SURVEYS OF FISH IN ELSON LAGOON DURING 1996 AND 2009-2010

Final Report
March 2012

Prepared by:

MJM Research, LLC

And

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North Slope Borough
Dept. of Wildlife Management
PO Box 69
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Prepared by:

Lawrence L. Moulton
MJM Research, LLC
1012 Shoreland Drive
Lopez Island, WA 98261

and

John C. Seigle
ABR, Inc.
PO Box 240268
Anchorage, AK 99524

Prepared for:

North Slope Borough
Dept. of Wildlife Management
PO Box 69
Barrow, AK 99723

ACKNOWLEDGEMENTS

We thank former North Slope Borough Mayor George Ahmaogak, Sr. and current Mayor Edward Itta for their support of these studies. Past and present members of the North Slope Borough Fish and Game Committee have also been very supportive of fish research on the North Slope. The NSB Department of Wildlife Management support staff has also been key in the success of these studies; these include Dolores Vinas, Cyd Hanns, and Molly Spicer. We appreciate the help of the folks at North Slope Borough Grants Division as well including: Ann Murphy, Teressa Williams, Rosanna Lemen, Evi Mongoyak and Sarah Ellis. Craig George, Laura Thorpe and Dave Ramey conducted field sampling during 1996. Jena Lempke, Samantha Simpson and Matt Appling of ABR Inc. greatly contributed to the 2009 and 2010 field sampling. Craig Moulton of MJM Research and Todd Sformo of NSB Department of Wildlife Management also contributed to the 2010 field sampling. We would also like to thanks the administrative staff at ABR Inc. and MJM Research for their contributions.

Most importantly we would like to recognize the Inupiat subsistence fishers of the North Slope for encouraging us to study these fisheries that are important to the wellbeing of the communities in which they live.

Funding sources for this project were provided by the North Slope Borough and the National Petroleum Reserve-Alaska Program, through the State of Alaska Department of Commerce, Community and Economic Development.

ABSTRACT

Elson Lagoon is a major lagoon system about 60 km in length at the extreme west end of the Alaskan Beaufort Sea bounded by a narrow stretch of land leading to Pt. Barrow at the north, a series of barrier islands to the east, and mainland Alaska to the south and west. Elson Lagoon, in addition to also being important for subsistence fishing activities, provides boat access from Barrow to inland river and lake systems via Dease Inlet. At the west end of Elson Lagoon lays a small inlet that flows into North Salt Lagoon, a small, shallow lagoon more protected from easterly winds than Elson Lagoon. North Salt Lagoon is an important area for subsistence fishing by gillnet as well as a prime location for duck hunting.

Fyke nets were used to sample Elson Lagoon at Brant Point in July and August 1996 and both lagoons during July and August 2009 and 2010. As part of a greater effort to assess subsistence harvest effort and catch in Elson and North Salt lagoons, we conducted baseline fyke netting surveys in order to:

- Document occurrence and relative abundance by species,
- Determine size distribution of selected target subsistence species when numerically abundant,
- Document age, growth, body condition and age at maturity for dominant species,
- Tag subsistence fish species (2009 only), and
- Collect basic water chemistry information (temperature, salinity, and pH)

In situ water chemistry parameters were measured to assess general fish habitat conditions to collect basic ambient water chemistry information including temperature, salinity, and pH at each fyke net location. Water temperatures at the Brant Pt station ranged between 5 and 14°C during the July 22 to August 6 period that was common to all three sampling years (1996, 2009, 2010). In 2009 and 2010, temperatures at North Salt Lagoon tended to be higher than at Brant Pt. Mean temperatures in Elson Lagoon for the period in common were lowest in 1996 (mean = 8.7°C) and highest in 2010 (mean = 11.5°C). Salinity was highly variable at Brant Pt, with no consistent pattern among the three sampling years.

In 1996, a net with double traps was fished west of Brant Point from July 19 to August 22. In 2009 and 2010, two nets with single traps were fished, one west of Brant Point and another near the inlet of North Salt Lagoon. A fyke net was fished at Brant Point for three days in July 1991 (Jul 27-29) to collect fish specimens for analysis. Least cisco from this 1991 sampling were used to compare to fish caught in 2010. Data recorded for each fish were:

- Species
- Fork or total length to the nearest millimeter
- Tag number if tagged
- Abnormalities or presence of parasites

In 2009, least cisco greater than 260 mm (10 inches) fork length were tagged. Once measured and/or tagged, fish were placed in a second floating pen where they were allowed to recover until the tagging period was completed. Samples of broad whitefish, arctic cisco, least cisco, and rainbow smelt caught in 1991, 1996 and/or 2010 were retained for analysis of length-weight, age-length, and state of maturity.

Age-length relationships for least cisco caught in 2010 were compared to those caught in 1991 to evaluate differences in growth rate among the two time periods. This comparison allows an evaluation of changes in growth rate that may be caused by long-term climatic changes.

Length-weight relationships were used to evaluate differences between least cisco caught in 2010 and those caught in 1991 and 1996. Comparison of length-weight relationships allows an evaluation of body condition during the three sampling periods, which can reflect habitat quality and feeding conditions.

While 15 species were caught during the sampling from 1996 to 2010, over 83% was composed of two species, fourhorn sculpin (48.3%) and least cisco (35.4%). Arctic flounder and saffron cod were a distant third and fourth. Fourhorn sculpin and least cisco were abundant during all years, while arctic flounder and saffron cod showed greater variability among years. Threespine stickleback were particularly abundant at the North Salt Lagoon station in 2010.

Least cisco were present in over 94% of the net checks. They were most abundant in 2010, particularly at the North Salt Lagoon station. Abundance was greatest in late July, with catches declining in early August. In 1996, least cisco were primarily large fish, with 75% of those caught exceeding 220 mm fork length (8.7 inches). In contrast, less than 25% exceeded 220 mm in 2009 and 2010. It appears that there was an influx of young least cisco in recent years that is dominating the catches. In 2009, this group was 120-160 mm (4.7 to 6.3 inches) and had grown to 160-200 mm (6.3-7.8 inches) by 2010.

Least cisco exhibited linear growth through age 8, which coincided with the onset of first spawning. Least cisco from 2010 were significantly larger at a given age than those caught in 1991. At this time it is not know if the difference is caused by increased growth or by sampling different stocks that may grow at different rates. Least cisco caught in Elson Lagoon are likely composed of mixed stocks, which complicates analyses of growth differences.

Length-weight differences were analyzed for least cisco captured in 1991, 1996 and 2010. There were no differences in length-weight relationships among size groups or sexes, so data from each year were pooled to evaluate temporal differences. Length-weight relationships for all three periods were significantly different from each other. Weights were calculated at three comparison lengths to evaluate the differences among years. This evaluation revealed that least cisco from 1996 were the heaviest at the comparison lengths. Smaller least cisco from 2010 were lighter than those from 1991, while those in excess of 280 mm (11 inches) were heavier.

Arctic cisco and Bering cisco were not abundant in the Elson Lagoon, but are notable because they do occur while being remote from their rivers of origin. The two species accounted for less than 1% of the catch in 1996 and 2009, but jumped to just under 2% in 2010. Arctic cisco/Bering cisco caught in 1996 were primarily large fish larger than 290 mm (11.4 inches). We estimated that 79% of those caught in 2009, and 82% in 2010, were from the 2007 year class, which was one of the strongest recruitments observed to date. In 2008, fish from the same year class were caught in the lower Chipp River, so it is possible the fish found in the coastal area near Barrow are wintering in or near drainages around Admiralty Bay.

Broad whitefish were rarely caught in Elson Lagoon fyke nets, with only 11 caught during the three sampling years. Most of those caught were young fish, with only one in excess of 300 mm (12 inches). Large broad whitefish are frequently caught by gill net during the summer subsistence fishery, so they are present, but are not often caught in fyke nets.

Rainbow smelt are a small anadromous fish that spawn in freshwater but spend the rest of their lives in marine or estuarine habitats. While rainbow smelt were not very abundant, they were present in over 40% of the fyke net samples. Rainbow smelt caught in Elson Lagoon were generally 200 mm or less, which corresponds to age-7 or less. Ages 5, 6, and 7 were the dominant age groups caught in Elson Lagoon. Age-at-length relationships indicate that the smelt caught in Elson Lagoon match the growth of the smelt from the Chipp River. The growth pattern and distribution of ages suggest that rainbow smelt caught in Elson Lagoon may be a segment of the same population represented by fish caught in Dease Inlet.

Pacific herring were tenth in overall abundance for the three sampling years, with a total of 46 caught. Only 1 was caught in 1996, with

approximately equal numbers caught in 2009 (24 fish) and 2010 (21 fish).

Saffron cod were fourth in overall abundance and were caught in almost 60% of the fyke net sets. Catches were highest at the Brant Point net in 2009, when catches averaged over 26 fish per day. High catches in 2009 were composed of a large number of fish between 130-180 mm (5-7 inches), although fish up to 390 mm (15 inches) were caught. In 1996, catch rates were highly variable through the season, while in 2009 and 2010 catch rates seemed to be increasing in early August as salinity increased.

Arctic cod are a small marine fish in the cod family; they form large schools and can often be abundant in the coastal region during summer. Arctic cod were eighth in overall abundance in the fyke net samples, but 89% of the catch was from 1996, with few caught during 2009-2010 sampling.

Arctic flounder were third in overall abundance and were caught in over 70% of the net sets. Their abundance was greatest at the Brant Point station in 2009 and 2010, with lesser abundance in North Salt Lagoon. Catch rates were highly variable through the season. In most cases catch rates increased in late July to early August, however at Brant Point in 2009, the reverse pattern was observed.

Fourhorn sculpin were the most abundant fish caught, composing 48% of the total catch, and occurred in every sample. Catches of fourhorn sculpin were highest at Brant Point in 1996 and 2009. Catch rates remained high through the season.

Threespine stickleback are a small fish that can have freshwater, anadromous or marine populations. The population caught in Elson Lagoon seems to be the marine variety as they were in spawning condition when caught during 2010. Threespine stickleback were much more numerous in 2010 than in previous years, with 82% of the catch recorded in the most recent year. Catches in North Salt Lagoon were higher than those at Brant Point in the two years when both stations were sampled.

Pink salmon, Dolly Varden, capelin and ninespine stickleback were also caught during the 1996 and 2009-2010 sampling in Elson Lagoon. Pink salmon tend to be more abundant in the Beaufort Sea during even-numbered years, and this is reflected in the catches. Pink salmon were not caught in 2009, but were present in the catches from 1996 and 2010. Their abundance does not appear to be accurately reflected in the fyke nets because subsistence fishermen on the shore opposite Brant Point were quite successful at catching pink salmon in gill nets.

Similarly, Dolly Varden seem to be caught more frequently in gill nets than is reflected in the fyke net catches, as only two were caught during the three years of fyke net sampling.

Capelin are a marine smelt (family Osmeridae) that forms dense schools and spawns along gravel beaches during summer. They are often are very abundant, and one school could dominate catches if they enter a net. So far, catches have been sporadic.

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INTRODUCTION

Elson Lagoon is a major lagoon system about 60 km in length at the extreme west end of the Alaskan Beaufort Sea bounded by a narrow stretch of land leading to Pt. Barrow at the north, a series of barrier islands (and ultimately Dease Inlet) to the east, and mainland Alaska to the south and west. Elson Lagoon, in addition to also being important for subsistence fishing activities, provides boat access from Barrow to inland river and lake systems via Dease Inlet. At the west end of Elson Lagoon lays a small inlet that flows into North Salt Lagoon, a small, shallow lagoon more protected from easterly winds than Elson Lagoon. North Salt Lagoon is an important area for subsistence fishing by gillnet as well as a prime location for duck hunting.

Fyke nets were used to sample Elson Lagoon in July and August 1996 and both lagoons during July and August 2009 and 2010. The 1996 sampling, conducted by NSB Department of Wildlife Management, was the first known fyke net survey within the lagoon (George et al. 1997, unpublished report). As part of a greater effort to assess subsistence harvest effort and catch in Elson and North Salt lagoons, we conducted baseline fyke netting surveys in order to:

- Document occurrence and relative abundance by species,
- Determine size distribution of selected target subsistence species when numerically abundant (i.e. least cisco, broad whitefish, pink salmon),
- Document age, growth, body condition and age at maturity for dominant species,
- Tag subsistence fish species (2009 only), and
- Collect basic water chemistry information (temperature, specific conductance, salinity, and pH)

METHODS

Water Chemistry

In situ water chemistry parameters were measured to assess general fish habitat conditions. At the end of each sampling period in 2009, a YSI-63 multi-parameter meter was used to collect basic ambient water chemistry information including temperature, conductivity, specific conductance, salinity (in parts per thousand, ppt), and pH at each fyke net location. During 2010, measurements of water temperature, specific conductance and salinity were taken at a depth of approximately 0.5 m (1.5 ft) near the lead of the net with a YSI Model 30 temperature and conductivity meter.

Fish Sampling

In 1996, a net with double traps was fished west of Brant Point from July 19 to August 22 (Fig. 1). In 2009 and 2010, two nets with single traps were fished, one west of Brant Point and another near the inlet of North Salt Lagoon (Fig. 1, Table 1). A fyke net was fished at Brant Point for three days in July 1991 (Jul 27-29) to collect fish specimens for analysis. Least cisco from this 1991 sampling were used to compare to fish caught in 2010.

Fyke nets are large trap nets that capture all sizes of fish (Fig. 2). Nets were checked each day on an approximately 24 hour set schedule, except when high winds prevented sampling. Nets were closed when high winds were forecast to minimize net mortality. In 1996, nets were also closed during weekends.

Station number, set number, and end time were recorded prior to fish processing. Captured fish were emptied from the cod end of the fyke net into a floating net pen (Fig. 3). Fourhorn sculpin and ninespine stickleback were removed and counted to prevent injury to other fish species. All other fish species were collected using a dip net and transferred from the floating net pen to a 25-gallon plastic container containing a clove oil solution to anesthetize fish. The following data were recorded for each fish:

- Species
- Fork or total length to the nearest millimeter
- Tag number if tagged
- Abnormalities or presence of parasites

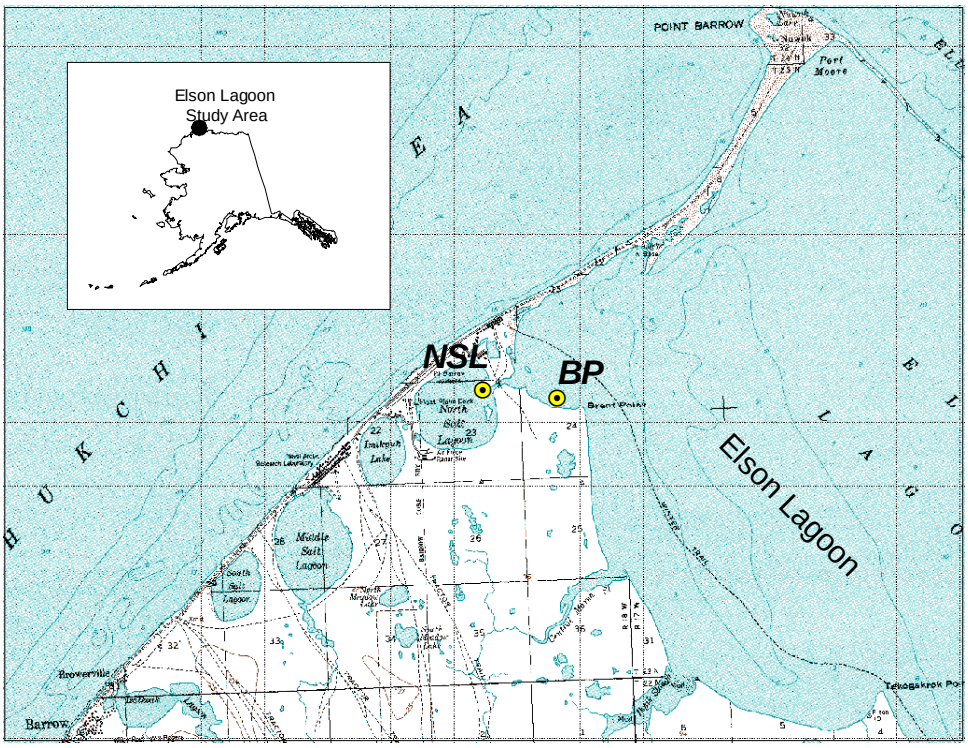

Figure 1. Western Elson Lagoon showing approximate locations of fyke net stations sampled in 1996, 2009 and 2010 (BP = Brandt Point, NSL = North Salt Lagoon).

In 2009, least cisco greater than 260 mm fork length and in good body condition were tagged using a uniquely coded Floy tag injected on the left side below the dorsal fin. A list of all tags released in 2009 is included in Appendix D. A subset of juvenile fish was kept for species verification in instances where only gill raker counts could elucidate the species (i.e. Arctic and Bering ciscoes). Representative samples of other species were kept and preserved with formalin for the North Slope Borough Department of Wildlife reference collection. Once measured and/or tagged, fish were placed in a second floating pen where they were allowed to recover until the tagging period was completed.

Table 1. Stations sampled for fish during the 1996 and 2009-2010 Elson Lagoon fyke net sampling (locations in WGS84 datum).

Station	WGS84 Latitude	WGS84 Longitude	Year Sampled	Dates Fished	Effort (hrs)
Brandt Point	71.33409	156.57388	1996	Jul 18-Aug 22	1,132.4
	71.33640	156.59567	2009	Jul 25-Aug 6	289.0
	71.33409	156.57388	2010	Jul 23-Aug 6	302.1
North Salt Lagoon	71.33542	156.60453	2009	Jul 17-Aug 6	506.0
	71.33570	156.60643	2010	Jul 23-Aug 6	301.8

Samples of broad whitefish, arctic cisco, least cisco, and rainbow smelt caught in 1991, 1996 and/or 2010 were retained for analysis of length-weight, age-length, and state of maturity. The sampling design was to obtain an equal sample size for each 50 mm length interval beginning at 50 mm. Fish sampled were re-measured in the lab to the nearest mm fork length and weighed to the nearest 0.1 gm. For mature or maturing females, the ovaries were removed and weighed to the nearest 0.1 gm. Otoliths were read using the break and burn technique. The otolith is broken across the transverse axis, held over a flame until the edge begins to discolor, and placed in isopropyl alcohol to be viewed with a dissecting microscope at 30 power. Annuli appear as narrow dark rings between the wider, lighter annual growth bands (Fig. 4).

Data Analysis

Age-length relationships for least cisco caught in 2010 were compared to those caught in 1991 to

evaluate differences in growth rate among the two time periods. This comparison allows an evaluation of changes in growth rate that may be caused by long-term climatic changes. If the climate is overall warmer or cooler, this should be reflected in the time it takes for fish to reach a given length. Fish in northern regions increase length-at-age in a linear fashion until maturity, at which time growth virtually ceases; therefore, the growth comparison was between fish less than the age of maturity. First, the age of maturity was determined by plotting the percent of mature fish at each age against age in years. Not all fish of a population mature at a given age, and it can take many years for an entire year class to reach maturity. After the age at first maturity was determined, linear models describing the age-length relationships, using log-transformed lengths, were compared using analysis of covariance to test for differences in slopes of the lines and adjusted means (i.e. intercept).

Length-weight relationships were used to evaluate differences between least cisco caught in 2010 and those caught in 1991 and 1996. Comparison of length-weight relationships allows an evaluation of body condition during the three sampling periods, which can reflect habitat quality and feeding conditions. As fish grow they go through stages where the body shape changes and have different length-weight relationships (Tesch 1968). To ensure a valid analysis, the length frequencies were examined for discontinuities that may indicate different growth stages, then length and weight data from the two sampling periods (1991 and 2010) were grouped into the identified length groups. Analysis of covariance was used to test for differences in slopes of the lines and adjusted means (i.e. intercept) between length groups within a time period. If significant differences were not found, the length groups were pooled; if significant differences were found, the length groups were maintained. The second test compared length groups between time periods.

Figure 2. Fyke net set at Brant Point in 2010 showing lead connected to shore (right foreground) and wings to either side of the trap (marked with pink floats).

Figure 3. Processing fish at an Elson Lagoon fyke net during 2010 sampling. Fish are placed in floating holding pens to reduce handling stress.

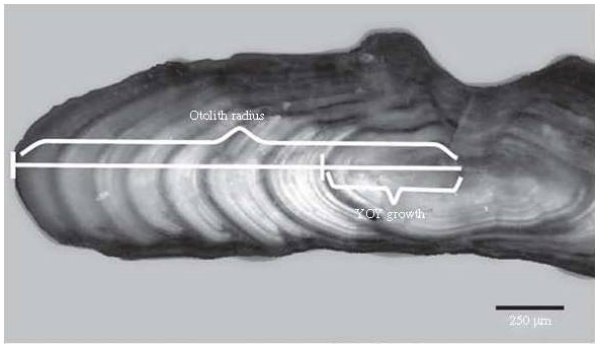

Figure 4. Cross-section of an arctic cisco otolith showing white bands reflecting summer growth and dark bands formed during winter (from von Biela et al. 2011).

RESULTS AND DISCUSSION

Water Chemistry

Water temperatures at the Brant Pt station ranged between 5 and 14°C during the July 22 to August 6 period that was common to all three sampling years (1996, 2009, 2010) (Fig. 5). In 2009 and 2010, temperatures at North Salt Lagoon tended to be higher than at Brant Pt. Mean temperatures in Elson Lagoon for the period in common were lowest in 1996 (mean = 8.7°C, range: 5.0-12.0°C) and highest in 2010 (mean = 11.5°C, range: 9.2-13.7°C). Salinity was highly variable at Brant Pt, with no consistent pattern among the three sampling years (Fig. 5). During 1996, salinity during July fluctuated rapidly, then was relatively stable at 12-15 ppt through August. In 2009, salinity started low, around 5 ppt, in mid-July and gradually increased to around 23 ppt by early August. In 2010, salinity was around 20 ppt at the onset of sampling on July 22, gradually decreased to around 18 ppt by the end of July, then increased to 25 ppt by the end of sampling on August 6.

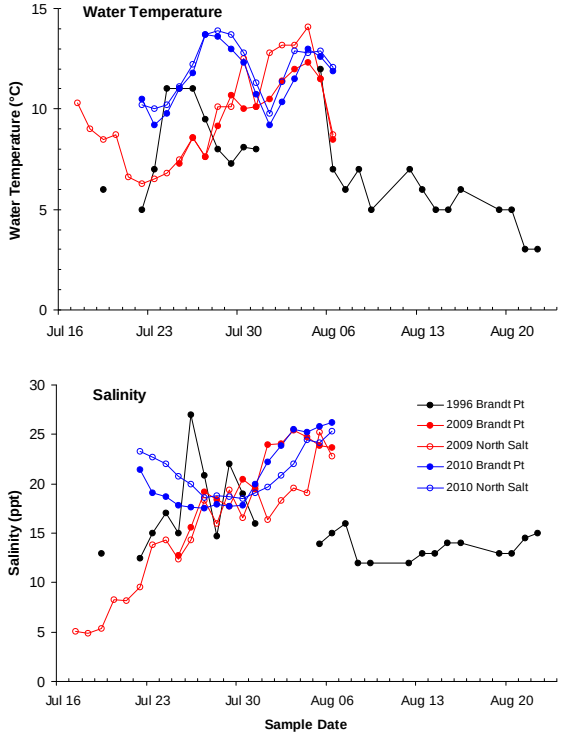

Figure 5. Water temperature and salinity during fish sampling at Elson Lagoon fyke net stations, 1996-2010.

Species Accounts

While 15 fish species were caught during the sampling from 1996 to 2010, over 83% was composed of two species, fourhorn sculpin (48.3%) and least cisco (35.4%) (Table 2). Arctic flounder and saffron cod were a distant third and fourth, at 6.1 and 5.3% respectively (Fig. 6). Fourhorn sculpin and least cisco were abundant during all years, while arctic flounder and saffron cod showed greater variability among years. (Fig. 7). Threespine stickleback were particularly abundant at the North Salt Lagoon station in 2010 after being a relatively minor component of the catch in previous years.

Table 2. Species catch by year at Elson Lagoon fyke net stations, 1996, 2009-2010.

	1996	2009		2010		
Species	Brandt Point	Brandt Point	North Salt	Brandt Point	North Salt	Totals
Broad whitefish	7	0	3	1	0	11
Arctic cisco	49	16	17	33	73	188
Bering cisco	3	2	3	0	0	8
Least cisco	2,167	750	836	1,038	1,878	6,669
Dolly Varden	1	0	0	0	1	2
Pink salmon	23	0	0	6	4	33
Rainbow smelt	56	37	11	31	10	145
Capelin	5	54	12	0	2	73
Pacific herring	1	19	5	2	19	46
Saffron cod	312	317	55	63	90	837
Arctic cod	111	10	1	0	3	125
Arctic flounder	109	271	97	286	150	913
Fourhorn sculpin	5,560	1,352	667	706	814	9,099
Threespine stickleback	20	9	92	105	458	684
Ninespine stickleback	1	0	4	0	3	8
No. of Fish	8,425	2,837	1,801	2,271	3,505	18,839
No. of Species	15	11	13	10	13	15
Effort (hrs)	1,132.4	289.0	506.0	302.1	301.8	2,531.3

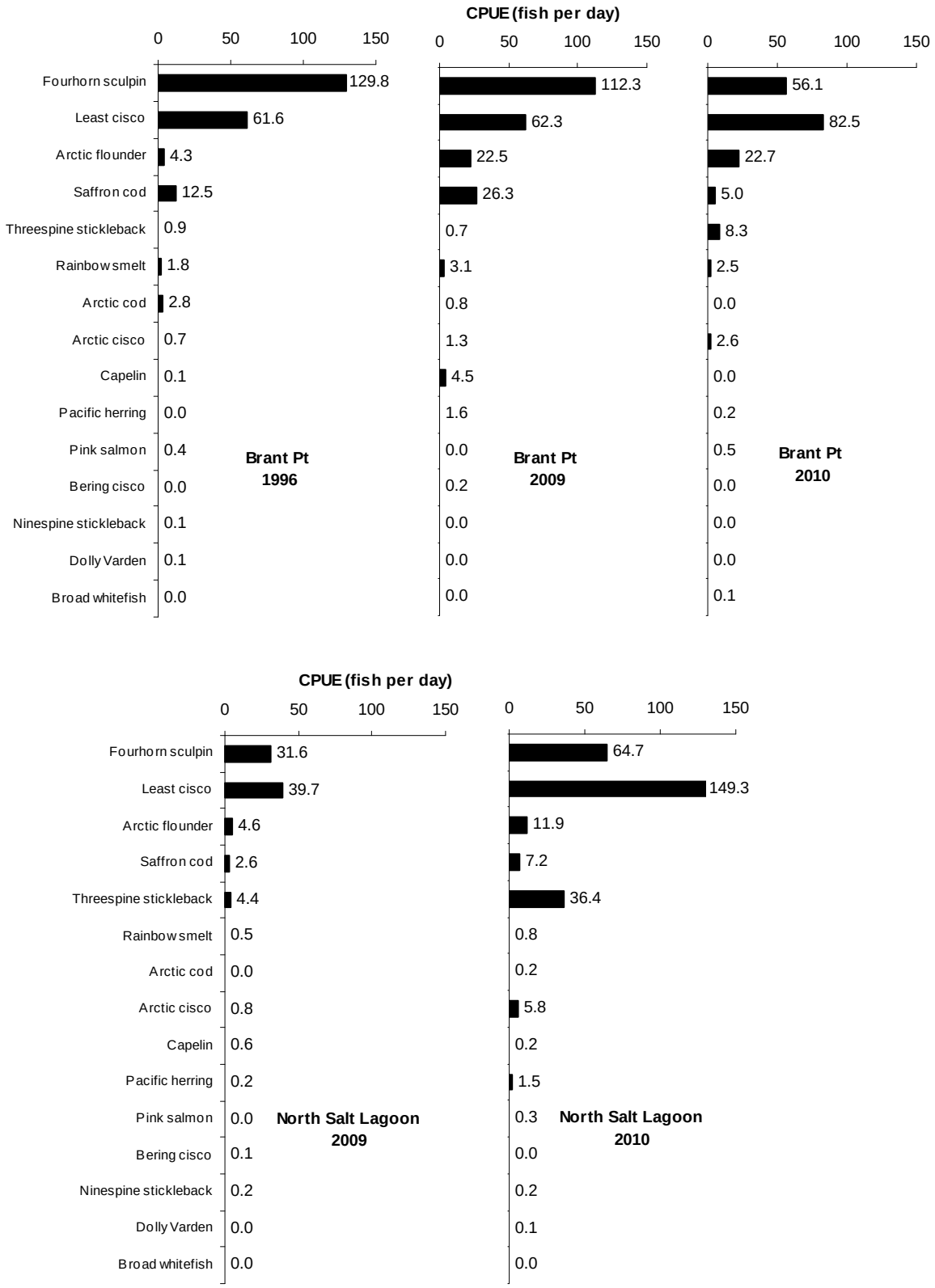

Figure 6. Fourhorn sculpin and least cisco dominated annual catch rate (in fish per day) by species at Elson Lagoon fyke nets, 1996 and 2009-2010.

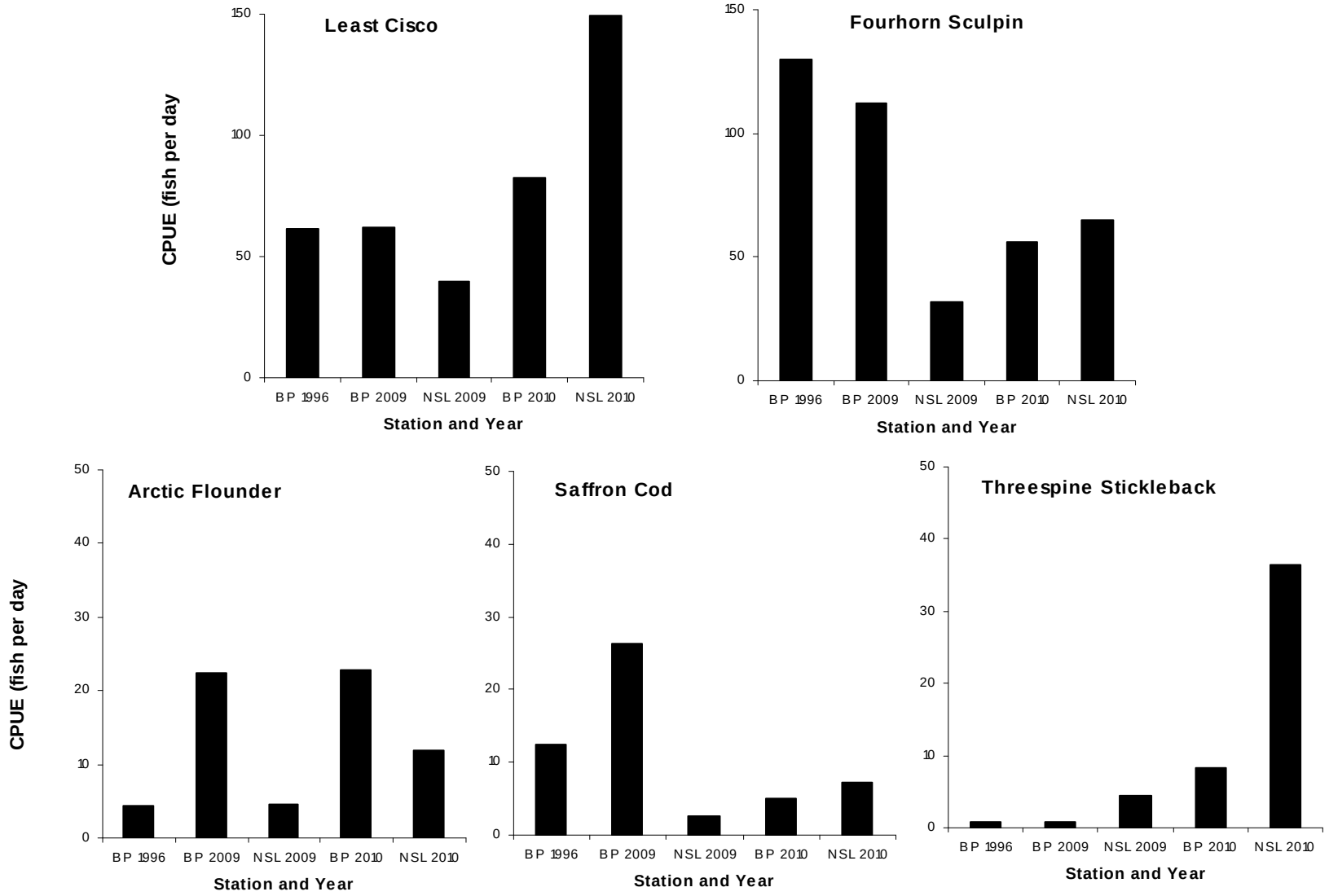

Figure 7. Mean annual catch rate (in fish per day) of most abudant species caught at Elson Lagoon fyke net stations from July 23 to August 6 during 1996-2010. (BP = Brandt Point, NSL = North Salt Lagoon)

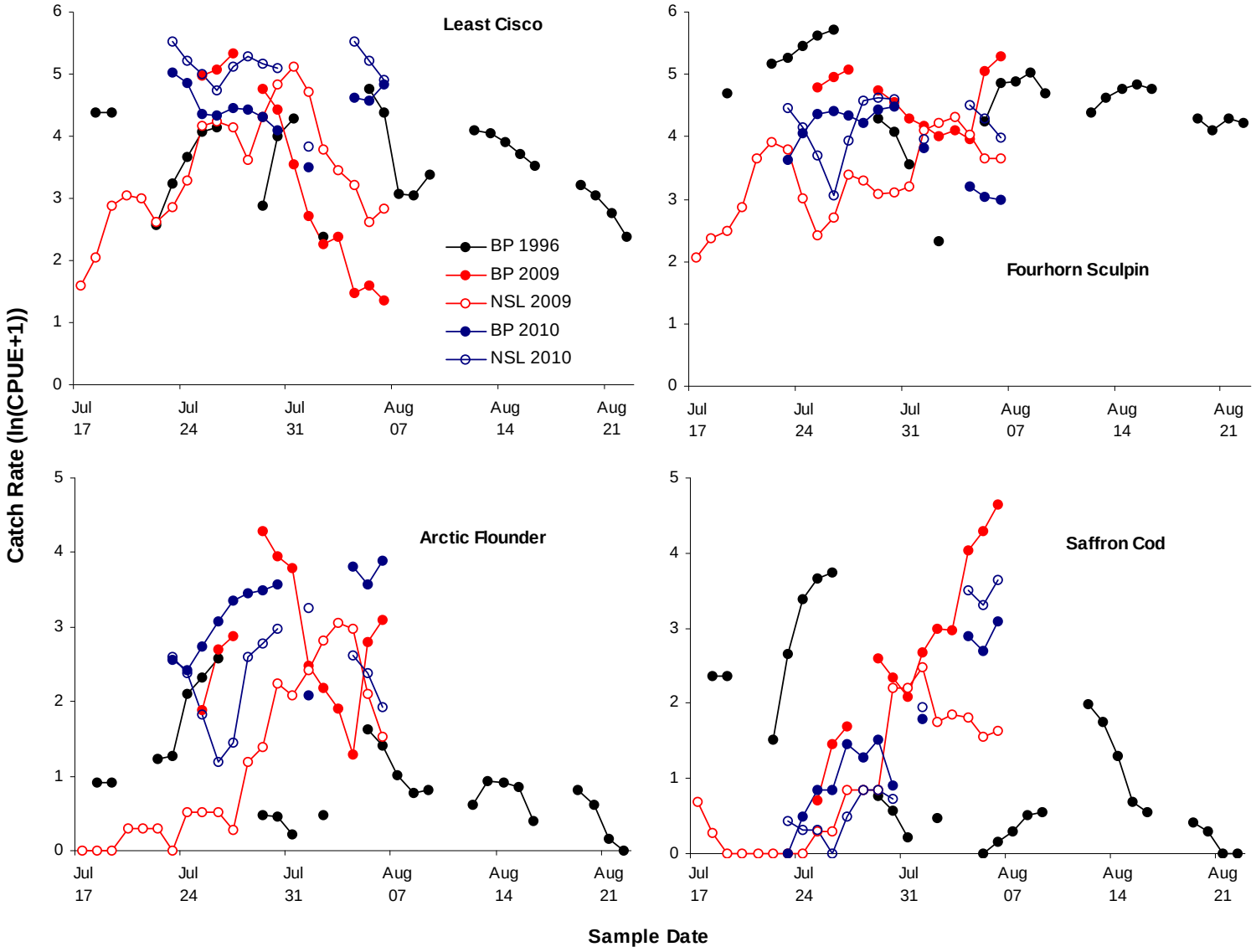

Figure 8, Daily catch rates (3-day moving averages) of the four most abundant species in Elson Lagoon fyke net sampling, 1996-2010. (CPUE = ln(3-day moving average of catch per day)+1))

Least Cisco. On the North Slope, least cisco occur as freshwater and anadromous populations. Anadromous populations spread along the coast during summer to feed on marine and estuarine invertebrates and return to rivers to spend the winter. As presented above, least cisco were a dominant component of the fish catch in Elson Lagoon during the 1996 to 2010 sampling, being present in over 94% of the net checks. Least cisco were most abundant in 2010, particularly at the North Salt Lagoon station (Fig. 7). Abundance was greatest in late July, with catches declining in early August (Fig. 8).

In 1996, least cisco were primarily large fish, with 75% of those caught exceeding 220 mm fork length (8.7 inches) (Fig. 9). In contrast, less than 25% exceeded 220 mm in 2009 and 2010. It appears that there was an influx of young least cisco in recent years that is dominating the catches. In 2009, this group was 120-160 mm and had grown to 160-200 mm by 2010.

Least cisco exhibited linear growth through age 8, which coincided with the onset of first spawning. There was no difference in the slopes of lines representing age-length relationships for least cisco caught in 1991 and 2010 ($p=0.15$), however, the intercepts were significantly different ($p<0.0001$). Least cisco from 2010 were significantly larger at a given age than those

caught in 1991 (Fig. 10). At this time it is not know if the difference is caused by increased growth or by sampling different stocks that may grow at different rates. Least cisco caught in Elson Lagoon are likely composed of mixed stocks, which complicates analyses of growth differences.

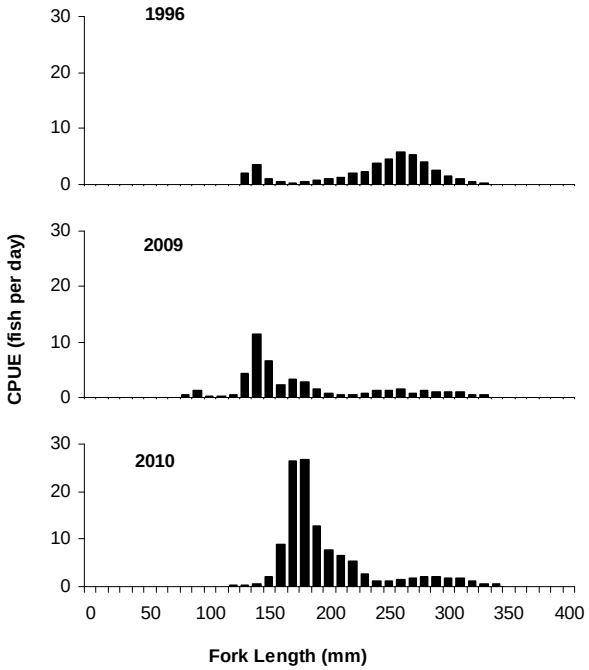

Figure 9. Least cisco from 1996 sampling with fyke nets tended to be larger than those caught in 2009 and 2010.

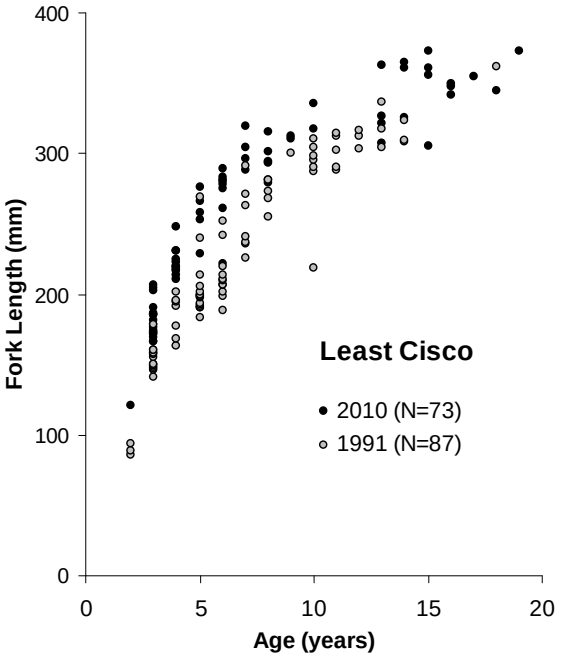

Figure 10. Age-length relationships of least cisco caught in Elson Lagoon revealed that those caught in 2010 were larger at a given length than those caught in 1991.

Sufficient data were available to analyze for length-weight differences among least cisco captured in 1991, 1996 and 2010. There were no differences in length-weight relationships among size groups or sexes, so data from each year were pooled to evaluate temporal differences. Analysis of covariance indicated that length-weight relationships for all three periods were significantly different from each other ($p<=0.01$). Weights were calculated at three comparison lengths (175, 250 and 325 mm) to evaluate the differences among years (Table 3). This evaluation revealed that least cisco from 1996 were the heaviest at the comparison lengths. Smaller least cisco from 2010 were lighter than those from 1991, while those in excess of 280 mm were heavier.

Table 3. Comparison of weights at given lengths for least cisco caught in Elson Lagoon; those from 1996 were larger than those from 1991 and 2010.

Sample	Length-Weight Relationship		Weight in gm at Comparison Fork Length (mm)		
Year	Slope	Intercept	175	250	325
1991	3.250	-5.646	43.9	140.0	328.4
1996	3.198	-5.461	51.6	161.5	373.8
2010	3.528	-6.328	38.5	135.6	342.2

Arctic Cisco/Bering Cisco. Arctic cisco and Bering cisco were not abundant in the Elson Lagoon sampling, but are notable because they do occur, but are remote from their rivers of origin. It is thought that arctic cisco in the Beaufort Sea originate in the Mackenzie River in Canada, while Bering cisco originate in the Yukon River. There are no rivers between these two that are known to harbor spawning populations of the two species.

A trained eye is needed to separate these two species in the field, and the identity of small individuals must be verified through gill raker counts, thus there is a high potential to misidentify.

The two species accounted for less than 1% of the catch in 1996 and 2009, but jumped to just under 2% in 2010. In the two earlier years, they were encountered in less than 50% of the sets, while in 2010 they were found in over 90% of the net checks. Arctic cisco/Bering cisco caught in 1996 were primarily large fish larger than 290 mm (Fig. 11). Those caught in 2009 and 2010 were primarily from the 2007 year class, which was one of the strongest recruitments observed to date (Fechhelm et al. 2010). We estimate that 79% of those caught in 2009, and 82% in 2010, were from this year class. In 2008, fish from the same year class were caught in the lower Chipp River (Moulton et al. 2011), so it is possible the fish found in the coastal area near Barrow are wintering in or near drainages around Admiralty Bay.

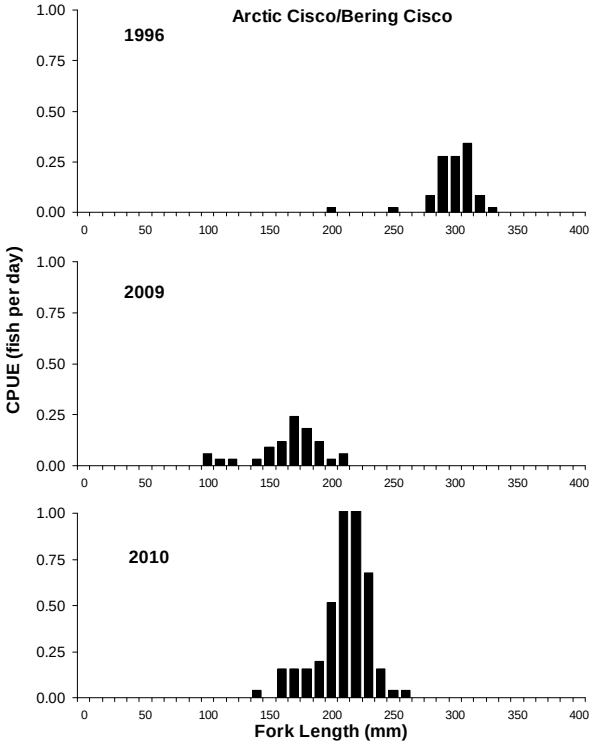

Figure 11. Arctic cisco/Bering cisco 2009 and 2010 sampling with fyke nets were primarily fish from the 2007 year class.

Broad Whitefish. Broad whitefish were rarely caught in Elson Lagoon fyke nets, with only 11 caught during the three sampling years. Most of those caught were young fish, with only one in excess of 300 mm fork length. Large broad whitefish are frequently caught by gill net during the summer subsistence fishery, so they are present, but are not often caught in fyke nets.

Rainbow Smelt. Rainbow smelt are a small anadromous fish that spawn in freshwater but

spend the rest of their lives in marine or estuarine habitats. While rainbow smelt were not very abundant, they were present in over 40% of the fyke net samples. Rainbow smelt caught in Elson Lagoon were generally 200 mm or less (Fig. 12), which corresponds to age-7 or less. Ages 5, 6, and 7 were the dominant age groups caught in Elson Lagoon, These ages were noticeably absent from sampling in the Chipp River during 2008 (Moulton et al 2011). The age-at-length relationship indicates that the smelt caught in Elson Lagoon match the growth of the smelt from the Chipp River (Fig. 13). The growth pattern and distribution of ages suggest that the rainbow smelt caught in Elson Lagoon may be a segment of the same population represented by the fish caught in the Dease Inlet region.

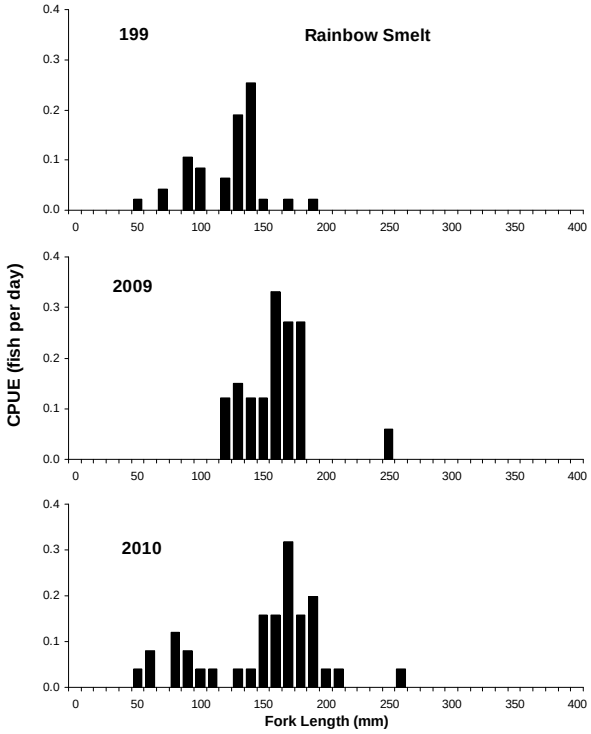

Figure 12. Rainbow smelt were primarily shorter than 200 mm during 1996, 2009 and 2010 sampling in Elson Lagoon.

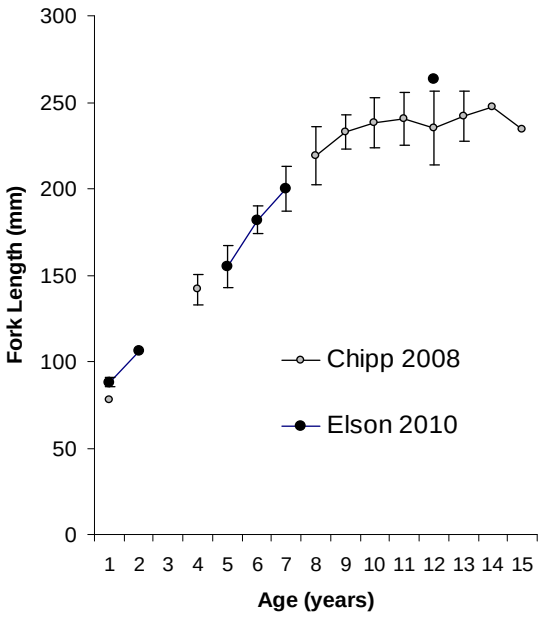

Figure 13. Rainbow smelt from Elson Lagoon in 2010 grew at rates similar to those caught in the Chipp River in 2008, although different ages were present.

Pacific Herring. Pacific herring were tenth in overall abundance for the three sampling years, with a total of 46 caught. Only 1 was caught in 1996, with approximately equal numbers caught in 2009 (24 fish) and 2010 (21 fish). Pacific herring ranged from 120 to 240 mm fork length (Fig. 14).

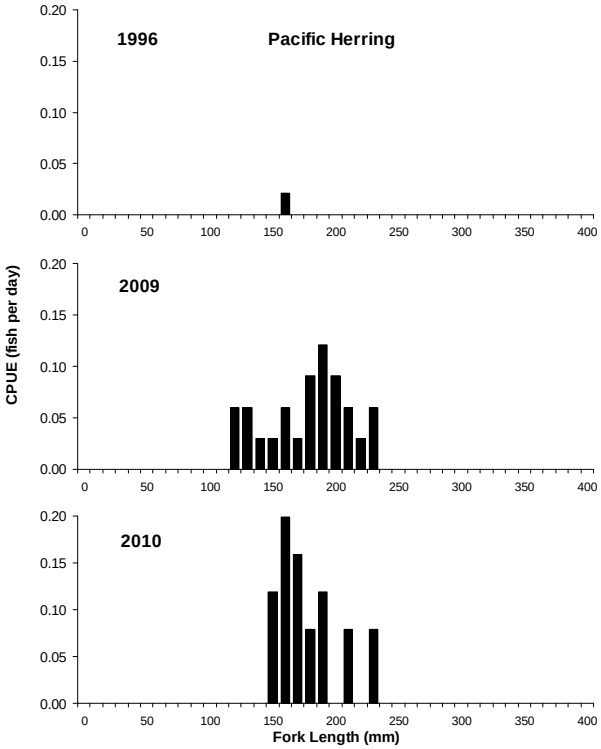

Figure 14. Pacific herring in Elson Lagoon were larger in 2009 than in 2010, likely reflecting differences in age structure.

Saffron Cod. Saffron cod were fourth in overall abundance and were caught in almost 60% of the fyke net sets (Table 2). Catches were highest at the Brant Point net in 2009, when catches averaged over 26 fish per day (Fig. 7). The high catches in 2009 were composed of a large number of fish between 130-180 mm fork length, although fish up to 390 mm were caught (Fig. 15). In 1996, catch rates were highly variable through the season, while in 2009 and 2010 catch rates seemed to be increasing in early August (Fig. 8) as salinity increased (Fig. 5).

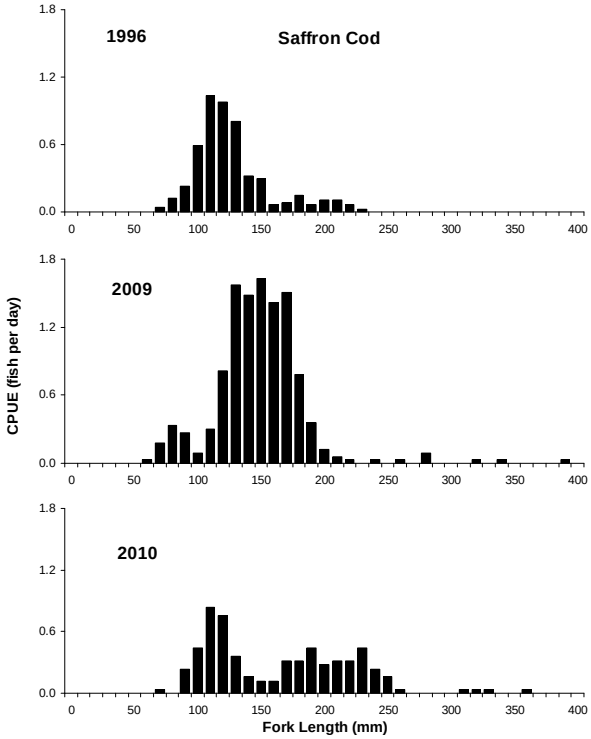

Figure 15. Saffron cod in Elson Lagoon during 2009 were dominated by one size group.

Arctic Cod. Arctic cod are a small marine fish in the cod family (Gadidae); they form large schools and can often be abundant in the coastal region during summer. Arctic cod were eighth in overall abundance in the fyke net samples, but 89% of the catch was from 1996, with few caught during 2009-2010 sampling (Table 2). A group of fish between 60 to 120 mm fork length composed 88% of the 1996 length frequency (Fig. 16).

Arctic Flounder. Arctic flounder were third in overall abundance and were caught in over 70% of the net sets (Table 2). Their abundance was greatest at the Brant Point station in 2009 and 2010, with lesser abundance in North Salt Lagoon (Fig. 7). Catch rates were highly variable through the season (Fig. 8). In most cases catch rates increased in late July to early August, however at Brant Point in 2009, the reverse pattern was observed. There were two length modes present in 2009 and 2010, at this time it is not known which ages correspond to these dominant modes (Fig. 17).

Fourhorn Sculpin. Fourhorn sculpin were the most abundant fish caught, composing 48% of the

total catch, and occurred in every sample (Table 2). Fourhorn sculpin were not measured, thus accurate size information is not available, but they ranged from juveniles less than 100 mm to in excess of 300 mm fork length.

Catches of fourhorn sculpin were highest at Brant Point in 1996 and 2009 (Fig. 7). Catch rates remained high through the season (Fig. 8).

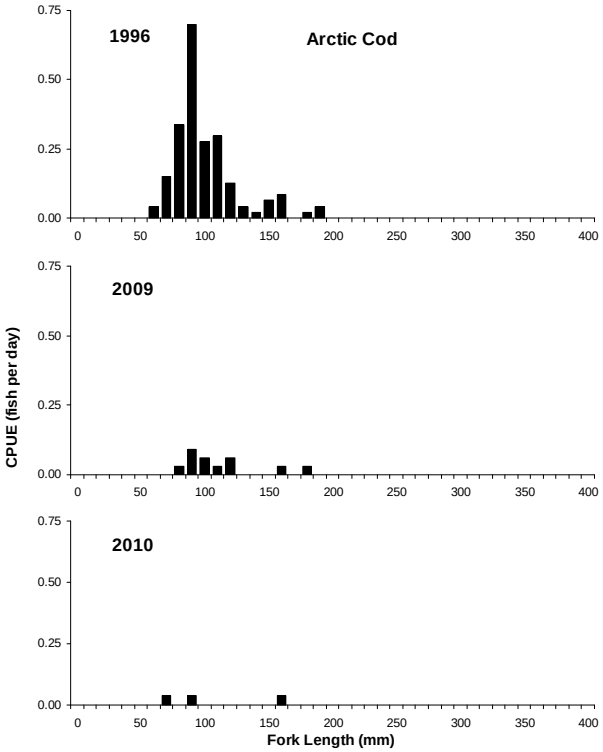

Figure 16. Arctic cod were most abundant in Elson Lagoon during 1996.

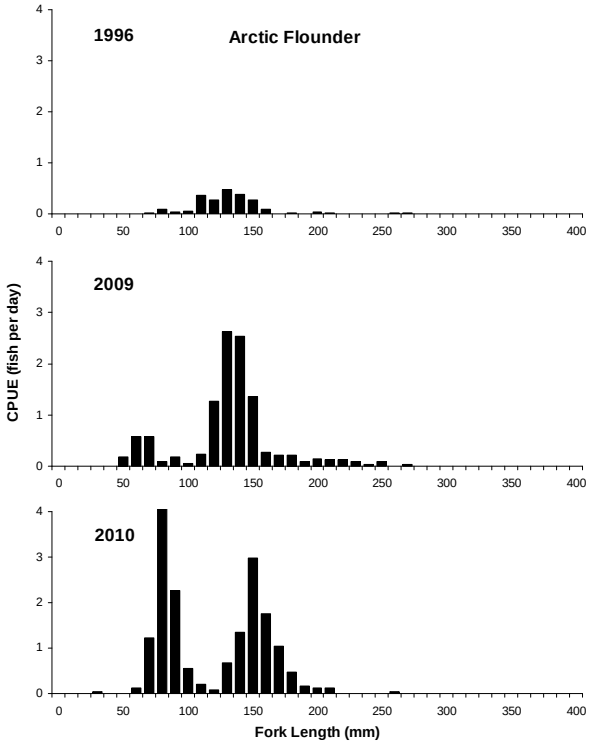

Figure 17. Arctic flounder abundance and size varied greatly among the three sampling years.

Threespine Stickleback. Threespine stickleback are a small fish that can have freshwater, anadromous or marine populations. The population caught in Elson Lagoon seems to be the marine variety as they were in spawning condition when caught during 2010. Threespine stickleback were much more numerous in 2010 than in previous years, with 82% of the catch recorded in the most recent year (Table 2). Catches in North Salt Lagoon were higher than those at Brant Point in the two years when both stations were sampled. In 2010, threespine stickleback were between 56 and 105 mm (2 to 4 inches) in length, with no obvious modes in the length frequency (Fig. 18). Only 19 threespine stickleback were caught in 1996, however, one was 134 mm long (about 5¼ inches), which may be the largest ever recorded.

Other Species. Pink salmon, Dolly Varden, capelin and ninespine stickleback were also caught during the 1996 and 2009-2010 sampling in Elson Lagoon (Table 2). Pink salmon tend to be more abundant in the Beaufort Sea during even-numbered years, and this is reflected in the catches. Pink salmon were not caught in 2009,

but were present in the catches from 1996 and 2010. Their abundance does not appear to be accurately reflected in the fyke nets because

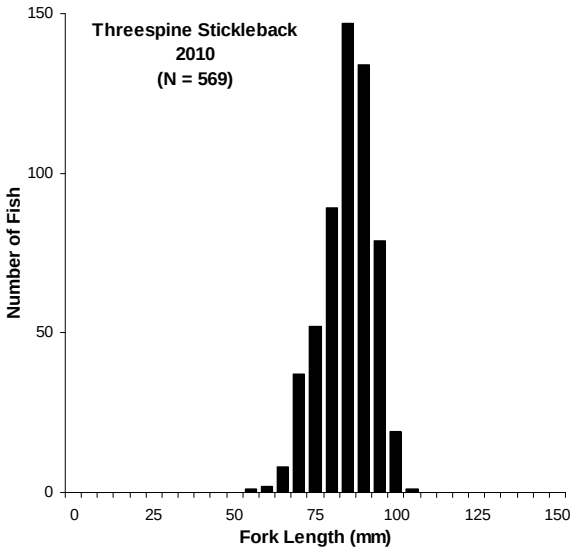

Figure 18. Threespine stickleback from Elson Lagoon ranged between 56 and 105 mm.

subsistence fishermen on the shore opposite Brant Point were quite successful at catching pink salmon in gill nets. Similarly, Dolly Varden seem to be caught more frequently in gill nets than is reflected in the fyke net catches, as only two were caught during the three years of fyke net sampling.

Capelin are a marine smelt (family Osmeridae) that forms dense schools and spawns along gravel beaches during summer. They are often are very abundant, and one school could dominate catches if they enter a net. So far, catches have been sporadic.

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APPENDIX A

Water Chemistry Data
Measured in Elson Lagoon
2009-2010

Appendix Table A-1. Water temperature at fyke net stations, 1996, 2009 and 2010.

Water Temperature (degrees C)					
	Brant Point			North Salt Lagoon	
Date	1996	2009	2010	2009	2010
Jul 16					
Jul 17				10.3	
Jul 18				9.0	
Jul 19	6.0			8.5	
Jul 20				8.7	
Jul 21				6.6	
Jul 22	5.0		10.5	6.3	10.2
Jul 23	7.0		9.2	6.5	10.0
Jul 24	11.0		9.8	6.8	10.2
Jul 25	11.0	7.3	11	7.5	11.1
Jul 26	11.0	8.6	11.8	8.6	12.2
Jul 27	9.5	7.6	13.7	7.6	13.7
Jul 28	8.0	9.2	13.6	10.1	13.9
Jul 29	7.3	10.7	13	10.1	13.7
Jul 30	8.1	10	12.3	12.5	12.8
Jul 31	8.0	10.1	10.8	10.1	11.3
Aug 01		10.5	9.2	12.8	9.8
Aug 02		11.4	10.4	13.2	11.4
Aug 03		12	11.5	13.2	12.9
Aug 04		12.3	13	14.1	12.8
Aug 05	12.0	11.5	12.6	11.5	12.9
Aug 06	7.0	8.5	11.9	8.7	12.1
Aug 07	6.0				
Aug 08	7.0				
Aug 09	5.0				
Aug 12	7.0				
Aug 13	6.0				
Aug 14	5.0				
Aug 15	5.0				
Aug 16	6.0				
Aug 19	5.0				
Aug 20	5.0				
Aug 21	3.0				
Aug 22	3.0				
Aug 23					

Appendix Table A-2. Salinity at fyke net stations, 1996, 2009 and 2010.

	Salinity (parts per thousand)				
	Brant Point			North Salt Lagoon	
Date	1996	2009	2010	2009	2010
Jul 16					
Jul 17				5.1	
Jul 18				4.9	
Jul 19	13.0			5.4	
Jul 20				8.3	
Jul 21				8.2	
Jul 22	12.5		21.4	9.5	23.3
Jul 23	15.0		19.1	13.8	22.7
Jul 24	17.0		18.7	14.3	22.0
Jul 25	15.0	12.8	17.8	12.4	20.7
Jul 26	27.0	15.6	17.6	14.3	20.0
Jul 27	20.9	19.2	17.5	18.3	18.6
Jul 28	14.7	18.5	17.9	16.0	18.8
Jul 29	22.0	17.7	17.7	19.4	18.7
Jul 30	19.0	20.5	17.8	16.6	18.5
Jul 31	16.0	19.5	20.0	19.8	19.1
Aug 01		24	22.2	16.4	19.7
Aug 02		24.1	23.9	18.3	20.9
Aug 03		25.4	25.5	19.6	22.0
Aug 04		24.7	25.2	19.1	24.4
Aug 05	13.9	23.9	25.8	25.2	24.2
Aug 06	15.0	23.7	26.2	22.8	25.3
Aug 07	16.0				
Aug 08	12.0				
Aug 09	12.0				
Aug 12	12.0				
Aug 13	13.0				
Aug 14	13.0				
Aug 15	14.0				
Aug 16	14.0				
Aug 19	13.0				
Aug 20	13.0				
Aug 21	14.5				
Aug 22	15.0				
Aug 23					

Appendix Table A-3. pH at fyke net stations, 2009.

	pH (pH units)				
	Elson Lagoon			North Salt Lagoon	
Date	1996	2009	2010	2009	2010
Jul 16					
Jul 17				7.95	
Jul 18				9.14	
Jul 19				8.61	
Jul 20				8.36	
Jul 21				8.30	
Jul 22				8.43	
Jul 23				8.48	
Jul 24				8.37	
Jul 25		8.50		8.32	
Jul 26		8.40			
Jul 27		8.45		8.42	
Jul 28				8.63	
Jul 29		8.57		8.40	
Jul 30		8.56		8.54	
Jul 31		8.52		8.47	
Aug 01		8.48		8.45	
Aug 02		8.29		8.40	
Aug 03		8.37		8.35	
Aug 04		8.38		8.39	
Aug 05		8.44		8.50	
Aug 06		8.53		8.47	
Aug 07					
Aug 08					
Aug 09					
Aug 12					
Aug 13					
Aug 14					
Aug 15					
Aug 16					
Aug 19					
Aug 20					
Aug 21					
Aug 22					
Aug 23					

APPENDIX B

Daily Fish Catch by Station in Elson Lagoon 1996-2010

Appendix Table B-1. Daily catches by side of net during 1996 Elson Lagoon fyke net sampling.

1996 Catch by Set - Brant Point (double trap net)

Species	Jul 18 North	Jul 18 South	Jul 19 North	Jul 19 South	Jul 22 North	Jul 22 South	Jul 23 North	Jul 23 South	Jul 24 North	Jul 24 South
Broad whitefish										
Arctic cisco								2	1	2
Bering cisco				2						
Least cisco		10	44	255		11	2	31	20	81
Dolly Varden										
Pink salmon								1		
Rainbow smelt				4				1	4	1
Capelin										
Pacific herring										
Saffron cod				38	2	5	1	5	18	49
Arctic cod		1	7	6	15	17	1	4	20	19
Arctic flounder				6			1	8	6	
Fourhorn sculpin			69	146	32	380	30	189	94	377
Threespine stickleback										
Ninespine stickleback										
No. of Fish	--	11	120	457	49	413	35	241	163	529
No. of Species	--	2	3	7	3	4	5	8	7	6
Effort (hrs)	0.00	28.00	23.25	23.83	21.50	21.00	23.00	22.50	24.50	24.50

1996 Catch by Set - Brant Point (double trap net)

Species	Jul 25 North	Jul 25 South	Jul 26 North	Jul 26 South	Jul 29 North	Jul 29 South	Jul 30 North	Jul 30 South	Jul 31 North	Jul 31 South
Broad whitefish										
Arctic cisco				2		2		2	1	
Bering cisco										
Least cisco	15	71	22	125	10	20	12	18	31	224
Dolly Varden						1				
Pink salmon		1	2							
Rainbow smelt	3	2	2	1	3				2	1
Capelin				1						
Pacific herring										
Saffron cod	25	68	49	12	1	2		1		
Arctic cod	4	2		1	1					
Arctic flounder	5	21	15	5	2				1	
Fourhorn sculpin	99	539	169	324	52	123	21	55	21	39
Threespine stickleback				1					1	14
Ninespine stickleback		1								
No. of Fish	151	705	259	472	69	148	33	76	57	278
No. of Species	6	8	6	9	6	5	2	4	6	4
Effort (hrs)	22.50	22.10	23.00	23.00	19.75	19.50	23.75	24.00	24.00	24.00

Appendix Table B-1. Daily catches by side of net during 1996 Elson Lagoon fyke net sampling.

1996 Catch by Set - Brant Point (double trap net)

Species	Aug 02 North	Aug 02 South	Aug 05 North	Aug 05 South	Aug 06 North	Aug 06 South	Aug 07 North	Aug 07 South	Aug 08 North	Aug 08 South
Broad whitefish								1		
Arctic cisco				1						1
Bering cisco										
Least cisco	2	14	19	338	7	83		6		3
Dolly Varden										
Pink salmon					1	2				
Rainbow smelt		11		3						1
Capelin							1			
Pacific herring										
Saffron cod		1						1	1	
Arctic cod								1		
Arctic flounder		1	5	4	1	5	2			1
Fourhorn sculpin	3	12	41	168	40	18	110	376	152	75
Threespine stickleback										1
Ninespine stickleback										
No. of Fish	5	39	65	514	49	108	113	385	153	82
No. of Species	2	5	3	5	4	4	3	5	2	6
Effort (hrs)	19.75	19.50	24.25	24.50	19.25	19.00	24.25	24.00	24.00	24.00

1996 Catch by Set - Brant Point (double trap net)

Species	Aug 09 North	Aug 09 South	Aug 12 North	Aug 12 South	Aug 13 North	Aug 13 South	Aug 14 North	Aug 14 South	Aug 15 North	Aug 15 South
Broad whitefish								2	1	
Arctic cisco		15	1	11				3		1
Bering cisco					1					
Least cisco	9	101	22	110	8	70	5	100	18	88
Dolly Varden										
Pink salmon	1	4	2			1		3		1
Rainbow smelt			3		1	5	1	2		2
Capelin				1						1
Pacific herring										1
Saffron cod		2	11	2	5	5		3	2	1
Arctic cod			6	2				1		1
Arctic flounder	1	3	1	1	1		2	4	1	1
Fourhorn sculpin	36	166	47	99	43	98	42	253	66	195
Threespine stickleback		1		1						
Ninespine stickleback										
No. of Fish	47	292	93	227	59	179	50	371	88	292
No. of Species	4	7	8	8	6	5	4	9	5	10
Effort (hrs)	24.00	24.00	20.50	20.00	24.00	24.00	24.00	24.00	24.00	24.00

Appendix Table B-1. Daily catches by side of net during 1996 Elson Lagoon fyke net sampling.

1996 Catch by Set - Brant Point (double trap net)

Species	Aug 16 North	Aug 16 South	Aug 19 North	Aug 19 South	Aug 20 North	Aug 20 South	Aug 21 North	Aug 21 South	Aug 22 North	Aug 22 South
Broad whitefish	1							1	1	
Arctic cisco				4						
Bering cisco										
Least cisco	5	22	1	44	4	47		25		14
Dolly Varden										
Pink salmon			1			1	1	1		
Rainbow smelt		1							1	1
Capelin				1						
Pacific herring										
Saffron cod			1	1						
Arctic cod			1	1						
Arctic flounder			1	3		1				
Fourhorn sculpin	50	150	36	90	83	81	12	54	25	180
Threespine stickleback					1					
Ninespine stickleback										
No. of Fish	56	173	41	144	88	130	13	81	27	195
No. of Species	3	3	6	7	3	4	2	4	3	3
Effort (hrs)	24.00	24.00	24.00	24.00	24.00	24.00	23.75	24.00	24.00	24.00

Appendix Table B-2. Daily catches during 2009 Elson Lagoon fyke net sampling.

2009 Catch by Set - Brant Point (single trap net)

Species	Jul 25	Jul 26	Jul 27	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
Broad whitefish												
Arctic cisco		5		6	3						1	1
Arctic/Bering cisco					2							
Least cisco	62	212	191	145	84	18	3	21	2	6	2	4
Dolly Varden												
Pink salmon												
Rainbow smelt		1	6	1	17	2	1	5			2	2
Capelin		4	4	4	21	2		19				
Pacific herring	5	5	2	3	3			1				
Saffron cod	1	1	8	14	11	3	8	30	18	7	143	73
Arctic cod		1			3	1						5
Arctic flounder	8	3	31	33	114	9	11	13		4	4	41
Fourhorn sculpin	103	128	185	115	112	55	57	83	23	73	58	360
Threespine stickleback	1	2	1	1		1	1					2
Ninespine stickleback												
No. of Fish	180	362	428	322	370	91	81	172	43	90	210	488
No. of Species	6	10	8	9	10	8	6	7	3	4	6	8
Effort (hrs)	24.00	22.50	24.75	23.25	25.00	23.50	25.00	24.00	22.50	24.25	24.50	25.75

Appendix Table B-3. Daily catches during 2009 North Salt Lagoon fyke net sampling.

2009 Catch by Set - North Salt Lagoon (single trap net)

Species	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27
Arctic/Bering cisco											
Arctic cisco					1				1	3	1
Broad whitefish	1					1					
Least cisco	4	1	15	34	10	13	15	23	39	127	35
Dolly Varden											
Pink salmon											
Rainbow smelt											
Capelin											
Pacific herring						1				2	
Saffron cod	1									1	
Arctic cod											
Arctic flounder					1				2		
Fourhorn sculpin	7	7	15	11	23	79	46	8	4	19	17
Threespine stickleback			3	4	2	4	3	1	2	1	2
Ninespine stickleback											
No. of Fish	13	8	33	49	37	98	64	32	48	153	55
No. of Species	4	2	3	3	5	5	3	3	5	6	4
Effort (hrs)	24.50	22.75	24.00	23.75	23.50	24.50	24.00	25.25	23.50	24.00	22.25

2009 Catch by Set - North Salt Lagoon (single trap net)

Species	Jul 28	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
Arctic/Bering cisco								1		
Arctic cisco	1	1	1	7		1				
Broad whitefish			1							
Least cisco	21	50	143	185		42	40	6	22	11
Dolly Varden										
Pink salmon										
Rainbow smelt				6		1	1		3	
Capelin		1		5	5	1				
Pacific herring				2						
Saffron cod	3	1		24	1	9	4	3	8	
Arctic cod										1
Arctic flounder	1	6	2	18	2	12	31	15	7	
Fourhorn sculpin	50	11	2	54	18	109	72	38	51	26
Threespine stickleback	2	4	1	25	17	11	4	2	1	3
Ninespine stickleback		1			1		2			
No. of Fish	78	75	150	326	44	186	154	65	92	41
No. of Species	6	8	6	9	6	8	7	6	6	4
Effort (hrs)	24.50	24.25	22.75	25.00	25.00	24.25	22.00	24.75	23.25	28.25

Appendix Table B-4. Daily catches during 2010 Elson Lagoon and North Salt Lagoon fyke net sampling.

2010 Catch by Set - Brant Point (single trap net)

Species	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
Broad whitefish									1			
Arctic cisco	2	3	3	3		1	6	1	6	4	3	1
Bering cisco												
Least cisco	221	41	81	109	38	108	99	14	64	35	144	84
Dolly Varden												
Pink salmon									1	1	3	1
Rainbow smelt			7	16		3				1	3	1
Capelin												
Pacific herring			1			1						
Saffron cod			2	2		8		3	10		31	7
Arctic cod												
Arctic flounder	15	6	7	30	25	27	39	29	14	6	73	15
Fourhorn sculpin	30	36	100	99	46	80	72	100	88	20	22	13
Threespine stickleback		1	6	4	3	1	2	26	1	15	24	22
Ninespine stickleback												
No. of Fish	268	87	207	263	112	229	218	173	185	82	303	144
No. of Species	4	5	8	7	4	8	5	6	8	7	8	8
Effort (hrs)	20.50	22.58	24.92	23.58	23.83	24.67	22.83	24.67	48.00	21.67	21.58	23.22

2010 Catch by Set - North Salt Lagoon (single trap net)

Species	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
Broad whitefish												
Arctic cisco	18	8	1	6	3	13	15	1	2	4	2	
Bering cisco												
Least cisco	281	158	50	219	75	208	289	14	91	246	204	43
Dolly Varden										1		
Pink salmon									1	2		1
Rainbow smelt	1					2				3	4	
Capelin												2
Pacific herring	1		1	3		2	10		1			1
Saffron cod		1				2	2		12	4	54	15
Arctic cod					2						1	
Arctic flounder	13	9	5	1	1	8	27	9	50	16	7	4
Fourhorn sculpin	73	78	19	14	28	111	143	49	103	98	63	35
Threespine stickleback	10	21	2	3	3	21	23	34	50	140	61	90
Ninespine stickleback				1				1				1
No. of Fish	397	275	78	247	112	367	509	108	310	514	396	192
No. of Species	7	6	6	7	6	8	7	6	8	9	8	9
Effort (hrs)	21.08	21.75	25.00	24.25	22.92	25.00	22.58	24.75	47.92	21.42	21.83	23.33

APPENDIX C

Length Frequency by Species in Elson Lagoon 1996-2010

Appendix Table C-1. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 18	Jul 19	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 29	Jul 30	Jul 31	Aug 02	Aug 05	Aug 06	Aug 07
0														
10														
20														
30														
40						1								
50														
60														
70														
80									1					
90														
100										1				
110														
120						1							1	
130					1	4	2					63	13	2
140					1		1		1			95	31	1
150						2						10	7	
160			1									3	7	1
170	1					3						3	1	
180		11				3						13	1	
190		12	1		2	1	2					15	1	
200		11	1	1	3	5	3	1	1	1		13	2	
210		22			7	5	7			4		10	3	
220		43	1	2	1	3	10			8	3	5	3	
230		36		2	10	3	20	1	1	9	1	9		1
240	2	49	2	2	5	6	19	4	6	22	3	6	4	1
250	2	34		5	22	12	13	7	2	33	1	16	2	
260	2	24	1	8	12	9	19	7	3	57	1	24	4	
270	1	22		5	10	8	14	3	4	47	4	20	2	
280		18		2	13	7	10	2	4	23		23		
290		2	1	4	4	5	3	2	3	22	2	13		
300	2		3	1	3	2	7			7		8		
310		6		1	3	3	2	2	2	4		5		
320		4			1	2		1	2	2			1	
330		2			1	1				6				
340					1					1				
350					1									
360										1		3		
370										2				
380													1	
390														
400														
Total:	10	297	11	33	101	86	132	30	30	251	15	357	84	6

Appendix Table C-1. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Aug 08	Aug 09	Aug 12	Aug 13	Aug 14	Aug 15	Aug 16	Aug 19	Aug 20	Aug 21	Aug 22
0											
10											
20											
30											
40											
50											
60											
70											
80											
90											
100				1							
110			1					1			
120											1
130		2		1	1	4	1			2	1
140	1	1		10	7	5	3			2	3
150		1	1	6	9	5	2		1	2	2
160		1		5	2		1		1		
170			1	2				1	1	1	
180									1		
190					2						
200		2		1	3	1		2		1	
210	1			2	1					1	
220		5	1	2	2	4	2			1	
230		5	1		4	2	2		1	1	
240		11	9	8	5	6		1	2		2
250		13	17	2	11	9	3	4	6		1
260		18	23	8	8	15	4	9	7	7	
270	1	14	17	12	15	20	4	8	10	2	1
280		16	19	6	12	12	1	8	6	2	2
290		7	13	7	9	9	1	7	7		1
300		6	3	4	5	8	1	3	6		
310		1	10	1	4	2	1	1	1	2	
320		3	3		4	3					
330		2	2			1	1		1		
340		1			1					1	
350											
360											
370											
380		1									
390											
400											
Total:	3	110	121	78	105	106	27	45	51	25	14

Appendix Table C-2. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 2009.

2009	Brant Point											
Fork Length (mm)	Jul 25	Jul 26	Jul 27	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80		3	2	5	1				1			
90		7	1	4	5			2				
100					1	1						
110				1								
120	1	3	2		1			2				
130	9	32	12	9	7	2	1					
140	9	50	22	29	11	2	1	4	1			1
150	3	22	8	30	9	6		3			2	1
160	1	19	9	11	1			3				
170	1	27	4	11	12	3		1				1
180	3	13	6	11	3			2		1		
190	1	9	1	6	1			1				1
200		5		1	1	1				1		
210		4	1		1	1						
220		2	2	4	2					1		
230	2	2	4	1								
240	3	3	8	8	2							
250	3	1	17	1				2		1		
260	3	6	22	1	1					1		
270	3	1	7	3	2							
280	2		17	1	3		1					
290	4	1	9	1	2							
300	4	1	15	2	3							
310	5		11	2	4					1		
320	1		8	1	4	1						
330	2		2	2	3			1				
340	2		1		1							
350					3							
360		1				1						
370												
380												
390												
400												
Total:	62	212	191	145	84	18	3	21	2	6	2	4

Appendix Table C-2. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 2009.

2009 North Salt Lagoon

Fork Length (mm)	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30
0														
10														
20														
30														
40														
50														
60														
70														
80													2	
90									1			1	4	
100									1			1	1	
110														
120			1	1				1	1	3				2
130			1	2	1	1		1	5	17	2	3	4	17
140						1	4	9	19	48	14	12	17	39
150						1	2	3	5	15	8	2	9	26
160			1	3		1			2	2	4		2	5
170	2			1			2	1	2	13	1		3	15
180				1	1			2	1	12	4	1	1	9
190			1	1		1		3		4	1		1	4
200	1			1		1				1				1
210						1		1		1	1			
220				2						1				3
230			3	3			1			3			1	3
240		1		1		1		1		3				4
250			2	2	1	1		1	2	1			2	2
260			2		3		1			2				2
270				4	1	1								
280				4		1	1			1			2	4
290				5	2	2	3							
300	1		2	2	1							1		2
310			1	1			1						1	3
320			1											1
330														1
340														
350														
360														
370														
380														
390														
400														
Total:	4	1	15	34	10	13	15	23	39	127	35	21	50	143

Appendix Table C-2. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 2009.

2009							
Fork Length (mm)	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0							
10							
20							
30							
40							
50							
60							
70							
80	3						
90	3		2			11	
100	2		2	1		2	
110	3		2			1	
120					1		
130	16		2	1	1		
140	70		9	4	1		3
150	49		5	2	1	2	6
160	6		5	1			1
170	6		2	2		2	1
180	9		4	6	1	1	
190	5		1	5			
200	4			5			
210	1		3	1		2	
220	1						
230	1			1			
240	1			3			
250	1					1	
260			1	2			
270	3		1	3			
280			2				
290				1			
300	1						
310							
320				1			
330			1	1	1		
340							
350							
360							
370							
380							
390							
400							
Total:	185	0	42	40	6	22	11

Appendix Table C-3. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 2010.

2010	**Brant Point**											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120								1				
130			1				1		1		1	
140						1	1					
150	3		1	1	2	1	3	1	1	1	1	
160	28		9	16	6	15	8		1	1	2	5
170	38	5	26	23	14	28	23	1	11	10	19	14
180	25	7	12	24	6	26	27	4	18	13	38	31
190	13	2	11	8	3	17	7	3	8	4	28	13
200	14	3	6	7		6	12	1	5	4	10	3
210	12	1	3	6	2	4	3		6		4	9
220	7	3	3	2	1	6	5	1	6	2	9	3
230	8	1	2	5			3	1	3		3	
240	2		4				2	1				1
250	5	2		2	1	2					1	
260	2			4			2				2	2
270	9	4	1	3	2						1	
280	9	3	1	3							2	
290	12	3		2	1	1			2		3	
300	11	3		2					1		6	2
310	10	4	1			1					4	1
320	6						2				4	
330	1								1		2	
340	4			1								
350											2	
360	1										1	
370											1	
380												
390												
400												
Total:	220	41	81	109	38	108	99	14	64	35	144	84

Appendix Table C-3. Daily length frequencies of least cisco caught in Elson Lagoon fyke nets, 2010.

2010	**North Salt Lagoon**											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120	1	1	1								1	
130		1					1				1	
140		8	1		1		3					
150	4	6		4		6	12		2	1	1	
160	29	23	3	11		18	33	1	4	3	4	2
170	50	46	11	60	16	79	102	3	16	38	25	4
180	33	26	18	48	19	55	66	3	17	69	70	14
190	20	11	4	15	2	20	21	4	7	54	43	6
200	20	7	2	20	3	11	12	1	8	19	17	6
210	22	9	2	11	11	7	14		8	24	10	
220	13	4	4	6	4	4	11		8	13	12	8
230	6	3		5	2	3	5		3	7	4	1
240	4	1		1	1			1	3	3	3	
250	3	2	1	5	1	1				1	2	
260	9	2	1	8	2		2		2	1	1	
270	10	3		2	3		1		2	2	1	
280	12	1		5	3	1	1	1	3	2	1	1
290	8	2	1	5	2	1	3		1	3	1	1
300	9			5		1			1	2	4	
310	8	1	1	2	4	1			3	1		
320	9	1		2			1			2	2	
330	7								1			
340	4			2			1		2	1	1	
350				1								
360					1							
370				1								
380												
390												
400												
Total:	281	158	50	219	75	208	289	14	91	246	204	43

Appendix Table C-4. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 18	Jul 19	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 29	Jul 30	Jul 31	Aug 02	Aug 05	Aug 06	Aug 07
0														
10														
20														
30														
40														
50														
60														
70														
80														
90														
100														
110														
120														
130														
140														
150														
160														
170														
180														
190														
200							1							
210														
220														
230														
240														
250														
260														
270														
280					1									
290				1			1	1						
300					1				1			1		
310		2		1	1			1		1				
320									1	1				
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	2	0	2	3	0	2	2	2	2	0	1	0	0

Appendix Table C-4. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Aug 08	Aug 09	Aug 12	Aug 13	Aug 14	Aug 15	Aug 16	Aug 19	Aug 20	Aug 21	Aug 22
0											
10											
20											
30											
40											
50											
60											
70											
80											
90											
100											
110											
120											
130											
140											
150											
160											
170											
180											
190											
200											
210											
220											
230											
240											
250			1								
260											
270											
280		2		1							
290		5	2		2			1			
300		4	4		1			1			
310	1	3	4			1		1			
320			1					1			
330		1									
340											
350											
360											
370											
380											
390											
400											
Total:	1	15	12	1	3	1	0	4	0	0	0

Appendix Table C-5. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 2009.

2009	**Brant Point**											
Fork Length (mm)	Jul 25	Jul 26	Jul 27	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120												
130												
140												
150				1							1	
160		1			1							
170		1		3	2							
180		3		1								
190				1								
200												
210												1
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	0	5	0	6	3	0	0	0	0	0	1	1

Appendix Table C-5. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 2009.

2009 North Salt Lagoon

Fork Length (mm)	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30
0														
10														
20														
30														
40														
50														
60														
70														
80														
90														
100										1			1	
110														
120														
130														
140														
150										1				
160														
170											1			1
180										1		1		
190					1									
200									1					
210														
220														
230														
240														
250														
260														
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	0	0	0	1	0	0	0	1	3	1	1	1	1

Appendix Table C-5. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 2009.

2009							
Fork Length (mm)	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100	1						
110							
120			1				
130							
140	1						
150							
160	2						
170							
180							
190	2						
200							
210	1						
220							
230							
240							
250							
260							
270							
280							
290							
300							
310							
320							
330							
340							
350							
360							
370							
380							
390							
400							
Total:	7	0	1	0	0	0	0

Appendix Table C-6. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 2010.

2010	Brant Point											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120												
130												
140												
150												
160				1			1		1			
170									1	2		
180							1					
190								1				
200		1								1		
210	1	1	1	2		1	2		2		1	
220	1		1				1			1	2	
230			1				1		2			3
240		1										
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	2	3	3	3	0	1	6	1	6	4	3	3

Appendix Table C-6. Daily length frequencies of Arctic/Bering cisco caught in Elson Lagoon fyke nets, 2010.

2010	**North Salt Lagoon**											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120												
130												
140							1					
150												
160						1						
170		1										
180	1					1	1					
190	3	1										
200	4			1		2	4					
210	2	3		1	1	4	3				1	
220	6	2		2	1	5	3		1			
230	2	1		1	1		3	1		2	1	
240									1	2		
250			1									
260				1								
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	18	8	1	6	3	13	15	1	2	4	2	0

Appendix Table C-7. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 18	Jul 19	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 29	Jul 30	Jul 31	Aug 02	Aug 05	Aug 06	Aug 07
0														
10														
20														
30														
40														
50														
60														
70						1								
80						1	1					1		
90						1								
100							2					1		
110				3	1	4	3	1				1	1	
120				2	2	5	2			1			1	
130						6	2				1	3	3	1
140				1	2	4	6	1				1		
150				2		4	2					1		1
160				1	1		2							
170														
180														
190														
200													1	
210														
220														
230														
240														
250														
260												1		
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	0	0	9	6	26	20	2	0	1	1	9	6	2

Appendix Table C-7. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Aug 08	Aug 09	Aug 12	Aug 13	Aug 14	Aug 15	Aug 16	Aug 19	Aug 20	Aug 21	Aug 22
0											
10											
20											
30											
40											
50											
60											
70											
80									1		
90			1								
100											
110		1						2			
120											
130	1	2	1	1	1						
140		1			2						
150					1	1		1			
160											
170											
180					1						
190											
200								1			
210						1					
220											
230											
240											
250											
260											
270					1						
280											
290											
300											
310											
320											
330											
340											
350											
360											
370											
380											
390											
400											
Total:	1	4	2	1	6	2	0	4	1	0	0

Appendix Table C-8. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 2009.

2009	Brant Point											
Fork Length (mm)	Jul 25	Jul 26	Jul 27	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50					6							
60			2		9	1	1					
70	1			1	12							
80					2							
90					5							
100					1							1
110			2	3								2
120			3	5	12	3	2	1		2	2	3
130	4	1	6	7	24	1	3	6			1	9
140	1	1	9	7	26	3		6			1	11
150			4	1	9	1	2					10
160	1			2	3							2
170			2	1	1		1					
180	1			1	1							
190		1										2
200			2	1	2							
210										1		1
220			1	1						1		
230				1	1		1					
240												
250				2			1					
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	8	3	31	33	114	9	11	13	0	4	4	41

Appendix Table C-8. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 2009.

2009 North Salt Lagoon

Fork Length (mm)	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30
0														
10														
20														
30														
40														
50														
60									1				2	1
70									1			1		
80													1	
90					1									
100														
110														
120														
130													3	
140														
150														
160														
170														
180														
190														
200														
210														
220														1
230														
240														
250														
260														
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	0	0	0	1	0	0	0	2	0	0	1	6	2

Appendix Table C-8. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 2009.

2009							
Fork Length (mm)	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0							
10							
20							
30							
40							
50							
60						2	
70	1			1	1		
80							
90							
100							
110	1						
120	4	1		3	1		
130	2	1	3	8	5	3	
140	4		2	8	4	1	
150	4		4	6	3	1	
160				1			
170			1	1			
180	1		1	1	1		
190							
200							
210	1		1				
220							
230							
240				1			
250							
260							
270				1			
280							
290							
300							
310							
320							
330							
340							
350							
360							
370							
380							
390							
400							
Total:	18	2	12	31	15	7	0

Appendix Table C-9. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 2010.

2010 Brant Point

Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30										1		
40												
50												
60	1			1			1					
70	5			1	2	1	5	2			9	
80	4			4	12	2	12	4	1	3	33	6
90				2	3	3	9	3	2		18	3
100				1	1		3	1			2	2
110					1	1					1	
120							1					
130				2	2		2	5		1	2	
140	2	1	3	4	1	5	1	4	2			1
150	1	3	3	11		5	4	4	5		3	1
160		1	1	3	2	4	1	3	2		3	2
170	1				1	3		1	1	1	1	
180				1		1		1	1			
190						1					1	
200	1											
210		1				1						
220												
230												
240												
250												
260								1				
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	15	6	7	30	25	27	39	29	14	6	73	15

Appendix Table C-9. Daily length frequencies of arctic flounder caught in Elson Lagoon fyke nets, 2010.

2010	North Salt Lagoon											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70	1	2	2			1						
80	2		3	1		3	1	2	9	1	1	
90	2	1						1	8	1		1
100							1	1	1	1		
110									1	1		
120									1			
130		1						1		1		
140		1			1		1	1	5	1		
150	2	1					7	2	13	4	4	2
160	1					2	9		5	3	2	
170	2	2				1	3	1	4	3		1
180	1	1				1	4		1			
190	1						1					
200	1								1			
210									1			
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	13	9	5	1	1	8	27	9	50	16	7	4

Appendix Table C-10. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 18	Jul 19	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 29	Jul 30	Jul 31	Aug 02	Aug 05	Aug 06	Aug 07
0														
10														
20														
30														
40														
50														
60														
70						1		1						
80					2	3								
90				1	4	2	3							
100			1	1	8	9	4							
110			2		17	14	7		1					
120			2	3	12	11	14	1						
130					13	5	15				1			
140					2	4	6	1						
150			1		2	1	4							1
160					2		1							
170					2	2								
180				1	2	2	1							
190						1	2							
200					1	1	2							
210						3								
220						1	2							
230														
240														
250														
260														
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	0	6	6	67	60	61	3	1	0	1	0	0	1

Appendix Table C-10. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Aug 08	Aug 09	Aug 12	Aug 13	Aug 14	Aug 15	Aug 16	Aug 19	Aug 20	Aug 21	Aug 22
0											
10											
20											
30											
40											
50											
60											
70											
80					1						
90				1							
100			3	2							
110		1	3	3				1			
120			1	2							
130			2	1		1					
140		1				1					
150			1	1	2	1					
160											
170											
180			1								
190											
200								1			
210	1		1								
220											
230			1								
240											
250											
260											
270											
280											
290											
300											
310											
320											
330											
340											
350											
360											
370											
380											
390											
400											
Total:	1	2	13	10	3	3	0	2	0	0	0

Appendix Table C-11. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 2009.

2009	Brant Point											
Fork Length (mm)	Jul 25	Jul 26	Jul 27	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60			1									
70					1						1	
80								2	1		2	
90										1	3	
100											1	1
110			1				1	3	3			
120				1	1		1	4	1	1	13	1
130			2	3	4		1	6	5		11	9
140		1	2	2	1		2	3	4		20	10
150	1			4	1			4	1	1	21	14
160			1	2		1		2	2	1	24	11
170				2	2	1		5	1	2	20	13
180			1		1						14	8
190										1	6	5
200											3	
210											2	
220												1
230												
240											1	
250												
260												
270												
280							1	1			1	
290												
300												
310												
320							1					
330												
340						1						
350												
360												
370												
380												
390							1					
400												
Total:	1	1	8	14	11	3	8	30	18	7	143	73

Appendix Table C-11. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 2009.

2009	North Salt Lagoon													
Fork Length (mm)	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30
0														
10														
20														
30														
40														
50														
60														
70												1	1	
80														
90														
100														
110														
120														
130												1		
140										1				
150												1		
160	1													
170														
180														
190														
200														
210														
220														
230														
240														
250														
260														
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	1	0	0	0	0	0	0	0	0	1	0	3	1	0

Appendix Table C-11. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 2009.

2009							
Fork Length (mm)	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0							
10							
20							
30							
40							
50							
60							
70	1			1			
80	1		1	2	1	1	
90	4					1	
100				1			
110	1		1				
120	3					1	
130	6		2		1	1	
140			2			1	
150	4					2	
160	1		1				
170	1		2		1		
180	1	1					
190							
200						1	
210							
220							
230							
240							
250							
260	1						
270							
280							
290							
300							
310							
320							
330							
340							
350							
360							
370							
380							
390							
400							
Total:	24	1	9	4	3	8	0

Appendix Table C-12. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 2010.

2010 Brant Point

Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100									1		6	2
110			1			1		1	1		6	1
120											7	2
130						1					4	
140						1					3	
150									1		1	
160												
170			1									
180						1			1			
190									1		1	
200											1	
210						1			1		1	1
220				1				1			1	
230						1			1			
240								1	1			
250						1			1			1
260									1			
270												
280												
290												
300												
310				1								
320												
330												
340												
350												
360						1						
370												
380												
390												
400												
Total:	0	0	2	2	0	8	0	3	10	0	31	7

Appendix Table C-12. Daily length frequencies of saffron cod caught in Elson Lagoon fyke nets, 2010.

2010	North Salt Lagoon											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70									1			
80												
90						1			2			3
100											2	
110									2		3	5
120									2		5	3
130											3	1
140												
150											1	
160									1	1	1	
170		1					1				5	
180									2		4	
190									1	2	6	
200							1				5	
210									1		3	
220											4	1
230										1	6	2
240											4	
250											1	
260												
270												
280												
290												
300												
310												
320											1	
330						1						
340												
350												
360												
370												
380												
390												
400												
Total:	0	1	0	0	0	2	2	0	12	4	54	15

Appendix Table C-13. Daily length frequencies of arctic cod caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 18	Jul 19	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 29	Aug 12	Aug 14	Aug 15	Aug 19
0												
10												
20												
30												
40												
50												
60			1		1							
70	1		1	1	3				1			
80		1	4	1	9	1						
90		1	10		14	3	1	1	2	1		
100		1	5	2	3	1						1
110		1	2		7	1			3			
120		1	4		1							
130			1	1								
140			1									
150									1		1	1
160		1	2		1							
170												
180			1									
190									1			
200												
210												
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	1	6	32	5	39	6	1	1	8	1	1	2

Appendix Table C-14. Daily length frequencies of arctic cod caught in Elson Lagoon fyke nets, 2009.

2009	Brant Point				North Salt Lagoon
Fork Length (mm)	Jul 26	Jul 30	Jul 31	Aug 06	Aug 06
0					
10					
20					
30					
40					
50					
60					
70					
80				1	
90		1	1	1	
100				1	1
110		1			
120				2	
130					
140					
150					
160		1			
170					
180	1				
190					
200					
210					
220					
230					
240					
250					
260					
270					
280					
290					
300					
310					
320					
330					
340					
350					
360					
370					
380					
390					
400					
Total:	1	3	1	5	1

Appendix Table C-15. Daily length frequencies of arctic cod caught in Elson Lagoon fyke nets, 2010.

2010 North Salt Lagoon

Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70					1							
80												
90					1							
100												
110												
120												
130												
140												
150												
160											1	
170												
180												
190												
200												
210												
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	0	0	0	0	2	0	0	0	0	0	1	0

Appendix Table C-16. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 18	Jul 19	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 29	Jul 30	Jul 31	Aug 02	Aug 05	Aug 06	Aug 07
0														
10														
20														
30														
40														
50														
60														
70					1							1		
80														
90							1			1		2		
100				1			1							
110														
120						1								
130					3	1		1						
140					1	2	1	1						
150								1						
160														
170														
180														
190						1								
200														
210														
220														
230														
240														
250														
260														
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	0	0	1	5	5	3	3	0	1	0	3	0	0

Appendix Table C-16. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Aug 08	Aug 09	Aug 12	Aug 13	Aug 14	Aug 15	Aug 16	Aug 19	Aug 20	Aug 21	Aug 22
0											
10											
20											
30											
40											
50											1
60											
70											
80											
90			1								
100				2							
110											
120	1										1
130			1	1		1	1				
140			1	3	2	1					
150											
160											
170					1						
180											
190											
200											
210											
220											
230											
240											
250											
260											
270											
280											
290											
300											
310											
320											
330											
340											
350											
360											
370											
380											
390											
400											
Total:	1	0	3	6	3	2	1	0	0	0	2

Appendix Table C-17. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 2009.

2009	**Brant Point**											
Fork Length (mm)	Jul 25	Jul 26	Jul 27	Jul 29	Jul 30	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120			1		1							
130			1		2			1				
140			1									
150		1			2						1	
160					5			2				1
170			2	1	2	2	1					1
180					4			2			1	
190												
200												
210												
220												
230												
240												
250			1		1							
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	0	1	6	1	17	2	1	5	0	0	2	2

Appendix Table C-17. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 2009.

2009	North Salt Lagoon													
Fork Length (mm)	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30
0														
10														
20														
30														
40														
50														
60														
70														
80														
90														
100														
110														
120														
130														
140														
150														
160														
170														
180														
190														
200														
210														
220														
230														
240														
250														
260														
270														
280														
290														
300														
310														
320														
330														
340														
350														
360														
370														
380														
390														
400														
Total:	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Table C-17. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 2009.

2009							
Fork Length (mm)	Jul 31	Aug 01	Aug 02	Aug 03	Aug 04	Aug 05	Aug 06
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							
120	2						
130	1						
140	1			1		1	
150							
160	1		1			1	
170							
180	1					1	
190							
200							
210							
220							
230							
240							
250							
260							
270							
280							
290							
300							
310							
320							
330							
340							
350							
360							
370							
380							
390							
400							
Total:	6	0	1	1	0	3	0

Appendix Table C-18. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 2010.

2010	**Brant Point**											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50												
60												1
70												
80											1	
90						1					1	
100												
110			1									
120												
130			1									
140				1								
150				3								
160				2		1						
170			2	4								
180			2	2								
190			1	2		1						
200										1		
210				1								
220												
230												
240												
250												
260											1	
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	0	0	7	15	0	3	0	0	0	1	3	1

Appendix Table C-18. Daily length frequencies of rainbow smelt caught in Elson Lagoon fyke nets, 2010.

2010	**North Salt Lagoon**											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
10												
20												
30												
40												
50										1		
60										1		
70												
80						1					1	
90												
100										1		
110												
120												
130												
140												
150											1	
160						1						
170	1										1	
180												
190											1	
200												
210												
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350												
360												
370												
380												
390												
400												
Total:	1	0	0	0	0	2	0	0	0	3	4	0

Appendix Table C-19. Daily length frequencies of threespine stickleback caught in Elson Lagoon fyke nets, 1996.

1996 Brant Point

Fork Length (mm)	Jul 26	Jul 31	Aug 08	Aug 09	Aug 12	Aug 20
0						
5						
10						
15						
20						
25						
30						
35						
40						
45						
50						
55						
60						
65		1				
70						
75						
80						1
85		3				
90	1	7	1			
95		2			1	
100		1				
105						
110						
115						
120						
125						
130				1		
135						
140						
145						
150						
155						
160						
165						
170						
175						
180						
185						
190						
195						
200						
Total:	1	14	1	1	1	1

Appendix Table C-20. Daily length frequencies of threespine stickleback caught in Elson Lagoon fyke nets, 2009 (most threespine stickleback caught in 2009 were not measured).

2009	Brant Point		North Salt Lagoon
Fork Length (mm)	Jul 25	Aug 06	Aug 06
0			
5			
10			
15			
20			
25			
30			
35			
40			
45			
50			
55			
60			
65			
70			
75		1	1
80			
85	1	1	2
90			
95			
100			
105			
110			
115			
120			
125			
130			
135			
140			
145			
150			
155			
160			
165			
170			
175			
180			
185			
190			
195			
200			
Total:	1	2	3

Appendix Table C-21. Daily length frequencies of threespine stickleback caught in Elson Lagoon fyke nets, 2010.

2010 Brant Point

Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
5												
10												
15												
20												
25												
30												
35												
40												
45												
50												
55												
60												
65												
70			1		1			1		4	4	
75				1			1	1			3	3
80		1	1		1			3		5	2	4
85			1					9	1		9	5
90			1	3	1			8		6	3	5
95			1			1	1	3			3	4
100			1					1				1
105												
110												
115												
120												
125												
130												
135												
140												
145												
150												
155												
160												
165												
170												
175												
180												
185												
190												
195												
200												
Total:	0	1	6	4	3	1	2	26	1	15	24	22

Appendix Table C-21. Daily length frequencies of threespine stickleback caught in Elson Lagoon fyke nets, 2010.

2010	**North Salt Lagoon**											
Fork Length (mm)	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 28	Jul 29	Jul 30	Aug 01	Aug 04	Aug 05	Aug 06
0												
5												
10												
15												
20												
25												
30												
35												
40												
45												
50												
55											1	
60								1				1
65	1							1		3	1	2
70	1					1	2	4	2	9	4	3
75						1	3	3	3	14	4	13
80		2				4	2	3	10	26	15	10
85	2	3				3	6	13	17	37	17	20
90	3	8		1	3	7	6	4	9	34	12	20
95	1	7	2	1		3	3	5	6	16	7	15
100	2	1		1		2	1		3	1		5
105												1
110												
115												
120												
125												
130												
135												
140												
145												
150												
155												
160												
165												
170												
175												
180												
185												
190												
195												
200												
Total:	10	21	2	3	3	21	23	34	50	140	61	90

Appendix Table C-22. Lengths of capelin caught in Elson Lagoon fyke nets, 1996-2010.

Brant Point 1996

Date	Fork Length (mm)
7/26/1996	133
8/7/1996	108
8/12/1996	110
8/15/1996	135
8/19/1996	135

Brant Point 2009

Date	Fork Length (mm)
7/26/2009	78
7/26/2009	106
7/26/2009	130
7/26/2009	133
7/27/2009	68
7/27/2009	64
7/27/2009	67
7/27/2009	73
7/29/2009	73
7/29/2009	73
7/29/2009	76
7/29/2009	82
7/30/2009	92
7/30/2009	85
7/30/2009	63
7/30/2009	77
7/30/2009	73
7/30/2009	79
7/30/2009	72
7/30/2009	60
7/30/2009	64
7/30/2009	84
7/30/2009	63
7/30/2009	68
7/30/2009	80
7/30/2009	80
7/30/2009	81
7/30/2009	108
7/30/2009	73
7/30/2009	75
7/30/2009	67
7/30/2009	77
7/30/2009	61
7/31/2009	139
7/31/2009	68
8/2/2009	89
8/2/2009	74
8/2/2009	68
8/2/2009	72
8/2/2009	65
8/2/2009	80
8/2/2009	81
8/2/2009	75
8/2/2009	70
8/2/2009	75
8/2/2009	71
8/2/2009	76
8/2/2009	65
8/2/2009	73
8/2/2009	77
8/2/2009	75
8/2/2009	81
8/2/2009	76
8/2/2009	76

North Salt Lagoon 2009

Date	Fork Length (mm)
7/29/2009	73
7/31/2009	74
7/31/2009	110
7/31/2009	72
7/31/2009	67
7/31/2009	73
8/1/2009	83
8/1/2009	65
8/1/2009	72
8/1/2009	58
8/1/2009	76
8/2/2009	127

N. Salt Lagoon 2010

Date	Fork Length (mm)
8/6/2010	148
8/6/2010	114

Appendix Table C-23. Lengths of Pacific herring caught in Elson Lagoon fyke nets, 1996-2010.

Brant Point 1996	
Date	Fork Length (mm)
8/15/1996	160

Brant Point 2009	
Date	Fork Length (mm)
7/25/2009	182
7/25/2009	184
7/25/2009	197
7/25/2009	235
7/25/2009	226
7/26/2009	162
7/26/2009	142
7/26/2009	196
7/26/2009	128
7/26/2009	192
7/27/2009	174
7/27/2009	136
7/29/2009	131
7/29/2009	183
7/29/2009	168
7/30/2009	197
7/30/2009	218
7/30/2009	203
8/2/2009	210

N. Salt Lagoon 2009	
Date	Fork Length (mm)
7/22/2009	122
7/26/2009	153
7/26/2009	201
7/31/2009	205
7/31/2009	234

Brant Point 2010	
Date	Fork Length (mm)
7/25/2010	163
7/28/2010	174

N. Salt Lagoon 2010	
Date	Fork Length (mm)
7/23/2010	238
7/25/2010	184
7/26/2010	181
7/26/2010	216
7/26/2010	210
7/28/2010	197
7/28/2010	199
7/29/2010	150
7/29/2010	176
7/29/2010	170
7/29/2010	198
7/29/2010	237
7/29/2010	172
7/29/2010	157
7/29/2010	161
7/29/2010	166
7/29/2010	160
8/1/2010	157
8/6/2010	169

Appendix Table C-24. Lengths of pink salmon caught in Elson Lagoon fyke nets, 1996-2010.

Brant Point 1996	
Date	Fork Length (mm)
7/23/1996	470
7/25/1996	430
7/26/1996	425
7/26/1996	435
8/6/1996	420
8/6/1996	413
8/6/1996	492
8/9/1996	444
8/9/1996	365
8/9/1996	395
8/9/1996	415
8/9/1996	448
8/12/1996	410
8/12/1996	445
8/13/1996	450
8/14/1996	425
8/14/1996	425
8/14/1996	455
8/15/1996	397
8/19/1996	390
8/20/1996	423
8/21/1996	390
8/21/1996	410

Brant Point 2010	
Date	Fork Length (mm)
8/1/2010	460
8/4/2010	410
8/5/2010	426
8/5/2010	440
8/5/2010	402
8/6/2010	426

N. Salt Lagoon 2010	
Date	Fork Length (mm)
8/1/2010	438
8/4/2010	459
8/4/2010	423
8/6/2010	412

Appendix Table C-25. Lengths of broad whitefish caught in Elson Lagoon fyke nets, 1996-2010.

Brant Point 1996	
Date	Fork Length (mm)
8/7/1996	220
8/14/1996	140
8/14/1996	145
8/15/1996	173
8/16/1996	155
8/21/1996	268
8/22/1996	280

N. Salt Lagoon 2009	
Date	Fork Length (mm)
7/17/2009	159
7/22/2009	171
7/30/2009	166

Brant Point 2010	
Date	Fork Length (mm)
8/1/2010	423

Appendix Table C-26. Lengths of ninespine stickleback caught in Elson Lagoon fyke nets, 1996-2010.

N. Salt Lagoon 2010

Date	Fork Length (mm)
7/26/2010	74
7/30/2010	72
8/6/2010	71

Appendix Table C-27. Lengths of Dolly Varden caught in Elson Lagoon fyke nets, 1996-2010.

Brant Point 1996	
Date	Fork Length (mm)
7/29/1996	522

N. Salt Lagoon 2010	
Date	Fork Length (mm)
8/4/2010	250

APPENDIX D

Tagged Least Cisco Released in Elson Lagoon 2009

Appendix Table D-1. Fish released with floy tags during 2009 Elson Lagoon sampling.

Species	Tag No.	Release Station	Capture Method	Release Date	Release Length (mm)
Least Cisco	NSB-2351	NSL01	Fyke Net	7/19/2009	310
	NSB-2353	NSL01	Fyke Net	7/19/2009	269
	NSB-2354	NSL01	Fyke Net	7/19/2009	304
	NSB-2355	NSL01	Fyke Net	7/19/2009	251
	NSB-2356	NSL01	Fyke Net	7/19/2009	262
	NSB-2357	NSL01	Fyke Net	7/21/2009	275
	NSB-2358	NSL01	Fyke Net	7/21/2009	291
	NSB-2359	NSL01	Fyke Net	7/21/2009	295
	NSB-2360	NSL01	Fyke Net	7/21/2009	307
	NSB-2361	NSL01	Fyke Net	7/21/2009	268
	NSB-2362	NSL01	Fyke Net	7/22/2009	284
	NSB-2363	NSL01	Fyke Net	7/22/2009	275
	NSB-2364	NSL01	Fyke Net	7/22/2009	292
	NSB-2365	NSL01	Fyke Net	7/22/2009	258
	NSB-2366	NSL01	Fyke Net	7/22/2009	293
	NSB-2367	NSL01	Fyke Net	7/22/2009	244
	NSB-2368	NSL01	Fyke Net	7/23/2009	237
	NSB-2370	NSL01	Fyke Net	7/23/2009	281
	NSB-2371	NSL01	Fyke Net	7/23/2009	264
	NSB-2372	NSL01	Fyke Net	7/23/2009	299
	NSB-2373	NSL01	Fyke Net	7/23/2009	290
	NSB-2374	NSL01	Fyke Net	7/23/2009	292
	NSB-2375	NSL01	Fyke Net	7/23/2009	315
	NSB-2377	NSL01	Fyke Net	7/20/2009	193
	NSB-2378	NSL01	Fyke Net	7/20/2009	161
	NSB-2379	NSL01	Fyke Net	7/20/2009	174
	NSB-2380	NSL01	Fyke Net	7/20/2009	246
	NSB-2381	NSL01	Fyke Net	7/20/2009	165
	NSB-2382	NSL01	Fyke Net	7/20/2009	270
	NSB-2383	NSL01	Fyke Net	7/20/2009	298
	NSB-2384	NSL01	Fyke Net	7/20/2009	282
	NSB-2385	NSL01	Fyke Net	7/20/2009	284
	NSB-2386	NSL01	Fyke Net	7/20/2009	290
	NSB-2387	NSL01	Fyke Net	7/20/2009	276
	NSB-2388	NSL01	Fyke Net	7/20/2009	300
	NSB-2389	NSL01	Fyke Net	7/20/2009	299
	NSB-2390	NSL01	Fyke Net	7/20/2009	297
	NSB-2391	NSL01	Fyke Net	7/20/2009	313
	NSB-2392	NSL01	Fyke Net	7/20/2009	296
	NSB-2394	NSL01	Fyke Net	7/24/2009	240
	NSB-2395	NSL01	Fyke Net	7/24/2009	253
	NSB-2459	EL01	Fyke Net	7/30/2009	307
	NSB-2679	NSL01	Fyke Net	7/19/2009	309
	NSB-2680	NSL01	Fyke Net	7/18/2009	243
	NSB-2682	NSL01	Fyke Net	7/17/2009	300
	NSB-2683	NSL01	Fyke Net	7/17/2009	206
	NSB-2951	EL01	Fyke Net	7/25/2009	262
	NSB-2952	EL01	Fyke Net	7/25/2009	267
	NSB-2953	EL01	Fyke Net	7/25/2009	250
	NSB-2954	EL01	Fyke Net	7/25/2009	307
	NSB-2956	NSL01	Fyke Net	7/25/2009	255

Appendix Table D-1. Fish released with floy tags during 2009 Elson Lagoon sampling.

Species	Tag No.	Release Station	Capture Method	Release Date	Release Length (mm)
Least Cisco	NSB-2957	NSL01	Fyke Net	7/25/2009	255
	NSB-2958	EL01	Fyke Net	7/26/2009	242
	NSB-2960	EL01	Fyke Net	7/26/2009	235
	NSB-2961	EL01	Fyke Net	7/26/2009	268
	NSB-2962	EL01	Fyke Net	7/26/2009	248
	NSB-2963	EL01	Fyke Net	7/26/2009	307
	NSB-2964	EL01	Fyke Net	7/26/2009	269
	NSB-2965	EL01	Fyke Net	7/26/2009	244
	NSB-2966	EL01	Fyke Net	7/26/2009	251
	NSB-2967	NSL01	Fyke Net	7/26/2009	238
	NSB-2968	NSL01	Fyke Net	7/26/2009	260
	NSB-2969	NSL01	Fyke Net	7/26/2009	232
	NSB-2970	EL01	Fyke Net	7/29/2009	272
	NSB-2972	NSL01	Fyke Net	7/30/2009	285
	NSB-2973	NSL01	Fyke Net	7/30/2009	283
	NSB-2974	NSL01	Fyke Net	7/30/2009	318
	NSB-2975	NSL01	Fyke Net	7/30/2009	325
	NSB-2977	EL01	Fyke Net	7/25/2009	271
	NSB-2978	EL01	Fyke Net	7/25/2009	273
	NSB-2980	EL01	Fyke Net	7/25/2009	291
	NSB-2981	EL01	Fyke Net	7/25/2009	310
	NSB-2982	EL01	Fyke Net	7/25/2009	300
	NSB-2983	EL01	Fyke Net	7/25/2009	332
	NSB-2984	EL01	Fyke Net	7/25/2009	314
	NSB-2985	EL01	Fyke Net	7/25/2009	280
	NSB-2986	EL01	Fyke Net	7/25/2009	299
	NSB-2987	EL01	Fyke Net	7/25/2009	310
	NSB-2988	EL01	Fyke Net	7/25/2009	340
	NSB-2989	EL01	Fyke Net	7/25/2009	302
	NSB-2990	EL01	Fyke Net	7/25/2009	295
	NSB-2991	EL01	Fyke Net	7/25/2009	245
	NSB-2992	EL01	Fyke Net	7/25/2009	318
	NSB-2993	EL01	Fyke Net	7/25/2009	323
	NSB-2994	EL01	Fyke Net	7/25/2009	283
	NSB-2995	EL01	Fyke Net	7/25/2009	307
	NSB-2996	EL01	Fyke Net	7/25/2009	336
	NSB-2997	EL01	Fyke Net	7/25/2009	343
	NSB-2998	EL01	Fyke Net	7/25/2009	279
	NSB-2999	EL01	Fyke Net	7/25/2009	294
	NSB-3000	EL01	Fyke Net	7/25/2009	315
	NSB-3326	EL01	Fyke Net	7/27/2009	296
	NSB-3327	EL01	Fyke Net	7/27/2009	279
	NSB-3328	EL01	Fyke Net	7/27/2009	274
	NSB-3329	EL01	Fyke Net	7/27/2009	283
	NSB-3330	EL01	Fyke Net	7/27/2009	306
	NSB-3331	EL01	Fyke Net	7/27/2009	311
	NSB-3332	EL01	Fyke Net	7/27/2009	304
	NSB-3333	EL01	Fyke Net	7/27/2009	331
	NSB-3334	NSL01	Fyke Net	7/28/2009	308
	NSB-3337	EL01	Fyke Net	7/29/2009	339
	NSB-3338	EL01	Fyke Net	7/29/2009	312

Appendix Table D-1. Fish released with floy tags during 2009 Elson Lagoon sampling.

Species	Tag No.	Release Station	Capture Method	Release Date	Release Length (mm)
Least Cisco	NSB-3339	EL01	Fyke Net	7/29/2009	310
	NSB-3340	EL01	Fyke Net	7/29/2009	276
	NSB-3341	EL01	Fyke Net	7/29/2009	275
	NSB-3342	EL01	Fyke Net	7/29/2009	280
	NSB-3343	EL01	Fyke Net	7/29/2009	302
	NSB-3344	EL01	Fyke Net	7/29/2009	329
	NSB-3345	EL01	Fyke Net	7/29/2009	305
	NSB-3346	EL01	Fyke Net	7/29/2009	337
	NSB-3347	EL01	Fyke Net	7/29/2009	297
	NSB-3348	NSL01	Fyke Net	7/29/2009	287
	NSB-3349	NSL01	Fyke Net	7/29/2009	312
	NSB-3350	NSL01	Fyke Net	7/29/2009	281
	NSB-3351	EL01	Fyke Net	8/4/2009	317
	NSB-3352	NSL01	Fyke Net	8/4/2009	338
	NSB-3376	EL01	Fyke Net	7/26/2009	267
	NSB-3377	EL01	Fyke Net	7/26/2009	268
	NSB-3378	EL01	Fyke Net	7/26/2009	265
	NSB-3379	EL01	Fyke Net	7/26/2009	294
	NSB-3380	EL01	Fyke Net	7/26/2009	229
	NSB-3381	EL01	Fyke Net	7/26/2009	273
	NSB-3382	EL01	Fyke Net	7/26/2009	360
	NSB-3383	NSL01	Fyke Net	7/26/2009	240
	NSB-3384	NSL01	Fyke Net	7/26/2009	245
	NSB-3385	NSL01	Fyke Net	7/26/2009	280
	NSB-3386	NSL01	Fyke Net	7/26/2009	249
	NSB-3387	NSL01	Fyke Net	7/26/2009	260
	NSB-3388	NSL01	Fyke Net	7/26/2009	251
	NSB-3389	NSL01	Fyke Net	7/26/2009	239
	NSB-3390	EL01	Fyke Net	7/27/2009	312
	NSB-3391	EL01	Fyke Net	7/27/2009	314
	NSB-3392	EL01	Fyke Net	7/27/2009	305
	NSB-3393	EL01	Fyke Net	7/27/2009	286
	NSB-3394	EL01	Fyke Net	7/27/2009	307
	NSB-3395	EL01	Fyke Net	7/27/2009	306
	NSB-3396	EL01	Fyke Net	7/27/2009	314
	NSB-3398	EL01	Fyke Net	7/27/2009	305
	NSB-3399	EL01	Fyke Net	7/27/2009	312
	NSB-3400	EL01	Fyke Net	7/27/2009	320
	NSB-3451	NSL01	Fyke Net	7/30/2009	280
	NSB-3452	NSL01	Fyke Net	7/30/2009	305
	NSB-3453	NSL01	Fyke Net	7/30/2009	333
	NSB-3454	NSL01	Fyke Net	7/30/2009	280
	NSB-3455	NSL01	Fyke Net	7/30/2009	317
	NSB-3456	NSL01	Fyke Net	7/30/2009	300
	NSB-3457	NSL01	Fyke Net	7/30/2009	315
	NSB-3458	EL01	Fyke Net	7/30/2009	359
	NSB-3460	EL01	Fyke Net	7/30/2009	275
	NSB-3461	EL01	Fyke Net	7/30/2009	314
	NSB-3462	EL01	Fyke Net	7/30/2009	334
	NSB-3463	EL01	Fyke Net	7/30/2009	327
	NSB-3464	EL01	Fyke Net	7/30/2009	297

Appendix Table D-1. Fish released with floy tags during 2009 Elson Lagoon sampling.

Species	Tag No.	Release Station	Capture Method	Release Date	Release Length (mm)
Least Cisco	NSB-3465	EL01	Fyke Net	7/30/2009	285
	NSB-3466	EL01	Fyke Net	7/30/2009	292
	NSB-3467	EL01	Fyke Net	7/30/2009	352
	NSB-3468	EL01	Fyke Net	7/30/2009	325
	NSB-3469	EL01	Fyke Net	7/30/2009	323
	NSB-3470	EL01	Fyke Net	7/30/2009	325
	NSB-3471	EL01	Fyke Net	7/30/2009	275
	NSB-3472	EL01	Fyke Net	7/30/2009	282
	NSB-3473	EL01	Fyke Net	7/30/2009	346
	NSB-3474	EL01	Fyke Net	7/30/2009	336
	NSB-3475	EL01	Fyke Net	7/30/2009	333
	NSB-3476	EL01	Fyke Net	7/30/2009	317
	NSB-3477	EL01	Fyke Net	7/30/2009	284
	NSB-3478	EL01	Fyke Net	7/30/2009	357
	NSB-3479	EL01	Fyke Net	7/31/2009	323
	NSB-3481	EL01	Fyke Net	7/31/2009	361
	NSB-3482	NSL01	Fyke Net	7/31/2009	272
	NSB-3483	NSL01	Fyke Net	7/31/2009	274
	NSB-3484	EL01	Fyke Net	8/1/2009	283
	NSB-3485	EL01	Fyke Net	8/2/2009	333
	NSB-3486	NSL01	Fyke Net	8/2/2009	280
	NSB-3487	NSL01	Fyke Net	8/2/2009	332
	NSB-3488	NSL01	Fyke Net	8/2/2009	284
	NSB-3489	NSL01	Fyke Net	8/2/2009	274
	NSB-3490	NSL01	Fyke Net	8/3/2009	293
	NSB-3491	NSL01	Fyke Net	8/3/2009	322
	NSB-3492	NSL01	Fyke Net	8/3/2009	274
	NSB-3493	NSL01	Fyke Net	8/3/2009	275
	NSB-3494	NSL01	Fyke Net	8/3/2009	338
	NSB-3495	NSL01	Fyke Net	8/3/2009	272

APPENDIX E

Biological Data obtained from fish caught in Elson Lagoon 1991-2010

Appendix Table E-1. Biological data collected on least cisco caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
1	7/24/1991	fyke net	least cisco	94	6.3	J	1			2
1	7/24/1991	fyke net	least cisco	202	68.4	J	1			4
1	7/24/1991	fyke net	least cisco	271	196.4	J	1			7
1	7/24/1991	fyke net	least cisco	290	245.7	M	3			11
1	7/24/1991	fyke net	least cisco	192	70.8	M	1			5
1	7/24/1991	fyke net	least cisco	252	141.6	F	2			6
1	7/24/1991	fyke net	least cisco	210	83.8	F	1			6
1	7/24/1991	fyke net	least cisco	157	30.3	J	1			3
1	7/24/1991	fyke net	least cisco	304	235.5	F	2			13
1	7/24/1991	fyke net	least cisco	194	63.6	F	1			4
1	7/24/1991	fyke net	least cisco	330	326.2	F	2			
1	7/24/1991	fyke net	least cisco	309	229.6	M	2			14
1	7/24/1991	fyke net	least cisco	178	46.9	F	1			3
1	7/24/1991	fyke net	least cisco	181	44.8	J	1			
1	7/24/1991	fyke net	least cisco	191	47.2	F	1			
1	7/24/1991	fyke net	least cisco	190	56.0	J	1			5
1	7/24/1991	fyke net	least cisco	178	45.5	F	1			3
1	7/24/1991	fyke net	least cisco	198	65.8	F	1			5
1	7/24/1991	fyke net	least cisco	146	25.2	F	1			3
1	7/24/1991	fyke net	least cisco	183	49.1	F	2			5
1	7/24/1991	fyke net	least cisco	158	31.8	J	1			3
1	7/24/1991	fyke net	least cisco	242	130.3					6
1	7/24/1991	fyke net	least cisco	148	24.9					3
1	7/24/1991	fyke net	least cisco	160	33.3	J	1			3
1	7/24/1991	fyke net	least cisco	304	256.5	M	3			10
1	7/24/1991	fyke net	least cisco	312	287.3	F	2			12
1	7/24/1991	fyke net	least cisco	269	192.0	F	1			5
1	7/24/1991	fyke net	least cisco	314	264.2	F	2			11
1	7/24/1991	fyke net	least cisco	310	264.2	M	2			10
1	7/24/1991	fyke net	least cisco	303	262.2	F	2			12
1	7/24/1991	fyke net	least cisco	219	83.0	F	1			10
1	7/24/1991	fyke net	least cisco	281	217.1	F	2			8
1	7/24/1991	fyke net	least cisco	241	129.2	M	1			7
1	7/24/1991	fyke net	least cisco	308	264.9	F	2			14
1	7/25/1991	fyke net	least cisco	295	243.7	M	2			10
1	7/25/1991	fyke net	least cisco	300	252.6	M	2			9
1	7/25/1991	fyke net	least cisco	298	268.5	F	6			10
1	7/25/1991	fyke net	least cisco	316	299.2	M	2			12
1	7/25/1991	fyke net	least cisco	290	224.3	M	2			10
1	7/25/1991	fyke net	least cisco	200	72.0	M	1			5
1	7/25/1991	fyke net	least cisco	240	117.4	F	2			5
1	7/25/1991	fyke net	least cisco	255	146.6	F	2			8
1	7/25/1991	fyke net	least cisco	214	80.4	J	1			5
1	7/25/1991	fyke net	least cisco	198	69.5	F	1			5
1	7/25/1991	fyke net	least cisco	190	64.2	F	1			5
1	7/25/1991	fyke net	least cisco	220	85.2	F	1			6
1	7/25/1991	fyke net	least cisco	191	57.4	F	1			4
1	7/25/1991	fyke net	least cisco	149	23.8	J	1			3
1	7/25/1991	fyke net	least cisco	207	68.4	M	1			6
1	7/25/1991	fyke net	least cisco	202	69.1	F	1			5
1	7/25/1991	fyke net	least cisco	177	46.9	M	1			4
1	7/25/1991	fyke net	least cisco	173	45.5	F	1			
1	7/25/1991	fyke net	least cisco	185	55.5	F	1			
1	7/25/1991	fyke net	least cisco	207	74.2	F	1			

Appendix Table E-1. Biological data collected on least cisco caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
1	7/25/1991	fyke net	least cisco	163	34.5	J	1			
1	7/25/1991	fyke net	least cisco	160	33.1	J	1			3
1	7/25/1991	fyke net	least cisco	147	26.7	J	1			3
1	7/25/1991	fyke net	least cisco	195	57.1	M	1			4
1	7/25/1991	fyke net	least cisco	150	25.2	J	1			3
1	7/25/1991	fyke net	least cisco	158	26.9	J	1			3
1	7/25/1991	fyke net	least cisco	155	28.8	F	1			3
1	7/25/1991	fyke net	least cisco	168	36.0	M	1			4
1	7/25/1991	fyke net	least cisco	188	52.9	M	1			6
1	7/25/1991	fyke net	least cisco	207	71.0	F	1			6
1	7/26/1991	fyke net	least cisco	214	95.7	F	1			6
1	7/26/1991	fyke net	least cisco	337	391.8	F	6			13
1	7/26/1991	fyke net	least cisco	163	31.2	J	1			4
1	7/26/1991	fyke net	least cisco	273	181.8	M	2			8
1	7/26/1991	fyke net	least cisco	193	71.2	J	1			5
1	7/26/1991	fyke net	least cisco	291	234.7	M	2			7
1	7/26/1991	fyke net	least cisco	211	82.2	F	2			6
1	7/26/1991	fyke net	least cisco	281	203.2	F	2			8
1	7/26/1991	fyke net	least cisco	141	21.0	J	1			3
1	7/26/1991	fyke net	least cisco	287	266.5	F	3			10
1	7/26/1991	fyke net	least cisco	199	68.4	J	1			5
1	7/26/1991	fyke net	least cisco	237	108.3	F	2			7
1	7/26/1991	fyke net	least cisco	191	56.9	F	2			5
1	7/26/1991	fyke net	least cisco	236	106.6	M	1			7
1	7/26/1991	fyke net	least cisco	150	26.0	J	1			3
1	7/26/1991	fyke net	least cisco	226	104.0	M	1			7
1	7/26/1991	fyke net	least cisco	89	5.0	J	1			2
1	7/26/1991	fyke net	least cisco	202	76.3	F	1			6
1	7/26/1991	fyke net	least cisco	86	4.2	J	1			2
1	7/26/1991	fyke net	least cisco	198	71.2	F	1			6
1	7/26/1991	fyke net	least cisco	197	57.5	F	1			5
1	7/26/1991	fyke net	least cisco	206	76.7	F	1			5
1	7/26/1991	fyke net	least cisco	323	341.3	F	3			14
1	7/26/1991	fyke net	least cisco	263	175.9	F	2			7
1	7/26/1991	fyke net	least cisco	317	326.6	M	6			13
1	7/26/1991	fyke net	least cisco	302	298.6	F	3			11
1	7/26/1991	fyke net	least cisco	362	458.9	F	6			18
1	7/26/1991	fyke net	least cisco	288	197.6	F	2			11
1	7/26/1991	fyke net	least cisco	268	174.6	M	2			8
1	7/26/1991	fyke net	least cisco	312	297.6	F	6			11
BP01	7/23/1996	fyke net	least cisco	240	131.3	M	2			9
BP01	7/23/1996	fyke net	least cisco	292	248.6	M	3			8
BP01	7/24/1996	fyke net	least cisco	261	179.0	F	3			8
BP01	7/24/1996	fyke net	least cisco	315	337.4	F	3			11
BP01	7/24/1996	fyke net	least cisco	296	241.6	F	3			9
BP01	7/24/1996	fyke net	least cisco	345	524.1	F	3			14
BP01	7/24/1996	fyke net	least cisco	256	165.7	M	2			
BP01	7/24/1996	fyke net	least cisco	285	231.1	F	3			
BP01	7/24/1996	fyke net	least cisco	153	28.7	F	1			
BP01	7/24/1996	fyke net	least cisco	195	63.1	M	1			
BP01	7/25/1996	fyke net	least cisco	172	51.8	F	2			
BP01	7/25/1996	fyke net	least cisco	130	22.6	F	1			
BP01	7/25/1996	fyke net	least cisco	150	32.2	M	1			
BP01	7/25/1996	fyke net	least cisco	266	181.2	M	1			

Appendix Table E-1. Biological data collected on least cisco caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
BP01	7/25/1996	fyke net	least cisco	119	19.0	F	1			
BP01	7/25/1996	fyke net	least cisco	176	55.4	M	1			
BP01	7/25/1996	fyke net	least cisco	140	26.6	F	1			
BP01	7/25/1996	fyke net	least cisco	236	143.4	M	2			
BP01	7/26/1996	fyke net	least cisco	258	176.1	M	2			
BP01	7/26/1996	fyke net	least cisco	245	140.4	F	2			
BP01	7/26/1996	fyke net	least cisco	258	161.1	F	2			
BP01	7/26/1996	fyke net	least cisco	235	120.1	M	2			
BP01	7/26/1996	fyke net	least cisco	223	121.4	F	2			
BP01	7/26/1996	fyke net	least cisco	201	74.2	F	1			
BP01	7/26/1996	fyke net	least cisco	239	154.2	F	2			
BP01	7/26/1996	fyke net	least cisco	230	115.1	M	2			
BP01	7/30/1996	fyke net	least cisco	310	333.3	M	2			
BP01	7/30/1996	fyke net	least cisco	200	81.5	M	1			
BP01	7/30/1996	fyke net	least cisco	271	192.3	F	2			
BP01	7/30/1996	fyke net	least cisco	255	165.1	M	2			
BP01	7/30/1996	fyke net	least cisco	235	139.2	F	2			
BP01	7/31/1996	fyke net	least cisco	360	532.1	F	3			
BP01	7/31/1996	fyke net	least cisco	271	217.8	M	3			
BP01	7/31/1996	fyke net	least cisco	340	387.9	F	2			
BP01	7/31/1996	fyke net	least cisco	250	173.2	M	2			
BP01	7/31/1996	fyke net	least cisco	270	222.1	M	2			
BP01	7/31/1996	fyke net	least cisco	289	270.1	F	3			
BP01	7/31/1996	fyke net	least cisco	275	231.8	M	2			
BP01	8/5/1996	fyke net	least cisco	360	543.1	F	3	16.1	3.055	
BP01	8/5/1996	fyke net	least cisco	277	229.2	M	2			
BP01	8/6/1996	fyke net	least cisco	150	36.1	F	1			
BP01	8/6/1996	fyke net	least cisco	143	26.9	M	1			
BP01	8/6/1996	fyke net	least cisco	215	105.4	F	1			
BP01	8/6/1996	fyke net	least cisco	141	30.4	F	1			
BP01	8/6/1996	fyke net	least cisco	135	25.6	F	1			
BP01	8/6/1996	fyke net	least cisco	130	21.6	F	1			
BP01	8/9/1996	fyke net	least cisco	303	349.4	F	3	34.4	10.92	
BP01	8/9/1996	fyke net	least cisco	259	184.7	M	2			
BP01	8/9/1996	fyke net	least cisco	255	186.3	F	2			
BP01	8/12/1996	fyke net	least cisco	249	178.9	M	2			
BP01	8/19/1996	fyke net	least cisco	275	228.8	F	2			
BP01	8/19/1996	fyke net	least cisco	200	84.6	M	1			
BP01	8/19/1996	fyke net	least cisco	287	200.0	F	2			
BP01	7/23/2010	fyke net	least cisco	305	255.6	M	2	4.1	1.63	15
BP01	7/23/2010	fyke net	least cisco	312	304.7	M	3	6.2	2.077	9
BP01	7/23/2010	fyke net	least cisco	348	446.2	F	2	7.8	1.779	16
BP01	7/23/2010	fyke net	least cisco	326	315.6	F	2	7.9	2.567	13
BP01	7/23/2010	fyke net	least cisco	325	375.1	M	3	8.6	2.347	14
BP01	7/23/2010	fyke net	least cisco	321	327.1	F	2	11.9	3.775	13
BP01	7/23/2010	fyke net	least cisco	363	434.8	F	3	15.9	3.796	13
BP01	7/23/2010	fyke net	least cisco	294	240.3	F	3	20.1	9.128	8
BP01	7/23/2010	fyke net	least cisco	336	432.6	F	3	30.6	7.612	10
BP01	7/23/2010	fyke net	least cisco	203	59.5	F	1			3
BP01	7/23/2010	fyke net	least cisco	169	34.6	F	1			3
BP01	7/23/2010	fyke net	least cisco	173	37.3	F	1			3
BP01	7/23/2010	fyke net	least cisco	166	32.8	M	1			3
BP01	7/23/2010	fyke net	least cisco	176	36.4	M	1			3
BP01	7/23/2010	fyke net	least cisco	174	40.6	F	1			3

Appendix Table E-1. Biological data collected on least cisco caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
BP01	7/23/2010	fyke net	least cisco	172	37.8	M	1			3
BP01	7/23/2010	fyke net	least cisco	181	41.1	F	1			3
BP01	7/23/2010	fyke net	least cisco	164	35.0	M	1			
BP01	7/24/2010	fyke net	least cisco	283	214.2	M	2	0.4	0.187	6
BP01	7/24/2010	fyke net	least cisco	276	197.1	F	1	0.7	0.356	5
BP01	7/24/2010	fyke net	least cisco	261	152.5	M	2	0.7	0.461	6
BP01	7/24/2010	fyke net	least cisco	293	205.6	F	2	1.1	0.538	8
BP01	7/24/2010	fyke net	least cisco	288	225.2	F	2	1.2	0.536	7
BP01	7/24/2010	fyke net	least cisco	275	195.0	F	2	1.7	0.879	6
BP01	7/24/2010	fyke net	least cisco	304	262.8	M	2	2.7	1.038	7
BP01	7/24/2010	fyke net	least cisco	278	204.1	M	3	3.0	1.492	6
BP01	7/24/2010	fyke net	least cisco	301	250.0	M	3	4.7	1.916	8
BP01	7/24/2010	fyke net	least cisco	315	310.0	M	3	6.1	2.007	8
BP01	7/24/2010	fyke net	least cisco	317	323.2	M	3	6.7	2.117	10
BP01	7/24/2010	fyke net	least cisco	307	311.4	M	3	6.9	2.266	13
BP01	7/24/2010	fyke net	least cisco	220	81.8	F	1			4
BP01	7/24/2010	fyke net	least cisco	214	82.2	F	1			4
BP01	7/24/2010	fyke net	least cisco	211	76.4	F	1			4
BP01	7/24/2010	fyke net	least cisco	190	49.5	M	1			3
BP01	7/24/2010	fyke net	least cisco	172	38.6	F	1			3
BP01	7/24/2010	fyke net	least cisco	171	37.7	M	1			3
BP01	7/24/2010	fyke net	least cisco	166	34.5	F	1			3
BP01	7/26/2010	fyke net	least cisco	258	158.8	F	2	0.4	0.253	5
BP01	7/26/2010	fyke net	least cisco	279	219.7	M	2	2.2	1.011	8
BP01	7/26/2010	fyke net	least cisco	310	257.1	F	2	2.8	1.101	9
BP01	7/26/2010	fyke net	least cisco	289	250.5	F	2	3.8	1.54	6
BP01	7/26/2010	fyke net	least cisco	345	332.8	F	2	4.0	1.217	18
BP01	7/26/2010	fyke net	least cisco	350	439.2	F	2	6.7	1.549	16
BP01	7/26/2010	fyke net	least cisco	319	369.3	M	3	7.9	2.186	7
BP01	7/26/2010	fyke net	least cisco	373	586.1	F	2	10.2	1.771	19
BP01	7/26/2010	fyke net	least cisco	356	462.9	F	3	39.7	9.381	15
BP01	7/26/2010	fyke net	least cisco	342	418.1	F	3	43.4	11.58	16
BP01	7/26/2010	fyke net	least cisco	218	87.3	F	1			4
BP01	7/26/2010	fyke net	least cisco	185	44.6	F	1			3
BP01	7/26/2010	fyke net	least cisco	186	45.7	F	1			3
BP01	7/26/2010	fyke net	least cisco	185	48.1	M	1			3
BP01	7/26/2010	fyke net	least cisco	185	49.8	F	1			3
BP01	7/27/2010	fyke net	least cisco	217	82.9	F	2	0.2	0.242	4
BP01	7/27/2010	fyke net	least cisco	281	197.2	F	2	1.3	0.664	6
BP01	7/27/2010	fyke net	least cisco	280	224.2	M	2	1.4	0.628	6
BP01	7/27/2010	fyke net	least cisco	296	260.3	F	2	2.3	0.891	7
BP01	7/27/2010	fyke net	least cisco	365	467.2	F	3	20.6	4.613	14
BP01	7/27/2010	fyke net	least cisco	253	138.1	M	1			5
BP01	7/27/2010	fyke net	least cisco	223	91.9	F	1			4
BP01	7/28/2010	fyke net	least cisco	225	102.0	F	1			4
BP01	7/28/2010	fyke net	least cisco	231	100.1	M	1			4
BP01	7/28/2010	fyke net	least cisco	229	111.7	M	1			5
BP01	8/5/2010	fyke net	least cisco	361	459.3	F	2	5.5	1.212	14
BP01	8/5/2010	fyke net	least cisco	361	462.6	F	3	6.3	1.381	15
BP01	8/5/2010	fyke net	least cisco	355	455.4	M	2	7.0	1.561	17
BP01	8/5/2010	fyke net	least cisco	373	609.5	F	3	37.7	6.593	15
NSL01	7/25/2010	fyke net	least cisco	222	84.3	F	2	0.2	0.238	6
NSL01	7/25/2010	fyke net	least cisco	248	115.6	F	2	0.5	0.434	4
NSL01	7/25/2010	fyke net	least cisco	266	174.5	F	1	0.6	0.345	5

Appendix Table E-1. Biological data collected on least cisco caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
NSL01	7/25/2010	fyke net	least cisco	231	123.7	M	1			4
NSL01	7/25/2010	fyke net	least cisco	207	66.2	M	1			3
NSL01	7/25/2010	fyke net	least cisco	205	59.5	F	1			3
NSL01	7/25/2010	fyke net	least cisco	220	96.3	F	1			4
NSL01	7/25/2010	fyke net	least cisco	121	15.0	M	1			2

Appendix Table E-2. Biological data collected on Arctic/Bering cisco caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
1	7/24/1991	fyke net	arctic cisco	239	115.8	J	1			4
BP01	7/23/1996	fyke net	arctic cisco	309	293.0	F	2			5
BP01	7/23/1996	fyke net	arctic cisco	297	302.5	M	2			6
BP01	7/24/1996	fyke net	arctic cisco	313	307.5	M	2			11
BP01	7/24/1996	fyke net	arctic cisco	285	241.2	M	1			9
BP01	7/24/1996	fyke net	arctic cisco	295	293.9	F	1			10
BP01	7/26/1996	fyke net	arctic cisco	290	299.7	F	2			
BP01	7/29/1996	fyke net	arctic cisco	293	263.9	F	2			
BP01	7/29/1996	fyke net	arctic cisco	318	360.4	F	2			
BP01	7/30/1996	fyke net	arctic cisco	323	389.4	F	2			
BP01	7/30/1996	fyke net	arctic cisco	309	320.9	F	2			
BP01	8/5/1996	fyke net	arctic cisco	295	289.1	M	1			
BP01	8/9/1996	fyke net	arctic cisco	309	343.5	M	1			
BP01	8/9/1996	fyke net	arctic cisco	293	317.1	F	1			
BP01	8/9/1996	fyke net	arctic cisco	293	306.6	M	1			
BP01	8/9/1996	fyke net	arctic cisco	305	380.3	M	1			
BP01	8/12/1996	fyke net	arctic cisco	315	426.6	F	1			
BP01	8/12/1996	fyke net	arctic cisco	270	216.0	M	1			
BP01	8/12/1996	fyke net	arctic cisco	310	357.1	F	1			
BP01	8/19/1996	fyke net	arctic cisco	313	357.5	M	1			
BP01	7/23/2010	fyke net	arctic cisco	219	84.6	F	1			3
BP01	7/23/2010	fyke net	arctic cisco	212	79.2	F	1			3
BP01	7/23/2010	fyke net	arctic cisco	221	94.6	F	1			3
BP01	7/24/2010	fyke net	arctic cisco	246	126.7	F	1			4
BP01	7/24/2010	fyke net	arctic cisco	233	115.0	M	1			3
BP01	7/26/2010	fyke net	arctic cisco	174	37.2	M	1			2
BP01	7/26/2010	fyke net	arctic cisco	267	183.8	F	1			4
BP01	7/27/2010	fyke net	arctic cisco	231	106.4	F	1			3
BP01	7/29/2010	fyke net	arctic cisco	164	34.6	M	1			2
NSL01	7/25/2010	fyke net	arctic cisco	214	81.6	F	1			3
NSL01	7/25/2010	fyke net	arctic cisco	219	86.0	F	1			3
NSL01	7/25/2010	fyke net	arctic cisco	256	144.7	F	1			4
NSL01	7/25/2010	fyke net	arctic cisco	235	113.0	F	1			3
BP01	7/23/1996	fyke net	arctic cod	138	14.9	F	2			3
1	7/24/1991	fyke net	Bering cisco	340	446.6	F	1			6
BP01	7/19/1996	fyke net	Bering cisco	315	327.2	M	2			2
BP01	7/19/1996	fyke net	Bering cisco	314	313.4	F	2			3
BP01	7/31/1996	fyke net	Bering cisco	315	398.4	F	2			
BP01	8/12/1996	fyke net	Bering cisco	285	2953.0	M	1			

Appendix Table E-3. Biological data collected on rainbow smelt caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
BP01	7/23/1996	fyke net	rainbow smelt	109	5.5	UNK	UNK			2
BP01	7/26/2010	fyke net	rainbow smelt	209	63.5	F	2			7
BP01	7/26/2010	fyke net	rainbow smelt	180	45.0	M	2			6
BP01	7/26/2010	fyke net	rainbow smelt	167	31.2	M	1			5
BP01	7/26/2010	fyke net	rainbow smelt	170	35.3	F	1			6
BP01	7/26/2010	fyke net	rainbow smelt	179	44.0	M	2			6
BP01	7/26/2010	fyke net	rainbow smelt	185	44.6	F	1			6
BP01	7/26/2010	fyke net	rainbow smelt	176	40.6	F	1			6
BP01	7/26/2010	fyke net	rainbow smelt	164	32.9	F	1			5
BP01	7/26/2010	fyke net	rainbow smelt	168	33.7	M	1			5
BP01	7/26/2010	fyke net	rainbow smelt	150	24.9	F	1			5
BP01	7/26/2010	fyke net	rainbow smelt	166	36.4	F	1			5
BP01	7/26/2010	fyke net	rainbow smelt	149	22.7	F	1			5
BP01	7/26/2010	fyke net	rainbow smelt	151	25.9	M	1			5
BP01	7/26/2010	fyke net	rainbow smelt	148	22.3	M	2			5
BP01	7/26/2010	fyke net	rainbow smelt	190	46.8	F	2			6
BP01	7/28/2010	fyke net	rainbow smelt	86	2.7	J	1			1
BP01	7/28/2010	fyke net	rainbow smelt	90	3.4	J	1			1
BP01	7/28/2010	fyke net	rainbow smelt	191	56.1	M	2			7
BP01	8/4/2010	fyke net	rainbow smelt	200	54.2	F	2			6
NSL01	7/25/2010	fyke net	rainbow smelt	180	45.2	M	2	0.5	1.119	6
NSL01	7/25/2010	fyke net	rainbow smelt	185	51.5	F	1	0.7	1.378	6
NSL01	7/25/2010	fyke net	rainbow smelt	188	47.0	M	2			6
NSL01	7/25/2010	fyke net	rainbow smelt	174	39.6	M	2			6
NSL01	7/25/2010	fyke net	rainbow smelt	106	6.4					2
NSL01	7/25/2010	fyke net	rainbow smelt	132	18.0	M	1			5
NSL01	7/25/2010	fyke net	rainbow smelt	177	40.0	M	2			6
NSL01	8/5/2010	fyke net	rainbow smelt	263	132.9	M	2	8.9	7.177	12

Appendix Table E-4. Biological data collected on miscellaneous species caught in Elson Lagoon, 1991, 1996, 2010.

Station	Date	Sample Method	Species	Fork Length (mm)	Weight (gm)	Sex	Maturity	Gonad Weight (gm)	GSI Index	Age
1	7/24/1991	fyke net	broad whitefish	159	35.5	J	1			2
1	7/24/1991	fyke net	broad whitefish	171	52.4	J	1			2
1	7/24/1991	fyke net	broad whitefish	268	209.8	F	1			4
1	7/25/1991	fyke net	broad whitefish	156	34.7	J	1			2
ELSON	7/28/2010	gill net	broad whitefish	599	2661.4	M	3	32.0	1.217	
ELSON	7/28/2010	gill net	broad whitefish	591	2847.4	F	3	186.5	7.009	
ELSON	7/30/2010	gill net	broad whitefish	618	3940.0	F	3	152.0	4.013	
ELSON	7/30/2010	gill net	broad whitefish	550		F	2			
ELSON	7/30/2010	gill net	broad whitefish	566		M	3			
1	7/24/1991	fyke net	humpback whitefish	332		M	1			11
BP01	7/23/1996	fyke net	saffron cod	128	12.4	M	2			7
BP01	7/23/1996	fyke net	saffron cod	120	8.7	UNK	UNK			2
1	7/24/1991	fyke net	whitefish/cisco hybrid	228	93.9	F	1			8