps.

Beaver meat is an important food source in the central Kuskokwim diet and is a primary supplement to the regular diet of fish and moose meat. Beaver meat is highly prized and is a favorite dish among area residents. It is usually smoked, dried, boiled, barbequed, or made into soups. The carcass is cut open from the belly and hung in a method similar to that used for blanket fish for drying and smoking. This method of preparation takes place in both warm and cold weather. It may be eaten half dried and boiled. Boiled beaver meat must be cooked for several hours and is often boiled twice, the first time with baking soda to remove strong flavors. The feet and tail are considered delicacies. Traditionally, head and feet were placed in birch bark baskets, covered with lichen, and allowed to age, at which time they were boiled and eaten. In winter beaver contain a large quantity of fat which is sometimes fried. Kidneys, liver, and lungs are boiled. The entrails are fed to dogs. Intestines were traditionally saved, cleaned, and used as a container for food. This use was not observed in 1982-83.

Muskrat (ilegvak; Ondotra zibethica)

Musk rats occur in ponds, lakes, and creeks year-round. They build houses from vegetation along the banks of ponds, lakes, and creeks in which they overwinter. Musk rats also reside in tunnels made in river-banks. Houses and tunnels have underwater exits. In winter months muskrats make "push-ups" above holes in river and lake ice which are constructed from small mounds of vegetation. These are hollow and

allow animals to emerge from the water and feed. Young are born in late April and May when there is enough open water for them to swim. During summer, muskrats are active raising young and repairing houses. They feed along the shores of lakes and creeks. Fall months are spent storing roots, grasses, and other types of vegetation for winter consumption. Muskrats feed on stored food throughout the winter and are active nocturnally. Furs are prime for commercial sale between January and May.

Aboriginally, muskrats were harvested in tossing snares made from a noose that dangled from one end of a long pole (Michael 1967). According to local informants, muskrats were historically harvested in winter in fish traps placed under the ice. Underwater fences were constructed across small creeks in which muskrats were known to travel. A fish trap was placed at the center of the fence and the swimming animal was guided into the trap. Fish traps were also placed under the ice by underground exits from houses or tunnels causing muskrats to become trapped upon leaving their homes.

Muskrats were traditionally harvested in the central Kuskokwim region by families who went to spring camps established for this purpose. In April families traveled with their belongings to areas having large or numerous lakes and camped until late spring, harvesting muskrat and waterfowl. It was reported that when tree leaves had grown as large as a beaver's ears, families knew that the Kuskokwim River ice had broken and returned home. Muskrats were primarily harvested by hunters using .22 magnum rifles while walking around lake shores or floating on lakes in canoes. By using vocal or man-made

calls, hunters could draw the animals close to them. Men hunted throughout the night and women skinned the muskrats the following day. On a good night 30 or more animals could be harvested. Often muskrats were sold in bundles of 30, the number required for making a parka. By the 1940s most families no longer settled at spring camps. However, some individuals continue to attend spring camp for short periods of time in order to hunt muskrats.

During 1982-83 the muskrat season in Game Management Unit 19 was established by regulation between November 1 and June 10 with no bag limit (Alaska Department of Fish and Game 1982d). Muskrat push-ups or feeding houses could not be disturbed for trapping purposes (Alaska Department of Fish and Game 1982d). Muskrats are currently harvested in winter using Number 0 spring traps. In spring they are taken in traps and with .22 magnum rifles.

During winter, spring traps are placed in muskrat push-ups and baited with roots and grasses. When animals emerge from the water to feed, they become caught in these traps. In spring traps are placed along the shores of lakes and creeks where muskrats are known to feed. Traps are checked morning and evening when animals are abundant. Trapped animals are clubbed to death. Most trappers feel that muskrats are more easily hunted than trapped. Hunters travel by night in boats or canoes around lakes, shooting the animals. Pelt quality diminishes if there are holes in the skin resulting from bullets or the mating act in which the male bites the female in the back of the neck. Muskrat skins are dried on small stretchers.

May is currently the most popular month for muskrat harvest in Chuathbaluk and Sleetmute. Because each pelt brings only a few dollars at most, many individuals do not consider hunting for prolonged periods of time or attending spring camp worthwhile unless they are in an area where muskrat are abundant. While muskrat populations were reportedly high in the central Kuskokwim region in the early and mid-1900s, local observers report that this species has declined in number in the recent past. Few animals and few signs of their presence have been observed by local trappers. Lack of an adequate food supply is offered as a possible explanation for the decline in muskrat populations. Muskrat are primarily harvested by Chuathbaluk and Sleetmute trappers for food and parka material.

Muskrat meat is considered tough and must be boiled for several hours before being eaten. Drying and smoking are the preferred means of preparation. The animal is split open at the belly, hung in a manner similar to that of a "blanket-cut" fish, and smoked, often using alder for flavoring. Historically, smoking was a common preparation and preservation method used at spring camps. Muskrat may be eaten half-dried and boiled. Scent glands are sometimes saved from the animals and used for scenting around traps.

Marten (qavcicuaq; Martes americana)

Marten in the central Kuskokwim generally occur in hilly, timbered country in association with spruce forests in the central Kuskokwim. Spruce stands along creeks, around meadows, in marshy areas, and on

hillsides provide good marten habitat. Marten mate in August and bear their young the following May. In summer and fall marten maintain dens and hunt within a fairly limited home range. By winter they begin to roam widely in search of food. Marten prey on mice, birds, and carrion. They are nocturnal and remain solitary for most of the year. During periods of extreme cold weather, marten remain somewhat inactive. They appear to be more common when snow accumulations are minimal and cold weather prevails. They have a greater tendency to move around prior to and following storms. They are most easily trapped in November and December when they begin to range more widely.

Marten are locally abundant throughout the central Kuskokwim River region. Most trappers make a conscious effort to avoid depleting populations by altering the course of their traplines every few years, allowing areas to rest, or by limiting their trapping efforts in a given area. Marten are known to migrate from year to year and may be abundant somewhere one year and scarce the next. These migrations can occur in the course of a trapping season. Local trappers report that marten populations in the Holitna, Hoholitna, and Oskawalik river drainages have only been significant within the past 15 to 20 years. A major fire occurring in the early 1930s spread from the Holitna River to Sleetmute and along the Kuskokwim River as far as Napaimute and is thought to have driven out marten populations. Marten began to reappear around the 1950s as habitat recovered. Local populations are currently much higher than they have been within the memories of most trappers. Many individuals are beginning to trap mostly small marten, however, suggesting that populations are beginning to respond to trapping pressure.

Marten are prime in November and are the first species set for by trappers. Their pelts remain prime through February. During 1982-83 marten in Game Management Unit 19 could be harvested between November 1 and February 28 with no bag limit (Alaska Department of Fish and Game 1982d). Marten were historically harvested using deadfall traps. They are currently taken most commonly in Number 1 spring traps using pole, ground, or cubby sets. Marten are considered to be relatively easy to trap.

Pole sets are the most popular for marten. A pole set is made by leaning a 3 to 4 inch diameter pole against a fence about 4 feet off the ground. A trap is nailed by the chain to the pole near the tree trunk. Bait is suspended about a foot above the trap. Various items, such as red squirrels, birds, viscera from game birds, dry or rotten fish, and rotten pieces of moose hide soaked in animal grease, are used for bait. Brightly colored strings and pieces of cloth are also used to attract the animals. Marten walk up the pole and become trapped upon trying to reach the hanging bait. Pole sets are considered as having several advantages over cubby and ground sets. They are easy to make and do not have to be constantly remade. They keep snow from accumulating on and covering the trap. They may be checked easily while traveling by snowmachine along the trapline. Most important, they prevent mice from consuming carcasses. Mice present the greatest nuisance to marten trappers, as they eat marten carcasses and ruin their pelts. Because the chain from the trap is nailed to the pole, dead marten are suspended above ground out of reach of mice. Lynx, red fox, and wolverine are sometimes trapped incidentally in pole sets.

Ground sets are made under spruce trees where open, clear spots on the ground occur beneath branches beginning about two feet off the ground. Trees having dense branches prevent snow from falling on and burying traps. The chain of the trap is nailed into the tree roots. Bait is hung from an over-hanging branch about two feet off the ground. As marten attempt to reach the bait, they become trapped in the ground set.

Cubby sets consist of little houses about three feet high that are made from spruce boughs. A trap with bait is placed inside. Marten explore cubbies out of curiosity. The animal becomes trapped upon entering the house. Cubbies tend to be destroyed by snowstorms and often must be rebuilt. Their advantage over pole and ground sets is that they lure curious animals that are not interested in bait.

Marten traps are checked once every three days or so. If traps are checked more often, the animals tend to get spooked and leave an area. Trapped marten are generally killed by dislodging the animal's heart. The animal is struck on the nose or head and stunned or made to bite into the trapper's glove and held firmly by the nape of the neck. From this position the heart is pinched and pulled. Marten may also be choked. Skins are typically stretched on wooden stretching boards. Carcasses are generally disposed of or used for bait. Dark marten pelts have the highest monetary value. Pelts having an orange or reddish coloration are considered less valuable. A harvest of 75 to 150 marten is considered high by Chuathbaluk and Sleetmute trappers.

Mink (imarmiutaq; Mustela vison)

Mink are distributed along rivers, creeks, and lakes in the central Kuskokwim area. Mink occurring around tundra lakes are larger than those found along creeks and small rivers but lack the fine quality of fur found on stream-side mink. In spring they den in the ground along creek and lake borders and give birth. Mink tend to travel great distances from their den sites. They travel fairly regular routes, however, and one can anticipate the return of a mink inside of a week to an area where trails and tracks are found. Mink often reside in old beaver houses. They feed primarily on fish, mice, and sometimes birds. Mink are active nocturnally. In winter, mink remain in hollow spaces between water and ice in the lower reaches of Kuskokwim tributaries. In the upper parts of tributaries where areas of open water occur, mink emerge from rivers and creeks above the ice and can be trapped. Mink remain active in warm and cold weather but are less likely to be trapped in warm weather.

Mink were historically harvested in deadfall traps, in fish traps as described for muskrats, and with bows and arrows having two-pronged, iron points. Currently mink are harvested using small snares and Number 0 or Number 1 spring traps. Traps are set away from mink dens to prevent animals from leaving an area. Sets are most commonly made along trails and in areas where mink tracks abound, indicating regularly traveled routes. Traps and snares are also set under ice in areas where mink are likely to travel. Fresh or dried fish and bits of meat or bacon are used as bait.

Mink traps must be checked every day or two to prevent carcasses from being eaten by mice. A trapped animal is usually killed by dislodging the heart as described in the case of marten. The skin is stretched on a small stretching board. Mink are considered edible by Chuathbaluk and Sleetmute residents but are not highly sought after as a source of food. Most carcasses are disposed of. Mink pelts are prime between November and February. During the 1982-83 season, mink could be trapped in Game Management Unit 19 between November 1 and February 28 with no bag limit (Alaska Department of Fish and Game 1982d).

Local observers note that mink populations in the central Kuskokwim River area have shown a reverse trend in comparison with marten populations. In the 1950s and earlier mink were abundant throughout the region. Within the past 30 years mink numbers have declined. They are currently considered uncommon. Few were harvested during 1982-83.

Land Otter (ciugilnguq; *Lutra canadensis*)

Land otter are distributed throughout the central Kuskokwim along rivers and creeks and around lakes. They feed primarily on fish. Otter inhabit dens dug into river or lake banks and old beaver houses. They often live and travel in groups. Otter maintain fairly regular travel routes and overland trails between lakes or along rivers may be apparent. Otter slides in snow are found during winter months. This species travels under all weather conditions and appears to be most

active in evening. In winter months otter in the lower parts of Kuskokwim tributaries remain beneath the ice where hollow spaces occur above water. Toward the headwaters of Kuskokwim tributaries where areas of open water occur, otter haul out above the ice. Trappers must go to areas of open water to trap otter in winter months.

Otter were historically harvested using bows with arrows having two-pronged iron points, in fish traps which were made from strips of spruce and set in streams, and by hand with the hunter grasping the tail of the otter and raising the hind feet off of the ground to prevent it from turning and biting him, then slitting its belly (Michael 1967). Otter were also harvested in deadfall traps. Currently otter are taken in snares, spring traps, fish traps, and with the use of firearms. An occasional otter may be caught during summer in a fish net set for salmon.

Otter may be snared using Number 1-XX snares in locations where they emerge from the water and haul out onto the ice. They may also be taken in snares set under the ice around man-made holes in beaver dams. Snares may be placed around the entrances to otter dens and are particularly fruitful around entrance holes where a significant amount of excrement is apparent. Otter often enter beaver snares. Otter are strong, muscular animals and can twist, chew, and break snares. Some trappers attach snares to willow boughs that lift the snared animal into the air and cause it to hang and choke.

Traps set for otter above ground must be devoid of human scent and covered well with grasses and snow. Number 4 double spring traps are commonly used. Traps may be placed in man-made holes in beaver dams,

along overland trails, under water in areas where otter are known to swim, in locations where otter emerge from the water and haul out on the ice, along otter slides, at the base of an otter slide where it enters the water, or in cubbies above otter dens. Small houses made of spruce boughs are constructed over the above-ground entrance to dens and a trap is placed inside. Animals entering their dens become trapped in the house. Male otter tend to travel widely, whereas females are more likely to remain in dens. Trappers wishing to preserve female members of the population and preferring large males often favor trail sets over sets near dens. Rotten and frozen fish are typically used as bait. Trapped otter are shot in the ear with a .22 magnum rifle.

In late fall otter sometimes feed on blackfish found in small streams in migration from summer lakes to wintering grounds. Blackfish traps which are submerged in shallow streams with a brush fence constructed on either side sometimes catch otter. These traps are narrow and prevent the animal from turning, struggling, and ruining the trap. This method was not observed in 1982-83. Otter are sometimes shot when encountered in the course of overland travel. In April when Kuskokwim tributaries break up, otter are frequently observed playing along the riverbanks and can easily be hunted and shot.

Otter sets should be checked daily. This is particularly important for underwater sets to prevent hair slippage from trapped animals. If an otter's foot freezes, it may chew it off and leave the trap. Otter have a lot of body fat and are difficult to skin. Skins are stretched on wooden frames. Furs are prime between November and April.

Those having long, dark, straight hairs hold the highest value. Exposure to sunlight causes pelts to lose their value by bleaching the hairs and making them singed and curled at the ends. Otter occurring in the central Kuskokwim are of fairly good quality, as tree cover shades the animals from excessive sunlight.

According to local trappers, otter populations in the central Kuskokwim appear to be in healthy and stable condition. This species is considered edible but is not sought after specifically for its meat. Otter are used locally in making parkas, mittens, hats, and trim.

Wolverine (teviqaniaq; Gulo gulo)

Wolverine have a wide distribution in the central Kuskokwim area and may be found along rivers and creeks, in hilly areas, and in places of both forest and tundra. This solitary animal travels widely in search of food, feeding mainly on ptarmigan, hares, caribou, moose, and carrion. The wolverine is a scavenger. In winter wolverine travel in all kinds of weather. Movement tends to be influenced by snow conditions, the animals favoring areas with little snow cover in order to find food easily. Dens and burrows are made in deep snow and hollow logs. Mating occurs in late spring or early summer and young are born the following March. Wolverine are nocturnal animals.

Wolverine are relatively uncommon in the central Kuskokwim area. A few usually occur within or pass through trapping areas used by most trappers but are considered hard to catch because they are smart and exhibit extensive movement patterns. Wolverine present a nuisance to

many trappers by stealing bait from traps and consuming carcasses of trapped animals, ruining the pelts of the trapped species. Wolverine pelts are prime in January and February. During 1982-83 season, wolverine could be trapped in GMU 19 between November 1 and March 31 with no bag limit (Alaska Department of Fish and Game 1982d).

Wolverine were historically harvested using deadfall traps. They are currently taken using snares and spring traps. Number 2-XX Thompson snares and Number 4 double spring traps are commonly used. Wolverine have a tendency to travel along broken trails and frequent trapline trails made by trappers using snowshoes or snowmachines. Snares and traps may be set for wolverine along these trails in areas where tracks are abundant. Snares may also be placed by the entrance to a wolverine den. Wolverine are attracted to big game kill sites and places where animals have died in order to scavenge their remains. Trappers often set several wolverine traps and snares in these areas. Rabbits, rotten fish, and rotten meat are commonly used as bait. Trappers kill trapped wolverine by shooting them or by holding down their head with a stick, slipping a noose or snare around the neck, thereby hanging and choking them.

Wolverine pelts are usually stretched on large stretching boards, though they may be stretched open and round for personal use. Trappers that harvest a couple of wolverine annually typically keep these for domestic use. Wolverine furs are used for making parka ruffs, trim, and tassels and trim on skin boots. Wolverine is highly valued as an inside trim for parka ruffs because the fur does not frost up.

Wolf (kegluneq; Canis lupus)

Wolves range widely throughout the central Kuskokwim area and are found along rivers, creeks, in hilly areas, in timbered country, and on the open tundra. Wolves travel great distances, often in groups, regardless of weather conditions. During summer wolves maintain dens in which they raise their young. This predatory species feeds on moose, caribou, fish, small mammals, and berries. Wolves are active day and night but are primarily nocturnal animals. Furs are most prime in January and February.

Wolves were historically taken in deadfall traps. Currently they are harvested in 4-XX snares, Number 4 double spring traps, and with the use of firearms. Wolves will not enter traps on which they detect human scent. Traps are typically boiled with spruce needles to remove scent before trapping. Snares and traps are placed along wolf trails in areas where tracks are common. Traps are often covered with moose hair. Chunks of meat and fish are generally scattered in the area surrounding the trap and used as bait. Wolf traps are checked about once a week. Traps checked more often may cause the animals to move to a new area. A trap that has successfully captured a wolf must be moved to a new location, as wolves will not enter traps in areas where other wolves have been taken. Trapped wolves are usually killed with .22 magnum rifles or a beaver snare attached to a long pole which is placed around the animal's neck and pulled tightly to choke it. Wolves encountered in the course of traveling are generally shot. Wolf pelts are stretched on large stretching boards. Most trappers take only a

few, if any, wolves in a season. These are generally kept for domestic use and made into parka ruffs.

Wolves are considered uncommon by trappers in the central Kuskokwim area. Most encounter a few tracks in the course of a season. Their population levels are thought to be influenced by the abundance of moose and caribou in an area. During 1982-83 the open season on wolves in Game Management Unit 19 lasted from November 1 through March 31 with no bag limit (Alaska Department of Fish and Game 1982d).

A wolf control program in Game Management Units 19A and 19B has been operative since the winter of 1978-79 (Robert Pegau pers. comm., May 1983) and was functional during the winter 1982-83. The stated purpose of this program was to reduce the effects of predation on the local moose population. In 1982-83 wolves could be hunted from the air by obtaining a permit from the Department of Fish and Game. During its first winter, 29 wolves were harvested by hunters having aerial permits. Since that time, one wolf has been harvested annually by aerial hunters (Robert Pegau pers. comm., May 1983). The wolf control program is considered by the Department of Fish and Game to have had little or no impact on the wolf population in Game Management Units 19A and 19B.

Red Fox (kaviaq; Vulpes vulpes)

Red foxes occur along rivers, around lakes, in hills, and on open tundra in the central Kuskokwim region. They travel extensively in fall and winter in search of prey such as mice, hares, squirrels, and

muskrats. The movement patterns of red foxes are influenced by snow conditions. This species is most common in areas with little snow cover, where foraging is easier. Foxes do not travel in stormy weather. This species is primarily a nocturnal animal but may be active day or night. Foxes maintain dens in spring and summer in which they raise their young. Fox pelts are prime in November and begin to lose value after January.

Foxes were harvested in aboriginal times in round or square wickerwork fences that were constructed near the winter village, set with bait, and had a net at the entrance (Michael 1967). Red foxes were also harvested in deadfall traps and in deep pits that were dug into the ground and covered with brush in areas where tracks were common. Foxes and other furbearers traveling by fell into the pits and were unable to climb out.

Foxes are relatively easy to trap at the beginning of a season but become more difficult to trap as time progresses. They are considered by trappers to be extremely smart and difficult to catch. Foxes are harvested in snares or in Number 1 or Number 1-1/2 spring traps. Snares and traps are placed at entrances to fox dens and along commonly traveled trails. Foxes have a tendency to travel near trapline trails and often steal bait and carcasses from a trapper's sets. Foxes generally cross these trails in several places rather than follow them directly. Snares set along trapline trails sometimes catch foxes. In February and March foxes concentrate along rivers to hunt snowshoe hares which are commonly found on islands. Snares set along rabbit trails often yield a fox. Occasionally foxes are taken in cubby sets

made for marten. Freshly killed rabbits are the preferred bait. Trapped foxes are shot, clubbed on the bridge of the nose, or stepped on and choked. Foxes encountered in the course of traveling are commonly shot. Man-made or vocal predator calls can be used to draw animals close to the hunter where they can be shot in close range. Fox skins are stretched on wooden or wire stretchers. Fox meat is known for its wretched smell and is one of the few animals that has rarely been utilized in historic or present times as a food source.

Foxes are locally common in the central Kuskokwim area. Their numbers are thought to vary from year to year in response to snowshoe hare populations. During the 1982-83 season, foxes could be harvested in Game Management Unit 19 between November 1 and February 28 (Alaska Department of Fish and Game 1982d).

Lynx (tertuli; Lynx canadensis)

Lynx are distributed throughout the spruce-birch forest but concentrate in winter along rivers, creeks, and valleys. This nocturnal species occurs in association with the snowshoe hare, its main food source. Lynx pelts are most prime in February.

Lynx were historically harvested in deadfall traps. They are currently taken in snares and Number 3 spring traps baited with hare, ptarmigan, grouse, beaver, or beaver castors cut up and mixed with lard. Snares are often set for lynx on islands where snowshoe hares occur. Trapped lynx are choked using snares. The carcasses are saved for eating purposes. Lynx meat is quite desirable and is commonly baked, boiled, or fried for eating.

Lynx are locally abundant in the central Kuskokwim. Few are present in the vicinity of Sleetmute and within the Holitna River drainage. Chuathbaluk trappers have better access to lynx which are more common within the Aniak River drainage. Lynx population levels are influenced by the abundance of snowshoe hares.

Short-tailed Weasel (*Mustela erminea*)

The short-tailed weasel or ermine occurs in the spruce-birch forest. It is sometimes trapped incidentally in sets made for other furbearer species. These animals may be skinned and saved or disposed of. Weasels have no role in the trapping economy of the central Kuskokwim region. They are considered extremely distasteful and are not eaten. It is considered a bad omen when a weasel runs across an individual's porch or entryway. The area must be sprinkled with holy water to prevent bad luck.

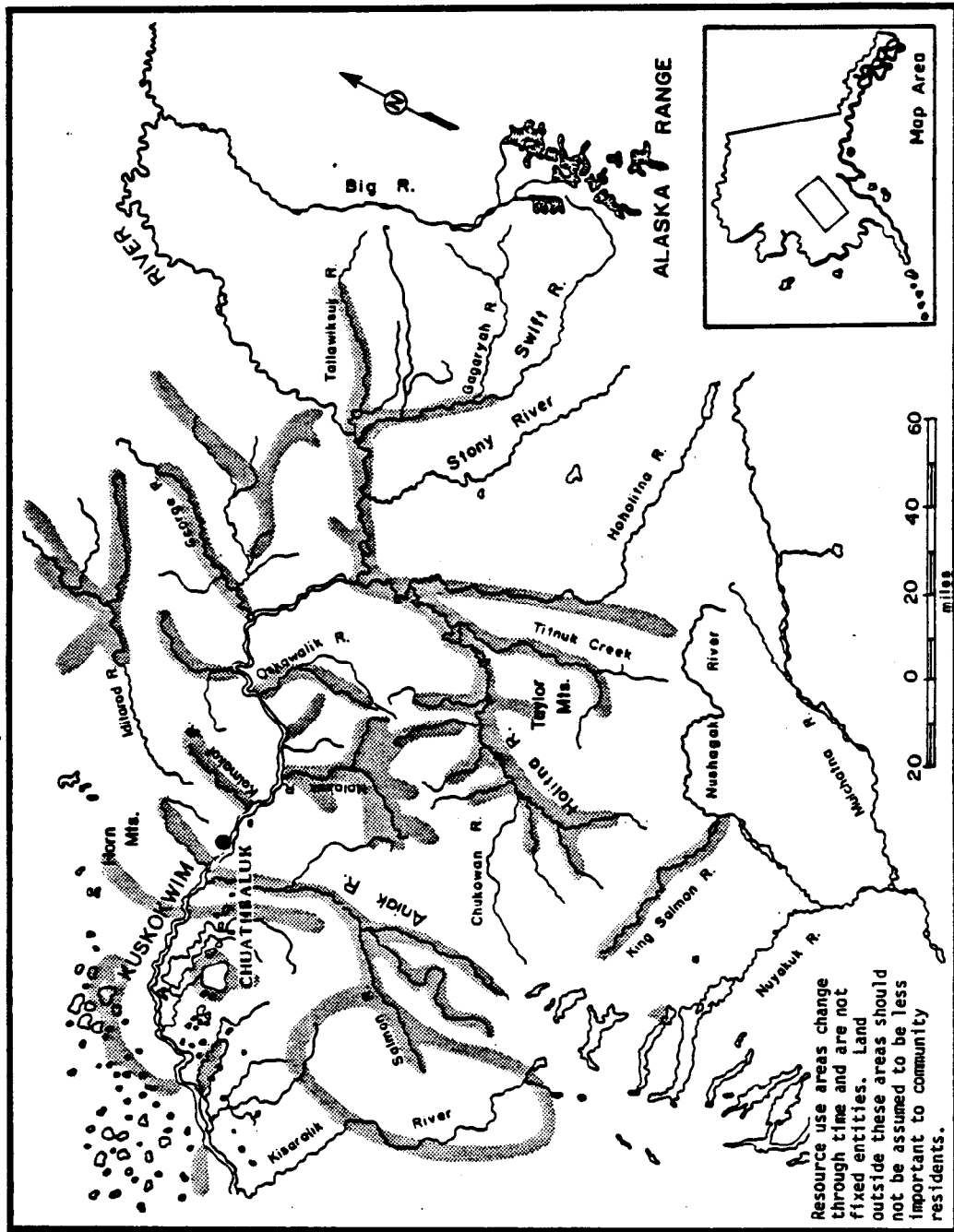
Squirrels

The red squirrel (*Tamiasciurus hudsonicus*) is common in the spruce forests of the central Kuskokwim. Red squirrels are sometimes trapped incidentally in sets made for other species. They are generally saved and used as bait for marten traps. While the red squirrel pelt has monetary value on the Canadian fur market, Chuathbaluk and Sleetmute trappers do not skin and export them.

The arctic ground squirrel (Spermophilus parryii), commonly harvested in spring by trappers from lower Kuskokwim villages, does not occur in the central Kuskokwim area and is rarely obtained by Chuathbaluk and Sleetmute trappers. Chuathbaluk trappers have occasionally been known to travel to Mount Hamilton in the Kilbuck Mountains to obtain this species, but they are rarely taken.

TRAPPING AREAS

Figures 72 through 75 indicate the areas used by Chuathbaluk and Sleetmute trappers within the two selected time periods. These figures show that trapping areas used by both Chuathbaluk and Sleetmute trappers were much more dispersed in the earlier time periods (Figs. 72 and 74). These time periods for both communities correspond to the time in which dog teams were used for winter travel. Local informants stated that they used a wider range of trapping areas when dog teams were in use. Since the advent of snowmachines, trapping activities have taken place within a more limited range. Trappers do not choose to travel far distances on snowmachines because they are considered unreliable and often break down, and because they must carry additional fuel which adds a great deal of weight to the load. The range of trapping areas used by Chuathbaluk residents prior to moving to the village also results from the earlier dispersed distribution of the population.



Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.

Fig. 72. Areas used by Chuathbaluk residents for trapping prior to moving to Chuathbaluk.

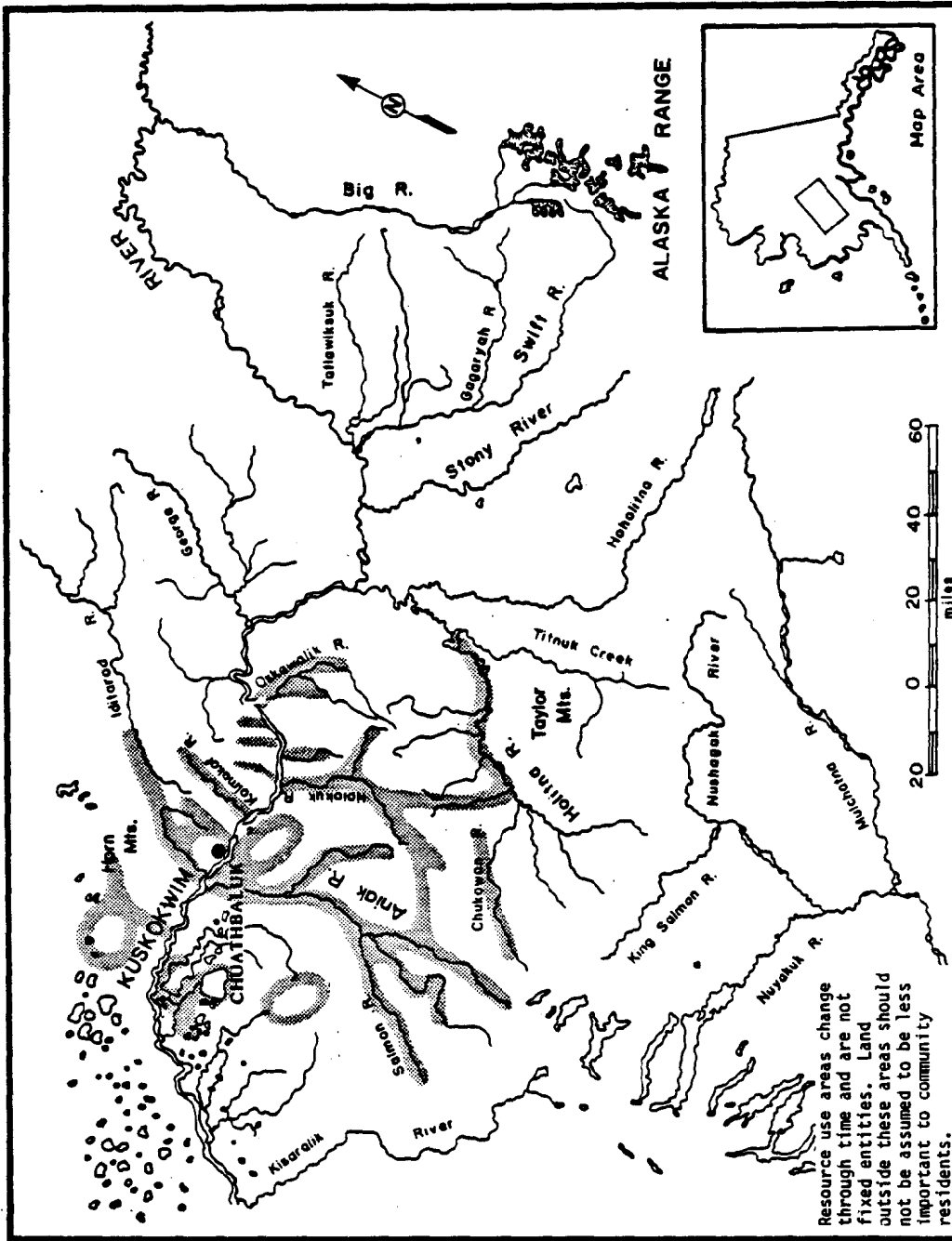
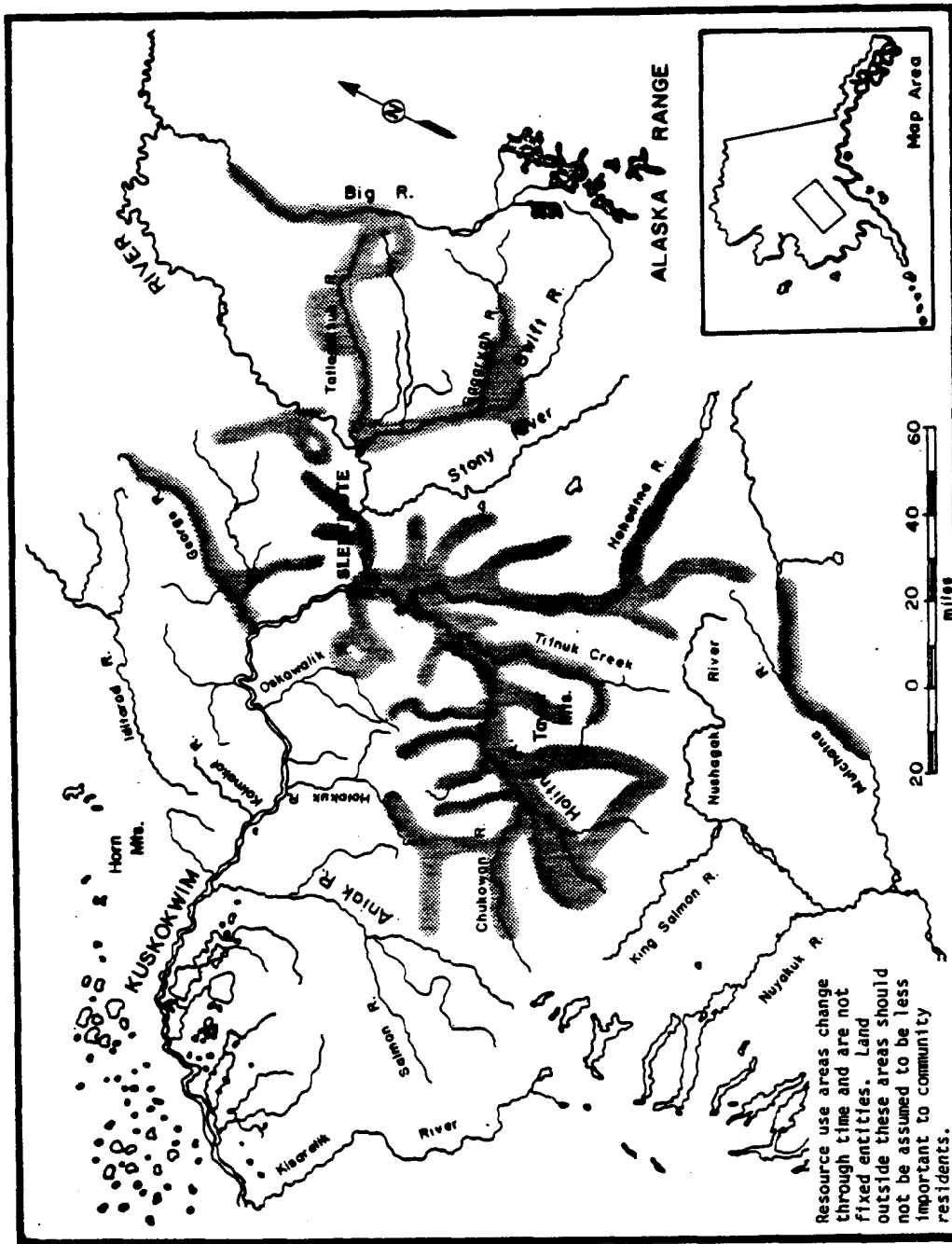


Fig. 73. Areas used by Chuatbaluk residents for trapping since moving to Chuatbaluk through 1983.



Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.

Fig. 74. Areas used by Sleetmute residents for trapping prior to the use of snowmachines.

Figure 71 notes trapping areas used by trappers in the Holitna and Hoholitna river drainages during 1982-83 (Grant Fairbanks pers. comm., February 1983). This figure includes trapping areas used by year-round and seasonal residents of the Holitna and Hoholitna rivers that were not considered Sleetmute residents for purposes of this study and were not included in the sample. Figure 71 shows that these drainages receive intensive use by local trappers. Local residents believe the area cannot support additional new trappers without creating conflict over trapping areas.

CHAPTER 11
PLANT GATHERING

INTRODUCTION

A variety of plants are gathered and used by residents of Chuathbaluk and Sleetmute. Each community uses similar species, although the extent of harvest and use varies according to local abundance. The following accounts describe the plants which were observed being gathered and/or used during 1982 and are based on observation and informal interviews with local informants. Numerous additional edible and usable plant species occur in the central Kuskokwim but were not in use during 1982. Some of these may have had historic use, but local informants were unable to provide information regarding use relating to these species. Historic accounts are given for plant species when available from the literature. Common and scientific names are according to Hulten (1968). The common name is followed by the Yup'ik Eskimo term and the scientific name in parentheses. (Plants were identified by Gregory de Nevers, field associate, California Academy of Sciences).

Green plants have been harvested by Chuathbaluk and Sleetmute residents both historically and presently for food, medicine, and ceremonial purposes. Greens are most commonly harvested and processed by females, although males and children may also participate in harvest activities. Most green plants are gathered close to the winter village

and fish camp sites or in the course of local boat travel. Greens are generally harvested by one or two females together during short morning or afternoon excursions for use by their household group. Formal, organized gathering activities take place for the purpose of harvesting berries and will be discussed below.

SPECIES ACCOUNTS

The following species accounts describe the harvest and use of green plants, fungi, and berries by Chuathbaluk and Sleetmute residents.

Alaska Potato (Elagaq; Hedysarum alpinum americanum)

Elagaq occurs on flat and gently sloping riverbanks and river beaches. The large, edible root extends deep into sandy soils. This root is sweet and can be gathered and eaten in late May and early June and between late September and early October when the plant leaves have turned brown and before the ground becomes frozen. Once frost touches the root, it spoils. Elagaq is harvested by digging deeply into the soil with an implement such as an ice pick. During periods of high water, riverbank erosion may cause elagaq to become strewn about the beach when the roots are released from the ground that has caved in. In this event, elagaq can be gathered easily from the beach. The leaves and stem are removed with a knife or hatchet, as are those parts of the root containing a pithy center. The roots are rinsed in the river and gathered in trash bags. The portion of the root to be

consumed is white and succulent. Elagaq is typically cut into 1/4 inch rounds. These are rinsed and soaked in water, then boiled until soft, a process taking several hours. The cooked roots can be consumed immediately or frozen for later use. Elagaq is primarily used in akutaq, a Yup'ik Eskimo dish, instead of or in addition to berries. They are also eaten plain and used in soups. One traditional dish consists of boiled elagaq mixed with fish eggs.

Wild Rhubarb (Angukaq; Polygonum alaskanum)

Angukaq, also known locally as wild rhubarb, occurs on steep river banks. It is harvested in June when the stem and leaves are young and tender. As the plant grows older and larger, the stem becomes woody, bitter, and less edible. Both the leaves and stem of angukaq are eaten. The leaves are removed from the stem, boiled, and eaten, and are comparable to spinach. The hollow stalks may be eaten raw or sliced and mixed into akutaq. The outer skin is removed leaving the inner, succulent part of the stem for consumption.

Fireweed (Curalrussat; Epilobium angustifolium angustifolium)

Curalrussat grows on riverbanks and in disturbed areas. The stems are harvested and consumed with the leaves removed in early June when they first emerge from the ground. As the stalk grows it becomes bitter and undesirable.

Labrador Tea (Ledum palustre decumbens)

Labrador tea is gathered on the tundra during summer. This species is dried and the stem and leaves are placed to steep in cups of imported tea to add flavoring. It is seldom used alone in brewing tea, as the flavor is considered strong and bitter.

Wild Rose (Tutaruaq; Rosa acicularis)

Wild rose grows along riverbanks, talus slopes, disturbed areas, and as a shrubby understory in birch, alder, and cottonwood stands. The fruits (tutaruaq) are gathered in late August and September, and eaten plain or processed into jelly. Tutaruaq have a high vitamin C content.

Water Berry (Qetek; Equisetum arvense)

The rhizomes of this species, locally referred to as "water berries" or qetek, are harvested from their vines between June and September. This plant grows in areas of sod and mud along rivers and sloughs in the contact zone between the water and shore. The crunchy berries are eaten plain or mixed into akutaq. They are also collected by mice and stored in underground nests. Large quantities of these berries are sometimes gathered from mouse nests.

Stinkweed (Kanaguagaq; Artemisia Tilesii elatior)

Kanaguagaq, also known locally as "stinkweed," is the most widespread medicinal plant used in the central Kuskokwim River area. Kanaguagaq is collected in August and September for drying. A salve for medicinal use is prepared from the dried, crumbled leaves which are mixed with lard. This salve is applied to cuts and infections and reportedly heals them quickly and effectively. Kanaguagaq is boiled in water to produce an extract which is used for washing and soaking wounds and stiff joints. The extract is drunk as a tea to relieve chest colds. Kanaguagaq is sometimes used for scent in steambaths. It can also be used as an insect repellent by rubbing the leaves against the skin.

Overfield et al. (1980) documented additional uses of kanaguagaq by Kuskokwim River Eskimos for relieving joint pain and skin infections. They observed its successful treatment of impetigo of the face and scalp and of infections on the inner nose and the fingernail bed. Kanaguagaq was also boiled to produce a pulpy solution in which a badly infected hand was soaked several times a day. Chest colds were treated by ingesting a few teaspoonfuls of liquid produced by boiling the leaves for half an hour several times a day. Arthritic joints were flailed with the leafy stalks of kanaguagaq following steambaths in order to relieve joint pain.

Wild Celery (Iki'tuk; Angelica lucida)

Iki'tuk was historically used as a ceremonial plant by central Kuskokwim River Eskimos. Iki'tuk was the focus of a ritual during the late 19th century that was performed in early winter in the village of Ohagamiut (Oswalt 1957). Two men were sent from the village to collect bundles of iki'tuk. According to informants, only those plants that communicated their desire to be gathered were collected. The men returned to the qasgiq (men's house) with their bundles of iki'tuk which were then distributed among the young men. Each young man placed his bundle of stalks above his sleeping place in the qasgiq. The large roots of iki'tuk were said to represent spirits of the dead and each man's partner in the underworld. Feasting then took place for four days. The plants were fed at every meal. On the fifth day, each young man took his bundle of stalks and began to dance with it. The bundles were then given to the adult men who set fire to them and shook them over the dancing young men until they burned out. Following this dance, the young men took their bundles of iki'tuk outside and placed them on the ground. Here the individual stalks were separated and formed into the shape of an animal. This species was not observed in use in 1982.

Punk (Kenerqaq; Fomes pinicola)

Kenerqaq, also known locally as "punk," is a species of fungus which commonly grows on birch tree trunks. Kenerqaq is gathered during summer.

Its primary use by Chuathbaluk and Sleetmute residents is as an insect repellent. Smoke produced by the burning fungus deters mosquitoes. This fungus is occasionally sold, traded, or given to lower Kuskokwim River Eskimos who value the ash for mixing into chewing tobacco.

Mushrooms

Several species of wild and edible mushrooms occur in the central Kuskokwim River region. According to local informants, area residents were able to distinguish between edible and poisonous mushrooms historically. This knowledge has since been lost. Wild mushrooms are not utilized presently because residents are afraid of harvesting poisonous species.

Grasses (Canek) and Sedges

Dried grasses and sedges are used locally as clothing insulation. They are placed inside skin boots to function as insoles. They also are stuffed inside clothing in winter months when individuals may be out in the woods traveling with insufficient warm clothes. Dried grasses and sedges are valuable in emergency situations. If an individual breaks through the river ice or overflow in winter and gets wet, grasses and sedges placed between the skin and wet clothing help preserve body heat until the individual reaches safety. Grasses were used historically in weaving socks, mats, baskets, and other items.

Moss (Uruq)

Moss is currently used as a building insulator. It is used as caulking in dwellings of log construction. Sheets of moss are sometimes placed on cabin roof tops to provide insulation.

BERRIES

Plant species producing edible berries receive the greatest use in central Kuskokwim River communities. Berries are harvested between July and September and are eaten fresh and preserved for winter use. A significant amount of time and labor is devoted to berry harvest and processing. The annual abundance of local berry crops varies considerably depending upon climatic conditions. Therefore harvest levels fluctuate as well from year to year. The summer of 1982 was an extremely productive year for berry species. According to local accounts, abundant rains, damp weather, and a late, cold spring in which frost forms on plants at night and melts during the day, allowing them to receive additional moisture, are qualities which lead to high berry productivity. Hot summer weather causes plants to dry out and berry crops to suffer. The accounts presented here describe the berry species harvested and processed by Chuathbaluk and Sleetmute residents during 1982 and are followed by a discussion of berry harvest.

Cloudberry (Atsalugpiaq; Rubus chamaemorus)

Atsalugpiaq, also known locally as the salmonberry, occurs on low, flat, wet tundra. This species begins to ripen in mid-July. The berries are picked a week or so before ripening, as they will ripen off of the plant within a few days. Salmonberries are harvested from July through mid-August. The berry is twisted off the top of the plant, leaving the stem and leaves behind. Salmonberries which are not ripe must be "picked twice." After they are removed from the plant, the sepals which enclose the berry must be removed. It is therefore advantageous to pick ripe berries whose sepals have opened fully and which easily disengage from the plant.

Salmonberries were traditionally preserved in late summer in a hole in the ground that was lined with birch bark and covered with moss. With the onset of cold weather in late September they were dug up and placed in the household cache, where cold weather preserved them through freezing. Salmonberries are currently preserved in holes in the ground by households lacking freezers. Twenty-five or 50-pound wooden butter barrels filled with berries and covered with birch bark are buried in the ground. Salmonberries are frozen in plastic sacks and containers by households owning electric freezers. They may also be jarred with sugar to undergo the canning process. Several informants reported that it is possible to preserve salmonberries in rainwater.

Salmonberries are primarily used for making akutaq. Fresh salmonberry akutaq is commonly prepared immediately following the first salmonberry harvest. The remaining berries are preserved for making

akutaq throughout the coming year. Salmonberries are also used in making jam and jelly. A traditional dessert was prepared from a mixture of salmonberries, salmon eggs, and seal oil. Fresh salmonberries are not commonly eaten by themselves, as they reportedly cause constipation.

Salmonberries are an excellent source of vitamin C. Fresh and frozen berries are extremely high in vitamin C, although once the berries mold or ferment, it is destroyed (Oswalt 1957). According to Oswalt (1957), one-half of a cup of salmonberries contains 2-1/2 to 3 times as much vitamin C as one orange.

Alpine Blueberry (Curaq; Vaccinium uliginosum alpinum)

Blueberries are distributed across high, dry tundra and in open woodland areas. Blueberry season occurs between early August and early September. Blueberries must be picked when they are ripe, as they do not ripen off the vine. Leaves and stems must be separated from the berries. They are typically picked and cleaned on the same day to prevent softening and difficulty in cleaning. Blueberries can be spread on a plastic tarp in dry weather to allow the wind to carry away the undesirable leaves and stems. In wet weather the berries are cleaned by hand.

Some individuals employ locally-manufactured devices termed "berry pickers" to increase the speed with which they harvest blueberries as well as the quantity. These small wooden boxes have rounded, protruding sides made from old desk bottoms, a handle on top, and a row of 1/4-inch welding rods spaced between the two wooden sides which serve to

rake and lift the berries off of the plant with an upward motion. The berries then roll back into the wooden box. When the box is full, the berries are spilled into a berry bucket.

Blueberries ferment quickly. They were traditionally mixed with salmon eggs and placed in birch bark containers for preservation and storage in a hole in the ground. Blueberries are currently preserved with sugar in wooden barrels or plastic buckets. Alternate layers of berries and sugar are placed in the storage container. Blueberries also are preserved in freezers or through jarring.

Blueberries are primarily used in making akutaq. Jam and syrup are additional blueberry products. These berries are commonly eaten fresh with sugar and milk. They are not to be eaten directly off of the plant during long outdoor day-hikes, however, as they reportedly enhance thirst.

Lingonberry (Tumagliq; Vaccinium vitis-idaea minus)

Tumagliq, known locally as the lowbush cranberry or simply "red berry," grows in open spruce woodlands, on dry tundra, and in close proximity to dwarf birch, birch, and spruce trees. Red berries ripen in early September and are harvested throughout the month. When picked early, they become slimy. Berry picking devices as described for picking blueberries also may be used for picking red berries. The leaves and stems must be removed, either by the wind or by hand.

Red berries are primarily used in akutaq and in cranberry sauce. The dry berries are placed in a box for storage in the household cache.

Wooden gasoline boxes are typically used. Red berries are often picked simultaneously with crowberries and are commonly mixed and stored with them.

Crowberry (Tan'gerpak; Empetrum nigrum hermaphroditum)

Tan'gerpak, commonly referred to as "blackberries," typically grow on hillsides where dry tundra occurs. Blackberries ripen in early September but are not picked until after the first frost, which causes them to sweeten. They may be harvested through late September. A berry picker may be used in harvesting blackberries. These berries are stored in wooden gasoline crates or cardboard boxes which are placed in the household cache. They are primarily used in making akutaq. Blackberries are known to be thirst-quenching and are often consumed directly from the plant by individuals who are out on day hikes.

Highbush Cranberry (Kitngigpak; Viburnum edule)

Highbush cranberries grow as a shrubby understory in dense stands of alder and cottonwood. They ripen in mid- to late August and are harvested through mid-September. Highbush cranberries are gathered in small quantities and are primarily used in making jam or jelly, though they are sometimes used in akutaq.

Raspberry (Puyuruaq; Rubus idaeus)

Raspberries occur along riverbanks and in disturbed areas. They are harvested between mid-August and mid-September. Raspberries are harvested on a small scale. They are eaten fresh, processed into jam, occasionally mixed into akutaq together with blueberries, and preserved in freezers.

Northern Black Currant (Cularlussaq; Ribes hudsonianum)
and Northern Red Currant (Alar'ussaq; Ribes triste)

Red and black currants occur along rivers and creeks and as shrubby understories in spruce woodlands. Neither species was observed to be harvested for storage or processing, though both are consumed fresh from the shrub when encountered in the course of traveling. Black currants reportedly are ingested as a treatment for arthritis.

BERRY HARVESTS

Berry picking activities (iqvarluni) were observed in Chuathbaluk and Sleetmute during the summer and fall of 1982. Berries were harvested on day trips from the winter village or fish camp and also were harvested during camping trips that lasted from several days to a week in areas known to be abundant in the desired species. Specific areas used for gathering berries by village households tended to be the same from year to year. They were typically areas where those households and close kin relations had harvested berries traditionally.

Often gathering berries is an activity of extended family groups in which individuals of all age and sex classes participate. Women, children, and young adults are the primary gatherers. Usually an adult male serves as gun-bearer, keeping watch for bears, and occasionally picks berries. Males often view berry-picking trips as opportunities to hunt or fish.

Chuathbaluk households appeared to harvest greater quantities of salmonberries than did Sleetmute households during 1982. Sleetmute residents used two small areas in fairly close proximity to the village for harvesting salmonberries during day trips or overnights. Chuathbaluk residents have easier access to the open tundra areas of the Yukon-Kuskokwim delta and travel downriver to berry camps where salmonberries may be harvested in abundance.

In 1982, Chuathbaluk households also harvested a greater number of blueberries than did Sleetmute households. Blueberries are sparse and scattered in the vicinity of Sleetmute. Chuathbaluk, meaning "big blueberries," derives its name from the abundance of blueberries growing around the community. Blueberries are plentiful in several locations close to Chuathbaluk, and residents typically take day trips to harvest them. Blueberries are also abundant near Crooked Creek. Residents of both Chuathbaluk and Sleetmute with close ties of kinship to residents of Crooked Creek may travel there for several days of gathering blueberries.

Chuathbaluk and Sleetmute households have access to areas in which lowbush cranberries and crowberries are numerous. Berry camps are established by extended family groups during September for harvesting

lowbush cranberries and crowberries and hunting moose, bear, and caribou concurrently.

Highbush cranberries and raspberries grow in the vicinity of each community. Residents typically harvest these when they have a few hours free from day to day.

The following cases from Chuathbaluk and Sleetmute provide examples of production units and activities conducted on summer berry-picking trips.

Case 1. Chuathbaluk (Fig. 76):

An extended family of Chuathbaluk and Aniak residents established their annual salmonberry camp between July 27 and July 30 1982 at Whitefish Lake. This production unit included a 68-year-old woman and her 41-year-old son from Chuathbaluk; the household of her 47-year-old son, 45-year-old daughter-in-law, four grandchildren, ages 22, 20, and 19, and a grandchild's spouse; the daughter-in-law's stepson, age 27; and the household of her 35-year-old son, his wife, age 30, their 2-year-old daughter, her 7-year-old son, and her 58-year-old mother, from Aniak. Whitefish Lake was the spring camp site used by the eldest woman from Chuathbaluk when she was young. By the early 1940s, many families no longer established spring camps. This individual continued to bring her family to Whitefish Lake for salmonberry picking, however, a practice that has persisted into following generations and become a family tradition.

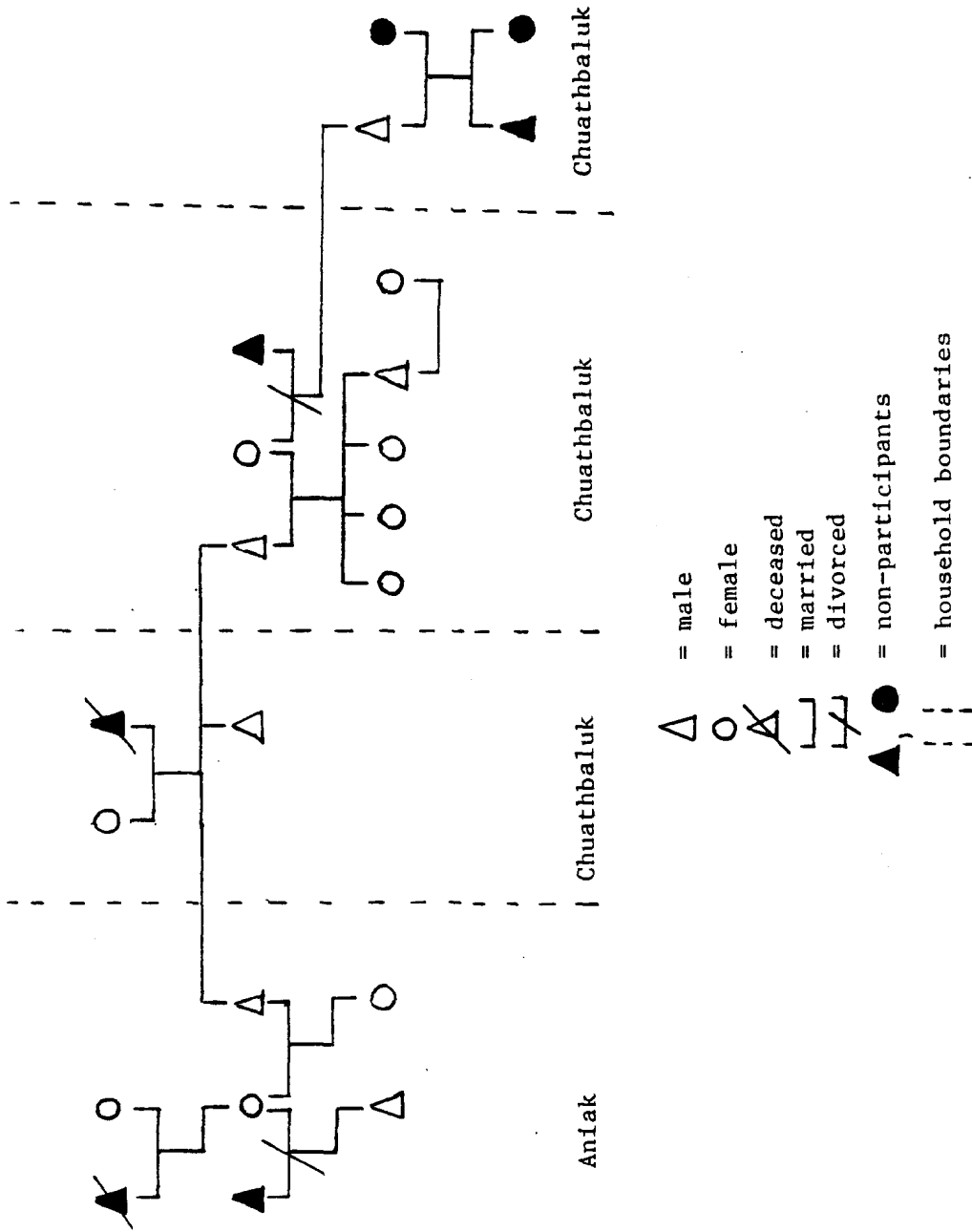


Fig. 76. Extended family group harvesting "salmonberries," Chuathbaluk and Aniak.

Each household group brought wall and pup tents which were established at two separate sites. Each of the four households used its own boat for traveling. Food supplied by each household was shared among the extended family group.

Male members of the berry-picking party established the camp sites while the female members of the group picked berries in the area. Following this, an intensive search for berries began. Areas that were productive in previous years were checked first. The party traveled slowly by boat along creeks, periodically stopping to check the banks for berries. In areas where there appeared to be lots of berries, the family vacated the boat and began picking on the tundra. If berries were sparse in the area, the group picked for an hour or so before moving on. If berries were dense, the group remained in the area throughout the day, resting only for lunch. In areas where berries were abundant, the entire extended family group picked together. If berries were sparse, the group split up. One- or two-gallon plastic buckets were carried while gathering salmonberries. When these buckets were full, they were carried back to the boats where 25- and 50-pound wooden butter barrels were kept. The cleaned berries were placed in these barrels in which they were transported back to the winter village. Some were

stored in the barrels. Individuals from each household group pooled their own berries.

Every member of this extended family group participated in berry-picking. Several fishing rods and two set nets were brought and used for harvesting whitefish which are abundant in the lake. The fish were transported to the winter village in two large burlap sacks where they were stored in freezers.

Each household spent approximately \$100 on fuel for transportation. Approximately 30 gallons of salmonberries were harvested per household.

Case 2. Sleetmute (Fig. 77):

An extended family group from Sleetmute and Aniak went camping on the Hoholitna River between September 4 and 6, 1982. This group included a man from Sleetmute, age 40, his 41-year-old wife, her son, and their adopted daughter, ages 17 and 16; the man's 49-year-old sister from Aniak and her 19-year-old daughter; and the man's distant cousin from Aniak, age 40, and his 39-year-old wife. The purpose of this trip was to harvest lowbush cranberries and hunt moose. A campsite was established in a location that had been used by the Sleetmute household for the preceding three years. This site was one in which red berries were locally abundant and was on a high, flat, cut bank that provided a good view and lookout over the river from which moose could be spotted.

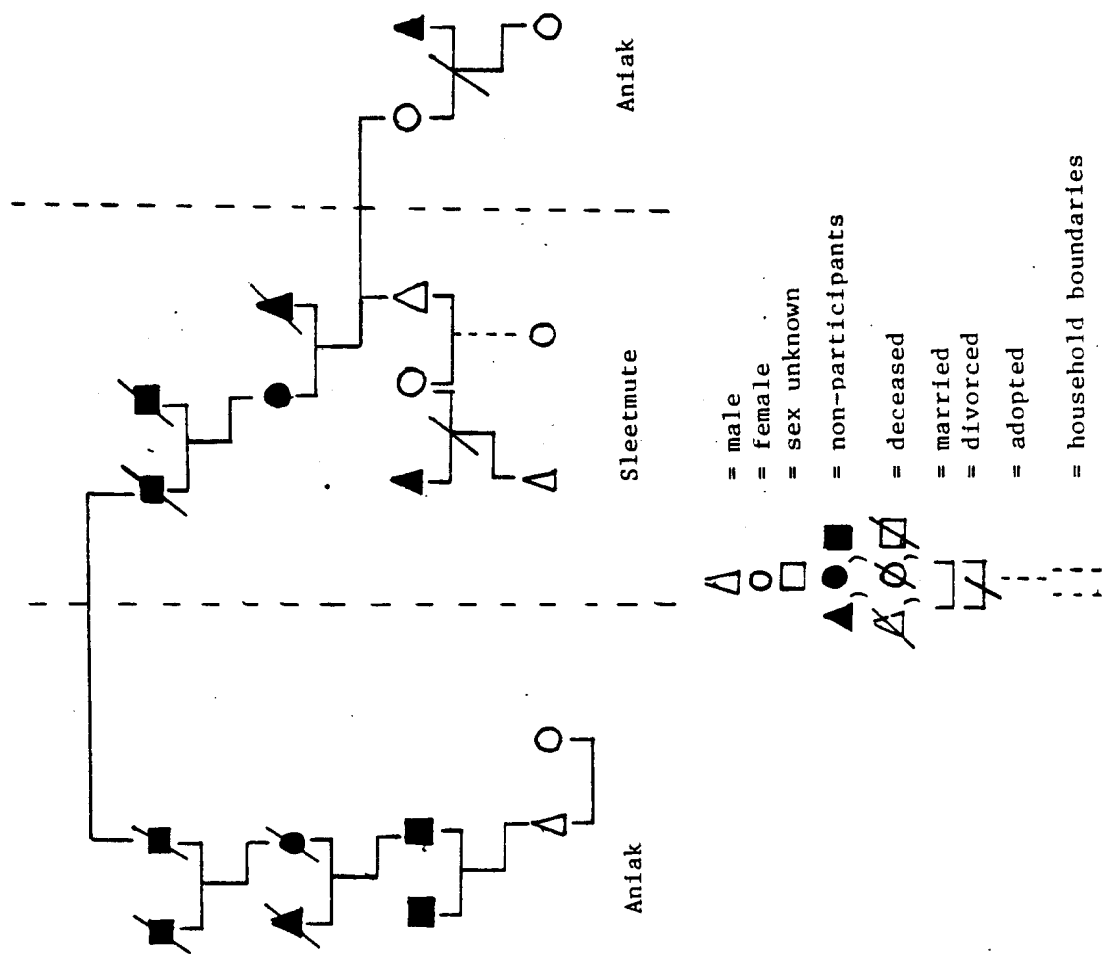


Fig. 77. Extended family group harvesting "lowbush cranberries," Sleetmute and Aniak.

The Sleetmute man's boat was used for transportation and the cost of gas divided evenly between household groups. Food was shared among the group.

The men spent the days and evenings hunting moose, bear, and beaver, while the women picked lowbush cranberries. Several fishing rods were taken on the trip which were used for harvesting silver salmon and pike for immediate consumption. Spruce grouse also were hunted for immediate consumption. An average of 10 gallons of lowbush cranberries were harvested per household. The party was successful in harvesting one beaver and was unsuccessful in harvesting moose and bear.

BERRY HARVEST AREAS

Figures 78 and 79 show the areas in which Chuathbaluk residents harvested berry species prior to moving to Chuathbaluk and since moving to Chuathbaluk until 1983. Figures 78 and 79 show the areas used for berry harvest by Sleetmute residents prior to the use of snowmachines and since the use of snowmachines until 1983. It should be noted that berry species have a scattered distribution throughout the central Kuskokwim area and that households often pick berries in many different locations in the course of a season. Areas shown on these maps denote locations where berry species occur in high densities and residents concentrate their berry picking activities. Berry harvest is not limited to those areas shown on the maps.

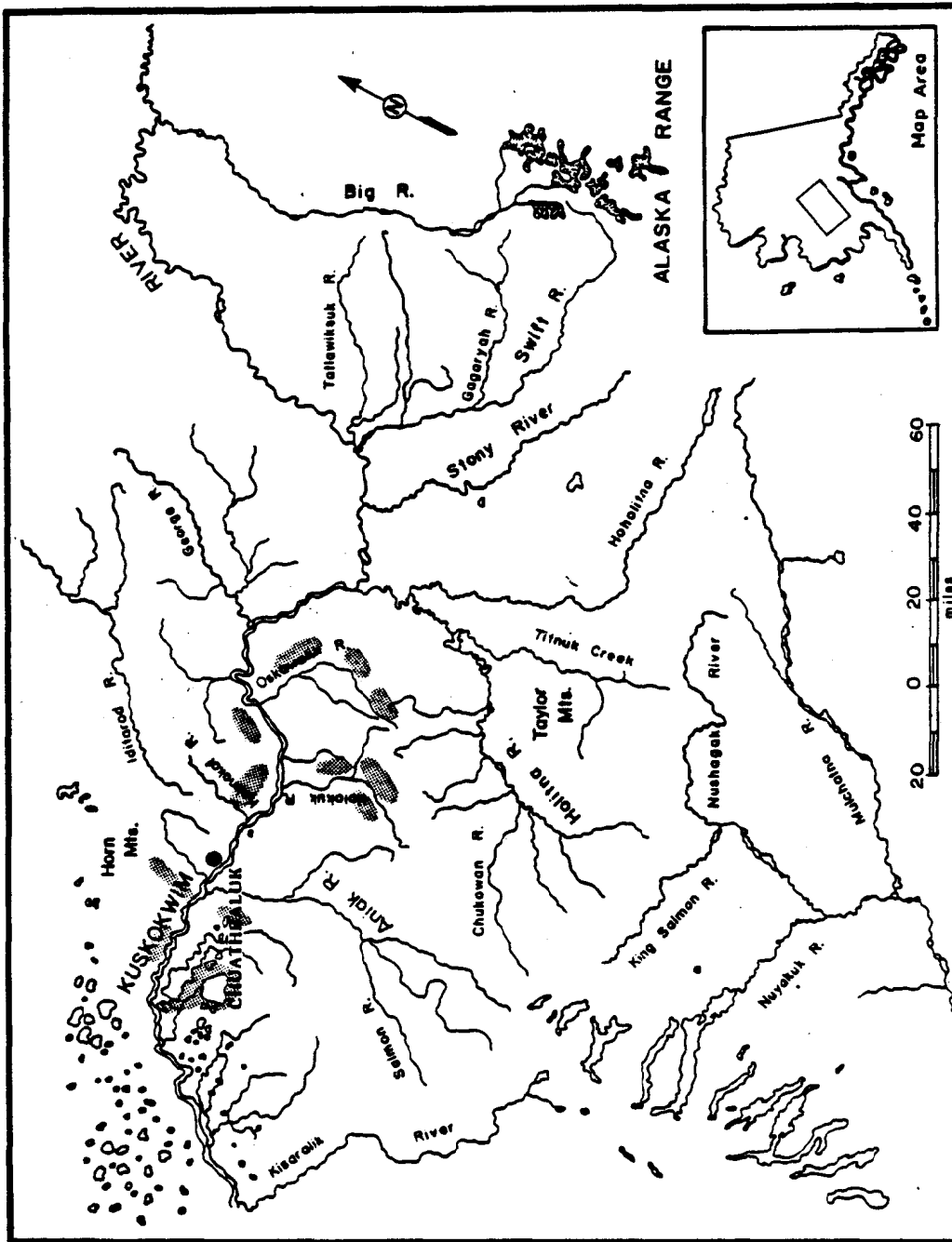


Fig. 78. Areas used by Chuathbaluk residents for harvesting berries prior to moving to Chuathbaluk.

Figure 78 shows that Chuathbaluk residents picked berries in scattered locations between the Kalskag area and the Oskawalik River prior to moving to the village. Since moving to Chuathbaluk (Fig. 79), berry picking areas have expanded as far downriver as Tuluksak and as far upriver as Crooked Creek, and include areas located on the Aniak, Holokuk, and Oskawalik rivers. Figures 80 and 81 show that Sleetmute residents have picked berries in scattered locations along the Kuskokwim River as far downriver as Crooked Creek and on the Holitna and Hoholitna rivers. Since the use of snowmachines, berry pickers have expanded their use areas as far upriver along the Kuskokwim as the Swift River.

Chuathbaluk and Sleetmute residents are currently utilizing berry harvest areas used by them historically. Berry picking takes place in a varied range of places by each household. While households have traditional areas they use for berry harvest, they also pick in scattered locales from year to year. The more extensive range of berry harvest areas shown for both villages in the later time period may reflect the fact that informants better remembered the multiple areas used by them for berry harvest in the recent past as compared with those used in the more distant past.

TREES AND SHRUBS

Tree species are highly valued in central Kuskokwim communities for use as firewood and lumber. Most Chuathbaluk and Sleetmute households heat their homes with wood only. Many dwellings and caches are of log

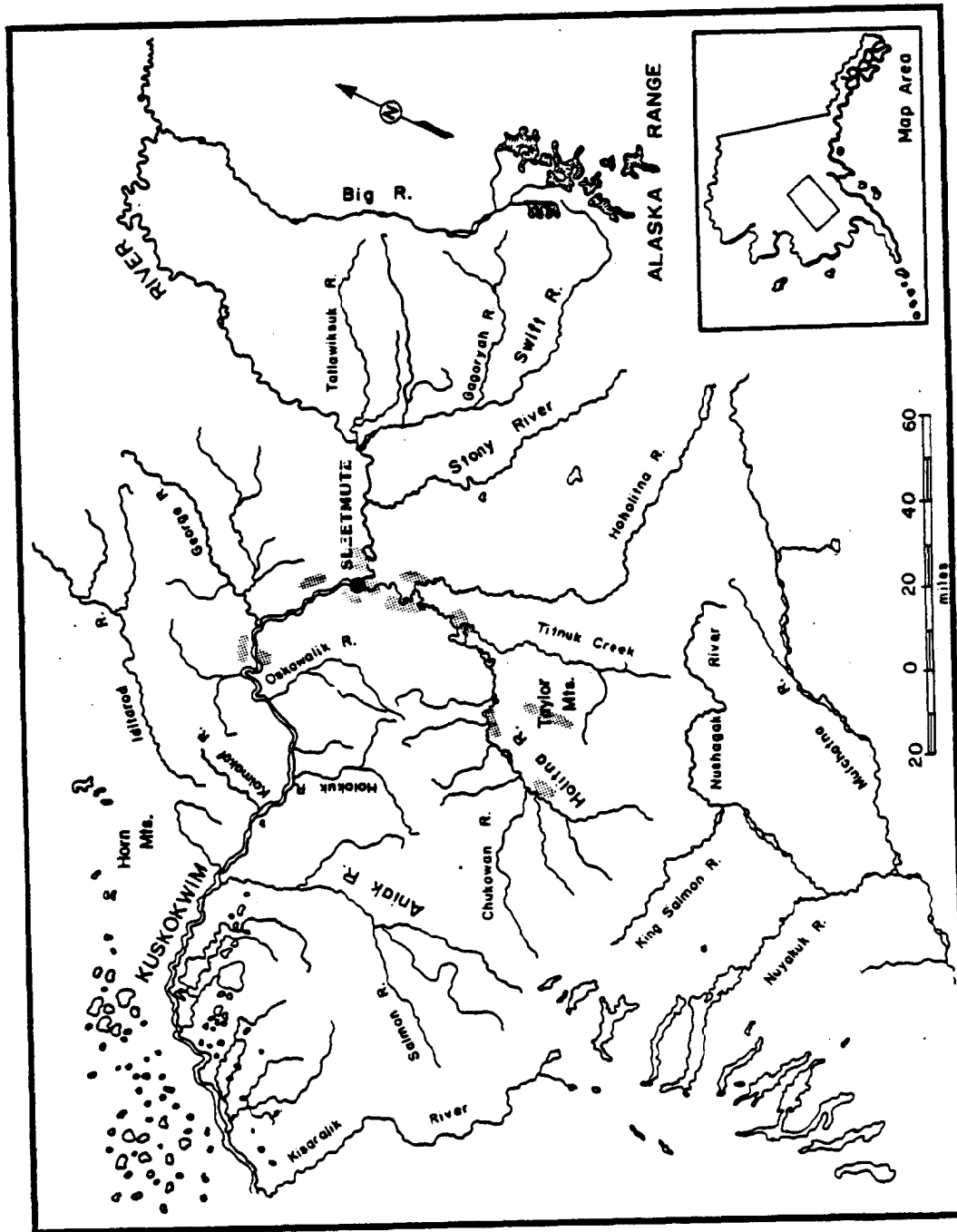


Fig. 80. Areas used by Sleetmute residents for harvesting berries prior to the use of snowmachines.

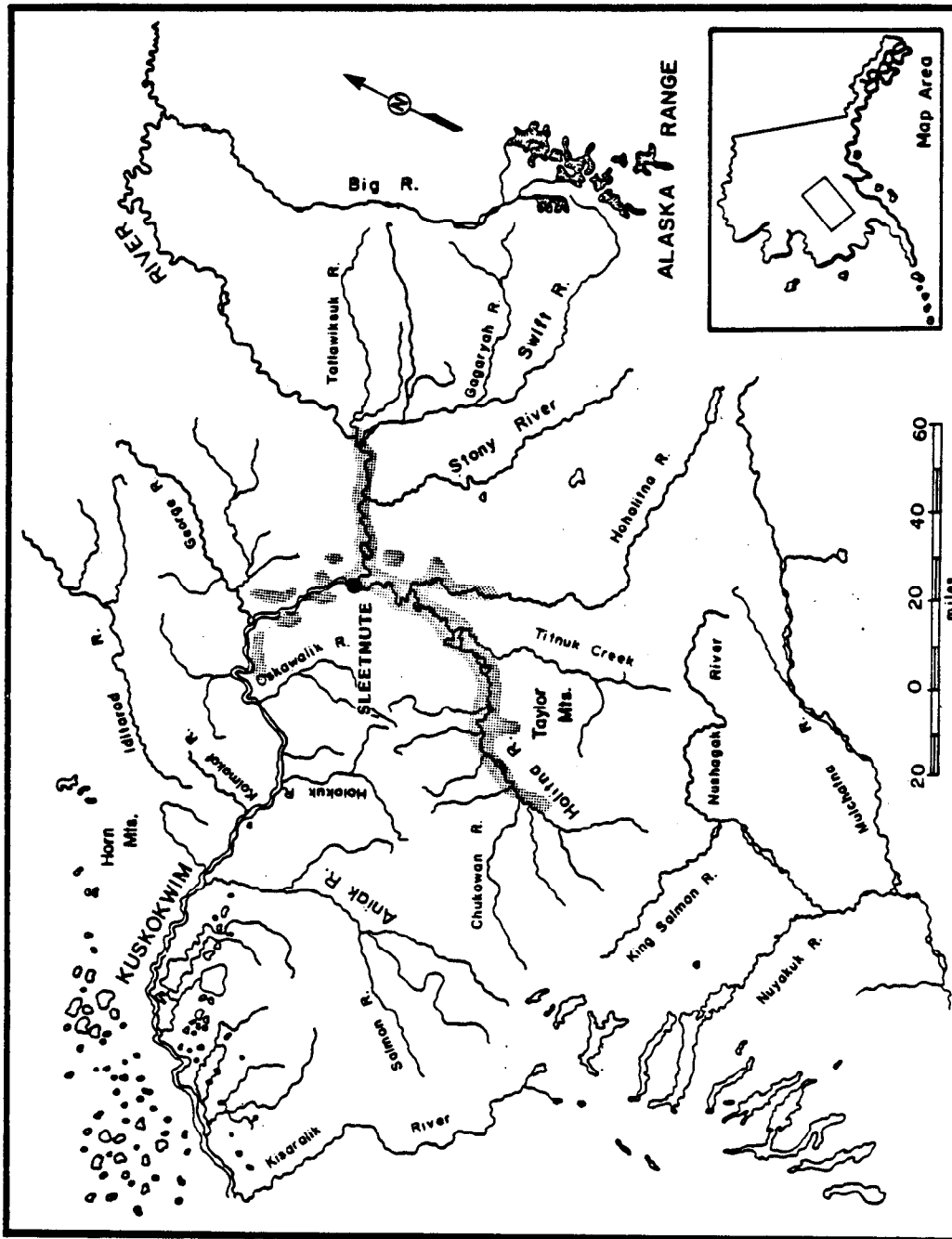


Fig. 81. Areas used by Sleetmute residents for harvesting berries since the use of snowmachines through 1983.

construction. Wood is harvested year-round in Chuathbaluk and Sleetmute. In spring and summer, cottonwood and alder are cut for smoking and drying salmon. Drifted cottonwood, birch, and spruce logs are gathered periodically throughout the summer. These may be cut and placed in a boat for transport to the winter village or may be fastened behind a boat and floated back to the winter village. In late August and September many households go "logging." At this time they travel upriver from the winter village by boat and gather driftwood. A floating raft may be constructed and pulled down to the winter village. Suitable trees growing along the riverbank also may be cut and gathered. This forms the initial supply of winter firewood.

Wood harvest continues following freeze-up and snowfall, making overland travel possible. Individuals travel by snowmachine or dog team to areas within approximately five miles of the village where desirable stands of trees can be harvested for firewood. Birch and white spruce are the preferred species. These are cut to between five and ten foot lengths and are hauled back to the winter village on snowmachine or dog sleds where they are then cut into shorter lengths and split. Days having below 0°F temperatures are especially desirable, as wood splits more easily in colder weather. Wood is harvested in this manner throughout the winter as needed. The average household uses approximately five to six cords of firewood annually.

Wood harvest and processing is a male activity. Typically a father and son or two brothers procure wood for their household. Households composed of elderly people who are unable to harvest wood alone either receive help from kin relations, such as sons, grandsons, or sons-in-law;

are given wood by kin relations; purchase cord wood from the Chuathbaluk saw mill (Chuathbaluk residents only); or heat with oil. Households having only one male who is capable of harvesting wood often cooperate in wood harvest with the household of a brother, son, or father.

Alder bark (cuukvaguaq; Alnus crispa) was traditionally valued for its ability to produce a rust-colored dye. It is currently used to flavor smoked and dried fish and meat.

According to local accounts, willow branches (napayaaq; Salix sp.) were used historically in crafting rope. Willows were split into fibers which were then soaked and twined together to form a strong rope that was used for such purposes as binding spruce splints into fish traps. Willows are also thought to provide a means of protection against wolves. It is said that when a wolf is encountered and threatens to attack an individual, a willow stalk may be picked and twirled in the air to produce a hissing sound that scares wolves away.

Cottonwood (Populus balsamifera balsamifera) is the preferred firewood for use in smoking and drying salmon. Both green and dry cottonwood are used.

Paper birch (elnguq; Betula papyrifera humilis) is the preferred source of winter firewood in Chuathbaluk and Sleetmute. Its ability to burn slowly and produce a strong heat makes it especially valuable for burning at night. Birch bark is used as a fire starter.

Birch bark was traditionally valued by central Kuskokwim River residents for crafting baskets. Some individuals continue to make birch bark baskets and use them for purposes such as gathering berries. The bark is peeled off of the tree trunk in May and June when it can be removed easily.

Spruce (qevgaartaq; Picea glauca) is primarily used for firewood and as lumber. Both dry and green spruce are used for firewood. Dry spruce is required for starting fires and producing quick heat. Green spruce is then placed on the fire to burn slowly and maintain warm temperatures. According to local informants, spruce tree roots were valued historically for making a tough thread that was used for purposes such as sewing canoes and kayaks.

White spruce is used in building construction in the central Kuskokwim and is processed locally by a few individuals who run both commercial and non-commercial small-scale sawmills. When steamboats were operative on the Kuskokwim River in the 1940s, a significant amount of spruce was harvested to maintain them. The potential for developing a timber industry in the central Kuskokwim has been investigated by The Kuskokwim Corporation. The U. S. Forest Service estimated that the Kuskokwim Corporation lands contain 214,000,000 cubic feet of trees more than 5 inches in diameter and at least 4-1/2 feet in height (University of Alaska, Cooperative Extension Service 1982). However, development of the timber industry in the central Kuskokwim will probably not occur until the area's transportation network has improved (University of Alaska, Cooperative Extension Service 1982).

Currently wood harvest by residents of Chuathbaluk and Sleetmute takes place in the general vicinity of the winter village or seasonal settlement. Maps showing the areas used for wood harvest by Chuathbaluk and Sleetmute residents are presented in Figures 82 and 83. Residents stated that they have always harvested wood in close proximity to their dwelling site but could not provide specific information

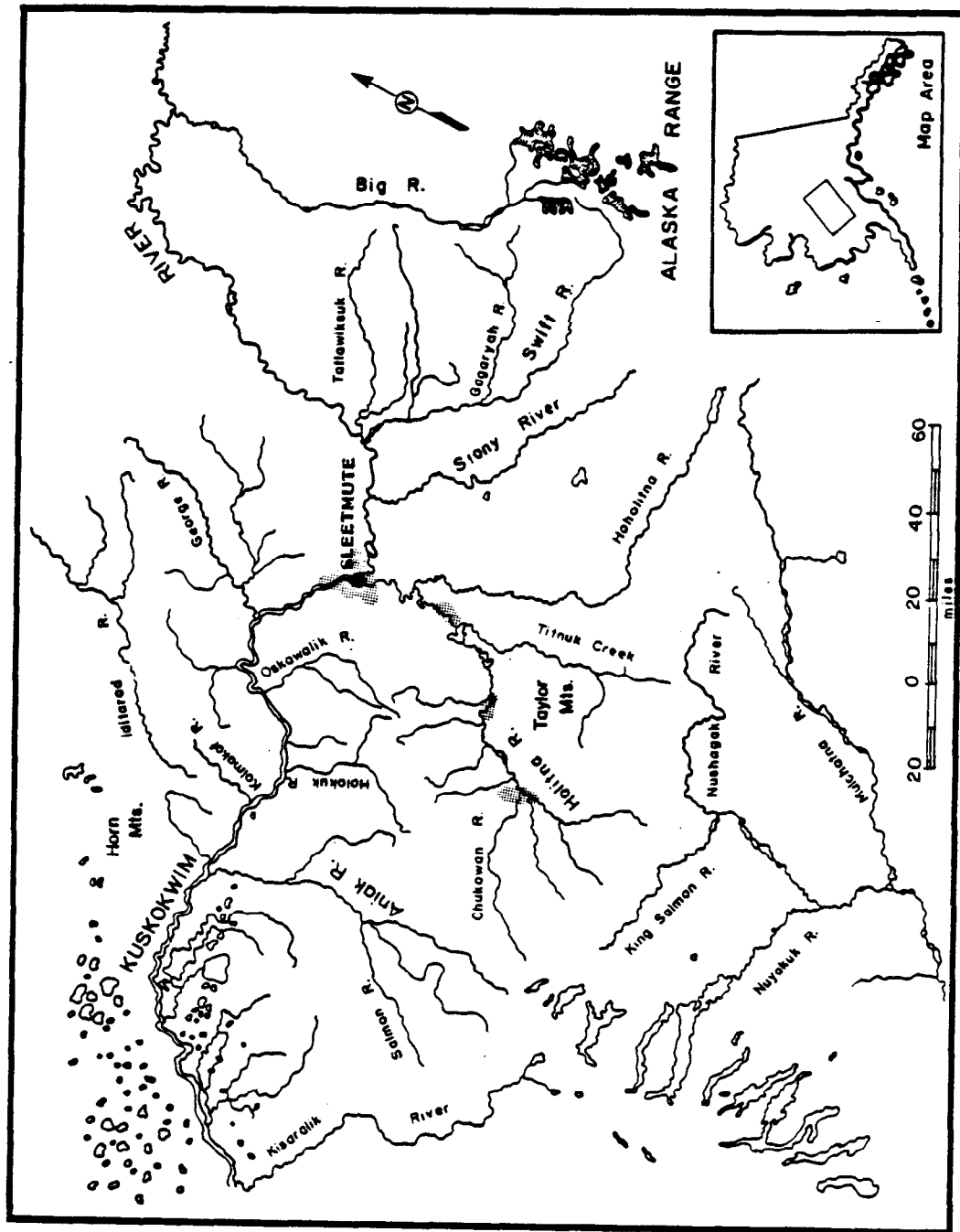


Fig. 83. Areas used by Sleetmute residents for harvesting wood since the use of snowmachines through 1983.

regarding every location in which they harvested wood in the earlier time periods. Maps showing wood harvest areas used by Chuathbaluk residents prior to the time at which they settled in Chuathbaluk and Sleetmute residents prior to the use of snowmachines, are regarded as incomplete and therefore have not been included here. Figure 82 shows that since they settled in Chuathbaluk, Chuathbaluk residents have obtained wood along the Kuskokwim above the Oskawalik River to above Kalskag. Wood harvest has taken place at fish camp sites, up the Kuskokwim in late summer-early fall when households go logging, around single household settlements separate from the community, and across from the village along winter trails in winter months. Since the use of snowmachines, wood harvest by Sleetmute residents has taken place close to the winter village, around single-household settlements across from the winter village, and at scattered locations on the Holitna and Hoholitna rivers where winter trapping cabins are located (Fig. 83).

AGRICULTURE

The central Kuskokwim River region has fertile soil and may have agricultural potential. One hundred thousand acres of Kuskokwim Corporation land are estimated to have the potential for agricultural development (University of Alaska, Cooperative Extension Service 1982). To date, farming in the central Kuskokwim region has occurred on a small scale only. The University of Alaska Cooperative Extension Service and the Kuskokwim Native Association in Aniak have run an experimental farm project in Aniak since the 1970s and have made efforts to start

community gardens in the central Kuskokwim communities (University of Alaska, Cooperative Extension Service 1982). Community gardens were not operative in Chuathbaluk or Sleetmute during the summer of 1982. During 1982 five Sleetmute households and five Chuathbaluk households maintained gardens.

Potatoes, turnips, lettuce, carrots, strawberries, sweet peas, cabbage, broccoli, cauliflower, chard, onions, beets, parsnips, and flowers were all grown in Chuathbaluk and Sleetmute during 1982. With the aid of a greenhouse, some residents are also growing tomatoes, cucumbers, zuchinni, and pumpkins. Some households maintain gardens at their summer fish camps. Other households fishing from the winter village or single-family settlements maintain gardens in these locations. Planting begins after the snow melts in late May or early June, and harvest takes place in late August and September.

CHAPTER 12

ECONOMIC DYNAMICS

INTRODUCTION

A subsistence-based economy is a type of socioeconomic system in rural Alaska based on the customary and traditional harvest and use of fish and wildlife resources (Wolfe and Ellanna 1983). Subsistence-based economies are characterized by several features: a mixed subsistence-cash economy, a seasonal round of economic activities, primarily domestic modes of production, a network of distribution and exchange in which kinship linkages are centrally-based, a traditional system of land use and occupancy, and systems of beliefs and ideologies concerning natural resources (Wolfe and Ellanna 1983). The following discussion considers the economies of Chuathbaluk and Sleetmute in terms of these characteristics of subsistence-based socioeconomic systems.

THE MIXED ECONOMY

The socioeconomic systems found in Chuathbaluk and Sleetmute have both subsistence and cash sectors. The subsistence sector comprises the production of food and materials for local use. The cash or market sector comprises activities directed toward producing cash for consumption or investment. Successful Chuathbaluk and Sleetmute households participate in both sectors and integrate the cash and subsistence

activities so that they are mutually supportive. Each sector of the mixed economy, and illustrations of the manner in which households integrate them, are described below.

Money is required to support current technologies utilized in the harvest and processing of fish and wildlife resources. Examples include boats with motors, snowmachines, fuel, fish nets, rifles, ammunition, steel traps, snares, chainsaws, chickenwire, processed wood, and other materials described in previous chapters. The money to purchase hunting and fishing equipment is derived by household members from several sources including seasonal and year-round local wage employment, non-local wage employment, transfer payments, commercial trapping, commercial fishing, the sale of cottage crafts, and private business enterprises. The types and number of wage sources differs somewhat between Chuathbaluk and Sleetmute.

During 1982-83, 17 Chuathbaluk households (58.6 percent) had at least one family member that participated in wage employment for at least part of the year. As described in Chapter 3, sources of wage employment in Chuathbaluk include jobs provided by the school district, the state university system, the regional health corporation, grants through The Kuskokwim Native Association, and state grants to the city council. Table 3 showed that these jobs tend to be low-paying and part-time. Additional seasonal employment provided by special projects operating on state funds is usually available to a limited extent during summer months, such as construction jobs, Comprehensive Employment and Training Act (CETA) positions, and fire-fighting. Some Chuathbaluk residents seek seasonal wage employment opportunities at

nearby Aniak, a regional center for the central Kuskokwim with a better-developed and more stable market economy than other villages within the region. Some younger residents seek summer employment opportunities in Bethel as well. Temporary and permanent out-migration to Aniak, Bethel, and Anchorage has occurred by some Chuathbaluk residents for employment-related reasons.

Transfer payments are a second source of income to the community. During 1982-83, an average of 13 Chuathbaluk households (44.8 percent) received food stamps, and 10 households (34.5 percent) received some combination of Old Age Assistance, Aid to Permanently Disabled, and Aid to Families with Dependent Children.

Self-employment was a third source of cash income. Three Chuathbaluk households (10 percent) fished for commercial sale each year, having limited entry permits for salmon in Districts 1 and 2. In 1982-83 two households received income by sewing skins for the commercial sale of fur garments. Seventeen households (58.6 percent) received some income through commercial trapping. One Chuathbaluk household earned income by operating a sawmill and store.

Sources of wage employment in Sleetmute are similar to those in Chuathbaluk. During 1982-83, 18 Sleetmute households (64.3 percent) had a member holding a wage-earning job in the community. As Sleetmute is further from Aniak, fewer people seek seasonal jobs there. A strategy employed by members of several Sleetmute households is that of temporarily moving to an area offering greater wage-employment opportunities for anywhere from several months to a few years, then returning to Sleetmute with money to reinvest in housing, equipment, and

other items. Many Sleetmute residents move to Anchorage or Bethel temporarily, the majority favoring Anchorage. At the beginning of the present study in June 1982, three Sleetmute households moved to Anchorage for the purpose of finding jobs for an anticipated stay of approximately one year. During the course of this study in 1982-83, members of seven Sleetmute households (25 percent) either moved to or returned from Anchorage where a residency was maintained for at least four months. At least seven Sleetmute households (25 percent) spent over one year within the past ten years residing in either Bethel or Anchorage. One Sleetmute household not included in this study is currently residing in Bethel.

Transfer payments and trapping are additional major sources of income to Sleetmute households. An average of 13 households (46.4 percent) received food stamps and 9 households (32.1 percent) received some combination of Old Age Assistance, Aid to Permanently Disabled, and Aid to Families with Dependent Children during 1982-83.

Thirteen households (46.4 percent) received an income from commercial trapping. As described in previous chapters, commercial trapping provides a greater source of income to Sleetmute residents than to those of Chuathbaluk. Because of their distance from commercial salmon districts, commercial fishing is not an economic option for Sleetmute residents. Additionally, households commonly do not earn income from the production of cottage crafts. Private enterprise comprises the remaining source of monetary income to the community. One Sleetmute household runs an airplane charter service, a store, a lodge, and a guide service for sport fishermen. Members of two

Sleetmute households are employed by the airplane charter service. Other Sleetmute residents occasionally obtain seasonal jobs assisting this household in some aspect of its private enterprise.

Wolfe (1981) found that in six Yukon delta communities the subsistence and cash sectors of the economy were mutually supportive. Households having the highest cash income had the greatest production output of locally derived food and raw materials. Successful participation in the cash sector of the local economy facilitated success in the subsistence sector due to the greater availability of money that could be invested in materials necessary for harvesting natural resources. However, there is a time limitation to this correlation, as strong participation in cash production can preclude subsistence production. The mutually supportive relationship of the cash and subsistence sectors appears to hold true in Chuathbaluk and Sleetmute as well. While systematic quantification of cash incomes and levels of local resource output were not gathered for all Chuathbaluk and Sleetmute households, the observed level of participation by particular households in market and subsistence activities suggests such a relationship, as illustrated below.

Integral to the balance of subsistence and market economies is a means by which to coordinate the timing of activities. Natural cycles influencing the availability of resources do not always correspond to external time schedules imposed by wage employment. Because household units typically serve as the basis for domestic production units, a division of labor within the household among subsistence and market activities can coordinate local and externally derived time schedules.

The following case studies from Chuathbaluk and Sleetmute provide examples of household adaptive strategies which allow households to successfully participate in both market and subsistence sectors of the local economy. These examples are contrasted with case studies illustrating households that did not successfully participate in either sector of the economy.

Case 1. Chuathbaluk

This household includes a husband and wife and three offspring. The husband holds a full-time, wage-paying job between late August and early May at the high school. He also has a second part-time, year-round, wage-paying job in the community. Like the husband, the wife has a part-time job at the high school between late August and early May. Because of this combination of wage-paying jobs, this household has one of the higher wage income levels in the community. It is also a household actively involved in resource harvest and processing. The household maintains a summer fish camp and garden close to the village and during 1982-83 dried more salmon than most Chuathbaluk households. Berries were harvested in large quantities throughout July, August, and September. One moose was harvested in November. A small number of furbearers were trapped during winter. A variety of other resources were harvested in addition, including waterfowl, snowshoe hares,

ptarmigan, grouse, and non-salmonid fish species. The household heats primarily with wood. Because the husband and wife are employed by the school district, they are able to take summers off and devote them to salmon harvest and processing. Because of the husband's other part-time job during summer, the household maintains a fish camp close to the village so that the husband can commute daily to his job. This part-time job does not detract significantly from his ability to harvest fish and his schedule is flexible, allowing him to work either morning or afternoon hours. He fishes primarily with a fishwheel, a method requiring less time and labor than drift gill netting. The wife is free to cut fish, maintain the smokehouse, garden, and pick berries throughout the summer. The couple moves back to Chuathbaluk in late August at the beginning of the school semester. They continue to harvest silver salmon and whitefish in their fishwheel throughout September, which can easily be checked from the village. A small smokehouse is maintained in the village for drying these fish at the home base and is attended between working hours. In September the couple take a week off from work to travel upriver, pick berries, hunt bear and moose, and go logging. Wood harvest and hunting trips during fall and winter take place on weekends, with

some help from one son. The husband runs a short trapline in the winter across from the village which he checks by snowmachine on weekends. Most furs are kept for domestic use. Fishing for non-salmonid fish species also occurs on weekends. The son assists in harvesting small game species and cares for the young children during the day throughout the school year. Resources are distributed by this household to other related households within and outside of the community.

The husband and wife in this household are mainly responsible for conducting economic activities and marginal support from offspring. There is no significant pooling of labor with other households, probably due to tight scheduling imposed by wage employment. The husband mainly hunts, traps, and harvests wood alone. This household has children that have grown and moved away who occasionally visit during summer and cooperate in salmon harvest and berry picking. It is basically a self-sufficient production unit, and one that successfully integrates the cash and subsistence sectors of the local economy.

Case 2. Chuathbaluk

This household, one of the most active community households in resource harvest, includes a husband and wife, the wife's mother, and six offspring. During

1982-83 the wife held a full-time, year-round, wage-paying job in the village. One of the daughters also worked periodically as a substitute in her mother's job. The husband and wife are commercial fishing partners in the summer. The husband also takes advantage of periodical summer employment opportunities on river barges. The eldest son commercial fishes in the summer with his paternal grandmother from another household. This son also took advantage of periodical construction jobs in Aniak during 1982-83, although he did not contribute any money to his household.

During 1982 this household maintained a summer fish camp about 30 miles downriver from Chuathbaluk with the household of the wife's son of a former marriage, also from Chuathbaluk, and also a commercial fisherman. From this location they are close to desirable commercial fishing spots in fishing District 2. They are also closer to fishing District 1 than they would be were their fish camp near or upriver from Chuathbaluk and can take advantage of District 1 commercial openings. This location also gives them access to Chuathbaluk and Aniak. These households fish for salmon using drift gill nets. Subsistence fishing occurs during closed commercial periods by the husband and sons, depending on who is available.

Wage employment opportunities take priority over commercial fishing activities, when available, as they are generally more profitable. These households harvest a large quantity of fish for subsistence use, as one household maintains an active dog team throughout the winter. The wife and daughters contribute to cutting fish, alternating their time spent in Chuathbaluk to perform their jobs. Subsistence fishing was completed by early August.

When both households are free from other responsibilities, the wife and daughter take time off from their jobs to go to salmonberry camp for several days. The harvest of lowbush cranberries, blueberries, and crowberries took place in September near the winter village during sporadic half-day berry-picking trips.

Upon termination of summer wage employment and commercial fishing, the husband and one son devoted most of September to hunting moose. Logs were also gathered at this time for winter heating. Household members remain in Chuathbaluk throughout the winter, the wife and daughter working, the younger children attending school. The husband is the second most active trapper in Chuathbaluk. From November through March he runs a trapline which is accessible from the winter village. He generally remains on the trapline for about three days each week, camping in a temporary camp

site. One son and the husband's brother from another household serve as interchangeable trapping partners. This household receives cash income from the sale of furs. Subsequent hunting and fishing for non-salmonid fish species takes place while out on the trapline. A fish trap set for burbot near the winter village is maintained from November through March. The fish trap is the primary responsibility of the sons. The wife's son's household that cooperated with this household at fish camp also cooperates in maintaining the burbot trap and shares in the harvest. The sons are responsible for wood harvest throughout the winter.

This case provides an example of a household actively involved in both cash and subsistence sectors of the economy. The division of labor among household members and cooperative production as an extended family group facilitates economic success in both sectors.

Case 3. Chuathbaluk

This household includes a husband, wife, and three children. In 1982-83, neither husband nor wife had wage-paying jobs in the community. The husband occasionally takes short, temporary construction jobs in Chuathbaluk or Aniak. The wife's time is taken caring for the children. This household's primary source of cash income is through transfer payments. The household

cannot afford to buy a boat, motor, snowmachine, or fishing equipment with which to harvest and process salmon. In addition, the households of the husband's and wife's parents and siblings do not own boats, nets, or snowmachines, and are also limited in their abilities to participate in the subsistence sector. This household therefore lacks both the technology and a closely kin-related group having the technology with which to participate in salmon production. Consequently, members did not process dry salmon during 1982-83. A small quantity of berries were harvested by the household close to the winter village. The household heats with wood. They do not have a means of transportation by which to harvest wood and therefore purchase processed cord wood from the sawmill owner in Chuathbaluk.

Household members own rifles, ammunition, hooks, line, and a few traps. The husband usually hunts bear and moose on foot close to the winter village and packs the meat back to the village on foot. Occasionally, he travels as a hunting partner with another hunter. Hooking for salmon and nonsalmonid fish species takes place from the winter village, as does small game hunting. In 1982-83, the husband ran a short trapline close to Chuathbaluk which he checked on foot during winter. A small amount of income was derived from selling furs.

This household was limited in its ability to participate in the subsistence sector of the local economy. First, it was unable to generate income in the cash sector to purchase equipment for harvesting a wide range of resources. Second, social circumstances, also limited by technology, prevented it from forming kin-related production groups for harvesting and processing subsistence products.

Case 4. Sleetmute

This household is actively involved in the cash sector of the Sleetmute economy, but time restraints associated with wage employment made it difficult to participate fully in the subsistence sector. The household is composed of a husband, a wife, and six children. The husband works at a full-time wage-paying job at the school from late August through May. The wife held a half-time, year-round, wage paying job in the community. The wife works during morning hours and the husband works during afternoon and evening hours, allowing them to balance child care responsibilities. While the children are old enough to assist in some resource harvest activities, they are not old enough to assume these responsibilities on their own. The husband and wife are constrained in their resource production capabilities by their wage employment. Also, they generally

do not pool their labor with other households in economic activities.

During 1982 the wife decided to take leave from work for the summer in order to have time for cutting fish and picking berries. Husband and wife harvested salmon and dried them at the winter village. Berries were picked close to the winter village, though the wife took one trip to a nearby village where she is from originally in order to harvest blueberries with her sisters. In late August the husband resumed his job, while the wife resumed hers later in the fall. The wife's parents moved to Sleetmute from a nearby village for the winter and were available for providing child care, enabling husband and wife to take trips away from the village by themselves for the purpose of harvesting resources. Moose hunting was conducted as a weekend activity during the open seasons. This time limitation prevented the household from being successful during the open seasons and they relied on distribution networks to provide them with moose and caribou meat. Wood harvest took place by the husband on weekends throughout the winter and by the oldest sons in the afternoons. The sons set rabbit snares close to the village. The husband did not trap. Occasional weekend trips were made up the Holitna River during winter for harvesting non-salmonid fish species. The husband did

not cooperate in the setting or maintenance of the community burbot trap.

This household has the means by which to invest in the equipment necessary for resource harvest and processing, and owns enough equipment to do so as a self-sufficient unit. However, it is not as active in the subsistence sector of the Sleetmute economy as other households because of time limitations imposed by the cash sector and the structure of the household unit.

Case 5. Sleetmute

This household is composed of a husband, his wife, and one son. The household spends the summer in Sleetmute where the husband occasionally obtains temporary seasonal employment. They have some income from transfer payments. A small number of salmon are harvested and dried from the winter village by this household who participate in salmon production with the household of the husband's sister's sister-in-law. Berries were picked close to the village. In September, this household moved to one of two trapping cabins on the Holitna River located in the trapping area of another non-kin related household including a man and his adopted son. The husband was invited by the adopted son to be his trapping partner for the winter. Both households remained at their trapping cabins from September through

of furbearers were harvested bringing significant incomes to both households. Furs were often traded by this household for equipment and supplies necessary for trapping and maintaining the camp site. Moose, non-salmonid fish species, snowshoe hares, and wood were easily harvested from the trapping camp, both households cooperating in resource production. The couple's son attended school through correspondence and assisted in resource harvest.

Such an economic strategy provided this household with a means of acquiring a cash income and at the same time provided easy access to natural resources which could be harvested with a much smaller investment of time and money than would be required by the household overwintering in Sleetmute. Although this household does not have a high cash income relative to other Sleetmute households, cooperation with other households and the manner in which cash is obtained allowed it to participate in the subsistence sector successfully. A large amount of equipment and supplies were not invested in by this household for resource returns.

Case 6. Sleetmute

This household includes a husband, wife, and four children. Neither husband, wife, nor children held wage-earning jobs in the village during 1982-83. The primary source of income for this household was through

transfer payments. The household could not afford to have an operative boat or motor during 1982 nor could it afford fishing or trapping equipment. This household participates to a limited extent in the subsistence economy through cooperation with the husband's stepfather's household. The stepfather has an adequate supply of materials and equipment necessary to fish and hunt but is elderly and requires assistance. By providing labor to his stepfather for salmon production, hunting, and trapping, the husband's household receives a supply of dried fish, moose and caribou meat, and furs. The household harvested a small quantity of berries and some non-salmonid fish species near the winter village but did not participate in maintaining the community fish trap. One son set snares for hare. The household owns a chainsaw and snowmachine which were used for harvesting wood throughout the winter. Hunting trips were made nearby during the open moose seasons and the household was successful in harvesting one moose. Lack of participation in the cash sector restricts the ability of this household to participate in the subsistence sector of the Sleetmute economy. The household depends mainly on cooperation with another household for the limited amount of subsistence production it does undertake.

These cases illustrate how households integrate activities in the subsistence and cash sectors. Most village households participate in both market and subsistence sectors of the local economy. Those households that are most active in the cash sector are often most active in the subsistence sector as well, with one type of economic activity facilitating the other. Those households that do not participate in the cash sector of the economy are frequently limited in their ability to carry out subsistence production. Division of labor between complementary economic tasks within household production units and cooperation with other households in subsistence production facilitates economic success. It should be noted that economic factors are only one aspect of subsistence production, and that other variables such as kinship networks, social circumstance, cultural values, and personal priorities also influence the level of participation a household unit exhibits in the market and subsistence sectors.

THE ANNUAL ROUND OF RESOURCE HARVEST

In a subsistence-based economy, production activities correspond to seasonal cycles influenced by the availability of resources (Wolfe and Ellanna 1983). While current state and federal regulations define timetables for harvesting particular resources, the annual pattern of harvest and processing activities for most resources are set by natural environmental cycles. The annual seasonal round of resource harvest occurring in these communities was presented in Figure 15. It shows

that residents draw from a relatively diverse resource base. Diversification in production provides security in light of population fluctuations occurring among separate species. While resources targeted, times of harvest, and harvest success vary somewhat from year to year and between individuals, an overall pattern of production activities may be observed in the study communities. This pattern is intrinsic to the socioeconomic systems of Chuathbaluk and Sleetmute, has long historic roots, and continues to pattern the sequence of activities of almost every community member.

DOMESTIC MODE OF PRODUCTION

A domestic mode of production is one in which the production and consumption of goods are activities of kinship-based groups (Wolfe and Ellanna 1983). Such is the case in Chuathbaluk and Sleetmute where production and consumption of goods typically takes place within groups of persons allied through kinship principles. In a subsistence-based economy, production units generally contain a division of labor based on age, sex, capability, and kinship relationships between group members (Wolfe and Ellanna 1983). Examples of kinship-based production units involved in the harvest and processing of resources were described in previous chapters. Organization of production units varies depending on the resource being harvested and processed, illustrated by the differences in group composition for salmon fishing (Chapter 5) and for berry picking (Chapter 11).

For instance, one Chuathbaluk household, containing a 68-year-old woman and her 39-year-old son, maintained a summer fish camp with her daughter, son-in-law, and three young grandchildren from Aniak. Both households pooled equipment (boats, motors, and fish nets) in the harvest effort. The mother and daughter cut fish while the son and son-in-law harvested firewood, maintained the smudge pot, and fished. Both households reside in a single dwelling while at fish camp. The Chuathbaluk household left fish camp for four days in July to harvest salmonberries at Whitefish Lake with the extended household of two of the mother's other sons from Chuathbaluk and Aniak. This same household later maintained a fall berry and hunting camp near the Oskawalik River for one week in September with the households of two of the mother's nieces and the household of one of the niece's brothers, all from Chuathbaluk. Therefore, fish, berry, and meat products obtained by this Chuathbaluk household were gained through cooperative participation with three different production units, organized through kinship principles, illustrating a domestic mode of production.

DISTRIBUTION AND EXCHANGE NETWORKS

The non-commercial distribution and exchange of fish, wildlife, and plants among community members is a characteristic found in subsistence-based socioeconomic systems (Wolfe and Ellanna 1983). The sharing, distribution, and exchange of a broad range of resources harvested in Chuathbaluk and Sleetmute primarily occurs along kinship lines and, in some cases, independent of kinship relationships. These distribution

networks are nonmonetary in nature and provide households that are unsuccessful or unable to harvest specific resources access to resources via successful households. Such a system provides for households composed of elderly people incapable of participation in production activities and households that are restricted in their ability to harvest resources by a social imbalance such as the absence of a hunter or a fish cutter.

Several contexts in which distribution and exchange in Chuathbaluk and Sleetmute occur were described in previous chapters. In chapters 5 and 7, kinship diagrams were presented showing the distribution of salmon and moose meat between households. Many other resources are distributed in a similar fashion. Traditional beliefs guide distribution in some instances. For instance, an animal that is the first of that species to be harvested in a hunter's lifetime is distributed to elders in the community.

In addition to these types of distribution and exchange networks, resources are distributed during ceremonial occasions. Resources are shared community-wide at Russian Orthodox celebrations in which every member of the community may participate. These celebrations include Slavic (Russian Orthodox Christmas), Russian Orthodox Easter, weddings, and 40-day feasts commemorating the dead. Slavic celebrations begin on January 7 and may last up until the Russian New Year, January 14. During Slavic celebrations, community members as well as visitors from other villages go from house to house in sequence, sing Christmas carols, and feast. In Chuathbaluk approximately five hours are spent at each home. Participants congregate in the appointed dwelling, sing

together for 45 minutes or so, and feast in shifts on a meal provided by the household. A household typically feeds between 100 and 200 people in one round. Once everyone has been fed at the first house, participants proceed to the second house. This procession continues until every home in the community has been visited, constituting the first round. Slavic celebrations take place around the clock. Three rounds of feasting occur. In Chuathbaluk Slavic celebrations generally last for one week. In Sleetmute celebrations last for three days. Food is stored throughout the year in preparation for Slavic. Large quantities of berries are harvested in summer in anticipation of the quantities of akutaq to be consumed during Slavic. Most households also prepare and serve beaver and moose meat and dried salmon. Similar dishes including those made from fresh fish and bear meat are served at community feasts which are held by the household of a woman getting married and by the household of a deceased community member 40 days following his or her death. Feasts are held among extended family groups at Russian Orthodox Easter.

Fish and wildlife resources are sometimes exchanged or traded for labor, materials, or other resources. Some Chuathbaluk households stated that they exchange moose products to members of lower Kuskokwim communities in return for seal oil. This type of exchange provides residents of both communities with desirable food resources which are relatively inaccessible in their areas. Some individuals who are members of households that do not harvest and process salmon donate labor during summer months to assist other households in producing dried salmon and receive dried fish in exchange. Other types of labor

provided to a household may be compensated for with food products. In Sleetmute furs are commonly traded to local furbuyers for groceries, supplies, and materials necessary for trapping activities. These systems of distribution and exchange occur along kinship-based networks linking households, and demonstrate the community-wide nature of subsistence-based socioeconomic systems.

TRADITIONAL SYSTEMS OF LAND USE AND OCCUPANCY

A traditional system of land use and occupancy is a common component of subsistence-based socioeconomic systems (Wolfe and Ellanna 1983). Traditional systems of land tenure organize areas used for resource harvest activities into socially defined units which are recognized both within the community and regionwide. The system follows unwritten customary laws of land use. Traditional systems of land use and occupancy as they exist in Chuathbaluk and Sleetmute have been discussed to some extent in Chapter 4. Figures presented throughout chapters 5 to 11 showing areas used for resource harvest by community members suggest the operation of these complex traditional systems.

It is clear that Chuathbaluk and Sleetmute residents maintain predominantly separate use areas within the central Kuskokwim region. Overlap is generally related to previous place of residency or kinship ties with individuals showing a history of use of that area. Within the use area delineated by the community, households often maintain individual use areas such as fish camps, hunting spots, or trapping cabins which are shared with kin or non-kin relations by

"permission" from the user. Use areas vary according to species harvested. Households do not maintain specific subregions from which they obtain all of the resources necessary to them. Overall, traditional systems of land use and occupancy are understood within Chuathbaluk and Sleetmute and the central Kuskokwim region as a whole, and area residents are said to respect the land use areas of others. However, these systems are not often understood or respected by non-local residents and outsiders. This lack of understanding and respect at times leads to regional conflict over natural resources and land use areas and the disruption of harvest activities.

Based on the above criteria including a mixed subsistence-cash economy, a seasonal round of economic activity, a domestic mode of production, a distribution and exchange network, and a traditional system of land use and occupancy, Chuathbaluk and Sleetmute may be classified as subsistence-based socioeconomic systems.

CHAPTER 13

CONCLUSIONS

This report described resource harvest and use by Chuathbaluk and Sleetmute residents between June 1982 and June 1983. Patterns of seasonal settlement and land use that arise from resource harvest activities were also described, along with the social, ecological, and economic frameworks within which resource harvests take place. From the information presented in these chapters, it is possible to compare the study communities in light of similarities and differences that exist in relation to subsistence patterns, and to suggest explanations for these similarities and differences.

Chuathbaluk and Sleetmute are both considered part of the central Kuskokwim. Both have viable, dynamic subsistence-based socioeconomic systems. Community residents have access to a base of wild, renewable resources which are influenced by ecological parameters. Residents utilize a particular spectrum of resources according to season, balancing their needs and orientation toward the resource base in accordance with prevailing environmental conditions. The system of resource harvest is not only patterned by an ecological framework, but is influenced by demographic, economic, and cultural factors which also change through time. Resource harvest and use by individual households and communities may therefore shift annually. An understanding of subsistence patterns described for Chuathbaluk and Sleetmute is limited by the time-frame of the present study, which was designed to take place over a one-year period only. With this limitation in mind,

the following discussion seeks to compare and contrast the study communities based on general observations that may withstand minor annual shifts in subsistence dynamics.

Chuathbaluk and Sleetmute show certain similarities and differences in historical development. The site of Chuathbaluk has shown discontinuous occupancy since the early 1800s by several cultural groups. In early historic times, Ingalik Athabaskans used it as a summer camp. It was occupied jointly by the Ingalik and Yup'ik Eskimos in the late 1800s, and by individuals associated with the Russian Orthodox Church in the late 1800s and early 1900s. After a period of abandonment beginning around 1929, the village site was resettled by one family in 1954 and has since grown to its current size of 132 individuals. Most current Chuathbaluk residents have previously resided in other central Kuskokwim communities. The major cultural tradition of current residents is Yup'ik Eskimo.

Sleetmute has been continuously occupied since around 1900. Population levels have fluctuated since that time, the current population of 101 being low in comparison with recorded historic levels. Some Sleetmute residents have moved to the village from dispersed single-family settlements along the Holitna, Hoholitna, and Kuskokwim rivers, while others have lived in the village throughout their lives. Historically, Sleetmute was composed of both Athabaskan and Yup'ik people, and these cultural traditions have persisted into the present day. The current Athabaskan component characterized by ethnic background and cultural contact is more evident in Sleetmute than in Chuathbaluk. Sleetmute is locally considered to be a Yup'ik community. Observed

adaptations in Sleetmute that are more characteristic of those seen in Athabaskan communities may be due to the fact that Sleetmute residents are adapted to an environment more characteristic of that to which Athabaskan groups within the Kuskokwim river drainage are adapted.

Both communities have been strongly influenced by Russian and Euro-american penetration into the central Kuskokwim region. This is especially evidenced by the current technologies used in resource harvest, such as rifles, boat motors, snowmachines, steel traps, fishwheels, and nylon fish nets. The Russian Orthodox Church has a strong presence in Chuathbaluk and Sleetmute. The current populations contain some individuals tracing partial Russian or Euroamerican ancestries.

The sociopolitical community profiles of Chuathbaluk and Sleetmute resemble one another. Both communities are represented by The Kuskokwim Corporation (a profit corporation) and the Kuskokwim Native Association (a non-profit corporation). Both communities have village councils, though Chuathbaluk is a second class city with a city council and Sleetmute is unincorporated, having a traditional (IRA) council. Community infrastructures are similar. Wage employment opportunities in both communities are limited and primarily government funded. Wage employment connected with private business comprises a minor component of the cash sector. Several Chuathbaluk residents participate in the commercial salmon fishery on the lower Kuskokwim River and also have access to wage employment in Aniak, the regional center. It is impractical for Sleetmute residents to participate in the commercial salmon fishery, and residents do not have access to wage employment in a nearby regional center. Sleetmute residents are more active than

Chuathbaluk residents in commercial trapping, and derive a higher cash income from this activity. Some Chuathbaluk and Sleetmute residents seek wage employment opportunities outside the community in Bethel or Anchorage, Anchorage being a common choice made by Sleetmute residents. Some households in each community rely on transfer payments as a source of cash income. In 1979 Sleetmute had a higher median household income (\$5,417) than Chuathbaluk (\$4,375). The relative economic disposition of households in the two communities does not appear to differ greatly, however, with 56.5 percent of the Sleetmute households earning under \$5,000 in 1979 and 55.5 percent of the Chuathbaluk residents earning under \$5,000 in 1979 (n=23, Sleetmute; n=27, Chuathbaluk).

The 1982-83 demographic profiles of Chuathbaluk and Sleetmute demonstrate similarities and differences. Both communities have sex ratios skewed toward males, with 59 percent of the population male and 41 percent of the population female. In Chuathbaluk, the imbalance of males occurs mostly under age 25, while in Sleetmute there is an imbalance of males in the majority of the age categories ranging from 0 to 79. Fifty-nine percent of the Chuathbaluk population is under age 25 and 48 percent of the Sleetmute population is under age 25. Average household size in Chuathbaluk (4.5) is larger than that in Sleetmute (3.6), and large households are more common in Chuathbaluk. In Sleetmute there is a high number of households containing single males, many of whom live separate from the winter community for portions of

the year. The predominance of males in both communities may result from female out-migration and female out-marriage. There seems to be a greater tendency for females to migrate out of the community for reasons related to educational and wage employment opportunities, sometimes resulting in out-marriage. Males exhibit a greater tendency to remain in the community. The high percentage of community residents under age 25 is probably due to a reduction in infant mortality over the past 20 years, birth rates remaining constant. Household size in recent years has been influenced by the history of housing projects in communities and the availability of dwelling space. Higher household size in Chuathbaluk may be due to the reduced availability of housing there. In 1982-83 there were few unoccupied dwellings in Chuathbaluk, and those that were unoccupied were considered unfit for winter habitation. There were more unoccupied dwellings in Sleetmute than in Chuathbaluk, most of which were considered fit for year-round habitation. Sleetmute residents therefore had more space available to occupy and had the opportunity to form smaller household groups.

Chuathbaluk and Sleetmute residents have access to essentially the same resource base, although the abundance of particular resources differs. Salmon is more abundant in the lower river around Chuathbaluk, while furbearers, moose, and caribou are more abundant around Sleetmute. The differences in local abundance of resources contributes to somewhat different community orientations toward the resource base.

Subsistence patterns in Chuathbaluk are especially oriented toward the harvest of salmon and moose, with bear, berries, non-salmonid fish species, and furbearers playing important support roles. Subsistence

patterns in Sleetmute are especially oriented around the harvest of moose and furbearers, with salmon, non-salmonid fish species, caribou, and berries being important additional resources. While the orientation of individual households toward resource harvest activities may vary from the overall pattern of the community, in general, salmon, berries, and bear are harvested in greater abundance in Chuathbaluk, while moose, caribou, and furbearers are more widely used in Sleetmute. Non-salmonid fish species are particularly important to many Sleetmute households which do not process and store salmon.

Blackfish, rainbow trout, and smelt are only available to Chuathbaluk residents but are harvested in small quantities and do not significantly alter the overall nature of resource harvest activities in the community. The timing of resource harvest is basically the same in both communities except for the harvest of migratory fish species that travel up the Kuskokwim River (salmon, lampreys, sheefish, whitefish, and burbot) and arrive in Sleetmute up to two weeks following their arrival in Chuathbaluk.

Accompanying different resource orientations are contrasting settlement patterns within the two communities. For Chuathbaluk residents the winter village is the focal settlement between September and May. Temporary trapping camps established for periodic short-term use are maintained by some households during winter months. In 1982, members of nine village households (34 percent) moved to summer fish camps to harvest and process salmon; salmon production occurred at the winter village by the remainder. Many village household residents spend an average of one week in late summer and early fall camping,

picking berries, and hunting bear. Camping trips are made in September for the purpose of harvesting moose and bear. Three households (10 percent) maintained single family settlements apart from the village throughout the year from which resource harvest and processing took place.

For Sleetmute residents, the winter village is less of a focal settlement for activities. The lesser importance of salmon in Sleetmute in comparison with Chuathbaluk may contribute to a more dispersed settlement pattern in Sleetmute. The village of Sleetmute serves as a base of economic activities for some households during winter months, for other households during summer months, for some households throughout the year, and for some households not at all. Six households (21 percent) maintained year-round single family settlements from which resource harvest and processing generally occurred. In the year of the study, eight households (29 percent) settled in trapping cabins on the Holitna and Hoholitna rivers between September and May and spent the summer in Sleetmute harvesting salmon and/or working at wage-earning jobs. Four households (14 percent) remained in the winter village between September and May. One of these households moved to a summer fish camp. The other three households traveled outside the state. The remaining ten Sleetmute households (36 percent) resided in the winter village throughout the year. Some households spent a few days camping and harvesting berries or bear in late summer-early fall. Hunting camps were maintained in September for harvesting moose, caribou, and bear.

The different emphasis in the selection of harvested resources exhibited in Chuathbaluk and Sleetmute are influenced by ecological factors. The country surrounding Chuathbaluk is characterized by tundra and open spruce-birch woodlands, while dense spruce-birch forest predominates in the Sleetmute area. Habitat differences influence the local abundance of associated resources. The closer proximity of Chuathbaluk to tundra areas representative of the Yukon-Kuskokwim delta gives Chuathbaluk residents increased access to resources found there, in particular salmonberries and blueberries. Because of the higher density of berry species occurring near Chuathbaluk, brown and black bear also appear to be more abundant in the area, giving community residents greater access to these species.

Moose in the central Kuskokwim region are most abundant in the Holitna and Aniak river drainages due to the quality of moose habitat found there and the size of these drainages. Chuathbaluk hunters use the Aniak River; however, moose in the drainage are less accessible than those in the Holitna drainage, because the river is difficult to navigate, especially in the upper parts of the drainage. In addition, there is competition for the moose resource from Aniak hunters. Chuathbaluk hunters also use other central Kuskokwim tributaries for moose hunting, but these have fewer moose and are also difficult to penetrate. Caribou are more abundant in the Sleetmute area than in the Chuathbaluk area. Biological data suggest that the Mulchatna herd is moving further down into the Holitna drainage every winter, whereas caribou in other central Kuskokwim drainages are rare (Robert Pegau pers. comm., June 1983). Sleetmute residents therefore have better

access to moose and caribou than do Chuathbaluk residents, who hunt in areas where moose and caribou occur in lower densities, further from the village, and in harvest areas which are shared with residents of other central Kuskokwim communities. Because a relatively large percentage of Sleetmute residents move to trapping cabins on the Holitna and Hoholitna rivers between September and May, they have access to these species throughout most of the year. Through networks of distribution and exchange, these resources are more available community-wide. The greater use of bear observed in Chuathbaluk during 1982-83 may indicate that Chuathbaluk households are more dependent on this species as an alternate resource because they cannot count on getting moose or caribou every year. Sleetmute households can generally count on harvesting at least one moose annually and therefore may not need to rely on bear as heavily.

The greater emphasis placed on the salmon resource by Chuathbaluk residents as compared with Sleetmute residents may partially be due to the fact that salmon are in better condition, have a higher fat content, and are more abundant in the vicinity of Chuathbaluk than in the vicinity of Sleetmute. The farther salmon must travel, the lower their fat content, the more worn out the fish, and the fewer the number that are available. Salmon spawn in Kuskokwim tributaries located between the two villages, causing a reduced number of stocks to be available to Sleetmute residents. In addition, most households overwintering on the Holitna and Hoholitna rivers do not feel a need to process and store large quantities of salmon because they have greater access to

abundant supplies of non-salmonid fish species throughout the winter, most notably pike, grayling, and arctic char.

The abundance of furbearer species also influences resource selection. The size of the Holitna drainage makes it particularly rich in furbearer species as compared with other central Kuskokwim drainages (Robert Pegau pers. comm., June 1983). Marten, beaver, and otter are abundant in the Holitna river drainage and are not as prevalent in the harvest areas used by Chuathbaluk trappers. Many Chuathbaluk trappers use the Aniak river drainage, which reportedly has a higher density of lynx than does the Holitna River. The abundance of marten and other furbearer species in the Holitna drainage may account for the present orientation of Sleetmute residents around trapping activities. In addition, trapping is a local source of cash income available to Sleetmute residents who do not have access to commercial salmon fishing and wage employment in Aniak, as do Chuathbaluk residents.

Demographic variables also influence resource harvest patterns. A particular level of resource harvest is minimally influenced by the size of the population and ratio of producers to non-producers. Resource harvest and processing are dependent on the presence of a production unit composed of members enacting complementary harvesting and processing roles. In both communities, production units are comprised of kinship-based groups. Salmon harvest and processing requires a male capable of fishing, cutting wood for smoking meat and fish, and maintaining boats and fishing gear and a female capable of cutting fish. Berry harvest typically takes place by the female members of a production unit, with males providing transportation, protection from bears, and

other support roles. Non-salmonid fish species are typically harvested by males, though females often participate. Large and small game animals and furbearers are almost always harvested by males. Female members of a production unit may assist in processing these resources. Age- and sex-related roles define the composition of production units. A household lacking a male and/or female member capable of harvesting or processing salmon will probably not be involved in salmon production, unless it cooperates with another household. A household lacking a capable female will probably not harvest and store berries. A household lacking a capable male will probably not be active in hunting or trapping activities and may have difficulty in obtaining game species. Though male and female roles sometimes overlap and immature members of the community occasionally substitute in production units, in most cases these factors do not compensate for the absent member of the production unit. Some households cooperate with other, kin-related households when lacking a complete production unit in order to successfully participate in resource harvest activities. Cooperation of this nature is more predominant in Chuathbaluk than in Sleetmute.

The demographic profiles of Chuathbaluk and Sleetmute appear to reinforce the resource focus of each community patterned by ecological conditions. In Sleetmute a predominance of males throughout the age categories of the population and the common occurrence of single adult males lends itself to greater participation in hunting and trapping activities, which are viable adaptations in the absence of female members of production units. In Chuathbaluk, where the sexes are more balanced in the adult population and households are larger and comprise

more complete production units, salmon and berry production are better facilitated. Reduced participation in furbearer harvest on the part of Chuathbaluk residents may partially be due to the difficulty in moving entire households including offspring to winter trapping camps. Those Sleetmute households maintaining winter trapping cabins are composed of either single males or married couples with one school-aged child. There may also be a more strongly defined cultural tradition of trapping and winter mobility in Sleetmute. It is important to note, however, that these observed adaptations are not necessarily caused by community residents maximizing their demographic composition, but that demographic composition may be influenced by the central importance of particular age- and sex-related roles, defined by ecological and/or cultural parameters. The degree to which population structure arising from recruitment and marriage patterns supports the prevalent ecological base found in each community has not been explored in this report.

Although Chuathbaluk and Sleetmute exhibit differences in resource focus and settlement patterns, data suggest that transportation methods used for obtaining resources, resource harvest methods, processing techniques, and systems of distribution and exchange are similar in both communities. In addition, both communities maintain a system based on traditional land use relating to resource harvest areas, which have been mapped at the community level throughout the text of this report. Patterns of land use by both communities have fluctuated over time.

In general, resource harvest activities by Sleetmute residents have been concentrated in the Holitna and Hoholitna river drainages during

the two time periods, indicating that this is the main area used by Sleetmute residents. Nearly every resource used by community members can be obtained within these drainages. The use of snowmachines as a transportation method for resource harvest activities was found to have an impact on areas used for trapping only. The expanded use of areas for resource harvest activities including moose, bear, and caribou hunting, and hooking for non-salmonid fish species, since the use of snowmachines, does not represent a shift in the overall pattern of land use by Sleetmute residents, but results from the activities of a few individuals. The expansion of caribou harvest areas in the later time period is due to the use of aircraft as a transportation method by a few community members. One resident moved to Sleetmute from Crooked Creek during the later time period yet maintained a tradition of harvesting resources along the Oskawalik and George rivers which is represented on the community maps.

Trapping areas used by Sleetmute residents contracted as a result of the use of snowmachines when trapping took place with the use of dog teams as a transportation method, a much more extensive range of harvest areas was utilized by Sleetmute residents, as can be seen from Figures 74 and 75. Community members stated that they are afraid to travel as far from the winter village for as long a period of time as they once did with dog teams because snowmachines are considered unreliable and often break down, causing individuals to become stranded. In addition, the distance individuals can travel is limited by the weight of the fuel that must be carried on long-distance trips, in contrast to the lightweight bundles of dried fish used to fuel dog teams.

Chuathbaluk residents have utilized a wide range of areas for harvesting resources between the approximate boundaries of Tuluksak at the downriver limit and McGrath at the upriver limit, and including many major Kuskokwim tributaries between these locations. This can be partially attributed to lower overall resource productivity in the drainages used by Chuathbaluk residents compared with those used by Sleetmute residents, the fact that individuals previously resided in communities throughout the central Kuskokwim region, and the fact that Chuathbaluk residents are using several drainages for resource harvest that are also in use by residents of other communities. The latter may make it more difficult for them to obtain resources. Chuathbaluk residents are currently using many resource harvest areas which they used historically. Current Chuathbaluk residents settled in the community between 1954 and the 1970s. Most individuals migrated from other central Kuskokwim communities. Prior to moving to Chuathbaluk, individuals harvested resources in areas traditionally associated with and used by the communities from which they moved since settling in Chuathbaluk, residents have more fully utilized local harvest areas, and have also continued to use harvest areas in the central Kuskokwim region with which they have historic ties.

In conclusion, both Chuathbaluk and Sleetmute have viable subsistence-based economies. Chuathbaluk and Sleetmute bear similarities and differences in their adaptations to the regional resource base, reflected in that pattern of subsistence activities. The factors underlying these socioeconomic systems are complex, as demonstrated in

this report. The socioeconomic patterns appear to be the product of a complex interaction of ecological, demographic, and cultural factors over time. Our understanding of the dynamics of these systems is just beginning.

REFERENCES CITED

Ackerman, Robert E.

- 1981 The Archaeology of the Central Kuskokwim River Region. Arctic Research Section, Laboratory of Anthropology, Washington State University.

Alaska Department of Fish and Game

- 1969 Annual Report of Survey - Inventory Activities, Juneau.
- 1972 Annual Report of Survey - Inventory Activities, Juneau.
- 1975 Annual Report of Survey - Inventory Activities, Juneau.
- 1977 Annual Report of Survey - Inventory Activities, Juneau.
- 1978 Annual Report of Survey - Inventory Activities, Juneau.
- 1976 Division of Game. Alaska Wildlife Management Plans -- Western Alaska. Draft Proposal.
- 1982a Alaska Board of Fisheries. Commercial Finfish Regulations, Juneau.
- 1982b Alaska Board of Fisheries. Subsistence Fishing Regulations, Juneau.
- 1982c Alaska Board of Game Regulatory Proposals, Juneau.
- 1982d Alaska Board of Game Trapping Regulations, Juneau.
- 1982e Division of Commercial Fisheries. Annual Management Report -- Kuskokwim Area, Anchorage.

Calista Corporation

- n.d. (Village Information Sheets).

Charnley, Susan

- 1982 Resource Use Areas in the Aniak and Oskawalik River Drainages. Division of Subsistence, Alaska Department of Fish and Game, Bethel, Technical Paper No. 50.
- 1983 Moose Hunting in Two Central Kuskokwim Communities: Chuathbaluk and Sleetmute. Division of Subsistence, Alaska Department of Fish and Game, Bethel, Technical Paper No. 76.

Darbyshire and Associates

1979 Middle Kuskokwim Region Community Profiles. Alaska Department of Community and Regional Affairs, Division of Community Planning.

Gordon, George Byron

1917 In the Alaskan Wilderness. Philadelphia: The John C. Winston Company.

Hosley, Edward

1966 The Kolchan: Athabaskans of the Upper Kuskokwim. Unpublished manuscript. University of Alaska, Fairbanks.

Hulten, Eric

1968 Flora of Alaska and Neighboring Territories. Stanford: Stanford University Press.

Jonrowe, Dee

1979 Middle Kuskokwim Food Survey. Division of Subsistence, Alaska Department of Fish and Game, Bethel, Technical Report No. 51.

Kari, James

1980 Stony River Place Names List. On File at Alaska Native Language Center, Fairbanks.

Kari, Priscilla

1983 Land Use and Economy of Lime Village. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Technical Paper No. 80.

Krauss, Michael E., compiler

1974 Native Peoples and Languages of Alaska. Fairbanks: Alaska Native Language Center. Map.

Maddox, Darryl M.

1975 On the Distribution of Kuskowagamiut Fishcamps: A Study in the Ecology of Adaptive Radiation. In Castell, Richard W. and George I. Quimby, eds. Maritime Adaptations of the Pacific. Mouton, The Hague and Paris. pp. 197-219.

Mason, Lynn D.

1967 Salmon Utilization. Unpublished manuscript. Department of Anthropology, University of California, Los Angeles.

Michael, Henry N., editor

1967 Lieutenant Zagoskin's Travels in Russian America 1842-1844. Arctic Institute of North America, Anthropology of the North: Translations from Russian Sources, no. 7. Canada: University of Toronto Press.

- Morrow, James E.
1980 The Freshwater Fishes of Alaska. Anchorage, Alaska Northwest Publishing Company.
- Osgood, Cornelius
1958 Ingalik Social Culture. Yale University Publications in Anthropology Number 53. New Haven: Yale University Press.
1970 Ingalik Material Culture. Yale University Publications in Anthropology Number 22. New Haven: Reprinted by Human Relations Area Files Press.
- Oswalt, Wendell H.
1957 A Western Eskimo Ethnobotany. Anthropological Papers of the University of Alaska 6(1):16-36.
1960 Eskimos and Indians of Western Alaska 1861-1868: Extracts from the Diary of Father Illarion. Anthropological Papers of the University of Alaska 8(2).
1962 Historical Populations in Western Alaska and Migration Theory. Anthropological Papers of the University of Alaska 2(1):1-14.
1963 Mission of Change in Alaska. San Marino, California: The Huntington Library.
1967 Alaskan Eskimos. San Francisco: Chandler Publishing Company.
1978 This Land Was Theirs. New York: Wiley Publishing Company.
1980a Historic Settlements Along the Kuskokwim River, Alaska. Alaska Division of State Libraries and Museums, Juneau, Alaska State Library Historical Monograph No. 7.
1980b Kolmakovskiy Redoubt: The Ethnoarchaeology of a Russian Fort in Alaska. Los Angeles: The Institute of Archaeology, University of California, Los Angeles.
- Oswalt, Wendell H. and VanStone, James W.
1967 The Ethnoarchaeology of Crow Village, Alaska. Smithsonian Institute Bureau of American Ethnology Bulletin 199. Washington, D. C.: United States Government Printing Office.
- Overfield, Theresa, William W. Epstein and Larry A. Gaudioso
1980 Eskimo Uses of Artemisia tilesii (Compositae). Economic Botany 34(2):97-100.

- Shuler, Judy
 1983 Letter from Judy Shuler, Alaska Department of Health and Social Services, Division of Public Assistance to Susan Charnley, Alaska Department of Fish and Game dated April 13, 1983.
- Smith, Barbara S.
 1980 Russian Orthodoxy in Alaska. Anchorage: Van Cleve Printing Company.
- Stickney, Alice
 1981 Middle Kuskokwim Food Survey--II. Division of Subsistence, Alaska Department of Fish and Game, Bethel, Technical Paper No. 53.
- U. S. Bureau of the Census
 1980 Census of Population and Housing: Summary Tape File 3. Unpublished Computer data. Anchorage: Institute for Social and Economic Research.
- University of Alaska Cooperative Extension Service
 1982 The Kuskokwim Corporation Plans Resource Development on Its Land. What's Developing in Alaska, January 1982.
- VanStone, James W.
 1959 Russian Exploration in Interior Alaska. Pacific Northwest Quarterly, 50:37-47.
- 1970 An Introduction to Baron F. P. von Wrangell's Observations on the Eskimos and Indians of Alaska. Arctic Anthropology 6(2).
- 1974 Athapaskan Adaptations. Chicago: Aldine Publishing Company.
- Wolfe, Robert J.
 1979 Food Production in a Western Eskimo Population. Ph.D. Dissertation in Anthropology, University of California, Los Angeles.
- 1981 Norton Sound/Yukon Delta Sociocultural Systems Baseline Analysis. Alaska OCS Socioeconomic Studies Program, Bureau of Land Management, Alaska Outer Continental Shelf Office, Technical Report No. 59.
- 1982 Alaska's Great Sickness, 1900: An Epidemic of Measles and Influenza in a Virgin Soil Population. Proceedings of the American Philosophical Society 126(2):90-121.
- Wolfe, Robert J. and Linda J. Ellanna, compilers
 1983 Resource Use and Socioeconomic Systems: Case Studies of Fishing and Hunting in Alaskan Communities. Division of Subsistence, Department of Fish and Game, Juneau, Technical Report No. 89.

Woodbury, Anthony C.
1983 Eskimo and Aleut Languages. In Volume 5: Arctic, David Damas,
ed. Handbook of American Indians, William C. Sturtevant, General
Editor. Smithsonian Institution Press, Washington D.C.

APPENDIX A

RESOURCE HARVEST QUESTIONNAIRE -- SEPTEMBER 1982

Household/Person Interviewing: _____

Moose Hunting

1. How many days did you spend hunting moose this season (September)?
2. Who did you go hunting with?
3. Where did you hunt? (general area)
4. How much money would you say you spent on gas, etc., in order to moose hunt?
5. Did you get a moose?
6. If yes, did you give some of the meat to any other household?
7. To whom?
8. Do you think that this was a good season?
9. Do you plan to hunt moose during the November or February seasons?

Moose, Caribou, and Bear Hunting

1. Did you get any bear or caribou yet this year?
2. If so, did you go out specifically to hunt bear/caribou, or did you get it while out doing something else?
3. Did anyone give you bear or caribou this year?
4. If so, whom?
5. About how many bear, caribou, and moose have your household harvested over the past five years?

Appendix A. (continued)

6. How many bear, caribou, and moose do you feel your household needs in order to have enough meat for the year, each year?
7. If you are not getting enough meat, why? Regulations? Not enough animals around? You do not have enough time, money, equipment to hunt?
8. Do you think there are lots of moose, caribou, and bear around, or not many?
9. What makes you think this?

Salmon Fishing

1. Did you put up salmon this summer?
2. If so, did you, or will you probably, give some of it away to anybody outside of your household?
3. If so, who?
4. If you did not put up salmon, did you receive dry fish from anyone else?
5. Who?

Regulations

1. What is your opinion of the hunting and trapping regulations with regard to season?
2. What is your opinion of the hunting and trapping regulations with regard to bag limit?
3. What is your opinion of the hunting and trapping regulations with regard to sex of the animal that can be taken?
4. What is your opinion of the hunting and trapping regulations with regard to methods that can be used?
5. How would you change these regulations if you dislike them?
6. What do you think of downriver hunters?

APPENDIX B

MOOSE HUNTING QUESTIONNAIRE -- NOVEMBER 1982 SEASON

Household/Person Interviewing: _____

1. How many days did you spend hunting moose this season (November)?
2. Who did you go hunting with?
3. Where did you hunt? (general area)
4. How much money did you spend on gas, etc., in order to hunt?
5. Did you get a moose? If so, was it a cow or a bull?
6. If yes, did you give some of the meat to any other household?
7. To whom?
8. If you didn't get a moose, did you receive meat from any other household?
9. From whom?
10. Do you have a freezer?

APPENDIX C

PERCEIVED ISSUES IN GAME MANAGEMENT UNIT 19A

Moose Population Levels

The draft proposal of the Alaska Wildlife Management Plan for the western region (Alaska Department of Fish and Game 1976) gives an historical overview of the growth of the moose population within the Kuskokwim River drainage. The following account is taken from this source. Prior to 1900, caribou were probably the most abundant ungulate along the middle and lower Kuskokwim. At that time, moose were scarce or absent along the Kuskokwim. A series of severe wildfires early in the century destroyed a wide range of caribou habitat, restricting this species but creating habitat favorable to moose. Moose began to appear along the Upper Kuskokwim between 1915 and 1920 following this series of wildfires.

One village resident explained this faunal change according to a traditional belief that animal species travel around the world. When a species is locally abundant, it is said that the species is passing through the immediate area. When the species diminishes in number, it has moved on to another part of the world. Animals always return, however, resulting in the cyclic nature of many animal populations. Caribou are currently traveling in another part of the world, and moose have arrived from elsewhere to take their place, a pattern that will again shift according to traditional beliefs. Lynx and snowshoe

hare populations provide additional examples of cycling animal populations.

Based on long-term observations, local observers report that the central Kuskokwim moose population is in fairly healthy condition. Cow moose appear to predominate, and large bull moose are reported to be scarce. Moose were more abundant in the area prior to the 1970s, according to local accounts. The decline is attributed to an increased harvest of particularly large bull moose by non-local hunters since that time. Spring flooding and heavy snowfalls are recognized as additional factors causing mortality within the moose population.

The Division of Game, Alaska Department of Fish and Game, has conducted aerial surveys of the moose population in Game Management Unit (GMU) 19 to determine sex and age composition (see Fig. 2). Results of these surveys are presented in the annual survey and inventory reports published by the Division. Most population censusing has been performed outside of GMU 19A in the McGrath-Farewell area, in the Takotna River drainage, and in the Alaska Range. Little population census data are available for GMU 19A. Survey data from 1981-82 showed excellent survival of calves and a good bull to cow ratio (Robert Pegau pers. comm., 1983).

Regulations

Hunting regulations in GMU 19 have been modified since 1959 in response to moose population levels and hunting pressure. Regulations governing moose harvest in GMU 19 were liberalized throughout

the 1960s and early 1970s, but were restricted in the latter half of the 1970s and were not liberalized again until 1981. In the 1960s and early 1970s, bag limits were increased from one to two moose and included antlerless moose. Hunting seasons were increased in length from 41 to 192 hunting days. Severe winters in 1971 and 1972 dramatically reduced the moose population in GMU 19. The reduced population was considered unable to support increased hunting pressure, and regulations were restricted during the 1974-75 season. The latter half of the 1970s saw increasingly restrictive regulations that shortened seasons and prohibited the harvest of antlerless moose. Increased moose harvests in GMU 19 and heavy hunting pressure by non-unit residents precipitated conservative regulations. Since the imposition of the regulations, managers indicate that the moose population has been recovering slowly. Seasons were again liberalized in 1981-82 when the moose population was considered healthy enough to sustain February and antlerless seasons.

According to local residents, longer, more liberal seasons provide an opportunity to maintain hunting patterns that are more representative of traditional patterns. Additionally, they state that the fall season occurs at a time of year when men traditionally go to hunting camps to harvest game animals. Later seasons allow those who are unsuccessful during the fall hunt to have another opportunity to hunt moose. Residents report that longer seasons allow hunters to hunt when climatic and environmental conditions are advantageous and also allow them to hunt concurrently with other activities such as

berry picking and trapping. The antlerless season provides an opportunity for hunters to take cows at times of the year when bulls taste poorly and lack fat.

Issues

Poor hunting success in recent years is a local concern, as local residents suggest that the need for meat in these communities has not been met during open seasons. A variety of reasons were given by community residents to explain why they thought they were not getting enough moose meat. The most common explanation given for poor hunting success was competition with hunters who were not residents of GMUs 19A and 19B, and particularly with those who are residents of the other Yukon-Kuskokwim delta communities.

Table 14 presents harvest ticket data collected by the Division of Game, Alaska Department of Fish and Game. Harvest returns in GMU 19A for 1981-82 indicate that there were 223 licensed hunters in GMU 19A, of whom 88 were successful. Of the total hunters, successful and unsuccessful, 45 percent were residents of GMU 19A, 22 percent were residents of the Yukon-Kuskokwim delta (GMU 18), 17 percent lived elsewhere in Alaska, 10 percent were non-resident citizens, and 6 percent were non-resident aliens. Of the total number of successful hunters, 51 percent were residents of GMU 19A. Hunting areas used by hunters residing outside GMU 19 during 1981-82 are presented in Table 15, and show that 25 percent hunted along the Kuskokwim River between Crow Village (8 miles below Aniak) and Stony River, 18 percent hunted on

TABLE 14. RESIDENCY OF HUNTERS AND HUNTING SUCCESS IN GMU 19A,
1980-81 AND 1981-82 REGULATORY YEARS.*

	-----Regulatory Year-----	
	1980-1981	1981-1982
Total number of hunters	165	223
Residency		
Residents of Unit 19A	59 (36%)	100 (45%)
Residents of Yukon-Kuskokwim delta communities outside Unit 19A	40 (24%)	49 (22%)
Residents elsewhere in Alaska	40 (24%)	38 (17%)
Non-resident citizens	18 (11%)	22 (10%)
Non-resident aliens	8 (5%)	14 (6%)
Hunting success		
Number of successful hunters	91 (55%)	88 (39%)
Number of unsuccessful hunters	74 (45%)	135 (61%)
Number of successful hunters that were residents of 19A	36 (40%)	45 (51%)

*Based on harvest ticket data, Division of Game, Alaska Department of Fish and Game.

the Holitna River, 22 percent hunted in the vicinity of Lime Village, 4 percent used the Hoholitna River, 7 percent hunted along the Aniak River, 3 percent hunted on the Stony River, and 3 percent used the Oskawalik River. Data documenting hunting areas used by the remaining 18 percent were unavailable. Similar data are presented for the 1980-81 season in Table 15.

Harvest statistics based on harvest ticket returns are recognized as underestimating actual number of hunters and harvest levels, because not all hunters procure or return harvest tickets. However, they do support the local perception that there is a significant amount of moose hunting activity within GMU 19A by non-unit residents. Of the non-unit residents hunting in 19A during 1981-82, 40 percent were residents of the Yukon-Kuskokwim delta; during 1980-81, 38 percent were delta residents. Although "downriver hunters" account for less than half of the non-local hunting pressure, they are probably perceived by local residents as causing the greatest amount of competition because they employ the same mode of transportation as local hunters and are often encountered in hunting areas used by central Kuskokwim River residents. Hunters coming from elsewhere in Alaska and from out-of-state travel primarily by aircraft rather than boat and are not as frequently encountered.

Local residents noted an apparent decrease of non-resident alien fly-in hunters during the 1982-83 seasons. This may have resulted from a 1982 amendment to Alaska Statute 16.05.407 introduced into the State House by the Representative of District 24 from Sleetmute. This

TABLE 15. AREAS WITHIN UNIT 19A USED FOR HUNTING MOOSE
 BY NON-RESIDENTS OF UNIT 19A DURING THE
 1980-81 AND 1981-82 REGULATORY YEARS.*

Areas Used	-----Regulatory Year-----	
	1980-1981	1981-1982
Kuskokwim River between Crow Village and Stony River	12 (11%)	31 (25%)
Holitna River drainage	21 (20%)	22 (18%)
Hoholitna River drainage	14 (13%)	5 (4%)
Lime Village area	16 (15%)	27 (22%)
Aniak River drainage	6 (6%)	8 (7%)
Stony River drainage	3 (3%)	4 (3%)
Oskawalik River drainage	1 (1%)	4 (3%)
Crooked Creek	3 (3%)	0 -
Data unavailable	30 (28%)	22 (18%)
Total number of non-resident hunters	106 (64%)	123 (55%)

*Based on harvest ticket data, Division of Game, Alaska Department of Fish and Game.

amendment made it illegal for a non-resident alien hunter to hunt big game animals in the State of Alaska without being accompanied by a licensed, registered, or class-A assistant guide.

The following description of use trends on the central Kuskokwim River is based on the accounts of local residents. According to local reports, prior to the early 1970s, moose in the central Kuskokwim were harvested primarily by unit residents. Since that time an ever-increasing number of non-unit hunters have entered GMU 19A mainly during the fall season to harvest moose. The bulk of these hunters have been residents of the lower Kuskokwim villages, Bethel, and some coastal communities who travel upriver by boat. Some local residents believe the commercial salmon fishery on the lower Kuskokwim has allowed lower river residents to earn enough money to afford to purchase and operate larger boats and motors (70 to 200 hp.) for traveling upriver during the fall moose season. Many of the lower river hunters have no kinship ties in the central Kuskokwim villages, which were the traditional basis for gaining access to moose hunting use areas of a village.

Hunting pressure from downriver hunters appears to be concentrated along the Kuskokwim River between Aniak and McGrath and on the Holitna River, these having deep enough channels to permit access by boats with large motors. Hunting pressure exerted by non-unit hunters is locally perceived to have impacted moose population levels, the availability of bull moose, and the ability of local people to hunt effectively and successfully.

Many Chuathbaluk and Sleetmute residents feel that downriver hunters have access to alternative resources such as marine mammals as well as greater numbers of better quality salmon. They feel that their own livelihood is being threatened because they are unable to harvest an adequate supply of a resource that is a staple in their diet.

Residents of Chuathbaluk and Sleetmute were asked to express their opinions of non-unit hunters from downriver. Half of the 30 individuals interviewed in Chuathbaluk were willing to tolerate their presence, stating that people should be able to choose where they hunt. The remaining half expressed negative opinions toward downriver hunters. Out of 11 Sleetmute residents interviewed, two-thirds had negative feelings toward downriver hunters. They expressed a desire for regulations that would control their numbers or eliminate them completely. Sleetmute residents concentrate their resource harvest activities along the Holitna River, a popular hunting area for downriver hunters. Many individuals stated that they had to concentrate their hunting activities within the Hoholitna River drainage in order to harvest moose successfully, because fewer downriver hunters could penetrate the shallower waters. The problem of competition is compounded by the fact that local residents must harvest moose in the latter part of the fall season to prevent spoilage. As downriver hunters start hunting early in the season, they are assumed by local residents to have freezers. By the time local people go hunting, many animals have either been harvested or driven away from the riverbeds by the hunting activity that has already taken place. The noise produced by boats

traveling up and down the waterways reportedly drives moose back in the brush where they are inaccessible.

In terms of other issues, some Sleetmute residents thought that the September season should open in mid-September and close in mid-October. Cool weather throughout the season would help alleviate the problem of meat spoilage for those who lacked freezers. Many individuals felt that the November season should be extended. Poor weather and travel conditions and its concurrence with freezeup often prevent local people from being able to harvest moose during the current November season. Other local residents felt that cows should not be taken during the February season when they are pregnant, fearing that such a practice may be harmful to the moose population. Many believed a September cow season would be preferable as a means of alleviating the hunting pressure on bulls and avoiding the take of pregnant females.

APPENDIX D

INTERVIEW FORM ADMINISTERED TO INDIVIDUALS WHO TRAPPED DURING 1982-83

Person Interviewing: _____

1. How many years have you been trapping for?
2. How did you learn to trap?
3. Do you usually trap every winter, or do you just trap some winters? Why do you trap during some years and not others?
4. Did you trap with a partner this year? If so, who? If this person is related to you, how is he related?
5. Do you and your partner camp together and run separate lines, do you run the same lines and use different traps, or do you share traps? How do you divide the fur?
6. Where did you trap this year?
7. How many years have you been trapping in this area? Why do you trap here? How did you acquire this trapping area?
8. Do you stay out at your trapping cabin or tent site for the entire winter, or do you go back and forth from the village to check your traplines? If you go out from the village, how many nights do you usually camp for?
9. During what months did you trap this year?
10. Do you usually get to your trapline by snowmachine, or do you fly-in to a trapping area and stay there for a certain length of time? Do you check your trapline with dogs, with snowmachine, or on snowshoes?
11. How long was your trapline this year? How many traps and snares did you set for different animal species?

marten:
mink:
otter:
beaver:
muskrat:

wolf:
wolverine:
red fox:
lynx:

12. About how many of the following animals did you trap this year?

marten:	wolf:
mink:	wolverine:
otter:	red fox:
beaver:	lynx:
muskrat:	

13. In what months did you get the most of each animal?

marten:	wolf:
mink:	wolverine:
otter:	red fox:
beaver:	lynx:
muskrat:	

14. Was it a good year for each of these different animals? Were they abundant or scarce in your trapping area?

marten:	wolf:
mink:	wolverine:
otter:	red fox:
beaver:	lynx:
muskrat:	

15. What trends in the population levels of these different animals have you observed since you started trapping? What do you think caused the changes in population levels?

marten:
mink:
otter:
beaver:
muskrat:
wolf:
wolverine:
red fox:
lynx:

16. Did you sell, keep, or trade most of your furs this year? Who do you sell or trade furs to?

17. Do you skin and stretch your furs or does someone else? Who?

18. What do you do with the carcasses of the different animals you catch?

19. About how much money did you earn from selling your furs this year?

20. Does most of your annual income come from trapping, or do you have other sources of income? What other sources of cash income do you have?

APPENDIX E

FURBEARER SPECIES INFORMATION SHEET

SPECIES:

A. Natural History Information

1. What habitat type is this animal found in at different times of the year? (rivers and creeks, lakes, hills, tundra, spruce/birch forest, etc.)

Fall:

Winter:

Spring:

Summer:

2. What kind of behavior does this animal have at different times of the year? What does it eat, where does it live, is it always on the move or does it stay within a small home range, can it be found in groups or is it solitary, how does it respond to different weather conditions and snow conditions? When does it mate and have young? Is it active during the day or at night?

Fall:

Winter:

Spring:

Summer:

3. What kind of habits and behavior does this animal have that are useful to know about in order to trap them successfully?
4. In what months are the furs on this animal the most prime?
5. What characteristics of the fur make it a high quality and valuable pelt?
6. In what areas of the central Kuskokwim is this species most abundant? (specific rivers or creeks, lake areas, mountain ranges)
7. Is this species, in general, very abundant in the central Kuskokwim?

B. Trapping Methods

1. What are the best months for trapping this species? Why?
2. What is used to trap this species with? Snares? Regular spring trips? Conibears? What size snare or trap is most commonly used for this species? Can it be easily hunted using rifles, do many people do this?
3. What was used to trap this species before the present methods came into use?
4. Where are sets usually placed? (under trees, under the ice, under water, in trails, by holes, etc.)
5. How are sets usually made? (draw pictures if helpful)
6. What kind of bait is typically used for trapping this animal?
7. How is the animal usually killed in the trap?
8. How often are the traps usually checked? Why?

9. When is the animal skinned?
10. How is the skin stretched?
11. What problems are often encountered in the trapping of this species?
12. What prices are typically being paid for this fur this year?