

ANNUAL MANAGEMENT REPORT FOR THE SUBSISTENCE AND COMMERCIAL FISHERIES  
OF THE KUSKOKWIM AREA, 1991

By:  
R. Kim Francisco  
Cindy Anderson  
Charles Burkey Jr.  
Mike Coffing  
Karen Hyer  
Douglas B. Molyneaux  
Charles Utermohle

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#### AUTHORS

R. Kim Francisco is Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090

Cindy J. Anderson is Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Charles Burkey Jr. is Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090

Douglas B. Molyneaux is Salmon Research Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Karen Hyer is Kuskokwim Sonar Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599

Michael W. Coffing is Resource Specialist for the Alaska Department of Fish and Game, Division of Subsistence, P.O. Box 1788, Bethel, Ak. 99559-1788

Charles Uttermole is a Research Analyst for the Alaska Department of Fish and Game, Division of Subsistence, 333 Raspberry Road, Anchorage, Ak. 99518-1599

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES . . . . .	iv
LIST OF FIGURES . . . . .	v
LIST OF APPENDICES . . . . .	vi
PREFACE . . . . .	1
PART I. SALMON FISHERY . . . . .	2
INTRODUCTION . . . . .	2
Area and District Boundaries . . . . .	2
Fishery Resources . . . . .	2
Management Programs . . . . .	2
SUBSISTENCE FISHERY . . . . .	4
Background . . . . .	4
Subsistence Salmon Fishing Regulations . . . . .	5
Participation . . . . .	5
Licenses, Permits, and Gear . . . . .	5
In-Season Closures . . . . .	5
Subsistence Salmon Harvest Surveys . . . . .	6
Methods . . . . .	6
Catch Calendars . . . . .	6
Household Surveys . . . . .	7
Postcard and Telephone Surveys . . . . .	8
Subsistence Salmon Harvest Estimation . . . . .	8
1991 Sampling Summary . . . . .	9
1991 Harvest Summary . . . . .	10
COMMERCIAL FISHERY . . . . .	10
SEASON SUMMARY . . . . .	11
Kuskokwim River (District 1 and 2) . . . . .	11
Chinook Salmon . . . . .	12
Sockeye Salmon . . . . .	14
Chum Salmon . . . . .	15
Coho Salmon . . . . .	16
Pink Salmon . . . . .	18
Roe Sales . . . . .	18
Quinhagak (District 4) . . . . .	18
Chinook Salmon . . . . .	18
Sockeye Salmon . . . . .	19
Chum Salmon . . . . .	19
Coho Salmon . . . . .	20
Pink Salmon . . . . .	20
Goodnews Bay (District 5) . . . . .	20
Chinook Salmon . . . . .	20
Sockeye Salmon . . . . .	21
Chum Salmon . . . . .	21
Coho Salmon . . . . .	21
Pink Salmon . . . . .	21
Enforcement . . . . .	21

TABLE OF CONTENTS (Continued)

	<u>Page</u>
OUTLOOK FOR 1992 . . . . .	22
Chinook Salmon . . . . .	22
Sockeye Salmon . . . . .	22
Chum Salmon . . . . .	23
Coho Salmon . . . . .	23
PART II: FRESHWATER FIN FISH FISHERY . . . . .	23
Subsistence Fishery . . . . .	23
Commercial Fishery . . . . .	23
Status of the Stocks . . . . .	24
PART III: MISCELLANEOUS SALTWATER FINFISH . . . . .	25
PART IV. HERRING FISHERY . . . . .	25
INTRODUCTION . . . . .	25
Area and District Boundaries . . . . .	25
Management Programs . . . . .	25
Season Summary . . . . .	26
STOCK STATUS . . . . .	26
Assessment Methods . . . . .	26
Spawning Populations . . . . .	27
Security Cove District . . . . .	27
Goodnews Bay District . . . . .	27
Cape Avinof District . . . . .	28
Nelson Island District . . . . .	28
Nunivak Island District . . . . .	28
SUBSISTENCE FISHERY . . . . .	28
COMMERCIAL FISHERY . . . . .	29
Security Cove District . . . . .	29
Goodnews Bay District . . . . .	29
Cape Avinof District . . . . .	30
Nelson Island District . . . . .	31
Nunivak Island District . . . . .	31
OUTLOOK AND MANAGEMENT STRATEGY FOR 1992 . . . . .	31
Security Cove District . . . . .	32
Goodnews Bay District . . . . .	32
Cape Avinof District . . . . .	32
Nelson Island District . . . . .	32
Nunivak Island District . . . . .	33
LITERATURE CITED . . . . .	34
APPENDICES . . . . .	71

LIST OF TABLES

<u>TABLE</u>	<u>Page</u>
1. 1991 Kuskokwim Area fish ticket summary . . . . .	38
2. Kuskokwim sonar expanded daily counts, 1991 . . . . .	39
3. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1991 . . . . .	41
4. 1991 Kuskokwim Area subsistence salmon project sampling summary . .	42
5. 1991 Kuskokwim Area subsistence salmon harvests . . . . .	43
6. Kuskokwim Area salmon entry permits issued by village, 1991 . . . .	44
7. Kuskokwim Area commercial and subsistence salmon catches by species and district, 1991 . . . . .	45
8. 1991 Kuskokwim Area commercial salmon fishery final calculated value by district and area . . . . .	46
9. Executive summary of department and working group actions, 1991 . .	47
10. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1991 . . . . .	50
11. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1991 . . . . .	51
12. Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1991 . . . . .	52
13. Goodnews Bay, District 5, commercial harvest and fishing effort by period, 1991 . . . . .	53
14. Preliminary projections of the 1992 Kuskokwim Area commercial salmon harvests in thousands of fish by species . . . . .	54
15. Kuskokwim Area Pacific herring proportion of biomass by age class, 1991 . . . . .	55
16. Kuskokwim Area Pacific herring age frequency by district, 1991 . .	56
17. Summary of Pacific herring commercial harvest by fishing period for Kuskokwim Area fishing districts, Alaska, 1991 . . . . .	57
18. Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, Alaska, 1992 . . . . .	58

LIST OF FIGURES

<u>FIGURE</u>	<u>Page</u>
1. Kuskokwim Area Map . . . . .	60
2. Kuskokwim Management Area, District 1 . . . . .	61
3. Kuskokwim Management Area, District 2 . . . . .	62
4. Kuskokwim Management Area District 4 . . . . .	63
5. Kuskokwim Management Area District 5 . . . . .	64
6. Kuskokwim drainage aerial chinook salmon escapement index, 1991 . . . . .	65
7. Goodnews Bay and Security Cove Herring District . . . . .	66
8. Cape Avinof Herring District . . . . .	67
9. Nelson Island Herring District . . . . .	68
10. Nunivak Island Herring District . . . . .	69
11. Age composition of Pacific herring in spawning populations and commercial harvest, Kuskokwim Area, 1991 . . . . .	70

LIST OF APPENDICES

<u>APPENDIX A</u>	<u>Page</u>
A.1 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon . . . . .	73
A.2 Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1991 . . . . .	74
A.3 Kuskokwim Area commercial, subsistence and personal use salmon catches, 1913-1991 . . . . .	75
A.4 Historic salmon escapement data from current Kuskokwim Area projects, 1976-1991 . . . . .	77
A.5 Kuskokwim Area subsistence chinook salmon harvest by village, 1960-1991 . . . . .	78
A.6 Kuskokwim Area subsistence chum salmon harvest by village, 1985-1991 . . . . .	82
A.7 Kuskokwim Area subsistence sockeye salmon harvest by village, 1985-1991 . . . . .	83
A.8 Kuskokwim Area subsistence coho salmon harvest by village, 1985-1991 . . . . .	84
A.9 Kuskokwim River distances . . . . .	85
A.10 Fishes commonly found in the Kuskokwim Area . . . . .	87
A.11 Mean salmon weights and prices paid to commercial fishermen, Kuskokwim Area, 1967-1991 . . . . .	88
A.12 Commercial Fishing Effort in Kuskokwim Area by Permit-Hour 1960-1991 . . . . .	89
A.13 Maximum, mean, and minimum number of permits used in a single period by district, 1962 - 1991 . . . . .	90
 <u>APPENDIX B</u>	
B.1 Associated environmental and catch data, Bethel, Kuskokwim River, 1965-1991 . . . . .	92
B.2 Comparative chinook salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1974-1991 . . . . .	93
B.3 Comparative sockeye salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1981-1991 . . . . .	100
B.4 Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1971-1991 . . . . .	104
B.5 Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1991 . . . . .	110
B.6 Kuskokwim River chum salmon return per spawner index, 1980-1991 . . . . .	111

LIST OF APPENDICES (Continued)

	<u>Page</u>
B.7 Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1991 . . . . .	112
B.8 Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1991 . . . . .	114
B.9 Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1991 . . . . .	116
B.10 Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1991 . . . . .	118
B.11 Commercial coho salmon catches by period, lower Kuskokwim River (District 1), 1974-1991 . . . . .	120
B.12 Kuskokwim River chinook salmon return per spawner index, 1976-1991 . . . . .	125
B.13 Comparative chinook salmon catches by fishing period by year in District 2, Middle Kuskokwim River 1985-1991 . . . . .	126
B.14 Comparative sockeye salmon catches by fishing period by year in District 2, Middle Kuskokwim River 1985-1991 . . . . .	128
B.15 Comparative chum salmon catches by fishing period by year in District 2, Middle Kuskokwim River 1985-1991 . . . . .	130
B.16 Comparative coho salmon catches by fishing period by year in District 2, Middle Kuskokwim River 1985-1991 . . . . .	133
B.17 Utilization of Kuskokwim River chinook salmon, 1960-1991 . . . . .	136
B.18 Chinook salmon sex ratios and proportion of females with gillnet marks, Kogruklu Weir, 1979-1991 . . . . .	137
B.19 Estimated swimming speed of salmon in the Kuskokwim River . . . . .	138
B.20 Lower Kuskokwim River, District 1, commercial effort, 1970-1991 . . . . .	139
B.21 Middle Kuskokwim River, District 2, commercial effort, 1970-1991 . . . . .	140
B.22 Utilization of Kuskokwim River chum salmon, 1960-1991 . . . . .	141
B.23 Age distribution of historic commercial chum salmon catches from the lower Kuskokwim River, by sample trip . . . . .	142
B.24 Age distribution of historic commercial chinook salmon catches from the lower Kuskokwim River, by sample trip . . . . .	146
B.25 Age distribution of historic commercial sockeye salmon catches from the lower Kuskokwim River, by sample trip . . . . .	148
B.26 Age distribution of historic commercial coho salmon catches from the lower Kuskokwim River, by sample trip . . . . .	150

LIST OF APPENDICES (Continued)

	<u>Page</u>
<u>APPENDIX C</u>	
C.1 Historical age composition percentage, chinook salmon, Quinhagak commercial harvest and escapement, 1982-1990 . . . . .	155
C.2 Kanektok River peak aerial surveys by species, 1959-1991 . . . . .	158
C.3 Historical age composition percentage, sockeye salmon, Quinhagak commercial harvest and escapement, 1982-1988 . . . . .	159
C.4 Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1982-1990 . . . . .	161
C.5 Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1991 . . . . .	163
C.6 Summary of historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1991 . . . . .	165
C.7 Quinhagak District commercial salmon harvest, 1960-1991 . . . . .	167
C.8 Summary of historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1991 . . . . .	168
C.9 Quinhagak District commercial salmon effort, 1970-1990 . . . . .	170
C.10 Summary of historical commercial harvest by period, Quinhagak District, coho salmon, 1979-1991 . . . . .	171
<u>APPENDIX D</u>	
D.1 Peak aerial survey results, Goodnews River, 1980-1991 . . . . .	174
D.2 Historical age composition percentage, chinook salmon Goodnews Bay commercial harvest and escapement, 1982-1989 . . . . .	176
D.3 Historical estimated run size and commercial exploitation rate, Goodnews River, 1981-1991 . . . . .	178
D.4 Historical age composition percentage, sockeye salmon Goodnews Bay commercial harvest and escapement, 1982-1989 . . . . .	179
D.5 Goodnews Bay District commercial salmon harvest, 1968-1991 . . . . .	182
D.6 Average cumulative estimated escapement and proportion by day for chinook, sockeye and chum salmon, Goodnews River counting tower project, 1981-1990 . . . . .	183
D.7 Historical age composition percentage, chum salmon, Goodnews Bay commercial harvest and escapement, 1982-1989 . . . . .	185
D.8 Summary of commercial harvest by period, Goodnews Bay District, chinook salmon, 1981-1991 . . . . .	188
D.9 Summary of commercial harvest by period, Goodnews Bay District, sockeye salmon, 1981-1991 . . . . .	190

LIST OF APPENDICES (Continued)

	<u>Page</u>
D.10 Summary of commercial harvest by period, Goodnews Bay District, chum salmon, 1981-1991 . . . . .	193
D.11 Summary of commercial harvest by period, Goodnews Bay District, coho salmon, 1979-1991 . . . . .	196
D.12 Goodnews Bay, District 5 commercial effort, 1970-1991 . . . . .	198
<u>APPENDIX F</u>	
F.1 Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1991 . . . . .	200
<u>APPENDIX G</u>	
G.1 Commercial miscellaneous saltwater finfish fishery catch data, Kuskokwim Area, 1988-1991 . . . . .	202
<u>APPENDIX H</u>	
H.1 Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981-1991 . . . . .	204
H.2 Pacific herring subsistence harvest and effort data from selected Kuskokwim Area villages, Alaska, 1975-1991 . . . . .	205
H.3 Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1991 . . . . .	206
<u>APPENDIX S</u>	
S.1 Subsistence salmon survey calendar, 1991 . . . . .	208
S.2 Post-season subsistence salmon harvest survey, Kuskokwim Area, 1991 . . . . .	210
S.3 Post-season subsistence salmon harvest survey postcard, 1991 . . . . .	212

## PREFACE

This is the thirtieth (1985/1986 was a single report) annual management report detailing the management activities of the Division of Commercial Fisheries staff in the Kuskokwim Area. The 1960-1974 management reports for the "Kuskokwim District" appear in the Arctic-Yukon-Kuskokwim Area report series. The 1975-1986 management reports appear in the Kuskokwim Area Annual Report series. The annual management report became a part of the Regional Information Report Series in 1987.

Data presented in this report supersedes information found in previous management reports. This report includes summary data from many special research projects. Complete documentation of these projects and results appear in separate reports. Some of the data presented is preliminary and may be presented with minor differences in future reports.

Subsistence catch estimates for the years before 1978 are different from the estimates presented in the Kuskokwim Area Annual Management Reports for 1978 through 1984. The historical data was reanalyzed in 1978 and tables were revised accordingly. The method and the reason for the revision was not recorded. In an effort to standardize the subsistence catch data, the estimates originally reported in the Management Reports before 1978 have replaced the 1978 revisions.

To simplify use of this report, the tabular data are separated into current year tables and appendix tables. The appendix tables are separated by species and fishing district. The appendix tables show annual comparisons and information that seldom change.

"Total fishermen" is the term used to represent the total number of fishermen who made at least one delivery during a particular time interval. In the past many area fishermen only delivered once or twice during each season. The increasing importance of cash in the area economy has resulted in higher levels of sustained effort throughout the fishing season.

"Total fishermen hours" is the product of the number of unique CFEC permits used in a fishing period multiplied by the total number of hours the district was open to commercial fishing. The catch divided by the resulting number of fishermen hours equals catch per fishermen hour (catch per unit effort or C.P.U.E.).

Computer tabulations of fish tickets provide the commercial catch data presented in this report. The computer software program used to tabulate fish ticket data is the statewide system provided by the Division of Commercial Fisheries Computer Services Section. During 1991, the Bethel office tabulated 14,213 fish tickets (Table 1).

## PART I. SALMON FISHERY

### *Area and District Boundaries*

The Kuskokwim Area includes all waters of Alaska between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands (Figure 1). Commercial salmon fishing occurs in four districts in the area:

District 1, the Lower Kuskokwim River, consists of the Kuskokwim River from a line between Apokak Slough and Popokamiut, upstream to a line between ADF&G regulatory markers located about one mile above the Tuluksak River (Figure 2). The downstream boundary has been in effect since 1986 and the upstream boundary was first used in 1990.

District 2, the Middle Kuskokwim River, consists of the Kuskokwim River from ADF&G regulatory markers located at the upstream entrance to the second slough on the west bank downstream from Kalskag to the regulatory markers at Chuathbaluk (Figure 3). The downstream boundary of District 2 was used for the first time in 1990.

District 4, Quinhagak, consists of the waters of Kuskokwim Bay between the mouth of Weelung Creek (misspelled in the regulations as Wheeling) and the South Mouth of the Arolik River (Figure 4). The northern boundary was new in 1990 and the first boundary change since 1960.

District 5 consists of the waters of Goodnews Bay (Figure 5). This boundary has been in effect since the inception of the fishery in 1968.

The W precedes the district number on the figures and in news releases (eg. W-1). This helps the public differentiate between announcements for the Yukon River districts (Y) and the Kuskokwim River (W) districts. W is the letter code assigned to the Kuskokwim by the Commercial Fisheries Entry Commission.

### *Fishery Resources*

Six species of Pacific salmon are indigenous to the area; chinook or "king" salmon (*Oncorhynchus tshawytscha*), sockeye or "red" salmon (*O. nerka*), coho or "silver" salmon (*O. kisutch*), pink or "humpy" salmon (*O. gorbuscha*) chum or "dog" salmon (*O. keta*) and rainbow trout (*O. mykiss*). The Kuskokwim River drainage has the largest populations of chinook, sockeye, coho and chum salmon in the area. Pink salmon occur throughout the area. Little quantitative data on the population size of pink salmon is available because of the lack of commercial markets and interest by subsistence fishermen. Rainbow trout are rare or absent upstream of the Aniak River drainage and west of the Kuskokwim River. The largest populations in the area are found in the Kanektok and Goodnews Rivers. There is no commercial fishery on rainbow trout. Their contribution to the subsistence fishery has not been quantified, except in the Kanektok River (Wagner 1991). There is a growing sport fishery on all six species that is documented by the Division of Sport Fish.

The management objective for all species and districts is to achieve desired escapement objectives and allow for the orderly harvest of fish surplus to spawning requirements. Subsistence uses receive the highest priority among beneficial uses of the resources.

### *Management Programs*

The vast size of the area and the turbid nature of many streams make accurate estimates of the size of salmon returns and spawning escapements difficult to obtain. The relative lack of comparative catch data, caused by the expansion of

the fisheries since their initiation, hampers management. Management of the commercial harvest is complicated by the need to provide optimum spawning escapements, as well as sufficient harvest to the important subsistence fishery. In recent years, salmon migratory timing data bases have become extensive enough to assist in-season management.

Prior to 1983, a management strategy of conservatively increasing the level of commercial catch to establish definite trends between catch and escapement allowed development of the fishery. The area's escapement data base allowed the assignment of provisional salmon spawning escapement objectives in major spawning systems in 1983. These objectives are an average of aerial survey, tower, weir, and sonar indices obtained in these systems since 1960 under good to fair conditions (Appendix A.1). Indices obtained under poor conditions (primarily turbid water or radically incomplete counts) were excluded. Surveys of an unusual magnitude were not used to calculate the index because of their disproportionate effect.

The index of annual spawning escapements is accomplished through aerial surveys of streams and lakes, weirs on the Kogruklu and Goodnews Rivers, and a sonar counter in the Aniak River. Turbid water conditions and inclement weather often prevent accurate aerial estimates of escapement. In 1991, poor weather in the Kuskokwim drainage hampered surveys.

Attainment of escapement objectives is needed to maintain salmon runs at recent historic levels and harvests. Adjustment of objectives to optimize salmon production occurs when sufficient new data is available. These adjustments are described in the Annual Management Report for the year in which they were made. There were no adjustments in 1991. Improvement of the escapement assessment program continues to be a priority.

The change from a harvest-guideline-based management strategy to an escapement-objective-based strategy in 1983 appears to be increasing the average harvest (Appendix A.3). It is too early to determine if the escapement-based management strategy will provide a long term increase in production in the Kuskokwim Area. The historic escapement levels supported much lower harvest levels and may not be able to support the increased harvest levels.

Adjustments of the number and duration of commercial fishing periods and time intervals between periods are the primary methods of distributing the harvest throughout the run. These fishing periods are scheduled to avoid over-harvesting discrete stocks to allow harvests to remain within guidelines, to achieve escapement objectives, and to provide sufficient fishing time for the subsistence fishery. Commercial fishing periods vary between 6 and 36 hours in length depending on the species, effort, and return magnitude. Run magnitude is measured by commercial catch data and by various Department escapement studies.

Several research projects help with assessing in-season run strength. A industry-Department test fishery for salmon began in 1988 near the downstream boundary of District 1. The industry sponsors withdrew their support in 1991. An inadequate Department budget prevented the operation of the project in 1991.

The summer of 1991 marked the fourth year of operation for the Kuskokwim Sonar. The focus of the 1991 field season was to provide area fishery managers with a timely estimate of fish passage. The sonar was operational from 02 June through 13 August. Two transducers were deployed from the right bank. A 6°x6° circular dual-beam transducer sampled near shore (0-40m) and a 3°x7° elliptical dual-beam transducer sampled offshore (41-100m). Counts were expanded for area not ensonified using horizontal fish distribution information gathered from a down-looking transducer. Daily fish passage estimates were provided for area managers. Unfortunately, an unexpected attenuation problem prevented the in-season use of the data. Post season correction of attenuation problem estimated that 1,400,181 fish passed the sonar site (Table 2, Hyer et.al 1992).

Test gill net catches were used to estimate the species composition of passing fish. Details of the methodology employed are described by (Molyneaux). Following each high tide, a series of seven or eight drifts were conducted near the sonar site using 90 m (50 fathom) gill nets. Each series of drifts began one hour after published high slack tide for Bethel. Each drift began at one of three stations across the width of the main channel near the divergence of Straight Slough. Nets were fished for approximately 20 minutes each. From 2 June until 10 July four different mesh sizes were used: 20.3 cm (8.0 in), 16.5 cm (6.5 in), 13.6 cm (5 3/8 in), and 10.2 cm (4 in). After 10 July, chinook salmon passage was essentially over so use of the larger 20.3 cm mesh nets was discontinued.

Relative test net CPUE was used to generate daily estimates of species proportions. Specifics of the data processing methodology for species apportionment are outlined by (Molyneaux). In general, selectivity curves were used to adjust catches for differential probability of capture. Adjusted CPUE was then summed over all length classes for each species. The species proportions were calculated as species CPUE divided by total (all species) CPUE. Species proportions were then multiplied by total fish passage (the sonar estimate) to estimate species passage. Final estimated passage was: chinook salmon (excluding jacks) = 70,276, jack chinook salmon = 18,498, sockeye salmon = 175,015, chum salmon = 631,397, pink salmon = 10,514, coho salmon = 188,806, whitefish = 302,137, and other (pike, burbot, etc.) = 3,534.

In the future the sonar is intended to allow limited size separation of fish. Acoustic size separation relies on a substantial length difference between species. Test gill nets were used to determine near shore (0-40m) fish length distribution. Two test gill nets (6.4 cm stretch mesh and 10.2 cm stretch mesh) were deployed 9 meters down stream from the transducer. Length frequency distributions displayed an obvious separation between whitefish and salmon. This may eliminate the need to use the 10.2 cm mesh gill net in the test fishery in the future; making the operation more efficient (Hyer et. al 1992).

The Kuskokwim River Salmon Management Working Group developed a program to provide CPUE information from the subsistence fishery. This program was sponsored by the Kuskokwim Fishermen's Cooperative (KFC) and the Department through a contract. Department budget reductions resulted in the Department not renewing the contract. The K.F.C. could not afford to wholly sponsor the program. It was discontinued on 1 July 1991 when the contract expired.

Communicating management plans and decisions to the public is always difficult. Many of the people in the Kuskokwim Area cannot read or speak English. More often English is a second language which increases the challenge of communicating management plans and decisions. The Department and the Working Group worked closely together which dramatically improved the acceptance and understanding of many users. Special regulation notices were broadcast over local radio stations and over VHF and CB radio in English and Yup'ik.

A weekly English language fishery program is broadcast over radio station KYUK in Bethel. The program provides information on regulations, biology, and fisheries management throughout the year.

## SUBSISTENCE FISHERY

### *Background*

Subsistence fishing and summer fishing camps have a long history in the Kuskokwim Area. Many families throughout the area rely on the harvest of fish and wildlife for subsistence use which continues to be an important component of the local economy. During summer, the day-to-day activities of many households focus around the harvesting, processing, and preserving of salmon for subsistence use.

The Kuskokwim Area subsistence salmon fishery is one of the largest and most important in the state, with more than 1,400 households harvesting salmon. Many other households, which may not be directly involved in actual harvesting, assist fishing households with processing and preservation activities.

There are 38 communities within the Kuskokwim Area (Figure 1). These communities consist of approximately 3,300 households, many of which fish for salmon for subsistence purposes. Approximately 2,600 of these households comprising 26 communities are situated along the Kuskokwim River or its tributaries. Residents of Kwigillingok, Kongiganak, and Kipnuk, situated along the northern shore of Kuskokwim Bay, comprise 185 households. Residents from these three communities are thought to harvest primarily Kuskokwim River salmon stocks.

In the southern portion of the Kuskokwim Area, residents of Quinhagak, Goodnews Bay, and Platinum, comprised of just over 200 households, utilize stocks primarily from the Kanektok, Arolik, Goodnews river systems. Residents of Bering Sea coast communities of Mekoryuk, Toksook Bay, Nightmute, Tununak, and Newtok, consisting of approximately 300 households, harvested salmon bound for both local and more distant (Yukon-Kuskokwim) drainages.

All six species of salmon (rainbow trout included) are harvested for subsistence use. Annual subsistence harvest surveys have been aimed at gathering data on only chinook, sockeye, chum, and coho salmon. Subsistence catches of chinook salmon in the Kuskokwim Area often exceed the commercial catch of this species (Table A.3).

#### *Subsistence Salmon Fishing Regulations*

##### Participation

Prior to 1988, any resident of Alaska could harvest Kuskokwim Area salmon for subsistence use. During 1988 and 1989, only Alaska residents domiciled in the Kuskokwim Area could take Kuskokwim Area salmon for subsistence uses. In December 1989, the Alaska Supreme Court ruled in McDowell v. State of Alaska that the rural preference in the State subsistence statute violated the Alaska Constitution. As a result of that decision, all Alaska residents domiciled in the State for at least 12 months became eligible to harvest salmon in the Kuskokwim Area for subsistence use.

##### Licenses, Permits, and Gear

In 1991, licenses and permits were not required for subsistence fishing in the Kuskokwim Area. Salmon harvested for subsistence use could be caught using set and drift gill nets, beach seines, and fishwheels. In the Holitna River drainage only, spears could also be used. The total length of set or drift gill nets in use by an individual could not exceed 50 fathoms. Gill nets could be of any sized mesh, however, nets with six inch or smaller mesh could not be more than 45 meshes in depth and nets with greater than six inch mesh could not be more than 35 meshes in depth. All gill nets used for subsistence fishing were required to have a buoy attached with the name and address of the operator written on it. Fishwheels were also required to have the name and address of the operator inscribed on the side of the fishwheel facing midstream of the river (ADF&G 1990). There were no restrictions on the number of salmon that could be harvested by individual fishermen or households.

##### In-Season Closures

Generally speaking, many of the fishermen involved in the subsistence fishery are local residents who also participate in the commercial fishery. During 1991, subsistence salmon fishing was closed in the commercial fishing districts and

adjacent areas before, during, and after each commercial fishing period. The purpose of these closures was to discourage illegal commercial fishing and to help prevent the sale of subsistence caught salmon in the commercial fishery.

In the Lower Kuskokwim region (District 1), only the commercial fishing district and Kuskokuak Slough areas were affected; the spawning tributaries remained open to subsistence fishing throughout the season (Figure 2). In the Middle Kuskokwim (District 2), Quinhagak (District 4), and Goodnews Bay (District 5), both the districts and the spawning tributaries were closed before, during, and after commercial periods. That portion of the Kuskokwim River between Districts 1 and 2 was closed to subsistence fishing at the same time subsistence closures occurred in District 1.

Unless affected by the commercial fishery, as described above, the subsistence fishery remained open. For example, subsistence closures in District 1 occurred 16 hours before, during, and 6 hours after each commercial fishing period. Which resulted in 19 days closed to subsistence fishing during the 92 days salmon were present. Commercial fishing was open for 110 hours on 16 days (Table 3).

#### *Subsistence Salmon Harvest Surveys*

The management of Kuskokwim Area salmon fisheries requires that the Department know how many salmon are harvested in both the subsistence and commercial fisheries. Data on the subsistence harvest of salmon is collected annually. The Division of Commercial Fisheries began annual subsistence salmon harvest surveys along the Kuskokwim River in 1960, in Quinhagak in 1967, and in Goodnews Bay and Platinum in 1979. In 1988 the Division of Subsistence took over the annual subsistence salmon harvest surveys under a memorandum of agreement with the Division of Commercial Fisheries and have been responsible for collecting and analyzing the data since that time.

#### *Methods*

Three methods were used to gather subsistence salmon harvest data. These methods were: 1) subsistence salmon catch calendars, 2) post-season community surveys of Kuskokwim Area households, and 3) postcard and telephone surveys. In early 1991, after the 1990 data analysis had been completed, the Division of Subsistence updated its household list database in order to better define households potentially harvesting Kuskokwim Area salmon stocks in 1991 for subsistence use. Each household in the database was designated as either "usually fish" or "does not usually fish" depending on past fishing history. Households listed in the database were the basis of sampling and estimation of subsistence salmon harvests for the Kuskokwim Area. Each household on the list was assigned a unique identifier through which subsequent information could be tracked.

*Catch Calendars:* In May 1991, subsistence salmon catch calendars were mailed to all Kuskokwim Area households which had been identified as "usually fish." Three similar but unique catch calendars (Appendix S.1) were designed for recording the daily catch of each salmon species harvested for subsistence use. One style of calendar was sent to households in communities along the Lower and Middle regions of the Kuskokwim River, to communities along the Bering Sea coast, and to communities in the Upper Kuskokwim River region upstream as far as the community of Stony River. A second style of calendar was sent to the remaining households in the Upper Kuskokwim River region and a third style was sent to households in Quinhagak, Goodnews Bay, and Platinum. Where addresses were available, the calendars were mailed to post office boxes; otherwise calendars were sent general delivery for the post office clerk to distribute. Each calendar was postage paid and addressed for return to the Bethel Division of Subsistence office. Subsistence salmon catch calendars were distributed to approximately 1,560

Kuskokwim Area households and one Anchorage household that called and specifically requested a calendar.

*Household Surveys:* The second method of collecting subsistence salmon harvest information was the post-season household surveys. Staff traveled to communities in the Kuskokwim Area and went house-to-house interviewing residents about their 1991 salmon fishing efforts. Similar to the approach used in developing the catch calendars, three color coded survey instruments were developed and used (Appendix S.2). Except for local terms used for the salmon species, the survey questions asked in each region were identical.

The goals of the post-season survey were to:

- 1) collect harvest data that would result in a total harvest estimate for subsistence salmon by species for the Kuskokwim drainage and by community;
- 2) compile information on fishing effort, gear types, participation rates, and timing of the subsistence harvest;
- 3) identify salmon harvest issues;
- 4) update community household lists and identify fishing households.

Thirty-one communities were targeted for post-season surveys over a two month period beginning in early October after most residents had completed salmon fishing for the season and after most hunters had returned home from fall moose and caribou hunting. Communities in which residents usually harvest salmon through October were surveyed in November. Division of Subsistence staff conducted house-to-house surveys in 28 communities. House-to-house surveys were not done in Bethel primarily because of its large size and time constraints placed on staff due to funding limitations. For the same reasons, house-to-house surveys were also not done in Telida and the five Bering Sea coast communities. Kipnuk and Kwigillingok officials have chosen not to allow staff to conduct house-to-house surveys in their communities.

Survey work was conducted systematically. Prior to beginning the community surveys, efforts were made to inform and prepare residents for the arrival of staff doing the surveys. This was done weeks or days in advance of their arrival through letters to City, IRA, or Traditional council offices in each community, radio announcements, posters in public buildings and phone calls to community officials.

Upon arrival in a community, staff checked in with the city office to introduce themselves and outline their task. Staff used community household "checklists", prepared in advance, to help them identify households they needed to contact while conducting the household surveys. Each "checklist" contained a listing of all known households in the community, identified which households were reported to have subsistence fished in 1990, which households were mailed 1991 catch calendars, and which households had already returned their catch calendars to the Department. Knowledgeable individuals in the community helped to update the community household list and identify which households "usually fish" and which households "usually did not fish." In addition, these individuals helped to identify households that subsistence fished for salmon in 1991.

Staff attempted to contact all households that were either identified as "usually fish" or were known to have fished during 1991. Structured interviews were conducted with these households through the use of a survey instrument (described below) and subsistence salmon catch calendars that had not been mailed were also collected. If time permitted, other households on the community list were contacted about their salmon fishing activities. A typical community visit lasted one to two days.

*Postcard and Telephone Surveys:* The third method of collecting information on subsistence harvest of salmon was through the use of postcard surveys and telephone interviews (Appendix S.3). The postcard survey simply asked if the household harvested salmon from the Kuskokwim Area for subsistence use, the quantities harvested, the type of fishing gear used. The postcard could be separated in half and returned postage paid. This type of survey was the primary method of obtaining harvest data from "usually fish" households in Bethel, McGrath, Telida, Kwigillingok, Kipnuk, and the five Bering Sea coast communities.

Postcard surveys were mailed out to Bethel and McGrath households in late September. McGrath households that had not returned their catch calendar or postcard survey were contacted by staff in November as the Upper Kuskokwim communities were being surveyed. Bethel households that had not returned either a postcard survey or catch calendar by early November were then contacted by telephone or again by a second postcard survey. A primary factor limiting contacts of Bethel households was that for many, neither a mailing address nor telephone number was available. Households in other communities that were not available during the staff visits to conduct house-to-house surveys and had not returned their salmon catch calendar were also mailed postcard surveys.

*Subsistence Salmon Harvest Estimation:* Information from the three information sources (catch calendars, household surveys, postcard/telephone surveys) was entered into a microcomputer database. Data were verified against source documents, and several logic checks of the data were made. The master list of names and addresses of resident households was updated to reflect changes in household composition and number of households residing in each community. The unique household numbering system was maintained on the master list and on the database tables containing information from each of the three information sources.

In order to provide a single best estimate for a household's harvest of a salmon species during 1991, information was a composite of the various information sources. This process was conducted by a single researcher on the project to ensure data consistency. There were few discrepancies between the information available from the different sources. In those cases where a household was determined to have fished for salmon, but no salmon harvest could be quantified through any information source, the harvest was identified as "missing."

Guidelines developed during the course of the process to composite harvest information included:

- (1) the assumption that the salmon catch calendar contained the best means of recording the household's harvest;
- (2) that information from the different sources needed to be evaluated concurrently in order to identify the harvest for each species;
- (3) that information from the different sources for a particular species may be different due to the timing of the collection of this information;
- (4) that information on the use of salmon to feed dogs be used as a minimum estimate of the household's harvest if no other information is available.

Salmon harvests identified as "removed from the commercial catch for subsistence use" were included in the household's subsistence harvest.

The average community catch (Ck) was estimated for salmon species from the composite catch per household data. Mean community catch (Ck) was estimated by

$$Ck = \sum_{i=0} (Nki * Cki) / \sum_{i=0} Nki$$

where

k = community

i = indicates whether the group "usually fishes" (1) or "usually does not fish" (0)

Nki = number of households that "usually fish" or "usually do not fish"

Cki = mean harvest for households that "usually fish" or "usually do not fish"

The total community catch (Tk) was estimated by

$$Tk = \sum_{i=0} (Nki * Cki)$$

and its variance (Vk) includes a finite population correction factor

$$Vk = \sum_{i=0} ((Nki^2) (1 - (nki/Nki)) (ski^2/nki))$$

where

nki = number of households for which information is available that "usually fish" or "usually do not fish"

ski<sup>2</sup> = variance for the amount harvested for the "usually fish" or "usually do not fish" households.

Community catch estimates and their variances were summed across communities for region subtotals and across all regions for Area totals.

#### 1991 Sampling Summary

Table 4 presents data on the number of households contacted using the three means of data collection. Of the estimated 3,248 households in communities located in the Kuskokwim Area, information was obtained on 2,137 (66%).

Approximately 1,349 households have been classified as "usually fish". In 1991, subsistence salmon harvest information was collected from 1,242 (92%) of these households. Approximately 1,900 households have been classified as "usually do not fish" for subsistence salmon. Information was collected from 895 (47%) of these households. About one-half of the households classified as "usually do not fish" resided in Bethel.

Of the 2,564 defined households living in communities along the Kuskokwim River drainage, 1,889 (74%) were contacted. Information was especially absent for Bethel where 533 households (49%) did not provide fishing or harvest data to the Department or were otherwise not contacted. The majority of the households contacts (1,055) were through household survey interviews. Of the total 1,889 households for which there was information, approximately 65% (1,226) were determined to have fished for subsistence salmon in 1991.

In the southern Kuskokwim Bay communities of Quinhagak, Goodnews Bay, and Platinum, the majority (84%) of the 204 households living in the region were contacted. Fishing status information for 1991 was gathered for 84 percent (172) of the region households. Of these 172 households, 125 (73%) fished for subsistence salmon in 1991.

In Kongiganak, Kipnuk, and Kwigillingok, communities along northern Kuskokwim Bay, data were obtained on the 1991 fishing efforts of 59 households. The majority of the data available came from Kongiganak (54 households) and there was very little response from either Kipnuk (5) or Kwigillingok (0). In Kongiganak, information was gathered from 54 (95%) of the 57 households. Sixty-seven percent of the households in Kongiganak reported fishing for subsistence salmon in 1991.

Approximately 300 households have been identified in the Bering Sea coast communities of Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak. Because house-to-house surveys were not conducted in these communities, data was obtained only by catch calendars and postcard surveys. Overall, 16 households in this region provided information. Of those households reporting, 94% harvested salmon for subsistence use in 1991. Chefornak was not included in the study.

Throughout the Kuskokwim Area, approximately 18% (276) of the 1,561 subsistence salmon calendars which were mailed pre-season were used and returned. In addition, there were responses to about 19% (332) of the 1,733 postcard surveys which were mailed to 1,424 Kuskokwim Area households who had not returned harvest calendars and were not surveyed. A second postcard survey was sent to each of 309 Bethel households that did not reply to the earlier mailings or were not available through telephone surveys.

#### 1991 Harvest Summary

Sample information and harvest estimates by community and fishing area are presented in Table 5. The 1991 subsistence harvest estimates for the Kuskokwim Area are 85,143 chinook, 51,821 sockeye, 93,037 chum, and 53,478 coho salmon. Reported harvests account for 81% of the estimated subsistence chinook salmon harvest; 82% of the sockeye; 77% of the chum; and 71% of the coho salmon subsistence harvests. Not all communities were surveyed identically (see above). This results in the estimate being a minimum harvest figure.

Chum and chinook continued to be the primary species harvested (in number of salmon) for subsistence use. In the lower Kuskokwim River area and in Southern Kuskokwim Bay, more chinook salmon were harvested than any other salmon species. In the Middle and Upper Kuskokwim River areas and in the Bering Sea Coast area, more chum salmon were harvested than any other salmon species.

Households in the Lower Kuskokwim region harvested 80 percent of the total estimated chinook salmon catch, 76 percent of the sockeye, 70 percent of the chum, and 78 percent of the coho. Two-thirds (69%) of the identified fishing households reside in this area.

#### COMMERCIAL FISHERY

The commercial fishery has expanded during the last ten years. This expansion is due to increased participation by individual fishermen and improvements in fishing gear, tendering, and processing capabilities. In 1991, 820 of the 832 permit holders made at least one landing (Appendix A.2). This is the first time in the history of the fishery that the number of permits has declined. The peak of 824 permits fished in 1990 was 99 percent of the total available permits (832). The number of fishermen is stabilizing at this level.

Permit holders transfer freely between districts. Increased mobility by the fleet resulted in a record 749 permits being fished in District 1 in 1991 (Appendix B.20).

The number of fishermen participating in each fishing period is beginning to stabilize. District 1 peaked in 1990. Districts 2, 4, and 5 have been stable since 1987 (Appendix A.13). Appendix A.12 shows fishermen-hours peaked in 1975.

Since that time, maintaining adequate subsistence harvests and average spawning escapements required reductions in fishing time. Fishermen efficiency has increased as the increase in harvest (Appendix A.3) and the decrease in fishermen-hours (Appendix A.12) shows. Commercial harvest guidelines and gear restrictions have also offset increases in fishing efficiency.

Kuskokwim Area fishermen owned 97 percent of the commercial permits in 1991. Alaskan residents owned the other permits, except for a single nonresident permit (Table 6).

Commercial fishing regulations set maximum gill net specifications of 6-inch or smaller mesh, 50 fathoms in length and 45 meshes depth in all districts. Fishing periods in District 1 and 2 are usually six hours in duration from 1:00 p.m. until 7:00 p.m., as required by the management plan. Longer fishing periods have the extra time divided before 1:00 p.m. and after 7:00 p.m. In Districts 4 and 5 fishing periods are normally 12 to 24 hours in length. Fishermen prefer daylight fishing hours so the periods are normally 9:00 a.m. until 9:00 p.m.

#### SEASON SUMMARY

The total 1991 Kuskokwim Area commercial salmon catch (Districts 1, 2, 4 and 5) consisted of 48,170 chinook, 202,441 sockeye, 556,818 coho, 522 pink and 501,692 chum salmon (Table 7). In 1991 the average Kuskokwim permit holder earned \$4,831 (Appendix A.2). The total amount paid to fishermen was \$3,961,423, excluding bonuses and other incentives (Appendix A.2). This is \$1,383,624 less than the previous ten year average. Below average weight for all species and below average prices for all species, except pink and chum salmon, were responsible for the low value of the catch (Appendix 11). Coho salmon were the most abundant and valuable species bringing fishermen over two million dollars (Table 8).

#### Kuskokwim River (District 1 and 2)

The Kuskokwim River Salmon Management Working Group (Working Group) continued to work closely with the Department in 1991. Through uncommon dedication by all the concerned parties the Working Group provided in-season management recommendations that helped accomplish management objectives (Table 9). The Working Group is composed of representatives of the Kuskokwim River salmon users. During the course of the season the Working Group met 28 times to evaluate the status of the salmon runs and make recommendations to the Department concerning commercial fishing periods. The Working Group dealt with most fishing periods individually, that is recommended one period at a time so that any unexpected changes in run strength could be dealt with. This strategy provided the maximum harvest and adequate escapement for chum salmon. In spite of the lowest amount of fishing time during the chinook salmon run since 1960, they failed to reach the escapement objective. Coho salmon were over-fished and the Department's two vetoes on 9 and 29 August failed to correct the situation (Table 9).

The Working Group recommended that the first fishing period be on 20 June in District 1, downstream of Bethel (Stat. Areas 335-11 & 335-12; Figure 2) in compliance with 5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. Six hundred and one fishermen participated in the first opening (Table 3). The sockeye salmon catch of 19,732 exceeded the chum catch for the first time in the history of the fishery. The chinook and sockeye salmon catch appeared normal. The chum salmon catch was very weak. The commercial catch and test fishery results showed the same patterns of abundance.

We could not determine if the chum salmon run was weak or late. Sockeye salmon are available to the fishery relatively briefly and the chinook salmon run appeared to be of normal strength. The Department recommended to the Working Group that the fishery reopen downstream of Bethel on 24 June. We felt this would provide an opportunity to harvest the surplus sockeye salmon while

protecting the chinook and chum salmon which had already been exposed to the earlier opening. It would also provide information on the strength and timing of the chum salmon run.

The Working Group recommended that the entire length of District 1 be used. The chinook salmon run appeared at this time to be average and we felt it was early enough in the chum salmon run to correct over fishing by later reductions in fishing so we allowed a whole district opening on 24 June (Table 3).

The chum salmon catch on 24 June was one of the worst on record and the test fishery continued to show the weakest chum salmon return since the test fishery began in 1985. The Department and the Working Group agreed that a serious chum salmon conservation problem existed and set the next fishing period for 1 July. This meant forgoing one of the three June fishing periods guaranteed by the Kuskokwim River Management Plan. District 2 also opened for the first time on 1 July (Table 10).

A weak chum salmon run continued to be evidenced by poor commercial and test fishing catches. Fishing periods were allowed only every 5 to 7 days until 18 July. In normal years a dwindling chum salmon run results in a closure until coho salmon dominate in the river at this time. The chum salmon catch peaked on the 18 July period; 18 days later than the usual peak on 1 July (Table 3).

In light of the improved catch and moderate improvements at the Aniak sonar and Kogruklu Weir projects the Department recommended the next period be in 4 days on 22 July. The Working Group disagreed and recommended that the next period be on 20 July. The Department refused to allow a period on 20 July and the Working Group then accepted the Department recommendation for 22 July.

Chum catches began to decline but were at record levels for that late in July. District 2 catches indicated good escapement occurring as did Aniak Sonar. Coho salmon catches were also increasing, showing normal run timing. The Working Group recommended an 8 hour period on 25 and 29 July and the Department allowed the periods. Chum salmon dominated the catch on 25 July and coho salmon dominated the catch on 29 July causing the management to shift to coho salmon (Table 3). This resulted in District 2 closing for one period on 1 August due to the lack of coho salmon and the poor quality of the chum salmon.

*Chinook Salmon:* The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish for the 10 year period 1960-1969 to 105,112 during 1981-1990 (B.17). A commercial harvest target of 30,000 to 40,000 was in effect from 1973-1984 to stabilize catches until the result of such a harvest could be evaluated. Experience showed that the harvest range was too high during weak runs. In 1984 the Board of Fisheries reduced the range to 17-32,000 chinook salmon.

Beginning in 1985 the commercial fishery was restricted to gill nets of 6-inch or smaller mesh size to reduce the harvest of the larger female chinook salmon and increase the harvest of the smaller "jack" chinooks. This action did not stop the decline in total escapement in 1985 and 1986 (Figure 6). The 1985 chinook salmon catch of 37,889 exceeded the harvest guideline while escapements were less than half the desired objective. The catch remained within the harvest guideline in 1986 and chinook salmon escapements were less than one third the objective.

The Board stated in 5 AAC. 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN that no directed commercial harvest of chinook salmon will take place to provide for a subsistence harvest that averages 64,000 chinook salmon (B.17) and to maintain average spawning escapements. This action, in 1987, followed earlier attempts to correct the declining escapements of Kuskokwim River chinook salmon. The strategy used in 1987 continued to require the use of 6-inch or smaller mesh

nets. In addition the plan provided for three eight hour fishing periods in June separated by six days. This insured that chinook salmon not caught during an opening would have adequate time to travel through District 1 before the next opening. During the first commercial opening, fishing was only allowed downstream of Bethel (Subdistricts 335-11 & 12, Figure 2). This prevented the harvest of earlier running chinook salmon in the upstream portion of the district while allowing the harvest of the later running sockeye and chum salmon. One final provision limited the sale of chinook salmon in June to 14,000 fish.

This final provision was meant to encourage commercial fishermen to take home chinook salmon caught incidental to the commercial chum salmon fishery and decrease their subsistence catch of chinook salmon. The 1987 strategy resulted in chinook salmon approaching escapement objectives in the Kuskokwim River for the first time since 1981 (Figure 6). The prohibition of sale of incidentally caught chinook salmon resulted in a large number of unsalable fish and widespread dissatisfaction with the plan.

Dissatisfaction with the 1987 plan resulted in an amended management plan. The cap was removed and replaced with an incidental harvest guideline for chinook salmon. The management plan retained no directed chinook fishery, the three 8 hour periods in June and that fishing only be allowed in the portion of District 1 below Bethel during the first period. The new management strategy included formation of the Kuskokwim River Salmon Management Working Group. The Board of Fisheries adopted the JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY. The Department, local Fish and Game advisory committees, subsistence and commercial fishermen, and processors joined the Board of Fisheries in drafting the statement. The statement's goal is to increase the sustained yield of Kuskokwim River salmon stocks so that they can provide for subsistence needs and an economically viable commercial fishery. To achieve this goal the Kuskokwim River salmon users formed a working group with two purposes:

1. To arrive at a consensus regarding the openings and closures of the Kuskokwim River commercial fishery.
2. To work towards the development of a comprehensive management plan for all Kuskokwim River salmon stocks.

This new approach allowed chinook salmon to reach or closely approach escapement objectives in 1988 through 1991 (Figure 6).

Chinook salmon escapement objectives were achieved from 1987 and 1988. Harvests in 1987 and 1988 exceeded the 17,000-32,000 harvest guideline. An increase in run size was primarily responsible for the increase in catch and escapement during this period.

In 1989, the Board increased the upper end of the incidental harvest guideline to 50,000 chinook salmon following the record 56,000 catch in 1988, which also achieved escapement objectives (Figure 6). The chinook escapement objective was achieved in 1990 along with a near record catch of 53,500.

The incidental chinook salmon catch was 37,778 in 1991, just below the average of 40,699 (Appendix B.5). For the first time since 1988 chinook salmon failed to reach escapement objective (Figure 6). Two out of three of the contributing brood years were below escapement objective. A decrease in the run size combined with the second largest combined chinook catch caused the low escapement (Appendix B.17). The average incidental catch in spite of the lowest fishing time since 1960 indicates that the fleet is very effective at catching chinook salmon. This shows that the excellent catch and escapement from 1987-1990 was due to larger runs. Weak chinook salmon runs are still over harvested by a commercial harvest greater than 30,000, when combined with the subsistence harvest. As Appendix B.17 shows the total catch in 1991 was the second highest

on record. The drop in escapement was not just due to a decrease in run size but the increase in total utilization.

The Kuskokwim River sonar provided the first estimate of total escapement for chinook salmon in 1991. This allowed the first calculation of total run size. The estimated exploitation rate was 78 percent (Appendix B.17). Based on production estimates of other chinook salmon stocks from the Columbia to Nushagak Rivers, chinook salmon can sustain exploitation rates of 65% to 72% (Brannian 1990). The sonar did not operate during the small portion of the chinook run that occurred in May. This causes the total run estimate to be a minimum figure. Appendix B.7 shows that the chinook run was complete when the sonar was discontinued on 12 August.

It is unlikely that a directed commercial fishery for chinook salmon will be possible unless the total run size increases dramatically. The weak chum salmon return in 1991 resulted in the lowest number of fishing hours during the chinook salmon return since 1960. Still the incidental commercial catch resulted in exceeding the maximum allowable harvest. It appears that during years of weak returns even the incidental catch in the commercial fishery may threaten the maximum sustained yield of Kuskokwim River chinook salmon.

The six-inch mesh restriction has resulted in an improvement in quality of the escapement. The percent of females with gill net marks at the Kogrukluik weir has notably increased (Appendix B.18). This appears to indicate a higher net survival rate among females. The commercial catch is showing an increase in the number of males and a decrease in the number of females. From 1981 - 1984 while using large mesh gear the commercial catch was 45 percent female. During the similar 1985 - 1991 period with the gear restrictions the commercial catch was 28 percent female. The gear change may also be responsible for the increased chinook salmon harvest since the commercial fishery is now targeting the smaller male fish that escape the large mesh subsistence nets. The increase in net marked females has not resulted in a corresponding improvement in the sex ratio at the weir. We hypothesize that this is a result of the continued use of large mesh in the subsistence fishery combined with the increase in the subsistence harvest (Appendix B.17). All age classes are being fully utilized through this combination of gear types. The commercial and subsistence catch (Appendix B.17) combined with the escapement index (Figure 6) shows that the chinook salmon run is being fully exploited.

The requirement to close the fishery above Bethel during the first period has improved escapements in the District 1 spawning tributaries. The Kwethluk, Kasigluk, and Kisaralik River are all tributaries to Kuskokuak Slough (Figure 2). The closing of the upper half of the district to commercial fishing in 1987 reversed the trend of below objective escapements that began in 1982.

*Sockeye Salmon:* The sockeye salmon catch is incidental to the chum salmon fishery in Districts 1 and 2. Before 1981, sockeye and chum salmon were not accurately identified in commercial or subsistence catches. This prevented an accurate record of the sockeye and chum salmon harvest in the Kuskokwim River. In 1981, fishermen, processors and the Department began to accurately identify each species in the commercial harvest. Sockeye salmon have comprised 5 to 33 percent of the chum-sockeye salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2 percent of the chum-sockeye salmon catch (Appendix B.5). In 1991 the commercial harvest was 108,946 sockeye salmon which was 20 percent of the chum-sockeye salmon catch. Sockeye salmon escapement is documented incidentally to the other species. The Kogrukluik weir escapement estimate of 16,458 sockeye salmon in 1991 was the third largest on record and above the objective of 2,000 adults (Appendix A.4). The Kuskokwim Sonar provided the first estimate of total escapement of sockeye salmon in the Kuskokwim River in 1991. After adjusting for the commercial and subsistence catch which occurred upstream of the sonar site, 119,000 sockeye salmon escaped in 1991. Adding the

total catch provides a total run estimate of 276,956. This is a 43 percent exploitation rate. Appendix B.8 shows that the entire sockeye salmon run occurred during the period the sonar was operated in 1991.

*Chum Salmon:* Before 1971, chum salmon were harvested incidentally during the chinook and coho salmon fisheries. Expansion of the commercial chum salmon fishery began in 1971, when it was apparent that a moderate increase in the chum salmon catch would be biologically sound. Based upon past subsistence harvest estimates (1924-1943 levels), a combined commercial and subsistence chum salmon harvest of 400,000 appeared to be consistent with the reproductive potential of the run (Appendix A.3). A combined catch of 400,000 chum salmon was the management goal during the early 1970's. Subsistence catches for the entire river have declined since the inception of the commercial fishery in 1971 (Appendix B.22). From 1971 to 1980 the average subsistence harvest was 173,680. The average harvest declined to 127,862 for the period 1981 to 1990. This appears to be due to the decline in the use of dog teams for transportation, not the increased commercial harvest.

Escapement objectives were approached or achieved from 1981-1984. Chum salmon escapement objectives were not achieved in 1985 through 1987. Escapement objectives were achieved from 1988 to 1990 (Appendix A.4). In 1991 escapement objectives were not achieved in the systems contributing to the early part of the run (Appendix A.4, Kogrukluk Weir). The systems contributing to the latter portion of the run achieved their escapement objectives (Appendix A.4, Aniak Sonar).

The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) has averaged 506,391 salmon in the last ten years (Appendix B.5). The commercial harvest strategy in-season is based on:

1. Test fishing indexes showing relative abundance of chum salmon is similar to years in which adequate escapement occurred.
2. Commercial catch per unit effort compare to previous years when escapement was adequate.
3. Subsistence fishermen report adequate subsistence catches.
4. Chum salmon escapement projects projecting adequate escapements will occur.

Declining run strength normally results in a 2 to 3 week closure beginning in early to mid-July. Before 1985, only the lower half of District 1 was open to commercial fishing during the chum salmon fishery. The Board instructed the Department to use the entire length of District 1 beginning in 1985. This increased the efficiency of the fleet and resulted in low chum escapements in 1986 and 1987. Although returns in 1988 and 1989 were at record levels, more time was needed between fishing periods to achieve escapement objectives. The 1990 and 1991 returns were smaller but spacing the periods every 4 to 7 days resulted in approaching or achieving chum salmon escapement objectives.

The chum salmon catch of 431,802 fish was 75,000 fish below average levels (Appendix B.5). The chum salmon escapement objective was reached in the Aniak drainage but the Kogrukluk Weir was below objective (Appendix A.4). The Kuskokwim Sonar provided the first estimate of total escapement of chum salmon in the Kuskokwim River in 1991. After adjusting for the commercial and subsistence catch which occurred upstream of the sonar site, 385,000 chum salmon escaped in 1991. Adding the total catch provides a total run estimate of 898,327. This is a 57 percent exploitation rate (Appendix B.22). Appendix B.10 shows that 99 percent of the chum salmon run occurred during the period the sonar

operated in 1991. The total run estimate is nearly complete but is a minimum.

A comprehensive review of chum salmon exploitation rates was not found in the literature such as was reported for chinook salmon. Beacham's review of 30 years of chum salmon data from British Columbia found that the sustainable exploitation rates ranged from as low as 25 percent to as high as 75 percent depending on the system. Most systems supported sustained exploitation rates of 55 percent. Our estimate of exploitation in 1991 was 57 percent (Appendix B.22), which seems high. This fits the results of the escapement indexes. Based on the information on sustainable exploitation rates, the escapement indexes appear to be appropriate until more detailed information on the Kuskokwim chum salmon run is available.

District 2 had the most fishing hours in the history of the fishery in 1991. This was the result of the removal of the district's harvest guidelines by the Board of Fisheries in 1990. District 2 and 1 now have the same fishing periods except when the management plan would be violated (Tables 3 & 10). For example District 2 opens later than District 1 to allow the latter running chum salmon to arrive in the district so that there is not a directed chinook salmon fishery.

*Coho Salmon:* Since statehood the commercial coho salmon catches for the entire river have ranged from 2,498 in 1960 to 660,000 fish in 1986 (Appendix B.5). The previous ten year average (1981-1990) is 428,764 fish. Effort in number of fishing permits has ranged from 83 in 1971 to 761 in 1989 (Appendixes B.20 & 21). In 1991, 733 fishermen landed coho salmon in District 1 (Appendix B.20).

Historically the subsistence fishery took few coho salmon due to poor drying conditions during August and September. Subsistence needs normally were met by earlier migrating species. This pattern has been changing gradually as the number of families with freezers increases. Coho salmon are the preferred species for freezing, accounting in part for the increased subsistence use of coho salmon during the last five years. For this reason, the Department has emphasized collection of subsistence coho salmon catch data in recent years (Appendix A.8).

The Kuskokwim River commercial fishery reopens when coho salmon predominate in the subsistence and test fisheries. An assessment of run strength, as shown by test fishing, subsistence and commercial catches, and the escapement trend at the Kogrukluik weir is used to determine the amount of fishing time. Districts 1 and 2 close by regulation on 1 September. A strong run in 1984 and a late run in 1989 resulted in extending the season into September. The management strategy is identical to the strategy for chum salmon presented above.

The catch during the period on 29 July was dominated by coho salmon (Table 3). The catch of 38,284 coho salmon was the second highest recorded on that date. The chum salmon catch was the highest ever recorded on that date. The large catch and the test fish indexes suggested that the run was average or strong. The Department recommended a six hour period on 1 August which the Working Group also felt was appropriate (Table 9).

The commercial catch and test fish data on 2 August showed the coho salmon run most similar to 1985 and 1988 (Appendixes B.9 & B.11). Both of these years failed to reach escapement objectives, but it was still too early to draw a firm conclusion about the 1991 run. The Department recommended a six hour period on 5 August and again on 8 August (the traditional Monday Thursday schedule) following the 5 August period. The Working Group felt eight hours was correct on both occasions. The Department had no reason to object to 8 hour periods and allowed them (Table 3).

Following these two periods, the test fishery showed a run most similar to 1990, which did not reach escapement objective (Appendix B.9). The commercial catch

in District 1 continued to be most similar to 1985 and 1988 (Appendix B.11). The District 2 catches, which have proven to be a good indicator of escapement through the lower district, were the lowest on record (Appendix B.16). The Department recommended that the next period be on 12 August for six hours due to conservation concerns. The Working Group felt the District 2 numbers were misleading because of high water and that the coho salmon were late like the chum salmon had been. They recommended the next period should be for 6 hours on 10 August (Table 9). The Department refused to allow this period. Ultimately the Working Group recommended a period on 12 August for 8 hours which the Department allowed.

The District 1 catch on 12 August was 114,000, the second highest single period catch on record (Appendix B.11). The District 2 catch continued to be poor as did the test fishery (Appendix B.9 & B.16). The Working Group felt that the District 2 catch would improve with the next opening once the fish had traveled that far and that the large catch clearly showed that the test fishery was mistaken. The Department recommended remaining on schedule, with a six hour period on 15 August. The Working Group recommended an 8 hour period on 14 August so that there would be time for a third period that week if coho salmon abundance increased. The Department allowed the period since the large catch seemed to indicate the run might be late.

The District 1 catch on 14 August was most similar to 1988 (Appendix 11). The District 2 CPUE was the lowest on record (Appendix B.16) and the Kogrukluk Weir escapement was half of what it should have been during a late run. The Bethel Test Fishery was the lowest ever recorded. The Working Group meeting was very contentious and resulted in a two day adjournment. Another contentious meeting resulted in a two day recess. Upon returning from recess the Department recommended a six hour period on 21 August. The Working Group recommended 6 hours on 19 August. The Department expressed their concerns for the run strength and escapement based on the commercial catch data, test fishery, and Kogrukluk Weir results. This was countered with numerous reports of excellent subsistence catches by the Working Group and members of the public. The Department allowed the Working Group recommendation to stand with reservations.

The catch in District 1 on 19 August was most similar to 1990 (Appendix 11); a year which did not reach escapement objectives. District 2 continued to be the poorest catch on record (Appendix B.16). The test fishery and weir also continued to show a weak run. After a heated discussion, the meeting on 20 August resulted in a recess until 22 August. After three motions to open the commercial fishery failed to reach consensus, the 22 August meeting also recessed until 24 August. The Department recommended a recess until 26 August but the Working Group recommended an 8 hour fishing period on 26 August. They also announced that if the catch was not "extraordinary" the season would be closed. The Department allowed the period.

There was no quorum at the meeting on 27 August following the period.

On 29 August the Department recommended letting the season close. The Working Group recommended fishing for 6 hours on 30 August. The Department refused to allow the period and the season closed by regulation on 1 September following a final 1 September meeting of the Working Group.

The total coho salmon catch of 500,935 was the fourth highest on record (Appendix B.5). Since 1979 - 80 the even year coho salmon runs have been larger than the odd year runs. The 1991 catch was the largest odd year catch in the history of the fishery (Appendix B.5). The test fisheries and the lowest commercial catch per unit effort ever recorded in District 2 suggest that escapement levels were below normal. The Kogrukluk Weir escapement estimate of 9,963 was the third lowest ever recorded and well below the objective of 25,000 (Appendix A.4). District 2's CPUE always exceeds 37 coho per hour in years when the 25,000 objective is reached at the weir. In years when the weir count is not available

the District 2 CPUE is the only measure of success. Since 1981 the escapement index has been below objective in six of the eleven years (Appendix A.4). Since 1988 only 1989 reached objective. The Kuskokwim Sonar provided a partial estimate of coho salmon escapement in 1991. Appendix B.9 shows that 66 percent of the coho run passed the sonar in 1991. A total run estimate from this limited data would be highly speculative.

*Pink Salmon:* Pink salmon harvest is incidental to the chum and coho salmon fishery in the Kuskokwim River. Pink salmon have a strong odd - even year cycle in the Kuskokwim River and 378 pink salmon is a normal odd year catch (Appendix B.5). There is no pink salmon escapement program for the Kuskokwim River.

*Roe Sales:* One catcher seller sold eggs to a local processor. The fish were sold through other outlets.

#### Quinhagak (District 4)

District 4 is located in the marine waters adjacent to the village of Quinhagak at the mouth of the Kanektok River, about 25 miles south of the Kuskokwim River mouth (Figure 4). Commercial fishing occurs only in the marine waters of Kuskokwim Bay to ensure adequate escapement of salmon into the Kanektok and Arolik Rivers. Fishermen fish primarily in the tidal channels that radiate out into the bay from the freshwater streams in the district.

Commercial fishing effort in this district has increased considerably in the last decade. Effort has ranged from 117 permits in 1982 to a record high during the 1990 season of 390 permit holders (Appendix C.9). The past 10 year average is 263 permit holders. Recent changes in the June Kuskokwim River commercial fishery has shifted effort to this district, which has a targeted chinook fishery. In the Kuskokwim area fishermen have unrestricted movement between commercial fishing districts.

District 4 opened on 13 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN, which requires an opening before 16 June. Effort was light since the majority of the fishing fleet were on strike for higher prices. Fishing effort peaked at 227 permit holders on 27 June (Table 11). A total of 346 permit holders participated in the fishery in 1991 in this district (Appendix C.9). Whenever possible coincidental openings were held with other districts to keep effort levels down. The commercial salmon fishing season closed by regulation on 8 September. There were no buyers present during the last commercial fishing period on 5 September.

Aerial surveys are the only in-season measure of escapement in District 4. Management is based on historical commercial catch levels and when possible, aerial surveys.

*Chinook Salmon:* Chinook salmon catches were below normal in 1991 and commercial fishing time remained on the normal two 12 hour periods per week schedule (Table 11). DISTRICT 4 SALMON MANAGEMENT PLAN (5 AAC 07.367.) requires management be for sockeye salmon when sockeye salmon are more than 50 percent of the chinook-sockeye salmon catch in District 4. The weak chinook salmon run and the strong sockeye salmon run resulted in this provision taking effect on 24 June in 1991, the earliest sockeye salmon have ever outnumbered chinook salmon (Table 11). This resulted in a normal fishing schedule despite the chinook salmon run's weakness. The total chinook catch in District 4 was 9,480 in 1991, which was well below the ten year average of 26,800 and the lowest catch since 1975 (Appendix C.7). Chinook salmon were worth 16% of the total value of the fishery, an average price of \$.56 per pound resulting in a total \$95,800 for this species

(Table 8). Poor quality aerial surveys were flown during the chinook season with a late August survey documenting 2,100 chinook salmon (Table 12).

Commercial harvests of chinook salmon in the past ten years peaked at 46,400 chinook salmon in 1983 (Table 7). The 1991 harvest of 9,500 chinook is the lowest this decade and well below the ten year average of 26,800 chinook salmon. The escapement objective into the Kanektok River for this species is 5,000. Aerial surveys (including poor surveys) indicate that escapement has been achieved in 6 out of the last 10 years (Table 8).

*Sockeye Salmon:* On 24 June sockeye salmon outnumbered chinook salmon and per 5 AAC 07.367 sockeye salmon management began (Table 11). Sockeye salmon catches were steady and fishing was increased to the normal 3 twelve hour periods per week during July. The sockeye salmon catch is the second highest on record at 53,657 (Appendix C.7). Post season aerial surveys documented 43,500 sockeye salmon in the Kanektok River drainage, which exceeds the objective of 15,000 (Appendix C.2). The average price paid for sockeye salmon was \$.67 per pound for a total of \$247,117, which is 47% of the total value of the commercial catch in this district (Table 8).

Sockeye salmon harvests have ranged from 6,500 in 1987 to 83,700 in 1990 (Appendix C.7). The sockeye salmon escapement index of 15,000 has been surpassed every year with the exception of 1983 (Appendix C.2). The objective was lowered from 30,000 to 15,000 in 1990. The past decade of aerial surveys documented an average escapement index of 30,000 sockeye salmon to this drainage.

*Chum Salmon:* Chum salmon are caught incidentally to the chinook and sockeye salmon commercial fishery. The 1991 chum salmon catch was 54,493; which is the highest chum salmon catch in the last 10 years and the second highest catch on record (Appendix C.7). Chum salmon brought an average of \$.29 per pound, resulting in \$107,227 in payment to fishermen (Table 8). This is 18% of the total value of the fishery. The escapement index for chum salmon is 30,000; 18,000 chum salmon were documented in a poor aerial survey in 1991 (Appendix C.2).

Chum salmon harvests in this district for the past 10 years have ranged from 8,600 to 50,400 (Appendix C.7). The escapement goal for this species of 30,500 was achieved in 1984 and 1991, but the 10 year average of 22,100 chum salmon is below the objective.

*Coho Salmon:* Coho salmon dominated the commercial catch on 2 August. Fishing continued for 3 twelve hour periods a week, with a record high catch of 11,957 on 23 August (Table 3). The total coho salmon catch of 42,571 is below the 10 year average of 56,672 (Appendix C.7). The commercial value of this species was 24% of the season's total. The average price of \$.47 per pound resulted in \$144,454 paid to commercial fishermen (Table 8). Weather prevented late coho enumeration by aerial surveys, but sport fishing catches indicated coho salmon well distributed throughout the drainage. An early aerial survey documented 4,330 coho salmon on 14 August (Appendix C.2); weather and water conditions prevented any further coho surveys.

Commercial harvest of coho salmon in this district has ranged from 26,900 in 1990 to the record catch of 135,000 in 1984 (Appendix C.7). The average of the past 10 years is 56,672 coho salmon. Escapement of coho salmon into the Kanektok River is extremely difficult to monitor with aerial surveys because weather during the month of September is typically rainy and stormy.

*Pink Salmon:* Pink salmon are incidentally caught during the season; 115 were caught in the 1991 season.

#### Goodnews Bay (District 5)

The Goodnews Bay fishing district is the southernmost salmon district in the Kuskokwim area. The majority of the commercial fishing fleet resides in the villages of Platinum and Goodnews Bay. Effort in this district peaked at 125 permit holders in 1988 and averages 77 (Appendix D.12). Fishing primarily is with drift gill nets in tidal channels and a few set nets near the mouth of the bay.

A counting tower was established in 1981 on the middle fork of the Goodnews River to provide estimates of salmon escapement for this district. The primary objective of this project is to provide daily escapement information to improve management of the commercial fishery. In 1991 this project was changed to a weir and was run a longer period of time. This was done to improve escapement data and to try and extend the project through the coho salmon run. The Goodnews River tower/weir project data provides a useful means of assessing aerial survey accuracy.

The Goodnews Bay district opened to commercial fishing on 20 June. Effort remained fairly steady with 35-45 permit holders participating during most of the season. Effort peaked at 50 permit holders on 13 July (Table 13). This was probably due to fishermen in Kuskokwim River districts transferring because fishing time was increased to enable the fleet to harvest a strong sockeye run.

*Chinook Salmon:* Management of chinook salmon mirrored the 1990 season when the escapement objective of 3,500 was achieved. The special management strategy is necessary because escapement objectives were not reached in the brood years. The chinook salmon catch of 912 is the lowest on record since 1974 (Appendix D.5). The 10 year average commercial catch for this species is 6,250. The Goodnews River Weir escapement project enumerated 2,147 chinook, which is well below the escapement objective of 3,500 (Appendix A.4). Management was successful in reducing the chinook salmon catch but the run was too small to reach the escapement objective.

Chinook salmon catches peaked in 1983 at 14,100 and have decreased every year with the 1991 catch of 900 being well below the ten year average of 6,200 (Appendix D.5). Escapement objectives for chinook salmon were achieved at the tower most recently during 1990 season. Delaying the commercial fishery opening

to target sockeye salmon allowed a chinook escapement of 3,600. Appendix D.3 presents historical estimates of chinook salmon exploitation for this district.

*Sockeye Salmon:* Sockeye salmon are the target species in June and July in the Goodnews Bay district. The commercial catch of sockeye salmon peaked in 1981 at 40,000 (Appendix D.5). The previous 10 year average catch is 25,573. Since 1983, sockeye salmon escapement has approached or exceeded escapement objectives, except 1985 and 1988 (Appendix A.4). Estimations of run exploitation appear low (Appendix D.3). A review of the five years of sockeye salmon exploitation rates resulted in a decrease of the escapement objective from 25,000-35,000 to 20,000-30,000.

Sockeye salmon catches in Goodnews Bay crept above average in the second week of the 1991 fishery. When the escapement indicated that the higher end of the escapement goal was going to be met, fishing time was increased. Sockeye salmon periods were increased to 24 hour periods 3 times a week for almost 3 weeks. Unfortunately during the peak of the run, buyers were not able to get tenders to cover the district (Table 13). The 1991 commercial catch of 39,800 sockeye salmon is only 400 fish shy of the record catch set in 1981. The ten year average for this species is 25,739 salmon (Appendix D.5). Sockeye salmon escapement at the Goodnews River weir passed the escapement objective of 25,000 with the final count of 47,400 sockeye salmon (Appendix A.4).

*Chum Salmon:* The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1991 catch of 15,892 is above the ten year average of 14,397 (Appendix D.5). Chum salmon escapement of 27,500 at the Goodnews River weir exceeded the 17,000 objective (Appendix D.5).

*Coho Salmon:* The 1991 coho salmon catch of 13,312 was only 45% of the 10 year average and followed the poor run of 1990 (Appendix D.5). Poor aerial survey conditions prevented a total coho salmon escapement count and the count of 1,694 coho salmon at the Goodnews River weir was from only the first part of the run. The weir had to close early because of insufficient funds.

*Pink Salmon:* Pink salmon peak during even years and only 29 were caught during the 1991 season (Appendix D.5).

#### Enforcement

A total of 107 citations were issued during the 1991 salmon season by Fish and Wildlife Protection. The break down by district is:

District	Number of Citations
1	86
2	13
4	8
5	0

The break down by type of citation was:

<u>Violation</u>	<u>Number of Citations</u>
Commercial Fishing Closed Season	36
Unmarked Commercial Gear	21
Vessel Registration	15
No Crewmember License	10
Misc.	8
No Photo ID	8

Over 15 unmarked subsistence nets were pulled during the subsistence closures in District 1. Most of these nets were pulled in Kuskokuak Slough and contained over 200 chinook salmon, which were so rotten they could not be salvaged. The nets also contained other fish but only the chinook salmon were counted.

#### OUTLOOK FOR 1992

The Department is in the process of developing a program that will allow forecasting salmon returns in the Kuskokwim Area. Presently, only broad range harvest projections are possible. Projections are made by examining brood year escapements and recent harvest trends.

#### Chinook Salmon

Chinook salmon return to the Kuskokwim Area primarily as age 4, 5, and 6 fish. The brood years for 1992 will be 1986 through 1988.

Chinook salmon escapements were below objective levels in two of the brood years in the Kuskokwim River drainage (Figure 7). The weak run in 1990 shows poor survival for the contributing year classes. This should result in an incidental chinook harvest similar to recent years of 19,000 to 56,000 (Table 14).

Quinhagak (District 4) has the only directed chinook salmon fishery in the area. Chinook salmon escapement indexes were below objective levels in the Kanektok River in two of the three brood years (Appendix C.2). A below average to average harvest of 14,000 to 34,000 chinook salmon should occur in 1992 (Table 14).

Goodnews River chinook salmon were below the escapement objectives in all three of the brood years (D.5). The recent years' harvest trend has been below average. The harvest in 1992 will probably be below average. The incidental catch probably will be 1,000 to 8,600 chinook salmon (Table 14).

#### Sockeye Salmon

The sockeye salmon catch in the Kuskokwim River is incidental to the chum salmon fishery. The incidental catch is expected to be 33,000 to 137,000 sockeye salmon in 1991 (Table 14).

Quinhagak and Goodnews Bay (District 5) are the only fisheries in the Kuskokwim Area that target on sockeye salmon. Most sockeye salmon return at five years of age in the Kuskokwim Area.

The 1987 brood year escapement index in the Kanektok River was 51,000 sockeye salmon; well above the escapement objective of 15,000 (Appendix C.2). Harvest ranges in recent years' vary from 6,700 to a record high of 83,700. The sockeye harvest in District 4 should fall between these ranges (Table 14).

The 1987 brood year escapement index was 52,000 in the Goodnews River (D.5). This was above the objective of 20,000 to 30,000. This should result in a harvest range of 6,700 to 40,000 sockeye salmon in District 5 (Table 14).

## Chum Salmon

Chum salmon return to the Kuskokwim Area primarily as 4 and 5 year old fish. The Kuskokwim River fishery targets on chum salmon. The chum salmon catch is incidental in Districts 4 and 5.

The escapement index in the Kuskokwim River was below objective in 1987 and above objective in 1988. An average chum salmon run is expected in 1992 and the harvest should be between 199,000 to 1,380,000 (Table 14).

The catch of chum salmon should be between 8,500 and 54,500 in District 4 and from 5,000 to 33,000 in District 5 (Table 14).

## Coho Salmon

Coho salmon return primarily as 4 year old fish in the Kuskokwim Area. The only coho salmon escapement index is the Kogrukluuk River weir in the Kuskokwim drainage. There is very little information on which to base coho salmon abundance.

The parent year (1988) escapement in the Kogrukluuk River of 12,800 was below the objective of 25,000. The commercial CPUE in District 2 in 1987 was also below average. An average to below average run in 1992 should produce a catch of 196,000 to 660,000 coho salmon (Table 14).

In Districts 4 and 5, past years catches are the only guide to the coho salmon catch in 1992. In the last five years coho catches have ranged from 27,000 to 68,600 in District 4 and from 7,800 to 31,800 in District 5. Catches within these ranges are expected in 1992 (Table 14).

## PART II: FRESHWATER FIN FISH FISHERY

Several species other than salmon, herring, and halibut are used for commercial, subsistence, and recreation purposes in the Kuskokwim Area. They are inconnu or sheefish (Stenodus leucichthys), whitefish (Coregonus spp. and Prosopium sp), char (Salvelinus sp), rainbow trout (Oncorhynchus mykiss), burbot (Lota lota), Arctic grayling (Thymallus arcticus), northern pike (Esox lucius), Arctic lamprey (Lamperta japonica), rainbow smelt (Osmerus mordax), blackfish (Dallia pectoralis) and longnose sucker (Catostomus) (Appendix A.10). The Division of Sport Fish documents the recreational fisheries.

### *Subsistence Fishery*

Miscellaneous fin fish are taken by seine, set and drift gill nets, fish traps, dip nets, "jigging" through the ice and rod and reel. Subsistence catches taken during the winter are usually stored frozen. Human consumption is the primary use but dog food is a significant use. No regulations limit the number of these miscellaneous species taken for subsistence. There is no funding to monitor this harvest. The Subsistence Division documented the freshwater fishery in the village of Kwethluk (Figure 2) from June 1986 through May 1987 (Coffing 1991).

### *Commercial Fishery*

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. Most of the whitefish harvest occurs under the ice in the winter. Formerly the majority of the whitefish harvest was incidental to the salmon fishery.

A permit from the Commercial Fisheries Entry Commission is required. A permit from the Department to conduct commercial fisheries on whitefish, sheefish, char, trout, pike, smelt, burbot, and lamprey is also required. Those species may also be taken incidentally to commercial salmon fishing. There were eleven freshwater permits issued in 1990 for the Kuskokwim Area. This was the largest number of permits ever issued (Appendix F.1). The guidelines for permits are:

1. All waters of the area are open, except for the Johnson River drainage and Whitefish Lake, to commercial freshwater fin fishing. The heavy subsistence utilization of those species in these areas is the reason for the closure.
2. Whitefish, cisco, smelt, pike, burbot, and lamprey may be taken. Sheefish, char, and trout may not be taken due to their small population, low reproductive rates, and their heavy utilization in the subsistence fishery.
3. All legal commercial gear types are allowed.
4. Gill nets must be greater than 5 inches stretch mesh. Long lines and set lines must use hooks with a gap between point and shank larger than 3/4 inch. These restrictions minimize the incidental catch of grayling, trout, char and other forbidden species and the catch of whitefish, burbot, and pike is predominantly of older age fish that have spawned at least once.

In 1991 a special permit allowing the use of smaller than 5 inch gear was issued for the Kuskokwim River near Kalskag. A targeted cisco fishery was the purpose of this permit. A daily catch log was required for this experimental permit. The 3 inch net was fished from 15 February until 9 March and 30 March to 7 April. The 3 inch gear was very successful at targeting cisco. The catch from this net was 98 percent cisco, 1 percent northern pike, and 1 percent whitefish (*Coregonus* sp.) and burbot. The daily catch data showed that the cisco run was strongest in February and declined rapidly through March and April.

A 4 1/2 inch net was fished from 10 March to 29 March and again from 8 April until 17 April. This net caught 90 percent whitefish (*Coregonus* sp.), 9 percent northern pike, and 1 percent sheefish and burbot. The 4 1/2 inch gear took no cisco. Whitefish were taken at a relatively constant rate through out both periods of operation.

A 5 inch mesh net was fished from 23 February through 28 February. It took 84 percent whitefish (*Coregonus* sp.), 13 percent northern pike, and 3 percent cisco and sheefish. Unfortunately the difference in the time of operation makes a comparison between the 5 inch gear and the others impossible. The short time fished does not allow any timing information.

Appendix F.1 presents the freshwater fin fish fishery catches and value since 1977. Only 5 permits were issued in 1991. The \$2,609 was the third most valuable harvest on record.

#### *Status of the Stocks*

The Department does not monitor the status of the freshwater species in the Kuskokwim Area. Limited Department observations, advisory committee recommendations and fishermen interviews give no indication of declining populations in most drainages.

### PART III: MISCELLANEOUS SALTWATER FINFISH

An "undocumented commercial" fishery on Saffron or "Tom Cod" has occurred in the Kuskokwim Area for some time. These fish were surplus to subsistence needs and fishermen and local stores were (often still are) unaware of the regulatory requirements. The Department has been trying to inform buyers and sellers of these requirements. Since 1988 we have had information on the sale of fish exported from the coastal villages to Bethel. Sales within the villages are still undocumented. The available data on this fishery is reported in Appendix G.1.

### PART IV. HERRING FISHERY

#### *Area and District Boundaries*

There are five commercial gill net sac roe districts and a subsistence herring fishery in the Kuskokwim Area. The Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (Figure 7). The Goodnews Bay District includes the waters of Goodnews Bay inside the north and south spits at the mouth and a line between the Ukfigag and Tunulik Rivers. The Cape Avinof District (Figure 8) consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Ishkowik River (162° 44' W. long) to the longitude of the Ursukfak River (164° 11' W. long). The Nelson Island District consists of all waters north of Chinigyak Cape and east of Atrnak Point, and all waters north of Talurarevuk Point and south of the southernmost tip of Chinit Point and east of 165° 30' W. long., and all waters north of the northernmost tip of Chinit Point and south of Kigigak Island and east of 165° 30' W. long. (Figure 9). The Nunivak Island District includes all waters extending three miles seaward of mean low water along the northern and east sides of Nunivak Islands from Kikoojit Rocks (60° 19' 30" N. lat., 166° 56' 30" W. long.) to the small bay approximately two miles east of Ingrirak Hill (60° 17' 25" N. lat., 166° 26' 55" W. long.) (Figure 10).

#### *Management Programs*

The Security Cove and Goodnews Bay commercial herring fisheries are managed under the Bering Sea Herring Fishery Management Plan which sets the maximum exploitation rate at 20% of the estimated spawning biomass. The Department attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the range (15-20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0-15%). The Alaska Board of Fisheries has directed the Department to manage the commercial herring fisheries in the Nelson Island, Nunivak Island and Cape Avinof Districts for an exploitation rate not to exceed 15% of the estimated available biomass. To provide additional protection for the subsistence herring harvest in the Nelson Island District, the following guidelines have been established by the Board of Fisheries:

1. The commercial fishery will be allowed to take up to 15% of the herring biomass, compared to up to 20% for most other fisheries having stocks of similar size and condition.
2. The commercial fishing season will be opened when a biomass of 3,000 tons or spawning activity is documented.
3. Periodic closures of the commercial fishery will be scheduled, during which time only subsistence fishing will be allowed.

4. Several important subsistence use areas occur throughout the district (e.g. waters north of Cape Vancouver) and specific areas may be closed to commercial fishing to insure the adequacy of subsistence harvests.
5. The Department will use all available means, including input from local residents, to insure the adequacy of subsistence herring harvests during the commercial fishing season.

#### *Season Summary*

The total Kuskokwim Area Pacific herring harvest for 1991 was approximately 1,159 tons with a total estimated value to the fishermen of approximately \$404,000 (Appendix H.1). The only food/bait fishery in this area occurs during the sac-ro-e fishery when the roe content is below the processors' acceptable minimums. Food/bait sales are a smaller portion of the harvest. Food/bait sales totaled 82 tons, while the sac roe harvest was 1,077 tons.

Fishing effort, measured in number of fishermen who made deliveries, decreased from 1990 levels by 18% in the Goodnews Bay and increased by 36% in the Cape Avinof District (Appendix H.3). Average percent roe recovery from sac-ro-e quality herring ranged from 9.3 in the Security Cove District to 7.5 in the Nunivak Island District. Percent harvest of estimated herring biomass ranged from 1.5 in the Nunivak Island District to 12.9 in the Security Cove District (Appendix H.1).

The 1991 total estimated herring spawning biomass of 17,192 tons for the surveyed portion of the Kuskokwim Area herring districts was 66% higher than the 1990 estimate (Appendix H.1). Ages 8 and older herring comprised 44% of the total run. Younger age fish (ages 3, 4, and 5) accounted for 35% of the total biomass (Table 15).

In 1990 the Nelson and Nunivak Island Districts were given limited entry status by the Commercial Fisheries Entry Commissions. Entry permits were issued to qualified applicants who had fished in these fisheries before 1 January 1988.

#### *STOCK STATUS*

##### Assessment Methods

Aerial surveys were flown throughout the Pacific herring spawning season in all Kuskokwim Area commercial fishing districts to determine relative abundance, distribution, and biomass of herring. Occurrence and extent of milt, numbers of fishing vessels, and visibility features affecting survey quality were also recorded. Data collection methods were similar to those used since 1978. Approximately 54 hours were spent conducting aerial surveys in the Kuskokwim Area: 12 hours in Security Cove and Goodnews Bay, 9 hours in the Central Kuskokwim Bay area, 9 hours in Nelson Island and 24 hours in Nunivak Island. Weather and sea conditions were fair to good in all but the Goodnews Bay District, where high winds and turbidity hampered survey coverage.

Standard conversions of 1.00 tons/538 ft<sup>2</sup> (water depths less than 8 ft), 1.52 tons/538 ft<sup>2</sup> (water depths between 8 and 16 ft), 2.58 tons/538 ft<sup>2</sup> (water depths between 16 and 26 ft) and 2.83 tons/538 ft<sup>2</sup> (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass within all districts.

Test fishing with variable mesh gill nets occurred in all districts to determine age, sex, size and sexual maturity of herring and to note occurrence of other

schooling fishes. Commercial landings were sampled in the Security Cove, Goodnews Bay, Cape Avinof and Nunivak Island fishing districts. Age composition of herring collected from the Department test fishery and the commercial catch is summarized, by district, in Table 16. Additionally, volunteer gill net vessels collected herring samples within all districts. This information allows interpretation and modification of aerial survey biomass data.

Ground surveys conducted in some districts provide information on the distribution and density of eel grass beds and herring spawn deposition.

#### Spawning Populations

##### Security Cove District

A total of 15 aerial surveys was flown on 15 days during the 1991 season, from 6 May to 5 June. Herring schools were first observed in the district on 9 May (12 tons). Total biomass (4,434 tons) was determined by combining the 2,940 tons of herring seen on 13 May and the 1,495 tons observed on 24 May. A total of 11.25 linear miles of milt was observed in spawn sightings during aerial surveys with peak spawning on 12 May when 5.0 miles of milt were seen.

The Security Cove test fish crew fished from 9 May to 27 May with variable mesh gill nets. The catch was 959 herring, all of which were sampled for age, sex, size and maturity. Age 8 and older herring comprised 44% of the test fish catch while 3 to 5 year old fish were 39% of the catch.

Volunteer commercial fishermen collected herring samples from designated areas of the district which industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production.

A sample of 285 herring from the commercial catch was 86% age 8 and older. Herring of age 6 and 7 comprised 14% of the commercial catch (Figure 11). No age-5 or younger herring were found in the commercial catch sample.

*Goodnews Bay District:* Fifteen aerial surveys were flown on 15 days during the 1991 season, from 6 May to 5 June. Only four of the surveys were flown under satisfactory conditions. The commercial fishery's catch per unit of effort was the highest ever in Goodnews Bay. Therefore, it appears that the total biomass of herring present in the district was greater than that observed on aerial surveys. In the Security Cove District, the estimated biomass (from aerial surveys) was 2.98 times the pre-season biomass projection. Department test fish samples showed good numbers of recruit herring (ages 3-6) in the Security Cove and Goodnews Bay Districts. Given the close proximity of Security Cove and Goodnews Bay and the similar recruitment in both districts, it is assumed that the actual biomass of herring in Goodnews Bay was greater than the projected biomass by approximately the same amount as in the Security Cove District. During aerial surveys a total of 2.0 linear miles of milt was observed on 13 May.

Test fishing occurred from 6 May to 5 June. The catch of 1,634 herring were sampled for age-sex-size data. Age 8 and older herring made up 46% while aged 3 - 7 fish were 50% of the test catch.

Volunteer commercial fishermen collected herring samples from designated areas of the Bay which industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production.

A sample of 241 herring from the commercial catch was 78% age 8 and older. Fish under age 8 were 22% of the catch.

*Cape Avinof District:* Between 14 May and 6 June, 9 aerial surveys were flown in the Cape Avinof District. All but three surveys were flown under satisfactory conditions. An aerial survey on 24 May saw 1,879 st of herring. A survey on 6 June saw an additional 204 st. The total biomass estimate (2,083 tons) was obtained by combining the two surveys. No spawn was observed in the Cape Avinof District in 1991.

The Department's test fishery near Kipnuk captured 1,139 herring between 23 May and 12 June which were sampled for age-sex-size data. Age 4 herring were the predominant age class (21%) while 36% of these fish were age 8 or older. Another test fish crew operated near Kwigillingok from 29 May to 12 June. A total of 581 herring were captured and sampled by this crew. Age 3-5 herring comprised 63% of the sample while 16% were age 8 or older.

Commercial fishermen brought in herring samples from various areas in the district for industry roe technicians to evaluate. This information was used to help determine the timing of fishing periods.

The commercial catch sample of 474 herring was 79% age 8 or older with ages 6 - 7 fish making up 21% of the catch.

*Nelson Island District:* Eighteen aerial surveys were flown on 18 days from 13 May to 6 June during the 1991 season. Ten of these surveys were made under acceptable conditions. An aerial survey on 17 May observed 819 st of herring in the district while a survey on 24 May saw 889 st and a survey on 4 June observed 676 st. The difference in age composition between Department test fish samples collected around 24 May and 4 June indicates that the fish seen on 24 May were different from those on 4 June. The total herring biomass estimate in the Nelson Island District of 2,385 st was obtained by combining these three surveys. Ten miles of spawn were observed during aerial surveys of the district. A total of 10.0 linear miles of milt was observed during aerial surveys with peak a spawning of 4.0 linear miles on 17 May.

Test fishing with variable mesh gill nets occurred from 19 May to 18 June. The catch was 1,326 herring which were sampled for age, sex, size and maturity. Age 3 to 7 fish made up 44% of the test catch with the other 56% being age 8 or older herring. Herring from Nelson Island subsistence fishermen were also collected.

*Nunivak Island District:* Fifteen aerial surveys were flown on 15 days between 13 May and 4 June during the 1991 season. Most surveys were made under excellent or fair conditions. An aerial survey on 19 May observed 3,237 st of herring and a survey on 28 May saw 666 st. These two surveys were combined to estimate a total biomass of 3,903 st in the district. A total of 24.0 linear miles of milt was observed while surveying with peak spawn seen on 21 May.

The Department test fishery captured 579 herring between 15 May and 4 June for age-sex-size data. Eighty-one percent of the herring were age 8 or older while recruit herring (ages 3 to 6) were 12% of the catch.

#### *SUBSISTENCE FISHERY*

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. The subsistence fishery is conducted primarily by residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornak, Toksook Bay, Umkumiut, Tununak, and Newtok. The herring stocks utilized by the subsistence fishery are the same ones targeted by the commercial fishery in the nearby commercial fishing districts.

Subsistence harvest surveys have occurred annually in Nelson Island villages since 1985 and sporadically in Kuskokwim delta villages since 1975. Average annual herring subsistence harvests have been at least 110 tons since 1975 (Appendix H.2). The 1991 subsistence survey of Nelson Island communities resulted in an estimated 70.1 tons of subsistence herring harvested. A survey of Nunivak Island residents estimated 3.9 tons of herring were taken for subsistence use. Subsistence survey results reflect harvest trends and reported catches represent minimum figures since not all fishermen are contacted and other Kuskokwim River delta villages were not surveyed.

During the surveys many Nelson Island villagers reported that the declining numbers of herring affected their subsistence activities (Pete, 1991). Several families did not fish for herring due to perceived declines in herring numbers and variable productivity. Herring were unusually variable in size and had higher than normal oil content. Subsistence users prefer herring with low oil content since they are less likely to spoil. Herring abundance dropped dramatically in mid-June, a time when the less oily herring are usually present. Time spent subsistence fishing increased in 1991 compared to previous years.

#### COMMERCIAL FISHERY

##### Security Cove District

The commercial herring fishery in the Security Cove District has opened and closed by emergency order since 1981 to provide for an orderly fishery and periodic reassessments of herring biomass. A total of 570 st of herring was harvested during three openings in the Security Cove District (Table 17).

The district was opened to commercial harvest for four hours starting at 7:00 pm on 13 May. Six processors purchased 5.9 st of sac-roe herring with an average roe percentage of 9.7%. Six deliveries were made by six fishermen. The second opening was for two hours starting at 3:30 pm on 14 May. The catch totaled 27.2 st of sac-roe herring with an average roe content of 10.8% and 2 st of bait. Twenty-five fishermen made 30 deliveries. A third opening of six hours occurred on 16 May. Fifty-two fishermen delivered 536.9 st of sac-roe herring with a roe content of 9.2% and 7.3 st of bait.

The sac roe quality herring had an average roe recovery of 9.3%. Value of the harvest was about \$208,000 (Appendix H.1). Average price was \$450 per ton for 10% roe recovery, with an increase or decrease of \$45 per ton for each percentage point above or below 10%.

Six processors purchased herring in Security Cove (Appendix H.3). A total of 52 fishermen made 100 deliveries in the 1991 fishery. Kuskokwim Area residents accounted for 5% of the catch.

The commercial exploitation rate of Pacific herring was 12.9% of the estimated available biomass (Appendix H.1). Ages 8 and older Pacific herring comprised 86% of the total harvest. There were no herring under age 6 in the commercial catch sample.

A Fish and Wildlife Protection helicopter, C-185 aircraft and the P/V Wolstad was present in the Security Cove District during the opening. Several minor fishing violations were reported.

##### Goodnews Bay District

Since 1981, to provide for an orderly fishery and periodic reassessments of herring biomass, commercial herring fishing in Goodnews Bay has opened and closed

by emergency order. A total of 263 tons were taken during one 4 hour fishing period.

Beach meetings with fishermen occurred to monitor the quality of the herring in Goodnews Bay. Samples were brought in by volunteer fishermen and analyzed by industry roe technicians.

One commercial opening on 22 May from noon to 4:00 pm produced a harvest of 263 st (258.5 st sac-roe with 8.9% roe content and 4.1 st bait). Average roe recovery for the season was 8.9%. The value of the catch to the fishermen was \$93,000 (Appendix H.1). Average price was \$450 per ton for 10% roe recovery, with an increase or decrease of \$45 per ton for every percentage point above or below 10%. Three processors purchased Pacific herring (Appendix H.3). Most processors established 7% as the minimum roe recovery required for sac roe quality Pacific herring. Herring of less than 7% roe recovery sold as bait and the price averaged \$50 per ton. A total of 103 fishermen made 137 deliveries in the 1991 fishery. Local fishermen (i.e. residents of Platinum, and Goodnews Bay) accounted for the majority of the harvest.

The exploitation rate of herring was 6.0% of estimated available biomass (Appendix H.1). Ages 8 and older herring comprised 78% of the total harvest. No age-5 or younger herring occurred in the harvest sample.

Management of the 1991 herring fishery in Goodnews Bay was without major problems. The Fish and Wildlife Protection vessel Woldstad patrolled the district during the season. Several fishing violations were reported.

#### Cape Avinof District

This was the fourth year that a commercial herring fishery occurred in the Cape Avinof District. As in all other Kuskokwim Bay districts, commercial herring fishing is regulated by emergency order. In November 1989, the Alaska Board of Fisheries moved the eastern boundary of the Cape Avinof District from Tsintulik Slough to the Ishkowiik River. This area was previously closed to commercial fishing at the request of local residents to prevent interference with the subsistence harvest. A total of 267.1 tons of herring were harvested during 28 hours of fishing time.

Six commercial openings were scheduled in the Cape Avinof District. The district was first opened to commercial fishing for three hours starting at 10:00 am on 26 May. The district was reopened at 7:00 pm for six hours. The harvest from both openings was 126.5 st of sac-roe herring with an average roe content of 9.7% and 6.4 st of bait. There were two openings on 27 May, a five hour opening starting at 9:00 am and a six hour opening beginning at 10:00 pm. The harvest on 27 May was 95.1 st of sac-roe herring with a roe content of 9.5% and 8.6 st of bait. The district was reopened on 29 May for four hours at 11:00 am. Thirty-two st of sac-roe herring with a roe content of 9.0% and 2.3 st of bait were landed. The final period was for four hours on 31 May starting at noon. Only 4.0 st of sac-roe quality herring with 8.3% roe content and 9.7 st of bait were delivered.

A tender was available near Kwigillingok for the first time in the Cape Avinof District fishery. A total of 65 st of sac-roe herring with a 10.1 roe content and 3.4 st of bait were delivered in the Kwigillingok area.

One hundred-thirty seven fishermen made deliveries to one processor. Fishermen received approximately \$450 per ton for 10% sac roe herring. The value of the catch to fishermen was about \$94,000. Kuskokwim Area fishermen accounted for 98% of the harvest.

The exploitation rate of herring was 12.8% of the estimated available biomass (Appendix H.1). Ages 8 and older herring comprised 80% of the total harvest. No age-5 or younger herring occurred in the harvest sample.

#### Nelson Island District

The commercial harvest of herring began in the Nelson Island District in 1985. To provide for an adequate subsistence harvest, an orderly commercial fishery, and to allow for periodic reassessments of the herring biomass the commercial fishery has opened and closed by emergency order.

No commercial openings occurred in the district in 1991. The estimated biomass of herring in the Nelson Island District was below the 2,500 ton threshold necessary for a commercial fishery. No processors registered to buy herring in the district.

#### Nunivak Island District

As in the Nelson Island District, the initial commercial fishery for herring in the Nunivak Island District occurred in 1985. To provide for an orderly fishery and to allow for periodic reassessments of herring biomass the fishery has opened and closed by emergency order.

The Nunivak Island District had two commercial herring periods in 1991. The first period, on 20 May, lasted four hours starting at 12:30 pm. Seventeen fishermen landed 17.2 st of sac-roe herring with a roe content of 7.5% and 37.1 st of bait. The second opening started at 11:30 am on 22 May and lasted eight hours. Only 5.2 st of bait herring were landed by seven fishermen during the second opening.

Seventeen fishermen made deliveries to two processors. They received approximately \$450 per ton for 10% sac roe herring. The value of the catch to fishermen was about \$9,000. Nunivak Area fishermen accounted for all of the harvest.

The exploitation rate of herring was 1.5% of the estimated available biomass (Appendix H.1). Ages 8 and older herring comprised 96% of the total harvest. No age-5 or younger herring occurred in the harvest sample.

#### OUTLOOK AND MANAGEMENT STRATEGY FOR 1992

Based upon relatively weak recruitment of younger age classes (ages 4-6) and reduced returns of older aged fish, a decline in the harvestable surplus of herring available in all districts is expected in 1992. Forecast methods are under development and reliable estimates of recruitment are not available, so observed herring spawning biomass will determine harvest levels during the season. If it is not possible to determine herring abundance using aerial survey methods, assessment of stock abundance will use information from test and commercial catches along with spawn deposition observations.

Projections from post-season escapement estimates, using mean rates of natural mortality and growth for each age class, suggest that the 1992 minimal spawning biomass for the Kuskokwim Area herring stocks (Security Cove to Nelson Island) should be roughly 11,206 tons (Table 18). However, increased recruitment of ages 3 through 6-year-old herring could increase this figure. (NOTE - use all projection estimates with extreme caution as projection methods are under development and the data base is not extensive.)

Herring biomass in the Security Cove and Goodnews Bay Districts increased significantly due primarily to good numbers of age 4 herring recruiting to the spawning population. The increased biomass in the Nunivak Island District is probably due to an expanded aerial survey program. Test fish samples showed low numbers of recruit age herring in the Nunivak Island District.

Available data on age composition shows a continuation of the downward trend in herring spawning biomass for the Nelson Island and Cape Avinof Districts due to the lack of any significant recruitment of younger age fish into the population. The factors responsible for this decline are not known. The resources now available to conduct research activities can not support an investigation extensive enough to find the causes of the decline. Continuation of this declining biomass trend may precipitate reduced harvest levels or complete closure of Nelson Island District during the 1992 commercial fishing season.

#### Security Cove District

The commercial season opens when the biomass reaches 1,200 tons or spawning activity is observed. The occurrence and length of fishing periods depends on stock strength, fishing effort, and spawning activity. The increased recruitment of younger age fish into the population allows a 20% exploitation rate for the Security Cove herring stock in 1992. The 1992 projected return is 3,042 tons which at a 20% exploitation rate would result in a harvest of about 608 tons (Table 18). A larger catch may occur if the 1992 biomass assessment is greater than the projection.

#### Goodnews Bay District

Management strategy for this district will be similar to that used for Security Cove. The season will open and close by emergency order when a biomass of 1,200 tons is observed or spawning activity occurs. The 1992 projected return of herring to the Goodnews Bay District is 2,978 tons which at a 20% exploitation rate would result in a harvest of 596 tons (Table 18). A larger catch may occur if the 1992 biomass assessment is greater than the projection.

#### Cape Avinof District

Either spawning activity or a biomass of 500 tons must be observed before the commercial herring season can be opened. The season will open and close by emergency order. The projected 1992 biomass for the Cape Avinof area stock is 1,382 tons (Table 18). The Cape Avinof District's herring stocks appear to be showing a lack of recruitment similar to that seen in many southwestern Alaska herring fisheries. The 15% exploitation rate will take into account the limited data base for this area and insure recognition of the subsistence fishing priority. Assuming a 15% commercial exploitation rate, the projected harvest would be 207 tons of herring. With an additional estimated 30 tons of subsistence herring harvest, total exploitation rate in 1992 would be 17%.

#### Nelson Island District

In the Bering Sea Herring Fishery Management Plan the Alaska Board of Fisheries set a minimum biomass level of 3,000 tons that would allow a commercial herring fishery in the Nelson Island District. The in-season estimate of herring biomass must exceed the threshold level before a commercial fishery can be allowed.

The peak biomass estimate for the Nelson Island District was 2,385 tons in 1991 (Appendix H.1). Over 40% of the herring were age 9 or older while 21% of the herring were recruits (ages 3, 4 and 5). The spawning biomass projected to return to the Nelson Island District in 1992 is 1,555 tons (Table 18), which is

lower than the threshold biomass needed to have a commercial fishery. This decline is primarily due to the high mortality rates of older age herring. The projected decline in biomass and the importance of protecting the herring stock for the subsistence fishery is the reason for closure of the fishery if the biomass threshold is not exceeded. If the in-season biomass estimate is greater than 3,000 st, a commercial fishery will be allowed. If the estimated biomass is less than 4,500 tons the exploitation rate in the commercial fishery will be under 10 percent. The harvest level will not exceed 10% unless available biomass exceeds 4,500 tons.

#### Nunivak Island District

The commercial season opens when the biomass reaches 1,500 tons or when significant spawning is observed. The projected biomass of herring returning to the Nunivak Island District in 1992 is 2,249 tons which at a 15% exploitation rate would result in a 337 ton harvest (Table 18). A larger catch may occur if the 1992 biomass assessment is greater than the projection.

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**TABLES**

Table 1. 1991 Kuskokwim Area fish ticket summary.

<u>STAT AREA</u>	<u>DISTRICT NAME</u>	<u>BATCH RANGE</u>	<u>TICKET RANGE</u>	<u>TOTAL TICKETS</u>
335-10	Lower Kuskokwim (S)	101-155	700,001--709,785	9,785
335-20	Middle Kuskokwim (S)	201-204	720,001--720,220	220
335-40	Quinhagak (S)	401-418	730,001--732,630	2,603
335-50	Goodnews Bay (S)	501-508	740,001--740,870	870
335-49	Security Cove (H)	900	725,011--725,110	100
335-50	Goodnews Bay (H)	900-901	725,111--725,247	137
335-60	Nelson Island (H)	NO COMMERCIAL OPENINGS		
335-70	Nunivak Island (H)	900, 903, 904	725,001-725,735	35
335-80	Cape Avinof (H)	901-903	725,248-725,710	463
TOTAL SALMON		85 BATCHES		13,478 TICKETS
TOTAL HERRING		5 BATCHES		735 TICKETS
TOTAL FISH TICKETS		90 BATCHES		14,213 TICKETS

Table 2. Kuskokwim Sonar Expanded Daily Counts, 1991.

<u>Date</u>	<u>0 - 40 meters</u>	<u>41 - 100 meters</u>	<u>Total Counts</u>
06/02	460	715	1175
06/03	147	727	874
06/04	270	1038	1308
06/05	331	1349	1680
06/06	2530	2872	5402
06/07	2529	3475	6004
06/08	1757	2872	4629
06/09	618	565	1183
06/10	1012	836	1848
06/11	2387	963	3350
06/12	2353	4208	6561
06/13	551	2639	3190
06/14	622	2141	2763
06/15	564	1600	2164
06/16	355	1900	2255
06/17	460	1734	2194
06/18	182	2470	2652
06/19	152	4054	4206
06/20	403	14184	14587
06/21	133	11496	11629
06/22	1759	13930	15689
06/23	1724	10695	12419
06/24	1200	8926	10126
06/25	920	10449	11369
06/26	921	20731	21652
06/27	2001	18349	20349
06/28	2811	22015	24826
06/29	3172	18265	21438
06/30	5341	22092	27433
07/01	11813	17637	29450
07/02	5853	11698	17551
07/03	5920	9517	15438
07/04	7592	9273	16865
07/05	10427	12624	23051
07/06	15091	19509	34600
07/07	16402	30717	47119
07/08	18897	22683	41580
07/09	18518	32379	50897
07/10	15630	35933	51563
07/11	13814	26149	39963
07/12	13062	35802	48864
07/13	10426	12260	22686
07/14	8170	10513	18684
07/15	5715	11229	16944
07/16	4036	7503	11539
07/17	6860	17175	24036
07/18	10009	30242	40251
07/19	6814	11827	18641
07/20	5872	3691	9562
07/21	7714	18585	26299
07/22	10737	11393	22130
07/23	21547	16862	38409
07/24	18386	20373	38759
07/25	22298	39662	61961
07/26	19919	29736	49654
07/27	23016	32218	55234
07/28	18170	22795	40965

-- continued --

Table 2. (page 2 of 2)

<u>Date</u>	<u>0 - 40 meters</u>	<u>41 - 100 meters</u>	<u>Total Counts</u>
07/29	12578	14976	27554
07/30	10473	12558	23031
07/31	10157	11293	21450
08/01	5593	18786	24378
08/02	5274	10557	15831
08/03	4902	11149	16052
08/04	4887	19073	23960
08/05	3907	9262	13169
08/06	4142	6873	11015
08/07	4764	9792	14556
08/08	2824	5900	8724
08/09	3157	4094	7251
08/10	3270	3108	6378
08/11	4917	6253	11170
08/12	7338	4397	11735
08/13	<u>4756</u>	<u>1520</u>	<u>6277</u>
<b>Total</b>	<b>483312</b>	<b>916866</b>	<b>1400181</b>

Table 3. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1991.

Period	Date	Hours	Permits	Chinook		Sockeye		Coho		Pink		Chum	
				Number	Cpue	Number	Cpue	Number	Cpue	Number	Cpue	Number	Cpue
01	06/20	6	601	13,813	3.83	19,732	5.47					13,266	3.68
02	06/24	6	616	12,612	3.41	19,262	5.21					30,632	8.29
03	07/01	6	629	5,966	1.58	24,428	6.47					50,121	13.28
04	07/06	6	589	2,102	.59	24,219	6.85			1		40,060	11.34
05	07/13	6	571	904	.26	6,458	1.88	16		21	.01	52,552	15.34
06	07/18	6	568	452	.13	5,128	1.50	977	.29	9		78,797	23.12
07	07/22	6	543	233	.07	3,085	.95	2,655	.81	19	.01	49,788	15.28
08	07/25	8	533	186	.04	1,526	.36	4,871	1.14	86	.02	30,083	7.06
09	07/29	8	534	134	.03	732	.17	37,141	8.69	49	.01	24,026	5.62
10	08/01	6	602	125	.03	624	.17	38,284	10.60	30	.01	13,098	3.63
11	08/05	8	643	56	.01	96	.02	56,262	10.94	32	.01	6,091	1.18
12	08/08	8	634	33	.01	40	.01	72,037	14.20	24		3,194	.63
13	08/12	8	662	42	.01	31	.01	114,581	21.64	40	.01	1,586	.30
14	08/14	8	601	18		23		58,393	12.14	15		634	.13
15	08/19	6	590	24	.01	24	.01	57,364	16.20	4		313	.09
16	08/26	8	512	6		12		43,664	10.66	2		93	.02
TOTALS		110	749	36,706	.45	105,420	1.28	486,245	5.90	332		394,334	4.79

Table 4. 1991 Kuskokwim Area Subsistence Salmon Project Sampling Summary.

	Total Households	Calendars		Postcards		Personal Interviews	Telephone Surveys	Any Info	Reported Subsistence Fishing
		Mailed To	Returned From	Mailed To	Returned From				
Kipnuk	95	4	0	90	5	0	1	5	4
Kwigillingok	33	1	0	33	0	0	0	0	0
Kongiganak	57	38	2	9	0	42	0	54	38
<u>North Kuskokwim Bay Totals</u>	<u>185</u>	<u>43</u>	<u>2</u>	<u>132</u>	<u>5</u>	<u>42</u>	<u>1</u>	<u>59</u>	<u>42</u>
Tuntutuliak	60	47	13	5	0	53	0	57	52
Eek	69	46	15	22	0	46	0	54	46
Kasigluk	82	62	9	14	0	60	1	76	53
Nunapitchuk	90	75	15	15	1	65	0	75	53
Atmoutluak	53	44	6	15	1	33	0	52	39
Napakiaak	73	59	13	23	4	50	1	69	46
Napaskiak	70	51	9	21	1	48	0	64	43
Oscarville	17	14	5	5	0	10	0	13	10
Bethel	1,094	307	59	970	227	1	544	561	337
Kwethluk	134	100	29	11	2	99	0	127	91
Akiachak	106	76	7	20	2	88	0	102	78
Akiak	50	38	10	8	0	40	0	49	41
Tuluksak	70	52	11	8	1	56	0	67	54
<u>Lower Kuskokwim Totals</u>	<u>1,968</u>	<u>971</u>	<u>201</u>	<u>1,137</u>	<u>239</u>	<u>649</u>	<u>546</u>	<u>1,366</u>	<u>943</u>
Lower Kalskag	57	48	10	8	2	43	0	51	31
Upper Kalskag	41	32	6	13	3	25	0	35	25
Aniak	154	121	12	32	6	112	1	143	88
Chuathbaluk	29	21	4	5	0	18	1	27	17
<u>Middle Kuskokwim Totals</u>	<u>281</u>	<u>222</u>	<u>32</u>	<u>58</u>	<u>11</u>	<u>198</u>	<u>2</u>	<u>256</u>	<u>161</u>
Crooked Creek	30	22	3	5	1	23	0	28	18
Red Devil	16	11	2	6	2	4	1	15	11
Sleetmute	38	25	9	7	2	23	0	33	23
Stony River	19	11	1	1	0	17	0	18	11
Lime Village	13	10	0	3	0	5	0	10	5
McGrath	148	52	2	121	46	92	0	116	40
Takotna	17	2	0	0	0	17	0	17	0
Nikolai	31	18	1	1	0	27	0	30	14
Telida	3	2	0	3	0	0	0	0	0
<u>Upper Kuskokwim Totals</u>	<u>315</u>	<u>153</u>	<u>18</u>	<u>147</u>	<u>51</u>	<u>208</u>	<u>1</u>	<u>267</u>	<u>122</u>
<b>KUSKOKWIM RIVER<sup>a</sup></b>									
<u>TOTALS</u>	<u>2,749</u>	<u>1,389</u>	<u>253</u>	<u>1,474</u>	<u>306</u>	<u>1,097</u>	<u>635</u>	<u>1,948</u>	<u>1,268</u>
Quinhagak	118	97	16	29	3	82	0	96	81
Goodnews Bay	70	41	6	21	0	36	0	63	36
Platinum	16	12	0	6	0	12	0	15	8
<u>South Kuskokwim Bay Totals</u>	<u>204</u>	<u>150</u>	<u>22</u>	<u>56</u>	<u>3</u>	<u>130</u>	<u>0</u>	<u>174</u>	<u>125</u>
Mekoryak	49	6	0	47	9	0	0	6	6
Newtok	58	2	0	30	2	0	0	0	0
Nightmute	26	1	0	18	2	0	0	2	2
Toksook Bay	75	8	0	58	8	0	1	7	6
Tununak	86	4	0	50	2	0	0	1	1
<u>Bering Sea Coast Totals</u>	<u>294</u>	<u>21</u>	<u>0</u>	<u>203</u>	<u>23</u>	<u>0</u>	<u>1</u>	<u>16</u>	<u>15</u>
Anchorage	1	1	1	0	0	0	0	1	1
<b>KUSKOKWIM AREA</b>									
<u>TOTALS</u>	<u>3,248</u>	<u>1,561</u>	<u>276</u>	<u>1,733</u>	<u>332</u>	<u>1,227</u>	<u>551</u>	<u>2,137</u>	<u>1,409</u>

a Includes North Kuskokwim Bay

Table 5. 1991 Kuskokwim Area Subsistence Salmon Harvests.

	Households		Chinook		Chum		Sockeye		Coho	
	Total	Contacts	Reported	Est'd	Reported	Est'd	Reported	Est'd	Reported	Est'd
			Harvest	Total	Harvest	Total	Harvest	Total	Harvest	Total
Kipruk	95	5	44	44	15	15	38	38	30	30
Kwigillingok	33	0	0	0	0	0	0	0	0	0
Kongiganak	57	54	497	533	633	679	303	325	345	370
<b>North Kuskokwim Bay Totals</b>	<b>185</b>	<b>59</b>	<b>541</b>	<b>577</b>	<b>648</b>	<b>694</b>	<b>341</b>	<b>363</b>	<b>375</b>	<b>400</b>
Tuntutuliak	60	57	3,997	3,997	4,620	4,620	1,646	1,646	723	723
Eek	69	54	2,516	2,881	734	843	479	552	401	457
Kasigluk	82	76	2,366	2,566	2,737	2,972	1,152	1,249	1,561	1,687
Nunapitchuk	90	75	3,201	3,472	4,851	5,262	1,799	1,951	833	904
Atmaultluak	53	52	1,336	1,369	1,757	1,801	636	652	287	294
Mapakiak	73	69	2,429	2,476	2,229	2,272	1,128	1,150	548	559
Mapaskiak	70	64	2,901	2,961	4,939	5,042	2,038	2,080	583	595
Oscarville	17	13	1,088	1,088	567	567	506	506	95	95
Bethel	1,094	561	17,257	30,233	13,202	3,444	10,594	18,205	16,294	29,229
Kwethluk	134	127	6,864	7,072	4,776	4,921	3,454	3,559	2,121	2,185
Akiachak	106	102	4,429	4,547	4,641	4,764	3,257	3,344	1,836	1,887
Akiak	50	49	2,516	2,576	4,002	4,097	1,285	1,316	1,621	1,660
Tuluksak	70	67	2,730	2,780	4,613	4,697	2,923	2,976	1,537	1,567
<b>Lower Kuskokwim Totals</b>	<b>1,968</b>	<b>1,366</b>	<b>53,630</b>	<b>68,018</b>	<b>53,673</b>	<b>65,302</b>	<b>30,897</b>	<b>39,186</b>	<b>28,440</b>	<b>41,842</b>
Lower Kalskag	57	51	3,561	3,835	1,976	2,128	859	925	381	410
Upper Kalskag	41	35	777	841	1,971	2,129	219	237	358	387
Aniak	154	143	3,170	3,303	3,393	3,533	2,000	2,086	998	1,042
Chuathbaluk	29	27	672	672	1,625	1,625	1,059	1,059	79	79
<b>Middle Kuskokwim Totals</b>	<b>281</b>	<b>256</b>	<b>8,180</b>	<b>8,651</b>	<b>8,965</b>	<b>9,415</b>	<b>4,137</b>	<b>4,307</b>	<b>1,816</b>	<b>1,918</b>
Crooked Creek	30	28	941	1,027	1,036	1,130	923	1,007	174	190
Red Devil	16	15	84	92	618	674	213	232	566	617
Sleetmute	38	33	731	775	1,830	1,915	1,266	1,366	1,547	1,614
Stony River	19	18	537	537	552	552	1,753	1,753	460	460
Lime Village	13	10	43	50	511	596	683	797	240	280
McGrath	148	116	789	821	964	999	0	0	788	818
Takotna	17	17	0	0	0	0	0	0	0	0
Nikolai	31	30	316	316	371	371	0	0	62	62
Telida	3	0	0	0	0	0	0	0	0	0
<b>Upper Kuskokwim Totals</b>	<b>315</b>	<b>267</b>	<b>3,441</b>	<b>3,618</b>	<b>5,882</b>	<b>6,237</b>	<b>4,838</b>	<b>5,155</b>	<b>3,837</b>	<b>4,041</b>
<b>KUSKOKWIM RIVER<sup>a</sup> TOTALS</b>	<b>2,749</b>	<b>1,948</b>	<b>65,792</b>	<b>80,864</b>	<b>69,168</b>	<b>81,648</b>	<b>40,213</b>	<b>49,011</b>	<b>34,468</b>	<b>48,201</b>
Quinhagak	118	95	2,970	3,536	1,129	1,346	1,292	1,538	2,437	2,901
Goodnews Bay	70	63	632	664	97	102	743	780	1,164	1,222
Platinum	16	14	18	18	4	4	120	120	31	31
<b>South Kuskokwim Bay Totals</b>	<b>204</b>	<b>172</b>	<b>3,620</b>	<b>4,218</b>	<b>1,230</b>	<b>1,452</b>	<b>2,155</b>	<b>2,438</b>	<b>3,632</b>	<b>4,154</b>
Hekoryuk	49	6	0	0	1,178	9,620	1	8	130	1,062
Newtok	58	0	0	0	0	0	0	0	0	0
Nightmute	26	2	10	10	60	60	110	110	20	20
Toksook Bay	75	7	40	40	253	253	155	155	1	1
Tunukak	86	1	10	10	0	0	100	100	0	0
<b>Bering Sea Coast Totals</b>	<b>294</b>	<b>16</b>	<b>60</b>	<b>60</b>	<b>1,491</b>	<b>9,933</b>	<b>366</b>	<b>373</b>	<b>151</b>	<b>1,083</b>
Anchorage	--	1	0	0	3	3	0	0	39	39
<b>KUSKOKWIM AREA TOTALS</b>	<b>3,247</b>	<b>2,137</b>	<b>69,472</b>	<b>85,142</b>	<b>71,892</b>	<b>93,036</b>	<b>42,734</b>	<b>51,822</b>	<b>38,290</b>	<b>53,477</b>

a Includes North Kuskokwim Bay

\*\* If less than 10% of households in a community were contacted, then reported harvest is used for estimated harvest. "

Table 6. Kuskokwim Area salmon entry permits issued by village, 1991.

<u>Village</u>	<u>Number of Entry Permits</u>
AKIACHAK	59
AKIAK	23
ANIAK	9
ATMAUTLUAK	26
BETHEL	164
CHUATHBALUK	2
CHEFORNAK	5
EEK	41
GOODNEWS BAY	32
KALSKAG	9
KASIGLUK	42
KIPNUK	16
KONGIGANAK	21
KWETHLUK	63
KWIGILLINGOK	16
MEKORYUK	1
MCGRATH	2
NAPAKIAK	39
NAPASKIAK	25
NUNAPITCHUK	46
OSCARVILLE	7
PLATINUM	7
QUINHAGAK	82
SLEETMUTE	1
TULUKSAK	25
TUNTUTULIAK	46
<b>KUSKOKWIM AREA SUBTOTAL</b>	<b><u>809</u></b>
ANCHORAGE	13
DILLINGHAM	1
FAIRBANKS	3
KENAI	1
MANOKOTAK	2
TOGIAK	2
<b>NON-LOCAL ALASKA RESIDENTS SUBTOTAL</b>	<b><u>22</u></b>
KAHULUI MAUI, HAWAII	1
<b>NON-ALASKAN RESIDENTS SUBTOTAL</b>	<b><u>1</u></b>
<b>TOTAL NUMBER OF KUSKOKWIM SALMON PERMITS</b>	<b><u>832</u></b>

Table 7. Kuskokwim Area commercial and subsistence salmon catches by species and district, 1991.

<u>DISTRICT</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
District 1, Lower Kuskokwim River:						
Commercial	36,420	105,420	486,245	332	394,334	1,022,751
Subsistence	68,596	39,548	42,242		65,996	216,382
SUBTOTAL	105,016	144,968	528,487	332	460,330	1,239,133
District 2, Middle Kuskokwim River:						
Commercial	1,072	3,526	14,690	46	37,468	56,802
Subsistence	8,651	4,307	1,918		9,415	24,291
SUBTOTAL	9,252	7,833	16,608	46	46,883	80,622
Upper Kuskokwim River:						
Commercial	CLOSED TO COMMERCIAL SALMON FISHING					
Subsistence	3,618	5,155	4,042		6,238	19,053
SUBTOTAL	3,618	5,155	4,042		6,238	19,053
Kuskokwim River:						
Commercial	37,778	108,946	500,935	378	431,802	1,079,839
Subsistence	80,865	49,010	48,241		81,652	259,768 <sup>a</sup>
SUBTOTAL	118,643	157,956	549,176	378	513,454	1,339,608
District 4, Quinhagak:						
Commercial	9,480	53,657	42,571	115	54,493	160,316
Subsistence	3,536	1,538	2,901		1,346	9,321
SUBTOTAL	13,016	55,195	45,472	115	55,839	169,637
District 5, Goodnews Bay:						
Commercial	912	39,838	13,312	29	15,397	69,488
Subsistence	682	900	1,253		106	2,941
SUBTOTAL	1,594	40,738	14,565	29	15,503	72,429
Kuskokwim Bay:						
Commercial	10,392	93,495	55,883	144	69,890	229,804
Subsistence	4,218	2,438	4,154		1,452	12,262
SUBTOTAL	14,610	95,933	60,037	144	71,342	242,066
Etolin Strait:						
Commercial	Closed to Commercial Fishing					
Subsistence	60	373	1,083		9,933	11,449
SUBTOTAL	60	373	1,083		9,933	11,449
Kuskokwim Area:						
Commercial	48,170	202,441	556,818	522	501,692	1,309,643
Subsistence	85,143	51,821	53,478		93,037	283,479
TOTAL	133,313	254,262	610,296	522	594,729	1,593,122

<sup>a</sup> Includes the catch of a fisher from Anchorage who fished in an unknown location in the Kuskokwim River.

Table 8. 1991 Kuskokwim Area commercial salmon fishery final calculated value by district and area.\*

	CHINOOK	SOCKEYE	COHO	PINK	CHUM	DISTRICT TOTAL
<u>LOWER KUSKOKWIM DISTRICT 1</u>						
TOTAL FISH	36,706	105,420	486,245	332	394,334	1,023,037
TOTAL POUNDS	545,141	732,944	3,094,435	1,144	2,433,100	6,806,764
TOTAL DOLLARS	\$310,730	\$498,402	\$1,392,496	\$137	\$788,592	\$2,990,357
AVERAGE WEIGHT	14.85	6.95	6.36	3.40	6.17	
<u>MIDDLE KUSKOKWIM DISTRICT 2</u>						
TOTAL FISH	1,072	3,526	14,690	46	37,468	56,802
TOTAL POUNDS	17,246	23,698	89,727	169	226,439	357,279
TOTAL DOLLARS	\$10,003	\$14,456	\$39,480	\$20	\$47,552	\$111,511
AVERAGE WEIGHT	16.09	6.72	6.11	3.67	6.04	
<u>QUINHAGAK DISTRICT 4</u>						
TOTAL FISH	9,480	53,657	42,571	115	54,493	160,316
TOTAL POUNDS	171,072	368,832	307,351	303	369,751	1,217,309
TOTAL DOLLARS	\$95,800	\$247,117	\$144,455	\$36	\$107,228	\$594,636
AVERAGE WEIGHT	18.05	6.87	7.22	2.63	6.79	
<u>GOODNEWS BAY DISTRICT 5</u>						
TOTAL FISH	912	39,838	13,312	29	15,892	69,983
TOTAL POUNDS	14,685	280,033	103,302	118	108,256	506,394
TOTAL DOLLARS	\$8,370	\$187,622	\$47,519	\$14	\$31,394	\$274,919
AVERAGE WEIGHT	16.10	7.03	7.76	4.07	6.81	
<u>TOTAL ALL DISTRICTS</u>						
TOTAL FISH	48,170	202,441	556,818	522	502,187	1,310,138
TOTAL POUNDS	748,144	1,405,507	3,594,815	1,734	3,137,546	8,887,746
TOTAL DOLLARS	\$424,903	\$947,597	\$1,623,950	\$207	\$974,766	\$3,961,423
AVERAGE WEIGHT	15.53	6.94	6.45	3.36	6.25	
AVERAGE PRICE/LB	\$0.56	\$0.67	\$0.45	\$0.12	\$0.31	
PRICE/FISH	\$8.70	\$4.65	\$2.90	\$0.40	\$1.94	
ROE SALES						\$85
GRAND TOTAL FOR AREA						\$3,961,508

\* Does not include test fish sales.

Table 9. Executive summary of department and working group actions, 1991.

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
03-14	NO QUORUM		
04-28	Reorganization and discussion of 1991 Kuskokwim River Salmon Management Plan.		
05-19	Discussion of in-season data and evaluation of in-season data.		
06-02	Approval of 1990 and 1991 minutes.		
06-16	District 1 for 6 hours on 20 June. (below Bethel required by regulation)	District 1 for 6 hours on 20 June. (below Bethel required by regulation)	District 1 for 6 hours on 20 June. (below Bethel required by regulation)
06-22	District 1, below Bethel for 6 hours 24 June.	District 1 for 6 hours on 24 June.	District 1 for 6 hours on 24 June.
06-26	Districts 1 and 2 for 6 hours on 1 July.	Districts 1 and 2 for 6 hours on 1 July.	Districts 1 and 2 for 6 hours on 1 July.
07-02	Districts 1 and 2 for 6 hours on 8 July.	Recess until 5 July.	Recess until 5 July.
07-05	Districts 1 and 2 for 6 hours on 8 July.	Districts 1 and 2 for 6 hours on 6 July.	Districts 1 and 2 for 6 hours on 6 July.
07-08	Meet again on 10 July.	Meet again on 10 July.	Meet again on 10 July.
07-10	Meet again on 12 July.	Districts 1 and 2 for 6 hours on 13 July and recess until 12 July.	Announcement of period delayed until 12 July.
07-12	Announced Districts 1 and 2 for 6 hours on 13 July.	Meet again on 16 July.	Districts 1 and 2 for 6 hours on 13 July.
07-16	Districts 1 and 2 for 6 hours on 19 July.	Districts 1 and 2 for 6 hours on 18 July.	Districts 1 and 2 for 6 hours on 18 July.

Table 9 (page 2 of 3)

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
07-19	Districts 1 and 2 for 6 hours 22 July.	Districts 1 and 2 for 6 hours on 20 July. Vetoed by Department. Districts 1 and 2 for 6 hours on 22 July.	Districts 1 and 2 for 6 hours on 22 July.
07-23	Districts 1 and 2 for 6 hours on 25 July.	Districts 1 and 2 for 8 hours on 25 July and 29 July.	Districts 1 and 2 for 8 hours on 25 July and 29 July.
07-31	Districts 1 for 6 hours on 1 August.	Districts 1 for 6 hours on 1 August.	Districts 1 for 6 hours on 1 August.
08-02	Districts 1 and 2 for 6 hours on 5 August.	Districts 1 and 2 for 8 hours on 5 August.	Districts 1 and 2 for 8 hours on 5 August.
08-04	NO QUORUM		
08-06	Districts 1 and 2 for 6 hours on 8 August.	Districts 1 and 2 for 8 hours on 8 August.	Districts 1 and 2 for 8 hours on 8 August.
08-08	Meeting with Commercial Fisheries Division Director Lloyd.		Request for in-season management needs list.
08-09	Districts 1 and 2 for 6 hours on 12 August.	Districts 1 and 2 for 6 hours on 10 August. Vetoed by Department. Vetoed again after reconsideration motion. Districts 1 and 2 for 6 hours on 11 August withdrawn for lack of support. Districts 1 and 2 for 8 hours on 12 August.	Districts 1 and 2 for 8 hours 12 August.
08-13	Districts 1 and 2 for 6 hours 15 August.	Districts 1 and 2 for 8 hours 14 August.	Districts 1 and 2 for 8 hours 14 August.
08-15	Meet again on 17 August.	Meet again on 16 August.	Meet again on 16 August.
08-16	Meet again on 19 August.	Recess until 18 August.	Recess until 18 August.

Table 9 (page 3 of 3)

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
08-18	Districts 1 and 2 for 6 hours on 21 August.	Districts 1 and 2 for 6 hours on 19 August.	Districts 1 and 2 for 6 hours on 19 August.
08-20	Recess until 22 August.	Recess until 22 August.	Recess until 22 August.
08-22	Meet again 24 August.	Recess until 24 August. Three motions for fishing periods failed.	Recess until 24 August.
08-24	Recess until 26 August.	Districts 1 and 2 for 8 hours on 26 August.	Districts 1 and 2 for 8 hours on 26 August.
08-27	NO QUORUM		
08-29	Let season close by regulation on 1 September.	Districts 1 and 2 for 6 hours on 30 August. Vetoed by Department. Recess until 1 September.	Recess until 1 September.
09-01	Let season closed by regulation.	Let season close by regulation.	Season closed by regulation.

Table 10. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1991.

Period	Date	Hours	Permits	Chinook		Sockeye		Coho		Pink		Chum		
				Number	Cpue	Number	Cpue	Number	Cpue	Number	Cpue	number	cpue	
01	07/01		6	17	483	4.74	1,200	11.76				3,043	29.83	
02	07/06		6	16	341	3.55	613	6.39				2,381	24.80	
03	07/13		6	18	112	1.04	981	9.08				4,384	40.59	
04	07/18		6	17	49	.48	365	3.58			5	.05	6,534	64.06
05	07/22		6	19	28	.25	117	1.03	17	0.15	14	.12	7,154	62.75
06	07/25		8	17	20	.15	177	1.30	115	.85	13	.10	7,686	56.51
07	07/29		8	16	21	.16	70	.55	177	1.38	6	.05	3,452	26.97
08	08/05		8	17	6	.04			1,596	11.74	4	.03	1,245	9.15
09	08/08		8	17	4	.03	3	.02	2,381	17.51	2	.01	835	6.14
10	08/12		8	16	2	.02			1,829	14.29			340	2.66
11	08/14		8	15	4	.03			2,461	20.51			227	1.89
12	08/19		6	19	2	.02			1,689	14.82			138	1.21
13	08/26		8	16					4,425	34.57			49	.38
TOTALS			92	23	1,072	.51	3,526	1.67	14,690	10.79	46	.02	37,468	17.71

Table 11. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1991.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/13	12	4	33	.69	4	.29					14	.29
02	06/20	12	71	3,031	3.56	411	.48					563	.66
03	06/24	12	81	1,403	1.44	1,643	1.69					732	.75
04	06/27	12	227	1,849	.68	4,923	1.81					2,722	1.00
05	07/01	12	76	657	.72	3,498	3.84					1,836	2.01
06	07/04	12	172	508	.25	5,743	2.78					2,612	1.27
07	07/06	12	73	273	.31	3,951	4.51					2,192	2.50
08	07/08	12	96	465	.40	8,229	7.14					3,050	2.65
09	07/11	12	210	406	.16	7,195	2.86					9,329	3.70
10	07/13	12	70	205	.24	4,241	5.05					4,799	5.71
11	07/15	12	114	230	.17	4,505	3.29	4				7,852	5.74
12	07/17	12	120	130	.09	3,725	2.59	6				5,988	4.16
13	07/19	12	86	97	.09	2,391	2.32	49	.05			4,960	4.81
14	07/22	12	60	35	.05	1,055	1.47	7	.01			990	1.47
15	07/24	12	62	33	.04	588	.79	21	.03			2,254	3.03
16	07/26	12	44	27	.05	529	1.00	82	.16			1,446	2.74
17	07/29	12	47	21	.04	356	.63	367	.65	46	.08	1,412	2.50
18	07/31	12	44	15	.03	183	.35	410	.78	18	.03	665	.35
19	08/02	12	34	14	.03	138	.34	390	.96	14	.03	288	.71
20	08/05	12	21	6	.02	92	.37	387	1.54	12	.05	218	.87
21	08/09	12	62	7	.01	67	.09	1,831	2.46	8	.01	265	.36
22	08/14	12	56	6	.01	34	.05	2,963	4.41	2		98	.15
23	08/16	12	79	5	.01	38	.04	5,599	5.91	3		96	.10
24	08/19	12	69	10	.01	26	.03	6,099	7.37	1		54	.07
25	08/21	12	105	4		28	.02	4,073	3.23	1		21	.02
26	08/23	12	111	1		13	.01	11,957	8.98	6		22	.02
27	08/26	12	77	6	.01	27	.03	2,644	2.86	2		10	.01
28	08/29	12	76	2		11	.01	2,508	2.75	1		1	
29	08/31	12	43			6	.01	1,427	2.77				
30	09/02	12	40	1		7	.01	1,747	3.64	1		4	.01
31	09/05	12	0										
				NO BUYER - NO COMMERCIAL FISHING									
TOTALS		372	346	9,480	.08	53,657	.43	42,571	.34	115		54,493	.44

Table 12. Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1991<sup>a</sup>.

<u>Location</u>	<u>Date</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Chum</u>
<u>KUSKOKWIM RIVER:</u>					
Aniak R.	23-Jul	1,564	0	na	850
Salmon R.	23-Jul	583	0	na	850
Kipchuk R.	23-Jul	885	0	na	500
Eek R.	02-Aug	1,312	4,180	na	1,220
Eek R.	30-Aug	3	32	3,289	0
Kasigluk R.	05-Aug	0	0	na	0
Kisaralik R.	05-Aug	238	0	na	15
Kisaralik R.	28-Aug	3	0	226	12
Kwethluk R.	02-Aug	818	0	na	3,590
Kwethluk R.	28-Aug	0	0	2,483	0
Canyon Cr.	02-Aug	184	0	na	140
Tuluksak R.	24-Jul	358	0	na	1,314
Tuluksak R.	03-Sep	0	0	1,022	0
<u>KUSKOKWIM BAY:</u>					
Goodnews River <sup>b</sup>	28-Aug	127	1,285	1,600	705
Kanektok River	11-Aug	2,262	44,416	4,300	19,052

a Peak aerial salmon escapement index count. Aerial index counts do not represent total escapement, but reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.

b Middle Fork Goodnews River only.

Table 13. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1991.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/20-06/20	12	25	139	.46	523	1.74					137	.46
02	06/27-06/27	12	34	173	.42	3,040	7.45					758	1.86
03	07/01-07/01	12	34	77	.19	3,376	8.27					850	2.08
04	07/06-07/06	12	38	100	.22	6,093	13.36					1,162	2.55
05	07/08-07/08	12	38	93	.20	5,916	12.97					1,837	4.03
06	07/11-07/11	12	43	53	.10	3,898	7.55					1,971	3.82
07	07/13-07/14	24	50	73	.06	5,080	4.23					2,288	1.91
08	07/15-07/16	24	0	NO BUYER - NO COMMERCIAL FISHING									
09	07/17-07/18	24	40	65	.07	2,978	3.10					2,019	2.10
10	07/19-07/20	24	32	33	.04	2,151	2.80					1,465	1.91
11	07/22-07/23	24	31	19	.03	2,056	2.76	1				1,177	1.58
12	07/24-07/25	24	27	20	.03	1,502	2.32	5	.01	2		874	1.35
13	07/26-07/27	24	26	10	.02	963	1.54	9	.01	6	.01	608	.97
14	07/29-07/30	24	23	15	.03	605	1.10	35	.06	8	.01	223	.40
15	07/31-08/01	24	12	7	.02	344	1.19	24	.08	1		121	.42
16	08/02-08/02	12	10	6	.05	204	1.70	96	.80			110	.92
17	08/05-08/05	12	18	6	.03	308	1.43	207	.96	4	.02	165	.76
18	08/09-08/09	12	24	7	.02	209	.73	516	1.79	1		63	.22
19	08/14-08/14	12	26	4	.01	164	.53	1,641	5.26	2	.01	42	.13
20	08/16-08/16	12	28	3	.01	109	.32	2,226	6.63	3	.01	16	.05
21	08/19-08/19	12	33	4	.01	117	.30	1,938	4.89	2	.01	5	.01
22	08/21-08/21	12	36	2		96	.22	2,688	6.22			1	
23	08/26-08/26	12	1					15	1.25				
24	08/28-08/28	12	40			42	.09	1,784	3.72				
25	08/31-08/31	12	33			51	.13	1,551	3.92				
26	09/02-09/02	12	18			13	.06	576	2.67				
27	09/05-09/05	12	0	NO BUYER - NO COMMERCIAL FISHING									
TOTALS		432	72	912	.03	39,838	1.40	13,312	.47	29		15,892	.56

Table 14. Preliminary projections of the 1992 Kuskokwim Area commercial salmon harvests in thousands of fish by species.

<u>Species</u>	<u>Management Region</u>			<u>Total</u>	
	<u>Kuskokwim River</u>	<u>Quinhaqak</u>	<u>Goodnews Bay</u>	<u>Kuskokwim Area<sup>a</sup></u>	
Chinook	19 - 56	14 - 46	3 - 14	36 -	116
Sockeye	33 - 137	6 - 84	7 - 40	46 -	261
Coho	196 - 660	27 - 135	8 - 31	231 -	826
Pink	1 - 11 <sup>b</sup>	8 - 21 <sup>b</sup>	1 - 5	10 -	37
Chum	199 - 1,382	9 - 53	5 - 33	213 -	1,468
<b>Total</b>	<b>448 - 2,246</b>	<b>64 - 339</b>	<b>24 - 123</b>	<b>536 -</b>	<b>2,708</b>

a Except as noted all the projections are based on the previous (1981-90) average catches in all districts.

b Kuskokwim Area pink salmon display a strong odd-even year cycle. This projection is based on the odd year catch for the previous 10 years.

Table 15. Kuskokwim area Pacific herring proportion of biomass by age class, 1991.

District	Age (years)											Total weight (st)
	3	4	5	6	7	8	9	10	11	12	13+	
<u>Commercial catch<sup>a</sup></u>												
Security Cove				0.3	11.1	23.4	10.5	16.4	11.7	15.7	10.9	570
Goodnews Bay				0.7	17.4	21.5	9.6	11.6	9.5	17.2	12.5	263
Cape Avinof				0.7	16.3	19.8	14.3	16.0	11.0	13.8	8.1	267
Nelson Island <sup>b</sup>												
Nunivak Island				0.8	2.0	9.6	6.7	17.5	22.0	29.2	12.2	59
All Districts				0.5	13.3	21.4	11.0	15.3	11.6	16.3	10.7	1159
<u>Test Fishery<sup>c</sup></u>												
Security Cove	0.2	19.3	2.3	2.3	15.5	18.4	6.5	12.4	9.9	8.5	4.7	4434
Goodnews Bay	0.6	12.3	2.6	2.8	19.1	14.0	6.1	11.1	10.4	13.0	8.0	4387
Cape Avinof	3.1	11.9	10.6	4.8	17.3	13.8	11.8	7.4	7.7	7.7	3.9	2083
Nelson Island	0.7	6.2	2.4	2.2	17.7	15.7	6.7	12.1	10.4	13.9	12.0	2385
Nunivak Island		3.8	0.7	0.5	5.6	11.4	8.6	16.2	13.5	22.3	17.4	3903
All Districts	0.7	11.3	3.0	2.3	17.3	14.8	7.5	12.3	10.6	13.4	9.3	17192
Jacksmith Bay	7.0	26.4	10.7	8.6	22.9	10.5	4.4	3.6	2.8	2.5	0.6	d
Kwigillingok	6.6	21.6	17.3	7.0	19.2	7.8	5.4	4.6	3.6	4.1	2.8	d

a Commercial drift gill net

b No commercial fishery in 1991

c ADF&G variable mesh gill net

d No biomass estimate available for Jacksmith Bay or Kwigillingok

Table 16. Kuskokwim area Pacific herring age frequency by district, 1991.

District	Age (years)											Sample Size
	3	4	5	6	7	8	9	10	11	12	13+	
<b>Commercial catch<sup>a</sup></b>												
Security Cove				0.4	13.6	26.5	11.0	15.9	10.6	13.3	8.7	263
Goodnews Bay				0.8	21.5	23.7	10.1	11.4	8.9	13.9	9.7	237
Cape Avinof				0.9	19.6	22.0	14.3	14.7	9.8	11.8	6.9	449
Nelson Island <sup>b</sup>												0
Nunivak Island				0.9	2.8	11.1	7.4	17.6	21.3	27.8	11.1	108
All Districts				0.8	16.8	22.4	11.8	14.6	11.0	14.3	8.4	1057
<b>Test Fishery<sup>c</sup></b>												
Security Cove	0.4	34.5	3.8	2.5	15.0	15.8	4.7	8.6	6.6	5.3	2.8	852
Goodnews Bay	1.5	24.6	4.1	3.5	20.3	12.8	4.9	8.1	7.0	8.3	4.9	1580
Jacksmith Bay	12.4	36.7	11.0	7.5	17.6	7.2	2.9	1.7	1.5	1.2	0.3	346
Cape Avinof												
Kipnuk	6.8	21.0	14.7	5.4	16.3	11.4	8.9	4.8	4.2	4.4	2.1	1094
Kwigilligok	13.4	30.9	18.9	6.2	14.6	5.5	3.3	2.2	1.7	2.1	1.2	581
Nelson Island	2.4	14.8	4.2	2.9	20.0	15.1	5.7	9.6	7.6	9.8	7.9	1297
Nunivak Island		9.7	1.6	1.0	6.9	12.8	8.7	14.7	11.8	18.8	14.0	508
All Districts	4.0	23.3	7.5	3.8	17.1	12.5	5.8	7.5	6.2	7.4	4.9	6258

- a Commercial drift gill net
- b No commercial fishery in 1991
- c ADF&G variable mesh gill net

Table 17. Summary of Pacific herring commercial harvest by fishing period for Kuskokwim Area fishing districts, Alaska, 1991.

<u>District</u>	<u>Period</u>	<u>Date</u>	<u>Time</u>	<u>Total hours</u>	<u>Harvest (st)</u>
Security Cove	1	5/13	1900-2300	4.0	5.9
	2	5/14	1530-1730	2.0	27.2
	3	5/16	1800-2400	<u>6.0</u>	<u>536.9</u>
			Total	12.0	570.0
Goodnews Bay	1	5/22	1200-1600	<u>4.0</u>	<u>262.7</u>
			Total	4.0	262.7
Cape Avinof	1	5/26	1000-1300	3.0	21.1
	2	5/26-7	1900-0100	6.0	105.4
	3	5/27	0900-1400	5.0	61.8
	4	5/27-8	2000-0200	6.0	33.3
	5	5/29	1100-1500	4.0	31.8
	6	5/31	1200-1600	<u>4.0</u>	<u>13.7</u>
		Total	28.0	267.1	
Nunivak Island	1	5/20	1230-1630	4.0	54.3
	2	5/22	1130-1930	<u>8.0</u>	<u>5.2</u>
		Total	12.0	59.5	

Table 18. Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, Alaska, 1992.

District	1992 Projection <sup>a</sup>			Exploitation
	Biomass (st)	Threshold (st) <sup>b</sup>	Harvest (st)	Rate (%)
Security Cove	3,042	1,200	608	20
Goodnews Bay	2,978	1,200	596	20
Cape Avinof	1,382	500	207	15
Nelson Island	1,555	3,000	- <sup>c</sup>	10 <sup>d</sup>
Nunivak Island	<u>2,249</u>	1,500	<u>337</u>	15
Total	11,206		1,748	

<sup>a</sup> Preseason projection. Projection may be adjusted based on inseason biomass estimates.

<sup>b</sup> Threshold biomass needed to allow a commercial fishery from 5 AAC 27.060 Bering Sea Herring Fishery Management Plan

<sup>c</sup> Projected biomass is below minimum for commercial harvest; fishery will not be opened if threshold biomass is not exceeded.

<sup>d</sup> Maximum exploitation rate if in-season biomass estimate exceeds threshold level. Commercial harvest will be regulated so that the biomass of herring escaping the fishery will not fall below the threshold level for that fishery.

**FIGURES**

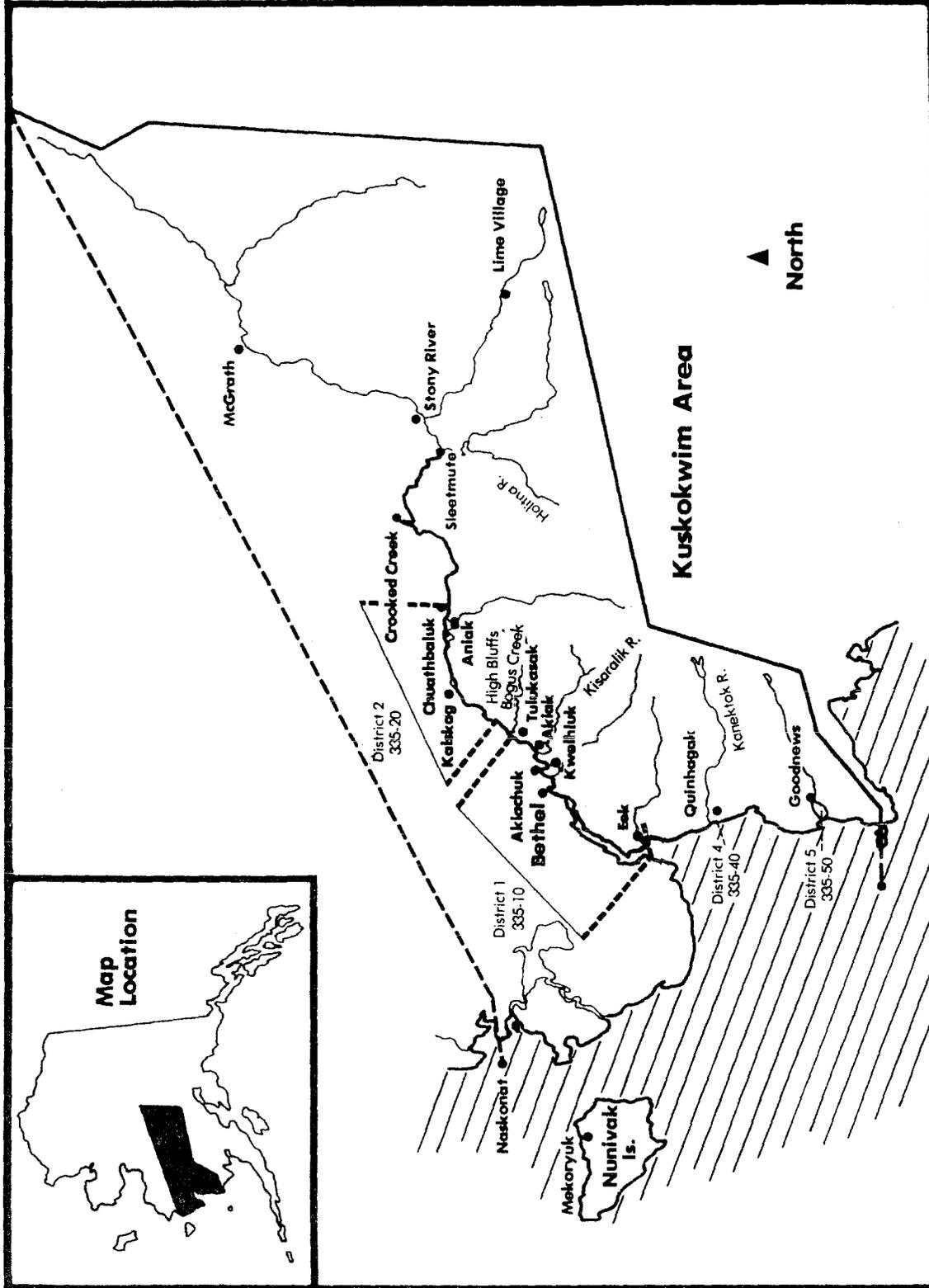
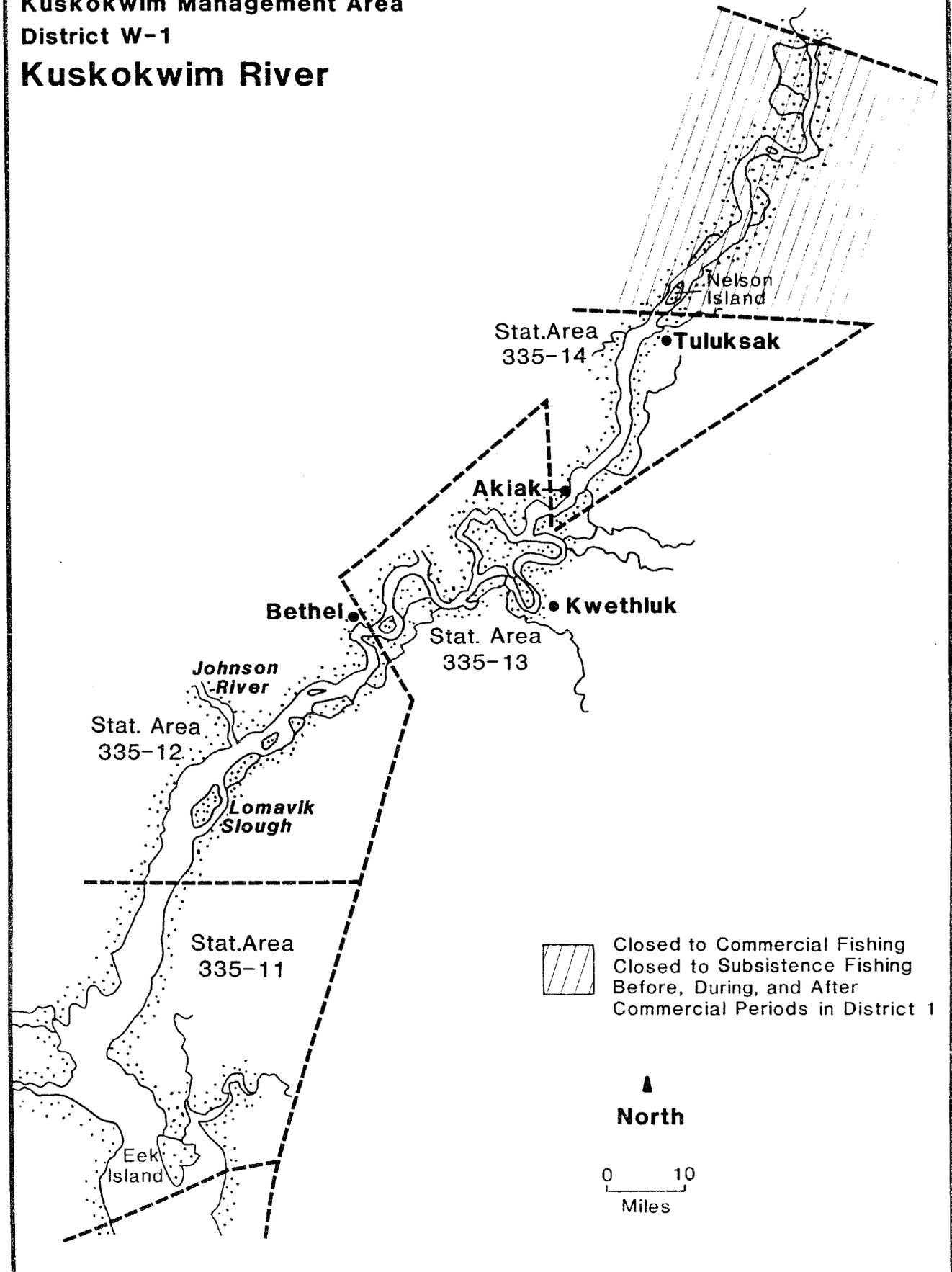


Figure 1. Kuskokwim Area Map.

**Kuskokwim Management Area  
District W-1  
Kuskokwim River**



**Figure 2.** Kuskokwim Management Area. District W-1

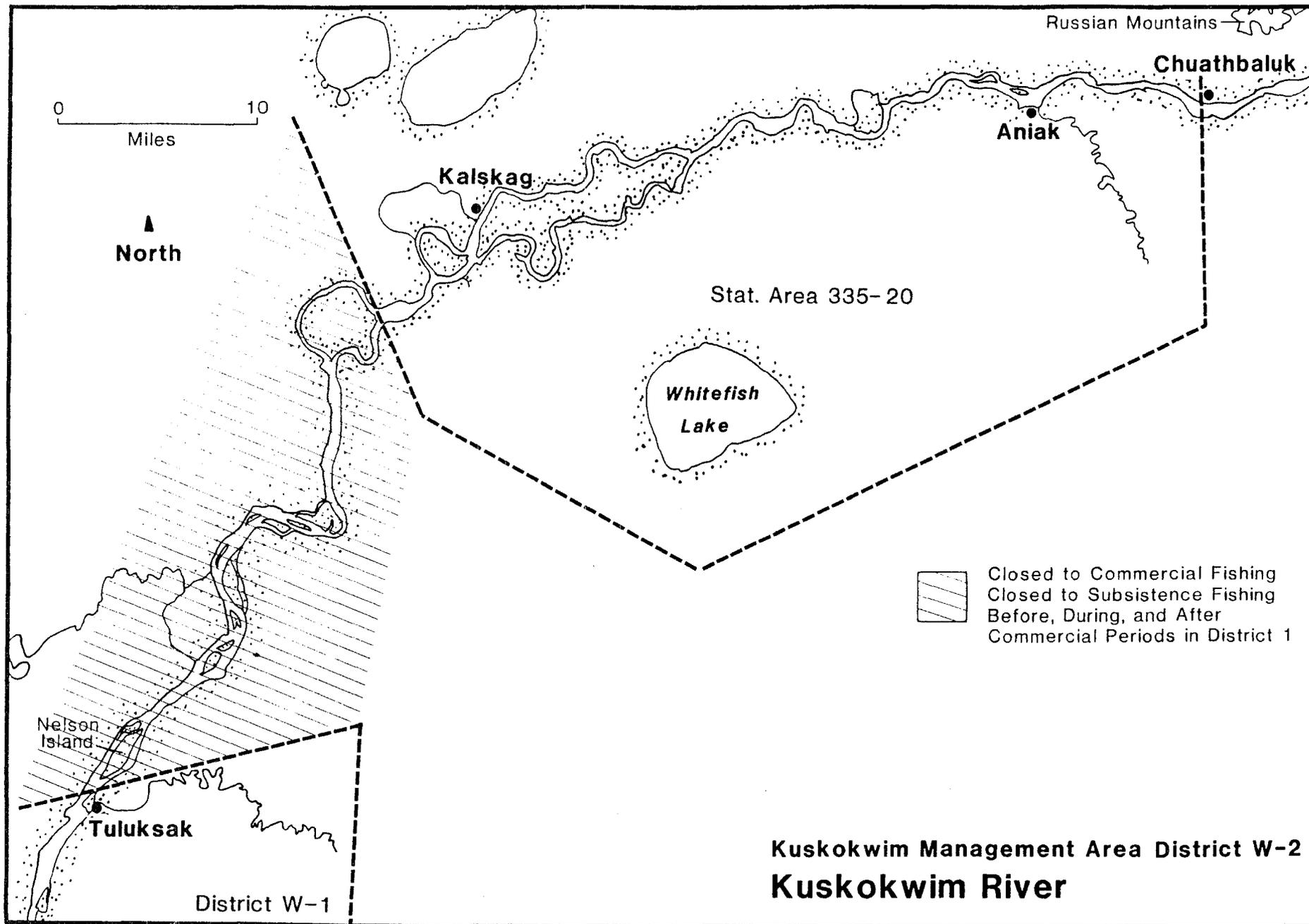
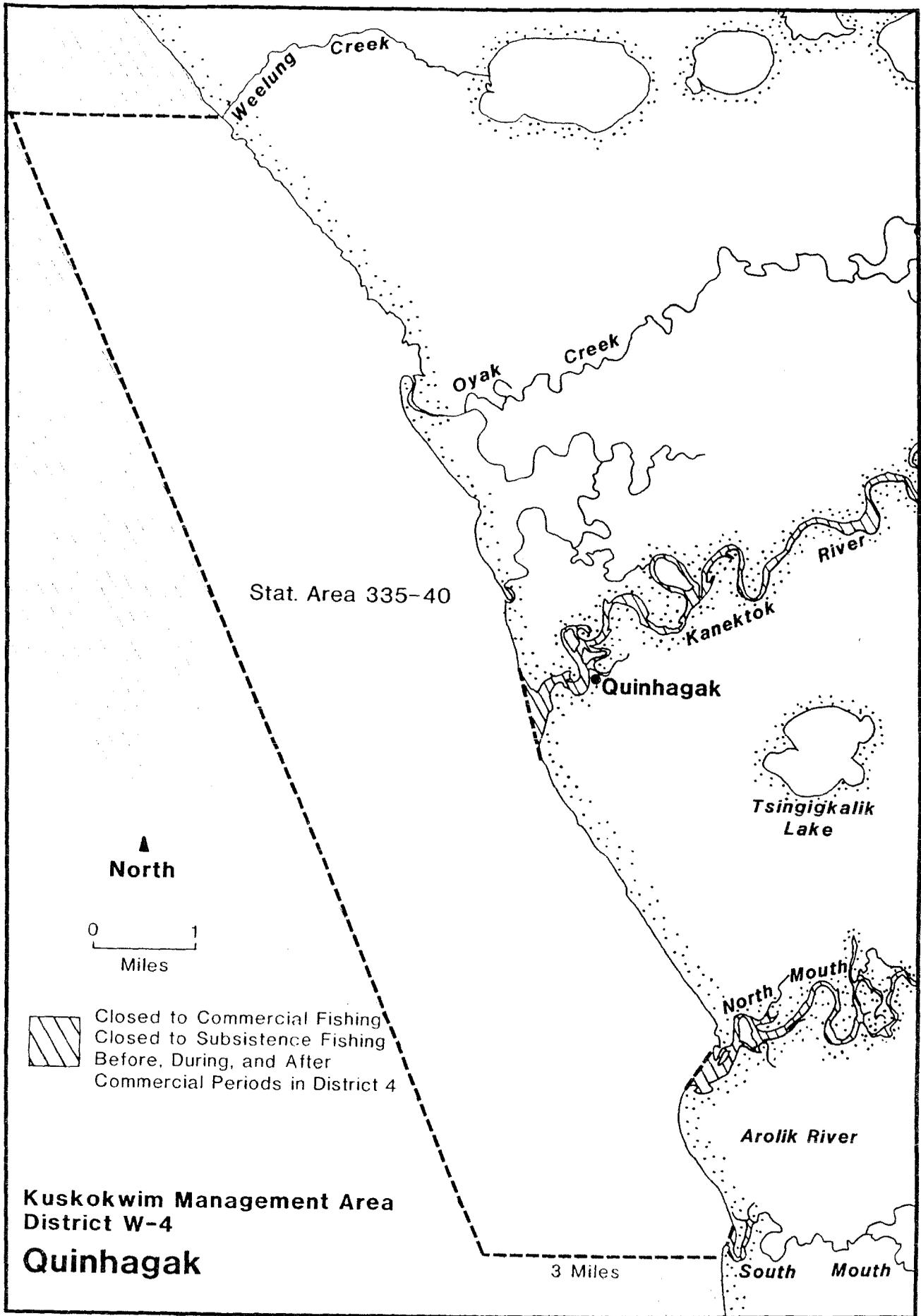


Figure 3 . Kuskokwim Management Area, District W-2



**Figure 4 . Kuskokwim Management Area, District W-4**

Kuskokwim Management Area District W-5

Goodnews Bay

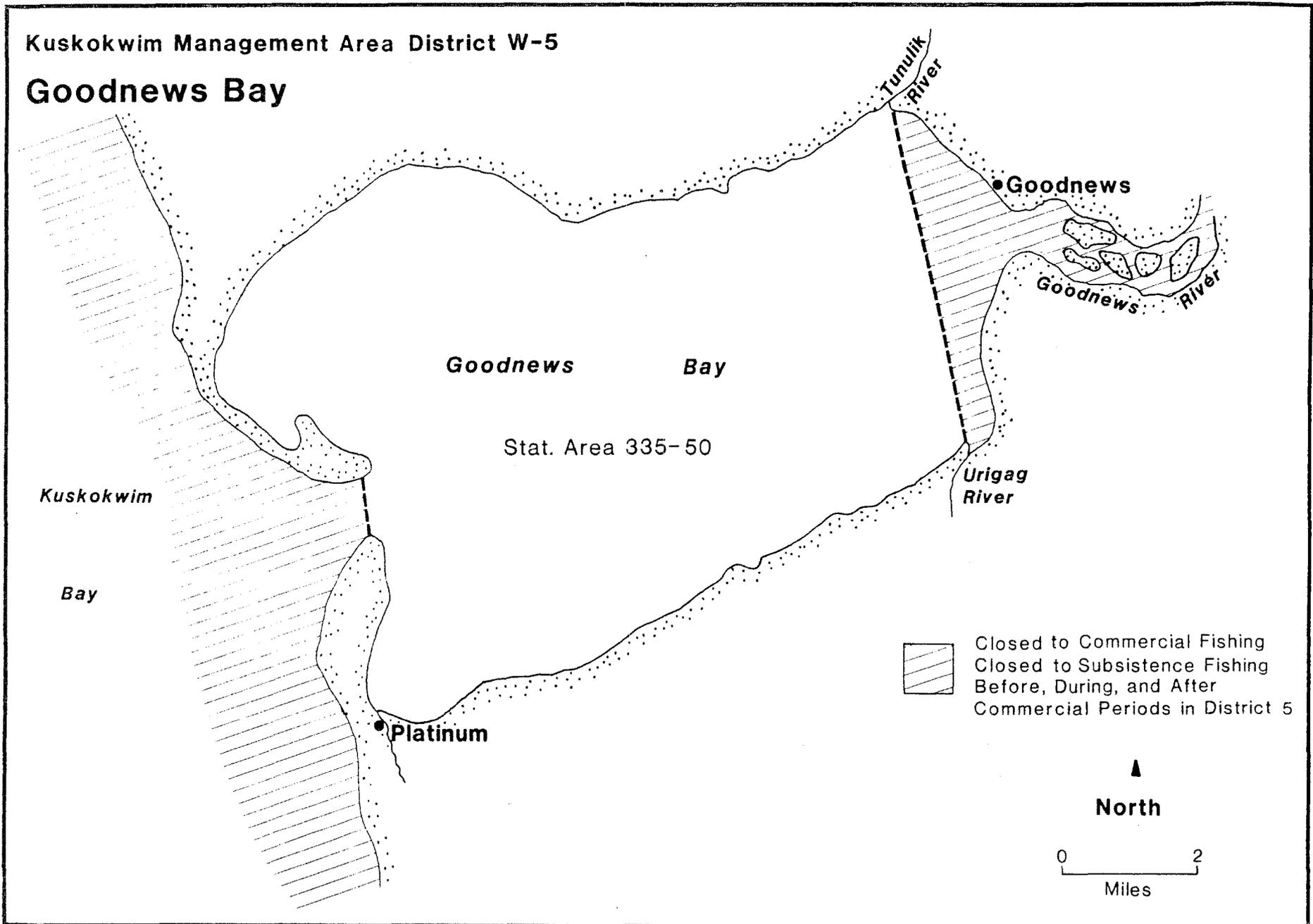


Figure 5. Kuskokwim Management Area, District W-5

# Kuskokwim River Aerial Index

## Chinook Salmon, 1975-1991

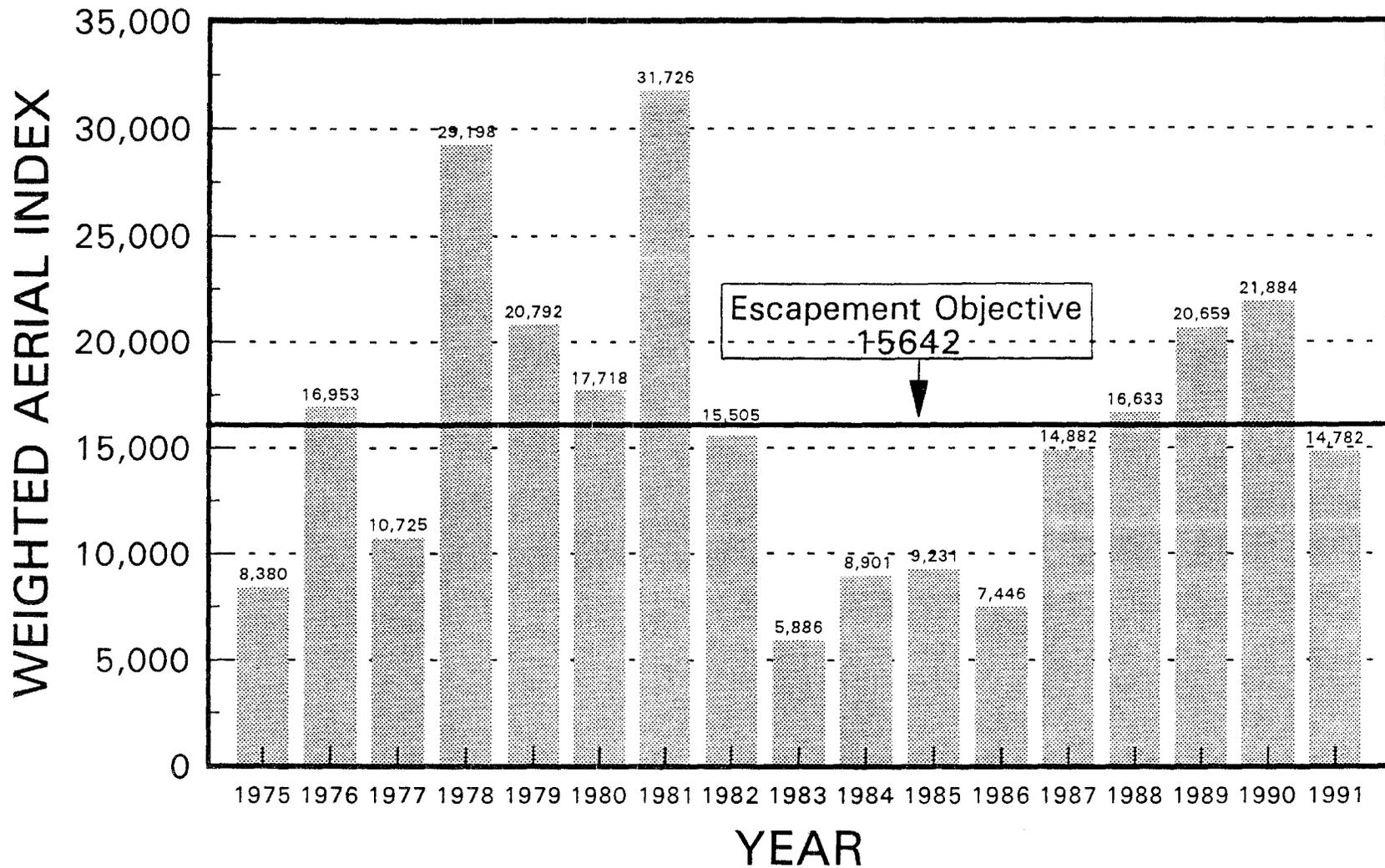


Figure 6. Kuskokwim drainage aerial chinook salmon escapement index, 1991.

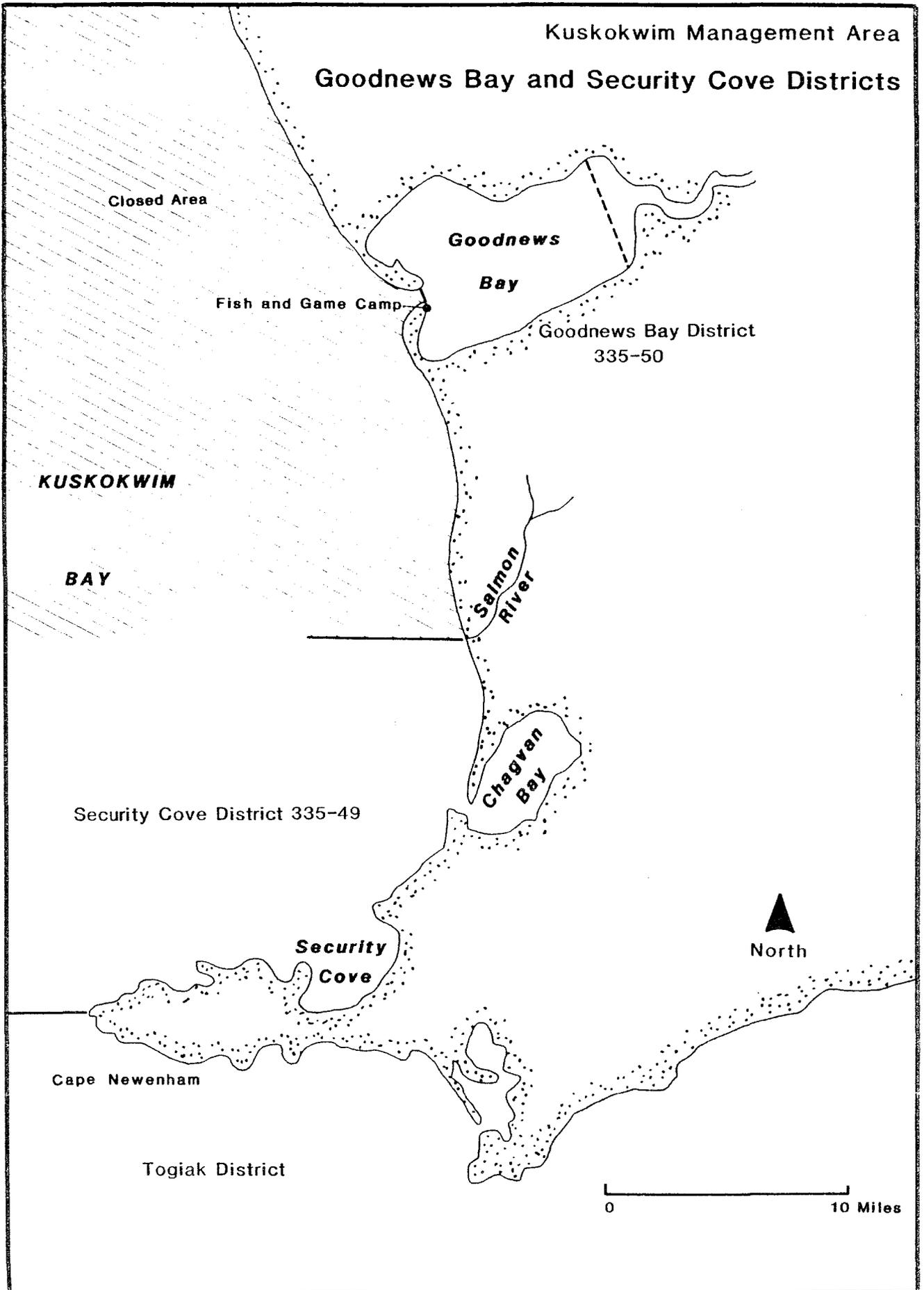


Figure 7. Goodnews Bay and Security Cove Herring Districts

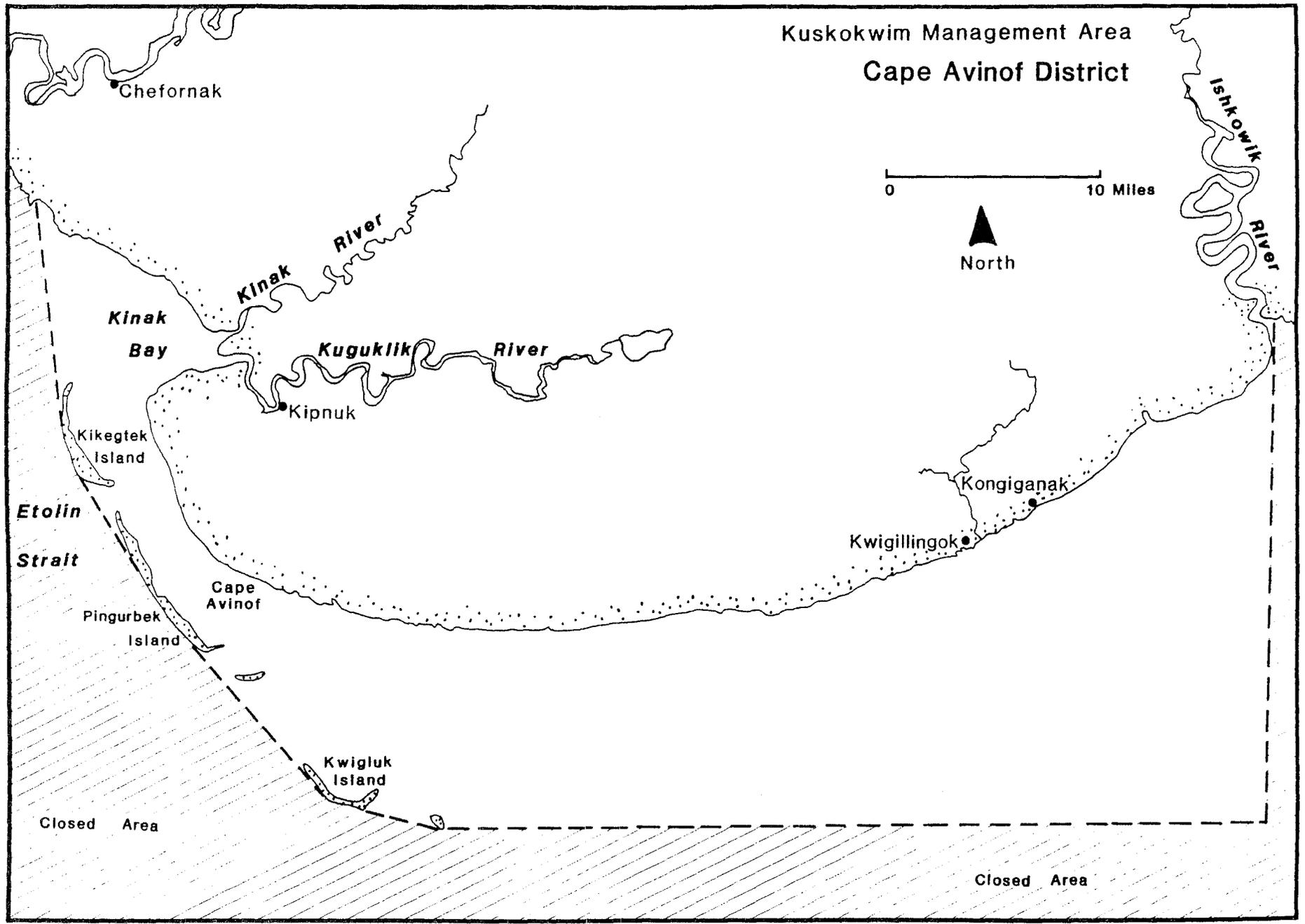


Figure 8 . Cape Avinof Herring District

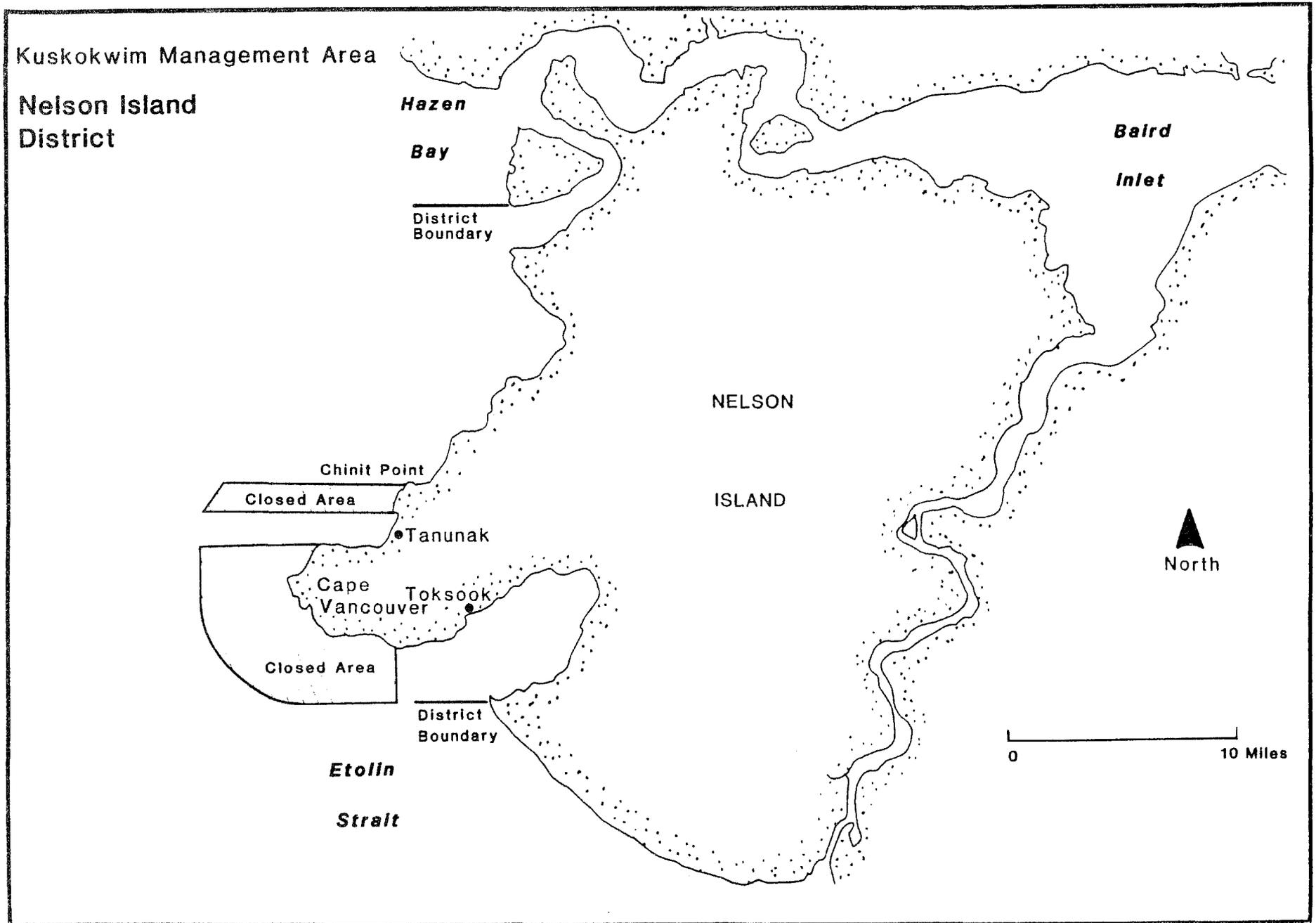


Figure 9 . Nelson Island Herring District

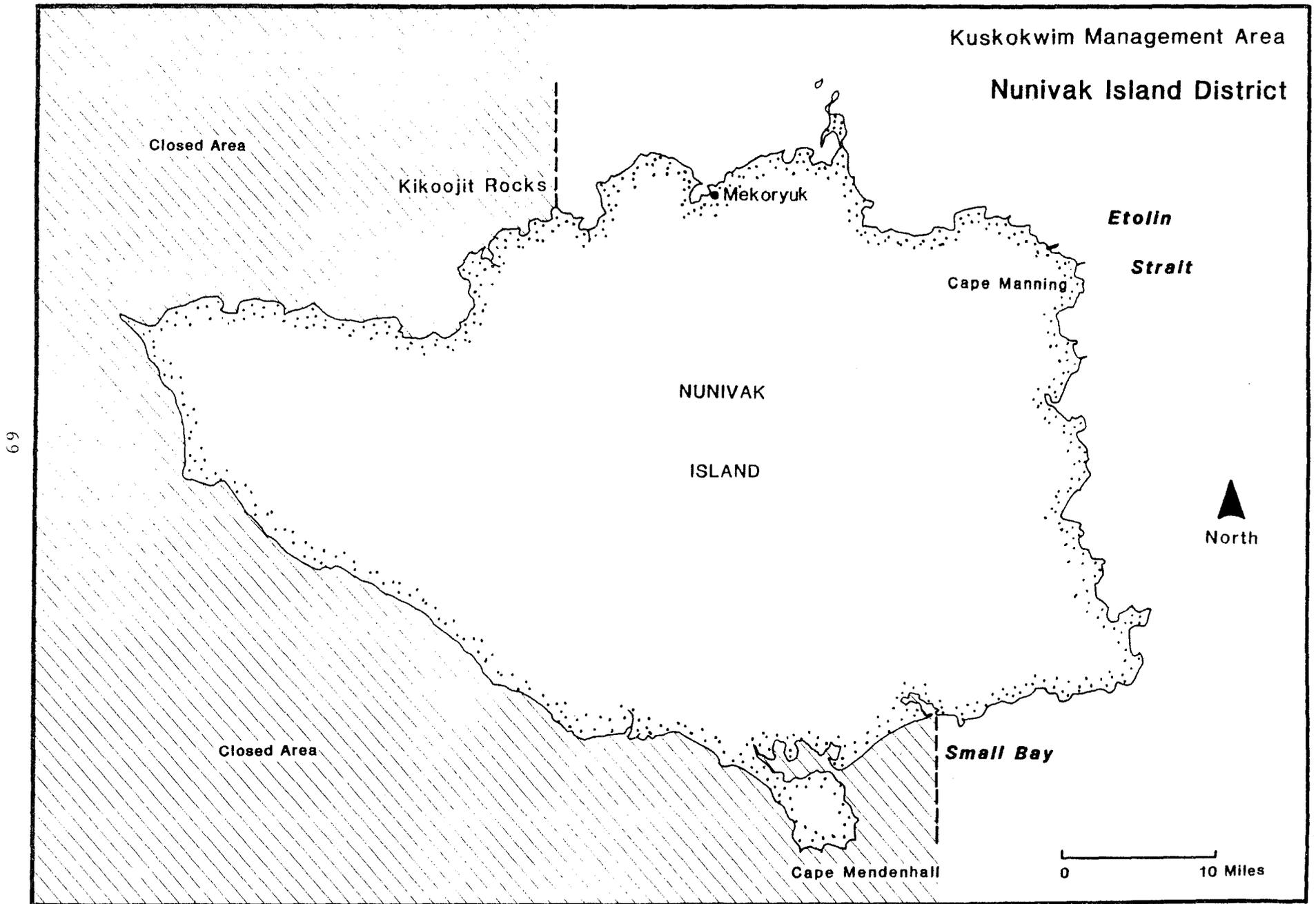


Figure 1Q Nunivak Island Herring District

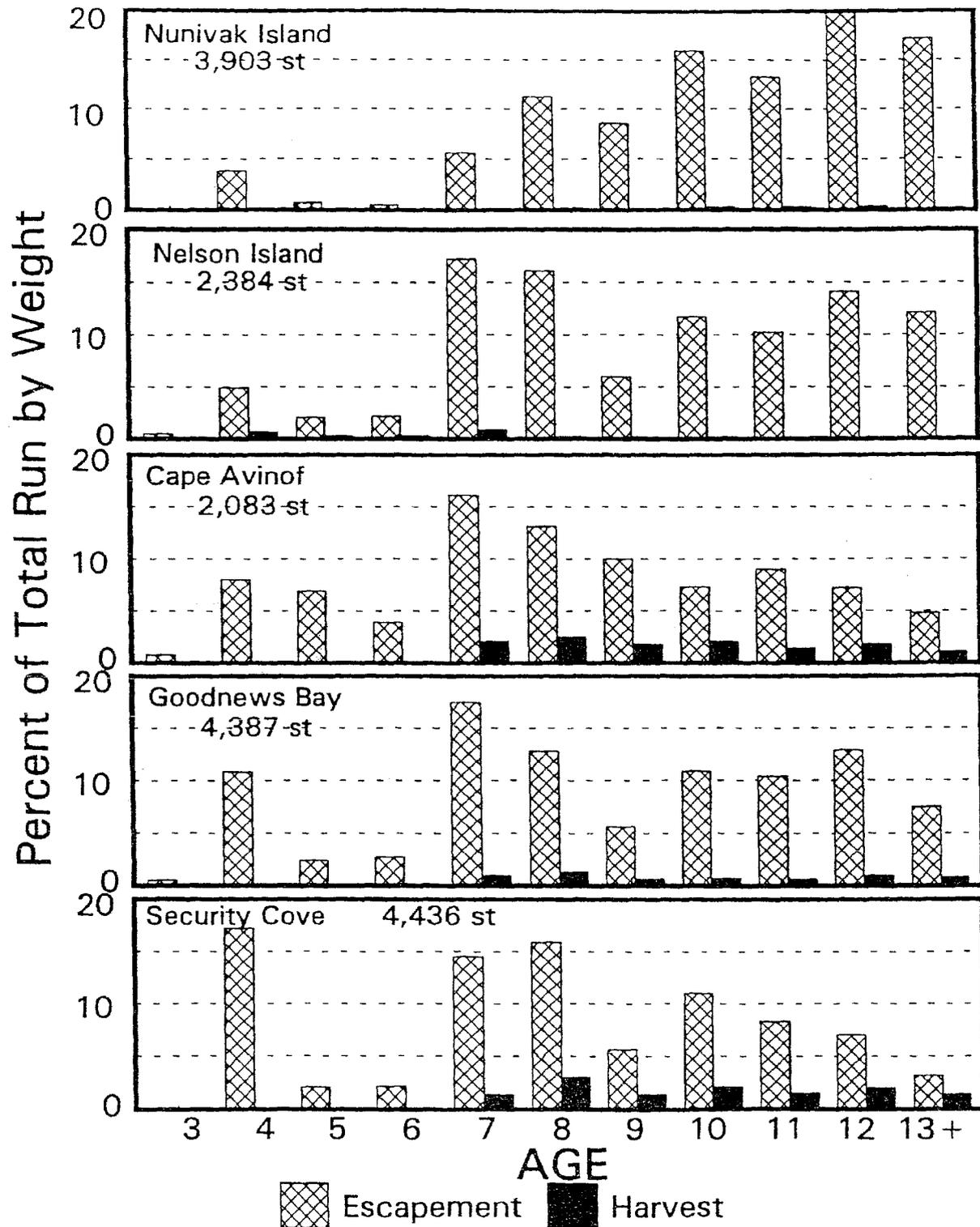


Figure 11. Age composition of Pacific herring in spawning populations and commercial harvest, Kuskokwim Area, 1991.

**APPENDICES**

**APPENDIX A**

Appendix A.1 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon.

	Escapement Objectives <sup>a</sup>			
	Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>				
1. Kwethluk River				
a. 3-step Mt. to Canyon Cr.	1.0	-	-	7.0
b. Canyon Creek	0.2	-	-	-
2. Kisaralik River				
a. Airstrip to Kisaralik L.	1.0	-	-	8.0
b. Kasigluk R. (upper to lower)	0.1	-	-	4.0
3. Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4. Aniak River				
a. Buckstock R. to Aniak L.	1.5	-	-	10.0
b. Salmon River	0.6	-	-	3.0
c. Aniak Sonar Project <sup>b</sup>	-	-	-	250.0
5. Holitna River				
a. Nogamut to Kasheggok <sup>c</sup>	2.0	1.0	-	49.0
b. Kogruklu Weir <sup>c</sup>	10.0	2.0	25.0	30.0
6. Salmon River (Pitka Fork)	1.3	-	-	-
<u>KUSKOKWIM BAY:</u>				
1. Kanektok River to Kagati Lake	5.8	15.0	25.0	30.5
2. Goodnews River System				
a. Main Fork and lakes	1.6	15.0	15.0	17.0
b. Middle Fork and lakes	0.8	5.0	2.0	4.0
c. Middle Fork Tower Project <sup>d</sup>	3.5	25.0	-	15.0

a Escapement objectives in thousands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

b Sonar total escapement estimates.

c Total Kogruklu River escapement estimates.

d Tower total escapement estimates.

Appendix A.2      Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1991.

<u>Year</u>	<u>Gross Value of Catch to Fishermen</u>	<u>Permits Fished<sup>a</sup></u>	<u>Average Income</u>
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
1989	5,194,025	824	6,303
1990	4,895,070	824	5,941
1991	3,961,423	820	4,831
TEN YEAR AVERAGE (1981-1990)	\$5,345,047	800 <sup>b</sup>	7,624 <sup>b</sup>

<sup>a</sup> Permit holders who made at least one delivery. Information not available prior to 1983.

<sup>b</sup> Previous seven year (1984-1990) average due to unavailable data.

## Appendix A.3

## Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1991.

Year	COMMERCIAL CATCH					Total	COMBINED			TOTAL HARVEST
	Chinook	Sockeye	Coho	Pink	Chum		Chinook	Other*	Total	
1913	7,800					7,800				7,800
1914		2,667				2,667				2,567
1915										
1916	949					949				949
1917	7,878					7,878				7,878
1918	3,055					3,055				3,055
1919	4,836					4,836				4,836
1920	34,853					34,853				34,853
1921	9,854					9,854				9,854
1922	8,944	6,120				15,064		180,000		195,064
1923	7,254					7,254				7,254
1924	19,253	900	7,167	7,167		34,487	17,700	203,148	220,848	255,335
1925	1,644	5,800				7,444	10,800	230,850	241,650	249,094
1926									738,576	738,576
1927									286,254	286,254
1928									481,090	481,090
1929									560,196	560,196
1930	7,626	2,448				10,074			538,650	548,724
1931	8,541					8,541			389,367	397,908
1932	9,339					9,339			746,415	755,754
1933							6,290	443,998	450,288	450,288
1934							20,800	597,132	617,932	617,932
1935	6,448		8,296			14,744	22,930	554,040	576,970	591,714
1936	624					624	33,500	549,423	582,923	583,547
1937	480					480			537,111	537,591
1938	624		828			1,452	10,153	400,242	410,395	411,847
1939	134					134	14,000	125,425	139,425	139,559
1940	247		500			747	8,000	415,523	423,523	424,270
1941	187		674			861	8,000	415,523	423,523	424,384
1942							6,400	325,339	331,739	331,739
1943							6,400	325,339	331,739	331,739
...										
1946	2,288		674			2,962				2,962
1947	5,356					5,356				5,356
...										
1951	4,210					4,210				4,210
...										
1954	57					57				57
...										
...										
1959	3,760					3,760				3,760
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	320,505	337,624
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	206,986	256,585

- Continued -

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH				COMBINED TOTAL HARVEST		
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho <sup>c</sup>	Small <sup>d</sup>	Total			
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129	362,954		
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,060	239,291		
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	284,498	349,788		
1965	24,965	1,886	12,191		4,242	43,284	24,697		250,878	275,575	318,859		
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757	277,473		
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387	372,499		
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388	612,246		
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313	481,553		
1970	65,032	12,654	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897	555,816		
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216	326,648		
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786	344,609		
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531	635,378		
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615	832,046		
1975	27,799	17,535	109,814	899	223,532	379,579	47,569		176,389	223,958	603,537		
1976	49,262	13,636	112,130	39,998	231,877	446,903	57,899	4,312	223,792	286,003	732,906		
1977	58,256	18,621	263,728	434	298,959	639,998	57,925	12,193	203,397	273,515	913,513		
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,209	12,437	125,052	175,698	843,909		
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482	919,683		
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461	1,288,613		
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103	1,205,106		
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298	1,390,011		
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026	943,487		
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,944	15,016	144,651	220,335	1,717,997		
							<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>	
1985	74,083	121,221	382,096	111	224,680	802,191	45,720	33,631	24,667	1,062	96,791	201,871	1,004,062
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256		29,742		142,930 <sup>e</sup>	226,928	1,516,676
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	31,555	18,085	291	70,709	192,444	1,510,882
1988 <sup>d</sup>	74,552	149,927	623,719	37,592	1,443,916	2,239,786	56,695	25,571	32,426		118,181	232,873	2,565,615
1989 <sup>d</sup>	67,003	82,628	556,312	819	802,199	1,508,961	77,030	33,958	50,046		132,858	293,834	1,802,853
1990	84,706	203,374	445,062	16,082	522,535	1,272,759	77,328	32,218	44,519		108,557	262,622	1,535,381
1991	48,170	202,441	556,818	522	501,692	1,309,643	85,143	51,821	53,478		93,037	283,479	1,593,122
Ten Year Average (1981-1990)	73,775	124,582	514,771	387 <sup>a</sup>	555,201	1,270,872	61,847		29,082		148,138 <sup>e</sup>	239,033	1,519,207

<sup>a</sup> Primarily chum and coho salmon.<sup>b</sup> Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted prior to 1988.<sup>c</sup> Includes sockeye, pink and chum salmon.<sup>d</sup> The personal use catch is included with the subsistence catch.<sup>e</sup> Odd years only.

Appendix A.4 Historic salmon escapement data from current Kuskokwim Area projects, 1976-1991.

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
<u>KOGRUKLUK WEIR<sup>a</sup> Objectives</u>		10,000	2,000	25,000	NA	30,000
1976	06/29 to 07/31	5,818	2,366	b	-	8,417
1977	07/14 to 07/27	1,945	1,637	b	2	19,444
1978	06/28 to 07/31	13,601	1,699	b	2	47,010
1979	07/01 to 07/24	11,420	476	b	1	4,836
1980	07/01 to 07/11	6,572	3,200	b	1	41,777
1981	06/27 to 10/25	16,820	18,077	11,532	6	57,373
1982	07/09 to 09/14	12,185	22,156	38,961	19	79,580
1983	06/22 to 07/02	2,992	1,176	8,327	-	9,407
1984	06/19 to 09/15	4,928	4,130	29,824	-	41,484
1985	06/29 to 09/07	4,438	4,366	16,536	-	17,181
1986	07/06 to 10/05	4,296	4,179	26,230	-	15,511
1987	08/09 to 09/23	b	b	24,238	-	b
1988	07/05 to 09/17	11,194	6,158	12,799	-	41,881
1989	07/07 to 09/14	11,940	5,810	b	-	39,548
1990	06/28 to 09/07	10,219	8,406	b	1	26,765
1991	07/04 to 09/15	7,280	16,458	9,963	4	24,193
<u>ANIAK SONAR<sup>c</sup> Objective</u>						250,000
1980	06/22 to 07/30	56,469	-	-	-	1,091,286
	08/16 to 09/12	-	-	81,556	-	-
1981	06/16 to 08/06	42,060	-	-	-	526,320
1982	06/21 to 08/01	33,864	-	-	-	389,226
1983	06/18 to 07/28	4,911	-	-	-	114,869
1984	06/16 to 07/30	-	-	-	-	275,261
1985	06/22 to 07/28	-	-	-	-	253,048
1986	06/26 to 07/24	-	-	-	-	209,080
1987	06/22 to 07/31	-	-	-	-	193,464
1988	06/22 to 07/31	-	-	-	-	401,511
1989	06/21 to 07/24	-	-	-	-	243,936
1990	06/23 to 08/06	-	-	-	-	300,408
1991	06/29 to 07/29	-	-	-	-	282,475
<u>MIDDLE FORK GOODNEWS RIVER TOWER<sup>d</sup></u>						
Objectives		3,500	25,000	NA	NA	15,000
1981	06/13 to 08/15	3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	0	34	15,548
1984	06/15 to 07/31	3,260	32,053	249	13,744	19,003
1985	06/27 TO 07/31	2,831	24,131	282	144	10,367
1986	06/16 TO 07/24	2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30	2,274	28,871	62	62	17,519
1988	06/23 to 07/30	2,712	15,799	6	6,781	20,799
1989	06/29 to 07/31	1,915	21,196	145	246	10,380
1990	06/19 to 07/24	3,636	31,679	0	3,378	6,410
1991 <sup>e</sup>	06/29 to 08/25	2,147	47,397	1,978	1,694	27,525

- a Pink salmon can pass freely through the Kogrukluk Weir.
- b No counts or incomplete count as project was not operated during the species' migration.
- c Aniak sonar counts are adjusted to provide the total estimated escapements.
- d The Goodnews River salmon counting tower's scheduled termination date precludes adequate assessment of the coho and pink salmon escapement.
- e The Goodnews River Tower was converted to a weir in 1991.

## Appendix A.5

## Kuskokwim Area subsistence chinook salmon harvest by village, 1960 - 1991.

VILLAGE <sup>a</sup>	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
KIPNUK		248	11	123	75	g							0	0	
KWIGILLINGOK	250	35	43	106	339	g	250	957	70		220	200	10	75	
KONGIGANAK	h	h	h	h						385	891	41	0		
TUNTUTULIAK	226	2,226	842	2,853	1,826	1,575	3,097	3,462	2,214	2,195	3,558	1,841	3,214	2,859	1,577
EEK						f	2,921	4,572	2,566	2,038	2,065	1,882	1,969	1,981	2,356
KASIGLUK & EEK					1,857	3,123									
KASIGLUK	135	1,215	127	1,302	f	f	1,032	2,766	1,485	2,888	3,931	1,645	1,292	1,864	1,411
NUMAPITCHUK	683	2,042	848	1,874	636	490	2,213	1,926	1,750	2,279	4,680	1,978	2,496	2,663	1,165
ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h	1,205	548	864	1,106	382
NAPAKIAK	1,830	2,573	2,191	3,148	2,677	2,872	3,658	3,895	2,468	3,546	4,960	1,868	2,009	1,763	1,224
HAPASKIAK	536	1,258	759	1,569	2,201	1,071	2,710	2,998	1,663	2,227	3,446	1,916	1,578	2,048	900
OSCARVILLE	1,968	282	75	309	339	688	322	1,127	393	457	542	570	196	586	180
BETHEL	1,923	4,150	1,378	7,019	4,114	3,371	8,046	13,925	6,205	7,472	17,026	8,731	8,371	8,898	4,631
KWETHLUK	2,692	3,763	2,329	5,050	3,262	2,887	6,551	6,993	2,848	3,187	7,932	5,564	5,137	3,444	2,694
AKIACHAK	1,626	3,052	1,800	2,533	3,488	3,685	4,904	5,543	3,755	2,602	7,022	4,818	3,872	2,592	1,726
AKIAK	1,865	3,159	906	2,869	2,495	1,345	3,670	3,660	1,822	1,275	3,290	2,688	1,899	1,895	1,292
TULUKSAK	737	1,486	493	1,295	572	1,021	1,576	1,709	1,048	1,131	1,995	1,280	1,318	1,322	883
LOWER KALSKAG	961	571	f	f	710	f	f	f	1,502	2,102	2,146	2,355	2,604	1,309	1,586
UPPER KALSKAG	667	1,049	f	f	1,143	f	f	f	1,619	1,623	734	601	401	938	463
KALSKAGS COMB.			805	2,661		1,395	3,379	3,567							
ANIAK	1,057	688	185	602	1,104	f	2,072	1,280	517	1,406	2,136	1,076	2,105	1,030	1,952
ANIAK <sup>b</sup>						642									
CHUATHBALUK <sup>c</sup>	64	54	10	30	74	f	139	217	34	180	219	179	261	942	674
NAPAIMUTE	20	16	44	52	134	g	78	60	94	19	22	17	20	13	6
CROOKED CREEK	747	518	561	859	1,358	374	1,446	585	77	541	684	291	183	269	650
GEORGETOWN							12		0	9	2	0	0	0	
RED DEVIL	f	40	f	f	f	f			111	142	232	135	182	138	205
SLEETMUTE	f	222	f	f	f	f	303	343	207	267	161	181	69	504	269
SLEETMUTE <sup>d</sup>	465	262	144	228	314	79			318	409	393	316	251	642	474
KASHEGELOK <sup>e</sup>							10								
STONY RIVER	435	25	31		299	79	636	303	176	2,187	105	402	95	287	439
LIME VILLAGE									0	50	15	2,119	0	0	
MCGRATH							300	25							
TAKOTNA															
MEDFRA															
NIKOLAI															
TELIDA															
QUINHAGAK								1,349	2,756						
GOODNEWS BAY															
PLATINUM															
TOTAL	18,752	27,457	13,455	33,180	29,017	24,697	49,022	60,919	35,380	40,208	69,219	42,926	40,145	38,526	26,665

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VILLAGE*	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
KIPNUK								60							134 <sup>k</sup>
KWIGILLINGOK		75	382	75										468	1,307
KONGIGANAK		122	361					52			235				
TUNTUTULIAK	3,492	4,807	2,470	1,656	2,268	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	2,580	3,552
EEK	2,110	3,232	2,675	1,807	2,003	1,557	1,731	2,578	2,040		1,436			1,987	1,685
KASIGLUK	1,713	1,613	1,324	608	1,142	1,704	3,377	3,115			2,054			1,077	2,602
NUNAPITCHUK	2,092	2,578	2,622	2,178	2,109	2,612	2,918	2,577	2,688		2,019	3,410	3,372	1,664	3,087
ATMAUTLUAK	1,042	1,159	1,015	966	2,242	1,288	1,247	1,752			1,559			891	1,227
NAPAKIAK	2,864	3,330	2,702	2,140	2,191	2,582	3,017	3,500	2,047		1,805		2,760	1,960	3,785
NAPASKIAK	2,303	3,566	1,989	2,122	2,085	3,160	2,911	2,872			2,155		2,907	2,977	4,181
OSCARVILLE	891	623	672	349	629	477	495	523			916		745	415	1,200
BETHEL	11,688	13,215	9,408	6,905	11,564	12,591	15,367	13,516	8,492	11,066	6,940	11,984	8,107	11,671	19,214
KWETHLUK	3,179	4,193	5,563	3,172	6,919	7,627	6,167	5,897		6,732	4,937	5,824	8,779	7,543	7,388
AKIACHAK	3,534	4,915	5,407	2,951	4,818	5,405	3,094	4,468		5,588	3,254		4,871	5,613	5,438
AKIAK	2,837	3,076	2,880	1,850	3,567	3,355	2,386	2,745		3,413	2,975		3,683	3,235	4,562
TULUKSAK	1,338	1,411	2,906	1,906	1,489	2,807	2,446	2,220	1,671	2,286	2,749		3,712	2,720	3,781
LOWER KALSKAG	2,755	4,536	1,750	1,951	2,821	3,917	3,271	2,594		3,242	1,707	1,666		2,204	2,843
UPPER KALSKAG	1,752	1,413	2,813	1,253	1,590	1,889	1,171	963		657	605	587		693	1,256
ANIAK	1,391	1,490	4,991	1,331	2,634	2,750	3,102	2,071	3,174	1,847	1,828	4,624	2,131	2,258	2,860
CHUATHBALUK <sup>c</sup>	594	657	1,507	1,238	2,189	1,507	841	1,491			1,102			102	446
NAPAIMUTE	16	420	176	144	149	90	45	138			53			96	
CROOKED CREEK	238	264	619	488	728	654	512	515			218			481	427
GEORGETOWN			66	0		93									
RED DEVIL	623	195	324	153	488	255	298	273			176			175	156
SLEETMUTE	256	356	684	300	755	220	728	242		154	745			308	420
SLEETMUTE <sup>d</sup>	879	551	1,008	453	988	475					921				
KASHEGELOK <sup>e</sup>			h	156	233	92									
STONY RIVER	761	620	33	182	171	332	233	419			167			210	692
LIME VILLAGE	100	33	0		38									426	105
MCGRATH					581			160	830	730	59			253	519
TAKOTNA					65									150	62
MEDFRA							i	i	i	i	i	i			
NIKOLAI					60		500	778	750	795	615			150	706
TELIDA															1
QUINHAGAK			2,012	2,328	1,420	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,663	2,508	048
GOODNEWS BAY			574		228	498	1,309	1,185	1,004	597	399	513	640	289	414
PLATINUM					110	192	100	51	62	32	27	42	176	21	44
MEKORYUK															0
NEWTOK															10
NIGHTMUTE															0 <sup>k</sup>
TOKSOOK BAY															450
TUNUAK															488
TOTAL		47,569	57,899	57,925	38,209	57,031	62,139	63,248	60,426	51,020	60,668	45,720	54,256	71,804	77,030

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VILLAGE*	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
KIPNUK	108	44													
KWIGILLINGOK															
KONGIGANAK	915	533													
TUNTUTULIAK	2,537	3,997													
EEK	4,609	2,881													
KASIGLUK	2,869	2,566													
NUNAPITCHUK	2,244	3,472													
ATMAUTLUAK	2,067	1,369													
NAPAKIAK	3,413	2,476													
NAPASKIAK	3,413	2,961													
OSCARVILLE	721	1,088													
BETHEL	18,248	30,233													
KWETHLUK	7,335	7,072													
AKIACHAK	5,204	4,547													
AKIAK	4,177	2,576													
TULUKSAK	1,706	2,780													
LOWER KALSKAG	2,515	3,835													
UPPER KALSKAG	1,446	841													
ANIAK	3,075	3,303													
CHUATHBALUK <sup>o</sup>	1,290	672													
CROOKED CREEK	591	1,027													
RED DEVIL	250	92													
SLEETMUTE	597	775													
STONY RIVER	385	537													
LIME VILLAGE	205	50													
MCGRATH	688	821													
TAKOTNA	126														
MEDFRA															
NIKOLAI	547	316													
TELIDA															1
QUINHAGAK	5,050	3,536													
GOODNEWS BAY	682	664													
PLATINUM	177	18													
MEKORYUK	0	0													
NEWTOK	1	0													
NIGHTMUTE	3	10													
TOKSOOK BAY	135	40													
TUNUAK	0	10													
ANCHORAGE		0													
TOTAL	77,329	85,142													

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- a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 40.
  - b Aniak, Chuathbaluk and Russian Mission.
  - c Var. Russian Mission, Little Russian Mission.
  - d Sleetmute to Red Devil.
  - e Kashegelok and Holitna.
  - f Data collected, but reported with another village.
  - g Data collected, combined with unspecified village or villages.
  - h Village not yet founded.
  - i Village abandoned.
  - j Kuskokwim Area total estimate based on a village subsurvey.
  - k Reported catch only.

## Appendix A.6

## Kuskokwim Area subsistence chum salmon harvest by village, 1985-1991.

VILLAGE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
KIPNUK					37	540	15								
KWIGILLINGOK															
KONGIGANAK	671			1,178	1,830	618	679								
TUNTUTULIAK	4,346	2,734	5,385	4,424	4,559	4,072	4,620								
EEK	401			1,188	966	2,665	843								
KASIGLUK	4,199			2,788	2,872	2,623	2,972								
NUNAPITCHUK	4,346	4,676	4,621	5,312	6,674	4,053	5,262								
ATMAUTLUAK	4,440			3,701	3,014	3,168	1,801								
NAPAKIAK	3,686		2,784	2,876	6,934	6,538	2,272								
NAPASKIAK	5,810		6,832	8,876	12,203	5,488	5,042								
OSCARVILLE	1,294		1,135	2,461	1,132	676	567								
BETHEL	9,260	14,778	7,974	13,536	19,214	16,852	3,444								
KWETHLUK	6,866	9,736	7,636	14,667	10,237	8,016	4,921								
AKIACHAK	5,931		4,355	10,417	7,307	6,222	4,764								
AKIAK	6,724		3,837	5,847	7,216	6,227	4,097								
TULUKSAK	6,064		3,466	5,826	7,961	4,967	4,697								
LOWER KALSKAG	4,637	2,538		9,016	4,069	3,637	2,128								
UPPER KALSKAG	1,855	3,684		3,090	3,427	1,320	2,129								
ANIAK	8,804	5,905	5,751	7,463	9,332	6,175	3,533								
CHUATHBALUK <sup>c</sup>	3,782			1,350	2,280	2,102	1,625								
NAPAIMUTE	414			88											
CROOKED CREEK	2,888			597	772	1,760	1,130								
RED DEVIL	1,021			2,112	1,153	1,344	674								
SLEETMUTE	3,689			3,472	1,813	1,574	1,915								
STONY RIVER	722			2,270	1,352	597	552								
LIME VILLAGE				1,141	2,100	2,250	596								
MCGRATH	792			367	2,258	1,833	999								
TAKOTNA				300	250	128									
MEDFRA															
NIKOLAI				2,644	1,178	829	371								
TELIDA					15										
QUINHAGAK	901	808	1,084	724	1,262	2,620	1,346								
GOODNEWS BAY	339	188	371	405	609	342	102								
PLATINUM	9	3	207	43	140	125	4								
Mekoryuk				501 <sup>b</sup>	8,402	8,892	9,620								
Tununak				893 <sup>b</sup>	86	65	0								
Toksook Bay				2,484 <sup>b</sup>	203	200	253								
Newtok				72 <sup>b</sup>	40	4									
Nightmute				728 <sup>b</sup>	30	35	60								
ANCHORAGE													3		
TOTAL	96,791	142,930 <sup>a</sup>	70,709 <sup>a</sup>	122,858	132,858	108,556	93,037								

<sup>a</sup> Estimated total based on sampled villages.

<sup>b</sup> Chum and sockeye salmon harvest combined.

## Appendix A.7

## Kuskokwim Area subsistence sockeye salmon harvest by village, 1985 - 1991.

VILLAGE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
KIPNUK					402	175	38								
KWIGILLINGOK															
KONGIGANAK	130			664	603	264	325								
TUNTUTULIAK	1,498	288	991	565	1,018	955	1,646								
EEK	241			302	168	1,212	552								
KASIGLUK	1,138			296	231	732	1,249								
NUNAPITCHUK	1,447	905	1,187	640	987	702	1,951								
ATMAUTLUAK	1,308			252	1,129	1,121	652								
NAPAKIAK	1,242		1,439	689	1,722	1,070	1,150								
NAPASKIAK	1,181		2,199	855	620	894	2,080								
OSCARVILLE	942		745	1,752	329	122	506								
BETHEL	3,409	7,730	3,810	4,357	5,712	5,892	18,205								
KWETHLUK	5,584	5,423	3,845	3,592	2,443	3,234	3,559								
AKIACHAK	3,182		3,532	2,870	2,584	2,115	3,344								
AKIAK	1,368		1,883	1,203	1,301	1,393	1,316								
TULUKSAK	1,620		1,733	1,235	2,234	991	2,976								
LOWER KALSKAG	948	765		1,732	765	662	925								
UPPER KALSKAG	187	727		321	338	292	237								
ANIAK	2,116	2,652	2,131	604	761	1,194	2,086								
CHUATHBALUK <sup>c</sup>	1,102			44	229	885	1,059								
NAPAIMUTE	125			48											
CROOKED CREEK	1,218			254	413	940	1,007								
RED DEVIL	205			291	332	408	232								
SLEETMUTE	1,351			569	776	890	1,366								
STONY RIVER	585			130	1,084	685	1,753								
LIME VILLAGE					5,653	2,100	797								
MCGRATH	0			146	0	0									
TAKOTNA				0	0	0									
MEDFRA															
NIKOLAI	0			0	0	0									
TELIDA					0	0									
QUINHAGAK	106	423	1,067	857	450	1,544	1,538								
GOODNEWS BAY	562	521	834	898	704	905	780								
PLATINUM	27	55	121	21	151	140	120								
Mekoryuk				501 <sup>b</sup>	0	417	8								
Tununak				893 <sup>b</sup>	135	7	100								
Toksook Bay				2,484 <sup>b</sup>	1,066	265	155								
Newtok				72 <sup>b</sup>	20	3	0								
Nightmute				728 <sup>b</sup>	70	10	110								
TOTAL	33,631	19,489 <sup>a</sup>	25,180 <sup>a</sup>	29,875	33,958	32,217	51,821								

<sup>a</sup> Sampled villages only.

<sup>b</sup> Chum and sockeye salmon harvest combined.

## Appendix A.8

## Kuskokwim Area subsistence coho salmon harvest by village, 1985 - 1990.

VILLAGE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
KIPNUK					243	460	30								
KWIGILLINGOK															
KONGIGANAK	88			917	525	265	370								
TUNTUTULIAK	371	1,692	760	710	484	759	723								
EEK	406			261	299	1,703	457								
KASIGLUK	1,763			713	687	908	1,687								
NUNAPITCHUK	513	576	696	651	487	287	904								
ATMAUTLUAK	326			266	971	322	294								
NAPAKIAK	836		959	373	1,763	1,506	559								
NAPASKIAK	415		629	1,148	809	674	595								
OSCARVILLE	155		40	50	684	34	95								
BETHEL	6,094	19,351	8,077	6,434	18,594	18,126	29,229								
KWETHLUK	3,041	3,545	2,537	3,649	3,307	3,406	2,185								
AKIACHAK	967		286	4,653	1,879	915	1,887								
AKIAK	1,270		1,294	1,377	2,523	1,715	1,660								
TULUKSAK	1,723		337	1,271	1,261	846	1,567								
LOWER KALSKAG	596	1,821		173	731	676	410								
UPPER KALSKAG	105	759		126	688	261	387								
ANIAK	1,552	1,051	2,302	1,221	2,461	1,094	1,042								
CHUATHBALUK <sup>c</sup>	393			216	305	601	79								
NAPAIMUTE	211			23											
CROOKED CREEK	290			69	536	534	190								
RED DEVIL	846			448	1,516	794	617								
SLEETMUTE	1,330			1,266	1,009	859	1,614								
STONY RIVER	395			107	611	195	460								
LIME VILLAGE				1,319	2,025	484	280								
MGRATH	143			308	697	1,512	818								
TAKOTNA				0	40	0									
MEDFRA															
NIKOLAI	550			583	328	55	62								
TELIDA					60	0									
QUINHAGAK	67	41	125	2,933	3,346	3,510	2,901								
GOODNEWS BAY	210	0	0	1,072	819	1,472	1,222								
PLATINUM	11	8	43	90	68	90	31								
Mekoryuk				0 <sup>b</sup>	273	433	1,062								
Tununak					86	0	0								
Toksook Bay					87	19	1								
Newtok					30	4									
Nightmute						0	20								
ANCHORAGE							39								
TOTAL	24,667	25,299 <sup>a</sup>	18,085 <sup>a</sup>	34,426	49,988	44,519									

<sup>a</sup> Sampled villages only.<sup>b</sup> Chum and sockeye salmon harvest combined.

	Distance from the Mouth		Distance from Bethel	
	Kilometer	Miles	Kilometer	Miles
Popokamiut				
(Lower boundry District 1)	-3	-2	-129	-80
Kuskokwim River Mouth				
60.80 N, 162.42 W	0	0	-125	-78
Eek Island, Southernmost tip,				
(Lower boundry District 1)	19	12	-106	-66
Apokak Slough				
(Lower boundry District 1)	35	22	-90	-56
Bek River	39	24	-87	-54
Kwegooyuk	42	26	-84	-52
Kinak River	48	30	-78	-48
Tuntutuliak Village	56	35	-87	-54
Kialik River	59	37	-66	-41
Fowler Island	83	52	-42	-26
Johnson River	93	58	-32	-20
Napakiak Village	104	65	-21	-13
Napaskiak Village	115	71	-12	-7
Oscarville Village	115	71	-11	-7
Bethel City	125	78	0	0
Gweek River	145	90	20	12
Kwethluk Village	159	99	34	21
Akiachak Village	169	105	43	27
Kasigluk River	173	108	48	30
Kisaralik River	175	109	50	31
Akiak Village	190	118	64	40
Mishevik Slough,	212	132	87	54
Tuluksak Village	218	136	93	58
Nelson Island	220	137	95	59
(District 1 Boundry)				
Bogus Creek	234	146	109	68
High Bluffs	264	164	139	86
Boundry of District 2	295	183	170	105
Mud Creek Slough	297	185	172	107
Kalskag Village	309	192	184	114
Aniak Village, Aniak River	362	225	237	147
Chuathbaluk Village	375	233	250	155
(Upper boundry District 2)				
Kolmakof River	395	246	270	168
Napamiut Village	410	255	285	177
Holokuk River	415	258	290	180
Oskawalik River	449	279	324	201
Crooked Creek Village	466	290	341	212
Georgetown Village,				
George River	497	309	372	231
Red Devil Village	526	327	401	249
Sleetmute village	539	335	414	257

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	Distance from the Mouth		Distance from From Bethel	
	Kilometer	Miles	Kilometer	Miles
Holitna River	540	336	415	258
Stony River Village	585	364	460	286
Stony River	587	365	462	287
Swift River	611	380	486	302
Tatlawisksuk River	616	383	491	305
Devil's Elbow	645	401	520	323
Vinasale	740	460	615	382
McGrath Village	815	507	690	429
Middle Fork	889	553	764	475
Big River	801	560	776	482
Pitka Fork	920	572	795	494
Medra Village	928	577	803	499
South Fork	931	579	806	501
East Fork	943	586	818	508
North Fork	943	586	818	508
Nikolai Village	999	621	874	543
Swift Fork	1,136	706	1,011	628
Telida Village	1,184	736	1,059	658
Highpower Creek	1,200	746	1,075	668
Fish Creek	1,284	798	1,159	720
North Fork Lake	1,334	829	1,209	751
Top of Kuskokwim Drainage	1,498	931	1,373	853

- a These distances were taken from the USGS 1:36,300 series of topographic maps. The "mouth" was defined as the point where the "grassland" banks are 24 miles apart. Some locations are not on the mainstem of the Kuskokwim River, as a result their mileages appear to be out of sequence since they are listed in the order of the turn off.

Appendix A.10 Fish species commonly found in the Kuskokwim Area<sup>a</sup>.

Species		
<u>Code</u>	<u>Genus and Species</u>	<u>Common Name</u>
110	<i>Gadus macrocephalus</i>	Pacific Cod
113	<i>Eleginus gracilis</i>	Saffron Cod
121	<i>Platichthys stellatus</i>	Starry Flounder
122	<i>Pleuronectes glacialis</i>	Arctic Flounder
127	<i>Pleuronectes aspera</i>	Yellowfin Sole
128	<i>Pleuronectes vetulus</i>	English Sole
162	<i>Cottus cognatus</i>	Slimy Sculpin
166	<i>Oligocottus maculosus</i>	Tidepool Sculpin
192	<i>Hexagrammos stelleri</i>	Whitespotted Greenling
200	<i>Hippoglossus stenolepis</i>	Pacific Halibut
230	<i>Clupea pallasii</i>	Pacific Herring
410	<i>Oncorhynchus tshawytscha</i>	Chinook Salmon
420	<i>Onchornynchus nerka</i>	Sockeye Salmon
430	<i>Onchornynchus kisutch</i>	Coho Salmon
440	<i>Onchornynchus gorbuscha</i>	Pink Salmon
450	<i>Onchornynchus keta</i>	Chum Salmon
500	<i>Esox lucius</i>	Northern Pike
513	<i>Osmerus mordax</i>	Rainbow Smelt
514	<i>Hypomesus olidus</i>	Pond Smelt
516	<i>Mallotus villosus</i>	Capelin
520	<i>Salvelinus alpinus</i>	Arctic Char
532	<i>Salvelinus malma</i>	Dolly Varden (none anadromous)
541	<i>Onchornynchus mykiss</i>	Rainbow Trout
550	<i>Salvelinus namaycush</i>	Lake Trout
570	<i>Stenodus leucichthys</i>	Inconnu
581	<i>Coregonus nasus</i>	Broad Whitefish
582	<i>Coregonus pidschian</i>	Humpback Whitefish
583	<i>Coregonus sardinella</i>	Least Cisco
584	<i>Coregonus autumnalis</i>	Arctic Cisco
585	<i>Prosopium cylindraceum</i>	Round Whitefish
590	<i>Lota lota</i>	Burbot
600	<i>Lampetra tridentata</i>	Pacific Lamprey
601	<i>Lampetra japonica</i>	Arctic Lamprey
610	<i>Thymallus arcticus</i>	Arctic Grayling
630	<i>Dallia pectoralis</i>	Alaska Blackfish
640	<i>Catostomus catostomus</i>	Longnose Sucker
660	<i>Gasterosteus aculeatus</i>	Threespine Stickleback
661	<i>Pungitius pungitius</i>	Ninespine Stickleback
670	<i>Percopsis omiscomaycus</i>	Trout Perch
NA	<i>Megalocottus platycephalus</i>	Belligerent Sculpin
NA	<i>Myoxocephalus quadricornis</i>	Fourhorn Sculpin

a Based on American Fisheries Society Special Publication No. 20, Common and Scientific Names of Fishes from the United States and Canada (Fifth Edition). Committee and Names of Fishes, Bethesda, Maryland, 1991.

Mean salmon weights and prices paid to commercial  
fisherman in the Kuskokwim Area, 1967 - 1991.

Year	Mean Weight - Pounds					Average Price - \$/Pound				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 <sup>b</sup>	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976 <sup>c</sup>	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	15.1	7.3	7.5	3.4	8.1	1.30	1.42	1.25	0.15	0.40
1989	16.6	7.2	7.3	3.4	6.8	0.75	1.20	0.55	0.05	0.26
1990	15.1	6.7	6.5	3.2	6.9	0.56	1.05	0.75	0.12	0.26
1991	15.3	6.9	6.5	3.4	6.3	0.56	0.67	0.45	0.12	0.31
Ten Year Average (1981-90)	16.8	7.1	7.1	3.5	7.1	0.83	0.83	0.65	0.08	0.28

<sup>a</sup> Information unavailable.

<sup>b</sup> Information was not available for district 5.

<sup>c</sup> Information was not available for district 4.

Appendix A.12 Commercial Fishing Effort in Kuskokwim Area by Permit - Hour, 1960-1991.

<u>Year</u>	<u>Dist. 1</u>	<u>Dist. 2</u>	<u>Dist. 3</u>	<u>Dist. 4</u>	<u>Dist. 5</u>	<u>Total</u>
1960	5136	960	648	4368	Closed	11,112
1961	16200	1512	1512	4992	Closed	24,216
1962	14274		0	8434	Closed	22,708
1963	5712	1722	0	5520	Closed	12,954
1964	6468	1140	0		Closed	7,608
1965	13500	546	0	3696	Closed	17,742
1966	18270		Closed		Closed	18,270
1967	88248	1932		3954	Closed	94,134
1968	77466	720		7986	4704	90,876
1969	67140	1488		29952	14055	112,635
1970	56646	3414		22080	9756	91,896
1971	18060	1842				19,902
1972	47802					47,802
1973	77478	3072		18372	2928	101,850
1974	124569	4950		18984	8148	156,651
1975	181786	3648		12312	5400	203,146
1976	82788	3894		14784	4848	106,314
1977	73944	3426		17592	3780	98,742
1978	71856	1892		14952	3672	92,372
1979	49608	984		27096	8220	85,908
1980	33370	714		21636	9504	65,224
1981	45096	1248		25656	11256	83,256
1982	46108	1128		22656	14556	84,448
1983	47040	708		20748	9456	77,952
1984	62643	1050		31488	14004	109,185
1985	37452	462		22254	8544	68,712
1986	48744	606		25740	10572	85,662
1987	60525	576		21222	10332	92,655
1988	81724	912		27440	14064	124,140
1989	66470	816		26134	12552	105,972
1990	50642	1051		44520	10548	106,761
1991	62,672	1320		29160	11532	104,684
Previous Ten Year Average	54644	856		26786	11588	93,874

## Appendix A.13

Maximum, mean, and minimum number of permits used in a single period by district, 1962 - 1991.

Year	District 1			District 2			District 4			District 5		
	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.
1962	190	121	25				32	19	7		Closed	
1963	103	17	1	17	10	2	30	13	1		Closed	
1964	113	30	1	30	4	1	29	15	1		Closed	
1965	164	43	1	5	3	1	31	13	1		Closed	
1966	172	122	61	1	1	1	12	8	1		Closed	
1967	208	144	10	4	2	1	19	8	1		Closed	
1968	262	164	2				78	38	8	17	13	5
1969	274	161	1	11	2	1	119	51	1	28	21	10
1970	320	198	22	11	6	3	75	48	21	25	16	5
1971	355	117	5	20	14	2	48	36	3	11	9	8
1972	341	149	28	12	10	8				12	9	5
1973	372	234	3	18	11	1	70	42	17	17	10	5
1974	444	272	25							40	23	7
1975	483	280	12				106	47	13	30	20	10
1976	495	357	174	55	33	11	99	44	5	35	13	4
1977	487	380	204	83	54	24	172	70	7	21	15	5
1978	509	390	72	24	12	3	123	38	3	24	15	5
1979	549	456	179	33	27	20	126	63	12	27	19	6
1980	482	421	319	37	23	12	101	56	3	35	22	9
1981	541	442	278	151	42	11	126	69	30	38	24	10
1982	499	414	302	47	27	10	107	67	5	38	27	1
1983	547	442	323	34	24	9	134	70	10	62	30	11
1984	542	411	39	33	17	8	165	82	34	47	38	29
1985	530	446	262	15	11	6	191	84	7	47	34	12
1986	600	489	234	27	9	3	216	86	2	52	31	19
1987	607	513	132	22	16	13	253	105	48	75	41	23
1988	640	583	408	21	17	13	202	73	29	68	39	22
1989	679	509	126	22	17	14	140	77	51	65	39	18
1990	653	616	534	18	16	14	218	106	1	58	27	1
1991	662	589	512	19	17	16	227	81	4	50	28	1

**APPENDIX B**

Appendix B.1. Associated environmental and catch data,  
Bethel, Kuskokwim River, 1965-1991<sup>a</sup>.

<u>Year</u>	<u>River Breakup</u>	<u>River Clear of Ice</u>	<u>First Reported</u>		<u>River Freeze-up</u>
			<u>Chinook Salmon</u>	<u>Smelt</u>	
1965			May 31	May 25	
1966	June 01		June 01 <sup>b</sup>	June 06	Oct. 20
1967	May 06	May 17	May 20	May 25	Oct. 19
1968	May 14	May 17	May 26		
1969	May 06	May 13	May 23		
1970	May 12	May 16	May 21	May 27	Oct. 18
1971	May 24	May 29	June 06	June 07	Nov. 04
1972	May 23	May 28	June 05	June 06	Nov. 03
1973	May 14	May 18	May 27	May 31	Oct. 15
1974	May 07	May 19	May 23	May 25	
1975	May 19	May 25	May 26	May 29	Oct. 29
1976	May 18	May 18	June 01		Oct. 27
1977	May 23	June 01	May 31	June 02	Oct. 18
1978			May 18	May 22	Oct. 25
1979	Apr 27	May 07	May 16		Nov. 19
1980	May 04	May 10	May 17	May 22	
1981	May 09	May 12	May 22	May 06 <sup>d</sup>	
1982	May 18	May 22	June 01	June 03	Oct. 30
1983	May 11	May 13	May 23	June 01	Oct. 22
1984	May 13	May 23	May 27	May 27	Oct. 18
1985	May 25	May 29	June 03	June 04	Oct. 22
1986	May 11	May 18	May 28	May 28	Oct. 24
1987	May 17	May 20	May 25 <sup>c</sup>	May 31	Nov. 06
1988	May 11	May 15	May 16		Nov. 14
1989	May 05	May 07	May 26	May 28	Oct. 31
1990	May 06		May 20		Nov. 13
1991	May 08	May 17	May 20	May 21	Nov. 16

<sup>a</sup> Environmental data, breakup and freeze-up from National Weather Service

<sup>b</sup> Caught at Kalskag

<sup>c</sup> Also first chum

<sup>d</sup> Questionable

Appendix B.2 Comparative chinook salmon catches by fishing period by year  
in District 1, Lower Kuskokwim River, 1974 - 1991<sup>a</sup>.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1974	June 10-11	4,384	422	5,064	0.90
	June 13-14	5,790	488	5,957	1.00
	June 17-18	5,857	506	6,072	1.00
Subtotal <sup>b</sup>		16,031	606	16,992	0.90
	June 27	558	267	1,602	0.40
	July 01-02	561	380	4,560	0.08
	July 04-05	196	282	3,384	0.06
	July 08-09	286	376	4,512	0.06
	July 18	31	190	1,140	0.03
Total		17,663	666	32,190	0.50
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1975	June 16	359	12	72	5.00
	June 19-20	1,031	46	552	1.90
	June 23-24	17,235	483	5,796	2.90
Subtotal <sup>b</sup>		18,625	541	6,420	2.90
	June 30	691	279	1,674	0.40
	July 03	636	360	2,160	0.30
	July 07	421	369	2,214	0.20
	July 10	195	304	1,824	0.10
	July 14	179	326	1,956	0.10
Total		20,747	539	16,248	1.20
<hr/>					
1976	June 17	6,962	459	2,754	2.50
	June 21	13,048	495	2,970	4.40
Subtotal <sup>b</sup>		20,010	561	5,724	3.40
	June 28	4,143	348	2,088	2.00
	July 01	1,550	415	2,490	0.60
	July 08	894	381	2,286	0.40
	July 12	377	344	2,262	0.20
	July 15	236	265	1,590	0.10
Total		27,177	517	16,440	1.70

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1977	June 15	12,458	467	2,802	4.50
	June 20	16,227	484	2,904	5.60
Subtotal <sup>b</sup>		28,685	563	5,706	5.00
	June 27	1,337	378	2,268	0.60
	June 30	504	409	2,454	0.20
	July 04	266	331	1,986	0.10
	July 07	407	368	2,208	0.20
	July 14	153	385	2,310	0.06
Total		31,352	653	16,932	1.80
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1978	June 09	7,590	509	3,054	2.50
	June 14	6,142	266	1,596	3.90
	June 16	12,341	396	2,376	5.20
	June 22	1,724	72	288	6.00
	June 23	8,342	429	1,716	4.90
Subtotal <sup>b</sup>		36,139	615	9,030	4.00
	June 26	1,964	499	2,694	0.70
	June 29	1,759	422	2,652	0.70
	July 03	894	476	2,856	0.30
	July 06	1,460	485	5,820	0.30
	July 10	694	428	5,136	0.10
	July 10	293	422	2,532	0.10
Total		43,203	617	30,720	1.40
<hr/>					
1979	June 11	12,270	523	3,138	3.90
	June 15	12,363	549	3,294	3.80
Subtotal <sup>b</sup>		24,633	591	6,432	3.80
	June 22	5,651	502	3,012	1.90
	June 26	2,277	531	3,186	0.70
	June 29	1,583	542	3,252	0.30

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1979	July 03	1,233	542	3,252	0.40
	July 10	470	520	3,120	0.20
Total		35,847	617	22,254	1.60
<hr/>					
1980	June 12	9,891	469	2,814	3.50
	June 18	16,921	468	2,808	6.00
Subtotal <sup>b</sup>		26,812	553	5,622	4.80
	June 23	4,777	426	2,616	1.80
	June 26	1,460	408	2,448	0.60
	July 02	498	383	2,298	0.20
	July 09	445	431	2,586	0.20
Total		33,992	597	15,570	2.20
<hr/>					
1981	June 10	11,897	489	2,934	4.10
	June 16	17,985	541	3,246	5.50
Subtotal <sup>a</sup>		29,882	589	6,180	4.80
	June 22	3,830	511	3,066	1.25
	June 25	2,000	508	3,048	0.66
	June 30	2,563	484	2,904	0.88
	July 02	1,707	459	2,754	0.62
	July 06	1,088	461	2,766	0.39
	July 09	491	440	2,640	0.37
Total		42,011	613	23,358	1.80
<hr/>					
1982	June 14	4,912	464	2,784	1.80
	June 17	11,285	496	2,892	3.80
	June 21	13,343	499	2,994	4.50
	June 24	8,548	459	1,836	4.70
Subtotal <sup>b</sup>		38,088	610	10,506	3.60

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1982	June 28	1,943	352	1,408	1.38
	June 30	2,064	483	1,932	1.07
	July 02	1,095	434	1,736	0.63
	July 05	875	372	2,232	0.39
	July 08	748	435	2,610	0.29
	July 12	307	354	2,124	0.14
	Total		45,120	610	22,548
1983	June 13	7,445	489	2,934	2.54
	June 16	5,961	450	2,700	2.21
Subtotal <sup>b</sup>		13,406	544	5,634	2.38
	June 20	4,776	474	2,844	1.68
	June 23	3,287	450	2,700	1.22
	June 27	2,566	446	2,676	0.96
	June 30	2,359	547	3,282	0.72
	July 04	1,213	443	2,658	0.46
	July 07	1,202	496	2,976	0.40
	July 11	633	466	2,796	0.23
Total		16,036	619	25,566	0.63
1984	June 18	10,845	484	2,904	3.73
	June 21	6,336	443	2,658	2.38
Subtotal		17,181	520	5,562	3.08
	June 25	3,018	466	2,796	1.08
	June 28	2,625	470	2,820	0.93
	July 02	1,988	483	2,898	0.69
	July 05	1,218	426	2,556	0.48
	July 09	1,211	496	2,976	0.41
	July 12	858	436	2,616	0.33
	July 16	744	373	2,238	0.33
Total		28,843	587	24,462	1.18

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	6,519	423	2,538	2.07
	June 24	10,413	488	2,928	3.56
	June 27	8,791	492	2,952	2.98
	July 01	6,168	514	3,084	2.00
	July 04	3,774	460	2,760	1.37
Total		35,665	598	14,262	11.98
1986	June 26	7,786	514	3,084	2.52
	June 30	4,200	576	3,456	1.22
	July 03	3,224	556	3,336	0.97
	July 07	1,805	586	3,516	0.51
	July 10	1,156	532	3,192	0.36
Total		18,171	631	16,584	5.58
1987	June 18	18,336	526	4,208	4.36
	June 24				
	June 30				
	July 03	5,970	580	3,480	1.72
	July 07	3,636	578	3,468	1.05
	July 11	1,910	597	3,582	0.53
	July 15	1,415	569	3,414	0.41
	July 20	1,227	551	3,306	0.37
	Aug. 06	207	590	3,540	0.06
	Aug. 13	103	604	3,624	0.03
	Aug. 17	76	595	3,570	0.02
Total		4,862	677	17,466	0.28
1988	June 16	12,640	602	4,816	2.62
	June 20	11,708	612	3,672	3.18
	June 24	9,710	644	3,864	2.51
	June 28	5,350	609	3,654	1.46
	July 02	3,531	580	3,480	1.01
	July 05	2,340	579	3,474	0.67
	July 08	1,891	604	3,624	0.52
	July 11	1,628	598	3,588	0.45
	July 14	1,751	597	3,582	0.49
	July 18	1,107	575	3,450	0.32
	July 21	621	539	3,234	0.19
	July 25	329	494	2,964	0.11
	July 28	333	552	3,312	0.10
	Aug 01	201	594	3,564	0.06

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	Aug 04	206	639	3,834	0.05
	Aug 08	114	640	3,840	0.03
	Aug 10	73	596	3,576	0.02
	Aug 12	115	624	3,744	0.03
	Aug 15	76	613	3,678	0.02
	Aug 18	37	620	3,720	0.01
	Aug 20	29	577	3,462	0.01
	Aug 27	14	532	3,192	0.00
	Aug 31	56	412	2,472	0.02
Total		53,860	746	81,796	0.66

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 19	9,204	374	2,988	3.08
	June 23	6,011	277	2,218	2.71
	June 26	1,862	126	1,006	1.85
	June 30	9,232	642	5,129	1.80
	July 03	4,600	629	3,770	1.22
	July 05	3,311	553	3,311	1.00
	July 08	3,136	621	3,733	0.84
	July 11	1,691	616	3,676	0.46
	July 14	1,216	590	3,576	0.34
	July 18	868	437	2,630	0.33
	July 27	210	562	3,364	0.06
	Aug 03	174	679	5,432	0.03
	Aug 07	78	642	3,853	0.02
	Aug 09	40	644	3,864	0.01
	Aug 12	34	650	3,900	0.01
	Aug 15	25	616	3,697	0.01
	Aug 18	7	381	2,284	0.00
	Aug 23	19	528	3,167	0.01
	Aug 26	17	508	4,063	0.00
	Aug 29	7	423	3,388	0.00
	Sept 01	3	194	1,421	0.00
Total		41,745	745	70,470	0.66

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1990	June 20	16,690	630	3,780	4.42
	June 25	16,031	611	3,666	4.37
	June 29	9,428	645	3,870	2.44
	July 05	4,071	591	3,546	1.15
	July 09	2,804	589	3,534	0.79
	July 14	2,127	625	5,000	0.43
	Aug 01	252	611	3,666	0.07
	Aug 06	306	631	3,786	0.08
	Aug 10	94	653	3,918	0.02
	Aug 13	38	642	3,852	0.01
	Aug 16	28	650	5,850	0.00
	Aug 20	11	594	3,564	0.00
	Aug 27	3	534	3,204	0.00
Total		51,883	743	51,234	0.84

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1991	June 20	13,813	601	3,606	3.83
	June 24	12,612	616	3,696	3.41
	July 01	5,966	629	3,774	1.58
	July 06	2,102	589	3,534	0.59
	July 13	904	571	3,426	0.26
	July 18	452	568	3,408	0.13
	July 22	233	543	3,258	0.07
	July 25	186	533	3,198	0.04
	July 29	134	534	3,204	0.03
	Aug 01	125	602	3,612	0.03
	Aug 05	56	643	3,858	0.01
	Aug 08	33	634	3,804	0.01
	Aug 12	42	662	5,296	0.01
	Aug 14	18	601	4,808	0.00
	Aug 19	24	590	3,540	0.00
	Aug 26	6	512	4,096	0.00
Total		36,706	749	62,672	0.59

- a The catch totals exclude small numbers of chinook salmon taken in late July and August.  
b Unrestricted mesh size.

Appendix B.3 Comparative sockeye salmon catches by fishing period by year  
in District 1, Lower Kuskokwim River, 1981 - 1991.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1981	June 10 <sup>a</sup>	48	489	2,934	0.02
	June 16 <sup>a</sup>	316	541	3,246	0.10
	June 22	3,852	511	3,066	1.26
	June 25	6,037	508	3,048	1.98
	June 30	12,262	484	2,904	4.22
	July 02	9,769	459	2,754	3.55
	July 06	5,510	461	2,766	1.99
	July 09	7,760	440	2,640	2.94
	Total		45,554	613	23,358
1982	June 14 <sup>a</sup>	321	464	2,784	0.12
	June 17 <sup>a</sup>	1,061	496	2,892	0.37
	June 21 <sup>a</sup>	2,432	499	2,994	0.81
	June 24 <sup>a</sup>	3,157	459	1,836	1.72
	June 28	9,938	352	1,408	7.06
	June 30	5,824	483	1,932	3.01
	July 02	3,110	434	1,736	1.79
	July 05	2,769	372	2,232	1.24
	July 08	1,786	435	2,610	0.68
	July 12	638	354	2,124	0.30
	Total		31,036	610	22,548
1983	June 13 <sup>a</sup>	114	489	2,934	0.04
	June 16 <sup>a</sup>	156	450	2,700	0.06
	June 20	3,289	474	2,844	1.16
	June 23	4,807	450	2,700	1.78
	June 27	10,465	446	2,676	3.91
	June 30	12,490	547	3,282	3.81
	July 04	24,540	443	2,658	9.23
	July 07	7,286	496	2,976	2.45
	July 11	3,001	466	2,796	1.07
Total		66,148	619	25,566	2.59

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	June 18 <sup>a</sup>	409	484	2,904	0.14
	June 21 <sup>a</sup>	2,618	443	2,658	0.98
	June 25	10,743	466	2,796	3.84
	June 28	10,942	470	2,820	3.88
	July 02	8,145	483	2,898	2.81
	July 05	6,798	426	2,556	2.66
	July 09	2,821	496	2,976	0.95
	July 12	2,188	436	2,616	0.84
	July 16	1,121	373	2,238	0.50
Total		45,785	587	24,462	1.87
1985 <sup>b</sup>	June 20	5,246	423	2,538	2.07
	June 24	25,536	488	2,928	8.72
	June 27	26,155	492	2,952	8.86
	July 01	31,082	514	3,084	10.08
	July 04	16,114	460	2,760	5.84
Total		104,133	598	14,262	7.30
1986 <sup>b</sup>	June 26	40,468	514	3,084	13.12
	June 30	22,633	576	3,456	6.55
	July 03	15,766	556	3,336	4.73
	July 07	8,347	586	3,516	2.37
	July 10	5,488	532	3,192	1.72
Total		92,702	631	16,584	5.59
1987	June 18	9,102	526	4,208	2.16
	June 24	24,355	607	4,856	5.02
	June 30	39,112	564	4,512	8.67
	July 03	44,030	580	3,480	12.65
	July 07	9,196	578	3,468	2.65
	July 11	4,611	597	3,582	1.29
	July 15	2,301	569	3,414	0.67
	July 20	774	551	3,306	0.23
Total		99,250	677	32,496	3.05

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 16	7,408	602	4,816	1.53
	June 20	14,502	612	3,672	3.95
	June 24	19,894	644	3,864	5.15
	June 28	17,628	609	3,654	4.82
	July 02	15,102	580	3,480	4.34
	July 05	7,284	579	3,474	2.10
	July 08	3,623	604	3,624	1.00
	July 11	2,467	598	3,588	0.69
	July 14	822	597	3,582	0.23
	July 18	396	575	3,450	0.11
	July 21	164	539	3,234	0.05
	July 25	109	494	2,964	0.37
	July 28	70	552	3,312	0.21
	Aug 01	32	594	3,564	0.01
	Aug 04	105	639	3,834	0.27
	Aug 08	92	640	3,840	0.02
	Aug 10	9	596	3,576	0.00
	Aug 12	11	624	3,744	0.00
	Aug 15	14	613	3,678	0.00
	Aug 18	8	620	3,720	0.00
	Aug 20	5	577	3,462	0.00
	Aug 27	8	532	3,192	0.00
	Aug 31	10	410	2,460	0.00
Total		89,763	746	81,784	1.10
1989	June 19	5,495	374	2,988	1.84
	June 23	7,011	277	2,218	3.16
	June 26	3,746	126	1,006	3.72
	June 30	10,214	642	5,129	1.99
	July 03	5,808	629	3,770	1.54
	July 05	2,917	553	3,311	0.88
	July 08	3,177	621	3,733	0.85
	July 11	1,565	616	3,676	0.42
	July 14	796	590	3,576	0.22
	July 18	451	437	2,630	0.17
Total		41,388	745	70,470	0.59
1990	June 20	10,318	630	3,780	2.73
	June 25	27,024	611	3,666	7.37
	June 29	18,774	645	3,870	4.85
	July 05	10,759	591	3,546	3.03
	July 09	8,757	589	3,534	2.48
	July 14	5,467	625	5,000	1.09
	Aug 01	533	611	3,666	0.15
	Aug 06	133	631	3,786	0.04

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
	Aug 10	94	653	3,918	0.02
	Aug 13	38	642	3,852	0.01
	Aug 16	29	650	5,850	0.00
	Aug 20	11	594	3,564	0.00
	Aug 27	3	534	3,204	0.00
Total		81,958	743	51,236	1.33
1991	June 20	19,732	601	3,606	5.47
	June 24	19,262	616	3,696	5.21
	July 01	24,428	629	3,774	6.47
	July 06	24,219	589	3,534	6.85
	July 13	6,458	571	3,426	1.88
	July 18	5,128	568	3,408	1.50
	July 22	3,085	543	3,258	0.95
	July 25	1,526	533	3,198	0.36
	July 29	732	534	3,204	0.17
	Aug 01	624	602	3,612	0.17
	Aug 05	96	643	3,858	0.02
	Aug 08	40	634	3,804	0.01
	Aug 12	31	662	5,296	0.01
	Aug 14	23	601	4,808	0.00
	Aug 19	24	590	3,540	0.01
	Aug 26	12	512	4,096	0.00
Total		105,420	749	62,672	1.68

<sup>a</sup> Unrestricted mesh size.

## Appendix B.4

Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwim River, 1971 - 1991.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1971	June 28-29	11,386	150	180	6.30
	July 01-02	8,949	111	1,332	6.70
	July 05-06	17,672	104	1,248	14.20
	July 08-09	12,603	93	1,116	11.30
	July 12-13	2,550	18	216	11.80
	July 15-16	8,000	69	828	9.70
	July 19-20	5,989	71	852	7.00
Totals		67,149	216	7,392	9.10
1972	June 29-30	9,863	87	1,044	9.40
	July 03-04	19,084	115	1,380	13.80
	July 06-07	19,839	101	1,212	16.40
	July 10-11	13,972	113	1,356	10.30
	July 13-14	6,290	80	960	6.60
Totals		69,048	176	5,952	11.60
1973	June 25-26	19,073	202	2,424	7.90
	June 28-29	47,258	250	6,000	7.90
	July 02-03	21,410	242	2,904	7.40
	July 05-06	31,056	212	2,544	12.20
	July 09-10	24,593	217	2,604	9.40
Totals		143,390	341	16,476	8.70
1974	June 27	27,017	267	1,602	16.90
	July 01-02	55,356	380	4,560	12.10
	July 04-05	27,211	282	3,384	8.00
	July 08-09	50,672	376	4,512	11.20
	July 18	6,661	190	1,140	5.84
Totals		166,917	467	15,198	11.00
1975	June 30	31,216	279	1,674	18.60
	July 03	35,525	360	2,160	16.00
	July 07	39,369	396	2,214	17.80

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1975	July 10	39,910	304	1,824	21.90
	July 14	21,092	326	1,956	10.80
Totals		167,112	539	9,828	17.00
1976	June 28	42,464	348	2,088	20.30
	July 01	44,024	415	2,490	17.70
	July 08	48,669	381	2,286	21.30
	July 12	21,153	377	2,262	9.40
	July 15	14,176	265	1,590	8.90
Totals		170,486	517	10,716	15.90
1977	June 27	40,321	378	2,268	17.80
	June 30	58,884	409	2,454	24.00
	July 04	37,500	331	1,986	18.90
	July 07	56,943	368	2,208	25.80
	July 14	24,765	385	2,310	10.70
Totals		218,413	522	11,226	19.50
1978	June 26	44,296	449	2,694	16.40
	June 29	36,793	442	2,652	13.90
	July 03	26,629	476	2,856	9.30
	July 06	48,031	485	5,820	8.30
	July 10	48,931	428	5,136	9.50
	July 13	14,935	422	2,532	5.90
Totals		219,615	617	21,690	10.10
1979	June 22	32,295	502	3,012	10.70
	June 26	53,648	531	3,186	16.80
	June 29	48,643	542	3,252	14.90
	July 03	83,164	542	3,252	25.60
	July 10	32,434	520	3,120	10.40
Totals		250,184	617	15,822	15.80

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1980	June 23	105,825	436	2,616	40.50
	June 26	131,945	408	2,448	53.90
	July 02	122,613	383	2,298	53.40
	July 09	90,233	431	2,586	34.90
Totals		450,616	579	9,948	45.20
1981	June 22	78,168	511	3,066	25.50
	June 25	81,431	508	3,048	26.70
	June 30	51,942	484	2,904	17.90
	July 02	58,594	459	2,754	21.30
	July 06	55,799	461	2,766	20.20
	July 09	66,138	440	2,640	25.00
	Totals		392,072	613	17,178
1982	June 28	58,528	352	1,408	41.60
	June 30	47,773	483	1,932	24.70
	July 02	38,918	434	1,736	22.40
	July 05	29,315	372	2,232	13.10
	July 08	28,942	435	2,610	11.90
	July 12	20,709	354	2,124	9.80
	Totals		224,185	576	12,042
1983	June 20	28,915	474	2,844	10.20
	June 23	24,625	450	2,700	9.10
	June 27	44,802	446	2,676	16.70
	June 30	55,209	547	3,282	16.80
	July 04	46,176	443	2,658	17.40
	July 07	36,965	496	2,976	12.40
	July 11	20,560	466	2,769	7.40
	Totals		257,252	619	19,905
1984	June 25	91,773	466	2,796	32.80
	June 28	67,120	470	2,820	23.80
	July 02	69,897	483	2,898	24.10

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	July 05	54,981	426	2,556	21.50
	July 09	36,440	496	2,976	12.10
	July 12	24,269	436	2,616	9.30
	July 16	18,613	373	2,238	8.30
Totals		363,093	587	18,900	19.20
1985	June 20	19,762	423	2,538	7.79
	June 24	42,778	488	2,928	14.61
	June 27	47,443	492	2,952	16.07
	July 01	47,471	514	3,084	15.39
	July 04	28,581	460	2,760	10.36
Total		186,035	598	14,262	13.04
1986	June 26	68,947	514	3,084	22.36
	June 30	60,780	576	3,456	17.59
	July 03	65,839	556	3,336	19.74
	July 07	55,983	586	3,516	15.92
	July 10	48,990	532	3,192	15.35
Total		92,702	631	16,584	18.12
1987	June 18	13,472	526	4,208	3.20
	June 24	54,454	607	4,856	11.21
	June 30	112,963	564	4,512	25.04
	July 03	66,783	580	3,480	19.19
	July 07	103,059	578	3,468	29.72
	July 11	72,118	597	3,582	20.13
	July 15	71,923	569	3,414	21.07
	July 20	62,044	551	3,306	18.77
	Aug. 08	4,074	590	3,540	1.15
	Aug. 13	894	604	3,624	0.25
Total		561,784	677	37,990	14.79
1988	June 16	72,219	602	4,816	15.00
	June 20	113,628	612	3,672	30.94
	June 24	119,808	644	3,864	31.00
	June 28	154,027	609	3,654	42.15
	July 02	187,916	580	3,480	54.00
	July 05	163,971	579	3,474	47.20
	July 08	138,772	604	3,624	38.20

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	July 11	137,450	598	3,588	38.31
	July 14	116,930	597	3,582	32.64
	July 18	57,749	575	3,450	16.73
	July 21	39,643	539	3,234	12.25
	July 25	24,893	494	2,964	8.40
	July 28	16,028	552	3,312	4.50
	Aug 01	6,967	594	3,564	1.95
	Aug 04	5,152	639	3,834	1.34
	Aug 08	2,890	640	3,840	0.75
	Aug 10	1,376	596	3,576	0.38
	Aug 12	1,422	624	3,744	0.38
	Aug 15	663	613	3,678	0.18
	Aug 18	330	620	3,720	0.09
	Aug 20	121	577	3,462	0.03
	Aug 27	93	532	3,192	0.03
	Aug 31	2,585	412	2,472	1.05
Total		1,364,533	746	81,796	16.68
1989	June 19	41,789	374	2,988	13.97
	June 23	65,650	277	2,218	29.63
	June 26	32,373	126	1,006	32.12
	June 30	131,629	642	5,129	26.63
	July 03	91,345	629	3,770	24.20
	July 05	85,727	553	3,311	25.84
	July 08	119,066	621	3,733	31.96
	July 11	78,053	616	3,676	21.12
	July 14	44,401	590	3,576	12.54
	July 18	26,407	437	2,630	10.07
	July 27	5,716	562	3,364	1.70
	Aug 03	3,615	679	5,432	0.67
	Aug 07	868	642	3,853	0.23
	Aug 09	432	644	3,864	0.11
	Aug 12	122	650	3,900	0.03
	Aug 15	119	616	3,697	0.03
	Aug 18	16	381	2,284	0.01
	Aug 23	21	528	3,167	0.01
	Aug 26	15	508	4,063	0.00
	Aug 29	21	423	3,388	0.01
	Sept 01	7	194	1,421	0.01
Total		727,392	745	70,470	10.32

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1990	June 20	30,306	630	3,780	8.02
	June 25	58,944	611	3,666	16.08
	June 29	74,911	645	3,870	19.36
	July 05	86,835	591	3,546	24.49
	July 09	91,411	589	3,534	25.87
	July 14	79,803	625	5,000	15.96
	Aug 01	9,065	611	3,666	2.47
	Aug 06	4,597	631	3,786	1.21
	Aug 10	1,269	653	3,918	0.32
	Aug 13	509	642	3,852	0.13
	Aug 16	239	650	5,850	0.04
	Aug 20	113	594	3,564	0.03
	Aug 27	25	534	3,204	0.01
<b>Total</b>		<b>438,027</b>	<b>743</b>	<b>51,236</b>	<b>7.10</b>
1991	June 20	13,266	601	3,606	3.68
	June 24	30,632	616	3,696	8.29
	July 01	50,121	629	3,774	13.28
	July 06	40,060	589	3,534	11.34
	July 13	52,552	571	3,426	15.34
	July 18	78,797	568	3,408	23.12
	July 22	49,788	543	3,258	15.28
	July 25	30,083	533	3,198	7.06
	July 29	24,026	534	3,204	5.62
	Aug 01	13,098	602	3,612	3.63
	Aug 05	6,091	643	3,858	1.18
	Aug 08	3,194	634	3,804	0.63
	Aug 12	1,586	662	5,296	0.30
	Aug 14	634	601	4,808	0.13
	Aug 19	313	590	3,540	0.09
	Aug 26	93	512	4,096	0.02
<b>Total</b>		<b>394,334</b>	<b>749</b>	<b>62,672</b>	<b>4.79</b>

Appendix B.5 Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1991.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	267,698	566,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,759	84,870	410,332	3,397	461,624	1,013,982
1991	37,778	108,946	500,935	378	431,802	1,079,839
Ten Year Average (1981-1990)	40,699	75,728	428,764	217 <sup>a</sup>	506,391	1,053,924

<sup>a</sup> Odd years only.

## Appendix B.6

Kuskokwim River chum salmon return per spawner index,  
1980-1991.

Brood Year	Escapement Index <sup>a</sup>	Return Index by Age <sup>b</sup>					Total	Return Spawner Index
		3	4	5	6	7		
1980	1,220,366	4,766	508,267	186,741	2,490	0	702,264	.6
1981	624,921	4,584	101,382	82,663	5,885	0	194,514	.3
1982	440,430	2,039	316,256	290,797	13,738	875	623,705	1.4
1983	123,866	1,546	335,913	282,261	11,493	0	631,213	2.0
1984	316,745	10,788	1,192,119	675,730	10,815			
1985	235,987	13,114	335,870	239,889				
1986	224,315	1,903	627,435					
1987	193,464 <sup>c</sup>	5,091						
1988	444,392							
1989	283,484							
1990	327,173							
1991	306,668							

a Aniak Sonar index plus KogrukluK Weir estimate.

b Based on District 1 commercial catch.

c KogrukluK Weir not available; Aniak Sonar.

Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
06/01						0.0	0.0							0.0	0.0	0.0
06/02	0.0	0.0	0.0	0.0	3.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.5	0.0
06/03	0.0	0.0	0.0	0.0	3.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.5	0.0
06/04	0.0	0.0	0.0	0.0	3.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.6	0.0
06/05	1.4	0.0	0.0	5.1	4.8	0.0	4.2	1.2	0.5	0.0	0.0	0.9	1.3	0.0	0.9	0.7
06/06	1.4	0.0	0.0	8.4	4.8	0.0	5.7	3.7	0.5	0.0	0.0	1.4	1.3	0.0	1.3	2.2
06/07	2.6	0.0	0.0	12.9	7.6	1.7	8.4	9.6	0.9	0.0	0.0	2.2	2.1	0.3	1.9	5.6
06/08	2.6	0.0	0.0	29.3	29.7	8.2	12.6	11.4	0.9	0.0	0.0	5.0	8.2	1.6	2.8	6.7
06/09	2.6	0.0	2.9	38.4	44.1	16.8	17.2	12.7	0.9	0.0	1.5	6.6	12.2	3.2	3.9	7.4
06/10	2.6	0.0	4.4	58.8	49.4	32.1	25.3	12.7	0.9	0.0	2.2	10.1	13.7	6.1	5.7	7.4
06/11	3.3	0.0	5.8	76.6	70.8	36.4	39.2	15.6	1.2	0.0	2.9	13.2	19.6	6.9	8.9	9.1
06/12	7.1	0.0	10.3	98.4	89.0	45.0	52.8	15.6	2.6	0.0	5.2	16.9	24.7	8.6	11.9	9.1
06/13	11.0	0.0	10.3	111.8	100.0	56.4	58.4	17.2	4.0	0.0	5.2	19.2	27.7	10.8	13.2	10.0
06/14	14.6	0.0	11.6	132.8	103.0	83.5	60.9	18.7	5.4	0.0	5.8	22.8	28.5	15.9	13.8	10.9
06/15	18.3	0.0	11.6	142.9	111.0	102.2	69.5	20.1	6.7	0.0	5.8	24.6	30.8	19.5	15.7	11.7
06/16	25.3	0.0	11.6	154.1	119.2	109.4	81.0	22.9	9.3	0.0	5.8	26.5	33.0	20.9	18.3	13.4
06/17	35.4	0.0	11.6	207.8	139.8	130.3	87.1	25.8	13.0	0.0	5.8	35.7	38.7	24.9	19.7	15.1
06/18	43.5	0.0	11.6	221.9	147.0	165.4	100.1	37.7	15.9	0.0	5.8	38.1	40.7	31.6	22.6	22.0
06/19	55.3	0.0	13.1	234.9	160.4	184.5	125.7	43.4	20.3	0.0	6.5	40.4	44.4	35.3	28.4	25.3
06/20	64.7	0.0	21.9	253.3	185.2	200.8	134.6	58.8	23.7	0.0	10.9	43.5	51.3	38.4	30.4	34.3
06/21	76.4	1.4	41.8	276.6	201.1	214.6	146.2	64.4	28.0	1.3	20.9	47.5	55.7	41.0	33.0	37.6
06/22	83.8	8.0	55.5	306.3	214.3	231.5	164.9	68.4	30.7	7.0	27.7	52.6	59.4	44.2	37.2	39.9
06/23	111.5	8.0	59.5	332.7	230.6	254.9	174.2	73.9	40.8	7.0	29.7	57.2	63.9	48.7	39.3	43.1
06/24	125.6	10.6	74.0	341.9	251.8	276.0	197.7	81.3	46.0	9.3	37.0	58.7	69.8	52.7	44.6	47.5
06/25	132.4	10.6	76.8	379.4	259.6	302.3	231.8	88.5	48.5	9.3	38.3	65.2	71.9	57.8	52.3	51.7
06/26	146.7	15.1	94.1	399.8	269.8	350.1	262.6	92.8	53.7	13.2	47.0	68.7	74.7	66.9	59.3	54.2
06/27	150.4	15.1	108.9	425.2	283.9	400.5	275.9	94.3	55.1	13.2	54.4	73.1	78.7	76.5	62.3	55.0
06/28	157.9	17.6	123.1	439.8	288.8	411.8	300.7	100.9	57.8	15.5	61.5	75.6	80.0	78.7	67.9	58.9
06/29	164.1	25.9	136.5	458.3	292.1	414.6	322.1	117.3	60.1	22.7	68.2	78.7	80.9	79.2	72.7	68.5
06/30	171.3	34.5	137.6	470.5	295.0	436.8	322.1	126.1	62.7	30.3	68.7	80.9	81.7	83.4	72.7	73.6
07/01	173.6	38.3	143.0	485.9	306.9	448.1	323.6	134.6	63.5	33.6	71.4	83.5	85.0	85.6	73.1	78.6
07/02	180.4	50.5	147.8	495.4	308.1	451.5	333.0	142.5	66.0	44.3	73.8	85.1	85.4	86.3	75.2	83.2
07/03	191.0	51.8	147.8	498.4	312.9	461.0	350.0	148.7	69.9	45.4	73.8	85.6	86.7	88.1	79.0	86.8
07/04	193.6	60.5	150.7	506.5	318.2	467.7	369.7	154.2	70.9	53.0	75.2	87.0	88.2	89.4	83.5	90.0
07/05	199.6	66.9	153.5	513.0	325.8	477.5	375.1	155.6	73.1	58.6	76.6	88.2	90.3	91.2	84.7	90.8
07/06	207.7	76.3	160.6	522.1	325.8	479.2	380.8	157.0	76.0	66.9	80.2	89.7	90.3	91.5	86.0	91.7
07/07	216.6	84.7	166.1	536.7	325.8	487.9	388.4	160.1	79.3	74.2	82.9	92.2	90.3	93.2	87.7	93.5
07/08	221.8	87.5	172.7	536.7	325.8	491.6	402.8	161.6	81.2	76.6	86.2	92.2	90.3	93.9	90.9	94.3
07/09	230.9	92.8	175.8	538.0	325.8	496.1	407.6	161.6	84.5	81.3	87.8	92.4	90.3	94.8	92.0	94.3
07/10	233.4	97.9	178.7	541.1	325.8	500.4	407.6	163.1	85.5	85.8	89.2	93.0	90.3	95.6	92.0	95.2

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Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
07/11	238.0	99.3	180.1	543.3	325.8	500.4	407.6	163.1	87.1	87.0	89.9	93.3	90.3	95.6	92.0	95.2
07/12	240.5	101.7	181.6	545.4	325.8	501.4	411.5	163.1	88.0	89.1	90.7	93.7	90.3	95.8	92.9	95.2
07/13	242.9	103.2	185.9	547.8	325.8	501.4	413.5	164.6	88.9	90.4	92.8	94.1	90.3	95.8	93.4	96.1
07/14	250.1	104.6	188.6	548.9	333.7	501.4	415.6	165.9	91.6	91.7	94.2	94.3	92.4	95.8	93.8	96.8
07/15	250.1	104.6	188.6	548.9	333.7	501.4	417.7	167.3	91.6	91.7	94.2	94.3	92.4	95.8	94.3	97.7
07/16	250.9	106.5	190.4	548.9	341.4	501.4	419.5	169.3	91.9	93.3	95.1	94.3	94.6	95.8	94.7	98.8
07/17	251.8	106.5	190.4	551.5	347.0	502.6	421.6	169.3	92.2	93.3	95.1	94.8	96.1	96.0	95.2	98.8
07/18	251.8	107.4	190.4	551.5	348.8	504.4	421.6	169.3	92.2	94.1	95.1	94.8	96.6	96.4	95.2	98.8
07/19	251.8	107.4	192.4	565.9	348.8	505.3	421.6	171.3	92.2	94.1	96.1	97.2	96.6	96.5	95.2	100.0
07/20	256.1	107.4	192.4	566.8	348.8	510.5	421.6	171.3	93.8	94.1	96.1	97.4	96.6	97.5	95.2	100.0
07/21	260.8	107.4	192.4	568.9	348.8	511.4	421.6	171.3	95.5	94.1	96.1	97.8	96.6	97.7	95.2	100.0
07/22	262.6	107.4	192.4	568.9	348.8	517.6	425.3	171.3	96.1	94.1	96.1	97.8	96.6	98.9	96.0	100.0
07/23	262.6	107.4	192.4	572.3	348.8	517.6	425.3	171.3	96.1	94.1	96.1	98.3	96.6	98.9	96.0	100.0
07/24	264.3	107.4	192.4	572.3	349.9	517.6	427.3	171.3	96.8	94.1	96.1	98.3	96.9	98.9	96.5	100.0
07/25	266.0	107.4	192.4	572.3	349.9	517.6	427.3	171.3	97.4	94.1	96.1	98.3	96.9	98.9	96.5	100.0
07/26	266.0	107.4	194.4	572.3	352.0	517.6	431.4	171.3	97.4	94.1	97.0	98.3	97.5	98.9	97.4	100.0
07/27	266.0	107.4	196.3	576.5	354.0	517.6	431.4	171.3	97.4	94.1	98.0	99.1	98.1	98.9	97.4	100.0
07/28	266.0	109.4	196.3	576.5	354.0	517.6	433.4	171.3	97.4	95.9	98.0	99.1	98.1	98.9	97.9	100.0
07/29	266.8	109.4	200.3	576.5	354.0	517.6	437.5	171.3	97.7	95.9	100.0	99.1	98.1	98.9	98.8	100.0
07/30	266.8	111.2	200.3	576.5	358.2	517.6	437.5	171.3	97.7	97.5	100.0	99.1	99.2	98.9	98.8	100.0
07/31	268.4	111.2	200.3	576.5	358.2	517.6	437.5	171.3	98.3	97.5	100.0	99.1	99.2	98.9	98.8	100.0
08/01	268.4	111.2	200.3	576.5	358.2	517.6	437.5	171.3	98.3	97.5	100.0	99.1	99.2	98.9	98.8	100.0
08/02	268.4	111.2	200.3	576.5	358.2	518.7	437.5	171.3	98.3	97.5	100.0	99.1	99.2	99.1	98.8	100.0
08/03	268.4	111.2	200.3	577.7	358.2	518.7	437.5	171.3	98.3	97.5	100.0	99.3	99.2	99.1	98.8	100.0
08/04	268.4	111.2	200.3	577.7	358.2	518.7	437.5	171.3	98.3	97.5	100.0	99.3	99.2	99.1	98.8	100.0
08/05	271.5	111.2	200.3	577.7	358.2	518.7	437.5	171.3	99.4	97.5	100.0	99.3	99.2	99.1	98.8	100.0
08/06	273.1	111.2	200.3	577.7	358.2	518.7	439.3	171.3	100.0	97.5	100.0	99.3	99.2	99.1	99.2	100.0
08/07	273.1	111.2	200.3	579.8	358.2	518.7	439.3	171.3	100.0	97.5	100.0	99.6	99.2	99.1	99.2	100.0
08/08	273.1	111.2	200.3	579.8	358.2	518.7	439.3	171.3	100.0	97.5	100.0	99.6	99.2	99.1	99.2	100.0
08/09	273.1	113.1	200.3	579.8	358.2	519.6	439.3	171.3	100.0	99.1	100.0	99.6	99.2	99.3	99.2	100.0
08/10	273.1	113.1	200.3	579.8	358.2	519.6	441.3	171.3	100.0	99.1	100.0	99.6	99.2	99.3	99.6	100.0
08/11	273.1	113.1	200.3	582.0	360.9	519.6	441.3	171.3	100.0	99.1	100.0	100.0	100.0	99.3	99.6	100.0
08/12	273.1	113.1	200.3	582.0	360.9	519.6	441.3	171.3	100.0	99.1	100.0	100.0	100.0	99.3	99.6	100.0
08/13	273.1	113.1	200.3	582.0	360.9	521.7	441.3	171.3	100.0	99.1	100.0	100.0	100.0	99.7	99.6	100.0
08/14	273.1	113.1	200.3	582.0	360.9	521.7	441.3	171.3	100.0	99.1	100.0	100.0	100.0	99.7	99.6	100.0
08/15	273.1	113.1	200.3	582.0	360.9	521.7	442.9	171.3	100.0	99.1	100.0	100.0	100.0	99.7	100.0	100.0
08/16	273.1	113.1	200.3	582.0	360.9	521.7	442.9	171.3	100.0	99.1	100.0	100.0	100.0	99.7	100.0	100.0
08/17	273.1	113.1	200.3	582.0	360.9	521.7	442.9	171.3	100.0	99.1	100.0	100.0	100.0	99.7	100.0	100.0
08/18	273.1	113.1	200.3	582.0	360.9	521.7	442.9	171.3	100.0	99.1	100.0	100.0	100.0	99.7	100.0	100.0
08/19	273.1	113.1	200.3	582.0	360.9	521.7	442.9	171.3	100.0	99.1	100.0	100.0	100.0	99.7	100.0	100.0
08/20	273.1	113.1	200.3	582.0	360.9	523.5	442.9	171.3	100.0	99.1	100.0	100.0	100.0	100.0	100.0	100.0
08/21	273.1	114.1	200.3	582.0	360.9	523.5	442.9	171.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
06/04	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
06/05	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
06/06	0.0	0.0	0.0	9.1	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0
06/07	0.0	0.0	0.0	18.2	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.4	0.0	0.0
06/08	0.0	0.0	0.0	35.2	12.3	2.9	0.0	0.0	0.0	0.0	0.0	1.3	0.8	0.4	0.0	0.0
06/09	0.0	0.0	0.0	47.8	26.6	5.8	0.0	0.0	0.0	0.0	0.0	1.7	1.8	0.7	0.0	0.0
06/10	0.0	0.0	0.0	63.5	38.3	8.7	0.0	0.0	0.0	0.0	0.0	2.3	2.6	1.1	0.0	0.0
06/11	2.7	0.0	0.0	79.6	81.6	28.5	8.2	0.0	0.5	0.0	0.0	2.9	5.4	3.6	0.0	0.0
06/12	2.7	0.0	6.0	191.4	143.2	40.0	11.1	0.0	0.5	0.0	0.2	6.9	9.5	5.0	0.0	0.0
06/13	2.7	0.0	14.1	240.0	190.7	51.1	11.1	2.9	0.5	0.0	0.6	8.7	12.7	6.4	0.0	0.5
06/14	2.7	0.0	26.9	248.7	204.5	78.0	26.6	6.0	0.5	0.0	1.1	9.0	13.6	9.8	0.7	1.1
06/15	7.7	0.0	29.8	290.4	213.6	101.8	40.7	8.7	1.3	0.0	1.2	10.5	14.2	12.7	1.0	1.5
06/16	7.7	0.0	64.5	458.2	220.9	118.0	60.3	8.7	1.3	0.0	2.5	16.6	14.7	14.8	1.0	1.5
06/17	9.8	0.0	70.3	710.2	247.2	128.7	123.0	20.6	1.7	0.0	2.8	25.7	16.5	16.1	2.4	3.6
06/18	16.3	0.0	81.8	779.2	295.6	174.6	138.7	71.3	2.8	0.0	3.2	28.2	19.7	21.8	3.6	12.6
06/19	16.3	0.0	87.6	795.7	393.6	208.7	176.6	82.7	2.8	0.0	3.4	28.8	26.2	26.1	5.4	14.6
06/20	23.1	0.0	135.3	842.8	419.4	227.5	207.4	121.5	4.0	0.0	5.3	30.5	28.0	28.4	10.9	21.5
06/21	29.8	0.0	240.3	918.8	554.1	280.1	222.4	130.1	5.1	0.0	9.4	33.3	36.9	35.0	12.3	23.0
06/22	51.9	0.0	292.6	1084.7	689.5	338.1	236.3	173.4	9.0	0.0	11.5	39.3	46.0	42.3	15.7	30.7
06/23	51.9	2.7	374.9	1439.6	806.6	374.2	313.2	190.1	9.0	0.2	14.7	52.1	53.8	46.8	19.3	33.7
06/24	66.0	16.0	494.3	1581.9	869.4	414.1	373.6	199.1	11.4	1.0	19.4	57.3	57.9	51.8	20.6	35.3
06/25	86.4	16.0	528.5	1630.5	898.2	496.7	464.2	207.6	14.9	1.0	20.7	59.1	59.9	62.1	21.9	36.8
06/26	96.9	28.3	675.9	1692.7	1012.9	522.5	488.7	213.3	16.7	1.7	26.5	61.3	67.5	65.3	28.7	37.8
06/27	108.7	39.5	853.3	1726.7	1081.6	575.6	532.2	234.2	18.8	2.4	33.4	62.5	72.1	72.0	34.1	41.5
06/28	144.3	137.0	915.8	1768.2	1123.8	615.8	622.0	272.8	24.9	8.3	35.9	64.0	74.9	77.0	42.2	48.3
06/29	182.9	137.0	949.2	1805.4	1132.9	650.3	725.7	298.1	31.6	8.3	37.2	65.4	75.5	81.3	44.3	52.8
06/30	201.4	272.3	1180.7	1969.2	1177.7	690.3	731.7	317.8	34.8	16.5	46.3	71.3	78.5	86.3	48.2	56.3
07/01	241.5	399.9	1384.8	2210.5	1268.8	703.7	755.6	346.1	41.7	24.2	54.3	80.1	84.6	88.0	56.2	61.3
07/02	258.8	526.2	1592.8	2273.3	1296.6	715.2	779.7	381.1	44.7	31.8	62.4	82.3	86.4	89.4	65.4	67.5
07/03	271.0	643.3	1745.3	2308.9	1329.0	737.6	844.8	428.6	46.8	38.9	68.4	83.6	88.6	92.2	66.0	75.9
07/04	293.6	899.4	1768.4	2433.1	1383.2	739.1	940.8	464.6	50.7	54.4	69.3	88.1	92.2	92.4	68.1	82.3
07/05	334.4	1049.1	2000.0	2599.0	1428.1	744.5	962.8	502.8	57.7	63.4	78.4	94.1	95.2	93.1	70.2	89.0
07/06	359.4	1439.0	2017.8	2611.1	1444.7	747.2	965.8	502.8	62.0	74.9	79.1	94.6	96.3	93.4	76.0	89.0
07/07	395.1	1292.7	2115.4	2655.4	1456.2	760.7	988.5	509.5	68.2	78.1	82.9	96.2	97.0	95.1	84.6	90.2
07/08	437.1	1360.7	2200.5	2661.9	1468.8	776.0	1026.8	509.5	75.5	82.3	86.2	96.4	97.9	97.0	86.5	90.2
07/09	451.0	1393.6	2232.5	2691.5	1478.4	779.0	1055.4	536.7	77.9	84.2	87.5	97.5	98.5	97.4	86.8	95.0
07/10	498.1	1438.9	2279.7	2721.8	1483.4	779.0	1069.4	542.5	86.0	87.0	89.3	98.6	98.9	97.4	88.8	96.1
07/11	525.0	1495.4	2313.2	2726.0	1487.8	781.1	1075.8	545.4	90.6	90.4	90.6	98.7	99.2	97.7	92.2	96.6
07/12	542.4	1553.0	2386.7	2729.3	1487.8	785.8	1079.8	548.3	93.6	93.9	93.5	98.9	99.2	98.2	94.8	97.1
07/13	544.8	1556.1	2407.9	2736.2	1487.8	789.9	1087.8	551.2	94.0	94.1	94.3	99.1	99.2	98.8	96.0	97.6

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Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
07/14	546.5	1578.6	2428.2	2740.7	1487.8	789.9	1093.4	553.9	94.3	95.4	95.1	99.3	99.2	98.8	96.6	98.1
07/15	548.9	1584.4	2429.2	2743.7	1490.8	789.9	1101.6	556.7	94.8	95.8	95.2	99.4	99.4	98.8	96.9	98.6
07/16	548.9	1596.8	2437.4	2743.7	1492.4	797.4	1105.6	556.7	94.8	96.5	95.5	99.4	99.5	99.7	97.6	98.6
07/17	549.8	1602.6	2460.6	2745.8	1492.4	798.5	1105.6	558.7	94.9	96.9	96.4	99.4	99.5	99.8	98.1	98.9
07/18	552.7	1607.3	2480.2	2745.8	1495.7	798.5	1105.6	558.7	95.4	97.2	97.2	99.4	99.7	99.8	98.9	98.9
07/19	562.4	1609.3	2495.9	2751.9	1497.5	799.8	1107.6	558.7	97.1	97.3	97.8	99.7	99.8	100.0	99.2	98.9
07/20	564.0	1609.3	2497.9	2755.1	1497.5	799.8	1107.6	558.7	97.4	97.3	97.9	99.8	99.8	100.0	99.2	98.9
07/21	569.2	1618.6	2505.5	2755.1	1497.5	799.8	1107.6	558.7	98.3	97.8	98.2	99.8	99.8	100.0	99.2	98.9
07/22	573.2	1622.1	2512.9	2755.1	1497.5	799.8	1107.6	562.6	98.9	98.1	98.5	99.8	99.8	100.0	99.4	99.6
07/23	573.2	1625.8	2518.5	2755.1	1498.6	799.8	1107.6	564.7	98.9	98.3	98.7	99.8	99.9	100.0	99.4	100.0
07/24	575.1	1629.2	2522.4	2755.1	1498.6	799.8	1107.6	564.7	99.3	98.5	98.8	99.8	99.9	100.0	99.4	100.0
07/25	576.0	1634.6	2526.1	2755.1	1499.7	799.8	1107.6	564.7	99.4	98.8	99.0	99.8	99.9	100.0	99.4	100.0
07/26	576.0	1639.4	2534.1	2755.1	1499.7	799.8	1107.6	564.7	99.4	99.1	99.3	99.8	99.9	100.0	99.4	100.0
07/27	576.0	1647.8	2538.1	2755.1	1499.7	799.8	1107.6	564.7	99.4	99.6	99.4	99.8	99.9	100.0	99.4	100.0
07/28	577.7	1650.8	2540.0	2755.1	1499.7	799.8	1109.5	564.7	99.7	99.8	99.5	99.8	99.9	100.0	99.4	100.0
07/29	579.3	1650.8	2540.0	2755.1	1499.7	799.8	1109.5	564.7	100.0	99.8	99.5	99.8	99.9	100.0	99.4	100.0
07/30	579.3	1650.8	2540.0	2755.1	1499.7	799.8	1110.5	564.7	100.0	99.8	99.5	99.8	99.9	100.0	99.4	100.0
07/31	579.3	1652.5	2540.0	2755.1	1499.7	799.8	1112.5	564.7	100.0	99.9	99.5	99.8	99.9	100.0	99.6	100.0
08/01	579.3	1652.5	2542.2	2755.1	1500.5	799.8	1112.5	564.7	100.0	99.9	99.6	99.8	100.0	100.0	99.6	100.0
08/02	579.3	1652.5	2542.2	2757.2	1500.5	799.8	1112.5	564.7	100.0	99.9	99.6	99.9	100.0	100.0	99.7	100.0
08/03	579.3	1652.5	2544.3	2759.0	1500.5	799.8	1112.5	564.7	100.0	99.9	99.7	99.9	100.0	100.0	99.8	100.0
08/04	579.3	1652.5	2546.4	2759.0	1500.5	799.8	1112.5	564.7	100.0	99.9	99.8	99.9	100.0	100.0	99.8	100.0
08/05	579.3	1652.5	2546.4	2759.0	1500.5	799.8	1112.5	564.7	100.0	99.9	99.8	99.9	100.0	100.0	99.8	100.0
08/06	579.3	1652.5	2547.6	2759.0	1500.5	799.8	1114.3	564.7	100.0	99.9	99.8	99.9	100.0	100.0	99.8	100.0
08/07	579.3	1652.5	2547.6	2759.0	1500.5	799.8	1114.3	564.7	100.0	99.9	99.8	99.9	100.0	100.0	99.8	100.0
08/08	579.3	1654.2	2547.6	2759.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.8	99.9	100.0	100.0	99.8	100.0
08/09	579.3	1654.2	2547.6	2759.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0
08/10	579.3	1654.2	2547.6	2759.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0
08/11	579.3	1654.2	2548.7	2759.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.9	99.9	100.0	100.0	100.0	100.0
08/12	579.3	1654.2	2548.7	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0
08/13	579.3	1654.2	2548.7	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0
08/14	579.3	1654.2	2548.7	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0
08/15	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/16	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/17	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/18	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/19	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/20	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/21	579.3	1654.2	2552.3	2761.0	1500.5	799.8	1114.3	564.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
07/12	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07/13	1.2	0.0	0.0	0.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
07/14	1.2	0.0	0.0	0.0	1.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
07/15	1.2	0.0	1.9	0.0	1.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
07/16	2.7	0.9	3.9	0.0	1.0	5.7	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.0	0.0
07/17	4.1	2.5	5.7	0.0	3.9	7.9	0.0	0.0	0.1	0.2	0.1	0.0	0.1	0.3	0.0	0.0
07/18	7.5	2.5	9.5	0.0	3.9	10.8	0.0	0.0	0.2	0.2	0.2	0.0	0.1	0.4	0.0	0.0
07/19	13.2	4.2	18.3	0.0	3.9	10.8	3.7	1.8	0.4	0.3	0.4	0.0	0.1	0.4	0.1	0.1
07/20	22.2	7.9	28.4	0.0	5.7	23.3	17.0	7.7	0.7	0.5	0.7	0.0	0.2	1.0	0.7	0.5
07/21	26.4	13.3	40.3	0.0	7.9	33.7	26.8	15.0	0.9	0.8	0.9	0.0	0.3	1.4	1.0	0.9
07/22	29.9	28.1	48.2	6.8	11.1	48.2	34.0	24.6	1.0	1.8	1.1	0.3	0.4	2.0	1.3	1.5
07/23	36.7	28.1	64.6	8.0	11.1	54.9	37.2	30.7	1.2	1.8	1.5	0.4	0.4	2.2	1.5	1.8
07/24	45.3	31.1	115.7	8.0	24.2	60.7	45.3	34.7	1.5	2.0	2.7	0.4	0.8	2.5	1.8	2.1
07/25	56.6	48.5	145.0	9.3	37.4	64.7	47.4	42.1	1.9	3.1	3.4	0.5	1.2	2.6	1.8	2.5
07/26	72.6	68.9	163.2	12.4	43.7	65.7	49.2	44.1	2.4	4.4	3.8	0.6	1.4	2.7	1.9	2.6
07/27	95.4	72.8	215.4	16.7	81.0	69.7	63.3	67.2	3.1	4.6	5.0	0.8	2.6	2.8	2.5	4.0
07/28	127.7	89.1	235.0	19.1	152.9	77.6	126.0	101.3	4.2	5.7	5.4	1.0	4.8	3.2	4.9	6.0
07/29	186.3	128.4	299.2	30.8	182.4	86.4	143.9	142.9	6.1	8.2	6.9	1.5	5.8	3.5	5.6	8.5
07/30	341.3	147.7	351.2	36.5	226.2	122.5	147.8	214.0	11.2	9.4	8.1	1.8	7.2	5.0	5.7	12.7
07/31	491.4	167.2	374.2	38.9	279.6	456.0	157.8	277.5	16.1	10.6	8.7	1.9	8.8	18.6	6.1	16.5
08/01	685.9	205.1	652.4	52.5	328.9	666.5	183.4	319.9	22.4	13.0	15.1	2.6	10.4	27.2	7.5	19.0
08/02	768.7	233.4	746.5	91.2	357.2	1059.0	205.3	343.4	25.1	14.8	17.3	4.5	11.3	43.2	8.7	20.4
08/03	1049.9	290.4	1111.8	171.1	444.6	1144.5	225.8	461.1	34.3	18.4	25.7	8.5	14.1	46.7	9.5	27.4
08/04	1094.9	348.3	1498.0	227.9	483.8	1163.3	279.6	585.5	35.8	22.1	34.7	11.4	15.3	47.5	11.6	34.8
08/05	1183.6	377.8	1721.2	253.0	518.1	1303.5	344.7	607.6	38.7	24.0	39.9	12.6	16.4	53.2	15.4	36.2
08/06	1318.0	463.0	1933.2	297.2	858.9	1602.2	423.1	639.5	43.1	29.4	44.8	14.8	27.2	65.4	18.5	38.1
08/07	1350.8	605.2	2143.0	392.4	1195.5	1793.0	473.2	659.6	44.2	38.4	49.6	19.6	37.8	73.1	20.5	39.3
08/08	1456.2	690.8	2230.2	435.1	1343.4	1829.4	549.2	737.9	47.6	43.9	51.6	21.7	42.5	74.6	23.4	43.9
08/09	1534.1	799.0	2372.5	470.3	1385.1	1978.0	666.8	780.4	50.2	50.7	54.9	23.5	43.8	80.7	28.0	46.4
08/10	1588.5	895.9	2651.2	505.6	1500.3	2004.2	725.2	822.6	52.0	56.9	61.4	25.2	47.5	81.8	30.3	49.0
08/11	1699.4	1096.8	2733.7	537.7	1738.9	2135.9	789.4	857.2	55.6	69.6	63.3	26.8	55.0	87.1	32.8	51.0
08/12	1782.5	1189.6	3024.0	710.7	1941.1	2210.0	999.0	1104.8	58.3	75.5	70.0	35.5	61.4	90.2	41.0	65.8
08/13	1819.0	1256.1	3120.7	822.9	2006.6	2238.2	1178.6	1195.8	59.5	79.7	72.3	41.0	63.5	91.3	48.2	71.2
08/14	1842.8	1286.5	3186.3	1145.0	2176.4	2258.6	1344.9	1235.6	60.3	81.7	73.8	57.1	68.9	92.1	54.8	73.5
08/15	1841.8	1347.6	3351.6	1291.2	2349.8	2262.0	1603.1	1271.8	60.2	85.5	77.6	64.4	74.4	92.3	64.9	75.7
08/16	1957.2	1416.0	3402.4	1405.4	2404.1	2263.4	1710.7	1291.4	64.0	89.9	78.8	70.1	76.1	92.3	69.1	76.9
08/17	2169.2	1433.8	3442.8	1487.9	2521.1	2275.4	1801.3	1316.5	71.0	91.0	79.7	74.2	79.8	92.8	72.6	78.4
08/18	2463.5	1456.9	3551.1	1540.3	2631.7	2280.5	1887.2	1404.0	80.6	92.5	82.2	76.8	83.3	93.0	76.0	83.6
08/19	2645.5	1460.9	3636.6	1556.2	2666.3	2286.6	1948.4	1443.5	86.5	92.7	84.2	77.6	84.4	93.3	78.4	85.9
08/20	2649.8	1473.8	3669.7	1566.6	2702.5	2300.0	2031.6	1469.9	86.7	93.6	85.0	78.1	85.5	93.8	81.6	87.5

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Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
08/21	2676.8	1490.9	3761.8	1582.2	2711.3	2342.6	2070.4	1507.8	87.6	94.6	87.1	78.9	85.8	95.6	83.1	89.7
08/22	2794.5	1490.9	3813.2	1590.4	2779.0	2359.2	2139.0	1528.1	91.4	94.6	88.3	79.3	88.0	96.2	85.8	90.9
08/23	2816.8	1499.5	3940.8	1611.3	2849.1	2375.1	2269.9	1537.9	92.1	95.2	91.2	80.4	90.2	96.9	90.9	91.5
08/24	2826.1	1507.5	4020.2	1636.0	2943.2	2379.6	2309.8	1563.8	92.4	95.7	93.1	81.6	93.1	97.1	92.5	93.1
08/25	2860.2	1519.2	4214.2	1647.5	3048.4	2399.4	2370.7	1577.7	93.6	96.4	97.6	82.2	96.5	97.9	94.8	93.9
08/26	2876.8	1519.2	4303.7	1662.7	3097.2	2412.1	2426.8	1619.9	94.1	96.4	99.6	82.9	98.0	98.4	97.6	96.4
08/27	2892.3	1529.2	4319.0	1693.3	3144.7	2427.3	2465.5	1637.3	94.6	97.1	100.0	84.5	99.5	99.0	99.1	97.4
08/28	2908.4	1567.3	4319.0	1736.9	3153.6	2439.2	2467.3	1652.7	95.1	99.5	100.0	86.6	99.8	99.5	99.2	98.4
08/29	2952.7	1575.3		1762.7	3159.7	2444.1	2479.9	1670.8	96.6	100.0		87.9	100.0	99.7	99.7	99.4
08/30	2971.7	1575.3		1807.4		2445.1	2487.7	1680.2	97.2	100.0		90.2		99.7	100.0	100.0
08/31	2997.2	1575.3		1807.4		2451.3	2487.7	1680.2	98.0	100.0		90.2		100.0	100.0	100.0
09/01	3005.2	1575.3		1827.5					98.3	100.0		91.2				
09/02	3015.7	1575.3		1858.6					98.6	100.0		92.7				
09/03	3019.2	1575.3		1898.8					98.8	100.0		94.7				
09/04	3022.8	1575.3		1911.6					98.9	100.0		95.4				
09/05	3049.9	1575.3		1943.4					99.8	100.0		96.9				
09/06	3057.2	1575.3		1956.5					100.0	100.0		97.6				
09/07				1974.0								98.5				
09/08				1982.1								98.9				
09/09				2001.1								99.8				
09/10				2004.7								100.0				
09/11				2004.7								100.0				

Date	CUMULATIVE CPUE								Percent							
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
06/01						2.6	0.0							0.1	0.0	
06/02						2.6	0.0	0.0						0.1	0.0	0.0
06/03						2.6	0.0	0.0						0.1	0.0	0.0
06/04	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
06/05	0.0	0.0	0.0	3.3	8.7	5.6	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.0
06/06	0.0	0.0	0.0	15.7	8.7	5.6	2.7	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.1	0.0
06/07	0.0	0.0	0.0	21.8	11.7	11.5	2.7	0.0	0.0	0.0	0.0	0.4	0.2	0.4	0.1	0.0
06/08	4.7	0.0	0.0	30.3	23.0	27.8	2.7	0.0	0.2	0.0	0.0	0.6	0.4	1.1	0.1	0.0
06/09	4.7	0.0	0.0	45.3	60.9	30.3	2.7	0.0	0.2	0.0	0.0	0.9	1.2	1.2	0.1	0.0
06/10	4.7	0.0	6.0	51.5	90.3	42.1	2.7	0.0	0.2	0.0	0.1	1.1	1.7	1.6	0.1	0.0
06/11	4.7	0.0	15.0	72.4	152.8	44.8	2.7	0.0	0.2	0.0	0.4	1.5	2.9	1.7	0.1	0.0
06/12	7.0	0.0	15.0	85.7	243.8	62.0	5.7	3.0	0.3	0.0	0.4	1.7	4.7	2.4	0.2	0.2
06/13	17.0	0.0	23.3	104.8	331.1	82.5	5.7	3.0	0.7	0.0	0.6	2.1	6.4	3.2	0.2	0.2
06/14	27.4	0.0	51.8	107.6	350.3	89.7	18.3	9.0	1.2	0.0	1.2	2.2	6.8	3.4	0.7	0.7
06/15	29.9	0.0	57.6	117.4	395.4	125.6	18.3	9.0	1.3	0.0	1.4	2.4	7.6	4.8	0.7	0.7
06/16	44.8	0.0	69.4	159.4	421.0	149.8	21.1	9.0	1.9	0.0	1.7	3.3	8.1	5.7	0.8	0.7
06/17	52.6	0.0	78.7	281.0	476.6	154.2	43.5	9.0	2.2	0.0	1.9	5.7	9.2	5.9	1.6	0.7
06/18	63.3	2.7	78.7	321.8	671.3	202.9	63.0	9.0	2.7	0.2	1.9	6.6	12.9	7.8	2.3	0.7
06/19	68.3	2.7	87.5	327.7	831.7	270.8	90.8	9.0	2.9	0.2	2.1	6.7	16.0	10.4	3.3	0.7
06/20	99.6	5.4	125.5	387.7	881.4	314.7	99.5	34.3	4.2	0.4	3.0	7.9	17.0	12.1	3.7	2.7
06/21	140.7	8.3	171.4	412.1	1024.9	390.5	129.5	37.0	5.9	0.6	4.1	8.4	19.8	15.0	4.8	2.9
06/22	215.9	16.5	295.1	612.6	1276.0	446.4	151.9	45.7	9.1	1.2	7.0	12.5	24.6	17.1	5.6	3.6
06/23	224.9	24.6	402.6	715.1	1522.3	525.0	205.1	60.0	9.4	1.9	9.6	14.6	29.3	20.1	7.5	4.7
06/24	245.3	89.8	553.9	763.1	1608.0	691.8	282.1	69.0	10.3	6.8	13.2	15.6	31.0	26.5	10.4	5.4
06/25	302.1	204.6	623.5	828.9	1623.9	900.2	314.0	77.5	12.7	15.4	14.9	16.9	31.3	34.5	11.6	6.1
06/26	307.3	207.2	710.6	928.4	1687.1	1011.4	362.9	109.1	12.9	15.6	16.9	19.0	32.5	38.8	13.4	8.6
06/27	424.5	231.8	841.9	1015.3	1992.7	1145.2	531.2	166.6	17.8	17.5	20.1	20.7	38.4	43.9	19.5	13.1
06/28	608.2	259.8	1046.1	1120.3	2101.2	1222.9	603.1	216.1	25.5	19.6	24.9	22.9	40.5	46.9	22.2	17.0
06/29	831.6	262.8	1164.3	1388.5	2209.5	1345.4	690.2	279.9	34.9	19.8	27.7	28.4	42.6	51.6	25.4	22.1
06/30	865.3	315.2	1637.0	1634.5	2298.0	1451.7	721.9	288.1	36.3	23.7	39.0	33.4	44.3	55.6	26.6	22.7
07/01	1001.1	380.1	1817.3	1786.6	2680.4	1566.9	789.4	318.1	42.0	28.6	43.3	36.5	51.7	60.0	29.0	25.1
07/02	1067.6	438.4	1934.9	1906.3	2868.4	1633.3	816.9	409.0	44.8	33.0	46.1	38.9	55.3	62.6	30.1	32.2
07/03	1071.0	462.9	1970.6	1940.5	3305.8	1711.2	1017.2	430.7	45.0	34.9	47.0	39.6	63.7	65.6	37.4	33.9
07/04	1172.1	642.8	1976.5	2002.6	3774.7	1768.3	1230.9	464.0	49.2	48.4	47.1	40.9	72.7	67.8	45.3	36.6
07/05	1321.6	819.6	2094.9	2179.7	3966.4	1949.9	1419.0	469.7	55.5	61.7	49.9	44.5	76.4	74.7	52.2	37.0
07/06	1449.2	896.4	2101.3	2568.8	4086.2	2008.9	1444.9	481.7	60.8	67.5	50.1	52.5	78.7	77.0	53.2	38.0
07/07	1537.2	927.5	2179.8	3031.5	4113.7	2125.5	1618.2	493.7	64.5	69.9	51.9	61.9	79.3	81.5	59.5	38.9
07/08	1807.2	951.7	2378.7	3069.9	4147.9	2190.5	1753.9	502.3	75.9	71.7	56.7	62.7	79.9	83.9	64.5	39.6
07/09	1844.7	957.1	2502.1	3341.5	4240.2	2247.4	1814.9	562.1	77.5	72.1	59.6	68.2	81.7	86.1	66.8	44.3
07/10	1947.9	996.9	2810.3	3549.8	4387.7	2313.8	1896.3	608.5	81.8	75.1	67.0	72.5	84.6	88.7	69.8	47.9

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Date	CUMULATIVE CPUe									Percent						
	1984	1985	1986	1987	1988	1989	1990	1991	1984	1985	1986	1987	1988	1989	1990	1991
07/11	1995.7	1022.0	2950.8	3612.4	4471.1	2317.1	1974.7	634.2	83.8	77.0	70.3	73.8	86.2	88.8	72.6	50.0
07/12	2047.8	1114.9	3018.5	3665.0	4536.1	2323.9	2048.2	677.5	86.0	84.0	71.9	74.8	87.4	89.1	75.4	53.4
07/13	2086.6	1117.9	3092.2	3751.8	4599.3	2378.3	2071.0	698.7	87.6	84.2	73.7	76.6	88.6	91.1	76.2	55.0
07/14	2093.2	1123.3	3338.4	4006.8	4636.9	2413.2	2104.1	726.2	87.9	84.6	79.6	81.8	89.4	92.5	77.4	57.2
07/15	2109.1	1123.3	3372.8	4068.3	4705.8	2423.9	2128.0	745.9	88.6	84.6	80.4	83.1	90.7	92.9	78.3	58.8
07/16	2124.8	1123.3	3460.2	4101.2	4787.7	2444.3	2165.4	758.0	89.2	84.6	82.5	83.7	92.3	93.7	79.7	59.7
07/17	2132.2	1126.3	3623.1	4208.0	4851.9	2461.4	2189.7	773.6	89.5	84.9	86.3	85.9	93.5	94.3	80.6	60.9
07/18	2223.4	1136.6	3756.7	4333.0	4909.2	2484.8	2248.5	828.7	93.4	85.6	89.5	88.5	94.6	95.2	82.7	65.3
07/19	2247.5	1136.6	3782.2	4535.4	4925.0	2501.1	2315.0	844.7	94.4	85.6	90.1	92.6	94.9	95.8	85.2	66.5
07/20	2262.2	1136.6	3792.2	4705.6	4954.2	2529.8	2387.9	860.6	95.0	85.6	90.4	96.1	95.5	96.9	87.8	67.8
07/21	2276.2	1142.2	3808.3	4728.7	4989.8	2542.7	2444.9	901.0	95.6	86.1	90.8	96.6	96.2	97.4	89.9	71.0
07/22	2291.9	1173.8	3855.0	4740.3	4999.4	2550.1	2484.9	953.7	96.2	88.4	91.9	96.8	96.3	97.7	91.4	75.1
07/23	2300.5	1183.0	3897.8	4748.3	5005.4	2563.5	2519.5	986.3	96.6	89.1	92.9	97.0	96.5	98.2	92.7	77.7
07/24	2318.3	1201.6	3947.4	4776.4	5029.6	2563.5	2543.6	998.1	97.3	90.5	94.1	97.5	96.9	98.2	93.6	78.6
07/25	2322.7	1208.9	3983.4	4817.0	5045.1	2567.8	2551.6	1053.7	97.5	91.1	94.9	98.4	97.2	98.4	93.9	83.0
07/26	2330.4	1213.5	4035.1	4837.0	5057.7	2567.8	2553.7	1061.7	97.8	91.4	96.2	98.8	97.5	98.4	93.9	83.6
07/27	2336.6	1225.4	4068.6	4841.3	5075.2	2567.8	2572.0	1110.9	98.1	92.3	97.0	98.9	97.8	98.4	94.6	87.5
07/28	2340.9	1231.3	4094.6	4847.3	5084.9	2567.8	2606.6	1129.2	98.3	92.8	97.6	99.0	98.0	98.4	95.9	89.0
07/29	2348.0	1233.3	4123.8	4852.0	5097.5	2569.1	2642.6	1164.8	98.6	92.9	98.3	99.1	98.2	98.5	97.2	91.8
07/30	2351.4	1242.7	4142.3	4854.3	5120.4	2569.1	2651.4	1178.3	98.7	93.6	98.7	99.1	98.7	98.5	97.5	92.8
07/31	2359.0	1248.9	4144.3	4855.6	5126.0	2583.2	2653.4	1202.4	99.0	94.1	98.8	99.1	98.8	99.0	97.6	94.7
08/01	2364.9	1250.9	4148.0	4859.9	5131.4	2589.6	2659.1	1209.9	99.3	94.2	98.8	99.2	98.9	99.2	97.8	95.3
08/02	2365.6	1255.3	4155.1	4863.2	5135.3	2597.4	2665.0	1215.9	99.3	94.6	99.0	99.3	99.0	99.5	98.0	95.8
08/03	2367.2	1265.1	4167.5	4872.3	5141.8	2601.2	2670.6	1227.4	99.4	95.3	99.3	99.5	99.1	99.7	98.2	96.7
08/04	2370.0	1268.9	4172.2	4883.5	5144.8	2602.2	2672.5	1237.3	99.5	95.6	99.4	99.7	99.2	99.7	98.3	97.5
08/05	2372.6	1269.9	4172.2	4886.7	5147.6	2602.2	2673.4	1239.3	99.6	95.7	99.4	99.8	99.2	99.7	98.4	97.6
08/06	2378.4	1269.9	4176.8	4890.9	5155.1	2605.2	2696.7	1241.3	99.9	95.7	99.5	99.9	99.3	99.8	99.2	97.8
08/07	2380.1	1270.7	4176.8	4890.9	5174.1	2607.2	2702.7	1243.2	99.9	95.7	99.5	99.9	99.7	99.9	99.4	97.9
08/08	2380.1	1272.4	4181.1	4890.9	5176.9	2607.2	2702.7	1250.3	99.9	95.9	99.6	99.9	99.8	99.9	99.4	98.5
08/09	2380.1	1280.6	4181.1	4893.1	5179.7	2609.5	2706.6	1252.2	99.9	96.5	99.6	99.9	99.8	100.0	99.6	98.7
08/10	2380.1	1280.6	4181.1	4895.4	5184.0	2609.5	2708.4	1255.4	99.9	96.5	99.6	100.0	99.9	100.0	99.6	98.9
08/11	2380.1	1284.6	4183.7	4897.6	5187.2	2609.5	2710.4	1259.1	99.9	96.8	99.7	100.0	100.0	100.0	99.7	99.2
08/12	2380.1	1290.3	4184.7	4897.6	5188.9	2609.5	2714.3	1261.8	99.9	97.2	99.7	100.0	100.0	100.0	99.9	99.4
08/13	2380.1	1290.3	4184.7	4897.6	5188.9	2609.5	2714.3	1263.5	99.9	97.2	99.7	100.0	100.0	100.0	99.9	99.5
08/14	2380.1	1290.3	4187.1	4897.6	5188.9	2609.5	2714.3	1263.5	99.9	97.2	99.8	100.0	100.0	100.0	99.9	99.5
08/15	2380.1	1326.3	4187.1	4897.6	5188.9	2609.5	2716.4	1265.4	99.9	99.9	99.8	100.0	100.0	100.0	99.9	99.7
08/16	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	2718.2	1265.4	99.9	100.0	99.8	100.0	100.0	100.0	100.0	99.7
08/17	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	2718.2	1267.3	99.9	100.0	99.8	100.0	100.0	100.0	100.0	99.8
08/18	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	2718.2	1269.3	99.9	100.0	99.8	100.0	100.0	100.0	100.0	100.0
08/19	2380.1	1327.3	4189.0	4897.6	5188.9	2609.5	2718.2	1269.3	99.9	100.0	99.8	100.0	100.0	100.0	100.0	100.0
08/20	2381.7	1327.3	4196.4	4897.6	5188.9	2609.5	2718.2	1269.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/21	2381.7	1327.3	4196.4	4897.6	5188.9	2609.5	2718.2	1269.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Commercial coho salmon catches by period, lower  
Kuskokwim River (District 1), 1974-1991.

Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1974	Aug 01-02	9,576	267	3,444	2.8
	Aug 05-08	59,090	444	31,968	1.8
	Aug 12-15	58,066	396	28,512	2.0
	Aug 19-22	12,301	263	18,936	0.6
	Aug 26-29	5,360	107	7,704	0.7
	Sept 2-05	430	25	1,815	0.2
	Totals	144,823	516	92,379	1.6
1975	Aug 10	2,357	142	852	2.8
	Aug 04-06	12,500	292	14,016	0.9
	Aug 11-13	18,551	373	17,904	1.0
	Aug 18-20	34,435	388	18,624	1.9
	Aug 25-27	16,277	270	12,960	1.3
	Totals	84,120	533	64,356	1.3
1976	Aug 02-03	10,534	286	6,864	1.5
	Aug 09-11	29,728	400	19,200	1.5
	Aug 16-18	28,664	387	18,576	1.5
	Aug 23-25	14,543	300	14,400	1.0
	Aug 30-31	4,420	174	7,308	0.6
	Totals	87,889	516	66,348	1.3
1977	Aug 01-02	23,987	360	8,640	2.8
	Aug 03-10	91,474	487	23,376	3.9
	Aug 15-16	60,935	438	10,512	5.8
	Aug 18	25,589	378	4,536	5.6
	Aug 22	16,980	361	4,332	3.9
	Aug 25	11,874	264	3,168	3.7
	Aug 29	6,819	204	2,448	2.8
	Totals	237,658	572	57,012	4.2
1978	Aug 01	6,311	297	3,564	1.8
	Aug 04	9,455	364	4,368	2.2
	Aug 08	20,501	433	5,196	3.9
	Aug 11	42,428	485	5,820	7.3
	Aug 15	48,950	476	5,712	8.6
	Aug 18	29,485	434	5,208	5.7
	Aug 22	22,287	396	4,752	4.7
	Aug 25	11,168	293	3,516	3.2
	Aug 29	12,215	250	3,000	4.1
	Totals	202,800	597	41,136	4.9

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<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1979	Aug 02	52,276	478	5,736	9.1
	Aug 06	53,797	480	2,880	18.7
	Aug 09	26,422	497	2,982	8.9
	Aug 13	27,915	463	2,778	10.0
	Aug 16	21,675	467	2,802	7.7
	Aug 20	19,445	390	2,340	8.3
	Aug 23	5,376	328	1,968	2.7
	Aug 27	6,342	310	3,720	1.7
	<u>Aug 30</u>	<u>2,182</u>	<u>179</u>	<u>2,148</u>	<u>1.0</u>
	<b>Totals</b>	<b>215,430</b>	<b>613</b>	<b>27,354</b>	<b>7.9</b>
1980	Aug 02	9,889	375	2,250	4.4
	Aug 07	36,126	455	2,730	13.2
	Aug 11	35,178	482	2,892	12.2
	Aug 14	28,211	439	2,634	10.7
	Aug 18	43,748	441	2,646	16.5
	Aug 21	33,274	419	2,514	13.2
	Aug 25	19,264	370	2,220	8.7
	<u>Aug 28</u>	<u>13,484</u>	<u>319</u>	<u>1,914</u>	<u>7.0</u>
	<b>Totals</b>	<b>219,174</b>	<b>586</b>	<b>19,800</b>	<b>11.1</b>
	1981	Aug 03	16,184	430	2,580
Aug 06		13,885	441	2,646	5.2
Aug 10		26,972	445	2,670	10.1
Aug 13		46,252	473	2,838	16.3
Aug 17		34,739	458	2,748	12.6
Aug 20		24,184	380	2,280	10.6
Aug 24		23,771	372	2,232	10.7
Aug 27		13,785	346	2,076	6.6
<u>Aug 31</u>		<u>8,096</u>	<u>278</u>	<u>1,668</u>	<u>4.9</u>
<b>Totals</b>		<b>207,868</b>	<b>586</b>	<b>21,738</b>	<b>9.6</b>
1982	July 29	19,561	416	2,496	7.8
	Aug 02	31,944	388	2,328	13.7
	Aug 05	35,766	455	2,670	13.4
	Aug 09	61,231	442	2,652	23.1
	Aug 12	80,685	449	2,694	29.9
	Aug 16	77,785	420	2,520	30.9
	Aug 19	49,566	403	2,418	20.5
	Aug 23	25,218	349	2,094	12.0
	Aug 26	26,761	314	1,884	14.2
	<u>Aug 30</u>	<u>26,815</u>	<u>302</u>	<u>1,812</u>	<u>14.8</u>
<b>Totals</b>	<b>435,332</b>	<b>596</b>	<b>23,568</b>	<b>18.5</b>	

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<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>		
				<u>Hours</u>	<u>Catch/Hr.</u>	
1983	Aug 01	9,767	377	2,262	4.3	
	Aug 04	15,389	430	2,580	6.0	
	Aug 08	34,541	383	2,298	15.0	
	Aug 11	35,268	485	2,910	12.1	
	Aug 15	24,072	462	2,772	8.7	
	Aug 18	22,822	408	2,448	9.3	
	Aug 22	34,918	388	2,328	15.0	
	Aug 26	19,039	323	1,938	9.8	
	<u>Totals</u>		195,816	577	19,536	10.0
	1984	July 30	56,609	459	2,754	20.6
Aug 02		79,240	401	2,406	32.9	
Aug 06		84,406	542	4,878	17.3	
Aug 09		80,990	523	4,707	17.2	
Aug 13		80,268	504	4,536	17.7	
Aug 16		78,342	502	4,518	17.3	
Aug 20		63,829	491	4,419	14.4	
Aug 23		49,372	481	4,329	11.4	
Aug 27		16,472	350	3,150	5.2	
Aug 30		11,222	210	1,890	5.9	
Sept 03		1,603	69	360	4.5	
Sept 06		1,877	39	234	8.0	
<u>Totals</u>			604,230	619	38,181	15.8
1985	Aug 01	34,052	487	2,922	11.7	
	Aug 05	54,819	527	3,162	17.3	
	Aug 08	78,149	525	3,150	24.8	
	Aug 12	77,809	530	3,180	24.5	
	Aug 15	28,013	441	2,646	10.6	
	Aug 19	19,316	406	2,436	7.9	
	Aug 22	17,534	390	2,340	7.5	
	Aug 26	10,688	297	1,782	6.0	
	Aug 29	9,568	262	1,572	6.1	
	<u>Totals</u>		329,948	627	23,190	14.2
1986	July 31	27,553	352	2,112	13.0	
	Aug 04	96,127	530	3,180	30.2	
	Aug 07	127,024	600	5,400	23.5	
	Aug 11	82,215	553	3,318	24.8	
	Aug 13	92,918	526	3,156	29.4	
	Aug 15	55,633	519	3,114	17.9	
	Aug 18	51,328	477	2,862	17.9	
	Aug 21	50,640	465	2,790	18.2	
	Aug 25	37,365	458	2,748	13.6	
	Aug 28	16,436	346	2,076	7.9	
	Sept 01	5,949	234	1,404	4.2	
	<u>Totals</u>		643,188	663	32,160	20.0

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<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1987	Aug 06	46,182	590	3,540	13.0
	Aug 13	104,968	604	3,624	29.0
	Aug 17	73,867	595	3,570	20.7
	Aug 19	45,277	585	3,510	12.9
	Aug 21	33,601	540	3,240	10.4
	Aug 24	27,607	500	3,000	9.2
	Aug 27	21,772	479	2,874	7.6
	Aug 31	12,873	364	2,184	5.9
	Sept 03	11,352	278	1,668	6.8
	Sept 07	4,311	132	792	5.4
	Totals	381,810	694	28,002	13.6
1988	June 16	0	602	4,816	0
	June 20	0	612	3,672	0
	June 24	0	644	3,864	0
	June 28	0	609	3,654	0
	July 02	0	580	3,480	0
	July 05	9	579	3,474	0
	July 08	1	604	3,624	0
	July 11	24	598	3,588	0.0
	July 14	141	597	3,582	0.04
	July 18	502	575	3,450	0.14
	July 21	1,278	539	3,234	0.39
	July 25	6,323	494	2,964	2.13
	July 28	20,970	552	3,312	6.33
	Aug 01	33,954	594	3,564	9.53
	Aug 04	76,576	639	3,834	19.97
	Aug 08	76,345	640	3,840	19.88
	Aug 10	53,874	596	3,576	15.06
	Aug 12	84,700	624	3,744	22.62
	Aug 15	59,724	613	3,678	16.23
	Aug 18	37,415	620	3,720	10.06
	Aug 20	24,046	577	3,462	6.95
	Aug 27	22,683	532	3,192	7.10
	Aug 31	12,264	412	2,472	4.96
Total		510,829	746	81,796	6.24

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<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1989	June 19	0	374	2,988	0
	June 23	0	277	2,218	0
	June 26	0	126	1,006	0
	June 30	0	642	5,129	0
	July 03	0	629	3,770	0
	July 05	3	553	3,311	0
	July 08	9	621	3,733	0
	July 11	126	616	3,676	0.03
	July 14	230	590	3,576	0.06
	July 18	2,216	437	2,630	0.85
	July 27	5,651	562	3,364	1.68
	Aug 03	99,022	679	5,432	18.23
	Aug 07	73,514	642	3,853	19.08
	Aug 09	103,158	644	3,864	26.70
	Aug 12	81,970	650	3,900	21.02
	Aug 15	23,071	616	3,697	6.24
	Aug 18	5,938	381	2,284	2.60
	Aug 23	30,940	528	3,167	9.77
	Aug 26	20,881	508	4,063	5.14
	Aug 29	11,080	423	3,388	3.27
	Sept 01	3,225	194	1,421	2.77
<b>Total</b>		<b>461,034</b>	<b>745</b>	<b>70,470</b>	<b>6.54</b>
1990	July 14	70	625	5,000	0.01
	Aug 01	23,549	611	3,666	6.42
	Aug 06	61,450	631	3,786	16.23
	Aug 10	58,251	653	3,918	14.87
	Aug 13	115,444	642	3,852	29.97
	Aug 16	68,605	650	5,850	11.73
	Aug 20	51,838	594	3,564	14.54
	Aug 27	16,030	534	3,204	5.00
<b>Total</b>		<b>395,237</b>	<b>743</b>	<b>51,236</b>	<b>12.03</b>
1991	July 13	16	571	3,426	0.0
	July 18	977	568	3,408	0.29
	July 22	2,655	543	3,258	0.81
	July 25	4,871	533	3,198	1.14
	July 29	37,141	534	3,204	8.69
	Aug 01	38,284	602	3,612	10.60
	Aug 05	56,262	643	3,858	10.94
	Aug 08	72,037	634	3,804	14.20
	Aug 12	114,581	662	5,296	21.64
	Aug 14	58,393	601	4,808	12.14
	Aug 19	57,364	590	3,540	16.20
	Aug 26	43,664	512	4,096	10.66
<b>Total</b>		<b>486,245</b>	<b>749</b>	<b>62,672</b>	<b>4.79</b>

Brood Year	Escapement Index <sup>a</sup>	Return Index by Age <sup>b</sup>					Total	Return/ Spawner Index
		3	4	5	6	7		
1976	16,953	0	11,946	40,364	72,973	5,928	131,211	7.7
1977	10,725	0	2,917	26,883	54,606	10,062	94,468	8.8
1978	29,198	0	13,398	20,508	38,952	4,169	77,027	2.6
1979	20,792	333	21,526	23,614	27,585	4,777	77,835	3.7
1980	17,718	1,865	10,097	29,435	30,856	3,055	75,025	4.2
1981	31,726	285	23,282	33,847	62,900	7,298	129,591	4.1
1982	15,505	0	3,285	16,404	18,840	8,796	47,325	3.1
1983	5,886	416	21,146	52,445	39,829	4,348	118,184	20.1
1984	8,901	0	31,060	30,089	22,065			
1985	9,231	0	37,186	60,165				
1986	7,446	0	57,597					
1987	14,882	255						
1988	16,633							
1989	20,659							
1990	21,884							
1991	14,782							

a Aerial survey index plus Kogrukluk Weir estimate.

b Total commercial and subsistence catch by age, based primarily on commercial catch sample in District 1. Age 8 fish were excluded due to their rare occurrence. The year of return is obtained by adding the age to the brood year.

Appendix B.13 Comparative chinook salmon catches by fishing period by year  
in District 2, Middle Kuskokwim River, 1985-1991.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	136	8	48	2.83
	June 24	263	11	66	3.98
	June 27	548	12	72	7.61
	July 01	779	15	90	8.66
	July 04	0	0	0	0
	Aug. 08	0	6	48	0
	Aug. 12	3	14	84	0.04
	Aug. 15	1	11	66	0.00
Total		1,730	23	474	3.65
1986	June 26	186	3	18	10.33
	June 30	386	13	78	4.95
	July 03	168	8	48	3.50
	July 07	117	2	12	9.75
	July 10	45	6	36	1.25
	Aug. 07	0	8	48	0.00
	Aug. 11	0	10	60	0.00
	Aug. 13	0	10	60	0.00
	Aug. 15	1	27	162	0.01
	Aug. 18	1	8	48	0.02
	Aug. 21	0	6	36	0.00
Total		904	43	606	1.49
1987	July 03	1,325	15	90	14.72
	July 07	935	22	132	7.08
	Aug. 13	4	14	84	0.05
	Aug. 17	6	14	84	0.07
	Aug. 19	1	13	78	0.01
	Aug. 21	1	18	108	0.01
Total		2,272	29	576	3.94
1988	June 24	669	13	78	8.58
	June 28	746	17	102	7.31
	July 02	468	19	114	4.11
	Aug 08	6	14	84	0.07
	Aug 10	10	16	96	0.10
	Aug 12	3	20	120	0.03
	Aug 15	1	21	126	0.01
	Aug 18	2	15	90	0.02
	Aug 20	1	17	102	0.01
Total		1,906	29	912	2.25

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 30	610	15	120	1.80
	July 03	371	18	108	1.22
	July 05	264	14	84	1.00
	July 11	3	14	84	0.46
	Aug 07	3	22	132	0.02
	Aug 09	1	18	108	0.01
	Aug 15	3	15	90	0.01
	Aug 18	7	20	120	0.00
Total		41,745	30	846	1.66
1990	June 29	641	14	84	7.63
	July 05	467	15	90	5.19
	July 09	255	17	102	2.50
	July 14	209	17	136	1.54
	Aug 06	21	15	90	0.23
	Aug 10	17	15	90	0.19
	Aug 13	4	15	90	0.04
	Aug 16	6	17	153	0.04
	Aug 20		18	108	
	Aug 27	1	17	102	0.01
Total		1,621	22	1,045	1.13
1991	July 01	483	17	102	4.74
	July 06	341	16	96	3.55
	July 13	112	18	108	1.04
	July 18	49	17	102	0.48
	July 22	28	19	114	0.25
	July 25	20	17	136	0.15
	July 29	21	16	128	0.16
	Aug 05	6	17	136	0.04
	Aug 08	4	17	136	0.03
	Aug 12	2	16	128	0.02
	Aug 14	4	15	120	0.03
	Aug 19	2	19	114	0.02
	Aug 26	0	16	128	0.00
Total		1,320	23	1,548	0.51

Appendix B.14. Comparative sockeye salmon catches by fishing period  
by year in District 2, Middle Kuskokwim River, 1985-1991.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	115	8	48	2.40
	June 24	340	11	66	5.15
	June 27	739	12	72	10.26
	July 01	1,100	15	90	12.22
	July 04	0	0	0	0.00
	Aug. 08	0	6	48	0.00
	Aug. 12	0	14	84	0.00
	Aug. 15	0	11	66	0.00
Total		2,294	23	474	4.84
1986	June 26	616	3	18	34.22
	June 30	1,171	13	78	15.01
	July 03	265	8	48	5.52
	July 07	26	2	12	2.17
	July 10	179	6	36	4.97
	Aug. 07	0	8	48	0.00
	Aug. 11	0	10	60	0.00
	Aug. 13	1	10	60	0.02
	Aug. 15	0	27	162	0.00
	Aug. 18	0	8	48	0.00
	Aug. 21	0	6	36	0.00
	Total		904	43	606
1987	July 03	511	15	90	5.68
	July 07	1,459	22	132	11.05
	Aug. 13	1	14	84	0.01
	Aug. 17	0	14	84	0.00
	Aug. 19	0	13	78	0.00
	Aug. 21	0	18	108	0.00
Total		1,971	29	576	3.42
1988	June 24	1,041	13	78	13.35
	June 28	639	17	102	6.26
	July 02	579	19	114	5.08
	Aug 08	0	14	84	0.00
	Aug 10	0	16	96	0.00
	Aug 12	2	20	120	0.02
	Aug 15	0	21	126	0.00
	Aug 18	0	15	90	0.00
	Aug 20	0	17	102	0.00
Total		1,906	29	912	2.75

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 30	587	15	120	4.89
	July 03	238	18	108	2.20
	July 05	176	14	84	2.10
	July 11	95	14	84	1.13
	Aug 07	0	22	132	0.00
	Aug 09	0	18	108	0.00
	Aug 15	0	15	90	0.00
	Aug 18	0	20	120	0.00
Total		1,096	30	846	1.29
1990	June 29	735	14	84	8.75
	July 05	561	15	90	6.23
	July 09	580	17	102	5.69
	July 14	567	17	136	4.17
	Aug 06	5	15	90	0.06
	Aug 10	5	15	90	0.06
	Aug 13	1	16	96	0.01
	Aug 16	0	17	153	0.00
	Aug 20	0	18	108	0.00
	Aug 27	1	17	102	0.03
Total		2,457	22	1,045	1.72
1991	July 01	1,200	17	102	11.76
	July 06	613	16	96	6.39
	July 13	981	18	108	9.08
	July 18	365	17	102	3.58
	July 22	117	19	114	1.03
	July 25	177	17	136	1.30
	July 29	70	16	128	0.55
	Aug 05	0	17	136	0.00
	Aug 08	3	17	136	0.02
	Aug 12	0	16	128	0.00
	Aug 14	0	15	120	0.00
	Aug 19	0	19	114	0.00
	Aug 26	0	16	128	0.00
Total		1,320	23	1,548	1.67

Appendix B.15 Comparative chum salmon catches by fishing period by year in District 2, Middle Kuskokwim River, 1985-1991.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	647	8	48	13.48
	June 24	2,411	11	66	36.53
	June 27	2,263	12	72	31.43
	July 01	2,854	15	90	31.71
	July 04	0	0	0	0
	Aug. 08	41	6	48	1.14
	Aug. 12	45	14	84	0.54
	Aug. 15	9	11	66	0.14
Total		8,270	23	474	17.44
1986	June 26	439	3	18	24.39
	June 30	1,619	13	78	20.76
	July 03	1,249	8	48	26.02
	July 07	387	2	12	32.25
	July 10	1,282	6	36	35.61
	Aug. 07	0	8	48	0.00
	Aug. 11	23	10	60	0.38
	Aug. 13	13	10	60	0.22
	Aug. 15	0	27	162	0.00
	Aug. 18	0	8	48	0.00
	Aug. 21	0	6	36	0.00
Total		5,012	43	606	8.27
1987	July 03	3,200	15	90	35.56
	July 07	4,152	22	132	31.45
	Aug. 13	304	14	84	3.62
	Aug. 17	102	14	84	1.21
	Aug. 19	39	13	78	0.50
	Aug. 21	40	18	108	0.37
Total		1,971	29	576	13.61

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 24	4,232	13	78	54.26
	June 28	6,087	17	102	59.68
	July 02	8,155	19	114	71.54
	Aug 08	308	14	84	3.67
	Aug 10	312	16	96	3.25
	Aug 12	244	20	120	2.03
	Aug 15	144	21	126	1.14
	Aug 18	116	15	90	1.29
	Aug 20	94	17	102	0.92
Total		19,692	29	912	21.97
1989	June 30	7,353	15	120	61.28
	July 03	5,101	18	108	47.23
	July 05	3,542	14	84	42.17
	July 11	4,580	14	84	54.52
	Aug 07	238	22	132	1.80
	Aug 09	114	18	108	1.06
	Aug 15	7	15	90	0.08
	Aug 18	11	20	120	0.09
	Total		20,946	30	846
1990	June 29	3,838	14	84	45.69
	July 05	4,397	15	90	48.86
	July 09	5,163	17	102	50.46
	July 14	6,999	17	136	51.46
	Aug 06	742	15	90	8.24
	Aug 10	550	15	90	6.11
	Aug 13	276	16	96	2.88
	Aug 16	105	17	153	0.69
	Aug 20	12	18	108	0.11
Aug 27	3	17	102	0.03	
Total		13,816	22	1,045	13.59

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1991	July 01	3,043	17	102	29.83
	July 06	2,381	16	96	24.80
	July 13	4,384	18	108	40.59
	July 18	6,534	17	102	64.06
	July 22	7,154	19	114	62.75
	July 25	7,686	17	136	56.51
	July 29	3,452	16	128	26.97
	Aug 05	1,245	17	136	9.15
	Aug 08	835	17	136	6.14
	Aug 12	340	16	128	2.66
	Aug 14	227	15	120	1.89
	Aug 19	138	19	114	1.21
	Aug 26	49	16	128	0.38
<b>Total</b>		<b>37,468</b>	<b>23</b>	<b>1,548</b>	<b>17.72</b>

Appendix B.16 Comparative coho salmon catches by fishing period  
by year in District 2, Middle Kuskokwim River, 1985-1991.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	0	8	48	0.00
	June 24	0	11	66	0.00
	June 27	0	12	72	0.00
	July 01	0	15	90	0.00
	July 04	0	0	0	0
	Aug. 08	739	6	48	20.53
	Aug. 12	2,914	14	84	34.69
	Aug. 15	2,005	11	66	30.38
Total		5,658	23	474	11.94
1986	June 26	0	3	18	0.00
	June 30	0	13	78	0.00
	July 03	0	8	48	0.00
	July 07	0	2	12	0.00
	July 10	0	6	36	0.00
	Aug. 07	2,445	8	48	50.94
	Aug. 11	2,677	10	60	44.62
	Aug. 13	2,787	10	60	46.45
	Aug. 15	5,761	27	162	35.56
	Aug. 18	1,804	8	48	37.58
Aug. 21	1,325	6	36	36.81	
Total		16,799	43	606	27.72
1987	July 03	0	15	90	0.00
	July 07	0	22	132	0.00
	Aug. 13	2,273	14	84	27.06
	Aug. 17	3,374	14	84	40.17
	Aug. 19	3,928	13	78	50.36
	Aug. 21	4,571	18	108	42.32
Total		14,146	29	576	24.56

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 24	0	13	78	0.00
	June 28	0	17	102	0.00
	July 02	0	19	114	0.00
	Aug 08	1,465	14	84	17.44
	Aug 10	3,823	16	96	39.82
	Aug 12	5,216	20	120	43.47
	Aug 15	2,317	21	126	18.39
	Aug 18	1,485	15	90	16.50
	Aug 20	1,573	17	102	15.42
Total		19,692	29	912	16.78
1989	June 30	0	15	120	0.00
	July 03	0	18	108	0.00
	July 05	0	14	84	0.00
	July 11	0	14	84	0.00
	Aug 07	6,607	22	132	50.05
	Aug 09	5,714	18	108	52.91
	Aug 15	1,867	15	90	20.74
	Aug 18	2,733	20	120	22.78
Total		16,921	30	846	20.00
1990	Aug 06	1,111	15	90	12.34
	Aug 10	1,946	15	90	21.62
	Aug 13	4,192	16	96	43.67
	Aug 16	2,239	17	153	14.63
	Aug 20	2,548	18	108	23.59
	Aug 27	1,780	17	102	17.45
Total		22,085	22	639	34.56

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1991	July 22	17	19	114	0.15
	July 25	115	17	136	0.85
	July 29	177	16	128	1.38
	Aug 05	1,596	17	136	11.74
	Aug 08	2,381	17	136	17.51
	Aug 12	1,829	16	128	14.29
	Aug 14	2,461	15	120	20.51
	Aug 19	1,689	19	114	14.82
	Aug 26	4,425	16	128	34.57
<b>Total</b>		<b>37,468</b>	<b>23</b>	<b>1,548</b>	<b>10.79</b>

<u>Year</u>	<u>Escapement Estimate</u>	<u>Females</u>	<u>Sex Ratio (% female)</u>	<u>Percent of females with gill net marks</u>
1979	11,299	1,786	17.6	11.03
1980	6,572	1,045	15.9	a
1981	16,820	7,905	47.0	12.47
1982	12,185	5,995	49.2	12.99
1983	2,992	865	28.9	16.49
1984	4,928	1,119	22.7	11.08
1985	4,438	1,429	32.2	18.99
1986	4,296	987	23.0	19.43
1987 <sup>b</sup>	4,063			
1988	11,194	3,848	34.4	13.34
1989	11,940	4,127	34.6	16.46
1990	10,219	2,289	22.5	14.35
1991	7,850	3,658	44.6	19.26
1979-84 Average			30.2	10.68
1985-90 Average			29.3	16.51

a Data not available

b Sample size too small to assess sex ratio and percentage of gill net marks

Appendix B.19 Estimated swimming speed of salmon in the Kuskokwim River.

<u>Tagged at Tuluksak, 1961<sup>a</sup></u>	<u>AVG/DAY</u>	<u>RANGE</u>
Chinook Salmon	11.5	6.0 - 16.0
Sockeye Salmon	7.7	4.9 - 16.0
Coho Salmon	9.7	3.6 - 13.2
Chum Salmon	12.2	3.4 - 48.0
Pink Salmon	13.2	3.0 - 26.0

<u>Tagged at Tuluksak, 1962<sup>b</sup></u>	<u>AVG/DAY</u>
Chinook Salmon	7.07
Sockeye Salmon	11.16
Coho Salmon	N/A
Chum Salmon	13.66
Pink Salmon	14.22

Note comparison of peak catch indicated chinook salmon travel time of 20 miles per day.

<u>Tagged at Enarayak, 7 mi upstream of Eek Island<sup>c</sup></u>	<u>AVG/DAY</u>	<u>RANGE</u>
Chinook Salmon	7.7	3.3 - 19.6
Sockeye Salmon	7.0	5.1 - 10.6
Chum Salmon	6.2	5.1 - 36.0

Peak subsistence catches at seven locations Napakiak to Crooked Creek indicate migration speed in 1962 was:

Chinook Salmon	16.7
Sockeye Salmon	23.0
Chum Salmon	13.6

<u>Tagged at Eek Test Fishery, Bethel Test Fishery, and vicinity of Bethel, 1989<sup>d</sup></u>	<u>AVG/DAY</u>	<u>RANGE</u>
Chinook Salmon	8.4	0.25 - 34.0

- a Source: AYK Regional Kuskokwim Stock Separation Report No. 1  
 b Source: AYK Regional Kuskokwim Stock Separation Report No. 2  
 c Source: AYK Regional Kuskokwim Stock Separation Report No. 3  
 d source: Pilot Inventory of the Chinook Salmon Stocks of the Kuskokwim River Basin, Yukon Delta National Wildlife Refuge, 1989 Preliminary Summary

Appendix B.20 Lower Kuskokwim River, District 1, commercial effort, 1970 - 1991.

<u>Year</u>	<u>Unrestricted Mesh Season</u>	<u>Restricted Mesh Season</u>	<u>Coho Salmon Season</u>				<u>Total</u>
1970	361	a	266				387
1971	418	216	83				422
1972	405	176	245				425
1973	456	341	411				530
1974	606	467	516				666
1975	472	540	533				737
1976	561	517	516				674
1977	563	522	572				653
1978	615	617	597				723
1979	591	617	613				685
1980	553	579	586				663
1981	589	613	586				679
1982	610	576	596				686
1983	544	619	577				679
1984	520	587	619				654
1985	b	598	627				654
1986	b	631	663				688
1987	b	680	694				703
1988	b	c	c				746
<u>Number of Permits Landing Each Species</u>							
	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Roe</u>	
1989	695	688	732	261	719	22	745
1990	724	722	714	526	736	1	744
1991	687	705	731	159	733	1	749
Ten Year Average (1981-1991)							698

- a No commercial salmon season.
- b No unrestricted mesh season.
- c Fishery continued without interruption.

Appendix B.21 Middle Kuskokwim River, District 2, commercial effort 1970 - 1991.

<u>YEAR</u>	<u>UNRESTRICTED MESH SEASON</u>	<u>RESTRICTED MESH SEASON</u>	<u>COHO SALMON SEASON</u>	<u>TOTAL</u>			
1970	10	a	11	18			
1971	22	a	a	22			
1972	12	a	a	12			
1973	28	a	a	28			
1974	36	a	16	37			
1975	38	a	a	38			
1976	55	a	11	57			
1977	83	54	24	105			
1978	28	a	16	43			
1979	41	a	20	43			
1980	37	21	12	43			
1981	153	11	16	153			
1982	38	50	25	60			
1983	14	42	9	43			
1984	15	49	32	58			
1985	b	17	16	23			
1986	b	21	35	43			
1987	b	24	20	29			
1988	b	19	21	29			
Number of Permits Landing Each Species							
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	20	19	29	8	26	2	30
1990	19	19	21	13	20	0	22
1991	20	20	22	9	22	0	23
Ten Year Average (1981-1990)							49

- a No commercial salmon season.  
b No unrestricted mesh season.

Appendix B.21 Middle Kuskokwim River, District 2, commercial effort 1970 - 1991.

YEAR	UNRESTRICTED	RESTRICTED	COHO SALMON			TOTAL	
	MESH SEASON	MESH SEASON	SEASON				
1970	10	a	11			18	
1971	22	a	a			22	
1972	12	a	a			12	
1973	28	a	a			28	
1974	36	a	16			37	
1975	38	a	a			38	
1976	55	a	11			57	
1977	83	54	24			105	
1978	28	a	16			43	
1979	41	a	20			43	
1980	37	21	12			43	
1981	153	11	16			153	
1982	38	50	25			60	
1983	14	42	9			43	
1984	15	49	32			58	
1985	b	17	16			23	
1986	b	21	35			43	
1987	b	24	20			29	
1988	b	19	21			29	
	Number of Permits Landing Each Species						
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	20	19	29	8	26	2	30
1990	19	19	21	13	20	0	22
1991	20	20	22	9	22	0	23
Ten Year							
Average							49
(1981-1990)							

- a No commercial salmon season.
- b No unrestricted mesh season.

<u>Year</u>	<u>Commercial Harvest<sup>a</sup></u>	<u>Estimated Subsistence Harvest<sup>b</sup></u>	<u>Total Utilization</u>	<u>Estimated Total Run Size</u>	<u>Exploitation Rate</u>
1960	0	301,753 <sup>c</sup>	301,753		
1961	0	179,529 <sup>c</sup>	179,529		
1962	0	161,849 <sup>c</sup>	161,849		
1963	0	137,649 <sup>c</sup>	137,649		
1964	0	190,191 <sup>c</sup>	190,191		
1965	0	250,878 <sup>c</sup>	250,878		
1966	0	175,735 <sup>c</sup>	175,735		
1967	148	208,445 <sup>c</sup>	208,593		
1968	187	275,008 <sup>c</sup>	275,195		
1969	7,165	204,105 <sup>c</sup>	211,270		
1970	1,664	246,810 <sup>c</sup>	248,474		
1971	68,914	116,391 <sup>c</sup>	185,305		
1972	78,619	120,316 <sup>c</sup>	198,935		
1973	148,746	179,259 <sup>c</sup>	328,005		
1974	171,887	277,170 <sup>c</sup>	449,057		
1975	181,840	176,389 <sup>c</sup>	358,229		
1976	177,864	223,792 <sup>c</sup>	401,656		
1977	248,721	198,355 <sup>c</sup>	447,076		
1978	248,656	118,809 <sup>c</sup>	367,465		
1979	261,874	161,239 <sup>c</sup>	423,113		
1980	483,211	165,172 <sup>c</sup>	648,383		
1981	418,677	157,306 <sup>c</sup>	575,983		
1982	278,306	190,011 <sup>c</sup>	468,317		
1983	267,698	146,876 <sup>c</sup>	414,574		
1984	423,718	142,542 <sup>c</sup>	566,260		
1985	199,478	95,542	295,020		
1986	309,213	141,931	451,144		
1987	574,336	69,047	643,383		
1988	1,381,674	117,008	1,498,682		
1989	749,182	122,086	871,268		
1990	461,624	96,273	557,897		
1991	431,802	81,652	513,454	898,377	57%
Ten Year Average (1981-1990)	506,391	127,862	634,253		

a District 1 and 2.

b Estimated subsistence harvest expanded from villages surveyed.

c Includes small numbers of small chinook, sockeye and coho salmon.

## Appendix B.23

Age distribution of historic commercial chum salmon catches from the lower Kuskokwim River, by sample trip.

Year	Date	Sample Size	Sex (%)	Age Composition (%)				Total	
				0.2	0.3	0.4	0.5		
1984	6/18-6/21	261	M	0	31	23	2	56	
			F	0	34	9	1	44	
			Subtotal	0	66	31	3	100	
	6/22-6/28	419	M	0	49	4	1	54	
			F	0	41	4	0	46	
			Subtotal	0	90	8	1	100	
	6/29-7/5	884	M	1	31	3	0	34	
			F	0	61	5	0	66	
			Subtotal	1	92	8	0	100	
	7/6-16	624	M	0	28	3	1	32	
			F	2	61	5	0	68	
			Subtotal	2	89	8	1	100	
	Season <sup>a</sup>	2,188	M	0	35	8	1	44	
			F	1	49	6	0	56	
			Total	1	84	14	1	100	
1985	6/20-6/27	606	M	0	12	32	0	44	
			F	0	16	40	0	56	
			Subtotal	0	28	72	1	100	
	7/1-7/4	424	M	1	23	26	0	49	
			F	1	22	28	0	51	
			Subtotal	1	44	54	0	100	
	Season <sup>a</sup>	1,030	M	0	17	29	0	47	
			F	0	19	34	0	53	
			Total	1	36	63	0	100	
	1986	6/26-7/3	636	M	0	37	13	0	50
				F	0	37	13	1	50
				Subtotal	0	74	25	1	100
		7/4-7/10	428	M	1	34	7	0	42
				F	1	47	11	0	58
				Subtotal	1	81	18	0	100
Season <sup>a</sup>		1,064	M	0	36	10	0	46	
			F	0	42	12	0	54	
			Total	1	78	21	0	100	

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Year	Date	Sample Size	Sex (%)	Age Composition (%)				
				0.2	0.3	0.4	0.5	Total
1987	6/18-6/24	256	M	0	11	34	1	45
			F	0	17	36	1	55
			Subtotal	0	28	70	2	100
	6/30	528	M	0	26	20	1	46
			F	1	25	28	0	54
			Subtotal	1	51	48	1	100
	7/3-7/7	214	M	1	21	19	0	41
			F	1	33	26	0	59
			Subtotal	1	54	45	0	100
	7/11	212	M	1	22	18	1	42
			F	1	34	23	1	58
			Subtotal	2	55	41	1	100
	7/15	198	M	2	24	16	1	41
			F	1	38	20	0	59
			Subtotal	2	62	35	1	100
	7/20	218	M	1	25	13	0	39
			F	3	44	14	1	61
			Subtotal	4	69	27	1	100
Season <sup>a</sup>	1,626	M	1	21	20	1	42	
		F	1	32	25	0	58	
		Total	2	53	44	1	100	
1988	6/16-6/20	387	M	0	27	22	1	50
			F	0	28	20	2	50
			Subtotal	0	56	41	3	100
	6/24-6/28	416	M	1	39	16	1	56
			F	0	33	11	1	45
			Subtotal	1	71	27	1	100
	7/2-7/5	370	M	1	46	9	0	55
			F	0	38	7	0	45
			Subtotal	1	84	15	0	100
	7/8-7/11	372	M	1	44	6	0	51
			F	0	46	3	0	50
			Subtotal	1	90	9	0	100
	7/14-7/18	409	M	1	30	7	0	38
			F	2	56	5	1	62
			Subtotal	2	86	12	1	100

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Appendix B.23 (page 3 of 4)

<u>Year</u>	<u>Date</u>	<u>Sample Size</u>	<u>Sex (%)</u>	<u>Age Composition (%)</u>				
				<u>0.2</u>	<u>0.3</u>	<u>0.4</u>	<u>0.5</u>	<u>Total</u>
1988	7/21-7/28	450	M	0	41	5	0	47
			F	1	48	4	0	53
		Subtotal		1	89	10	0	100
	Season <sup>a</sup>	2,404	M	0	38	11	0	49
			F	0	41	8	0	51
	Total		1	79	19	1	100	
1989	6/19	147	M	0	15	27	1	43
			F	0	14	41	2	56
		Subtotal		0	29	68	3	99
	6/26-6/30	149	M	0	17	33	1	50
			F	0	17	33	0	50
		Subtotal		0	34	66	1	100
	7/3-7/5	143	M	0	18	32	0	50
			F	0	14	36	1	50
		Subtotal		0	32	67	1	100
	7/11-7/18	201	M	1	15	24	1	40
			F	1	34	24	1	60
		Subtotal		1	50	48	2	100
	Season <sup>a</sup>	640	M	0	16	29	0	46
			F	0	20	33	1	54
		Total		0	36	62	1	100
1990	6/20-6/29	206	M	1	29	29	3	61
			F	1	30	9	0	39
		Subtotal		1	59	37	3	100
	7/5-7/9	154	M	0	33	13	0	46
			F	0	41	13	1	55
		Subtotal		0	73	26	1	100
	7/14-8/6	198	M	2	29	2	0	33
			F	1	53	9	0	63
		Subtotal		3	82	11	0	95
	Season <sup>a</sup>	558	M	1	30	15	1	46
			F	1	41	10	0	52
		Total		1	71	25	1	98

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Year	Date	Sample Size	Sex (%)	Age Composition (%)				Total
				0.2	0.3	0.4	0.5	
1991	6/20	154	M	0	15	25	0	40
			F	0	19	41	0	60
		Subtotal		0	34	66	0	100
	6/24	145	M	1	26	24	0	51
			F	0	24	25	0	49
		Subtotal		1	50	49	0	100
	7/1	172	M	(Not Available)				
			F	(Not Available)				
		Subtotal		0	58	42	0	0
	7/6	169	M	1	37	20	1	58
			F	2	28	12	0	42
		Subtotal		2	64	33	1	100
	7/13	136	M	1	28	13	0	41
			F	2	37	20	0	59
		Subtotal		3	65	32	0	100
	7/18	153	M	2	29	13	0	44
			F	3	40	13	0	56
		Subtotal		5	69	26	0	100
	7/22	158	M	0	27	13	0	39
			F	1	41	18	0	61
		Subtotal		1	68	31	0	100
	7/29	146	M	1	24	9	0	34
			F	1	51	13	0	66
		Subtotal		3	75	22	0	100
	8/1	146	M	1	21	5	0	27
			F	1	55	16	0	73
		Subtotal		1	77	22	0	100
	8/5	140	M	2	26	9	0	36
			F	1	51	11	0	64
		Subtotal		4	77	19	0	100
	8/8	109	M	2	64	6	7	79
			F	1	17	1	3	21
		Subtotal		3	81	6	10	100
	Season <sup>a</sup> (7/01 excluded)	1,628	M	1	30	14	1	45
			F	1	36	17	0	55
		Total		2	66	31	1	100
All Years (Percents Are Mean of Annual Totals) <sup>b</sup>	11,138	Grand Total	M	0	28	17	1	46
			F	1	35	18	0	54
				1	63	35	1	100

a Percentages for season totals are simple averages, they are not weighted averages.

b Percentages in the grand total are simple percentages using the season totals.

## Appendix B.24

## Age distribution of historic commercial chinook salmon catches from the lower Kuskokwim River, by sample trip.

Year	Date	Sample Size	Sex	Age Composition (%)										Total		
				0.2	1.1	1.2	0.4	1.3	2.2	1.4	2.3	1.5	2.4		1.6	2.5
1984	Season*	658	M	0	0	10	0	31	0	19	1	4	1	0	0	67
			F	0	0	0	0	4	0	22	0	6	1	0	0	33
			Total	0	0	10	0	35	0	41	1	9	2	0	1	100
1985	6/20	367	M	0	0	17	0	26	0	14	0	2	0	0	0	60
			F	0	0	4	0	14	0	18	0	5	0	0	0	40
			Subtotal	0	0	21	0	39	0	33	0	7	0	0	0	100
6/24	91	M	0	0	29	0	10	0	13	0	0	0	0	0	52	
		F	0	0	8	0	9	0	28	0	4	0	0	0	48	
		Subtotal	0	0	36	0	19	0	41	0	4	0	0	0	100	
6/27	88	M	0	0	33	0	28	0	11	0	1	0	0	0	74	
		F	0	0	6	0	8	0	10	0	2	0	0	0	26	
		Subtotal	0	0	39	0	36	0	22	0	3	0	0	0	100	
7/1	74	M	0	0	31	0	22	1	12	0	0	0	0	0	66	
		F	0	0	3	0	7	0	23	0	1	0	0	0	34	
		Subtotal	0	0	34	0	28	1	35	0	1	0	0	0	100	
7/4	17	M	0	0	50	0	25	0	13	0	0	0	0	0	88	
		F	0	0	6	0	6	0	0	0	0	0	0	0	13	
		Subtotal	0	0	56	0	31	0	13	0	0	0	0	0	100	
Season*	637	M	0	0	32	0	22	0	13	0	1	0	0	0	68	
		F	0	0	5	0	9	0	16	0	3	0	0	0	32	
		Total	0	0	37	0	31	0	28	0	3	0	0	0	100	
1986	Season*	142	M	0	2	12	0	42	0	10	0	0	0	0	0	66
			F	0	0	1	0	13	0	15	0	5	0	1	0	34
			Total	0	2	13	0	55	0	25	0	5	0	1	0	100
1987	Season* (6/18)	550	M	0	0	46	0	13	0	19	0	1	0	0	0	78
			F	0	0	2	0	3	0	17	0	1	0	0	0	22
			Total	0	0	47	0	16	0	36	0	1	0	0	0	100
1988	Season*	646	M	0	0	25	0	27	0	6	0	1	0	0	0	60
			F	0	0	3	0	20	0	11	0	5	0	0	0	40
			Total	0	0	28	0	48	0	17	0	7	0	0	0	100
1989	6/19	147	M	0	0	26	0	13	1	22	4	0	3	0	0	69
			F	0	0	1	0	4	1	20	0	1	3	0	1	31
			Subtotal	0	0	27	0	17	2	42	4	1	5	0	1	100
6/23,26,30 7/3,5	211	M	0	0	24	0	16	2	10	1	2	1	0	0	57	
		F	0	0	11	0	10	2	14	1	4	1	0	0	43	
		Subtotal	0	0	36	0	26	4	24	2	7	1	0	0	100	
Season*	358	M	0	0	25	0	14	2	16	3	1	2	0	0	63	
		F	0	0	6	0	7	1	17	0	3	2	0	0	37	
		Total	0	0	31	0	22	3	33	3	4	3	0	0	100	

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Year	Date	Sample Size	Sex	Age Composition (%)											Total		
				0.2	1.1	1.2	0.4	1.3	2.2	1.4	2.3	1.5	2.4	1.6		2.5	
1990	6/20,25	256	M	0	0	47	0	29	0	8	0	2	0	0	0	86	
			F	0	0	1	0	6	0	6	0	1	0	0	0	15	
			Subtotal	0	0	48	0	35	0	14	0	3	0	0	0	100	
	6/29,7/5,9	152	M	0	0	30	0	33	0	11	0	3	0	0	0	76	
			F	0	0	1	0	9	0	12	0	2	0	0	0	24	
			Subtotal	0	0	30	0	42	0	23	0	5	0	0	0	100	
	Season*	408	M	0	0	38	0	31	0	10	0	2	0	0	0	81	
			F	0	0	1	0	8	0	9	0	2	0	0	0	19	
			Total	0	0	39	0	39	0	19	0	4	0	0	0	100	
	1991	6/20	155	M	0	0	29	0	21	4	7	4	0	0	0	1	66
				F	0	0	2	0	12	1	14	0	3	2	0	1	34
				Subtotal	0	0	31	0	34	5	21	4	3	2	0	1	100
6/24		129	M	0	0	36	0	17	0	9	0	1	1	0	0	64	
			F	0	0	2	0	13	0	20	0	2	0	0	0	37	
			Subtotal	0	0	37	0	30	0	30	0	2	1	0	0	100	
7/6		71	M	0	0	28	0	21	0	11	0	0	0	0	0	61	
			F	0	0	0	0	7	0	28	0	4	0	0	0	39	
			Subtotal	0	0	28	0	28	0	40	0	4	0	0	0	100	
7/13		44	M	0	0	27	0	22	0	11	0	0	0	0	0	61	
			F	0	0	9	0	7	0	21	0	2	0	0	0	39	
			Subtotal	0	0	36	0	29	0	32	0	2	0	0	0	100	
7/18	21	M	5	0	38	0	10	5	10	0	0	5	0	0	72		
		F	0	0	5	0	5	0	14	0	0	5	0	0	29		
		Subtotal	5	0	43	0	14	5	24	0	0	10	0	0	100		
Season*	420	M	1	0	32	0	18	2	10	1	0	1	0	0	65		
		F	0	0	3	0	9	0	19	0	2	1	0	0	35		
		Total	1	0	35	0	27	2	29	1	2	2	0	0	100		
All Years (Percents Are Mean of Season Totals <sup>b</sup> )	3,819	M	0	0	27	0	25	1	13	1	1	0	0	0	68		
		F	0	0	3	0	9	0	16	0	3	1	0	0	32		
		Grand Total	0	0	30	0	34	1	29	1	4	1	0	0	100		

\* Percentages for season totals are simple averages, they are not weighted averages.

<sup>b</sup> Percentages in the grand totals are simple percentages using the season totals.

## Appendix B.25

## Age distribution of historic commercial sockeye salmon catches from the lower Kuskokwim River, by sample trip.

Year	Date	Sample Size	Sex	Age Composition (%)											Total		
				0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	2.4		3.3	
1984	Season*	296	M	0	0	3	3	0	0	27	3	0	11	0	0	47	
			F	0	0	4	6	0	0	29	3	0	8	0	0	52	
			Total	0	0	7	9	0	0	57	7	1	18	0	0	99	
1985	6/20-27	544	M	0	0	1	3	0	0	28	4	1	4	0	0	41	
			F	0	0	2	4	0	1	40	6	0	6	0	0	59	
		Subtotal	0	0	3	8	0	1	68	10	1	10	0	0	100		
		7/1-4	349	M	0	0	1	1	0	1	31	7	1	7	0	0	48
	F			0	0	1	3	0	1	32	6	1	10	0	0	52	
		Subtotal	0	0	2	4	0	2	63	12	2	16	0	0	100		
	Season*	893	M	0	0	1	2	0	0	30	5	1	5	0	0	44	
	F	0	0	1	3	0	1	36	6	0	8	0	0	56			
	Total	0	0	3	6	0	1	65	11	1	13	0	0	100			
1986	Season*	535	M	0	0	3	3	0	0	39	1	0	4	0	0	50	
			F	0	0	4	3	0	0	37	2	0	4	0	0	50	
			Total	0	0	2	5	0	1	64	12	1	15	0	0	100	
1987	6/18	68	M	0	0	0	2	0	0	25	0	2	7	0	0	35	
			F	0	0	2	6	0	0	50	0	0	7	0	0	65	
		Subtotal	0	0	2	7	0	0	75	0	2	15	0	0	100		
		6/24	331	M	0	0	2	2	0	0	35	1	2	3	0	0	44
	F			0	0	3	5	0	0	41	2	0	5	0	0	56	
		Subtotal	0	0	5	7	0	0	76	2	2	8	0	0	100		
	6/30	168	M	0	0	0	4	0	1	40	0	1	4	0	0	49	
F			0	0	1	3	0	0	36	1	1	10	0	0	51		
	Subtotal	0	0	1	7	0	1	76	1	1	14	0	0	100			
	Season*	567	M	0	0	1	2	0	0	33	0	1	5	0	0	43	
	F	0	0	2	5	0	0	42	1	0	7	0	0	57			
	Total	0	0	2	7	0	0	76	1	2	12	0	0	100			
1988	Season*	453	M	0	0	0	1	0	0	30	1	0	12	0	0	44	
			F	0	0	0	1	0	0	44	1	2	10	0	0	57	
			Total	0	0	0	1	0	0	74	1	2	21	0	0	100	
1989	Season* (6/19,23, 26,30,7/3)	175	M	0	0	0	1	0	0	29	4	1	8	1	0	44	
			F	0	0	0	2	0	0	30	6	3	13	0	1	55	
			Total	0	0	0	3	0	0	59	10	5	21	1	1	99	
1990	Season* (6/25,29, 7/9)	250	M	0	0	0	1	0	0	37	3	0	7	0	0	49	
			F	0	0	0	2	0	1	40	2	2	3	0	0	51	
			Total	0	0	0	4	0	1	77	5	3	10	0	0	100	
1991	6/20	147	M	0	0	1	1	0	0	45	0	1	2	0	0	50	
			F	1	0	0	5	0	0	44	1	0	1	0	0	50	
			Subtotal	1	0	1	6	0	0	88	1	1	3	0	0	100	

-- continued --

Year	Date	Sample Size	Sex	Age Composition (%)											Total	
				0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	2.4		3.3
1991	7/1	98	M	(Not Available)											0	
			F	(Not Available)											0	
			Subtotal	0	0	2	14	0	1	78	1	1	3	0	0	100
	7/6	148	M	0	0	2	4	0	1	34	1	3	5	0	0	49
			F	0	0	1	8	0	1	40	1	0	0	0	0	51
			Subtotal	0	0	3	12	0	2	74	1	3	5	0	0	100
	7/13	99	M	0	0	3	6	0	0	33	0	0	0	0	0	42
			F	0	0	1	8	0	1	47	0	1	1	0	0	59
			Subtotal	0	0	4	14	0	1	80	0	1	1	0	0	101
	7/18	21	M	0	0	0	5	0	0	50	0	5	0	0	0	60
			F	0	0	0	5	0	0	30	0	0	5	0	0	40
			Subtotal	0	0	0	10	0	0	80	0	5	5	0	0	100
	Season <sup>a</sup> (7/1 excluded)	513	M	0	0	1	4	0	0	40	0	2	2	0	0	50
			F	0	0	0	6	0	1	40	0	0	2	0	0	50
			Total	0	0	2	10	0	1	81	1	3	4	0	0	100
All Years (Percents Are Mean of Annual Totals) <sup>b</sup>		3,682	M	0	0	1	2	0	0	33	2	1	7	0	0	46
			F	0	0	1	4	0	0	37	3	1	7	0	0	54
			Grand Total	0	0	2	6	0	1	69	6	2	14	0	0	100

<sup>a</sup> Percentages for season totals are simple averages, they are not weighted averages.

<sup>b</sup> Percentages in the grand totals are simple percentages using the season totals.

## Appendix B.26

Age distribution of historic commercial coho salmon catches from the lower Kuskokwim River, by sample trip.

Year	Date	Sample Size	Sex	Age Composition (%)			
				1.1	2.1	3.1	Total
1984	7/12-8/2	271	M	3	48	2	52
			F	2	44	2	48
			Subtotal	4	93	3	100
	8/3-9	243	M	1	52	0	53
			F	2	44	1	47
			Subtotal	3	96	1	100
	8/10-16	252	M	2	47	1	51
			F	3	44	2	49
			Subtotal	6	92	3	100
	8/17-27	328	M	2	47	3	52
			F	3	44	2	49
			Subtotal	5	90	5	100
	8/28-9/3	239	M	4	42	3	49
			F	5	42	5	52
			Subtotal	8	83	8	100
Season*	1,333	M	2	47	2	51	
		F	3	44	2	49	
		Total	5	91	4	100	
1985	8/1-5	255	M	4	44	4	52
			F	4	40	4	48
			Subtotal	8	84	8	100
	8/8-12	239	M	3	51	2	56
			F	3	40	1	44
			Subtotal	6	91	3	100
	8/15-19	249	M	8	45	2	55
			F	4	37	3	45
			Subtotal	13	83	4	100
	8/22-29	376	M	7	41	3	51
			F	6	42	2	50
			Subtotal	13	82	5	100
	Season*	1,119	M	6	45	2	53
			F	5	40	3	47
			Total	10	85	5	100
1986	6/31-8/4	250	M	4	51	0	55
			F	2	42	0	45
			Subtotal	6	93	0	100

-- continued --

Year	Date	Sample Size	Sex	Age Composition (%)			
				1.1	2.1	3.1	Total
	8/7-15	336	M	3	51	1	55
			F	2	41	2	46
			Subtotal	5	92	4	100
	8/17-28	255	M	2	48	2	52
			F	2	44	2	48
			Subtotal	4	91	4	100
	Season*	841	M	3	50	1	54
			F	2	43	1	46
			Total	5	92	3	100
	1987	8/6	126	M	1	37	6
F				10	37	10	56
			Subtotal	10	74	16	100
8/13		111	M	7	32	5	43
			F	2	47	8	57
			Subtotal	9	78	13	100
8/17,19		158	M	2	36	9	47
			F	3	42	8	53
			Subtotal	4	79	17	100
8/21,24		147	M	3	40	7	50
	F		3	35	12	50	
		Subtotal	6	75	19	100	
8/27,31,9/3	278	M	6	40	8	54	
		F	3	35	8	46	
		Subtotal	9	75	16	100	
Season*	820	M	4	37	7	47	
		F	4	39	9	53	
		Total	8	76	16	100	
1988	7/25,28	221	M	4	49	0	53
			F	1	46	1	48
			Subtotal	5	95	1	100
	8/1,4	244	M	2	48	1	52
			F	2	46	1	48
			Subtotal	4	94	2	100
	8/8,10	238	M	2	48	1	50
			F	3	46	1	50
			Subtotal	4	94	2	100

-- continued --

Year	Date	Sample Size	Sex	Age Composition (%)			Total	
				1.1	2.1	3.1		
1988	8/15,18	240	M	2	45	1	48	
			F	4	48	0	52	
			Subtotal	6	94	1	100	
	8/27,31	484	M	2	42	1	44	
			F	3	50	1	54	
			Subtotal	4	92	2	99	
	Season*	1,427	M	2	46	1	49	
			F	2	47	1	50	
			Total	4	94	1	100	
	1989	7/18,27,8/3	229	M	4	52	1	58
				F	5	38	0	42
				Subtotal	9	90	1	100
8/7,9,12		127	M	7	47	1	54	
			F	2	42	2	46	
			Subtotal	9	88	3	100	
8/15,18		132	M	3	52	1	56	
			F	5	37	2	44	
			Subtotal	8	89	3	100	
8/23,26		127	M	4	46	2	51	
			F	6	43	1	49	
			Subtotal	9	88	2	100	
8/29		128	M	6	34	2	43	
			F	6	48	4	57	
			Subtotal	12	82	6	100	
Season*		743	M	5	46	1	52	
			F	4	41	2	48	
			Total	9	88	3	100	
1990	8/1,6,10	222	M	1	54	4	59	
			F	1	37	2	41	
			Subtotal	3	92	6	100	
	8/13,16,20,27	167	M	3	51	2	56	
			F	3	38	3	44	
			Subtotal	6	89	5	100	
	Season*	389	M	2	53	3	57	
			F	2	38	3	43	
			Total	4	90	5	100	

-- continued --

Year	Date	Sample Size	Sex	Age Composition (%)				
				1.1	2.1	3.1	Total	
1991	7/25	89	M	1	69	1	71	
			F	0	29	0	29	
		Subtotal		1	98	1	100	
	8/1	94	M	6	51	6	64	
			F	3	31	2	36	
		Subtotal		10	82	9	100	
	8/8	98	M	2	71	6	80	
			F	1	18	1	20	
		Subtotal		3	90	7	100	
	8/14	95	M	1	51	7	59	
			F	2	35	4	41	
		Subtotal		3	85	12	100	
	8/19	98	M	2	31	3	36	
			F	4	54	6	64	
		Subtotal		6	85	9	100	
	8/26	99	M	1	40	3	44	
			F	6	46	3	56	
		Subtotal		7	87	6	100	
Season*		573	M	2	52	5	59	
			F	3	36	3	41	
		Total		5	88	7	100	
All Years (Percents Are Mean of Annual Totals) <sup>b</sup>			7,245	M	3	47	3	53
				F	3	41	3	47
		Grand Total			6	88	6	100

\* Percentages for season totals are simple averages, they are not weighted averages.

<sup>b</sup> Percentages in the grand totals are simple percentages using the season totals.

**APPENDIX C**

Appendix C.1 Historical age composition percentage, chinook salmon,  
Quinhagak commercial harvest and escapement, 1982 - 1990.

		<u>Total years of life at maturity</u>					
	Sample Size	3	4	5	6	7+	Total
1982							
Commercial							
Male		0.0	3.6	33.3	9.4	1.3	47.6
Female		0.0	1.3	31.1	18.4	1.6	52.4
Combined	309	0.0	4.9	64.4	27.8	2.9	100.0
Commercial Catch <sup>b</sup>		0	1,083	14,236	6,145	641	22,106
1983							
Commercial							
Male		0.4	25.9	6.1	27.3	1.5	61.2
Female		0.0	0.1	0.8	37.0	0.9	38.8
Combined	758	0.4	26.0	6.9	64.3	2.4	100.0
Commercial Catch <sup>b</sup>		186	12,060	3,201	29,826	1,113	46,385
Escapement							
Male		0.3	6.7	10.9	29.7	1.0	48.6
Female		0.0	0.2	2.4	45.8	3.0	51.4
Combined	580	0.3	6.9	13.3	75.5	4.0	100.0
Escapement <sup>o</sup>		148	3,403	6,558	37,231	1,972	49,312
1984							
Commercial							
Male		0.0	12.0	52.7	14.8	3.9	83.4
Female		0.0	0.0	1.5	10.1	5.0	16.6
Combined	583	0.0	12.0	54.2	24.9	8.9	100.0
Commercial Catch <sup>b</sup>		0	4,038	18,239	8,379	2,995	33,652
Escapement							
Male		1.5	5.0	34.0	20.0	2.6	63.1
Female		0.0	0.0	4.3	28.5	4.1	36.9
Combined	545	1.5	5.0	38.3	48.5	6.7	100.0
Escapement <sup>o</sup>		574	1,912	35,973	14,648	18,549	38,245

-continued-

		<u>Total years of life at maturity</u>						
		Sample Size	3	4	5	6	7+	Total
1985								
Commercial								
Male			0.0	19.3	20.9	26.7	1.6	59.1
Female			0.0	0.0	2.5	28.3	0.7	40.9
Combined	569		0.0	19.3	23.4	55.0	2.3	100.0
Commercial Catch <sup>b</sup>			0	5,867	7,114	16,721	699	30,401
Escapement								
Male			0.6	5.3	11.0	30.6	0.9	48.4
Female			0.0	0.0	3.7	45.5	2.4	51.6
Combined	661		0.6	5.3	14.7	76.1	3.3	100.0
Escapement <sup>o</sup>			215	1,895	5,256	27,210	1,180	35,755
1986								
Commercial								
Male			2.0	6.0	43.0	16.0	4.0	71.0
Female			0.0	0.0	2.0	19.0	8.0	29.0
Combined	502		2.0	6.0	45.0	35.0	12.0	100.0
Commercial Harvest			457	1,370	10,276	7,992	2,740	22,835
Escapement								
Male			1.5	6.0	21.2	18.1	6.0	52.8
Female			0.0	0.0	6.5	26.6	14.1	47.2
Combined	199		1.5	6.0	27.7	44.7	20.1	100.0
Escapement <sup>o</sup>			343	1,375	6,349	10,246	4,607	22,922
1987								
Commercial								
Male			0.4	26.7	17.9	36.4	1.3	82.7
Female			0.0	0.0	0.0	16.4	1.0	17.3
Combined	525		0.4	26.7	17.9	52.8	2.3	100.0
Commercial Catch			99	6,939	4,659	13,730	595	26,022
Escapement								
Male			0.5	2.9	10.8	34.6	3.1	52.0
Female			0.0	0.8	3.7	39.4	3.9	48.0
Combined			0.5	3.7	14.4	74.0	7.1	100.0
Escapement <sup>o</sup>	381		44	2,944	1,974	5,823	253	11,029

-continued-

<u>Total years of life at maturity</u>							
	Sample Size	3	4	5	6	7+	Total
1988							
Commercial							
Male		0.0	19.8	24.2	12.8	3.0	59.8
Female		0.0	2.7	9.5	18.1	9.8	40.2
Combined	592	0.0	22.5	33.6	30.9	12.8	100.0
Commercial Catch		0	3,119	4,666	4,292	1,782	13,883
Escapement samples not collected							

- a) Total represents number of freshwater and marine annuli, plus one.  
 b) Based on commercial catch samples.  
 c) Escapement numbers based on Kanektok River Sonar estimates.

## Appendix C.2

Kanektok River peak aerial surveys by  
species, 1959-1991<sup>a</sup>.

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1960	6,047	34,900		36,100
1961				
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978 <sup>b</sup>	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981 <sup>c</sup>	15,900	49,175		71,840
1982 <sup>d</sup>	8,142	55,940		
1983	8,890	2,340		9,360
1984 <sup>e</sup>	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
1988	11,140	30,440		20,063
1989	7,914	14,735	1,755	6,270
1990	2,563	32,082		2,475
1991 <sup>d</sup>	2,100	43,500	4,330	18,000
AVERAGE:	7,055	30,000	18,242	33,600
OBJECTIVE:	5,000	15,000		30,500

- a Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; these are footnoted.
- b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.
- c Poor survey for chinook, sockeye, chum salmon.
- d Late Survey for chinook, sockeye salmon (after 5 August).
- e Poor coho survey.

## Appendix C.3

Historical age composition percentage, sockeye salmon,  
Quinhagak commercial catch and escapement, 1982 - 1988.

Age Composition		<u>Total years of life at maturity<sup>a</sup></u>				Total
		3	4	5	6	
1982						
Commercial	Sample Size					
Male		0.0	17.2	38.0	0.0	55.2
Female		0.0	13.3	31.5	0.0	44.8
Combined	203	0.0	30.5	69.5	0.0	100.0
Commercial Catch <sup>b</sup>		0	7,834	17,851	0	25,685
Escapement sockeye salmon samples were not collected.						
1983						
Commercial	Sample Size					
Male		0.0	23.0	20.9	4.0	47.9
Female		0.0	31.0	18.5	2.6	52.1
Combined	470	0.0	54.0	39.4	6.6	100.0
Commercial Catch <sup>b</sup>		0	5,542	4,044	677	10,263
Escapement sockeye salmon samples were not collected.						
1984						
Commercial	Sample Size					
Male		0.0	17.1	34.5	4.9	56.5
Female		0.0	10.0	30.1	3.4	43.5
Combined	531	0.0	27.1	64.6	8.3	100.0
Commercial Catch <sup>b</sup>		0	4,677	11,149	1,432	17,258
Escapement						
Male		0.3	22.8	36.7	1.5	61.3
Female		0.0	8.9	29.0	0.8	38.7
Combined	382	0.3	31.7	65.7	2.3	100.0
Escapement <sup>c</sup>		164	17,357	35,973	1,259	54,754
1985						
Commercial	Sample Size					
Male		0.0	9.3	40.4	1.6	59.1
Female		0.0	11.9	35.3	1.6	40.9
Combined	569	0.0	21.2	75.6	3.2	100.0
Commercial Catch <sup>b</sup>		0	1,666	5,957	252	7,876

-continued-

Age Composition		Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1986						
Commercial						
Male		0.0	11.7	39.2	0.2	51.1
Female		0.0	9.8	39.2	0.0	48.9
Combined	314	0.0	21.4	78.3	0.2	100.0
Commercial Catch <sup>b</sup>		0	4,607	16,827	50	21,484
Escapement						
Male		0.0	10.1	26.6	0.0	36.7
Female		0.0	10.1	50.6	2.6	63.3
Combined		0.0	20.2	77.2	2.6	100.0
Escapement Estimate <sup>c</sup>		0	1,565	5,983	202	7,751
1987						
Commercial	Sample Size					
Male		0	20.3	38.6	0	58.9
Female		0	10.5	30.7	0	41.1
Combined	153	0	30.7	69.3	0	100.0
Commercial Catch <sup>b</sup>		0	1,993	4,496	0	6,489
Escapement						
Male		0	34.6	12.2	0	46.8
Female		0	46.8	6.5	0	53.3
Combined	295	0	81.4	18.7	0	100.0
Escapement <sup>c</sup>		0	8,563	1,967	0	10,520
1988						
Commercial						
Male		0.1	6.4	50.4	3.3	60.4
Female		0	3.8	32.8	3.0	39.6
Combined	748	0.1	10.1	83.3	6.3	100.0
Commercial Catch <sup>b</sup>		29	2,190	17,954	1,384	21,557
Escapement samples not collected.						

<sup>a</sup> Age classes are a total of fresh water and marine growth.

<sup>b</sup> Age classes based on commercial catch samples.

<sup>c</sup> Age classes based on escapement samples. Escapement estimate based on the Kanektok River Sonar/aerial surveys.

<sup>d</sup> Preliminary data.

## Appendix C.4

## Historical age composition percentage, chum salmon, Quinagak commercial harvest and escapement, 1982 - 1990.

Age Composition	Sample Size	<u>Total years of life at maturity<sup>a</sup></u>				Total
		3	4	5	6	
1982						
Commercial						
Male		1.0	24.6	13.7	1.0	40.3
Female		0.0	38.7	19.6	1.4	59.7
Combined	414	1.0	63.3	33.3	2.4	100.0
Commercial Catch <sup>b</sup>		333	21,108	11,104	800	33,346
Escapement samples were not collected.						
1983						
Commercial						
Male		0.0	24.7	16.0	0.6	41.3
Female		0.6	34.9	22.8	0.4	58.7
Combined	482	0.6	59.6	38.8	1.0	100.0
Commercial Catch <sup>b</sup>		139	13,762	8,959	231	23,090
Escapement						
Male		0.0	15.5	37.6	1.0	54.1
Female		0.2	21.9	23.8	0.0	45.9
Combined	401	0.2	37.4	61.4	1.0	100.0
Escapement <sup>c</sup>		108	20,157	33,092	539	53,895
1984						
Commercial						
Male		0.2	33.8	13.4	0.0	47.4
Female		0.0	39.9	12.1	0.6	52.6
Combined	464	0.2	73.7	25.5	0.6	100.0
Commercial Catch <sup>b</sup>		101	37,162	12,858	303	50,424
Escapement						
Male		0.1	38.1	17.1	1.2	56.5
Female		0.1	32.0	11.1	0.3	43.5
Combined	772	0.2	70.1	28.2	1.5	100.0
Escapement <sup>c</sup>		400	140,298	56,439	3,002	200,140
1985						
Commercial						
Male		0.0	25.5	21.4	0.2	59.1
Female		0.0	27.5	25.3	0.0	40.9
Combined	458	0.0	53.0	46.7	0.2	100.0
Commercial Catch <sup>b</sup>		0	1,666	5,957	252	7,876
Escapement						
Male		0.2	24.1	27.1	0.0	51.4
Female		0.2	25.7	22.7	0.0	48.6
Combined	440	0.4	49.8	49.8	0.0	100.0
Escapement <sup>c</sup>		61	7,632	7,632	0	15,325

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Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1986						
Commercial						
Male		0.0	22.6	17.1	0.0	39.7
Female		0.0	41.7	18.6	0.0	60.3
Combined	314	0.0	64.3	35.7	0.0	100.0
Commercial Catch <sup>b</sup>		0	19,100	10,600	0	29,700
Escapement						
Male		0.2	27.1	28.8	0.9	57.0
Female		0.0	23.0	19.3	0.7	43.0
Combined	431	0.2	50.1	48.1	1.6	100.0
Escapement <sup>c</sup>		38	9,422	9,046	302	18,808
1987						
Commercial						
Male		0	20.7	35.3	0	56.0
Female		0	17.4	26.6	0	44.0
Combined	241	0	38.1	61.9	0	100.0
Commercial Catch <sup>b</sup>		0	3,267	5,290	0	8,557
Escapement						
Male		0	14.0	32.0	2.0	48.0
Female		0	22.0	30.0	0	52.0
Combined	150	0	37.0	62.0	2.0	100.0
Escapement <sup>c</sup>		0	4,118	6,901	223	11,132
1988						
Commercial						
Male		0.7	34.1	14.8	0.8	50.4
Female		.5	31.0	16.9	1.2	49.6
Combined	593	1.2	65.1	31.7	2.0	100.0
Commercial Catch <sup>b</sup>		345	19,020	9,264	591	29,220
Escapement samples not collected.						
1989 <sup>d</sup>						
Commercial						
Male		0	23.4	24.2	0.4	48.0
Female		0	26.1	24.4	0.6	51.1
Combined	641	0	49.5	48.6	1.0	100.0
Commercial Catch <sup>b</sup>		0	19,698	19,308	389	39,395
Escapement samples not collected.						

<sup>a</sup> Age classes are a total of fresh water and marine growth.

<sup>b</sup> Age classes based on commercial catch samples.

<sup>c</sup> Age classes based on escapement samples. Escapement estimate based on the Kanektok River Sonar/aerial surveys.

<sup>d</sup> Preliminary data.

## Appendix C.5

Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1991.

<u>DATE</u>	No. Years w/ fishing period on <u>this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	3	4	151	56	0.00077
6/14	1	384	384	384	0.00118
6/15	2	89	134	112	0.00224
6/16	3	0	277	142	0.00474
6/17	1	1119	1119	1119	0.00870
6/18	4	355	468	430	0.01992
6/19	2	171	741	456	0.02392
6/20	3	111	411	296	0.02744
6/21	3	1039	2141	1505	0.04319
6/22	2	379	746	563	0.05563
6/23	3	343	1741	1152	0.07217
6/24	3	638	1643	1292	0.08796
6/25	4	732	1667	1333	0.12036
6/26	2	1717	2300	2009	0.13770
6/27	3	461	4923	1976	0.15617
6/28	3	1908	2413	2096	0.18346
6/29	1	0	0	0	0.18346
6/30	3	1360	2601	2019	0.22280
7/1	2	975	3498	2237	0.23998
7/2	5	1242	5654	2754	0.28182
7/3	3	2244	3604	3013	0.34264
7/4	3	627	5743	2524	0.37178
7/5	5	1157	6464	2932	0.41296
7/6	2	1126	3951	2539	0.42557
7/7	5	1211	8326	3790	0.48280
7/8	3	1289	8229	3990	0.52197
7/9	4	1532	7313	3598	0.56191
7/10	2	2229	2786	2508	0.58357
7/11	6	1901	7672	4126	0.67395
7/12	2	1468	1601	1535	0.68610
7/13	4	1842	10755	4779	0.72665
7/14	5	878	3465	2102	0.77770
7/15	3	1240	4505	2948	0.81593
7/16	3	564	8537	3465	0.83276
7/17	3	937	3725	2055	0.85036
7/18	4	657	1454	1032	0.87472
7/19	3	866	12850	5369	0.89580
7/20	2	477	1722	1100	0.90736
7/21	4	477	989	739	0.91946
7/22	3	799	1312	1055	0.93522
7/23	3	328	4361	1683	0.94302

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<u>Date</u>	<u>No. years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/24	3	215	907	570	0.94974
7/25	4	0	2681	848	0.95598
7/26	2	0	529	265	0.95687
7/27	6	0	2096	476	0.96330
7/28	1	102	102	102	0.96366
7/29	4	126	429	281	0.96853
7/30	3	19	1516	549	0.97067
7/31	3	97	210	163	0.97242
8/1	5	42	757	228	0.97594
8/2	3	38	138	90	0.97673
8/3	6	30	408	167	0.98133
8/4	3	3	93	55	0.98200
8/5	5	6	293	117	0.98529
8/6	5	16	254	99	0.98808
8/7	2	30	240	135	0.98947
8/8	6	0	198	54	0.99024
8/9	3	6	67	36	0.99052
8/10	5	10	77	42	0.99219
8/11	3	6	28	20	0.99243
8/12	4	1	103	54	0.99369
8/13	5	0	89	30	0.99423
8/14	4	1	44	24	0.99461
8/15	4	12	42	29	0.99531
8/16	5	0	39	18	0.99550
8/17	5	1	71	25	0.99661
8/18	4	6	36	16	0.99676
8/19	6	2	26	12	0.99715
8/20	4	3	42	20	0.99735
8/21	5	0	28	12	0.99762
8/22	4	1	32	11	0.99795
8/23	5	1	51	15	0.99807
8/24	4	0	16	6	0.99820
8/25	5	0	28	8	0.99849
8/26	5	0	27	9	0.99866
8/27	4	0	30	10	0.99873
8/28	4	0	11	5	0.99886
8/29	5	0	7	4	0.99897
8/30	2	0	0	0	0.99897
8/31	5	0	20	8	0.99931
9/1	5	0	8	4	0.99937
9/2	4	0	14	5	0.99959
9/3	3	0	1	1	0.99959
9/4	3	0	18	8	0.99987
9/5	6	0	16	3	0.99994
9/6	2	0	1	1	0.99995
9/7	5	0	5	1	0.99997
9/8	3	0	3	1	1.00000

## Appendix C.6

Summary of historical commercial harvest by  
period, Quinhagak District, chum salmon,  
1981-1991.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	3	14	1092	397	0.00375
6/14	1	2125	2125	2125	0.00780
6/15	2	1008	1122	1065	0.01211
6/16	3	0	847	545	0.01784
6/17	1	1556	1556	1556	0.02208
6/18	4	1162	2611	1800	0.04522
6/19	2	1198	1913	1556	0.05330
6/20	3	563	968	759	0.06087
6/21	3	2150	4471	2966	0.07924
6/22	2	1051	2177	1614	0.09412
6/23	3	1103	3226	2034	0.11243
6/24	3	732	3228	1788	0.13185
6/25	4	1711	5417	3253	0.17027
6/26	2	1529	4329	2929	0.18705
6/27	3	1855	2722	2150	0.20724
6/28	3	2458	5449	4203	0.23937
6/29	1	0	0	0	0.23937
6/30	3	2066	4903	3610	0.28445
7/1	2	1836	2131	1984	0.29700
7/2	5	1972	6034	4070	0.34131
7/3	3	1788	3743	2497	0.37770
7/4	3	2333	3155	2700	0.40529
7/5	5	1820	6778	3767	0.44910
7/6	2	2192	2953	2573	0.45779
7/7	5	2939	4827	3712	0.50815
7/8	3	3050	3672	3318	0.53905
7/9	4	3518	7408	5092	0.57894
7/10	2	4022	4774	4398	0.60226
7/11	6	2552	9329	4502	0.66712
7/12	2	3211	3742	3477	0.68474
7/13	4	4270	7438	5347	0.72242
7/14	5	732	3080	1922	0.75337
7/15	3	2796	10756	7135	0.79725
7/16	3	1784	3369	2449	0.81287
7/17	3	2326	5988	3844	0.83546
7/18	4	1310	4343	2771	0.86580
7/19	3	2339	4960	3788	0.88820
7/20	2	2256	3934	3095	0.89897
7/21	4	1143	1941	1573	0.91622
7/22	3	990	2219	1626	0.92945
7/23	3	791	1690	1266	0.93720

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<u>Date</u>	<u>No. years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/24	3	499	2254	1344	0.94430
7/25	4	0	1397	816	0.95135
7/26	2	0	1446	723	0.95376
7/27	6	0	787	451	0.96036
7/28	1	333	333	333	0.96127
7/29	4	353	1412	759	0.96795
7/30	3	173	802	402	0.97042
7/31	4	5	665	262	0.97231
8/1	5	246	479	335	0.97727
8/2	3	153	288	209	0.97859
8/3	5	110	580	257	0.98391
8/4	4	4	134	85	0.98455
8/5	5	98	357	223	0.98777
8/6	5	52	285	145	0.99178
8/7	2	101	114	108	0.99221
8/8	6	0	136	70	0.99317
8/9	3	11	265	103	0.99372
8/10	5	16	108	66	0.99549
8/11	3	4	37	23	0.99568
8/12	4	15	53	40	0.99618
8/13	5	2	95	35	0.99669
8/14	4	13	98	43	0.99705
8/15	4	6	53	28	0.99737
8/16	5	2	96	30	0.99770
8/17	5	2	50	21	0.99828
8/18	4	7	9	9	0.99836
8/19	6	5	54	17	0.99868
8/20	4	3	27	14	0.99881
8/21	5	2	21	10	0.99898
8/22	4	1	18	9	0.99910
8/23	5	3	22	12	0.99923
8/24	4	0	7	4	0.99932
8/25	5	0	5	3	0.99936
8/26	5	0	10	6	0.99951
8/27	4	0	6	3	0.99953
8/28	4	1	4	3	0.99960
8/29	5	0	3	1	0.99961
8/30	2	0	1	1	0.99962
8/31	5	0	10	3	0.99974
9/1	4	0	2	1	0.99975
9/2	5	0	7	3	0.99984
9/3	3	0	0	0	0.99984
9/4	3	0	13	4	0.99998
9/5	6	0	5	1	0.99999
9/6	2	0	0	0	0.99999
9/7	5	0	2	1	1.00000
9/8	3	0	0	0	1.00000

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<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,872	21,534	68,591	21,258	29,183	154,438
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115 <sup>a</sup>	54,493	160,316
Ten Year Average (1981-1990)	26,826	23,214	56,672	139 <sup>b</sup>	33,516	147,309

<sup>a</sup> Odd years only.

## Appendix C.8

## Summary of historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1991.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	3	33	7720	3156	0.03223
6/14	1	5080	5080	5080	0.03223
6/15	2	2948	3415	3182	0.06381
6/16	3	0	7835	3005	0.09201
6/17	1	3527	3527	3527	0.10974
6/18	4	4726	11997	7758	0.21219
6/19	2	3525	5801	4663	0.25923
6/20	3	803	6617	3484	0.28984
6/21	3	4268	5458	4740	0.32931
6/22	2	4002	10586	7294	0.39265
6/23	3	2039	11652	6656	0.46198
6/24	3	1403	6698	4502	0.51363
6/25	4	2732	4539	3776	0.56344
6/26	2	1703	1741	1722	0.58101
6/27	3	1849	9711	5118	0.61815
6/28	3	1438	4089	2937	0.66894
6/29	1	0	0	0	0.66894
6/30	3	690	4496	2124	0.70009
7/1	2	657	3752	2205	0.71380
7/2	5	1204	3602	2090	0.74966
7/3	3	2018	2771	2369	0.78417
7/4	3	508	4068	2434	0.80557
7/5	5	850	2710	1323	0.83517
7/6	2	273	996	635	0.83968
7/7	5	960	1566	1354	0.86242
7/8	3	465	2407	1263	0.87856
7/9	4	739	1259	922	0.89054
7/10	2	646	736	691	0.89757
7/11	6	406	1545	1003	0.91518
7/12	2	450	687	569	0.92103
7/13	4	205	1011	606	0.92727
7/14	5	220	1351	651	0.94184
7/15	3	230	1306	924	0.95221
7/16	3	401	533	458	0.95635
7/17	3	130	290	214	0.95874
7/18	4	202	845	438	0.96524
7/19	3	97	792	426	0.96720
7/20	2	412	490	451	0.97078
7/21	4	131	248	186	0.97506
7/22	3	35	629	292	0.97752
7/23	3	88	324	217	0.97903

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<u>Date</u>	<u>No. years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/24	3	33	187	101	0.98032
7/25	4	0	379	158	0.98266
7/26	2	0	27	14	0.98266
7/27	6	0	194	97	0.98472
7/28	1	56	56	56	0.98500
7/29	4	21	116	86	0.98661
7/30	3	73	111	96	0.98737
7/31	4	0	46	26	0.98780
8/1	5	54	153	88	0.98916
8/2	3	14	53	37	0.98967
8/3	6	40	160	73	0.99133
8/4	3	0	30	19	0.99162
8/5	5	6	141	60	0.99275
8/6	5	25	78	42	0.99346
8/7	2	27	43	35	0.99380
8/8	6	0	71	28	0.99456
8/9	3	6	22	12	0.99471
8/10	5	19	125	58	0.99576
8/11	3	6	15	10	0.99591
8/12	4	24	74	47	0.99673
8/13	5	0	36	15	0.99695
8/14	4	6	29	13	0.99716
8/15	4	8	43	29	0.99769
8/16	5	1	10	6	0.99776
8/17	5	2	66	24	0.99823
8/18	4	7	10	9	0.99838
8/19	6	3	51	18	0.99875
8/20	4	6	16	10	0.99884
8/21	5	4	13	7	0.99897
8/22	4	3	33	13	0.99918
8/23	5	1	5	3	0.99923
8/24	4	3	14	7	0.99936
8/25	5	0	16	6	0.99946
8/26	5	5	17	8	0.99966
8/27	4	3	4	3	0.99971
8/28	4	2	8	4	0.99977
8/29	5	0	7	3	0.99984
8/30	2	0	1	1	0.99984
8/31	5	0	3	1	0.99988
9/1	4	0	10	3	0.99991
9/2	5	0	4	1	0.99993
9/3	3	0	2	1	0.99995
9/4	3	2	2	2	0.99997
9/5	6	0	2	1	1.00000
9/6	2	0	1	1	1.00000
9/7	5	0	0	0	1.00000
9/8	3	0	0	0	1.00000

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<u>YEAR</u>	<u>EFFORT<sup>a</sup></u>
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1988	288
1989	227
1990	390
1991	346
TEN YEAR AVERAGE (1981-1990)	263

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a Permits that made at least one delivery during that year.

## Appendix C.10

Summary of historical commercial harvest by  
period, Quinhagak District, coho salmon,  
1979-91.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/30	4	0	2	1	0.00000
7/1	2	0	0	0	0.00000
7/2	7	0	1	0	0.00000
7/3	3	0	0	0	0.00000
7/4	5	0	0	0	0.00000
7/5	5	0	0	0	0.00000
7/6	3	0	0	0	0.00000
7/7	6	0	0	0	0.00000
7/8	3	0	0	0	0.00000
7/9	6	0	39	7	0.00001
7/10	2	0	5	3	0.00001
7/11	8	0	9	1	0.00002
7/12	2	0	2	1	0.00002
7/13	5	0	7	1	0.00003
7/14	6	0	2	1	0.00004
7/15	3	0	18	7	0.00009
7/16	5	0	39	11	0.00013
7/17	3	4	14	8	0.00016
7/18	6	0	234	50	0.00046
7/19	3	11	88	49	0.00057
7/20	3	3	787	267	0.00114
7/21	5	0	366	126	0.00206
7/22	3	1	12	7	0.00209
7/23	5	0	1386	354	0.00351
7/24	3	21	63	44	0.00373
7/25	6	0	3482	718	0.00720
7/26	2	0	82	41	0.00720
7/27	7	0	5512	911	0.01243
7/28	2	352	1214	783	0.01444
7/29	4	152	565	374	0.01640
7/30	5	0	3079	1430	0.02315
7/31	4	146	925	424	0.02568
8/1	7	0	5680	1491	0.03868
8/2	3	390	2806	1386	0.04410
8/3	7	592	5390	1927	0.06117
8/4	3	190	1755	936	0.06630
8/5	6	387	4517	2062	0.08821
8/6	7	2068	8436	4116	0.12335
8/7	2	693	8188	4441	0.14136
8/8	7	0	19215	5716	0.18401

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<u>Date</u>	<u>No. years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
8/9	3	1831	5676	4267	0.20180
8/10	6	2429	9428	5566	0.25238
8/11	4	3863	10076	7029	0.29620
8/12	4	2857	3894	3287	0.32645
8/13	7	1561	10961	5564	0.37073
8/14	4	1671	3543	2829	0.39087
8/15	6	1603	15733	8426	0.45670
8/16	5	1403	5599	3294	0.47581
8/17	6	2008	9785	4610	0.51782
8/18	5	1008	9776	6455	0.56705
8/19	6	2532	6099	4254	0.60835
8/20	6	3958	8728	5992	0.64910
8/21	5	2110	4073	3171	0.67470
8/22	6	1972	5231	4008	0.71000
8/23	5	2400	11957	5347	0.72985
8/24	5	1708	8673	4029	0.75839
8/25	6	115	6095	3410	0.79342
8/26	5	1419	4825	3631	0.82138
8/27	6	1431	5975	3490	0.84726
8/28	4	1514	3737	2628	0.86399
8/29	7	0	3623	2476	0.89193
8/30	2	1054	9431	5243	0.90676
8/31	6	1427	3382	2311	0.92576
9/1	4	1407	2365	1901	0.94089
9/2	5	535	4065	2106	0.95760
9/3	4	600	2717	1589	0.96530
9/4	3	1177	2058	1675	0.97605
9/5	8	0	3799	1037	0.98664
9/6	2	950	1158	1054	0.99153
9/7	5	0	1798	554	0.99646
9/8	2	0	1262	631	1.00000

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**APPENDIX D**

Appendix D.1 Peak aerial survey results, Goodnews River,  
1980 -1991.

<u>Year</u>	<u>Species</u>	<u>Goodnews River Goodnews Lake</u>	<u>Middle Fork River &amp; Lakes</u>	<u>Total</u>
1980	Chinook	1,228	1,164	2,392
	Sockeye	41,576	18,596	60,172
	Chum	1,975	3,782	5,757
1981	Chinook	a	a	a
	Sockeye	a	a	a
	Chum	a	a	a
1982	Chinook	1,990	1,546	3,536
	Sockeye	19,160	2,327	21,487
	Chum	9,700	6,300	16,000
1983	Chinook	2,600	2,500	5,241
	Sockeye	9,650	5,900	15,600
	Chum	a	a	a
1984	Chinook	3,235	2,020	5,261
	Sockeye	9,240	12,897	22,137
	Chum	17,250	9,172	27,347
1985	Chinook	3,535	2,050	5,585
	Sockeye	2,843	2,710	5,553
	Chum	4,415	3,593	8,008
1986	Chinook	1,068	1,249	2,317
	Sockeye	8,960	16,990	25,950
	Chum	11,850	4,400	16,250
1987	Chinook	2,234	1,598	3,870
	Sockeye	19,786	9,033	28,819
	Chum	12,103	2,805	15,588
1988	Chinook	637	1,024	1,661
	Sockeye	5,880	5,831	11,711
	Chum	3,846	5,814	9,660
1989	Chinook	8	1,277	1,285
	Sockeye	30,764	1,145	31,909
	Chum	a	2,922	2,922
1990	Chinook	0	38	38
	Sockeye	22,100	1,092	23,192
	Chum	a	311	311

-continued-

	<u>Species</u>	<u>Goodnews River Goodnews Lake</u>	<u>Middle Fork River &amp; Lakes</u>	<u>Total</u>
1991	Chinook	127	a	127
	Sockeye	1,285	a	1,285
	Chum	365	a	365
<hr/>				
Escapement	Chinook	1,600	800	2,400
Objective <sup>b</sup>	Sockeye	15,000	5,000	20,000
	Chum	17,000	4,000	21,000

<sup>a</sup> Information not available.

<sup>b</sup> Escapement objectives are preliminary and are subject to change as additional data becomes available. Escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

## Appendix D.2

## Historical age composition percentage, chinook salmon, Goodnews Bay commercial catch and escapement 1982 - 1989.

Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>					Total
		3	4	5	6	7+	
1982							
Commercial							
Male		0.0	5.6	37.4	11.2	0.0	54.2
Female		0.0	2.8	29.9	13.1	0.0	45.8
Combined	107	0.0	8.4	67.3	24.3	0.0	100.0
Commercial Catch <sup>b</sup>		0	796	6,377	2,303	0	9,476
Escapement samples were not collected.							
1983							
Commercial							
Male		0.0	14.4	7.6	25.3	1.1	48.4
Female		0.0	0.2	0.6	48.8	2.0	51.6
Combined	655	0.0	14.6	8.2	74.1	3.1	100.0
Commercial Catch <sup>b</sup>		0	2,061	1,158	10,461	438	14,117
Escapement							
Male		0.0	0.0	9.4	39.5	2.9	51.8
Female		0.0	0.0	2.2	44.6	1.4	48.2
Combined	139	0.0	0.0	11.6	84.1	4.3	100.0
Escapement <sup>c</sup>		0	0	1,670	12,109	619	14,398
1984							
Commercial							
Male		0.2	7.6	32.4	22.4	5.4	68.0
Female		0.0	0.0	2.8	22.0	7.2	32.0
Combined	500	0.2	7.6	35.2	44.4	12.6	100.0
Commercial Catch <sup>b</sup>		17	655	3,031	3,824	1,085	8,612
Escapement							
Male		0.0	4.5	22.6	20.7	3.6	51.4
Female		0.0	0.0	4.5	39.6	4.5	48.6
Combined	111	0.0	4.5	27.1	60.3	8.1	100.0
Escapement <sup>c</sup>		0	393	2,369	5,272	709	8,743
1985							
Commercial							
Male		0.2	18.2	7.5	30.8	2.4	59.1
Female		0.0	10.0	4.5	25.2	1.1	40.9
Combined	532	0.2	28.2	12.0	56.0	3.6	100.0
Commercial Catch <sup>b</sup>		12	1,634	695	3,244	208	5,793
Escapement							
Male		0.0	0.0	0.0	21.0	5.3	59.1
Female		0.0	0.0	0.0	73.7	0.0	40.9
Combined	19	0.0	0.0	0.0	94.7	5.3	100.0
Escapement <sup>c</sup>		0	0	0	7,556	423	7,979

-continued-

Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>					Total
		3	4	5	6	7+	
1986							
Commercial							
Male		0.0	17.0	49.0	16.0	4.0	86.0
Female		0.0	0.0	2.0	19.0	8.0	29.0
Combined	363	0.0	17.0	51.0	35.0	12.0	115.0
Commercial Catch <sup>b</sup>		0	463	1,389	953	327	2,723
1987							
Commercial							
Male		0	12.9	19.2	15.5	0	47.6
Female		0	3.0	12.5	34.3	2.6	52.4
Combined	271	0	15.9	31.7	49.8	2.6	100.0
Commercial Catch <sup>b</sup>		0	533	1,065	1,672	87	3,357
Escapement							
Male		0	12.8	7.7	25.6	0	46.2
Female		0	5.1	17.9	23.1	7.7	53.8
Combined	39	0	17.9	25.6	48.7	7.7	100.0
Escapement <sup>c</sup>		0	406	581	1,106	175	2,272
1988							
Commercial							
Male		0	18.7	16.2	15.2	2.5	52.6
Female		0	8.0	8.4	27.6	3.4	47.4
Combined	475	0	26.7	24.6	42.7	5.9	100.0
Commercial Catch <sup>b</sup>		1,327	1,223	2,121	293	0	4,964
Escapement							
Male		0	2.1	12.8	35.1	8.5	58.5
Female		0	0	10.6	22.3	8.5	41.5
Combined	94	0	2.1	23.4	57.4	17.0	100.0
Escapement <sup>c</sup>		0	114	1,268	3,110	921	5,419
1989							
Commercial							
Male		0	7.2	24.4	24.4	2.0	58.0
Female		0	2.4	15.2	22.0	2.4	42.0
Combined	250	0	9.6	39.6	46.4	4.4	100.0
Commercial Catch <sup>b</sup>		0	285	1,175	1,376	131	2,966
Escapement							
Male		6.3	0	15.6	28.1	3.1	53.1
Female		0	0	6.3	34.4	6.3	46.9
Combined		6.3	0	21.9	62.5	9.4	100.0
Escapement <sup>c</sup>		182	0	633	1,806	271	2,891

<sup>a</sup> Total years of life is total number of years spent in fresh water and marine.

<sup>b</sup> Allocations by age class based on commercial catch samples.

<sup>c</sup> Age class is based on escapement samples. Escapement estimate based on the Goodnews River Project.

<sup>d</sup> Preliminary data.

Appendix D.3 Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1991.

Year	Species	Middle Fork Tower Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Est.	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Total Run Size Estimate	Exploitation <sup>a</sup> Rate (% of Run)
1981	Chinook	3,688	-b	7,766 <sup>c</sup>	1,409	7,190	16,365	53%
	Sockeye	49,108	-b	100,029 <sup>c</sup>	3,511 <sup>d</sup>	40,273	143,813	30%
	Chum	21,827	-b	53,799 <sup>c</sup>	-	13,642	67,441	20%
1982	Chinook	1,395	-b	2,937 <sup>c</sup>	1,236	9,476	13,649	78%
	Sockeye	56,255	-b	114,587 <sup>c</sup>	2,754 <sup>d</sup>	38,877	156,218	27%
	Chum	6,767	-b	16,679 <sup>c</sup>	-	13,829	30,508	45%
1983	Chinook	6,027	36%	14,398	1,066	14,117	29,581	51%
	Sockeye	25,816	22%	69,955	1,518 <sup>d</sup>	11,716	83,189	16%
	Chum	15,548	-b	38,323 <sup>c</sup>	-	6,766	45,089	15%
1984	Chinook	3,260	35%	8,743	629	8,612	17,984	51%
	Sockeye	32,053	27%	67,213	964	15,474	83,651	20%
	Chum	19,003	35%	117,739	189	14,340	132,268	11%
1985	Chinook	2,831	70%	7,979	426	5,793	14,198	44%
	Sockeye	24,131	11%	50,481	704	6,698	57,883	13%
	Chum	10,367	32%	25,025	348	4,784	30,157	17%
1986	Chinook	2,083	57%	4,094	555	2,723	7,372	44%
	Sockeye	51,069	28%	93,228	942	22,608	116,778	20%
	Chum	14,765	38%	51,910	191	10,355	62,456	17%
1987	Chinook	2,274	100%	4,490	816	3,357	8,663	48%
	Sockeye	28,871	85%	51,989	955	27,758	80,702	36%
	Chum	17,519	58%	37,802	578	20,381	58,761	36%
1988	Chinook	2,712	39%	5,419	310	4,964	10,693	49%
	Sockeye	15,799	30%	38,319	1065	36,368	75,752	49%
	Chum	20,799	21%	39,501	448	33,059	73,008	46%
1989	Chinook	1,915	67%	2,891	467	2,966	6,324	54%
	Sockeye	21,186	60%	35,476	869	19,299	55,644	36%
	Chum	10,380	28%	15,495	760	13,622	29,877	48%
1990	Chinook	3,636	-b	7,656 <sup>c</sup>	682	3,303	11,641	34%
	Sockeye	31,679	-b	64,528 <sup>c</sup>	905	35,823	101,256	36%
	Chum	6,410	-b	15,799 <sup>c</sup>	342	13,194	29,335	46%
1991 <sup>e</sup>	Chinook	2,147	-b	4,521 <sup>c</sup>	682	912	6,115	26%
	Sockeye	47,397	-b	96,544 <sup>c</sup>	900	39,838	137,228	30%
	Chum	27,525	-b	67,844 <sup>c</sup>	106	15,892	83,842	19%

a Commercial and subsistence exploitation

b Incomplete aerial survey results

c Average Middle Fork/Goodnews River escapement estimate ratio for 1983-1989 used to estimate Goodnews River escapement in years with no aerial survey data.

d Subsistence caught chum salmon is included in subsistence sockeye salmon harvest

e Goodnews Tower Project changed to weir project in 1991

Appendix D.4 Historical age composition percentage, sockeye salmon, Goodnews Bay commercial catch and escapement, 1982 - 1989.

Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1982						
Commercial						
Male		0.0	3.9	43.1	10.8	57.8
Female		0.0	1.0	36.3	4.9	42.2
Combined	102	0.0	4.9	79.4	15.7	100.0
Commercial Catch <sup>b</sup>		0	1,905	30,868	6,104	38,877
Escapement samples were not collected.						
1983						
Commercial						
Male		0.0	19.0	31.3	4.2	54.5
Female		0.0	20.0	22.3	3.2	45.5
Combined	404	0.0	39.0	53.6	7.4	100.0
Commercial Catch <sup>b</sup>		0	4,569	6,280	867	11,716
Escapement						
Male		0.0	72.2	11.1	0.0	83.3
Female		0.0	5.6	11.1	0.0	16.7
Combined		0.0	77.8	22.2	0.0	100.0
Escapement <sup>c</sup>	18	0	54,425	15,530	0	69,955
1984						
Commercial						
Male		0.0	14.8	45.1	2.2	62.1
Female		0.0	6.2	31.0	0.7	37.9
Combined	549	21.0	97.1	79.0	2.9	100.0
Commercial Catch <sup>b</sup>		3,250	15,025	12,224	449	15,474
Escapement						
Male		0.0	23.4	27.7	0.0	51.1
Female		0.0	21.3	27.6	0.0	48.9
Combined	47	0.0	44.7	55.3	0.0	100.0
Escapement <sup>c</sup>		0	30,044	37,169	0	67,213
1985						
Commercial						
Male		0.0	10.7	43.6	0.0	59.1
Female		0.0	13.5	32.2	0.0	40.9
Combined	488	0.0	24.2	75.8	0.0	100.0
Commercial Catch <sup>b</sup>		0	1,621	5,077	0	6,698
Escapement						
Male		0.0	17.7	47.0	0.0	64.7
Female		0.0	29.4	5.9	0.0	35.3
Combined	17	0.0	47.1	52.9	0.0	100.0
Escapement <sup>c</sup>		0	23,777	26,704	0	50,481

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Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1986						
Commercial						
Male		0.0	5.1	49.8	0.0	54.9
Female		0.0	3.5	41.6	0.0	45.1
Combined	488	0.0	8.5	91.5	0.0	100.0
Commercial Catch <sup>b</sup>		0	2,146	22,966	0	25,112
Escapement						
Male		0.0	5.5	54.9	0.0	60.4
Female		1.1	2.2	36.3	0.0	39.6
Combined	91	1.1	7.7	91.2	0.0	100.0
Escapement <sup>c</sup>		1,026	7,179	85,024	0	93,228
1987						
Commercial						
Male		0.0	4.0	45.5	0.0	49.5
Female		0.0	2.9	47.6	0.0	50.5
Combined	546	0.0	6.9	93.0	0.0	100.0
Commercial Catch <sup>b</sup>		0	1,932	25,826	0	27,758
Escapement						
Male		0.0	4.0	46.6	2.4	53.0
Female		0.0	6.1	39.3	1.6	47.0
Combined	578	0.0	10.1	85.9	4.0	100.0
Escapement <sup>c</sup>		0	2,915	24,800	1,154	28,871
1988						
Commercial						
Male		0.1	3.5	51.8	3.0	58.5
Female		0.0	0.7	37.9	2.9	41.5
Combined	738	0.1	4.2	89.7	5.9	100.0
Commercial Catch <sup>b</sup>		36	1,527	32,623	2,146	36,368
Escapement						
Male		0.0	5.1	36.0	1.0	42.1
Female		0.0	8.0	48.0	1.9	57.9
Combined	315	0.0	13.1	84.0	2.9	100.0
Escapement <sup>c</sup>		0	5,019	32,188	1,112	38,319

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Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>					Total
		3	4	5	6	7	
1989 <sup>d</sup>							
Commercial							
Male		.2	6.6	46.8	1.8	0	55.3
Female		0	3.8	38.5	2.1	0	44.6
Combined	579	.2	10.4	85.7	3.9	0	100.0
Commercial Catch		33	2,000	16,532	734	0	19,299
Escapement							
Male		0	0	53.9	10.3	0	64.1
Female		0	0	30.8	5.1	0	35.9
Combined		0	0	84.7	15.4	0	100.0
Escapement	39	0	0	30,048	5,463	0	35,476

<sup>a</sup> Age classes are a total of fresh water and marine growth.

<sup>b</sup> Age classes based on commercial catch samples.

<sup>c</sup> Age classes based on escapement samples. Escapement estimate based on the Goodnews River counting tower.

<sup>d</sup> Preliminary data.

<u>YEAR</u>	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINK</u>	<u>CHUM</u>	<u>TOTAL</u>
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
Ten year Average (1981-1990)	6,250	25,573	29,269	31 <sup>a</sup>	14,397	77,668

<sup>a</sup> Odd years only.

Appendix D.6. Average cumulative estimated escapement and proportion by day for chinook, sockeye and chum salmon, Goodnews River weir, 1981-1991.<sup>a</sup>

Date	Chinook		Sockeye		Chum	
	Avg. Cumulative		Avg. Cumulative		Avg. Cumulative	
	Number	Percent	Number	Percent	Number	Percent
6/11	0	0.0000	0	0.0000	0	0.0000
6/12	0	0.0000	0	0.0000	0	0.0000
6/13	0	0.0000	0	0.0000	0	0.0000
6/14	0	0.0000	0	0.0000	0	0.0000
6/15	0	0.0000	9	0.0003	0	0.0000
6/16	0	0.0000	10	0.0003	0	0.0000
6/17	1	0.0003	13	0.0004	0	0.0000
6/18	1	0.0003	21	0.0006	0	0.0000
6/19	2	0.0008	49	0.0015	0	0.0000
6/20	5	0.0017	70	0.0021	0	0.0000
6/21	11	0.0040	147	0.0045	1	0.0000
6/22	14	0.0052	251	0.0077	3	0.0002
6/23	29	0.0107	517	0.0159	4	0.0003
6/24	45	0.0166	990	0.0305	17	0.0011
6/25	76	0.0282	1717	0.0528	76	0.0049
6/26	109	0.0403	2384	0.0733	139	0.0090
6/27	166	0.0616	3616	0.1112	250	0.0160
6/28	213	0.0788	4514	0.1389	303	0.0195
6/29	263	0.0975	5415	0.1666	382	0.0245
6/30	328	0.1214	6364	0.1958	508	0.0326
7/1	417	0.1545	7636	0.2349	739	0.0475
7/2	483	0.1790	8908	0.2740	922	0.0593
7/3	553	0.2048	10094	0.3105	1151	0.0740
7/4	631	0.2337	11565	0.3558	1441	0.0926
7/5	734	0.2719	13439	0.4134	1771	0.1138
7/6	809	0.2996	15015	0.4619	2050	0.1318
7/7	914	0.3388	16545	0.5090	2350	0.1510
7/8	995	0.3687	18284	0.5625	2670	0.1716
7/9	1098	0.4067	20103	0.6184	3217	0.2068
7/10	1230	0.4557	21675	0.6668	3863	0.2482
7/11	1355	0.5021	23245	0.7151	4506	0.2896
7/12	1479	0.5478	24583	0.7563	5239	0.3367
7/13	1577	0.5844	25666	0.7896	5854	0.3762
7/14	1672	0.6196	26678	0.8207	6473	0.4160
7/15	1774	0.6572	27641	0.8503	7215	0.4637
7/16	1867	0.6919	28505	0.8769	8097	0.5204
7/17	1984	0.7350	29205	0.8984	8887	0.5711
7/18	2068	0.7664	29823	0.9174	9505	0.6109
7/19	2141	0.7932	30358	0.9339	9977	0.6412
7/20	2211	0.8191	30856	0.9492	10575	0.6796
7/21	2279	0.8446	31250	0.9613	11137	0.7158
7/22	2346	0.8692	31562	0.9709	11782	0.7572
7/23	2416	0.8950	31780	0.9776	12427	0.7986
7/24	2484	0.9205	31963	0.9833	12965	0.8332

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Date	Chinook		Sockeye		Chum	
	<u>Avg. Cumulative</u>		<u>Avg. Cumulative</u>		<u>Avg. Cumulative</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
7/25	2527	0.9362	32100	0.9875	13412	0.8620
7/26	2567	0.9512	32182	0.9900	13825	0.8885
7/27	2589	0.9595	32259	0.9924	14173	0.9108
7/28	2611	0.9675	32319	0.9942	14552	0.9352
7/29	2634	0.9761	32364	0.9956	14789	0.9505
7/30	2654	0.9834	32405	0.9969	14959	0.9613
7/31	2665	0.9875	32428	0.9976	15095	0.9701
8/1	2682	0.9936	32445	0.9981	15449	0.9929
8/2	2686	0.9951	32459	0.9986	15484	0.9951
8/3	2691	0.9969	32470	0.9989	15524	0.9977
8/4	2693	0.9978	32478	0.9991	15531	0.9981
8/5	2695	0.9987	32483	0.9993	15539	0.9986
8/6	2697	0.9992	32486	0.9994	15544	0.9989
8/7	2698	0.9995	32488	0.9994	15546	0.9991
8/8	2698	0.9998	32491	0.9995	15548	0.9992
8/9	2699	1.0000	32492	0.9996	15551	0.9994
8/10	2699	1.0000	32495	0.9996	15553	0.9995
8/11	2699	1.0000	32497	0.9997	15555	0.9996
8/12	2699	1.0000	32498	0.9997	15556	0.9997
8/13	2699	1.0000	32498	0.9997	15557	0.9998
8/14	2699	1.0000	32498	0.9997	15558	0.9998
8/15	2699	1.0000	32499	0.9998	15560	1.0000
8/16	2699	1.0000	32499	1.0000	15560	1.0000
8/17	2699	1.0000	32499	1.0000	15560	1.0000
8/18	2699	1.0000	32499	1.0000	15560	1.0000
8/19	2699	1.0000	32499	1.0000	15560	1.0000
8/20	2699	1.0000	32499	1.0000	15560	1.0000
8/21	2699	1.0000	32499	1.0000	15560	1.0000
8/22	2699	1.0000	32499	1.0000	15560	1.0000
8/23	2699	1.0000	32499	1.0000	15560	1.0000
8/24	2699	1.0000	32499	1.0000	15560	1.0000
8/25	2699	1.0000	32499	1.0000	15560	1.0000

a Average for the years 1981-1985, 1987-1991. This project changed from a tower to a weir in 1991. Early termination date of the project in 1986 precluded assessment of the entire chinook, sockeye and chum salmon migration. The project's normal termination precludes adequate assessment of coho and pink salmon escapement.

## Appendix D.7

## Historical age composition percentage, chum salmon, Goodnews Bay commercial catch and escapement, 1982 - 1989.

Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1982						
Commercial						
Male		0.0	16.3	20.0	0.0	36.3
Female		0.7	29.6	32.7	0.7	63.7
Combined	135	0.7	45.9	52.7	0.7	100.0
Commercial Catch <sup>b</sup>		97	6,348	7,288	97	13,829
Escapement samples were not collected.						
1983						
Commercial						
Male		0.9	15.3	22.7	0.5	39.4
Female		2.8	27.3	30.5	0.0	60.6
Combined	216	3.7	42.6	53.2	0.5	100.0
Commercial Catch <sup>b</sup>		250	2,882	3,600	34	6,766
Escapement						
Male		0.6	19.0	37.3	0.0	56.9
Female		0.6	15.5	27.0	0.0	43.1
Combined	174	1.2	34.5	64.3	0.0	100.0
Escapement <sup>c</sup>		186	5,364	9,997	0	15,548
1984						
Commercial						
Male		0.0	30.6	15.3	2.0	47.9
Female		0.4	38.5	12.5	0.7	52.1
Combined	457	69.5	96.9	30.5	2.7	100.0
Commercial Catch <sup>b</sup>		9,966	13,895	4,374	387	14,340
Escapement						
Male		0.0	32.3	4.4	0.0	36.7
Female		0.0	56.6	6.7	0.0	63.3
Combined	90	0.0	88.9	11.1	0.0	100.0
Escapement <sup>c</sup>		0	104,670	13,069	0	117,739
1985						
Commercial						
Male		0.0	27.8	14.4	0.0	59.1
Female		0.0	30.0	27.5	0.0	40.9
Combined	270	0.0	57.8	41.9	0.0	100.0
Commercial Catch <sup>b</sup>		0	2,765	2,004	0	4,784
Escapement						
Male		0.0	30.4	19.6	0.0	50.0
Female		0.0	28.3	21.7	0.0	50.0
Combined	46	0.0	58.7	41.3	0.0	100.0
Escapement <sup>c</sup>		0	14,690	10,335	0	25,025

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Age Composition	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1986						
Commercial						
Male		0.2	37.7	12.2	0.2	50.3
Female		0.5	36.0	12.5	0.7	49.7
Combined	353	0.7	73.7	24.7	0.9	100.0
Commercial Catch <sup>b</sup>		72	7,632	2,558	93	10,355
Escapement						
Male		0.0	38.0	19.0	0.0	57.0
Female		0.0	33.0	10.0	0.0	43.0
Combined	21	0.0	71.0	29.0	0.0	100.0
Escapement <sup>c</sup>		0	36,856	15,054	0	51,910
1987						
Commercial						
Male		0	37.2	17.9	0	55.1
Female		0	28.6	16.3	0	44.9
Combined	430	0	65.8	34.2	0	10.0
Commercial Catch <sup>b</sup>		0	13,414	6,967	0	20,381
Escapement						
Male		0.0	37.3	30.2	0.0	67.5
Female		0.2	22.3	10.1	0.0	32.5
Combined	467	0.2	59.5	40.3	0.0	100.0
Escapement <sup>c</sup>		81	22,503	15,218	0	37,802
1988						
Commercial						
Male		.6	9.4	33.9	1.1	45.0
Female		.2	13.6	40.7	0.4	55.0
Combined	469	.9	23.0	74.6	1.5	100.0
Commercial Catch <sup>b</sup>		282	7,613	24,671	493	33,059
Escapement						
Male		0.7	12.5	35.1	1.2	49.5
Female		0.0	16.4	32.1	0.9	49.5
Combined	422	0.7	28.9	67.2	2.1	100.0
Escapement <sup>c</sup>		276	11,416	26,544	830	39,501

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Age Composition		Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1989 <sup>d</sup>	Sample Size					
Commercial						
Male		0.2	27.0	27.2	1.3	55.7
Female		0.2	20.9	22.6	0.6	44.3
Combined	540	0.4	48.0	49.8	1.9	100.0
Commercial Catch <sup>b</sup>		50	6,534	6,786	252	13,622
Escapement						
Male		1.0	50.0	22.5	0	73.5
Female		0.0	19.6	6.9	0	26.5
Combined		1.0	69.6	29.4	0	100.0
Escapement <sup>c</sup>		150	10,681	4,664	0	15,495

<sup>a</sup> Age classes are a total of fresh water and marine growth.

<sup>b</sup> Age classes based on commercial catch samples.

<sup>c</sup> Age classes based on escapement samples. Escapement estimate based on the Goodnews River counting tower.

<sup>d</sup> Preliminary data.

## Appendix D.8

Summary of historical commercial harvest by period,  
Goodnews Bay District, chinook salmon, 1981-1991.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	1252	1252	1252	0.00806
6/14	0	0	0	0	0.00806
6/15	1	197	197	197	0.01055
6/16	2	251	1096	674	0.02221
6/17	1	362	362	362	0.02568
6/18	3	387	1706	1084	0.06881
6/19	2	296	390	343	0.09065
6/20	5	139	2642	838	0.14894
6/21	2	1298	1535	1417	0.17737
6/22	1	1591	1591	1591	0.19748
6/23	3	583	1639	1003	0.27167
6/24	3	476	988	695	0.30602
6/25	3	340	1896	1286	0.35589
6/26	2	352	416	384	0.38039
6/27	3	173	3944	1915	0.44856
6/28	3	807	1307	1024	0.49022
6/29	2	330	457	394	0.50508
6/30	3	460	1551	979	0.55916
7/1	2	77	1156	617	0.58498
7/2	4	234	710	463	0.61907
7/3	2	156	391	274	0.63444
7/4	1	2301	2301	2301	0.64925
7/5	6	95	1809	563	0.70708
7/6	1	272	272	272	0.71052
7/7	6	196	1119	641	0.78409
7/8	4	93	495	231	0.80622
7/9	3	135	351	278	0.81697
7/10	3	156	203	186	0.83092
7/11	6	53	408	194	0.85422
7/12	2	327	737	532	0.86475
7/13	3	66	135	91	0.87555
7/14	5	54	514	231	0.89221
7/15	4	0	354	153	0.90215
7/16	4	54	294	123	0.90994
7/17	2	65	210	138	0.91908
7/18	4	54	217	100	0.92520
7/19	2	33	66	50	0.92912
7/20	4	75	192	124	0.93733
7/21	3	35	68	49	0.94050
7/22	3	19	228	109	0.94487
7/23	4	17	97	48	0.94837
7/24	3	20	77	40	0.95204

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<u>Date</u>	No. years w/fishing period on <u>this date</u>	<u>Minimum</u> <u>harvest</u>	<u>Maximum</u> <u>harvest</u>	<u>Average</u> <u>harvest</u>	<u>Cumulative</u> <u>proportion</u> <u>harvest</u>
7/25	5	0	82	35	0.95537
7/26	2	0	10	5	0.95637
7/27	5	24	122	64	0.96028
7/28	2	5	21	13	0.96103
7/29	4	15	157	59	0.96451
7/30	4	16	73	36	0.96696
7/31	3	7	34	20	0.96870
8/1	6	12	78	37	0.97155
8/2	3	6	26	17	0.97312
8/3	6	9	102	47	0.97643
8/4	3	6	17	12	0.97726
8/5	5	6	54	23	0.97903
8/6	4	6	79	27	0.98057
8/7	2	15	43	29	0.98157
8/8	6	0	60	17	0.98321
8/9	3	7	18	12	0.98456
8/10	6	5	78	28	0.98637
8/11	3	5	15	10	0.98717
8/12	4	7	47	25	0.98825
8/13	5	0	36	12	0.98931
8/14	4	4	41	16	0.99069
8/15	4	5	26	15	0.99142
8/16	5	0	12	4	0.99212
8/17	5	2	22	12	0.99295
8/18	3	0	8	5	0.99346
8/19	5	4	14	9	0.99448
8/20	4	1	12	7	0.99501
8/21	5	0	7	4	0.99556
8/22	4	3	17	10	0.99604
8/23	3	0	7	4	0.99635
8/24	4	2	17	9	0.99695
8/25	4	0	13	5	0.99719
8/26	5	0	8	4	0.99757
8/27	4	2	13	6	0.99791
8/28	5	0	8	3	0.99830
8/29	5	2	4	3	0.99862
8/30	3	1	4	2	0.99878
8/31	5	0	6	2	0.99898
9/1	4	0	7	2	0.99924
9/2	5	1	5	3	0.99976
9/3	3	0	2	1	0.99978
9/4	3	0	6	2	0.99988
9/5	5	0	5	1	0.99997
9/6	2	0	0	0	0.99997
9/7	5	0	1	0	0.99999
9/8	4	0	2	1	1.00000
9/9	1	0	0	0	1.00000

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## Appendix D.9

Summary of historical commercial harvest by period  
Goodnews Bay District, sockeye salmon, 1981-1991.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	27	27	27	0.00021
6/14	0	0	0	0	0.00021
6/15	1	70	70	70	0.00037
6/16	2	125	696	411	0.00308
6/17	1	744	744	744	0.00484
6/18	3	281	596	408	0.00947
6/19	2	478	551	515	0.01380
6/20	5	102	1989	752	0.02647
6/21	2	967	1280	1124	0.03519
6/22	1	569	569	569	0.03647
6/23	3	1029	2701	1732	0.05385
6/24	3	596	2120	1536	0.07317
6/25	3	1040	2087	1594	0.09198
6/26	2	1719	1909	1814	0.10719
6/27	3	685	3040	819	0.13082
6/28	3	2097	3371	2800	0.15846
6/29	2	1422	3323	2373	0.17010
6/30	3	2037	8143	5091	0.21569
7/1	2	1143	3376	1143	0.23891
7/2	4	1818	8198	3695	0.28284
7/3	2	2589	5510	4050	0.31308
7/4	1	1598	1598	1598	0.32548
7/5	5	1254	4221	2582	0.36700
7/6	2	2346	6093	2346	0.38620
7/7	6	2057	4833	3448	0.46105
7/8	4	1231	5916	2320	0.50506
7/9	3	2167	3751	3020	0.53465
7/10	3	1759	4494	3157	0.56647
7/11	6	1397	3898	2511	0.63484
7/12	2	1444	2318	1881	0.64882
7/13	3	2046	5080	2383	0.67175
7/14	5	1039	3173	2277	0.71242
7/15	4	0	4818	2942	0.74908
7/16	4	902	2841	1774	0.77295
7/17	2	2978	3936	3936	0.78864
7/18	4	559	3049	1675	0.81038
7/19	2	1683	2151	1683	0.81928
7/20	4	395	3852	1840	0.83943
7/21	3	507	1318	904	0.84958
7/22	3	614	2207	1411	0.86402
7/23	4	162	874	546	0.87154

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<u>Date</u>	<u>No. Years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/24	3	588	2458	1523	0.88329
7/25	5	0	1534	518	0.89082
7/26	2	0	963	0	0.89302
7/27	5	166	1270	538	0.90282
7/28	2	278	555	417	0.90548
7/29	4	605	1312	1045	0.91773
7/30	4	84	423	299	0.92135
7/31	3	300	803	552	0.92536
8/1	6	45	811	355	0.93512
8/2	3	204	335	296	0.93758
8/3	6	36	949	490	0.94740
8/4	3	188	208	195	0.94952
8/5	5	94	932	440	0.95652
8/6	4	34	498	240	0.95921
8/7	2	178	686	432	0.96160
8/8	6	0	926	259	0.96595
8/9	3	46	209	91	0.96717
8/10	6	18	659	326	0.97309
8/11	3	0	174	85	0.97409
8/12	4	17	564	238	0.97729
8/13	5	0	204	106	0.97895
8/14	4	4	316	147	0.98067
8/15	4	5	398	137	0.98236
8/16	5	0	110	35	0.98325
8/17	5	4	498	179	0.98563
8/18	3	0	120	72	0.98652
8/19	5	5	360	125	0.98834
8/20	4	0	138	60	0.98911
8/21	5	1	239	104	0.99094
8/22	4	7	353	120	0.99237
8/23	3	0	88	31	0.99284
8/24	4	1	244	90	0.99378
8/25	4	0	90	37	0.99451
8/26	5	0	204	88	0.99544
8/27	4	0	148	44	0.99592
8/28	5	1	79	48	0.99672

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<u>Date</u>	<u>No. Years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
8/29	5	1	155	54	0.99747
8/30	3	0	68	24	0.99784
8/31	5	0	88	44	0.99845
9/1	4	0	57	26	0.99891
9/2	5	2	69	41	0.99941
9/3	3	0	21	7	0.99949
9/4	3	0	53	18	0.99968
9/5	5	0	61	15	0.99983
9/6	2	0	0	0	0.99983
9/7	5	0	63	14	1.00000
9/8	4	0	0	0	1.00000
9/9	1	0	0	0	1.00000

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<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	10	10	10	0.00015
6/14	0	0	0	0	0.00015
6/15	1	102	102	102	0.00090
6/16	2	89	1091	590	0.00551
6/17	1	167	167	167	0.00672
6/18	3	194	501	316	0.01288
6/19	2	249	557	403	0.01937
6/20	5	137	3501	915	0.04173
6/21	2	591	698	645	0.05090
6/22	1	708	708	708	0.05609
6/23	3	886	7833	3202	0.09484
6/24	3	594	1188	868	0.12213
6/25	3	724	2351	1472	0.15399
6/26	2	866	1241	1054	0.17147
6/27	3	691	758	726	0.19666
6/28	3	649	8369	3666	0.24048
6/29	2	425	1235	830	0.25296
6/30	3	1349	2048	1675	0.28468
7/1	2	710	850	780	0.29952
7/2	4	713	3434	2067	0.34522
7/3	2	1309	3074	2192	0.36991
7/4	1	1626	1626	1626	0.39392
7/5	5	976	3193	1777	0.44475
7/6	2	963	1162	1063	0.45181
7/7	6	1357	4478	2210	0.55347
7/8	4	949	1894	1503	0.58880
7/9	3	1191	1371	1306	0.61726
7/10	3	1346	2085	1677	0.65730
7/11	6	562	5830	1899	0.71899
7/12	2	1057	1384	1221	0.73636
7/13	3	896	2288	1442	0.75153
7/14	5	601	2123	1340	0.80287
7/15	4	0	2495	1302	0.84673
7/16	4	476	1360	919	0.87650
7/17	2	1532	2019	1776	0.88773
7/18	4	488	1191	722	0.91263
7/19	2	506	1465	986	0.91629
7/20	4	479	1265	833	0.93754
7/21	3	233	467	380	0.94697
7/22	3	307	1177	615	0.95456
7/23	4	35	301	192	0.96083

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<u>Date</u>	<u>No. Years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/24	3	244	874	478	0.96493
7/25	5	0	236	151	0.96998
7/26	2	0	608	304	0.96998
7/27	5	58	166	126	0.97546
7/28	2	89	93	91	0.97699
7/29	4	32	223	123	0.97990
7/30	4	42	124	94	0.98285
7/31	3	8	121	74	0.98358
8/1	6	22	61	49	0.98663
8/2	3	47	110	83	0.98764
8/3	6	22	105	50	0.98981
8/4	3	23	36	29	0.99050
8/5	5	21	165	59	0.99165
8/6	4	22	41	31	0.99259
8/7	2	16	21	19	0.99286
8/8	6	0	26	15	0.99346
8/9	3	19	63	42	0.99393
8/10	6	8	36	20	0.99476
8/11	3	10	25	16	0.99513
8/12	4	0	16	8	0.99542
8/13	5	2	22	10	0.99575
8/14	4	9	62	31	0.99648
8/15	4	0	10	5	0.99663
8/16	5	0	16	7	0.99684
8/17	5	6	22	10	0.99718
8/18	3	0	6	3	0.99726
8/19	5	2	16	6	0.99744
8/20	4	0	11	5	0.99761
8/21	5	0	127	28	0.99861
8/22	4	3	6	5	0.99875
8/23	3	0	6	2	0.99880
8/24	4	0	8	4	0.99886
8/25	4	0	4	2	0.99895
8/26	5	0	42	11	0.99926
8/27	4	0	5	2	0.99933
8/28	5	0	11	3	0.99944
8/29	5	0	6	3	0.99955
8/30	3	0	2	1	0.99959
8/31	5	0	9	3	0.99965

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<u>Date</u>	<u>No. Years w/fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
9/1	4	0	4	2	0.99971
9/2	5	0	10	3	0.99983
9/3	3	0	4	2	0.99988
9/4	3	0	9	4	0.99996
9/5	5	0	3	1	0.99998
9/6	2	0	0	0	0.99998
9/7	5	0	2	1	1.00000
9/8	4	0	0	0	1.00000
9/9	1	0	0	0	1.00000

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Summary of historical commercial harvest by period,  
Goodnews Bay, coho salmon, 1979-1991.

<u>DATE</u>	No. Years w/ fishing period on <u>this date</u>	<u>Minimum</u> <u>harvest</u>	<u>Maximum</u> <u>harvest</u>	<u>Average</u> <u>harvest</u>	<u>Cumulative</u> <u>proportion</u> <u>harvest</u>
7/14	2	0	1	1	0.00000
7/15	1	0	0	0	0.00000
7/16	3	1	18	7	0.00004
7/17	1	0	0	0	0.00004
7/18	2	0	5	3	0.00006
7/19	2	0	6	3	0.00007
7/20	3	1	111	38	0.00020
7/21	4	1	18	7	0.00027
7/22	1	1	1	1	0.00027
7/23	4	2	195	60	0.00064
7/24	3	5	33	17	0.00077
7/25	4	2	383	122	0.00158
7/26	2	9	40	25	0.00171
7/27	4	6	1059	285	0.00311
7/28	3	36	153	86	0.00369
7/29	5	5	91	33	0.00422
7/30	4	47	1306	450	0.00732
7/31	5	24	364	102	0.00864
8/1	7	56	2811	526	0.01526
8/2	4	96	1148	585	0.02023
8/3	6	66	3943	747	0.02662
8/4	5	92	949	568	0.03334
8/5	5	126	752	358	0.04004
8/6	6	314	4275	1447	0.05693
8/7	2	231	812	522	0.05979
8/8	7	357	2712	1272	0.08175
8/9	3	516	2240	1640	0.09365
8/10	7	463	4198	1567	0.11973
8/11	4	663	6065	2618	0.14180
8/12	4	1255	2074	1680	0.16650
8/13	7	673	4852	2119	0.19943
8/14	4	1325	2374	1924	0.22999
8/15	6	1225	5999	3225	0.26864
8/16	5	462	5456	2474	0.30900
8/17	6	1390	6880	3487	0.35353
8/18	4	1446	3864	2647	0.38032
8/19	5	1394	4180	2696	0.42751
8/20	6	68	9590	3414	0.47631
8/21	5	968	3459	2109	0.51610
8/22	6	1723	6731	3368	0.56092
8/23	4	1308	5306	3203	0.58896
8/24	5	1597	4356	3101	0.62278
8/25	5	1739	3709	2957	0.66029

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<u>Date</u>	No. Years w/fishing period on <u>this period</u>	<u>Minimum</u> <u>harvest</u>	<u>Maximum</u> <u>harvest</u>	<u>Average</u> <u>harvest</u>	<u>Cumulative</u> <u>proportion</u> <u>harvest</u>
8/26	5	15	3249	2017	0.69308
8/27	6	1101	6625	3183	0.74756
8/28	5	1377	3529	2164	0.78681
8/29	7	725	4972	2269	0.82757
8/30	4	1483	3926	2734	0.85266
8/31	6	1125	3479	2267	0.88854
9/1	5	604	2778	1798	0.91007
9/2	5	576	3233	1348	0.93275
9/3	5	377	3822	2007	0.95031
9/4	3	374	2685	1567	0.96686
9/5	7	0	2695	1240	0.98494
9/6	3	0	1715	956	0.98982
9/7	5	0	1656	555	0.99670
9/8	3	0	843	281	1.00000

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Appendix D.12 Goodnews Bay, District 5 commercial effort 1970-1991.

<u>YEAR</u>	<u>EFFORT<sup>a</sup></u>
1970	35
1971	16
1972	14
1973	21
1974	49
1975	50
1976	40
1977	34
1978	35
1979	30
1980	48
1981	48
1982	48
1983	79
1984	77
1985	69
1986	86
1987	69
1988	125
1989	88
1990	82
1991	72
TEN YEAR AVERAGE (1981-1990)	77

a Permits that made at least one delivery during that year.

APPENDIX F

Appendix F.1 Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1991.

Year	Number of Fishermen <sup>b</sup>	Number Caught <sup>a</sup>		Total Weight (lbs)		Total Value (\$)		
		Whitefish <sup>c</sup>	Burbot	Whitefish	Burbot	Whitefish	Burbot	Total
1977	3	718	0	d	0	952	0	952
1978	b	1,735	0	6,017	0	d	0	d
1979	b	3,219	0	11,211	0	d	0	d
1980	4	603	0	2,173	0	830	0	830
1981	4	1,197	0	4,620	0	2,310	0	2,310
1982	5	1,512	0	6,219	0	2,856	0	2,856
1983	0	0	0	0	0	0	0	0
1984	2	0	651	0	d	0	d	d
1985	5	555	1,829	2,275	2,016	1,137	455	1,593
1986	3	0	0	0	3,428	0	857	857
1987	4	417	0	1,260	0	1,008	0	1,008
1988	3	d	d	2,588	7	1,991	3	1,994
1989	7	178	282	583	270	501	597	1,098
1990	11	1,664	d	5,502	10	5,166	5	5,171
1991	5	1,413	41	2,442	256	2,412	197	2,609

a Does not include catches incidental to the commercial salmon fishery.

b Does not include fisherman who delivered catches incidental to the commercial salmon fishery.

c Includes cisco and pike

d Data not available.

**APPENDIX G**

Appendix G.1 Commercial miscellaneous saltwater finfish fishery catch data, Kuskokwim Area, 1988-1991.

<u>Year</u>	<u>Number of Fishermen</u>	<u>Species</u>	<u>Number Caught</u>	<u>Total Weight (lbs)</u>	<u>Total Value (\$)</u>
1988	4	Tom Cod <sup>a</sup>	b	439	878
1989	2	Tom Cod	b	591	1,180
1990	1	Tom Cod	300	221	442
1991	2	Tom Cod	b	1,356	2,690

a Tom Cod is the local name for Saffron Cod (*Eleginus gracilis*).

b Data not available

**APPENDIX H**

Appendix H.1 Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981-1991.

District	Estimated Biomass (st)	Harvest				Roe%	Estimated Value (\$ X 1000)	Exploitation Rate (%)
		Sac-roe	Bait	Waste	Total			
<u>1991</u>								
Security Cove	4434	561	9	0	570	9.3	208	12.9
Goodnews Bay	4387	259	4	0	263	8.9	93	6.0
Cape Avinof	2083	240	27	0	267	9.5	94	12.8
Nelson Is.	2385	-	-	-	-	-	-	-
Nunivak Is.	3903	17	42	0	59	7.5	9	1.5
Total	17192	1077	82	0	1159	9.2	404	6.7
<u>1990</u>								
Security Cove	2650	174	60	0	234	8.7	94	8.8
Goodnews Bay	2577	427	28	0	455	12.2	314	17.7
Cape Avinof	2020	49	1	0	50	12.0	35	2.5
Nelson Is.	2705	-	-	-	-	-	-	-
Nunivak Is.	422	-	-	-	-	-	-	-
Total	10374	650	89	0	739	11.1	443	7.1
<u>1989</u>								
Security Cove	2830	544	10	0	554	9.4	256	19.6
Goodnews Bay	4044	453	162	0	616	8.4	335	15.2
Cape Avinof	689	90	39	0	129	8.0	54	18.7
Nelson Is.	3316	122	100	11	233	8.5	57	7.0
Nunivak Is.	617	79	37	0	116	9.4	42	18.8
Total	11496	1289	347	11	1647	8.8	744	14.3
<u>1988</u>								
Security Cove	4906	324	0	0	324	9.3	362	6.6
Goodnews Bay	4479	473	10	0	483	8.0	463	10.8
Cape Avinof	4108	348	0	0	348	8.6	264	8.5
Nelson Is.	7152	760	15	0	775	9.2	713	10.8
Nunivak Is.	2800	-	-	-	-	-	-	-
Total	23445	1905	25	0	1930	8.8	1802	8.2
<u>1987</u>								
Security Cove	2300	312	1	0	313	9.7	242	13.6
Goodnews Bay	2000	179	142	0	321	7.3	133	16.1
Nelson Is.	8100	915	8	0	923	9.2	661	11.4
Nunivak Is.	4400	254	160	0	414	7.8	231	9.4
Total	16800	1660	311	0	1971	8.7	1267	11.7
<u>1986</u>								
Security Cove	3700	747	4	0	751	11.2	535	20.3
Goodnews Bay	3000	554	3	0	557	10.4	325	18.6
Nelson Is.	7300	852	34	0	886	10.3	428	12.1
Nunivak Is.	6000	469	42	0	511	10.1	213	8.5
Total	20000	2622	83	0	2705	10.5	1501	13.5
<u>1985</u>								
Security Cove	4900	703	0	30	733	10.1	355	15.0
Goodnews Bay	4300	711	0	13	724	8.7	309	16.8
Nelson Is.	9500	967	10	0	977	10.6	527	10.3
Nunivak Is.	5700	349	9	0	358	8.9	146	6.3
Total	24400	2730	19	43	2792	9.8	1337	11.4
<u>1984</u>								
Security Cove	5100	325	0	10	335	11.8	110	6.6
Goodnews Bay	4100	667	0	50	717	10.1	168	17.5
Total	9200	992	0	60	1052	10.6	278	11.4
<u>1983</u>								
Security Cove	6400	966	107	0	1073	9.4	443	16.8
Goodnews Bay	3200	426	9	0	435	9.4	185	13.6
Total	9600	1392	116	0	1508	9.4	628	15.7
<u>1982</u>								
Security Cove	5100	707	106	0	813	9.3	271	15.9
Goodnews Bay	2600	437	49	0	486	9.5	188	18.7
Total	7700	1144	155	0	1299	9.4	459	16.9
<u>1981</u>								
Security Cove	8300	1150	23	0	1173	8.1	347	14.1
Goodnews Bay	4300	558	99	0	657	7.7	196	15.3
Total	12600	1708	122	0	1830	8.0	543	14.5

Appendix H.2 Pacific herring subsistence harvest (st) and effort data from selected Kuskokwim Area villages, Alaska, 1975-1991<sup>a</sup>.

Village	Year																
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
<u>Nelson Island</u>																	
Tununak	22	15	57	38	34	65	40	48	94	e	43	63	48	49	47	54	21
Umkumiut	33	9	3	11	8	3	10	0	e	e	e	e	d	d	d	d	d
Toksook Bay	34	35	21	37	51	29	14	35	-	-	46	70	51	59	52	46	40
Nightmute	-	-	-	-	-	-	-	-	-	-	3 <sup>b</sup>	21	15	16	15	18	8
Newtok	-	-	-	-	-	-	-	-	-	-	7 <sup>c</sup>	13	10	12	10	8	1
Total	89	59	81	86	93	97	64	83	94	-	99	167	124	136	124	126	70
No. of Fishing Families	109	42	90	83	54	70	93	65	43	-	65 <sup>b</sup>	72 <sup>b</sup>	96	104	- <sup>b</sup>	100	85
<u>Nunivak Island</u>																	
Mekoryuk	-	-	-	-	-	-	-	-	-	-	<1	<1	-	e	e	5	4
No. of Fishing Families	-	-	-	-	-	-	-	-	-	-	11	6 <sup>b</sup>	-	e	e	19	20
<u>Other Kuskokwim Delta</u>																	
Chefornak	-	-	-	-	-	-	-	-	-	-	13 <sup>b</sup>	c	14	e	e	e	e
Kipnuk	-	-	-	-	-	-	-	-	-	-	9	c	14	c	e	e	e
Kongiganak	-	-	-	-	-	-	-	-	-	-	3	2	c	e	e	e	e
Kwigillingok	-	11	1	-	8	13	-	13	-	-	5	c	c	e	e	e	e
Total	-	11	1	-	8	13	-	13	-	-	30	2	28	e	e	e	e
No. of Fishing Families	-	8	9	-	22	19	-	21	-	-	55 <sup>b</sup>	12 <sup>b</sup>	49	e	e	e	e
<u>All Areas Combined</u>																	
Total Catch	92	75	85	91	112	121	78	107	103	11	138	177	155	136	124	145	74
No. of Fishing Families	143	91	129	112	160	150	139	89	80	47	175 <sup>b</sup>	131	184	104	- <sup>b</sup>	119	95

- a Subsistence survey results are believed to accurately reflect harvest trends, however, reported catches reflect minimum figures since all fishermen cannot be contacted.  
b Fishing families were not interviewed or only a portion of fishing families were interviewed as catch was enumerated while on drying racks.  
c Survey not allowed by village council.  
d Umkumiut effort included with Toksook Bay and Nightmute.  
e Not surveyed.

Appendix H.3      Number of buyers and fishermen participating in Kuskokwim  
Area Pacific herring fisheries, Alaska, 1981-1991.

<u>Year</u>	<u>District</u>	<u>Number of Buyers</u>	<u>Number of Fishermen</u>	<u>Number of Deliveries</u>
<u>1991</u>	Security Cove	6	52	100
	Goodnews Bay	2	103	137
	Cape Avinof	1	137	463
	Nelson Island		No commercial opening	
	Nunivak Island	2	17	31
<u>1990</u>	Security Cove	9	52	77
	Goodnews Bay	3	126	530
	Cape Avinof	1	101	109
	Nelson Island		No commercial opening	
	Nunivak Island		No commercial opening	
<u>1989</u>	Security Cove	8	104	108
	Goodnews Bay	6	138	533
	Cape Avinof	3	147	335
	Nelson Island	4	162	438
	Nunivak Island	3	45	210
<u>1988</u>	Security Cove	4	31	51
	Goodnews Bay	6	60	309
	Cape Avinof	1	98	485
	Nelson Island	7	174	547
	Nunivak Island		No commercial opening	
<u>1987</u>	Security Cove	8	65	67
	Goodnews Bay	4	117	191
	Nelson Island	9	235	633
	Nunivak Island	4	61	341
<u>1986</u>	Security Cove	11	88	199
	Goodnews Bay	5	104	319
	Nelson Island	4	163	1,099
	Nunivak Island	5	36	284
<u>1985</u>	Security Cove	6	107	268
	Goodnews Bay	5	83	420
	Nelson Island	6	143	776
	Nunivak Island	5	37	273
<u>1984</u>	Security Cove	4	38	86
	Goodnews Bay	4	130	390
<u>1983</u>	Security Cove	6	94	312
	Goodnews Bay	4	84	225
<u>1982</u>	Security Cove	3	107	250
	Goodnews Bay	3	84	297
<u>1981</u>	Security Cove	7	113	311
	Goodnews Bay	5	175	479

APPENDIX S

Division of Subsistence  
 Alaska Department of Fish and Game  
 Box 1788  
 Bethel, Alaska 99559

NAME \_\_\_\_\_

BE WHITE THE BORDER OF THE FISH WHICH  
 CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR  
 HOUSE. PLEASE INCLUDE SALMON THAT WERE  
 GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES  
 AND SALMON THAT WERE CAUGHT FOR DOGFOOD.  
**DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL  
 FISHING.**

July Rate  
 U.S. Postage  
 Paid  
 Fairbanks, Ak.  
 Permit No. 69

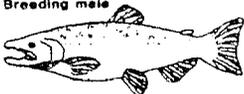
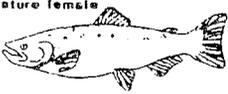
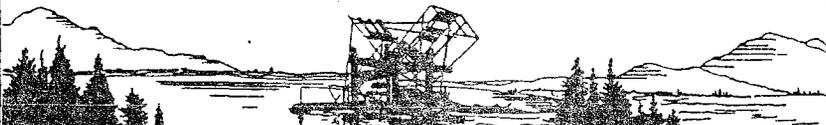
This calendar is sent to you by the  
 Alaska Department of Fish and Game  
 in Bethel.

WHEN DONE SALMON FISHING FOR THE YEAR, FOLD  
 THIS CALENDAR SO THAT THE ADDRESS ON THE  
 BACK IS VISIBLE AND DROP IN THE MAIL. POSTAGE  
 IS NOT NEEDED.

KING \_\_\_\_\_  
 CHUM \_\_\_\_\_  
 RED \_\_\_\_\_

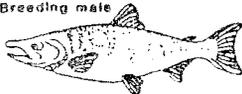
PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN MAY.

## JUNE 1991 SUBSISTENCE SALMON CALENDAR

Breeding male 		Mature female 		SATURDAY		
Common name: King salmon						1
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
2	3	4	5	6	7	8
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
9	10	11	12	13	14	15
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
16	17	18	19	20	21	22
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
23	24	25	26	27	28	29
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
30						KING _____ CHUM _____ RED _____

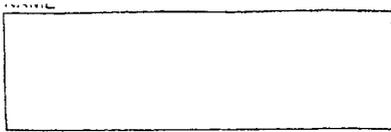
TARYAQVAK =  
 IQALLUK =  
 SAYAK =

## JULY 1991 SUBSISTENCE SALMON CALENDAR

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____			
SUNDAY	8	9	10	11	12	13
7	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____			
14	15	16	17	18	19	20
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
21	22	23	24	25	26	27
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
28	29	30	31	Breeding male  Common name: Chum salmon		
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____			

TARYAQVAK =  
 IQALLUK =  
 SAYAK =

TARYAQVAK =  
 IQALLUK =  
 SAYAK =  
 QAKRYAO =



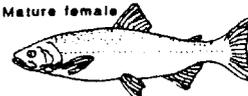
PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD. **DO NOT** INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

Bulk Rate  
U.S. Postage  
Paid  
Fairbanks, Ak.  
Permit No. 69

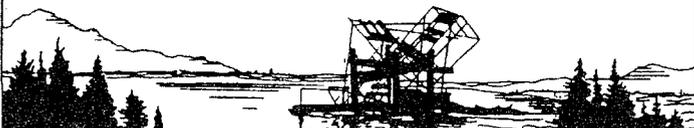
This calendar is sent to you by the Alaska Department of Fish and Game in Bethel.

WHEN DONE SALMON FISHING FOR THE YEAR, FOLD THIS CALENDAR SO THAT THE ADDRESS ON THE BACK IS VISIBLE AND DROP IN THE MAIL. POSTAGE IS NOT NEEDED.

## AUGUST 1991 SUBSISTENCE SALMON CALENDAR

  <p>Common name: Silver salmon</p>		THURSDAY	FRIDAY	SATURDAY
		1	2	3
		KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	
4	5	6	7	8
TARYAOVAK = KING _____ IOALLUK = CHUM _____ SAYAK = RED _____ QAKHYAQ = SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
11	12	13	14	15
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
18	19	20	21	22
IOALLUK = CHUM _____ SAYAK = RED _____ QAKHYAQ = SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
25	26	27	28	29
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
30	31			
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____			

## SEPTEMBER 1991 SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
IOALLUK = CHUM _____ SAYAK = RED _____ QAKHYAQ = SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
8	9	10	11	12	13	14
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
15	16	17	18	19	20	21
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
22	23	24	25	26	27	28
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
29	30					
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____					

KUSKOKWIM AREA

1991 POST-SEASON SUBSISTENCE SALMON HARVEST SURVEY

(Questions marked with an asterisk are asked of all households interviewed) lk

Interviewer: <u>BP SM</u>	Person Interviewed: _____
Community: _____	Relation to Household Head: _____
Survey Date: _____, 1991	Was household in community last year?: No ___ Yes ___

- \*1. We would like to make sure we have the correct name and address for this household.  
 Name of household head: \_\_\_\_\_ Same as person interviewed \_\_\_\_\_  
 Post Office Box: \_\_\_\_\_
- \*2. Did this household catch salmon for subsistence use this year? No \_\_\_ (go to # 5) Yes \_\_\_
- 3. May I have your calendar?  
 [ Will return it later \_\_\_ Didn't get one \_\_\_ Didn't use \_\_\_ Not available \_\_\_ ] (go to # 8)  
 [ ADF&G has it \_\_\_ Picked up by interviewer \_\_\_ ] (go to # 11)
- \*4. Does this household usually subsistence fish for salmon? No \_\_\_ Yes \_\_\_

**HOUSEHOLD DIDN'T FISH**

5. Did this household help another household process ("put up") salmon?  
 No \_\_\_ (go to # 17) Yes \_\_\_: (Names, HHIDs) \_\_\_\_\_

6. ~~Please estimate how many salmon of you processed ("put up").~~  
 CHINOOK \_\_\_\_\_ CHUM \_\_\_\_\_ SOCKEYE \_\_\_\_\_ COHO \_\_\_\_\_ Could not estimate \_\_\_\_\_  
 ("kings") ("dogs") ("reds") ("silvers")

7. Please estimate how many salmon were for your household only.  
 CHINOOK \_\_\_\_\_ CHUM \_\_\_\_\_ SOCKEYE \_\_\_\_\_ COHO \_\_\_\_\_ Could not estimate \_\_\_\_\_  
 ("kings") ("dogs") ("reds") ("silvers")

(Go to Question 17) \_\_\_\_\_

**HOUSEHOLD FISHED, ADF&G DOES NOT HAVE CALENDAR**

8. Did other households fish with you? No \_\_\_ Yes \_\_\_: (Names, HHIDs) \_\_\_\_\_

9. Please estimate how many salmon your household (or all households together) caught. (Ask about salmon already eaten, frozen, given to other households, and dog food)  
 CHINOOK \_\_\_\_\_ CHUM \_\_\_\_\_ SOCKEYE \_\_\_\_\_ COHO \_\_\_\_\_ Could not estimate \_\_\_\_\_  
 ("kings") ("dogs") ("reds") ("silvers") Salmon are included with Household \_\_\_\_\_  
 (HHID)

10. Please estimate how many salmon were for your household only.  
 CHINOOK \_\_\_\_\_ CHUM \_\_\_\_\_ SOCKEYE \_\_\_\_\_ COHO \_\_\_\_\_ All \_\_\_ Could not estimate \_\_\_\_\_  
 ("kings") ("dogs") ("reds") ("silvers")

(Go to Question 16) \_\_\_\_\_

**HOUSEHOLD FISHED, ADF&G DOES HAVE CALENDAR**

11. Are all of the salmon this household caught written on the calendar? (Ask about salmon already eaten, frozen, given to other households, and dog food) No \_\_\_ Yes \_\_\_ (go to # 13)

12. How many additional salmon, not written on the calendar, were caught?  
 CHINOOK \_\_\_\_\_ CHUM \_\_\_\_\_ SOCKEYE \_\_\_\_\_ COHO \_\_\_\_\_ Could not estimate \_\_\_\_\_  
 ("kings") ("dogs") ("reds") ("silvers")

13. Did other households fish with you? No \_\_\_ (go to # 16) Yes \_\_\_: (Names, HHIDs) \_\_\_\_\_

14. Are the salmon they caught written on your calendar? No \_\_\_ Yes \_\_\_

15. Please estimate how many salmon were for your household only. All \_\_\_  
CHINOOK \_\_\_ CHUM \_\_\_ SOCKEYE \_\_\_ COHO \_\_\_ Could not estimate \_\_\_  
(Go to Question 16)

**FISHING GEAR** (For subsistence fishing households only)

16. What type(s) of fishing gear was used for catching subsistence salmon this year?  
Drift net \_\_\_, Fish wheel \_\_\_, Seining \_\_\_, Spear \_\_\_,  
Set net \_\_\_, Rod-and-reel \_\_\_, Other (Identify) \_\_\_\_\_

**COMMERCIAL FISHING**

\*17. Does this household commercial fish? No \_\_\_ (go to # 21)  
Yes \_\_\_: (Where? \_\_\_Kuskokwim River or Bay \_\_\_Yukon Area \_\_\_Bristol Bay)

18. Were all of the salmon caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All were sold \_\_\_ Some were used for subsistence \_\_\_

19. How many commercially caught salmon were used for subsistence?  
CHINOOK \_\_\_ CHUM \_\_\_ SOCKEYE \_\_\_ COHO \_\_\_

20. Are those listed on the salmon calendar or included in the estimates you gave me?  
Yes \_\_\_, No \_\_\_

**HOUSEHOLD SIZE**

\*21. How many people live in this household? \_\_\_\_\_

**DOG FOOD** (For subsistence fishing households only)

22. Did this household catch salmon for dog food? Only backbones/heads/guts/scraps \_\_\_ (go to # 25)  
No \_\_\_ (go to # 25) Yes \_\_\_:

23. How many? CHUM \_\_\_ SOCKEYE \_\_\_ COHO \_\_\_  
("dogs") ("reds") ("silvers")

24. Are the salmon harvested for dog food included on your calendar or in the estimates you gave me?  
Yes \_\_\_, No \_\_\_

25. How many dogs does this household have? \_\_\_\_\_

26. (For subsistence fishing households only) Better than average \_\_\_  
How was subsistence salmon fishing for you this year? Average \_\_\_  
Worse than average \_\_\_  
Why \_\_\_\_\_

\*27. Do you have anything you would like to say about fishing regulations, such as changes you would like to see?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*28. Would you like a summary of this season's subsistence salmon survey? Yes \_\_\_, No \_\_\_ (Available 4/92)

End. Address in Area Resident.

Each spring the Alaska Department of Fish and Game mails subsistence catch calendars to Kuskokwim area households that harvest salmon for subsistence use. This postcard was mailed to you as part of our effort to collect information about the harvest of Kuskokwim salmon. We would appreciate your assistance.

**Please take a moment to fill out the bottom back side of this card and drop it in the mail to us.** No stamp is necessary, postage is already paid. This information will be used to help make sure that there will be enough salmon for subsistence use.

Thank you,  
Subsistence Division Office  
Room 214, BNC Complex  
Bethel (543-3100)

Division of Subsistence  
Alaska Dept. of Fish and Game  
P.O. Box 1788  
Bethel, AK 99559



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED  
STATES

**BUSINESS REPLY MAIL**  
First Class Mail Permit No. 50 Fairbanks, AK.

Postage Will Be Paid By Addressee

State of Alaska  
Department of Fish and Game  
Subsistence Division  
P.O.Box 1788  
Bethel, AK 99559-1788

Division of Subsistence  
Alaska Dept. of Fish and Game  
P.O. Box 1788  
Bethel, AK 99559

(correct your address if necessary)

NAME: \_\_\_\_\_  
P.O. BOX: \_\_\_\_\_  
CITY, STATE: \_\_\_\_\_  
ZIP CODE: \_\_\_\_\_

1. Did your household harvest salmon in 1991 for subsistence use?  
(include the salmon kept for subsistence when commercial fishing) Yes \_\_\_ No \_\_\_
2. How many salmon did your household harvest for subsistence?  
(include those eaten, frozen, dried, smoked, canned, or used as dogfood)  
Chinook \_\_\_\_\_ (Kings)      Chum \_\_\_\_\_ (L's)      Sockeye \_\_\_\_\_ (Reds)      Coho \_\_\_\_\_ (Silvers)
3. What type(s) of gear did your household use to catch subsistence salmon?  
Set net \_\_\_\_\_ Drift net \_\_\_\_\_ Fishwheel \_\_\_\_\_ Rod and reel \_\_\_\_\_
4. Please write comments and suggestions here: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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