

**YUKON RIVER JOINT TECHNICAL COMMITTEE REPORT
TO THE MARCH 1998 NEGOTIATION SESSION**

Prepared by

The U.S./Canada Yukon River
Joint Technical Committee

February, 1998

Anchorage, Alaska

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1.0 INTRODUCTION

At the October 1997 Yukon River salmon negotiation session, the chief negotiators for the United States and Canadian delegations directed the Yukon River Joint Technical Committee (JTC) to meet and address the following agenda items prior to the negotiation session scheduled for March 1998:

- 1) Compile available information on Yukon River chinook salmon age-sex-length composition.
- 2) Explore the tools and mechanisms available or that might be needed to implement a long term harvest share agreement; both U.S. and Canadian proposals will be examined.

The JTC met in Anchorage on 25-26 February 1998, with the first of these two days dedicated to an agenda tasked to us by the Yukon River Panel and reported upon separately, and the second of these two days dedicated to the agenda tasked to us by the negotiators and reported upon herein. The 26 February meeting was attended at various times by the following persons:

Canadian Department of Fisheries and Oceans (DFO)

Ian Boyce
Sandy Johnston (Co-chair)

Alaska Department of Fish and Game (ADF&G)

Elizabeth Andrews	Rich Cannon
Louis Barton	Russ Holder
Dan Bergstrom	Rich Price
Larry Buklis (Co-chair)	Keith Schultz
Jeff Bromaghin	

United States Fish and Wildlife Service (USFWS)

Ken Harper	Monty Millard
Steve Klosiewski	David Wiswar

National Marine Fisheries Service (NMFS)

John Eiler
Dick Wilmot

Bering Sea Fishermen's Association (BSFA)

Jude Henzler

Tanana Chiefs Conference (TCC)

Kevin Van Hatten

2.0 YUKON RIVER CHINOOK SALMON LENGTH AT AGE BY SEX ANALYSIS

The JTC reviewed the availability of age-sex-length information for Yukon River chinook salmon in context with the time and resources available to compile and present such information, and in context with the central question from the negotiation delegations as understood by the JTC, that being whether a decrease in size has occurred for Yukon River chinook salmon. Draft information brought to the meeting included age, sex, and length information from selected sampling locations in the Yukon River drainage in Alaska and Canada. The locations had been chosen as representative, and based upon the extent of the historical record. It should be understood from the outset that detection of changes in fish size due to genetic factors would likely require a multi-decade time series that exceeds the historical time frame of the available data.

It was decided to focus the analysis and presentation for this assignment on trends in length at age by sex for six data sources, and to extend the historical period further back than had been available at the time of the meeting, to the extent feasible given the available time, resources, and limitations of the data. There was some consideration given to examining average fish weight data from commercial processor annual records, but this was not pursued as such an analysis would need to somehow factor in changes in fishery management regimes and gear selectivities. Further analysis or presentation of age and sex composition information was not pursued at this time in order to be able to accomplish an adequate treatment of the length at age by sex analysis. Interpretation of age and sex composition trends in a given fishery or escapement sample, likewise, would require consideration of fishery management regimes and sampling selectivities that are controlled for to some extent by examining the length data separately by age and sex group. All three aspects typically measured by sampling programs, namely age, sex, and size, are of biological interest, and compilation and analysis of these data will continue on an ongoing basis in the future as other work priorities allow.

Figures 1 and 2 are maps of the Yukon River drainage in Alaska and Canada, respectively, provided for general reference. The six data sources used for this analysis were as follows:

- 1) Commercial fishery samples from Yukon River District 1 (Y-1) in Alaska, sampled from unrestricted mesh size fishing periods, unless noted as otherwise. During fishing periods with unrestricted gear mesh gillnets, it is thought that most of the samples are from 8 to 9 inch stretch mesh gear, although some smaller mesh gear (ie. less than 6 inch stretch mesh) may be fished in some years, especially if the summer chum salmon market and run are strong. The samples are collected from processing plants in Emmonak, and are thought to be a representative sample of commercially caught chinook salmon entering the mouth of the Yukon River.

- 2) Big Eddy test fishing samples from 8-1/2 inch stretch mesh size gillnets. Big Eddy is a test fishing project located just upriver of Emmonak in the mainstem Yukon River. These samples from the Big Eddy test fishery were collected from 8-1/2 inch mesh gillnet catches prior to the opening of the commercial fishing season and represent the pre-season portion of the run entering the Yukon River.
- 3) East and West Fork Andreafsky River escapement samples pooled. Samples were from post spawning salmon on the East and West Forks, primarily from carcasses, through 1993, and from weir samples on the East Fork since 1994. The Andreafsky River is a representative stock from the lower run stock group.
- 4) Salcha River escapement samples. Samples were collected during a mark-recapture tagging project (using electroshocking technique for capture) and/or from post spawning salmon, typically carcasses. The Salcha River is a representative stock from the middle run stock group.
- 5) Fish wheel catch samples from the DFO tagging project immediately upstream from the Canada/U.S. border on the mainstem Yukon River (ie. non-Porcupine).
- 6) Commercial fishery samples from the Dawson area on the mainstem Yukon River in Canada, being primarily from large mesh size gillnets, but including some fish wheel catches.

Figures 3-8 provide graphic summaries of the length at age by sex information for each of these six sources, respectively. Appendix A to this report provides tabular detail. Data were obtained from agency reports and files. A few general comments are warranted regarding methods. Ages for chinook salmon from these locations were obtained from scale interpretation, or, for a small number of samples obtained from the commercial fishery in Canada, pectoral fin interpretation. Sex identification has typically been by external characteristics, although some fish are sometimes cut for positive internal sex identification at some of these locations. Length was measured as noted on the data tables in Appendix A. Differences in measurement methods between locations is not problematic for the purposes of this analysis, since trends are being compared within, and not between, data sources. For some years in the District 1 commercial fishery sampling, fish length data by fishing period are weighted by the commercial catch abundance for the period, before pooling into an annual average, but for other years, and for the other five data sources used in this analysis, sample fish length data are pooled without weighting.

In terms of the essential results, the length at age by sex data does not indicate any sustained substantial change in fish size for Yukon River chinook salmon. We understand that inter-generational traditional knowledge may recall fish of larger size being caught more frequently in the past. Two considerations are worthy of mention. The first is that the data sources presented here are more limited in time frame than is inter-generational knowledge. The second is that, while the size at age by sex data may

not indicate any sustained substantial change, a shift in the composition of catches by age or sex, or both, could account for perceived changes in the size of fish in catches.

3.0 DISCUSSION OF MANAGEMENT TOOLS AND MECHANISMS FOR HARVEST SHARE IMPLEMENTATION

The JTC was tasked by the negotiators to explore the tools and mechanisms available or that might be needed to implement long term harvest share agreements associated with both the U.S. and Canadian proposals. This discussion and dialogue by the JTC was requested to provide the delegations with the technical limitations and needs associated with actual implementation of a long term harvest share agreement. The JTC entered into this dialogue by agreeing to place some restrictions on the content and direction of the discussions.

First, there was agreement that discussions would not move into areas of negotiation, but consider the standing proposal of each country as if it were the direction given the management agencies to implement a long term agreement. Therefore, the JTC discussed what management tools and types of information would be required and how these tools might be used in fisheries management. A second area of discussion and agreement was to focus primarily on the most recent Canadian proposal, which moves away from the total allowable catch (TAC) formulation to some degree and embraces a harvest guideline approach to management and sharing of available surplus production.

A very helpful and informative discussion preceded this decision, which allowed managers and scientists to explore the feasibility of implementing a very prescriptive TAC approach to harvest shares and management. Both the standing U.S. proposal and an earlier Canadian proposal had used this framework. There was agreement among the JTC members that the TAC approach was very useful for catch accounting and discussion of harvest shares, but frankly was not feasible at this time given available technology and resources. Although the pending U.S. counter proposal to Canada could not be discussed, it was acknowledged that the use of harvest guidelines as a framework was more in line with current management practices than was a TAC approach. However, there was also strong agreement among the JTC that technology development and new data collection processes were necessary to implement a TAC approach to management of fisheries and monitoring of harvest shares, and was needed to ensure accountability and to improve management capability. In other words, the JTC recognized the merit of simplifying implementation by using something we know we can do and understand - harvest guideline management - but also recognized the merit of continuing to strive to develop better tools and a better understanding of the biology that supports the fisheries. In fact, it was suggested that a real commitment by both countries to fund and develop these improved capabilities is a fundamental element of the cooperative conservation and management principles of the agreement. The following list of recommendations were developed for consideration by the joint delegations:

- 1) Recommend that the JTC be tasked to prepare a detailed assessment and identification of existing project improvements, new project needs, and technology development required to implement a harvest sharing agreement for the Yukon River.
- 2) Recommend that a clearly stated connection be developed between the implementation of the R&E Fund and data collection needs associated with implementation of a long term agreement. The JTC members felt that it might be helpful for the Panel to offer guidance to prospective submitters of R&E proposals as to what types of information and projects are most needed consistent with the purposes of the Fund.
- 3) Recommend that principles for accountability and conservation be more thoroughly defined for the purposes of long term implementation. Clear direction to the management entities is needed as to whether management precision is to be rigorously achieved upon implementation of the long term agreement, or whether it is a goal for which a commitment is made to fund and work toward over time. In other words, will fisheries managers be expected to meet harvest share arrangements without having the resources or the time needed to develop the assessment tools required, or will there be an understanding that the commitment will be to endeavor to meet the objectives with the current management program, while committing to fund and develop the necessary tools?

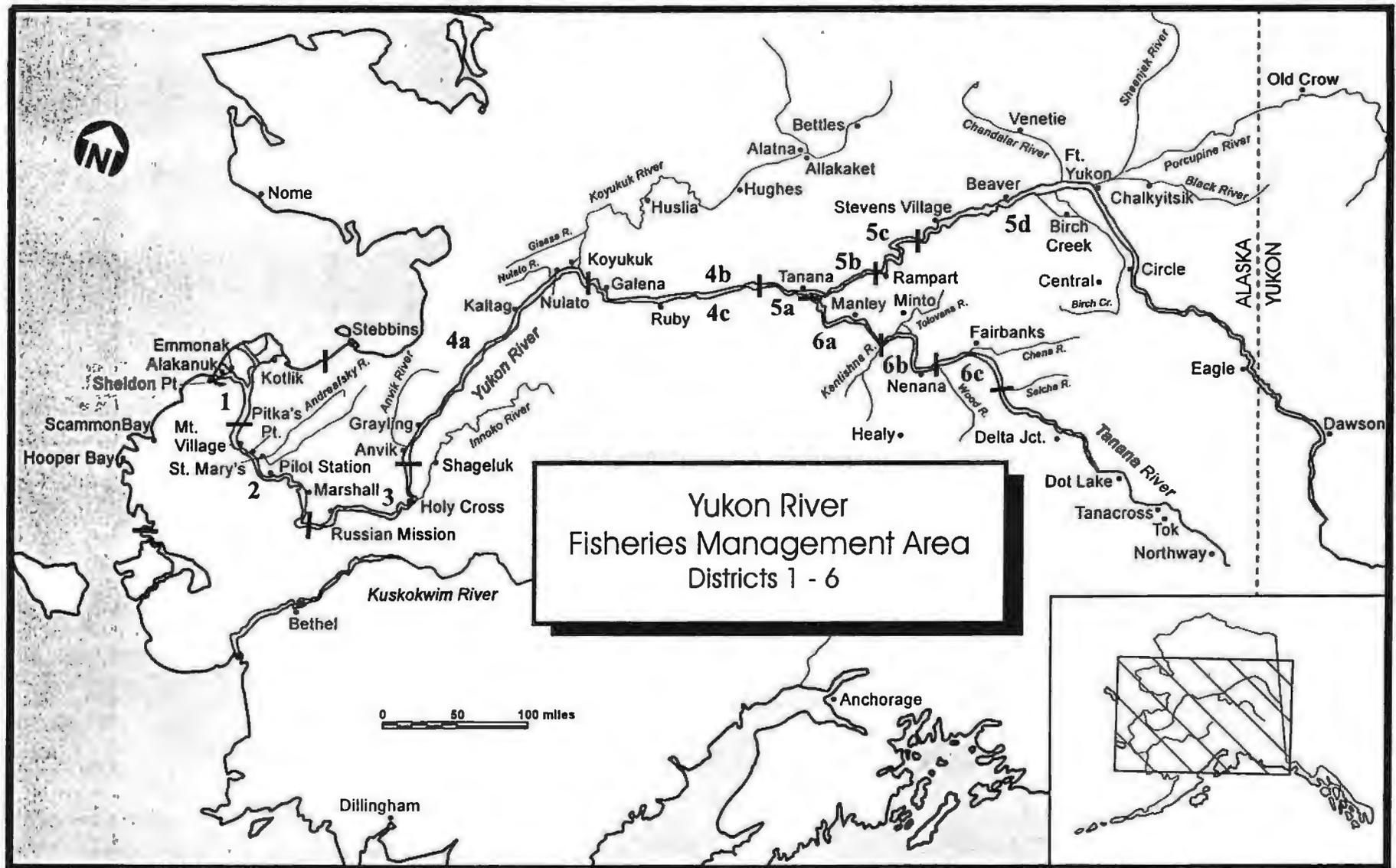


Figure 1. Map of the Alaska portion of the Yukon River drainage.

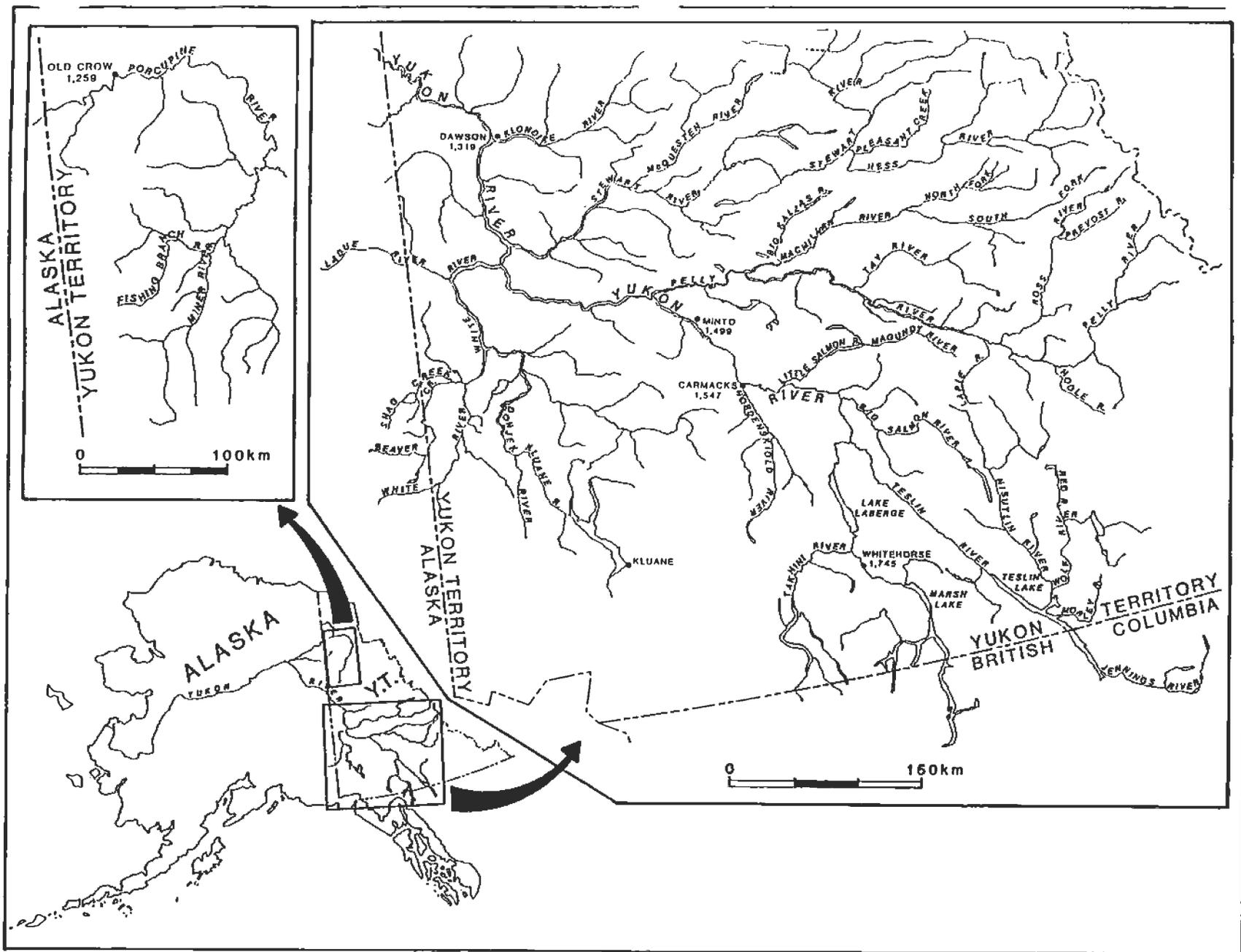


Figure 2. Map of the Canadian portion of the Yukon River drainage.

DISTRICT Y-1 COMMERCIAL

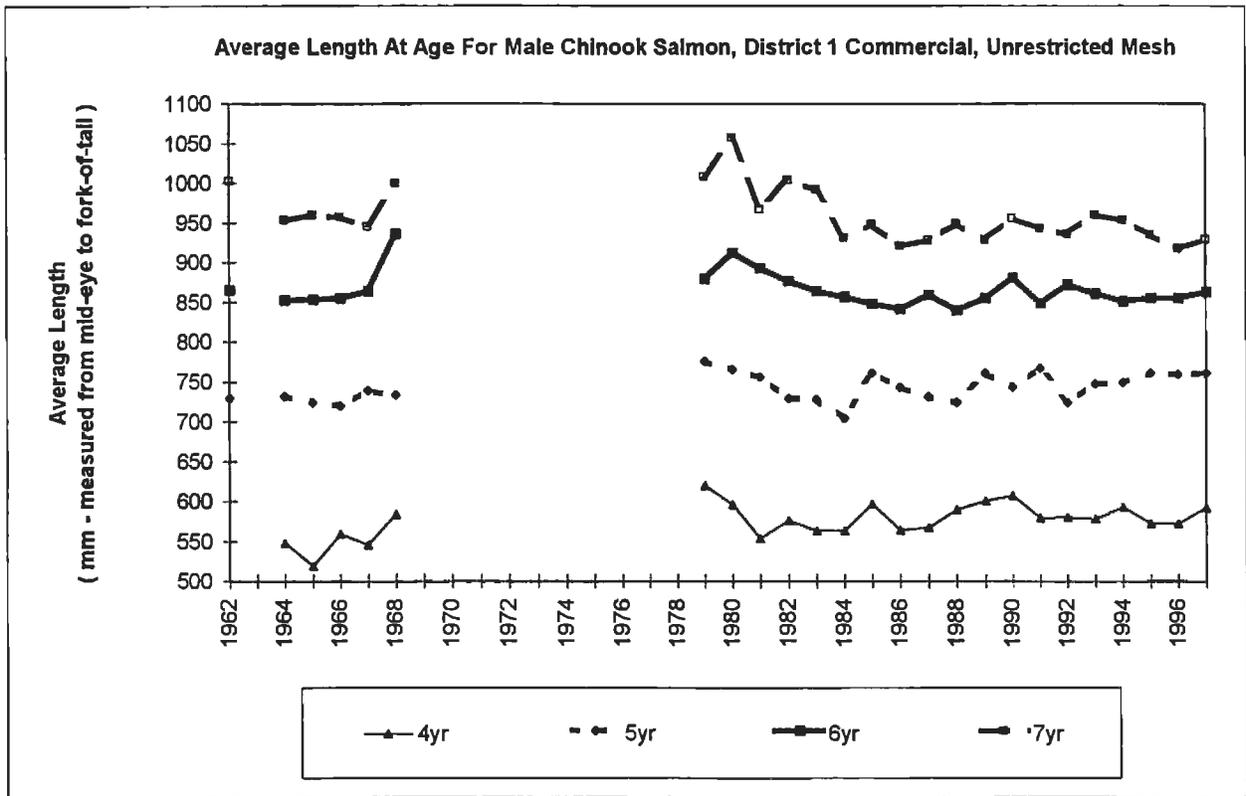
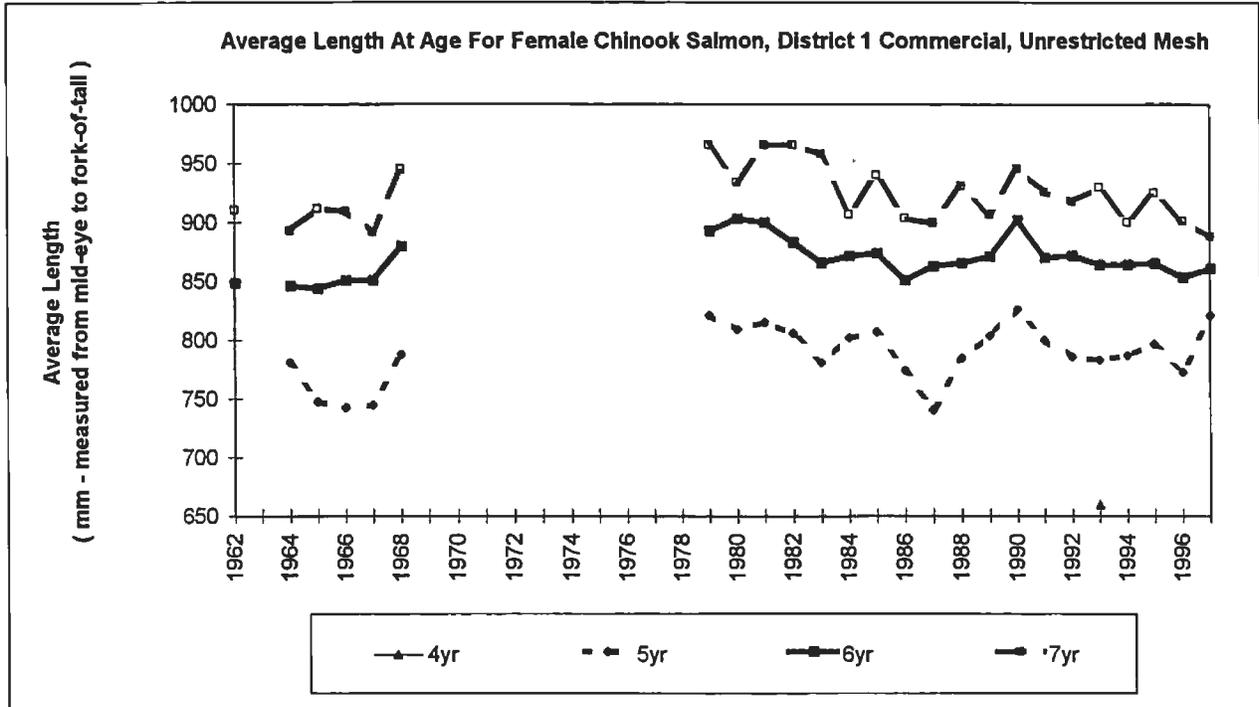


Figure 3. Average length at age for female (top graph) and male (bottom graph) Yukon River chinook salmon sampled primarily from unrestricted mesh size commercial fishing periods in District Y-1. See Appendix data table for more detailed information.

BIG EDDY TEST CATCH

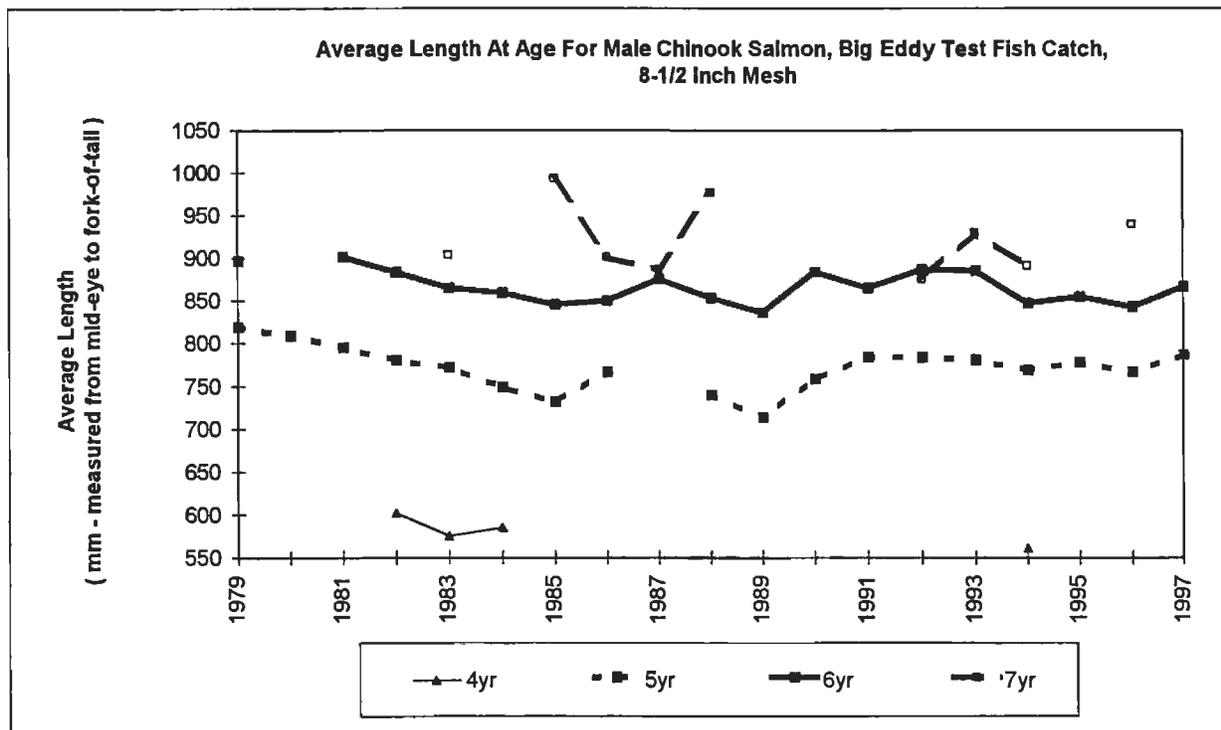
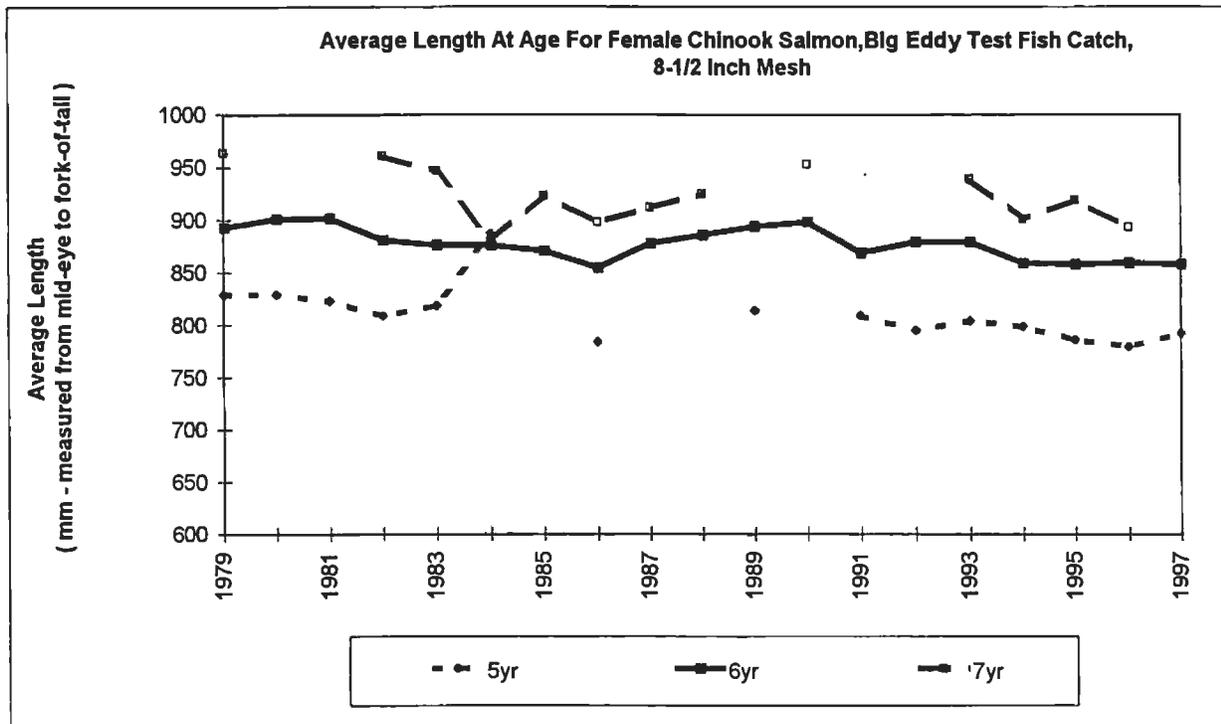


Figure 4. Average length at age for female (top graph) and male (bottom graph) Yukon River chinook salmon sampled from 8-1/2 inch mesh size test fishing catch at Big Eddy. See Appendix data table for more detailed information.

ANDREAFSKY RIVER

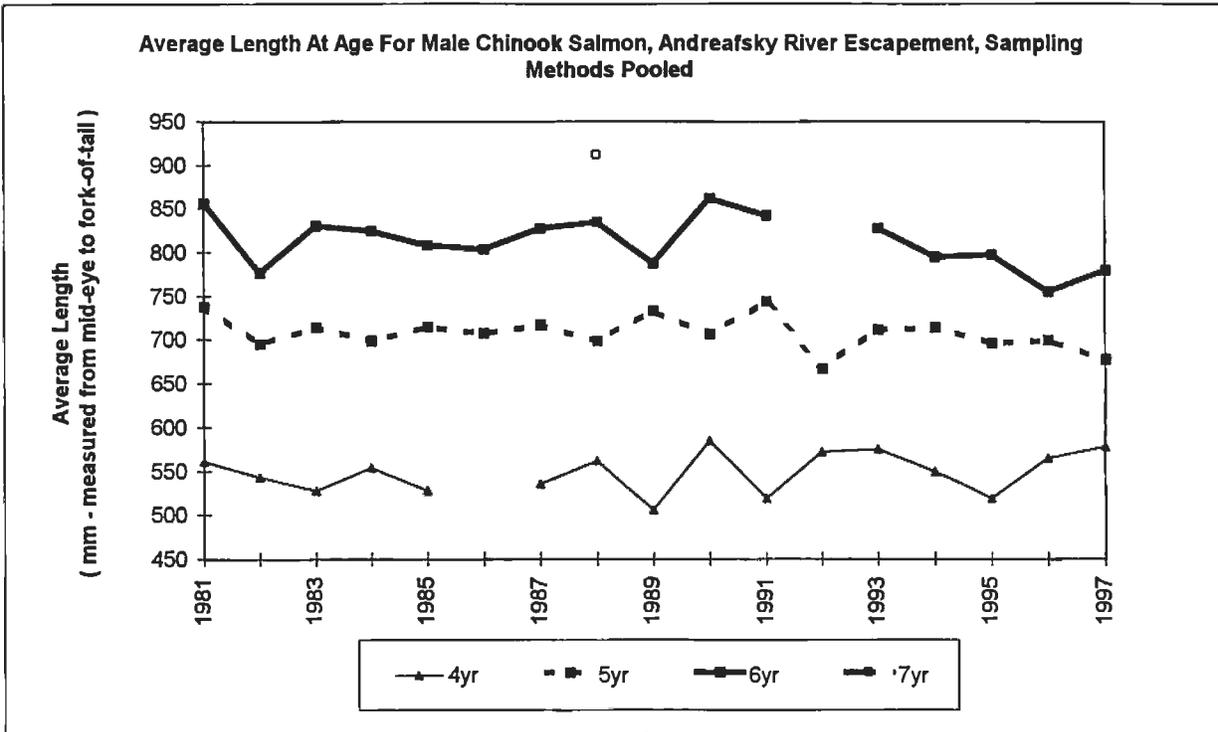
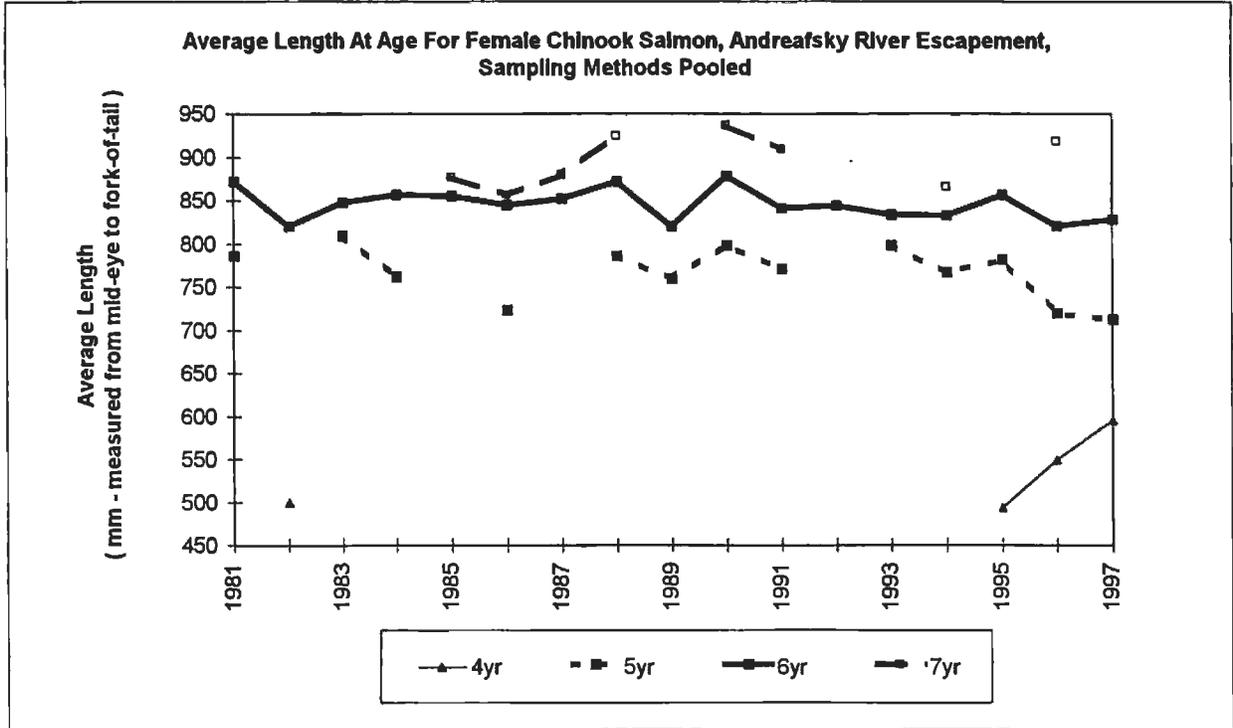


Figure 5. Average length at age for female (top graph) and male (bottom graph) Yukon River chinook salmon samples collected from the East and/or West Fork of the Andreafsky River, sampling methods pooled. See Appendix data table for more detailed information.

SALCHA RIVER

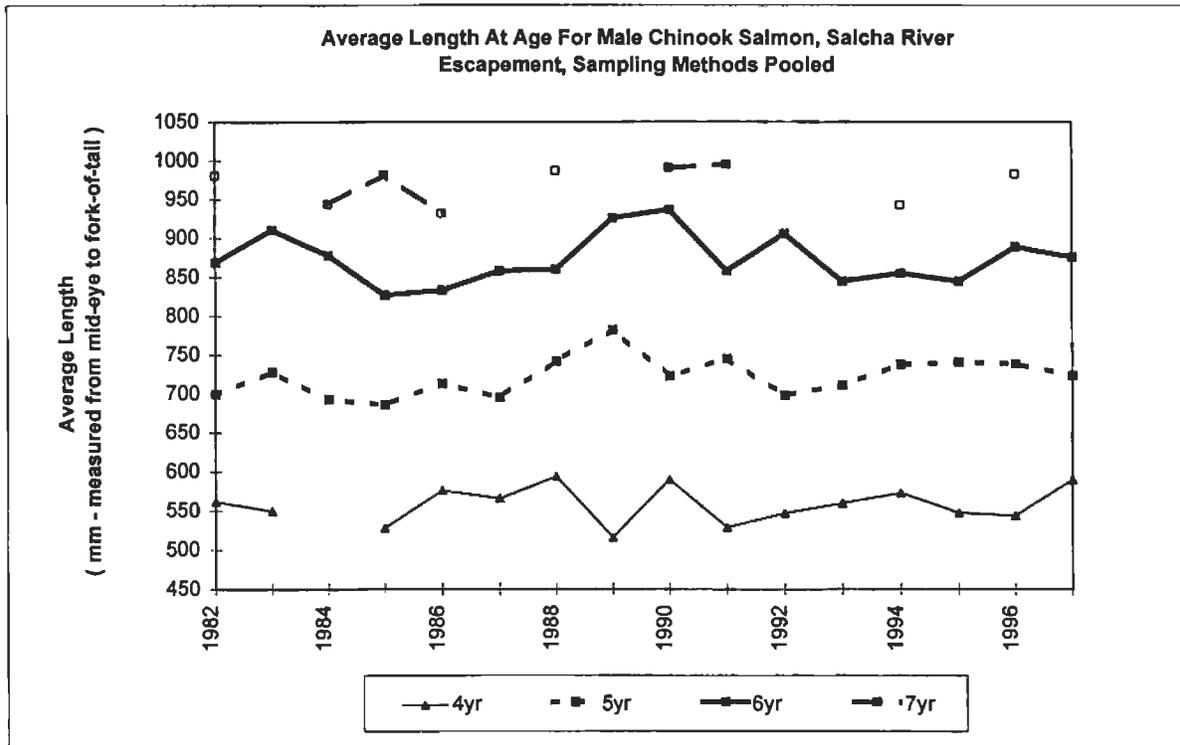
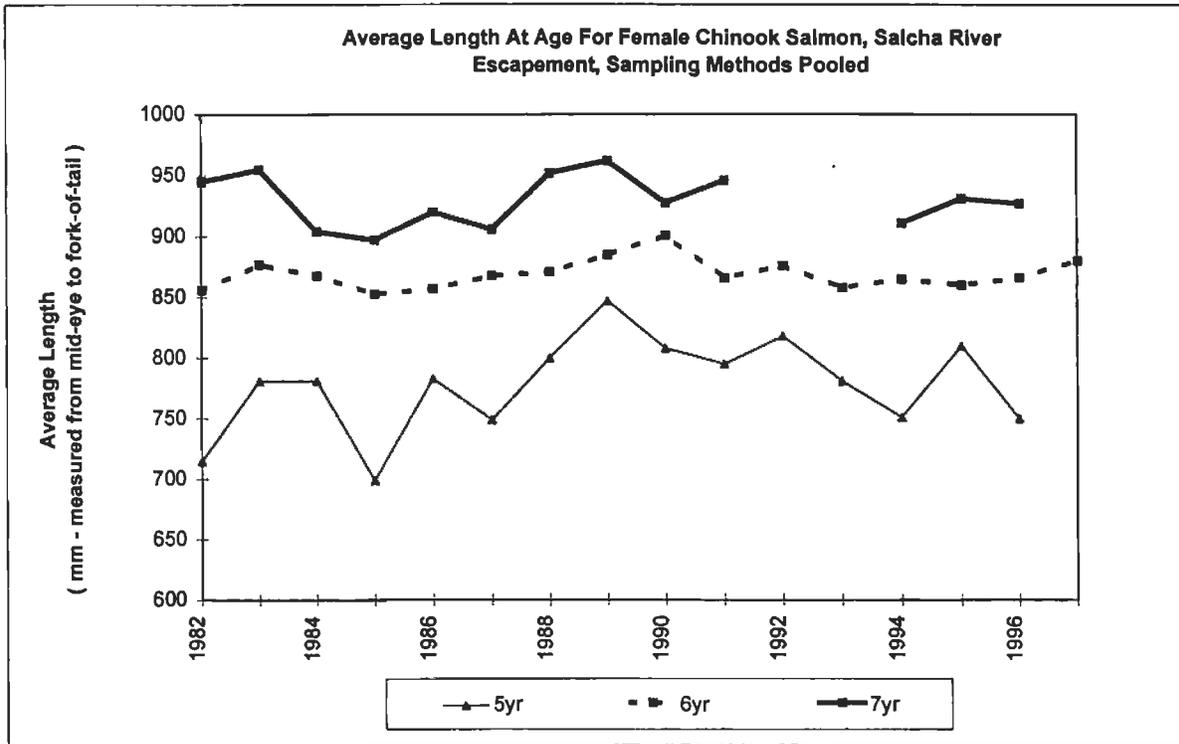


Figure 6. Average length at age for female (top graph) and male (bottom graph) Yukon River chinook salmon samples collected from the Salcha River escapement, sampling methods pooled. See Appendix data tables for more detailed information.

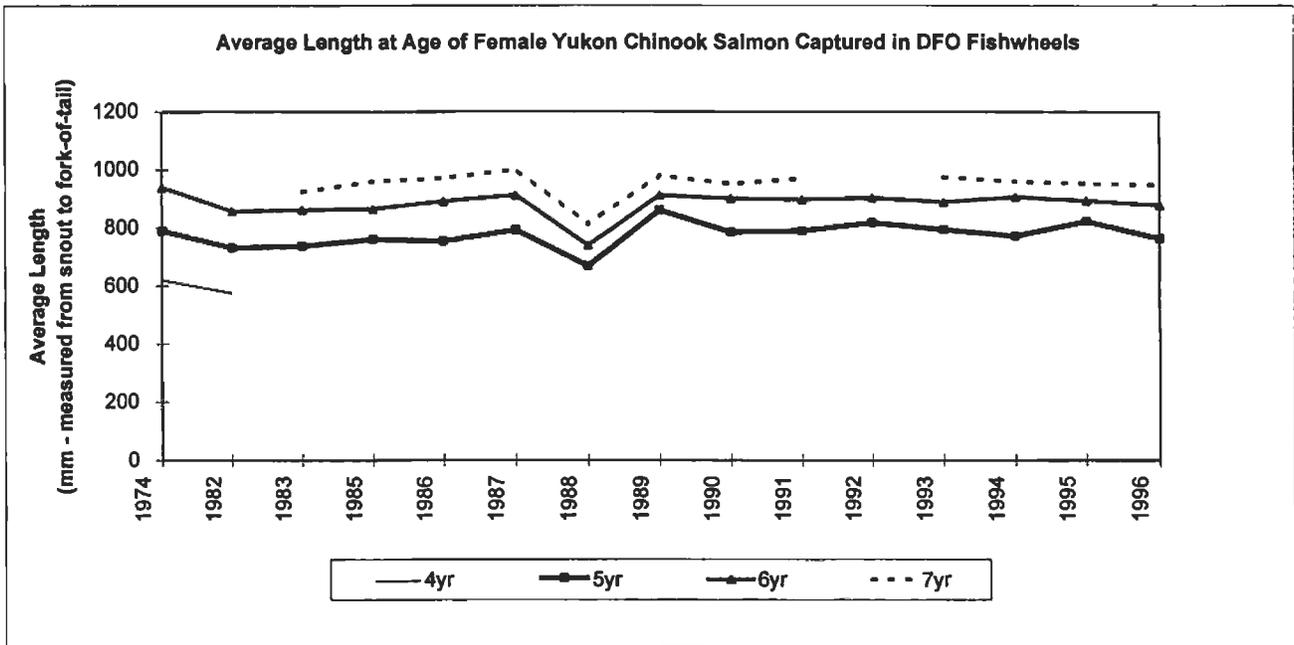
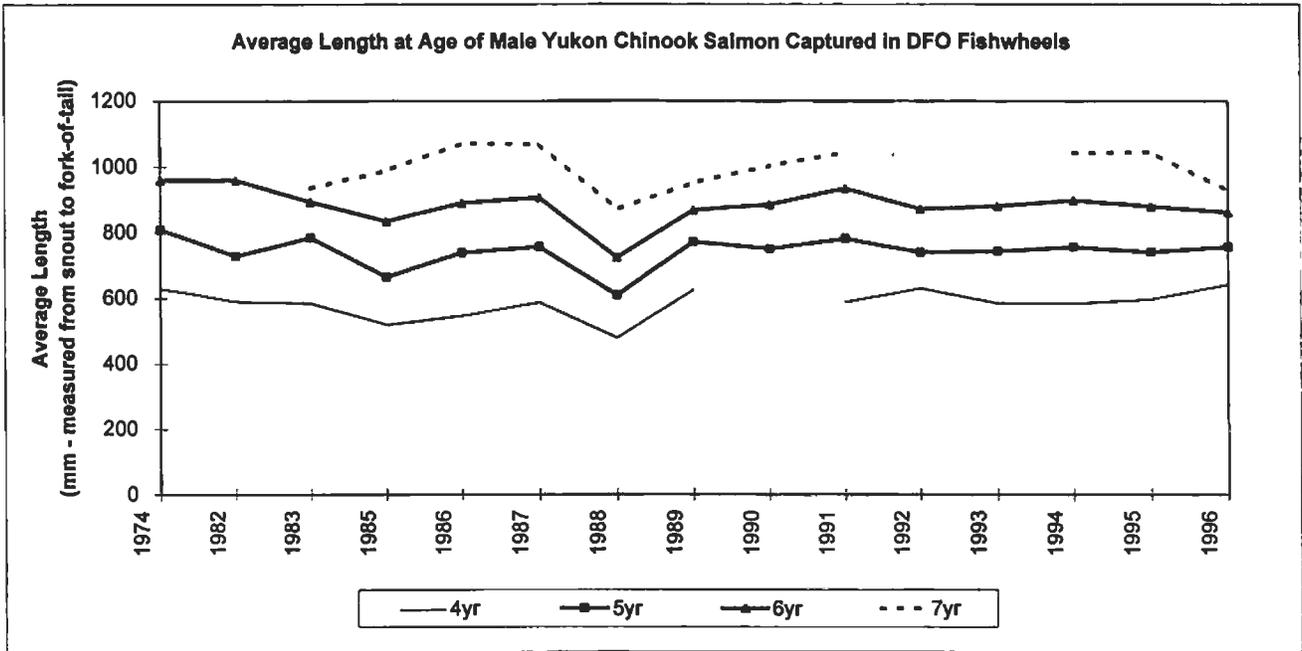


Figure 7. Average fork length at age for male (top graph) and female (bottom graph) Yukon River chinook captured at the DFO fishwheels, 1974, 1982-1983, and 1985-1996.

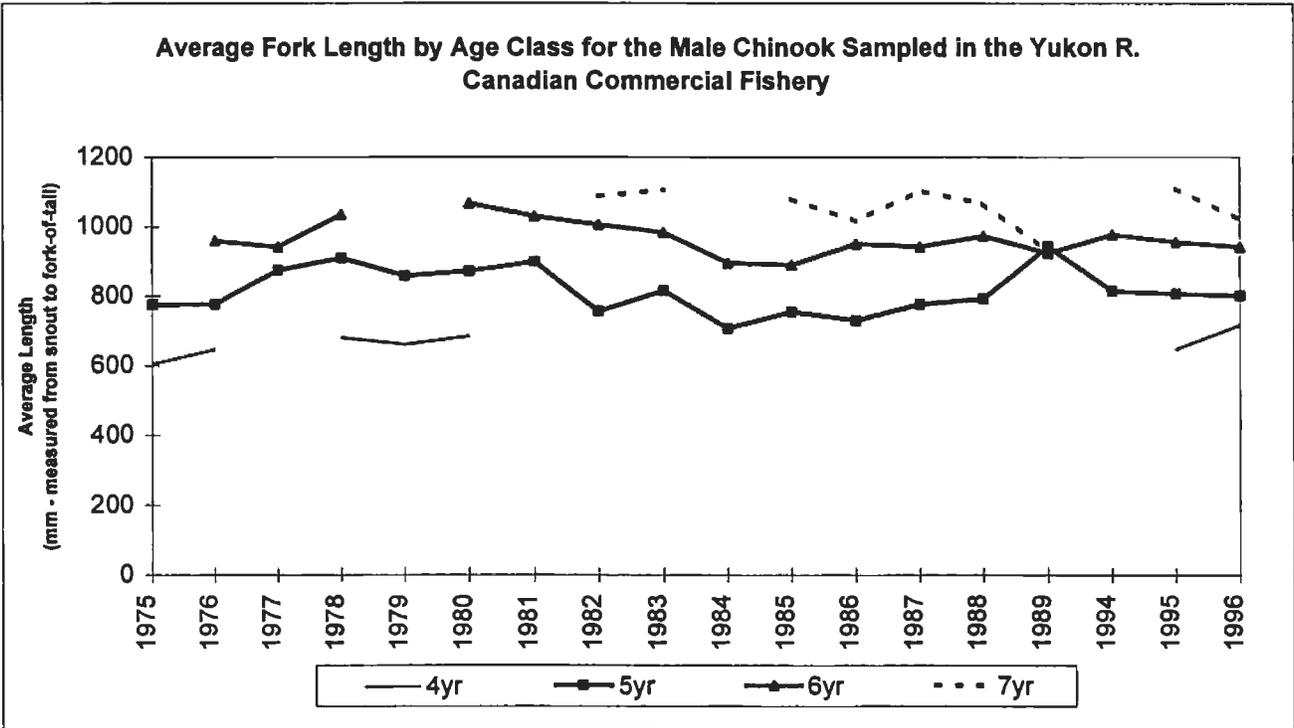
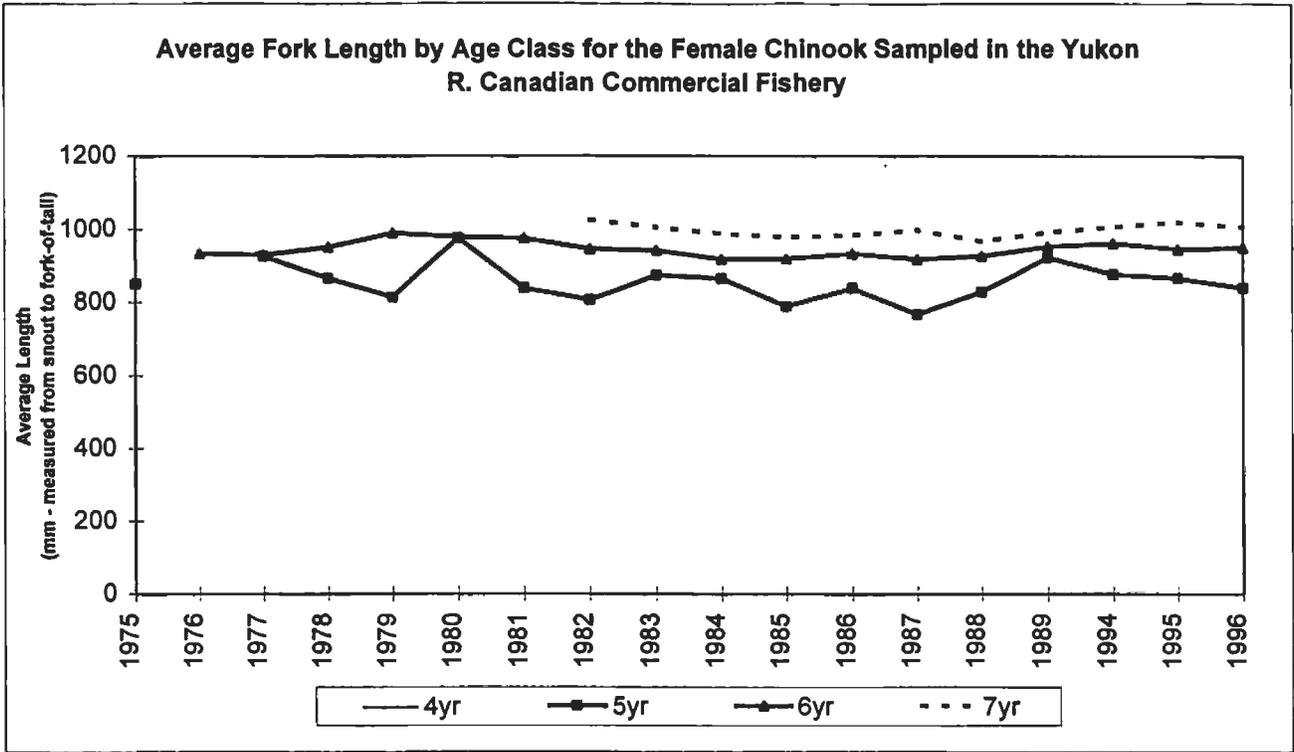


Figure 8 . Average fork length at age for female (top graph) and male (bottom graph) Yukon River chinook caught in the Canadian commercial fishery, 1975-1989 and 1994-1996.

Appendix A. Yukon River Chinook Salmon Length at Age by Sex Data Tables

Appendix Table 1. Length at age summary for chinook salmon sampled from District 1 commercial harvest, unrestricted mesh, Yukon River, 1962, 1964-1968, and 1979-1997. a

		Age In Years											
		3yr		4yr		5yr		6yr		7yr		8yr	
Year		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
1962	Mean Length	0.0	0.0	0.0	0.0	0.0	730.0	849.0	866.0	911.0	1003.0	0.0	0.0
	Sample Size						[6]	[63]	[59]	[17]	[6]		
1964	Mean Length	0.0	0.0	520.0	548.0	781.0	732.0	846.0	853.0	893.0	954.0	0.0	0.0
	Sample Size			[1]	[34]	[19]	[53]	[145]	[133]	[25]	[43]		
1965	Mean Length	0.0	0.0	0.0	519.0	748.0	724.0	844.0	854.0	912.0	960.0	0.0	0.0
	Sample Size				[6]	[21]	[90]	[163]	[161]	[35]	[42]		
1966	Mean Length	0.0	0.0	0.0	559.0	743.0	720.0	851.0	855.0	910.0	958.0	0.0	0.0
	Sample Size				[8]	[11]	[122]	[383]	[322]	[49]	[46]		
1967	Mean Length	0.0	0.0	600.0	546.0	745.0	739.0	851.0	864.0	892.0	946.0	0.0	0.0
	Sample Size			[1]	[7]	[28]	[72]	[389]	[332]	[64]	[65]		
1968	Mean Length	0.0	0.0	0.0	584.0	788.0	734.0	880.0	936.0	945.0	1000.0	0.0	.0
	Sample Size				[34]	[19]	[152]	[546]	[315]	[170]	[99]		
1979	Mean Length	0.0	0.0	0.0	620.0	821.0	776.0	893.0	880.0	966.0	1008.0	0.0	0.0
	Sample Size				[67]	[54]	[324]	[212]	[141]	[70]	[35]		
1980	Mean Length	0.0	0.0	0.0	596.0	809.0	766.0	903.0	912.0	934.0	1058.0	0.0	0.0
	Sample Size				[15]	[94]	[345]	[325]	[133]	[11]	[9]		
1981	Mean Length	0.0	0.0	0.0	554.0	815.0	756.0	900.0	893.0	966.0	967.0	0.0	0.0
	Sample Size				[7]	[27]	[146]	[478]	[254]	[13]	[7]		
1982	Mean Length	0.0	0.0	585.0	576.0	806.0	730.0	883.0	877.0	966.0	1004.0	0.0	0.0
	Sample Size			[3]	[147]	[47]	[309]	[483]	[266]	[89]	[55]		
1983	Mean Length	0.0	0.0	0.0	583.0	781.0	728.0	866.0	864.0	958.0	992.0	0.0	0.0
	Sample Size				[135]	[82]	[258]	[439]	[296]	[41]	[24]		
1984	Mean Length	0.0	0.0	0.0	563.0	802.0	704.0	872.0	857.0	907.0	931.0	0.0	0.0
	Sample Size				[43]	[35]	[187]	[227]	[158]	[36]	[28]		
1985	Mean Length	0.0	0.0	0.0	597.0	807.0	761.0	874.0	848.0	940.0	948.0	0.0	0.0
	Sample Size				[6]	[3]	[23]	[298]	[182]	[43]	[23]		
1986	Mean Length	0.0	0.0	0.0	584.0	774.0	743.0	851.0	842.0	904.0	921.0	0.0	0.0
	Sample Size				[13]	[72]	[275]	[364]	[222]	[193]	[117]		
1987	Mean Length	0.0	0.0	0.0	587.0	741.0	731.0	863.0	859.0	900.0	928.0	0.0	0.0
	Sample Size				[15]	[20]	[54]	[660]	[482]	[71]	[60]		
1988	Mean Length	0.0	0.0	0.0	590.0	785.0	724.0	866.0	840.0	931.0	949.0	985.0	0.0
	Sample Size				[30]	[35]	[145]	[215]	[192]	[203]	[164]	[1]	
1989	Mean Length	0.0	0.0	0.0	601.0	804.0	761.0	871.0	855.0	907.0	929.0	995.0	1095.0
	Sample Size				[9]	[53]	[183]	[328]	[265]	[67]	[32]	[1]	[1]
1990	Mean Length	0.0	0.0	660.0	607.0	826.0	743.0	902.0	881.0	946.0	956.0	0.0	0.0
	Sample Size			[2]	[83]	[66]	[155]	[474]	[272]	[57]	[17]		
1991	Mean Length	0.0	0.0	0.0	579.0	800.0	767.0	870.0	849.0	926.0	943.0	1023.0	0.0
	Sample Size				[21]	[146]	[409]	[491]	[296]	[81]	[60]	[2]	
1992	Mean Length	0.0	0.0	820.0	580.0	786.0	724.0	872.0	872.0	918.0	936.0	0.0	0.0
	Sample Size			[1]	[30]	[49]	[111]	[655]	[444]	[30]	[25]		
1993	Mean Length	0.0	0.0	660.0	578.0	783.0	747.0	864.0	861.0	930.0	960.0	0.0	0.0
	Sample Size			[6]	[130]	[136]	[222]	[618]	[424]	[81]	[39]		
1994	Mean Length	0.0	0.0	0.0	593.0	787.0	749.0	864.0	851.0	900.0	954.0	0.0	0.0
	Sample Size				[22]	[198]	[397]	[486]	[216]	[47]	[18]		
1995	Mean Length	0.0	0.0	672.0	572.0	797.0	761.0	865.0	855.0	925.0	935.0	1015.0	0.0
	Sample Size			[3]	[53]	[79]	[146]	[855]	[664]	[43]	[31]	[1]	
1996	Mean Length	0.0	380.0	765.0	572.0	773.0	759.0	853.0	855.0	901.0	918.0	0.0	0.0
	Sample Size		[1]	[1]	[25]	[352]	[416]	[448]	[329]	[301]	[198]		
1997	Mean Length	0.0	0.0	560.0	592.0	821.0	761.0	861.0	863.0	888.0	930.0	0.0	0.0
	Sample Size			[3]	[80]	[70]	[138]	[798]	[763]	[18]	[930]		

a From fishing periods with no mesh size restriction, 1962, 1964-1968, 1979 -1981, and 1985 -1997. Restricted (less than 6 inch) and unrestricted mesh size periods pooled for 1982, 1983, and 1984. Length measured from mid-eye to fork of tail in mm. This presentation includes only fish with one freshwater scale check. Sample sizes of 5 fish or less for a given age-sex group were excluded from the related graphic presentation.

Appendix Table 2. Length at age summary for chinook salmon sampled from Big Eddy test fishing catch, 8-1/2 inch mesh, Yukon River, 1979-1997. a

		Age In Years											
		3yr		4yr		5yr		6yr		7yr		8yr	
Year		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
1979	Mean Length	0.0	0.0	0.0	649.0	829.0	820.0	893.0	897.0	964.0	1137.0	0.0	0.0
	Sample Size				[2]	[15]	[15]	[26]	[13]	[7]	[6]		
1980	Mean Length	0.0	0.0	0.0	583.0	829.0	809.0	901.0	862.0	0.0	0.0	0.0	0.0
	Sample Size				[2]	[6]	[12]	[9]	[4]				
1981	Mean Length	0.0	0.0	0.0	566.0	823.0	796.0	902.0	902.0	928.0	0.0	0.0	0.0
	Sample Size				[4]	[15]	[32]	[86]	[78]	[2]			
1982	Mean Length	0.0	0.0	0.0	602.0	809.0	781.0	881.0	884.0	961.0	1031.0	0.0	0.0
	Sample Size				[9]	[9]	[44]	[165]	[73]	[24]	[5]		
1983	Mean Length	0.0	0.0	0.0	575.0	819.0	772.0	876.0	865.0	947.0	904.0	0.0	0.0
	Sample Size				[9]	[12]	[72]	[189]	[210]	[18]	[6]		
1984	Mean Length	0.0	0.0	0.0	585.0	887.0	749.0	876.0	859.0	880.0	894.0	0.0	0.0
	Sample Size				[6]	[7]	[43]	[99]	[78]	[15]	[5]		
1985	Mean Length	0.0	0.0	855.0	560.0	775.0	732.0	871.0	846.0	923.0	993.0	0.0	0.0
	Sample Size			[1]	[2]	[3]	[10]	[118]	[92]	[10]	[8]		
1988	Mean Length	0.0	445.0	0.0	525.0	784.0	767.0	855.0	850.0	898.0	901.0	0.0	0.0
	Sample Size		[1]		[3]	[22]	[66]	[102]	[105]	[56]	[37]		
1987	Mean Length	0.0	360.0	0.0	555.0	900.0	787.0	878.0	876.0	912.0	887.0	0.0	0.0
	Sample Size		[1]		[3]	[4]	[5]	[210]	[100]	[24]	[19]		
1988	Mean Length	0.0	0.0	640.0	626.0	817.0	740.0	886.0	853.0	925.0	977.0	0.0	930.0
	Sample Size			[1]	[4]	[3]	[18]	[43]	[26]	[47]	[16]		[1]
1989	Mean Length	0.0	0.0	0.0	603.0	814.0	714.0	894.0	836.0	927.0	823.0	0.0	0.0
	Sample Size				[2]	[9]	[12]	[14]	[20]	[3]	[2]		
1990	Mean Length	0.0	0.0	0.0	605.0	797.0	759.0	898.0	884.0	953.0	950.0	0.0	0.0
	Sample Size				[4]	[5]	[6]	[68]	[37]	[6]	[2]		
1991	Mean Length	0.0	0.0	0.0	468.0	809.0	784.0	869.0	865.0	925.0	891.0	0.0	0.0
	Sample Size				[2]	[31]	[50]	[42]	[50]	[2]	[4]		
1992	Mean Length	0.0	0.0	0.0	552.0	795.0	784.0	879.0	887.0	920.0	876.0	0.0	0.0
	Sample Size				[3]	[10]	[16]	[149]	[105]	[5]	[6]		
1993	Mean Length	0.0	0.0	0.0	552.0	804.0	781.0	879.0	885.0	939.0	929.0	0.0	0.0
	Sample Size				[3]	[32]	[49]	[107]	[74]	[12]	[6]		
1994	Mean Length	0.0	400.0	725.0	561.0	799.0	769.0	859.0	847.0	901.0	891.0	0.0	0.0
	Sample Size		[1]	[1]	[8]	[61]	[161]	[181]	[103]	[20]	[8]		
1995	Mean Length	0.0	0.0	600.0	603.0	786.0	778.0	858.0	855.0	919.0	963.0	0.0	0.0
	Sample Size			[1]	[3]	[11]	[24]	[117]	[99]	[7]	[4]		
1996	Mean Length	0.0	0.0	840.0	587.0	779.0	767.0	859.0	843.0	893.0	940.0	0.0	0.0
	Sample Size			[1]	[3]	[79]	[90]	[34]	[14]	[20]	[15]		
1997	Mean Length	0.0	0.0	0.0	621.0	792.0	767.0	858.0	867.0	865.0	930.0	0.0	0.0
	Sample Size				[4]	[7]	[9]	[90]	[85]	[2]	[1]		

a Length measured from mid-eye to fork of tail in mm. This presentation includes only fish with one freshwater scale check. Sample sizes of 5 fish or less for a given age-sex group were excluded from the related graphic presentation.

Appendix Table 3. Length at age summary for chinook salmon sampled from the Andreafsky River escapement, methods pooled, Yukon River, 1981-1997. a

		Age In Years											
		3yr		4yr		5yr		6yr		7yr		8yr	
Year		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
1981	Mean Length	0.0	0.0	0.0	561.0	786.0	738.0	872.0	857.0	950.0	0.0	0.0	0.0
	Sample Size				[29]	[23]	[80]	[119]	[45]	[1]			
1982	Mean Length	0.0	365.0	500.0	543.0	738.0	695.0	820.0	777.0	868.0	920.0	0.0	0.0
	Sample Size		[3]	[9]	[70]	[5]	[114]	[20]	[11]	[2]	[3]		
1983	Mean Length	0.0	0.0	0.0	528.0	809.0	714.0	848.0	831.0	895.0	0.0	0.0	0.0
	Sample Size				[54]	[7]	[128]	[97]	[67]	[1]			
1984	Mean Length	0.0	385.0	0.0	554.0	762.0	699.0	857.0	825.0	923.0	894.0	0.0	0.0
	Sample Size		[1]		[53]	[15]	[194]	[92]	[57]	[5]	[2]		
1985	Mean Length	0.0	0.0	0.0	528.0	755.0	715.0	855.0	808.0	877.0	928.0	0.0	0.0
	Sample Size				[166]	[2]	[55]	[122]	[61]	[15]	[2]		
1986	Mean Length	0.0	0.0	470.0	574.0	723.0	708.0	845.0	804.0	857.0	853.0	0.0	0.0
	Sample Size			[1]	[5]	[24]	[167]	[25]	[33]	[13]	[3]		
1987	Mean Length	0.0	415.0	0.0	536.0	743.0	717.0	852.0	828.0	880.0	960.0	0.0	0.0
	Sample Size		[1]		[17]	[2]	[28]	[199]	[107]	[7]	[1]		
1988	Mean Length	0.0	355.0	0.0	562.0	786.0	699.0	872.0	835.0	925.0	912.0	0.0	0.0
	Sample Size		[1]		[119]	[21]	[93]	[74]	[27]	[56]	[6]		
1989	Mean Length	0.0	0.0	0.0	506.0	760.0	733.0	820.0	788.0	905.0	982.0	0.0	0.0
	Sample Size				[12]	[16]	[145]	[12]	[34]	[1]	[3]		
1990	Mean Length	0.0	520.0	645.0	585.0	798.0	707.0	878.0	862.0	937.0	845.0	0.0	0.0
	Sample Size		[3]	[1]	[161]	[29]	[81]	[159]	[58]	[7]	[1]		
1991	Mean Length	0.0	0.0	0.0	519.0	771.0	744.0	841.0	842.0	909.0	879.0	0.0	0.0
	Sample Size				[34]	[42]	[201]	[73]	[48]	[7]	[2]		
1992	Mean Length	0.0	0.0	0.0	572.0	840.0	667.0	844.0	835.0	923.0	0.0	0.0	0.0
	Sample Size				[11]	[1]	[24]	[8]	[4]	[2]			
1993	Mean Length	0.0	420.0	0.0	575.0	798.0	712.0	834.0	828.0	840.0	988.0	0.0	0.0
	Sample Size		[1]		[63]	[10]	[125]	[124]	[84]	[5]	[2]		
1994	Mean Length	0.0	0.0	0.0	550.0	767.0	714.0	833.0	795.0	866.0	0.0	930.0	0.0
	Sample Size				[35]	[33]	[199]	[103]	[49]	[19]		[1]	
1995	Mean Length	0.0	0.0	494.0	519.0	782.0	696.0	857.0	797.0	868.0	915.0	0.0	0.0
	Sample Size			[8]	[112]	[19]	[35]	[118]	[45]	[5]	[1]		
1996	Mean Length	360.0	438.0	549.0	565.0	720.0	700.0	820.0	755.0	918.0	920.0	0.0	0.0
	Sample Size	[1]	[4]	[9]	[15]	[93]	[158]	[29]	[17]	[11]	[2]		
1997	Mean Length	0.0	0.0	595.0	578.0	712.0	678.0	828.0	780.0	0.0	0.0	0.0	0.0
	Sample Size			[34]	[182]	[17]	[47]	[100]	[30]				

a Samples collected from the East and/or West Fork of the Andreafsky River, sampling methods pooled including carcasses from spawned out fish, and live fish captured in beach seine or in weir trap on the East Fork. Length measured from mid-eye to fork of tail in mm. This presentation includes only fish with one freshwater scale check. Sample sizes of 5 fish or less for a given age-sex group were excluded from the related graphic presentation.

Appendix Table 4. Length at age summary for chinook salmon sampled from the Salcha River escapement, methods pooled, Yukon River, 1982-1997. a

Year		Age In Years											
		3yr		4yr		5yr		6yr		7yr		8yr	
		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
1982	Mean Length	0.0	378.0	0.0	562.0	715.0	700.0	856.0	869.0	945.0	981.0	0.0	0.0
	Sample Size		[3]		[119]	[13]	[142]	[149]	[62]	[27]	[10]		
1983	Mean Length	0.0	0.0	0.0	550.0	781.0	728.0	877.0	911.0	955.0	993.0	0.0	0.0
	Sample Size				[72]	[40]	[57]	[202]	[60]	[14]	[2]		
1984	Mean Length	0.0	0.0	0.0	0.0	781.0	693.0	868.0	878.0	904.0	944.0	0.0	0.0
	Sample Size					[17]	[180]	[150]	[60]	[45]	[11]		
1985	Mean Length	0.0	0.0	0.0	528.0	699.0	686.0	853.0	827.0	897.0	982.0	0.0	0.0
	Sample Size				[60]	[7]	[70]	[206]	[106]	[17]	[9]		
1986	Mean Length	0.0	390.0	670.0	576.0	783.0	713.0	857.0	833.0	920.0	932.0	0.0	0.0
	Sample Size		[1]	[1]	[68]	[30]	[213]	[88]	[65]	[74]	[18]		
1987	Mean Length	0.0	445.0	565.0	566.0	749.0	695.0	868.0	858.0	906.0	875.0	0.0	0.0
	Sample Size		[1]	[1]	[31]	[13]	[56]	[293]	[111]	[38]	[5]		
1988	Mean Length	0.0	395.0	790.0	594.0	800.0	742.0	871.0	860.0	952.0	987.0	0.0	0.0
	Sample Size		[2]	[1]	[100]	[12]	[98]	[133]	[73]	[47]	[25]		
1989	Mean Length	0.0	370.0	0.0	516.0	847.0	782.0	885.0	926.0	962.0	0.0	0.0	0.0
	Sample Size		[1]		[9]	[18]	[44]	[100]	[26]	[19]			
1990	Mean Length	0.0	315.0	603.0	590.0	808.0	723.0	901.0	937.0	928.0	991.0	0.0	0.0
	Sample Size		[1]	[2]	[82]	[31]	[82]	[172]	[63]	[30]	[11]		
1991	Mean Length	0.0	355.0	0.0	529.0	795.0	745.0	866.0	858.0	946.0	995.0	0.0	0.0
	Sample Size		[1]		[42]	[70]	[154]	[150]	[58]	[19]	[11]		
1992	Mean Length	0.0	386.0	0.0	547.0	818.0	698.0	876.0	906.0	903.0	993.0	0.0	0.0
	Sample Size		[8]		[193]	[19]	[158]	[192]	[47]	[3]	[2]		
1993	Mean Length	0.0	503.0	660.0	560.0	781.0	711.0	858.0	845.0	918.0	0.0	0.0	0.0
	Sample Size		[4]	[1]	[126]	[28]	[149]	[92]	[48]	[4]			
1994	Mean Length	0.0	397.0	609.0	573.0	751.0	738.0	865.0	855.0	911.0	943.0	0.0	0.0
	Sample Size		[3]	[4]	[10]	[43]	[162]	[168]	[105]	[17]	[8]		
1995	Mean Length	0.0	0.0	778.0	548.0	810.0	741.0	860.0	845.0	931.0	926.0	0.0	0.0
	Sample Size			[3]	[71]	[42]	[70]	[249]	[93]	[9]	[5]		
1996	Mean Length	0.0	381.0	570.0	544.0	750.0	739.0	866.0	889.0	927.0	983.0	0.0	0.0
	Sample Size		[11]	[1]	[24]	[45]	[113]	[80]	[37]	[83]	[18]		
1997	Mean Length	0.0	0.0	858.0	590.0	860.0	724.0	880.0	876.0	833.0	915.0	0.0	0.0
	Sample Size			[3]	[23]	[4]	[22]	[81]	[44]	[2]	[1]		

a Samples collected during tagging studies (using electroshock technique) and/or from carcasses from spawned out fish. Length measured from mid-eye to fork of tail in mm. This presentation includes only fish with one freshwater scale check. Sample sizes of 5 fish or less for a given age-sex group were excluded from the related graphic presentation.

Appendix Table 5. Fork length at age summary for chinook salmon captured in the DFO fishwheels, Yukon River, 1974,1982-1983, and 1985-1996. a

Year		4(2)		5(2)		6(2)		7(2)	
		Female	Male	Female	Male	Female	Male	Female	Male
1974	Mean Length	620.0	630.0	790.0	810.0	940.0	960.0	0.0	0.0
	Sample Size	(87)	(249)	(38)	(50)	(14)	(8)	(0)	(0)
1982	Mean Length	575.0	590.0	732.0	729.0	858.0	960.0	920.0	1030.0
	Sample Size	(8)	(41)	(12)	(20)	(16)	(7)	(3)	(3)
1983	Mean Length	572.0	585.0	737.0	785.0	862.0	895.0	924.0	937.0
	Sample Size	(4)	(51)	(34)	(208)	(132)	(238)	(8)	14.0
1985	Mean Length	0.0	520.0	760.0	665.0	865.0	835.0	960.0	990.0
	Sample Size	(0)	(181)	(28)	(181)	(219)	(282)	(47)	(79)
1986	Mean Length	566.7	546.7	753.8	740.0	891.8	891.0	971.1	1071.3
	Sample Size	(3)	(49)	(60)	(287)	(336)	(216)	(100)	(32)
1987	Mean Length	0.0	587.7	792.0	757.4	912.2	907.8	1000.5	1069.0
	Sample Size	(0)	(22)	(5)	(89)	(211)	(132)	(21)	(10)
1988	Mean Length	0.0	479.2	668.9	610.1	739.1	724.9	811.4	870.9
	Sample Size	(0)	(54)	(12)	(119)	(42)	(28)	(51)	(11)
1989	Mean Length	813.0	626.7	860.0	773.0	911.0	869.0	980.0	953.0
	Sample Size	(9)	(43)	(49)	(176)	(184)	(104)	(35)	(20)
1990	Mean Length	640.0	750.0	784.0	751.0	900.8	885.8	950.6	1004.3
	Sample Size	(4)	(1)	(37)	(221)	(172)	(72)	(16)	(7)
1991	Mean Length	650.0	589.4	788.3	782.4	897.5	935.6	970.5	1045.2
	Sample Size	(3)	(105)	(155)	(378)	(240)	(73)	(58)	(21)
1992	Mean Length	766.0	631.0	817.1	741.1	902.4	872.9	927.5	0.0
	Sample Size	(5)	(68)	(34)	(183)	(133)	(167)	(4)	(0)
1993	Mean Length	600.0	584.9	792.8	744.0	888.2	882.0	975.0	1050.0
	Sample Size	(1)	(225)	(29)	(228)	(111)	(74)	(20)	(2)
1994	Mean Length	0.0	584.0	771.0	757.0	906.0	900.0	959.0	1044.0
	Sample Size	(0)	(67)	(54)	(387)	(117)	(96)	(20)	(13)
1995	Mean Length	587.0	598.0	822.0	742.0	893.0	881.0	952.0	1046.0
	Sample Size	(3)	(231)	(23)	(76)	(166)	(105)	(12)	(11)
1996	Mean Length	597.0	643.0	762.0	758.0	877.0	863.0	947.0	929.0
	Sample Size	(25)	(30)	(178)	(312)	(75)	(41)	(22)	(19)

a Length measured from snout to fork of tail in mm. This presentation includes only fish with one freshwater check. Sample sizes of 5 fish or less for a given age-sex group were excluded from the related graphic presentation.

Appendix Table 6. Fork length at age summary for chinook salmon sampled in the Canadian commercial fishery, Yukon River, 1975-1989 and 1994-1996. a

Year		4(2)		5(2)		6(2)		7(2)	
		Female	Male	Female	Male	Female	Male	Female	Male
1975	Mean Length	0.0	605.0	851.0	775.0	869.0	837.0	1005.0	0.0
	Sample Size	(0)	(80)	(3)	(22)	(4)	(3)	(1)	(0)
1976	Mean Length	0.0	647.0	0.0	777.0	935.0	959.0	1137.0	0.0
	Sample Size	(0)	(21)	(0)	(46)	(7)	(6)	(1)	(0)
1977	Mean Length	0.0	560.0	927.0	875.0	931.0	942.0	0.0	0.0
	Sample Size	(0)	(1)	(7)	(24)	(12)	(7)	(0)	(0)
1978	Mean Length	0.0	681.0	867.0	910.0	952.0	1035.0	1010.0	1095.0
	Sample Size	(0)	(22)	(12)	(28)	(37)	(28)	(3)	(3)
1979	Mean Length	695.0	661.0	815.0	859.0	990.0	990.0	1061.0	1213.0
	Sample Size	(1)	(26)	(1)	(15)	(17)	(3)	(6)	(4)
1980	Mean Length	668.0	685.0	977.0	872.0	980.0	1067.0	0.0	1201.0
	Sample Size	(1)	(6)	(17)	(56)	(43)	(40)	(0)	(4)
1981	Mean Length	607.0	676.0	840.0	899.0	976.0	1030.0	1051.0	1236.0
	Sample Size	(1)	(5)	(13)	(67)	(161)	(151)	(4)	(2)
1982	Mean Length	0.0	614.0	807.0	757.0	946.0	1006.0	1026.0	1088.0
	Sample Size	(0)	(11)	(12)	(40)	(95)	(48)	(26)	(14)
1983	Mean Length	665.0	633.0	875.0	816.0	942.0	983.0	1006.0	1107.0
	Sample Size	(2)	(5)	(12)	(41)	(194)	(139)	(19)	(20)
1984	Mean Length	0.0	527.0	866.0	708.0	918.0	896.0	988.0	1166.0
	Sample Size	(0)	(21)	(4)	(45)	(111)	(21)	(26)	(1)
1985	Mean Length	0.0	0.0	790.0	755.0	920.0	890.0	980.0	1080.0
	Sample Size	(0)	(0)	(10)	(16)	(209)	(123)	(88)	(17)
1986	Mean Length	0.0	0.0	840.0	730.0	934.0	951.0	985.0	1017.0
	Sample Size	(0)	(0)	(8)	(9)	(67)	(39)	(18)	(6)
1987	Mean Length	607.0	653.0	768.0	777.0	918.0	943.0	999.0	1104.0
	Sample Size	(6)	(4)	(11)	(17)	(91)	(55)	(13)	(8)
1988	Mean Length	0.0	608.0	829.0	793.0	927.0	973.0	967.0	1066.0
	Sample Size	(0)	(15)	(6)	(31)	(68)	(44)	(56)	(34)
1989	Mean Length	960.0	0.0	924.0	943.0	953.0	924.0	993.0	927.0
	Sample Size	(1)	(0)	(7)	(14)	(70)	(23)	(21)	(23)
1994	Mean Length	0.0	0.0	877.0	815.0	962.0	977.0	1008.0	1110.0
	Sample Size	(0)	(0)	(7)	(25)	(22)	(26)	(7)	(3)
1995	Mean Length	699.0	647.0	867.0	806.0	946.0	956.0	1021.0	1110.0
	Sample Size	(12)	(105)	(30)	(124)	(484)	(307)	(34)	(15)
1996	Mean Length	0.0	717.0	841.0	802.0	952.0	942.0	1008.0	1021.0
	Sample Size	(0)	(9)	(70)	(379)	(189)	(135)	(141)	(71)

a Length measured from snout to fork of tail in mm. This presentation includes only fish with one freshwater check. Sample sizes of 5 fish or less for a given age-sex group were excluded from the related graphic presentation.