HARVEST ESTIMATE AND ASSOCIATED INFORMATION FOR THE 2002 COLVILLE RIVER FALL FISHERY



Prepared by

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for

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EXECUTIVE SUMMARY

Moulton, L.L. Harvest estimate and associated information for the 2002 Colville River fall fishery.

The objectives of the 2002 study were to continue obtaining estimates of the total effort and catch for the fall gill net fishery in the Colville River delta, which targets quaqtaq (arctic cisco), including harvests of both the village of Nuique and the commercial fishery. Similar to previous years, a daily count was made of the nets fishing from mid October to late November.

The fishery began around October 14, which is considered slightly late. The 2002 fishery was characterized by an initial high catch rate of qaaqtaq (arctic cisco) in the Nigliq Delta area, followed by a decrease through the season. Catch rates were generally low in the Upper Nigliq and Nanuk areas. While the 2002 catch rate in the Nigliq Channel was up substantially from 2001, it was the fourth lowest on record. Catches in 2001 were the lowest yet seen for both the Nuiqsut and commercial fishery. The catch of iqalussaq (least cisco), the primary by-catch species, was the sixth lowest observed in seventeen years of monitoring. In the commercial fishery, effort was the third lowest recorded, and was similar to that recorded in 2001. Low catch rates, combined with the low effort, resulted in the third lowest qaaqtaq (arctic cisco) catch recorded since 1967.

A substantial increase in the qaaktaq (arctic cisco) CPUE is predicted for 2003. This prediction is based on the abundance of fish between 260-300 mm in the Prudhoe Bay region during summer 2002. The 2002 harvest was supported almost completely by larger fish of the 1997 year class. Catches in fyke nets from summer studies in Prudhoe Bay indicate there is a substantial pool of fish that will grow into harvestable size by fall 2003. Most of the 2003 harvest will be composed of this year class, as well as some of the larger members of the 1998 year class.

Catch rates of qaaktaq (arctic cisco) after 2003 may moderate somewhat as the 1997 year classes matures and leaves the area, and the 1998 year class, which appears to be less abundant, fully recruits into the fishery. By 2005, catch rates will likely again decline to a low level.

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HARVEST ESTIMATE AND ASSOCIATED INFORMATION FOR THE 2002 COLVILLE RIVER FALL FISHERY

Lawrence L. Moulton

INTRODUCTION

For nearly 30 years, there were concerns that causeways built in the coastal region of the Alaskan Beaufort Sea to support coastal developments were causing changes in the summer feeding habitat of anadromous fishes in the region (Furniss 1975; USACE 1980, 1984). A variety of studies have been conducted in the coastal region since the mid-1970's to gain basic biological, distribution and habitat utilization information needed to address these concerns (Furniss 1975; Bendock 1979; Craig and Haldorson 1981; Griffiths and Gallaway 1982; Critchlow 1983; Griffiths et al. 1983; Woodward-Clyde Consultants 1983; Moulton and Fawcett 1984; Envirosphere 1987, LGL 1990, 1992, 1993, 1995).

The anadromous fishes that are the subject of these studies provide an important food resource for the Inupiat communities of the Alaskan Arctic Coastal Plain and have been fished for many generations. The arctic cisco (*Coregonus autumnalis*), in particular, is a highly prized food resource. This species is harvested near Kaktovik in late summer and in the Colville River delta after ice forms during fall. In addition to subsistence harvests, there is a commercial fishery that has operated in the Colville River delta since the early 1950's. Prior to 1985, there was little information on the subsistence harvests of anadromous fishes, although detailed information existed on the commercial fishery (Craig and Haldorson 1981; Gallaway et al. 1983; Moulton et al. 1986a; Craig 1987).

The concerns expressed over possible effects of causeways to the anadromous fishes of the region, especially arctic cisco, raised concerns among local people that their traditional fishery resource would, in turn, be affected. The local government for Alaska's Arctic Coastal Plain region, the North Slope Borough, requested that information be collected to assess the fisheries in the Colville River, which were considered to be most at risk. The study reported here was begun in 1985 in response to that request. The initial year of investigation included a study of fish use of the Colville

River delta region and evaluation of both summer and fall fisheries (Fawcett et al. 1986; Moulton et al. 1986b). Following years (1986 to 2002) focused on the fall fishery for arctic cisco and least cisco (*C. sardinella*).

Arctic cisco targeted by the fall fishery are derived from spawning stocks in the Mackenzie River, with young-of-the year fish recruiting into the Colville region during August or September, as described by Gallaway et al. (1983). The recruitment of age 0 arctic cisco into the Colville River region is aided by westerly currents generated by the predominantly easterly winds in the Beaufort Sea region. Strength of recruitment has been correlated to the percentage of easterly winds from June to September (Fechhelm and Fissel 1988). Arctic cisco return to the Mackenzie River at maturity to spawn, thus are only available to the fishery for two or three years prior to maturity. Anadromous least cisco being harvested spawn and winter entirely in the Colville Delta and lower river.

This study of the 2002 fishery constitutes the seventeenth year that the fishery in the delta was subjected to a harvest estimate. Results from the 2001 study were not previously reported and are included for the first time in this report. Results from 1985 to 2000 are reported in Moulton and Field (1988), previous editions of the Endicott Monitoring Program Annual Report Series and Moulton (2001). Additional information on the fall gill net fishery in the Colville River was developed by George and Nageak (1986) and George and Kovalsky (1986).

The objectives of the 2002 survey were to 1) continue to obtain estimates of effort and catch for the fall fishery in the Colville River delta, which targets arctic cisco, including subsistence harvests by the village of Nuiqsut and commercial harvests, 2) evaluate the harvest predictions made prior to the fishing season, and 3) evaluate methods to predict catches in future years.

METHODS

The study area includes the Colville River from the Itkillik River downstream to Harrison Bay (Figure 1). The 2002 study was restricted to three areas of concentrated fishing effort in the Nigliq Channel: 1) the Upper Nigliq Channel near Nuiqsut, 2) the Nanuk area of the Nigliq Channel, and 3) the Nigliq Delta (Figure 2).

The assessment and monitoring of the fall under-ice fishery based in Nuiqsut began on 15 October and continued through the third week in November. Fishing began on October 3, which was a fairly normal start date for this fishery (Table 1).

Salinity measurements were taken every other day with a YSI 30 salinity/conductivity/temperature meter at standard locations in three monitoring areas on the Nigliq Channel (Figure 2). Salinity was measured from a vertical profile of the water column at 0.5 m increments.

During the main fishing season, village catches were sampled daily for species composition, number of fish caught, and fork length to the nearest mm. Fish were examined for tags, fin clips, and dye marks applied by other fish studies in the region. Whenever catch data were collected, set duration, net length, net depth (e.g. the width of the net) and mesh size data were also recorded so that catch-per-unit-effort (CPUE) could be calculated for the net set. Effort was calculated in net-days by using the start and end dates for each net. Effort data were adjusted for the various net lengths and set durations by standardizing net length to 18 m and set duration to 24 h.

The nets in the village fishery are of variable length with 18 and 24-m nets being the most common. The commercial fishery uses 46-m nets. In 2002, net depth was measured on nets used in the Nigliq Channel. Seven of the 83 nets (or 8%) were 2.4 m deep with 80% being 1.8 m deep and the remainder either 1.2, 1.5 or 2.7 m. In 1993 and 1994, estimates of the total catch were made both with and without a correction for net depth. The 1993 estimate containing the correction for net depth was 4.4% greater than the estimate based solely on net length and set duration, while in 1994 the

correction resulted in an error 3% less than the uncorrected estimate. A correction for net depth was not made in 2002 because most of the nets were 1.8 m deep.

Within the main sampling areas, each net was identified and monitored throughout the entire time the net was deployed between October 14 and November 25. Catch rates (CPUE) were estimated by obtaining daily catch and effort data by mesh size in each fishing area during the season. The total effort expended by each mesh size in each area, and the associated CPUE estimate, was calculated. Estimated catches for each mesh size by area were then calculated and summed to provide the estimates of total catch.

Daily catch and effort by individual net and weekly length frequencies by species for each mesh size from the commercial fishery in the Outer Colville Delta were provided by the commercial fisher who has regularly participated in the reporting of harvest data. The commercial fishery reports for 2001 and 2002 are attached. Length measurements were from 50 fish selected without known bias on each Monday of the fishing season. Effort was calculated in net-days by using the start and end dates for each net.

In both the village and commercial fisheries, 76-mm mesh nets were the preferred gear. Catch rate indices used for comparisons among areas and years and evaluation of changes in length distributions were based on 76-mm mesh.

Otoliths were obtained from 100 arctic cisco in 2001 and 150 in 2002 caught in 76-mm mesh in the commercial fishery to estimate the age distribution of the harvest. An additional 150 otoliths were obtained from least cisco in 2001 to conduct a similar analysis for least cisco. 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.

Information obtained from annual measurements of length frequency, length/weight relationships and estimated catches by mesh size was used to estimate the annual harvested biomass for arctic cisco and least cisco from 1985 to 2002. Length/weight relationships and length frequency data were used to estimate the mean weight of a harvested fish by mesh size for each year, then the total estimated harvest for that mesh size was multiplied by the mean weight. A composite length frequency was generated for mesh sizes in which length frequencies were not determined on an annual basis.

Records of catch and effort have been maintained for the Colville Delta commercial fishery since 1967 (summarized in Gallaway et al. 1983, 1989). Effort data are recorded as the beginning and end date of each net set. Catch data are recorded as the catch by species for each net whenever the nets are checked. Usually the nets are checked daily or every other day, although longer sets are sometimes made. From 1967 to 1986, the fishery records were maintained by Mr. Jim Helmericks. In 1987, a second fishery operation was initiated by Mr. Harmon (Bud) Helmericks. Data from 1987 to 1991 contain estimates of the effort and catch for both operations. Since 1992, the fishery has reverted to a single operation. The data are converted to catch rates (CPUE) by dividing the total season harvest by the total effort expended.

Prior to 1981, the total effort expended by the commercial fisheries averaged 908 net-days (standard deviation = 295) and was never less than 500 net-days. Between 1982 and 1990, the effort averaged 475 net-days (standard deviation = 186). There is a significant inverse correlation between catch rate and effort (r = -0.545, 45 df, a=0.01). The relationship is statistically identical for arctic cisco and least cisco catch rates. Because of this correlation between effort and catch rate, the data were adjusted to remove the linearity from the relationship. Use of the unadjusted data would provide inflated estimates of catch rates in years when effort is low. The adjustment consisted of calculating a correction factor for each observed effort based on the correlations through 1990. The correction factor was calculated as follows:

 $CF_i = CPUE_{E_i} - CPUE_m$

where $CF_i = correction factor for effort estimate i$

 $CPUE_{Ei}$ = linear estimate of catch rate associated with effort i $CPUE_m$ = estimated catch rate associated with the mean of the observed effort

The correction factor was then subtracted from the observed catch rates to provide an adjusted catch rate (Table 2). The adjusted catch rates were used for all subsequent analyses. The trend of the revised CPUE estimates is similar to that of the observed CPUE.

The primary effects of the adjustment are a slight increase in CPUE in the early years of the data set and a decrease in the post-1980 period for years in which effort was low, which was the desired effect of the adjustment.

RESULTS

Distribution of Fishing Effort

Village Fishery. The total estimated effort by Nuiqsut villagers in the Nigliq Channel fall fishery was 1,976 net-days, about 11% above the average for the 1992-2001 period (Figure 4). From 1985 to 2002 the number of Nuiqsut fishing groups (a family or group of families fishing cooperatively) participating in the under-ice fishery ranged between 21 and 35 (Figure 4a). In 2002, 32 fishing groups were identified. Effort in 2002 was highest in the Nigliq Delta area, followed by the Upper Nigliq area (Figure 4b).

Effort has gradually shifted downstream in the Nigliq Channel during the seventeen years of monitoring (Figure 5). From 1985 to 1989, between 65 to 74% of the effort within the channel was expended in the Upper Nigliq area. In 1993, effort in the Nanuk area exceeded that of the Upper Nigliq area for the first time, and in 2002 over 70% of the Nigliq Channel effort was in the Nigliq Delta area. Since 1998, the Nigliq Delta has had the highest effort of the three Nigliq Channel areas.

Salinity is monitored in conjunction with the fishery because arctic cisco are associated with salinities in the range of 15 to 25% (parts per thousand). During east winds, the water level in the river drops, and the channels become fresh. When the wind reverses to the west, water levels rise and saline water moves into the delta, which brings in arctic cisco, and displaces least cisco, humpback whitefish and broad whitefish. From 1985 to 1993, with the exception of 1988, salinity in the Nigliq Channel near the village reached 10 to 15% by the beginning of November (Figure 6). In contrast, during 1997 and 1998 the salinity exceeded 20% in both the Nanuk and Nigliq Delta areas through the fishing season. In 2002, salinity in the Nigliq Channel was low to moderate compared to previous years, with the Upper Nigliq remaining fresh through the season (Figure 7). In the Nanuk region, salinity rose from 3% at the onset of fishing to 13% by late November. Salinity in the Nigliq Delta was 20% at the onset of fishing, and gradually decreased to near 17% by the end of monitoring.

Commercial Fishery. The commercial fishery operated four 46-m nets in the East Channel for 330 net-days (based on 18 m of net per day). This effort continued the trend of low effort in recent years, being 36% lower than than the previous ten-year average effort (515 net-days).

Catch Composition

Arctic cisco, the target species, comprised almost 50% of the total observed catch in the Nigliq Channel in 2002 (Table 3). Least cisco also accounted for 31% of the observed catch, with humpback whitefish third most abundant almost 18%. In 2002, Bering cisco (*C. laurettae*) abundance remained low. In 1990, the species was more numerous than in the past and an effort was made to quantify their contribution to the 1990 harvest. Since 1991, their occurrence in the harvest has remained low. Round whitefish (*Prosopium cylindraceum*) occur in high abundance within the lower Colville River and delta (Fawcett et al. 1986), but rarely appear in the harvest. Their small size and narrow body allow them to pass through the meshes used in the fishery.

Comparative Catch Rates

Village Catch Rates. Overall, the arctic cisco catch rates in the Nigliq Channel were among the lower rates recorded, although they were about 67% higher than the record low catch rates observed in 2001 (Table 4). Least cisco mean catch rates in Nigliq Channel areas were lower than the previous ten-year average, but were not unusual (Table 5).

Commercial Catch Rates. The effort-adjusted catch rate for arctic cisco (see Methods) in the commercial fishery increased substantially from that observed in 2001, but was still 73% less than the previous ten-year average (Table 2). The catch rate in 2001 was essentially non-existant, with fewer than 2,000 fish taken during the season. The mean annual catch rate for arctic cisco and least cisco has been recorded for one of the commercial fisheries since 1967 (Figure 8). Values are reported in fish/day/46 m net to maintain continuity with previous reports on this fishery. The 2002 catch rate for arctic cisco, adjusted for varying effort, was the fourth lowest yet recorded, following 2000 and 2001, which were the lowest yet recorded. The adjusted catch rate for least cisco was

about 11% lower than the previous 10-year mean (Table 2, Figure 8).

Estimated Total Catch

Village Harvest. The total estimated catch of arctic cisco by villagers (7,533 fish, 2,669 kg) was the third lowest recorded, following the unusually low catch of 2001 (Figure 9, Tables 6, 7). The least cisco total catch was sixth lowest, about 26% under the recent 10-year average (Table 6). Catch rates of least cisco were low in all areas, but not unusual (Table 5). Humpback whitefish continued to be a significant portion of the catches (Table 6). Broad whitefish harvest remained at low levels.

Commercial Harvest. The total commercial harvest of arctic cisco was 3,935 fish (1,424 kg), was about 34% of the harvest by both numbers biomass for this species (Table 7). While the harvest was about double that observed in 2001, it was still over 70% less that the recent 10-year mean, again reflecting the unsually low catch levels of 2001 (Table 2). The total commercial harvest of 5,503 least cisco (1,710 kg) was 50% of the fall harvest by numbers and weight.

Humpback whitefish exhibited moderate abundance in the commercial harvest in 2002, with a total catch of 4,185 fish (Table 6). This is below the 1992 to 2001 average harvest of 6,043 fish. This is the third year in a row that the catch of humpback whitefish exceeded the arctic cisco harvest; this is another indicator of the low abundance of arctic cisco in the region from 2000-2002.

Size and Age of Harvested Fish

A comparison of the length frequencies of arctic cisco captured in 76-mm mesh gill nets to those captured in fyke nets has been used in past reports to evaluate the effect of strong and weak year-classes on the fishery, for both catch rate and size of harvested fish (Figure 10). The movement of dominant year classes through the fishery has a profound effect on the size of fish harvested, even when mesh size was held constant. For example, the length frequency of arctic cisco from fyke nets in the coastal region during the late summer of 1995 (after 14 August) indicated that there was a group of fish, primarily from the 1990 recruitment (LGL Alaska 1992), that was just becoming large

enough to be caught by 76-mm mesh gill nets in 1995 (Figure 10). In 1996 and 1997, virtually all members of this group were of sufficient size to be harvested. The length frequencies for 2002 indicate that there was a large group of fish too small to be caught by the 76 mm mesh gill nets. This group will grow to catchable size by fall, 2003 and will likely comprise most of the harvest at that time.

The length frequency of least cisco caught in the 76-mm mesh nets was similar to that observed in previous years (Figure 11). In the mid- to late 1980's, the peak of abundance was in the 310-320 mm range, while in the early 1990's, the 300-310 mm ranges have become more dominant. The 2002 length frequency is quite similar to those obtained from previous samples.

Information from the fyke nets fished in Prudhoe Bay during the summer is used to obtain information on the relative strength of arctic cisco year classes when they recruit into the region as yong-of-the-year (YOY) (Figure 12). Abundant year classes in the mid-1980's produced high catches in the early 1990's, while the abundant 1990 and 992 year classes produced high catches in 1997-1998 (Figure 9). The absence of a dominant year class from 1993 to 1996 resulted in the recent period of low catches. Based on the YOY index, the 1997 recruitment appears to be moderately strong and should provide some relief from the recent years of low catch.

Ages of arctic cisco taken in the fishery have been estimated from 1984 to 2002 (Figure 13). The age data were used to partition the catch rate in the commercial fishery by year class to evaluate the relative year class strength (Figure 14). The cumulative catch rate for a year class can be used as an index to year class productivity. The analysis demonstrates why 1986 had such a high catch rate; i.e., two abundant year classes (1979 and 1980) had reached a harvestable size in the same year. In subsequent years, the abundance of these year classes decreased and they were replaced by later year classes. The 1987 year class, which dominated the fishery from 1992 to 1994, was essential gone by 1996. The cumulative harvest of this year class has surpassed any other single year class in abundance. The 1990 year class contributed the second highest cumulative harvest, and was responsible for the high catch rates in 1996 and 1997. Subsequent year classes have been much less abundant, which is responsible for the low catch rates in recent years.

for the high catch rates in 1996 and 1997. Subsequent year classes have been much less abundant, which is responsible for the low catch rates in recent years.

Least cisco are only sampled every other year for age structure because of their slow growth rate and the relative stability of the population. The distribution of ages in least cisco has not shown a change in year class dominance (Figure 15), which is consistent with the hypothesis that the least cisco captured in the fishery were from a relatively stable Colville River population. There was, however, a continuing upward shift in the mean age of the harvested fish since 1978. In 1978, the mean age was 9.6 years; while in 1995, the mean age was 12.5 years. In subsequent years, the mean age has remained over 11 years. This upward shift in age may reflect reduced mortality in the population. As previously presented, there has been a substantial reduction in the commercial fishing effort since 1980. This reduction in effort may account for much of the reduced mortality that has allowed the mean age of harvested fish to increase.

Information from Returned Tagged Fish

Tag returns continue to dwindle, since tags have not been released in great numbers since 1993. During 2001, 4 tags were recovered from the Nuiqsut fishery, all from releases during summer 2001 (Table 8). The returns came from one broad whitefish, two humpback whitefish and one least cisco released in the Fish Creek drainage in eastern NPR-A. The commercial fishery returned 9 tags in both 2001 and 2002 from least cisco released in or near Prudhoe Bay during the early 1990's. In addition, one least cisco released in the outer portion of the Colville Delta north of the proposed CD-North development was caught in 2001.

Predictability in Arctic Cisco Harvest Rates

The mean catch rate of large arctic cisco in Prudhoe Bay fyke nets one year prior to entering the fishery is regressed against the catch in 76-mm mesh gill nets the following year to evaluate the

suitability of this size group as a predictor of catch. The best predictor of gill net catch rate is the fyke net catch rate of 260-300 mm arctic cisco during the summer prior to entering the fishery. After an additional summer of growth, this group typically grows into the 300-340 mm size range that is highly vulnerable to 76-mm mesh gill nets. The correlation between fyke net catches of 260-300 mm arctic cisco and the next year's catch of 300-340 mm fish is statistically significant (p=0.02) (Table 9, Figure 16).

The harvest rate for 300-340 mm arctic cisco was predicted for 1994 through 2002 using the relationship between commercial gill net catches and fyke net catches the prior year. The comparison of the predictions to actual harvest rates is as follows:

			Percent
<u>Year</u>	Predicted	<u>Actual</u>	<u>Error</u>
1994	15.3	15.0	-2%
1995	35.6	32.2	-30%
1996	59.1	130.0	+98%
1997	55.4	50.1	-10%
1998	66.6	20.1	-68%
1999	56.1	26.7	-52%
2002	52.5	12.7	-76%

The lack of fyke net sampling in Prudhoe Bay during 1999 and 2000 precluded making predictions for 2000 and 2001.

The actual 2002 CPUE was much less than the predicted, and it is clear there is often substantial deviation between the predicted and actual CPUE's. Much of this deviation can be explained for a given year after close examination of the details for a given year. Examples of known reasons for the high deviation include annual differences in salinity distribution and changes in timing of the fishery. For 2002, there is some evidence that summer 2001 was a poor growth year and most fish of the 1997 year class did not reach harvestable size by age 5.

The village catch rate for arctic cisco in the Nigliq Channel is correlated with the commercial catch rate observed in the Outer Delta, indicating that arctic cisco abundance fluctuates similarly throughout the lower delta within a given year (Table 10, Figure 17). Catch rates of least cisco between the two areas show no relationship (p=0.62).

DISCUSSION

The 2002 fishery was characterized by low abundance of arctic cisco, as expected because the continued weak recruitments after 1990. Early catch rates in the Nigliq Delta area were high when periodic west winds brought high salinity water into the area, inducing fish to move upstream. Catches then decreased through the season. Studies from previous years have established that arctic cisco move into the Colville River channels as salinity increases after ice formation (Moulton and Field 1988; Moulton 1994). For years in which salinity does not increase, such as 1988 and 1999, catches of arctic cisco are lower than expected. In 2002, salinity was high in the Nigliq Delta area through the season, but low to moderate in the other two areas. Least cisco catch rates was near the recent 10-year average in the commercial fishery but were low in the Nigliq Channel. High salinity that encourages arctic cisco into the delta displaces least cisco, which seem to prefer lower salinity. Bering cisco, which had been unusually abundant and a dominant portion of the catch in 1990, remained essentially absent in 2002. Humpback whitefish again formed a significant portion of the harvest in 2002.

In the past, knowledge of arctic cisco juvenile recruitment into the region as a whole and information on growth rates prior to recruitment into the fishery has allowed some prediction of impending increases or decreases in the arctic cisco catch rate (Figure 17). Unpredictable variables, such as the distribution of saline water in the delta, and possible variations in natural mortality, growth and maturation rates, make accurate predictions of catch rates unlikely. In 2002, the fishery did not respond as expected, with catch rates remaining lower than predicted. The 1990 year class has fully matured and left the region. The 1997 year class, which was expected to support the 2002 harvest, apparently did not grow as expected and a lower proportion of the fish than normal reached

harvestable size. Catches should improve substantially in 2003 when the 1997 year class fully recruits into the fishery and larger members of the 1998 year class begin to enter the fishery.

PREDICTIONS FOR 2003

Based on the high catch rates of 260-300 mm arctic cisco in Prudhoe Bay during 2002, it is likely that 2003 gill net catch rates will increase substantially from those observed in 2002. The 2002 harvest was supported almost completely by larger fish from the 1997 year class. In 2003, the main body of fish from this year class will have grown large enough to be harvested by the gill nets used in the Colville Delta fishery (see Figure 10). The 2003 harvest will be supplemented with larger fish from the 1998 year class, which appears to be of moderate abundance. Catches should remain moderately high through 2004, when both the 1997 and 1998 year classes will comprise the majority of the harvest.

If the catches of 260-300 mm arctic cisco from fyke nets in the Prudhoe Bay region in 2002 are used as predictors of abundance, then the catches in the Colville Delta commercial fishery (76-mm mesh) will be around 75 fish per day per 46 m of net (or 30 fish per day per 18 m of net) for fish in the range of 300-340 mm, which will likely form 80-90% of the harvest. In the Nigliq Channel, catches may approach 18 fish per day per 18 m of net. Most of the remaining 10 to 20 % will be larger fish from the 1998 year class. As is usually the case, variability in this estimate could result from salinity distribution, competing fishers, or reduced growth rates during the summer of 2003.

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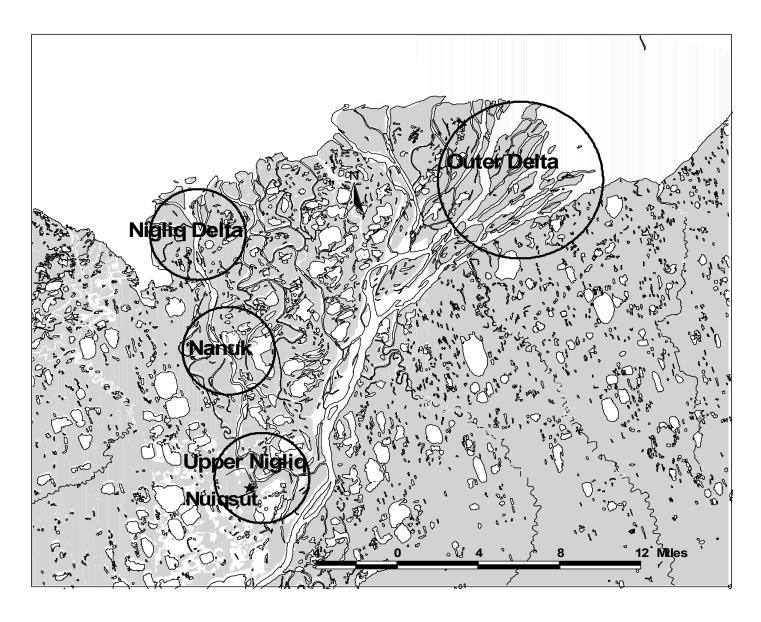


Figure 1. Colville Delta region showing locations of major fishing areas.

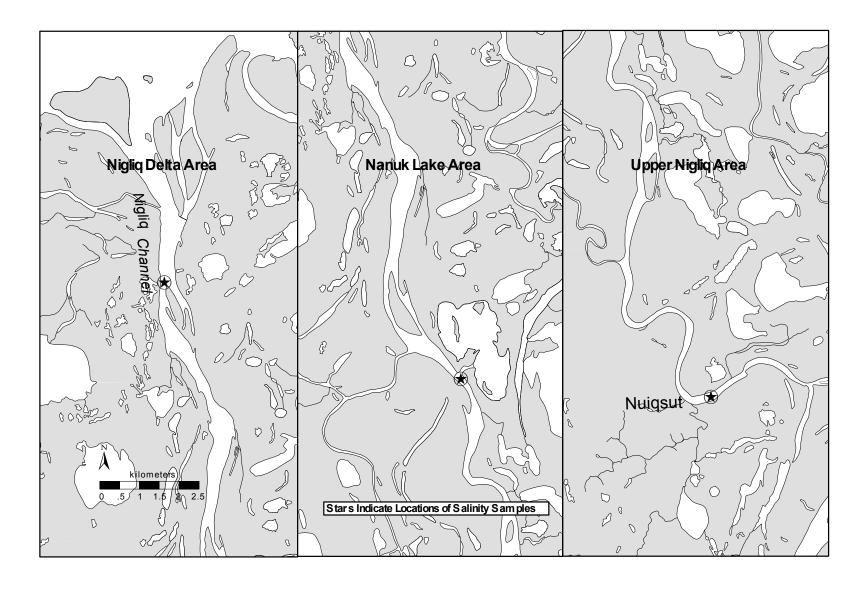


Figure 2. Major fishing areas on the Nigliq Channel with location of salinity monitoring stations.

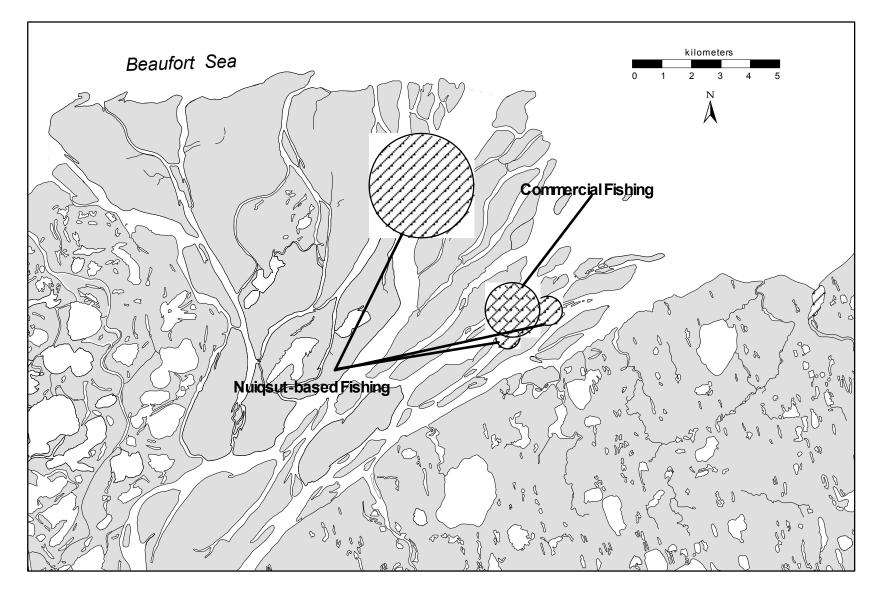
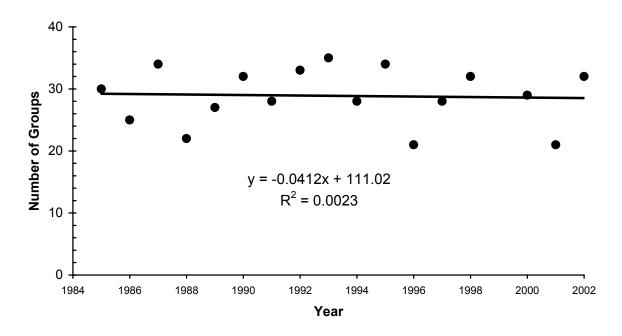
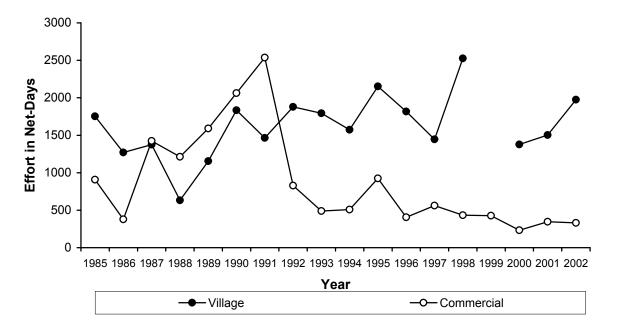


Figure 3. Fishing areas on the lower Colville River and Outer Delta region.



a. Number of Fishing Groups



b. Estimated Fishing Effort

Figure 4. Estimated fishing effort in the Colville Delta fall Fishery, 1985-2002 by number of fishing groups and effort in net-days (1 net-day = 24 hrs fishing per 18 m of net, all meshes combined).

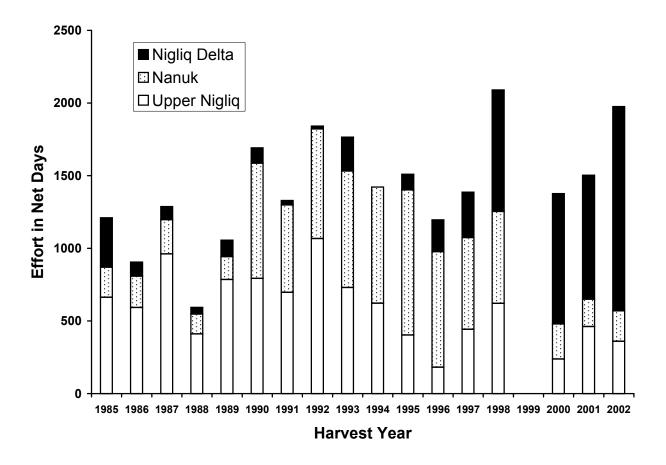


Figure 5. Distribution of fishing effort in the Nigliq Channel by fishing area, all meshes combined, 1986 to 2002.

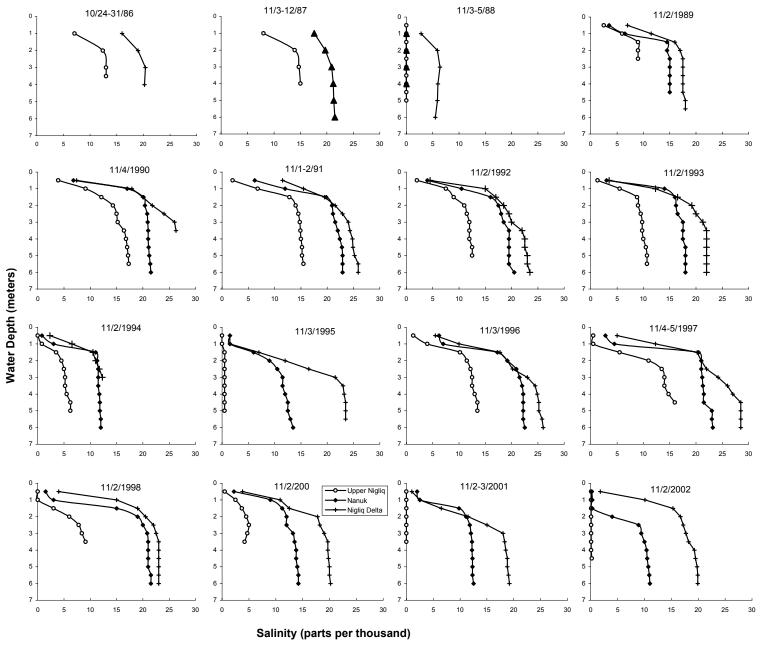


Figure 6. Salinity distribution in the Nigliq Channel, Colville Delta, during the fall gill net fishery, 1986-2002.

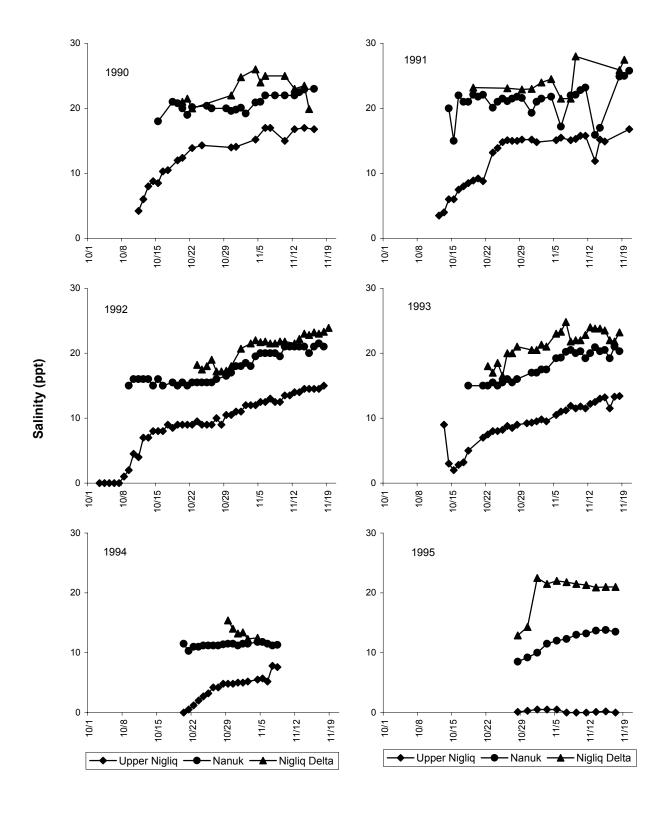


Figure 7. Salinities measured at 3 m below the ice surface at Nigliq Channel fishing areas, 1990-2002.

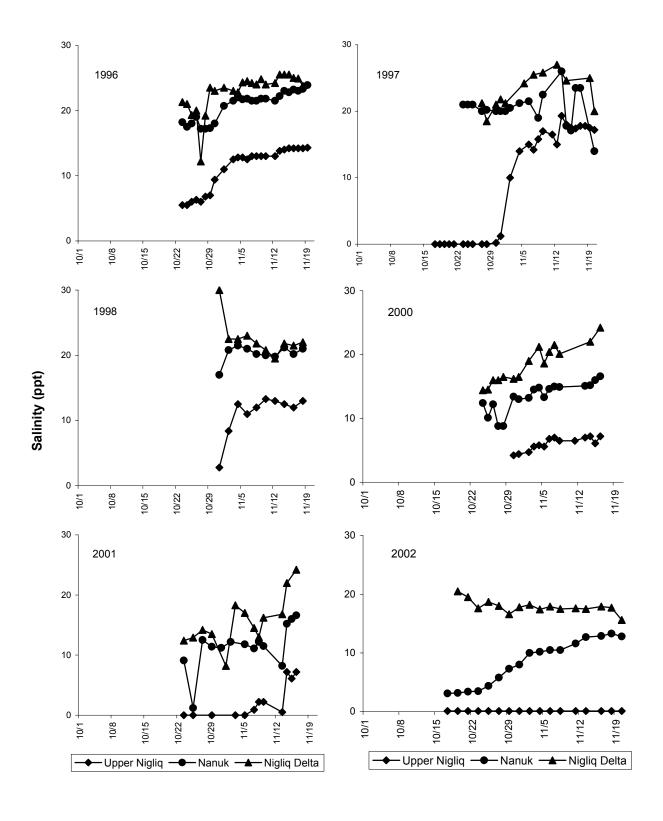
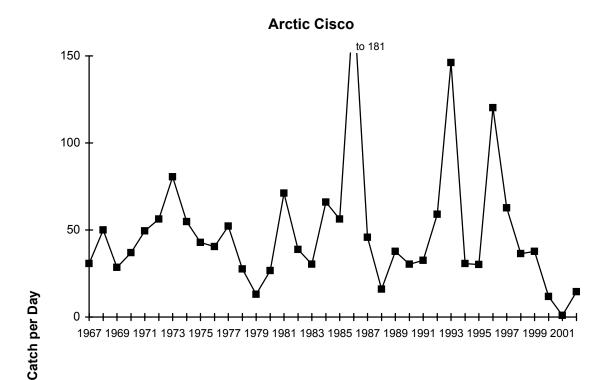


Figure 7. Salinities measured at 3 m below the ice surface at Nigliq Channel fishing areas, 1990-2002.



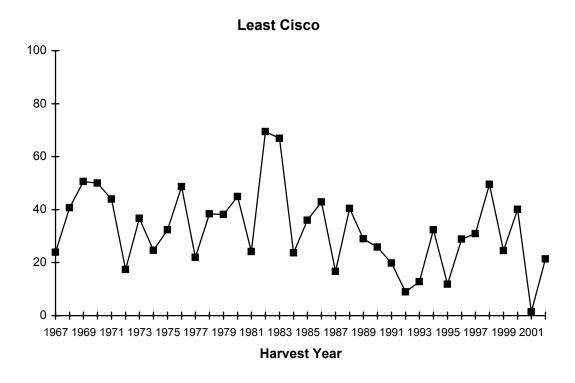
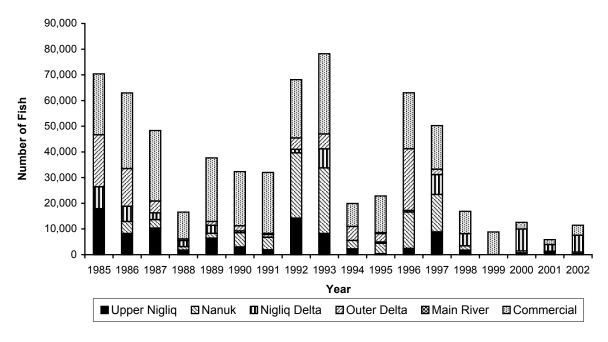
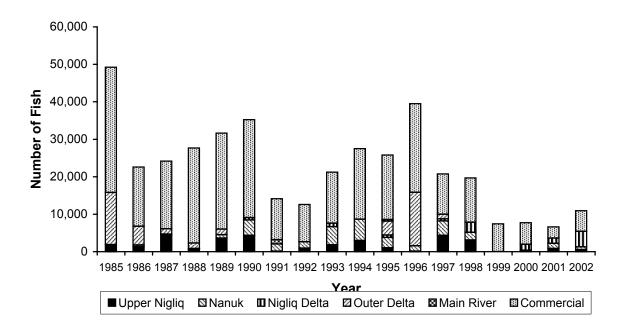


Figure 8. Catch rates of arctic cisco and least cisco in the Colville River delta commercial fishery, 1967-2002 (using catch rates ajusted for varying effort - see text).



a. Arctic Cisco



b. Least Cisco

Figure 9. Catch of arctic cisco and least cisco by harvest area in the Colville Delta, 1985 to 2002.

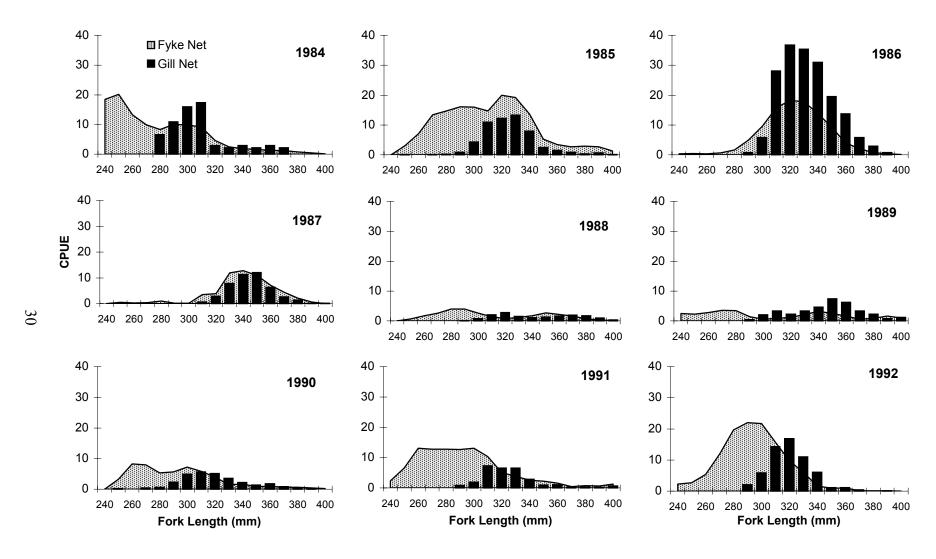


Figure 10. Length frequencies of Arctic cisco caught in fyke nets near Prudhoe Bay compared to those caught by 76-mm gill nets in the Colville Delta commercial fishery, 1984-2002 (fyke net length frequencies for fish caught after August 15, i.e. after summer growth period). (Length frequencies scaled by CPUE to reflect annual changes in Arctic cisco abundance).

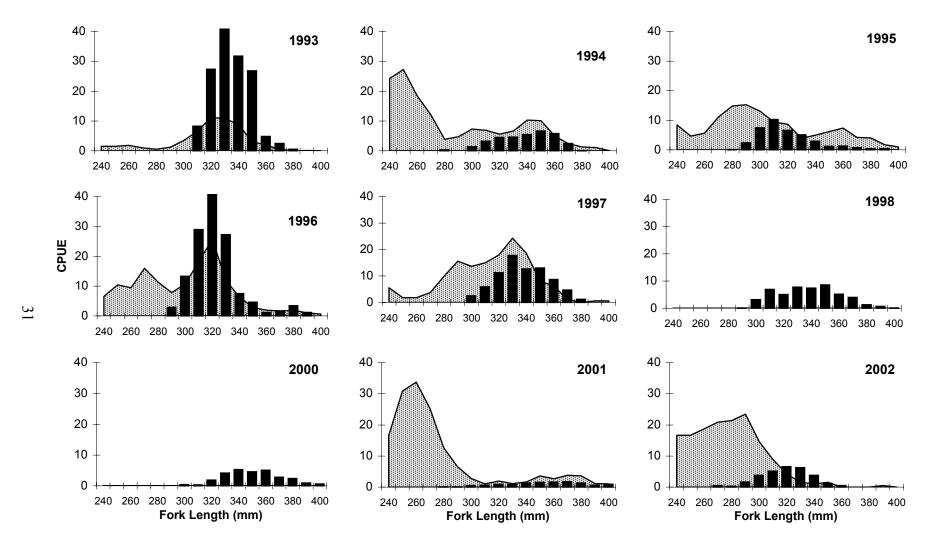


Figure 10. Length frequencies of Arctic cisco caught in fyke nets near Prudhoe Bay compared to those caught by 76-mm gill nets in the Colville Delta commercial fishery, 1984-2002 (fyke net length frequencies for fish caught after August 15, i.e. after summer growth period). (Length frequencies scaled by CPUE to reflect annual changes in Arctic cisco abundance).

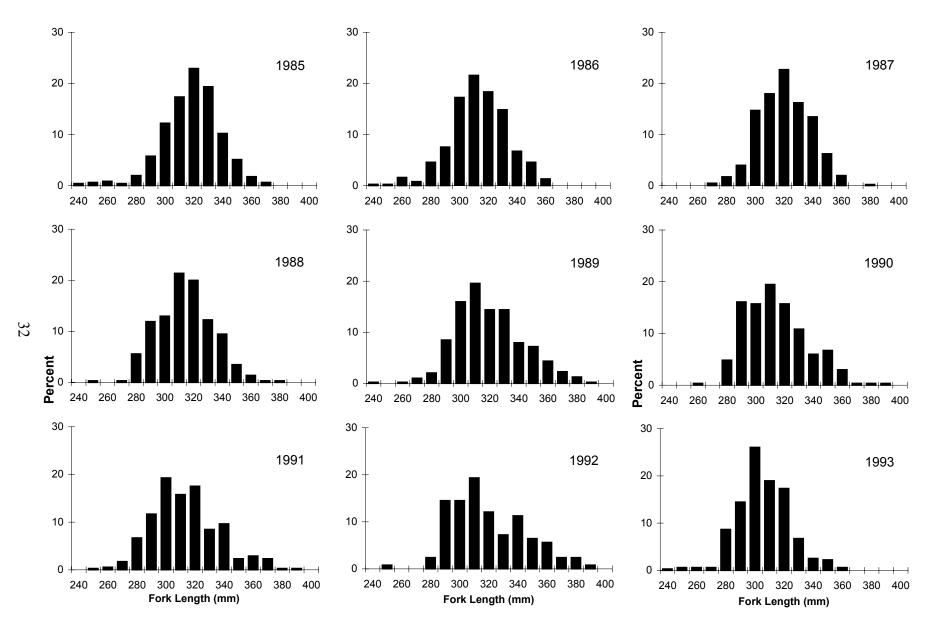


Figure 11. Length frequency distributions of least cisco captured in 76-mm gill nets in the Colville Delta fishery, 1985-2002.

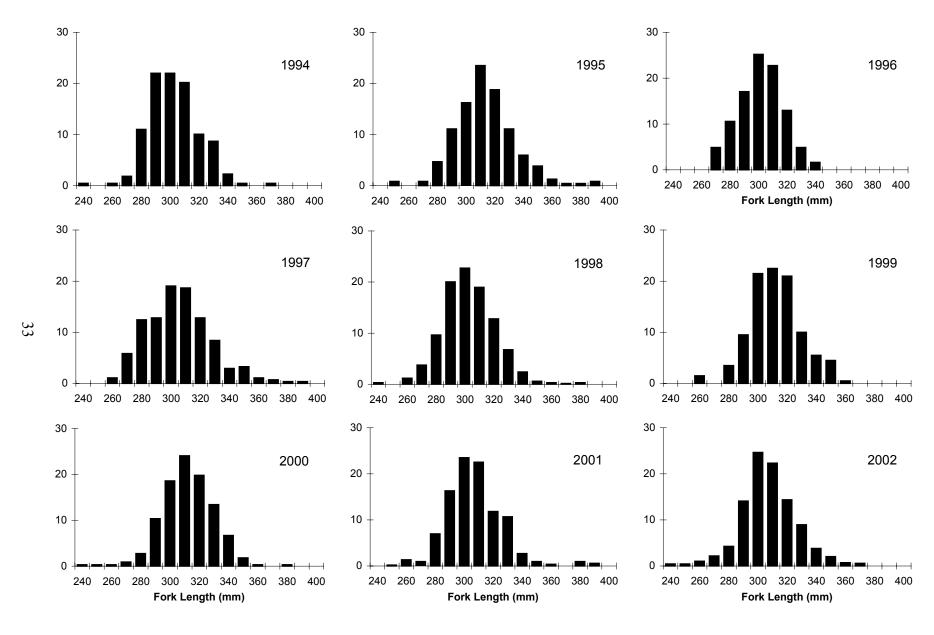


Figure 11. Length frequency distributions of least cisco captured in 76-mm gill nets in the Colville Delta fishery, 1985-2002.

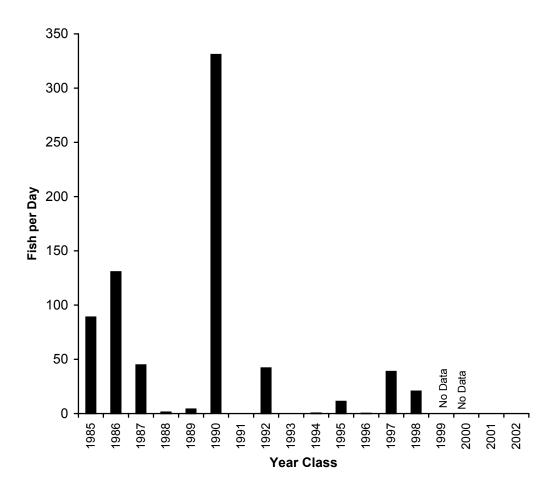


Figure 12. Catch rates of young-of-the-year (YOY) arctic cisco by year class ir Prudhoe Bay fyke nets, 1985-2002. (from LGL Alaska Research Associates 2000, B. Fechhelm, pers. comm. 2003).

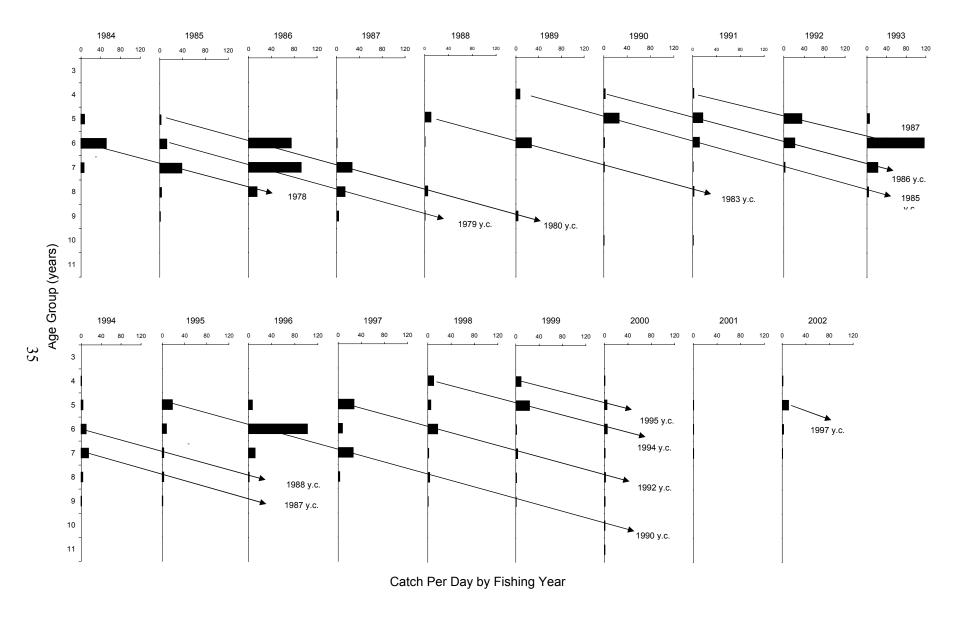


Figure 13. Age distribution of arctic cisco caught in the Colville River commercial fishery, 1984 - 2002, scaled to CPUE (from fish caught in 76-mm mesh nets, arrows indicate progression of year classes through the fishery).

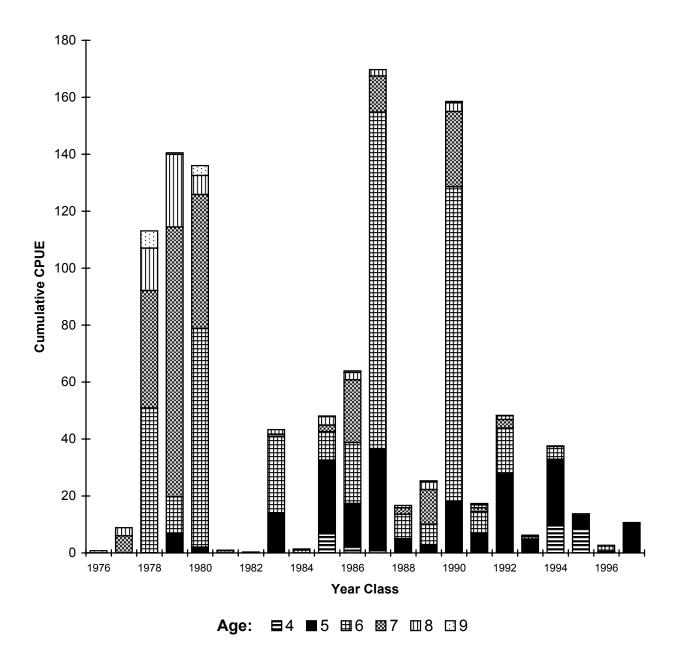


Figure 14. Cumulative harvest for each year class of arctic cisco, expressed as cumulative catch rate for harvest years 1984 to 2002.

Catch Per Day by Fishing Year

Figure 15. Age distribution of least cisco caught in the Colville River commercial fishery, 1987 - 2001, scaled to CPUE (from fish caught in 76-mm mesh nets, arrows indicate progression of year classes through the fishery).

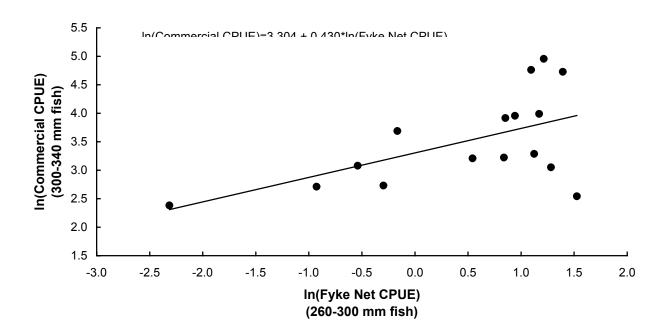


Figure 16. Relationship between commercial catch rate of 300-340 mm Arctic cisco in 76-mm mesh and fyke net catch rate for 260-300 mm fish the prior year.

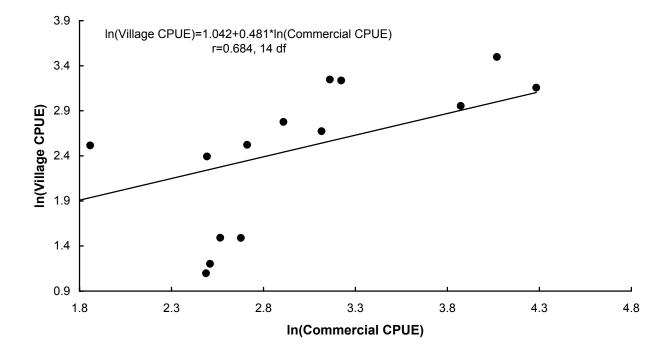


Figure 17. Relationship between village and commercial catch rates of arctic cisco in 76-mm mesh, 1985-2002.

Table 1. Estimated onset of fishing effort in the Nuiqsut fall fishery, 1985-2002.

	Onset of
Year	Fishing
1985	Oct 2
1986	Oct 3
1987	Oct 8
1988	Oct 14
1989	Oct 22
1990	Oct 6
1991	Oct 12
1992	Sep 26
1993	Oct 3
1994	Oct 3
1995	Oct 16
1996	Sep 28
1997	Oct 13
1998	Sep 28
1999	
2000	Oct 3
2001	Oct 6
2002	Oct 14

Average start date for 1985-2002 = October 6.

Table 2. Observed and effort-adjusted CPUE values for the Colville Delta commercial fishery, 1967 - 2002 (CPUE = fish/day/46 m net).

		A	rctic Cisco)	I	east Cisco	
	Total	Total	Actual	Adjusted	Total	Actual	Adjusted
Year	Effort	Harvest	CPUE	CPUE ^a	Harvest	CPUE	CPUE ^a
1967	774	21,904	28.3	30.8	15,982	20.6	24.0
1968	1,427	41,948	29.4	50.0	19,086	13.4	40.7
1969	699	19,593	28.0	28.5	35,001	50.1	50.6
1970	562	22,685	40.4	37.0	30,650	54.5	50.0
1971	1,422	41,312	29.1	49.5	23,887	16.8	44.0
1972	646	37,101	57.4	56.4	12,183	18.9	17.5
1973	993	71,575	72.1	80.7	25,191	25.4	36.7
1974	947	44,937	47.5	54.8	14,122	14.9	24.6
1975	759	30,953	40.8	42.9	22,476	29.6	32.4
1976	996	31,659	31.8	40.5	37,046	37.2	48.7
1977	576	31,796	55.2	52.2	14,961	26.0	22.0
1978	1,077	18,058	16.8	27.7	25,761	23.9	38.4
1979	620	9,268	14.9	13.2	25,097	40.5	38.1
1980	1,209	14,753	12.2	26.8	30,982	25.6	45.0
1981	501	38,176	76.2	71.2	15,504	30.9	24.2
1982	328	15,975	48.7	38.9	27,085	82.6	69.5
1983	520	18,162	34.9	30.4	37,909	72.9	66.9
1984	371	27,686	74.6	66.0	13,076	35.2	23.7
1985	363	23,678	65.2	56.4	17,383	47.9	36.1
1986	151	29,595	196.0	181.3	9,444	62.5	42.9
1987	570	27,948	48.3	45.9	11,930	20.9	16.7
1988	485	10,470	21.6	16.0	23,196	47.8	40.5
1989	636	24,802	39.0	37.6	19,595	30.8	29.0
1990	825	21,772	25.6	30.3	17,064	20.7	25.9
1991	1,015	23,731	23.4	32.5	7,743	7.6	19.8
1992	331	22,754	68.7	59.0	7,284	22.0	9.0
1993	196	31,310	159.7	146.3	6,037	30.8	12.8
1994	203	8,958	44.1	30.8	10,176	50.1	32.4
1995	368	14,311	38.9	30.1	8,633	23.5	11.8
1996	162	21,817	134.7	120.2	7,796	48.1	28.9
1997	225	16,990	75.5	62.8	10,754	47.8	30.9
1998	173	8,752	50.6	36.4	11,822	68.3	49.5
1999	171	8,872	51.9	37.6	7,430	43.5	24.5
2000	93	2,619	28.2	11.7	5,758	61.9	40.1
2001	138	1,924	13.9	1.0	2,976	21.6	1.4
2002	132	3,935	29.8	14.5	5,503	41.7	21.3
1992-2001							
Mean:	206	13,831	66.6	53.6	7,867	41.8	24.1

^a The relationship used to adjust the CPUE for effort is based on the correlation between CPUE and effort during the period 1967-1990.

Table 3. Catch contribution by species as observed during fisherman interviews in the Nigliq Channel, by percent of sampled catch (does not include commercial fishery).

Species	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000
Arctic cisco	69.5	95.9	71.8	90.6	66.2	39.6	62.8	89.2	85.4	39.6	34.7	81.9	74.8	39.6	79.4
Bering Cisco	(a)	(a)	(a)	(a)	(a)	21.8	1.2	0.1	0.02	0.1	0.2	0.0	0.0	0.0	0.1
Least cisco	14.8	3.8	18.7	8.3	23.7	30.2	30.0	6.0	11.1	44.6	35.0	4.8	22.9	50.8	14.0
Broad whitefish	15.1	0.3	5.5	0.6	7.0	5.3	1.0	0.2	0.3	2.2	7.6	0.1	1.3	0.4	0.2
Humpback whitefish	0.5	0.03	3.8	0.5	3.1	2.9	3.8	0.1	0.4	13.2	22.3	0.4	0.9	8.9	6.0
Arctic grayling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow smelt	0.2	0.03	0.01	0.0	0.03	0.2	1.0	0.0	0.04	0.3	0.2	0.1	0.0	0.0	0.3
Round whitefish	0.0	0.01	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Dolly Varden char	0.0	0.0	0.03	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern Pike	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saffron cod	0.0	0.0	0.03	0.0	0.03	0.03	0.04	0.0	0.01	0.0	0.0	0.02	0.0	0.0	0.03
Burbot	0.0	0.0	0.06	0.1	0.03	0.01	0.09	0.0	0.0	0.0	0.1	0.02	0.0	0.0	0.0
Arctic flounder	0.0	0.0	0.00	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0
Fourhorn sculpin	(b)	4.4	2.7	(b)	(b)	12.5	(b)	(b)	(b)						
Total Observed:	2,705	8,952	6,826	2,948	2,946	7,911	7,576	24,305	17,155	3,792	7,155	5,730	19,758	6,481	3,871

⁽a) = included with Arctic cisco prior to 1990

⁽b) = always present but not counted

Table 4. Mean catch rate of arctic cisco in 76-mm mesh gill nets in the Nuiqsut fall fishery, 1985-2002 (in fish per day per 18 m of net).

				Nigliq	Outer Colv	ville Delta
	Upper		Nigliq	Channel	Main	East
Year	Nigliq	Nanuk	Delta	Average	Channel	Channel
1985	NA	NA	NA	14.5	76.1	
1986	15.7	24.5	64.0	23.5	62.0	
1987	13.9	17.4	29.8	16.1	47.6	
1988	5.2	12.4	56.4	12.4	19.3	
1989	10.3	18.0	24.7	12.5	NA	
1990	8.2	13.1	11.2	11.0	NA	
1991	4.3	4.6	4.5	4.4	NA	
1992	17.6	34.5	112.0	25.7	54.1	
1993	18.7	37.8	41.8	33.0	207.1	
1994	3.0	3.5	NA	3.3	35.5	
1995	1.3	3.4	4.8	3.0	21.4	7.6
1996	16.2	19.5	NA	19.2	28.6	45.8
1997	20.8	25.3	33.2	25.4	NA	
1998	2.6	2.5	7.7	4.4	NA	
1999	NA	NA	NA	NA	NA	
2000	1.0	4.0	13.3	9.6	NA	
2001	2.1	1.6	3.4	2.7	NA	
2002	0.9	3.6	5.9	4.6	NA	
1992-2001						
Mean	9.2	14.7	30.9	14.0	69.4	26.7
Standard Deviation	8.7	14.8	38.7	11.9	78.0	27.0

NA = not available, -- = no effort

Table 5. Mean catch rate of least cisco in 76-mm mesh gill nets in the Nuiqsut fall fishery, 1985-2002 (in fish per day per 18 m of net).

				Mialia	Ovton Calvilla Dalta
	I I		NT: -1: .	Nigliq	Outer Colville Delta
	Upper		Nigliq	Channel	Main
Year	Nigliq	Nanuk	Delta	Average	Channel
1985	NA	NA	NA	2.7	47.4
1986	1.4	1.1	0.7	1.2	18.3
1987	5.5	1.1	1.3	4.1	15.4
1988	1.9	1.0	2.9	1.7	57.9
1989	3.3	1.1	0.5	2.8	NA
1990	5.3	3.5	9.3	4.7	NA
1991	0.4	0.9	0.0	0.7	NA
1992	1.0	1.1	2.6	1.1	8.1
1993	2.3	4.4	3.7	3.7	NA
1994	3.2	5.1	NA	4.3	NA
1995	4.1	2.4	4.7	2.9	NA
1996	0.6	1.4	NA	1.3	NA
1997	11.4	10.6	3.1	9.2	NA
1998	7.4	1.1	5.1	4.2	NA
1999	NA	NA	NA	NA	NA
2000	1.3	2.1	2.8	2.4	NA
2001	1.8	9.3	2.4	3.5	NA
2002	1.5	4.4	2.0	2.2	NA
1992-2001					
Mean	3.7	4.2	3.5	3.6	
Standard Deviation	3.6	3.6	1.1	2.4	

NA = not available, -- = no effort

Table 6. Estimated harvest during the Colville Delta fall fisheries by species, in number of fish, 1967-2002.

	Arctic (Cisco	Least C	isco	Humpback '	Whitefish	Broad Wh	nitefish
	Commercial	Village	Commercial	Village	Commercial	Village	Commercial	Village
Year	Harvest ^a	Harvest ^b	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest
1967	21,904		15,982		356			
1968	41,948		19,086		172			
1969	19,593		35,001		3,136			
1970	22,685		30,650		345			
1971	41,312		23,887		183			
1972	37,101		12,183		1,481			
1973	71,575		25,191		5,733			
1974	44,937		14,122		4,802			
1975	30,953		22,476		1,946			
1976	31,659		37,046		1,793			
1977	31,796		14,961		1,366			
1978	18,058		25,761		2,758			
1979	9,268		25,097		1,102			
1980	14,753		30,982		4,232			
1981	38,176		15,504		469			
1982	15,975		27,085					
1983	18,162		37,909					
1984	27,686		13,076					
1985	23,678	46,681	17,383	15,814				1,148
1986	29,595	33,523	9,444	6,805		79		229
1987	27,948	20,847	11,930	6,114	1,880	957		1,239
1988	10,470	6,098	23,196	2,320	6,945	70		58
1989	24,802	12,892	19,595	6,035	5,804	421	69	1,306
1990	21,772	11,224	17,064	9,100	4,581	200	2	416
1991	23,731	8,269	7,743	3,193	1,658	634	11	206
1992	22,754	45,401	7,284	2,659	5,209	30	208	130
1993	31,310	46,944	6,037	7,599	5,339	1,057	19	534
1994	8,958	10,956	10,176	8,669	8,827	2,736	8	936
1995	14,311	8,573	8,633	8,573	10,860	6,395	186	1,514
1996	21,817	41,205	7,796	15,854	6,425	6,105	258	326
1997	16,990	33,274	10,754	10,002	1,721	365	13	486
1998	8,752	13,559	11,822	19,323	5,279	4,681	13	91
1999	8,872		7,430		6,875		436	
2000	2,619	9,956	5,758	1,973	3,706	1,062	4	3
2001	1,924	3,935	2,976	3,630	6,184	2,576		979
2002	3,935	7,533	5,503	5,422	4,185	2,765		268

^aCommercial harvest numbers provided by J. Helmericks, 1996-2002 ^v 2000-2002 village harvest represents only the Nigliq Channel harves

Table 7. Estimated numbers and biomass of harvested Arctic cisco and least cisco by year for village and commercial fisheries in the Colville Delta, 1985-2002 (Bering cisco included for 1990).

	Village Harvest						Commerc	ial Harvest			
	Arctic	Cisco	Least	Cisco	Bering Cisco	Arctio	Cisco	Least	Cisco		Harvested
	Catch	Biomass	Catch	Biomass	Catch Biomass	Catch	Biomass	Catch	Biomass	Total	Biomass
Year	(in fish)	(kg)	(in fish)	(kg)	(in fish) (kg)	(in fish)	(kg)	(in fish)	(kg)	Catch	(kg)
1985	46,681	19,478	15,814	5,308	trace	23,678	10,146	17,596	6,021	103,769	40,953
1986	33,522	14,449	6,804	2,181	trace	29,456	12,640	9,000	2,959	78,782	32,228
1987	20,926	9,893	6,178	1,927	trace	27,494	12,945	11,939	4,117	66,537	28,883
1988	6,098	2,986	2,321	789	trace	10,480	5,264	23,040	8,121	41,939	17,159
1989	12,892	6,425	6,036	1,845	trace	24,802	12,697	19,640	7,006	63,370	27,972
1990	11,224	4,409	9,100	2,619	8,652 5,474	21,105	8,634	17,049	5,513	67,130	26,650
1991	8,269	2,860	3,193	761	trace	23,698	8,695	7,744	1,838	42,904	14,154
1992	45,402	15,728	2,658	787	trace	22,754	8,391	7,284	2,513	78,098	27,419
1993	46,944	18,707	7,599	2,107	trace	31,310	12,725	6,037	1,795	91,890	35,334
1994	10,956	4,525	8,669	2,475	trace	8,958	4,037	10,176	3,153	38,758	14,190
1995	8,573	3,471	8,573	2,495	trace	14,311	5,353	8,633	2,658	40,090	13,977
1996	41,205	15,387	15,854	4,648	trace	21,817	8,124	7,796	2,375	86,672	30,534
1997	33,274	14,487	10,002	2,985	trace	16,990	7,186	10,754	3,228	71,020	27,885
1998	13,559	5,435	11,470	3,303	trace	8,752	3,501	11,822	3,443	45,602	15,682
2000	9,956	4,851	1,973	643	trace	2,619	1,218	5,758	1,873	20,306	8,585
2001	3,935	1,886	3,630	1,086	trace	1,924	913	2,976	925	12,465	4,810
2002	7,533	2,669	5,422	1,533	trace	3,935	1,424	5,503	1,710	22,393	7,336

Table 8. Release and recapture locations of recovered tagged fish, 2001.

						Distance
	Release	Release	Recapture	Recapture	Days	between sites
Species	Site ¹	Date	Site	Date	Out	(miles)
Broad whitefish	U2	7/26/2001	Upper Nigliq	10/20/2001	86	44.8
Humpback whitefisl	U2	7/26/2001	Upper Nigliq	10/31/2001	97	44.8
	U2	7/28/2001	Nanuk	10/30/2001	94	37.0
Least cisco	MC7916	6/24/2001	Nanuk	10/30/2001	128	26.0
	CDN-01B	9/3/2001	Helmericks	10/20/2001	47	21.0

U2 = Ublutuoch (Tingmeaksiovik) River

MC7916 = large lake south of Fish Creek

CDN-01B = tapped lake north of the proposed CD-North development

Table 9. Predicted commercial catch rate for Arctic cisco in 2003 based on the relationship between commercial catch rate of 300-340 mm Arctic cisco and the mean fyke net catch rate for 260-300 mm fish the previous year

	Adjusted			year-1
	Commercial	Commercial	Commercial	Fyke Net
Harvest	76-mm Mesh	Proportion	CPUE	CPUE
Year	CPUE	300-340 mm	300-340 mm	260-300 mm
1985	60.5	0.864	52.2	2.57
1986	186.5	0.760	141.7	3.37
1987	79.7	0.502	40.0	0.85
1988	21.6	0.502	10.8	0.10
1989	37.1	0.413	15.3	0.74
1990	30.0	0.724	21.7	0.58
1991	29.7	0.832	24.8	1.72
1992	58.9	0.916	54.0	3.22
1993	148.1	0.763	113.1	4.03
1994	27.2	0.553	15.0	0.40
1995	30.1	0.833	25.1	2.31
1996	130.5	0.896	117.0	2.99
1997	64.3	0.780	50.1	2.35
1998	35.2	0.600	21.1	3.61
1999	37.6	0.710	26.7	3.08
2000	12.0	0.423	5.1	
2001	1.0	0.322	0.3	
2002	14.5	0.877	12.7	4.60
2003	110.8		75.5	10.71
Mean:		0.682		

¹ Bold = Predicted Values

Table 10. Predicted Arctic cisco CPUE for the Nigliq Channel in 2003 based on predicted commercial CPUE and historical relationship from 1985-2002.

i .	Nigliq	Commercial	Commercial
	CPUE	CPUE	CPUE
Year	(18-m of net)	(18-m of net)	(45-m of net)
1985	14.5	22.6	56.4
1986	23.5	72.5	181.3
1987	16.1	18.3	45.9
1988	12.4	6.4	16.0
1989	12.5	15.1	37.6
1990	11.0	12.1	30.3
1991	4.4	13.0	32.5
1992	25.7	23.6	59.0
1993	33.0	58.5	146.3
1994	3.3	12.3	30.8
1995	3.0	12.0	30.1
1996	19.2	48.1	120.2
1997	25.4	25.1	62.8
1998	4.4	14.6	36.4
1999		15.1	37.6
2000	9.6	4.7	11.7
2001	2.7	0.4	1.0
2002	4.6	5.8	14.5
2003	17.6	44.3	110.8
Historical			
Mean:	13.2	21.1	52.8

Bold = Predicted Values

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Appendix Table 1. Total estimated fishing effort by in the Colville River fall fishery, 1985-2002 (in net-days per 18-m of gill net).

		Vil	lage Effo	ort				
Year	Upper Nigliq	Nanuk	Nigliq Delta	Outer Delta	Main River	Total Village	Commercia	Total
1985	663	207	340	543		1,753		2,661
1986	592	216	97	365		1,270		1,648
1987	961	236	90	89		1,376		2,800
1988	411	136	47	37		631	1,213	1,844
1989	786	157	114	98		1,155	1,590	2,745
1990	793	793	106	142		1,834	2,063	3,897
1991	697	601	31	28	108	1,465	2,538	4,003
1992	1,067	755	19	39		1,880	828	2,707
1993	730	802	233	28		1,793	490	2,283
1994	622	800	0	152		1,574	508	2,082
1995	403	1,000	108	443	198	2,151	925	3,076
1996	182	795	219	622		1,818	405	2,223
1997	443	631	313	59		1,446	563	2,008
1998	621	632	836	435		2,525	433	2,958
1999							428	428
2000	238	240	898			1,377	233	1,609
2001	461	189	854			1,503	345	1,848
2002	360	209	1,407			1,976	330	2,306
1992-20	01							
Mean:	530	649	387			1,785	516	2,122
StDev:	269	270	371			370	212	761

Appendix Table 2. Total estimated catch of arctic cisco in the Colville Delta fall fishery, 1985-2002. (in numbers of fish).

	N	igliq Chann	el	Outer Colv	ille Delta		Total	Total	
	Upper		<u> </u>	Main	East		Village	Commercial	Total
Year	Nigliq	Nanuk	Nigliq Delta	Channel	Channel	Main River	Catch	Catch	Harvest
1985	17,878	NA	8,500	12,397	7,906		46,681	23,678	70,359
1986	8,239	4,636	5,924	14,724	0		33,523	29,456	62,979
1987	10,331	3,310	2,635	4,571	0		20,847	27,494	48,341
1988	1,736	1,401	2,374	587	0		6,098	10,480	16,578
1989	6,403	1,866	3,123	1,500	0		12,892	24,802	37,694
1990	2,979	5,538	706	2,000	0		11,224	21,105	32,329
1991	1,866	4,853	91	1,025	0	434	8,269	23,731	32,000
1992	14,182	25,444	1,375	4,400	0		45,401	22,754	68,155
1993	8,243	25,525	7,375	5,800	0		46,944	31,310	78,254
1994	2,230	3,326	0	5,400	0		10,956	8,958	19,914
1995	379	4,037	489	1,400	1,853	415	8,573	14,311	22,884
1996	2,404	14,170	598	13,571	10,462	0	41,205	21,817	63,022
1997	8,834	14,554	7,743	2,144	0	0	33,274	16,990	50,264
1998	1,730	1,697	4,721				8,148	8,752	16,900
1999								8,872	
2000	688	735	8,533				9,956	2,619	12,575
2001	1,044	279	2,612				3,935	1,924	5,859
2002	384	641	6,508				7,533	3,935	11,468

Appendix Table 3. Total estimated catch of least cisco in the Colville Delta fall fishery, 1985-200 (in numbers of fish)

	Ni	igliq Chann	el	Outer Colv	ille Delta		Total	Total	
·	Upper			Main	East		Village	Commercial	Total
Year	Nigliq	Nanuk	Nigliq Delta	Channel	Channel	Main River	Catch	Catch	Harvest
1985	1,871	NA	0	8,698	5,245		15,814	33,410	49,224
1986	1,329	440	38	4,998	0		6,805	15,805	22,610
1987	4,483	124	74	1,433	0		6,114	18,053	24,167
1988	600	143	123	1,454	0		2,320	25,360	27,680
1989	3,621	898	16	1,500	0		6,035	25,630	31,665
1990	4,348	4,098	654		0		9,100	26,149	35,249
1991	136	1,929	0		0	1,128	3,193	10,931	14,124
1992	927	1,706	26		0		2,659	9,943	12,601
1993	1,832	4,839	928		0		7,599	13,636	21,234
1994	2,990	5,679	0		0		8,669	18,845	27,514
1995	1,039	2,782	615		3,731	406	8,573	17,206	25,779
1996	136	1,450	15	7,982	6,271	0	15,854	23,650	39,504
1997	4,344	3,845	572	1,241	0	0	10,002	10,754	20,756
1998	3,120	2,042	2,691				7,853	11,822	19,675
1999								7,430	
2000	225	168	1,580				1,973	5,758	7,731
2001	871	1,337	1,421				3,630	2,976	6,606
2002	538	741	4,143				5,422	5,503	10,925

Appendix Table 4. Fishing effort in the Nigliq Channel by fisher, 2001.

			Net	Net			
Fisher		Fishing	Length	Depth	Mesh	Start	End
Code	Net	Area	(m)	(m)	(mm)	Date	Date
1	A	650	24	1.8	76	10/6/2001	10/21/2001
1	В	650	30	1.8	83	10/7/2001	10/23/2001
1	C	610	30	2.4	83	10/27/2001	11/21/2001
7	Α	610	24	1.8	76	10/27/2001	11/21/2001
7	В	670	24	1.8	89	11/17/2001	11/21/2001
11	Α	670	30	1.8	76	10/7/2001	11/8/2001
25	A	610	24	1.8	89	10/26/2001	11/21/2001
30	A	670	30	1.8	89	10/7/2001	10/19/2001
30	В	670	24	1.8	89	10/10/2001	10/17/2001
32	A	670	30	1.2	89	10/13/2001	11/4/2001
33	A	610	24	1.8	76	10/12/2001	10/21/2001
33	В	610	24	1.8	76	10/13/2001	10/21/2001
33	C	610	24	1.8	76	10/21/2001	11/21/2001
33	D	610	30	1.8	64	10/27/2001	11/10/2001
33	E	650	24	1.8	76	11/10/2001	11/21/2001
42	A	650	24	1.8	76	10/6/2001	10/22/2001
42	В	650	24	1.8	89	10/7/2001	10/22/2001
43	A	610	24	2.4	89	10/19/2001	10/31/2001
48	A	670	24	1.8	89	10/6/2001	11/5/2001
48	В	670	24	1.8	89	10/6/2001	11/7/2001
52	A	670	30	1.8	76	10/12/2001	11/11/2001
57	Α	670	18	1.8	76	10/6/2001	11/21/2001
57	В	670	24	1.8	89	10/7/2001	11/21/2001
60	A	670	18	1.2	76	10/14/2001	11/21/2001
61	A	670	24	1.8	76	10/13/2001	11/21/2001
62	A	610	18	1.2	76	10/17/2001	11/4/2001
62	В	610	18	1.2	76	10/17/2001	11/14/2001
63	A	670	18	1.8	76	10/7/2001	11/21/2001
65	A	670	18	1.8	76	10/6/2001	10/31/2001
65	В	670	18	1.8	89	10/6/2001	10/29/2001
65	C	670	18	1.2	64	10/29/2001	11/21/2001
66	A	610	24	1.8	89	10/13/2001	10/31/2001
66	В	610	24	1.8	89	10/14/2001	10/31/2001

Appendix Table 4. Fishing effort in the Nigliq Channel by fisher, 2001.

			Net	Net			
Fisher		Fishing	Length	Depth	Mesh	Start	End
Code	Net	Area	(m)	(m)	(mm)	Date	Date
69	A	650	18	1.8	76	10/7/2001	11/21/2001
69	В	670	24	1.8	76	10/7/2001	11/21/2001
69	C	670	18	1.8	76	10/12/2001	11/21/2001
76	A	670	24	1.8	89	10/14/2001	11/21/2001
80	A	670	18	1.8	83	10/12/2001	11/21/2001

Fisher Code: numerical code used to identify individual fishers, used constantly across years.

Area: 610 = Upper Nigliq; 650 = Nanuk; 670 = Nigliq Delta; 100 = Outer Delta

Start = Date net was set at a location

End = Date net was removed from a location

Appendix Table 5. Fishing effort in the Nigliq Channel by fisher, 2002.

			Net	Net			
Fisher		Fishing	Length	Depth	Mesh	Start	End
Code	Net	Area	(m)	(m)	(mm)	Date	Date
1	A	610	24	1.8	102	10/15/2002	10/21/2002
1	В	610	18	1.8	89	10/19/2002	11/6/2002
1	C	610	24	1.8	76	10/21/2002	11/25/2002
4	A	610	24	1.8	127	10/14/2002	11/25/2002
4	A	670	18	1.2	76	10/19/2002	10/26/2002
4	В	650	18	1.8	76	10/16/2002	11/25/2002
4	В	670	18	1.2	76	10/27/2002	10/30/2002
4	C	650	18	1.8	64	10/16/2002	10/21/2002
4	D	670	18	1.8	76	10/19/2002	11/6/2002
4	E	670	24	1.8	76	10/19/2002	11/7/2002
4	F	670	18	1.8	76	10/18/2002	11/13/2002
4	G	670	18	1.8	76	11/2/2002	11/25/2002
4	Н	670	18	1.8	64	11/2/2002	11/25/2002
7	A	610	24	1.8	76	10/17/2002	11/8/2002
7	В	650	24	1.8	76	10/17/2002	10/21/2002
7	C	650	24	1.8	76	10/20/2002	11/13/2002
10	A	670	24	1.8	64	10/26/2002	11/25/2002
20	A	610	18	1.8	76	10/24/2002	11/24/2002
24	A	650	24	1.8	76	10/20/2002	10/30/2002
24	В	650	18	1.8	76	10/19/2002	11/25/2002
25	A	610	24	1.8	89	10/15/2002	10/21/2002
25	В	670	24	1.8	89	10/21/2002	11/9/2002
25	C	670	8	2.7	76	10/23/2002	11/13/2002
25	D	670	8	2.7	76	10/25/2002	11/13/2002
25	E	670	18	2.7	89	10/28/2002	11/3/2002
25	F	670	30	1.8	76	11/7/2002	11/25/2002
29	A	670	24	1.8	76	10/28/2002	11/12/2002
30	A	610	30	2.4	127	10/19/2002	10/20/2002
30	В	670	18	1.8	89	11/11/2002	11/25/2002
31	A	610	24	1.8	64	10/15/2002	10/26/2002
32	A	650	30	1.2	89	10/19/2002	11/2/2002
32	В	650	24	1.8	76	10/19/2002	11/2/2002
32	C	670	18	1.5	64	11/9/2002	11/20/2002
33	A	610	24	1.8	127	11/7/2002	11/8/2002
33	В	670	24	1.8	76	11/8/2002	11/25/2002
33	C	610	24	1.8	76	11/8/2002	11/20/2002
37	A	670	30	2.4	76	10/17/2002	11/24/2002

Appendix Table 5. Fishing effort in the Nigliq Channel by fisher, 2002.

			Net	Net			_
Fisher		Fishing	Length	Depth	Mesh	Start	End
Code	Net	Area	(m)	(m)	(mm)	Date	Date
37	A	670	30	2.4	76	10/17/2002	11/24/2002
37	В	670	24	2.4	76	10/17/2002	11/14/2002
42	A	610	30	1.8	83	10/19/2002	10/21/2002
43	Α	610	30	2.4	76	10/18/2002	11/13/2002
43	В	670	30	1.8	76	11/13/2002	11/25/2002
48	A	670	18	1.8	89	10/18/2002	11/7/2002
48	В	670	18	1.8	76	10/18/2002	11/25/2002
48	C	670	24	1.8	89	10/19/2002	11/25/2002
48	D	670	18	1.8	89	10/20/2002	11/7/2002
51	A	670	18	2.4	89	10/19/2002	11/25/2002
51	В	670	24	2.4	76	10/19/2002	11/25/2002
51	C	670	24	1.8	89	10/22/2002	11/25/2002
54	A	670	30	1.2	83	10/18/2002	11/23/2002
54	В	670	18	1.2	83	10/28/2002	11/20/2002
57	A	670	24	1.8	89	10/21/2002	10/29/2002
57	В	670	18	1.8	76	10/22/2002	11/24/2002
57	C	670	24	1.8	89	11/2/2002	11/25/2002
61	A	610	24	1.8	64	10/15/2002	10/20/2002
61	В	670	24	1.8	64	10/19/2002	11/23/2002
61	C	670	24	1.8	76	10/21/2002	11/17/2002
64	A	670	24	1.8	76	10/27/2002	11/22/2002
64	В	670	24	1.8	76	11/14/2002	11/24/2002
65	A	670	18	1.8	89	10/18/2002	10/26/2002
65	В	670	18	1.8	76	10/20/2002	11/23/2002
65	C	670	18	1.8	89	10/27/2002	11/7/2002
66	A	610	24	1.8	89	10/15/2002	10/21/2002
66	В	610	24	1.8	89	10/15/2002	10/30/2002
66	C	610	24	1.8	89	10/21/2002	11/21/2002
66	D	650	24	1.8	89	10/30/2002	11/21/2002
69	A	670	24	1.8	89	10/22/2002	11/20/2002
69	В	670	24	1.8	89	10/22/2002	11/24/2002
69	C	670	24	1.8	76	10/27/2002	11/24/2002
72	A	650	24	1.8	89	10/15/2002	10/20/2002
72	В	670	30	1.8	89	10/18/2002	10/20/2002
72	C	670	24	1.8	76	10/19/2002	11/25/2002
72	D	670	30	1.8	89	10/20/2002	10/26/2002
72	E	670	24	1.8	89	10/19/2002	10/28/2002

Appendix Table 5. Fishing effort in the Nigliq Channel by fisher, 2002.

			Net	Net			
Fisher		Fishing	Length	Depth	Mesh	Start	End
Code	Net	Area	(m)	(m)	(mm)	Date	Date
72	F	670	18	1.8	64	10/26/2002	11/25/2002
72	G	670	30	1.8	89	11/9/2002	11/25/2002
73	Α	670	18	1.8	76	10/21/2002	11/17/2002
74	Α	670	30	1.8	76	10/23/2002	11/7/2002
74	В	670	24	1.8	76	10/28/2002	11/17/2002
76	A	610	24	2.4	102	10/14/2002	10/20/2002
78	A	610	18	1.8	76	10/27/2002	11/25/2002
81	A	610	24	1.8	76	10/18/2002	11/3/2002
82	A	670	24	1.8	76	11/9/2002	11/25/2002
88	A	670	12	1.8	76	11/2/2002	11/25/2002

Fisher Code: numerical code used to identify individual fishers, used constantly across years.

Area: 610 = Upper Nigliq; 650 = Nanuk; 670 = Nigliq Delta; 100 = Outer Delta

Start = Date net was set at a location

End = Date net was removed from a location

Appendix Table 6. Estimated effort by Nigliq Channel fishermen by mesh size and fishing area, 2001.

Estimated Effort in Net-Days by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Ni	gliq									
	64	0.0	0.0	16.7	16.7	16.7	1.7	0.0	51.7	
	76	0.0	0.0	73.3	49.3	41.7	31.7	5.3	201.3	
	83	0.0	0.0	16.4	16.4	16.4	16.4	3.3	68.9	
	89	0.0	0.0	52.9	52.9	17.3	13.3	2.7	139.1	461.0
Nanuk										
	64	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	76	0.0	13.7	50.0	27.3	23.3	23.3	4.7	142.3	
	83	0.0	4.9	16.4	4.9	0.0	0.0	0.0	26.2	
	89	0.0	4.0	13.3	2.7	0.0	0.0	0.0	20.0	188.6
Nigliq De	elta									
	64	0.0	0.0	10.0	10.0	10.0	10.0	2.0	42.0	
	76	0.0	20.0	110.0	110.0	99.3	70.0	13.3	422.7	
	83	0.0	0.0	10.0	10.0	10.0	10.0	2.0	42.0	
	89	0.0	23.7	116.0	92.3	67.0	40.0	8.0	347.0	853.7

Estimated Nigliq Total: 1,503.3

Appendix Table 7. Estimated catch of arctic cisco in the Nigliq Channel, 2001.

Estimated Arctic Cisco CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			3.3	3.3	5.1	5.1	
	76			3.3	1.3	1.4	1.4	1.4
	83			3.3	1.3	1.4	1.4	1.4
	89			2.8	1.9	2.3	0.9	0.9
Nanuk	64							
	76		1.8	1.8	1.4	1.4	1.4	1.4
	83		0.2	0.2	0.2			
	89		2.7	2.7	0.8			
Nigliq Delta	64			4.0	4.0	4.3	4.0	4.0
	76		5.2	5.2	2.3	3.2	2.4	2.4
	83			3.3	2.5	2.3	1.0	1.0
	89		4.8	4.8	0.8	1.6	0.9	0.9

Estimated Arctic Cisco Harvest by 10-day Interval

	Mesh		Oct 31-							Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	55	55	85	9	0	204	
	76	0	0	238	64	57	45	8	413	
	83	0	0	53	21	22	23	5	125	
	89	0	0	149	99	40	12	2	302	1,044
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	24	89	39	33	33	7	225	
	83	0	1	3	1	0	0	0	5	
	89	0	11	36	2	0	0	0	49	279
Nigliq Delta	64	0	0	40	40	43	40	8	171	
. .	76	0	105	576	255	313	168	32	1,449	
	83	0	0	33	25	23	10	2	92	
	89	0	114	560	71	109	38	8	899	2,612

Estimated Nigliq Channel Harvest:

Appendix Table 8. Estimated catch of least cisco in the Nigliq Channel fishery, 2001.

Estimated Least Cisco CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			5.7	5.7	9.9	9.9	
	76			1.3	2.2	2.5	1.5	1.5
	83			1.3	2.2	2.5	1.5	1.5
	89			0.0	0.2	0.3	0.0	0.0
Nanuk	64							
	76		20.5	20.5	0.3	0.3	0.3	0.3
	83		0.4	0.4	0.4			
	89		0.0	0.0	0.0			
Nigliq Delta	64			5.5	5.5	14.0	4.0	4.0
	76		3.0	3.0	1.1	3.6	1.7	1.7
	83			0.0	3.0	5.3	1.3	1.3
	89		0.0	0.0	0.0	0.3	0.0	0.0

Estimated Least Cisco Harvest by 10-day Interval

<u> </u>	Mesh					Oct 31-	<u> </u>	_	Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	95	95	165	17	0	372	
	76	0	0	92	107	105	48	8	359	
	83	0	0	21	36	41	25	5	127	
	89	0	0	0	8	5	0	0	13	871
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	281	1,027	7	6	6	1	1,327	
	83	0	2	7	2	0	0	0	10	
	89	0	0	0	0	0	0	0	0	1,337
Nigliq Delta	64	0	0	55	55	140	40	8	298	
0 1	76	0	59	325	123	356	118	22	1,003	
	83	0	0	0	30	53	13	3	98	
	89	0	0	0	0	23	0	0	23	1,421

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Estimated Nigliq Channel Harvest: 3,630

Appendix Table 9. Estimated catch of broad whitefish in the Nigliq Channel fishery, 2001.

Estimated Broad Whitefish CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh			Oct 31-					
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	
Upper Nigliq	64			0.0	0.0	0.0	0.0		
	76			1.8	1.0	0.5	0.2	0.2	
	83			1.8	1.0	0.5	0.2	0.2	
	89			4.7	0.3	0.4	0.1	0.1	
Nanuk	64								
	76		0.0	0.0	0.3	0.3	0.3	0.3	
	83		0.0	0.0	0.0				
	89		0.6	0.6	0.0				
Nigliq Delta	64			0.0	0.0	0.0	0.0	0.0	
	76		2.1	2.1	0.1	0.0	0.0	0.0	
	83			5.8	0.0	0.0	0.0	0.0	
	89		0.4	0.4	0.1	0.1	0.0	0.0	

Estimated Broad Whitefish Harvest by 10-day Interval

	Mesh		•	•	•	Oct 31-	•	•	Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	0	0	0	0	0	0	
	76	0	0	128	48	20	6	1	204	
	83	0	0	29	16	8	3	1	57	
	89	0	0	248	16	8	2	0	274	534
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	0	9	8	8	2	26	
	83	0	0	0	0	0	0	0	0	
	89	0	2	8	0	0	0	0	10	37
Nigliq Delta	64	0	0	0	0	0	0	0	0	
0 1	76	0	42	231	9	1	0	0	284	
	83	0	0	58	0	0	0	0	58	
	89	0	9	44	8	5	0	0	66	408

Estimated Nigliq Channel Harvest:

Appendix Table 10. Estimated catch of humpback whitefish in the Nigliq Channel fishery, 2001.

Estimated Humpback Whitefish CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			0.0	0.0	0.9	0.9	
	76			0.3	0.3	0.4	0.8	0.8
	83			0.3	0.3	0.4	0.8	0.8
	89			0.0	0.9	2.0	2.0	2.0
Nanuk	64							
	76		0.0	0.0	0.2	0.2	0.2	0.2
	83		0.0	0.0	0.0			
	89		1.5	1.5	1.5			
Nigliq Delta	64			0.5	0.5	4.0	0.0	0.0
	76		4.5	4.5	2.1	1.4	1.4	1.4
	83			2.8	0.0	1.5	2.1	2.1
	89		3.8	3.8	4.1	2.2	1.0	1.0

Estimated Humpback Whitefish Harvest by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	0	0	15	2	0	17	
	76	0	0	18	17	15	26	4	80	
	83	0	0	4	6	6	13	3	32	
	89	0	0	0	50	34	27	5	116	244
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	0	5	4	4	1	13	
	83	0	0	0	0	0	0	0	0	
	89	0	6	20	4	0	0	0	30	43
Nigliq Delta	64	0	0	5	5	40	0	0	50	
	76	0	90	493	230	137	95	18	1,063	
	83	0	0	28	0	15	21	4	68	
	89	0	89	437	383	150	41	8	1,108	2,289

Estimated Nigliq Channel Harvest:

Appendix Table 11. Estimated catch of Bering cisco in the Nigliq Channel fishery, 2001.

Estimated Bering Cisco CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64							
	76							
	83							
	89							
Nanuk	64							
	76							
	83							
	89							
Nigliq Delta	64							
	76							
	83							
	89							

Estimated Bering Cisco Harvest by 10-day Interval

<u> </u>	Mesh	<u> </u>				Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	0	0	0	0	0	0	
	76	0	0	0	0	0	0	0	0	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	0	0	0	0	0
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	0	0	0	0	0	0	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	0	0	0	0	0
Nigliq Delta	64	0	0	0	0	0	0	0	0	
	76	0	0	0	0	0	0	0	0	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	0	0	0	0	0

Estimated Nigliq Channel Harvest:

Appendix Table 12. Estimated effort by Nigliq Channel fishermen by mesh size and fishing area, 2002.

Estimated Effort in Net-Days by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
	, ,									
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Ni	gliq									
	64	0.0	0.0	12.0	8.0	0.0	0.0	0.0	20.0	
	76	0.0	0.0	10.0	91.3	68.7	53.3	20.3	243.7	
	83	0.0	0.0	1.7	1.7	0.0	0.0	0.0	3.3	
	89	0.0	0.0	21.0	35.3	20.3	13.3	2.7	92.7	359.7
Nanuk										
	64	0.0	0.0	4.0	1.0	0.0	0.0	0.0	5.0	
	76	0.0	0.0	10.3	61.3	37.3	25.3	12.0	146.3	
	83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	89	0.0	0.0	7.0	16.7	18.3	13.3	2.7	58.0	209.3
Nigliq De	elta									
	64	0.0	0.0	1.3	22.7	44.7	56.7	26.3	151.7	
	76	0.0	0.0	19.0	177.0	226.3	237.3	102.7	762.3	
	83	0.0	0.0	3.3	18.7	26.7	26.7	7.7	83.0	
	89	0.0	0.0	11.0	129.7	114.0	101.3	54.0	410.0	1407.0

Estimated Nigliq Total: 1,976.0

Appendix Table 13. Estimated catch of arctic cisco by Nigliq Channel fishermen by mesh size fishing area, 2002.

Estimated Arctic Cisco CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			6.5	6.4			
	76			2.6	1.5	0.5	0.3	0.6
	83			1.2	1.2			
	89			0.7	0.4	0.0	0.0	0.0
Nanuk	64			15.0	15.0			
	76			2.3	5.4	1.9	2.7	2.7
	83							
	89			0.7	0.4	0.7	1.1	1.1
Nigliq Delta	64			24.0	10.2	5.5	9.8	2.4
	76			15.2	6.8	6.5	4.7	4.2
	83			1.2	1.4	0.8	0.3	0.4
	89			12.2	1.7	0.3	3.1	1.9

Estimated Arctic Cisco Harvest by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	78	51	0	0	0	129	
	76	0	0	26	134	36	14	11	222	
	83	0	0	2	2	0	0	0	4	
	89	0	0	14	15	0	0	0	30	384
Nanuk	64	0	0	60	15	0	0	0	75	
	76	0	0	23	330	70	69	33	524	
	83	0	0	0	0	0	0	0	0	
	89	0	0	5	7	12	15	3	42	641
Nigliq Delta	64	0	0	32	231	247	555	63	1,128	
	76	0	0	288	1,210	1,471	1,120	429	4,517	
	83	0	0	4	26	21	8	3	62	
	89	0	0	134	219	29	314	105	801	6,508

Estimated Nigliq Channel Harvest: 7,533

Appendix Table 14. Estimated catch of least cisco by Nigliq Channel fishermen by mesh size and fishing area, 2002.

Estimated Least Cisco CPUE by 10-day Interval (numbers in bold are estimates)

_	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			10.3	3.8			
	76			6.3	1.9	1.2	0.4	0.6
	83			1.8	1.8			
	89			0.2	0.5	0.0	0.0	0.0
Nanuk	64			17.0	17.0			
	76			2.3	5.2	3.8	4.1	4.1
	83							
	89			0.4	0.0	0.0	0.8	0.8
Nigliq Delta	64			37.5	25.3	12.3	20.1	2.7
	76			6.2	2.5	2.1	1.6	1.4
	83			0.6	0.1	0.4	0.0	0.0
	89			0.9	0.3	0.3	0.7	0.6

Estimated Least Cisco Harvest by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	123	30	0	0	0	153	
	76	0	0	63	178	82	23	11	357	
	83	0	0	3	3	0	0	0	6	
	89	0	0	5	17	0	0	0	22	538
Nanuk	64	0	0	68	17	0	0	0	85	
	76	0	0	23	319	144	105	50	641	
	83	0	0	0	0	0	0	0	0	
	89	0	0	3	0	0	10	2	15	741
Nigliq Delta	64	0	0	50	573	548	1,139	71	2,381	
	76	0	0	118	441	467	384	141	1,551	
	83	0	0	2	2	10	0	0	14	
	89	0	0	10	45	35	73	33	197	4,143

Estimated Nigliq Channel Harvest:

Appendix Table 15. Estimated catch of broad whitefish by Nigliq Channel fishermen by mesh size and fishing area, 2002.

Estimated Broad Whitefish CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			0.0	0.8			
	76			2.2	0.7	0.2	0.0	0.0
	83			1.2	1.2			
	89			2.0	1.3	0.5	0.5	0.5
Nanuk	64			0.0	0.0			
	76			0.0	0.2	0.3	0.0	0.0
	83							
	89			0.1	0.1	0.0	0.0	0.0
Nigliq Delta	64			0.0	0.0	0.1	0.0	0.0
	76			0.2	0.0	0.0	0.0	0.0
	83			0.0	0.0	0.0	0.0	0.0
	89			0.0	0.0	0.0	0.1	0.0

Estimated Broad Whitefish Harvest by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	0	6	0	0	0	6	
	76	0	0	22	66	15	0	0	103	
	83	0	0	2	2	0	0	0	4	
	89	0	0	43	46	10	7	1	107	220
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	0	10	11	0	0	21	
	83	0	0	0	0	0	0	0	0	
	89	0	0	1	1	0	0	0	2	23
Nigliq Delta	64	0	0	0	0	3	0	0	3	
	76	0	0	3	2	5	0	0	10	
	83	0	0	0	0	1	0	0	1	
	89	0	0	0	1	0	10	0	12	2:

Estimated Nigliq Channel Harvest:

268

Appendix Table 16. Estimated catch of humpback whitefish by Nigliq Channel fishermen by mesh size and fishing area, 2002.

Estimated Humpback Whitefish CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh					Oct 31-		
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			5.8	2.4			
	76			6.1	2.0	1.1	0.7	0.2
	83			0.6	0.6			
	89			2.3	1.6	1.2	1.2	1.2
Nanuk	64			1.0	1.0			
	76			0.8	1.9	0.6	1.7	1.7
	83							
	89			1.1	1.5	1.5	1.8	1.8
Nigliq Delta	64			0.0	1.8	1.0	1.6	0.8
• .	76			2.4	1.4	1.3	1.2	0.9
	83			0.0	0.7	0.0	0.0	0.8
	89			5.1	2.0	0.9	1.8	1.2

Estimated Humpback Whitefish Harvest by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	69	20	0	0	0	89	
	76	0	0	61	180	72	37	5	356	
	83	0	0	1	1	0	0	0	2	
	89	0	0	49	56	24	16	3	147	593
Nanuk	64	0	0	4	1	0	0	0	5	
	76	0	0	8	118	21	43	21	211	
	83	0	0	0	0	0	0	0	0	
	89	0	0	8	24	28	23	5	88	304
Nigliq Delta	64	0	0	0	41	43	91	22	196	
	76	0	0	46	251	299	292	95	983	
	83	0	0	0	13	0	0	6	19	
	89	0	0	56	262	102	183	67	670	1,869

Estimated Nigliq Channel Harvest: 2,765

Appendix Table 17. Estimated catch of Bering cisco by Nigliq Channel fishermen by mesh size and fishing area, 2002.

Estimated Bering Cisco CPUE by 10-day Interval (numbers in bold are estimates)

	Mesh		•	•	•	Oct 31-	•	•
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29
Upper Nigliq	64			0.0	0.0			
	76			0.0	0.0	0.0	0.0	0.0
	83			0.0	0.0			
	89			0.0	0.0	0.2	0.2	0.2
Nanuk	64			0.0	0.0			
	76			0.0	0.0	0.0	0.0	0.0
	83							
	89			0.0	0.0	0.0	0.0	0.0
Nigliq Delta	64			0.0	0.0	0.0	0.1	0.0
	76			0.0	0.0	0.0	0.0	0.0
	83			0.0	0.0	0.0	0.0	0.0
	89			0.0	0.0	0.0	0.0	0.0

Estimated Bering Cisco Harvest by 10-day Interval

	Mesh					Oct 31-			Mesh	Area
Area	(mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Nov 9	Nov 10-19	Nov 20-29	Total	Total
Upper Nigliq	64	0	0	0	0	0	0	0	0	
	76	0	0	0	0	2	0	0	2	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	3	2	0	6	8
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	0	0	0	0	0	0	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	0	0	0	0	0
Nigliq Delta	64	0	0	0	0	0	3	0	3	
	76	0	0	0	0	0	0	0	0	
	83	0	0	0	0	1	1	0	1	
	89	0	0	0	0	0	0	0	0	4

Estimated Nigliq Channel Harvest:

Appendix Table 18. Observed daily catches of arctic cisco in the Colville Delta commercial fishery, 2001.

	East Channe	1			
	76 Maal	_	=	83-mm	
Date	76-mm Mesl Net 1	Net 2	Net 4	Mesh Net 3	Total
Oct 9	92	92	1,00	11005	184
Oct 10	68 33 74	47 56 84 62			115
Oct 11 Oct 12	33	56			89 224
Oct 12 Oct 13	74 27	84 62		66 42	131
Oct 14		02		42	131
Oct 15	49	56		53 42	158
Oct 16	19	56 24	17		102
Oct 17	22 11	28 18	20	37	107
Oct 18 Oct 19		18		27	63 23
Oct 19	14	9 11	11	9 11	47
Oct 20 Oct 21					
Oct 22	12	13	9	20	54
Oct 23 Oct 24				 <u>-</u>	
Oct 24 Oct 25	5	10 12	12	17	44
Oct 25 Oct 26	δ	12	19	13	20 32 48
Oct 27	10	10	7	13 21	48
Oct 27 Oct 28					
Oct 29 Oct 30	12	17	15		44
Oct 30 Oct 31					20
Nov 1		9	4		20
Nov 2	22	5	12		39
Nov 3 Nov 4	3	6	6		15
Nov 4					
Nov 5 Nov 6	3	2	9		14
Nov 7	5	8	7		20
Nov 8 Nov 9					
Nov 9	9	15	29		53
Nov 10	7	7	13		27
Nov 11 Nov 12			11		17
Nov 12			11		1 /
Nov 14	21	21	24		66
Nov 14 Nov 15					
Nov 16	23 39	15 22	11		49
Nov 17 Nov 18			11		72
Nov 19					
Nov 20	16	19	12		47
Nov 21					
Nov 22					
Nov 23					
Nov 23 Nov 24 Nov 25					
Total Catch		683	266	358	1,924
Net-Days CPUE	43 14.3	43 15.9	36 7.4	28 12.8	150 12.8
CFUE	14.3	13.9	/.4	12.0	14.0

Appendix Table 19. Observed daily catches of arctic cisco in the Colville Delta commercial fishery, 2002.

Date Net 1 Net 2 Net 3 Net 4 Total		East Channe	el			
Date Net 1 Net 2 Net 3 Net 4 Total						
Oct 10 Oct 12 Oct 13 Oct 14 Oct 14 0ct 15 Oct 16 186 183 369 Oct 17 268 219 119 167 773 Oct 18 191 199 119 165 674 Oct 19 132 148 81 103 464 Oct 20 0ct 21 141 107 107 355 Oct 22 47 55 53 155 Oct 23 0ct 24 56 45 51 152 Oct 24 56 45 51 152 152 Oct 25 51 48 78 177 137 137 137 137 137 137 137 137 137 137 137 137 137 137 137 137 137 138 138 148 148 148 148 148 148 148 148 148 148						
Oct 12 Oct 13 Oct 14 Oct 15 26 43 69 Oct 16 186 183 369 Oct 17 268 219 119 167 773 Oct 18 191 199 119 165 674 Oct 20 Oct 21 141 107 107 355 Oct 22 47 55 53 155 Oct 23 30 55 51 152 Oct 24 56 45 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 30 30 59 23 134 Nov 1 68 46 14 12 61 Oct 30 30 59 23 134 Nov 2 22 30 59 23 134 <td>Date</td> <td>Net 1</td> <td>Net 2</td> <td>Net 3</td> <td>Net 4</td> <td>Total</td>	Date	Net 1	Net 2	Net 3	Net 4	Total
Oct 12 Oct 13 60 14 60 15 26 43 69 60 60 16 186 183 369 60 177 268 219 119 167 773 60 18 191 199 119 165 674 674 60 19 132 148 81 103 464 60 60 20 60 21 141 107 107 355 53 155 60 22 47 55 53 155 60 22 47 55 53 155 60 22 47 55 53 155 60 22 47 55 53 155 60 125 60 22 47 55 53 155 60 125 60 23 157 60 22 60 22 177 60 22 48 48 41 137 12 61 60 1						
Oct 14 6ct 15 26 43 69 Oct 16 186 183 369 Oct 17 268 219 119 167 773 Oct 18 191 199 119 165 674 Oct 19 132 148 81 103 464 Oct 20 0ct 21 141 107 107 355 55 0ct 22 47 55 53 155 Oct 23 0ct 24 56 45 51 152 0ct 25 51 48 78 177 0ct 26 48 48 41 137 0ct 27 0ct 27 0ct 28 41 29 29 99 99 0ct 29 20 15 14 12 61 0ct 31 14 12 61 0ct 31 14 12 61 0ct 31 14 10 14 18 18 18 18 18 18 18 18 18 18 </td <td>Oct 11</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Oct 11					
Oct 14 6ct 15 26 43 69 Oct 16 186 183 369 Oct 17 268 219 119 167 773 Oct 18 191 199 119 165 674 Oct 19 132 148 81 103 464 Oct 20 0ct 21 141 107 107 355 55 0ct 22 47 55 53 155 Oct 23 0ct 24 56 45 51 152 0ct 25 51 48 78 177 0ct 26 48 48 41 137 0ct 27 0ct 27 0ct 28 41 29 29 99 99 0ct 29 20 15 14 12 61 0ct 31 14 12 61 0ct 31 14 12 61 0ct 31 14 10 14 18 18 18 18 18 18 18 18 18 18 </td <td>Oct 12</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Oct 12					
Oct 15 26 43 69 Oct 16 186 183 369 Oct 17 268 219 119 167 773 Oct 18 191 199 119 165 674 Oct 29 132 148 81 103 464 Oct 20 0ct 21 141 107 107 355 Oct 21 141 107 107 355 Oct 23 0ct 24 56 45 51 152 Oct 25 51 48 78 177 177 0ct 26 48 48 41 137 Oct 27 0ct 28 41 29 29 99 99 Oct 30 0ct 31 12 14 12 61 Oct 31 Nov 1 68 46 114 12 61 Nov 2 22 30 59 23 134 Nov 3 Nov 4 19 18 <td>Oct 13</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Oct 13					
Oct 16 186 183 369 Oct 17 268 219 119 167 773 Oct 18 191 199 119 167 773 Oct 19 132 148 81 103 464 Oct 20 35 355 3 155 Oct 21 141 107 107 355 Oct 23 35 35 155 Oct 23 30 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 30 52 29 99 Oct 29 20 15 14 12 61 Oct 30 30 59 23 134 Nov 2 22 30 59 23 134 Nov 3 10 18 28 65 Nov 4 19 18 28 65	Oct 14					
Oct 17 268 219 119 167 773 Oct 18 191 199 119 165 674 Oct 19 132 148 81 103 464 Oct 20 Oct 21 141 107 107 355 Oct 22 47 55 53 155 Oct 23 Oct 24 56 45 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 30 Oct 30 0ct 31 14 12 61 Oct 30 Oct 31 Nov 1 68 46 114 12 61 Nov 3 Nov 3 134 Nov 3 134 Nov 3 134 Nov 5 10 18 10 15 43 134 Nov 9 10 2 10 2	Oct 15	26	43			69
Oct 19 132 148 81 103 464 Oct 20 Oct 21 141 107 107 3355 Oct 22 47 55 53 155 Oct 23 30 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 30 0ct 30 0ct 31 14 12 61 Oct 31 Nov 1 68 46 114 12 61 Nov 3 10 18 28 65 65 Nov 3 10 15 43 43 Nov 5 10 15 43 Nov 7 10 21 10 21 Nov 10 10 21 10 21 Nov 11 9 2 10 21 Nov 14 10 15	Oct 16	186	183			369
Oct 19 132 148 81 103 464 Oct 20 Oct 21 141 107 107 3355 Oct 22 47 55 53 155 Oct 23 30 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 30 0ct 30 0ct 31 14 12 61 Oct 31 Nov 1 68 46 114 12 61 Nov 3 10 18 28 65 65 Nov 3 10 15 43 43 Nov 5 10 15 43 Nov 7 10 21 10 21 Nov 10 10 21 10 21 Nov 11 9 2 10 21 Nov 14 10 15	Oct 17	268	219	119	167	7/3
Oct 20 Oct 21 141 107 107 355 Oct 22 47 55 53 155 Oct 23	Oct 18	191	199	119	165	6/4
Oct 23 Oct 24 56 45 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 30 29 99 99 Oct 28 41 29 29 99 99 Oct 30 30 30 59 23 134 14 12 61 61 62 61 62 61 62 61 62 62 62 62 62 63 63 63 65 80 65 80 65 80 80 65 80 80 65 80 80 65 80 80 7 17 32 80 80 7 17 32 80 80 7 17 32 80 80 14 80 14 80 14 80 14 80 14 80 14 80 14 <td< td=""><td>Oct 19</td><td>132</td><td>148</td><td>81</td><td>103</td><td>464</td></td<>	Oct 19	132	148	81	103	464
Oct 23 Oct 24 56 45 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 30 29 99 99 Oct 28 41 29 29 99 99 Oct 30 30 30 59 23 134 14 12 61 61 62 61 62 61 62 61 62 62 62 62 62 63 63 63 65 80 65 80 65 80 80 65 80 80 65 80 80 65 80 80 7 17 32 80 80 7 17 32 80 80 7 17 32 80 80 14 80 14 80 14 80 14 80 14 80 14 80 14 <td< td=""><td>Oct 20</td><td>171</td><td>107</td><td>107</td><td></td><td>255</td></td<>	Oct 20	171	107	107		255
Oct 23 Oct 24 56 45 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 30 29 99 99 Oct 28 41 29 29 99 99 Oct 30 30 30 59 23 134 14 12 61 61 62 61 62 61 62 61 62 62 62 62 62 63 63 63 65 80 65 80 65 80 80 65 80 80 65 80 80 65 80 80 7 17 32 80 80 7 17 32 80 80 7 17 32 80 80 14 80 14 80 14 80 14 80 14 80 14 80 14 <td< td=""><td>Oct 21</td><td>141</td><td>107</td><td>52</td><td></td><td>333 155</td></td<>	Oct 21	141	107	52		333 155
Oct 24 56 45 51 152 Oct 25 51 48 78 177 Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 29 20 15 14 12 61 Oct 30 0ct 31 0ct 31 12 68 46 114 Nov 1 68 46 114 12 61 Nov 3 Nov 3 134 134 134 Nov 3 Nov 4 19 18 28 65 Nov 5 18 10 15 43 14 Nov 6 18 10 15 43 32 Nov 9 Nov 10 21 17 32 Nov 11 9 2 10 21 Nov 12 10 21 14 14 Nov 15 10 10 14 14	Oct 22	4/	33			133
Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 29 20 15 14 12 61 Oct 30 Oct 31 Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 Nov 4 19 18 28 65 Nov 5 Nov 6 18 10 15 43 Nov 7 Nov 8 8 7 17 32 Nov 9 Nov 10 21 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 20 Nov 20 Nov 21 Nov 22 2 0 0 2 Nov 23 Nov 24 Nov 25 </td <td>Oct 23</td> <td>56</td> <td>45</td> <td><u></u>51</td> <td></td> <td>152</td>	Oct 23	56	45	<u></u> 51		152
Oct 26 48 48 41 137 Oct 27 Oct 28 41 29 29 99 Oct 29 20 15 14 12 61 Oct 30 Oct 31 Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 Nov 4 19 18 28 65 Nov 5 Nov 6 18 10 15 43 Nov 7 Nov 8 8 7 17 32 Nov 9 Nov 10 21 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 20 Nov 20 Nov 21 Nov 22 2 0 0 2 Nov 23 Nov 24 Nov 25 </td <td>Oct 25</td> <td><u>50</u> 51</td> <td>48</td> <td>78</td> <td></td> <td>177</td>	Oct 25	<u>50</u> 51	48	78		177
Oct 27 Oct 28 41 29 29 99 Oct 29 20 15 14 12 61 Oct 30 Oct 31 0ct 32 0ct 3	Oct 26	48	48	41		137
Oct 28 41 29 29 99 Oct 30 Oct 31 12 61 Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 18 10 15 43 Nov 5 18 10 15 43 Nov 7 Nov 8 8 7 17 32 Nov 9 10 21 10 21 Nov 10 19 2 10 21 Nov 12 10 21 14 Nov 13 6 3 5 14 Nov 14 14 14 14 Nov 15 10 21 15 11 Nov 17 10 18 5 1 5 11 Nov 18 5 1 5 11 11 11 12 12 12 12 12 12 12 12 12 <td>Oct 27</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Oct 27					
Oct 31 Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 Nov 4 19 18 28 65 Nov 5 Nov 6 18 10 15 43 Nov 7 17 32 Nov 9 Nov 10 32 17 32 Nov 10 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 14 14 14 14 Nov 15 Nov 16 3 3 8 14 Nov 17 10 1 1 1 1 Nov 20 1 1 5 1 5 1 1 Nov 21 1 0 0 2 0 0 2 Nov 23 1 0 0 0 0 0 0 0 0 0	Oct 28	41	29	29		99
Oct 31 Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 Nov 4 19 18 28 65 Nov 5 Nov 6 18 10 15 43 Nov 7 17 32 Nov 9 Nov 10 32 17 32 Nov 10 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 14 14 14 14 Nov 15 Nov 16 3 3 8 14 Nov 17 10 1 1 1 1 Nov 20 1 1 5 1 5 1 1 Nov 21 1 0 0 2 0 0 2 Nov 23 1 0 0 0 0 0 0 0 0 0	Oct 29	20	15	14	12	61
Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 19 18 28 65 Nov 5 10 15 43 Nov 7 17 32 Nov 8 8 7 17 32 Nov 9 10 21 17 32 Nov 10 19 2 10 21 21 Nov 12 10 21 14 <td< td=""><td>Oct 30</td><td></td><td></td><td></td><td></td><td></td></td<>	Oct 30					
Nov 1 68 46 114 Nov 2 22 30 59 23 134 Nov 3 19 18 28 65 Nov 5 10 15 43 Nov 7 17 32 Nov 8 8 7 17 32 Nov 9 10 21 17 32 Nov 10 19 2 10 21 21 Nov 12 10 21 14 <td< td=""><td>Oct 31</td><td></td><td></td><td></td><td></td><td></td></td<>	Oct 31					
Nov 3 Nov 4 19 18 28 65 Nov 6 18 10 15 43 Nov 7 Nov 8 8 7 17 32 Nov 9 Nov 10 32 33 33 33 33 34 34 34 32 32 33 34 34 32 32 33 34 34 32 32 33 33 33 33 33 33 34 34 <td>Nov 1</td> <td>68</td> <td>46</td> <td></td> <td></td> <td></td>	Nov 1	68	46			
Nov 4 19 18 28 65 Nov 5 Nov 6 18 10 15 43 Nov 7 Nov 8 8 7 17 32 Nov 9 Nov 10 21 Nov 11 9 2 10 21 Nov 12 21 14 14 Nov 13 6 3 5 14 Nov 15 10 14 14 Nov 16 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 20 10 2 10 2 Nov 21 10 2 2 0 0 2 Nov 23 10 2 0 0 2 Nov 25 2 0 0 0 2 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 2	22	30	59	23	134
Nov 5 Nov 6 18 10 15 43 Nov 7 10 32 Nov 10 21 10 21 Nov 11 9 2 10 21 Nov 12 10 21 14 Nov 13 6 3 5 14 Nov 14 10 14 14 Nov 15 10 14 14 Nov 16 3 3 8 14 Nov 17 11 10 11 11 Nov 20 10 2 11 11 11 Nov 20 10 2 12 10 2 12<	Nov 3					
Nov 6 18 10 15 43 Nov 7 32 Nov 8 8 7 17 32 Nov 10 21 Nov 11 9 2 10 21 Nov 12 21 Nov 13 6 3 5 14 Nov 15 3 3 8 14 Nov 16 3 3 8 14 Nov 17 10 1 1 Nov 18 5 1 5 11 Nov 20 10 2 1 Nov 21 10 2 2 0 0 2 Nov 23 2 0 0 2 0 0 2 Nov 24 10 2 0 0 3 </td <td>Nov 4</td> <td>19</td> <td>18</td> <td>28</td> <td></td> <td>65</td>	Nov 4	19	18	28		65
Nov 10 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 16 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 5					
Nov 10 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 16 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 6	18	10	15		43
Nov 10 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 16 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 8	Q		17		32
Nov 10 Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 16 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 9					32
Nov 11 9 2 10 21 Nov 12 Nov 13 6 3 5 14 Nov 14 Nov 15 Nov 16 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 21 Nov 22 2 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 10					
Nov 12 Nov 13 Nov 14 Nov 14 Nov 15 Nov 16 Nov 16 Nov 17 Nov 18 S Nov 19 Nov 20 Nov 21 Nov 22 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132		9	2.	10		21
Nov 14 Nov 15 Nov 16 3 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 12					
Nov 14 Nov 15 Nov 16 3 3 3 8 14 Nov 17 Nov 18 5 1 5 11 Nov 19 Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 13	6	3	5		14
Nov 15 Nov 16 3 3 8 14 Nov 17 1	Nov 14					
Nov 17 Nov 18 5 1 5 11 Nov 19 1 2 1	Nov 15					
Nov 18 5 1 5 11 Nov 20	Nov 16	3	3	8		14
Nov 19 Nov 20 Nov 21 Nov 22 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132						
Nov 20 Nov 21 Nov 22 2 0 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 18	5	1	5		11
Nov 21 Nov 22 2 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 19					
Nov 22 2 0 0 2 Nov 23 Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 20					
Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 21					
Nov 24 Nov 25 Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 22		0	0		<u>2</u> .
Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 23					
Total Catch 1367 1259 839 470 3,935 Net-Days 39 39 37 17 132	Nov 25					
Net-Days 39 39 37 17 132	1107 23					
Net-Days 39 39 37 17 132						
Net-Days 39 39 37 17 132	Total Catch	1367	1259	839	470	3,935
						132
		35.1	32.3	22.7	27.6	29.8

Appendix Table 20. Observed daily catches of least cisco in the Colville Delta commercial fishery, 2001.

	East Channe	el			
	76 Maa'	L	-	83-mm Mesh	
Date	76-mm Mes	Net 2	Net 4	Net 3	Total
Oct 9		81	TYCL 4	INCL 3	137
Oct 10	75	114			189 144 174
Oct 11 Oct 12	46	98 83			144
Oct 12	56 75 46 70 65	83		21	174
Oct 13	65	71		17	153
Oct 14 Oct 15	80	113		20	213
Oct 15	67	90	51	<u>20</u>	228
Oct 17	95	111	49 44	20 20 21	228 276 163
Oct 18	95 36 25 42	67	44	16	163
Oct 19	25	30		11	66
Oct 20 Oct 21	42	76	56	9	183
Oct 21 Oct 22	65	73	60		207
Oct 22	03	13	00	9	207
Oct 23 Oct 24	36	49	27	<u> </u>	114
Oct 25	36 19	49 30			10
Oct 26			19 21	3	22 88
Oct 27	34	29	21	4	88
Oct 28	32	36	29		97
Oct 29 Oct 30	32	30	29		9/
Oct 31	32	36	30		98
Nov 1					<u>-</u>
Nov 2	31	14	29 9		74
Nov 3 Nov 4	22	14	9		45
Nov 4					
Nov 5 Nov 6	13	9	11		33
Nov 7	15	8	6		29
Nov 8			·		
Nov 9	18	9	9		36
Nov 10	4	3	2		9
Nov 11					
Nov 12	6	4	2		12
Nov 13	13	13	11		37
Nov 14 Nov 15	1.3	13	11		51
Nov 16	10	8	5		23
Nov 17	5	14	2		21
Nov 18					
Nov 19					
Nov 20	16	25	15		56
Nov 21 Nov 22					
Nov 23					
Nov 24					
Nov 25					
T-4-1-0 + 1	1000	1200	407	1.50	2.076
Total Catch	n 1028 43	1308 43	487	153	2,976 150
Net-Days CPUE	23.9	30.4	36 13.5	28 5.5	19.8
CIUE	43.3	30.4	13.3	5.5	17.0

Appendix Table 21. Observed daily catches of least cisco in the Colville Delta commercial fishery, 2002.

	East Channe	1								
	76-mm Mesh									
		76-mm								
Date	Net 1	Net 2	Net 3	Net 4	Total					
Oct 10 Oct 11										
Oct 11										
Oct 12 Oct 13										
Oct 14										
Oct 15	32	21			53					
Oct 16	32 132	21 104			53 236 480					
Oct 17	113	122	68	177	480					
Oct 18	121	110	84	126	441					
Oct 19 Oct 20	115	118	83	124	440					
Oct 20										
Oct 21	104 58	81 49	65 54		250 161					
Oct 21 Oct 22 Oct 23	58	49	54		101					
Oct 24	72	70	73		215					
Oct 25	90	98	60		215 248 273					
Oct 25 Oct 26	90 95	98 87	60 91		273					
Oct 27										
Oct 28 Oct 29	123 57	111 60	107 54		341 232					
Oct 29	57	60	54	61	232					
Oct 30										
Oct 31	100									
Nov 1 Nov 2	123 64	99 60	00	135	222 347					
Nov 2	04	00	00	133	34/					
Nov 3 Nov 4 Nov 5 Nov 6	84	83	73		240					
Nov 5										
Nov 6	45	34	47		126					
INOV /										
Nov 8	93	80	102		275					
Nov 9										
Nov 10	105									
Nov 11	125	79	/9		283					
Nov 12 Nov 13	50	56	55		161					
Nov 14	50	50								
Nov 14 Nov 15										
Nov 16	90	56	72		218					
Nov 17										
Nov 18	35	38	56		129					
Nov 19 Nov 20										
Nov 21		20	42		122					
Nov 22 Nov 23	31	38	43		132					
Nov 24										
Nov 25										
Total Catch	1872	1654	1354	623	5,503					
Net-Days	39	39	37	17	132					
CPUE	48.0	42.4	36.6	36.6	41.7					

Appendix Table 22. Observed daily catches of humpback whitefish in the Colville Delta commercial fishery, 2001.

	East Channe	1			
	76-mm Mesh	1	-	83-mm Mesh	
Date	Net 1	Net 2	Net 4	Net 3	Total
Oct 9	66 81 82	40			106 125 146 288 233
Oct 10 Oct 11	81	44 64			125
Oct 11	02 103	72		113	288
Oct 13	103 64	57		113 112	233
Oct 14					
Oct 15	97	87 59 34		122	306
Oct 16 Oct 17		59	51	101 90	286
Oct 17	97 75 41 38 59	50 50	51 70 42	101	306 286 235 231 230 367
Oct 18 Oct 19	59	50 59 68		112	230
Oct 20	52	68	97	150	367
Oct 21 Oct 22					
Oct 22 Oct 23	77	113	96	188	474
Oct 24	72	110	90	181	<u>⊿53</u>
Oct 24 Oct 25 Oct 26	38	81	70	101	453 119 242
Oct 26	-		54	188	242
Oct 27 Oct 28	60	95	54 69	154	378
Oct 28 Oct 29	103	96	95		
Oct 29	103	96	95		294
Oct 30 Oct 31	62	65	89		216
Nov 1					
Nov 2	65	75 31	79 47		219 117
Nov 3 Nov 4	39	31	47		117
Nov 4 Nov 5	52		57		152
Nov 5	32	43	37		132
Nov 6 Nov 7	31	67	65		163
Nov 8					
Nov 9 Nov 10	36 17	48	43 18		127 73
Nov 10 Nov 11	17	38	18		73
Nov 12	19	29	18		66
Nov 13					
Nov 14	43	76	37		156
Nov 15				-	
Nov 16 Nov 17	29 30	49 47	22 25		100 102
	30	4/	43		102
Nov 18 Nov 19				. 	
Nov 20	43	89	48		180
Nov 21 Nov 22					
Nov 22					
Nov 23 Nov 24					
Nov 24 Nov 25					
Total Catch		1786	1212	1612	6,184
Net-Days CPUE	43 36.6	43 41.5	36 33.7	28 57.6	150 41.2
Crue	30.0	41.3	33.1	37.0	41.2

Appendix Table 23. Observed daily catches of humpback whitefish in the Colville Delta commercial fishery, 2002.

	East Channe	1			
		76-mm	Mesh		
Date	Net 1	Net 2	Net 3	Net 4	Total
Oct 10					
Oct 11					
Oct 12 Oct 13					
Oct 14					
Oct 15	100	44			144
Oct 16	199				380
Oct 17	199 43	181 52	72	96	144 380 263 170
Oct 18	13	18	47 69	96 92	170
Oct 19	28	37	69	69	203
Oct 20					
Oct 21	31 24	31	82 63		144
Oct 19 Oct 20 Oct 21 Oct 22 Oct 23	24	20	63		107
Oct 23 Oct 24		20	0.5		170
Oct 25	47 31 22	38	85 60		170
Oct 25 Oct 26	<u> </u>	33 23	62		107
Oct 27		23	02		107.
Oct 26 Oct 27 Oct 28 Oct 29	45	41	95		181
Oct 29	45 31	41 14	95 62	47	181 154
Oct 30 Oct 31					
Oct 31					
Nov 1	34 33	39 22			73
Nov 2	33	22	151	133	339
Nov 3 Nov 4					
Nov 4	42	33	112		187
Nov 5 Nov 6 Nov 7	3/1	26	06		156
Nov 7		20	20		130
Nov 8	44	30	126	• • • • • • • • • • • • • • • • • • • •	200
Nov 9					
Nov 10					
Nov 11	36	40	175		251
Nov 12					
Nov 13	23	16	111		150
Nov 14					
Nov 15	50	20	172		258
Nov 16 Nov 17	58	28	172		238
Nov 18	28	24	94		146
	20				140.
Nov 19 Nov 20					
Nov 21					
Nov 22	58	45	175		278
Nov 22 Nov 23					
Nov 24					
Nov 25					
Total Catal	1004	025	1000	427	/ 10 <i>5</i>
Total Catch Net-Days	1004 39	835 39	1909 37	437 17	4,185 132
CPUE	25.7	21.4	51.6	25.7	31.7
CLOE	43.1	∠1.廿	31.0	43.1	31.7

Appendix Table 24. Length frequency by mesh size for arctic cisco, 2001 Colville Delta fall fishery.

ARCTIC CISCO - Village

ARCTIC CISCO - Commercial

Fork	M	esh Siz	ze (mm	1)				76 mm	mesh			
Length												76 mm
(mm)	64	76	83	89	Oct 9	Oct 16	Oct 24	Oct 31	Nov 7	Nov 14	Nov 20	Total
200		1										
210												
220												
230												
240												
250	3											
260	6	1										
270	7	1										
280	11	4					2					2
290	5	8		1					3	1		4
300	2	18	1	1	1	4	1	1	2	1	3	13
310	1	25	2	2	3	3	2	3	1	1	3	16
320		42	1	8	4	5	3	3	4	6	1	26
330	3	45	3	2	2	6	2	7	2	3	1	23
340	2	67	1	11	5	5	7	5	7	5	3	37
350	6	47	1	18	7	8	3	7	8	4	6	43
360	5	54	2	46	10	5	6	6	7	5	7	46
370	2	34		42	4	5	7	8	10	6	9	49
380	1	38	1	41	7	3	11	4	3	5	5	38
390	1	18		21	2	3	2	1	3	3	4	18
400		8		15	2	2	2	4	8	6	2	26
410		2		8	2	1	1	1	2	4	2	13
420				5	1		1				1	3
430												
440												
450												
Total:	55	413	12	221	50	50	50	50	60	50	47	357

Appendix Table 25. Length frequency by mesh size for arctic cisco, 2002 Colville Delta fall fishery.

ARCTIC CISCO - Village

ARCTIC CISCO - Commercial

Fork	M	Iesh Siz	ze (mm))	Fork			76	mm me	sh		
Length					Length							76 mm
(mm)	64	76	83	89	(mm)	Oct 15	Oct 22	Oct 29	Nov 6	Nov 13	Nov 22	Total
200					200							
210	2				210							
220		1			220							
230	1				230							
240		1			240							
250	7				250							
260	11				260							
270	40	1			270							
280	54	18		2	280							
290	48	116		17	290	4	2	1	1			8
300	55	380	1	32	300	7	6	6	5	2	2	28
310	22	590	6	41	310	11	13	12	8	7	1	52
320	12	386	5	34	320	16	14	14	13	18	2	77
330	5	172	19	35	330	4	7	13	6	13	4	47
340	5	67	6	24	340	3	3	2	5	4	1	18
350	1	37	5	24	350		2		2			4
360		19	3	25	360		2 2			1	1	4
370		26	4	30	370		1		2		2	5
380		12	4	25	380	1		2		3		6
390	1	6	2	12	390	1			1			2
400		3	1	2	400	2						2
410		1		3	410							
420			1		420							
430					430							
440					440							
450		1			450							
460					460							
470					470							
480					480							
490					490							
500					500							
Total:	264	1837	57	306	Total:	49	50	50	43	48	13	253

Appendix Table 26. Length frequency by mesh size for least cisco, 2001 Colville Delta fall fishery.

LEAST CISCO - Village

LEAST CISCO - Commercial

Fork		Mesh (r	nm)		Fork		7	6 mm me	sh	
Length (mm)	64	76	83	89	Length (mm)	Oct 9	Oct 31	Nov 9	Nov 20	76 mm Total
200	0.1	70	- 05		200	000	00131	11077	110120	10141
210					210					
220					220					
230					230					
240					240					
250	2	1			250					
260	8	7			260					
270	9	5			270	1	1		1	3
280	22	36	1		280	1	1			2
290	20	84	4	1	290	5	1	1	3	10
300	19	121	2		300	6	8	1	9	24
310	15	116	1		310	12	8	5	7	32
320	8	61	1		320	15	10	9	7	41
330	5	55	1	1	330	6	10	8	15	39
340	1	14		4	340	2	9	6	7	24
350		5			350	3	2	2	1	8
360	1	2		3	360			3		3
370				2	370					
380		5		1	380					
390		3		1	390					
400					400					
410					410					
420					420					
430					430					
440					440					
450					450					
Total:	110	515	10	13	Total:	51	50	35	50	186

Appendix Table 27. Length frequency by mesh size for least cisco, 2002 Colville Delta fall fishery.

LEAST CISCO - Village

LEAST CISCO - Commercial

					-					
Fork		Mesh (r	nm)			Fork		76 mm	n mesh	
Length						Length				76 mm
(mm)	64	76	83	89		(mm)	Oct 15	Oct 22	Oct 29	Total
190		1		1	•	190				
200		2		1		200				
210		1		1		210				
220						220				
230		3		1		230				
240	2	3		3		240				
250	13	3	1	7		250				
260	31	7		6		260				
270	71	15		9		270				
280	63	29		9		280	1			1
290	42	96		8		290	2	2	2	6
300	39	168		7		300	11	9	7	27
310	18	152	1	7		310	12	9	13	34
320	13	98		10		320	10	16	14	40
330	7	61		2		330	9	9	11	29
340	2	26	1			340	5	3	2	10
350	1	14		2		350	1	2	1	4
360	1	5	1	3		360				
370		4		2		370				
380				2		380				
390				2		390				
400						400				
410						410				
420						420				
430						430				
440						440				
450					_	450				
Total:	303	688	4	83	-	Total:	51	50	50	151

Appendix Table 28. Age frequencies of arctic cisco caught in 76 mm mesh, 1976-2002.

											Perce	nt										
Age																						
(Years)	1976	1977	1978	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
3	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.5	10.7	0.0	0.0	0.0	0.5	0.0	18.3	7.3	4.9	0.0	0.0	0.7	0.0	0.0	0.0	28.7	24.5	3.5	10.3	7.6
5	3.2	57.7	10.2	10.2	3.3	0.0	0.0	63.5	0.0	86.0	51.0	59.7	3.4	10.8	59.5	5.3	43.2	14.0	65.0	33.6	16.5	72.9
6	54.8	15.4	74.0	77.2	21.5	41.2	1.0	1.6	72.0	3.3	33.6	36.4	79.7	31.7	23.6	84.7	11.6	48.3	2.8	37.1	37.1	14.6
7	6.4	23.6	0.9	9.1	68.2	50.8	59.0	0.8	0.0	2.7	1.4	3.9	14.9	46.8	7.4	9.3	41.1	4.2	8.4	4.2	14.4	4.2
8	29.0	1.6	2.8	0.0	4.8	8.0	32.0	31.0	0.0	0.0	5.6	0.0	2.0	9.4	7.4	0.7	4.1	9.1	2.8	11.2	4.1	0.7
9	6.4	0.5	0.0	0.0	1.3	0.0	7.6	2.4	9.3	0.0	0.0	0.0	0.0	0.7	2.0	0.0	0.0	1.4	1.4	4.2	12.4	0.0
10	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	5.2	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0
N=	31	182	215	est.	est.	199	196	126	est.	150	143	154	148	139	148	150	146	151	150	143	97	144

1984, 1985 and 1989 age distributions estimated by comparing length frequencies of Arctic cisco caught in gill nets to fish caught in fyke nets

Appendix Table 29. Age frequencies of least cisco caught in 76 mm mesh, 1976-2002.

					Per	ent									
Age															
(Years)	1976 1977 1978	1984 1985 1986	1987	1988 1989	1990 1991	1992	1993	1994 19	995 1	996 1997	1998	1999	2000	2001	2002
5	0.0		0.0	0.0	0.0)	0.0		0.0	0.0		0.7		0.7	
6	7.4		0.0	2.3	0.7	'	0.0		0.0	0.0		4.1		1.3	
7	14.8		2.5	0.0	2.7	'	0.7		2.7	2.7		2.7		2.0	
8	28.4		12.6	4.5	8.0)	4.7		3.3	6.1		6.8		2.7	
9	8.6		19.6	11.4	8.7	'	7.4	1	0.0	9.5		13.0		4.7	
10	7.4		18.1	20.5	15.3		16.8		8.0	14.9		18.5		14.0	
11	7.4		16.1	13.6	20.0)	24.2	1	7.3	14.2		13.0		20.0	
12	11.1		14.1	9.1	16.0)	13.4	1	5.3	15.5		8.9		19.3	
13	4.9		5.5	13.6	11.3		12.8	1	1.3	10.8		9.6		10.7	
14	4.9		4.5	11.4	8.0)	8.1		9.3	10.1		7.5		8.0	
15	0.0		4.0	6.8	2.7	'	6.7		6.7	6.1		4.8		5.3	
16	2.5		1.0	2.3	0.7	'	2.7		6.7	4.7		4.1		4.0	
17	1.2		1.0	4.5	2.0)	0.7		3.3	3.4		2.7		3.3	
18	1.2		0.0	0.0	2.0)	0.0		2.7	2.0		1.4		1.3	
19	0.0		0.0	0.0	1.3		0.7		0.0	0.0		1.4		1.3	
20	0.0		0.5	0.0	0.7	,	0.0		0.7	0.0		0.7		1.3	
21	0.0		0.0	0.0	0.0)	0.7		0.7	0.0		0.0		0.0	
22	0.0		0.5	0.0	0.0)	0.0		0.7	0.0		0.0		0.0	
N =	81		199	44	150)	149	1	50	148		146		150	

23,678

10,146

29,456

12,640

27,494

12,945

10,480

5,264

24,802

12,826

8,634

21,105

23,698

Appendix Table 30. Calculation of harvested biomass for arctic cisco in the Colville Delta fall fishery, 1985-2002.

	Cisco	Weight by M	lesh Size													
)85		986	19	987	19	988	19	989	19	990	19	991	19	92
Mesh	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt
(mm)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)
64	381	0.284	381	0.306	381	0.297	381	0.313	381	0.289	381	0.287	381	0.279	525	0.253
76	629	0.425	1,428	0.429	830	0.471	773	0.484	1,601	0.518	470	0.393	1,327	0.365	1,596	0.369
83	883	0.465	883	0.475	883	0.472	883	0.515	883	0.514	883	0.475	883	0.431	233	0.454
89	1,162	0.516	346	0.462	122	0.539	63	0.653	212	0.539	223	0.555	211	0.556	325	0.477
Estimat	ted Nigliq	Catch														
Mesh	• .)85	19	986	19	987	19	988	19	989	19	990	19	991	19	92
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51						, 0,		,			36		178		0	0
64	5,465	1,553	1,058	323	581	172	61	19	839	243	2,143	616	2,912	812	11,050	2,794
70					801	377	263	127							1,921	708
76	14,940	6,353	14,990	6,424	10,502	4,941	5,066	2,453	6,092	3,157	5,542	2,176	3,401	1,242	25,440	9,381
83	1,812	843	1,928	916	2,448	1,156	43	22	3,349	1,721	145	69	283	122	582	265
89	4,161	2,147	822	380	1,945	1,048	57	37	1,112	599	1,358	753	470	261	1,948	929
95															61	29
102							5	3								
114							16									
Total:	26,378	10,897	18,798	8,044	16,277	7,695	5,511	2,673	11,392	5,720	9,224	3,624	7,244	2,486	41,002	14,106
Estimat	ted Outer	Delta Catch														
Mesh	19	985	19	986	19	987	19	988	19	989	19	990	19	991	19	92
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
64	682	194		0		0		0		0		0		0		0
70	40.440	0.440	40.400	5.045	4 40-	0.144	400	000	4 500		0.000	705	4.005	074	4 400	4 000
76	19,148	,	13,102	,	4,487	,	420		1,500		2,000		1,025		4,400	1,623
83	470	0	390		400	0	407	0		0		0		0		0
89 T-4-1	473		1,232		162		167		4.500	0	0.000	0	4.005	0	4 400	0
Total:	20,303	8,581	14,724	6,370	4,649	2,199	587	312	1,500	777	2,000	785	1,025	374	4,400	1,623
Estimat	ted Comn	nercial Catch	1													
Mesh		985	19	986	19	987		988		989	19	990		991	19	92
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
76	22,831	9,709	28,988		22,527		5,056		18,825		16,884		23,046		22,754	8,391
83		0		0	4,967	2,345	5,277		5,977	,	4,221	,	652		0	0
89	847	437	468	216		0	147	96		0		0		0	0	0

83

89

Total:

1,721

31,310 12,725

807

0

1,904

8,958

0

908

4,037

0

0

0

14,311

	Cisco																	
Estima		Weight by N 993		994	10	95	19	196	19	997	10	998	20	000	20	001	20	002
Mesh	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt
(mm)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)
64	979	0.298	125	0.219	1.185	0.295	1,273	0.307	1,273	0.296	1,310	0.296	1,310	0.296	1.629	0.296	264	0.258
76	1,965	0.403	520	0.444	824	0.374	1,539	0.371	788	0.420	423	0.380	1,041	0.464	412	0.477	1,836	0.362
83	920	0.469	2,036	0.477	389	0.491	83	0.400	259	0.460	2,767	0.460	142	0.521	2,978	0.463	2,978	0.463
89	870	0.469	166	0.547	289	0.513	296	0.451	875	0.468	299	0.501	278	0.541	278	0.541	306	0.448
Estima	ted Nigliq	Catch																
Mesh	19	993	19	994	19	95	19	96	19	997	19	998	20	000	20	001	20	002
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51	0	0	0	0	0	0		0		0		0		0		0		0
64	6,861	2,044	1,665	364	307	91	1,770	544	435	129	146	43	12	4	375	111	1,332	343
70	1,877	756	258	115	134	50		0		0		0		0		0		0
76	24,612	9,913	3,242	1,438	2,257	844	13,376	4,961	18,381	7,717	5,531	2,103	6,756	3,137	2,087	996	5,263	1,904
83	1,080	507	15	7	850	417	512	205	2,211	1,017	151	69	737	384	223	103	66	31
89	5,844	2,743	375	205	1,357	696	1,514	683	10,103	4,724	2,320	1,163	2,451	1,327	1,250	677	872	390
95	869	408		0		0		0		0		0		0		0		0
102																		
114																		
Total:	41,144	16,371	5,556	2,130	4,905	2,099	17,172	6,393	31,130	13,587	8,148	3,378	9,956	4,851	3,935	1,886	7,533	2,669
		Delta Catch																
Mesh		993		994		995		96		997		998		000		001		002
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
64		0		0	90		2,267	697		0		0		0		0		0
70	5 000	0.000	5 400	0.000	232		40.000	0	0.444	0	- 444	0		0		0		0
76	5,800	,	5,400	,	3,287	1,230	18,963	7,033	2,144		5,411	2,057		0		0		0
83		0		0	55		0.000	0		0		0		0		0		0
89 Total:	5,800	2,336	5,400	2,396	3,669	1,372	2,803 24,033	1,265 8,994	2,144	900	5,411	2,057	0	0	0	0	0	0
Catios -	tad Car	namaial Ostal	_	•	•	•		•	•			•						
Estima Mesh		nercial Catch 993		994	10	95	10	96	10	997	10	998	20	000	20	001	20	002
(mm)	No.	(kg)	No.		No.	(kg)	No.	(kg)	No.		No.		No.	(kg)	No.	(kg)	No.	(kg)
76	29,589	. 0,	7,054	(kg) 3,129	14,311	5,353	20,740		15,686	(kg) 6,586	6,579	(kg) 2,501	2,591	1,203	1,566		3,935	
70	29,509	11,517	1,004	3,129	14,511	5,555	20,740	1,032	13,000	0,500	0,379	2,501	2,591	1,203	1,500	1-1	5,935	1,424

1,077

21,817

0

0

5,353

431

8,124

0

1,304

16,990

600

7,186

0

2,173

8,752

1,000

3,501

28

2,619

15

1,218

0

358

1,924

166

913

0

3,935

0

0

89 Total: 101 17,596 40

6,021

12 9,000

2,959

11,939

4,117

Appendix Table 31. Calculation of harvested biomass for least cisco in the Colville Delta fall fishery, 1985-2002.

Estimat	ed mean v	weight by m	esh size													
_	19	85	19	86	19		19	88	19	189	19	90	19	991	19	92
Mesh		Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt		Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt
(mm)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)
64	572	0.251	572	0.263	572	0.248	572	0.263	572	0.255	572	0.250	572	0.237	697	0.247
76	449	0.342	370	0.329	400	0.344	285	0.346	388	0.355	267	0.317	292	0.236	124	0.345
83	36	0.397	36	0.382	36	0.393	36	0.412	36	0.406	36	0.366	36	0.385	39	0.386
	ed Nigliq (
Mesh	19			86	19		19			189	19			991	19	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51											545	136	172		0	0
64	492	123	951	250	1,090	270	46	12	3,086	786	3,633	909	2,261	536	1,381	341
70					355		33								65	22
76	1,271	434	746	245	2,695	926	715	247	1,247	443	4,696	1,491	726		1,078	372
83	27	11	59	23	456	179	48	20	190	77	15	6	24	9	4	2
89	81	32	50	19	149	59	8	3	13	5	211	77	11	4	127	49
95															3	1
102							1									
114							16									
Total:	1,871	601	1,806	537	4,745	1,434	867	282	4,536	1,311	9,100	2,619	3,193	761	2,658	787
Estimat		Delta Catch														
Mesh	19			86	19		19			189		90		991	19	92
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
64	692	173	32	8		0		0		0		0		0		0
76	13,175	4,504	4,924	1,619	1,417	487	1,392	481	1,500	533		0		0		0
83		0	12	5		0		0		0		0		0		0
89	76	30	31	12	16	6	62	26		0		0		0		0
Total:	13,943	4,707	4,998	1,643	1,433	493	1,454	507	1,500	533	0	0	0	0	0	0
Estimat		ercial Catch														
Mesh	19			86		87	19			189	19			991	19	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
76	17,495	5,981	8,988	2,955	11,636	3,998	20,678	7,148	19,126	6,798	14,944	4,744	7,666		7,284	2,513
83		0		0	303	119	1,904	784	514	209	2,105	770	78		0	0
~~	404	40	40			^	450	400		^				^	_	

458 23,040 189

8,121

7,006

17,049

19,640

1,838

0

7,744

5,513

2,513

0

Appendix Table 31. (continued)

Least	Cisco																	
Estima	ted mean	weight by m	esh size															
	19	93	19	994	19	95	19	96	19	997	19	998	20	00	20	01	20	02
Mesh	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt	Samp.	Ave Wgt
(mm)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)	Size	(kg)
64	778	0.246	778	0.253	833	0.236	886	0.235	886	0.242	310	0.234	1,221	0.239	1,634	0.243	303	0.251
76	311	0.297	218	0.306	234	0.308	123	0.302	173	0.300	514	0.288	328	0.325	515	0.310	681	0.311
83	62	0.345	62	0.371	92	0.335	92	0.367	133	0.336	133	0.336	133	0.336	147	0.332	147	0.332
Estima	ted Nigliq	Catch																
Mesh	19	93	19	994	19	95	19	96	19	997	19	998	20	00	20	001	20	02
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51	0	0		0		0		0		0		0		0		0		0
64	3,739	921	3,714	939	1,476	348	600	141	971	235	1,956	457	16	4	670	163	2,619	657
70	274	81	442	135	380	117		0		0		0		0		0		0
76	2,745	814	4,200	1,284	2,196	676	890	269	6,623	1,985	5,229	1,506	1,690	550	2,689	833	2,549	792
83	82	28	12	4	102	34	15	6	335	112	124	42	51	17	235	78	20	7
89	754	260	301	112	283	95	96	35	833	280	545	183	215	72	36	12	234	78
95	4	1		0		0		0		0		0		0		0		0
102																		
114																		
Total:	7,599	2,107	8,669	2,475	4,437	1,270	1,601	451	8,761	2,613	7,853	2,188	1,973	643	3,630	1,086	5,422	1,533
Estima	ted Outer	Delta Catch																
Mesh	19	93	19	994	19	95	19	96	19	997	19	998	20	00	20	01	20	02
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
64		0		0	708		1,552	365		0		0		0		0		0
76		0		0	3,333	1,026	12,700	3,833	1,241	372	11,470	3,303		0		0		0
83		0		0	95	32		0		0		0		0		0		0
89		0		0	1	0		0		0		0		0		0		0
Total:	0	0	0	0	4,137	1,225	14,253	4,198	1,241	372	11,470	3,303	0	0	0	0	0	0
Estima	ted Comm	ercial Catch	1															
Mesh	19	93	19	994	19	95	19	96	19	997	19	998	20	00	20	001	20	02
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
76	5,939	1,761	9,549	,	8,633	2,658	7,451	2,249	10,644	2,580	11,010	3,170	5,693	1,851	2,823	875	5,503	1,710
83	98	34	627	233	0	0	345	127	110	33	812	273	65	22	153	51		0
89	0	0	0		0			0		0		0		0		0		0
Total:	6,037	1,795	10,176	3,153	8,633	2,658	7,796	2,375	10,754	2,613	11,822	3,443	5,758	1,873	2,976	925	5,503	1,710

Appendix Table 32. Catch rate of arctic cisco in the commercial fishery by year-class, 1984-2002 (outlined boxes indicate year-class CPUE at age-5, based on CPUE corrected for effect of variable effort, 76-mm mesh).

								Fishing	Year											Year
Year																				Class
Class	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
1974	0.0																			0.0
1975	0.0	0.0																		0.0
1976	0.0	0.8	0.0																	0.8
1977	6.0	2.9	0.0	0.0																8.9
1978	50.9	41.2	14.9	6.1	0.0															113.1
1979	6.7	13.0	94.7	25.5	0.5	0.1														140.6
1980		2.0	76.8	47.0	6.7	3.5	0.2													136.2
1981	_		0.0	0.8	0.2	0.0	0.0	0.6												1.6
1982				0.0	0.3	0.0	0.0	0.0												0.3
1983			_	0.4	13.7	26.7	0.8	1.7												43.3
1984				_		0.0	1.0	0.4												1.4
1985					0.2	6.8	25.8	10.0	2.3		0.2									48.3
1986						_	2.2	15.2	21.4		2.5	0.6								64.0
1987							_	1.5	35.2	118.1	12.7	2.2								169.7
1988								·-		5.0	8.6	2.2	0.9							16.7
1989										-	2.9	7.1	12.2	2.6	0.5	0.0	0.3			25.7
1990										_	0.2	17.9	110.5	26.4	3.0	0.5	0.4			159.0
1991											_		7.0	7.5	1.4	1.0	0.5	0.1		17.4
1992												•		27.7	16.1	3.0	1.3	0.1		48.3
1993													·-		4.7	1.0	0.5	0.0		6.2
1994														•	9.6	23.3	4.4	0.1	0.1	37.6
1995																8.8	4.0	0.4	0.6	13.8
1996																	0.4	0.2	2.1	2.7
1997																		0.1	10.6	10.7
1998																			1.1	1.1
Total																				
CPUE	65.9	60.5	186.5	79.7	21.6	37.1	30.0	29.7	58.9	148.1	27.2	30.1	130.5	64.3	35.2	37.6	12.0	1.0	14.5	

boxes indicate CPUE at age-5

Appendix Table 33. Mean weight and CPUE by mesh size in the Nigliq Channel fishery, 1986-2002.

Arctic Cisco	
Mean Weight (kg) by Mesh	Siz

Arctic C Mean W		g) by Mes	sh Size													
Mesh				1000	1000	1001	1000	1002	1004	1005	1006	1007	1000	2000	2001	2002
(mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000	2001	2002
51	0.160	0.160	0.160 0.313	0.160 0.289	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160 0.296	0.160 0.296	0.160 0.296	0.160
64	0.306 0.367	0.297 0.384	0.313	0.289	0.287 0.340	0.279 0.322	0.253 0.311	0.298	0.219	0.295 0.334	0.307 0.339	0.296 0.358	0.296	0.296		0.258 0.310
70 76	0.367	0.384	0.399	0.404	0.340	0.322	0.311	0.350 0.403	0.331 0.444	0.334	0.339	0.338	0.338	0.380	0.386 0.477	0.310
83	0.429	0.471	0.484	0.518	0.393	0.303	0.369	0.469	0.444	0.374	0.371	0.420	0.380	0.464	0.477	0.362
89	0.473	0.472	0.653	0.539	0.473	0.431	0.434	0.469	0.477	0.491	0.451	0.468	0.501	0.541	0.403	0.463
95	0.462	0.539	0.653	0.539	0.555	0.556	0.477	0.469	0.547	0.513	0.431	0.513	0.513	0.513	0.513	0.513
Mean CI	PUE by N	Mesh Siz	e													
Mesh	1006	1007	1000	1000	1000	1001	1002	1002	1004	1005	1006	1007	1000	2000	2001	2002
(mm) 51	1986	1987	1988	1989	1990 5.7	1991 44.5	1992	1993	1994	1995	1996	1997	1998	2000	2001	2002
64	15.4	9.9	3.7	5.3	3.7 22.4	26.6	44.5	33.3	6.7	4.6	27.2	12.9	2.2	1.0	4.0	7.5
70	13.4	26.7	6.4	3.3	22.4	20.0	15.4	10.7	2.3	4.0	21.2	12.9	2.2	1.0	4.0	1.3
76	23.5	16.1	12.4	12.5	11.0	4.4	24.7	33.0	4.2	3.0	17.5	25.4	4.4	9.6	2.7	4.6
83	14.7	8.4	1.5	3.0	5.6	3.7	14.9	15.6	0.6	5.3	3.1	17.5	10.2	6.7	1.6	0.8
89	10.3	11.4	0.8	4.5	8.2	1.2	4.7	11.6	1.7	2.9	2.2	20.1	3.0	4.4	2.5	1.6
95	10.5					<u>-</u>	3.1	19.3								1.0
Mean W Mesh		g) by Mes	sh Size													
(mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000	2001	2002
51	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160
64	0.263	0.248	0.263	0.255	0.250	0.237	0.247	0.246	0.253	0.236	0.235	0.242	0.234	0.239	0.243	0.251
70	0.296	0.296	0.304	0.305	0.284	0.236	0.296	0.272	0.279	0.272	0.268	0.271	0.261	0.263	0.277	0.281
76	0.329	0.344	0.346	0.355	0.317	0.236	0.345	0.297	0.306	0.308	0.302	0.300	0.288	0.288	0.310	0.311
83	0.382	0.393	0.412	0.406	0.366	0.385	0.386	0.345	0.371	0.335	0.367	0.336	0.336	0.325	0.332	0.332
89	0.382	0.393	0.412	0.406	0.366	0.385	0.386	0.345	0.371	0.335	0.335	0.335	0.335	0.336	0.336	0.336
95	0.382	0.393	0.412	0.406	0.366	0.385	0.386	0.345	0.371	0.335	0.335	0.335	0.335	0.336	0.336	0.336
Mean Cl	PUE by N	Mesh Siz	e													
Mesh																
(mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000	2001	2002
51					46.6	43.0										
64	13.8	18.7	2.8	19.5	33.5	13.9	5.5	18.1	15.0	22.1	11.5	28.8	30.1	1.3	7.1	14.8
70		11.8	1.4	• •	4 -	0.7	0.5	1.6	3.9	11.4		0.2	4.5	a .	2.5	2.2
76	1.2	4.1	1.7	2.8	4.7	0.7	1.1	3.7	5.4	2.9	1.1	9.2	4.2	2.4	3.5	2.2
83	0.5	1.6	1.7	0.9	0.3	0.3	0.1	1.2	0.5	0.6	0.6	2.6	8.4	0.5	1.7	0.2
89	0.6	0.9	0.1	0.1	0.4	0.0	0.4	1.5	1.4	0.6	0.6	1.7	0.7	0.4	0.1	0.4
95							0.2	0.1								

Appendix Table 34. Salinity profiles from the Nigliq Channel, Colville Delta, 2001.

RK = River Kilometer, as measured from the mouth of Nigliq Channel Depth in meters from upper surface of ice, salinity in ppt

Upper Nigliq (RK 29)

оррег г	15119 (141)									
Depth					Salinity	(ppt)				
(m)	Oct 23	Oct 25	Oct 27	Oct 29	Nov 3	Nov 5	Nov 7	Nov 8	Nov 9	Nov 13
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0
2.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.3	1.0	0.0
2.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.8	1.5	0.0
3.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	2.0	1.9	0.5
3.5	0.0	0.0		0.0	0.0	0.0	0.9	2.2	2.2	0.5

Nanuq Lake (RK 15)

Trailing I	Lake (IKK	13)									
Depth					Sal	linity (pp	t)				
(m)	Oct 23	Oct 25	Oct 27	Oct 29	Oct 31	Nov 2	Nov 5	Nov 7	Nov 8	Nov 9	Nov 13
0.5	7.0	0.1	0.0	2.0	1.0	2.0	0.5	0.3	7.5	0.8	0.0
1.0	7.9	0.1	3.5	8.0	2.0	2.5	4.5	4.5	8.5	7.5	5.8
1.5	8.5	0.1	10.2	9.5	9.0	9.8	9.9	6.0	9.4	9.9	6.5
2.0	9.0	0.4	11.0	10.2	10.0	11.1	11.0	7.8	11.3	11.0	7.5
2.5	9.1	0.5	11.8	10.9	10.5	11.8	11.5	8.9	11.7	11.2	8.0
3.0	9.1	0.8	12.2	11.2	11.0	12.0	11.8	10.0	11.7	11.2	8.0
3.5	9.1	1.2	12.5	11.4	11.2	12.2	11.8	11.1	12.2	11.5	8.2
4.0	9.1	1.2	12.5	11.5	11.5	12.2	11.8	11.1	12.3	11.8	8.2
4.5	9.1	2.0	12.8	11.8	11.7	12.3	12.0	11.1	12.3	11.8	8.3
5.0	9.1	4.3	13.0	11.8	11.8	12.3	12.0	11.2	12.7	11.8	8.5
5.5	9.1	9.4	13.0	11.8	12.0	12.3	12.2	11.2	12.8	12.2	8.7
6.0	9.1	10.2	13.0	11.8	12.0	12.5	12.2	11.2	12.9	12.2	8.8
6.5	9.1	11.0	13.0	11.8	12.0	12.7	12.2	11.2	13.0	12.2	8.8

Nigliq Delta (RK 6)

Depth					Sal	linity (pp	t)				
(m)	Oct 23	Oct 25	Oct 27	Oct 29	Nov 1	Nov 3	Nov 5	Nov 7	Nov 8	Nov 9	Nov 13
0.5	0.8	0.8	1.0	1.0	1.0	1.0	1.7	1.2	1.2	1.2	2.5
1.0	1.5	3.5	6.8	6.2	3.5	2.5	6.8	5.5	8.8	1.8	8.5
1.5	9.0	8.2	9.7	9.4	5.2	6.5	10.0	8.0	10.4	7.8	11.2
2.0	10.0	9.5	11.2	10.8	6.8	11.5	13.0	10.4	11.8	10.9	13.8
2.5	11.2	11.5	11.3	12.5	7.2	15.0	14.8	12.0	12.8	13.2	15.5
3.0	12.0	12.4	13.8	13.2	7.5	18.0	16.8	14.0	12.9	15.5	16.8
3.5	12.4	12.9	14.2	13.5	8.2	18.3	17.0	14.5	13.0	16.2	16.8
4.0	12.8	13.2	14.9	14.0	9.5	18.5	17.0	14.8	13.2	16.8	17.2
4.5	13.0	13.9	15.5	13.8	12.0	18.8	17.2	14.8	13.2	16.8	17.2
5.0	13.5	14.4	16.0	15.5	13.5	18.8	17.2	15.0	13.5	16.8	17.2
5.5	14.5	14.9	16.5	16.0	14.8	19.0	17.5	15.0	13.5	16.8	17.2
6.0	14.5	15.1	16.8	16.2	16.0	19.2	17.8	15.8	13.8	16.8	17.2
6.5		15.1		16.2	16.6	19.2	20.5	15.8	15.5	16.8	17.2

Appendix Table 35. Salinity profiles from the Nigliq Channel, Colville Delta, 2002.

RK = River Kilometer, as measured from the mouth of Nigliq Channel Depth in meters from upper surface of ice, salinity in ppt

Upper Nigliq (RK 29)

Depth		·																
(m)	Oct 17	Oct 19	Oct 21	Oct 23	Oct 25	Oct 27	Oct 29	Oct 31	Nov 2	Nov 4	Nov 6	Nov 8	Nov 11	Nov 13	Nov 16	Nov 18	Nov 20	Nov 22
0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
2.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
2.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4.5	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.1	0.2	0.3	0.1	0.1

Nanuq Lake (RK 15)

Depth									Salini	ty (ppt)								
(m)	Oct 17	Oct 19	Oct 21	Oct 23	Oct 25	Oct 27	Oct 29	Oct 31	Nov 2	Nov 4	Nov 6	Nov 8	Nov 11	Nov 13	Nov 16	Nov 18	Nov 20	Nov 22
0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.3
1.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.7	0.3	0.4	0.4
1.5	0.1	0.1	0.1	0.1	0.3	0.2	0.3	0.3	0.3	0.3	0.6	0.6	1.5	6.8	6.2	1.5	1.4	1.2
2.0	0.2	0.2	0.1	0.9	2.2	1.8	2.4	2.9	4.0	5.5	8.1	8.1	9.0	10.0	11.2	12.0	11.6	11.5
2.5	1.9	2.1	2.0	2.1	3.3	4.5	5.9	7.2	8.9	8.9	9.4	9.5	10.9	11.8	12.2	12.7	11.9	12.9
3.0	2.6	2.6	2.7	2.8	2.9	5.2	6.8	7.7	9.4	9.6	10.1	10.1	11.2	12.6	12.6	13.0	12.6	13.2
3.5	3.1	3.2	3.4	3.5	4.4	5.8	7.3	8.0	10.0	10.2	10.5	10.5	11.6	12.7	12.9	13.3	12.8	13.4
4.0	3.6	3.9	4.0	4.0	4.7	6.5	7.6	8.4	10.4	10.6	10.6	10.7	11.8	12.8	13.2	13.5	13.0	13.6
4.5	4.1	4.4	4.6	4.5	5.1	6.7	7.9	8.7	10.5	10.8	10.9	10.9	12.0	13.0	13.4	13.6	13.2	13.7
5.0	4.9	5.0	5.1	4.9	5.6	7.0	8.1	8.9	10.7	11.0	11.1	11.0	12.2	13.4	13.5	13.8	13.7	13.8
5.5	5.5	5.5	5.4	5.7	6.6	7.4	8.4	9.2	10.9	11.1	11.2	11.1	12.5	13.6	13.8	13.8	13.7	13.8
6.0	6.0	6.3	6.3	6.4	6.5	7.8	8.6	9.3	11.0	11.3	11.2	11.2	12.6	13.7	13.8	14.0	13.8	14.5
6.5	6.8	6.7	6.6	6.8	6.7	8.0	8.6	9.4	11.4	11.3	11.3	11.3	12.9	13.8	13.8	14.1	13.5	14.6
7.0	7.0	7.0	6.7	6.8	6.7	8.1	8.6	9.4	11.6	11.4	11.4	11.4	13.2	13.9	13.8	14.0	13.5	14.7
7.5	7.0	7.0	6.8	6.8	6.8	8.1	8.6	9.3	11.6	11.3	11.6	11.4	13.2	14.2	13.9	14.0	13.9	14.7

Nigliq Delta (RK 6)

Depth								5	Salinity (pp	ot)							
(m)	Oct 19	Oct 21	Oct 23	Oct 25	Oct 27	Oct 29	Oct 31	Nov 2	Nov 4	Nov 6	Nov 8	Nov 11	Nov 13	Nov 16	Nov 18	Nov 20	Nov 22
0.5	0.7	0.4	0.3	0.4	0.3	0.2	1.4	1.8	0.3	0.4	0.4	0.5	0.5	0.7	0.6	0.6	0.6
1.0	0.7	0.4	0.3	1.3	0.6	0.3	1.5	10.1	0.4	0.5	1.2	0.6	0.7	1.1	0.6	0.6	0.6
1.5	1.1	0.4	0.4	2.0	2.2	0.4	2.4	15.3	0.8	1.1	1.8	3.9	7.1	7.6	0.6	0.8	0.9
2.0	5.0	1.0	0.5	8.5	9.7	6.1	8.3	16.7	8.7	13.1	9.2	14.7	13.6	10.6	2.4	1.0	7.0
2.5	19.2	12.4	6.6	10.3	15.0	10.8	10.2	17.2	13.3	16.1	14.8	15.8	15.7	14.2	14.7	2.8	11.9
3.0	20.1	17.0	15.0	15.5	16.4	15.3	16.5	17.7	17.1	17.3	17.0	16.5	16.8	16.2	16.5	12.9	15.4
3.5	20.5	19.5	17.6	18.7	18.0	16.6	17.8	18.2	17.4	17.9	17.5	17.6	17.5	17.9	17.7	15.6	17.2
4.0	20.8	19.8	19.0	19.9	19.9	18.8	19.7	19.3	18.4	19.3	19.0	17.9	18.1	18.1	18.9	16.9	17.8
4.5	20.9	20.1	19.8	20.1	20.1	19.1	20.0	19.5	19.3	19.8	19.5	18.9	19.2	18.8	19.5	17.7	18.3
5.0	20.9	20.2	20.1	20.3	20.1	19.1	20.1	19.8	19.6	20.1	19.9	19.7	19.6	19.1	19.9	18.0	18.9
5.5	20.9	20.3	20.3	20.5	20.3	19.3	20.3	19.9	19.7	20.2	20.0	20.1	19.9	19.7	20.1	18.7	19.9
6.0		20.5	20.3	20.6	20.3	18.8	20.3	19.9	19.7	20.3	20.2	20.2	20.0	20.1	20.1	20.7	19.9
6.5		20.6	20.3	20.6	20.3	18.7	20.2	19.9	19.7	20.2	20.2	20.1	20.2	20.2	20.1	20.7	19.9

Appendix Table 36. Cumulative length frequencies of arctic cisco and least cisco by mesh size, Nuiqsut fishery, 1986-2002. (data used to evaluate mesh selectivity)

Arctic Ci	sco - Villa	ge Catch	l			Least Cisc	o - Villag	ge Catch		
Fork										
Length		Village N	Aesh Sizes	in mm			Villag	ge Mesh S	izes in mn	1
(mm)	64	70	76	83	89	64	70	76	83	89
200	0	0	2	0	0	2	0	3	0	1
210	2	0	0	0	0	7	0	4	0	3
220	1	1	3	1	0	16	0	3	0	4
230	1	0	5	0	0	63	0	5	1	4
240	3	0	2	0	0	129	0	10	1	13
250	19	0	9	0	1	205	0	16	0	15
260	81	0	4	0	1	202	4	101	2	12
270	192	8	31	1	4	212	3	267	2	17
280	254	19	260	3	5	234	5	413	12	16
290	304	53	829	5	35	190	6	608	11	29
300	264	130	2,196	35	86	111	2	702	16	37
310	181	197	3,195	141	171	92	3	641	28	34
320	123	127	2,925	315	358	41	1	440	12	32
330	58	71	2,437	487	744	24	0	285	13	34
340	31	32	1,698	565	1,085	10	2	142	10	34
350	18	7	1,046	355	987	4	0	56	5	13
360	6	5	632	249	795	3	0	31	2	19
370	3	3	345	164	442	2	0	15	5	14
380	4	2	175	72	275	0	0	13	2	8
390	3	0	92	26	114	0	0	4	2	6
400	0	0	45	13	65	0	0	0	0	6
410	0	0	14	2	34	0	0	0	0	0
420	0	0	2	6	14	0	0	0	0	0
430	0	0	1	1	2	0	0	0	0	0
440	0	0	1	1	3	0	0	0	0	0
450	0	0	1	1	0	0	0	0	0	0
Total:	1,548	655	15,950	2,443	5,221	1,547	26	3,759	124	351

Arctic cisco - Commercial Catch

Arcuc c	isco - Co	Jiiiiiler	ciai Ca	ittii														
Fork																	·	
Length	Comme	ercial 7	6-mm 1	Mesh														
(mm)	1985	1986	1987	1988	1989	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
250	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
270	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
280	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	2	0	8
290	7	1	0	2	4	7	16	0	0	25	5	8	1	1	0	4	8	89
300	36	8	0		22	16	45	0		77	23	19	19	10	5	13	28	351
310	92	39	5	50	35	60	109	17	28	106	50	36	41	37	4	16	52	777
320	103	51	22	69	24	54	129	56	39	68	91	57	30	62	23	26	77	981
330	112	49	61	38	35	54	84	91	40	52	47	41	46	60	51	23	47	931
340	67	43	88	26	49	24	46	65	47	30	13	42	44	44	65	37	18	748
350	21	27	93	31	79	8	9	55	58	12	8	28	51	23	56	43	4	606
360	13	19	49	41	66	9	9	10	50	13	2	15	31	18	62	46	4	
370	7	8	20	47	35	3	3	5	21	8	3	4	24	18	34	49	5	
380	3	4	10	43	24	3	0	1	1	4	6	0	8	11	30	38	6	
390	5	1	1	24	8	2	1	0	0	4	2	0	4	8	12	18	2	92
400	1	0	1	7	12	5	0	0	0	0	0	0	1	6	8	26	2	69
410	0	0	0	0	5	2	0	0		0	0	0	0	1	0	13	0	22
420	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	3	0	6
430	0	0	0		0	1	0	0		0	0	0	0	1	0	0	0	
440	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total:	471	250	350	396	400	250	451	300	300	400	250	250	300	300	351	357	253	5,629

ATTACHMENT 1Colville River Commercial Fishery - 2001

COLVILLE RIVER COMMERCIAL FISHERY 2001

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An Overview of the Helmericks Fishery 2001 Season

Freeze-up Conditions

Our lake froze on the 29th of September and there was enough ice across places on the river that boat travel was essentially ended at this time. The official freeze-up date for the river came a few days later on October 1st, which was about a week later than freeze-up recorded for the previous two years. With little precipitation in the mountains, and light winds just before freeze-up, the river was low and fairly fresh even near the bottom at freeze-up. After the first week of October a low salinity layer developed in the top 3 meters and remained into late November. In the past ten years only 1995 and 1999 have had a close similarity in water chemistry. In 1995 the water remained fresh until the end of October, then developed a salinity layer in the bottom 2 meters that was twice as brackish as this 2001 season, while maintaining a fresh layer in the top 3 meters. In 1999 the river remained basically fresh water with a salinity of less than 1 ppt into January, 2000.

This year there were no large concentrations of Glaucous gulls in the delta at freeze-up, and a group of 250 red-breasted mergansers were only around for two days. Perhaps this was an indication of low numbers of small ciscos in the area at the time.



A new season starts

Fishing Effort and Methods

This year's fishing methods and location remained the same as in past years, and while the fishing effort was down from the ten year average, it was an increase of 48% over last year. I set the first nets of the season, two 3" mesh nets on the 8th of October when the ice was three inches thick at our Char Island fishing location. This was two days earlier than in 2000, and about the average for the past ten years. A 3 ¼" mesh net was set on October 11th and the last net, a 3" mesh was set on the 15th. The larger mesh net was fished until the 27th of October when it was pulled to

help from going over our quota of hump-back whitefish, even though it was still catching equal numbers of arctic cisco. The 3" nets were fished until the 20th of November when they were pulled for the season. This gave us a total of 138 net days of fishing, and data collected over a seven week period. While this year's effort was up over last year, it was still 43% below the ten year average.

Nets are normally checked each week day except Sunday, which is set aside to get caught up on other chores. We switch to picking nets every other day when the fish run slows down, like it does towards the end of the season. Longer sets than two days are usually caused by storms or high temperatures, when the fish are better off left in the cold water than lying on the ice and not freezing. Catch data was recorded for each net by species and net location. Fishing effort is calculated in net days by using the date a net is set, then pulled.

Figure 01

Date	Oct. 8	Oct.11	Oct. 15	Oct. 27	Nov. 20
Net #1	3"				3"
Net #2	3"				3"
Net #3		3 1/4"		31/4"	
Net #4			3"		3"
Action Taken	Set	Set	Set	Pulled	Pulled

Net Activity

Collection Methods

This year all tagged fish and a small sample of arctic cisco were collected for laboratory analysis. Besides the usual weight and length measurements, otoliths were also collected from the arctic cisco. On the laboratory reports the condition and names of the fish are indicated by the following notations:

ARCS - arctic cisco LSCS - least cisco BDWF - broad whitefish
BRCS - bering cisco GRAY-grayling HBWF - humpback whitefish
TND - total net days CPUE - catch per unit effort PPT - parts per thousand

SO - indicates a spawned out individual

M - a mature fish

M1 - may not spawn the following season

M2 - most likely to spawn the following season

Fat 0-5 - amount of body-cavity fat rated on a scale of 0-5, with 0 being the lowest, or none

Stomach fullness - indicates the amount of retained food

FL - fork length measurement

Daily catch data was recorded for each net as to species and number. The nets were picked every day (except Sunday), for the first two weeks then they were picked about every other day for the rest of the season. CPUE is based on a net size of 50 meters in length by 2 meters deep, and a soak time of 24 hours. The fork length was recorded to the nearest millimeter on the dissection sheets and to the nearest centimeter on the weekly charts. Fish weights were recorded to the nearest gram. Every week fifty arctic cisco were collected midweek for length frequencies from the 3" mesh nets. We collected 7 weekly samples from the 3-inch nets, but only two for the 3½" net due to the shorter time used. I tried to collect weekly samples on Tuesday this year, but because of the picking schedule change into the third week, about half were collected on Wednesday. Also for a couple weeks sample size was too small on the previous day and so a second day was needed to get a standard sample size. Least cisco and humpback whitefish were sampled four times during the fall for length frequencies. No broad whitefish were sampled this year.

A YSI Model 30 conductive meter was used to record the water temperature and salinity at the Char Island set on the East Channel throughout the fishing season. Water temperature was recorded in degrees Celsius and the salinity in parts per thousand (PPT). Measurements were taken every .5 meter in the water column, starting from the surface and extending to the bottom.

Tag Return Information

The tag catch remained low, and continued to decline The total tag returns for the 2001 season was only 10 floy tags. There has been no tagged arctic cisco for several years now, and the few collected tags were all least cisco, most from LGL's tagging done in the early 1990's, except for one 2001 tag from MJM. A break down of all the tags is shown in Figure 3, and the dissection data in Table 12.

Catch Totals and Monthly Catch Per Unit Effort

138 Total Net Days Fished in the 2001 Season

Figure 02

Month	ARCS	CPUE	LSCS	CPUE	HBWH	CPUE
October	1505	19.3	2601	33.3	4729	60.6
November	419	7.0	375	6.3	1455	24.3
December	0	0	0	0	0	0
Totals	1924	13.9	2976	21.6	6184	44.8

2001 Floy Tag Recovery By Company and Species

Figure 03

Company	LSCS	ARCS	нвwн	BDWF	Total
ARCO85	00	00	00	00	00
ENVIRO	00	00	00	00	00
LGL82	00	00	00	00	00
LGL-blue	00	00	00	00	00
LGL90	01	00	00	00	01
LGL91	03	00	00	00	03
LGL92	02	00	00	00	02
LGL93	03	00	00	00	03
WCC82	00	00	00	00	00
MJM-01	01	00	00	00	01
Species	10	00	00	00	10



Tagged least cisco MJM-01

Weather and Salinity Conditions

Salinity and temperature profile measurements were taken every day during the fishing season using a YSI model s-c-t meter. Readings were also taken twice before the fishing season started, and once afterwards to check on what the river salinity was doing. Readings were taken every .5 meter, starting at the surface of the water and continuing until the bottom was reached at around five meters. The salinity was recorded in parts per thousand (PPT), and the water temperature in degrees Celsius. The water data was collected at the Char Island Station from the 4th of October to the 20th of November, then again on December 1st.

Just prior to and during the fall fishing season the winds were light so only two minor flooding episodes were observed in the first part of fall fishing, and in our area they were only near the ocean front. October winds from the south to west direction accounted for only 22.5% of the winds, while the majority were out of the northwest to north (58%). The highest salinity was recorded at the start of fishing when it was 16 ppt on the bottom, but basically it remained quite stable throughout the season. After the middle of the of October salinity remained about 8 ppt until the end of fishing. The fresh layer in the top three meters remained at less than 1 ppt throughout most of the season, with the three meter level only dropping below 1ppt after the 9th of November.

All of the fall storms were from the north or north-northeast and none lasted more than two and a half days. Only one storm in the early morning of the 12th October had winds over 25 knots, and this had little effect on the river salinity. Predominate NW to NNE winds in October, coming off the sea ice to land, brought many snowy days and we received over eighteen inches of snow for that month. This is the most snow in October we have had in over six years.

Tables 1A-1C show the daily salinity and water temperatures for the Char Island Station. Chart 1 shows the salinity measurements graphed out at each meter level. Chart 2 shows the salinity averages for the years 1995-2001, Chart 3 shows the low salinity years between 1992 and 2001. Chart 5 shows the daily catch totals by species in relation to average salinity levels for 2001. Weather recorded on each fishing day and fall storms* are shown in Table 2.



Water Reading

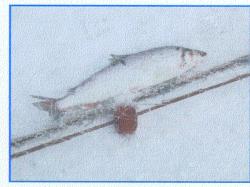
^{*} To be classed as a storm a wind at or above 20 knots is used.

Arctic Cisco (Coregonus autumnalis)

The arctic cisco catch for the 138 net days of fishing this year was 1,924 (960 kg), which

resulted in a catch per net day (CPUE) of 13.9 for the season. This is the lowest CPUE that we have had since 1985 and represents a decline of 79% from the last 10 year mean of 66.8 CPUE. The catch total is also the lowest for the fishery ever, a 27% decline from last year's catch, and a whopping 87% decline from the 10 year average of 14,594 fish. The total net days fished this year is up 48% over 2000, but still down 43% when compared to the 10 year mean of 242 net days. The daily catch totals are shown Table 3.

As anticipated from the data collected in 2000, the arctic cisco catch continued to decline. While total numbers were down, fish size



Arctic cisco

(measured in fork length) was up again for another year, breaking last years record of 35.2cm by 5cm. This is an increase to 35.7cm, another record for the 3" nets. With the larger fish being caught, the average weight for the season was a robust 0.50kg per fish or a biomass total of 960kg for the arctic cisco catch this year. The ≤32cm length percentages made a slight increase over last year, increasing to 0.17% of the total catch. Last year it was only 0.086%, so a few younger fish have appeared, but it still looks like it will take more than this coming year to get back above 40% and a decent catch. In the past a ratio of between 50-60% of the population being in the ≤32cm range indicated strong 5-6 year age class in the system. (See Table 7 for ARCS population size in respect to≤32cm). After getting several spawned out arctic cisco last year, only one was collected this year. A small number (less than 2%) of arctic cisco were seen that looked spawned out, and five were collected. While all these were under weight, only one was a positive spawner. This is a lot less than last year when compared to the estimated 10% that were possible Colville spawners, and this indicates breeding is still very sporadic in the Colville at this time. The population as a whole was in good health and most of the ARCS dissected had a medium amount of body cavity fat.

Changes in arctic cisco sizes from one week to the next between the two net sizes was more pronounced then usual this year. The weekly measurements from the three-inch nets (Table 8) showed that the population had a size fluctuation of 1.32cm for the season. We caught the smallest sized fish during the second and fourth weeks, and our smallest average of the season was only 34.76cm, caught in the second week. Fish continued to increase in size, with weeks six and seven having the largest weekly average at 36.1cm. The 3½ net had an average fork length of 37.46cm (Table 9), and a rather large difference of 1.16cm between the first two weeks when samples were taken. Also there was a 1.8cm difference between the 3" net at 35.7cm, another indicator of how skewed the population is towards fish over 7 years old. October's average CPUE of 19.3 was about triple of November's 7.0, and also had a lot more variation in the daily catch, ranging from a high of 92 in the first week to a low of 3.3 CPUE at the end of the month. November had fewer fish for the whole month with single digit CPUE for most of the month with a spike up to 24 on the 17th then back down to 5.2 to end the season.

The dark-finned arctic cisco made a larger percentage of the run this year compared to past years. They averaged about 30% of the yearly take, with daily variations as high as 40% of the catch.

Bering cisco (Coregonus luarettae)

Bering cisco continue to remain low after their peak in 1990, with only two taken in October again this year. The one that was sampled was a mature male 343mm in length and weighing 486 grams. It had some of the classic black metallic spots and white dots outlined in pink on the body.

Least Cisco (Coregonus sardinella)

The poor showing for least cisco this fall was the main unexpected event. After a few lean years in the early 90's it looked like the least cisco were doing all right. While 2000 total catch was down due to low net days, the CPUE continued high where it had been for the past five years. So this year's catch of only 2,976 (922.6kg) least cisco was a surprise, and the lowest catch total in 34 years. This year's CPUE of 21.6 is a drop of 65% over last year and a 46% drop over the 10 year mean. The catch total of 2,976 is a decline of 62% over the 10 year mean of 7,934. The daily catch by net are shown in Table 4, and daily catch (all species) is graphed with salinity readings in Chart 3.

All indicators were present for the fishery to have a good catch of least cisco this year: low salinity levels, large numbers in 2000, and little feeding pressure from competing arctic cisco. The season started out with good numbers, but they declined rapidly, going from a high of 94 CPUE to 16 CPUE at the end of October. The CPUE average for October was 33, but dropped to only 6.3 for the month of November.

Fork length samples were collected four times, starting on October 9th, over the course of the fall fishing season to assess population size. The weekly



Least cisco

sample lengths varied between 31.4cm on 9 October to 32.8 on 9 November. This spread of 1.4cm was .8cm greater than last year, and the yearly average also increased for another year to 32.01cm. This is an increase of .3cm over 2000, and is the first time the population has averaged over 32cm since 1991, which was also a low population year. While this year's growth is slightly smaller than last year, the growth curve continues to increase since the low of 30.75cm in 1997. Weekly fork length measurements are listed in Table 10, and yearly length size from 1985 to 2001 are graphed in Chart 4.

All the tagged fish caught this year were least cisco, and tag data and dissection information are listed in Table 12, and Figure 3. As expected the total tag return continues to remain low, although MJM Research did apply a few new tags this year. Most of the tags came from the LGL tagging operations from 1993 and earlier, although we did get one of the 2001 MJM tags. Of the 10 tagged fish caught, 6 were mature non-spawning females, 3 were spawned-out females, and 1

was a spawned out male. The non-spawning females were in good shape and body cavity fat values between .5 and 4.5 (5.0 max), and at an average weight of 0.31kg. The total biomass for the least cisco catch this year is 922.6kg.

Humpback Whitefish (Coregonus pidschian)

The humpback whitefish run had another strong year with a catch of 6184 (3030.2kg) for the season. The catch was a 66% increase over 2000 and 11% over the 10 year mean of 5590 whitefish (Table 14). The run was strong all fall, but catch rates were higher during October when we were still running the larger mesh net. That net was pulled early to keep from catching more than our quota allowed. The season CPUE of 44.8 was 13% increase over 2000 and 64% above the 10 year mean CPUE of 27.3. All segments of the population were present, most non-spawners were in good health, and all were feeding throughout the fall. The 2001 daily catch by net is shown in Table 5, yearly fish totals in Table 6, and population size measurements in Table 11.

Weekly fork length measurements were taken four times during the fall and ranged from 35.1cm to 37cm with a yearly average of 35.9cm. The two largest samples were taken in October, with the size dropping about one centimeter in November. This is 0.3cm less than the average for 2000.

Summery

With the arctic cisco run down even more this year, we were not able to supply both the Arctic Coast market as well as the Fairbanks one. Moreover, with the poor catch of least cisco, we would have been unable to even meet the Fairbanks market, save for the good run of hump-back whitefish. In the life history of our commercial fishery, a span of fifty years, this is the first time that the total whitefish catch exceeded both the arctic and least cisco catches combined. The large size and thus good poundage of the few arctic cisco we did catch helped somewhat to make up for that dismal aspect of our fishery.

Data collected for 2001 indicates that 2002 might be another lean year, especially if the least cisco numbers also remain low. The hump-back whitefish population seems to remain healthy and produce good numbers, which will help keep the commercial fishery going.

James Helmericks Golden Plover Guiding jwhgpa@astacalaska.com



What its all about

COMMERCIAL FISHERY SUPPORTING DATA APPENDIX LISTING

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Chart 05	Graph of daily species totals for 2001 plotted against average salinity levels.
Chart 06	Graph of arctic cisco movements & salinity in 2001

Char Island - East Channel - Salinity Data 2001

Meters	04-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct	13-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
0.5	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2
1.0	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2
1.5	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2
2.0	0.1	0.4	0.2	0.2	0.3	0.2	0.3	0.2	0.3	0.4	0.3	0.2
2.5	0.2	0.6	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.2
3.0	0.3	1.0	0.3	0.3	0.5	0.3	0.3	0.3	0.3	0.5	0.3	0.2
3.5	0.3	4.2	1.8	1.0	0.9	1.9	1.8	12.4	9.9	1.2	0.6	2.8
4.0	0.4	10.6	12.4	13.8	10.6	9.0	7.6	13.7	11.9	10.6	11.7	8.8
4.5	0.4	12.3	13.0	16.0	11.6	10.1	8.0	13.9	13.8	13.1	12.5	9.3
5.0	0.4	12.5										
5.5												

Salinity Recored in Parts Per Thousand

0.5-2.0	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2
		6.9										
0.5-5.0	0.2	4.3	3.2	3.6	2.8	2.5	2.1	4.6	4.2	3.0	3.0	2.5

Water Temperature Data

0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4.0	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.4	0.4	0.3	0.4	0.3
5.0	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.4	0.3	0.4	0.5	0.3

Temperature in Degrees Celsius

							and the same of th	The state of the s
0.0-5.0 0.2 0.1	0.2 0.2	0.1 0.1	0.2	0.2	0.2	0.2	0.2	0.2

Table 1B

Char Island - East Channel - Salinity Data 2001

Meters	20-Oct	22-Oct	24-Oct	25-Oct	26-Oct	27-Oct	29-Oct	31-Oct	02-Nov	03-Nov	05-Nov	07-Nov
0.5	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2		0.1
1.0	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2		0.1
1.5	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2		0.1
2.0	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2		0.2
2.5	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2		0.2
3.0	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2		0.6
3.5	1.6	8.0	1.3	0.5	3.6	1.3	0.2	0.3	2.7	4.9		1.9
4.0	1.9	10	10.1	6.8	8.4	10.1	8.5	7.4	8.4	8.3		5.5
4.5	2.1	12.3	11.5	7.1	10.2	11.5	11.1	11.0	9.2	9.2		8.8
5.0												
5.5												

Salinity Recored in Parts Per Thousand

0.5-2.0	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	ERR	0.1
2.5-5.0	1.2	4.7	4.7	3.0	4.5	4.7	4.0	3.8	4.2	4.6	ERR	3.4
0.5-5.0	0.8	2.7	2.7	1.7	2.6	2.7	2.3	2.2	2.4	2.6	ERR	1.9

Water Temperature Data

0.0	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0
1.0	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0
2.0	0.2	0.2	0.0	0.1	-0.1	0.0	0.1	0.2	0.1	0.0	0
3.0	0.2	0.2	0.0	0.1	-0.1	0.0	0.1	0.2	0.1	0.0	-0.1
4.0	0.3	0.5	0.4	0.3	0.2	0.3	0.3	0.4	0.3	0.3	0.2
5.0	0.4	0.6	0.4	0.3	0.4	0.4	0.5	0.6	0.5	0.4	0.3

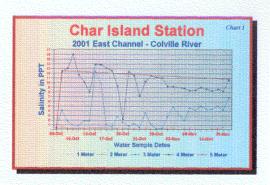
Temperature in Degrees Celsius

			Principles Control of						
-5.0 0.3 0.3 0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.1	ERR	0.1

Table 1C

Char Island - East Channel - Salinity Data 2001

Meters	09-Nov	10-Nov	12-Nov	14-Nov	16-Nov	17-Nov	20-Nov	01-Dec	01-Jan-02
0.5	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.4
1.0	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4
1.5	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4
2.0	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	2.5
2.5	0.2	0.1	0.1	0.1	0.2	0.2	0.5	3	9.1
3.0	0.4	2.0	1.8	1.8	1.1	2.0	2.2	4.9	13.2
3.5	4.7	4.2	5.0	4.4	4.4	5.1	4.2	6.8	14.8
4.0	6.1	6.2	8.6	7.7	7.6	7.6	6.6	8.3	15.3
4.5	8.3	8.4	9.0	8.6	8.3	8.6	8.2	10.5	15.5
5.0								10.8	
5.5									



Salinity Recored in Parts Per Thousand

0.5-2.0	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.9
2.5-5.0 0.5-5.0	3.9	4.2	4.9	4.5	4.3	4.7	4.3	7.4	13.6
0.5-5.0	2.3	2.4	2.8	2.6	2.5	2.7	2.5	4.5	8.0

Water Temperature Data

0.0	0.1	0	0.1	0.1	0.1	0.1	0.0	0	0.1
1.0	0.1	0	0.1	0.1	0.1	0.1	0.1	0	0.1
2.0	0.1	0	0	0.1	0.1	0.1	0.1	-0.1	0
3.0	0.1	0.1	0.1	0.2	0.2	0.1	0.0	0	-0.2
4.0	0.2	0.2	0.3	0.4	0.4	0.4	0.2	0.2	-0.1
5.0	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.2	-0.1

Temperature in Degrees Celsius

0050 00	01 00	0.2	0.0	0.0	0.4	0.4	0.0
0.0-5.0 0.2	0.1 0.2	0.2	U.Z	U.Z	U. I	U.I	-0.0

Weather During Fishing Season

Colville Village

Table 02

Recorded on Sampling Day

		orueu on Sampling Day	,	
08-Oct-01 1	1125hr Bro	k 16degF Vis 05 It snow	N	07 kts
09-Oct-01 1	1130hr Ov	c 15degF Vis 02 snow,drft sn	NNE	15 kts
10-Oct-01 1	1445hr Ov	c 14 degF Vis 02 snow, drifting sn	N	20 kts
11-Oct-01 1	1524hr Ov	c 20degF Vis 01 snow,drft sn	NNE	18-25 kts
12-Oct-01 1	1425hr Ov	c 25degF Vis 05 mist	N	08 kts
13-Oct-01 1	1250hr Bro	k -1 degF Vis 20	SE	05 kts
15-Oct-01 1	1215hr Ov	16degF Vis 03 snow	s	04 kts
16-Oct-01 1	1225hr Ov	16degF Vis 03 snow	N	04 kts
17-Oct-01 1	1255hr Ov	12degF Vis 01 snow, drft sn	N	18 kts
18-Oct-01 1	1305hr Ov	10degF Vis 02 snow, drft sn	N	16 kts
19-Oct-01 1	1200hr Sca	at 02degF Vis 10	N	10 kts
20-Oct-01 1	1330hr Bro	k 05degF Vis 1.5 Drifting snow, mist	N	16 kts
22-Oct-01 1	1600hr Ove	06 degF Vis 04 It. snow, mist, drft sn	N	14 kts
24-Oct-01 1	1315hr Ove	04 degF Vis 03 lt. snow, mist	NW	10 kts
25-Oct-01 1	1450hr Ove	-3 degF Vis 02 mist	sw	03 kts
26-Oct-01 1	1300hr Ove	-2degF Vis 05 lt. snow	s	07 kts
27-Oct-01 1	1350hr Bro	k -6degF Vis 20	N	04 kts
29-Oct-01 1	1330hr Ove	08degF Vis 1.5 lt. snow, mist, drft sn	NNE	15-20 kts
31-Oct-01 1	1300hr Bro	k 0 degF Vis 10	s	10 kts
02-Nov-01 1	1300hr Ove	06degF Vis 05 It. snow, drft sn	ssw	10 kts
03-Nov-01 1	1215hr Ove	06degF Vis 05 lt. snow	w	08 kts
05-Nov-01 1	1230hr Ove	02 degF Vis 07 It. snow	E	09 kts
07-Nov-01 1	225hr Bro	k -4 degF Vis 10	ssw	08 kts
09-Nov-01 1	150hr Ove	-2 degF Vis 05 It. snow, drifting sn	NE	12 kts
10-Nov-01 1	400hr Bro	k -4 degF Vis 05 mist, drifting sn	Ε	8-12 kts
12-Nov-01 1	130hr Ove	04 degF Vis 08 lt. snow	NE	06 kts
14-Nov-01 1	305hr Ove	: 02 degF Vis 04 It. snow	NE	04 kts
16-Nov-01 1	215hr Bro	k -6 degF Vis 15	s	08 kts
17-Nov-01 1	430hr Bro	k -4 degF Vis 10	S	05 kts
20-Nov-01 1	200hr Ove	11 degF Vis 01 snow	NW	05 kts

Fall Storm Winds ≥20 Knots

10-Oct	N 20 kts	11/09 NNE 17-23 kts late evening
11-Oct	NNE 18-25 kts	
12-Oct	N 25 Pk Gust 33 kts early AM	
29-Oct	N 20-25 kts evening	

ARCTIC CISCO

2001

Table 03
Daily Fish Catch by Net - East Channel CRD - October - November

DATE	Net#1	Net#2	Net#3	Net#4	Net#5	Net#6	Day Total
	3" Mesh	3" Mesh	31/4 * Mesh	3" Mesh	3" Mesh	3" Mesh	
09-Oct	92	92					184
10-Oct	68	47					115
11-Oct	33	56					89
12-Oct	74	84	66				224
13-Oct	27	62	42				131
14-Oct	-	02	100				0
15-Oct	49	56	53				
16-Oct	19	24					158
17-Oct			42	17			102
	22	28	37	20			107
18-Oct	11	18	27	7			63
19-Oct	5	8	9				23
20-Oct	14	11	11	11			47
21-Oct							0
22-Oct	12	13	20	9			54
23-Oct							0
24-Oct	5	10	17	12			44
25-Oct	8	12					20
26-Oct			13	19			32
27-Oct	10	10	21	7			48
28-Oct	10	10					0
29-Oct	12	17		40			
30-Oct	12	146		15			44
31-Oct	4						0
	7	9		4	-		20
Oct. Total	468	558	358	121	0	0	1505
01-Nov							0
02-Nov	22	5		12			39
03-Nov	3	6		6			15
04-Nov	1000						0
05-Nov	3	2	CO CONTRACTOR	9			14
06-Nov							0
07-Nov	5	8		7			20
08-Nov							0
09-Nov	9	15		29			53
10-Nov	7	7		13			27
11-Nov				10			
12-Nov	1	5		44			0
13-Nov				11			17
	04						0
14-Nov	21	21		24			66
15-Nov	-						0
16-Nov	23	15		11			49
17-Nov	39	22		11			72
18-Nov							
19-Nov							
20-Nov	16	19		12			47
Nov. Total	149	125	0	145	0	0	419

LEAST CISCO

Daily Fish Catch by Net - East Channel CRD - October - November

HUMPBACK WHITEFISH

2001

Daily Fish Catch by Net - East Channel CRD - October - November

Table 0

10-Oct 81 44 11-Oct 82 64 12-Oct 103 72 113 13-Oct 64 57 112 14-Oct 15-Oct 97 87 122 16-Oct 75 59 101 51 17-Oct 41 34 90 70 18-Oct 59 59 112 20-Oct 59 59 112 20-Oct 59 68 150 97 21-Oct 22-Oct 77 113 188 96 23-Oct 72 110 181 90 25-Oct 38 81 26-Oct 188 54 27-Oct 60 95 154 69 28-Oct 103 96 95 30-Oct 31-Oct 62 65 89 Oct. Total 1170 1194 1612 753 0 0 4 01-Nov 02-Nov 65 75 79 03-Nov 39 31 47 04-Nov 05-Nov 13 67 65 08-Nov 09-Nov 36 48 43 10-Nov 17 38 18 10-Nov 19-Nov 19 29 18 13-Nov 19-Nov 29 49 22 17-Nov 43 89 48 21-Nov 22-Nov 43 89 48 21-Nov 22-Nov 43 89 48								Table 05
09-Oct 66 40 10-Oct 81 44 11-Oct 82 64 112-Oct 103 72 113 13-Oct 64 57 112 14-Oct 15-Oct 97 87 122 16-Oct 97 87 122 16-Oct 97 87 122 16-Oct 95 59 101 51 17-Oct 41 34 90 70 18-Oct 59 59 112 20-Oct 52 68 150 97 21-Oct 22-Oct 77 113 188 96 23-Oct 24-Oct 72 110 181 90 25-Oct 38 81 26-Oct 38 81 26-Oct 103 96 95 28-Oct 29-Oct 103 96 95 30-Oct 31-Oct 62 65 89 Oct. Total 1170 1194 1612 753 0 0 4 Ot-Nov 05-Nov 52 43 57 06-Nov 52 43 57 06-Nov 07-Nov 36 48 43 10-Nov 19-Nov 19-Nov 19-Nov 11-Nov 11-N	DATE							Day Total
10-Oct 81 44 11-Oct 82 64 11-Oct 82 64 12-Oct 103 72 113 13-Oct 64 57 112 14-Oct 15-Oct 97 87 122 16-Oct 75 59 101 51 17-Oct 41 34 90 70 18-Oct 59 59 112 20-Oct 59 59 112 20-Oct 52 68 150 97 21-Oct 22-Oct 77 113 188 96 23-Oct 24-Oct 72 110 181 90 25-Oct 38 81 26-Oct 188 54 27-Oct 60 95 154 69 28-Oct 103 96 95 30-Oct 31-Oct 62 65 89 Oct. Total 1170 1194 1612 753 0 0 4 01-Nov 02-Nov 65 75 79 03-Nov 39 31 47 04-Nov 05-Nov 05-Nov 05-Nov 05-Nov 09-Nov 36 48 43 10-Nov 17-Nov 19 19 29 18 13-Nov 14-Nov 19 29 18 13-Nov 14-Nov 29 49 22 17-Nov 19 19 29 18 13-Nov 14-Nov 29 49 22 17-Nov 19-Nov 05-Nov 04 3 76 37 15-Nov 19-Nov 05-Nov 29 49 22 17-Nov 19-Nov 20-Nov 43 76 37 15-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 43 89 48	09-Oct	66	40	-				100
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05-Nov 52 43 57 06-Nov 07-Nov 31 67 65 08-Nov 09-Nov 36 48 43 10-Nov 17 38 18 11-Nov 12-Nov 19 29 18 13-Nov 14-Nov 43 76 37 15-Nov 16-Nov 29 49 22 17-Nov 30 47 25 18-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov		39	31		47			117
06-Nov			- 10					
07-Nov 31 67 65 08-Nov 09-Nov 36 48 43 10-Nov 17 38 18 11-Nov 12-Nov 19 29 18 13-Nov 14-Nov 43 76 37 15-Nov 16-Nov 29 49 22 17-Nov 30 47 25 18-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov		52	43		57			152
08-Nov		24	07		0.5			(
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10-Nov 17 38 18 11-Nov 12-Nov 19 29 18 13-Nov 14-Nov 43 76 37 15-Nov 16-Nov 29 49 22 17-Nov 30 47 25 18-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov		26	40		42			400
11-Nov 12-Nov 19 29 18 13-Nov 14-Nov 43 76 37 15-Nov 16-Nov 29 49 22 17-Nov 30 47 25 18-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov								127
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13-Nov 14-Nov 43 76 37 15-Nov 16-Nov 29 49 22 17-Nov 30 47 25 18-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov		10	20		18			66
14-Nov 43 76 37 15-Nov 16-Nov 29 49 22 17-Nov 30 47 25 18-Nov 19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov		10	20		10			(
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19-Nov 20-Nov 43 89 48 21-Nov 22-Nov 23-Nov			-3.5					(
21-Nov 22-Nov 23-Nov	The state of the s							(
21-Nov 22-Nov 23-Nov		43	89		48			180
22-Nov 23-Nov		100	200		27.00			(
23-Nov								
0.4 N								
24-Nov	24-Nov							(
25-Nov								(
26-Nov								(
27-Nov								(
28-Nov								(
29-Nov								(
30-Nov								(
Nov. Total 404 592 0 459 0 0 1455	Nov. Total	404	592	0	459	0	0	1455
01-Dec								
Year Total 1,574 1,786 1,612 1,212 0 0 6,184	Year Total	1,574	1,786	1,612	1,212	0	0	6,184

Yearly Fish Totals

Helmericks's Commercial fishery

YEAR	Total Effort	ARCS	LSCS	HBWF	BDWF	Catch Total
1967	774	21,904	15,982	356		38,242
1968	1,427	41,948	19,086	172		61,206
1969	699	19,593	35,001	3,136		57,730
1970	562	22,685	30,650	345		53,680
1971	1,422	41,312	23,887	183		65,382
1972	646	37,101	12,183	1,481		50,765
1973	993	71,575	25,191	5,733		102,499
1974	947	44,937	14,122	4,802		63,861
1975	759	30,953	22,476	1,946		55,375
1976	996	31,659	37,046	1,793		70,498
1977	567	31,796	14,961	1,366		48,123
1978	1,077	18,058	25,761	2,758		46,577
1979	620	9,268	25,097	1,102		35,467
1980	1,209	14,753	30,982	4,232		49,967
1981	501	38,176	15,504	469		54,149
1982	328	15,975	27,085			43,060
1983	520	18,162	37,909			56,071
1984	371	27,686	13,076			40,762
1985	368	23,678	17,383			41,061
1986	151	29,595	9,444			39,039
1987	165	14,788	4,214	1,880		20,882
1988	243	9,012	14,040	6,945		29,997
1989	306	12,145	10,328	5,904	69	28,446
1990	427	11,772	11,064	4,581	2	27,419
1991	446	9,558	3,637	1,658	11	14,864
1992	332	22,754	7,292	5,209	208	35,463
1993	196	31,310	6,037	5,339	19	42,705
1994	210	8,958	10,176	8,827	8	27,969
1995	405	14,311	8,633	10,860	186	33,990
1996	162	21,817	7,796	6,425	258	36,296
1997	225	16,990	10,754	1,721	13	29,478
1998	176	8,752	11,822	5,279	13	25,866
1999	171	8,872	7,430	6,875	436	23,613
2000	93	2,619	5,758	3,706	4	12,087
2001	138	1,924	2,976	6,185	53	11,138

Arctic Cisco Population Size - Fork Length

\le 32CM Subsample

Table 07

YEAR	CATCH	TND	CPUE	SAMPLE SIZE	AVE. SIZE	≤32cm SIZE	% TOTAL
1985	23,678	368	64.3	200	33.36	69	0.345
1986	29,595	151	196	250	33.22	99	0.396
1987	14,788	165	89.6	350	34.52	27	0.077
1988	9,012	243	37.1	400	34.62	139	0.347
1989	12,145	306	39.7	350	34.86	74	0.211
1990	11,772	427	27.6	400	32.77	218	0.545
1991	9,558	446	21.4	250	32.74	137	0.548
1992	22,754	332	68.5	450	32.10	299	0.664
1993	31,310	196	159.7	300	33.36	73	0.243
1994	8,958	210	42.7	300	33.88	82	0.273
1995	14,311	405	35.3	400	31.88	277	0.692
1996	21,817	162	134.7	250	32.24	169	0.676
1997	16,990	225	75.5	250	32.76	120	0.480
1998	8,752	176	49.7	300	33.77	91	0.303
1999	8,872	171	51.9	300	33.70	110	0.366
2000	2,619	93	28.2	350	35.20	30	0.086
2001	1,924	138	13.9	357	35.65	61	0.170
2002							

^{*} TND=Total Net Days In Season

^{*} NET DAY=1 Net @2 meter x 50 meter x 24 Hrs.

^{*} CPUE=Catch Per Unit Effort

^{*} Sample Size=Number Of Fish in Weekly Samples

ARCTIC CISCO LENGTH SAMPLES

Weekly Samples 3.0 In. Nets

Table 8

Fork	9-Oct-2001	16-Oct-2001	24-Oct-2001	31-Oct-2001	7-Nov-2001	14-Nov-2001	20-Nov-2001
Length	3"	3"	3"	3"	3"	3"	3"
25							
26							
27	0	0	0	0	0	0	0
28	0	0	2	0	0	0	0
29	0	0	0	0	3	1	0
30	1	4	1	1	2	1	3
31	3	3	2	3	1	1	3
32	4	5	3	3	4	6	1
33	2	6	2	7	2	3	1
34	5	5	7	5	7	5	3
35	7	8	3	7	8	4	6
36	10	5	6	6	7	5	7
37	4	5	7	8	10	6	9
38	7	3	11	4	3	5	5
39	2	3	2	1	3	3	4
40	2	2	2	4	8	6	2
41	2	1	1	1	2	4	2
42	1	0	1	0	0	0	1
43	0	0	0	0	0	0	0
Average	35.76	34.76	35.74	35.38	35.75	36.08	36.06

Fish Measured to Nearest CM-Fork Length Weekly Sample Size 50 Fish

Note: 7&9 November 60 arcs taken for samples - miscounted out in cold

Note: 20 November sample size 47 fish

28	0	0	56	0	0	0	0
29	0	0	0	0	87	29	0
30	30	120	30	30	60	30	90
31	93	93	62	93	31	31	93
32	128	160	96	96	128	192	32
33	66	198	66	231	66	99	33
34	170	170	238	170	238	170	102
35	245	280	105	245	280	140	210
36	360	180	216	216	252	180	252
37	148	185	259	296	370	222	333
38	266	114	418	152	114	190	190
39	78	117	78	39	117	117	156
40	80	80	80	160	320	240	80
41	82	41	41	41	82	164	82
42	42	0	42	0	0	0	42
Total	1788	1738	1787	1769	2145	1804	1695
Average	35.76	34.76	35.74	35.38	35.75	36.08	36.06

ARCTIC CISCO LENGTH SAMPLES

Weekly Samples 3.25 In. Nets

Table 9

Fork	10/16/2001	10/24/2001				
Length	3.25"	3.25"	3.25"	3.25"	3.25"	
25						
26						
27						
28						
29	0	0				
30	1	0				1
31	0	0				
32	0	0				
33	2	2				
34	2	2				
35	9	3				
36	6	5				1
37	10	10				
38	10	5				
39	4	9				
40	4	7				
41	1	6				
42	1	2				
43	0	0				
Average	36.88	38.04	0.00	0.00	0	1

Sample size: Oct. 16th 50 fish; Oct.24th 51 fish. Fish Measured To Nearest CM Fork Length

28	0	0	0	0	0	
29	0	0	0	0	0	
30	30	0	0	0	0	
31	0	0	0	0	0	
32	0	0	0	0	0	
33	66	66	0	0	0	
34	68	68	0	0	0	
35	315	105	0	0	0	
36	216	180	0	0	0	
37	370	370	0	0	0	
38	380	190	0	0	0	
39	156	351	0	0	0	
40	160	280	0	0	0	
41	41	246	0	0	0	
42	42	84				
Total	1844	1940				
Average	36.88	38.04				

LEAST CISCO LENGTH SAMPLES

Weekly Samples 3 in. Nets

Table 10

Fork	9-Oct-2001	31-Oct-2001	9-Nov-2001	20-Nov-2001				
Length	3"	3"	3"	3"	3"	3"	3"	
24								
25								
26	0	0	0	0				
27	1	1	0	1				
28	1	1	0	0				
29	5	1	1	3				
30	6	8	1	9				
31	12	8	5	7				
32	15	10	9	7				
33	6	10	8	15				
34	2	9	6	7				
35	3	2	2	1				
36	0	0	3	0				
37	0	0	0	0				
38								
Average	31.43	31.96	32.80	31.86	0.00	0.00	0.00	0.00

Fish Mearsured To Nearest CM-Fork Length

Weekly Sample Size 50 Fish Note: Oct. 9th sample size 51 fish. Note: Nov. 9th sample size 35 fish.

CM								
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
27	27	27	0	27	0	0	0	0
28	28	28	0	0	0	0	0	0
29	145	29	29	87	0	0	0	0
30	180	240	30	270	0	0	0	0
31	372	248	155	217	0	0	0	0
32	480	320	288	224	0	0	0	0
33	198	330	264	495	0	0	0	0
34	68	306	204	238	0	0	0	0
35	105	70	70	35	0	0	0	0
36	0	0	108	0	0	0	0	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
Total	1603	1598	1148	1593	0	0	0	0
verage	31.43	31.96	32.80	31.86	0.00	0.00	0.00	0.00

HUMP-BACK WHITEFISH LENGTH SAMPLES & Broad Whitefish In 2001

Weekly Samples 3 In. Nets

т	-	b	e	-4	4
	а	u	ıe	- 1	- 1

Fork	09-Oct	31-Oct	09-Nov	20-Nov	
Length	HBWF	HBWF	HBWF	HBWF	BDWF
28					
29					
30	0	0	0	0	
31	1	1	2	1	
32	1	1	1	2	
33	8	2	4	2	
34	3	1	1	7	
35	8	4	10	6	
36	8	4	7	2	
37	7	4	8	10	
38	6	11	8	7	
39	4	11	5	6	
40	2	6	1	2	
41	1	2	1	2	
42	1	2	1	1	
43	0	1	1	0	
44	0	0	0	1	
45				0	
46				1	
Average	36.06	36.96	35.60	35.10	

Sample Size 50 Fish Each

Fish Measured To Nearest CM Fork Length

CM				t CM For	9		
28	0	0		0			
29	0	0	0	0			
30	0	0	0	0			
31	31	31	62	31			
32	32	32	32	64			
33	264	66	132	66			
34	102	34	34	238			
35	280	140	350	210			
36	288	144	252	72			
37	259	148	296	370			
38	228	418	304	266			
39	156	429	195	234			
40	80	240	40	80			
41	41	82	41	82			
42	42	84	42	42			
43	0	43	43	0			
44	0	0	0	44			
45	0	0	0	0			
46	0	0	0	46			
Total	1803	1848	1780	1755	0	1	
Average	36.06	36.96	35.60	35.10	0.00		_

James Helmericks' Commercial Fishery

Table 12

2001 Tag Returns

DATE	CO_NAME	TAG_ID	SPECIES	WGT_GRM	F_Lth_MM	SEX	B_CAV	STOM_\
11-Oct	LGL92	02420	LSCS	387	348	Fso	0.0	0.00
13-Oct	LGL90	08784	LSCS	429	328	Fm1	0.5	0.25
19-Oct	LGL93	14576	LSCS	284	314	Mso	0.0	0.00
20-Oct	LGL91		LSCS	369	345	Fso	0.0	0.00
	MJM-01		LSCS	290	320	Fm2	4.5	0.00
22-Oct	LGL91		LSCS	357	332	Fso	0.0	0.00
24-Oct	LGL91		LSCS	345	333	Fm1	1.5	0.00
29-Oct	LGL92		LSCS	329	335	Fm1	0.5	0.00
3-Nov	LGL93		LSCS	278	311	Fm1	1.0	0.00
6-Nov	LGL93	11100	LSCS	405	343	Fm2	3.0	0.00

Commercial Fishery Mean Totals All Species 1985 to 2001

Table 14

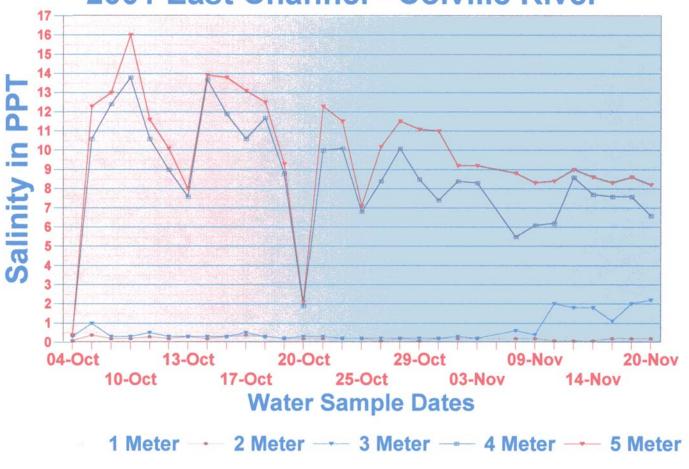
		Arctic	Cisco				Least (Cisco	
		Total	Total	Actual			Total	Total	Actual
	Year	Catch	Effort	CPUE		Year	Catch	Effort	CPUE
	1985	23,678	368	64.3		1985	17,383	368	47.2
	1986	29,595	151	196.0		1986	9,444	151	62.5
	1987	14,788	165	89.6		1987	4,214	165	25.5
	1988	9,012	243	37.1		1988	14,040	243	57.8
	1989	12,145	306	39.1		1989	10,328	306	33.8
	1990	11,772	427	27.6		1990	11,064	427	25.9
	1991	9,558	446	21.4		1991	3,637	446	8.2
	1992	22,754	332	68.5		1992	7,292	332	22.0
	1993	31,310	196	159.7		1993	6,037	196	30.8
	1994	8,958	210	42.7		1994	10,176	210	48.5
	1995	14,311	405	35.3		1995	8,633	405	21.3
	1996	21,817	162	134.7		1996	7,796	162	48.1
	1997	16,990	225	75.5		1997	10,754	225	47.8
	1998	8,752	176	49.7		1998	11,822	176	67.2
	1999	8,872	171	51.9		1999	7,430	171	43.5
	2000	2,619	93	28.2		2000	5,758	93	61.9
	2001	1,924	138	13.9		2001	2,976	138	21.6
1991 - 2000					1991 - 2000				
10 yr Mean		14,594	242	66.8	10 Yr Mean		7,934	242	39.9

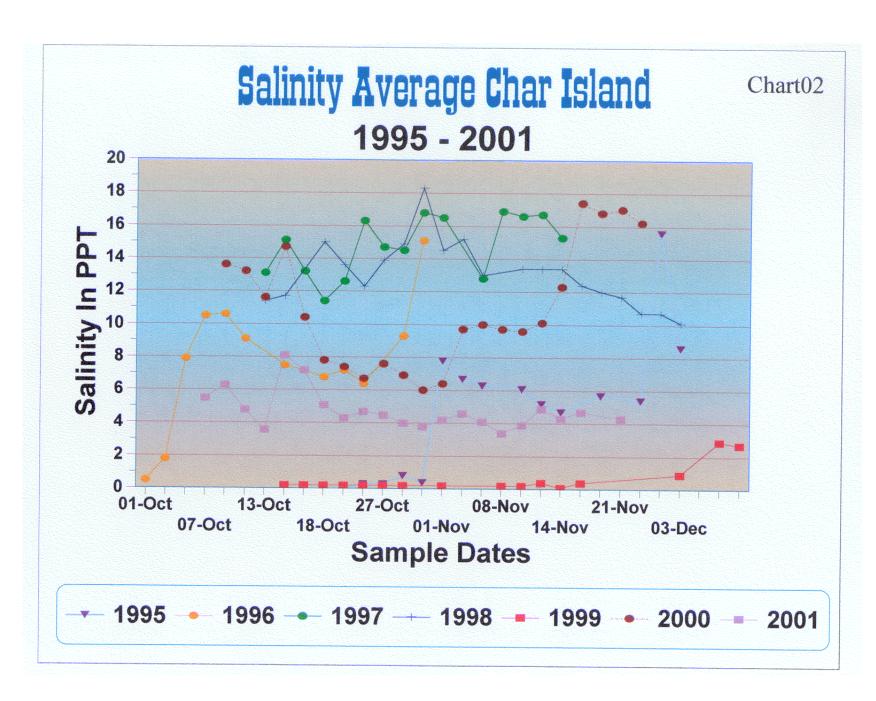
Humpback Whitefish

		Total	Total	Actual
	Year	Catch	Effort	CPUE
	1985		368	
	1986		151	
	1987	1,880	165	11.4
	1988	6,945	243	28.6
	1989	5,904	306	19.3
	1990	4,581	427	10.7
	1991	1,658	446	3.7
	1992	5,209	332	15.7
	1993	5,339	196	27.2
	1994	8,827	210	42.0
	1995	10,860	405	26.8
	1996	6,425	162	39.7
	1997	1,721	225	7.6
	1998	5,279	176	30.0
	1999	6,875	171	40.2
	2000	3,704	93	39.8
	2001	6,184	138	44.8
1991 - 2000				
10 Yr Mean		5,590	242	27.3



2001 East Channel - Colville River





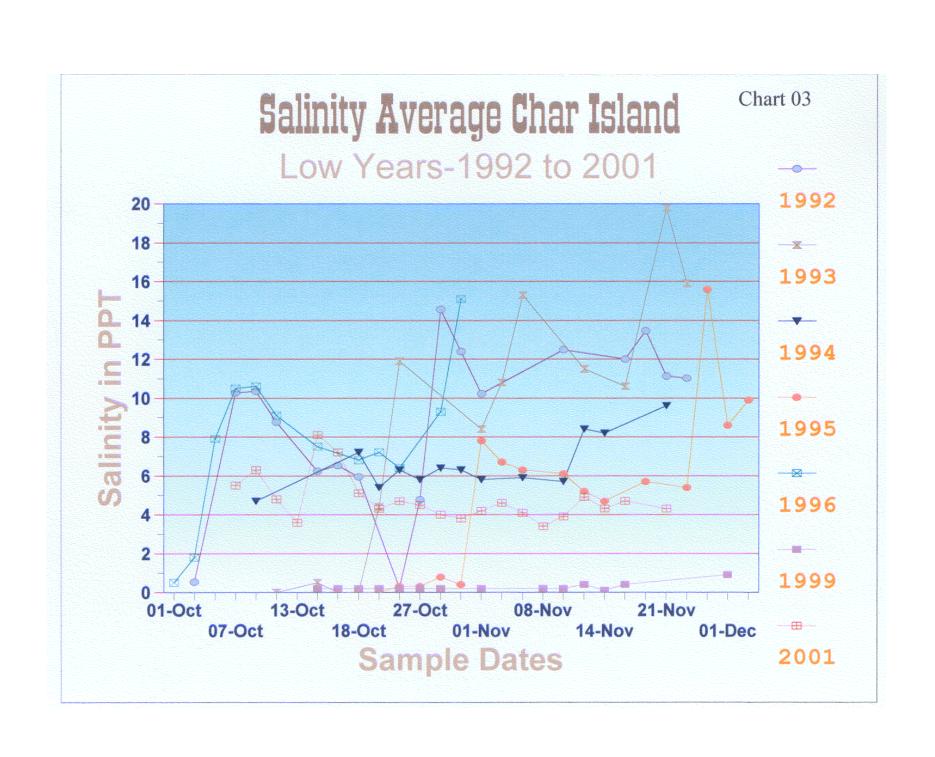
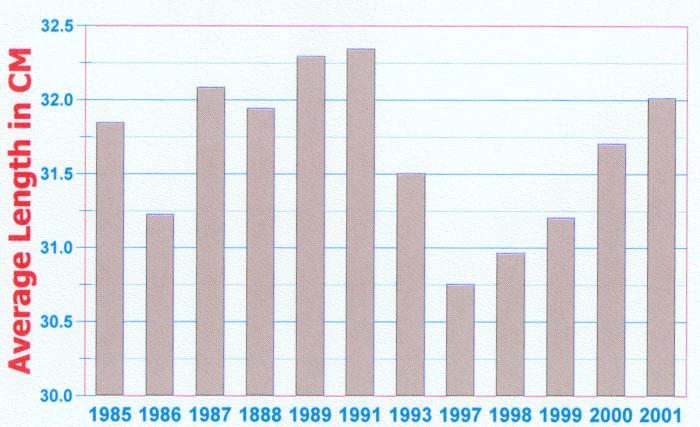
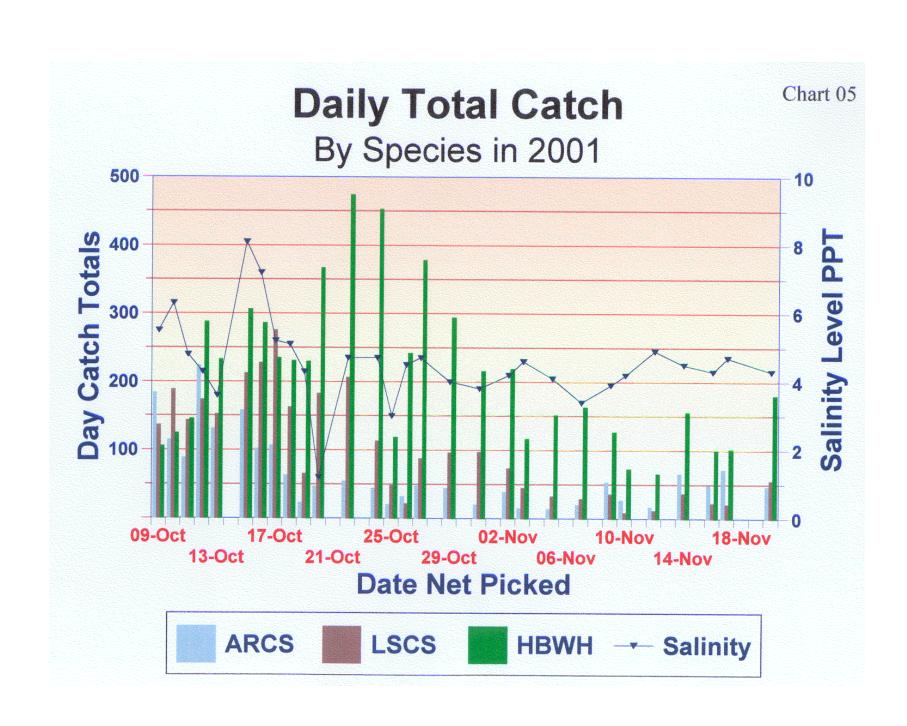


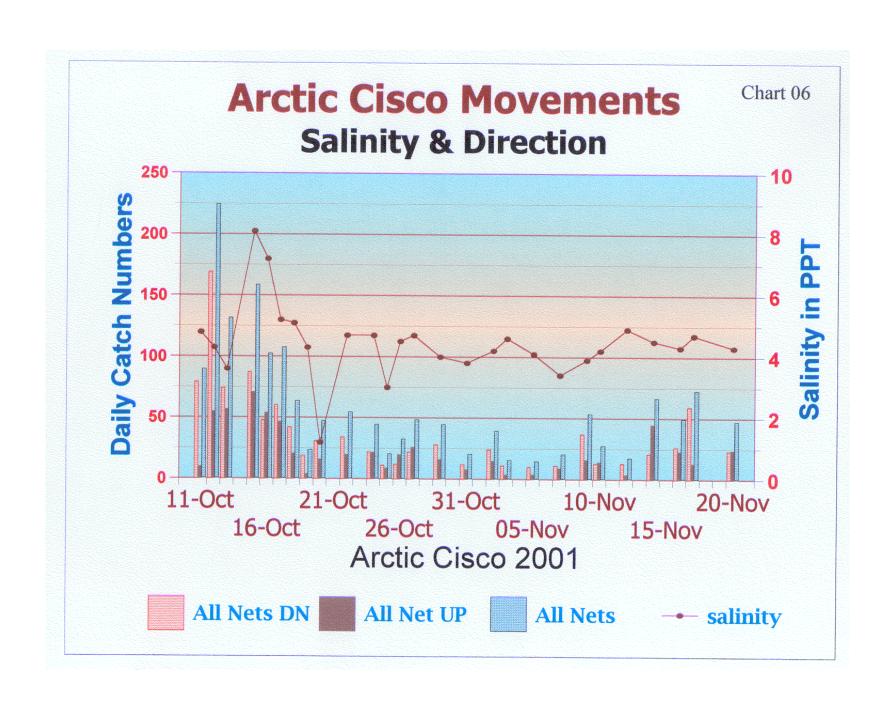
Chart 04

Least Cisco



Sample Year





ATTACHMENT 2Colville River Commercial Fishery - 2002

COLVILLE RIVER HELMERICKS WINTER FISHERY 2002

JAMES W. HELMERICKS
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An Overview of the Helmericks Fishery 2002 Season

Freeze-up Conditions

Freeze up was over a week later than last year with the lake freezing on October 7th, and the river channel by the house froze a few days later on October 10th. We had a west wind just before freeze up that was combined with late season melting in the mountains to create moderately high water levels as the river froze. Even with the storm, the river was fresh when we started the fall fishing. A strong east wind early on the 14th of October forced higher salinity water into the lower river delta. Light south west winds for the next few days helped retain the increased salinity, but after October 19th the river slowly freshened until by December 1 salinity levels were close to those at the start of fishing.

This was another season without any large concentrations of glaucous gulls in the delta at freeze up. Those that were present didn't stay long; perhaps the high water and windy conditions made conditions that weren't conducive for good fishing for the gulls.



A New Season Starts

Fishing Effort and Methods

This year's fishing methods and location remained the same as in past years, and the total fishing effort was down 42% from the ten year average, and also 11% below last years effort. I set the first nets of the season, two 3" mesh nets on the 14th of October. Another two 3" nets were set two days later on the 16th. Net number four was fished sporaticly the first couple weeks of fishing to balance time and amount of least cisco and whitefish being caught. Net number four was pulled for the last time on November 2nd, and the other three were pulled on November 22nd, ending the season. The larger 3.25" mesh net was not used this year due to the small average size in the arctic cisco this year, and we were catching plenty of whitefish in the 3" mesh nets. We had a total of 123 net days of fishing, and data was collected over a six week period. This effort was down slightly from last year. With the arctic cisco run down to less than 1 fish per net day there didn't seem to be any economical reason to keep fishing, as we had all the whitefish and least cisco we could sell.

Nets are checked each week day except Sunday, which is set aside to get caught up on other chores. We switch to picking nets every other day when the run slows down, like it does towards the end of the season. Longer sets than two days are usually caused by storms or high temperatures, when the fish are better off left in the cold water than lying on the ice and not freezing. Catch data was recorded for each net by species and net location. Fishing effort is calculated in net days by using the date a net is set, then pulled.

Fig	ure	0	l

riguic Or						
Date	Oct. 14	Oct. 16	Oct. 19	Oct. 28	Nov. 02	Nov. 22
Net #1	3"					3"
Net #2	3"					3"
Net #3		3"				3"
Net #4		3"	3"	3"	3"	
Action Taken	Set	Set	Pulled	Set	Pulled	Pulled

Net Activity

Collection Methods

This year all tagged fish and a small sample of arctic cisco were collected for laboratory analysis. Besides the usual weight and length measurements, otoliths were also collected from the arctic cisco. On the laboratory reports the condition and names of the fish are indicated by the following notations:

ARCS - arctic cisco LSCS - least cisco BRCS - bering cisco GRAY-grayling

BDWF - broad whitefish
TND - total net days

HBWF - humpback whitefish
CPUE - catch per unit effort

PPT - parts per thousand cm - centimeter kg - kilogram mm - millimeter SO - indicates a spawned out individual

M - a mature fish

M1 - may not spawn the following season

M2 - most likely to spawn the following season

Fat 0-5 - amount of body-cavity fat rated on a scale of 0-5, with 0 being the lowest, or none

Stomach fullness - indicates the amount of retained food

FL - fork length measurement

Wind storm criteria - To be classed as a storm a wind at or above 20 knots is used.

Daily catch data was recorded for each net according to species and number of fish. The nets were picked every day (except Sunday), for the first two weeks then they were picked about every other day for the rest of the season. CPUE is based on a net size of 50 meters in length by 2 meters deep, and a soak time of 24 hours. The fork length was recorded to the nearest millimeter on the dissection sheets and to the nearest centimeter on the weekly charts. Fish weights were recorded to the nearest gram. Every week fifty arctic cisco were collected at midweek from the 3" mesh nets for length frequencies. We collected six of these weekly samples from the 3-inch nets. I tried to collect weekly samples on Tuesday this year, but because of a lack of arctic cisco in the last two weeks, several days per week were needed to get a standard sample size and even then some are not a full sample of 50. Least cisco were sampled three times and humpback whitefish were sampled twice during the fall for length frequencies. No broad whitefish were sampled this vear.

A YSI Model 30 conductive meter was used to record the water temperature and salinity at the Char Island set on the East Channel throughout the fishing season. Water temperature was recorded in degrees Celsius and the salinity in parts per thousand (PPT). Measurements were taken every .5 meter in the water column, starting from the surface and extending to the bottom. See table 1A-1C and Chart 01 for the current salinity and temperature readings.

Tag Return Information

The tag catch remained low, and continued to decline. The total tag returns for the 2002 season was only 9 floy tags. There has been no tagged arctic cisco for several years now, and the few collected tags were all least cisco, all from LGL's tagging done in the early 1990's. A break down of all the tags is shown in Figure 3, and the dissection data in Table 12.

Catch Totals and Monthly Catch Per Unit Effort 123 Total Net Days Fished in the 2002 Season

T-1	22.2		^	-
H	gu	re	U	Z

Month	ARCS	CPUE	LSCS	CPUE	HBWH	CPUE
October	3485	74.1	3370	71.7	2147	45.7
November	450	5.9	2133	28.1	2038	26.8
December	0	0	0	0	0	0
Totals	3935	32.0	5503	44.7	4185	34.0

2001 Floy Tag Recovery By Company and Species

Figure 03

Company	LSCS	ARCS	нвwн	BDWF	Total
ARCO85	00	00	00	00	00
ENVIRO	00	00	00	00	00
LGL82	00	00	00	00	00
LGL-blue	00	00	00	00	00
LGL90	02	00	00	00	02
LGL91	00	00	00	00	00
LGL92	06	00	00	00	06
LGL93	01	00	00	00	01
WCC82	00	00	00	00	00
MJM-01	00	00	00	00	00
Species	09	00	00	00	09

Weather and Salinity Conditions

Salinity and temperature profile measurements were taken every day during the fishing season using a YSI model s-c-t meter. One reading on December 1st was also taken to see if any major changes had occurred afterwards to check on what the river salinity was doing. Readings were taken every .5 meter, starting at the surface of the water and continuing until the bottom was reached at around 5.5 meters. The salinity was recorded in parts per thousand (PPT), and the water temperature in degrees Celsius. The water data was collected at the Char Island Station

from the 14th of of November, December 1st.

Just prior to fishing we had a to southwest wind occurred before up. Once fall for the rest of the storms were out northeast. Of the

October to the 22nd then again on

the start of fall few days of south storms, which and during freeze fishing started and fishing season, all of the north to ten stormy days

Loading Fish

during fishing, four of those had wind gusts above 40 knots, and three over 30 knots. In contrast, year 2001 had only five stormy days and only one day was the wind higher than 30 knots. October winds from the southeast to west direction accounted for 39% of the winds, but all were light after freeze up. With the light westerly winds, we had little storm surge flooding and no influx of higher salinity sea water after the first week of fishing. The highest salinity was recorded on the third day of fishing (Oct.16), and four days the salinity reading on the bottom was around 20 PPT. After October 21st the average salinity readings slowly decreased with only two minor spikes around the first of November. By the end of the fishing season even the bottom readings were less than 2 PPT. The top three meters remained less than 0.5 PPT throughout the season and by December 1st the river had returned to a fresher state than when we started fishing with some readings of 0.1PPT and the bottom 2.5 meters being only 0.2 PPT.

Once fall fishing started the seven major wind storms were from the north through northeast and the longest lasted four days. The strongest winds were in early November with peak gusts to 43 knots. Predominately northwest to north-northeast winds in October, coming off the sea ice to land, brought many snowy days and we set another record for the amount of moisture receive for the month. Most of this snow was lost in a rare warm spell during the period 30 October to 1 November when we had high temperatures of +35F.

Tables 1A-1C show the daily salinity and water temperatures for the Char Island Station. Chart 1 shows the salinity measurements graphed out at each meter level. Chart 2 shows the salinity averages for the years 1995-2002, Chart 3 shows the low salinity years between 1992 and 2002. Chart 5 shows the daily catch totals by species in relation to average salinity levels for 2002. Weather recorded on each fishing day and fall storms are shown in Table 2.



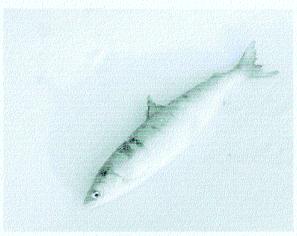
Taking water Readings

Arctic Cisco (Coregonus autumnalis)

The arctic cisco catch for the 123 net days of fishing this year was 3935 fish (2912 lb), which resulted in a catch per net day (CPUE) of 32.0 for the season. This year's CPUE is an increase of 2.3 over last years 13.9 CPUE, which was the lowest since 1985. This is still a decline of 52% with regards to the ten year mean CPUE of 66. The catch total doubled (2.05) over the 2001 catch but still falls well below the ten year mean of 13,831 arcs by 72%. The total net days fished dropped slightly over 2001 (123 TND to 138 TND). Part of the decline in fishing time was due to the arctic cisco moving out of the system and the fishery not needing any more least cisco or hump-back whitefish. Besides the TND being down from

last year it is also down 42% against the ten year mean of 211 TND. The daily catch totals are shown in Table 03, yearly fish totals in Table 06, yearly mean totals in table 14, and daily catch totals with salinity plotted is shown in Chart 05.

While this year's catch of arctic cisco was up over double of last year, the total biomass was only 1.38kg greater. The average fish size went from 0.50 kg in 2001 to only 0.33 kg 2002 for a total weight of 1320.9 kg. The



Arctic Cisco

population also showed the largest drop in fork length size as recorded for the past eighteen years, dropping 3.37cm, from 2001's record 35.65cm to this year's 32.28cm for the three inch nets. Before this the largest drop between years was 2.09cm between 1989 and 1990. Another indication of this years small size was the large increase in the number of arcs in the \leq 32cm length range. This figure is also the largest gain or loss seen since 1985, going from last years 0.170% to this years 0.649% of arcs at \leq 32cm fork length. (See Table 7 for ARCS population size in respect to \leq 32cm)

The 32cm or less indicator is a bit misleading this year in how large the recruitment of 5-6 year old fish was. This is born out in the weekly fish measurements and total fish caught in the first week of fishing. The weekly measurements from the three-inch mesh nets (Table8), showed that the population had a fluctuation of 1.8cm for the season. the smallest fish were caught in the first week (31.4cm), and progressively increased in size, until the largest fish were caught in the last week (33.2cm), which also coincided with the fewest number of arcs in the river system.

The season average CPUE changed drastically as the season advanced. The first week had a high CPUE of 146.8, by the second week that had dropped to 36.6, and in week six it was a miserable CPUE of only 0.7! The CPUE for October as a whole was 74.1, with November dropping rapidly to only 5.9. The large CPUE was recorded when the smallest fish were in the system. The first week of fishing caught 60% of the arctic cisco, and 89% of the arcs catch was taken in October. While there was a fair number of arctic cisco in the system during the first week and half, they were either fished out as they worked their way through the delta, or the small numbers moved back out into the ocean and didn't return. The way the arctic's numbers tailed off, worse than in any other year for the month of November, I would say there just isn't a very large number of recruits in the 5-6 year class.

The arctic cisco that were caught were in good health and most of the arcs dissected had a medium amount of body cavity fat. Out of the whole catch only four individuals were seen that looked like they could have been current year spawners. The largest individual of the fall was a mature female that was 438mm in fork length, and weighted 1113 grams.

Bering cisco (Coregonus luarettae)

Bering cisco continue to remain low after their peak in 1990, with only three taken during the fishing season this year, all in October. One mature female was sampled, and was 363mm in fork length and weighted 513grams.

Least Cisco (Coregonus sardinella)

After a low cycle last year, the least cisco catch was back up and the CPUE of 44.7 was higher than the ten year mean of 41.3. This was a 185% increase over 2001 and produced a total catch of 5503 (1722.3kg) least cisco for the year. This catch total, while up from last year was still 30% below the ten year mean of 7867 least cisco.

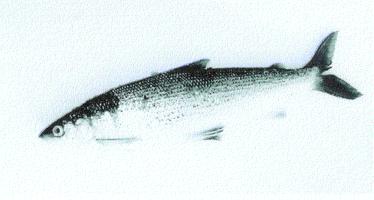
The least cisco run was more consistent through-out the season when compared to the arctic cisco run. October had a daily CPUE ranging

from a high of 120 to a low of 36, with the month's average coming in at 71.7. Numbers declined in November and the CPUE for that month was down to 28.1 at the end of the fishing season. October with 47 net days produced 61% of the lscs catch, while November with 76 net days produced 39% of the lscs catch.

Fork length samples were collected three times, starting on October 15th, to assess population size. There was very little variation between sample weeks this year, having a spread of only 0.19cm. Samples ranged from 31.57cm to 31.76cm and the average fork length for the year was

31.7cm. This was a decline of .3cm from last year's 32cm, but exactly what we had in 2000.

Least cisco daily catch totals are listed in Table 04, historic season totals in table 06, weekly fork length measurements are listed in Table 10, Ten Year Mean totals are listed in Table 14, Yearly length



Least Cisco

size from 1985 to 2002 are graphed in Chart 04, and catch totals graphed against salinity readings are shown in Chart 05.

All the tagged fish caught this year were least cisco, and tag data and dissection information are listed in Table 12, and Figure 3. As expected the total tag return continues to remain low, and all tags colleted this year were LGL tags from 1993 or earlier. Of the 9 tagged fish caught, 4 were mature non-spawning females, 4 were spawned-out females, and one tag was from a pulled tag with no data except species. The non-spawning females were in good health and body cavity values ranged from 1.5 to 4, and the average weight per fish was 0.31kg. The total biomass for the least cisco catch this year is 1722.3kg.

Humpback Whitefish (Coregonus pidschian)

The humpback whitefish had another good year, although not as strong as the past year. The total catch of 4185 fish was down 32%from last year's catch of 6184, and down 31% from the ten year mean of 6042 whitefish (Table 14). The run remained constant all season and the

whitefish catch was higher at the end of the season than either arctic or least ciscos (chart 05). October had a CPUE of 45.7 and produced 51% of the catch, while November's share was 49% with a CPUE of 26.8. The season CPUE of 34 was down 24% over 2001, but was 108% over the ten year mean of 31.4 (Table 14).

All segments of the population were present, most non-spawners were in good condition, and all were feeding throughout the fall. Fork length measurements were taken twice during the fall, and for the season averaged 35.2cm. Six humpback whitefish-arctic cisco hybrids were caught this fall. Of the five sampled, four were immature males ranging in length from 290mm to 350mm. The lone female was mature and had a length of 385mm and a weight of 590 grams. The average weight for humpback whitefish this year was 0.44kg, giving a total biomass for the catch of 1860.2kg.

The 2002 daily catch by net is shown in Table 05, historic yearly fish totals in Table 06, population size measurements in Table 11, yearly mean totals in Table 14, and daily catch totals plotted with daily salinity is shown in Chart 05.

Summery

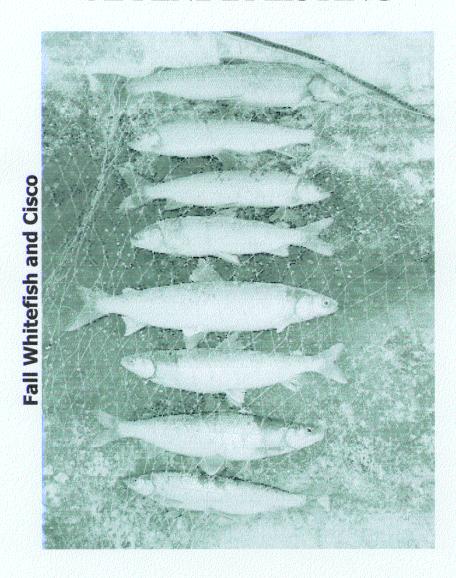
The arctic cisco showed a burst of promise the first week of fishing and things looked like they had the makings of good catch of arctic's. The decline for the rest of the season with the arctic cisco was rapid and November produced our worst monthly CPUE to date. The least cisco made a good recovery from last year in the fishery, and combined with the continued good run of humpback whitefish we were able to cover our market in Fairbanks. Since Barrow is strictly an arctic cisco market, we were unable to contribute much there this year.

The data collected in the winter fishery seems to indicate that 2003 will most likely be another low catch year for the arctic cisco, but the rest of the fishery should produce good numbers of fish.

James Helmericks Golden Plover Guiding jwhgpa@astacalaska.com

WINTER FISHERY SUPPORTING DATA

APPENDIX LISTING



LIST OF APPENDIX TABLES and CHARTS

Table 1a,1b,1c	Salinity data from Char Island Station, lower Colville River Delta.
Table 02	Weather and storm winds on salinity sampling days.
Table 03	Daily arctic cisco catch by net.
Table 04	Daily least cisco catch by net.
Table 05	Daily humpback whitefish catch by net.
Table 06	Winter Fishery catch totals 1967- 2002.
Table 07	Arctic cisco \leq 32cm fork length population data 1985-2002.
Table 08	Arctic cisco weekly length samples, 3" mesh nets.
Table 09	Arctic cisco weekly length samples, 31/4" mesh nets. Not used 2002
Table 10	Least cisco weekly length samples, 3" mesh nets.
Table 11	Humpback whitefish weekly length samples, 3" mesh nets.
Table 12	Tag returns and dissection data for 2002.
Table 13	Colville non-tagged fish dissection data for 2002. Not used 2002
Table 14	Commercial Fishery Ten-Year Mean
Chart 01	Char Island salinity graphed at 1 thru 5 meters for 2002.
Chart 02	Graphed salinity average for all depths 1995 - 2002.
Chart 03	Graphed low year salinity's, 1992 to 2002
Chart 04	Graph of least cisco population size 1985 - 2002.
Chart 05	Graph of daily species totals for 2002 plotted against average salinity levels.

Table 1A

Char Island - East Channel - Salinity Data 2002

Meters	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct	21-Oct	22-Oct	24-Oct	25-Oct	26-Oct	28-Oct
0.5	0.2	0.2	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0.3	0.5	0.3
1.0	0.2	0.2	0.5	0.3	0.3	0.3	0.3	0.2	0.1	0.3	0.5	0.4
1.5	0.2	0.2	0.6	0.3	0.3	0.3	0.3	0.2	0.1	0.3	0.5	0.5
2.0	0.2	0.2	0.7	0.3	0.3	0.3	0.3	0.2	0.1	0.4	0.5	0.5
2.5	0.2	0.2	9.6	0.3	0.4	1.4	0.3	0.2	0.2	0.4	0.6	0.6
3.0	0.2	0.2	16.4	0.8	12.8	17.4	0.8	0.5	0.7	0.5	0.6	0.6
3.5	0.2	0.2	18.4	14.8	16.4	18.0	15.0	14.1	13.2	3.0	1.1	0.8
4.0	0.2	0.2	19.0	16.0	17.6	18.3	16.6	14.9	13.6	11.8	5.8	2.2
4.5	0.2	0.2	19.5	18.9	18.6	18.3	16.9	16.7	15.9	13.2	12.3	12.2
5.0	0.2	0.2	19.8	20.2	19.1	18.8	17.6	17.3	16.9	15.0	13.5	13.2
5.5	0.2	0.2	19.9	20.3	19.8	18.9	17.8	17.5	16.9	16.8	16	14.6

Salinity Recored in Parts Per Thousand

0.5-2.0	0.2	0.2	0.6	0.3	0.3	0.3	0.3	0.2	0.1	0.3	0.5	0.4
2.5-5.5	0.2	0.2	17.5	13.0	15.0	15.9	12.1	11.6	11.1	8.7	7.1	6.3
0.5-5.5	0.2	0.2	11.3	8.4	9.6	10.2	7.8	7.5	7.1	5.6	4.7	4.2

Water Temperature Data

0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0
1.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.0	0.0
2.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0
3.0	0.1	0.1	-0.1	0.1	-0.1	-0.1	0.0	0.0	0.0	0.2	0.0	0.0
4.0	0.1	0.1	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.1	0.3	0.1	0.1
5.0	0.1	0.1	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	0.2	0.3	0.2	0.2

Temperature in Degrees Celsius

0.0-5.0 0.1 0.1 -0.1 0.0 0.0 -0.0 0.0 0.0 0.1 0.2 0.1 0.1	_												
	0.0-5.0	0.1	0.1	-0.1	0.0	0.0	-0.0	0.0	0.0	0.1	0.2	0.1	0.1

Char Island - East Channel - Salinity Data 2002

Meters	29-Oct	01-Nov	02-Nov	04-Nov	06-Nov	08-Nov	11-Nov	13-Nov	16-Nov	18-Nov	22-Nov	01-Dec
0.5	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1
1.0	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1
1.5	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1
2.0	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1
2.5	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.1
3.0	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2
3.5	0.4	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4.0	10.2	0.6	7.2	0.3	0.2	0.2	0.4	0.2	0.3	0.2	0.2	0.2
4.5	12	6.8	9.1	7.5	6.7	2.4	2	1.7	0.7	0.2	0.3	0.2
5.0	13.5	9.6	11.2	9	10.2	7.2	4.6	5.9	2.0	1.8	0.6	0.2
5.5	14.5	13.6	12.7	10.8	10.5	9.2	7.5	7.2	5.3	2.9	1.5	0.2

Salinity Recored in Parts Per Thousand

0.5-2.0												
2.5-5.5	7.3	4.5	5.8	4.0	4.0	2.8	2.2	2.2	1.3	0.8	0.5	0.2
0.5-5.5	4.7	2.9	3.8	2.6	2.6	1.8	1.4	1.4	0.9	0.5	0.3	0.2

Water Temperature Data

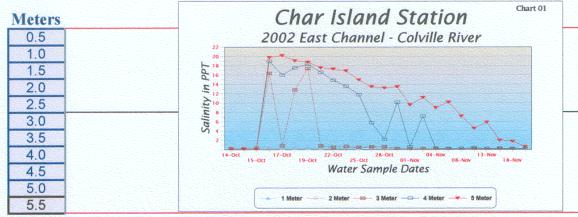
0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
2.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0
3.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0
4.0	0.2	0.2	0.2	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.0
5.0	0.2	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.2	0.1

Temperature in Degrees Celsius

0.0-5.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0

Table 1C

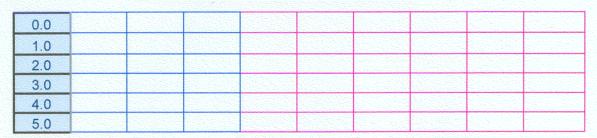
Char Island - East Channel - Salinity Data 2002



Salinity Recored in Parts Per Thousand

| 0.5-2.0 | ERR |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2.5-5.5 | ERR |
| 0.5-5.5 | ERR |

Water Temperature Data



Temperature in Degrees Celsius

0.0-5.0	ERR								

Weather During Fishing Season

Colville Village

Table 02

Recorded on Sampling Day

	11	CCO	lucu	on Sampling Day		
14-Oct-02	1000hr	Ovc	25degF	Vis 10	NE	22G26 kts
15-Oct-02	1015hr	Scat	18degF	Vis 15	E	06 kts
16-Oct-02	1105hr	Ovc	20degF	Vis 04 It snow	SSW	05 kts
17-Oct-02	1255hr	Ovc	19degF	Vis 03 snow	SSW	10 kts
18-Oct-02	1130hr	Ovc	12degF	Vis 10	SSE	08 kts
19-Oct-02	1130hr	Brok	08degF	Vis 10	S	05 kts
21-Oct-02	1215hr	Ovc	22degF	Vis 08	N	12 kts
22-Oct-02	1105hr	Ovc	06degF	Vis 02 mist	E	05 kts
24-Oct-02	1145hr	Ovc	20degF	Vis 1/4 fog	Calm	1
25-Oct-02	1130hr	Brok	09degF	Vis 20	SE	02 kts
26-Oct-02	1140hr	Scat	18degF	Vis 20	N	08 kts
28-Oct-02	1140hr	Brok	28degF	Vis 10	SSW	07 kts
29-Oct-02	1100hr	Ovc	27degF	Vis 05 drifting snow	N	25G30 kts
01-Nov-02	1055hr	Ovc	25degF	Vis 02 mist	SSW	/ 08 kts
02-Nov-02	1110hr	Ovc	20degF	Vis 05 mist	NNE	15 kts
04-Nov-02	1155hr	Brok	15degF	Vis 03 drifting snow	NE	15-20 kts
06-Nov-02	1140hr	Scat	15degF	Vis 10	NNE	25G35 kts
08-Nov-02	1305hr	Ovc	05degF	Vis 10 It snow	NNE	05 kts
11-Nov-02	1235hr	Brok	05degF	Vis 04 It snow, mist	NNE	10 kts
13-Nov-02	1145hr	Ovc	14degF	Vis 07 It snow	NNE	08 kts
16-Nov-02	1230hr	Ovc	14degF	Vis 02 It snow, mist	NNE	10 kts
18-Nov-02	1205hr	Ovc	-2degF	Vis 10	NNN	/ 05 kts
22-Nov-02	1300hr	Scat	-3degF	Vis 03 blowing snow	NE	22 kts

Fall Storm Winds ≥ 20 Knots

05-Oct	SSW 36 knots late evening	05-Nov NNE 30G36 knots - Pk gust 43 kts
06-Oct	SSW 40 knots morning	06-Nov N 25G33 knots - Pk gust 42 kts
08-Oct	S 25G33 knots morning	17-Nov N 23 knots - Pk gust 30 kts
11-Oct	ENE 28 knots morning	21-Nov NNE 25 knots
12-Oct	NE 24G36 knots morning	22-Nov NE 22 knots
13-Oct	NE 24G36 knots all day	
14-Oct	NE 22G26 knots	
29-Oct	N 35 knots	

ARCTIC CISCO

2002

Table 03

Daily Fish Catch by Net - East Channel CRD - October - November

DATE	\$ com 10 - 0 4 0 - 0 - 1 - 1 0 0 0 0 0						Day Tota
	3" Mesh	3" Mesh	3" Mesh	3" Mesh	3" Mesh	3" Mesh	
09-Oct							0
10-Oct							0
11-Oct							0
12-Oct							0
13-Oct							0
14-Oct							0
15-Oct	26	43					69
16-Oct	186	183					369
17-Oct	268	219	119	167			773
18-Oct	191	199	119	165			674
19-Oct	132	148	81	103			464
20-Oct							0
21-Oct	141	107	107				355
22-Oct	47	55	53				155
23-Oct	47	33	33				0
	50	AF	E4				152
24-Oct	56	45	51				
25-Oct	51	48	78				177
26-Oct	48	48	41				137
27-Oct							0
28-Oct	41	29	29				99
29-Oct	20	15	14	12			61
30-Oct							0
31-Oct							0
Oct. Total	1207	1139	692	447	0	0	3485
01-Nov	68	46					114
02-Nov	22	30	59	23			134
03-Nov							0
04-Nov	19	18	28	- 1-17			65
05-Nov							0
06-Nov	18	10	15				43
07-Nov	10						0
08-Nov	8	7	17				32
09-Nov	0		31.6				0
							0
10-Nov	•		40				
11-Nov	9	2	10				21
12-Nov	77.27	220	1122				0
13-Nov	6	3	5				14
14-Nov							0
15-Nov							0
16-Nov	3	3	8				14
17-Nov							0
18-Nov	5	1	5				11
19-Nov							0
20-Nov							0
21-Nov							0
22-Nov	2	0	0				2
23-Nov	-	074					0
24-Nov							0
25-Nov	11 = -27	777 77 77					
26-Nov							
27-Nov							
·oracinfolici							
Nov. Total	160	120	147	23	0	0	450
auv. Total							

LEAST CISCO

2002

Daily Fish Catch by Net - East Channel CRD - October - November Table 04

								Table 04
DATE	Net # 1	Net # 2				Net # 6		Day Tota
	3" Mesh	3" Mesh	3." Mesh	3" Mesh	3" Mesh	3" Mesh	3" Mesh	
09-Oct								0
10-Oct								0
11-Oct								0
12-Oct								0
13-Oct								0
14-Oct								0
15-Oct	32	21						53
16-Oct	132	104						236
17-Oct	113	122	68	177				480
18-Oct	121	110	84	126				441
19-Oct	115	118	83	124				440
20-Oct								0
21-Oct	104	81	65					250
22-Oct	58	49	54					161
23-Oct								0
24-Oct	72	70	73					215
25-Oct	90	98	60					248
26-Oct	95	87	91					273
27-Oct								0
28-Oct	123	111	107					341
29-Oct	57	60	54	61				232
30-Oct								0
31-Oct								0
Oct. Total	1,112	1,031	739	488	0	0	0	3370
01-Nov	123	99						222
02-Nov	64	60	88	135				347
03-Nov	(56.27)	1.5.		00.75				0
04-Nov	84	83	73					240
05-Nov								0
06-Nov	45	34	47					126
07-Nov	35.50	1,500						0
08-Nov	93	80	102					275
09-Nov		200.00						0
10-Nov								0
11-Nov	125	79	79					283
12-Nov	120	7.5	,,,					0
13-Nov	50	56	55					161
14-Nov	50	30	55					0
15-Nov								0
16-Nov	90	56	72					218
17-Nov	90	30	12					0
	35	38	56					129
18-Nov 19-Nov	30	38	50					0
								0
20-Nov								0
21-Nov		00	40					132
22-Nov	51	38	43					
23-Nov								0
24-Nov								0
25-Nov								0
26-Nov								0
27-Nov								0
28-Nov								0
29-Nov								0
30-Nov								0
Nov. Total		623	615	135	0	0	0	2133
Year Total	1872	1654	1354	623	0	0	0	5503

HUMPBACK WHITEFISH

2002

Daily Fish Catch by Net - East Channel CRD - October - November
Table 05

DATE Net #1 Net #2 Net #3 Net #4 Net #3 "Mesh 3" Mesh	1 3 Mesh 2 1 3 2 1
09-Oct 10-Oct 11-Oct 11-Oct 12-Oct 13-Oct 14-Oct 15-Oct 100 44 16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	1 3 2 1
11-Oct 12-Oct 13-Oct 14-Oct 15-Oct 100 44 16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	3 2 1
12-Oct 13-Oct 14-Oct 15-Oct 100 44 16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	3 2 1
13-Oct 14-Oct 15-Oct 100 44 16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	3 2 1
14-Oct 15-Oct 100 44 16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	3 2 1
15-Oct 100 44 16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	3 2 1
16-Oct 199 181 17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	3 2 1
17-Oct 43 52 72 96 18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	2
18-Oct 13 18 47 92 19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	1
19-Oct 28 37 69 69 20-Oct 21-Oct 31 31 82	
20-Oct 21-Oct 31 31 82	
21-Oct 31 31 82	2
22-Oct 24 20 63	1
	1
23-Oct	
24-Oct 47 38 85	1
25-Oct 31 33 60	2
26-Oct 22 23 62	1
27-Oct	
28-Oct 45 41 95	1
29-Oct 31 14 62 47	1
30-Oct	
31-Oct	
Oct. Total 614 532 697 304 0	0 22
01-Nov 34 39	
02-Nov 33 22 151 133	3
03-Nov	
04-Nov 42 33 112	1
05-Nov	
06-Nov 34 26 96	1
07-Nov	
08-Nov 44 30 126	2
09-Nov	
10-Nov	
11-Nov 36 40 175	2
12-Nov	
13-Nov 23 16 111	1
14-Nov	
15-Nov	
16-Nov 58 28 172	2
17-Nov	
18-Nov 28 24 94	1
19-Nov	
20-Nov	
21-Nov	
22-Nov 58 45 175	2
23-Nov	-
24-Nov	
25-Nov	
26-Nov	
27-Nov	
28-Nov	
29-Nov	
30-Nov	
Nov. Total 390 303 1212 133 0	0 2038
01-Dec Year Total 1,004 835 1,909 437 0	
1001 1000 1,004 000 1,000 401 0	0 4,292

Yearly Fish Totals

Helmericks's Winter fishery

Table 06

YEAR	Total Effort	ARCS	LSCS	HBWF	BDWF	Catch Total
1967	774	21,904	15,982	356		38,242
1968	1,427	41,948	19,086	172		61,206
1969	699	19,593	35,001	3,136		57,730
1970	562	22,685	30,650	345		53,680
1971	1,422	41,312	23,887	183		65,382
1972	646	37,101	12,183	1,481		50,765
1973	993	71,575	25,191	5,733		102,499
1974	947	44,937	14,122	4,802		63,861
1975	759	30,953	22,476	1,946		55,375
1976	996	31,659	37,046	1,793		70,498
1977	567	31,796		1,366		48,123
1978	1,077	18,058		2,758		46,577
1979	620	9,268		1,102		35,467
1980	1,209	14,753		4,232		49,967
1981	501	38,176		469		54,149
1982	328	15,975				43,060
1983	520	18,162				56,071
1984	371	27,686	13,076			40,762
1985	368	23,678	17,383			41,061
1986	151	29,595	9,444			39,039
1987	165	14,788		1,880		20,882
1988	243	9,012	14,040	6,945	R = ===	29,997
1989	306	12,145		5,904	69	28,446
1990	427	11,772		4,581	2	27,419
1991	446	9,558	3,637	1,658	11	14,864
1992	332	22,754	7,292	5,209	208	35,463
1993	196	31,310	6,037	5,339	19	42,705
1994	210	8,958	10,176	8,827	8	27,969
1995	405	14,311	8,633	10,860	186	33,990
1996	162	21,817	7,796	6,425	258	36,296
1997	225	16,990	10,754	1,721	13	29,478
1998	176	8,752		5,279	13	25,866
1999	171	8,872		6,875	436	23,613
2000	93	2,619	5,758	3,706	4	
2001	138	1,924		6,185	53	11,138
2002	123	3,935	5,503	4,183	32	13,653
2003						0
2004						0
2005					5	0
						0

Arctic Cisco Population Size - Fork Length

≤32CM Subsample

Table 07

YEAR	CATCH	TND	CPUE	SAMPLE SIZE	AVE. SIZE	#32cm SIZE	% TOTAL
1985	23,678	368	64.3	200	33.36	69	0.345
1986	29,595	151	196	250	33.22	99	0.396
1987	14,788	165	89.6	350	34.52	27	0.077
1988	9,012	243	37.1	400	34.62	139	0.347
1989	12,145	306	39.7	350	34.86	74	0.211
1990	11,772	427	27.6	400	32.77	218	0.545
1991	9,558	446	21.4	250	32.74	137	0.548
1992	22,754	332	68.5	450	32.10	299	0.664
1993	31,310	196	159.7	300	33.36	73	0.243
1994	8,958	210	42.7	300	33.88	82	0.273
1995	14,311	405	35.3	400	31.88	277	0.692
1996	21,817	162	134.7	250	32.24	169	0.676
1997	16,990	225	75.5	250	32.76	120	0.480
1998	8,752	176	49.7	300	33.77	91	0.303
1999	8,872	171	51.9	300	33.70	110	0.366
2000	2,619	93	28.2	350	35.20	30	0.086
2001	1,924	138	13.9	357	35.65	61	0.170
2002	3,935	123	32.0	254	32.28	165	0.649

^{*} TND=Total Net Days In Season

^{*} NET DAY=1 Net @2 meter x 50 meter x 24 Hrs.

^{*} CPUE=Catch Per Unit Effort

^{*} Sample Size=Number Of Fish in Weekly Samples

ARCTIC CISCO LENGTH SAMPLES

Weekly Samples 3.0 In. Nets

Table 8

Fork	15-Oct-2002	22-Oct-2002	29-Oct-2002	6-Nov-2002	13-Nov-2002	22-Nov-2002	
Length	3"	3"	3"	3"	3"	3"	3"
25	0	0	0	0	0		
26	0	0	0	0	0		
27	0	0	0	0	0		
28	0	0	0	0	0		
29	4	2	1	1	0	0	
30	7	6	6	5	2	2	
31	11	13	12	8	7	1	
32	16	14	14	13	18	2	
33	4	7	13	6	13	4	
34	3	3	2	5	4	1	
35	0	2	0	2	0	0	
36	0	2	0	0	1	1	
37	0	1	0	2	0	2	
38	1	0	2	0	3	0	
39	1	0	0	1	0		
40	2	0	0	0	0		
41	0	0	0	0	0		
42							
43							
Average	31.40	32.02	32.04	32.42	32.67	33.15	0.00

Fish Measured to Nearest CM-Fork Length

Weekly Sample Size 50 Fish

Note: 6th November sample size 43 fish

Note week 5 sample size 48 fish

Note week 6 sample size 13 fish

and the state of t	tote week o	Sample Size	I O HOH				
28	0	1	1	1			
29	116	58	29	29	0	0	
30	210	180	180	150	60	60	
31	341	403	372	248	217	31	
32	512	448	448	416	576	64	
33	132	231	429	198	429	132	
34	102	102	68	170	136	34	
35	0	70	0	70	0	0	
36	0	72	0	0	36	36	
37	0	37	0	74	0	74	
38	38	0	76	0	114	0	
39	39	0	0	39	0	0	
40	80	0	0	0	0	0	
41	0	0	0	0	0	0	
42	0	0	0	0	0	0	
Total	1570	1601	1602	1394	1568	431	
Average	31.4	32.02	32.04	32.42	32.67	33.15	0.00

LEAST CISCO LENGTH SAMPLES

Weekly Samples 3 in. Nets

Table 10

Fork	15-Oct-2002	22-Oct-2002	29-Oct-2002					
Length	3"	3"	3"	3"	3"	3"	3"	
24	0	0	0		30			
25	0	0	0					
26	0	0	0					
27	0	0	0					
28	1	0	0					
29	2	2	2					
30	11	9	7					
31	12	9	13					
32	10	16	14					
33	9	9	11					
34	5	3	2					
35	1	2	1					
36	0	0	0					
37								
38								
Average	31.57	31.76	31.70	0.00	0.00	0.00	0.00	0.00

Fish Mearsured To Nearest CM-Fork Length Weekly Sample Size 50 Fish

CM								
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
28	28	0	0	0	0	0	0	0
29	58	58	58	0	0	0	0	0
30	330	270	210	0	0	0	0	0
31	372	279	403	0	0	0	0	0
32	320	512	448	0	0	0	0	0
33	297	297	363	0	0	0	0	0
34	170	102	68	0	0	0	0	0
35	35	70	35	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
Total	1610	1588	1585	0	0	0	0	0
Average	31.57	31.76	31.70	0.00	0.00	0.00	0.00	0.00

HUMPBACK WHITEFISH LENGTH SAMPLES & Broad Whitefish In 2002

Weekly Samples 3 In. Nets

Table 11

					raine ii
Fork	15-Oct	29-Oct			15-Oct
Length	HBWF	HBWF	HBWF	HBWF	BDWF
28	2	0			
29	0	0			
30	2	2			1
31	3	0			0
32	3	3			1
33	4	6			2
34	8	1			2
35	11	5			2
36	8	10			1
37	4	10			
38	1	6			
39	3	3			
40	1	4			
41	0	0			7791
42					
43					
44					
45					
46					
Average	34.50	35.96	0.00	0.00	33.6

HBWF Sample Size 50 Fish Each

Fish Measured To Nearest CM Fork Length

CM							
28	56	0		0			
29	0	0	0	0		0	
30	60	60	0	0		30	
31	93	0	0	0		0	
32	96	96	0	0		32	
33	132	198	0	0		66	
34	272	34	0	0		68	
35	385	175	0	0		70	
36	288	360	0	0		36	
37	148	370	0	0		0	
38	38	228	0	0			
39	117	117	0	0			
40	40	160	0	0			
41	0	0	0	0			
42	0	0	0	0			
43	0	0	0	0			
44	0	0	0	0			
45	0	0	0	0			
46	0	0	0	0			
Total	1725	1798	0	0	0	302	
Average	34.5	35.96	0.00	0.00	0.00	33.6	

James Helmericks' Winter Fishery

2002 Tag Returns

Table 12

DATE	CO_NAME	TAG_ID	SPECIES	WGT_GRM	F_Lth_MM	SEX	B_CAV	STOM_V
17-Oct	LGL90	06161	LSCS	331	402	Fm2	3.0	0.10
19-Oct		02152	LSCS	357	356	Fso	0.0	0.10
17-Oct	LGL92	15281	LSCS	298	259	Fso	0.0	0.25
28-Oct	LGL92	07579	LSCS	341	348	Fso	0.0	0.10
26-Oct	LGL92	11226	LSCS	340	383	Fm1	2.0	0.10
29-Oct	LGL92	08818	LSCS	335	366	Fm1	1.5	0.25
22-Nov	LGL92	07703	LSCS	333	345	Fso	0.0	0.50
01-Nov	LGL93	08219	LSCS	335	436	Fm1	4.0	0.10
02-Nov	LGL92	88018*	LSCS					
			LSCS					

*pulled tag no data recorded for least cisco

Commercial Fishery Mean Totals All Species

1985 to 2002

Table 14

	Arctic Cisco						Least Cisco		
		Total	Total	Actual			Total	Total	Actual
	Year	Catch	Effort	CPUE	_	Year	Catch	Effort	CPUE
	1985	23,678	368	64.3	-	1985	17,383	368	47.2
	1986	29,595	151	196.0		1986	9,444	151	62.5
	1987	14,788	165	89.6		1987	4,214	165	25.5
	1988	9,012	243	37.1		1988	14,040	243	57.8
	1989	12,145	306	39.1		1989	10,328	306	33.8
	1990	11,772	427	27.6		1990	11,064	427	25.9
	1991	9,558	446	21.4		1991	3,637	446	8.2
	1992	22,754	332	68.5		1992	7,292	332	22.0
	1993	31,310	196	159.7		1993	6,037	196	30.8
	1994	8,958	210	42.7		1994	10,176	210	48.5
	1995	14,311	405	35.3		1995	8,633	405	21.3
	1996	21,817	162	134.7		1996	7,796	162	48.1
	1997	16,990	225	75.5		1997	10,754	225	47.8
	1998	8,752	176	49.7		1998	11,822	176	67.2
	1999	8,872	171	51.9		1999	7,430	171	43.5
	2000	2,619	93	28.2		2000	5,758	93	61.9
	2001	1,924	138	13.9		2001	2,976	138	21.6
	2002	3,935	123	32.0		2002	5,503	123	44.7
1992 - 2001					1992 - 2001				
10 yr Mean		13,831	211	66.0	10 Yr Mean		7,867	211	41.3

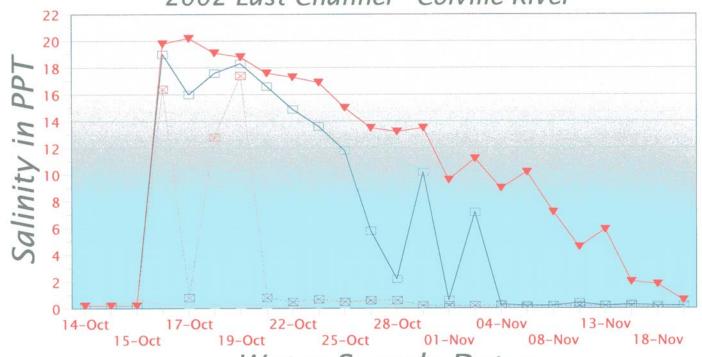
Humpback Whitefish

		Total	Total	Actual
	Year	Catch	Effort	CPUE
	1985		368	
	1986		151	
	1987	1,880	165	11.4
	1988	6,945	243	28.6
	1989	5,904	306	19.3
	1990	4,581	427	10.7
	1991	1,658	446	3.7
	1992	5,209	332	15.7
	1993	5,339	196	27.2
	1994	8,827	210	42.0
	1995	10,860	405	26.8
	1996	6,425	162	39.7
	1997	1,721	225	7.6
	1998	5,279	176	30.0
	1999	6,875	171	40.2
	2000	3,704	93	39.8
	2001	6,184	138	44.8
	2002	4,185	123	34.0
1992 - 2001				
10 Yr Mean		6,042	211	31.4

Chart 01

Char Island Station





Water Sample Dates



Chart 02

Salinity Average Char Island

