Continuity and Change in Salmon Harvest Patterns, Yukon River Drainage, Alaska

Final Report for Study 07-253

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TABLE OF CONTENTS

Introduction 1

Methods 2

Results 4

Community Population 4

Commercial Salmon Harvest Trends 5

Subsistence Salmon Harvest Trends 7

Subsistence Chinook Patterns by Area 8

Subsistence Chum Patterns by Area 9

Local Assessments of Salmon Fisheries 9

Wild Food Harvests in Surveyed Communities, 2007 12

Salmon Shortages and Species Substitution 14

Fishing Gear 15

Salmon Production Costs 21

Family Production Groups 22

Fish Camps 23

Dogs 33

Commercial Fisheries and Dog Food 40

Making a Living on the River 47

Fishing Regulations 62

Closed Periods 62

Six-Inch Nets 70

High-Seas By-Catch 73

Discussion 74

Conclusions 77

Acknowledgements 78

Literature Cited 79

Figures and Tables 78-113

Appendix. Household Survey 125-130

LIST OF TABLES

Table 1. Economic and Social Characteristics of Yukon Villages, Fairbanks Area, and the Anchorage/Matanuska-Susitna Area 81

Table 2. Case Communities and Surveyed Households, 2008 81

Table 3. Amount Necessary for Subsistence as Determined by the Alaska Board of Fisheries, Yukon-Northern Area 82

Table 4. Perceived Changes in Salmon Fisheries Reported by Surveyed Households (Percentage of Households Responding "Yes"), 2008 82

Table 5. Wild Resource Harvests by Surveyed Households, Alakanuk, 2008 83-84

Table 6. Wild Resource Harvests by Surveyed Households, Anvik, 2008..... 85-86

Table 7. Wild Resource Harvests by Surveyed Households, Grayling, 2008 87-88

Table 8. Wild Resource Harvests by Surveyed Households, Stevens Village, 2008 89-90

Table 9. Wild Resource Harvests by Surveyed Households, Tanana, 2008..... 91-92

Table 10. Equipment Owned by Households (Average per Surveyed Household), 2008 93

Table 11. Boat Lengths of Surveyed Households, 2008 94

Table 12. Outboard Motor Horsepowers of Surveyed Households, 2008 94

Table 13. Fishing Net Types Owned by Surveyed Households, 2008 95

Table 14. Average Length (Fathoms) of Fishing Nets Owned By Surveyed Households, 2008 96

Table 15. Correlations of Subsistence Salmon Harvests (Lbs) with Fishing Fuel, Fishing Equipment, and Other Factors, Alakanuk, Anvik, Grayling, and Stevens Village, 2007 96

Table 16. People and Households Involved with Salmon (Mean per Household), 2007 97

Table 17. Communities of Visitors During Salmon Season 97

Table 18. Fish Camp Use by Surveyed Households 98

Table 19. Fishing Sites by Year, Stevens Village 98

Table 20. Salmon Caught for Dog Food (Numbers and Percentage of Of Total Catch) and Number of Dogs, 2007 98

Table 21. Employment of Surveyed Households, 2007 99

Table 22. Mean Household Incomes of Surveyed Households, 2007 99

Table 23. Sources of Employment in Surveyed Households, 2007 100

Table 24. Surveyed Households by Household Type, 2008 101

Table 25. Demographic Characteristics of Members of Surveyed Households 102

Table 26. Places of Birth of Members of Surveyed Households 103

Table 27. Selected Characteristics of Key Respondents 103

LIST OF FIGURES

Fig. 1. Communities and Fishing Districts, Yukon Drainage, Alaska.....104

Fig. 2. Population Trends: Anchorage, Fairbanks, and Yukon River.....104

Fig. 3. Population Trends, Yukon River Villages, 1950-2008 105

Fig. 4. Population Trends, 1950-2008, Alakanuk, Anvik, Grayling, Stevens Village, Tanana 105

Fig. 5. Commercial and Subsistence Salmon Catches, Yukon River Drainage, Alaska 1918-2008.....106

Fig. 6. Commercial Permits Fished (Percentage), Yukon River Salmon Fisheries, 1980-2006.....106

Fig. 7. Commercial Permits Used (Number), Middle (Y4) and Upper (Y5, Y6) Yukon River Salmon Fisheries, 1980-2006 107

Fig. 8. Commercial Salmon Earnings by Species, Lower Yukon River (Y1-Y3), 1976-2006 107

Fig. 9. Earnings from Commercial Salmon Fisheries, Middle Yukon River (Y4), 1976-2006 108

Fig. 10. Earnings from Commercial Salmon Fisheries, Upper Yukon River (Y4 and Y5), 1976-2006 108

Fig. 11. Mean Earnings from Commercial Salmon Fisheries, Yukon River Villages, 1976-2006 109

Fig. 12. 3-Yr-Running Mean Earnings from Commercial Salmon Fisheries (in 2006 Dollars), Yukon River Villages, 1976-2006 109

Fig. 13. Earnings from Commercial Salmon Fisheries, Anvik, Middle Yukon River, 1976-2006.....110

Fig. 14. Subsistence Chinook Harvests, Yukon River, 1961-2007, with Subsistence Thresholds 110

Fig. 15. Subsistence Summer Chum Harvests, Yukon River, 1961-2007, with Subsistence Thresholds 111

Fig. 16. Subsistence Fall Chum Harvests, Yukon River,
1961-2007, with Subsistence Thresholds 111

Fig. 17. Subsistence Coho Harvests, Yukon River,
1961-2007, with Subsistence Thresholds 112

Fig. 18. Subsistence Chinook Salmon Catches (Fish per Capita),
Lower, Middle, and Upper Yukon Villages, 1980-2007 112

Fig. 19. Subsistence Chinook Salmon Catches,
Yukon Villages, 1975-2007 113

Fig. 20. Subsistence Chinook Salmon Harvests per Person,
Alakanuk, Anvik, and Grayling, 1976-2007.....113

Fig. 21. Subsistence Chinook Salmon Harvests per Person,
Stevens Village and Tanana, 1976-2007 114

Fig. 22. Subsistence Summer Chum Salmon Catches,
Yukon Villages, 1978-2007 114

Fig. 23. Subsistence Fall Chum Salmon Catches,
Yukon Villages, 1978-2007 115

Fig. 24. Wild Food Harvests (Lbs per Person) by
Case Community, 2007 and Prior Survey Year.....115

Fig. 25. Mean Vessel Length by Year,
Yukon River Commercial Salmon Fishery.....116

Fig. 26. Mean Horsepower of Vessels by Year,
Yukon River Commercial Salmon Fishery.....116

Fig. 27. Fishing Skiffs, Lower Yukon River, 2008 117

Fig. 28. Fishing Skiffs, Middle Yukon River, 2008 117

Fig. 29. Stevens Village Fishing Sites (Map 1) 118

Fig. 30. Stevens Village Fishing Sites (Map 2) 119

Fig. 31. Stevens Village Fishing Sites (Map 3) 120

Fig. 32. Stevens Village Fishing Sites (Map 4) 121

Fig. 33. Stevens Village Fishing Sites (Map 5) 122

Fig. 34. Dog Population Counts, Yukon Drainage, 1966-2006.....123

Fig. 35. Dog Counts from ADF&G Salmon Surveys,
Yukon River Villages and Fairbanks, 1966-2006.....123

Fig. 36. Employment by Month by Surveyed Households, 2007.....124

ABSTRACT

Weak salmon runs and restricted fisheries have stressed the villages of the Yukon River drainage, illustrated by changes within five case communities along the lower, middle, and upper river in Alaska. Increased fishing costs from weak runs and decreased earnings from commercial salmon fisheries posed substantial hardships for fishing households. Recent trends associated with weak salmon runs included fewer fish wheels, increased drifting for salmon, decreased fish camp use, increased difficulties attaining subsistence foods, increased costs of dog food, and decreased use of sled dogs. Alternative wild resources had not replaced salmon shortfalls reported in lower river and upper river communities during the study year. Middle river communities showed increased reliance on Chinook salmon. Upriver villages displayed substantial out-migration, falling populations, and dual urban/rural residencies with seasonal returns for subsistence salmon fishing. Regulatory issues included short subsistence fishing periods and Chinook salmon drop-out losses from six-inch nets. Overall, weak salmon runs undermined the viability of mixed, subsistence-cash economies and village populations in the Yukon drainage.

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INTRODUCTION

Salmon has been a staple food within Alaska Native villages of the Yukon River drainage (Andersen 1992; Case and Halpin 1990; Sumida 1988; Wheeler 1998; Wolfe 1981, 2005). Forty villages depended on annual harvests of salmon as dietary mainstays (Fig. 1), with 11,204 people in 2008, 89% Alaska Natives from Yup'ik and Athabaskan tribal groups. The rural economies of villages in the Yukon drainage have been characterized by high production of wild foods for local use and low per capita monetary incomes (Wolfe 1984; Wolfe and Walker 1987). Village residents produced about 600 lbs per capita per year of wild foods during the 1980s and early 1990s (Table 1). In these villages, monetary incomes typically were low, about $10,403 per capita as measured by the 2000 U.S. Census, less than half the incomes within urban areas like Fairbanks and Anchorage (Table 1). Salmon harvests for subsistence use and commercial sale have been central to the economic and cultural well being of this rural population.

Since the late 1990s, depressed salmon runs have been associated with substantial changes in salmon fisheries of the Yukon drainage. Commercial salmon fishing has been severely restricted or closed on the lower and middle river. Incomes to village residents from commercial fishing have fallen. Subsistence fishing times have been shortened and staggered to achieve salmon escapements. Reported subsistence catches have decreased, especially for summer chum, fall chum, and coho salmon.

Details about how families and communities have adjusted during this period of weak salmon returns are not well documented. While annual salmon catches for subsistence and commercial uses are monitored, other kinds of possible changes within salmon-dependent villages are not. Over the past decade, have families modified their fishing activities in response to weak runs, such as changing gear, fishing effort, and fishing areas? What choices have families made regarding feeding sled dogs? How have families responded to lower fishing incomes and higher costs of producing subsistence salmon? Has there been an out-migration from villages because of economic hardships? Have harvests of other wild foods increased to make up shortfalls in salmon?

This report examines these types of questions related to subsistence salmon. It presents information collected in selected communities on the Yukon River on continuity and change in salmon harvest patterns during the last decade of depressed salmon returns. The report describes the fishing patterns of families within these communities, including types of gear, use of fish camps, costs of fuel, sharing of products, and household subsistence harvests. It summarizes statements from local residents about how families have responded to the recent downturn in fisheries. And it identifies factors related to the continuity and change in salmon fishing patterns within communities of the Yukon drainage.

METHODS

To document salmon fishing patterns during the recent period of weak salmon runs, households were surveyed in five communities in the Yukon drainage – Alakanuk, Anvik, Grayling, Stevens Village, and Tanana (Table 2). The five communities were selected to illustrate fishing patterns across a range of areas and cultural groups within the drainage. As shown in Table 2, Alakanuk is a Yup'ik village on the lower river close to the mouth (District Y1). Anvik and Grayling are neighboring villages (Deg Hit'an and Holikachuk) on the middle Yukon River (District Y3). Stevens Village is a Koyukon village on the upper Yukon River near the Yukon Flats (District Y5). Tanana is a Tanana Athabaskan village in the upper Yukon River (District Y5) near the confluence of the Tanana and Yukon rivers. The communities represent a range of village sizes, from Stevens Village (71 people) to Alakanuk (677 people) (Table 2). Comprehensive household surveys of wild food harvests have been conducted in each place previously (Wolfe 1981; Wheeler 1998; Sumida 1988; Case and Halpin 1990). These previous comprehensive household surveys offer a comparison year for this study's survey findings.

The communities were visited by the principal investigator during the summer of 2008. During these visits, local researchers were hired and trained to administer surveys to a selection of households in the five communities. The survey form is presented in the Appendix. The instrument was designed to document wild food harvests and employment of households during the prior year. It also asked questions regarding continuity and change in salmon fishing patterns over time within the community. The household member who participated in the survey received a small honorarium ($30). Participants were told that names would not be presented in the final report to preserve the privacy of respondents.

Household lists were developed in each community with the assistance of local researchers and village governments. Sampling goals were set for each community – Alakanuk (40 households), Anvik, Grayling, and Tanana (30 households each), and Stevens Village (23 households, a complete census). Researchers started at the top of the alphabetically-ordered household list and interviewed down. As shown in Table 2, sampling goals were met in Alakanuk and Tanana. Sampling goals were almost met in Anvik and Grayling, but the local researcher covering these communities fractured her leg toward the end of the survey period which restricted her travel, and a number of household heads were unavailable for surveys. Of 23 households in Stevens Village, only 7 were surveyed (30.4%) because of high refusal rates and household heads who were unavailable during the survey period.

In total, 131 households were surveyed, representing 38.8% of all community households (Table 2). Sampling fractions ranged from 26.0% of households (Alakanuk) to 84.4% of households (Anvik). A demographic profile of this sample of households is presented in Table 2 and in Tables 24-27. Within this sample, nuclear families were the most common household type (31.3%) (Table 24). Other household types included

single-person households (22.9%), three-generation households (stem families) (14.5%), unmarried couples (conjugal pairs) (12.2%), and single parents with children (11.5%). In the sample, most household members were Alaska Native (98.4%) and born within the local community (77.7%) (the exception was Stevens Village, where 61.1% of the sample were born outside the village). The places of birth of household members are shown in Table 26. The mean ages of household members were fairly similar across the five communities, ranging from 21.9 years (Alakanuk) to 27.3 years (Tanana) (Table 25). Of household members, 53.6% were males and 46.4% were females (Table 25). Within this sample of households, Alakanuk had the largest mean household size (5.63 people per household), while the mean household sizes of the Athabaskan villages ranged from 2.57 to 3.74 people per household (Table 2). Overall, the sampling procedure selected households whose members were primarily Alaska Native, born locally, and distributed among a range of household types.

To augment the household surveys, the principal investigator conducted open-ended interviews with key respondents in Alakanuk, Anvik, and Stevens Village. The principal investigator sought key respondents with a significant time-depth of knowledge about salmon fishing in the community. Most key respondents were recommended by the locally-hired researcher. Others were self-referrals who heard about the study and wanted to be interviewed. Key respondents received an honorarium ($30) for participating. A total of 26 key respondents (18 males and 8 females) were interviewed (Table 27). As shown in Table 27, most key respondents (57.7%) were fifty years or older. Interviews covered a range of topics on continuity and change, including fishing methods, fishing areas, fish camps, costs of fishing, commercial fishing, fishing to feed dogs, and fishing regulations. Topics commonly varied depending upon a respondent's area of expertise and personal interests.

The interviews with key respondents were digitally recorded and transcribed for analysis. Most statements in the report are excerpted from these transcripts. On average, key respondents were interviewed for 41.5 minutes (Table 27). Interviews were as short as 13 minutes and as long as 125 minutes.

Open-ended questions about continuity and change also formed a part of the household surveys administered by locally-hired researchers (see Table 4). Responses to these open-ended questions also were digitally recorded and transcribed for analysis.

The study was designed for key respondent interviews in three communities only. Accordingly, open-ended interviews were conducted by the principal investigator at Alakanuk, Anvik, and Stevens Village, but not Grayling or Tanana. However, the principal investigator visited all communities and fishing experts were consulted at Grayling and Tanana prior to training local researchers for household surveys. Other fishing experts were consulted at the annual meeting of the Yukon River Drainage Fisheries Association in Grayling, February 2008, where a summary of the proposed project was presented.

Prior to fieldwork, quantitative information on subsistence and commercial salmon catches within the Yukon drainage was compiled from existing databases as provided by the Alaska Department of Fish and Game (ADF&G) and the Commercial Fisheries Entry Commission (CFEC). Demographic information on community population was compiled from the U.S. Census and the Alaska Department of Labor. Information on dog counts was obtained from ADF&G, Division of Commercial Fisheries, compiled from post-season surveys of salmon fishermen. Post-season estimates of annual subsistence salmon harvests were obtained from data sets collected by ADF&G, Division of Commercial Fisheries and compiled by ADF&G, Division of Subsistence. The compiled quantitative information was analyzed for trends in salmon catches, commercial salmon earnings, human population, and counts of dogs, by community, year, and river area. The final analysis combined information from these three major data sources: household surveys in five communities, key respondent interviews in three communities, and annual post-season salmon catch data for villages in the Yukon drainage in Alaska.

RESULTS

Community Population

Since 1950, the rural population has grown within the Yukon drainage (Fig. 2). Yukon River villages increased from 4,316 people in 1950 to 11,204 people in 2008, an increase of 259.6%, primarily from increased births over deaths. While rural growth has been substantial, the growth of Alaska's urban areas has far outstripped that of the Yukon drainage villages during the same period (Fig. 2). Since 1950, the Anchorage area grew from 35,021 to 367,509 people (a ten-fold increase), while the Fairbanks area grew from 18,129 to 82,515 people (a four-fold increase), largely from in-migration by people from outside the state. Fairbanks lies within the Yukon River drainage. Its relatively larger population and higher rates of growth compared with drainage villages reflect its stronger, industrial-capital economy offering substantial employment in trade, national defense, mining, and tourism. As described below, some residents of the Fairbanks area participated in the Yukon drainage salmon fisheries.

While the overall rural population of the Yukon drainage has grown, downriver and upriver areas displayed substantially different population trends (Fig. 3). Most recent growth has occurred in the Yup'ik Eskimo villages of the lower river (Y1-Y3). In this area, population has increased five-fold, from 1,058 people in 1950 to 5,324 people in 2008. By contrast, the village populations in the middle river (Y4) and upper river (Y5 and Y6) had not doubled during that period. The village populations of the middle and upper river, primarily Athabaskan tribal groups, have shown no growth after about 1980. In these upriver areas, the rural population has stabilized or contracted in recent years, principally due to out-migration of tribal members to urban areas.

The population trends of the five surveyed communities were consistent with these area trends (Fig. 4). At the river mouth, Alakanuk grew from 140 people in 1950 to 670 people by 2008. The populations of Anvik and Grayling (middle river) and Stevens Village and Tanana (upper river), have not grown since 1980. All the upriver case communities have decreased in size since the 2000 census. How out-migration from villages may be linked to salmon fishing is examined elsewhere in this report.

Commercial Salmon Harvest Trends

Overall trends in salmon harvests for subsistence use or commercial sale, the two main uses of salmon in the Yukon drainage, are shown in Fig. 5. An initial attempt to develop commercial salmon fisheries at the Yukon River mouth (1918-1924) was halted because of alleged negative impacts on upriver subsistence fishing and the regional trade in dried chum salmon for sled dogs (Wolfe 1984). For three decades (1930s-1950s) a small commercial fishery coexisted with local subsistence uses (subsistence catches were not enumerated during this period). Subsistence fishing for dog food declined as air and barge transport replaced dog sleds for moving goods during the 1940s, and when snowmachines replaced dog teams of many families during the 1960s. Subsequently, commercial salmon fisheries expanded during the 1960s and developed rapidly during the 1970s, producing substantial annual catches for two decades (1970s-1980s).

During the 1970s and 1980s, commercial fishing became integrated with subsistence fishing within village economies (Wolfe 1981, 1984). Local residents held most commercial fishing permits and operated small-scale gear (nets or fish wheels) within family-based production groups. Commercial fishing drew on traditional skills and values within the local culture. Selling salmon to outside middlemen buyers provided an annual income base for income-poor communities. Families commonly reinvested a portion of their earnings into subsistence fishing and hunting pursuits, producing subsistence foods that circulated within villages along non-market networks.

During the 1990s, commercial salmon catches rapidly declined. Nearly complete shutdowns of the Yukon River commercial fisheries occurred 1998 through 2004. Consistent with legal requirements, fisheries management severely restricted commercial fishing to protect spawning escapement and subsistence uses. The state administration declared economic disasters for portions of the Yukon drainage in 1998 and 2001. Since about 2005, as salmon runs improved, the commercial fisheries began a tentative re-emergence toward uncertain futures.

The rapid rise in commercial fishing during the 1970s, the two decades of high catches, and the rapid fall during the 1990s are clearly evident in Fig. 5. Alongside this, total annual subsistence catches doubled during the 1970s from about 200,000 to 400,000 salmon. During the 1990s, subsistence catches contracted from about 400,000 to 200,000 salmon. These subsistence trends are discussed further below.

Participation rates by resident commercial fishermen have differed by fishing area (Fig. 6). Commercial fishermen from lower river villages (Y1-Y3) have displayed high and consistent rates of participation in local fisheries. On the lower river greater than 90% of permits registered to local residents have been active every year except 2001, when commercial fisheries were closed. In this cash-poor area, commercial fishermen have remained active despite declining earnings and increasing restrictions. About 52 permits have fallen into disuse over the last twenty-five years: 541 permits fished in 1981 fell to about 489 permits fished in 2006.

Along the middle river (Y4) and upper river (Y5 and Y6), participation rates by local commercial fishermen have been much lower and more variable (Figs. 6 and 7). Many commercial fishing permits fell into disuse in the middle and upper districts because fishermen could not find buyers for their product. After 1996, participation rates fell drastically due to closures. They have rebounded slightly after 2001 on the upper river, but not the middle river. In Y4-Y6, issued permits fell from 217 permits (1981) to 163 permits (2006), and fished permits fell from 164 permits (1981) to 32 permits (2006).

Before the 1990s, several stocks (Chinook, summer chum, fall chum, and coho) contributed to the income of commercial fishermen on the lower river (Y1-Y3), depending on the year (Fig. 8). After the early 1990s Chinook became the primary income-producing stock on the lower river. In contrast, salmon roe from summer chum provided the bulk of earnings to commercial fishermen in the middle river (Y4) (Fig. 9). In upper river districts (Y5 and Y6), a mix of stocks (Chinook, fall chum, roe, and coho) has contributed to the incomes of commercial fishermen, depending on the area and year, with some of the catch sold as dried-and-smoked products (Fig. 10).

Overall, the commercial salmon fisheries pumped about four to five million dollars annually into the communities of the lower river districts prior to the recent collapse (Fig. 8). The commercial fisheries of the middle and upper river areas injected about half a million annually to these areas prior to the collapse (Figs. 9 and 10). Before the recent declines, average annual gross earnings of fishermen were modest in all three areas – on the lower river about $12,000-$19,000 annually; on the middle river about $10,000-$15,000 annually; and on the upper river about $8,000-$12,000 annually (Fig. 11). While not large, the annual incomes helped to support families and commonly enabled members to participate in the traditional round of subsistence activities valued in the local culture.

The declines in average annual gross earnings to commercial fishermen are shown in Fig. 12. This figure depicts a three-year running average, adjusted to inflation. Since about 1999, on average commercial fishermen in all areas sold less than $5,000 of salmon annually. On average, fishermen earned only a few thousand dollars after expenses. In certain areas, commercial earnings disappeared altogether, as shown in Anvik (Fig. 13), where the commercial roe fishery was closed 1998 to 2006 (a small roe fishery reopened in 2007, but closed again in 2008). With the collapse in runs and weakening of markets for salmon products, commercial fishing no longer provided a secure monetary base within the Yukon drainage.

Subsistence Salmon Harvest Trends

Subsistence catches comprised the other major use of salmon in the Yukon drainage. Total subsistence catches of salmon since 1918 are shown in Fig 5. Subsistence catches have been directed primarily to meeting the food needs of local residents and sled dogs. Harvests tend to be self-limiting: families typically quit fishing when their family's food requirements are met. Unlike commercial fishing, subsistence fishing is primarily harvest for local use, including sharing (commercial fishing is harvest for sale to middlemen buyers for outside markets). Because of this, subsistence catch levels have displayed considerably more stability over time, unlike commercial catches whose levels are determined more by allowable harvest quotas, external markets, and profits.

The Alaska Board of Fisheries has established harvest ranges for the amounts of salmon necessary to provide for subsistence uses in the Yukon drainage, shown in Table 3 (5AAC 01.236). The amounts were developed by the state board from information provided by ADF&G and public testimony on historic use levels. When subsistence harvests fall consistently below the lower bound of the amount necessary for subsistence uses, state regulations specify that the state board restrict and/or eliminate non-subsistence harvests of salmon (commercial, sport, and personal uses) and allocate subsistence harvests to the subsistence users most dependent on salmon and least able to obtain alternative food (Alaska Statute 16.05.258(b)). As such, the subsistence thresholds are legal management objectives for the state. In Figs. 14-17, subsistence catches since 1961 are compared with the amount necessary ranges.

Since 1961, the total annual subsistence catches of Chinook salmon, the main food fish along the Yukon drainage, increased from about 10,000-20,000 fish to about 40,000-50,000 fish by the 1980s (Fig. 14). Since 1990s, total annual harvests have remained relatively stable, standing above the lower threshold of the amount necessary for subsistence uses every year but three (1996, 2000, and 2002).

The total annual subsistence catches of chum salmon present different trends from Chinook (Figs. 15 and 16). Before 1989, annual summer chum catches usually stood above 150,000 fish. After this, subsistence summer chum catches declined, falling below the lower threshold by 1999 (Fig. 15). Annual fall chum catches fell from around 150,000 fish (1990) to a low point of 19,300 fish by 2000 (Fig. 16). Subsistence chum catches fell with the depressed runs, mirroring the declines of commercial chum catches during the 1990s. Annual subsistence harvests of chum have increased since 2003, but they have barely reached the lower threshold of the amount necessary for subsistence uses.

Total annual subsistence catches of coho salmon increased from about 5,000-10,000 fish in the 1960s to about 30,000-40,000 fish by the 1980s (Fig. 17). Annual subsistence catches of coho salmon declined during the 1990s to a level close to the lower threshold of the amount necessary for subsistence uses.

Chinook salmon subsistence trends are primarily linked to food needs of families, fishing gear choices, and in recent years, regulatory restrictions. By contrast, chum and

coho salmon subsistence trends are primarily connected to feeding sled dogs, gear choices, and regulatory restrictions. Commercial fishing trends have connections with subsistence patterns as well. Less commercial fishing income to village households can inhibit subsistence fishing by cash-poor families. Weak commercial chum fisheries that reduce the local supplies of cheap dog food affect the costs of maintaining sled dogs and the numbers of dog teams. These factors and others are discussed in more detail in other sections.

Subsistence Chinook Patterns by Area

Chinook salmon has comprised a larger part of the diet of residents of the upper river, compared with lower river areas. This is shown by per capita subsistence harvests (number of fish per person) from 1908-2007 (Fig. 18). Along the upper river (Y5 and Y6), residents have typically caught about six to nine Chinook salmon per person per year. By comparison, along the lower river (Y1-Y3), residents have caught between two and five Chinook salmon per person per year. Catches of middle river residents (Y4) have been intermediate in recent years, about five to seven Chinook salmon per person per year (since 2003). In general, Chinook is a staple food along the entire river, with per capita consumption of Chinook salmon increasing as one moves upriver.

Annual subsistence catches of Chinook salmon have displayed the most year-to-year variability in lower river areas (Fig. 19). Variation by a factor of two is not uncommon between a set of years on the lower river, such as catches of 7,779 (1982) and 20,238 (1983), or 9,881 (1985) and 21,852 (1987). The higher year-to-year variability probably is related to less consistent catch conditions along the lower river, an area with multiple river channels for fish to travel and waterways subject to tide and weather that influence fishing success. Restrictive regulations may have more impacts on fishing outcomes under these difficult conditions. By comparison, year-to-year variability is less for subsistence Chinook catches in the middle river (Y4) and upper river (Y5 and Y6). Chinook have been more reliably caught in upriver areas compared with the lower river.

In recent decades, Chinook salmon has increased as a part of the subsistence diet in middle river villages (Y4). As shown by per capita harvests, middle river villages have increased their consumption of Chinook salmon since 1980 from about three fish per person (1981) to about six fish per person (2006). The regression line of this trend shows an increase of about .12 Chinook salmon per person each year ($y = 0.12x + 2.40$; Rsq = 0.75). This increased use of Chinook is probably connected to gear choices along the middle river: increased drift gear that targets mid-channel Chinook, and fewer fish wheels that target near-shore chum salmon. The larger Chinook catches also may be connected to the average sizes of Chinook salmon caught by fishermen. Some fishermen have reported that the average size of Chinook salmon has decreased, so more Chinook must be caught to meet a family's food needs.

Lower river villages (Y1-Y3) also have increased their per capita use of Chinook salmon since 1980, but only slightly, an increase of about .04 Chinook salmon per person

each year (y = 0.04x + 3.31; Rsq = 0.40). However, the total catch of Chinook on the lower river has increased substantially. This has been due primarily to an increasing population of consumers. In upper river villages (Y5 and Y6) there are no statistically significant trends in per capita Chinook use in recent decades. The level of dependency on Chinook in the local diet has remained relatively high and consistent since 1980.

Chinook harvests at the case community level are shown in Figs. 20 and 21. Per capita Chinook catches have increased at Anvik, Grayling, and Tanana over the past thirty years, indicating a greater reliance on Chinook in the subsistence diet in those villages. There have been no statistically significant changes in per capita Chinook harvests at Alakanuk or Stevens Village during that same period.

Subsistence Chum Patterns by Area

Substantial changes in subsistence chum salmon use have occurred on the middle and upper river areas (Fig. 22). Middle river villages (Y4) reported substantial declines in subsistence summer chum catches after 1988, from about 150,000-200,000 chums annually during the early 1980s, plummeting to about 35,000 by 1991 and 16,000 by 2007 (Fig. 22). As discussed later, much of this change was due to changes in the commercial roe fisheries in the middle river. Summer chum harvests for dog food fell in the upper river villages (Y5 and Y6) from about 47,000 (1985) to about 10,000 (2007) (Fig. 22). In lower river villages (Y1-Y3) summer chum catches primarily have been used as human food. Subsistence catches in the lower river fell from about 76,000 (1987) to about 50,000 (2007). This represents a decline in summer chum in the local diet from about 16.9 to 12.0 chum per capita per year (comparing 1987 and 2007).

Large changes in subsistence fall chum salmon use have occurred on the upper river (Fig. 23). Upper river villages (Y5 and Y6) reported increasing fall chum harvests from about 115,000 to 150,000 fish during the 1980s, followed by substantial declines to about 16,000 fish by 2002. The rise in fall chum use during the 1980s was connected to increased fishing for dog food on the upper river. Plummeting catches of fall chum were associated with weaker fall chum runs and fewer sled dogs. These kinds of connections are discussed later. In the middle river (Y4), fall chum catches fell from about 30,000 to 8,000 fish (comparing 1989 with 2007). In the lower river, catches fell comparably. These reductions represent changes in use of fall chum for human food and dog food.

Local Assessments of Salmon Fisheries

Surveyed households in the five case communities offered assessments about the salmon fisheries in their areas. Householders answered “yes” or “no” to eight general questions about potential changes or impacts in the fisheries, with opportunities to comment afterwards. These general assessments by surveyed households are summarized in Table 4. Greater detail about each general trend is covered elsewhere in the report.

Above all other aspect of the fisheries, the increased costs of fishing received the most unanimity in responses. Overall, 82.5% of households reported that costs had affected salmon fishing in their community. As discussed in later sections, increased expenses due to higher fuel prices and reduced Chinook catches per trip were impacting fishing by many households.

A substantial majority of households (78.0%) reported that fishing regulations had affected salmon fishing. Householders mentioned reduced fishing time, six-inch mesh restrictions, and commercial fishing closures, among other regulations, as discussed later.

A majority of households (64.6%) responded "yes" to the question, "Has your family experienced problems due to fewer salmon?" Stevens Village (80.0%) on the upper river and Alakanuk (75.0%) on the lower river had the most households reporting problems. From 55.2% to 65.4% of households reported problems in Tanana, Anvik, and Grayling. Common difficulties mentioned were shortfalls in food, increased costs in catching salmon, and inadequate monetary incomes from commercial fishing.

A majority of households (62.7%) reported that fewer salmon had caused changes for households: Alakanuk (65.0%), Anvik (70.4%), Grayling (61.5%), Stevens Village (80.0%), and Tanana (50.0%). Types of adjustments included changes in fishing methods, species fished, and types of employment, as discussed later in the report.

Assessments differed between communities regarding fish camps, fishing areas, and dog teams. Upriver at Stevens Village, every household reported changes in these factors, while at the mouth at Alakanuk, fewer households reported changes in camps, areas, and dogs. Household responses at the other villages were intermediate. As is discussed later, continuity and change in these factors have been linked to local histories and conditions, with more change in upriver villages than at the mouth.

Finally, a minority of households (15.0%) reported that family members had moved from the village because of fewer salmon. Insufficient local employment was the most common reason given for family members moving elsewhere. Salmon fishing drew family members back seasonally. Later in the report, the analysis explores the linkages between village population and the salmon fisheries.

Overall, key respondents reported that the low runs for salmon in recent years required households to spend more time and money to catch fish. Catches were slower, took more traveling, and required greater costs. At Alakanuk, Anvik, and Stevens Village, many households had not met their subsistence goals for Chinook salmon, the primary food fish for Yukon River villages.

This fisherman summarized conditions at Anvik along the middle river (Y4), where commercial salmon fishing has been closed for a decade because of low runs and only subsistence fishing occurred in 2008:

> There's not enough fish as there used to be. It's declined big time. People spend more time, more money, more gas.
>
> The kings, they're decreasing and slowing down. Kings are the main eating fish. With us it's always been about a week to ten days and we'd be done fishing for kings. We got done in about ten days, but we started a lot earlier than everybody else. I know everybody else is still fishing, because it's really trickling in right now, just slowly trickling in. Some people would put up sixty, seventy a day. Now they're only putting up eight, ten a day, which is terrible. This year we only put up about a hundred, a hundred and ten for strips. But we usually catch between one-fifty and two hundred per year.
>
> Some guys are going a little farther downriver to drift. Looking for better spots. There's not much you can do when there's no fish, just got to keep trying.
>
> The higher gas prices are terrible. You know, it's up over a dollar since last year. The gas is $5.75 a gallon. I heard it might get raised again after the next batch of fuel comes in. Six gallons a trip to our set net. Twelve gallons a day. That's sixty-nine bucks plus oil. Oil is about twenty. So you're talking about eighty bucks a day to go back and forth. And you do that four or five times a week, it starts adding up. You're talking about three hundred bucks a week, just to check your net.
>
> Pretty much everybody says they're not getting enough fish. We're the lucky ones, we kind of started early, so we got our quota for the year, but there's still other people struggling to get their amount that they get every year.

This elder described conditions for his family at Alakanuk, where low Chinook runs had closed the commercial fishery in 2008, and little money was being made with chum salmon. His family did not get enough Chinook salmon for subsistence because of low runs and net restrictions, relying instead on chum salmon, a less preferred fish:

> The numbers of fish are not as great as it used to be, especially with kings. In the past, the commercial fishing for chums has not been that good either. When I was growing up, people caught a lot more fish than they do today, probably three or four times, maybe five times more than they do today. There were a lot more fish than today. There were many fish then.
>
> This year probably more people will stay home to try to work because commercial fishing was so limited. The big money maker is the kings and there was no king opening. This year we didn't do any commercial fishing for king salmon. We are fishing for chum salmon even though the earnings we get will be very low, a couple thousand dollars maybe at the most. Some won't even break even.
>
> We don't need that many kings [for subsistence]. We only fish for what we need when we're able to get them. This year, I only caught three kings. But I would have been happier with something like twenty more kings. We use kings for strips and for

> dried fish. We didn't put away any strips this year. The ones we caught were too few and too small. Kings also are used for brining. This year we didn't do any of those things. I used only a chum salmon net [because of net restrictions], so the kings we caught were too small for strips. I know I caught some big ones, but they weren't there when I checked my net [because of dropout from the small mesh size]. Chums are okay but kings are the preferred fish. With chums, we take the backbone out. The outer part of the meat we cut with the skin and that's most of what we eat. My wife saves as much meat from the backbone as she could. She dried the backbones for the dogs and some for us.

This respondent described the situation at Stevens Village during the last several years. Her family ran out of dried salmon because of low subsistence catches in 2007:

> This year it's just small amounts of kings. It's really scarce. Last year I thought that we had enough fish for the winter, but this spring we just kind of ate our fish here and there, just trying to save it until we got more fish this summer. We ended up with not having enough. That was for 2007. In 2006, it declined, and then 2007, we had more. And this year [2008] it is even worse. It's really bad this year. Usually when we start getting fish, we're eating fish almost every day. This year, it's like we're trying to put as much away as we can, rather than just start eating it. That's what I've seen in the last couple of years.

Additional comments about the fisheries from other key respondents are presented in the later analyses of fishing patterns.

Wild Food Harvests in Surveyed Communities, 2007

Salmon harvests are part of a fairly diverse mix of wild foods that support villages along the Yukon River. The place of salmon in the annual production of wild food is shown in Fig. 24 and Tables 5-9. These tables present harvests of wild food for human consumption in 2007 as reported by surveyed households in the five case communities. Fig. 24 also presents harvest levels for households during a prior survey year. Salmon harvests for feeding dogs in 2007 are shown separately in Table 20. Harvests are shown as both numbers and pounds (lbs), a useful measure for comparing between kinds of wild foods. The conversion factors for converting numbers to pounds are provided in column 7 of Tables 5-9, following the methods described in Wolfe and Utermohle (2000).

On average, households in all study communities produced substantial quantities of wild foods in 2007. Households at Grayling produced the largest amounts of wild foods (725 lbs per person), an amount equivalent to about two pounds per person per day. This level of wild food production is not uncommon for Alaska Native villages off the road network with low monetary incomes (Wolfe and Walker 1987). Wild food production levels at Tanana (671 lbs per person) and Anvik (645 lbs per person) were close to those at Grayling. Lower amounts of wild food were produced by surveyed households at Alakanuk (322 lbs per person) and Stevens Village (277 lbs per person), levels providing

somewhat less than one pound per person per day. The wild food production levels at Alakanuk and Stevens Village were closer to those of rural villages on the Alaska road system, areas impacted by competition from urban residents and more restrictive harvest regulations (Wolfe and Walker 1987).

In 2007, Chinook salmon provided the largest source of wild food in Anvik (48.9%), Graying (42.0%), and Tanana (45.6%). Chinook provided 35.7% of the wild food in Stevens Village and 13.8% of the wild foods in Alakanuk. Based on interviews, subsistence Chinook fishing was described as extremely difficult in recent years at Alakanuk and Stevens Village.

Summer chum was the largest source of human food at Alakanuk in 2007, providing 22.3% of the wild food harvest. In other case communities, summer chum harvests provided less than 3% of the wild food harvest. Fall chum provided 9.7% of the food supply at Grayling , 5.1% at Anvik, and 3.2% at Alakanuk. Coho provided less than 2.0% of the food supply in all places.

Land mammals (principally moose) provided another substantial source of wild food in each community: Stevens Village (49.3% of the wild food harvest), Anvik (27.4%), Grayling (26.3%), Tanana (26.0%), and Alakanuk (18.2%). Marine mammals (seals and beluga) contributed 20.2% of the wild food at Alakanuk. Fish other than salmon provided from 10.5% to 22.9% of the annual food harvests for case communities in 2007.

The harvests in 2007 can be compared to a prior survey year in each community (Fig. 24). Chinook salmon harvests appeared to be substantially higher at Anvik and Grayling in 2007 compared with 1990, the prior survey year. At Anvik, Chinook harvests rose from 88.2 to 315.4 lbs per person, a 257.7% increase comparing 1990 and 2007. At Grayling, Chinook harvests rose from 59.1 to 304.2 lbs per person, a 414.6% increase comparing 1990 and 2007. These increases were consistent with the general trend of increased per capita Chinook harvests in these middle river communities (Fig. 20).

By comparison, Chinook salmon harvests were substantially lower at Stevens Village, falling from 335.2 to 98.7 lbs per person, a decrease of 70.6% (comparing 1984 and 2007). At Stevens Village, the sampled households produced little chum and no coho for human food in 2007.

At Alakanuk, Chinook harvests also were lower, falling 72.5 to 44.7 lbs per person, a decrease of 38.3% (comparing 1980 and 2007). Harvests for human consumption also were lower for summer chum (-26.9%), fall chum (-26.9%), and coho (-57.9%). As stated above, Alakanuk residents reported difficulties with subsistence salmon fishing in recent years.

At Tanana, Chinook salmon harvests by surveyed households were somewhat higher, from 234.5 to 305.9 lbs per person, a 30.5% increase (comparing 1987 and 2007). Tanana households commonly fished in the narrow canyon upriver from the community,

a unique fishing area that funneled fish runs by fish wheel sites. Per capita Chinook harvests at Tanana have shown a general increasing trend (Fig. 21).

Compared with the previous survey year, Tanana's harvests for human consumption in 2007 were similar to its previous study year (only 1.4% below harvests in 1987). Total wild food harvests in 2007 were somewhat lower for Grayling (18.9% below harvests in 1990) and for Anvik (23.6% below harvests in 1990). Substantially lower wild food harvests were reported by households at Stevens Village (52.9% below harvests in 1984) and Alakanuk (55.6% below harvests in 1980). In terms of overall wild food production for human consumption, households at Anvik, Grayling, and Tanana appear to have had good years in 2007. By comparison, households at Alakanuk and Stevens Village had relatively poor years.

One must be cautious interpreting the comparisons of single years of data. The confidence ranges around the total per capita estimates in 2007 were as follows: Alakanuk (+/-24.2%), Anvik (+/-18.8%), Grayling (+/-19.7%), and Stevens Village (+/-67.2%). The confidence ranges for the previous survey years were as follows: Anvik (+/-20.3%), Grayling (+/-9.7%), and Stevens Village (+/-0.0%). No confidence ranges were presented in the literature for the earlier harvest estimates at Alakanuk and Tanana. Because of this potential range, the reports of key respondents help in interpreting harvest trends. As discussed further below, key respondents indicated that families at Alakanuk and Stevens Village were having a difficult time catching subsistence foods. These assessments are consistent with the lower harvests at Alakanuk and Stevens Village documented by the household survey.

Salmon Shortages and Species Substitution

As stated above, salmon is part of a mix of wild foods that supports communities in the Yukon drainage. Typically, the local availability any wild food fluctuates from year to year. Catching a mix of wild foods helps to buffer against shortfalls due to this annual variability in particular species. Low harvests in one type of salmon might be replaced by higher harvests of other types of fish or wildlife. However, it is also possible that other wild foods do not compensate for low subsistence salmon harvests during a poor year. Some families may buy more store foods, if they have the income. Some households may rely more on federal food stamps on low harvest years. Other householders may leave the village in search of employment because of difficult economic circumstances at home.

The between-year comparisons of wild food harvests (Fig. 24, Tables 5-9) suggest that the low harvests of salmon in Alakanuk and Stevens Village were not made up by increased harvests of other types of wild resources in 2007. Comparing 1980 with 2007, food production was lower across all major species groups in Alakanuk, including marine mammals (-48.8%), land mammals (-15.1%), birds (-83.6%), and other fish (-81.4%). There was no evidence of increased production in other wild foods to make up for low subsistence salmon catches. The lower production across all wild food categories may be related to the lack of money for capitalizing other types of fishing and hunting in

Alakanuk, a deficit due in part to depressed commercial fishing incomes. It may reflect a greater reliance by households on store-bought food, even though monetary incomes are particularly low in this village.

Comparing 1985 with 2007 in Stevens Village, harvests were up for land mammals (+45.2%), but down for other fish (-71.4%) and birds (-69.6%). The increased harvest of moose was less than the loss of output in the subsistence salmon fishery. Key respondents reported that moose populations were low in the Stevens Village area. Because of poor wild food prospects, the tribe had invested in a bison herd, grazed near Delta east of Fairbanks. Bison meat was distributed to families within the village to help supplement subsistence food harvests. The depressed local economy at Stevens Village had resulted in a significant out-migration of families from the community and a loss of population, as discussed further below.

At Anvik, Grayling, and Tanana, Chinook harvests were substantially higher. Wild food harvests were lower across all other major resource groups comparing 2007 with the previous survey year (the exception being land mammal harvests at Tanana, which were unchanged). Of major resources, only Chinook salmon harvests showed increases between survey years.

One may conclude from these comparisons that harvests of other wild food species had not increased to make up for shortfalls of salmon at Alakanuk and Stevens Village in 2007. Harvests of other wild food species had not increased to compensate for the greater costs of catching salmon in any village. The breadth and quantities of other wild foods had narrowed. During this year of weak salmon runs, Chinook salmon appeared to have assumed more importance as a food resource for families at Anvik, Grayling, and Tanana. The tribe at Stevens Village was attempting to replace shortfalls in wild foods by ranching bison. Overall, households in the five case communities had not compensated for salmon problems by catching larger volumes of other wild resources, based on these two survey years.

Fishing Gear

In surveyed communities, equipment for catching and processing salmon was owned within family-based groups. Fishing technology was relatively small-scale, including small skiffs, outboard motors, gill nets, fish wheels, drying racks, and smokehouses. While scaled appropriately for family ownership and use, affording the equipment and fuel for fishing and hunting was a consistent problem for families with low incomes. In recent years, higher fuel costs coupled with lower incomes from commercial fishing made it increasingly difficult for many families to operate equipment. Families adjusted through cost-saving measures, such as traveling less and partnering with other producers. However, limited household incomes posed significant obstacles for many families participating in traditional subsistence activities. This section describes trends in fishing gear and the recent problems with fishing costs for families.

Substantial changes in fishing gear and methods have occurred along the Yukon River within the last half-century. A 57-year-old fisherman described gear changes he had witnessed in Anvik along the middle river (Y4):

> Before my time they used fish traps along this bend here for catching the dog fish [chum salmon for dog food]. They were made out of wood, real long. In order to haul fish with a canoe, they made a big willow basket, weaved together. They would put the fish in it and they towed it with the canoe in the water. I remember those. They stopped using traps when I was a child.
>
> They switched over to fish wheels, people putting in the fish wheels. When I grew up, we grew up on the fish wheels. And they started drifting down the Yukon. Fish wheels are less work and they get a lot more. With one fish wheel, we put up enough fish for two smokehouses, the mission's and ours.
>
> And they had the drift net. They would get down in the water. They would dip for silvers and kings with the dip net, with a great big dip net like they do in the fall. They also did it from boats. Put it in and drift. That's the way the drifting would work when I was growing up. They used dip nets to drift. Now they use gill nets. Gill nets replaced dip nets in the 1960s.
>
> People take silvers [fall chum] on this corner here, drifting here. And you can catch them with a rod and reel, right down on the bank there. A lot of kids do that every year, catching silvers by rod and reel.

In his lifetime, this fisherman had observed fish traps, fish wheels, dip nets operated from the shore and drifted from boats, set gill nets, drift gill nets, and angling with rod-and-reel for harvesting salmon.

The amounts of fishing-related equipment currently owned by surveyed households in each case community are summarized in Table 10. The table also lists other major subsistence-related items (rifles, snowmachines, traplines, and so forth). Prominent in all communities are boats, outboard motors, nets of several mesh sizes, drying racks, smokehouses, and freezers. Fish wheels were common only in Tanana, where every third household owned a wheel. Commercial fishing permits were most common among surveyed households in Alakanuk (.73 permits per household). About forty percent of households had fish camps at Grayling, Stevens Village, and Tanana. Sled dogs were most common in Tanana and Stevens Village, but hardly in evidence in Alakanuk, Anvik, and Grayling (Table 10).

Currently, the predominant gear type for catching salmon for food was the gill net. The use of fish wheels was on the decline as a general trend in the middle and upper Yukon River communities. With fewer sled dogs to feed and with the closures of commercial chum roe fisheries, there were diminished conditions for operating fish wheels. Fishermen in the five communities set gill nets or drifted with gill nets. As a

general trend, drifting was increasing over setting gill nets because of time constraints created by restricted fishing periods and employment.

Boats have seen moderate increases in size over the last three decades on the Yukon River (Fig. 25). Between 1978 and 2006, the average lengths of vessels registered for the Yukon fishing area increased from about 19 to 23 feet. During that same period, the average powers of outboard motors increased from about 40 to 115 horsepower (Fig. 26). Larger boats and motors have increased speed, range, and hauling capacities for fishermen. Pointed V-hulls were preferred on the lower river, while square-bow, flat-bottom boats were most common on the middle river and upper river (Figs. 27 and 28). Wood-framed, plywood-covered skiffs, common in the middle 1970s, have nearly disappeared, replaced by aluminum hulls.

A fisherman discussed the shift from wood to aluminum boats in Alakanuk, along with a more recent switch from two-stroke to four-stroke outboard motors for fuel efficiency (but increased maintenance):

> I think the last wooden skiffs were owned by the A's. The last one I saw running out there was the A's. I think he still has it today because he coated it with fiberglass. Aluminum really took off. Aluminum lasts a lot longer. You just throw it up on the bank and forget about it. You don't have to flip it over and maintain it. You don't have to paint it, you don't have to keep it dry, you don't really have to baby it.
>
> They're manufacturing boats out here now, a subsidiary of the Yukon Delta fisheries, the fish processor. This boat I got, that's where it came from. It's a 24-footer. They built it out here in Alakanuk. We had a welding shop. They were operating right out here, and I think it was one of the first ones they built. The base of it is five feet wide, and the sides are eight feet. It's a really good ocean boat, but it's too steep. It has very steep sides. It can carry a lot of weight. I was carrying 22 students in it up to Emmonak for Bible camp with their gear. I was pushing the boat with a two-stroke 175 Optimax. [Laughs] Didn't matter how much fuel I was using, it was for a good cause.
>
> Everybody's going over to four-strokes. They're more fuel-efficient. But they're heavy, too, very heavy. I've seen two hundreds, four-strokes. But the average outboard is one-fifteens and one-forties, one-fifties. Popular ones are one-fifteens, Yamaha and Suzuki. And the other popular one is one-fifty, Yamaha.

The length of boats and power of outboard motors owned by surveyed households are shown in Tables 11 and 12. Eighteen-foot boats were most common, followed by 20-foot and 22-foot boats. Despite the observation that "everyone's going over to four-strokes," the most common powers of outboards were 40 HP, 115 HP, and 50 HP. The larger boats and motors were owned at Alakanuk, where residents commonly travel on the open ocean, where the river is often rough, and where commercial fishermen haul loads of fish for commercial sale.

The nets owned by households are listed in Table 13. Households used larger-mesh nets for targeting Chinook salmon (about 7 to 8.75 inch mesh), and mid-sized mesh nets for chums and coho (about 5 to 6.5 inches). Nets with mesh about 4 to 5 inches were used for catching other kinds of fish in addition to chums and coho, particularly whitefish and sheefish. Households used small-mesh nets (about 2 to 3.5 inches mesh) for small fish like cisco, pike, and the smaller whitefish species.

Of the five surveyed communities, Alakanuk households reported owning the most salmon nets (1.48 king nets and 1.53 chum nets per household), twice as many as at Anvik and Grayling (Table 13). The lower river salmon fisheries have been almost exclusively net fisheries after the disappearance of salmon fish traps. In Alakanuk, old commercial gear commonly was reused as subsistence gear.

Nets at Alakanuk also were longer on average compared with upriver communities (Table 14). A 50 fathom net length (300 feet) was common subsistence gear at Alakanuk. While 50 fathom nets were used at Anvik and Grayling, households also commonly reported using 25 fathom nets (150 feet) and 16.6 fathom nets (100 feet).

The fewest nets were reported by households in the two upriver communities of Stevens Village and Tanana. In Tanana, almost a quarter of households (23.3%) reported owning a fish wheel. A few households in Stevens Village also owned a fish wheel. Fish wheels especially were effective in the narrow canyon area upriver from Tanana. In Stevens Village, fish wheels were used for taking chum salmon for dog food and commercial sale. Surveyed households reported owning only Chinook salmon nets at Stevens Village.

At Alakanuk, 54.3% of households with nets owned at least one six-inch mesh net. Six-inch mesh nets were hardly seen in the other surveyed communities. On certain years, commercial fishing in lower river districts has been restricted to six-inch nets or smaller to conserve Chinook salmon. In response to these restrictions, fisherman have acquired the six-inch mesh, the largest allowed those years.

In Alakanuk, people were switching from set nets to drift nets, especially for commercial fishing. This allowed for more productive fishing in response to time constraints created by shorter fishing periods and fishermen holding jobs in the village. This switch to drifting was described (with some hyperbole) by one Alakanuk fisherman:

> Nobody used to drift in the past. Way back in the seventies, early eighties, everybody was at camp. Set net, you know. You just throw your net in there and just walk away from it because you had all that time to fish. Now, six hours is probably the maximum time you'll go during king season. That's too short of a time to set net. Very few people are doing that. If you have a lot of sites, setting can be worth it. But you have to have a lot of gear. I have three sites, but I wasn't setting any this year. I was doing other things at home, trying to get this boat ready. Re-hanging all my gear. I'd been putting it off for a couple of years now, and I finally had to do it.

The preference of drifting during shortened fishing periods can be illustrated by comparing commercial with subsistence fishing methods at Alakanuk. Of surveyed households that caught subsistence salmon, 50.0% used drift nets only, 32.1% used set nets only, and 17.9% used both set and drift nets for subsistence fishing. By contrast, among households who commercial fished, 83.3% used drift nets only, 12.5% used set nets only, and 4.2% used both set and drift nets to commercial fish. This shows that when the goal is optimizing harvests during a short commercial fishing period, most fishermen chose to drift. Drifting gave more flexibility in changing fishing areas. During a commercial period, patter over CB radios often conveyed information about the locations of salmon. A drifter with sufficient fuel was able relocate, while a set netter was more constrained by fixed locations. A set netter might do well with several sites if the fish migrated by the nets during an opening, but might do poorly if tides and wind were wrong. Still, under the right conditions, a set net site could out-perform a drift net. In 2007, the most productive commercial fisherman in Alakanuk operated set nets.

Drifting typically came with higher fuel expenditures at Alakanuk. In 2007, drifters expended an average of 133 gallons of fuel fishing for salmon, while set netters expended an average of 100 gallons. But drifting was more productive. Drifters caught about 29.9 lbs of fish per gallon of fuel, more than setters at about 14.4 lbs per gallon of fuel (this average excludes the one high-liner set netter, who caught 32.4 lbs of fish per gallon of fuel). Those that used both drift and set net gear during a season caught an average of 22.8 lbs of fish per gallon of fuel (and expended on average 184 gallons per fisherman, the most fuel fishing). So on average, drifters caught about twice as many fish per gallon of fuel as set netters, but expended a third more fuel. Commercial fishermen hoped to cover the larger fuel costs by selling more fish.

Upriver at Anvik, of surveyed households that caught salmon in 2007, 26.9% used a combination of set and drift nets, while 30.8% used set nets only and 42.3% used drift nets only. (This was somewhat similar to Alakanuk's subsistence fishing, where 17.9% used set and drift net, 32.1% used set net only, and 50.0% used drift nets only.) Compared with the river's mouth, the Yukon River narrowed into fewer channels at Anvik, funneling fish runs through fewer passages. A good set net site could be very productive in catching salmon. However set net sites were limited in number. Also, certain segments of the Chinook runs traveled mid-river. Set nets caught fish migrating nearer to the banks, said to be bound for more local spawning streams.

In Anvik, most salmon was harvested with set nets (60.9% by weight), compared with drift nets (38.8%) and fish wheels (0.3) in 2007. Set-net-only fishermen used 91 gallons of fuel on average visiting set net sites, twice as much as drift-net-only fishermen (53 gallons). Drift-and-set fishermen used the most fuel (127 gallons) during the season. (These averages excluded one high-liner drift-and-set fisher who used twice as much fuel as the next highest fisherman.) In terms of productivity, set-net-only fishermen caught 16.4 lbs of fish per gallon of fuel, while drift-net-only fishermen caught 12.0 lbs of fish per gallon. Intermediate, drift-and-set fishermen caught 14.5 lbs of fish per gallon of fuel. Anvik households used less fuel fishing for salmon compared with Alakanuk in 2007. At

Anvik, set netting could out-perform drifting for subsistence fishing, if a household had a set net site.

The cost of owning and maintaining fishing equipment was considered substantial to families with limited annual monetary incomes. A fisherman at Stevens Village spoke about this:

> It's just me and my sister who have continued on fishing. My brothers, we spent time at camp helping my father, but I was the only one that stuck with it. They all moved on and got trades and jobs and never came back.
>
> It's a spendy endeavor. You've got to have a good boat and a good motor and all the gear. You have to be established. I accrued my gear over the years. It would be hard if a person is working full time just to up and buy a boat and outboard, unless they had a good job and had it financed. Of course you can do that, but then you've got your fishing nets and those aren't cheap either. It's a healthy investment. Nowadays you wouldn't get a [monetary] return on your investment, not the way it is now. So you can't afford it. And it's pretty expensive to fish. You got to have gas and oil for the outboard, plus food for yourself when you're out there. It's not a cheap endeavor.

Because of increasing fuel costs, fishermen considered ways to cut costs. A commercial salmon fisherman from Alakanuk considered teaming up with another partner, splitting fuel expenses and earnings. He had switched to a more fuel-efficient four-stroke outboard motor to cut fuel costs, but the motor leaked oil, forcing him to use a two-stroke motor. Fuel costs figured prominently in his fishing decisions:

> This year, it's hard to say now, I might have to buddy up with somebody and go half and half on fuel, considering the price. Right now, we're paying about six dollars a gallon for fuel. And that's with our corporation over here. They haven't even jumped up their price yet. I don't know when they're going to do it. I think right now they're just trying to empty out their old gas, last year's fuel. And I think after that's all gone it's going to jump up to maybe seven, eight dollars a gallon.
>
> This boat I purchased, it's a lot bigger. It's got a big motor, two-stroke. It pushes very well, but it uses a lot of fuel. Last year we had to use it because the four-stroke was leaking a lot of oil. My sump was leaking and it was eating up our profit. We were going up to the Y1/Y2 boundary, that's an hour and a half ride. It's eight gallons a trip, one-way. By the time we're done fishing it's almost twenty gallons of fuel we burn. And twenty gallons at six dollars a gallon, we're burning over a hundred dollars of fuel on every opener and barely making about fifty dollars profit. So it wasn't worth it for us to be running up there with that two-stroke. The four-stroke, it's more fuel efficient but she's old. Lot of maintenance, lot of problems right now with it.

This fisherman said if he did well at the tail end of the commercial season, "it paid my gas to go moose hunting." So his ability to hunt later in the season depended on a few

hundred dollars profit from commercial fishing. “If I do well, I’ll be able to go moose hunting, and if I don’t, I’m going to have problems.”

Salmon Production Costs

As stated above, meeting the costs of fishing was a concern commonly expressed by surveyed residents of the lower, middle, and upper Yukon River in 2008. That money is of central importance for fishing success is shown by factors correlated with subsistence salmon production by surveyed households. For this analysis, all surveyed households in Alakanuk, Anvik, Grayling, and Stevens Village were pooled into a single data set. Correlation coefficients were calculated between a household’s subsistence salmon catch (lbs) and other household characteristics. Five factors were found to be significantly related to household salmon production: fishing fuel (gallons), equipment holdings, number of harvesters, number of households eating the salmon, and number of people eating the salmon. These statistically significant factors are listed in Table 15, with the strength of association.

Considering the entire pool of surveyed households, the amount of fuel expended by households while fishing was the factor most strongly associated with household subsistence salmon productivity ($R = 0.533$, sig.<0.000). Excluding households that did not fish during the past year, the amount of fuel expended still remained the factor most strongly associated with household subsistence salmon productivity ($R=0.450$, sig.<0.000). (Both these correlations exclude one outlier household, an Anvik household with a large dog team, high fuel expenditures, and high subsistence harvests. This household’s fuel-food production profile was consistent with the general finding, but its removal improved the clarity of the statistical relationship.)

The strong correlation of fuel expenditures and salmon output is consistent with the concerns of key respondents about the rising monetary costs of subsistence fishing. To be successful fishing, a household had to expend money in boat fuel to reach fishing sites, to check set nets, to drift gill nets, and to transport fish. Many fishermen commented on the difficulties of making these expenditures given the higher costs of fuel and the poor salmon runs. Some households said they could not afford to travel to set and check nets that were catching only small numbers of fish. This means a lack of money might limit the extent of fishing, and by extension, the amounts of salmon caught. Statistically, the survey data supports this. Households that invested more into fuel had larger salmon harvests.

Household income (total earned and unearned income) was related to the amount of fuel expended. Statistically, the greater the household’s income, the greater the amount of fuel expended. This suggests that low incomes restricted subsistence fishing effort for some households.

Fishing output also increased with equipment holdings. For this analysis, “equipment holdings” was the count of fishing-related equipment owned by a household (outboard

motors, boats, Chinook nets, chum nets, fish wheels, drying racks, smokehouses, fishing camps, food caches, and freezers). Statistically, the more fishing equipment a household owned, the greater the salmon produced (R = 0.236, sig.=0.018). The equipment holdings of a household was not as strongly associated with fishing output as fishing fuel expenditures. Equipment holdings reflect expenses over a long time period, while fuel costs reflect current-year investments. Household income also was related to equipment holdings (R = 0.233, sig.=0.019). These relationships support key respondent observations about the costs of fishing equipment. Households with limited incomes might not be able to afford the equipment to be successful subsistence fishing.

Salmon production also was statistically related to a household's labor force. Households with more harvesters produced more salmon. Salmon production also was statistically related to the number of consumers of the salmon. The greater the harvests, the greater the number of households and people eating the salmon. Dual causal directions may underlie this relationship. The correlation may in part show the effect of food needs within extended families: the more mouths to feed, the more salmon that is produced. At the same time, the correlation may in part show the effect of a large harvest: the more salmon a household produced, the more people it could (and did) feed.

Household income was related to number of harvesters. Households with more working adults often had more income earners. But household income was not related to the number of consumers of the household harvest.

In a multiple regression model, two variables (amount of fuel expended and number of household eating the salmon harvested) together accounted for 32.3% of the variability in subsistence salmon harvests by households (R = 0.569, sig.=0.040). These two variables were the best predictors of subsistence salmon production within this set of households. One variable measures a production input (fuel), while the other variable likely measures a production need (number of households to feed).

Family Production Groups

The production of salmon for subsistence uses in 2007 typically occurred within family groups. This type of economic organization (a "domestic mode of production") for wild food production was consistent with that described in earlier ethnographies for the communities (Sumida 1988; Wheeler 1998; Wolfe 1981).

Households commonly worked together to catch and process salmon in the five study communities, as shown in Tables 16 and 17. The average number of households that worked together ranged from 2.2 households in Anvik to 3.2 households in Grayling (Table 16). Most commonly, these were households of children working with parents. But other arrangements occurred, such as households of siblings working together, or more occasionally, partnerships among friends. Labor typically was unpaid for subsistence fishing. The finished product was divided and consumed among the members of the participating family group.

The numbers of people consuming subsistence salmon produced by a surveyed household in 2007 ranged considerably. Some surveyed households estimated that upwards to one hundred people used the salmon put up by that household in 2007, or that upwards to 50 households used the salmon (Table 16). These large numbers probably refer to salmon used at community-wide events, such as a memorial potlatch or a wedding celebration. On average, the people using a household's salmon ranged from 6.7 people at Anvik to 15.5 people at Tanana; households using the salmon ranged from 3.1 at Stevens Village to 6.1 households at Tanana (Table 16).

Family members from other communities sometimes visited during salmon fishing season, often to participate in fishing and processing, bringing products back to their home communities. From a quarter to half of households reported that family members visited during salmon season (Table 16). A few households in Alakanuk and Tanana reported up to twenty family members visiting, representing eight to ten households. But the averages across all households were much less, on the order of one to three extra people. Overall, summer was a season for visiting by children and grandchildren who lived elsewhere. Salmon fishing, sometimes at a fish camp, was an occasion for members of extended families to come together.

The communities of summer visitors in 2007 are listed in Table 17. For Alakanuk, half of the communities were neighboring villages, such as Emmonak, Mountain Village, and Scammon Bay. Anchorage and Fairbanks comprised the other half. These urban areas represented half or more of the communities of visitors during salmon season for the case communities.

Surveyed households were asked if there had been a change in visitors during salmon season over the last ten years, a period of low salmon runs. A majority of surveyed households in Alakanuk (80.0%), Stevens Village (71.4%), and Tanana (56.7%) assessed there had been no change in visiting patterns. This was also the most common response at Grayling (44.%) and Anvik (37%). However, a substantial percentage of households assessed that visiting had decreased "somewhat" or "a lot" at Grayling (48.1%), Anvik (40.7%), and Tanana (33.3%). A few respondents observed that higher costs of airplane tickets had reduced travel and visits by family members. The costs of travel had become prohibitive. Overall, based on these responses, it appears that visiting by outsiders during salmon fishing had not increased during the last ten years in these communities. For most families, visiting had remained constant or had decreased.

Fish Camps

Some families used camps as bases for fishing or processing salmon. Fish camps generally were located near set net sites, fish wheel sites, or drifting areas. Seasonal camps commonly had facilities such as cabins, wall tents, wooden racks for drying fish, and smoke houses for curing salmon. In the past, fish camps commonly had yards for sled dogs, though these are found less commonly today. Camps were owned within

family groups and frequently were referred to by the names of the eldest members ("so-and-so's camp"). The fish camps and set net sites frequently passed down within a family line.

Fewer people resided at fish camps along the Yukon River according to key respondents. More and more, people lived at the main community during fishing season. However, fish camps still provided seasonal bases of operation for many people, though they might not reside or smoke fish there. And some families continued to use a fish camp as a seasonal residence.

Fish camp ownership and use by surveyed households is shown in Table 18. During the last five years, only 7.4% of households in Anvik reported using a fish camp, compared with Grayling (11.5%), Alakanuk (15.0%), Tanana (33.3%), and Stevens Village (42.9%). Many Tanana fish camps were located upriver from the community in the Rapids, a productive area for fish wheels. Maintaining a fish camp reduced travel costs to the family's fish wheel. At Stevens Village, most fishing sites were located downriver from the community, about halfway to the Dalton Highway bridge. Here, fish camps were being used primarily as bases of operation by local residents, rather than as seasonal residences. A few neighboring fish camps had seasonal occupants from urban areas and other villages, as discussed below.

Trends in fish camp use can be assessed by comparing uses during 1950-2007 with the last five years (2003-2007). Anvik and Grayling on the middle river (Y4) show the greatest declines. At Grayling, fish camp use fell from 46.2% to 11.5% of households, and at Anvik, fish camp use fell from 40.7% to 7.4% of households. Historically, around Anvik, fish camps commonly were used for catching and drying chum salmon for dog food, and for commercial fishing to sell roe. Fish camps fell into disuse with fewer sled dogs and the closure of the commercial roe fishery, trends discussed below. At Alakanuk, fish camp use decreased from 20.0% to 15.0% of surveyed households. Fish camps were used more commonly by previous generations, it was asserted by respondents at Alakanuk. But in the lives of current residents, fishing from a camp had been practiced by only a fifth of surveyed households. This fraction had declined slightly in recent years. At Tanana, fish camp use also had declined slightly, from 43.3% to 33.3% of households. At Stevens Village, the surveyed households reported no recent declines in fish camp use.

Families that used fish camps reported relatively long tenures. Households with fish camps at Anvik, Grayling, and Tanana reported a quarter-century of use of their camps, on average. At Stevens Village, the average use of fish camps was 51.3 years, attesting to long fidelity to particular places. The average fish camp use at Alakanuk was 19.3 years.

Fish camps might offer efficiencies for fishing families. When having a camp benefited a family's activities in producing salmon, it continued to be used. Some camps were used for specific kinds of fishing, such as fishing for dog food or salmon roe. If these particular functions faded, so did camp use. But some camps continued to be used because of other cultural values. Families commonly enjoyed camping. Valued activities

attached to camp continued to draw them back. The following excerpts from interviews illustrate these and other reasons behind the general trends in fish camp uses.

One resident from Alakanuk described why his family continued to use a fish camp for catching and processing fish. His camp was on Manning Island near the mouth of the south pass of the Yukon River. In recent years, he and members of his household lived and worked at the camp for short stretches during the early Chinook and summer chum runs. Responsibilities of paid employment brought him back to the village for stretches during the summer. When I spoke with him in late July, his family had returned to the village. The last batch of dried salmon remained at the camp with a watchdog. He planned a trip to camp to bring it back to town. He discussed reasons for using a fish camp, including the availability of wood for building racks and for smoking fish, the lack of dust when drying fish outdoors, and the nearness to his set net sites for fishing.

> I camp and do my subsistence and commercial fishing from camp. My camp is along the coast on Manning Island. On or near Manning Island are about seven other camps, five on Manning Island and a couple right across from the island.
>
> We prefer going to our camp because what we need most in camp is right there. Here in town, we'd have to go look [along the Yukon River] for what we need – wood, logs, things to make our fish rack and smokehouse. At camp, we can pick up those things not far from where we are, the things we need for smoking fish. Also on the island there is no traffic. In town there is a lot of dust flying from four wheelers and other cars going back and forth. Whenever there's a wind, the wind blows the dust to settle on the fish. At camp there's no dust flying around. Right now there are more vehicles in town, more ATVs, than twenty years ago. When the roads are dry, they create a lot of dust.
>
> On the island there's willow and grass and a lot of driftwood. We use a lot of driftwood for making our racks and smokehouses. We use different forms of wood to smoke our fish. To smoke we use live branches which we cut, and also different types of driftwood. Some cottonwood. Some willows. We mix it with alder. The taste is milder that way. With only alder, the smoke taste can be pretty strong. But if you smoke them using different willows or logs, I like the taste a lot better.
>
> My wife and I like to camp because we don't have to go far to take care of the fish. In town we'd have to put our drying fish in a spot where there'd be less dust, away from our house which sits right on the dusty road. That would mean quite a ways from the house. At camp, our fish rack and smokehouse are right there. We just go out from our cabin and take care of our fish.
>
> During the time we are taking care of the fish, then I commercial fish from the camp. There are tenders out there to buy the fish. When the fish are done, then we move back to town and I commercial fish from there.

> This year, we went out the middle of the month late [in June]. We're still down there [in late July]. Our fish are basically done. Our last group of fish are still at camp. We need to go down and pack them away. Then we'll wait for the fall chum to do our fishing. We're in the process of moving back right now. We've brought back some things we don't need at camp.

Another fisherman believed declining fish camp use around Alakanuk was connected to the closures of commercial fishing. Without reliable commercial fisheries, people looked for work in town. There was also an age factor, he thought, with older fishermen more tied to the custom of camping than younger fishermen:

> I think camps are less today than twenty years ago. There still are some camps, but not as many. The numbers of fish are not as great as it used to be, especially with kings. The commercial fishing for chums has not been that good either. This year probably more people will stay home to try to work because commercial fishing was so limited. The big money maker is the kings, but there was no king opening.
>
> The other factor is that younger people tend to stay in town more compared with the older people. The older people who are able still go to their fish camps. There are some young people that still go to fish camps. My age group, we've been going out to fish camp ever since we were toddlers. Many of us still go out to our fish camps. I like being at camp because everything I want for the fish is right there. The fish are cleaner.

An elder said he had a series of fish camps during his lifetime. He changed locations three times because of flooding. He remembered these hardships with a good-natured laugh. After three moves, he said that was "enough." As an elder, he now dried fish at the village:

> I used to have a fish camp. I used that for many years down at Isurituli. I moved my camp three times. The third time – enough! [Laughs]
>
> I built three fish racks. My two tents went away down with the fall-time flood. My stove. My whole camp went. Maybe it's still out there somewhere. [Laughs] The northern end of Manning Island. Plywood floor. The frame. Maybe it's still out there.
>
> At camp you had fish on one side, but nothing on the other. The trees [willows and alders] used to look red! After my racks fill up and I salt king salmon, when my racks fill up, then we put them on the trees. Before you get to the tent, it used to look nice. The fish rack, and red all over with fish hanging [from the bushes].
>
> Now we dry fish in town. The rack is here. It's down the beach here. We dry them. We've put away four buckets so far, four buckets of fish.

> We used to set net most of the time. When we used to fish then, we started from June 1st, maybe three or four days a week. Then we'd catch commercial fish. It used to be good, you know. No restrictions from the Fish and Game.

The above account illustrates the difficulties of maintaining a camp on an active river delta. At the mouth of the Yukon River, channels and islands can change substantially from fall floods, ice, and silt. Relocating camps becomes more difficult with a fisherman's advancing age.

Some fishermen combined fishing with wage employment at the village, strategically traveling between fishing areas and town. Some of these choices were determined by the need to make productive use of time. The following fisherman felt he could not afford to sit at camp if the commercial or subsistence fisheries were closed:

> We dry our fish at camp. People that camp out there, yeah, some of us prefer to camp out there. Some prefer to cut fish there. I've been there probably since I was born. I was born in that area, raised in that area. Also, we were at camp because it's closer for commercial fishing.
>
> For my part, I was trying to catch them early [this year]. But they put us on limitations, on restrictions. So it took me longer to put away fish. A lot of commuting back and forth, you know, just because they put us on restrictions for subsistence.
>
> What's the use of going up to camp when it's closed for subsistence? You just sit idle and doing nothing at camp. And then come opening time, the fish have passed, so you're set back another week. But for my part, I was lucky to catch them when they were running. So that got us busy catching enough for the winter supply.

A friend at this same interview said he did likewise:

> In his situation and my situation, too, we're trying to work at the same time. He's trying to work at the office here and then fish at the same time for himself and for commercial from his camp. So he has to go back and forth. Same with me, too, I got to go back and forth to my camp. So there's a lot of expenses there, especially in gas. But we have to do it if we want to have enough food. We have to do the best we can. And it's doubly hard if our fish get wet. Then we have to start all over again.

The next fisherman also attributed the declining use of camps to the impacts of regulations that restricted subsistence and commercial fishing. He no longer maintained a fish camp because of short fishing times:

> We have no fish camp. We dry fish in Alakanuk. We dry the fish out at the mouth [of the slough] and we smoke them down here [in town]. It's too dusty to dry right in town.

> I used to have a camp in the past. Not anymore that the hours of fishing's too short. These days it's not worth having a camp. Hours are too short on fishing.
>
> This year they closed us once for about a week [during the subsistence season]. And here there was kings running. Everybody was mad, because they wanted to make some more strips and dry.

At Anvik, fish camps became less important with the decline of sled dogs. Fishermen caught the bulk of their dog food at fish camps, putting up surplus for local trade. As these activities disappeared, so did use of fish camps, as described by this Anvik resident:

> Everybody I remember back then had fish camps all the way up and down the Yukon. They had fish camps at Four Mile and fish camps right in front of town. You'd look out in front of town and see nothing but smokehouses and fish camps. [Referring to the map.] They spread right across here and up on the river here, and they had fish camps down in here, and fish camps up by Four Mile and up here. They had fish camps right down in here, too, from Shageluk. That's when I was growing up. A lot of people would come to the Yukon to fish from Shageluk.
>
> Now we don't put up as many [bundles of] dog food like we did back then. We required a big smokehouse. And they don't buy it anymore. I know a lot of this fish that we sold here ended up in Nome. By the boat, to St. Michael, all the way up to Nome to feed their dogs up there. It was sold by bundles there and somebody wanted a hundred bundles of fish. The bundled fish that we sold would end up everywhere. It would end up in Nome too.
>
> All these smokehouses and houses that were across there were wiped out with ice. They're right in a floodplain, you know. Hock Bluff eddy, that's where I fish. I had an old fish camp down there. But I don't have it any more. The ice wiped it out.

Stevens Village families used fish camps as bases for fishing at eddies and fish wheel sites within a traditional use area of tribal members. One resident described the extent of this traditional area:

> You know all these villages of the Interior originally were separate bands, tribes related to each other through dialect, inter-marriage, and the clan system. But every band or village had its traditional hunting and fishing ground that the other bands recognized. Traditionally, the Stevens Village people's traditional use area was forty miles upriver [from the Yukon bridge] halfway to Beaver Village, around Marten Island, then north back to the foothills, south to Hess Creek. On the western edge, the traditional boundary was at the Ray River area, which is now where the Dalton Highway crosses the Yukon. Traditionally, at that Ray River area for a few miles on either side was like an overlap of Rampart people and Stevens Village people.
>
> Now and more contemporary times, with the advent of state fishing regulations and with this road, that traditional type area is not recognized anymore [by outsiders].

> You have non-local Natives will come in and set up camp right off the road, like you saw last night. In more traditional times, they would ask permission from the tribe of whose area they were in. That's kind of still a little bit in practice, but not so much, because nowadays people travel, and even Native peoples kind of abide by the state and federal hunting and fishing boundaries and permitting system rather than the traditional form of governance over traditional tribal fishing and hunting boundaries.

In 2008, Stevens Village residents used a 78-mile stretch of river for salmon fishing (Figs. 29-33). Most salmon fishing occurred between the Dalton Highway bridge and the village, a river stretch of about 26 miles by boat. There was a concentration of nets and camps in a ten-mile stretch of river about halfway between the bridge and village (about seven miles above the bridge to about nine miles below Stevens Village) (Figs. 29-30). This is where most fishing occurred in 2008. Below the bridge was a stretch of river used jointly by Stevens Village and Rampart families. The last Stevens Village fish camp was located about 22 miles downriver from the bridge. Upriver from the village were fewer fishing sites and camps. Here the river flowed out of the Yukon Flats through shallower, braided channels with less frequent eddies for nets or sites for fish wheels. The last fish camp used by residents of Stevens Village was about 30 miles upriver from the village.

Respondents reported 27 fish camping sites along the Yukon River in 2008. Of these, nine were below the bridge and 18 above the bridge (19 sites in Subdistrict 5C and 8 sites in Subdistrict 5D). Of the 27 camping sites, 23 received some use as a base of operation during 2008. Reasons offered for four camps not being used were as follows: an elder stayed in Fairbanks instead of using the camping site (but the eddy near the camp was being fished by permission by another Stevens Village resident); an old family camp was not used because of a broken boat motor; and two old family camps were not being used because the main owners had died and their children or grandchildren had not yet reestablished their uses.

Most camp users from Stevens Village did not reside overnight at the camping sites. The most common pattern for Stevens Village residents was to use the site as a base of operation for checking set nets. While fish might be cleaned on location, the catch most typically was conveyed back to the village for processing (drying, smoking, and storage). A few camps with cabins, racks, and smokehouses were used as seasonal residences, but primarily by persons with dual residencies. It was said that extended seasonal camping was becoming less common for local families, as described by one surveyed resident:

> I see a lot of people doing fishing here in town now, instead of going to their fish camp. You know, I see people building smokehouses in the village. Like BG, all her family, they all fish here now. L's house. And C, and S and D. I mean, everybody's started fishing from the village instead of going to camp. That might be because of gas, you know. They can't pay for enough gas to go back and forth to camp.

This person identified higher travel costs as leading to more processing of fish at the village, rather than at camp.

The uses of some camps appeared to vary from year to year. An example was a camp belonging to a family residing at Fort Yukon with kinship connections to Stevens Village. In 2008, the family could not afford to use the camp from lack of money and high gasoline prices. Instead, two members of the extended family living in Fairbanks visited the camp for a few days, accompanied by several residents of Stevens Village. They set a net for Chinook salmon during this short stay. The catch of fresh fish was conveyed back to Fairbanks. This use was said to be atypical for the camp.

A mix of local and non-local residents fished in the traditional use area of Stevens Village. Of the 27 fish camping sites, 8 were used primarily by residents of Stevens Village ("local camps"), 15 were used primarily by people with kinship connections to Stevens Village (or Rampart) but currently living elsewhere ("dual-residency camps"), and 4 were used primarily by people without kinship connections to Stevens Village and living elsewhere ("non-local camps"). The current homes of people using the 15 dual-residency camps was as follows: Fairbanks-Stevens Village (7 camps), Fairbanks-Rampart (5 camps), Delta-Stevens Village (1 camp), U.S. Military-Stevens Village (1 camp), and Fort Yukon-Stevens Village-Fairbanks (1 camp). The current homes of people using the 4 non-local camps were as follows: Fairbanks-Tanana-Galena, Fairbanks-Huslia, Fairbanks-Minto, and Fairbanks. I heard a number of complaints concerning the non-local camps, as some viewed them as encroachments into the traditional fishing area of Stevens Village.

Respondents reported 32 set net sites and 6 fish wheel sites in 2008. Of these, 7 set net sites were below the bridge and 25 set net sites were above the bridge (24 in 5C and 8 in 5D). Of the fish wheel sites, one was below the bridge and five were above the bridge. Of the 32 set net sites, all but one received some use in 2008 (one net site did not receive use because of problems with beavers ruining nets). Of the six fish wheel sites, five received some use in 2007 or 2008. Regarding the unused wheel site, its owners were constructing a new fish wheel in 2008.

Of the 32 set net sites, 14 were used by persons with dual residencies, 2 by outsiders, and 16 by residents of Stevens Village. Of the 5 fish wheel sites, one was used by a person with dual residency, one by an outsider, and three by residents of Stevens Village.

The continuity of fishing areas used by Stevens Village residents can be assessed by comparing current fishing sites with those documented by Sumida in 1984 (1988:97-110). There has been substantial continuity in the locations of camps and fishing eddies over the last 24 years (the period between the two studies). A comparative count of sites by year are shown in Table 19. Of the 13 fish camps sites reported in 1984, 76.9% continued to be used in 2008. Of the 17 set net sites reported in 1984, 70.6% continued to be used in 2008. And of the nine fish wheel sites reported in 1984, 22.2% continued to be used in 2008. This indicates considerable continuity in the use of camping sites and set net sites over the last 24 years. Over this same period, while some fish wheel sites show a continuity of use, there has been an overall decline in the use of fish wheel sites.

Table 19 also shows 40 sites reported in 2008 that were not reported in 1984 by Sumida. Of these, 17 were below the bridge, an area not mapped by Sumida. Of the remaining 23 sites, outsiders used 5 sites, dual-residents used 9 sites, and Stevens Village residents used 9 sites. Some of these may be new camps and fishing sites established since 1984. However, others may have existed in 1984, left unmapped by Sumida because of her focus on year-round residents of Stevens Village. Some dual-residency and non-local camps and their fishing sites may be missing from her earlier maps because of this emphasis.

Sumida reported 15 sites used in 1984 that were not reported used in 2008: 3 camps, 5 set net sites, and 7 wheel sites. This indicates that some former camping and fishing areas have fallen out of use over the last 24 years due to factors such as changes in eddies and channels, deaths of owners, and shifts in fishing methods away from fish wheels.

As stated above, Stevens Village residents used most fishing camps as bases of operation, primarily during the king salmon season. The general trend has been for residents to spend less time at fishing camps. This means less time living at camps and less time drying and smoking salmon at camps. The change was noted by a Stevens Village resident:

> There are fish camps that people don't use anymore up here. I guess years ago people would be living at these camps all summer putting fish up, smoking and drying them. But over the years that's becoming less and less for different reasons.

Reasons include fewer dogs to feed, the press of monetary employment during summer, and closed subsistence fishing times. Still, some families continued to reside at camps because of their advantages, such as nearness to fishing sites, availability of materials, efficiencies, and custom.

In addition to camp-based fishermen, the Yukon River in the vicinity of Stevens Village was used by growing number of non-Native visitors who accessed the area using the Dalton Highway. These visitors at times created difficulties for fishermen from Stevens Village if they encroached on traditional set net sites or fish wheel sites. A resident from Stevens Village described these problems:

> In this area there's ever-increasing pressure of people coming up from Fairbanks. There's only a limited number of fishing eddies. Those are being competed for. And sometimes the local people will get pushed out of their traditional fishing sites. It has led up to a few conflicts.
>
> Quite a few people will come out [on the Dalton Highway], like on holiday weekends when the fish are running. When it's really busy they'll be running up and down the river with their nets, looking for a place to set their net. When the fish are running, you'll see them camped out on the long weekends on the sandbars and stuff. Or some will come up with their friends and try to look for a fishing site. But I guess they come out and find out that it's really limited here. You can't just throw a net in

anywhere. I guess some of them don't come back. Some of them will have friends that have an established fish camp further down the river. They'll pull their gear in from Fairbanks and put in here and go way downriver to where they fish. Some of their friends will come out and join them at their camps further downriver. I've seen over the years quite a few non-Native people that have established fish camps in that Rapids area. Some of them used to live in Tanana. I've seen them come up to the bridge. A couple of them I got to know.

A lot of newcomers are good about it. They just don't know. They don't know the traditional protocol. They're just unawares. And then you have the few guys that get belligerent and ruin it for everybody. You have some of those types too. People who have set nets in my spots have been good about moving if I go there and tell them, 'well, sorry but you're in my spot.' The couple of encounters that I had, the people were cooperative, they just didn't know. Lately some [local] people will put up a sign on the riverbank to post their fishing site. It doesn't carry any weight legally. It's just so that somebody will know, like the honor system. If somebody sees a marked eddy, they'll say, 'Oh, this is so-and-so's spot, we don't want to intrude.' Most times they'll abide by it and say, 'Sorry, we didn't know.'

Of course, people who know each other for a long time, if they're not going to use their site for one reason or another, they'll let others use it. See, right now I'm allowing my sister and her husband to use my spots because I'm not there right now. And some of these people will do the same. They'll say, 'well, I've got enough fish, or I can't really come out this year, so go ahead and use my spot so I don't lose it to somebody else that I don't know.' That will happen once in a while.

That place where we stopped and saw those nets in there, that's a family's fishing spot. It's a big eddy. This has been a contentious fishing hole for that family because it attracts a lot of people. Non-locals will put a net in there. It's a big fishing site.

Over here is another camp that's used off and on. Originally that was A's camp, a non-local dog musher. He's since moved on, but his kids will come over once and a while to camp there and catch a few fish. He used to run a fish wheel down here. Like I said earlier, there are only so many eddies. So these newcomers always scramble around looking for an eddy. So they really don't have a place to fish.

As shown by this account, customary rules help to regulate the use of camps, net sites, and fish wheel sites along this stretch of river. Even with the influx of outsiders who are ignorant of the area's history, the uses of the limited fishing areas appear to be worked out from year-to-year between individuals at a personal level based on these customary protocols.

Dogs

Historically, sled dogs have been major consumers of chum and coho salmon in the Yukon drainage (Andersen 1992; Andersen and Scott 2010; Wolfe 1984). During the 19th century, sled dogs were used for trapping, hunting, hauling goods, and transporting people during winter. Most were fed fish, particularly chum salmon. The dog population increased when non-Natives settled the region during the mid-19th century. In addition to the dogs of non-Native miners, trappers, and traders, the territorial postal system used dogs for hauling mail and supplies. A substantial trade developed for dried chum salmon along the Yukon River during this period. Native families produced extra for sale to middlemen traders who supplied the growing demand for dog food. The demand for dried chums decreased when aircraft began delivering mail and supplies during the 1940s. It decreased further during the 1960s when families acquired snowmachines, especially within the Yup'ik villages of the lower Yukon. Some families continued to maintain dog teams in upriver villages. Interest in sprint and distance racing revitalized dog mushing during the 1970s, the first Iditarod running in 1973. New non-Native racers established kennels in the Yukon drainage at places including Manley Hot Springs, Tanana, Nenana, and the Fairbanks vicinity. Racers commonly used chum salmon, coho salmon, and commercial dog food to feed dogs. After a peak during the early 1990s, sled dog numbers fell again. This most recent decline has been associated with several factors, including the collapse of chum salmon stocks, an aging cohort of professional racers, and the increased expenses of maintaining teams.

Counts of dogs in the Yukon drainage have been made by ADF&G since 1966 through post-season salmon surveys and permits. Not all families get surveyed, and types of dogs usually are not distinguished (sled dogs, scrap dogs, and so forth). Nevertheless, the counts from the post-season surveys track general trends in dog numbers in the Yukon drainage for families in the salmon survey network (Figs. 34 and 35).

As shown in Fig 34, dog numbers were falling when ADF&G began dog counts in 1966, representing the continuing transition from sled dogs to snowmachines in villages. The annual dog count in Yukon drainage villages fell to its lowest point (1,804 dogs) in 1972. The revival of sled dog racing began after that, marked by increasing dog counts in Yukon drainage villages. By 1980, there were about five thousand dogs reported by households in post-season salmon surveys. This level held fairly consistent during the 1980s. A change in the state's subsistence law allowed urban residents who used Yukon salmon stocks (previously under other types of permits) to be counted as subsistence fishermen. This regulatory change added at least a thousand dogs to counts between 1989 and 1992, sled dogs owned by urban residents who fished for salmon on the Yukon and Tanana rivers. The peak count of dogs occurred in 1992 (8,696 dogs). Since then, dog counts have declined. In 2006, dog numbers reached 5,276 dogs, a level comparable to the 1980s.

Projecting demand for salmon to feed dogs solely from dog counts is difficult. Dog food can come from a number of sources. Families with working sled dogs may harvest salmon themselves, or they may acquire salmon through gifts or trades from commercial

fishermen with fish wheels, as described below. In addition, families may purchase commercial dog foods as supplements or dietary mainstays, especially for dogs racing competitively. Families may supplement with other fish and wildlife, such as lamprey, blackfish, whitefish, beaver, and muskrat. In villages without sled dogs, many families feed only food scraps and commercial dog food to household dogs. Given this complexity, accurately projecting demand for salmon to feed dogs requires knowing factors like the dogs' uses and their locations as well the relative costs and availability of salmon procured locally compared with commercial alternatives.

Households surveyed for this study were asked the numbers of sled dogs, other adult dogs, and puppies owned within the household. Key respondents provided additional information on dogs and their uses in the community. The counts of dogs in 2008 presented here are based on these sources.

In Alakanuk, there were about 250 dogs in 154 households in 2008, or 1.63 dogs per household, based on household surveys. Among surveyed households, the transition from dogs to snowmachines was complete. There were no dog teams among the 40 surveyed households (they owned 1.8 snowmachines and 1.1 four-wheelers per household). Still, of surveyed households, 75.0% kept dogs as watchdogs, scrap dogs, and pets. Almost all households fed their dogs with scraps or commercial dog food. Only 5.0% caught salmon (coho) in order to feed their dogs. Salmon caught for dog food in Alakanuk based on the surveyed households is shown in Table 20.

Dogs were considered important at Alakanuk, serving important roles as consumers of food scraps. Unused wild food recklessly scattered offended animals and attracted bears, according to traditional Yup'ik beliefs. Feeding scraps to dogs kept unused wild food out of the garbage dumps. Dogs also served as watchdogs, especially around salmon drying racks. One Alakanuk resident described the important roles of dogs:

> Here there are no dog teams, but there are still dogs. Most are pets. They use them to feed them whatever scraps they have. If we didn't have dogs, the scraps would have to go to the dump and that's not too good of an idea.
>
> Many people prefer to have at least one or two dogs. They come in pretty handy at camp. They let us know what animals are close by, like bears. So dogs are still important to us.
>
> We try to use as much of the fish as we can. Some of the things we don't use we save for the dogs. Backbones are usually reserved for dogs. Some of the subsistence catches also are saved for dogs.
>
> I once had a team. I took care of them, made sure they had enough food, not only dry fish, but fish stored away underground for use as winter food. They get fermented, but they're still good eating when they're stored right. The dog food was stored underground and used just for dog food, mostly fall chum or coho. When I used to

> make food for the dogs, I used to share it with them. I'd eat a little piece of it, like on a tail or some part of a body. Those dogs had good food! [Laughs.]

In Anvik there were about 73 dogs in 32 households in 2008, or 2.28 dogs per household, based on household surveys. There was only one household with a dog team (14 dogs). Of surveyed households without dog teams, 77.7% had dogs, owning an average of 1.85 dogs per household. Most households fed their dogs with scraps or commercial dog food. But some households (18.5%) caught and fed whole salmon to their dogs. Of the catches of surveyed households, 90.1% of the summer chum and 64.5% of the coho harvests went to feed dogs (Table 20).

In neighboring Grayling there were about 80 dogs in 44 households in 2008, or 2.49 dogs per household, based on household surveys. None of the surveyed households had dog teams, although one household identified its three dogs as "sled dogs." Of surveyed households, 70.4% had dogs. A substantial portion of households (40.7%) reported that they caught salmon for their dogs. Among surveyed households, 45.2% of the summer chum harvest and 88.0% of the coho harvest went to feed dogs (Table 20).

An Anvik household described alternative ways to feed dogs. In the past, dogs ate up to two dried chum salmon daily during winter, depending upon conditions. Currently, he primarily fed his dogs fish during summer and supplemented with commercial dog foods during the winter:

> When I was growing up, we fed our dogs one-and-a-half to two salmon a day, every day, in the winter when it was cold. Some of those salmon are a pound apiece, some over a pound, a pound-and-a-quarter apiece. We were taught that when it got down below twenty below, you fed those dogs two fish. Or a good fish at least when you're running, at least a fish-and-a-half.
>
> The dogs got fish. And beaver meat in the spring, with muskrat meat. Lampreys in the fall. Lots of different types. Long years ago those old folks used to put a hole in the ground, line it with birch bark, and put fish eggs inside, or fish heads. They'd seal it up with birch bark and cover it with mud and they'd dig it up in the winter. That's all the vitamins and oil you needed right there for the dogs, all winter long. In the roe you've got different vitamins and you've got oils. With the dried salmon, that was all they needed. Those dogs were in good shape.
>
> Right now, all my dogs are eating is fish. But in winter I buy commercial feed. I supplement them with different types of commercial meat.

In the upriver village of Stevens Village, there were more sled dogs compared with Alakanuk, Anvik, and Grayling. In Stevens Village, five households had dog teams, owning 52 dogs, an average of 10.4 dogs per kennel (5, 6, 11, 14, and 16 dogs respectively). In total in Stevens Village there were about 88 dogs in 23 households in 2008, or 3.83 dogs per household. These estimates combine information from key respondent interviews and surveyed households. Of the 18 households without sled dogs,

83.3% had household dogs and owned an average of 2.00 dogs per household. Three of the five households with sled dogs caught salmon for dog food. The other two households received salmon caught by others for feeding their dogs in 2007.

Feeding a dog team can represent a major expense for households with little monetary income, so finding sources of cheap dog food was important. Cash-poor households in Stevens Village could not afford to operate a team primarily with commercial food. Commercial dog food was used to supplement a team's diet, but was too expensive to serve as the dietary mainstay.

The decline of chum salmon runs during the 1990s lead to shortages of cheap dog food in upriver villages like Stevens Village. One man at Stevens Village reported that he gave up his dog team when chum salmon runs collapsed.

> I had a lot of dogs, even though I had a snowmachine. What did it for me, why I had to get rid of my dog team, was that the chum salmon fishery collapsed quite a few years ago to where you couldn't put up chum salmon for dog feed. That's one of the reasons [for fewer dog teams], the fall chum. It just collapsed.
>
> They had to have emergency closures, back when Tony Knowles was the governor. Everybody was cut off, you know. That's when the governor took these emergency measures and started flying out fish. To us, that was like a slap in the face. I guess some other communities took that fish, but here, it's like a pride thing, you know. How can you accept stripped-out hatchery fish? I guess some other communities took it and it wasn't fit for dog feed, they claimed. It was a humiliating situation.

Another Stevens Village resident also had to put down his dogs because of low chum runs. He was living at Circle at the time and used a dog team for trapping. He could not afford to buy commercial food to maintain them.

> There's been a few teams wiped out here. They used to have dogs, but they just can't afford to have them no more, you know. You don't want to starve your dogs, so... Yeah, there's been quite a few dogs that were around here. I mean, everybody used to have dogs. Now nobody has dogs anymore. They just can't feed them no more, it's not feasible, just couldn't feed them.
>
> I know I couldn't feed my dogs, so I got rid of them. I was in Circle. We lived in Circle there for a while, and I used to have a big dog team, like seventeen dogs. And then one year, no fish. I was sixteen years old. I wasn't going to starve my dogs. So I I just put them down, yeah. Don't want to give them to somebody else who can't feed them either.
>
> No fish. I mean, I'm not going to buy forty pounds of dog food every day to feed all my dogs. I just couldn't feed them. So now I've just got bird dogs. [Laughs] They just eat [store-bought] dog food.

Inexpensive supplies of salmon have helped to fuel dog teams in rural villages, particularly the smaller teams of cash-poor families. When chum salmon supplies contracted with the collapse of chum runs during the 1990s, dog food costs increased. In response, many mushers culled their kennels and dog teams decreased in numbers and size. As a general principle, expensive dog food presents extreme problems for rural dog owners with limited incomes.

Four of the five dog teams at Stevens Village were fed with salmon from fish wheels. Fish wheels can produce relatively cheap dog food. Once built and placed, their day-to-day operations may require a relatively small additional expense at the wheel sites. As a fishing season progresses, a fish wheel may have the capacity of producing extra fish. An owner may decide he is done fishing for a time. He has caught as many subsistence fish as he needs, or he is taking a break during a slow part of the run, or he must stop commercial fishing because a commercial period is closed. At this point, operating that wheel for some additional fishing time costs little, just the labor to remove the fish from the wheel's box and the costs of transporting the catch away from the site. So a fish wheel can provide cheap dog food if catching the salmon is an additional use of gear whose expenses are already covered. That is, salmon can be cheaply caught on the margin, tacked on to an ongoing fishing operation. Once a fish wheel is established in a village, it holds the potential for supporting dog teams with extra cheap fish to families who may not own the equipment themselves.

Two households with sled dogs in Stevens Village obtained their dog food in this manner. They illustrate connections between fish wheels and cheap fish that can benefit cash-poor households without equipment. One household with low monetary income maintained a small dog team to haul wood and water. This household was relatively new to the community and had not yet acquired reliable subsistence equipment. They fed their dogs through the largesse of a neighbor's fish wheel near the village.

> We have dogs. We can't afford to buy gas for our snowmachine, especially if it doesn't pull. Our snowmachine ain't pulling. It'll go but it doesn't pull the wood anymore. It's just old. Plus, someone dumped sugar in our tanks. Yeah, like three cups. A little neighbor girl did that.
>
> We have eleven dogs. Last year we hooked up about seven. I think we even got up to nine one time, but that was a little too much. We used them to pull wood. They did good except for Spike. He turned around, because he wanted to get in the basket. He seen the wood and he goes, "No, I want to get in." We used either snowmachine or the dogs. The boys go across the rivers and haul it a load at a time. And then, last winter they found a spot upriver, and it was nothing but dead trees, so they just took them all down. That's what we used to heat. All wood. When we first moved in here we went through six cords of wood because the place wasn't insulated good. Then they perma-chinked it last year. So this last time it stayed pretty warm except for when it got like sixty below. This last time we burned about four cords. Maybe not even that. It did pretty good.

> We had one dog that hauled water. That's why he doesn't like to run with the team. He wants to be by himself. He got used to pulling a bucket of water in a wagon.
>
> Last year our neighbor gave us a bunch of dog fish for the dogs, because they have a fish wheel. So we were lucky. We only caught like twenty fish last year because we had no boat again. We've just been having the worst luck. He just said, "You gotta haul it." So we took a four-wheeler all the way up there and we loaded this wagon. He said, "Take it all. Take as much as you want for your dogs." So we took it. That four-wheeler, it didn't have four-wheel drive or whatever. That four-wheeler was only a two-wheel. We were pushing it up the hill and everything, fish falling out.
>
> If it wasn't for him, our dogs wouldn't have made it. That fish fed our dogs for a long time. We had it in the smokehouse. We cut them and dried them for the dogs. We got quite a bit. Still, that wasn't enough. We had to buy dog food. We had more dogs last year. We got rid of some of them that didn't want to pull. I mean there's no sense in feeding them if they're not going to work. Can't just keep them. It's like that little rascal that runs around, little no-good housedog of ours. Yeah. That [commercial] dog food's just too much to get over here. It's like eighty bucks through the mail for two bags. And that's the cheap dog food for $10.99. So they get the scraps. What we don't eat, it goes in the dog bucket. They'll get the tail, the fins.

Surplus salmon from a fish wheel also helped to support the sled dogs of a second resident in Stevens Village who recently moved to the village. He used his dogs for trapping furbearers during the winter. Previously, living elsewhere in the region, he received salmon to feed his dogs from a friend who operated a fish wheel in the Rampart area. Last year, he received about fifteen hundred salmon for dog food in this manner.

> I have ten adults and six pups. I'll start out running four to five, then I'll go to six, then eight. Ten is about the most I'll run unless an emergency comes up, when I'll hook up an extra two to four. Usually for about half the season I'm only running about six. Then we'll get more snow and I'll go up to eight. After trapping season is over and I just want to cover some ground I'll hook up two more and make it ten.
>
> Cats [lynx] are the main things I trap. There's beaver around here. I got a few beaver. Wolves, if we get a chance we'll go after them. You can get by with trapping. But you still have to get some money during summer. Last year we got by the winter okay.
>
> There's a guy downriver who's got a wheel, a guy down toward Rampart. He lets me get all that I want. He just gives me the fish. He'll keep the better chums for himself. I might help him get his wheel out of the water, but that's about it. He just gives me the fish, especially if he's catching quite a few. If he's not catching too many then he'll keep them all himself.
>
> But the thing wrong about that arrangement is it's so far to go now. You know, gas will just eat you up. When I lived down that way it was a different story. But from up

> here it's not very practical. Transportation is the big thing. From here to Rampart is ninety miles. You've got a return trip too, so you're talking about 180 miles by boat. Going down you get good gas mileage, but coming up with a load, it might take twelve gallons going down and 15 to 18 coming back. Gas in the village is $7 a gallon. You get two to three hundred fish in the boat. It's a lot of weight.
>
> We really need the fish this year. We really do. If you don't have enough here in the wintertime, it's a day into Fairbanks and a day back to get dog food. It's pricey. You got to go in to get it. Then you've got to get it here. We use the Old Roy from Wal-Mart. It used to be fifteen dollars a bag, but now it's up to $22.50. You go in, you're not going in just for dog food. You're going in for gas, groceries, so you've got a big load coming back and a lot of weight. You probably won't get everything out at one time.

Because he needed a cheaper source of dog food, he was considering building a fish wheel in Stevens Village, or teaming up with a long-term resident to build and operate it:

> Yeah, there's a good chance of it. Build one or help somebody else build one. Like I said, we do need the fish. If I go in with somebody else that's a big benefit because they know all the fishing spots. They've been around here for years. I just don't know the spots like they do. Here, most of those old guys don't catch enough salmon even to supply their own dogs, let alone surplus to give to others. I know W, he gets fish but he's still got to buy dog food. Y's the same way. H will save fish for his one dog, but he's not supplying anybody else.

These two cases illustrate that for cash-poor households, fish wheels can be sources of cheap dog food. When fish wheels disappear in a village, then cheap dog food can disappear for households without reliable fishing equipment. As discussed earlier, about 40 commercial fish wheels operated in upriver areas (Y4 and Y5) from 1988 to 1996, but the number fell to zero by 2000 and 2001 (Fig. 7). In 2006, about 20 commercial fish wheels operated in upriver areas, representing a third of fish wheel permits. In Stevens Village, only one commercial fish wheel was active at the time of this study, occasionally selling chum to dog mushers at the Dalton Highway bridge. In addition to this, one other subsistence fish wheel operated at Stevens Village.

Of the surveyed communities, Tanana had the most fish wheels (Table 10). Of the 30 surveyed households, nine had fish wheels. Tanana also had the most sled dogs of the surveyed communities. In Tanana, there were about 354 dogs in 85 households (266 adult sled dogs, 43 other adult dogs, and 45 puppies), or 4.16 dogs per household. In Tanana there were eleven households with dog teams, according to key respondents. The five surveyed households with teams had kennels with 8, 8, 25, 27, and 90 adult sled dogs. Of households without teams, 44.0% had household dogs and owned an average of 0.60 dogs per household. In 2007, Tanana caught substantial amounts of chum and coho salmon as measured by post-season surveys of ADF&G (Table 20). Dog food comprised about 88.8% of the summer chum catch, 97.4% of the fall chum catch, and 89.4% of the

coho catch in 2007, based on post-season reports to ADF&G of the amounts of salmon fed to dogs.

Commercial Fisheries and Dog Food

As stated above, historically there have been linkages between the commercial salmon fisheries and dogs because of the capacity of commercial fish wheels to produce inexpensive dog food. When the commercial fisheries contracted due to markets and weak runs, so did this potential source of cheap dog food for local dog owners. This section describes those kinds of linkages on the middle river at Anvik, based on key respondent accounts.

From about 1970 through 1996, Anvik hosted a commercial salmon fishery on the middle river (Y4). The main product was salmon roe from mature summer chum salmon bound for spawning areas on the Anvik River. As with other commercial fisheries on the Yukon River, most permit holders were Alaska Natives, and its gear included fish wheels, set nets, and (late in the fishery) beach seines. The roe fishery collapsed in 1997 (Fig. 9). For the decade since then, commercial fishing permits have remained idled at Anvik. In recent years, with runs recovering, the area was poised for reopening the commercial roe fishery.

A resident of Anvik described the high quality of roe taken from summer chum salmon caught near the Anvik-Yukon confluence:

> The roe here on the Anvik River is the highest quality there is because it's a terminal fishery, it's where the fish are getting ready to spawn. When they come into this bluff down here or into the Anvik River, before they spawn, they say the egg quality is number one. It's not under-matured and it's not over-matured. They say it's the best number one roe egg.

This same resident recounted the rise and fall of the roe fishery, as he observed it as he worked as a roe buyer and fisherman:

> When snowmachines came in, there was less and less fishing for traditional use [as dog food]. It was kind of going out. And then along comes 1970. I think I was probably the only one here that had a dog team *per se*, because I was still trapping with dog team. A buyer out of Bethel came up here and contacted me and wanted to buy chum roe. Of course everybody was throwing the roe away at the time. We would throw away thousands of pounds every year. And there was an outfit, Kemp and Pelluci. They were out of Duluth, Minnesota. They had a plant in Bethel and they were flying in here with an old Norseman on floats. So I began buying for them that first year. I bought sometimes two tons of egg roe a day for eighty cents a pound. We flew a number of pounds, quite a few. I was getting a commission that was – anyway, I did pretty good those first few years. A couple of years later everybody started getting involved. We had three or four buyers come in, and of

course the price went up. The people took more notice of fisheries. Then pretty soon everybody was doing it.

All at once they find out, well, it's just getting so crowded that the entry commission is going to come in and issue permits, entry permits. They came up with a system to give people permits with points for how many years they fished, etcetera, etcetera. So a lot of the people that did fish years ago didn't file or didn't qualify because they hadn't documented a lot of their fishing. And a lot of people who didn't need them got them. Same old story.

Anyway, all through the seventies it was pretty lucrative fishing here. We had lots of chums, lots of roe, and lots of dried salmon. In fact, we had an overabundance of dried fish. Just a lot of it was just spoiling. People were cutting too much, you know, for the roe. We kind of had a cash boom here for a while. And then in the late eighties it started petering out and then, I forget when our [first] crash was – about 1989, '90, I think. Then we started going downhill to where there were very few people doing it anymore. Prices went down to a dollar and a quarter a pound and the buyers kind of split. Then we were out for six, seven years now, I think. We haven't sold any roe at all. It's still there, the product is still there. They're still interested in buying. But our fish, the count went down and nobody really knows why to this date what happened there.

For most of the fishery's history, fishermen caught fish in the main Yukon River. Regulations closed the Anvik River to fishing. Fish wheels operated on the bluff near the Anvik River mouth, and gill nets set in eddies caught fish downstream from the fish wheels. Much of the catch consisted of summer chum bound for the Anvik River. But gear on the main stem also caught chum and Chinook bound for upriver areas:

It was fish wheels and set nets, probably half and half. The nets did really good in the first part of the season. Fish wheels were kind of slow, because it's one area. The nets were catching a lot of the main stem fish, main Yukon. And then once the Anvik River fish hit, we caught a lot in the wheels because they were streaming right up the bluff there. It was kind of split, I think. For a while the nets were blocking a lot of the fish wheels. Then we got the regulations changed to where escapements were going by. You know, it was a lot of bickering around and politicking. [Laughs]

Some of the fishermen in the roe fishery didn't live in Anvik, but came from other villages, according to another resident:

They'd come in and this town would fill up from all the other surrounding villages. It was quite an operation. It was a big operation. That's the way it was when they were fishing here. They weren't living here. They'd come in. They sold fish here but they weren't living here.

In later years, the state worked with fishermen to develop a seine fishery on the Anvik River to better target the Anvik run and take pressure off the runs on the main-stem Yukon:

> Fish and Game came in when we opened the terminal fishery [on the Anvik River]. We went up with Fish and Game personnel and tested the best way to catch them. The idea was to be able to release the ones back that you didn't want. A fish wheel and a gill net couldn't do that. So they said, "Ok, let's try small beach seining." So we tested beach seines. Just about everybody here that fished went up there. All took a hand at it and tried it to see what was the best way to do it. It worked good. Some catches we'd pull out four hundred fish. We figured out what was the best way to pull them in and how many people we'd need to get them out of the net and put the ones back in the river, you know, the ones you didn't want, the males and the too-ripe females, the ones close to spawning. You could tell. And the whitefish and the kings that were mixed in. We'd get some trout. Different types of fish.
>
> So Fish and Game started the Anvik River terminal fishery. They had 300,000 that they wanted for escapement for spawning in the Anvik River. But when they saw how much was being taken in the Anvik River, they upped escapement to 500,000. So now, once you reach 500,000, they can open it up to roe fishery, figuring that they have enough for escapement. So that's where it's at right now. It's at 500,000.

Fishermen in neighboring communities also developed roe fisheries. Buyers picked up roe from fishermen at fish camps in the Grayling and Kaltag areas. A woman from Grayling remembers her father established a fish camp to participate in the fishery. The family operated both a net and a fish wheel. As a teenager, her job was to remove roe and cut the carcasses for dog food. When the fishery collapsed and closed, her father’s fish camp was discontinued:

> My dad started his own camp because of commercial fishing, because he was a commercial fisherman. I was already in my teenage years when I was cutting fish for my dad. Sometimes we'd have to go really fast just to get the eggs out and put them in the buckets and cut the fish later. There was a boat that drove up and down to pick up the buckets.
>
> We'd have to go check the fish wheel, check the net, really fast. My sister used to stay up all night at the nets, checking with my dad. I never did check the nets. I just cut the fish. I never watched the wheel. My brothers sat by the wheel. They had to throw the males back in.
>
> I'd take out the eggs and cut them for dogs. We used it all winter for our dogs. It was better than buying dog food. It's cheaper. My brother used to run dogs. Then he quit. Sometimes they used to sell bundles of dog fish, too. We had lots of bundles of fish that one year. People that used to mush dogs, they used to sell it to them.

> Then, no more commercial fishing. I remember it. Just no more buyers. So we just never went to camp anymore. Then my dad passed away. So we never did go back.

A Kaltag resident interviewed for this study recounted how he helped his father pick up roe from fishermen at their fish camps for processors at his community:

> At Kaltag, I remember driving up and down the river with my dad. He used to be a big tender, a fish tender for the salmon processing plant in Kaltag, the egg processing plant. Right up and down the river – you could buy buckets of eggs from everybody on the Yukon. They had fish wheels. You'd see just loads and loads of fish on racks. It looked nice, those dogs barking, bears all over the place.
>
> I used to buy the eggs with my dad. We'd make it a one-day trip, just zoom up and down the river, get all the eggs, cruise over to the back cabin, and get all the eggs up to the processing plant. They'd get the eggs processed and shipped out.
>
> We tasted the eggs and everything. On crackers, before we put them into the roe buckets. I tried it out. I was like, 'What the heck, since I'm rubbing in it, I might as well try it, too.' I grabbed a cracker, put it in, and tried it. I didn't really care for it. But if they like it and they want it, we'll work at it, make it for them. They salt brine them. It was kind of oily and kind of like chewing butter, that kind of texture.

Fish carcasses were by-products from the commercial roe fishery. The carcasses of female salmon stripped of roe were returned to fishermen. The middle river had a long history of drying summer chums for local sled dogs and for sale to middlemen traders who supplied the demand for dog food in the Yukon drainage and elsewhere. Anvik fishermen had participated in this trade for years, as described by this resident:

> Chum salmon for use for our dog teams has been traditional. When I was a kid cutting fish back in the fifties, everybody here along the Yukon, all the way from Holy Cross all the way up to Galena and those areas that I was familiar with, people cut thousands of fish for dogs. Chum salmon. My family, we used to do five, six thousand a year, which wasn't as much as a lot of the families did, ten thousand fish. They used probably half of that for their own dog teams and then they'd sell the rest for their income. A lot of that fish back then went to Fairbanks to a guy that bought and sold fish there to the drivers up around Fairbanks. It was selling for about eight cents. When I first started selling fish when I was a kid, it was eight cents a pound for dried fish and then went to fifteen years later.
>
> I'll show you this photo here. This is what I'm talking about, sending bundles out to Fairbanks. These are bundles of fish, fifty fish per bundle, fifty fish and sixty pounds, over sixty pounds. My dad and my uncle bought twenty-two tons that year. Twenty-two tons of salmon! It was me hauling. I'd haul them up to the warehouse and then store them. When the barge came in I would haul them back down and load them. There was a guy in Fairbanks that dealt in it. He bought it and then resold it. This was 1958 or 1959.

Another Anvik resident recounted participating in the dog food trade that predated the commercial roe fishery:

> I've lived here all my life. Back in them days we lived by subsistence, off the fish wheel. We would catch thousands of fish a day, something like three thousand, four thousand fish a day, just for dog food, back in the 1950s and 1960s. We'd bundle up that fish after we smoked it and sell it to the people on the barge. They'd buy a hundred bundles or so to take downriver or upriver. They bought a lot of bundled fish, the barge people did. That's the only source of dog food that we had back then.
>
> They had a lot of smokehouses all the way up and down the Yukon, especially right in front of the town, there on the island right here. The smokehouses were something like ten tiers high, just for the mission. Yeah, we'd cut fish for the mission. We'd cut eating fish and dog fish. We'd fill the smokehouse all the way, ten tiers.
>
> One barge that came downriver, it had a family-owned store boat, the Dominic store boat. He bought bundles of fish also. I remember cutting fish all summer. Then our father allowed us to sell four bundles and we went home with a couple cases of grapes each.
>
> If you're reading some of the historical newsletters, you'll see, some guy [at St. Michael's] remembers his grandfather coming to Anvik to trade with us for fish. Dry fish was pretty scarce back then. And we had bundles of fish to last all winter. They had to come here to go trade with seal oil. The seal oil we used for lamps here. There was a portage up the Anvik River toward St. Michael's.

Commercial fishermen on the middle river attempted to process and move the by-product carcasses from the roe fishery into this traditional trade. While there was still some local demand for dog food, the greatest demand was from dog owners in other areas, especially in upriver districts. One commercial roe fisherman described his practices for distributing dried fish:

> At the time I was the only one that had a team that used that amount of fish [in Anvik]. But there's still a lot of small scrap dogs around that people buy fish for. A lot of it went to different villages or upriver. I sold some upriver. It was a commercial product so we could sell it. I sold some to somebody in Nenana. And then Bethel, McGrath. In fact, McGrath still buys fish from us. Dried salmon. So a ton here and a ton there. It's not a moneymaking thing, but you could still offset your cost of fuel and stuff if you wanted to sell it.
>
> It was going to the people that had recreational-type teams. But a lot of the so-called "professional teams" then started going to the higher-quality dog food, the chopped-up different meats and stuff. The dry fish didn't provide all-in-one what they needed. So dry fish became a supplement.

> About fifteen years ago, people were using those wood mulchers for fish. I had one too. They were getting their dried fish, running it through, mulching it up, putting them in the bags, and shipping them. It made it a lot easier to feed. Even after the commercial roe fisheries quit, one person was still doing it, selling fish up in Galena.

In this manner, the commercial fisheries in the middle and upper rivers became potential sources of cheap dog food during the mid-1970s through the mid-1990s. When the commercial roe fisheries developed, dog counts rose within the Yukon drainage because of a resurgent interest in dog racing. The two industries developed in tandem. Dog counts increased most in upriver areas (Y5, Y6) and more modestly in the middle river. For example, in Y4, dog counts increased from 912 dogs in 1970 to 1,767 dogs by 1980.

In post-season monitoring, ADF&G records show large annual subsistence summer chum catches in the middle river (Y4) during the 1980s, between 150,000 to 200,000 fish on certain years (such as 1980, 1985, 1986) (Fig. 15). These large counts probably were connected to the commercial roe fisheries. They did not reflect local demand for dog food along the middle river but represented the by-products or side-products from the commercial roe fisheries. For example, though commercial and subsistence catches increased at Anvik, dog counts remained relatively flat from 1975 to 1990 (fluctuating between about 100 and 150 dogs). Dog counts briefly rose to 221 in 1993, but dropped again to levels around 100 dogs. Most households owned household dogs, not sled dogs. So the number of sled dogs did not increase in Anvik with the surplus of cheap dog food.

The large by-products from the commercial roe fishery presented concerns for local residents. By tradition, waste was something to be avoided when fishing and hunting. It was believed to lead to poor catches in the future. By most accounts, most commercial fishermen made an effort to cut the by-product fish carcasses as dog food. But as there were not suitable markets for it, much of the dried product on large harvest years turned out to be excess, as described by this respondent:

> The first few years [of the commercial roe fishery] were pretty good. Everybody had smokehouses and they had camps. I had a smokehouse that held about five thousand fish. We had racks already there, so most of that fish got hung. But then we had a lot of the "get rich quick" people who wanted to speed up the process. They started coming in from upriver, like Kaltag. And downriver, Holy Cross. We had a whole big bunch of people come in and we had fish camps all along the river – not camps, just putting up racks and hanging that fish and not even taking care of it, just selling the roe and then going through the motions of hanging the fish. Fish and Game said, ‘Well, you can't do anything, because once that fish is processed, once you cut it open, it's yours and you can pretty well do what you want with it.’ Well, that was ok [legally], but it looked bad, you know. They had hundreds of fish hanging, some of them were just hanging until the rain and the ravens took them.
>
> Morally, the old way, the old people would never have liked it, to see that waste, because of all the hunger and stuff. I know it bothered me. But you look at it from a

> commercial standpoint: economically, the people are getting the money off the roe. Years ago the eggs was the by-product. Now it turned around where the carcass was the by-product.
>
> For Anvik River chums, the carcass is almost useless, even for dog food, even for our own use. Once you cut them, they just dry up like bark. There's no oil or nothing in them. The fish are ready to die anyway. They're going to die, you know. They go upriver and spawn and then float back down. You'd see them on the river, the bears eating them. It just didn't really bother me because that's what's just going to happen anyway. But the main-stem Yukon is a different story, because a lot of that fish is destined for Koyukuk River and Tanana River, places where people use them. Those chum carcasses have value. What I wanted to do was implement a grading system, say ones, twos, and threes. The ones would be the best ones, the twos the middle, and the threes are the throwaways. You could do that.

The evolution of the commercial roe fishery at Anvik illustrates principles found elsewhere along the Yukon drainage. Local fishermen were capable of catching relatively large amounts of fish with fish wheels and nets if they had the buyers to support it. This characterizes commercial fisheries in other Yukon districts. Further, sideline products like dried dog food developed alongside the commercial fishery. The commercial fisheries became sources of cheap dog food for dog owners who received it as gifts or through sales from commercial fishermen. But at Anvik, moving the product from the harvest area to dog owners elsewhere posed substantial problems. During high-catch years, many fishermen found no economic way to sell to potential buyers. Consequently, some of the by-product remained unused. Finally, the contraction of commercial fishing within the Yukon drainage reduced this potential source of cheap dog food, creating difficulties for low-income households with sled dogs. Feeding dogs became more expensive with fewer cheap salmon sources. Some owners culled teams they couldn't afford to support. In this manner feeding sled dogs (commonly viewed as a subsistence use) and the commercial fisheries were linked. Trends in one use have affected trends in the other.

The future viability of commercial roe fisheries on the middle river appeared dependent on a number of external factors, such as competition from hatcheries, non-local investment sources, and state management capabilities. One fisherman described an attempt to restart the roe fishery at Anvik in 2007 and 2008:

> The summer chum fishery didn't quite come together this year [2008]. Sounds like it's going to be next year, though. We've got some things going with another company. We could have pulled it off this year, but we had some other priorities we needed to do. Sounds like next year we're going to have the chum salmon.
>
> I fished last year [2007]. There's some other people that were going to fish this year, too. People still hold their permits. It'll be both a wheel and net fishery. Commercial net and wheel and then maybe even the seine operation on the end if we get the fish count. I don't know what the count is this year, so far. I imagine the Anvik is pretty

low because I haven't really caught that many chum while I was drift netting. If they get their count, they'll open the river for seines.

Last year the eggs went to Europe. Japan has their own hatcheries and stuff. So the other place that we sell to is over in Europe. They wanted the eggs. Yeah, the fishery already is coming back. But we've got to try to do something with the whole fish instead of just the egg roe.

As for carcasses, the plan was to buy the whole carcasses and then ship the carcass to Anchorage and then process it there. For what, I don't know. I don't know what the guy had planned. But I'd like to see it made into something right here in Anvik and then shipped off. There's several different things that you could do with it now, if you had the right set-up to do it. There's a lot of food you could make out of it. There's some other stuff that we've been looking into to do with the carcass.

I'd like to see this plant set up here, to operate this with the people here in town, self-sufficient, and then do away with the middleman. But it takes a lot of effort. You need someone in there all the time to make all these deals and make things happen. In the past they had these technicians here from Japan and they made *ikura* right here in town and packed it and shipped it out. It worked pretty good. But the guy last year was just trying to take the roe, chill the eggs and then ship them into a plant in Anchorage. And I told him he was going to have a problem with that. And he did, lost some egg roe. You pretty much have to do everything right here in town to make it pay, rather than ship it out. What with the bigger airport, maybe it'll work.

Making a Living on the River

To make a living on the Yukon River typically required families to integrate subsistence activities with wage employment, commercial fishing, or other types of money-making activities. At the household level, the two sectors of the mixed, subsistence-cash economy were combined by family members. Income produced by family members typically paid for the equipment and fuel used in the production of wild foods. Wild foods circulated in the community along kinship lines, sharing networks, and traditional exchanges.

The cash sector appeared to be the weaker of the two economic sectors. As a general rule, households continually struggled to find ways to make enough money to enable them to live. Wage-paying jobs tended to be scarce, seasonal, and intermittent. Finding employment in the private sector was difficult. Workers commonly depended on sporadic construction projects paid through short-term grants. Most longer-term positions were public-sector jobs in the schools, city offices, tribal offices, and the village corporations.

These kinds of employment and levels of income are illustrated by the households surveyed in this project (Tables 21-23). The percentage of adults who earned some money through employment ranged from 50.0% (Stevens Village) to 80.0% (Anvik). The

average number of jobs per household ranged from 1.07 jobs (Tanana) to 1.93 jobs (Anvik). Many jobs were seasonal so that the average months worked per employed household ranged from 7.5 months to 10.0 months. The seasonality of employment is shown in Fig. 35. The kinds of employers of 199 jobs providing work to members of surveyed households in 2007 are listed in Table 23. The top employers included schools, self-employment (such as commercial fishing and trapping), stores, the city, village Native corporation, the tribe, village utilities, Bureau of Land Management (firefighting), regional Native organizations, and the regional health corporation. The private business sector was noticeably weak, offering a few jobs with bush airlines, fisheries, and seasonal construction.

Mean earned household incomes were modest in 2007, ranging from $13,557 (Grayling) to $28,516 (Anvik) (Table 22). Most households received dividends from the Alaska Permanent Fund. Some households also received money through pensions, retirements, and Native corporation dividends. Unearned income sources included social security, supplemental security, adult public assistance, Alaska senior benefits, and unemployment benefits. Altogether, total mean household incomes (earned and unearned sources) ranged from $27,286 (Grayling) to $38,936 (Anvik). On a per capita basis, total incomes (earned and unearned sources) ranged from $6,357 per person (Alakanuk) to $14,807 per person (Anvik). These earnings were comparable to the mean per capita income of Yukon area villages in 2000, which was $10,403 per person. They were substantially lower than per capita incomes in Alaska's urban areas at $24,525 per person (Fairbanks) and $20,166 per person (Anchorage) (2000 U.S. Census).

Commercial fishing was a type of self-employment. A significant problem for commercial salmon fishermen, alongside restrictions due to low fish runs, was finding buyers for their catches. For example, the numbers of buyers around Alakanuk had shrunk over time. Only a single buyer operated at the Yukon River mouth in 2008, a fisherman's cooperative supported by funding from the Yukon Delta Fisheries Development Association, the region's Community Development Quota (CDQ) program group (National Oceanic and Atmospheric Administration 2007), as related by one Alakanuk fisherman:

> If the CDQ had not invested in the fish processing plant, there would be no processing here this summer [at Emmonak]. They are the only ones left operating. They are providing some employment for the commercial fishermen and fish processors.
>
> Bering Sea has pulled out and probably will stay out unless the king numbers go back up. So there's Kwigpak at Emmonak and Borealis at St. Mary's. They are the only two buyers I know of on the Yukon. In the past there were Bering Sea, Alaska Commercial, Emmonak Fishing Co-op, another outfit I can't remember their name, Borealis, a cannery, Bering Traders, Point Adams Packing Company, and a couple of briners, one in Chuloonawik and one in Black River.

In recent years, the prices paid to commercial fishermen for their salmon also has been depressed, a situation attributed by some local fishermen to the glut of farmed salmon on world markets:

> Fish farms operating in other parts of the world have affected the commercial catch of chums. They affect the price of the wild chums. It decreases the value of the chums. The processors don't want to buy them. When that happens we don't fish for them commercially, just for subsistence. Right now [2008] it's forty cents a pound, but in the past it was way low – five cents a pound. This year, the only fishing we were able to do was for commercial chums.

An Alakanuk fisherman believed that a family could not make ends meet with income only from commercial fishing. A family needed income from other sources to pay off basic expenses like electric bills:

> For people who are depending on the commercial fishing, it's a hardship. For people who are working, one or two family members working in the household, I think they are okay. But for people who are dependent on commercial fishing only, that's their hardship. For a lot of people that's the only income they have, during the commercial fishing. A lot of people, they pay their electric bill, pay for their homes which they're renting. Quite of few people are behind right now I guess. That's my understanding. With the commercial fishing right now, my permit isn't worth that much anymore. It used to be in the heydays, if I sold it, it would be okay. But right now, it's not that much. Right now the price of gas as you can see, I don't think that one man living on commercial fishing only has an income. I don't think it's going to work. Unless he gets lots of fish in the two or three hours, the six hours [of openings]. They only give you that much.

Another fisherman at Alakanuk described commercial fishing at mid-season in 2008. There had been no openings during the Chinook salmon runs. Commercial fishing had opened for chum salmon with nets less than six inches in mesh. He was hardly making expenses. He wondered how bills would get paid during the coming winter:

> For the chums I commercial fished twice so far. I sold maybe a total of $400, for two commercial periods. That was on the latter part of the fish run. Four hundred before expenses. Just for gas, the two times I fished was like eighty-five dollars. Eighty-five dollars to spend just on gas for six hours of fishing.
>
> It's six dollars and seven cents a gallon for gas right now. Could be up to seven bucks. And over seven dollars, my figuring was seven dollars and fifty cents a gallon for heating fuel for the winter. And the airfreight, food costs are keeping up with the fuel and freight costs. For a ninety pound bottle of propane, by the time it gets here the customers pay triple price from what is paid at North Pole refinery. So I don't know what we'll do next year.

> This is the second time they've closed that king season completely. In 2001, we only fished once that year, I think. It's going to bring hardship to the residents down in this area.
>
> My estimate is like eighty-five percent [of commercial fishermen] are without jobs, and the remainder with jobs. We are going to be hurting on food, electrical, heating fuel. I don't know the future of this Chinook salmon. It's hard to say.
>
> This last period, I didn't go because right now all the fish are gone. Only when the fall chums and the cohos start coming in [will I go]. They're usually here by next week. And they usually run heavy between the tenth and the twentieth. Actually, all the way until the end of August. Kuigpak is ready for fall chums. For me, fall chums would be like maybe thirty percent of my income. At least you wouldn't be out drifting and losing expenses on fuel. It helps, the fall chums.

Another fisherman gave a similar assessment of commercial fishing during 2008:

> Most of the people try to make their money on kings, if the fish prices are good. If we had an opening, this year it could have helped a lot of people, because the price of the kings was high. And the chums, too, they had good price. But this year, I'm losing. Especially on gas. Gas is so much. Everybody's losing. Didn't make no money this year. There's a fall chum running right now. Hopefully we'll get a little bit out of that.

A village administrator believed that many households would have to rely on government assistance because of the poor commercial fishing. People would not have money to fish and hunt for food:

> I think they'll rely mainly on government subsidies, such as the food program, the public assistance. I think they'll rely mostly on them because you can't go anywhere without any income to get your food to put on the table. There's hardly any jobs in the villages, just jobs such as BIA pass-through or state schools, post office, things like that. They are limited.

During other low commercial fishing years, construction work in Alakanuk helped replace the loss in fishing income for some households, as remembered by one fisherman:

> I was working. Any kind of job I could get, any opportunity for work, I jumped at it. But I know the subsistence here in 2001 was terrible because of their restrictions and the windows, the restrictions [that prevented us] to go out there and subsistence fish.
>
> I think that year there was some work on the water-sewer project. So that during this time, I think people had something to fall upon. But the water-sewer project, I got on in '97. So we worked '97, '98, '99, 2000. And there was other work. There was work coming in with the other projects. I think the water-sewer project sustained the people because there was consistent work, year-round. And then after it ended, all

> that income just stopped. And now there's just a little bit of work coming. There's work, there's still work coming into this town on water-sewer jobs, but it's not going to be like it was. It's not going to be mass production of employment.
>
> The first phase of the airstrip was really good. It employed a lot of people. It was consistent for like three or four months. Now this current phase right here, it's just a small job now.
>
> Building renovations – I think they're doing that right now. But very few people, maybe three people. Just here and there. There are no real big projects right now that employ a lot of people. This coming year, they're slated for a new school. But even though it's such a big project, it's not going to produce a lot of employment. Just a very, very few.
>
> Income this year will be like 2001. Probably. It looks like that. People that caught even one king, you know, that paid for their fuel. And if you caught maybe thirty chums, that's just a little extra. That's how the fishing has been during this summer.

Another respondent thought some might have to leave to look for work, because there were hardly any on-going construction projects in Alakanuk:

> There's hardly any jobs in town. Summertime there's usually fix-up work in town. This year there's houses. AVCP. And that's it. You got to go, maybe, got to go someplace and try to look for work. A lot of people are going to be hurting because they didn't make the money they wished for during summer, especially king season.

But others disagreed. When told that "moving to town" was an option taken by some people, one long-term Alakanuk resident stated that was not common in Alakanuk. He attributed this to the commercial fisheries that provided a monetary base for the community, even though the fishery had been depressed in recent years:

> There are a few people who have moved out, but not in great numbers. Our population is basically growing. Anchorage is quite a ways away. Even Bethel – there are some people who have moved over there but not that many. Some move over there for health reasons, some kind of illness. Others to find some kind of work there. But not that many.
>
> Most of the ones I know who want to stay in the village do odd jobs here and there. There are no real permanent jobs in the community.
>
> One of the things that is holding our people here is the commercial fishing. We're able to do that at least every year. This year we didn't do any commercial fishing for king salmon, but we are for chum salmon even though the earnings we get will be very low, a couple thousand dollars maybe at the most. Some won't even break even.

> Even though the fish fluctuates up and down, it's still a main source of employment for our people, not only commercial fishing but those who work in the processing plants, tender boats. It's mostly younger people or women working in the processing plants. The older people tend to do the commercial fishing. Commercial fishing is still very important to us. We're lucky to have at least some.

Another long-term resident said that the traditional culture kept people home, despite the difficulty of finding work:

> It's culture. The subsistence lifestyle. We get to eat our cultural foods here more than we do when we move into Anchorage. Even Bethel.

A member of the city council endorsed the importance of commercial fishing for the community:

> This fishery plays a big role in the economy. I'm with the city council and I do see a trend. When there's fishing, or jobs, people pay their bills. When they're not receiving that income from the fishing, or the jobs, the bills get stacked. What's more important [to pay off], you know? They have to weigh their priorities, really look at the priority. And considering the fuel, the electricity, it's going to climb. This fishery, it plays a big role in a lot of communities, all the way up the river.

In upriver communities like Anvik and Stevens Village, village populations have not been growing since the 1970s (Figs. 3-4). People have been moving out. A common reason for moving was employment because of the lack of jobs at home. This resident at Anvik did not attribute out-migration directly to slow subsistence (or commercial) fishing, but to the lack of jobs in general:

> They leave, but it's not because of the fish, it's just because there's no jobs. A lot of people got jobs out of town. They don't want to travel back and forth because it's too expensive. The price is six hundred dollars round trip now to Anchorage and back. A lot of people would just rather live in town, rather than coming back here. But there's a few that came back. The price of living in town's not so cheap, either.

The closure of the commercial roe fisheries at Anvik removed a large amount of money from the local economy. The higher costs of goods and debt were forcing some to move, according to another Anvik resident:

> There's a big crunch right now in the local stores here. People's bills are piling up. The economy is real low out here anyway to begin with. People are moving to the cities from the villages because it's a high cost of living. But Anchorage ain't much cheaper, either. Some move out for a while and then they come back.
>
> We've been hurting for the past ten years out here, you know. There's no commercial fishing. People had to go do different things, like a different lifestyle. People were

> making fifty, seventy-five thousand dollars a summer fishing, and then it went to zero. Ten years closed. That's a lot of money after ten years if you add it up.
>
> People are always going to [subsistence] fish because that's what they need to survive with. It's closer to go out there, spend the money to go out to the river, than to go to Anchorage and buy food or order it.

Another Anvik resident called the closure of the commercial roe fishery devastating:

> It was really devastating for us here. When the fishing crashed a lot of people started to get training to the tribe, or on their own to BIA or Tanana Chiefs. They got training to do something else, like to be a roustabout or a drill master or heavy equipment. When that salmon crashed, we had to really look for different resources for income, you know. A lot of people had to go out of the village to work. So there are a lot of people working on the pipeline nowadays, the pipeline or fighting fires. A lot of people were trained to be firefighters. A lot of people lost their limited entry permits. They didn't pay taxes or whatever. And some who still had them, they turned them over to their sons or whatever.

The commercial fishing closure “hurt" the community, according to another Anvik resident. She recalled that construction grants created some local, short-term employment, but as projects ended, some families and family members sought work outside the community:

> It really hurt people. I think it really hurt this community. Pure and simple, it's not here anymore. You know a lot of people have moved out of here and it seems like it's even getting worse in terms of jobs right now. There's less jobs now than there was even five years ago.
>
> There’s less grant money. The federal dollars are harder for the tribe to go after. There's less city money. We've had a couple of big projects here that have created jobs, but in terms of the steady jobs here for the winter, those stable jobs aren't here anymore. A lot of that has to do with less grant money. I think this year they lost between four and six positions, just with the tribe. I don't know how people are going to do it.
>
> Right now they've got [some] jobs at tribal, they've got the post office people, there's two stores, they've got the corporation and the city—those are all part-time jobs. The school has the only full-time jobs, the two teachers. This airport [construction], that's been for the last three years. That was an economic boon. But right now I don't think they hardly have maybe one or two local guys hired. They have this tribal building they're trying to finish; hopefully the money will come back through to finish work on that. There's odd things that come up. You know a lot of the [office] jobs, the women are the ones that are working them. It just happens to be the way it is. A lot of the men aren't going to do it.

> The younger people, a lot of them are leaving. These guys are working on the slope now. They're having to fly back and forth here, and they have to pay for their own tickets from Anchorage to here. Every two weeks, when you have to shell out seven hundred bucks, it gets spendy. Plus groceries and all of that. The cost of travel in here doubled in the last four months. A ticket was $350 round trip from Anvik to Anchorage not four months ago. I just bought a ticket was $707 round trip. So it has literally doubled from here to Anchorage.

When villages become too small, maintaining a local public school becomes problematic. Dwindling numbers of students and teachers create other reasons for families to leave the village. This issue was described by this Anvik resident who has struggled with whether to move to Fairbanks for her children's education:

> It's a K-12 school at Anvik. We've had three teachers up until recently. Then we went to two teachers. Last year they tried three again because we had a larger number of students. But they're going back to two because there were families that moved last winter. The count went down to fourteen students. That's the lowest it's ever been in Anvik. Nineteen was the lowest before that. If you get down to ten, they close the schools. That's something that's happening all around us. Like Shageluk, they've always been a bigger school than we have. They were down to the same number of students that we had. Their population must have just shriveled up. A lot of it is economics. There's no work. How can you pay for food and gas?
>
> And the school is such a social outlet for the community in the wintertime. There's all kinds of things that can go on with that. Of course that creates other social problems that go along with it, more alcohol, more domestic violence, and other things that go along with stress.
>
> When you have such a mix [of ages in a class], when you have fourth through eighth, the age range this year, then you're teaching to a fifth grade level. It's not okay because we've got some really bright students who need to continue to move on. It's not okay to keep teaching down to people.
>
> I don't want to leave. I like the lifestyle here, I like living out here. And yet because of the way the schools have been, economics and a lot of other reasons, I have to try to make some choices for the kids that would benefit them. It's a shame. It's really a shame. And I feel really bad about it, because that's our biggest dilemma. I don't like it. I don't like it at all. I'm really struggling with that.

This family maintained two residences last year. They lived in Fairbanks during the school year and returned to their main home in Anvik for the summer. In 2008, they returned to subsistence fish for their extended family. The parents struggled with whether to continue this dual residency pattern.

Migration between village and town, dual residencies, and seasonal moves for employment and subsistence fishing had become well-established patterns at Stevens

Village. Poor prospects for local employment pushed families away from the village, similar to Anvik. Traditional pursuits like subsistence fishing tended to pull people back. The location of the Dalton Highway just downriver from the village created special conditions for Stevens Village. It provided a ground link between the village and the Fairbanks area. Residents reached the bridge with boats during the open-water season and snowmachines after freeze-up. Residents traveled to and from town in trucks left at the bridge. At times, relatives living in the Fairbanks area provided transportation. Some trips combined air and ground transports. Travel between village and Fairbanks became normalized after the general store closed at Stevens Village. With no local store, residents had to travel to Fairbanks for groceries and other supplies.

Two main centers now served the tribal group – Stevens Village and Fairbanks. The common pattern was for tribal members to range between the two centers. At any given time, members of extended families could be found in one or the other location. Family members found sources of income and commercial goods in the Fairbanks area. They found wild foods and other traditional pursuits in the Stevens Village area. Tribal members maintained considerable mobility between the two centers. Historically, substantial seasonal mobility within a home range was characteristic of Koyukon and other Interior Native tribal groups. The current pattern of mobility was consistent with this traditional pattern of mobility. The main peculiarity today was that the home range of tribal members crossed a rural-urban divide, and seasonal moves were for monetary employment as well as fishing and hunting.

One Stevens Village resident described this development for his family and others. He currently lived in the Fairbanks vicinity during winter and in the Stevens Village area during the summer:

> My brothers, we spent time at [fish] camp helping my father, but I was the only one that stuck with it. They all moved on and got trades and jobs and never came back. Years ago, back in the late seventies and eighties when there was a chum fishery, my father fished hard. That's when there were a lot of fish. He would put up a smokehouse full of salmon strips. They would jar a lot of it. Can it. Put fish away in the freezer for winter and also sell salmon strips. That would get people through the winter. Back then he had a state limited entry permit. There was a commercial fishery. So he was able to make ends meet and be able to live the lifestyle on the river.
>
> But things started to go into decline to the point that a lot of people now live and work in Fairbanks. They'll still come back to the river to get a few fish, but it's awful hard to live out here full time like people used to.
>
> So people will stay where the work is. Or go to where the work is. This is where the work used to be, out on the river, but not anymore. People move on.

Though he worked most of the time in the Fairbanks area, he considered his house at Stevens Village to be his family's principal domicile. He also maintained a seasonal fish

camp on the river and hunted in the traditional area of his village. His seasonal round consisted of moving among these places.

As he stated above, the low salmon runs on the Yukon River helped to push people into this type of economic mobility. In the past, people could make a living on the river. With the declining fish harvests and opportunities for income, people were forced to look elsewhere for work: "This is where the work used to be, on the river, but not anymore." More recently, the depressed salmon runs and restricted subsistence fishing had pushed him from using his family's fish camp:

> Over the years with the declines in runs, there are more and more restrictions. Especially down in district 5C below Waldron Creek where I fish, we've been facing ever more restrictions. Eventually, this four-day fishing period came into existence some years ago. It's pretty hard to stay in your camp. You have to stop and start, stop and start. You're sitting there for three days not being productive, not catching anything. You're losing, you know. You're losing putting food up. You're losing because you have to feed yourself sitting there waiting until you can fish again. That's a loss economically, and also in terms of putting food up for your family, or if you're going to share it with your extended family. On a couple of fronts you can't just sit there. You have to do something. It's a reason why people don't stay in camp.

In this way, low salmon runs and restricted subsistence fishing time increased his mobility. He moved in order to be economically productive.

A young man echoed this observation about mobility. His preference would be to spend more time in the Yukon River area. However, the depressed local economy meant he had to live elsewhere for long stretches:

> Just this last winter, I spent all winter in Fairbanks, working. I need to work. There are few jobs here. Just the people who keep Stevens Village running are the ones who got jobs. The school. The tribal office. Clinic. Washeteria. You got to go elsewhere for that. Go to school. Get an education for a job, for the career you want to be in. You got to pursue that elsewhere. That's the sucky part about it. You can't be where you want to be. You've got to be somewhere else to make a living so that you *can* be where you want to be.

A woman with one of the full-time jobs in the community described the economic difficulties that forced tribal members to live elsewhere:

> There's a lot of different kinds of problems that people deal with here in the village. No jobs, no subsistence, no boat, no gas, no money for gas. It gets hard. Some people all work together to help one person. Or, you know, all family members go and help one person. Or their nephews might pay for the boat parts to get their motor going. They all help each other.

> There are no kind of jobs here. No economy here. No jobs. Just nothing here. So they have to go leave, go to school, get a job. Just to make a living, so they can pay for whatever they need. But it's getting hard out there in the city, so people are talking about coming home now. I heard that maybe four families will be coming home, but I don't know. Maybe just one. But a lot of people are moving away and some are moving back. I was actually thinking about leaving, too. My boyfriend is out there looking for a job right now. I have a job here. I have a brand-new home here I've had for almost a year. And I want to keep that. It's like a retirement kind of home I'm trying to build on here. If I leave here then I'm going to have to start all over again.

Some tribal members established dual residences, coming to the village to fish during summer and working outside during the remainder of the year. This was becoming a more common pattern, according to this elder:

> My view is that everybody's just leaving the village. There's not too many here. So they're all in Fairbanks, Anchorage, somewhere. Moving out of here. If they do come in [seasonally to fish], that's what they're doing now, the ones that are here at those camps, they're just here about two or three weeks, maybe not even that. If I were in their shoes I'd be the same way too. I'd just come over, get my fish, and then go back. And then that's it.

Among current residents in Stevens Village, many are individuals who have lived outside the village for periods of time and have returned. One surveyed household contained an elder who had worked most of his adult life in the Anchorage area after training in engine maintenance. At retirement he returned to Stevens Village. During summer he lived at a fish camp, catching and smoking salmon for subsistence uses. Another young man who served in the military recently returned from overseas duty. During 2008 he worked to establish a fish camp downriver from the village. He planned to return to active military duty outside the state. The elders in a third household had worked most of their adult lives outside the community. Their children were raised by grandparents. They had returned as older adults and fished with the help of their adult children. This type of mobility during a person’s lifetime appeared to be the norm.

The following case illustrates a household recently returned to the village in 2006. The household, a married couple with two children, were adapting to village life, acquiring equipment for fishing and hunting, and participating in subsistence activities. The female head, now 47 yrs old, said she regularly moved back and forth between the city and village as a child.

> I was born and raised in Anchorage until I was eleven. My aunt raised and adopted me. Then I moved to Fairbanks to meet with my real mother. So I went back and forth all the time, and back and forth from Stevens. You know, I'd live in Anchorage and come to Stevens for the summer for fishing. My mom fished at my auntie's fish camp. And we also used to go way past to the old camp of my grandmother’s.

Living as a young adult in the city, she did not completely learn subsistence skills. She had to relearn them with the help of friends.

> I forgot how to cut fish, living in Fairbanks all them years. So when we moved back over here to Stevens, I was looking at that fish like, I don't know what to do with that thing! I didn't even want to touch it! [Laughs] But my friend, I'd go up to her house and she'd show me. The first time I cut fish with her, I cut my finger. I quit! But she taught me how. I went to fish camp with her. We stayed up there for a little bit. I spent a couple days with her and caught fish.
>
> Our first year here was pretty rough because we weren't used to the no showers and no bathrooms and hauling water, cutting wood, and we had to figure out this wood stove. Now we've got it pretty well down. You know, you have to climb on top of the house, clean the chimneys, and keep the grass cut, otherwise you end up with more bugs all over. They did that perma-chinking around the logs [to help insulate the house]. Now we've just got to do around the windows.

Before the move, she worked at Kuparak oil field. Her mother watched her two children in Fairbanks. When her mother died, she decided to move back to Stevens Village for the education and welfare her children. The move was also for economic reasons, as the family found the cost of living in the city prohibitive.

> We came back because of my boys. I wanted them to have a subsistence lifestyle, teaching them to learn to hunt, to learn the family background. I didn't want them growing up in town where they'd start running around getting involved with drugs and alcohol. Before we moved here the oldest was coming home at like four in the morning. Grandpa was going out looking for him. So I said, "Nope, we're leaving."
>
> And the rent in Fairbanks for the house I lived in was coming to $3,000 a month! You had to pay for the water. The sewer was separate. Every time that toilet flushes, you're paying for it. And then the electricity! It was too much. I couldn't afford it. Even when I worked up north I couldn't afford it. I worked at Kuparak for five years. When my mom passed away – she was the one that mainly watched the boys – she was buried here, at Stevens. So that was another reason we moved back.

When she returned to Stevens Village, the tribe supplied her with a house.

> These houses were all built the same time. Last year they sort of just gave them to us. I mean, they were built pretty poorly. The woman who stayed here before us moved to Fairbanks. I don't know why she moved back. I think it was just because there's no job or something. I don't know what happened.

Her mother originally left the village because there was no employment. Now she faced the same difficulties with her partner.

> My mom, she had an old man that worked out of the village. That's how it was. There was no way for her to support herself here in the village. I mean, there was no jobs. I'm facing that issue now. I mean, me and my husband thought we'd work the summers, there'd be some kind of work here. It'd be good to work, but there's none.
>
> Like they had Bryce Construction here, and then regional housing when they were working on these houses. So he had a job then and we were able to get by pretty good. My husband, he's a carpenter, a painter. He's all kinds of things. But they don't have that kind of jobs here. He got his red card so he got to go firefighting for the first time. That was about a week ago at Venetie, that fire over in Venetie. But he was only out there for five days.
>
> Now I've got to collect the welfare and that doesn't cut it with the electric costs on this house. Our electric quadrupled. For a while it was fifty bucks a month. Now it's two, three hundred a month. And we're cooking outdoors most of the time. We need to get a gas stove or a propane stove instead of electric. Plus we've got two freezers plugged in. But our freezers don't burn that much. When we got everything off, we hardly burn it, you know.
>
> And gas costs! Gas is the thing. One lady told me, they're going to pack up fish camp. They can't afford the gas to go check the net. Not for one fish a day, she said. It ain't worth it, not with that gas price.
>
> Living here is expensive. We thought it would be cheaper because we have a house we don't have to pay nothing on. But you know it's not. You got to buy fuel, you got to keep things running. Like chainsaws. If a chainsaw breaks down, you got to order one. We waited for about two months.

The previous year the household had three months of seasonal employment outside the village at Coldfoot, earning a total of $3,600. Other than that, the household received $3,308 from state permanent fund dividends and $900 from Native corporation dividends. They also received foodstamps and energy assistance.

With so little money coming in, it was difficult to maintain equipment for fishing. They were given a fourteen-foot boat by an uncle. They purchased a 30 horsepower outboard and a hundred-foot gill net with large mesh for Chinook salmon. They had a small drying rack and smokehouse in the village and two freezers. For winter travel, they had a snowmachine and a small dog team with eight adult dogs. The previous year they caught ten Chinook salmon, a moose, twenty hares, a burbot, and a beaver for about 807.5 lbs of food (about 202 lbs per person). They also cut and hauled about four cords of wood to heat the cabin.

In 2008, they placed the gill net directly across from the village in an area where several families had nets. This location reduced fuel expenditures:

My cousin told us, "Just put your net across the river. That way you don't have to go too far to check it." So we did that. There's an eddy there. That's why there's so many nets. Sometimes there's like four nets over there. Last year I remember seeing just a row of nets.

"If they're open, they're open." That's what everybody told us. So we just put it in. J said that they don't own that site. "If there's no net there, go put your net in. But if you take it out, and you move it, then somebody else will take it." They can do that.

We had our net last year down at Cotton Point. That's where we put our net in and we didn't do good. We were getting one fish every two or three days. This new spot over here, we're getting more. We were getting like two a day for a while and then we were getting nothing. When I went to get the net out yesterday, there was one fish in there. We took the net out, though, until we can get that boat going and put the net back out.

The household was experiencing problems catching fish because of a broken outboard motor. They could not afford to replace it. At the time of the interview between the first and second Chinook runs, her husband worked on the motor outside the house. He used money from the five-days of firefighting to purchase parts. The family had caught only a few Chinook salmon so far. They were considering fishing the fall chum run to make up for lost food if a smaller mesh net could be procured.

We just bought a starter for the boat. Then the darn thing won't go! He's trying to hook up a driveline to it. We got the boat from my uncle. The boat must be an antique. We don't even dare to put new rivets in it. We put some kind of a bondo-seal in it. We don't know if it'll work. It might just fall apart out there.

If we don't get a boat going, we're not going to be getting any more fish. And nets are expensive! I think our king net cost almost four hundred. You'd have to use a welfare check just on that to get it. That's what I'm going to do with this one. I'm going to get a silver net. Maybe next year I'll have a boat going.

We wanted to start a fish camp and take our dogs with us. It would be good for the boys. I think we'd be able to focus on fishing more, rather than focusing on what's going on in the village. Me, I'd like to go upriver. That way if the boat breaks down we can float it down. Just float home! [Laughs] That's what I want to do. I want to get a fish camp with these boys where they're just learning the basics of fishing.

We wanted to go berry-picking this year, but I think about as far as we go is back by the old airport to get raspberries. That's another thing I like about out here. There's a lot of food out there, but...

Moose – that's another hard thing to come by, you know. We got lucky. We got one [last year]. We shared it around because they say the first kill, it's bad luck if you don't share it. So you donate moose to everybody. But we still got some left. And

> buffalo from the tribe. The First Chief brought us buffalo. That stuff was really good. I liked it. Just like beef.

They have considered moving back to Fairbanks because of these present economic difficulties.

> We're not going to get no fish if that boat isn't fixed. I don't know, we might just go to town [Fairbanks]. I'd go back to work. I want to apply with the NANA to go up north and go housekeeping again. Or some other company. I have a friend up there right now and her starting pay is eleven dollars an hour, and then after her first four weeks she'll get a raise. It would be two weeks on, two weeks off. I'd stay up there for as long as I could. Well, I used to when my mom was around. Now it would be hard. I'd have to come back [to watch children].

The village feels like home to her, though she finds fitting in difficult at times. Keeping the school open with so few students was another problem they faced.

> Yes, I feel like this is my home. I just... there's so much, what would you call it? There's so much anger in this village. There is. There's a lot of animosity here. And it's really hard to live with people like that. You know one minute they're "hi!" and the next minute they're glammering at you! It's like, "Gosh!" So... I don't know. They don't talk to me one day, but I don't care.

> The school, you know what, I'm not sure if we have enough kids. I mean, S's got her children. And they're going to lose A. Actually, young G's going to be gone, too. They're supposed to be going to Galena. So they're going to lose two more students. How many was there up there, son? [Son's answer: "Ten or eleven."] And then J graduated, so that's three that are gone from that school. [Wolfe: "People need to crank out some babies."] Well, my baby days are over.

This family's return to Stevens Village illustrates the difficulties of making a living in a small village with few jobs. The lack of money affected their ability to pay for basic services like electricity and fuel, and acquiring the tools for subsistence fishing and hunting. Though absent for much of her life, the female head received assistance from her extended family and from the tribe, including second-hand equipment, a house, training in cutting fish, and advice where to set a net. In this case, the traditional culture drew the family back to the tribe's center at Stevens Village. They had returned to be part of that culture. Subsistence traditions like fishing for salmon, fish camps, and running sled dogs had brought them home. It remained uncertain if they would stay. The lack of local jobs was pushing them away.

Fishing Regulations

Fishing regulations mediated access to Yukon River salmon stocks. Customary rules guided the activities of extended families at the local level, including conventions regarding harvest areas, harvest methods, and disposition of the catch. Alongside these local customs, fishing was regulated by state and federal entities.

During interviews, key respondents occasionally commented on fishing regulations and the regulatory system. Chief among the main concerns raised were limitations on fishing times (open and closed seasons and periods), limitations on gear (mesh size), and the lack of effective regulations on high-seas salmon by-catch. This section summarizes these concerns expressed by key respondents. In all communities, key respondents talked about regulations. The summaries presented in this report are reflective of the degree to which an issue was discussed by key respondents in a particular village.

Closed Periods

On the lower river, many families preferred to put up subsistence Chinook and summer chums soon after river breakup. With the bulk of the subsistence catch drying, then families with commercial permits would fish for sale during commercial openings. Families caught additional fish for subsistence uses between commercial periods, as needed. Under such a schedule, subsistence fishing would get an initial week or so jump on commercial fishing. The two kinds of fishing would be kept distinct, separated by alternating open-and-closed periods.

This preferred schedule has not often been achieved during the last decade or so of weak Chinook runs, according to key respondents. The state and federal management strategy has sought to take fishing pressure off the earliest pulses of the Chinook runs in order to get Chinook upriver to meet escapement goals, fish counts at the U.S.-Canada border, and subsistence uses in upriver districts. At the mouth immediately after breakup, there is always uncertainty regarding the strength of the Chinook and summer chum runs. Information on run strength is primarily collected with sonar counts at Pilot Station, about week after Chinook entered the river mouth. Cautious management has erred on the side of conservative openings until that information became available. Further, in years of strong summer chum runs but weak Chinook salmon runs, fishing times tended to be restricted in the lower river commercial chum fishery to avoid a by-catch of Chinook. Mixed-stock management has favored Chinook over summer chum salmon.

In recent years, managers have tried to open subsistence fishing for seven days a week right after breakup to allow the earliest Chinook to be caught (said by some to be disproportionately small males). But as soon as the first pulse of Chinook salmon appears, subsistence fishing has been reduced to two open periods a week (two 36-hour periods or two 24-hour periods). Eventually commercial fishing may be opened. However, in 2007 and 2008, commercial fishing with Chinook gear (gill nets larger than six-inch mesh) was not allowed, effectively closing commercial fishing of Chinook

salmon. Overall, the management intent is to reduce fishing pressure on the earliest portions of the Chinook runs while providing for subsistence fishing and secondarily for commercial fishing.

According to key respondents at Alakanuk, the early closed subsistence fishing schedules create problems for families: increased costs for subsistence fishing (labor and money) to compensate for the closed periods, increased difficulties processing subsistence salmon, and shortfalls of food. Such problems are worsened under particular conditions, such as bad weather (affecting spoilage), fish run characteristics (if fish disproportionately come into the Yukon River through the middle or north passes rather than the south passes), and inabilities of families to adjust to the regulatory closures. The closures also contradict a customary rule that people should actively harvest when a subsistence food makes itself seasonally available, not when it is absent.

Some families have modified their fishing methods in an attempt to meet their food needs. One Alakanuk fisherman described how he shifted from set nets to drift nets in response to fishing closures in 2008:

> This year it was pretty hard on us. The controlled time from Fish and Game came at an earlier date, late in May after breakup. We were given eighteen hours to subsistence fish each period, two in a week, and even that was cut down later on.
>
> I camp and do my subsistence and commercial fishing from camp. My camp is along the coast on Manning Island. I use one net for subsistence. Usually I set net to catch my subsistence fish because I depend on the tides to bring the fish in. It's usually kind of late at night or early in the morning. If the schedules are long then I set the net and I'm able to do other things on my camp [while the net fishes], take care of the camp, fix my smokehouse, fish racks, work on my nets.
>
> This year I didn't have time to do that. This year, because of the shortage of time allowed for subsistence fishing, I had to drift. I did my fishing late at night or early in the morning so I could catch the fish when the tide is high. I drifted for chums in the early morning, after one o'clock, one to five, one to six, when the high tide is along the coast. That's when we catch our fish along the coast. I was able to catch most of what I need [of chums]. I still need a little more, a few more fish to pack away for the winter. But I didn't catch any kings. No, I did. I caught three small kings, jacks. Those were the only kings I caught. Ordinarily I'd be satisfied with at least a dozen or so kings, even twenty at the most would be okay.
>
> I usually take what I need and then quit fishing for king salmon. When I have enough I quit. Most of the fish I caught this year were the early summer chum. I used one drift net for subsistence. But if the schedules are long, then I set net, because I'd be able to do other things. This year I drifted the best I could. I had to leave other things to time available, like working on my nets.

As this case illustrates, in subsistence salmon fishing, fishermen commonly work to reach some harvest goal to meet the family's food needs the remainder of the year. With the shortened fishing times, this fisherman anticipated that he would not be able to meet that goal. In response, he shifted to a more intensive fishing method. At the time of the interview, he had not yet reached it.

Another fisherman remarked that he chose drifting over setting a net when the open periods got restricted, though it cost him more money:

> For my part, I was trying to catch them early, but they put us on limitations, on restrictions, so it took me longer to put away fish. It was open two 36-hour periods from the beginning. And I think it was a couple of weeks after, they restricted it down to six-inch. A lot of commuting back and forth, just because they put us on restrictions for subsistence. Everybody travels back and forth more.
>
> I prefer to drift with short periods. Sometimes you catch more than if you're set netting. With unrestricted time, you could set net and the net would keep up with your cutting, putting away fish. With restrictions, it's just like, "Hurry up and go!" with the limited time.
>
> Drifting takes more fuel than set netting. You catch more for subsistence in a shorter amount of time. But it also costs coming back and forth if you had a set net.

Another fisherman remarked on the shift from set nets to drift nets because of short, subsistence openings. He also said shorter periods were turning subsistence fishing into a competition, like commercial fishing openings, concentrating fishing effort of all the village families into a narrower time and area:

> I think that now, that there's more people drifting. When we go for subsistence it's almost like a commercial period. There's a lot of boats out there. You don't catch as much as you want. You've just got to be behind people or ahead of them.
>
> When we do subsistence in the past, we'd go out any time, when the fish come in any time. We get what we need, come back in and tell people there's fish out there. They'd go out and go pick them out. But now, when we were doing subsistence fishing this early summer for chums, my brother and I went out and it's just like commercial. There's about ten boats drifting out there. And I told him, "Man, this is bullshit! Just like commercial!" We had to go look for another spot to drift. We burned more gas than what we needed to, just go out there. We had to go further down.
>
> Mostly I drift for subsistence. But this year I mostly had my king gear out of the water. Gas was too expensive. I didn't have the money to run around like I used to do in the past.

Short fishing periods designed to miss the main pulses in the salmon runs can have negative effects on subsistence salmon processing, according to several fishermen. The small, widely-spaced batches of salmon create difficulties for successfully drying and smoking salmon:

> When you fish for them piece by piece, a few hours here, a few hours there, the fish don't dry up at the same time. It takes a double amount of work to take care of the fish and cure them in the way that you want to. If you're getting enough fish at one time, the fish that you need to fill your smokehouse, at one time, that does save a lot of work, a lot of gas, a lot of fuel. If you do it piece by piece, you waste a lot of money on gas and fuel.
>
> The tide and the fish and the weather are important. We have to watch the weather. If we hit the right tide, the right weather, we get the fish. If the time is open and one of those things is missing, the fish aren't going to be there. So you end up wasting a lot more gas than if you fished when you wanted to get what you need.

Another fisherman echoed this concern. His preference was to catch salmon all at once and carefully tend to that single batch of fish through the drying and smoking process. It conserved on labor from his family members:

> We like to catch our subsistence all at once and then quit. We don't take very much when we do subsistence, like about maybe 400 chums, maybe 100 kings. The way they set it up now, two 36 hours or two 18 hours [a week], it takes [excessive] time. I don’t like it. We want our fish to dry all at once. I think they should go back to the old ways, without cutting us off on subsistence. I don't think a lot of people will take a lot of kings and chums. Once they get their subsistence, they quit. The rest [of the fish run] could go up.
>
> This year [2008] they closed us once for about a week. We don't catch no kings. And here there were kings running! Everybody was mad, because they wanted to make some more strips and dry.
>
> We [eventually] got our subsistence. But it took too long for them. When you do two 36 or two 18 [openings], we get ten kings and some chums. Then we have to dry them. They dry and then we go out and get some more fish. While the first ones are drying in the smokehouse, the second ones are out drying a little out in the fish hanger. Then we put them in the smokehouse. And while these were smoked and almost ready to put away, we got another batch to smoke! It will take us time. We have to [continually] look, so we wouldn't over dry them.
>
> It would be better to smoke everything at once than smoking it few by few.

Another fisherman echoed this concern about the problems of drying fish in small batches, rather than a larger, single batch. The different quality of fish drying at different rates risked over-drying and excessively-hard fish:

> You're trying to get them all at once when you're subsistence fishing. [If not] they'll dry different ways, the ones you catch early and the ones that you catch later. You're trying to dry them that way, the ones that you cut first. They'd sit and dry. The ones that you cut later will take some time for them to dry. So you want to try to get them all done at once, rather than stretch it over time, because sometimes they get over-dried. That's when it gets really, really hard.

By happenstance, short subsistence openings might occur during bad weather, creating problems with processing that batch of fish. Because of the increased potential for spoilage, some fishermen wouldn't fish an opening under those conditions:

> With restrictions, what's the use of fishing for subsistence if it's raining? They'll just spoil by the time they hang a day or so. They spoil. It's just a waste of effort.

Without the restricted schedule, fishermen would have more flexibility to choose a dry day to catch and process subsistence fish.

Shorter fishing periods can create difficult fishing conditions for set netters. Set nets at the mouth are influenced by tides. A net's productivity is affected by the direction of the tides, tidal strength, and water depth, all of which influence the passage of fish and the shape of the net. For fishermen who continue to use set nets, the short openings required setting and pulling nets in the dark, as described by an Alakanuk fisherman who typically fishes for both subsistence and commercial uses:

> I have two nets I really rely on. Actually, I have one that I really rely on. But the other one came back, the eddy came back. It's right on that point. It's kind of like two rivers coming together, feeding off of this side and feeding off of this side. It's okay at slack tide, but when the tide comes in I have to pull the net because the current is too strong. When the tide is too strong, it pulls the net out of the eddy and it doesn't catch fish. So I get maybe four hours of fishing each opener for that net, and then nine hours for the other net.
>
> Right now, during the first season, we had only six hours. That's only six hours of fishing. Last year Fish and Game were doing their openers at three in the morning. It's pitch black. We traveled down maybe two o'clock in the morning. That was crazy, you know. Almost ran into somebody's net! So I thought that was crazy, having us fish out there when it's pitch black. A lot of us don't have GPS's.

As stated above, subsistence fishing typically is guided by customs and traditions at the local level. Most wild resources are seasonal, appearing for short periods of time. To the Yup'ik way of thinking, the animals make themselves available at that time so that people can catch and use them. One traditional principal is for good hunters to be active at those times when food makes itself available. From this point of view, it's absurd to close when the fish are present and to open when the fish are not. This elder talks about these traditional principals at Alakanuk:

> Like my old man used to tell me, he said, 'get them while they're here.' If they pass on through, if you try to catch them later than that, you won't catch nothing. When the fish come they should let them fish. You can't sell them.
>
> Right now, they are giving us twenty-four hours [open period]. What for? That doesn't do me any good. I don't need to fish. It's something I don't understand. When the fish are here, they limit you. When the fish are gone, even if you try to catch, you won't catch them.
>
> So when the fish are here, I go out. Then you can come arrest me if they want. Yeah. A couple of times, even if it's closed, I go out because the fish are there.
>
> That's subsistence for the living purpose, for the family needs that have to be met, subsistence for the family purpose. I think somehow the state should leave it alone at some point.
>
> Fish and Game shouldn't bother [regulating] subsistence anyway. Right now, you and I took whatever we need. We need up to that point and that's it, you know. You quit, yeah. You can have the rest if you want it. Why mess with subsistence anyway? The periods, you know.

In this case, the elder admitted to occasionally fishing during closed periods because the fish were running. Previously he had fished during an open period when the fish were absent and had come up with nothing. 'Come arrest me if they want,' he said. By and large, this was an exceptional response to fishing closures. By and large, subsistence fishermen on the lower river attempted to abide by the closed periods. However, as this case illustrates, in extreme circumstances, individual fishermen may feel forced to fish outside the regulations to meet their family's food needs.

A traditional Yup'ik belief is that fish go away if they are not used. It's like the traditional understanding that lazy people go hungry. This same elder explained these traditional principles:

> My old man, the people in the old days, they used to say, 'If you don't catch fish, they won't be abundant, eventually.' It's just like the muskrats or minks. If you don't hunt them, they will decline. But if you hunt them for a good purpose, yes, then they will increase. But if you don't catch them, if Fish and Game don't want you to catch the king salmon, they will decline, yes. If Fish and Game don't want you to catch chums for your own subsistence, well, they will decline. A lot of people believe that. And a matter of fact, it's true.
>
> Like the old folks used to tell me, 'if you're lazy, you won't get nothing.' [He laughs.] During the wintertime, if you're cold, if you don't have no wood, you'll be cold. If you don't have no food on the table, if you're lazy, you'll be hungry. If you don't catch whatever, when it's available, if you don't catch it, you'll be hungry. But

> if you catch it right there when it's there, then you'll have something. If God brings me fish into the Yukon River, I have to catch them for my family.
>
> Like they told us, 'if you take more than what you can take, then it will spoil and it won't do you any good.'
>
> I don't know about commercial fishing now, but why is Fish and Game stingy with the [subsistence] fish? I don't know. The old saying is, 'get them while they are there. Because God will give you more, eventually.' I really don't understand Fish and Game, even if I try.

Another fisherman expressed concern about the closures effect of concentrating subsistence fishing efforts on particular segments of the runs. As general principles, he thought fishing during the pulses, or spreading the effort across a longer span of time, runs might better protect the escapements of weaker segments:

> The runs of the fish, we really don't know where they go. If we fish according to the schedules Fish and Game has, some of the fish may be going to a certain creek, and only that certain creek to spawn. If we catch most of those fish, then there are fewer for that particular creek. But if we catch when most of the fish come together, even if we catch, they'll still be enough to spawn in a good manner.
>
> The old people long time ago, my grandfather, my father-in-law, they say that animals, any kind of animals, fish or game, they fluctuate. Some years they go up, some years they go down naturally, even without human cause. It could be environmental. It could be weather. Anything. But if the environment is there, and if there are enough numbers to re-grow again, that species will come back. So those two are important. There has to be a good environment and there has to be enough escapement.
>
> In the past, traditionally, those old people regulated like they knew that. That's how come they didn't starve a long time ago. Otherwise, if they didn't regulate themselves, we would have died out long ago. Traditionally, a long, long time ago, people regulated their own fishing. It was the elders who told the young people when to fish, where to fish, how much to catch, when to quit, to take what they need and nothing else.

This fisherman said it was difficult to make ends meet with the combination of high gas prices and shorter subsistence fishing periods. He worked subsistence fishing around his paid job in town:

> The open periods this year, I think they're averaging like nine hours, six hours. With short hours and very few fish in the river, it's pretty hard to make ends meet, especially with the high price of gas, the amount of gas that we have to use to go out to the fishing grounds.

> I have a full-time job. It's mainly after working hours or on weekends when I do my subsistence fishing. I don't commercial fish. You just have to deal with the closures and see when is the best time to go out there, whenever the fish are out there. I usually call Fish and Game and listen to their recorded messages on where the fish might be, how much they're catching in certain areas.
>
> This year, I think I did a lot better than I did last year. Last year I started late because I was in another village and by the time I got here, pretty much all the salmon had gone through. We were fortunate enough to have some dried fish from the previous year that we used for last year. It was probably toward the spring when we finished our dried fish. It lasted until then.
>
> This year I probably caught, I don't know, over a hundred chums. And probably about thirty, a little over thirty kings.
>
> I'm looking forward to fall chum. It's pretty hard to say how much you're going to use, but if they're available, then we want to get as much as we can, though not more than what we need, as far as to get by through the winter. Our family helps one another, as far as getting dried fish for the winter.

At Anvik, subsistence salmon fishing times also have been reduced through open and closed periods. The effect here is that fishermen may miss the main run, catching the fewer fish at the beginning or end of a run, according to this fisherman at Anvik, describing the season in 2008:

> Fish and Game cut our periods down, hour-wise. We usually have two forty-eights per week. They cut us down to two twenty-fours per week for about a week or two. Now it's back to forty-eights again. When the fish are strong, Fish and Game will just open up 24/7. But they haven't done that this year. There must be something going on downriver, they're not getting their count [from the sonar at Pilot Station].
>
> The closures give the fish more time to go by. If it's closed for three days out of the week, those three days those fish can go by. You might just get the tail end of the run or the front end of the run. While it's closed all the nice fish will go by.

Closures increased the costs of fishing for subsistence fishermen at Anvik, according to another fisherman. Closures forced them to fish longer for stragglers and to spend more on fuel while fishing:

> I missed the first part of the [Chinook] season. I heard there was quite a few fish the first two weeks of the run, but I wasn't here. I got the second half of it with the shorter seasons, the twenty-four hours they cut us down to. After we went to twenty-four hour periods, the main run went by us. We didn't catch what we needed. We fish for twenty-four hours and then the run starts hitting and then you're shut down for forty-eight hours. I guess that's the way Fish and Game designed it. But we still need

some fish, too. We can't just go fish with the price of gas nowadays. We're only catching stragglers.

Families are just going to have to try to survive the best way they can. I mean, we've been doing it for years. You know, this ain't the first year that we ran short on the fish. It's been going on for thousands of years. And sometimes the fish are out there but the people aren't. So you have to be there when they're here.

Six-Inch Nets

Mesh size was another regulatory issue raised by key respondents in 2008. By in-season announcement, at times fisheries managers have reduced the allowable size of a net's mesh to six inches or less to conserve Chinook salmon. The six-inch mesh restriction created certain problems not intended by Fish and Game, according to some fishermen. One problem was drop-out loss of large Chinook salmon from six inch nets, a difficulty that undermined the purpose of the regulation. Another problem was encroachment of fishermen from District Y-3 into District Y-4 because of the six-inch mesh restriction.

An elder at Alakanuk observed that smaller mesh nets were not good to use during the Chinook salmon season on the lower river because of drop-out losses:

Fish and Game didn't allow commercial fishing for Chinook this year. And all our mesh sizes for subsistence fishing were six inches or smaller. We couldn't use any net over six-inch mesh.

Fishermen here have both, the king nets and the chum nets. King nets are anywhere from eight-inch to eight-and-three-quarters-inch mesh. Chum nets are from five-and-a-half-inch to five-and-seven-eighths-inch mesh. There might be some that are six-inch. The ones I use are generally five-and-seven-eighths.

King nets are used mainly for commercial fishing and some subsistence fishing, not much though. Chum nets are used for both subsistence and commercial fishing, but a lot more for subsistence.

The small nets are less efficient for catching kings. They probably are more dangerous for Chinook. When larger Chinook get stuck on six-inch mesh nets, their snouts get tangled up and they can't breathe. They have to open their mouths to breathe and the mesh size is too small for them to open their mouths so they can't breathe and they die very fast. That's one danger to larger Chinook salmon for using small mesh nets. They die and they fall out when the net is brought in. They don't get tangled up. They're just there hanging on by a little piece and when the net is lifted up they just fall out. Or when you're drifting the net, the salmon stay there for a while, but due to the currents or checking the net they fall off even before you get to them. The same thing in set net areas when using the small, six-inch mesh. You

can catch the smaller kings, those under five years old maybe, the ones they call jacks, on chum nets. If you're lucky you might catch a few big ones when they get tangled up, when they roll over the floats, that's when you can catch them. But I think most of them die. We tell Fish and Game that the smaller mesh gear is not good for the big kings but I don't think they realize that yet.

The issue of drop-out losses was raised by another subsistence fisherman from Alakanuk. Elders have reported problems with six-inch mesh:

> We've heard this all along that the elders are saying that when you reduce your mesh gear down you tend to kill off the big salmon, because all they're doing is just getting hung by their nose. Big fish like that, once you catch them they die right away. They don't live very long. Salmon that are caught passed their gills, around the body part, they tend to live longer than those ones that are caught right around the mouth. A lot of times when you pull up a big king like that, they're dead already in less than maybe fifteen, twenty minutes.
>
> So based on what the elders say, the fishermen are concerned about that lower mesh with the kings. That's the message that they've been sending to the Board of Fish and Federal Subsistence Board, that if you reduce the mesh size, then you're just killing off the big salmon that are destined to spawn. And not only killing them off, you're losing them. They're getting wasted. They drop out of the nets because they're not fully caught. It's almost as bad as the pollock fisheries that are wasting those fish out in the high seas.
>
> It's pretty hard to work with the managers. Yet they try to work with us. I mean, they say it, you know, in public. But I don't know how much of our information is really looked at, for them to say, "yeah, that's the case."

A middle-aged fisherman echoed this problem with drop-out loss. Six-inch nets have been observed to create significant problems for the Chinook runs on the lower river:

> Going back thirty years, thirty-plus years maybe, I used to watch my old man set net with a six-inch. In six hours, you catch kings by the nose and they're already dead. So when we're drifting with six-inch [because of the mesh restrictions], I know we kill king salmon, especially the big kings.
>
> When they put the six-inch restrictions on kings, the six-inch is actually killing the kings, even if you don't catch them. They just drop and then they die. I heard it from my old man starting forty years ago, and from the elders.

Drop-out loss is a particularly difficult issue because of traditional prohibitions about waste. It's commonly taught that waste causes wild foods to disappear. The life forces that govern the movements of fish are highly sensitive to waste. It's believed that fish are reluctant to swim past the bones of fish touched by humans, or killed by gear operated by humans. The fish can sense the touch of humans. So there are multiple problems with

drop-out loss. The fish are lost as food, requiring people to catch additional fish for food. And the unused carcasses drive away the wild fish from the area in the future. As stated above, Yup'ik fishermen have communicated these concerns to managers in the state and federal agencies. But fishermen report that the managers have not yet been convinced of the validity of these observations.

Another issue reported regarding six-inch mesh restrictions was displacement of subsistence fishermen into other fishing areas. In 2008, subsistence mesh restrictions in the area around Holy Cross pushed fishermen upriver, creating problems for set netters from Anvik. This was the first time this displacement problem had happened, according to key respondents at Anvik. During the Chinook run, managers announced an in-season prohibition on mesh larger than six inches in District Y3. Fishermen in Holy Cross decided to cross the line into District Y4 to drift nets, as described by an Anvik resident:

> Fish and Game restricted them to six-inch mesh at Holy Cross. After they restricted Holy Cross, they started coming up here and fishing. They were drifting right in front of people's set nets. That made the set nets worse. The set nets weren't doing any good.
>
> They came up and intercepted a lot of our fish. Well, I guess it's not *our* fish, but in a way it was because we were open and they were closed, that is, they were restricted. A lot of them came up. I think that should be changed. I think if you're a Y-3 fisherman, you can't come to Y-4 and fish, take our fish, unless you're a resident of Y-4. We don't go down there and do that to them.
>
> They put a lot of hurt on a lot of people. There's a few set nets that usually did good. Some of those Holy Cross guys down there were drifting. They were getting fifty, sixty a night. The set nets never get fifty, sixty a night. They only get like ten. So they're intercepting a lot of the kings that were coming up to the set net sites here. I know a lot of people were upset about it. But there's really not much you can do about it because there's no law stating that they can't come up here and fish. I think that should be changed.
>
> Traditionally, everybody pretty much stayed in their boundaries. Anvik would stay here and Grayling would pretty much stay up there and Holy Cross would stay where they're at. But the fishing's been so poor that everybody's been running around looking for somewhere to fish. I don't blame them, I guess, but I don't think it's fair to the local fishermen.

Another Anvik fisherman described the competition from Holy Cross created by the six-inch net restriction, a situation he called an "onslaught":

> The onslaught from Holy Cross, the people that came up, they caught a lot of our fish. They were using drift nets. I was there at that time with them, drifting too. It's not very far to Y-4 [from Holy Cross]. They've never done that before. There was no need to. I saw about ten boats that came up. The gear cuts into catch rates. I know it

> did mine. I used to have a good net spot, but the channels change, so I'm more into drift net myself now, instead of set net. Let them fish their gear in Y-3, you know, all they need.

Another fisherman at Anvik believed a six-inch net restriction did not conserve Chinook salmon. It might lead to more Chinook being caught. He reasoned that people fished for a certain poundage of dried fish for the winter food supply. If people caught smaller-sized Chinook salmon with the six-inch net, they would simply fish longer and catch more Chinook to meet their requirements.

> If they restrict us to six-inch mesh, we're going to end up just catching more because you're looking at poundage. If you do restrict us to six-inch mesh it's not really going to help anything. We're just going to catch more fish. Instead of getting like a hundred big ones, I might go for a hundred and fifty medium ones. So it's going to affect the fishery either way.

Another problem created by the smaller mesh was increased catches of summer chum during the Chinook season. By the time summer chum reach Anvik, many were only suitable as dog food. Without dog teams to feed, families had no use for extra summer chum:

> With six-inch mesh, you'll catch more dog salmon than kings. Down in Holy Cross when they were using six-inch mesh, they were just loading up with chum salmon. You'll load up when they're running thick. It's frustrating, because that's not what you're looking for. No matter what you do, there's going to be some kind of drawbacks. I think Fish and Game is going to have to sit down and think about that.

High-Seas By-Catch

High-seas by-catch of Yukon River salmon was a third regulatory issue identified during interviews during 2008. Salmon interceptions in the North Pacific and Bering Sea have been long-term concerns for Yukon fishermen. The most recent interception problem was the increasing by-catch of Chinook salmon in the Bering Sea pollock fisheries. This section provides comments from just two of the many people that mentioned this concern.

One fisherman at Alakanuk believed the low Chinook runs on the Yukon resulted from the by-catch in the Bering Sea:

> The other things we've been hearing about are the by-catches out on the high seas and the Bering Sea. We really didn't hear about those by-catches in the early parts of the commercial fishing. Those were the days when there were plenty of fish. But when we start hearing about high sea fishing out in the Bering Sea, that's when we start hearing about the decline of the salmon. That's when some people became concerned.

> Some people were very active in trying to regulate those high-sea by-catches. But even though they are being regulated, they are still being caught. The number from what I hear has been increasing more and more. Fish and Game tells us that it takes about five years for salmon to come back to the river. Whatever by-catch occurs out there on the high seas will affect us five years later. This winter I heard through different news reports that the high seas by-catch was very high, as high as it's been since recording by-catches. I don't remember exactly what number it was, but it was very high, over a hundred thousand, maybe a hundred seventy thousand, something around there. In the past, the reports I always heard were always below a hundred thousand. Last year was the first time I heard that the by-catch was so very great.

An Anvik fisherman expressed similar concerns about high-seas interception and the depressed Chinook salmon runs:

> We're blaming it on the by-catch out in the ocean. I think that's where it's really happening. Because they're not doing any good down on the lower Yukon either, down toward Emmonak, in that area. So something's happening out in the ocean. It's not happening on the river. I don't know what's going on, but that's where I think it's happening. They've got nets out there miles and miles long and they're just looking for one product. They get another product, they'll just toss it out. I don't think Fish and Game should be blaming us. They should be looking at the by-catch, the incidental catch on the ocean.

Others also expressed concerns about salmon interception in the ocean fisheries. With fishing closures and six-inch mesh restrictions, it was an issue frequently raised during interviews.

DISCUSSION

A comparison of fishing patterns across two decades of research (1980 to the present) reveals substantial underlying stability in village economic systems within the Yukon drainage. Comparing this study with earlier reports (such as Andrews 1988; Case and Halpin 1990; Sumida 1988; Sumida and Andersen 1990; Wheeler 1987, 1998; and Wolfe 1981), the basic structure of the rural mixed economy appears essentially unchanged during that period. Most families had members that worked within subsistence and cash sectors. Subsistence activities remained organized within kinship-based groups (a domestic mode of production). Work within the cash sector was limited, including commercial fishing for middlemen businesses (recently on the decline), wage employment for city or tribal government entities, and short-term employment on local projects through grants. Earnings from the cash sector activities helped capitalize the subsistence sector. Together, the subsistence and cash sectors provided an economic base for villages. This organization of the mixed subsistence-cash economy of rural villages has endured over the last two decades in the Yukon drainage. Most changes documented

in this study through the household surveys and key respondent interviews appeared to be shifts or adjustments within this underlying economic form.

Over the last two decades, fishing and processing methods have been relatively consistent. Fishing gear remained small-scale, owned and operated within family-based groups. This study uncovered no major innovations in types of equipment or methods. (One exception, spraying pesticides on drying salmon to reduce fly larval infestation, a practice reported in Tanana, proved to be a localized innovation.) Observed gear changes were refinements of older types. Boats were now slightly longer on average; aluminum had replaced wood. Outboard motors included higher horsepower units and some fuel-efficient four-strokes. Drying racks and smokehouses were more commonly located at the home village, not at fish camp.

One important change was fewer fish wheels, a trend in middle river and upper river areas. This change has come with important consequences because it was linked within a suite of other changes in the commercial and subsistence fisheries for chum and coho salmon. Before the collapse of chum runs, fish wheels had helped produce large supplies of cheap dog food for local use and trade on the middle and upper river. Key respondents described how a portion of the subsistence dog food was a by-product (or satellite industry) of commercial fisheries that funneled to feed sled dogs for racing revitalized during the mid-1970s. So fish wheels, dog food supplies, commercial salmon fishing, and sled dog racing had linkages. After the late 1990s, weak chum runs shut down chum fisheries. Fewer fish wheels meant less cheap dog food. Higher dog food costs has lead to fewer sled dogs. As reported above, currently low-income dog owners at Stevens Village reported difficulties feeding their working dog teams without access to cheap chums from fish wheels. These changes accompany other changes in dog racing, including an aging cohort of drivers, out-migration, and shifts to commercial dog foods. If these trends continue, if dog counts fall substantially in the middle and upper river, the amounts of chum and coho necessary for subsistence use (as established in regulation) may require revisions to match the new, lower levels of use.

Households have responded to the weaker salmon runs. Where allowed by regulation, drifting had increased in some areas over the last two decades. Key respondents attributed this change to fewer and shorter fishing periods (commercial and subsistence). Drifting also enabled some wageworkers to fish during off hours from the village. Drifting represented an intensification of older methods to counter greater time constraints, though at increased monetary costs.

Increased drifting appeared to be associated with an increased reliance on Chinook salmon in middle river villages, as measured by per capita harvests. Previously, a greater mix of gear types (fish wheels, dip nets, set nets, and drift dip nets) caught substantial quantities of chum salmon. Shifts from shore-based gear (because of reduced local needs for dog food and the closure of roe fisheries) toward the large-mesh gill nets drifted in mid-river appear to be associated with increased per capita Chinook catches for subsistence food.

Since the late 1990s, depressed salmon runs have stressed the villages in the Yukon drainage. An already weak cash sector has been made weaker through restricted and closed commercial fisheries. While the rural mixed economy is resilient, the lack of money poses practical limits to survival. Lower incomes have created desperate situations for many households. Unpaid bills were "stacking up." In upriver villages, cash-poor villagers were being forced to out-migrate in search of work to pay off debts. During interviews, few respondents directly attributed the out-migration to fewer fish in the river. But links between out-migration and lack of money were clear. The several thousand dollars earned annually by households selling commercial salmon were extremely important for paying bills and supporting subsistence fishing and hunting. Historically, the commercial salmon fisheries returned modest earnings to fishermen, yet they have played central parts in supporting villages in the Yukon drainage. Currently, falling populations, failing schools for lack of students, and the drain of working families in upriver areas represented demographic factors that might undermine the cultural survival of the Alaska Native tribes along the Yukon River.

Families have responded to these difficult economic circumstances through increased seasonal mobility and multiple residencies, as shown by patterns at Stevens Village. Tribal members commonly worked at times outside the community (Fairbanks, the oil pipeline, and elsewhere) and at times on the river catching fish, based in the home village or fish camps. Such mobility poses regulatory issues if subsistence fishing eligibility is restricted narrowly to full-time rural residency. It may be important to understand dual residencies within a longer historic context, compared with traditional patterns of mobility of Athabaskan tribal groups for seasonal activities. It is of interest that the populations of Yup'ik groups, such as Alakanuk, though under similar economic stresses, have demonstrated different demographic responses from upriver groups. It was the impression of key respondents that the commercial fisheries, even during the limited years, have helped to hold the population to the area. Greater commercial fishing opportunities and higher rates of commercial permit use on the lower river are consistent with that view. In addition, Alakanuk (with 670 people) has a larger infrastructure that offered more locally-available jobs and fewer worries about school closures compared with communities with smaller populations.

Fishermen eagerly hoped for the recovery of commercial salmon fishing in their areas. But that future appeared dependent on many factors external to the region. Commercial fishing recoveries seemed to be tied to factors beyond the control of local fishermen, such as Chinook salmon interception in the Bering Sea and depressed market prices due to outside hatchery-produced roe and farmed salmon. The most visible sign of these external problems was the dwindling of middlemen buyers on the river. The only buyer on the lower river during the study year was subsidized by the regional CDQ group for pollock, an irony in that local salmon fishing survived through a non-local pollock fishery that intercepted its stocks.

Overall, the futures of the villages within the Yukon drainage appear to be closely tied to sustainable salmon fisheries for subsistence and commercial uses. A lack of income to households is stressing the rural economic system. A weakening cash sector

from depressed commercial salmon fisheries threatened the viability of villages, especially in upriver areas. Because of these difficulties, families were making hard choices about staying or leaving. The falling populations in many villages signaled difficulties for the futures of the traditional cultures and ways of life within the Yukon drainage.

CONCLUSIONS

Findings from this study on continuity and change in salmon fisheries along the Yukon River include the following:

- Mixed subsistence-market economies dependent on salmon fishing continue in the Yukon drainage villages covered by this study. The traditional organization of village economies persists despite new stresses from weak salmon runs. The basic structure of the rural economy (subsistence and market activities combined by extended family groups) resembles that described two decades earlier.

- A weakened cash sector has created economic stresses within Yukon drainage villages. Households reported difficulties paying for basic living expenses and for paying the costs of subsistence fishing and hunting. The deterioration of commercial salmon fisheries has worsened this cash-poor situation.

- Families reported increased difficulties feeding sled dogs. Cheap chum supplies have decreased. The higher cost of feeding dogs has led to fewer sled dogs and working teams in upriver areas. Declines of dogs may reduce subsistence demand for chum and coho salmon.

- In upriver areas, insufficient money is forcing people to leave their home villages for work. Out-migration of families for jobs is stressing schools and depressing village populations.

- Increased mobility and multiple residences are responses by some families to current economic difficulties. In Stevens Village, some families are maintaining dual residencies, with members working outside for income and returning seasonally to fish for salmon from camps or the home village.

- Changes in salmon fisheries linked to weaker salmon runs include the following: increased use of drift nets, decreased use of fish wheels (in upriver areas), decreased seasonal residence at fish camps, increased expenses (money and labor) in salmon fishing, increased reliance on Chinook salmon for food (in middle river communities), and difficulties in achieving subsistence salmon catches, especially in lower river and upper river communities.

- Restrictive subsistence regulations create difficulties for families in catching and processing salmon. Restricted fishing times reportedly increase costs for families, the potential of spoilage of subsistence products, and the likelihood of subsistence food shortfalls.

- Local fishermen on the lower river report that six-inch mesh restrictions have increased the dropout loss of Chinook salmon.

- The futures of traditional cultures and rural villages in the Yukon drainage are tied to sustainable salmon fishing for subsistence uses and commercial sale.

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Table 1. Selected Economic and Social Characteristics of Yukon Drainage Villages, Fairbanks Area, and the Anchorage/Matanuska-Susitna Area

Characteristic	Yukon Area Villages (40)	Anchorage/ Mat-Su Area	Fairbanks Area
Population (2000)	12,248	319,240	82,840
Percent Alaska Native (2000)	89%	10%	10%
Per Capita Income (2000)	$10,403	$20,166	$24,525
Adjusted Per Capita Income (2000)*	$5,397	$20,166	$24,083
Per Capita Wild Food Harvests (1980s)**	601 lbs	21 lbs	19 lbs

*Adjusted for the cost of food in the community. **See Wolfe and Walker (1987) and Wolfe and Utermohle (2000) for wild food estimates.

Table 2. Case Communities and Surveyed Households, 2008

Characteristic	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
Location (District)	Lower River (Y-1)	Middle River (Y-4)	Middle River (Y-4)	Upper River (Y-5)	Upper River (Y-5)	-
Cultural Group	Yup'ik Eskimo	Athabaskan (Deg Hit'an)	Athabaskan (Holikachuk)	Athabaskan (Koyukon)	Athabaskan (Tanana)	-
Population (2007)	677	102	163	71	257	1,270
Households Surveyed	40	27	27	7	30	131
Household Size	5.63	2.63	3.74	2.57	2.63	3.77
Household Sample Fraction	26.0%	84.4%	61.4%	30.4%	35.3%	38.8%
Year of Earlier Ethnography	1980 (Wolfe 1981)	1990 (Wheeler 1998)	1990 (Wheeler 1998)	1984 (Sumida 1988)	1987 (Case & Halpin 1990)	-

Table 3. Amount Necessary for Subsistence
as Determined by the Alaska Board of Fisheries
Yukon-Northern Area (5 AAC 01.236)

Stock	Amount Necessary
King salmon	45,500 - 66,704
Summer chum salmon	83,500 - 142,192
Fall chum salmon	89,500 - 167,100
Coho salmon	20,500 - 51,980

Table 4. Perceived Changes in Salmon Fisheries Reported by Surveyed
Households (Percentage of Households Responding "Yes"), 2008

Type of Change	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
Have Costs of Fishing Affected Salmon Fishing by Your Household or Others?	79.5%	81.5%	92.3%	100.0%	75.9%	82.5%
Have Fishing Regulations Affected Salmon Fishing by Your Household or Others?	80.0%	70.4%	76.9%	100.0%	79.3%	78.0%
Has Your Family Experienced Problems Due to Fewer Salmon?	75.0%	55.6%	65.4%	80.0%	55.2%	64.6%
Has Fewer Salmon Caused Changes for Your Household or Others?	65.0%	70.4%	61.5%	80.0%	50.0%	62.7%
Have There Been Changes With Use of Fish Camps in Recent Years?	32.5%	81.5%	73.1%	100.0%	51.9%	58.4%
Have There Been Changes With Salmon Fishing Areas in Recent Years?	57.5%	63.0%	38.5%	100.0%	58.6%	56.7%
Have There Been Changes With Dogs or Feeding Dogs in Low Salmon Years?	25.0%	51.9%	61.5%	100.0%	50.0%	46.8%
Have Family Members Moved From Village Due to Fewer Salmon?	15.0%	11.1%	23.1%	20.0%	10.3%	15.0%

Table 5. Wild Resource Harvests by Surveyed Households, Alakanuk, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Percapita	Total	Mean HH	Harvest	Percapita
All Resources	100.0	97.5	97.5	100.0	97.5		279,965.43	1,817.96	321.76			19.88%	24.20%
Fish	100.0	95.0	95.0	92.5	90.0		159,436.17	1,035.30	183.24			21.63%	27.57%
Salmon	100.0	82.5	75.0	62.5	75.0		114,315.74	742.31	131.38			27.97%	31.53%
Summer Chum	92.5	75.0	67.5	57.5	65.0	5.4	62,349.21	404.87	71.66	11,546.15	74.98	29.02%	31.07%
Fall Chum	62.5	55.0	37.5	40.0	37.5	5.4	9,043.65	58.73	10.39	1,674.75	10.88	56.25%	62.54%
Coho Salmon	40.0	47.5	25.0	22.5	22.5	5.2	4,164.16	27.04	4.79	800.80	5.20	67.08%	78.67%
Chinook Salmon	97.5	80.0	67.5	55.0	60.0	14.8	38,518.48	250.12	44.27	2,602.60	16.90	38.47%	41.49%
Pink Salmon	10.0	12.5	7.5	7.5	5.0	2.4	240.24	1.56	0.28	100.10	0.65	119.18%	119.10%
Non-Salmon Fish	100.0	90.0	87.5	92.5	80.0		45,120.43	292.99	51.86			25.34%	27.49%
Herring	32.5	12.5	12.5	25.0	20.0	6.0	1,432.20	9.30	1.65	238.70 gal	1.55	107.19%	108.38%
Smelt	15.0	15.0	10.0	12.5	5.0	6.0	231.00	1.50	0.27	38.50 gal	0.25	102.01%	101.64%
Pacific Tom Cod	40.0	25.0	25.0	27.5	25.0	6.0	1,155.00	7.50	1.33	192.50 gal	1.25	65.28%	66.11%
Eel	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Sculpin	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Stickleback	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Blackfish	82.5	45.0	42.5	72.5	62.5	6.0	5,024.25	32.63	5.77	837.38 gal	5.44	43.73%	42.72%
Burbot	80.0	57.5	57.5	57.5	47.5	4.5	3,153.15	20.48	3.62	700.70	4.55	37.53%	38.19%
Char	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Grayling	2.5	0.0	0.0	2.5	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Pike	92.5	85.0	82.5	57.5	67.5	2.3	10,510.47	68.25	12.08	4,671.32	30.33	31.99%	33.62%
Sheefish	92.5	57.5	55.0	72.5	50.0	8.0	9,848.30	63.95	11.32	1,231.04	7.99	56.93%	56.65%
Sucker	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Trout	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Whitefish	72.5	57.5	55.0	50.0	55.0	3.0	4,446.75	28.88	5.11	1,482.25	9.63	51.66%	54.11%
Bering Cisco	97.5	70.0	70.0	70.0	67.5	1.4	9,319.31	60.52	10.71	6,656.65	43.23	38.36%	39.14%
Land Mammals	100.0	77.5	65.0	97.5	85.0		50,980.74	331.04	58.59			34.62%	31.40%
Large Land Mammals	100.0	62.5	50.0	97.5	82.5		49,896.00	324.00	57.35			32.51%	32.16%
Black Bear	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Brown Bear	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Caribou	17.5	0.0	0.0	17.5	7.5		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Goat	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Moose	100.0	62.5	50.0	97.5	82.5	540.0	49,896.00	324.00	57.35	92.40	0.60	32.51%	32.16%
Dall Sheep	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%

Table 5 (Continued). Wild Resource Harvests by Surveyed Households, Alakanuk, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Percapita	Total	Mean HH	Harvest	Percapita
Small Land Mammals	47.5	42.5	37.5	20.0	15.0		1,084.74	7.04	1.25			49.19%	61.59%
Beaver	7.5	7.5	7.5	0.0	7.5	15.0	404.25	2.63	0.46	26.95	0.18	111.96%	112.82%
Fox	2.5	2.5	2.5	0.0	2.5	0.0	0.00	0.00	0.00	3.85	0.03	174.03%	0.00%
Hare	35.0	32.5	22.5	17.5	2.5	5.0	596.75	3.88	0.69	119.35	0.78	72.58%	73.06%
Land Otter	5.0	5.0	2.5	2.5	0.0	3.0	11.55	0.08	0.01	3.85	0.03	174.03%	177.26%
Lynx	5.0	5.0	5.0	0.0	2.5	4.0	46.20	0.30	0.05	11.55	0.08	128.38%	128.16%
Marten	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Mink	2.5	2.5	2.5	0.0	0.0	0.0	0.00	0.00	0.00	3.85	0.03	174.03%	0.00%
Muskrat	7.5	7.5	7.5	0.0	0.0	0.8	25.99	0.17	0.03	34.65	0.23	122.26%	122.65%
Porcupine	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Weasel	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Wolf	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Wolverine	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Marine Mammals	100.0	60.0	57.5	92.5	72.5		56,441.00	366.50	64.87			34.22%	43.41%
Bearded Seal	100.0	60.0	55.0	92.5	70.0	140.0	30,453.50	197.75	35.00	217.53	1.41	33.81%	32.64%
Ringed Seal	5.0	5.0	5.0	5.0	5.0	66.0	762.30	4.95	0.88	11.55	0.08	128.38%	128.16%
Spotted Seal	42.5	35.0	30.0	35.0	35.0	56.0	3,665.20	23.80	4.21	65.45	0.43	46.10%	43.98%
Steller Sea Lion	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Walrus	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Belukha	67.5	20.0	17.5	65.0	27.5	700.0	21,560.00	140.00	24.78	30.80	0.20	81.77%	82.66%
Birds and Eggs	97.5	77.5	75.0	72.5	65.0		7,492.10	48.65	8.61			27.75%	28.04%
Migratory Birds	97.5	75.0	72.5	72.5	65.0		6,695.15	43.48	7.69			29.90%	29.24%
Mallard	50.0	40.0	40.0	20.0	22.5	1.0	304.15	1.98	0.35	304.15	1.98	43.77%	43.89%
Northern Pintail	25.0	22.5	22.5	12.5	10.0	1.0	180.95	1.18	0.21	180.95	1.18	61.13%	64.48%
Scoter	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Canada Geese	95.0	70.0	67.5	62.5	60.0	1.0	1,024.10	6.65	1.18	1,024.10	6.65	35.08%	36.81%
Snow Geese	30.0	25.0	20.0	25.0	10.0	3.0	219.45	1.43	0.25	73.15	0.48	61.51%	62.84%
Swan	90.0	67.5	62.5	52.5	40.0	10.0	2,887.50	18.75	3.32	288.75	1.88	32.08%	32.51%
Crane	77.5	57.5	52.5	42.5	30.0	10.0	2,079.00	13.50	2.39	207.90	1.35	33.78%	34.95%
Upland Game Birds	55.0	50.0	47.5	32.5	27.5		796.95	5.18	0.92			44.87%	46.48%
Grouse	2.5	2.5	2.5	0.0	2.5	1.0	19.25	0.13	0.02	19.25	0.13	174.03%	174.13%
Ptarmigan	55.0	50.0	47.5	32.5	27.5	1.0	777.70	5.05	0.89	777.70	5.05	44.52%	46.17%
Bird Eggs							21.37	0.14	0.02				94.17%
Vegetation	97.5	95.0	95.0	47.5	60.0	2.5	5,594.05	36.33	6.43	2,279.01	14.80	20.66%	20.93%
Berries	95.0	92.5	92.5	40.0	42.5	4.0	4,716.25	30.63	5.42	1,179.06	7.66	19.46%	22.40%
Plants/Greens	57.5	52.5	52.5	10.0	22.5	2.4	877.80	5.70	1.01	365.75	2.38	55.25%	55.12%
Wood	70.0	67.5	67.5	15.0	32.5	0.0	0.00	0.00	0.00	734.20	4.77	43.29%	0.00%

Table 6. Wild Resource Harvests by Surveyed Households, Anvik, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
All Resources	100.0	100.0	100.0	92.6	92.6		54,260.18	1,695.63	644.80			26.77%	18.94%
Fish	100.0	100.0	100.0	88.9	66.7		38,442.90	1,201.34	456.84			28.26%	23.20%
Salmon	100.0	96.3	96.3	70.4	55.6		31,037.87	969.93	368.84			29.10%	20.52%
Summer Chum	59.3	59.3	59.3	29.6	11.1	5.4	1,049.60	32.80	12.47	194.37	6.07	51.14%	27.77%
Fall Chum	74.1	70.4	70.4	37.0	25.9	5.4	2,771.20	86.60	32.93	513.19	16.04	23.85%	22.91%
Coho Salmon	11.1	11.1	11.1	0.0	3.7	5.2	677.93	21.19	8.06	130.37	4.07	55.09%	52.08%
Chinook Salmon	100.0	96.3	96.3	63.0	44.4	14.8	26,539.14	829.35	315.38	1,793.19	56.04	22.73%	22.42%
Pink Salmon	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Non-Salmon Fish	96.3	96.3	96.3	66.7	44.4		7,405.04	231.41	88.00			48.73%	43.01%
Herring	3.7	3.7	3.7	3.7	0.0	6.0	142.22	4.44	1.69	23.70 gal	0.74	81.25%	80.39%
Smelt	3.7	3.7	3.7	3.7	0.0	6.0	142.22	4.44	1.69	23.70 gal	0.74	81.25%	80.39%
Pacific Tom Cod	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Eel	11.1	11.1	11.1	11.1	3.7	3.0	3,733.33	116.67	44.37	1,244.44	38.89	77.28%	76.42%
Sculpin	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Stickleback	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Blackfish	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Burbot	11.1	11.1	11.1	3.7	3.7	4.5	48.00	1.50	0.57	10.67	0.33	50.39%	51.55%
Char	3.7	3.7	3.7	0.0	0.0	3.4	80.59	2.52	0.96	23.70	0.74	81.25%	83.92%
Grayling	33.3	33.3	29.6	18.5	7.4	0.7	67.20	2.10	0.80	96.00	3.00	37.75%	38.98%
Pike	77.8	77.8	77.8	29.6	25.9	2.3	490.67	15.33	5.83	218.07	6.81	17.88%	20.74%
Sheefish	81.5	81.5	81.5	44.4	37.0	8.0	1,886.81	58.96	22.42	235.85	7.37	18.72%	20.04%
Sucker	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Trout	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Whitefish	81.5	81.5	81.5	40.7	25.9	3.0	810.67	25.33	9.63	270.22	8.44	19.58%	23.31%
Bering Cisco	3.7	3.7	3.7	3.7	0.0	1.4	3.32	0.10	0.04	2.37	0.07	81.25%	83.92%
Land Mammals	96.3	100.0	96.3	77.8	74.1		14,844.15	463.88	176.40			37.97%	13.38%
Large Land Mammals	92.6	96.3	92.6	55.6	70.4		14,153.48	442.30	168.19			9.82%	13.06%
Black Bear	11.1	11.1	11.1	3.7	0.0	58.0	171.85	5.37	2.04	2.96	0.09	47.05%	50.38%
Brown Bear	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Caribou	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Goat	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Moose	92.6	88.9	88.9	55.6	70.4	540.0	13,920.00	435.00	165.42	25.78	0.81	8.76%	12.98%
Dall Sheep	3.7	7.4	3.7	3.7	0.0	104.0	61.63	1.93	0.73	0.59	0.02	81.25%	82.76%

Table 6 (Continued). Wild Resource Harvests by Surveyed Households, Anvik, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
Small Land Mammals	63.0	51.9	55.6	40.7	22.2		690.67	21.58	8.21			39.95%	38.16%
Beaver	48.1	37.0	40.7	37.0	14.8	15.0	622.22	19.44	7.39	41.48	1.30	36.89%	41.22%
Fox	14.8	14.8	14.8	0.0	3.7	0.0	0.00	0.00	0.00	9.48	0.30	40.92%	0.00%
Hare	7.4	3.7	3.7	3.7	0.0	5.0	5.93	0.19	0.07	1.19	0.04	81.25%	80.39%
Land Otter	3.7	3.7	3.7	0.0	0.0	3.0	14.22	0.44	0.17	4.74	0.15	81.25%	83.92%
Lynx	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Marten	33.3	29.6	29.6	3.7	3.7	0.0	0.00	0.00	0.00	423.11	13.22	43.70%	0.00%
Mink	3.7	3.7	3.7	0.0	3.7	0.0	0.00	0.00	0.00	1.19	0.04	81.25%	0.00%
Muskrat	3.7	3.7	3.7	0.0	0.0	0.8	0.89	0.03	0.01	1.19	0.04	81.25%	80.39%
Porcupine	11.1	11.1	11.1	3.7	3.7	8.0	47.41	1.48	0.56	5.93	0.19	52.56%	53.43%
Weasel	11.1	11.1	11.1	3.7	0.0	0.0	0.00	0.00	0.00	14.22	0.44	67.84%	0.00%
Wolf	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Wolverine	3.7	3.7	3.7	0.0	3.7	0.0	0.00	0.00	0.00	2.37	0.07	81.25%	0.00%
Marine Mammals	7.4	0.0	0.0	7.4	0.0		0.00	0.00	0.00			0.00%	0.00%
Bearded Seal	3.7	0.0	0.0	3.7	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Ringed Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Spotted Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Steller Sea Lion	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Walrus	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Belukha	7.4	0.0	0.0	7.4	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Birds and Eggs	85.2	85.2	81.5	33.3	33.3		640.00	20.00	7.61			18.62%	20.41%
Migratory Birds	63.0	63.0	63.0	22.2	25.9		271.41	8.48	3.23			25.12%	25.99%
Mallard	51.9	51.9	51.9	14.8	22.2	1.0	117.33	3.67	1.39	117.33	3.67	23.77%	23.88%
Northern Pintail	29.6	29.6	29.6	3.7	11.1	1.0	68.74	2.15	0.82	68.74	2.15	38.92%	40.65%
Scoter	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Canada Geese	55.6	55.6	55.6	18.5	18.5	1.0	59.26	1.85	0.70	59.26	1.85	21.93%	23.63%
Snow Geese	7.4	7.4	7.4	3.7	3.7	3.0	14.22	0.44	0.17	4.74	0.15	63.49%	62.38%
Swan	3.7	3.7	3.7	3.7	0.0	10.0	11.85	0.37	0.14	1.19	0.04	81.25%	83.92%
Crane	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Upland Game Birds	74.1	74.1	70.4	14.8	18.5		368.59	11.52	4.38			17.48%	19.54%
Grouse	74.1	74.1	70.4	11.1	18.5	1.0	367.41	11.48	4.37	367.41	11.48	17.50%	19.57%
Ptarmigan	3.7	3.7	0.0	3.7	0.0	1.0	1.19	0.04	0.01	1.19	0.04	81.25%	80.39%
Bird Eggs							0.00	0.00	0.00				0.00%
Vegetation	92.6	92.6	92.6	37.0	44.4	1.8	333.13	10.41	3.96	181.27	5.66	10.29%	18.23%
Berries	77.8	77.8	77.8	29.6	33.3	4.0	328.30	10.26	3.90	82.07	2.56	15.19%	17.64%
Plants/Greens	3.7	3.7	3.7	0.0	0.0	2.4	4.84	0.15	0.06	2.01	0.06	81.25%	83.92%
Wood	81.5	81.5	81.5	22.2	37.0	0.0	0.00	0.00	0.00	97.19	3.04	10.76%	0.00%

Table 7. Wild Resource Harvests by Surveyed Households, Grayling, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
All Resources	100.0	100.0	100.0	88.9	92.6		115,774.79	2,631.25	724.95			23.91%	18.69%
Fish	96.3	96.3	96.3	70.4	77.8		82,507.58	1,875.17	516.64			26.62%	22.48%
Salmon	96.3	96.3	96.3	51.9	63.0		63,473.10	1,442.57	397.45			27.67%	23.92%
Summer Chum	48.1	51.9	48.1	14.8	14.8	5.4	3,396.80	77.20	21.27	629.04	14.30	36.27%	44.96%
Fall Chum	81.5	81.5	81.5	37.0	33.3	5.4	11,272.80	256.20	70.59	2,087.56	47.44	27.70%	30.80%
Coho Salmon	18.5	18.5	18.5	0.0	3.7	5.2	228.80	5.20	1.43	44.00	1.00	66.61%	129.43%
Chinook Salmon	96.3	96.3	96.3	48.1	59.3	14.8	48,574.70	1,103.97	304.16	3,282.07	74.59	21.69%	25.69%
Pink Salmon	3.7	7.4	3.7	0.0	0.0		0.00	0.00	0.00	0.00	0.00	127.77%	0.00%
Non-Salmon Fish	96.3	96.3	92.6	63.0	59.3		19,034.48	432.60	119.19			33.56%	35.10%
Herring	3.7	3.7	3.7	3.7	0.0	6.0	16.62	0.38	0.10	2.77 gal	0.06	127.77%	128.09%
Smelt	3.7	3.7	3.7	3.7	3.7	6.0	19.56	0.44	0.12	3.26 gal	0.07	127.77%	132.08%
Pacific Tom Cod	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Eel	48.1	48.1	44.4	18.5	14.8	3.0	5,016.00	114.00	31.41	1,672.00	38.00	66.47%	67.90%
Sculpin	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Stickleback	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Blackfish	3.7	3.7	3.7	3.7	0.0	6.0	977.78	22.22	6.12	162.96 gal	3.70	127.77%	128.09%
Burbot	18.5	18.5	18.5	11.1	3.7	4.5	190.67	4.33	1.19	42.37	0.96	65.09%	65.21%
Char	11.1	11.1	11.1	7.4	7.4	3.4	337.99	7.68	2.12	99.41	2.26	92.13%	96.21%
Grayling	40.7	40.7	40.7	11.1	11.1	0.7	196.21	4.46	1.23	280.30	6.37	42.20%	40.79%
Pike	74.1	74.1	74.1	33.3	37.0	2.3	1,441.00	32.75	9.02	640.44	14.56	34.71%	37.42%
Sheefish	81.5	81.5	77.8	44.4	40.7	8.0	4,184.89	95.11	26.20	523.11	11.89	28.92%	31.23%
Sucker	3.7	3.7	3.7	0.0	0.0	2.1	119.78	2.72	0.75	57.04	1.30	127.77%	129.43%
Trout	22.2	22.2	22.2	0.0	3.7	1.5	134.44	3.06	0.84	89.63	2.04	58.23%	56.53%
Whitefish	81.5	81.5	81.5	48.1	40.7	3.0	6,399.56	145.44	40.07	2,133.19	48.48	49.85%	50.92%
Bering Cisco	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Land Mammals	100.0	96.3	96.3	77.8	77.8		30,501.37	693.21	190.99			47.13%	15.42%
Large Land Mammals	100.0	96.3	92.6	70.4	74.1		27,297.93	620.41	170.93			19.78%	15.20%
Black Bear	14.8	14.8	14.8	7.4	11.1	58.0	472.59	10.74	2.96	8.15	0.19	64.18%	64.28%
Brown Bear	3.7	3.7	3.7	0.0	0.0	141.0	229.78	5.22	1.44	1.63	0.04	127.77%	123.97%
Caribou	11.1	7.4	7.4	11.1	3.7	130.0	635.56	14.44	3.98	4.89	0.11	93.75%	95.41%
Goat	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Moose	100.0	96.3	92.6	66.7	74.1	540.0	25,960.00	590.00	162.55	48.07	1.09	15.85%	15.29%
Dall Sheep	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%

Table 7 (Continued). Wild Resource Harvests by Surveyed Households, Grayling, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
Small Land Mammals	74.1	70.4	70.4	44.4	33.3		3,203.44	72.81	20.06			50.44%	44.68%
Beaver	66.7	63.0	63.0	44.4	29.6	15.0	3,006.67	68.33	18.83	200.44	4.56	41.47%	44.07%
Fox	14.8	14.8	14.8	0.0	7.4	0.0	0.00	0.00	0.00	14.67	0.33	61.38%	0.00%
Hare	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Land Otter	11.1	11.1	11.1	0.0	7.4	3.0	34.22	0.78	0.21	11.41	0.26	93.34%	94.31%
Lynx	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Marten	33.3	33.3	33.3	3.7	0.0	0.0	0.00	0.00	0.00	482.37	10.96	59.85%	0.00%
Mink	3.7	3.7	3.7	0.0	0.0	0.0	0.00	0.00	0.00	3.26	0.07	127.77%	0.00%
Muskrat	3.7	3.7	3.7	0.0	0.0	0.8	6.11	0.14	0.04	8.15	0.19	127.77%	130.76%
Porcupine	25.9	25.9	25.9	3.7	7.4	8.0	156.44	3.56	0.98	19.56	0.44	58.09%	60.73%
Weasel	11.1	11.1	11.1	0.0	0.0	0.0	0.00	0.00	0.00	9.78	0.22	77.23%	0.00%
Wolf	7.4	7.4	7.4	0.0	0.0	0.0	0.00	0.00	0.00	8.15	0.19	104.40%	0.00%
Wolverine	14.8	14.8	14.8	0.0	0.0	0.0	0.00	0.00	0.00	9.78	0.22	63.88%	0.00%
Marine Mammals	18.5	0.0	0.0	18.5	7.4		0.00	0.00	0.00			0.00%	0.00%
Bearded Seal	7.4	0.0	0.0	7.4	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Ringed Seal	3.7	0.0	0.0	3.7	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Spotted Seal	7.4	0.0	0.0	7.4	3.7		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Steller Sea Lion	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Walrus	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Belukha	3.7	0.0	0.0	3.7	3.7		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Birds and Eggs	81.5	81.5	81.5	33.3	29.6		1,276.00	29.00	7.99			25.20%	28.58%
Migratory Birds	51.9	51.9	51.9	29.6	22.2		531.26	12.07	3.33			37.70%	39.32%
Mallard	40.7	40.7	40.7	18.5	14.8	1.0	215.11	4.89	1.35	215.11	4.89	46.61%	45.33%
Northern Pintail	11.1	11.1	11.1	3.7	7.4	1.0	68.44	1.56	0.43	68.44	1.56	74.57%	76.32%
Scoter	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Canada Geese	48.1	48.1	48.1	29.6	22.2	1.0	226.52	5.15	1.42	226.52	5.15	35.91%	38.22%
Snow Geese	3.7	3.7	3.7	3.7	0.0	3.0	4.89	0.11	0.03	1.63	0.04	127.77%	128.09%
Swan	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Crane	3.7	3.7	3.7	0.0	0.0	10.0	16.30	0.37	0.10	1.63	0.04	127.77%	126.73%
Upland Game Birds	81.5	81.5	81.5	14.8	22.2		744.74	16.93	4.66			25.87%	30.40%
Grouse	81.5	81.5	81.5	14.8	22.2	1.0	744.74	16.93	4.66	744.74	16.93	25.87%	30.40%
Ptarmigan	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Bird Eggs							0.49	0.01	0.00				129.43%
Vegetation	100.0	100.0	96.3	48.1	55.6	2.4	1,489.35	33.85	9.33	618.93	14.07	27.54%	28.69%
Berries	85.2	85.2	81.5	33.3	40.7	4.0	1,163.56	26.44	7.29	290.89	6.61	25.56%	26.23%
Plants/Greens	7.4	7.4	7.4	0.0	3.7	2.4	325.80	7.40	2.04	135.75	3.09	99.86%	96.76%
Wood	88.9	88.9	85.2	25.9	29.6	0.0	0.00	0.00	0.00	192.30	4.37	19.56%	0.00%

Table 8. Wild Resource Harvests by Surveyed Households, Stevens Village, 2008 (Salmon for Dog Food Removed)

Resource Name	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
All Resources	100.0	100.0	100.0	85.7	85.7		16,360.39	711.32	276.63			65.61%	67.17%
Fish	100.0	71.4	71.4	57.1	57.1		7,730.46	336.11	130.71			79.64%	75.28%
Salmon	100.0	71.4	71.4	57.1	42.9		6,012.86	261.43	101.67			99.89%	73.87%
Summer Chum	14.3	14.3	14.3	0.0	0.0	5.4	177.43	7.71	3.00	32.86	1.43	204.09%	214.23%
Fall Chum	14.3	0.0	0.0	14.3	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Coho Salmon	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Chinook Salmon	100.0	71.4	71.4	42.9	42.9	14.8	5,835.43	253.71	98.67	394.29	17.14	66.36%	71.67%
Pink Salmon	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Non-Salmon Fish	42.9	42.9	42.9	0.0	28.6		1,717.61	74.68	29.04			137.51%	155.18%
Herring	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Smelt	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Pacific Tom Cod	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Eel	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Sculpin	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Stickleback	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Blackfish	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Burbot	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Char	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Grayling	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Pike	28.6	28.6	28.6	0.0	0.0	2.3	81.32	3.54	1.38	36.14	1.57	183.36%	192.04%
Sheefish	14.3	14.3	14.3	0.0	14.3	8.0	157.71	6.86	2.67	19.71	0.86	204.09%	214.23%
Sucker	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Trout	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Whitefish	28.6	28.6	28.6	0.0	28.6	3.0	1,478.57	64.29	25.00	492.86	21.43	141.61%	155.87%
Bering Cisco	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Land Mammals	85.7	71.4	71.4	42.9	57.1		8,068.07	350.79	136.42			72.04%	101.47%
Large Land Mammals	85.7	71.4	57.1	42.9	42.9		5,513.43	239.71	93.22			72.16%	103.53%
Black Bear	14.3	14.3	14.3	0.0	0.0	58.0	190.57	8.29	3.22	3.29	0.14	204.09%	214.23%
Brown Bear	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Caribou	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Goat	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Moose	85.7	71.4	42.9	42.9	42.9	540.0	5,322.86	231.43	90.00	9.86	0.43	96.21%	108.16%
Dall Sheep	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%

Table 8 (Continued). Wild Resource Harvests by Surveyed Households, Stevens Village, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
Small Land Mammals	71.4	71.4	71.4	0.0	42.9		2,554.64	111.07	43.19			72.22%	105.16%
Beaver	57.1	57.1	57.1	0.0	14.3	15.0	443.57	19.29	7.50	29.57	1.29	89.75%	116.18%
Fox	14.3	14.3	14.3	0.0	0.0	0.0	0.00	0.00	0.00	6.57	0.29	204.09%	0.00%
Hare	57.1	57.1	57.1	0.0	28.6	5.0	1,478.57	64.29	25.00	295.71	12.86	107.96%	128.44%
Land Otter	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Lynx	28.6	28.6	28.6	0.0	0.0	4.0	552.00	24.00	9.33	138.00	6.00	147.71%	161.43%
Marten	14.3	14.3	14.3	0.0	0.0	0.0	0.00	0.00	0.00	65.71	2.86	204.09%	0.00%
Mink	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Muskrat	28.6	28.6	28.6	0.0	14.3	0.8	54.21	2.36	0.92	72.29	3.14	132.50%	147.64%
Porcupine	14.3	14.3	14.3	0.0	14.3	8.0	26.29	1.14	0.44	3.29	0.14	204.09%	214.23%
Weasel	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Wolf	28.6	28.6	28.6	0.0	0.0	0.0	0.00	0.00	0.00	6.57	0.29	131.74%	0.00%
Wolverine	14.3	28.6	14.3	0.0	0.0	0.0	0.00	0.00	0.00	3.29	0.14	204.09%	0.00%
Marine Mammals	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00			0.00%	0.00%
Bearded Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Ringed Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Spotted Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Steller Sea Lion	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Walrus	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Belukha	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Birds and Eggs	71.4	57.1	14.3	42.9	28.6		351.57	15.29	5.94			191.46%	201.76%
Migratory Birds	71.4	57.1	14.3	42.9	28.6		338.43	14.71	5.72			190.76%	201.28%
Mallard	42.9	28.6	14.3	14.3	14.3	1.0	101.86	4.43	1.72	101.86	4.43	196.51%	207.44%
Northern Pintail	28.6	14.3	14.3	14.3	0.0	1.0	23.00	1.00	0.39	23.00	1.00	204.09%	214.23%
Scoter	57.1	42.9	14.3	28.6	28.6	2.0	210.29	9.14	3.56	105.14	4.57	189.37%	200.26%
Canada Geese	42.9	28.6	0.0	28.6	14.3	1.0	3.29	0.14	0.06	3.29	0.14	204.09%	214.23%
Snow Geese	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Swan	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Crane	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Upland Game Birds	14.3	14.3	14.3	0.0	0.0		13.14	0.57	0.22			204.09%	214.23%
Grouse	14.3	14.3	14.3	0.0	0.0	1.0	13.14	0.57	0.22	13.14	0.57	204.09%	214.23%
Ptarmigan	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Bird Eggs							0.00	0.00	0.00				0.00%
Vegetation	85.7	85.7	85.7	42.9	57.1	0.9	210.29	9.14	3.56	223.43	9.71	59.19%	100.20%
Berries	71.4	57.1	42.9	42.9	42.9	4.0	210.29	9.14	3.56	52.57	2.29	86.51%	100.20%
Plants/Greens	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Wood	85.7	85.7	85.7	28.6	14.3	0.0	0.00	0.00	0.00	170.86	7.43	57.46%	0.00%

Table 9. Wild Resource Harvests by Surveyed Households, Tanana, 2008 (Salmon for Dog Food Removed)

	Percentage of Households					Pounds Harvested				Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
All Resources	100.0	100.0	90.0	100.0	90.0		150,229.51	1,767.41	671.17				
Fish	100.0	76.7	76.7	76.7	56.7		109,189.67	1,284.58	487.82				
Salmon*	96.7	53.3	53.3	70.0	53.3		74,764.24	879.58	334.02				
Summer Chum	43.3	26.7	16.7	23.3	13.3	5.4	2,665.51	31.36	11.91	493.61	5.81		
Fall Chum	40.0	30.0	26.7	16.7	20.0	5.4	2,520.67	29.65	11.26	466.79	5.49		
Coho Salmon	26.7	20.0	20.0	6.7	10.0	5.2	1,097.19	12.91	4.90	211.00	2.48		
Chinook Salmon	93.3	50.0	50.0	63.3	46.7	14.8	68,480.87	805.66	305.95	4,627.09	54.44		
Pink Salmon	13.3	6.7	6.7	6.7	0.0					0.00	0.00		
Non-Salmon Fish	76.7	63.3	63.3	46.7	30.0		34,425.43	405.01	153.80			58.02%	67.61%
Herring	3.3	3.3	3.3	3.3	0.0	6.0	85.00	1.00	0.38	14.17 gal	0.17	164.52%	167.15%
Smelt	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Pacific Tom Cod	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Eel	3.3	6.7	3.3	0.0	3.3	3.0	8.50	0.10	0.04	2.83	0.03	164.52%	158.45%
Sculpin	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Stickleback	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00 gal	0.00	0.00%	0.00%
Blackfish	3.3	3.3	3.3	0.0	0.0	6.0	340.00	4.00	1.52	56.67 gal	0.67	164.52%	162.86%
Burbot	30.0	26.7	26.7	3.3	13.3	4.5	2,435.25	28.65	10.88	541.17	6.37	90.03%	93.13%
Char	6.7	3.3	3.3	0.0	0.0	3.4	28.90	0.34	0.13	8.50	0.10	164.52%	165.02%
Grayling	30.0	26.7	26.7	6.7	13.3	0.7	337.17	3.97	1.51	481.67	5.67	73.73%	71.86%
Pike	36.7	33.3	33.3	10.0	13.3	2.3	2,339.63	27.53	10.45	1,039.83	12.23	62.16%	59.30%
Sheefish	53.3	50.0	50.0	30.0	16.7	8.0	10,993.33	129.33	49.11	1,374.17	16.17	102.02%	106.34%
Sucker	16.7	16.7	16.7	0.0	0.0	2.1	428.40	5.04	1.91	204.00	2.40	79.87%	84.88%
Trout	10.0	6.7	6.7	3.3	3.3	1.5	46.75	0.55	0.21	31.17	0.37	118.77%	118.39%
Whitefish	63.3	50.0	50.0	26.7	16.7	3.0	16,252.00	191.20	72.61	5,417.33	63.73	60.94%	64.32%
Bering Cisco	10.0	10.0	10.0	0.0	6.7	1.4	1,130.50	13.30	5.05	807.50	9.50	103.40%	103.00%
Land Mammals	96.7	73.3	63.3	90.0	63.3		39,109.21	460.11	174.72			54.78%	35.54%
Large Land Mammals	96.7	60.0	53.3	80.0	46.7		33,019.67	388.47	147.52			42.83%	32.38%
Black Bear	30.0	20.0	16.7	20.0	16.7	58.0	1,314.67	15.47	5.87	22.67	0.27	77.89%	78.38%
Brown Bear	0.0	3.3	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Caribou	33.3	13.3	3.3	30.0	3.3	130.0	1,105.00	13.00	4.94	8.50	0.10	164.52%	160.67%
Goat	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Moose	96.7	60.0	53.3	73.3	46.7	540.0	30,600.00	360.00	136.71	56.67	0.67	32.04%	31.31%
Dall Sheep	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%

Table 9 (Continued). Wild Resource Harvests by Surveyed Households, Tanana, 2008 (Salmon for Dog Food Removed)

	Percentage of Households						Pounds Harvested			Amount Harvested		95% Conf Limit (+/-)	
Resource Name	Use	Att	Harv	Recv	Give	Fact.	Total	Mean HH	Per Capita	Total	Mean HH	Harvest	Percapita
Small Land Mammals	60.0	63.3	53.3	43.3	36.7		6,089.54	71.64	27.21			57.11%	85.49%
Beaver	56.7	53.3	50.0	33.3	23.3	15.0	4,207.50	49.50	18.80	280.50	3.30	83.84%	84.19%
Fox	6.7	6.7	6.7	0.0	3.3	0.0	0.00	0.00	0.00	17.00	0.20	138.88%	0.00%
Hare	46.7	50.0	40.0	16.7	16.7	5.0	1,586.67	18.67	7.09	317.33	3.73	83.42%	82.86%
Land Otter	6.7	6.7	3.3	3.3	0.0	3.0	17.00	0.20	0.08	5.67	0.07	164.52%	169.26%
Lynx	6.7	10.0	3.3	3.3	0.0	4.0	22.67	0.27	0.10	5.67	0.07	164.52%	169.26%
Marten	43.3	43.3	40.0	10.0	13.3	0.0	0.00	0.00	0.00	617.67	7.27	55.32%	0.00%
Mink	10.0	10.0	6.7	3.3	0.0	0.0	0.00	0.00	0.00	22.67	0.27	118.07%	0.00%
Muskrat	6.7	6.7	3.3	3.3	3.3	0.8	6.38	0.08	0.03	8.50	0.10	164.52%	162.86%
Porcupine	6.7	6.7	6.7	3.3	3.3	8.0	249.33	2.93	1.11	31.17	0.37	149.79%	148.19%
Weasel	3.3	3.3	3.3	0.0	0.0	0.0	0.00	0.00	0.00	2.83	0.03	164.52%	0.00%
Wolf	13.3	10.0	10.0	3.3	3.3	0.0	0.00	0.00	0.00	17.00	0.20	91.65%	0.00%
Wolverine	3.3	3.3	3.3	0.0	3.3	0.0	0.00	0.00	0.00	5.67	0.07	164.52%	0.00%
Marine Mammals	10.0	0.0	0.0	10.0	0.0		0.00	0.00	0.00			0.00%	0.00%
Bearded Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Ringed Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Spotted Seal	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Steller Sea Lion	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Walrus	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Belukha	10.0	0.0	0.0	10.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Birds and Eggs	80.0	53.3	50.0	40.0	36.7		311.67	3.67	1.39			36.58%	45.69%
Migratory Birds	80.0	53.3	50.0	40.0	36.7		283.33	3.33	1.27			36.70%	47.78%
Mallard	53.3	40.0	40.0	20.0	23.3	1.0	45.33	0.53	0.20	45.33	0.53	41.13%	42.06%
Northern Pintail	26.7	26.7	26.7	0.0	13.3	1.0	31.17	0.37	0.14	31.17	0.37	54.78%	52.11%
Scoter	50.0	40.0	36.7	16.7	26.7	2.0	68.00	0.80	0.30	34.00	0.40	42.29%	42.86%
Canada Geese	76.7	50.0	50.0	36.7	36.7	1.0	53.83	0.63	0.24	53.83	0.63	34.07%	33.21%
Snow Geese	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0.00%	0.00%
Swan	3.3	3.3	3.3	0.0	3.3	10.0	28.33	0.33	0.13	2.83	0.03	164.52%	162.86%
Crane	6.7	6.7	6.7	0.0	3.3	10.0	56.67	0.67	0.25	5.67	0.07	114.31%	113.48%
Upland Game Birds	43.3	33.3	30.0	6.7	20.0		28.33	0.33	0.13			49.26%	49.51%
Grouse	43.3	33.3	30.0	6.7	20.0	1.0	25.50	0.30	0.11	25.50	0.30	46.67%	48.41%
Ptarmigan	6.7	6.7	3.3	0.0	0.0	1.0	2.83	0.03	0.01	2.83	0.03	164.52%	160.67%
Bird Eggs							0.00	0.00	0.00				0.00%
Vegetation	100.0	100.0	86.7	73.3	63.3	1.5	1,618.97	19.05	7.23	1,074.54	12.64	43.96%	63.22%
Berries	86.7	80.0	66.7	33.3	26.7	4.0	898.17	10.57	4.01	224.54	2.64	36.92%	36.13%
Plants/Greens	53.3	36.7	10.0	23.3	33.3	2.4	720.80	8.48	3.22	300.33	3.53	129.99%	129.12%
Wood	90.0	83.3	83.3	40.0	46.7	0.0	0.00	0.00	0.00	549.67	6.47	33.53%	0.00%

*Salmon harvests from post-season harvest surveys of ADF&G, Division of Commercial Fisheries (salmon for dog food removed)

Table 10. Equipment Owned by Households
(Average per Surveyed Household), 2008

Items	Alakanuk	Anvik	Grayling	Stevens Village	Tanana
Outboard Motors	1.23	1.00	0.85	0.86	0.83
Boats	1.25	0.96	0.85	0.86	0.87
King Nets (>6.9")	1.48	0.78	0.70	1.14	0.37
Chum Nets (4"-6.9")	1.53	0.67	0.63	0.00	0.33
Other Nets (2"-3.9")	0.68	0.15	0.37	0.00	0.20
Fishwheels	0.00	0.00	0.07	0.14	0.30
Drying Racks	0.70	0.67	1.04	0.86	0.67
Smokehouses	0.70	0.59	0.89	0.71	0.70
Fish Camps	0.25	0.19	0.41	0.43	0.43
Cache	0.08	0.22	0.19	0.29	0.20
Freezers	1.83	1.59	1.59	1.14	1.50
Snowmachines	1.80	1.81	1.33	1.00	1.43
4-Wheelers, ATVs	1.08	1.04	0.89	0.57	0.33
Airplanes	0.00	0.00	0.00	0.00	0.00
Traplines	0.03	0.52	0.48	0.43	0.43
Winter Cabins	0.10	0.15	0.33	0.29	0.33
Rifles	3.90	3.44	4.11	2.86	2.41
Adult Sled Dogs	0.00	0.11	0.07	2.26	3.13
Other Adult Dogs	1.30	1.63	1.19	1.17	0.51
Puppies	0.33	0.11	0.56	0.39	0.53
Commercial Permits	0.73	0.26	0.19	0.29	0.20
Fuel for Salmon Fishing (Gallons)	162.83	153.75	129.28	139.17	250.00
Fuel for All Activities (Gallons)	332.44	352.12	333.46	357.14	573.70

Table 11. Boat Lengths
of Surveyed Households, 2008

Boat Lengths (Feet)	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
12	1	0	0	0	1	2
14	0	1	1	1	0	3
16	1	5	0	0	5	11
17	0	0	0	0	2	2
18	20	4	12	4	7	47
19	0	4	4	0	2	10
20	9	7	3	0	3	22
21	1	1	0	0	0	2
22	15	0	1	1	3	20
24	3	3	2	0	2	10

Table 12. Outboard Motor Horsepowers
of Surveyed Households, 2008

Outboard Horsepower	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
10	1	0	0	0	0	1
15	1	0	1	0	1	3
20	0	1	0	0	0	1
25	1	6	3	1	1	12
30	0	0	2	1	0	3
40	8	6	5	0	5	24
45	0	0	1	0	0	1
50	4	2	5	0	8	19
55	0	1	1	0	0	2
60	3	1	1	0	0	5
70	3	1	1	0	3	8
75	4	0	0	0	2	6
85	0	0	1	0	0	1
90	2	4	1	1	2	10
115	15	4	0	3	0	22
130	0	0	0	0	1	1
135	0	1	0	0	0	1
140	3	0	1	0	1	5
150	2	0	0	0	1	3
200	2	0	0	0	0	2

Table 13. Fishing Net Types Owned by
Surveyed Households, by Community, 2008

Mesh (Inches)	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
7	0	2	2	0	1	5
7.5	0	2	4	0	0	6
7.625	1	0	0	0	0	1
7.75	1	0	0	0	0	1
8	19	9	5	4	1	38
8.125	1	0	0	0	0	1
8.25	1	1	2	0	0	4
8.5	8	2	4	0	2	16
8.625	3	0	0	0	0	3
8.75	12	2	0	0	0	14
Unspecified	13	3	2	4	7	29
King Nets	*59*	*21*	*19*	*8*	*11*	*118*
Mean King	*1.48*	*0.78*	*0.70*	*1.14*	*0.37*	*0.90*
4	8	4	6	0	1	19
4.5	2	1	2	0	0	5
5	1	4	4	0	3	12
5.25	0	0	1	0	0	1
5.5	5	1	0	0	0	6
5.625	1	0	0	0	0	1
5.75	2	0	0	0	0	2
5.875	4	5	1	0	0	10
6	28	0	1	0	2	31
6.5	2	2	0	0	0	4
Unspecified	8	1	2		4	15
Chum Nets	*61*	*18*	*17*	*0*	*10*	*106*
Mean Coho	*1.53*	*0.67*	*0.63*	*0.00*	*0.33*	*0.81*
2	0	3	4	0	1	8
2.5	0	0	1	0	0	1
3	9	1	0	0	1	11
3.5	10	0	0	0	3	13
Unspecified	8	0	5		1	14
Other Nets	*27*	*4*	*10*	*0*	*6*	*32*
Mean Other	*0.68*	*0.15*	*0.37*	*0.00*	*0.20*	*0.24*

Table 14. Average Length (Fathoms) of Fishing Nets
Owned by Surveyed Households, by Community, 2008

Net Type	Alakanuk	Anvik	Grayling	Stevens Village	Tanana
King Nets	41.0	24.5	23.3	16.6	18.3
Chum Nets	39.4	35.8	18.7		12.3
Other Nets	44.0	113.8	87.4		48.0

Table 15. Correlations of Subsistence Salmon Harvests (Lbs) with
Fishing Fuel, Fishing Equipment, and Other Household Factors,
Alakanuk, Anvik, Grayling, and Steven Village, 2007

Houshold Factors		Salmon Harvest (Lbs)	Fishing Fuel	Equipment Holdings	Harvesters	Households Eating the Salmon	People Eating the Salmon
Fishing Fuel	R =	0.533	-	-	-	-	-
	Sig =	*0.000*	-	-	-	-	-
Equipment	R =	0.236	0.430	-	-	-	-
Holdings	*Sig =*	*0.018*	*0.000*	-	-	-	-
Harvesters	R =	0.300	0.389	0.382	-	-	-
	Sig =	*0.002*	*0.000*	*0.000*	-	-	-
Hshlds Eating	R =	0.371	0.357	0.423	0.151	-	-
the Salmon	*Sig =*	*0.000*	*0.000*	*0.000*	*ns*	-	-
People Eating	R =	0.219	0.130	0.301	0.107	0.677	-
the Salmon	*Sig =*	*0.031*	*ns*	*0.003*	*ns*	*0.000*	-
Household	R =	0.076	0.309	0.233	0.210	0.092	0.037
Income*	*Sig =*	*ns*	*0.002*	*0.019*	*0.036*	*ns*	*ns*

** Total earned and unearned income.*

Table 16. People and Households Involved with Salmon (Mean per Household), 2007

Community		Households Working Together to Catch, Put Up Salmon *	Family Members Visiting During Salmon Season	Households Visiting During Salmon Season	People in Extended Family Using the Salmon	Households Eating the Salmon Harvested by Family
Alakanuk	Mean	3.0	1.2	0.5	14.2	3.9
	Maximum	*7*	*20*	*8*	*50*	*10*
Anvik	Mean	2.2	0.4	0.4	6.7	3.4
	Maximum	*3*	*3*	*3*	*20*	*7*
Grayling	Mean	3.2	1.1	0.8	11.2	4.3
	Maximum	*8*	*12*	*6*	*80*	*15*
Stevens Village	Mean	2.7	2.7	1.7	13.2	3.1
	Maximum	*5*	*10*	*5*	*30*	*5*
Tanana	Mean	2.8	3.8	1.7	15.5	6.1
	Maximum	*5*	*20*	*10*	*100*	*50*

** For households that fished*

Table 17. Communities of Visitors During Salmon Season

Community	Alakanuk	Anvik	Grayling	Stevens Village	Tanana
Akiachak	0	0	0	0	1
Alakanuk	1	0	0	0	0
Anchorage	5	2	6	0	2
Anvik	0	0	1	0	0
Beaver	0	0	0	0	1
Emmonak	2	0	0	0	0
Fairbanks	2	3	0	3	11
Galena	0	0	0	0	1
Holy Cross	0	1	0	0	0
Huslia	0	0	0	0	1
Manley Hot Springs	0	0	0	0	2
Minto	0	0	0	0	2
Mountain Village	2	0	0	0	0
Nenana	0	0	0	0	3
North Pole	0	0	1	0	0
Nulato	0	1	0	0	0
Rampart	0	0	0	0	2
Scammon Bay	1	0	0	0	0
Shageluk	0	1	4	0	0
Sheldon Point	1	0	0	0	0
Stevens Village	0	0	0	0	1
Other U.S.	0	0	0	0	1

Table 18. Fish Camp Use by Surveyed Households

Community	Fish Camps per Household	Used a Fish Camp Between 1950-2007	Used a Fish Camp Between 2003-2007	Mean Years Using Fish Camp*	Mean Years Using Fish Camp**
Alakanuk	0.25	20.0%	15.0%	19.3	3.9
Anvik	0.19	40.7%	7.4%	23.0	9.4
Grayling	0.41	46.2%	11.5%	23.6	10.9
Stevens Village	0.43	42.9%	42.9%	51.3	22.0
Tanana	0.43	43.3%	33.3%	26.4	11.4

** For households using fish camp between 1950-2007.*
*** For all surveyed households, between 1950-2007.*

Table 19. Fishing Sites by Year, Stevens Village

	Year(s) Observed *			Totals by Year *		Percentage of
	1984 Only	1984 and 2008	2008 Only	1984 Totals	2008 Totals	1984 Sites Used in 2008
Camp Sites	3	10	17	13	27	76.9%
Net Sites	5	12	20	17	32	70.6%
Wheel Sites	7	2	3	9	5	22.2%
Total Sites	15	24	40	39	64	61.5%

** Reported to Sumida in 1984 and/or Wolfe in 2008.*

Table 20. Salmon Caught for Dog Food,
(Numbers and Percentage of Total Catch)
and Number of Dogs, 2007

Type of Salmon or Dogs	Alakanuk	Anvik	Grayling	Stevens Village	Tanana
Summer Chum	0	1,760	518	164	4,642
	0.0%	*90.1%*	*45.2%*	*83.3%*	*88.8%*
Fall Chum	0	68	78	0	21,041
	0.0%	*11.6%*	*3.6%*	*0.0%*	*97.4%*
Coho	77	237	323	0	2,118
	8.8%	*64.5%*	*88.0%*	*0.0%*	*89.4%*
Total Salmon	77	2,065	919	164	27,802
	0.5%	*71.1%*	*25.0%*	*83.3%*	*95.2%*
Sled Dogs	0	14	0	52	266
All Dogs	250	73	80	88	354

Table 21. Employment of Surveyed Households, 2007

Community	Sampled Households With Employment	Adults Who Were Employed	Average Number of Jobs Per Household	Average Months Worked Per Job	Average Months Worked Per Employed	Average Months Worked Per Employed
Alakanuk	90.0%	52.3%	1.75	7.3	8.6	9.8
Anvik	85.2%	80.0%	1.93	7.0	8.1	9.9
Grayling	74.1%	38.5%	1.37	7.1	9.1	9.3
Stevens Village	57.1%	50.0%	1.14	9.0	9.6	10.0
Tanana	80.0%	62.0%	1.07	7.1	6.9	7.5

Table 22. Mean Household Incomes of Surveyed Households, 2007

Community	Employment Income	Other Earned Income*	AK Permanent Fund	Unearned Income**	Total Household Income	Total Per Capita Income
Alakanuk	$18,010	$2,025	$8,063	$7,663	$35,760	$6,357
Anvik	$28,516	$1,023	$3,859	$5,537	$38,936	$14,807
Grayling	$13,557	$3,682	$5,858	$4,189	$27,286	$7,518
Stevens Village	$20,443	$429	$4,726	$2,294	$27,892	$10,847
Tanana	$20,048	$5,095	$4,025	$2,714	$31,882	$12,107

** Native Corporation Dividend, Pension, Retirement*

*** Social Security, Supplemental Security, Adult Public Assistance, Alaska Senior Benefits, Unemployment*

Table 23. Sources of Employment within Surveyed Households, 2007

Employer	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Totals
Schools	14	5	7		3	29
Self	14	1	7	1	2	25
Stores	10	13	2			25
City	9	6	4		4	23
Village Native Corporation	1	11		1	5	18
Native Tribe	1		2	2	7	12
Utilities/Gas	1	6	2	1	1	11
BLM (firefighting)			4	1	3	8
Regional Native Organization	5		1	1		7
Regional Health Corporation	1	1	3			5
Airlines	2	1	1			4
Bering Sea Fishery	4					4
US Postal Service		2		1	1	4
Regional Housing Authority			2		1	3
Catholic Bishop Northern AK	2					2
State of Alaska	1	1				2
AK Native Womens Co.		1				1
AK Reclamation		1				1
ATS	1					1
Bering Pacific	1					1
Brice					1	1
D.F. Jorgensen Co.	1					1
Doyon Drilling					1	1
Golden Alaska	1					1
IRR					1	1
TWEP			1			1
U.S. Army	1					1
VSW					1	1
Yukon Delta			1			1
Other		3			1	4
Total	70	52	37	8	32	199

Table 24. Surveyed Households by Household Type, 2008

	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
Single Individual	2	10	6	1	11	30
	5.0%	*37.0%*	*22.2%*	*14.3%*	*36.7%*	*22.9%*
Conjugal Pair	3	5	1	2	5	16
	7.5%	*18.5%*	*3.7%*	*28.6%*	*16.7%*	*12.2%*
Nuclear Family	14	7	4	3	13	41
	35.0%	*25.9%*	*14.8%*	*42.9%*	*43.3%*	*31.3%*
Single Parent	3	4	6	1	1	15
	7.5%	*14.8%*	*22.2%*	*14.3%*	*3.3%*	*11.5%*
Missing Generation	0	1	3	0	0	4
	0.0%	*3.7%*	*11.1%*	*0.0%*	*0.0%*	*3.1%*
Stem Family	13	0	6	0	0	19
	32.5%	*0.0%*	*22.2%*	*0.0%*	*0.0%*	*14.5%*
Extended Family	2	0	0	0	0	2
	5.0%	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*1.5%*
Extended Family + Unrelated Other(s), one	1	0	0	0	0	1
	2.5%	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.8%*
Joint Family	2	0	1	0	0	3
	5.0%	*0.0%*	*3.7%*	*0.0%*	*0.0%*	*2.3%*
Total	40	27	27	7	30	131
	100.0%	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*

Table 25. Demographic Characteristics of Members of Surveyed Households

Characteristic	Alakanuk	Anvik	Grayling	Stevens Village	Tanana	Total
Age (years)						
Mean	26.0	31.0	30.3	41.6	35.4	29.5
Minimum	<1	1	2	12	<1	<1
Maximum	85	80	86	81	83	86
Gender						
Male	50.2%	62.0%	48.5%	55.6%	62.0%	53.6%
Female	49.8%	38.0%	51.5%	44.4%	38.0%	46.4%
Born in Study Community?						
No	9.3%	35.2%	35.6%	61.1%	21.5%	22.3%
Yes	90.7%	64.8%	64.4%	38.9%	78.5%	77.7%
Residency in Community (years)						
Mean	21.9	23.4	23.4	24.7	27.3	23.3
Minium	1	1	1	3	1	1
Maximum	83	82	65	57	70	83
Alaska Native?						
No	0.4%	2.8%	0.0%	17.6%	2.6%	1.6%
Yes	99.6%	97.2%	100.0%	82.4%	97.4%	98.4%
Active Subsistence Harvester?						
No	28.0%	57.7%	48.5%	35.7%	59.7%	41.8%
Yes	72.0%	42.3%	51.5%	64.3%	40.3%	58.2%
Active Subsistence Processor?						
No	38.7%	57.7%	55.4%	14.3%	57.1%	47.1%
Yes	61.3%	42.3%	44.6%	85.7%	42.9%	52.9%
Active Subsistence Helper?						
No	16.9%	35.2%	29.7%	42.9%	29.9%	25.0%
Yes	83.1%	64.8%	70.3%	57.1%	70.1%	75.0%

Table 26. Places of Birth of Members of Surveyed Households

Alakanuk		Anvik		Grayling		Stevens Village		Tanana	
Alakanuk	204	Anchorage	11	Anchorage	5	Anchorage	1	Alatna	1
Chevak	2	Anvik	46	Aniak	1	Fairbanks	5	Beaver	1
Emmonak	1	Bethel	4	Anvik	2	Stevens Village	7	Fairbanks	2
Fox	1	Fairbanks	2	Bethel	7	Other U.S.	2	Hughes	1
Kivalina	1	Grayling	2	Fairbanks	2	Foreign	1	Huslia	1
Kotlik	2	Holy Cross	2	Grayling	65	Missing	2	Kokrines	1
Mountain Village	3	King Cove	1	Holikachuk	9			Kotzebue	1
Scammon Bay	1	Other U.S.	2	Holy Cross	1			Lime Village	1
Sheldon Point	5	Canada	1	Kaltag	1			Nulato	1
Saint Michael	1			Shageluk	4			Rampart	2
Kwiguk	1			Bonsilla River	1			Tanana	62
Nunallerpak	1			Fox Point Island	1			Other U.S.	2
Akulerak	1			Cripple Landing	1			Missing	3
Other U.S.	1			Other U.S.	1				
Total	225	Total	71	Total	101	Total	18	Total	79

Table 27. Selected Characteristics of Key Respondents

	Alakanuk	Anvik	Stevens Village	Total
Number	6	8	12	26
Gender				
Males	6	5	7	18
Females	0	3	5	8
Age Cohort				
20s			1	1
30s		1	2	3
40s	1	3	2	6
50s	1		6	7
60s	3	3		6
70s	1	1	1	3
Length (minutes)				
Mean	53.7	36.9	38.5	41.5
Minimum	26	23	13	13
Maximum	125	54	76	125
Total	322	295	462	1,079

Fig. 1. Communities and fishing districts, Yukon drainage, Alaska

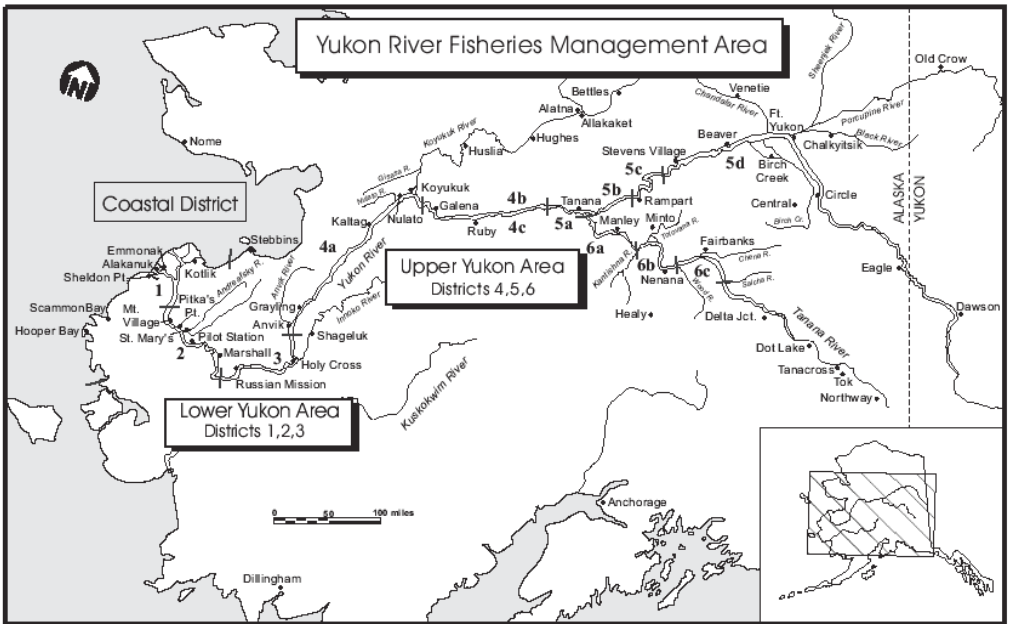
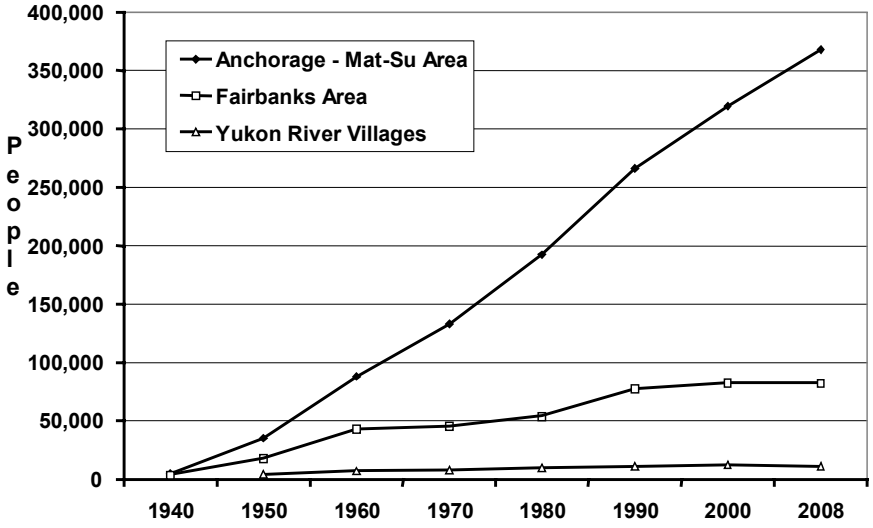


Fig. 2. Population Trends: Fairbanks, and Yukon River



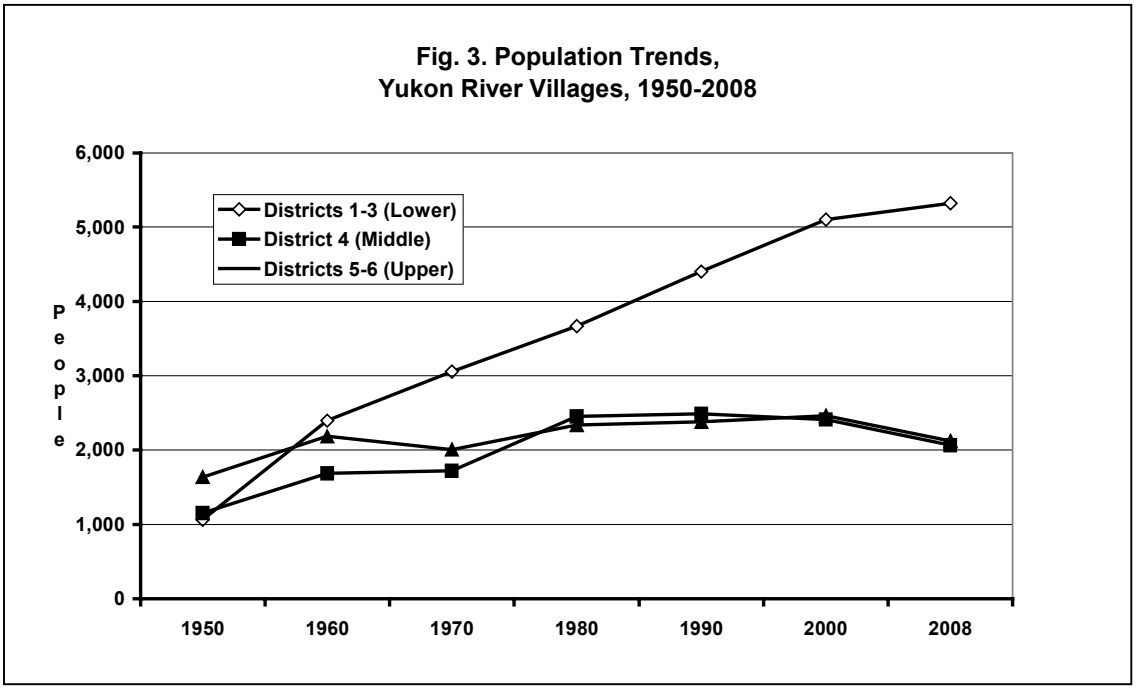


Fig. 3. Population Trends,
Yukon River Villages, 1950-2008
Districts 1-3 (Lower)
District 4 (Middle)
Districts 5-6 (Upper)
People
6,000
5,000
4,000
3,000
2,000
1,000
0
1950
1960
1970
1980
1990
2000
2008

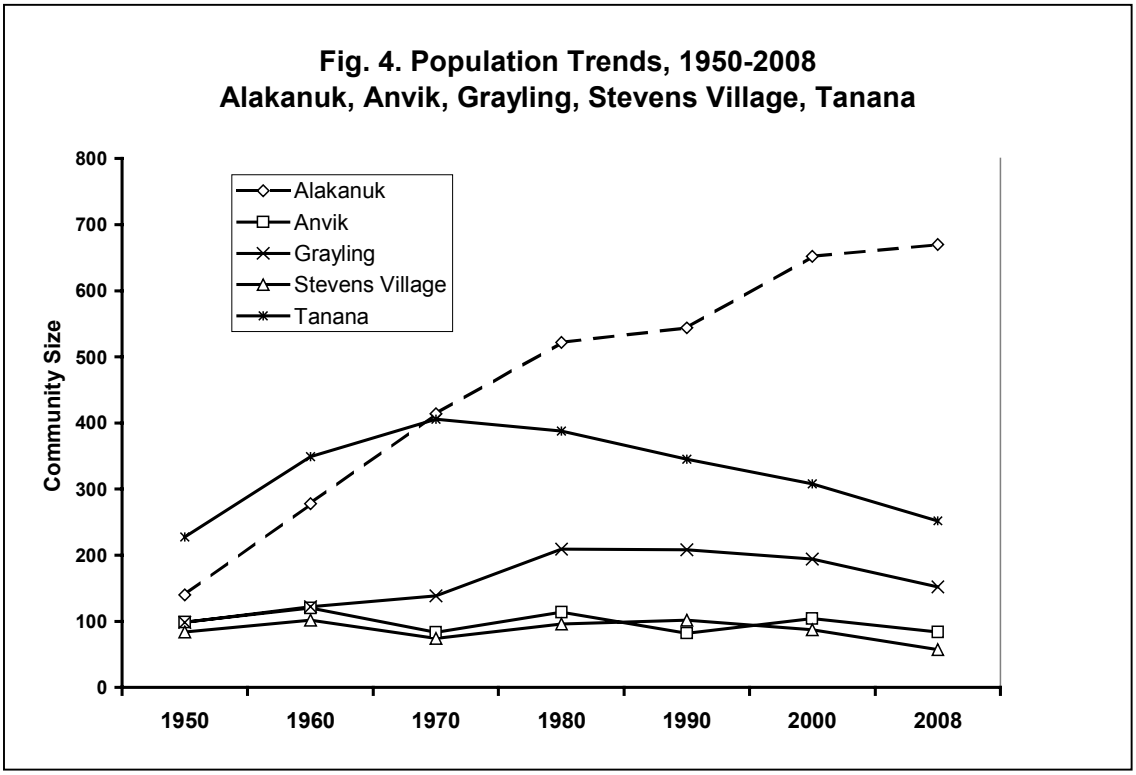


Fig. 4. Population Trends, 1950-2008
Alakanuk, Anvik, Grayling, Stevens Village, Tanana
Alakanuk
Anvik
Grayling
Stevens Village
Tanana
Community Size
800
700
600
500
400
300
200
100
0
1950
1960
1970
1980
1990
2000
2008

Fig. 5. Commercial and Subsistence Salmon Catches, Yukon River Drainage, Alaska 1918-2008

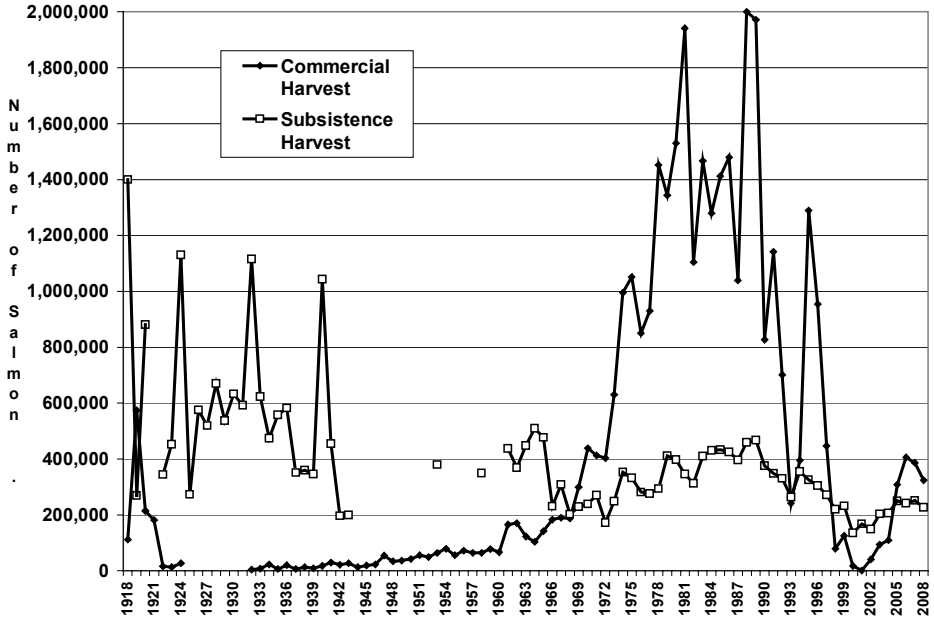


Fig. 6. Commercial Permits Fished (Percentage), Yukon River Salmon Fisheries, 1980 - 2006

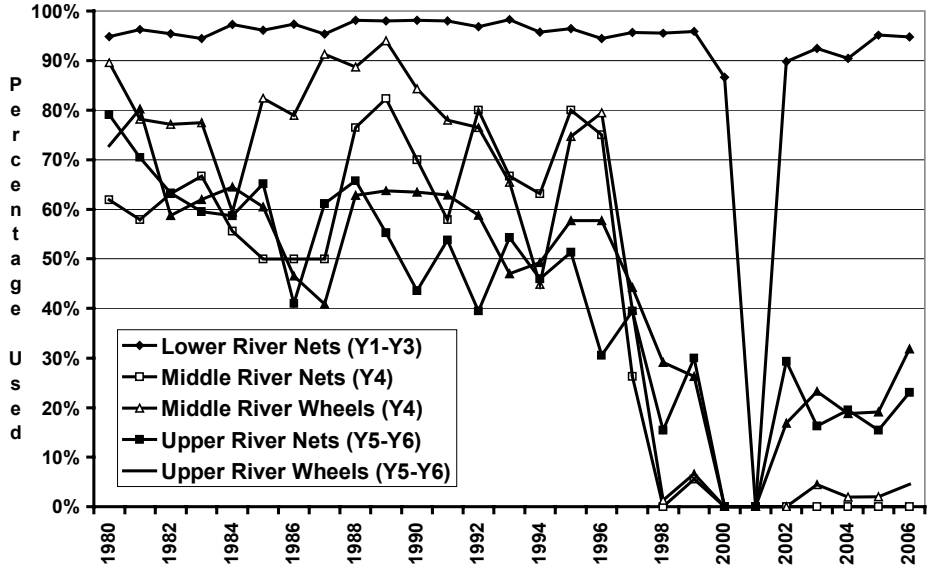


Fig. 7. Commercial Permits Used (Number), Middle (Y4) and Upper (Y5, Y6) Yukon River Salmon Fisheries, 1980 - 2006

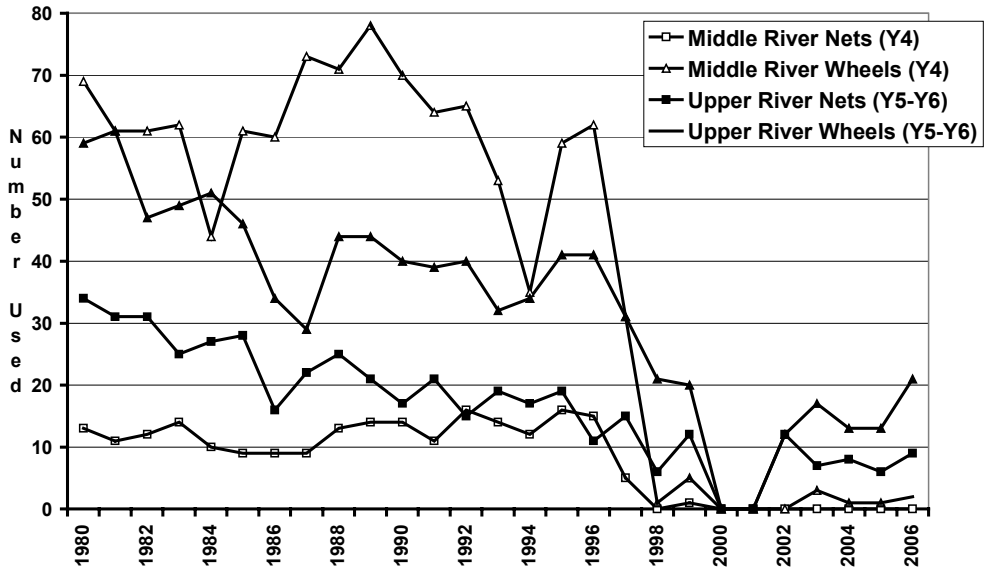


Fig. 8. Commercial Salmon Earnings by Species, Lower Yukon River (Y1 - Y3), 1976 - 2006

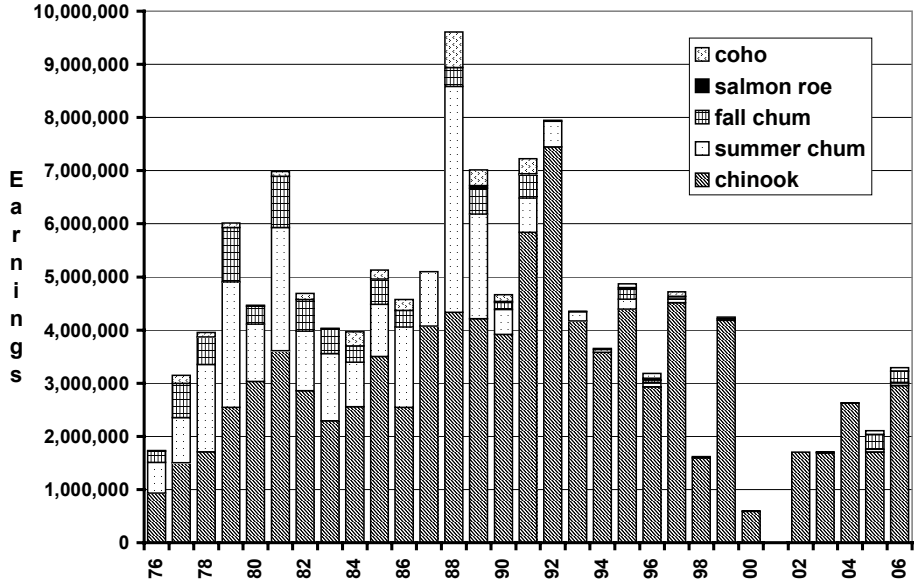


Fig. 9. Earnings from Commercial Salmon Fisheries, Middle Yukon River (Y4), 1976 - 2006

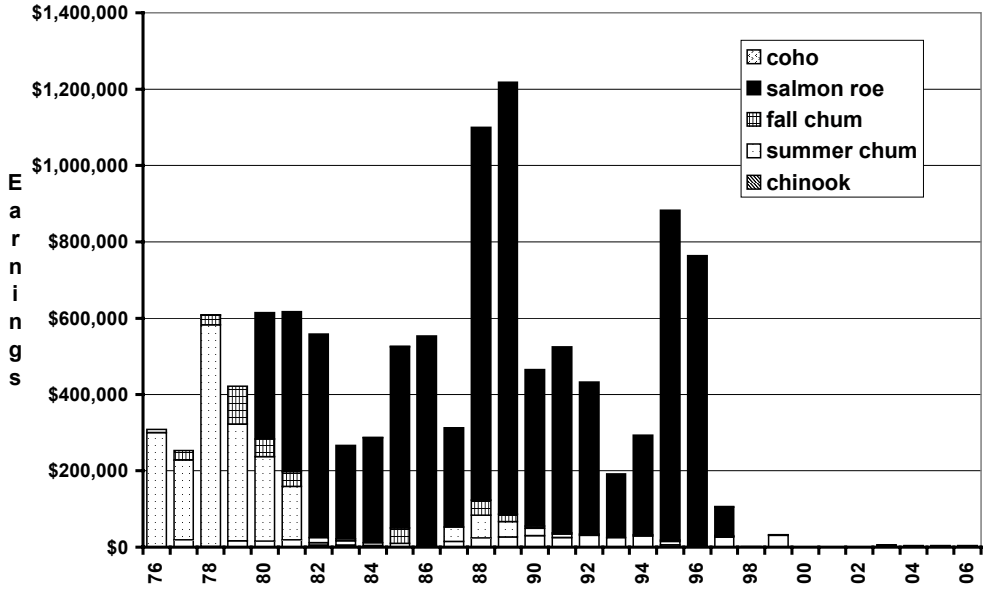


Fig. 10. Earnings from Commercial Salmon Fisheries, Upper Yukon River (Y4 and Y5), 1976 - 2006

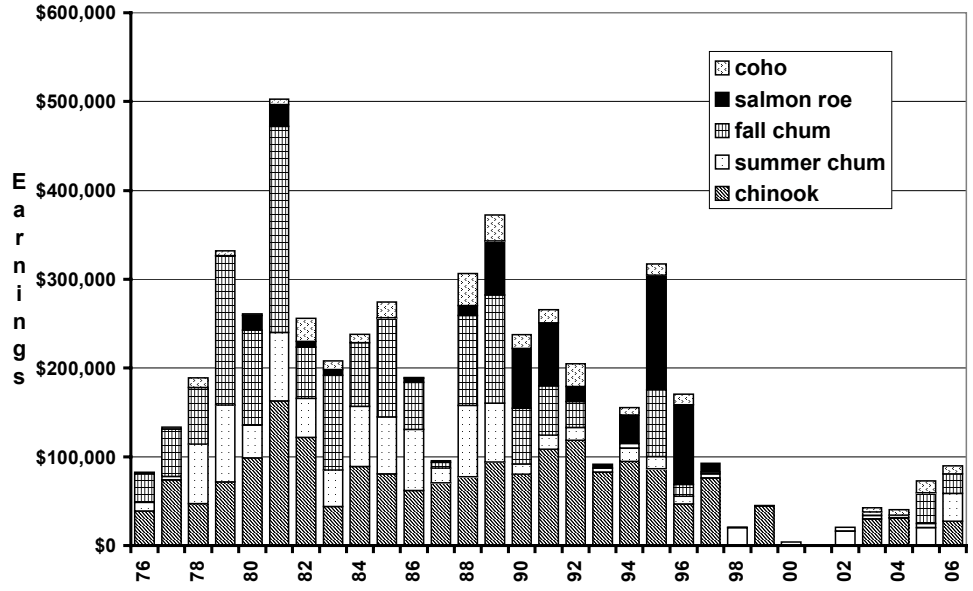


Fig. 11. Mean Earnings from Commercial Salmon Fisheries, Yukon River Villages, 1976 - 2006

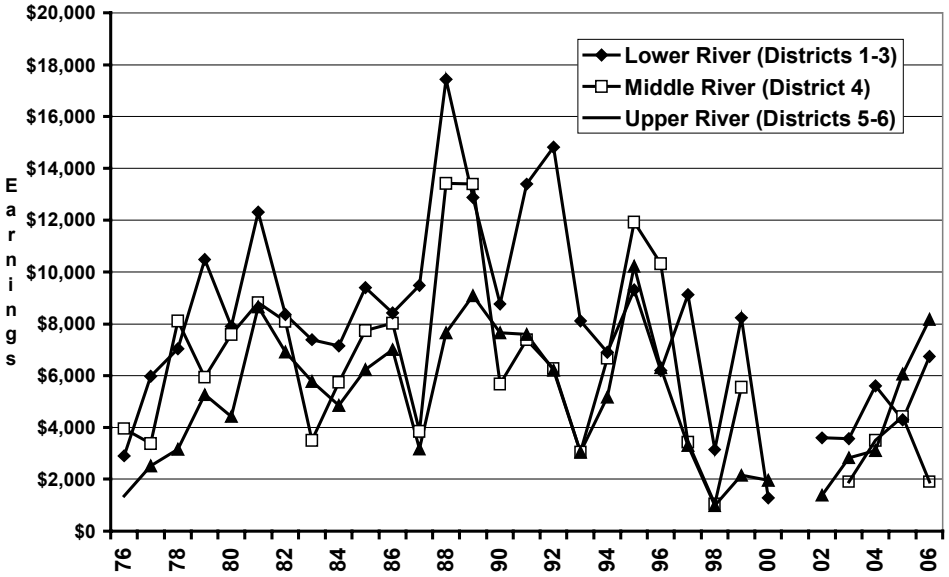


Fig. 12. 3-Yr-Running Mean Earnings from Commercial Salmon Fisheries (in 2006 Dollars), Yukon River Villages, 1976-2006

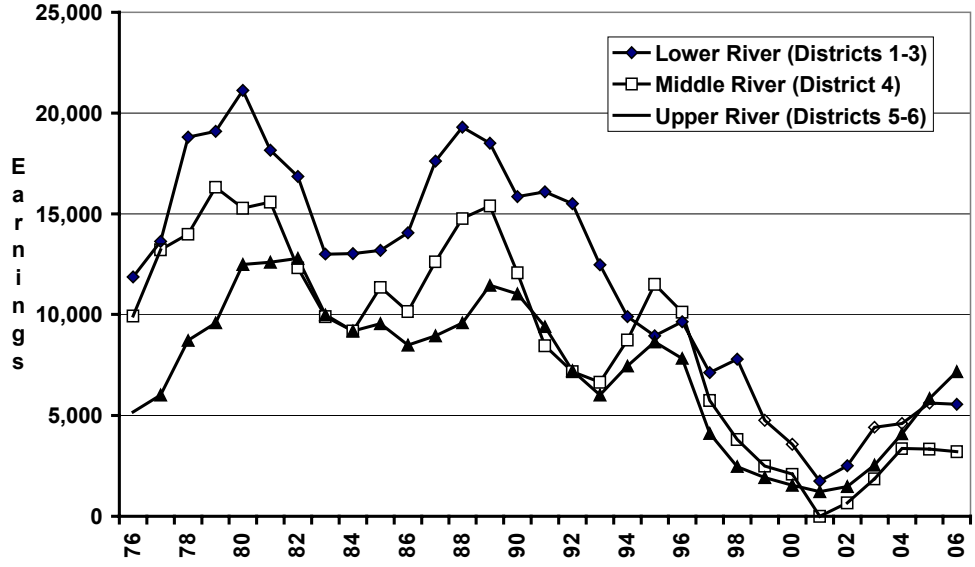


Fig. 13. Earnings from Commercial Salmon Fisheries, Anvik, Middle Yukon River, 1976 - 2006

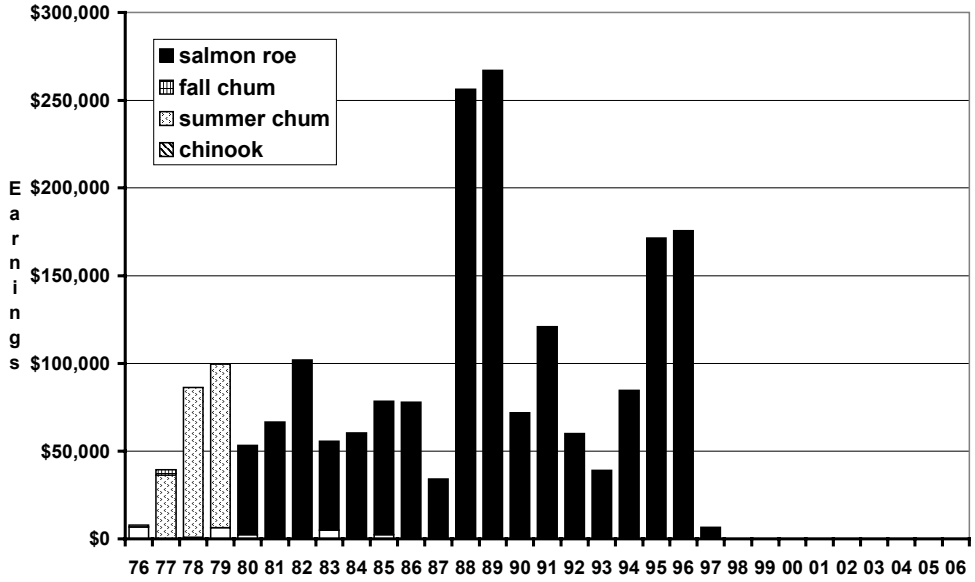


Fig. 14. Subsistence Chinook Harvests, Yukon River, 1961 - 2007, with Subsistence Thresholds

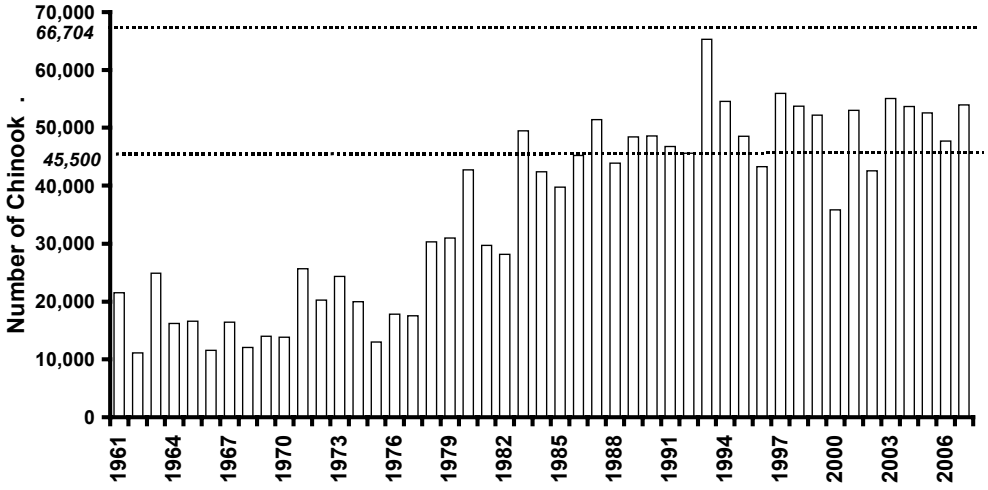


Fig. 15. Subsistence Summer Chum Harvests, Yukon River, 1961 - 2007, with Subsistence Thresholds

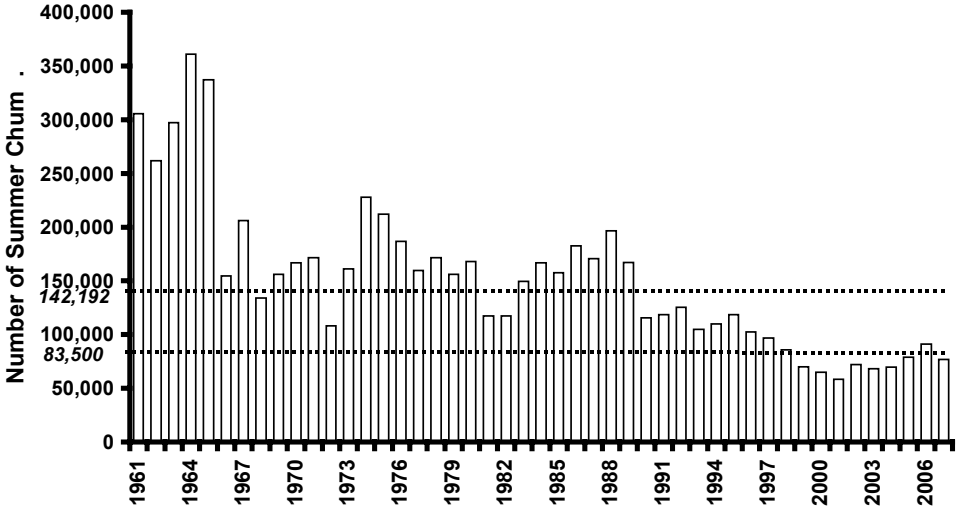
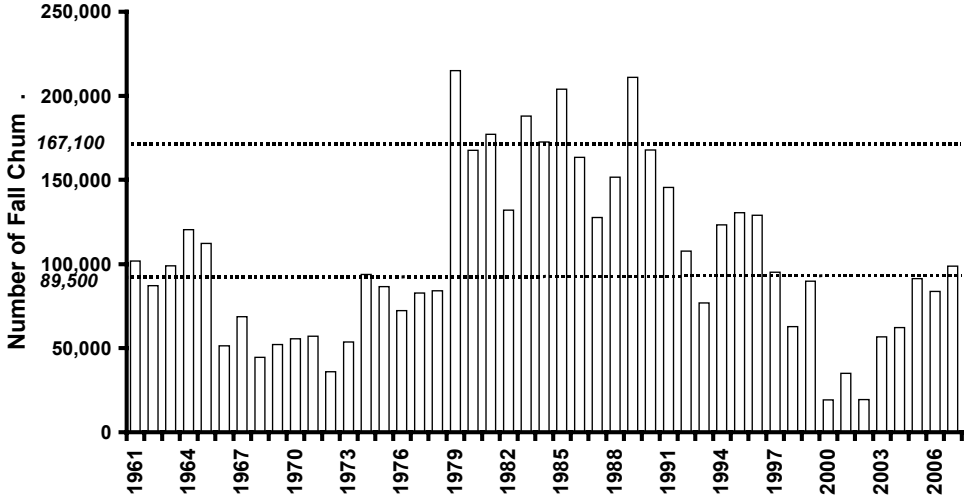


Fig. 16. Subsistence Fall Chum Harvests, Yukon River, 1961 - 2007, with Subsistence Thresholds



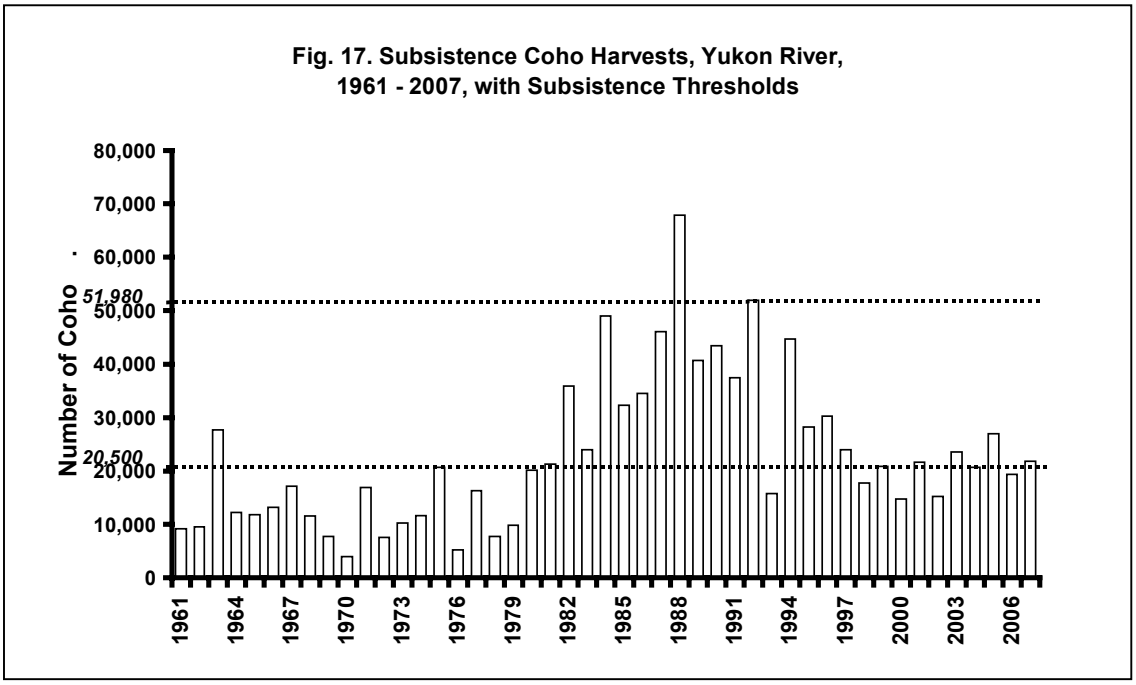


Fig. 17. Subsistence Coho Harvests, Yukon River,
1961 - 2007, with Subsistence Thresholds
Number of Coho
80,000
70,000
60,000
51,980
50,000
40,000
30,000
20,500
20,000
10,000
0
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006

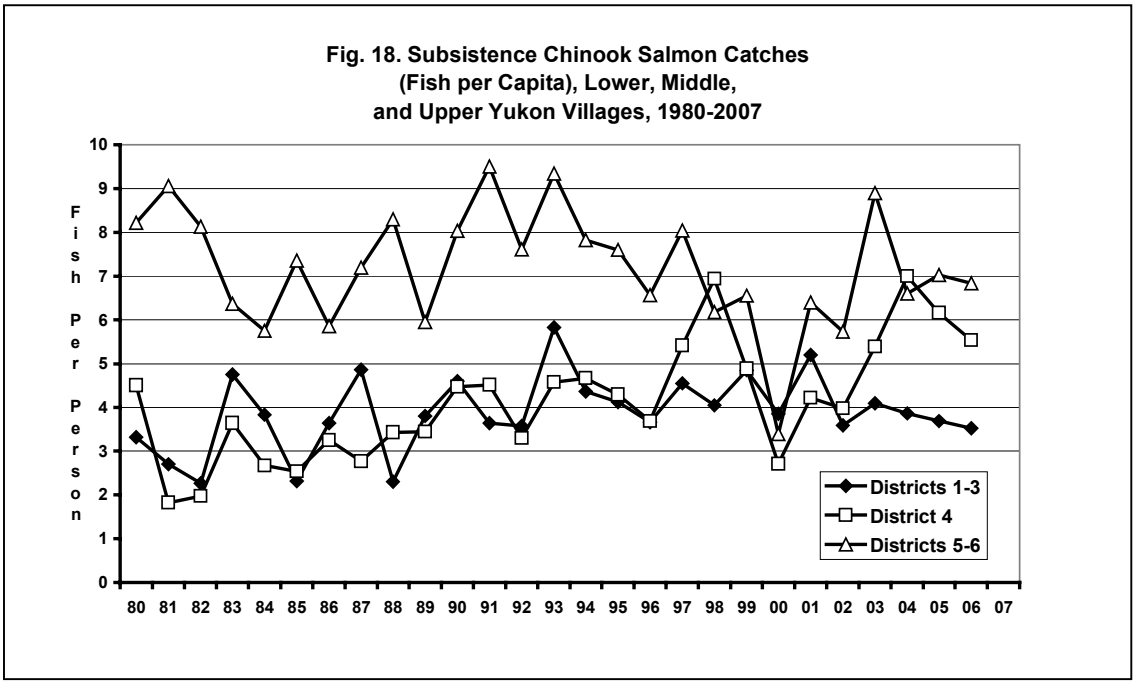


Fig. 18. Subsistence Chinook Salmon Catches
(Fish per Capita), Lower, Middle,
and Upper Yukon Villages, 1980-2007
Fish Per Person
10
9
8
7
6
5
4
3
2
1
0
80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07
Districts 1-3
District 4
Districts 5-6

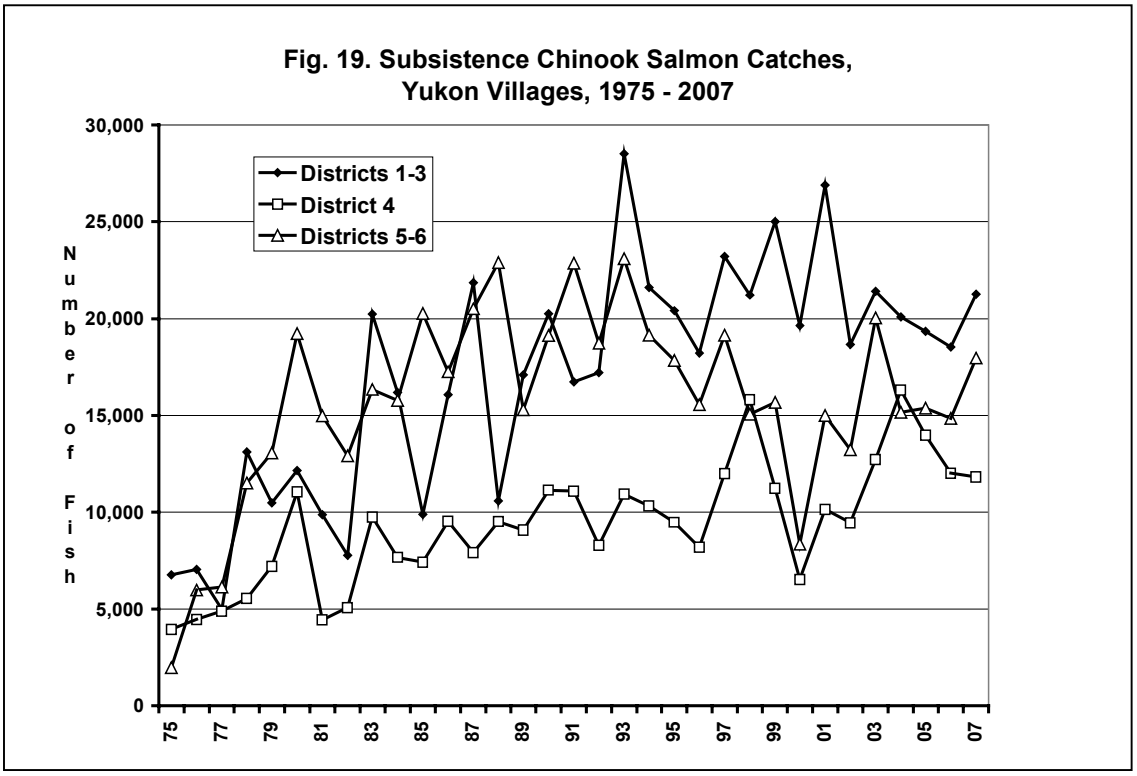


Fig. 19. Subsistence Chinook Salmon Catches,
Yukon Villages, 1975 - 2007
Districts 1-3
District 4
Districts 5-6
Number of Fish
30,000
25,000
20,000
15,000
10,000
5,000
0
75
77
79
81
83
85
87
89
91
93
95
97
99
01
03
05
07

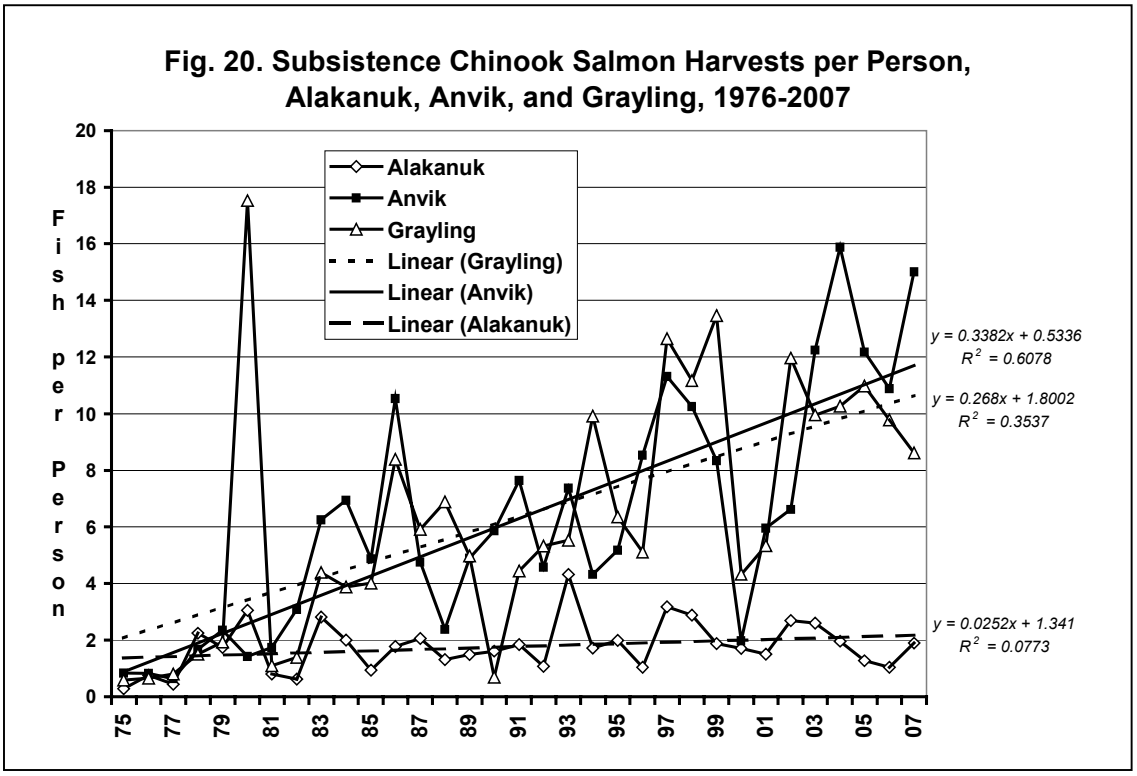


Fig. 20. Subsistence Chinook Salmon Harvests per Person,
Alakanuk, Anvik, and Grayling, 1976-2007
Alakanuk
Anvik
Grayling
Linear (Grayling)
Linear (Anvik)
Linear (Alakanuk)
Fish per Person
y = 0.3382x + 0.5336
R2 = 0.6078
y = 0.268x + 1.8002
R2 = 0.3537
y = 0.0252x + 1.341
R2 = 0.0773
20
18
16
14
12
10
8
6
4
2
0
75
77
79
81
83
85
87
89
91
93
95
97
99
01
03
05
07

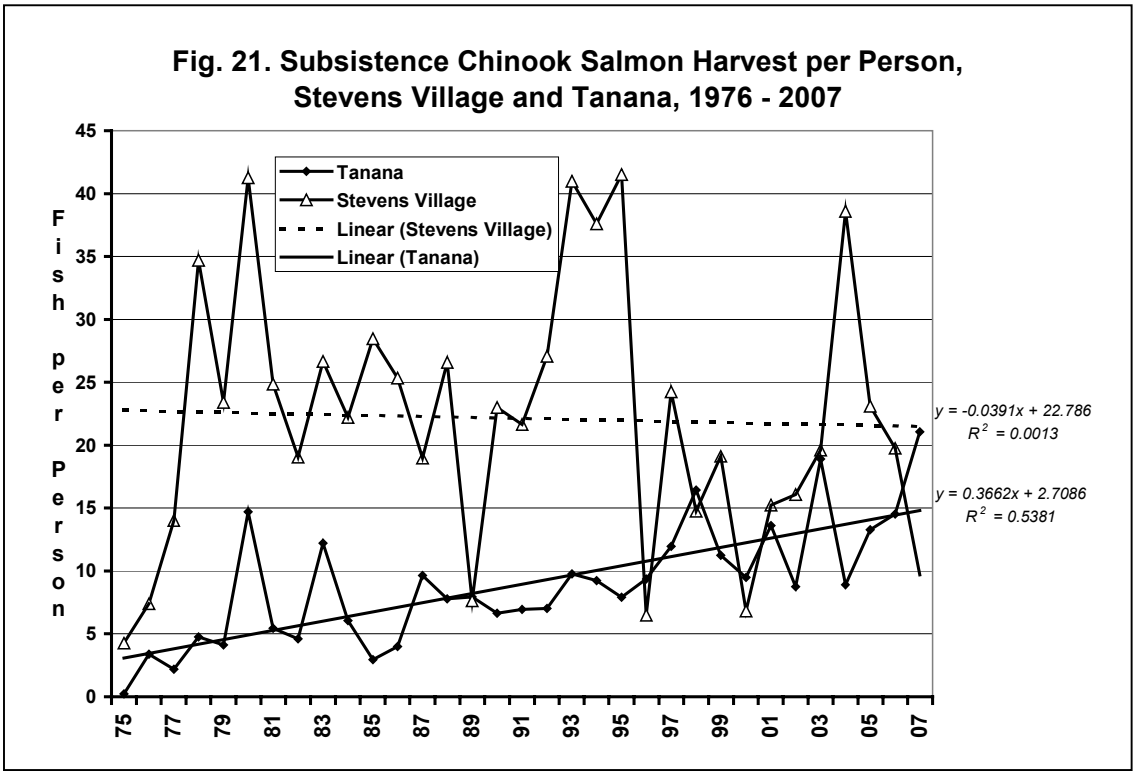


Fig. 21. Subsistence Chinook Salmon Harvest per Person, Stevens Village and Tanana, 1976 - 2007
Fish per Person
Tanana
Stevens Village
Linear (Stevens Village)
Linear (Tanana)
y = -0.0391x + 22.786
R2 = 0.0013
y = 0.3662x + 2.7086
R2 = 0.5381
0
5
10
15
20
25
30
35
40
45
75
77
79
81
83
85
87
89
91
93
95
97
99
01
03
05
07

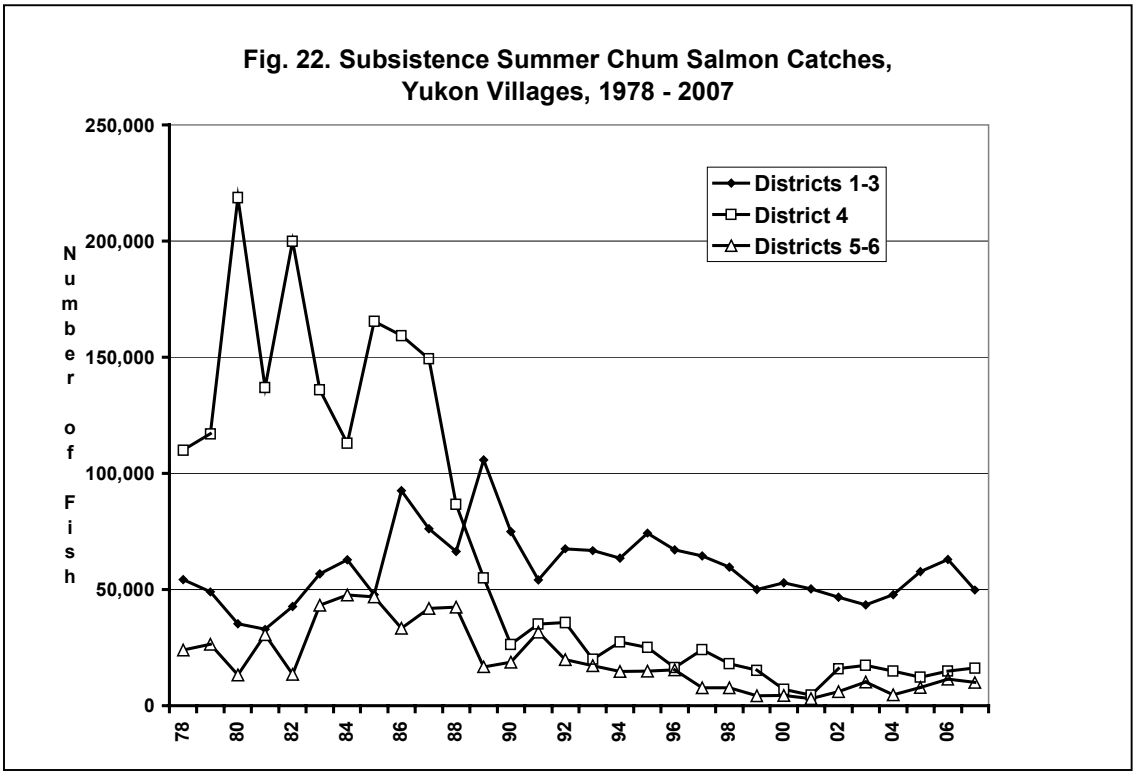


Fig. 22. Subsistence Summer Chum Salmon Catches, Yukon Villages, 1978 - 2007
Number of Fish
Districts 1-3
District 4
Districts 5-6
0
50,000
100,000
150,000
200,000
250,000
78
80
82
84
86
88
90
92
94
96
98
00
02
04
06

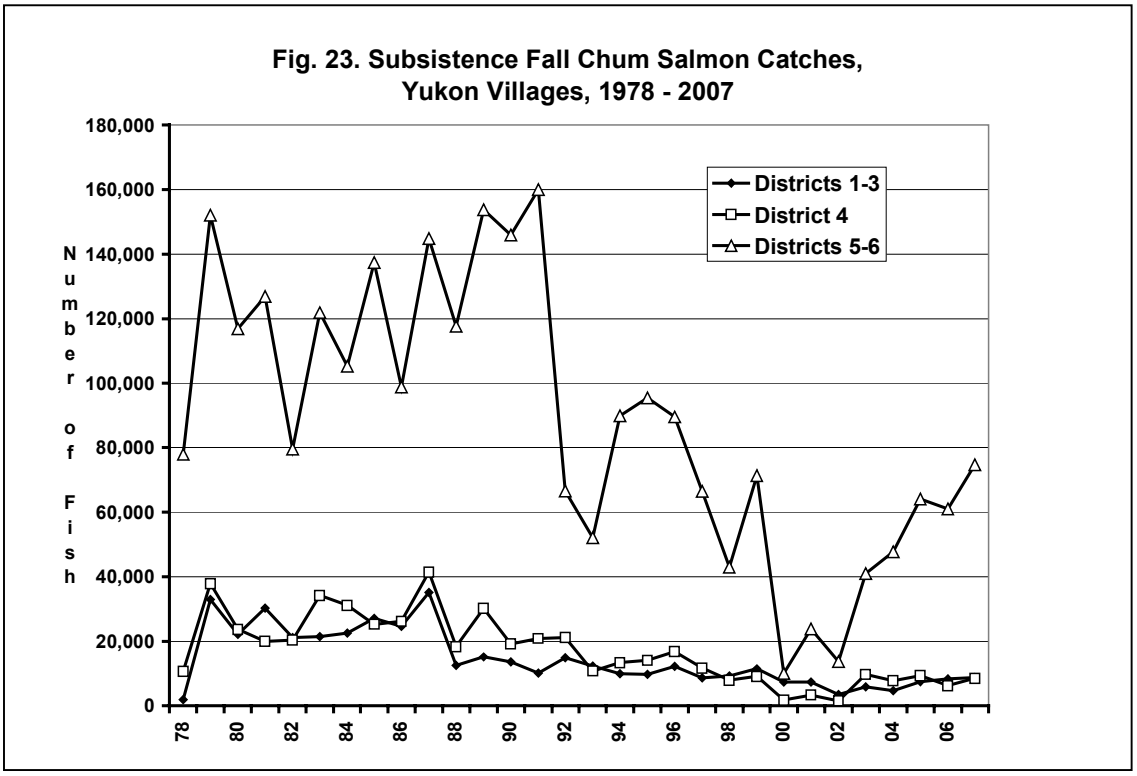


Fig. 23. Subsistence Fall Chum Salmon Catches,
Yukon Villages, 1978 - 2007
Number of Fish
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
78
80
82
84
86
88
90
92
94
96
98
00
02
04
06
Districts 1-3
District 4
Districts 5-6

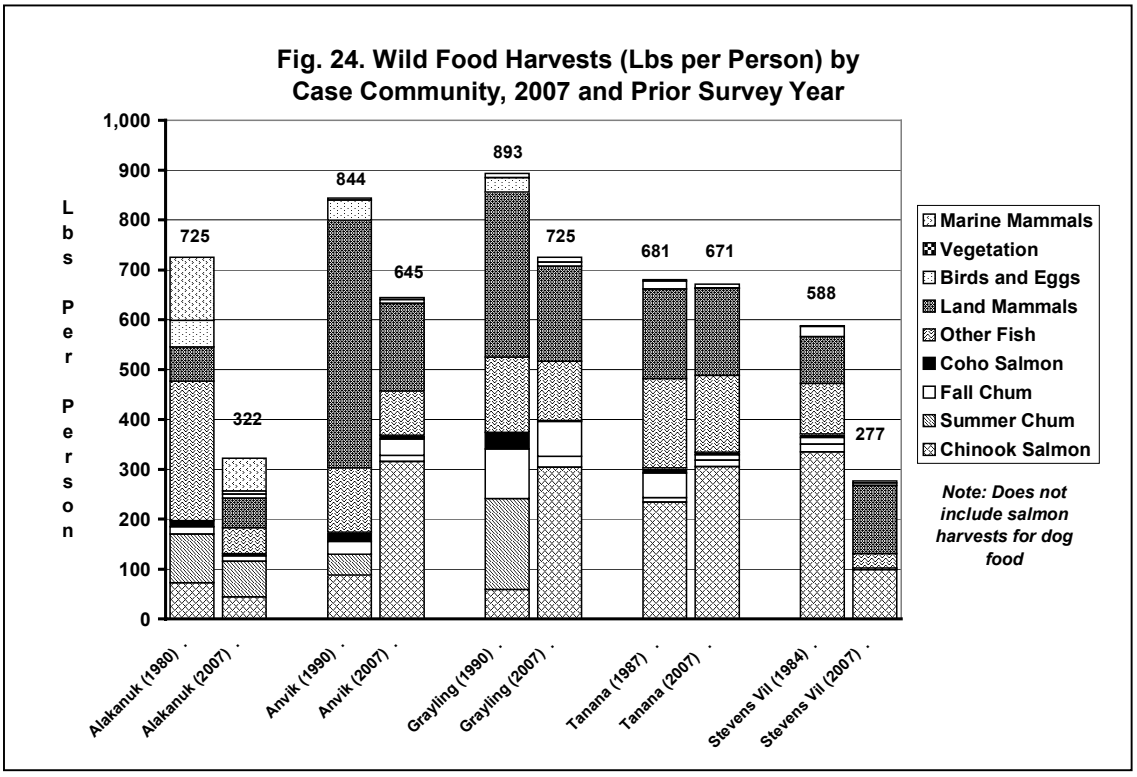


Fig. 24. Wild Food Harvests (Lbs per Person) by
Case Community, 2007 and Prior Survey Year
Lbs Per Person
1,000
900
800
700
600
500
400
300
200
100
0
725
322
844
645
893
725
681
671
588
277
Alakanuk (1980)
Alakanuk (2007)
Anvik (1990)
Anvik (2007)
Grayling (1990)
Grayling (2007)
Tanana (1987)
Tanana (2007)
Stevens Vil (1984)
Stevens Vil (2007)
Marine Mammals
Vegetation
Birds and Eggs
Land Mammals
Other Fish
Coho Salmon
Fall Chum
Summer Chum
Chinook Salmon
Note: Does not include salmon harvests for dog food

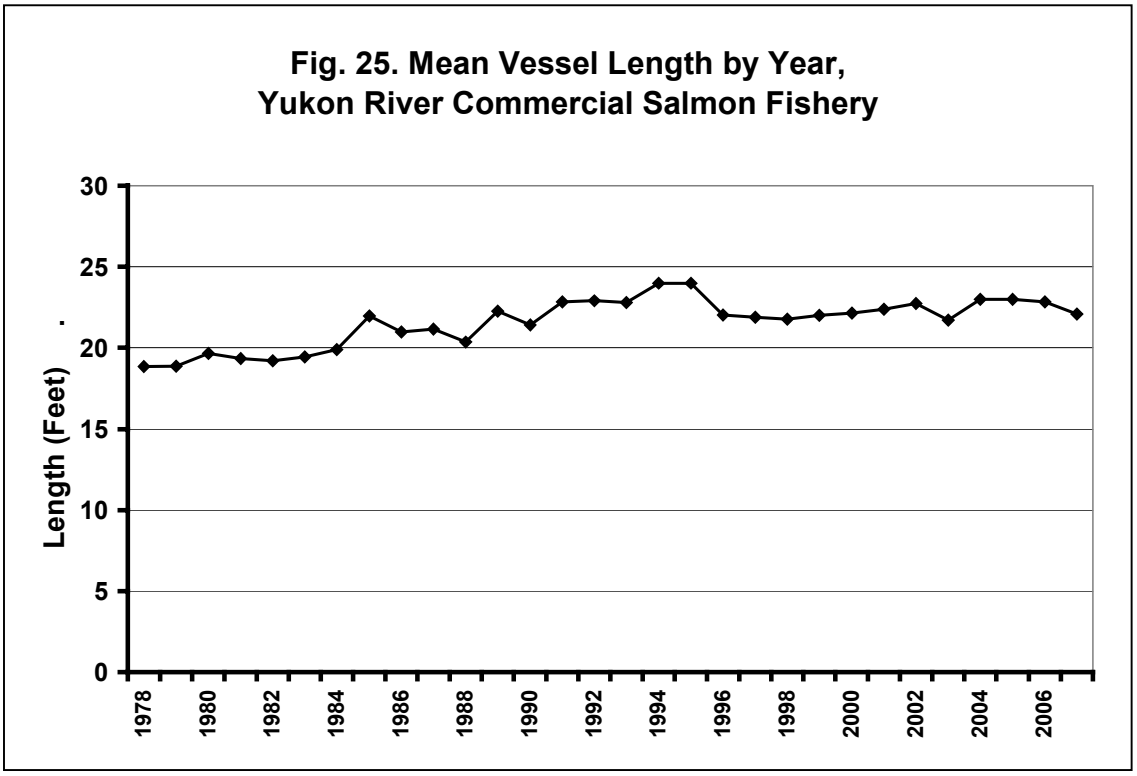


Fig. 25. Mean Vessel Length by Year,
Yukon River Commercial Salmon Fishery
Length (Feet)
30
25
20
15
10
5
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006

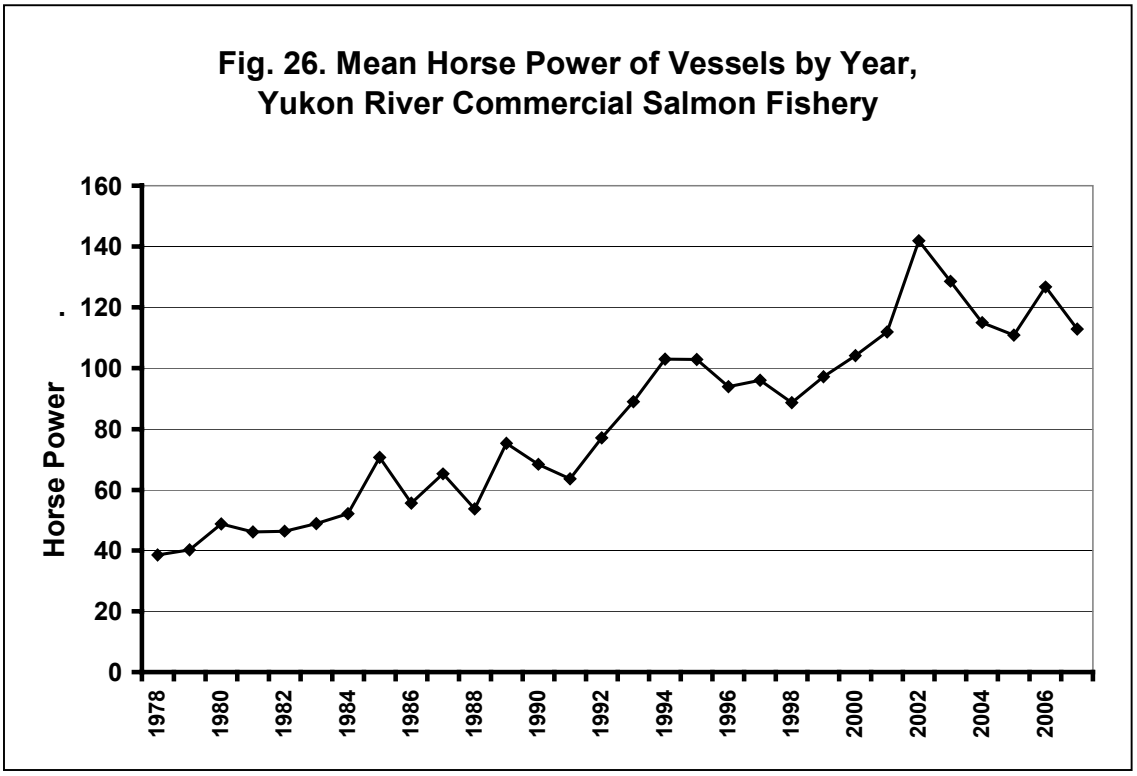


Fig. 26. Mean Horse Power of Vessels by Year,
Yukon River Commercial Salmon Fishery
Horse Power
160
140
120
100
80
60
40
20
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006

Fig. 27. Fishing boats, lower Yukon River, Alakanuk, 2008

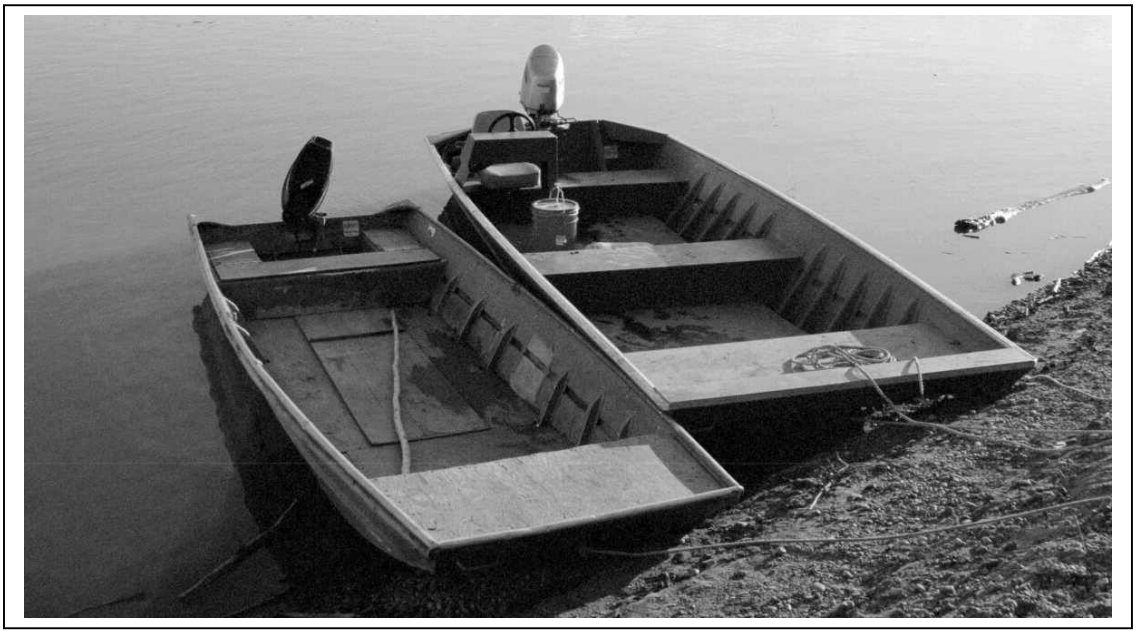


Fig. 28. Fishing boats, upper Yukon River, Stevens Village, 2008

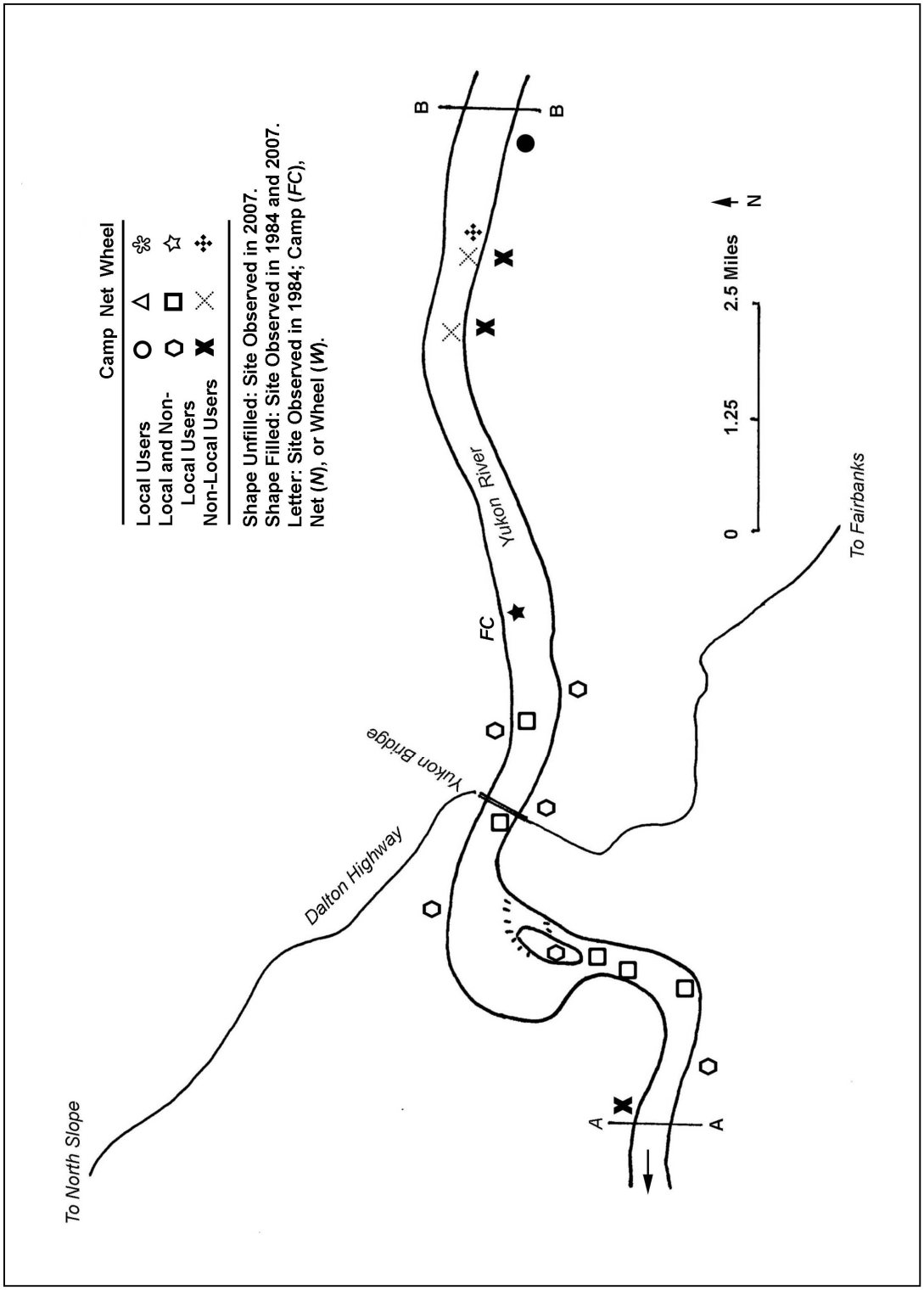


Fig. 29. Stevens Village Fishing Sites (Map 1)

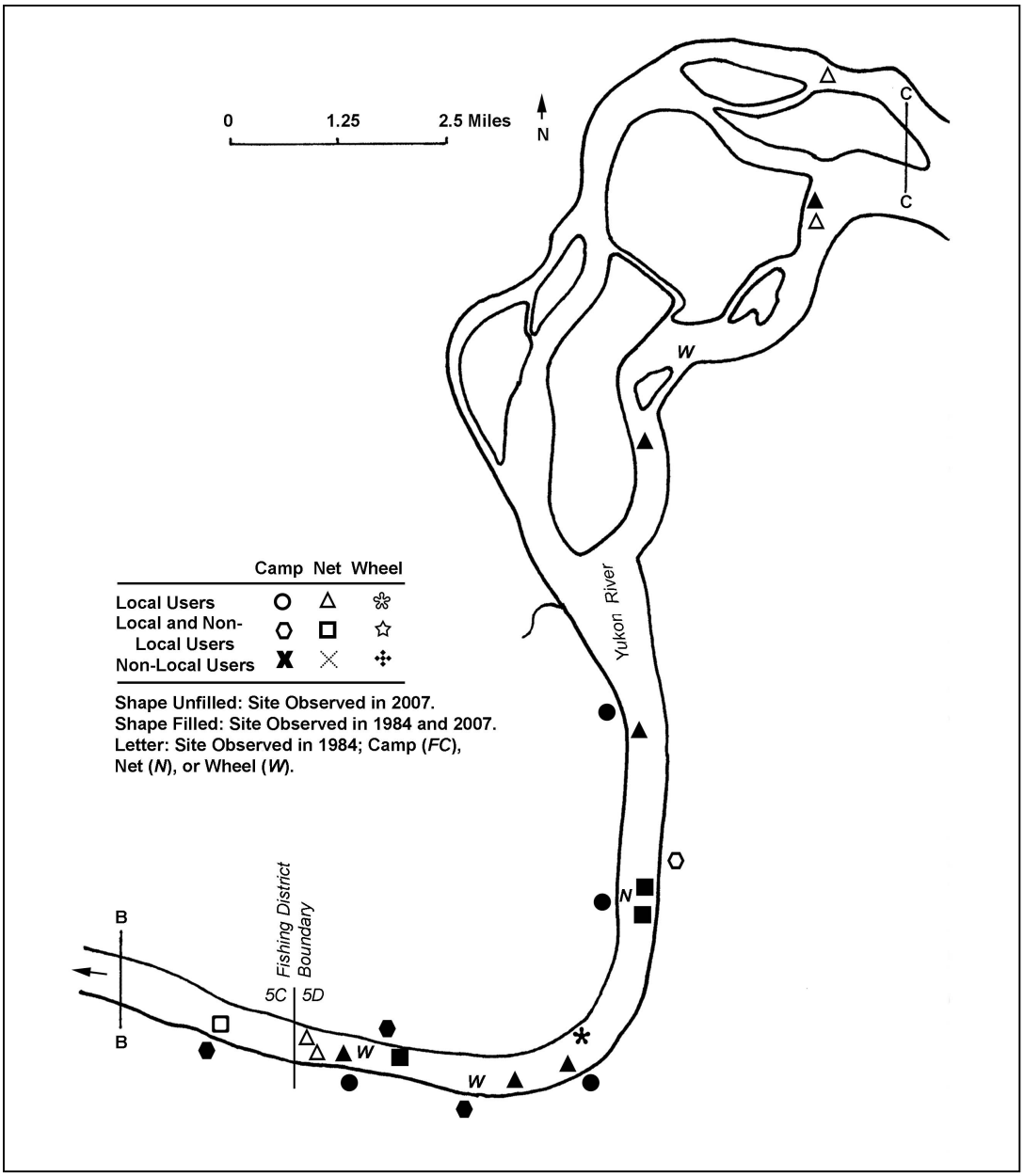


Fig. 30. Stevens Village Fishing Sites (Map 2)

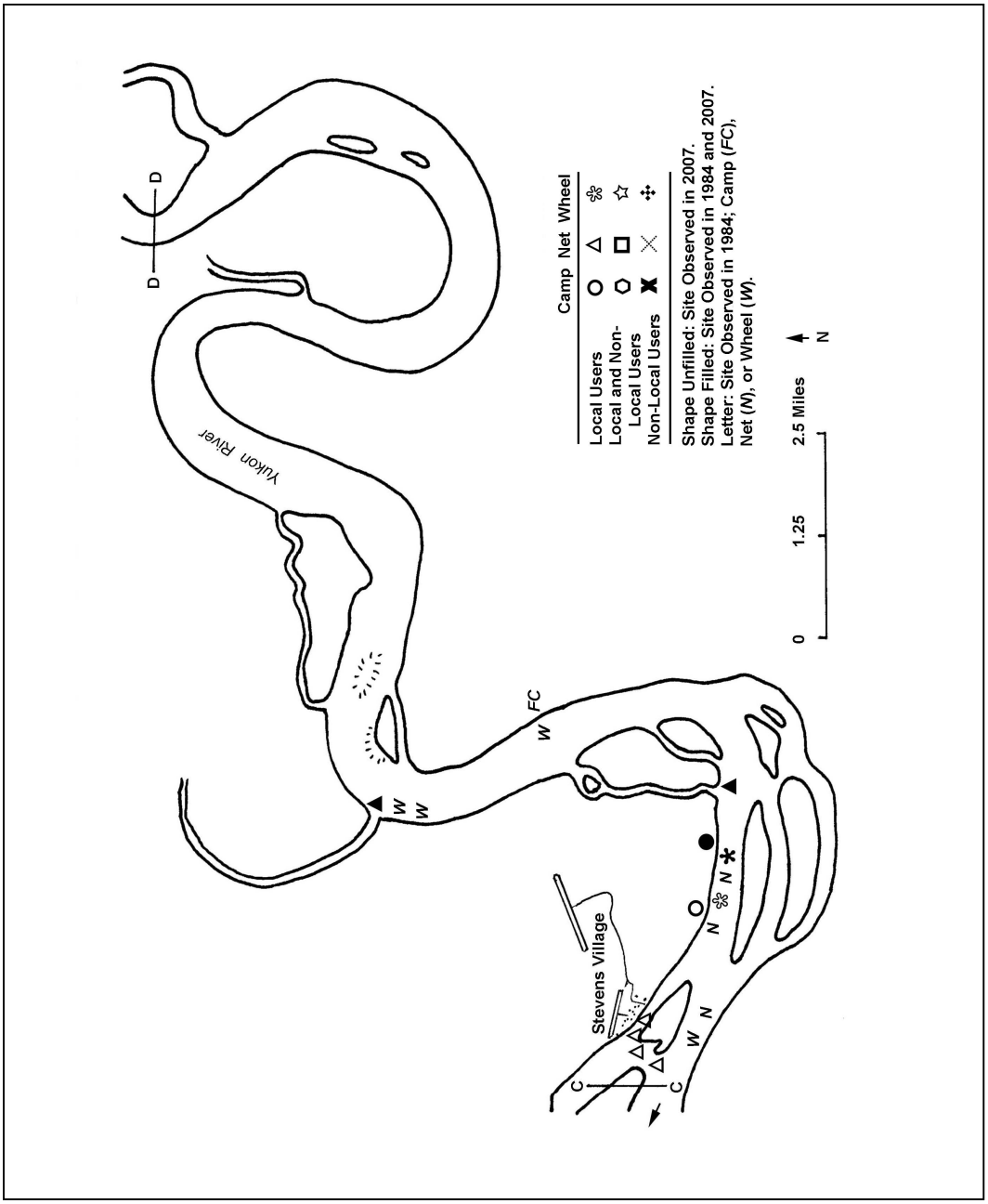


Fig. 31. Stevens Village Fishing Sites (Map 3)

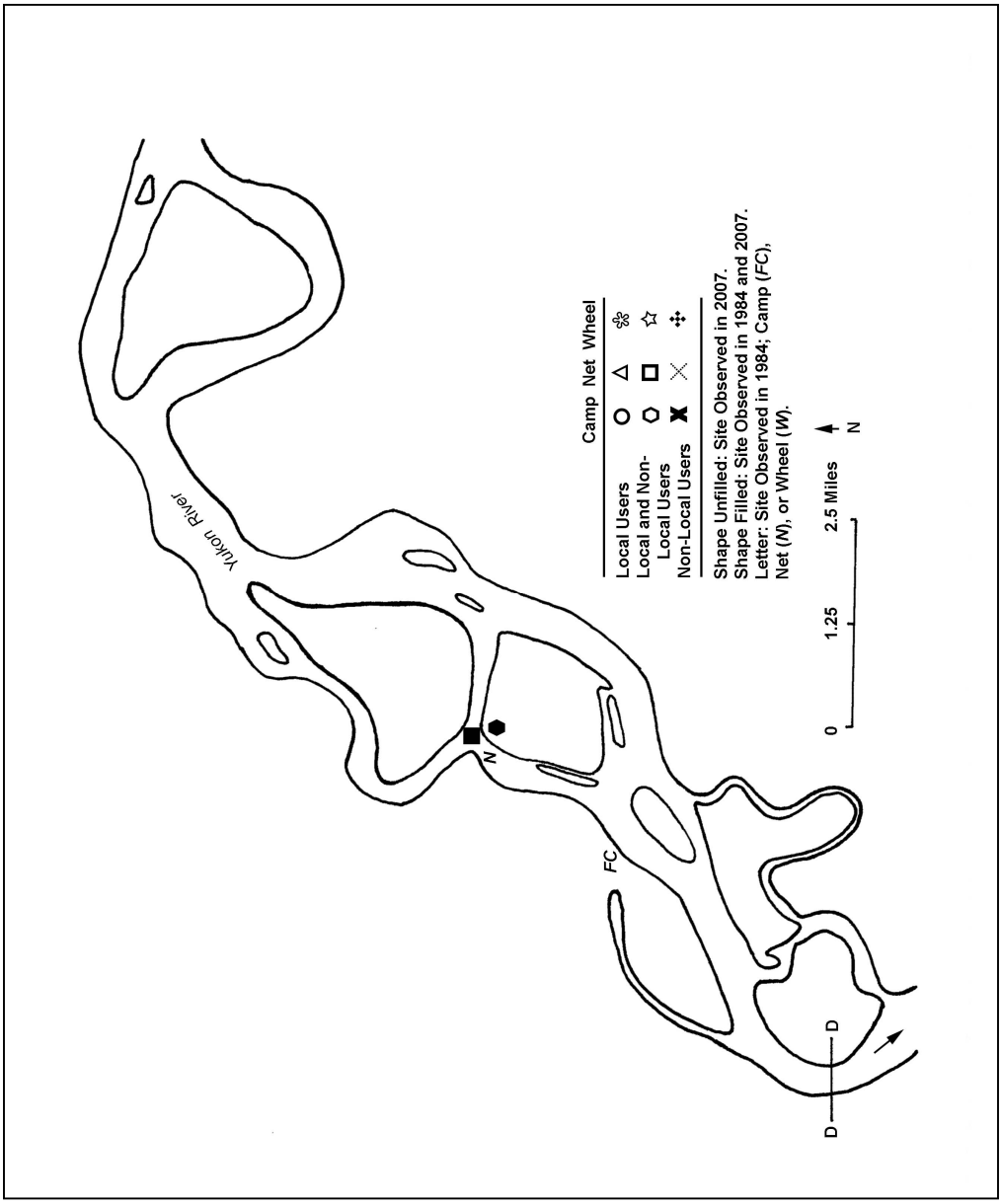


Fig. 32. Stevens Village Fishing Sites (Map 4)

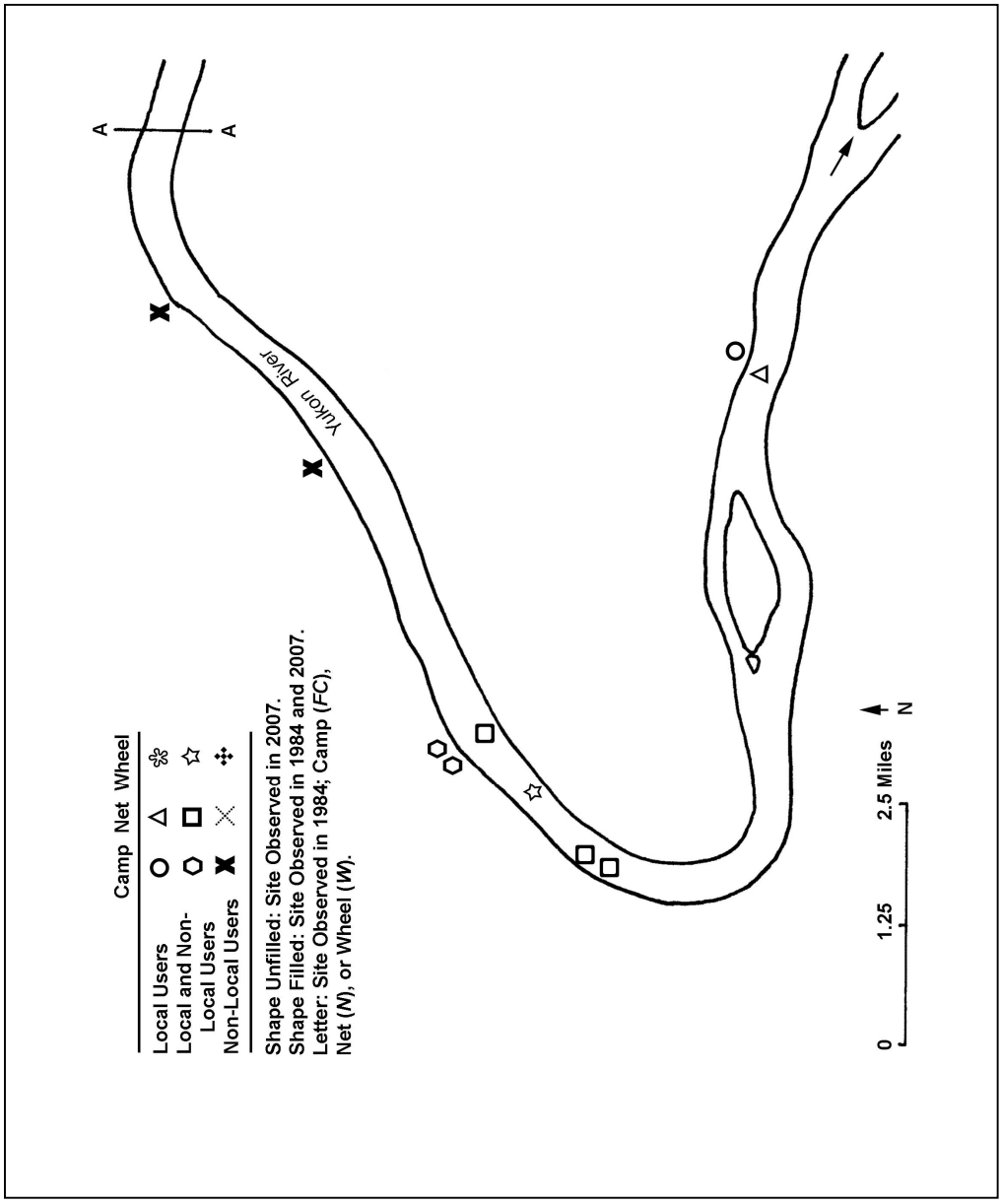


Fig. 33. Stevens Village Fishing Sites (Map 5)

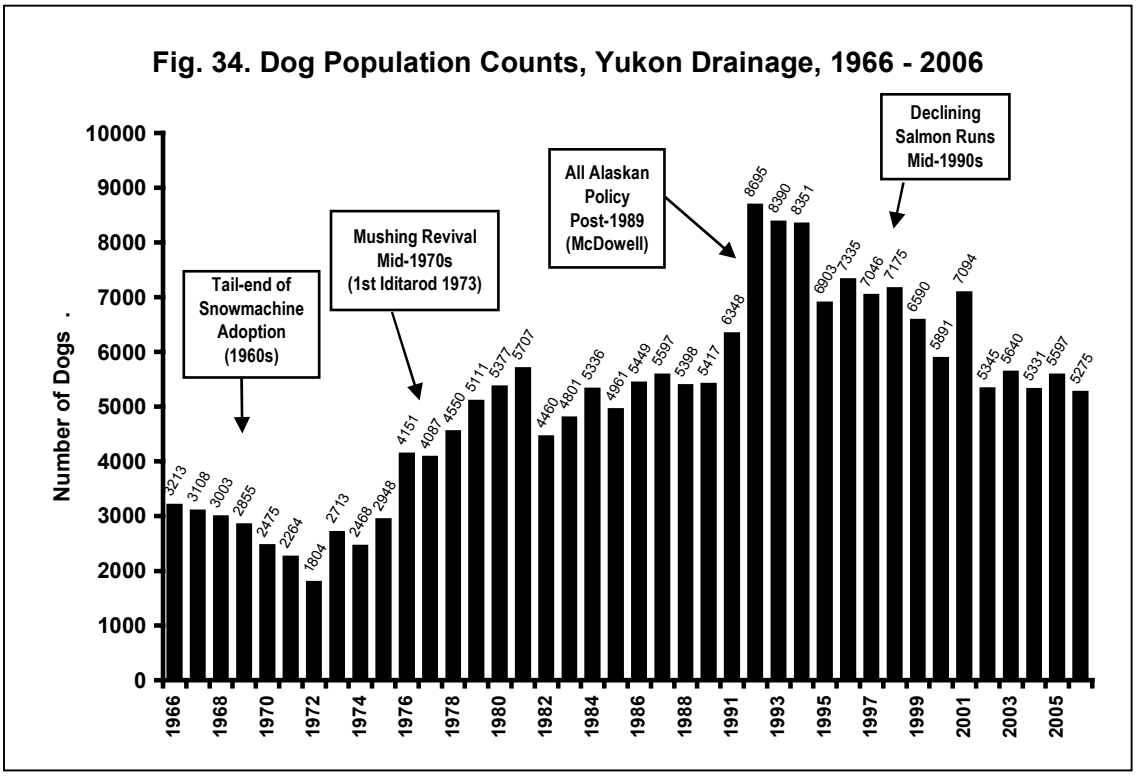


Fig. 34. Dog Population Counts, Yukon Drainage, 1966 - 2006
Number of Dogs
Tail-end of Snowmachine Adoption (1960s)
Mushing Revival Mid-1970s (1st Iditarod 1973)
All Alaskan Policy Post-1989 (McDowell)
Declining Salmon Runs Mid-1990s
3213
3108
3003
2855
2475
2264
1804
2713
2468
2948
4151
4087
4550
5111
5377
5707
4460
4801
5336
4961
5449
5597
5398
5417
6348
8695
8390
8351
6903
7335
7046
7175
6590
5891
7094
5345
5640
5331
5597
5275

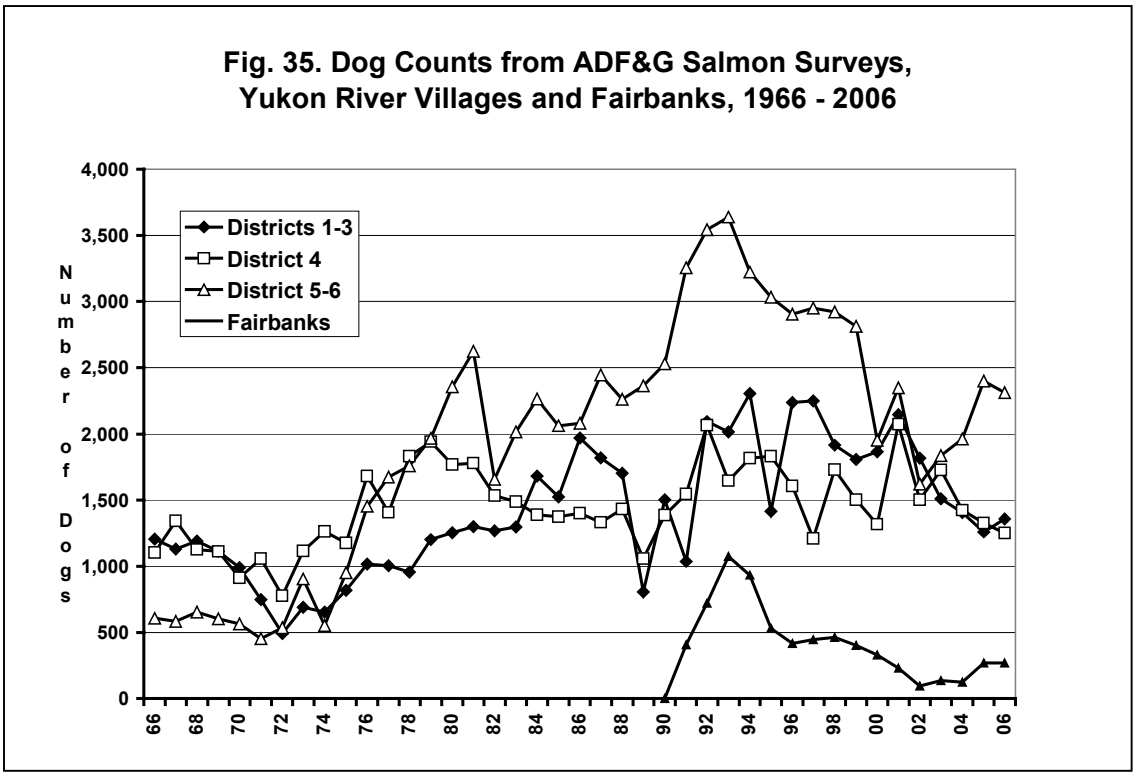


Fig. 35. Dog Counts from ADF&G Salmon Surveys, Yukon River Villages and Fairbanks, 1966 - 2006
Number of Dogs
Districts 1-3
District 4
District 5-6
Fairbanks

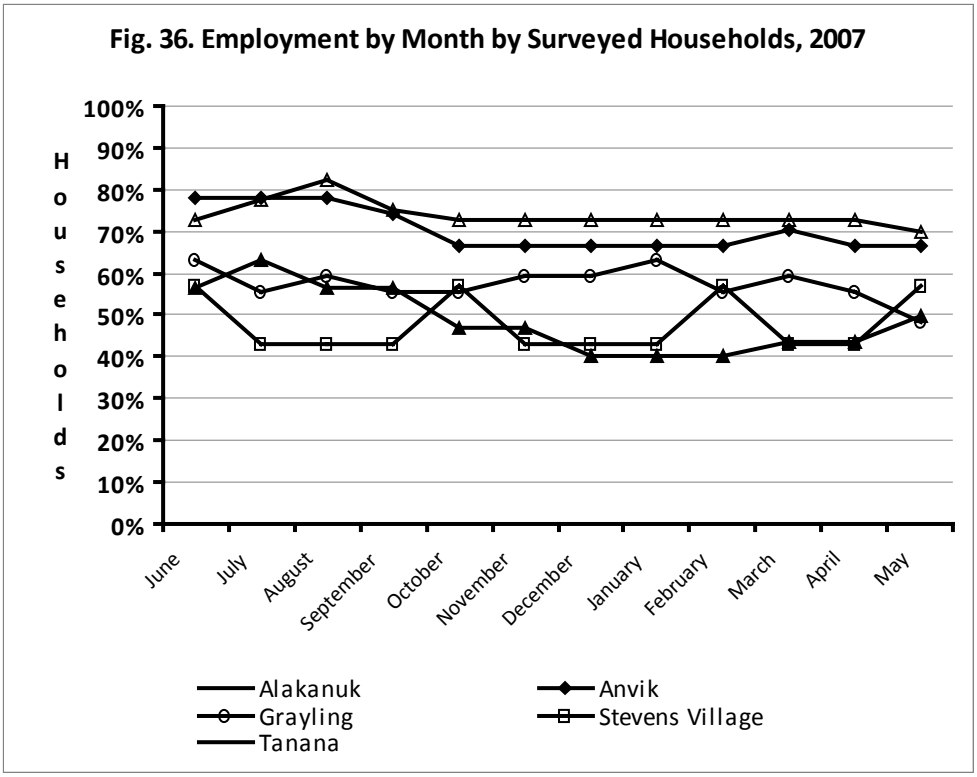


Fig. 36. Employment by Month by Surveyed Households, 2007
Households
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
June
July
August
September
October
November
December
January
February
March
April
May
Alakanuk
Anvik
Grayling
Stevens Village
Tanana

APPENDIX. HOUSEHOLD SURVEY (NEXT SIX PAGES)

YUKON RIVER SALMON TRENDS ANVIK **HHID:**

START TIME: _____ STOP TIME: _____
DATE: _____ INTERVIEWER: _____

WHO WERE MEMBERS OF THIS HOUSEHOLD LAST YEAR? (BETWEEN JUNE 2007 AND MAY 31, 2008)

PERSON'S ID	MALE OR FEMALE?	RELATION TO HH HEAD?	BIRTH YEAR ?	BIRTH PLACE (PARENTS HOME)?	YEARS IN COMMUNITY?	ALASKA NATIVE?	LAST YEAR, WAS THIS PERSON AN ACTIVE SUBSISTENCE ...		
							HARVESTER?	PROCESSOR?	HELPER?
HEAD 1	M F					Y N	Y N	Y N	Y N
HEAD 2	M F					Y N	Y N	Y N	Y N
3	M F					Y N	Y N	Y N	Y N
4	M F					Y N	Y N	Y N	Y N
5	M F					Y N	Y N	Y N	Y N
6	M F					Y N	Y N	Y N	Y N
7	M F					Y N	Y N	Y N	Y N
8	M F					Y N	Y N	Y N	Y N
9	M F					Y N	Y N	Y N	Y N
10	M F					Y N	Y N	Y N	Y N
11	M F					Y N	Y N	Y N	Y N
12	M F					Y N	Y N	Y N	Y N

PART 1, PAGE 1

YUKON RIVER SALMON TRENDS ANVIK **HHID:**

SUBSISTENCE SALMON FISHING

	LAST YEAR ... DID MEMBERS OF YOUR HH ...		LAST YEAR ... HOW MANY (___) DID HOUSEHOLD MEMBERS HARVEST WITH ...				LAST YEAR ...	LAST YEAR...	
	USE ?	TRY TO HARVEST?	SET NET?	DRIFT NET?	FISH WHEEL?	ROD & REEL?	HOW MANY OF THESE FISH WERE CAUGHT JUST FOR FEEDING DOGS?	DID YOUR HH GIVE (__) TO OTHERS?	DID YOUR HH RECEIVE (__) FROM OTHERS?
KING SALMON	Y N	Y N						Y N	Y N
SUMMER CHUM	Y N	Y N						Y N	Y N
FALL CHUM	Y N	Y N						Y N	Y N
COHO	Y N	Y N						Y N	Y N
PINK	Y N	Y N						Y N	Y N

In the table above, harvest means salmon ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED last year with subsistence gear, including salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If harvesting with other households, report ONLY YOUR SHARE of the catch.

COMMERCIAL SALMON FISHING

	LAST YEAR ... DID MEMBERS OF YOUR HOUSEHOLD TRY TO HARVEST (___) COMMERCIALLY?	LAST YEAR ... HOW MANY (___) DID HOUSEHOLD MEMBERS HARVEST WITH COMMERCIAL ...				LAST YEAR, FROM COMMERCIAL FISHING ... HOW MANY FISH FROM YOUR CATCH WAS USED THIS WAY?				
		SET NET?	DRIFT NET?	FISH WHEEL?	OTHER?	FISH SOLD WHOLE?	FISH SOLD FOR ROE AND CARCASSES CUT FOR ...		FISH NOT SOLD FOR ROE AND CUT FOR ...	
							DOG FOOD?	EATING?	DOG FOOD?	EATING?
KING SALMON	Y N									
SUMMER CHUM	Y N									
FALL CHUM	Y N									
COHO	Y N									
PINK	Y N									

In the table above, harvest means salmon ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED last year with commercial gear, including salmon sold and salmon retained for local use, sharing, or trade. If helping others, report ONLY YOUR SHARE of the catch.

PART 1, PAGE 2

YUKON RIVER SALMON TRENDS	ANVIK	HHID:

1. **DOES YOUR HOUSEHOLD HAVE ANY OF THE FOLLOWING EQUIPMENT ?**

Boat motor	Number:_____	Horsepowers:_____	
Boat	Number:_____	Lengths: _____	
King net	Number:_____	Lengths: _____	Mesh:_____
Chum net	Number:_____	Lengths: _____	Mesh:_____
Other net(s)	Number:_____	Lengths: _____	Mesh:_____
Fish wheel	Number:_____	Age (years): _____	
Drying rack	Number:_____		
Smokehouse	Number:_____		
Fish camp	Number:_____	(see 1B)	
Food cache	Number:_____		
Freezer	Number:_____		
Snowmachine	Number:_____		
Four-wheeler	Number:_____		
Other ATV	Number:_____		
Airplane	Number:_____		
Trapline	Length:_____	(see 1C)	
Winter cabin	Number:_____		
Rifles	Number:_____	Gauges:_____	
Adult Sled Dogs	Number:_____		
Other Adult Dogs	Number:_____		
Puppies	Number:_____		
Commercial permit	Types:_____	(see 1D)	

FISHCAMP HISTORY

1B. What years did members of your family subsistence fish for salmon from a fishcamp?

1950 51 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 79
1980 81 82 83 84 85 86 87 88 89 1990 91 92 93 94 95 96 97 98 99 2000 01 02 03 04 05 06 07

TRAPLINE HISTORY

1C. What years did members of your family trap along a trapline?

1950 51 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 79
1980 81 82 83 84 85 86 87 88 89 1990 91 92 93 94 95 96 97 98 99 2000 01 02 03 04 05 06 07

PERMIT HISTORY

1D. What years did members of your family use a commercial salmon permit?

1950 51 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 79
1980 81 82 83 84 85 86 87 88 89 1990 91 92 93 94 95 96 97 98 99 2000 01 02 03 04 05 06 07

FUEL USE

2. Last year, how much boat gasoline did your family use because of salmon fishing, including trips to and from fishing areas? _____ gallons (or) _____ drums
3. Last year, how much total gasoline (boat and snowmachine) did your household use for all activities? _____ gallons (or) _____ drums

SALMON FISHING

4. Did your household work with members of other households to catch and put up salmon in 2007? Yes____ No _____
5. If yes, how many households worked together to catch and put up salmon in 2007, including your own? _____
6. Did family members visit from outside the village during the salmon season? Yes___ No ____
7. How many family members visited during the salmon season last year? _____
8. From how many households did the visitors come from last year? _____
9. From what communities did they visit?_____
10. Over the last ten years, how has the number of visiting family members changed during salmon season?
    Increased a lot ___ Increased somewhat____ No change ____ Decreased somewhat_____ Decreased a lot____

SHARING SALMON

11. About how many people in your extended family used (ate) the salmon put up in 2007? _____
12. About how many different households ate the salmon harvested by your family last year? _____

PART 1, PAGE 3

"For this part of the survey, I'd like to turn on my recorder. This makes sure I get the information correctly. No names will be mentioned in the final report. Is it okay for me to record?"

CHANGES IN THE SALMON FISHERY

In recent years, less salmon has returned to the Yukon River.

1. Did your family experience problems because of lower salmon numbers? YES__ NO__
   What kinds of problems?

2. Have lower salmon numbers caused changes for your household, or for other fishing families? YES__ NO__
   What kinds of changes?

3. Have some family members moved away from the village because of the poor salmon fishing? YES__ NO__
   Please explain:

4. Have there been changes with dogs or with feeding dogs because of the low salmon years? YES__ NO__
   What changes?

5. Have there been changes with use of fish camps in recent years? YES__ NO__
   What changes?

6. Have there been changes with salmon fishing areas in recent years? YES__ NO__
   What changes?

7. Have the costs of fishing affected salmon fishing by your family, or by other families? YES __ NO __
   Please explain.

8. Have more restrictive fishing regulations affected how your family fishes, or other families? YES__ NO__
   Please explain.

9. Are there other things you'd like to say about salmon or salmon fishing? YES __ NO__
   Please explain.

YUKON RIVER SALMON TRENDS ANVIK **HHID:**

"This is the last set of questions for Part II.

Subsistence fishing and hunting requires money.

These questions ask about the source of money for the household last year.

HOW DID HOUSEHOLD MEMBERS WORK FOR MONEY DURING THE LAST TWELVE MONTHS?

(PLEASE INCLUDE COMMERCIAL FISHING, TRAPPING, SELF-EMPLOYMENT, AND WAGE EMPLOYMENT)

JOB #	PERSON'S ID *	JOB TITLE ?	EMPLOYER ?	LOCATION ?	MONTHS WORKED ?	INCOME ?
1					J J A S O N D J F M A M	
2					J J A S O N D J F M A M	
3					J J A S O N D J F M A M	
4					J J A S O N D J F M A M	
5					J J A S O N D J F M A M	
6					J J A S O N D J F M A M	
7					J J A S O N D J F M A M	
8					J J A S O N D J F M A M	
9					J J A S O N D J F M A M	
10					J J A S O N D J F M A M	
11					J J A S O N D J F M A M	
12					J J A S O N D J F M A M	
13					J J A S O N D J F M A M	
14					J J A S O N D J F M A M	

** A person's ID is on page one of the survey.* *"Income" means after expenses.*

WHAT OTHER TYPES OF INCOME CAME TO THE HOUSEHOLD LAST YEAR ?

AK PERMANENT FUND *	$ _____ /YR	PENSION/RETIREMENT	$ _____ /YR
NATIVE CORP. DIVIDEND	$ _____ /YR	WORK COMP/INSURANCE	$ _____ /YR
SOCIAL SECURITY	$ _____ /YR	FOOD STAMPS	$ _____ /YR
SUPP. SECURITY INCOME	$ _____ /YR	ENERGY ASSISTANCE	$ _____ /YR
ADULT PUBLIC ASSISTANCE	$ _____ /YR	UNEMPLOYMENT	$ _____ /YR
AK SENIOR BENEFITS (LONGEVITY)	$ _____ /YR	OTHER	$ _____ /YR

** AK PERMANENT FUND IN 2007: 1 - $1,654 2 - $3,308 3 - $4,962 4 - $6,616 5 - $8,270 6 - $9,924 7 - $11,578 8 - $13,232 9 - $14,886 10 - $16,540*

PART 2, PAGE 3

YUKON RIVER SALMON TRENDS ANVIK HHID:

"This is Part II of the survey. It asks about other wild foods used by your household last year. This is because salmon is one of many foods."

	LAST YEAR ... DID MEMBERS OF YOUR HH ...		LAST YEAR... HOW MANY DID YOUR HOUSEHOLD HARVEST?	LAST YEAR...	
OTHER FISH	USE ?	TRY TO HARVEST?		DID YOUR HH GIVE (___) TO OTHERS?	DID YOUR HH RECEIVE (___) FROM OTHERS?
BLACKFISH	Y N	Y N		Y N	Y N
BURBOT	Y N	Y N		Y N	Y N
CHAR	Y N	Y N		Y N	Y N
EEL	Y N	Y N		Y N	Y N
GRAYLING	Y N	Y N		Y N	Y N
HERRING	Y N	Y N		Y N	Y N
PACIFIC TOM COD	Y N	Y N		Y N	Y N
PIKE	Y N	Y N		Y N	Y N
SCULPIN	Y N	Y N		Y N	Y N
SHEEFISH	Y N	Y N		Y N	Y N
SMELT	Y N	Y N		Y N	Y N
STICKLEBACK	Y N	Y N		Y N	Y N
SUCKER	Y N	Y N		Y N	Y N
TROUT	Y N	Y N		Y N	Y N
BERING CISCO	Y N	Y N		Y N	Y N
WHITEFISH	Y N	Y N		Y N	Y N
BIG GAME					
MOOSE	Y N	Y N		Y N	Y N
CARIBOU	Y N	Y N		Y N	Y N
BLACK BEAR	Y N	Y N		Y N	Y N
BROWN BEAR	Y N	Y N		Y N	Y N
GOAT	Y N	Y N		Y N	Y N
DALL SHEEP	Y N	Y N		Y N	Y N
SMALL GAME					
BEAVER	Y N	Y N		Y N	Y N
FOX	Y N	Y N		Y N	Y N
HARE	Y N	Y N		Y N	Y N
LAND OTTER	Y N	Y N		Y N	Y N
LYNX	Y N	Y N		Y N	Y N
MARTEN	Y N	Y N		Y N	Y N
MINK	Y N	Y N		Y N	Y N
MUSKRAT	Y N	Y N		Y N	Y N
PORCUPINE	Y N	Y N		Y N	Y N
WEASEL	Y N	Y N		Y N	Y N
WOLF	Y N	Y N		Y N	Y N
WOLVERINE	Y N	Y N		Y N	Y N

PART 2, PAGE 1

YUKON RIVER SALMON TRENDS ANVIK HHID:

"This is Part II of the survey. It asks about other wild foods used by your household last year. This is because salmon is one of many foods."

	LAST YEAR ... DID MEMBERS OF YOUR HH ...		LAST YEAR... HOW MANY DID YOUR HOUSEHOLD HARVEST?			LAST YEAR...		
BIRDS	USE ?	TRY TO HARVEST?	Spr	Sum	Fall	DID YOUR HH GIVE (___) TO OTHERS?	DID YOUR HH RECEIVE (___) FROM OTHERS?	EGGS
MALLARD	Y N	Y N				Y N	Y N	
N. PINTAIL	Y N	Y N				Y N	Y N	
SCOTER	Y N	Y N				Y N	Y N	
CANADA GOOSE	Y N	Y N				Y N	Y N	
SNOW GOOSE	Y N	Y N				Y N	Y N	
SWAN	Y N	Y N				Y N	Y N	
CRANE	Y N	Y N				Y N	Y N	
GROUSE	Y N	Y N				Y N	Y N	
PTARMIGAN	Y N	Y N				Y N	Y N	
PLANTS								
BERRIES	Y N	Y N				Y N	Y N	
PLANTS/GREENS	Y N	Y N				Y N	Y N	
WOOD	Y N	Y N				Y N	Y N	
SEA MAMMALS								
BEARDED SEAL	Y N	Y N				Y N	Y N	
RINGED SEAL	Y N	Y N				Y N	Y N	
SPOTTED SEAL	Y N	Y N				Y N	Y N	
BELUKHA	Y N	Y N				Y N	Y N	
SEA LION	Y N	Y N				Y N	Y N	
WALRUS	Y N	Y N				Y N	Y N	

Please estimate how many of these wild resources ALL MEMBERS OF YOUR HOUSEHOLD HARVESTED last year. (Include all you gave away, ate fresh, fed to dogs, lost to spoilage, or got by helping others. If harvesting with others, report ONLY YOUR SHARE of the catch.)

PART 2, PAGE 2