HARVEST ESTIMATE AND ASSOCIATED INFORMATION FOR THE 2000 COLVILLE RIVER FALL FISHERY

Prepared by

MJM Research
1012 Shoreland Drive
Lopez Island, WA 98261

for

PHILLIPS ALASKA, INC.,
P.O. Box 100360
Anchorage, AK 99510-0360

And

BP EXPLORATION (ALASKA) INC.
P.O. Box 196612
Anchorage, AK 99519-6612

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EXECUTIVE SUMMARY

Moulton, L.L. Harvest estimate and associated information for the 2000 Colville River fall fishery.

The objectives of the 2000 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 arctic cisco, including harvests of both the village of Nuiqsut and the commercial fishery. Similar to previous years, a daily count was made of the nets fishing from mid October to late November. Fishers were interviewed as they tended their nets to obtain estimates of catch rate.

The fishery began in early October, which is considered normal timing. Much of the early fishing was missed by the time monitoring began on October 15. Reports were that fishing was good during the early season, but decreased later in October. Because of the late start and uncertainty regarding the early catch patterns, the 2000 estimates should be viewed as minimum effort and harvest levels.

The 2000 fishery was characterized by a low catch rate on arctic cisco throughout the season. Fishing effort was 22% under the 1989-1998 average, while the village harvest of arctic cisco was one of the lower harvests observed. The catch of least cisco, the primary by-catch species, was the lowest yet observed in fifteen years of monitoring. Catch rates of least cisco in the Nigliq Channel were low, and when combined with the low effort, resulted in the overall low total harvest . In the commercial fishery, effort was down 46% from that recorded in 1999 and, when combined with the low catch rates, resulted in the lowest arctic cisco catch yet recorded. Bering cisco, which had been unusually abundant in 1990, remained at an incidental level in 2000.

The prediction for 2001 is for a continuing decrease in the arctic cisco CPUE. This prediction is based on the apparent abundance of age-0 fish in the Prudhoe Bay region during the initial recruitment year. The 2000 harvest was supported almost completely by the 1994 and 1995 year classes, which were quite weak, based on catches of age-0 fish in Prudhoe Bay. Most of the 2001 harvest will continue to be composed of these two year classes, since the 1996 year class appears to be essentially absent from the region.

Catch rates after 2001 may increase somewhat as the 1997 and 1998 year classes recruit into the fishery. Neither of these year classes is particularly strong, however, so any increase in harvest rate is likely to be small and harvests will probably remain low until 5 years after another major recruitment.

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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 2000) 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 2000 fishery constitutes the fifteenth year that the fishery in the delta was subjected to a harvest estimate. Results from 1985 to 1997 are reported in Moulton and Field (1988) and previous editions of the Endicott Monitoring Program Annual Report Series. 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 2000 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 2000 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 almost every day with a YSI Model 33 salinometer 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 24 and 30-m nets being the most common. The commercial fisheries use 46-m nets. In 2000, net depth was measured on nets used in the Nigliq Channel. Six of the 54 nets (or 11%) were 1.2 m deep with 81% being 1.8 m deep and the remainder either 1.5 or 2.4 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 2000 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 15 and November 21. 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 1998 through 2000 are attached. Length measurements were from 50 fish selected randomly 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 150 arctic cisco caught in 76-mm mesh in the commercial fishery to estimate the age distribution of the harvest. 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 2000. 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:

$$CF_i = CPUE_{Ei} - CPUE_m$$

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 1,377 net-days, about 13% below the average for the 1990-1998 period (Figure 4). From 1985 to 2000 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 2000, 29 fishing groups were identified. Effort in 2000 was highest in the Nigliq Delta area, followed by the Nanuk area (Figure 4b).

A normal freeze-up allowed fishing to begin in early October (Table 1). Effort monitoring began October 15, thus about 2 weeks of the early season fishing activity was missed. An effort was made to re-construct the early season effort through fisher interviews, but catch rates by area and mesh could not be re-constructed. Catch rates were reported to be declining when the monitoring commenced, thus the harvest estimate is likely to be low.

Effort has gradually shifted downstream in the Nigliq Channel during the fifteen 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 2000 over 50% of the Nigliq Channel effort was in the Nigliq Delta area, with an additional 37% in the Nanuk area. This is the first year that the Nigliq Delta had the highest effort of the three Nigliq Channel areas.

In 2000, salinity in the Nigliq Channel was moderate compared to previous years (Figure 6). By early November, salinity at Nuiqsut was approaching 5‰. Similarly, in the Nanuk region, salinity approached 15‰ and the Nigliq Delta was near 20‰. 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 7). In 1997 and 1998, the salinity exceeded 20‰ in both the Nanuk and Nigliq Delta areas through the season.

Commercial Fishery. The commercial fishery operated three 46-m nets in the East Channel for 233 net-days (based on 18 m of net per day). This effort was the lowest yet recorded, being 46% lower than that reported in 1999, and 75% lower than the previous ten-year average effort (918 net-days).

Catch Composition

Arctic cisco, the target species, comprised 79% of the total observed catch in the Nigliq Channel in 2000 (Table 3). Least cisco also accounted for 14% of the observed catch, with humpback whitefish third most abundant at 6%. In 2000, 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, decreasing substantially from the high rates observed in 1996 and 1997, but increasing slightly from the 1998 catch rates (Table 4). Least cisco mean catch rates in Nigliq Channel areas were slightly lower than the previous ten-year average (Table 5).

Commercial Catch Rates. The effort-adjusted catch rate for arctic cisco (see Methods) in the commercial fishery decreased substantially from that observed in 1998 and 1999 and was 80% less than the previous ten-year average (Table 2). 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. As indicated above, the 2000 catch rate for arctic cisco, adjusted for varying effort, was the lowest yet

recorded. The adjusted catch rate for least cisco was 63% higher than the previous 10-year mean (Table 2, Figure 8).

Estimated Total Catch

Village Harvest. The total estimated catch of arctic cisco by villagers (9,956 fish, 4,851 kg) was the lowest since 1995 (Figure 9, Tables 6, 7). This estimate is considered a minimum estimate because the monitoring effort started late and missed effort and high catch rates in early to mid-October, and village harvest in the Outer Delta was not estimated. The least cisco total catch was the lowest yet observed, but again was likely affected by deficiencies in the harvest estimate (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 2,619 fish (1,218 kg), approximately 20% of the harvest by both numbers biomass for this species (Table 7). While the harvest was down 70% from that observed in 1999, in was accompanied by a 46% decrease in effort (Table 2). The total commercial harvest of 5,758 least cisco (1,873 kg) was 74% of the fall harvest by numbers and weight.

Humpback whitefish were not unusually abundant in the commercial harvest in 2000, with a total catch of 3,706 fish (Table 6). This is below the 1989 to 1998 average harvest of 5,570 fish. An unusual observation is that the catch of humpback whitefish exceeded the arctic cisco harvest for the first time; this is another indicator of the low abundance of arctic cisco in the region in 2000.

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 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 2000 length frequency is quite similar to those obtained from 1986 and 1995 samples.

Ages of arctic cisco taken in the fishery have been estimated from 1984 to 2000 (Figure 12). 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 13). 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.

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 14), which was 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.

Selectivity of Colville Delta Gill Nets

Gillnets are highly selective, with small changes in mesh size leading to substantial changes in the size and number of fish being caught. A 6 mm (0.25 inch) incremental increase in mesh size leads to 10-20 mm increases in the length of arctic cisco, depending on the mesh (Moulton 1995). For both arctic and least cisco, an increase from 64 to 76-mm mesh increases the mean length by approximately 30 mm. These length increases equate to weight gains of around 148 gm in arctic cisco and 68 gm in least cisco.

Catch rates expressed as biomass (kg/day/18-m of net) are, on average, highest in 76-mm mesh for arctic cisco, but highest in 64-mm mesh for least cisco (Table 8). When both species are combined, 64-mm mesh produces the greatest rate of biomass yield. Despite this high biomass yield, 64-mm mesh averages around 10% of the total annual effort in the Nigliq Channel. The small size of individual fish in 64-mm mesh does not produce a desirable catch for most fishers, although some prefer the small fish when acquiring dog food. For most fishers, 76-mm mesh provides enough fish of desirable species and size to offset the reduction in biomass yield, and this mesh averages 56% of the total effort (range: 42-71%).

Information from Returned Tagged Fish

Tag returns continue to dwindle, since tags have not been released since 1993. During 1999 and 2000, 25 and 16 tagged least cisco were recovered by the commercial fishery. All of the returns were from 1990 or later releases (Table 9). All tagged arctic cisco have apparently matured and left the Colville region.

Tagged fish have been recovered annually in the commercial fishery since tagging began in the

mid-1970's. Since 1983, the report on tag recoveries has included length, weight and sex data on the recovered tagged fish. Recovered least cisco consisted of males, post-spawning females and non-spawning females. In 2000, females were 94% of the recovered tags (Table 10). Post-spawning female least cisco were 19% of the catch, which is below the long-term average. In least cisco, spent females consistently had the greatest mean length, most likely because spent fish are thinner than non-spawning females and pass through the gill nets at a larger size (Table 11).

Tag returns from the commercial fishery have been used to generate population estimates for harvestable least cisco and arctic cisco since 1976 (Craig and Haldorson 1981). Data available since 1980 were used to estimate the number of harvestable least cisco and arctic cisco until 1993 (Appendix Table 37). Population estimates for least cisco indicated a generally stable population level between 200-400 thousand harvestable fish, while the arctic cisco estimates were more cyclic, following patterns described in Gallaway et al. (1989). Since tagging has not been conducted since 1993, a more current population estimate cannot be made.

Predictability in Arctic Cisco Harvest Rates

Prior to the 1999 fishery, the mean catch rate of large arctic cisco in fyke nets one year prior to entering the fishery was 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 was 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 would grow 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 was highly significant ($r=0.705$, 13 df) (Table 12, Figure 15).

The harvest rate for 300-340 mm arctic cisco was predicted for 1994 through 1999 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:

Year	Predicted	Actual	Percent Error
1994	15.3	19.2	+25%
1995	35.6	32.2	-10%
1996	59.1	130.0	+120%
1997	55.4	50.1	-10%
1998	66.6	20.1	-70%
1999	56.1	26.7	-52%

The predicted 1999 CPUE greatly exceeded the actual in part because salinity remained low (less than 1 part per thousand (ppt) in the Outer Delta throughout the fishing season (see Helmericks 1999: attached report of the 1999 commercial fishery). From 1994 to 1998, the mean water column salinity ranged from around 6 to 16 ppt late in the fishing season. It is clear there is 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.

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 13, Figure 16). Catch rates of least cisco between the two areas show no relationship ($r = 0.087$, 12 df).

DISCUSSION

The 2000 fishery was characterized by low abundance of arctic cisco, as expected because the continued weak recruitments after 1990. Early catch rates were high when early season high salinities induced fish to move upstream into the main fishing areas. 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, the catch of arctic cisco is lower than expected. In 2000, salinity was high in all areas. Least cisco catch rates were above 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 2000. Humpback whitefish again formed a significant portion of the harvest in 2000.

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 2000, the fishery responded as expected. The 1990 year class has fully matured and left the region. The 1994 and 1995 year classes, which would expect to support the 2000 harvest, are quite weak, based on their abundance as age-0 fish in Prudhoe Bay. Harvests are likely to remain low in 2001, however, as the 1996 year class is almost non-existant in the region. Catches may improve a little by 2002 when the 1997 and 1998 year classes begin to enter the fishery, but these also appear to be weak year classes and any harvest increases are likely to be moderate at best.

PREDICTIONS FOR 2001

Catches of 260-300 mm arctic cisco from fyke nets in the Prudhoe Bay region that have been used in the past as predictors of abundance are no longer available, thus the apparent abundance of age-0 fish in the Prudhoe Bay region during the initial recruitment year is the best available information on which to base a prediction (Figure 17). Based on the age-0 data, it is likely that 2001 catch rates will decrease slightly from those observed in 2000. The 2000 harvest was supported almost completely by the 1994 and 1995 year classes, which were quite weak. Most of the 2001 harvest will continue to be composed of these two year classes, since the 1996 year class appears to be essentially absent from the region.

Catch rates after 2001 may increase somewhat as the 1997 and 1998 year classes recruit into the fishery. Neither of these year classes is particularly strong, however (Figure 17), so any increase in harvest rate is likely to be small and harvests will probably remain low until 5 years after another major recruitment.

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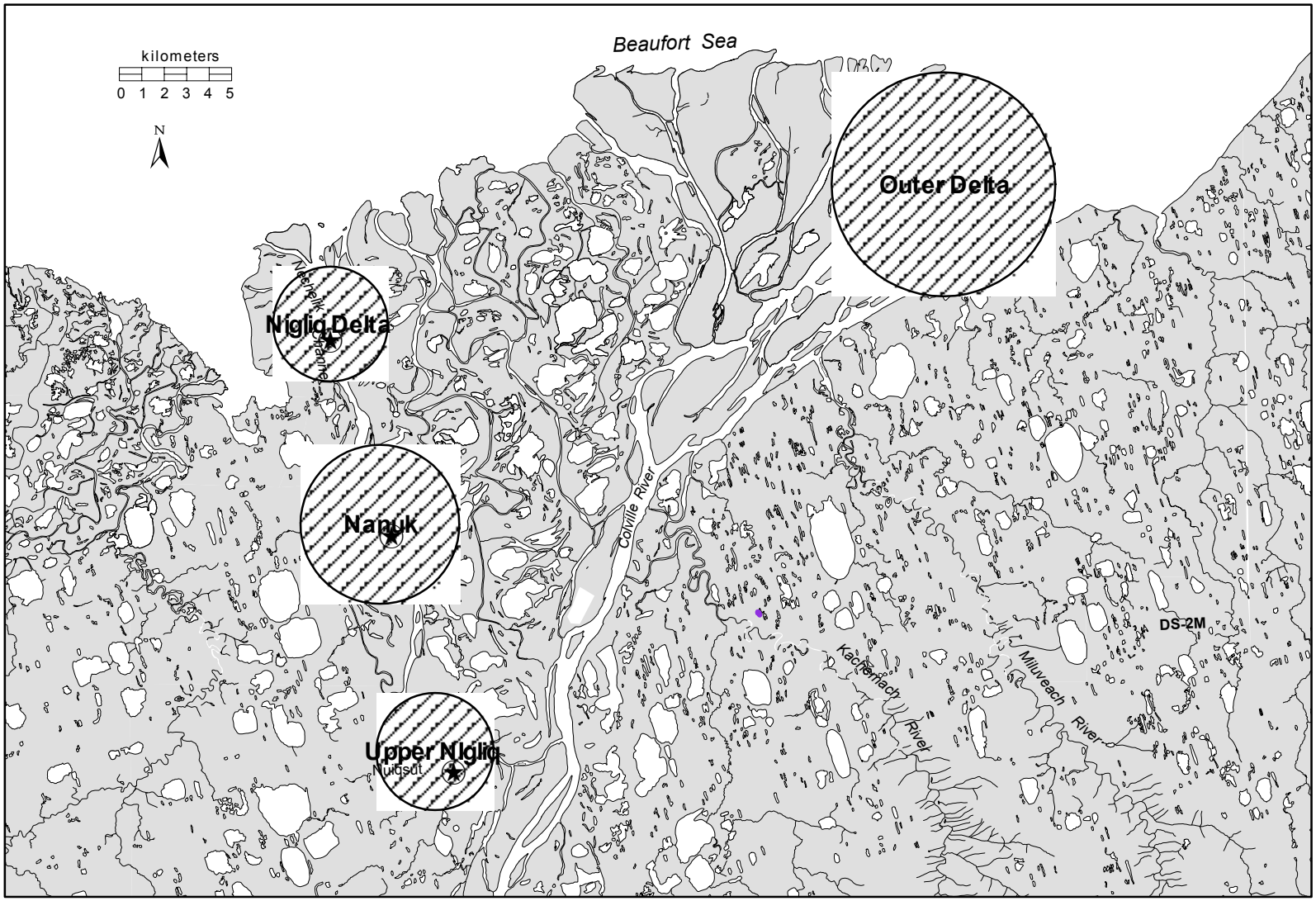


Figure 1. Colville Delta region showing locations of major fishing areas.

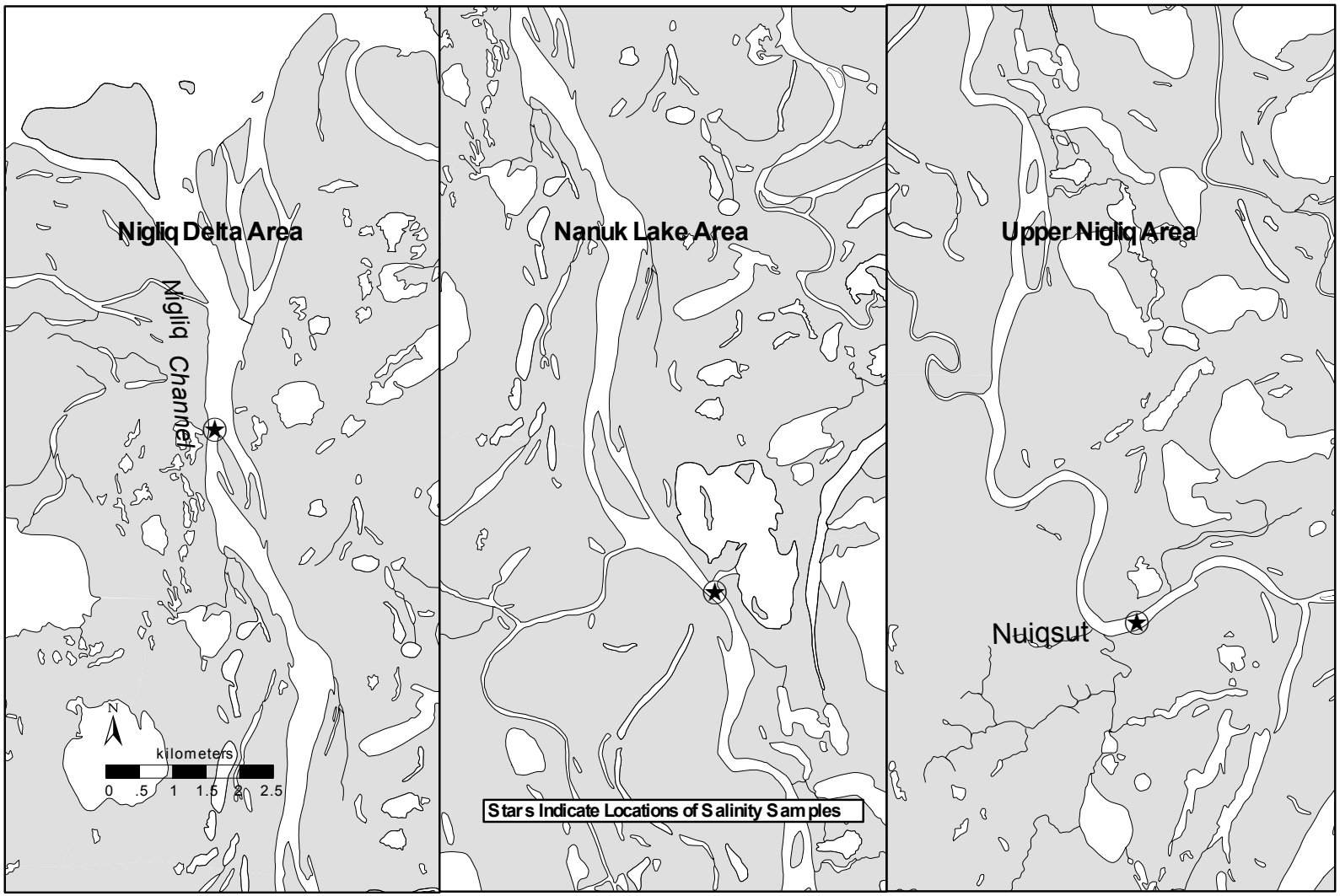


Figure 2. Major fishing areas on the Nigliq Channel with location of salinity monitoring stations.

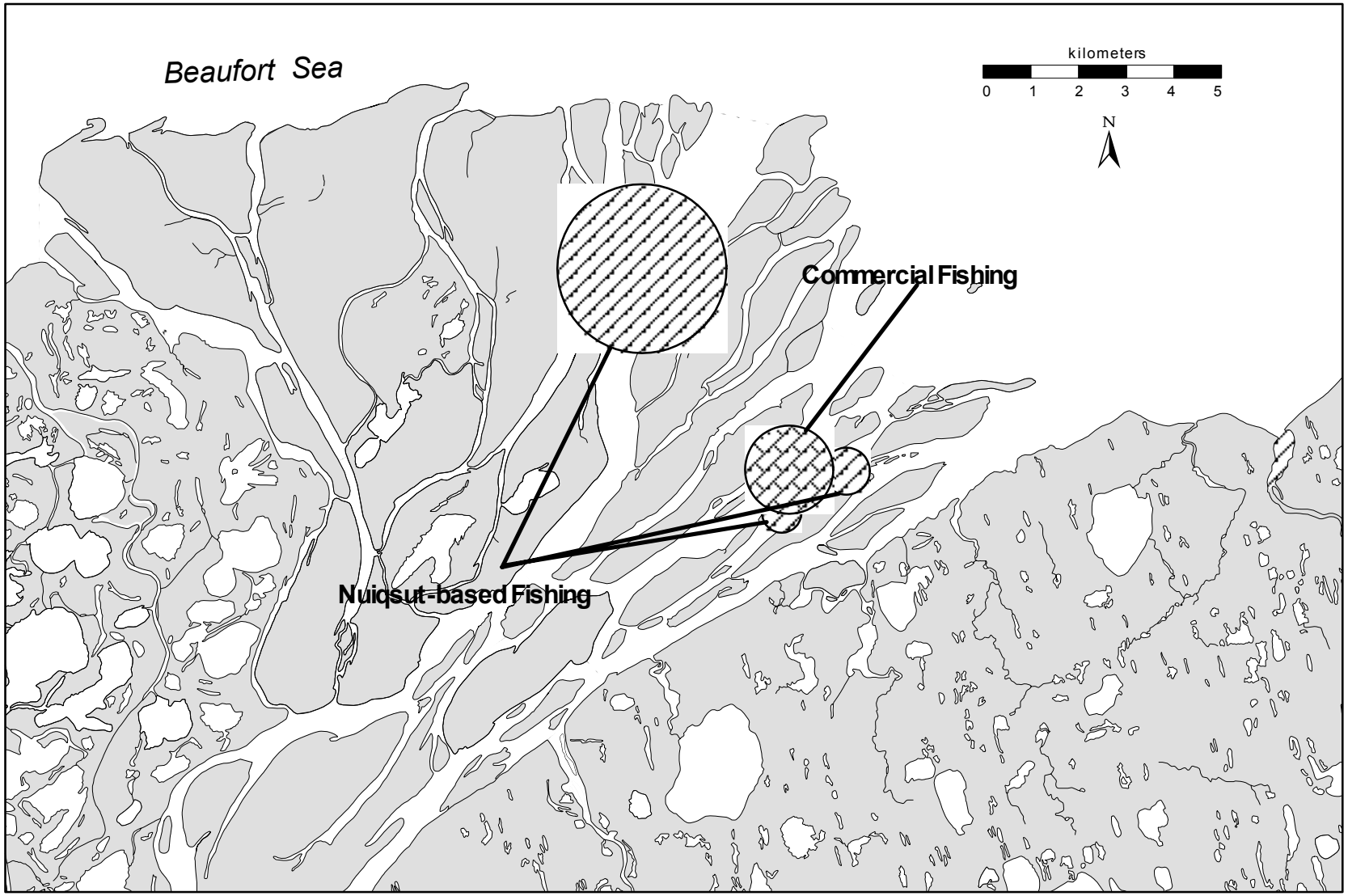
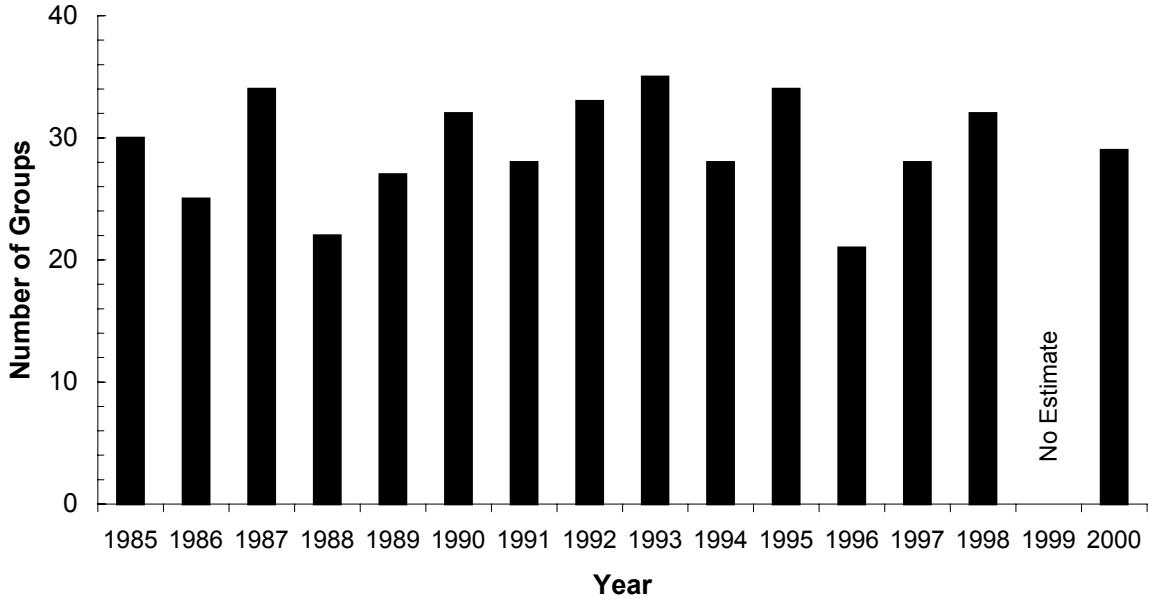
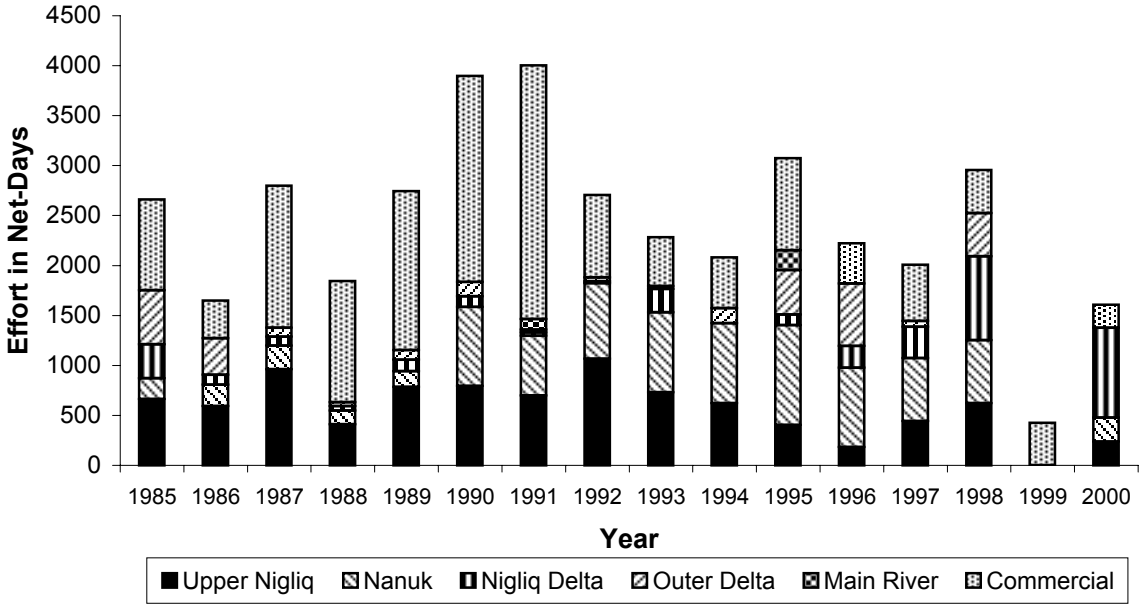


Figure 3. Fishing areas on the lower Colville River and Outer Delta region.



a. Number of Fishing Groups



b. Estimated Fishing Effort

Figure 4. Estimated fishing effort in the Colville Delta fall Fishery, 1985-2000 by number of fishing groups and effort in net-days (1 net-day = 24 hrs fishing per 18 m of net, all meshes combined).

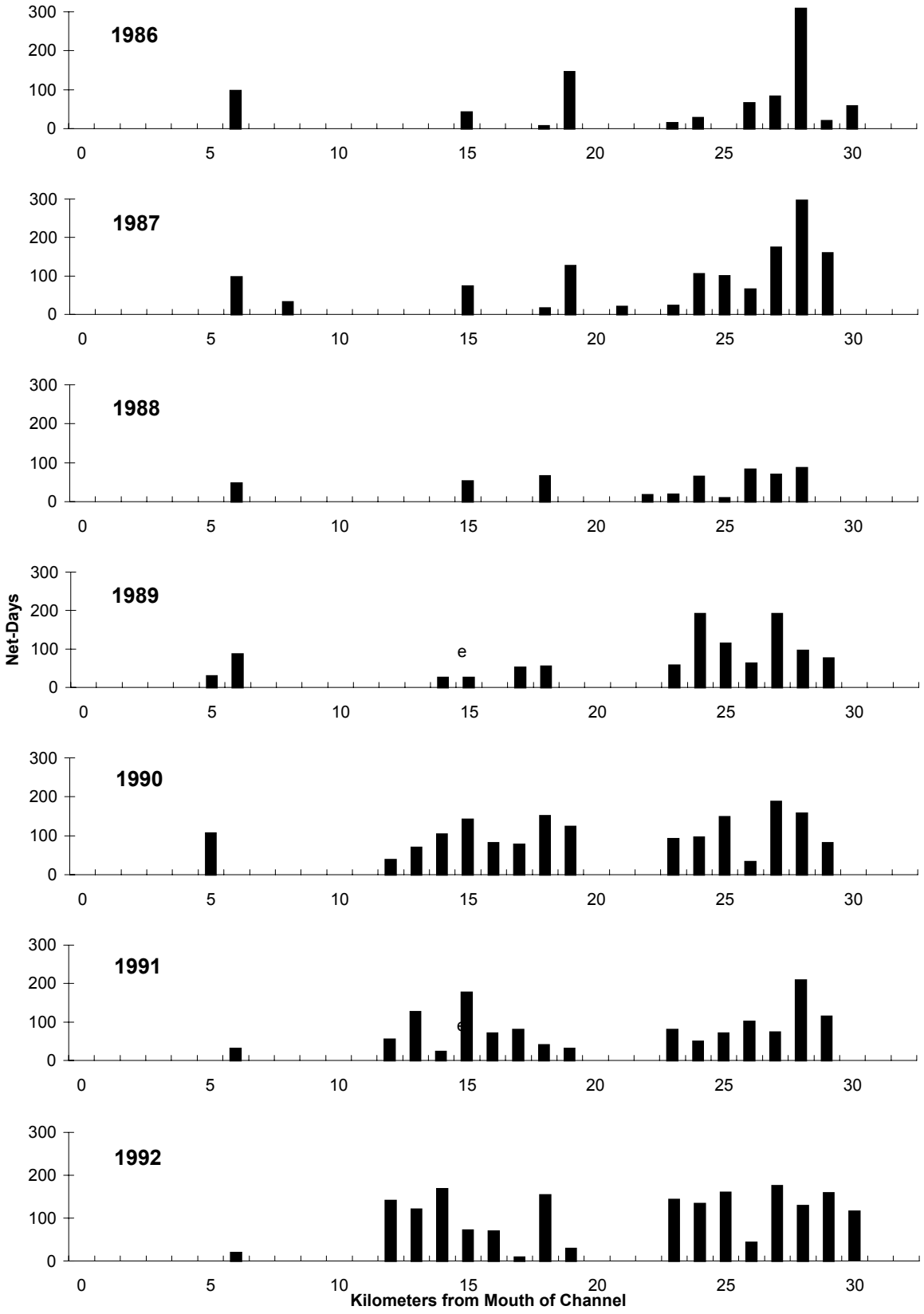


Figure 5. Distribution of fishing effort on the Nigliq Channel, Colville Delta, 1986-2000.

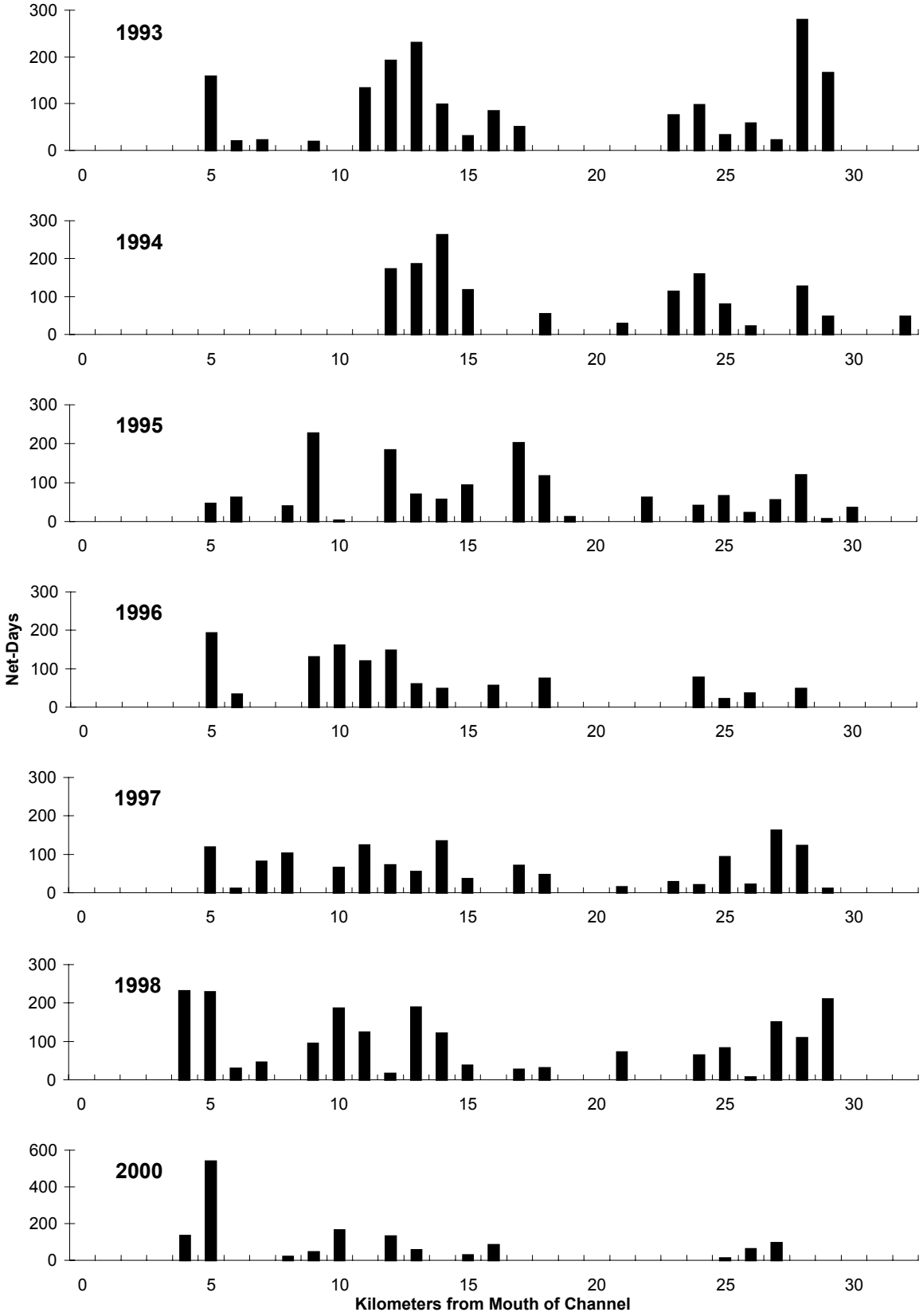


Figure 5. Distribution of fishing effort on the Nigliq Channel, Colville Delta, 1986-2000.

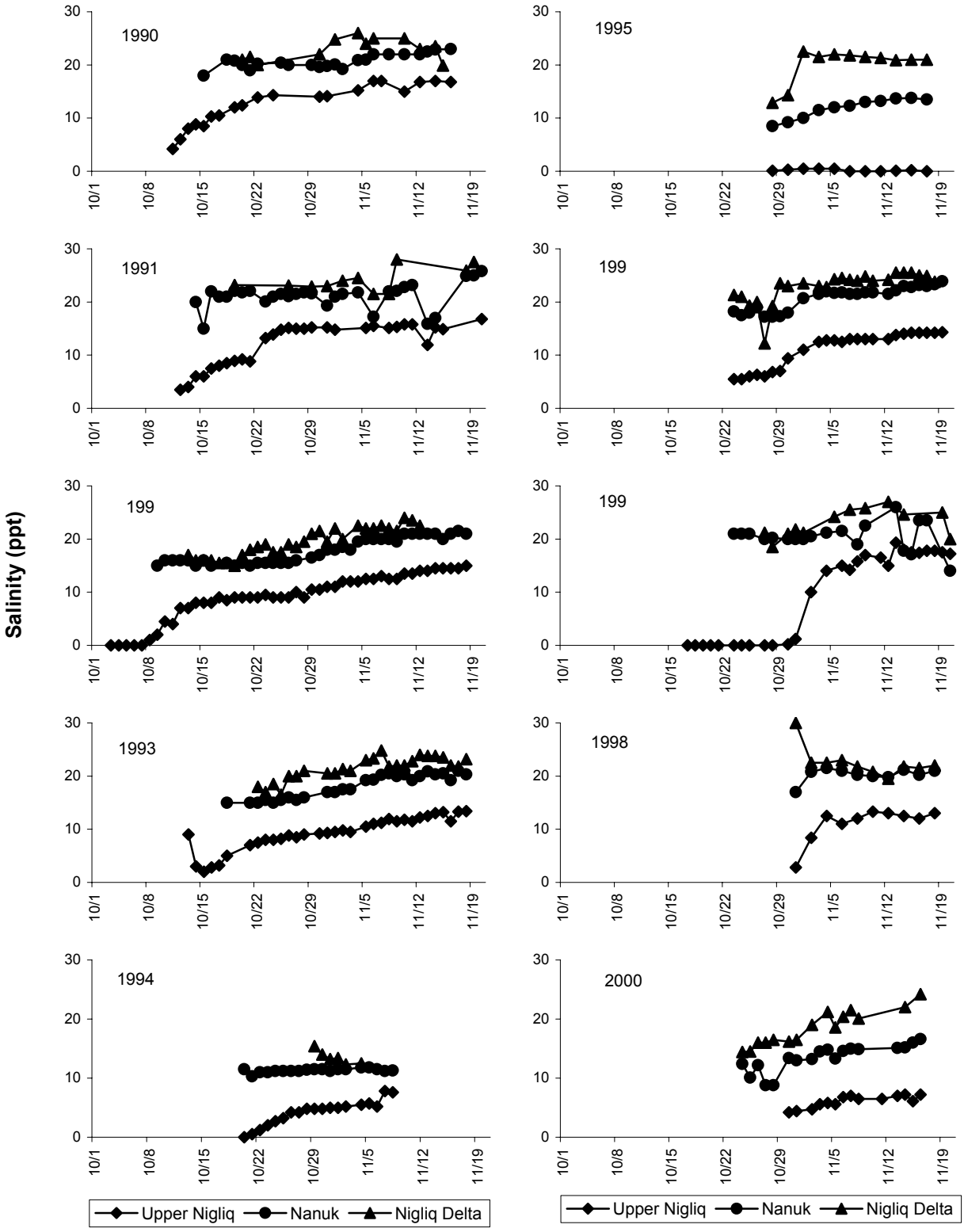


Figure 6. Salinities measured at 3 m below the ice surface at Nigliq Channel fishing areas, 1990-2000.

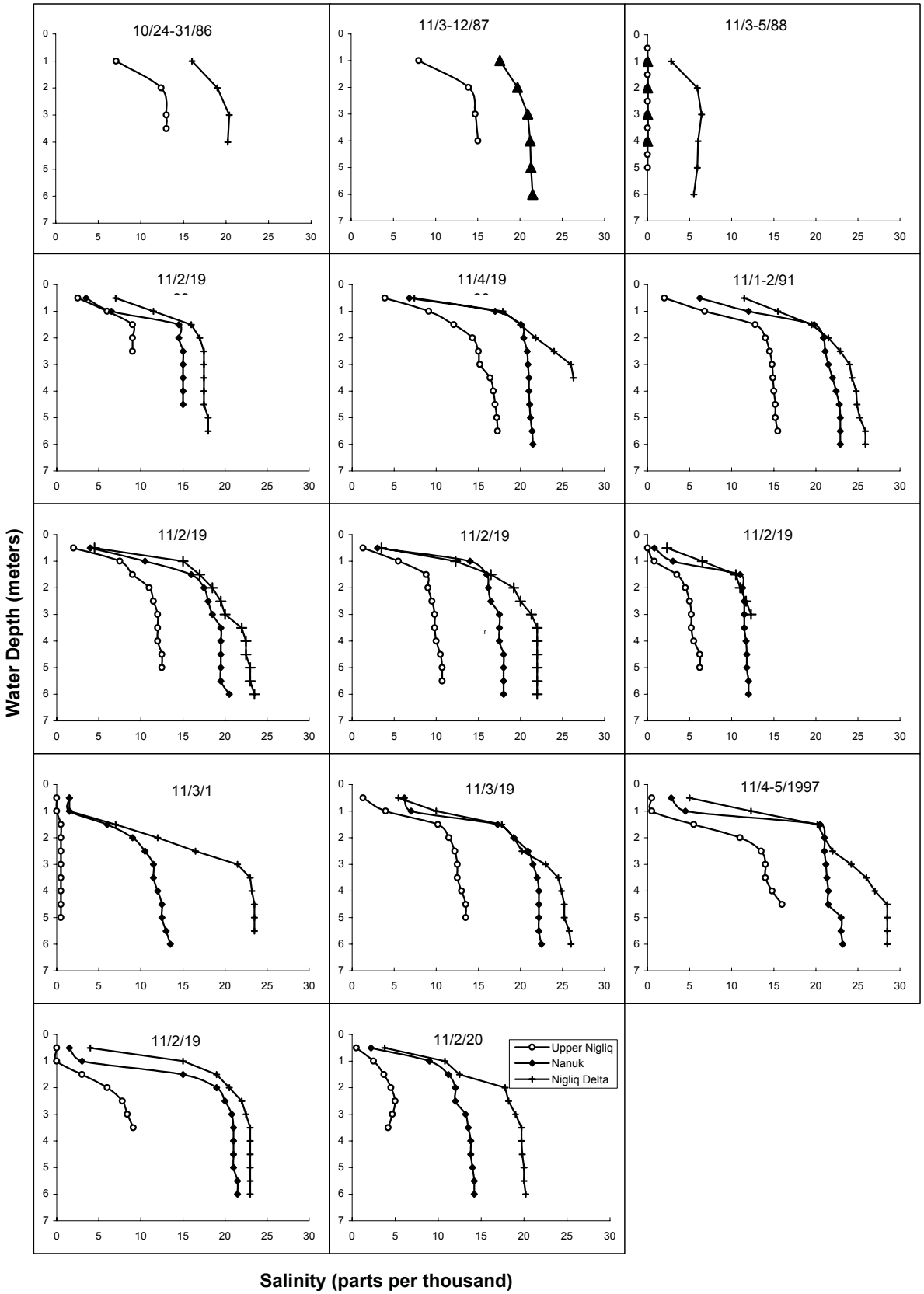


Figure 7. Salinity distribution in the Nigliq Channel, Colville Delta, during the fall gill net fishery, 1986-2000.

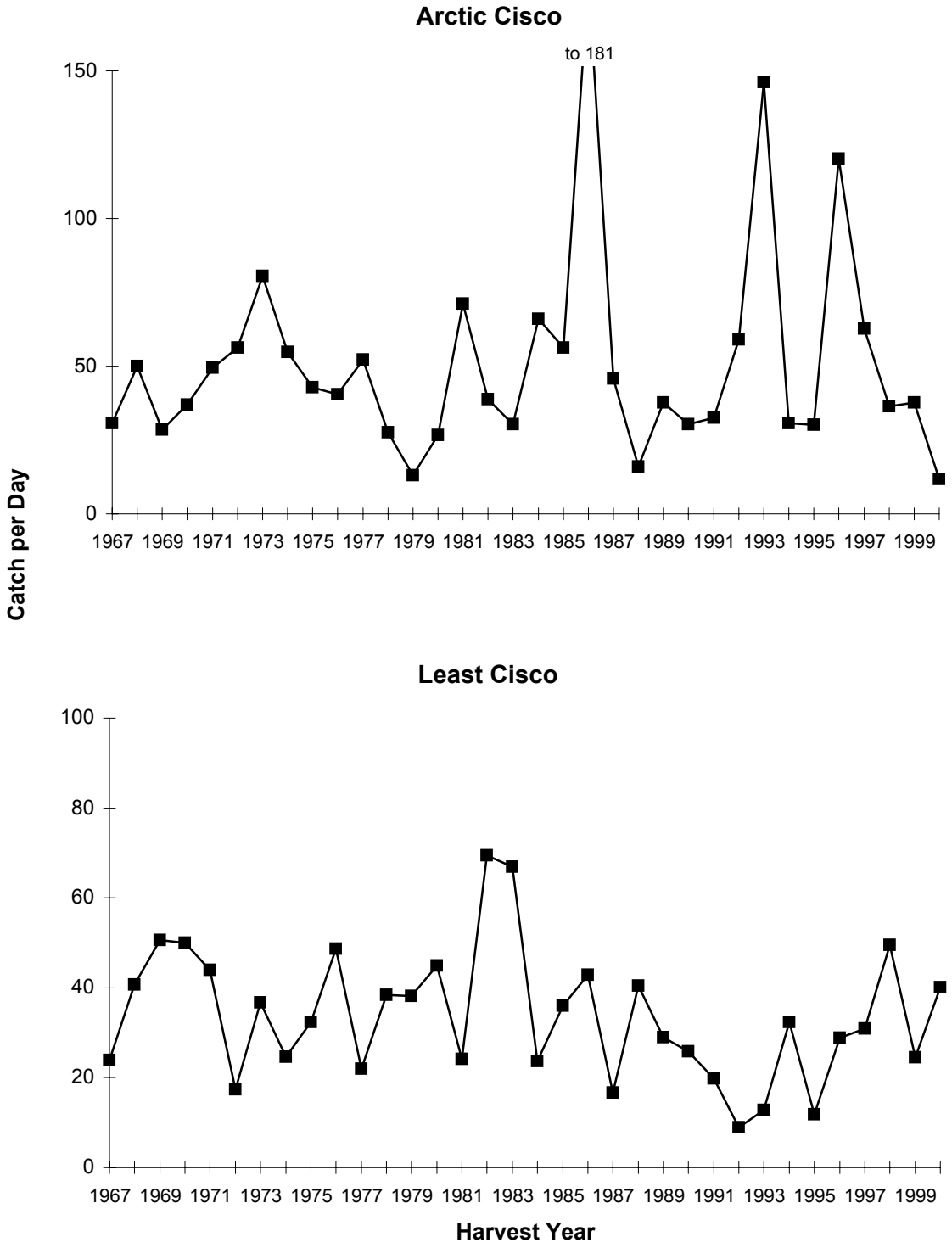
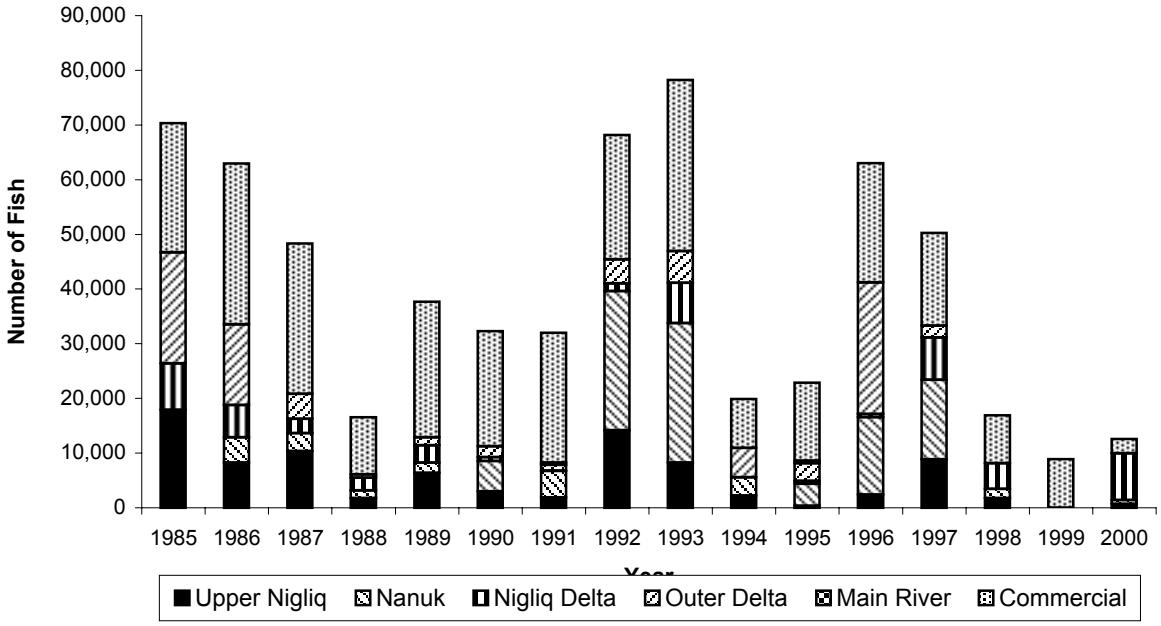
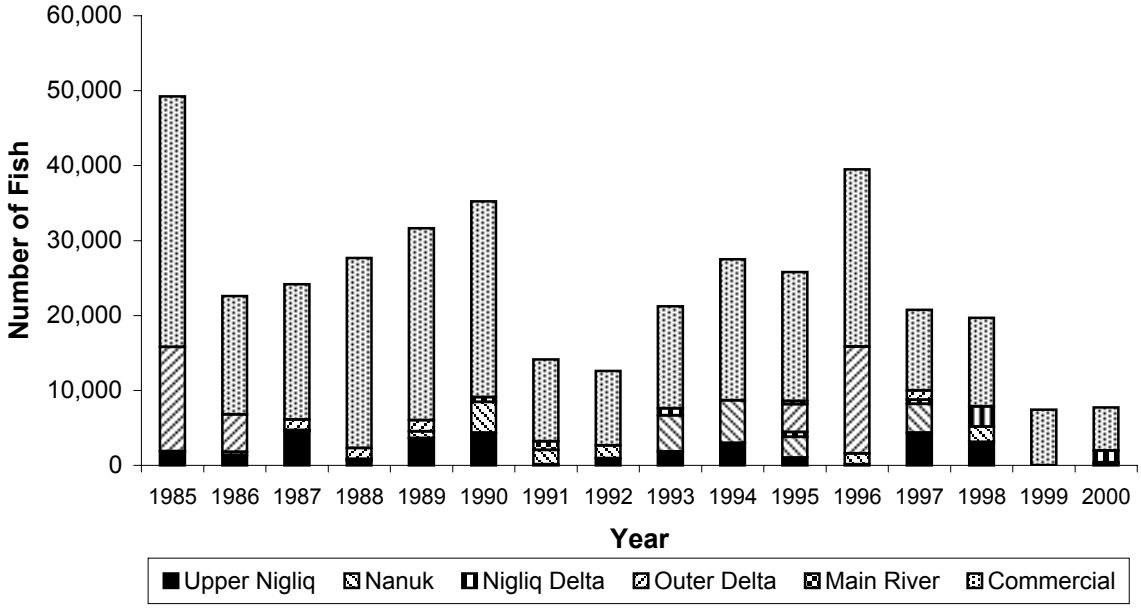


Figure 8. Catch rates of arctic cisco and least cisco in the Colville River delta commercial fishery, 1967-2000 (using catch rates ajusted for varying effort - see text).



a. Arctic Cisco



b. Least Cisco

Figure 9. Catch of arctic cisco and least cisco by harvest area in the Colville Delta, 1985 to 2000.

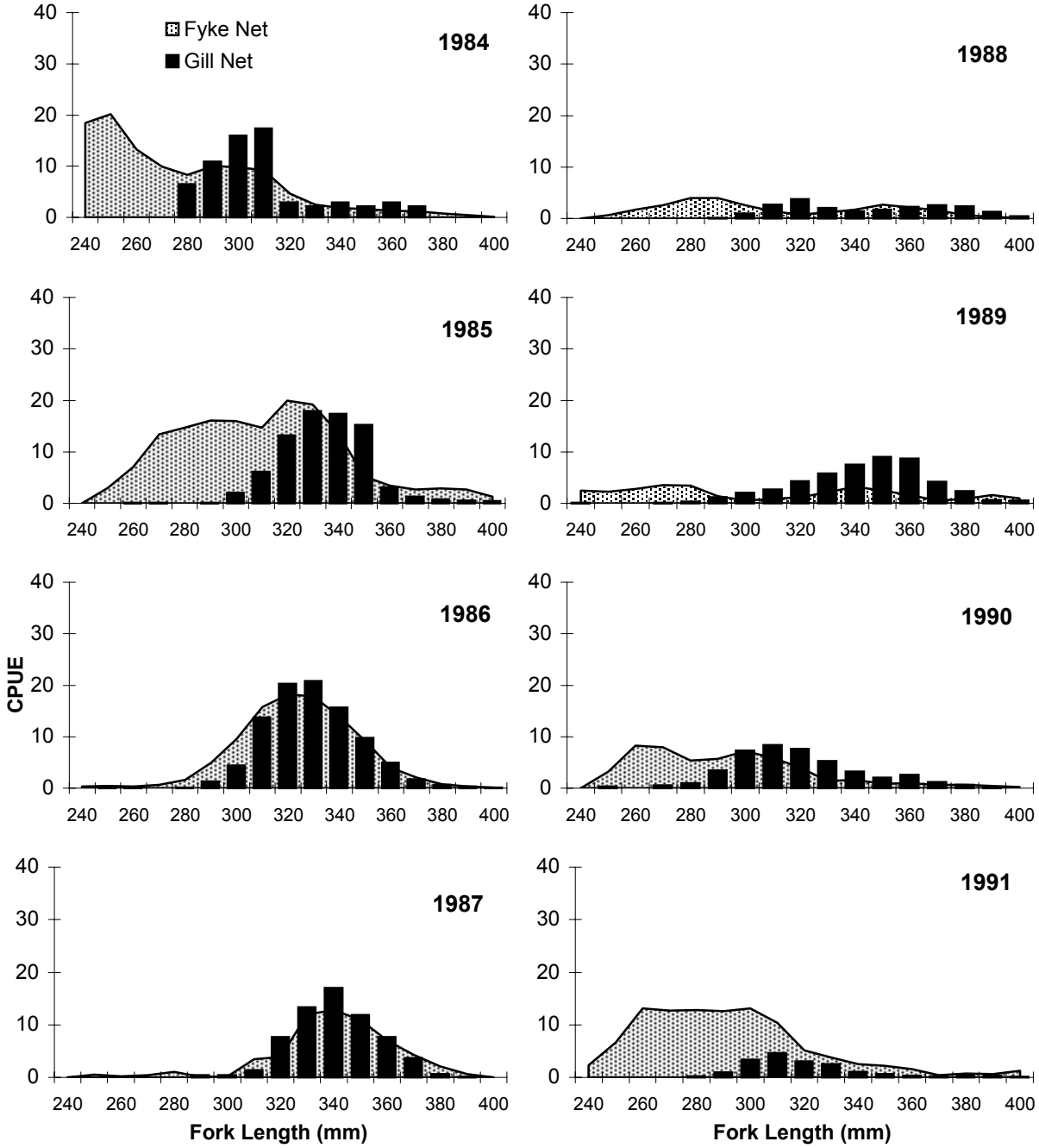
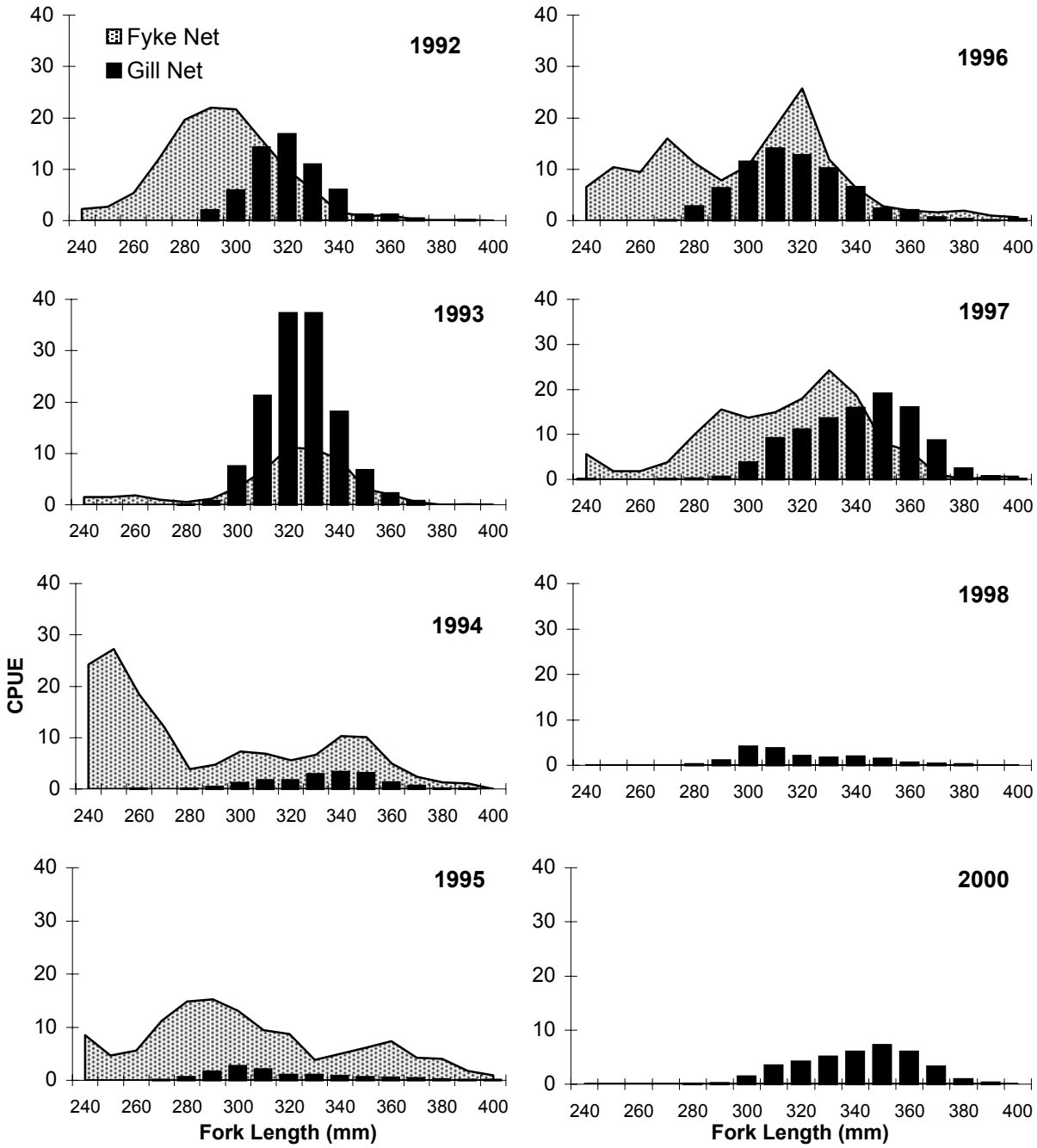


Figure 10. Length frequencies of Arctic cisco caught in fyke nets near Prudhoe Bay compared to those caught by 76-mm gill nets in the Nuiqsut fishery, 1984-2000 (fyke net length frequencies for fish caught after August 15, i.e. after summer growth period). (Length frequencies scaled by CPUE to reflect annual changes in Arctic cisco abundance, Prudhoe Bay fyke nets terminated in 1997)



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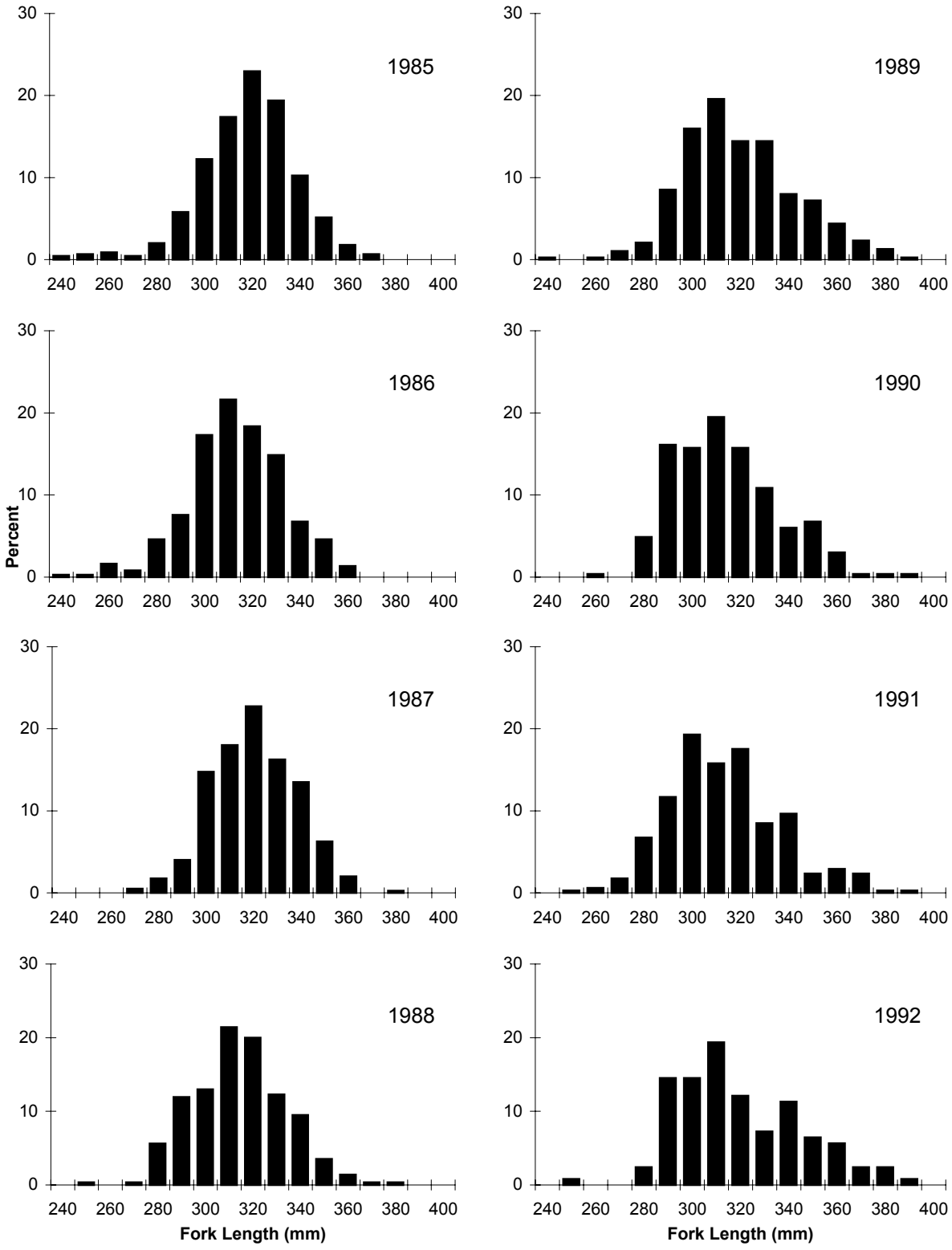
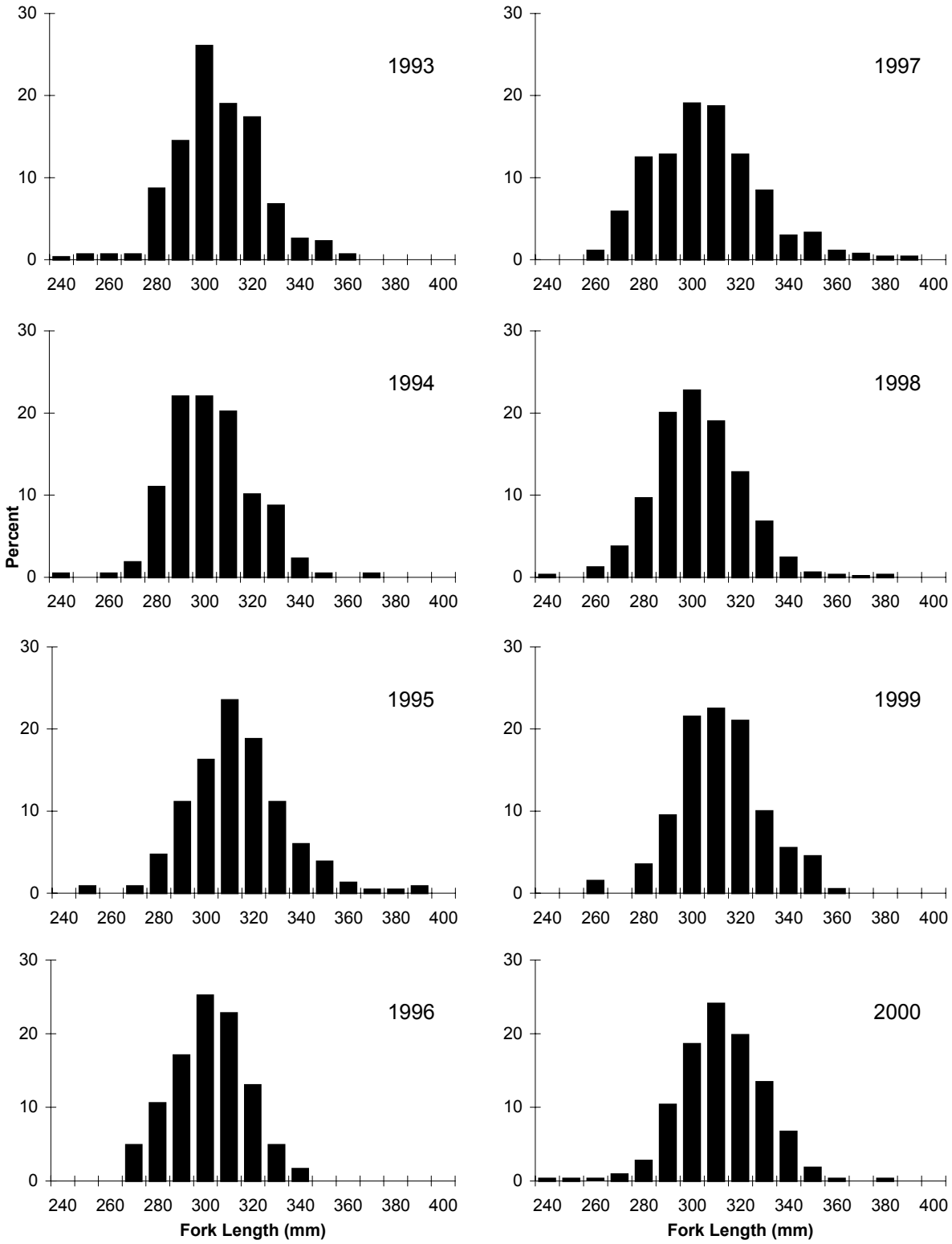


Figure 11. Length frequency distributions of least cisco captured in 76-mm gill nets in the Colville Delta fishery, 1985-2000.



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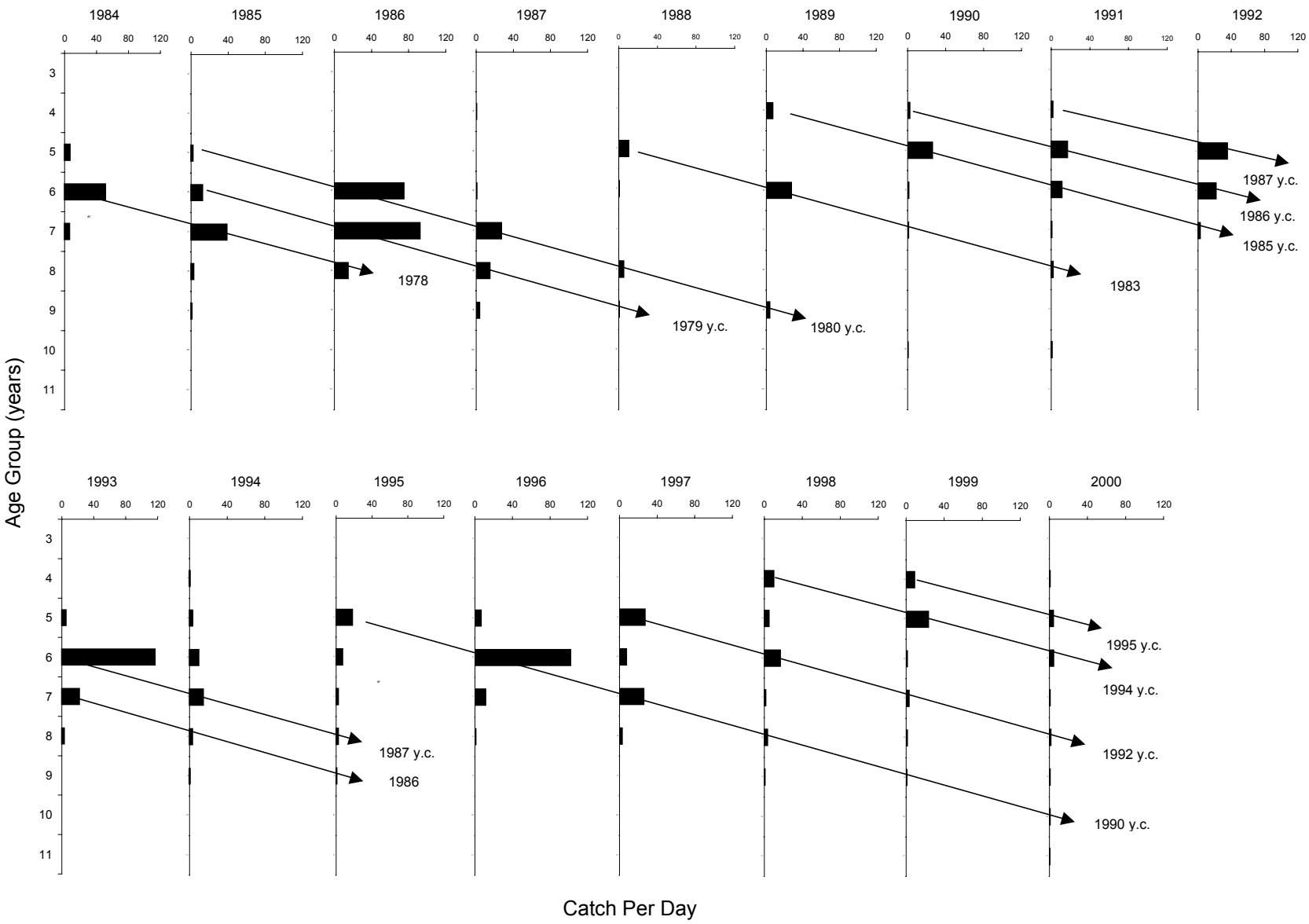

Figure 12. Age distribution of arctic cisco caught in the Colville River commercial fishery, 1984 - 2000, scaled to CPUE (from fish caught in 76-mm mesh nets, arrows indicate progression of year classes through the fishery).

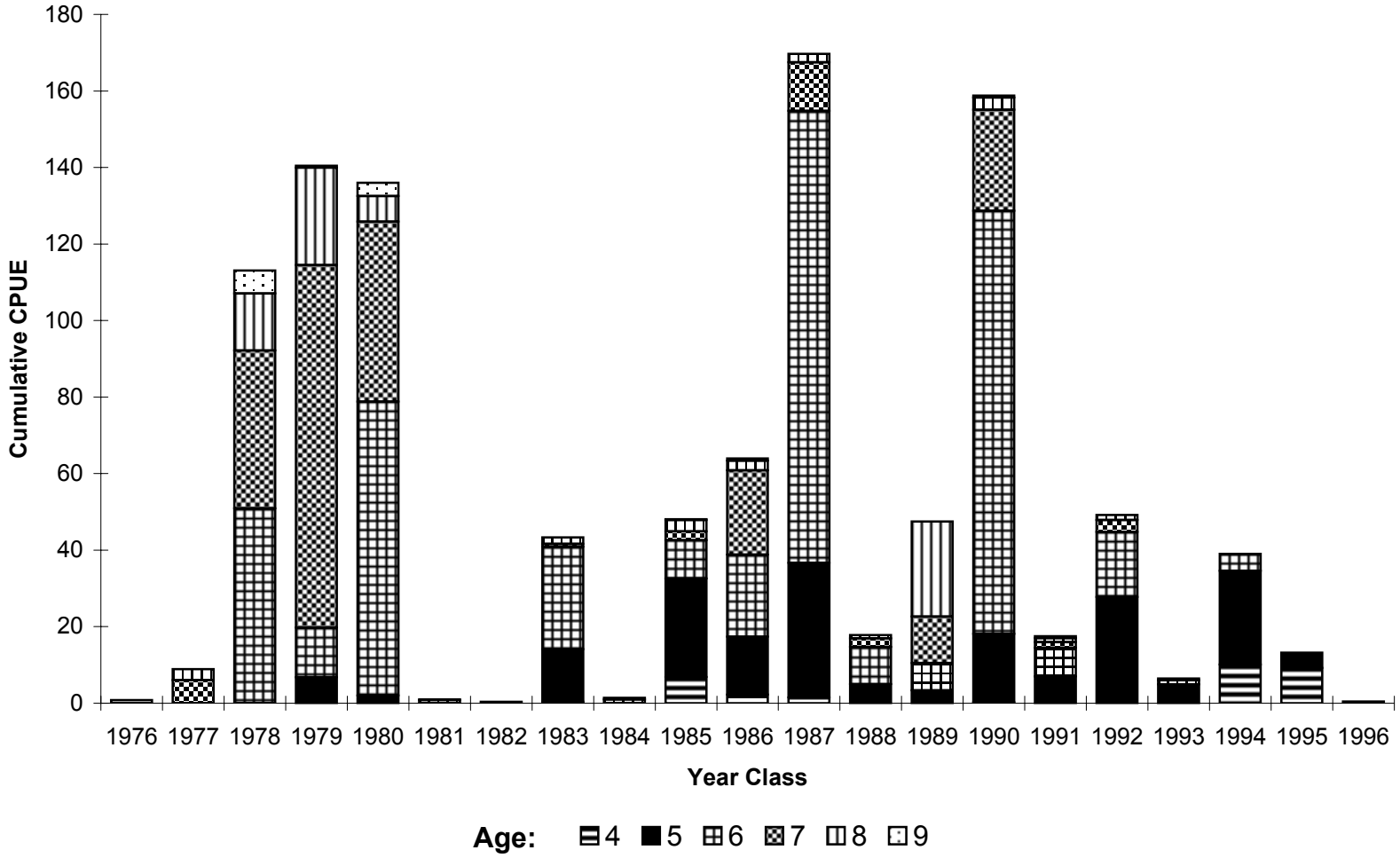

Figure 13. Cumulative harvest for each year class of arctic cisco, expressed as cumulative catch rate for harvest years 1984 to 2000.

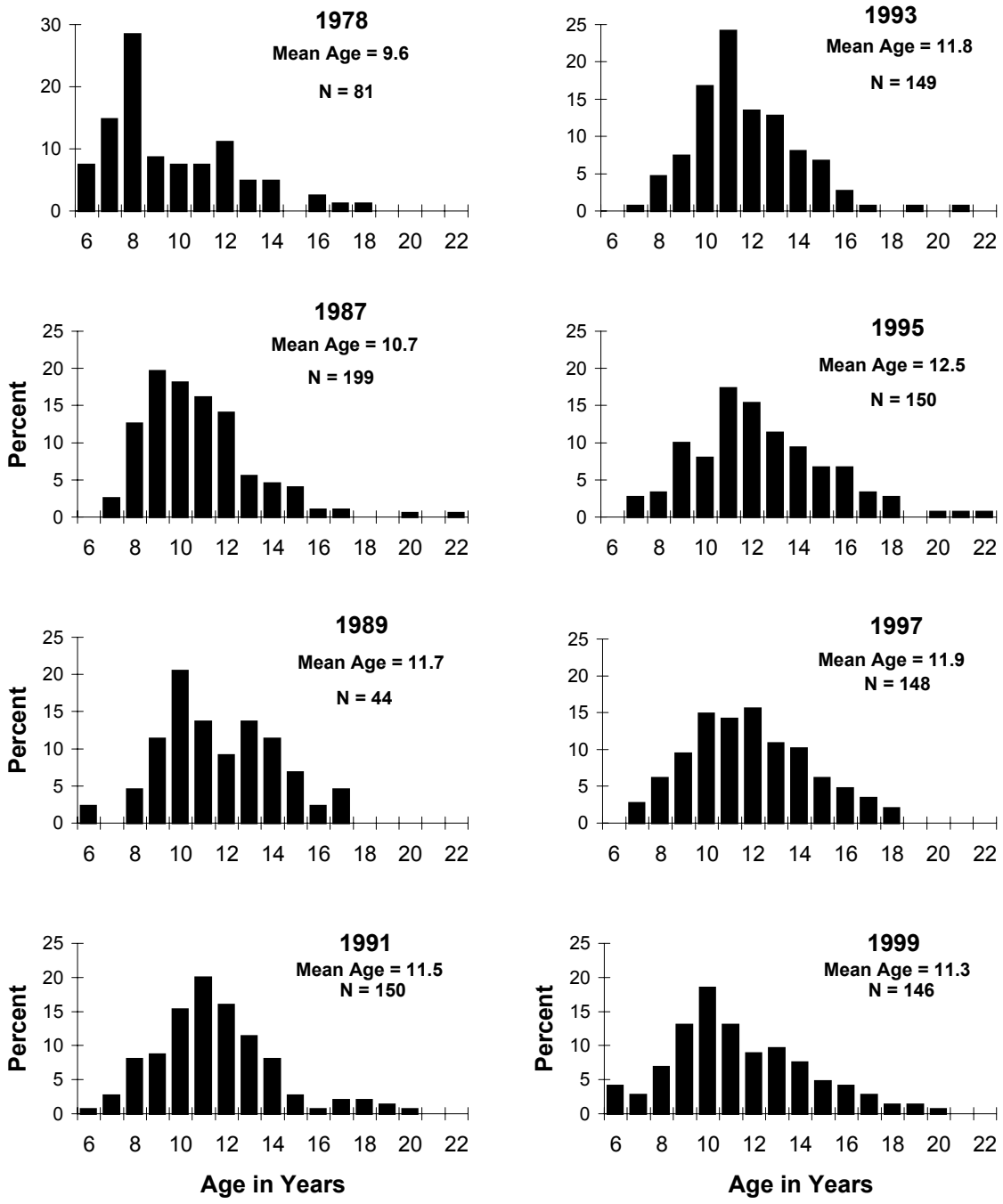

Figure 14. Age distribution of least cisco caught in the Colville River commercial fishery, 1978-1999 (based on catches in 76-mm mesh).

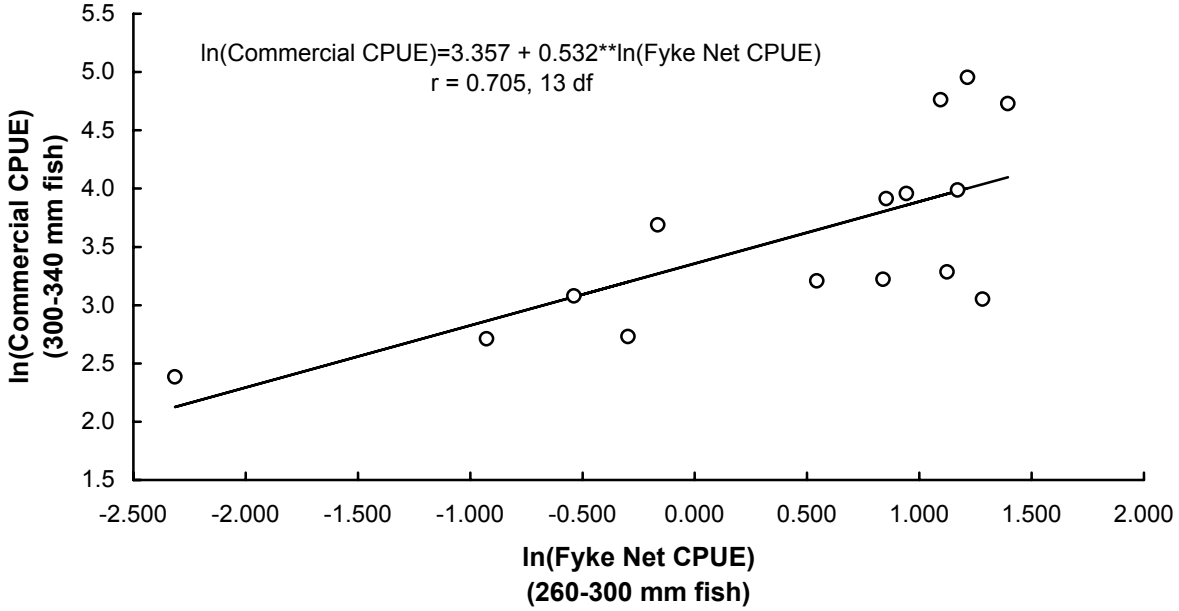

Figure 15. Relationship between commercial catch rate of 300-340 mm Arctic cisco in 76-mm mesh and fyke net catch rate for 260-300 mm fish the prior year.

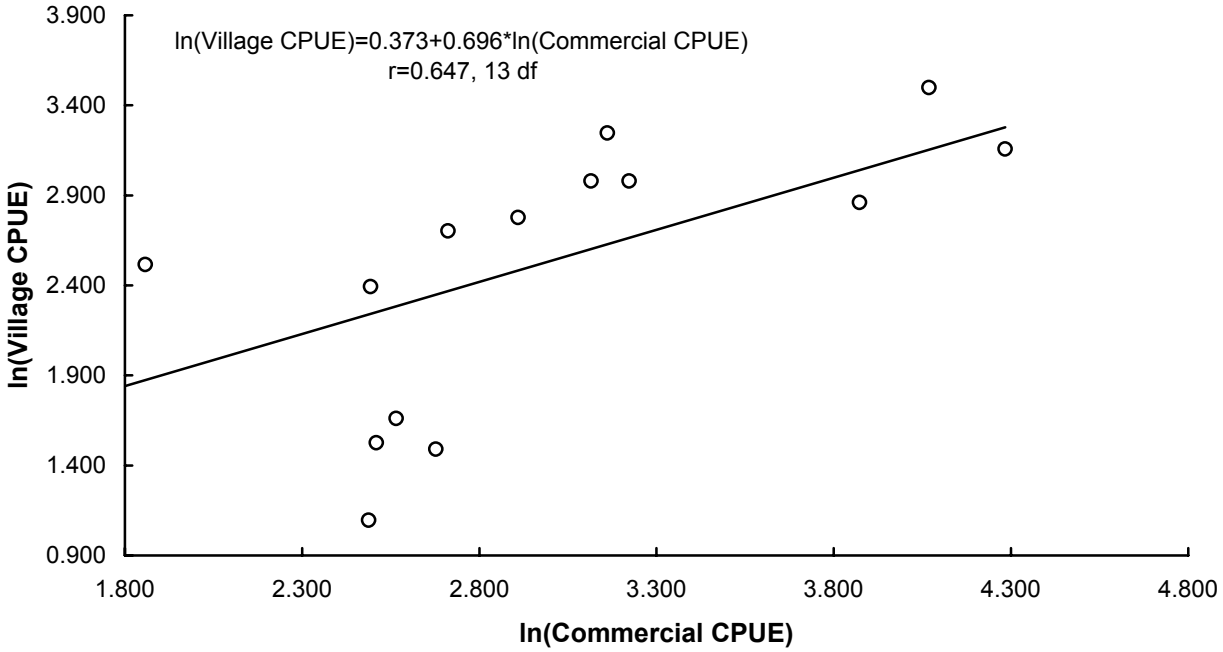

Figure 16. Relationship between village and commercial catch rates of arctic cisco in 76-mm mesh, 1985-2000.

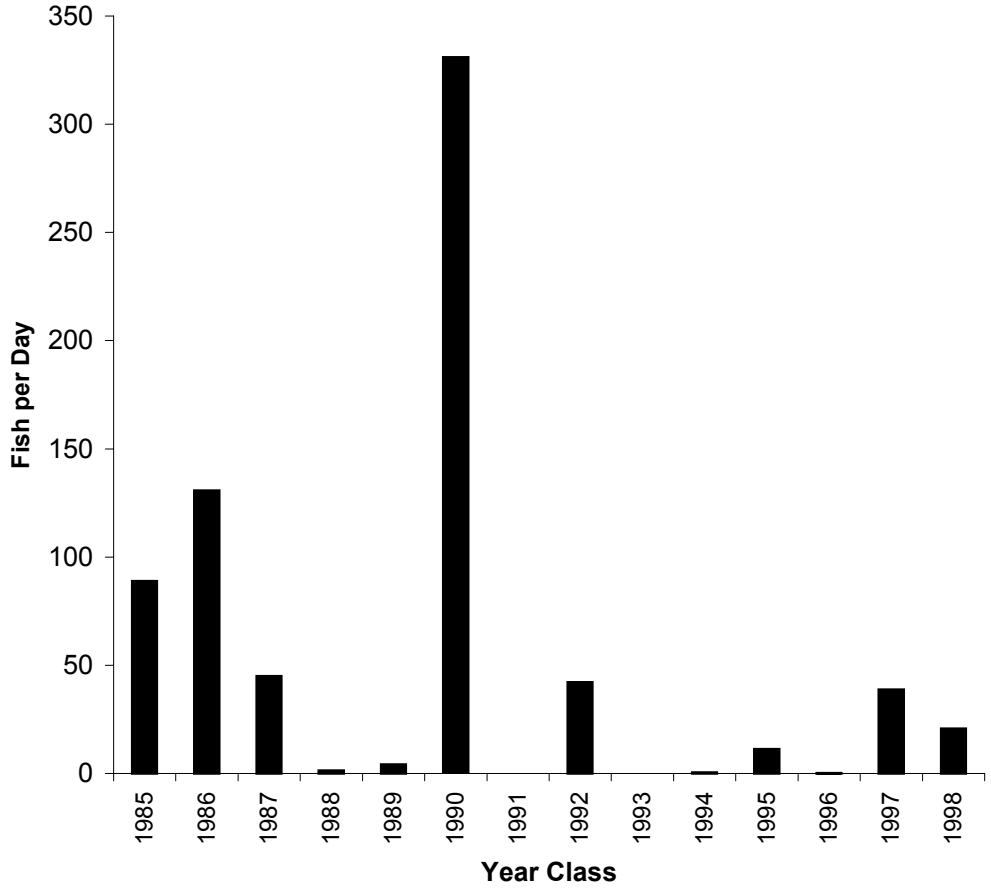

Figure 17. Catch rates of arctic cisco by year class in Pruhdoe Bay fyke nets at age-0 (from LGL Alaska Research Associates 2000).

Table 1. Estimated onset of fishing effort in the Nuiqsut fall fishery, 1985-2000.

Year	Onset of 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

Average start date for 1985-2000 = October 6.

Table 2. Observed and effort-adjusted CPUE values for the Colville Delta commercial fishery, 1967 - 2000 (CPUE = fish/day/46 m net).

		Arctic Cisco			Least Cisco		
Year	Total Effort	Total Harvest	Actual CPUE	Adjusted CPUE[a]	Total Harvest	Actual CPUE	Adjusted 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
1990-1999 Mean:	367	17,927	67.3	58.6	9,474	36.2	24.6

[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	200(
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.(
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.(
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.(
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.(
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.(
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.(
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.(
Fourhorn sculpin	(b)	(b)	(b)	(b)	(b)	(b)	(b)	4.4	2.7	(b)	(b)	12.5	(b)	0.0	0.(
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, 1985-2000 (in fish per day per 18 m of net).

				Outer Colville Delta	
Year	Upper Nigliq	Nanuk	Nigliq Delta	Main Channel	East Channel
1985	12.1	NA	NA	76.1	--
1986	17.1	27.9	78.5	62.0	--
1987	11.5	43.0	39.3	47.6	--
1988	6.1	5.1	56.4	19.3	--
1989	10.3	18.0	24.7	NA	--
1990	3.4	7.0	8.1	NA	--
1991	4.1	6.9	5.9	NA	--
1992	14.5	30.0	126.0	54.1	--
1993	18.5	44.7	44.1	207.1	--
1994	3.8	4.4	--	35.5	--
1995	1.1	3.2	22.3	21.4	7.6
1996	16.2	19.5	--	28.6	45.8
1997	20.8	25.3	33.2	NA	--
1998	2.6	2.5	7.7	NA	--
1999	NA	NA	NA	NA	--
2000	1.0	4.0	13.3	NA	--
1989-1998					
Mean	9.5	16.1	34.0	69.4	26.7
Standard Deviation	7.4	14.0	39.5	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, 1985-2000 (in fish per day per 18 m of net).

Year	Upper Nigliq	Nanuk	Nigliq Delta	Outer Colville Delta Main Channel
1985	3.6	NA	NA	47.4
1986	1.8	0.9	0.0	18.3
1987	5.5	2.8	1.1	15.4
1988	1.8	0.5	3.0	57.9
1989	3.3	1.1	0.7	NA
1990	5.3	3.8	9.3	NA
1991	0.9	2.3	0.0	NA
1992	2.9	1.0	3.2	8.1
1993	2.1	3.8	2.7	NA
1994	4.0	6.3	--	NA
1995	4.7	2.8	7.8	NA
1996	0.6	1.4	--	NA
1997	11.4	10.6	3.1	NA
1998	7.4	1.1	5.1	NA
1999	NA	NA	NA	NA
2000	1.3	2.1	2.8	NA
1989-1998				
Mean	4.3	3.4	4.0	
Standard Deviation	3.2	3.0	3.3	

NA = not available, -- = no effort

Table 6. Estimated harvest during the Colville Delta fall fisheries by species, in number of fish, 1967-2000.

	Arctic Cisco		Least Cisco		Humpback Whitefish		Broad Whitefish	
Year	Commercial Harvest	Village Harvest	Commercial Harvest	Village Harvest	Commercial Harvest	Village Harvest	Commercial Harvest	Village 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

Commercial harvest numbers provided by J. Helmericks, 1996, 1997, 1998, 1999, 2000.

Table 7. Estimated numbers and biomass of harvested Arctic cisco and least cisco by year for village and commercial fisheries in the Colville Delta, 1985-2000 (Bering cisco included for 1990).

	Village Harvest						Commercial Harvest					
	Arctic Cisco		Least Cisco		Bering Cisco		Arctic Cisco		Least Cisco			Harvested
Year	Catch (in fish)	Biomass (kg)	Catch (in fish)	Biomass (kg)	Catch (in fish)	Biomass (kg)	Catch (in fish)	Biomass (kg)	Catch (in fish)	Biomass (kg)	Total Catch	Biomass (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

Table 8. Biomass catch per day by mesh size in the Nigliq Channel, 1986-2000 (expressed as Kg/day/18 m net).

Mesh (mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000	89-98 Mean
Arctic Cisco															
64	4.69	2.95	1.15	1.53	6.43	7.42	11.24	9.91	1.48	1.36	8.37	3.82	0.66	0.30	5.22
70		10.24	2.54				4.78	3.76	0.76	1.34					2.66
76	10.07	7.56	5.99	6.46	4.30	1.62	9.12	13.30	1.84	1.12	6.48	10.68	1.69	4.46	5.66
83	7.01	3.99	0.76	1.53	2.66	1.58	6.78	7.30	0.30	2.61	1.23	8.05	4.69	3.49	3.67
89	4.76	6.14	0.52	2.41	4.53	0.64	2.23	5.45	0.95	1.48	1.00	9.38	1.53	2.41	2.96
Least Cisco															
64	3.63	4.62	0.72	4.96	8.39	3.29	1.36	4.47	3.81	5.22	2.71	6.99	7.03	0.32	4.82
70		3.50	0.42				0.15	0.43	1.10	3.10					1.19
76	0.38	1.42	0.60	1.00	1.48	0.16	0.37	1.09	1.65	0.90	0.32	2.75	1.21	0.78	1.09
83	0.17	0.62	0.68	0.37	0.10	0.12	0.04	0.41	0.19	0.21	0.21	0.89	2.82	0.16	0.54
89	0.24	0.34	0.05	0.05	0.15	0.01	0.14	0.52	0.52	0.20	0.19	0.55	0.24	0.13	0.26
Arctic Cisco + Least Cisco															
64	8.33	7.57	1.87	6.50	14.82	10.71	12.61	14.37	5.28	6.57	11.08	10.81	7.70	0.61	10.04
70		13.74	2.96				4.93	4.19	1.86	4.44		0.00			3.08
76	10.45	8.97	6.59	7.46	5.78	1.78	9.49	14.40	3.49	2.02	6.80	13.43	2.89	5.24	6.75
83	7.18	4.60	1.45	1.90	2.76	1.70	6.82	7.71	0.48	2.82	1.44	8.94	7.52	3.65	4.21
89	5.00	6.48	0.57	2.45	4.68	0.65	2.38	5.97	1.47	1.68	1.19	9.93	1.77	2.54	3.22

Table 9. Tags recaptured during the Colville Delta fall fishery, village and commercial recoveries combined,. 1980-2000.

Arctic Cisco

Release Year	Study	Number Released	No. Tags Recaptured In: pre-1985	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Percent Recaptured to Date[a]
1976	ADF&G	?	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
1977-78	Simpson Lag.	?	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
1980	OCSEAP	229	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.0
1981	Waterflood	1,756	70	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.3
1982	Endicott	439	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.0
1982	Waterflood	435	16	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.6
1984	Waterflood	5,840	88	89	59	25	4	1	0	0	0	0	0	0	0	0	0	0	0	4.6
1985	Endicott	11,695	--	342	220	98	21	4	1	1	0	0	0	0	0	0	0	0	0	5.9
1985	Colville	164	--	5	7	2	2	0	1	0	0	0	0	0	0	0	0	0	0	10.4
85-90	USFWS	?	--	1	1	2	0	1	9[b]	5	1	0	0	0	0	0	0	0	0	NA
1988	Endicott (Prudhoe)	899	--	--	--	--	30[c]	28	2[c]	1	0	0	0	0	0	0	0	0	0	6.8
1988	Endicott (Colville)	178	--	--	--	--	6	7	2[d]	2	0	0	0	0	0	0	0	0	0	9.6
1990	Endicott	716	--	--	--	--	--	--	17	6	6	1	0	0	0	0	0	0	0	4.2
1991	Endicott (Prudhoe)	2,407	--	--	--	--	--	--	--	52	45	32	5	2	0	0	0	0	0	5.7
1991	Endicott (Colville)	154	--	--	--	--	--	--	--	6	4	5	1	0	0	0	0	0	0	10.4
1992	Endicott (Prudhoe)	3,628	--	--	--	--	--	--	--	--	76	46	9	0	0	0	0	0	0	3.6
1992	Endicott (Colville)	379	--	--	--	--	--	--	--	--	4	13	3	0	0	0	0	0	0	5.3
1993	Endicott (Prudhoe)	1,591	--	--	--	--	--	--	--	--	--	76	14	4	0	0	0	0	0	5.9
Total			202	446	288	127	33	41	19	73	136	173	32	6	0	0	0	0	0	

a = returns from all fisheries operating in the Colville Delta, 1980-1995

b = 1990 includes 1 adipose clip

c = 1988 recovery of 88 Endicott (Prudhoe) includes 2 Arctic cisco recovered as Bering cisco, 1990 recovery includes 2 Arctic cisco recovered as Bering cisco.

d = 1990 recovery of 88 Endicott (Colville) includes 2 Arctic cisco recovered as Bering cisco.

Table 9. (continued)

Least Cisco

Release Year	Study	Number Released	No. Tags Recaptured In: pre-1985	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Percent Recaptured to Date[a]
1976	ADF&G	?	NA	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	NA
1977-78	Simpson Lag.	?	NA	9	1	2	3	0	1	1	0	0	0	0	0	0	0	0	0	NA
1980	OCSEAP	1,067	75	4	2	1	3	1	0	0	0	0	0	0	0	0	0	0	0	8.1
1981	Waterflood	6,157	458	107	19	19	14	11	4	1	0	0	0	0	0	0	0	0	0	10.3
1982	Endicott	1,798	225	28	8	8	8	3	1	1	0	2	0	0	0	1	0	0	0	15.9
1982	Waterflood	2,131	158	20	5	2	4	2	0	0	0	0	0	0	0	0	0	0	0	9.0
1984	Waterflood	14,126	304	434	197	133	182	86	55	14	7	4	4	0	1	0	0	0	0	10.1
1985	Endicott	9,915	--	762	171	159	164	77	48	14	9	8	4	2	3	0	0	0	0	14.3
1985	Colville	940	--	23	10	7	11	7	7	1	0	0	2	0	0	0	0	0	0	7.2
85-90	USFWS	?	--	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	NA
1988	Endicott (Prudhoe)	499	--	--	--	--	34	15	7	2	0	0	0	1	0	0	1	0	0	12.0
1988	Endicott (Colville)	368	--	--	--	--	17	5	5	1	0	0	1	0	0	0	0	0	0	7.9
1990	Endicott	5,803	--	--	--	--	--	--	176	70	47	29	43	18	9	11	3	2	0	7.0
1991	Endicott (Prudhoe)	10,834	--	--	--	--	--	--	--	153	73	72	101	73	23	32	21	10	3	5.2
1991	Endicott (Colville)	396	--	--	--	--	--	--	--	2	1	0	3	3	1	0	2	0	1	3.3
1992	Endicott (Prudhoe)	6,744	--	--	--	--	--	--	--	--	125	58	148	57	36	24	13	4	4	7.0
1992	Endicott (Colville)	820	--	--	--	--	--	--	--	--	4	5	7	3	2	2	0	1	0	2.9
1993	Endicott (Prudhoe)	8,514	--	--	--	--	--	--	--	--	--	106	129	101	43	42	25	8	8	5.4
Total			1220	1391	414	332	441	208	304	260	266	284	442	258	118	112	65	25	16	

Table 10. Sex composition of arctic cisco and least cisco catch in the Colville Delta commercial fishery, 1983 - 2000 (based on sex composition of recovered tagged fish, 1991U are a sample of untagged fish).

Arctic Cisco

	Males	Females	Total Examined
Number of Fish			
1983	8	3	11
1984	76	15	91
1985	142	50	192
1986	100	53	153
1987	93	19	112
1988	24	23	47
1989	24	13	37
1990	15	11	26
1991	16	38	54
1991(U)	131	142	273
1992	52	55	107
1993	71	72	143
1994	9	16	25
1995	3	3	6
1996-98	0	0	0
Percent Composition			
1983	72.7	27.3	
1984	83.5	16.5	
1985	74.0	26.0	
1986	65.4	34.6	
1987	83.0	17.0	
1988	51.1	48.9	
1989	64.9	35.1	
1990	57.7	42.3	
1991	29.6	70.4	
1991(U)	48.0	52.0	
1992	48.6	51.4	
1993	49.7	50.3	
1994	36.0	64.0	
1995	50.0	50.0	
1996-98	NA	NA	
Mean:	58.1	41.9	

Least Cisco

	Males	Non-spawning Females	Spent Females	Total Examined
Number of Fish				
1983	49	146	24	219
1984	118	128	160	406
1985	102	567	167	836
1986	28	152	124	304
1987	26	178	88	292
1988	29	245	131	405
1989	25	61	99	185
1990	21	158	94	273
1991	16	104	47	167
1991(U)	16	84	51	151
1992	6	201	39	246
1993	12	154	75	241
1994	17	240	69	326
1995	16	105	88	209
1996	6	69	21	96
1997	7	35	54	96
1998	2	22	27	51
1999	0	13	12	25
2000	1	12	3	16
Percent Composition				Total Females
1983	22.4	66.7	11.0	77.6
1984	29.1	31.5	39.4	70.9
1985	12.2	67.8	20.0	87.8
1986	9.2	50.0	40.8	90.8
1987	8.9	61.0	30.1	91.1
1988	7.2	60.5	32.3	92.8
1989	13.5	33.0	53.5	86.5
1990	7.7	57.9	34.4	92.3
1991	9.6	62.3	28.1	90.4
1991(U)	10.6	55.6	33.8	89.4
1992	2.4	81.7	15.9	97.6
1993	5.0	63.9	31.1	95.0
1994	5.2	73.6	21.2	94.8
1995	7.7	50.2	42.1	92.3
1996	6.3	71.9	21.9	93.8
1997	7.3	36.5	56.3	92.7
1998	3.9	43.1	52.9	96.1
1999	0.0	52.0	48.0	100.0
2000	6.3	75.0	18.8	93.8
Mean:	9.2	57.6	33.2	90.8

Table 11. Mean lengths of adult arctic cisco and least cisco, 1983 - 2000
(1983-2000 data from recovered tagged fish, 1991(U) from sample of untagged fish from commercial fishery)

Arctic Cisco

	Males			Females		
Year	Mean Length	Standard Deviation	Sample Size	Mean Length	Standard Deviation	Sample Size
1983	333.3	12.1	8	346.0	26.2	3
1984	310.2	18.8	76	333.6	29.8	15
1985	321.0	15.0	142	335.4	23.1	50
1986	315.3	15.7	100	328.8	18.9	53
1987	335.4	11.5	93	353.2	13.9	19
1988	343.9	18.9	24	356.2	32.0	23
1989	341.6	18.5	24	347.9	26.0	13
1990	323.5	20.6	12	342.0	36.8	11
1991	325.6	28.3	21	340.4	38.0	38
1991(U)	313.5	21.2	131	326.3	29.9	142
1992	312.0	14.9	51	313.4	14.8	55
1993	327.9	13.0	71	331.9	14.1	72
1994	344.3	10.7	9	349.6	20.1	16
1995	345.3	18.1	3	350.3	4.5	3
1996-00			0			0
Mean:	329.2 a			340.7 a		

Least Cisco

	Males			Non-spawning Females			Spent Females		
Year	Mean Length	Standard Deviation	Sample Size	Mean Length	Standard Deviation	Sample Size	Mean Length	Standard Deviation	Sample Size
1983	306.4	20.2	49	317.3	15.0	146	318.8	16.2	24
1984	310.1	20.0	118	309.1	14.9	126	320.5	14.9	157
1985	302.7	16.2	102	319.3	16.8	567	321.7	14.3	167
1986	301.8	17.0	28	316.3	16.9	152	324.4	15.8	124
1987	304.1	17.1	26	323.1	17.6	178	324.3	17.3	88
1988	307.1	14.7	29	321.6	16.8	245	328.9	15.8	131
1989	302.5	14.5	25	317.6	17.8	61	324.4	16.8	99
1990	299.9	12.5	21	311.2	15.1	156	323.3	15.7	94
1991	301.3	18.0	16	314.6	16.3	103	320.0	17.0	47
1991(U)	281.2	21.8	16	307.7	17.2	84	316.7	15.1	51
1992	289.3	21.4	6	309.9	17.8	195	319.5	19.2	37
1993	306.1	17.0	12	316.8	16.2	154	327.5	15.7	75
1994	292.5	15.3	17	316.8	16.4	240	322.5	16.9	69
1995	293.5	13.3	16	315.0	14.4	104	325.0	12.7	88
1996	300.2	8.4	6	316.8	14.9	69	319.0	15.9	21
1997	296.7	8.1	7	315.8	18.2	35	324.2	15.3	54
1998	298.0	4.2	2	321.2	12.2	22	325.9	14.3	27
1999			0	328.8	17.9	13	339.7	11.2	12
2000	333.0	--	1	315.0	36.7	12	323.7	61.3	3
Mean:	300.8 a			317.0 a			324.1 a		

1991(U) Arctic cisco data from LGL Alaska Research Associates
a Means do not include 1991 untagged sample

Table 12. 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.

Harvest Year	Adjusted Commercial 76-mm Mesh CPUE	Commercial Proportion 300-340 mm	Commercial CPUE 300-340 mm	year-1 Fyke Net CPUE 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	--
Mean:		0.692		

[1] Predicted

Table 13. Correlation between Arctic cisco CPUE for village and commercial 76-mm mesh, 1985-2000.

Year	Village CPUE (18-m of net)	Commercial CPUE (18-m of net)	Commercial CPUE (45-m of net)
1985	19.7	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	14.9	15.1	37.6
1990	11.0	12.1	30.3
1991	5.3	13.0	32.5
1992	25.7	23.6	59.0
1993	33.0	58.5	146.3
1994	4.6	12.3	30.8
1995	3.0	12.0	30.1
1996	17.5	48.1	120.2
1997	9.6	25.1	62.8
1998	4.4	14.6	36.4
1999	--	15.1	37.6
2000	9.6	4.7	11.7
Mean:	14.8	23.4	58.4

DATA APPENDIX

LIST OF APPENDIX TABLES

Appendix Table 1. Total estimated fishing effort by in the Colville River fall fishery, 1985-2000 (in net-days per 18-m of gill net).

	Village Effort							
Year	Upper Nigliq	Nanuk	Nigliq Delta	Outer Delta	Main River	**Total Village**	**Commercial**	**Total**
1985	663	207	340	543		1,753	908	2,661
1986	592	216	97	365		1,270	378	1,648
1987	961	236	90	89		1,376	1,424	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

Appendix Table 2. Total estimated catch of arctic cisco in the Colville Delta fall fishery, 1985-2000 (in numbers of fish).

	Nigliq Channel			Outer Colville Delta			Total	Total	
Year	Upper Nigliq	Nanuk	Nigliq Delta	Main Channel	East Channel	Main River	Village Catch	Commercial Catch	Total 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

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

	Nigliq Channel			Outer Colville Delta			Total	Total	
Year	Upper Nigliq	Nanuk	Nigliq Delta	Main Channel	East Channel	Main River	Village Catch	Commercial Catch	Total 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

Appendix Table 4. Fishing effort in the Nigliq Channel by fisher, 200

Fisher Code	Net	Fishing Area	Net Length (m)	Net Depth (m)	Mesh (mm)	Start Date	End Date
1	A	670	30	1.8	89	10/6/2000	11/5/2000
1	B	670	24	1.8	89	10/8/2000	10/14/2000
4	A	670	18	1.8	76	10/7/2000	11/6/2000
4	B	670	18	1.8	76	10/7/2000	11/6/2000
4	C	670	24	1.8	76	10/8/2000	11/6/2000
7	A	670	24	1.8	89	10/7/2000	10/15/2000
7	B	670	18	1.8	76	10/7/2000	10/15/2000
11	A	670	30	2.4	76	10/4/2000	11/7/2000
11	B	670	24	2.4	76	10/5/2000	10/23/2000
12	A	610	30	1.8	76	10/7/2000	10/16/2000
12	B	610	30	1.8	76	10/8/2000	10/16/2000
17	A	610	24	1.8	89	10/22/2000	11/21/2000
20	A	610	18	1.8	76	11/5/2000	11/13/2000
24	A	670	24	1.8	76	10/14/2000	11/14/2000
25	A	650	30	1.8	76	10/11/2000	11/13/2000
32	A	670	30	1.2	89	10/7/2000	11/4/2000
32	B	670	30	1.8	76	10/7/2000	11/4/2000
33	A	650	24	1.8	76	10/11/2000	11/21/2000
41	A	670	18	1.8	89	10/7/2000	10/15/2000
42	A	670	24	1.8	89	10/7/2000	10/26/2000
42	B	670	24	1.8	76	10/8/2000	10/26/2000
43	A	610	24	2.4	89	11/2/2000	11/21/2000
48	A	650	24	1.8	89	10/7/2000	11/12/2000
48	B	650	24	1.8	89	10/8/2000	11/12/2000
48	C	650	18	1.8	89	10/8/2000	11/12/2000
51	A	670	24	1.8	76	10/7/2000	10/15/2000
51	B	670	24	1.8	76	10/8/2000	10/15/2000
52	A	610	30	1.8	76	10/7/2000	10/16/2000
52	B	610	24	1.2	76	10/8/2000	10/15/2000
54	A	670	24	1.2	83	10/7/2000	11/14/2000
54	B	670	24	1.2	83	10/8/2000	11/14/2000
56	A	670	24	1.8	89	10/7/2000	11/5/2000
56	B	670	18	1.2	76	10/7/2000	11/5/2000
61	A	670	24	1.8	76	10/7/2000	11/13/2000
61	B	670	24	1.8	89	10/9/2000	10/17/2000
63	A	670	18	1.8	76	10/8/2000	11/13/2000
64	A	650	24	1.8	76	10/18/2000	11/7/2000

Appendix Table 4. Fishing effort in the Nigliq Channel by fisher, 200

Fisher Code	Net	Fishing Area	Net Length (m)	Net Depth (m)	Mesh (mm)	Start Date	End Date
65	A	670	24	1.8	89	10/6/2000	10/15/2000
65	B	670	18	1.8	76	10/6/2000	10/15/2000
65	C	670	18	1.8	76	11/4/2000	11/14/2000
66	A	610	30	1.8	76	10/3/2000	10/14/2000
66	B	610	18	1.8	83	10/4/2000	10/14/2000
66	C	610	24	1.2	64	10/8/2000	10/17/2000
67	A	610	18	1.8	76	10/11/2000	10/31/2000
69	A	650	24	1.8	89	10/17/2000	11/7/2000
69	B	670	24	1.5	89	11/7/2000	11/16/2000
69	C	670	24	1.8	89	11/7/2000	11/16/2000
72	A	670	24	1.8	89	10/7/2000	11/5/2000
72	B	670	24	1.8	89	10/8/2000	11/5/2000
72	C	670	30	1.8	89	10/24/2000	11/5/2000
74	A	610	24	1.8	76	10/11/2000	10/31/2000
74	B	610	24	1.8	76	10/11/2000	10/31/2000
75	A	670	24	1.8	76	10/7/2000	10/14/2000
75	B	670	30	1.8	76	10/8/2000	10/14/2000

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. Estimated effort by Nuiqsut fishermen by mesh size and fishing area, 2000.

Estimated Effort in Net-Days by 10-day Interval

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29	Mesh Total	Area Total
Outer Delta	64	0	0	0	0	0	0	0	0.0	
	76	0	0	0	0	0	0	0	0.0	
	89	0	0	0	0	0	0	0	0.0	0.0
Upper Nigliq	64	0	2.7	9.3	0.0	0.0	0.0	0.0	12.0	
	76	0	27.7	76.3	36.7	7.7	4.0	0.0	152.3	
	83	0	6.0	4.0	0.0	0.0	0.0	0.0	10.0	
	89	0	0.0	0.0	10.7	22.7	26.7	4.0	64.0	238.3
Nanuk	64	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	76	0	0.0	14.7	25.3	24.0	13.3	1.3	78.7	
	83	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	89	0	8.7	44.7	50.0	47.3	11.0	0.0	161.7	240.3
Nigliq Delta	76	0	63.0	166.0	125.3	97.3	21.0	0.0	472.7	
	83	0	6.7	26.7	26.7	26.7	13.3	0.0	100.0	
	89	0	45.2	119.4	86.1	55.9	18.7	0.0	325.2	897.9

Estimated Outer Delta Total: 0.0
Estimated Nigliq Total: 1,376.6
Estimated Nuiqsut Total: 1,376.6

Appendix Table 6. Estimated catch of arctic cisco in the Nuiqsut fishery, 2000.

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

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29
Outer Delta	64							
	76							
	89							
Upper Nigliq	64		**1.0**	**1.0**				
	76		**1.0**	**1.0**	**1.0**	1.0	1.0	
	83		**6.8**	**6.8**				
	89				6.8	6.6	7.6	**7.6**
Nanuk	64							
	76			13.9	1.4	2.3	1.5	**1.5**
	83							
	89		**4.8**	4.8	1.0	2.3	0.5	
Nigliq Delta	76		**17.4**	17.4	14.1	5.1	1.6	
	83		**12.6**	12.6	6.5	2.7	0.5	
	89		**4.0**	4.0	8.1	3.4	1.9	

Estimated Arctic Cisco Harvest by 10-day Interval

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29	Mesh Total	Area Total
Outer Delta	64									
	76			estimated from commercial CPUE						
	89									
Upper Nigliq	64	0	3	9	0	0	0	0	12	
	76	0	28	76	37	8	4	0	152	
	83	0	41	27	0	0	0	0	68	
	89	0	0	0	72	150	203	31	456	688
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	204	34	56	20	2	316	
	83	0	0	0	0	0	0	0	0	
	89	0	41	212	49	110	5	0	419	735
Nigliq Delta	76	0	1,097	2,891	1,773	493	33	0	6,287	
	83	0	84	335	173	71	7	0	670	
	89	0	181	478	694	188	36	0	1,576	8,533

Estimated Outer Delta Harvest:	0
Estimated Nigliq Channel Harvest:	9,956
Estimated Nuiqsut Harvest:	9,956

Appendix Table 7. Estimated catch of Bering cisco in the Nuiqsut fishery, 2000.

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

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29
Outer Delta	64							
	76							
	89							
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	0.0	**0.0**
Nanuk	64							
	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	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	0.1	0.0	0.0	

Estimated Bering Cisco Harvest by 10-day Interval

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29	Mesh Total	Area Total
Outer Delta	64									
	76		not estimated							
	89									
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	76	0	0	0	0	0	0	0	0	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	5	0	0	0	5	5

Estimated Total Main River Harvest:	0
Estimated Nigliq Channel Harvest:	5
Estimated Nuiqsut Harvest:	5

Appendix Table 8. Estimated catch of least cisco in the Nuiqsut fishery, 2000.

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

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29
Outer Delta	64							
	76							
	89							
Upper Nigliq	64		**1.3**	**1.3**				
	76		**1.3**	**1.3**	**1.3**	1.3	1.4	
	83		**0.0**	**0.0**				
	89				0.0	0.2	0.0	**0.0**
Nanuk	64							
	76			11.0	0.0	0.2	0.0	**0.0**
	83							
	89		**0.0**	0.0	0.0	0.0	0.1	
Nigliq Delta	76		**4.2**	4.2	2.3	0.7	0.4	
	83		**1.1**	1.1	0.0	0.5	0.0	
	89		**0.0**	0.0	2.3	0.2	0.2	

Estimated Least Cisco Harvest by 10-day Interval

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29	Mesh Total	Area Total
Outer Delta	64									
	76			estimated from commercial CPUE						
	89									
Upper Nigliq	64	0	4	12	0	0	0	0	16	
	76	0	37	102	49	10	6	0	203	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	5	0	0	5	225
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	162	0	4	0	0	166	
	83	0	0	0	0	0	0	0	0	
	89	0	0	0	0	1	1	0	2	168
Nigliq Delta	76	0	263	693	290	66	9	0	1,321	
	83	0	8	30	0	13	0	0	51	
	89	0	0	0	194	12	3	0	208	1,580

Estimated Outer Delta Harvest:	0
Estimated Nigliq Channel Harvest:	1,973
Estimated Nuiqsut Harvest:	1,973

Appendix Table 9. Estimated catch of broad whitefish in the Nuiqsut fishery, 2000.

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

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29
Outer Delta	64							
	76							
	89							
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	0.1	0.0	**0.0**
Nanuk	64							
	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	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 Broad Whitefish Harvest by 10-day Interval

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29	Mesh Total	Area Total
Outer Delta	64									
	76		not estimated							
	89									
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	3	0	0	3	3
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	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 Total Main River Harvest:	0
Estimated Nigliq Channel Harvest:	3
Estimated Nuiqsut Harvest:	3

Appendix Table 10. Estimated catch of humpback whitefish in the Nuiqsut fishery, 2000.

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

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29
Outer Delta	64							
	76							
	89							
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	0.9	0.5	**0.5**
Nanuk	64							
	76			3.8	0.1	0.3	0.2	**0.2**
	83							
	89		**0.2**	0.2	0.2	0.0	0.1	
Nigliq Delta	76		**2.6**	2.6	1.1	0.3	0.0	
	83		**1.3**	1.3	1.1	0.1	0.0	
	89		**0.3**	0.3	0.5	0.3	0.2	

Estimated Humpback Whitefish Harvest by 10-day Interval

Area	Mesh (mm)	Sep 21-30	Oct 1-10	Oct 11-20	Oct 21-30	Oct 31-Nov 9	Nov 10-19	Nov 20-29	Mesh Total	Area Total
Outer Delta	64									
	76		not estimated							
	89									
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	20	13	2	35	35
Nanuk	64	0	0	0	0	0	0	0	0	
	76	0	0	56	2	6	2	0	68	
	83	0	0	0	0	0	0	0	0	
	89	0	2	10	10	1	1	0	24	92
Nigliq Delta	76	0	163	429	132	26	1	0	752	
	83	0	9	35	29	3	0	0	76	
	89	0	11	30	46	17	4	0	108	936

Estimated Total Main River Harvest:	0
Estimated Nigliq Channel Harvest:	1,062
Estimated Nuiqsut Harvest:	1,062

Appendix Table 11. Length-weight relationships for tagged arctic cisco recaptured in the Colville Delta commercial fishery, 1983-2000 (lengths and weights measured by J. Helmericks) and a sample of untagged arctic cisco in 1991.

Arctic Cisco

Females						Calculated	95% Confidence Interval	
Year	Slope	Intercept	r	df	N	Wgt at 335 mm	Upper	Lower
1984	4.168	-7.871	0.964	13	15	449.7	475.6	423.7
1985	3.478	-6.151	0.938	48	50	427.8	450.4	405.2
1986	2.873	-4.609	0.882	51	53	441.0	463.5	418.6
1987	2.690	-4.145	0.859	17	19	443.9	470.6	417.3
1988	3.260	-5.558	0.925	21	23	469.9	495.2	444.6
1989	3.653	-6.595	0.967	11	13	426.7	453.2	400.2
1990	3.084	-5.146	0.965	9	11	437.0	464.7	409.4
1991	2.853	-4.632	0.975	36	38	373.0	395.4	350.5
1991U	2.870	-4.656	0.963	140	142	390.7	412.2	369.3
1992	3.183	-5.405	0.914	48	50	429.1	452.6	405.6
1993	3.180	-5.417	0.861	70	72	410.3	432.2	388.3
1994	3.780	-6.931	0.940	14	16	411.1	437.1	385.0
1995	insufficient samples				3			
1996	insufficient samples				0			
1997	insufficient samples				0			
1998	insufficient samples				0			
1999	insufficient samples				0			
2000	insufficient samples				0			
Males								
1984	2.996	-4.952	0.918	74	76	409.6	432.0	387.2
1985	2.907	-4.729	0.831	140	142	409.4	431.4	387.4
1986	3.269	-5.602	0.902	98	100	448.2	470.3	426.1
1987	2.972	-4.874	0.774	91	93	426.1	448.0	404.3
1988	3.269	-5.595	0.880	22	24	457.3	481.7	433.0
1989	3.426	-6.003	0.913	22	24	444.2	468.0	420.3
1990	3.592	-6.446	0.965	10	12	421.9	448.9	395.0
1991	2.737	-4.310	0.956	19	21	399.9	423.9	376.0
1991U	2.881	-4.676	0.933	129	131	397.3	422.0	372.6
1992	3.166	-5.362	0.881	51	53	428.4	451.5	405.3
1993	3.287	-5.678	0.864	69	71	417.6	439.6	395.6
1994	2.765	-4.334	0.723	7	9	443.3	475.6	410.9
1995	insufficient samples				3			
1996	insufficient samples				0			
1997	insufficient samples				0			
1998	insufficient samples				0			
1999	insufficient samples				0			
2000	insufficient samples				0			

1991U data for Arctic cisco supplied by LGL Alaska Research Assoc.

Appendix Table 12. Length-weight relationships for tagged least cisco recaptured in tl Colville Delta commercial fishery, 1983-2000 (lengths and weights measure by J. Helmericks) and a sample of untagged least cisco in 1991

Least Cisco

Year	Slope	Intercept	r	df	N	Calculated Wgt at 315 mm	95% Confidence Interval Upper	Lower
Female (Non-spawners)								
1983	2.810	-4.495	0.813	144	146	335.1	356.9	313.3
1984	2.783	-4.443	0.836	124	126	323.7	345.6	301.9
1985	2.684	-4.195	0.876	564	566	325.1	346.3	303.8
1986	2.239	-3.071	0.828	150	152	333.4	354.9	311.9
1987	2.743	-4.338	0.885	176	178	326.2	347.7	304.7
1988	2.872	-4.637	0.909	243	245	344.4	365.6	323.1
1989	2.718	-4.249	0.896	59	61	348.1	370.1	326.1
1990	2.416	-3.537	0.851	156	158	315.6	336.9	294.2
1991	2.731	-4.344	0.908	106	108	300.9	322.2	279.5
1991U	2.800	-4.496	0.923	82	84	315.4	337.0	293.8
1992	2.642	-4.093	0.883	180	182	320.9	342.4	299.5
1993	2.457	-3.638	0.873	152	154	317.1	338.4	295.8
1994	2.628	-4.047	0.879	238	240	329.9	351.3	308.6
1995	2.496	-3.738	0.849	102	104	314.2	335.6	292.8
1996	2.694	-4.211	0.910	67	69	329.7	350.9	308.5
1997	2.788	-4.466	0.925	33	35	316.1	337.8	294.3
1998	3.783	-6.939	0.933	20	22	324.7	347.0	302.5
1999	1.821	-2.032	0.796	11	13	329.4	354.0	304.8
2000	0.225	1.945	0.766	10	12	320.8	342.9	298.6
Female (Spent)								
1983	2.443	-3.622	0.788	22	24	303.3	327.4	279.3
1984	2.353	-3.396	0.808	155	157	303.4	324.9	281.9
1985	2.455	-3.660	0.913	165	167	298.2	319.6	276.7
1986	2.220	-3.060	0.839	122	124	305.7	327.1	284.3
1987	2.513	-3.813	0.891	86	88	292.7	314.3	271.0
1988	2.403	-3.508	0.852	129	131	312.0	333.5	290.5
1989	2.896	-4.744	0.904	97	99	309.0	330.6	287.4
1990	2.316	-3.323	0.826	92	94	290.5	312.2	268.7
1991	2.623	-4.106	0.880	46	48	279.8	302.1	257.5
1991U	2.539	-3.881	0.926	47	49	289.1	310.8	267.4
1992	2.513	-3.824	0.878	34	36	284.0	306.9	261.1
1993	2.659	-4.191	0.920	73	75	282.3	303.9	260.7
1994	2.629	-4.093	0.877	67	69	299.2	321.2	277.2
1995	2.582	-4.005	0.864	86	88	278.4	300.1	256.7
1996	1.991	-2.496	0.827	19	21	301.0	323.7	278.3
1997	2.386	-3.501	0.849	51	53	287.8	309.9	265.7
1998	2.178	-2.962	0.874	25	27	301.0	323.6	278.4
1999	3.494	-6.291	0.948	10	12	274.7	311.8	237.5
2000	Insufficient samples				3	323.7		
Males								
1983	2.730	-4.342	0.900	47	49	301.1	323.6	278.5
1984	2.535	-3.855	0.930	116	118	299.8	321.2	278.4
1985	2.487	-3.734	0.857	100	102	301.8	323.7	280.0
1986	2.359	-3.409	0.933	26	28	305.4	328.5	282.3
1987	2.417	-3.564	0.897	24	26	297.6	321.1	274.1
1988	2.333	-3.350	0.786	27	29	301.4	325.1	277.8
1989	2.675	-4.189	0.856	23	25	312.0	336.2	287.8
1990	2.661	-4.176	0.791	19	21	295.6	321.7	269.6
1991	2.344	-3.422	0.807	15	17	271.1	297.4	244.7
1991U	3.014	-5.069	0.901	14	16	289.3	319.6	259.1
1992	2.693	-4.263	0.969	3	5	291.7	348.0	235.4
1993	2.570	-3.961	0.830	10	12	288.4	316.2	260.6
1994	3.780	-6.931	0.940	14	16	309.9	338.4	281.4
1995	3.176	-5.472	0.875	14	16	290.2	319.8	260.6
1996	2.937	-4.863	0.935	4	6	297.9	344.3	251.6
1997	2.218	-3.081	0.945	5	7	289.4	343.5	235.3
1998	Insufficient samples				2	298.0		
1999	Insufficient samples				0			
2000	Insufficient samples				1	333.0		

Appendix Table 13. Length frequency by mesh size for arctic cisco, 1999 Colville Delta fall fishery.

ARCTIC CISCO - Commercial

Fork Length (mm)	76 mm mesh						
	Oct 15	Oct 19	Oct 26	Nov 4	Nov 10	Nov 15	76 mm Total
200							
210							
220							
230							
240							
250							
260							
270							
280							
290			1				1
300		1	2	5		2	10
310	1	4	12	4	7	9	37
320	10	10	11	9	10	12	62
330	7	9	6	15	15	8	60
340	7	9	10	7	5	6	44
350	8	4	2	4	4	1	23
360	7	4	2	2	1	2	18
370	4	3	2	1		8	18
380	3	2	1	1	3	1	11
390	1	1		2	3	1	8
400	2	2	1		1		6
410					1		1
420							
430		1					1
440							
450							
Total:	50	50	50	50	50	50	300

Appendix Table 14. Length frequency by mesh size for arctic cisco, 2000 Colville Delta fall fishery.

ARCTIC CISCO - Village

Fork Length (mm)	Mesh Size (mm) 76	83	89
200			
210			
220			
230			
240			
250	1		
260			
270		1	
280	1		
290	5		
300	18		1
310	51	1	2
320	110	4	7
330	148	6	8
340	119	31	20
350	92	32	58
360	65	17	72
370	48	21	51
380	21	19	34
390	8	6	13
400	3	3	9
410			2
420		1	
430			
440			1
450			
Total:	690	142	278

ARCTIC CISCO - Commercial

Fork Length (mm)	76 mm mesh Oct 12	Oct 18	Oct 24	Nov 1	Nov 8	Nov 15	Nov 22	76 mm Total
200								
210								
220								
230								
240								
250								
260								
270								
280								
290								
300		2		2		1		5
310			2			1	1	4
320	4	5	2	4	5	1	2	23
330	11	8	7	6	11	4	4	51
340	10	7	11	10	11	5	11	65
350	12	10	8	8	6	7	5	56
360	4	9	8	4	8	16	13	62
370	5	5	2	8	3	6	5	34
380	2	3	4	6	4	5	6	30
390	2	1	2	1	1	3	2	12
400			4	1	1	1	1	8
410								
420							1	1
430								
440								
450								
Total:	50	50	50	50	50	50	50	350

Appendix Table 15. Length frequency by mesh size for least cisco, 1999 Colville Delta fall fishery.

LEAST CISCO - Commercial

Fork Length (mm)	Oct 19	Oct 26	Nov 4	Nov 10	76 mm Total
200					
210					
220					
230					
240					
250					
260				3	3
270					
280		2	1	4	7
290	4	6	4	5	19
300	9	10	16	8	43
310	12	11	9	13	45
320	15	10	10	7	42
330	6	4	5	5	20
340	3	4	1	3	11
350	1	3	3	2	9
360			1		1
370					
380					
390					
400					
410					
420					
430					
440					
450					
Total:	50	50	50	50	200

Appendix Table 16. Length frequency by mesh size for least cisco, 2000 Colville Delta fall fishery.

LEAST CISCO - Village

Fork Length (mm)	76	89
200		
210		
220		
230		
240	1	1
250	1	1
260	1	
270	2	
280	6	
290	24	2
300	31	4
310	34	1
320	13	1
330	11	1
340	3	1
350		
360		
370		
380	1	
390		
400		
410		
420		
430		
440		
450		
Total:	128	12

LEAST CISCO - Commercial

Fork Length (mm)	76 mm mesh				
	Oct 12	Oct 18	Oct 31	Nov 8	76 mm Total
200					
210					
220					
230					
240					
250					
260					
270	1				1
280		3			3
290	1	4	1	4	10
300	5	9	8	8	30
310	13	10	12	10	45
320	13	9	16	14	52
330	7	11	10	5	33
340	9	2	1	7	19
350	1	1	2	2	6
360		1			1
370					
380					
390					
400					
410					
420					
430					
440					
450					
Total:	50	50	50	50	200

Appendix Table 17. Age frequencies of arctic cisco caught in 76 mm mesh, 1976-2000

Age (Years)	Percent																			
	1976	1977	1978	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
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
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
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
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
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
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
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
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
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
N =	31	182	215	est.	est.	199	196	126	est.	150	143	154	148	139	148	150	146	151	150	143

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 18. Age frequencies of least cisco caught in 76 mm mesh, 1976-2000.

Age (Years)	Percent																			
	1976	1977	1978	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
5			0.0				0.0		0.0		0.0		0.0		0.0		0.0		0.7	
6			7.4				0.0		2.3		0.7		0.0		0.0		0.0		4.1	
7			14.8				2.5		0.0		2.7		0.7		2.7		2.7		2.7	
8			28.4				12.6		4.5		8.0		4.7		3.3		6.1		6.8	
9			8.6				19.6		11.4		8.7		7.4		10.0		9.5		13.0	
10			7.4				18.1		20.5		15.3		16.8		8.0		14.9		18.5	
11			7.4				16.1		13.6		20.0		24.2		17.3		14.2		13.0	
12			11.1				14.1		9.1		16.0		13.4		15.3		15.5		8.9	
13			4.9				5.5		13.6		11.3		12.8		11.3		10.8		9.6	
14			4.9				4.5		11.4		8.0		8.1		9.3		10.1		7.5	
15			0.0				4.0		6.8		2.7		6.7		6.7		6.1		4.8	
16			2.5				1.0		2.3		0.7		2.7		6.7		4.7		4.1	
17			1.2				1.0		4.5		2.0		0.7		3.3		3.4		2.7	
18			1.2				0.0		0.0		2.0		0.0		2.7		2.0		1.4	
19			0.0				0.0		0.0		1.3		0.7		0.0		0.0		1.4	
20			0.0				0.5		0.0		0.7		0.0		0.7		0.0		0.7	
21			0.0				0.0		0.0		0.0		0.7		0.7		0.0		0.0	
22			0.0				0.5		0.0		0.0		0.0		0.7		0.0		0.0	
N =			81				199		44		150		149		150		148		146	

Appendix Table 19. Catch rate of arctic cisco in the commercial fishery by year-class, 1984-2000 (outlined boxes indica
year-class CPUE at age-5, based on CPUE corrected for effect of variable effort, 76-mm mesh

	Fishing Year																	
Year Class	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Year Class 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	0.0	2.0	76.8	47.0	6.7	3.5	0.2											136.2
1981	0.0	0.0	0.0	0.8	0.2	0.0	0.0	0.6										1.6
1982		0.0	0.0	0.0	0.3	0.0	0.0	0.0										0.3
1983			0.0	0.4	13.7	26.7	0.8	1.7										43.3
1984				0.0	0.0	0.0	1.0	0.4										1.4
1985					0.2	6.8	25.8	10.0	2.3	3.0	0.2	0.0						48.3
1986						0.0	2.2	15.2	21.4	22.0	2.5	0.6	0.0					64.0
1987							0.0	1.5	35.2	118.1	12.7	2.2	0.0					169.7
1988								0.0	0.0	5.0	8.6	2.2	0.9					16.7
1989											2.9	7.1	12.2	2.6				24.9
1990											0.2	17.9	110.5	26.4				155.0
1991													7.0	7.5				14.4
1992														27.7	17.0	3.2	1.3	49.2
1993															4.9	1.1	0.5	6.5
1994															10.1	24.5	4.4	39.0
1995																9.2	4.0	13.2
1996																	0.4	0.4
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	

boxes indicate CPUE at age-5

Appendix Table 20. Observed daily catches of arctic cisco in the Colville Delta commercial fishery, 1999.

	East Channel						
	76-mm Mesh						
Date	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	Total
Oct 10							
Oct 11							
Oct 12							
Oct 13							
Oct 14	120	110	88				318
Oct 15	145	81	100	39			365
Oct 16	133	116	102	43			394
Oct 17							
Oct 18	81	57	84	35			257
Oct 19	51	37	51	39	65	25	268
Oct 20	85	57	108	38	83	67	438
Oct 21	72	75	116	50	78	59	450
Oct 22	91	100	96	48	44	46	425
Oct 23	80	38	57	30	43	18	266
Oct 24							
Oct 25	86	78	91				255
Oct 26			125	37	99	93	354
Oct 27	84	86	92				262
Oct 28			85	53	72	42	252
Oct 29	59	47	88				194
Oct 30	20	18	45	42	62	26	213
Oct 31							
Nov 1	34	41	49		48	16	188
Nov 2							
Nov 3							
Nov 4	45	51	63		120	91	370
Nov 5							
Nov 6	179	127	177		170	103	756
Nov 7							
Nov 8							
Nov 9	203	175	216		209	116	919
Nov 10	46	34	95		100	43	318
Nov 11	130	157	143		217	108	755
Nov 12	103	82	91		116	40	432
Nov 13	41	26	53				120
Nov 14							
Nov 15	40	51	74		91	47	303
Nov 16							
Nov 17							
Nov 18							
Nov 19							
Nov 20							
Nov 21							
Nov 22							
Nov 23							
Nov 24							
Nov 25							
Nov 26							
Nov 27							
Nov 28							
Nov 29							
Nov 30							
Total Catch	1928	1644	2289	454	1617	940	8,872
Net-Days	33	33	33	16	28	28	171
CPUE	58.4	49.8	69.4	28.4	57.8	33.6	51.9

Appendix Table 21. Observed daily catches of least cisco in the Colville Delta commercial fishery, 1999.

	East Channel						
	76-mm Mesh						
Date	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	Total
Oct 10							
Oct 11							
Oct 12							
Oct 13							
Oct 14	164	84	95				343
Oct 15	97	81	72	47			297
Oct 16	101	89	119	42			351
Oct 17							
Oct 18	165	105	110	63			443
Oct 19	124	67	73	72	124	41	501
Oct 20	161	108	112	56	57	100	594
Oct 21	115	75	70	30	74	18	382
Oct 22	63	49	56	22	55	20	265
Oct 23	87	62	63	36	69	19	336
Oct 24							
Oct 25	185	134	142				461
Oct 26			51	72	146	73	342
Oct 27	83	65	47				195
Oct 28			54	38	89	41	222
Oct 29	84	55	34				173
Oct 30	36	33	75	24	63	37	268
Oct 31							
Nov 1	34	21	63		47	16	181
Nov 2							
Nov 3							
Nov 4	91	47	80		73	31	322
Nov 5							
Nov 6	32	21	28		43	13	137
Nov 7							
Nov 8							
Nov 9	54	44	24		42	17	181
Nov 10	10	19	22		26	11	88
Nov 11	122	66	79		80	39	386
Nov 12	80	50	100		78	31	339
Nov 13	72	36	70				178
Nov 14							
Nov 15	111	83	105		120	26	445
Nov 16							
Nov 17							
Nov 18							
Nov 19							
Nov 20							
Nov 21							
Nov 22							
Nov 23							
Nov 24							
Nov 25							
Nov 26							
Nov 27							
Nov 28							
Nov 29							
Nov 30							
Total Catch	2071	1394	1744	502	1186	533	7,430
Net-Days	33	33	33	16	28	28	171
CPUE	62.8	42.2	52.8	31.4	42.4	19.0	43.5

Appendix Table 22. Observed daily catches of humpback whitefish in the Colville Delta commercial fishery, 1999.

	East Channel						
	76-mm Mesh						
Date	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	Total
Oct 10							
Oct 11							
Oct 12							
Oct 13							
Oct 14	68	69	118				255
Oct 15	35	35	86	79			235
Oct 16	68	50	97	100			315
Oct 17							
Oct 18	85	86	101	128			400
Oct 19	86	95	219	196	99	46	741
Oct 20	59	54	117	101	110	153	594
Oct 21	85	91	145	108	103	45	577
Oct 22	62	41	119	96	87	40	445
Oct 23	65	70	89	98	66	26	414
Oct 24							
Oct 25	68	56	128				252
Oct 26			50	130	127	65	372
Oct 27	70	50	55				175
Oct 28			43	90	92	39	264
Oct 29	64	62	55				181
Oct 30	26	32	45	76	73	29	281
Oct 31							
Nov 1	41	43	64		68	18	234
Nov 2							
Nov 3							
Nov 4	41	44	61		88	41	275
Nov 5							
Nov 6	29	34	47		72	16	198
Nov 7							
Nov 8							
Nov 9	41	34	62		49	21	207
Nov 10	22	7	22		40	7	98
Nov 11	26	17	36		24	13	116
Nov 12	10	18	10		28	6	72
Nov 13	21	16	26				63
Nov 14							
Nov 15	25	21	12		47	6	111
Nov 16							
Nov 17							
Nov 18							
Nov 19							
Nov 20							
Nov 21							
Nov 22							
Nov 23							
Nov 24							
Nov 25							
Nov 26							
Nov 27							
Nov 28							
Nov 29							
Nov 30							
Total Catch	1097	1025	1807	1202	1173	571	6,875
Net-Days	33	33	33	16	28	28	171
CPUE	33.2	31.1	54.8	75.1	41.9	20.4	40.2

Appendix Table 23. Observed daily catches of arctic cisco in the Colville Delta commercial fishery, 2000.

	East Channel			
	76-mm Mesh		83-mm Mesh	
Date	Net 1	Net 2	Net 3	Total
Oct 10				
Oct 11	42			42
Oct 12	30	53		83
Oct 13	32	52	15	99
Oct 14	30	66	13	109
Oct 15				
Oct 16	54	65		119
Oct 17				
Oct 18	55	61		116
Oct 19	32	21		53
Oct 20				
Oct 21	27	21		48
Oct 22				
Oct 23				
Oct 24	77	54		131
Oct 25				
Oct 26	90	163		253
Oct 27				
Oct 28	37	100		137
Oct 29				
Oct 30	21	15		36
Oct 31		17		17
Nov 1	33	33		66
Nov 2				
Nov 3	48	44		92
Nov 4	38	68		106
Nov 5				
Nov 6	16	22		38
Nov 7	19	11		30
Nov 8	24	10		34
Nov 9				
Nov 10				
Nov 11				
Nov 12				
Nov 13	36	30		66
Nov 14				
Nov 15	80	95		175
Nov 16				
Nov 17	157	187		344
Nov 18	79	51		130
Nov 19				
Nov 20	88	46		134
Nov 21				
Nov 22	53	65		118
Nov 23				
Nov 24				
Nov 25	19	24		43
Nov 26				
Nov 27				
Nov 28				
Nov 29				
Nov 30				
Total Catch	1217	1374	28	2,619
Net-Days	46	45	2	93
CPUE	26.5	30.5	14.0	28.2

Appendix Table 24. Observed daily catches of least cisco in the Colville Delta commercial fishery, 2000.

	East Channel			
	76-mm Mesh		83-mm Mesh	
Date	Net 1	Net 2	Net 3	Total
Oct 10				
Oct 11	176			176
Oct 12	221	170		391
Oct 13	306	216	40	562
Oct 14	184	206	25	415
Oct 15				
Oct 16	253	159		412
Oct 17				
Oct 18	137	148		285
Oct 19	122	99		221
Oct 20				
Oct 21	152	95		247
Oct 22				
Oct 23				
Oct 24	91	94		185
Oct 25				
Oct 26	112	72		184
Oct 27				
Oct 28	140	70		210
Oct 29				
Oct 30	109	45		154
Oct 31		73		73
Nov 1	106	53		159
Nov 2				
Nov 3	160	118		278
Nov 4	164	135		299
Nov 5				
Nov 6	97	54		151
Nov 7	91	46		137
Nov 8	81	39		120
Nov 9				
Nov 10				
Nov 11				
Nov 12				
Nov 13	107	67		174
Nov 14				
Nov 15	88	65		153
Nov 16				
Nov 17	129	94		223
Nov 18	118	37		155
Nov 19				
Nov 20	121	57		178
Nov 21				
Nov 22	77	43		120
Nov 23				
Nov 24				
Nov 25	65	31		96
Nov 26				
Nov 27				
Nov 28				
Nov 29				
Nov 30				
Total Catch	3407	2286	65	5,758
Net-Days	46	45	2	93
CPUE	74.1	50.8	32.5	61.9

Appendix Table 25. Observed daily catches of humpback whitefish in the Colville Delta commercial fishery, 2000.

	East Channel			
	76-mm Mesh		83-mm Mesh	
Date	Net 1	Net 2	Net 3	Total
Oct 10				
Oct 11	47			47
Oct 12	54	57		111
Oct 13	62	93	152	307
Oct 14	75	95	139	309
Oct 15				
Oct 16	46	80		126
Oct 17				
Oct 18	70	89		159
Oct 19	50	97		147
Oct 20				
Oct 21	81	96		177
Oct 22				
Oct 23				
Oct 24	123	141		264
Oct 25				
Oct 26	82	88		170
Oct 27				
Oct 28	84	120		204
Oct 29				
Oct 30	80	67		147
Oct 31		57		57
Nov 1	87	57		144
Nov 2				
Nov 3	50	87		137
Nov 4	26	41		67
Nov 5				
Nov 6	82	98		180
Nov 7	32	50		82
Nov 8	38	74		112
Nov 9				
Nov 10				
Nov 11				
Nov 12				
Nov 13	119	117		236
Nov 14				
Nov 15	93	65		158
Nov 16				
Nov 17	54	55		109
Nov 18	11	48		59
Nov 19				
Nov 20	17	56		73
Nov 21				
Nov 22	6	25		31
Nov 23				
Nov 24				
Nov 25	38	55		93
Nov 26				
Nov 27				
Nov 28				
Nov 29				
Nov 30				
Total Catch	1507	1908	291	3,706
Net-Days	46	45	2	93
CPUE	32.8	42.4	145.5	39.8

Appendix Table 26. Mean weight and CPUE by mesh size in the Nigliq Channel fishery, 1986-2000.

Arctic Cisco

Mean Weight (kg) by Mesh Size

Mesh (mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000
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
64	0.306	0.297	0.313	0.289	0.287	0.279	0.253	0.298	0.219	0.295	0.307	0.296	0.296	0.296
70	0.367	0.384	0.399	0.404	0.340	0.322	0.311	0.350	0.331	0.334	0.339	0.358	0.338	0.380
76	0.429	0.471	0.484	0.518	0.393	0.365	0.369	0.403	0.444	0.374	0.371	0.420	0.380	0.464
83	0.475	0.472	0.515	0.514	0.475	0.431	0.454	0.469	0.477	0.491	0.400	0.460	0.460	0.521
89	0.462	0.539	0.653	0.539	0.555	0.556	0.477	0.469	0.547	0.513	0.451	0.468	0.501	0.541
95	0.462	0.539	0.653	0.539	0.555	0.556	0.477	0.469	0.547	0.513	0.513	0.513	0.513	0.513

Mean CPUE by Mesh Size

Mesh (mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000
51					5.7	44.5								
64	15.4	9.9	3.7	5.3	22.4	26.6	44.5	33.3	6.7	4.6	27.2	12.9	2.2	1.0
70		26.7	6.4				15.4	10.7	2.3	4.0				
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
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
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
95							3.1	19.3						

Least Cisco

Mean Weight (kg) by Mesh Size

Mesh (mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000
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
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
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
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
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
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
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

Mean CPUE by Mesh Size

Mesh (mm)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000
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
70		11.8	1.4				0.5	1.6	3.9	11.4				
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
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
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
95							0.2	0.1						

Appendix Table 27. Calculation of harvested biomass for arctic cisco in the Colville Delta fall fishery, 1985-2000.

Arctic Cisco

Estimated Mean Weight by Mesh Size

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(mm)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (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

Estimated Nigliq Catch

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51											36	10	178	50	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	10								
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

Estimated Outer Delta Catch

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(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																
76	19,148	8,143	13,102	5,615	4,487	2,111	420	203	1,500	777	2,000	785	1,025	374	4,400	1,623
83		0	390	185		0		0		0		0		0		0
89	473	244	1,232	569	162	87	167	109		0		0		0		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

Estimated Commercial Catch

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
76	22,831	9,709	28,988	12,423	22,527	10,600	5,056	2,449	18,825	9,754	16,884	6,629	23,046	8,414	22,754	8,391
83		0		0	4,967	2,345	5,277	2,719	5,977	3,071	4,221	2,004	652	281	0	0
89	847	437	468	216		0	147	96		0		0		0	0	0
Total:	23,678	10,146	29,456	12,640	27,494	12,945	10,480	5,264	24,802	12,826	21,105	8,634	23,698	8,695	22,754	8,391

Appendix Table 27. continued.

Arctic Cisco

Estimated Mean Weight by Mesh Size

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (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
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
83	920	0.469	2,036	0.477	389	0.491	83	0.400	259	0.460	2,767	0.460	142	0.521
89	870	0.469	166	0.547	289	0.513	296	0.451	875	0.468	299	0.501	278	0.541

Estimated Nigliq Catch

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	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	6,861	2,044	1,665	364	307	91	1,770	544	435	129	146	43	12	4
70	1,877	756	258	115	134	50		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
83	1,080	507	15	7	850	417	512	205	2,211	1,017	151	69	737	384
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
95	869	408		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

Estimated Outer Delta Catch

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
64		0		0	90	27	2,267	697		0		0		0
70					232	87		0		0		0		0
76	5,800	2,336	5,400	2,396	3,287	1,230	18,963	7,033	2,144	900	5,411	2,057		0
83		0		0	55	27		0		0		0		0
89		0		0	4	2	2,803	1,265		0		0		0
Total:	5,800	2,336	5,400	2,396	3,669	1,372	24,033	8,994	2,144	900	5,411	2,057	0	0

Estimated Commercial Catch

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
76	29,589	11,917	7,054	3,129	14,311	5,353	20,740	7,692	15,686	6,586	6,579	2,501	2,591	1,203
83	1,721	807	1,904	908	0	0	1,077	431	1,304	600	2,173	1,000	28	15
89	0	0	0	0	0	0		0		0		0		0
Total:	31,310	12,725	8,958	4,037	14,311	5,353	21,817	8,124	16,990	7,186	8,752	3,501	2,619	1,218

Appendix Table 28. Calculation of harvested biomass for least cisco in the Colville Delta fall fishery, 1985-2000.

Least Cisco

Estimated mean weight by mesh size

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(mm)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (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

Estimated Nigliq Catch

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51											545	136	172	41	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	171	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

Estimated Outer Delta Catch

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(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

Estimated Commercial Catch

Mesh	1985		1986		1987		1988		1989		1990		1991		1992	
(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	1,808	7,284	2,513
83		0		0	303	119	1,904	784	514	209	2,105	770	78	30	0	0
89	101	40	12	5		0	458	189		0		0		0	0	0
Total:	17,596	6,021	9,000	2,959	11,939	4,117	23,040	8,121	19,640	7,006	17,049	5,513	7,744	1,838	7,284	2,513

Appendix Table 28. (continued)

Least Cisco

Estimated mean weight by mesh size

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)	Samp. Size	Ave Wgt (kg)
64	778	0.246	778	0.253	833	0.236	886	0.235	886	0.242	310	0.234	1,221	0.239
76	311	0.297	218	0.306	234	0.308	123	0.302	173	0.300	514	0.288	328	0.325
83	62	0.345	62	0.371	92	0.335	92	0.367	133	0.336	133	0.336	133	0.336

Estimated Nigliq Catch

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
51	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
70	274	81	442	135	380	117		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
83	82	28	12	4	102	34	15	6	335	112	124	42	51	17
89	754	260	301	112	283	95	96	35	833	280	545	183	215	72
95	4	1		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

Estimated Outer Delta Catch

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
64		0		0	708	167	1,552	365		0		0		0
76		0		0	3,333	1,026	12,700	3,833	1,241	372	11,470	3,303		0
83		0		0	95	32		0		0		0		0
89		0		0	1	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

Estimated Commercial Catch

Mesh	1993		1994		1995		1996		1997		1998		2000	
(mm)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)	No.	(kg)
76	5,939	1,761	9,549	2,920	8,633	2,658	7,451	2,249	10,644	2,580	11,010	3,170	5,693	1,851
83	98	34	627	233	0	0	345	127	110	33	812	273	65	22
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

Appendix Table 29. Tags recovered in the Colville Delta commercial fishery in 1999-2000.

Tag Code	Species	Length at Recapture	Recapture Date	Recapture Location	Length at Release	Release Date	Release Location
LGL9004750	LSCS	357	10/16/1999	151	332	07/29/90	208
LGL9006503	LSCS	340	10/20/1999	151	291	08/03/90	220
LGL9100570	LSCS	335	11/4/1999	151	306	07/16/91	211
LGL9100815	LSCS	309	10/15/1999	151	284	07/18/91	212
LGL9104707	LSCS	375	10/22/1999	151	361	07/16/91	223
LGL9104971	LSCS	336	11/4/1999	151	270	07/16/91	220
LGL9105093	LSCS	331	11/6/1999	151	288	07/23/91	208
LGL9107463	LSCS	322	10/18/1999	151	311	07/19/91	218
LGL9109650	LSCS	333	10/26/1999	151	258	08/08/91	231
LGL9110900	LSCS	328	10/21/1999	151	295	07/23/91	222
LGL9115684	LSCS	336	10/18/1999	151	312	08/18/91	208
LGL9115733	LSCS	324	11/6/1999	151	282	08/19/91	208
LGL9208298	LSCS	360	10/20/1999	151	321	07/31/92	211
LGL9210628	LSCS	332	10/16/1999	151	302	08/03/92	208
LGL9211581	LSCS	340	11/4/1999	151	273	08/13/92	223
LGL9211682	LSCS	306	10/14/1999	151	264	08/12/92	223
LGL9213379	LSCS	337	10/14/1999	151	316	08/22/92	114
LGL9304493	LSCS	341	10/22/1999	151	301	07/14/93	211
LGL9306931	LSCS	321	11/1/1999	151	265	08/28/93	206
LGL9309081	LSCS	338	11/10/1999	151	317	08/03/93	214
LGL9309426	LSCS	333	10/14/1999	151	298	08/05/93	211
LGL9309591	LSCS	334	10/15/1999	151	264	08/08/93	211
LGL9309857	LSCS	352	10/18/1999	151	297	08/12/93	230
LGL9311736	LSCS	315	10/26/1999	151	265	08/18/93	223
LGL9312242	LSCS	315	10/14/1999	151	296	08/05/93	220
LGL9007895	LSCS	316	10/13/2000	151	317	08/25/91	113
LGL9101608	LSCS	333	11/3/2000	151	289	07/22/91	231
LGL9103723	LSCS	266	11/6/2000	151	291	07/28/91	214
LGL9110524	LSCS	325	10/18/2000	151	--	07/22/91	220
LGL9200599	LSCS	388	10/26/2000	151	320	07/17/92	214
LGL9206992	LSCS	319	10/18/2000	151	302	08/07/92	218
LGL9209919	LSCS	333	10/21/2000	151	292	07/26/92	218
LGL9216529	LSCS	315	10/26/2000	151	284	08/07/92	214
LGL9303278	LSCS	280	11/1/2000	151	272	07/19/93	211
LGL9304457	LSCS	393	10/13/2000	151	323	07/14/93	211
LGL9306135	LSCS	272	11/15/2000	151	294	07/22/93	230
LGL9307016	LSCS	365	11/25/2000	151	290	07/24/93	214
LGL9309446	LSCS	283	10/14/2000	151	258	08/05/93	211
LGL9310868	LSCS	317	11/18/2000	151	282	07/17/93	204
LGL9312739	LSCS	304	11/22/2000	151	334	08/11/93	222
LGL9314087	LSCS	275	11/22/2000	151	--	08/01/93	222

Location Code: 100 = Outer Colville Delta
151 = J. Helmericks commercial fishery
610 = Upper Nigliq area
650 = Nanuk Lake area
670 = Nigliq Delta area
Release Station Numbers = station numbers as reported for release year summer study

Appendix Table 30. Summary of tag returns by fishery, Colville Delta, fall 1999 and 2000.

		Commercial Fishery		Village Fishery		Total	
		Least Cisco		Least Cisco		Least Cisco	
Study		1999	2000	1999	2000	1999	2000
81 Waterflood							
82 Endicott							
84 Waterflood							
85 Endicott							
85 Colville							
USFWS							
88 Endicott	Prudhoe						
	Colville						
90 Endicott	Prudhoe	2				2	
91 Endicott	Prudhoe	10	3			10	3
	Colville	0	1			0	1
92 Endicott	Prudhoe	4	4			4	4
	Colville	1	0			1	0
93 Endicott	Prudhoe	8	8			8	8
Total:		25	16	0	0	25	16

Appendix Table 31. Data used to calculate decrease in tagged least cisco in the Colville River delta commercial fishery, 1980-2000. (corrected for length difference between tags released and tags recovered).

Release Year	Number of Tags Released	Net Selectivity Correction Factor	Total Examined Catch	Number Recaptured In: 1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1980	1,067	0.286	31,459	32	20	8	12	3	5	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0
1981	6,157	0.095	15,504		90	155	159	52	45	14	11	9	6	0	1	0	0	0	0	0	0	0	0	0
1982(E)	1,798	0.236	27,085			155	48	22	19	7	5	3	2	0	1	0	2	0	0	0	1	0	0	0
1982(W)	2,131	0.340	27,085			88	56	14	14	4	1	2	2	0	0	0	0	0	0	0	0	0	0	0
1983	0		37,909				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	14,126	0.397	13,076					313	331	144	69	116	47	34	7	7	3	4	2	1	0	0	0	0
1985	9,915	0.171	17,596						432	129	96	122	38	34	8	8	8	4	1	2	0	0	0	0
1986	0		9,000							--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1987	0		11,939								--	--	--	--	--	--	--	--	--	--	--	--	--	--
1988(E)	499	0.191	13,884									23	11	3	1	0	0	0	1	0	0	1	0	0
1988(C)	368	0.393	13,884									9	2	2	0	0	0	0	0	0	0	0	0	0
1989	0		10,328										--	--	--	--	--	--	--	--	--	--	--	--
1990	5,895	0.289	11,049											104	32	44	26	31	15	9	10	3	2	0
1991(E)	10,834	0.399	3,632												62	66	57	72	59	17	27	21	10	3
1991(C)	396	0.447	3,632												0	0	0	1	1	1	0	2	0	1
1992(E)	6,744	0.359	7,284													122	49	114	49	29	21	13	4	4
1992(C)	820	0.651	7,284													4	4	4	3	2	2	0	1	0
1993	8,514	0.405	6,037														95	103	81	35	35	25	8	8
1994	0		10,176																					
1995	0		8,633																					
1996	0		7,796																					
1997	0		10,754																					
1998	0		11,822																					
1999	0		7,430																					
2000	0		5,758																					

1982E = 1982 Endicott Baseline Study, 1982W = 1982 PBU Waterflood Monitoring Study

(E) = Prudhoe Bay area stations, (C) = Colville Delta area stations

Appendix Table 32. Decrease in recovery rate of tagged least cisco in the Colville River delta commercial fishery, 1980-2000. (standardized to 20,000 fish examined)

Release	Percent Recaptured After Years At Large															
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1980	2.67	2.82	0.55	0.59	0.43	0.53	0.42	0.16	0.27	0.18	0.17	0.00	0.00	0.00	0.00	0.00
1981	2.08	1.95	1.36	1.29	0.83	0.51	0.30	0.21	0.19	0.00	0.09	0.00	0.00	0.00	0.00	0.00
1982(E)	8.34	1.60	1.87	1.20	0.87	0.47	0.24	0.22	0.00	0.31	0.00	0.37	0.00	0.00	0.00	0.10
1982(W)	4.62	1.67	1.00	0.75	0.42	0.08	0.14	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	5.62	3.32	2.27	0.82	1.18	0.64	0.44	0.27	0.14	0.07	0.06	0.03	0.02	0.00	0.00	0.00
1985	5.97	3.16	1.62	1.77	0.74	0.62	0.44	0.22	0.27	0.08	0.02	0.05	0.00			
1988(E)	8.21	4.72	1.09	1.10	0.00	0.00	0.00	0.46	0.00	0.00	0.34	0.00	0.00			
1988(C)	5.80	1.31	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
1990	4.49	3.49	2.05	1.46	1.03	0.59	0.39	0.32	0.09	0.09	0.00					
1991(E)	5.25	2.09	1.74	1.31	1.26	0.40	0.46	0.33	0.25	0.10						
1991(C)	0.00	0.00	0.00	0.50	0.59	0.65	0.00	0.85	0.00	0.88						
1992(E)	7.75	2.93	3.32	1.68	1.10	0.58	0.33	0.16	0.21							
1992(C)	3.84	2.40	0.96	0.85	0.63	0.45	0.00	0.33	0.00							
1993	6.21	2.98	2.20	1.05	0.76	0.50	0.25	0.33								
Mean	5.06	2.46	1.48	1.03	0.70	0.43	0.24	0.29	0.11	0.15	0.08	0.06	0.00	0.00	0.00	0.02
St Dev =	2.37	1.15	0.85	0.48	0.39	0.23	0.18	0.20	0.12	0.26	0.11	0.13	0.01	0.00	0.00	0.05

Regression of recapture percent vs. years at large:
ln(recap %) = 1.392 - 0.437(year at large) r^2 = 0.993

1982E = 1982 Endicott Baseline Study, 1982W = 1982 PBU Waterflood Monitoring Study
(E) = Prudhoe Bay area stations, (C) = Colville Delta area stations

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00001	670	A	10/15/2000	24	76	24	24	ARCS	41	0	1.33	30.8
00001	670	A	10/15/2000	24	76	24	24	HBWF	3	0	1.33	2.3
00001	670	A	10/15/2000	24	76	24	24	LSCS	19	0	1.33	14.3
00002	650	A	10/15/2000	30	76	24	25	ARCS	59	0	1.67	35.4
00002	650	A	10/15/2000	30	76	24	25	HBWF	17	0	1.67	10.2
00002	650	A	10/15/2000	30	76	24	25	LSCS	51	0	1.67	30.6
00003	670	A	10/15/2000	30	89	24	32	ARCS	23	0	1.67	13.8
00003	670	A	10/15/2000	30	89	24	32	HBWF	2	0	1.67	1.2
00004	670	B	10/15/2000	30	76	24	32	ARCS	30	0	1.67	18.0
00004	670	B	10/15/2000	30	76	24	32	HBWF	5	0	1.67	3.0
00004	670	B	10/15/2000	30	76	24	32	LSCS	1	0	1.67	0.6
00005	670	A	10/16/2000	24	76	24	24	ARCS	27	0	1.33	20.3
00005	670	A	10/16/2000	24	76	24	24	HBWF	6	0	1.33	4.5
00005	670	A	10/16/2000	24	76	24	24	LSCS	12	0	1.33	9.0
00005	670	A	10/16/2000	24	76	24	24	RBSM	1	0	1.33	0.8
00006	650	A	10/16/2000	30	76	24	25	ARCS	32	0	1.67	19.2
00006	650	A	10/16/2000	30	76	24	25	HBWF	11	0	1.67	6.6
00006	650	A	10/16/2000	30	76	24	25	LSCS	26	0	1.67	15.6
00007	650	A	10/16/2000	24	89	24	48	ARCS	18	0	1.33	13.5
00007	650	A	10/16/2000	24	89	24	48	HBWF	2	0	1.33	1.5
00008	650	B	10/16/2000	24	89	24	48	ARCS	15	0	1.33	11.3
00008	650	B	10/16/2000	24	89	24	48	HBWF	1	0	1.33	0.8
00009	650	C	10/16/2000	18	89	24	48	ARCS	10	0	1.00	10.0
00010	650	A	10/17/2000	30	76	24	25	ARCS	5	0	1.67	3.0
00010	650	A	10/17/2000	30	76	24	25	HBWF	1	0	1.67	0.6
00010	650	A	10/17/2000	30	76	24	25	LSCS	8	0	1.67	4.8
00011	670	A	10/17/2000	24	76	24	24	ARCS	9	0	1.33	6.8
00011	670	A	10/17/2000	24	76	24	24	LSCS	5	0	1.33	3.8
00012	650	A	10/18/2000	24	89	24	48	ARCS	6	0	1.33	4.5
00013	650	B	10/18/2000	24	89	24	48	ARCS	2	0	1.33	1.5
00015	670	A	10/18/2000	30	89	24	32	ARCS	2	0	1.67	1.2
00016	670	B	10/18/2000	30	76	24	32	ARCS	6	0	1.67	3.6
00016	670	B	10/18/2000	30	76	24	32	HBWF	3	0	1.67	1.8
00016	670	B	10/18/2000	30	76	24	32	LSCS	1	0	1.67	0.6
00017	650	A	10/18/2000	30	76	24	25	ARCS	9	0	1.67	5.4
00017	650	A	10/18/2000	30	76	24	25	LSCS	7	0	1.67	4.2
00018	670	A	10/19/2000	24	89	24	56	ARCS	2	0	1.33	1.5
00019	670	B	10/19/2000	18	76	24	56	ARCS	8	0	1.00	8.0
00019	670	B	10/19/2000	18	76	24	56	HBWF	2	0	1.00	2.0
00019	670	B	10/19/2000	18	76	24	56	LSCS	2	0	1.00	2.0
00020	670	A	10/19/2000	24	76	48	24	ARCS	37	0	2.67	13.9
00020	670	A	10/19/2000	24	76	48	24	HBWF	7	0	2.67	2.6
00020	670	A	10/19/2000	24	76	48	24	LSCS	12	0	2.67	4.5
00021	650	A	10/19/2000	30	76	24	25	ARCS	11	0	1.67	6.6
00021	650	A	10/19/2000	30	76	24	25	HBWF	3	0	1.67	1.8
00022	650	A	10/19/2000	24	89	24	48	ARCS	2	0	1.33	1.5
00023	650	B	10/19/2000	24	89	24	48	ARCS	2	0	1.33	1.5
00024	650	C	10/19/2000	18	89	24	48	ARCS	5	0	1.00	5.0
00025	670	A/B	10/19/2000	55	76	24	11	ARCS	98	0	3.00	32.7
00025	670	A/B	10/19/2000	55	76	24	11	BDWF	1	0	3.00	0.3
00025	670	A/B	10/19/2000	55	76	24	11	HBWF	10	0	3.00	3.3
00025	670	A/B	10/19/2000	55	76	24	11	LSCS	15	0	3.00	5.0
00027	670	A	10/19/2000	30	89	24	32	ARCS	2	0	1.67	1.2
00028	670	B	10/19/2000	30	76	24	32	ARCS	6	0	1.67	3.6
00028	670	B	10/19/2000	30	76	24	32	HBWF	1	0	1.67	0.6
00028	670	B	10/19/2000	30	76	24	32	LSCS	2	0	1.67	1.2
00029	670	A/B	10/19/2000	49	83	24	54	ARCS	25	0	2.67	9.4
00029	670	A/B	10/19/2000	49	83	24	54	HBWF	3	0	2.67	1.1
00029	670	A/B	10/19/2000	49	83	24	54	LSCS	3	0	2.67	1.1
00031	670	A/B	10/19/2000	49	76	24	35	ARCS	42	0	2.67	15.8
00031	670	A/B	10/19/2000	49	76	24	35	HBWF	9	0	2.67	3.4
00031	670	A/B	10/19/2000	49	76	24	35	LSCS	12	0	2.67	4.5

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00033	670	A/B	10/20/2000	37	76	24	4	ARCS	32	0	2.00	16.0
00033	670	A/B	10/20/2000	37	76	24	4	HBWF	11	0	2.00	5.5
00033	670	A/B	10/20/2000	37	76	24	4	LSCS	13	0	2.00	6.5
00035	670	C	10/20/2000	24	76	24	4	ARCS	19	0	1.33	14.3
00035	670	C	10/20/2000	24	76	24	4	HBWF	4	0	1.33	3.0
00035	670	C	10/20/2000	24	76	24	4	LSCS	1	0	1.33	0.8
00036	650	A	10/20/2000	24	89	24	48	ARCS	0	0	1.33	0.0
00037	650	B	10/20/2000	24	89	24	48	ARCS	3	0	1.33	2.3
00038	650	C	10/20/2000	18	89	24	48	ARCS	2	0	1.00	2.0
00039	670	A/B	10/20/2000	49	76	24	35	ARCS	58	0	2.67	21.8
00039	670	A/B	10/20/2000	49	76	24	35	HBWF	6	0	2.67	2.3
00039	670	A/B	10/20/2000	49	76	24	35	LSCS	13	0	2.67	4.9
00041	670	A/B	10/20/2000	49	83	24	54	ARCS	42	0	2.67	15.8
00041	670	A/B	10/20/2000	49	83	24	54	HBWF	4	0	2.67	1.5
00041	670	A/B	10/20/2000	49	83	24	54	LSCS	3	0	2.67	1.1
00041	670	A/B	10/20/2000	49	83	24	54	RBSM	1	0	2.67	0.4
00043	670	A	10/20/2000	30	89	24	32	ARCS	3	0	1.67	1.8
00044	670	B	10/20/2000	30	76	24	32	ARCS	7	0	1.67	4.2
00044	670	B	10/20/2000	30	76	24	32	HBWF	1	0	1.67	0.6
00045	670	A	10/20/2000	30	76	24	11	ARCS	46	0	1.67	27.6
00045	670	A	10/20/2000	30	76	24	11	HBWF	3	0	1.67	1.8
00045	670	A	10/20/2000	30	76	24	11	LSCS	8	0	1.67	4.8
00046	670	B	10/20/2000	24	76	24	11	ARCS	39	0	1.33	29.3
00046	670	B	10/20/2000	24	76	24	11	HBWF	4	0	1.33	3.0
00046	670	B	10/20/2000	24	76	24	11	LSCS	5	0	1.33	3.8
00046	670	B	10/20/2000	24	76	24	11	RBSM	1	0	1.33	0.8
00047	670	A	10/21/2000	24	76	24	24	ARCS	36	0	1.33	27.0
00047	670	A	10/21/2000	24	76	24	24	HBWF	3	0	1.33	2.3
00047	670	A	10/21/2000	24	76	24	24	LSCS	3	0	1.33	2.3
00048	650	A	10/21/2000	24	89	24	48	ARCS	1	0	1.33	0.8
00049	650	B	10/21/2000	24	89	24	48	ARCS	1	0	1.33	0.8
00050	650	C	10/21/2000	18	89	24	48	ARCS	3	0	1.00	3.0
00051	670	A	10/21/2000	30	89	24	32	ARCS	1	0	1.67	0.6
00052	670	B	10/21/2000	30	76	24	32	ARCS	3	0	1.67	1.8
00053	670	A	10/22/2000	24	76	24	24	ARCS	32	0	1.33	24.0
00053	670	A	10/22/2000	24	76	24	24	HBWF	4	0	1.33	3.0
00053	670	A	10/22/2000	24	76	24	24	LSCS	1	0	1.33	0.8
00054	670	A	10/22/2000	30	89	24	32	ARCS	1	0	1.67	0.6
00055	670	B	10/22/2000	30	76	24	32	ARCS	3	0	1.67	1.8
00056	650	A	10/22/2000	24	89	24	48	ARCS	0	0	1.33	0.0
00057	650	B	10/22/2000	24	89	24	48	ARCS	4	0	1.33	3.0
00058	650	C	10/22/2000	18	89	24	48	ARCS	0	0	1.00	0.0
00059	670	A/B	10/22/2000	55	76	24	11	ARCS	72	0	3.00	24.0
00059	670	A/B	10/22/2000	55	76	24	11	HBWF	3	0	3.00	1.0
00061	670	A/B	10/23/2000	49	76	48	35	ARCS	60	0	5.33	11.3
00061	670	A/B	10/23/2000	49	76	48	35	HBWF	4	0	5.33	0.8
00063	670	A/B	10/23/2000	49	83	48	54	ARCS	50	0	5.33	9.4
00063	670	A/B	10/23/2000	49	83	48	54	HBWF	4	0	5.33	0.8
00065	670	A	10/24/2000	18	89	24	1	ARCS	17	0	1.00	17.0
00065	670	A	10/24/2000	18	89	24	1	LSCS	5	0	1.00	5.0
00066	670	B	10/24/2000	24	89	24	1	ARCS	24	0	1.33	18.0
00066	670	B	10/24/2000	24	89	24	1	HBWF	2	0	1.33	1.5
00067	650	A	10/24/2000	24	89	48	48	ARCS	3	3	2.67	1.1
00067	650	A	10/24/2000	24	89	48	48	HBWF	1	0	2.67	0.4
00068	650	B	10/24/2000	24	89	48	48	ARCS	4	4	2.67	1.5
00068	650	B	10/24/2000	24	89	48	48	HBWF	1	0	2.67	0.4
00069	650	C	10/24/2000	18	89	48	48	ARCS	3	3	2.00	1.5
00070	670	A	10/24/2000	30	89	24	32	ARCS	2	0	1.67	1.2
00071	670	B	10/24/2000	30	76	24	32	ARCS	4	0	1.67	2.4
00071	670	B	10/24/2000	30	76	24	32	HBWF	1	0	1.67	0.6
00072	670	A/B	10/24/2000	37	76	24	4	ARCS	23	23	2.00	11.5
00072	670	A/B	10/24/2000	37	76	24	4	BDWF	2	2	2.00	1.0

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00072	670	A/B	10/24/2000	37	76	24	4	HBWF	1	0	2.00	0.5
00072	670	A/B	10/24/2000	37	76	24	4	LSCS	4	4	2.00	2.0
00074	670	C	10/24/2000	24	76	24	4	ARCS	31	0	1.33	23.3
00074	670	C	10/24/2000	24	76	24	4	HBWF	5	0	1.33	3.8
00074	670	C	10/24/2000	24	76	24	4	LSCS	1	0	1.33	0.8
00075	670	A	10/24/2000	30	76	24	11	ARCS	34	34	1.67	20.4
00075	670	A	10/24/2000	30	76	24	11	HBWF	4	0	1.67	2.4
00075	670	A	10/24/2000	30	76	24	11	LSCS	7	7	1.67	4.2
00076	670	A	10/25/2000	30	76	20	11	ARCS	42	42	1.39	30.2
00076	670	A	10/25/2000	30	76	20	11	BDWF	1	0	1.39	0.7
00076	670	A	10/25/2000	30	76	20	11	HBWF	6	0	1.39	4.3
00076	670	A	10/25/2000	30	76	20	11	LSCS	7	7	1.39	5.0
00077	670	A	10/25/2000	24	89	48	35	ARCS	23	23	2.67	8.6
00077	670	A	10/25/2000	24	89	48	35	BRCS	2	2	2.67	0.8
00078	670	B	10/25/2000	24	76	48	35	ARCS	17	17	2.67	6.4
00078	670	B	10/25/2000	24	76	48	35	BDWF	1	1	2.67	0.4
00078	670	B	10/25/2000	24	76	48	35	HBWF	2	0	2.67	0.8
00079	670	A	10/25/2000	18	89	24	1	ARCS	14	0	1.00	14.0
00079	670	A	10/25/2000	18	89	24	1	LSCS	2	0	1.00	2.0
00080	670	B	10/25/2000	24	89	24	1	ARCS	25	0	1.33	18.8
00080	670	B	10/25/2000	24	89	24	1	HBWF	2	0	1.33	1.5
00080	670	B	10/25/2000	24	89	24	1	LSCS	10	0	1.33	7.5
00081	670	A	10/25/2000	24	76	48	24	ARCS	71	0	2.67	26.6
00081	670	A	10/25/2000	24	76	48	24	HBWF	4	0	2.67	1.5
00081	670	A	10/25/2000	24	76	48	24	LSCS	13	0	2.67	4.9
00081	670	A	10/25/2000	24	76	48	24	RBSM	1	0	2.67	0.4
00082	670	A	10/25/2000	30	89	24	32	ARCS	4	0	1.67	2.4
00083	670	B	10/25/2000	30	76	24	32	ARCS	4	0	1.67	2.4
00083	670	B	10/25/2000	30	76	24	32	HBWF	2	0	1.67	1.2
00084	670	B	10/25/2000	18	76	24	56	ARCS	19	0	1.00	19.0
00084	670	B	10/25/2000	18	76	24	56	HBWF	3	0	1.00	3.0
00084	670	B	10/25/2000	18	76	24	56	LSCS	3	0	1.00	3.0
00085	670	A	10/25/2000	18	76	24	4	ARCS	11	0	1.00	11.0
00085	670	A	10/25/2000	18	76	24	4	HBWF	1	0	1.00	1.0
00085	670	A	10/25/2000	18	76	24	4	LSCS	10	0	1.00	10.0
00086	670	B	10/25/2000	18	76	24	4	ARCS	35	0	1.00	35.0
00086	670	B	10/25/2000	18	76	24	4	HBWF	1	0	1.00	1.0
00086	670	B	10/25/2000	18	76	24	4	LSCS	9	0	1.00	9.0
00087	670	C	10/25/2000	24	76	24	4	ARCS	40	0	1.33	30.0
00087	670	C	10/25/2000	24	76	24	4	HBWF	2	0	1.33	1.5
00087	670	C	10/25/2000	24	76	24	4	LSCS	4	0	1.33	3.0
00088	670	C	10/26/2000	24	76	24	4	ARCS	26	26	1.33	19.5
00088	670	C	10/26/2000	24	76	24	4	HBWF	6	0	1.33	4.5
00088	670	C	10/26/2000	24	76	24	4	LSCS	11	11	1.33	8.3
00089	650	A	10/26/2000	24	89	24	48	ARCS	2	2	1.33	1.5
00089	650	A	10/26/2000	24	89	24	48	HBWF	1	0	1.33	0.8
00090	650	B	10/26/2000	24	89	24	48	ARCS	1	1	1.33	0.8
00091	650	C	10/26/2000	18	89	24	48	ARCS	1	1	1.00	1.0
00091	650	C	10/26/2000	18	89	24	48	HBWF	2	0	1.00	2.0
00092	670	A	10/26/2000	30	76	24	11	ARCS	28	28	1.67	16.8
00092	670	A	10/26/2000	30	76	24	11	HBWF	2	0	1.67	1.2
00092	670	A	10/26/2000	30	76	24	11	LSCS	11	11	1.67	6.6
00093	670	A	10/26/2000	24	83	48	54	ARCS	17	17	2.67	6.4
00093	670	A	10/26/2000	24	83	48	54	HBWF	7	0	2.67	2.6
00094	670	B	10/26/2000	24	83	48	54	ARCS	16	16	2.67	6.0
00094	670	B	10/26/2000	24	83	48	54	HBWF	3	0	2.67	1.1
00095	670	A/B/C	10/27/2000	61	76	24	4	ARCS	73	0	3.33	21.9
00095	670	A/B/C	10/27/2000	61	76	24	4	HBWF	5	0	3.33	1.5
00095	670	A/B/C	10/27/2000	61	76	24	4	LSCS	29	0	3.33	8.7
00098	670	A	10/27/2000	18	76	72	63	ARCS	8	0	3.00	2.7
00099	650	A	10/27/2000	24	89	24	48	ARCS	1	1	1.33	0.8
00100	650	B	10/27/2000	24	89	24	48	ARCS	3	3	1.33	2.3

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00101	650	C	10/27/2000	18	89	24	48	ARCS	0	0	1.00	0.0
00102	670	A/B	10/27/2000	49	83	24	54	ARCS	26	26	2.67	9.8
00102	670	A/B	10/27/2000	49	83	24	54	HBWF	5	0	2.67	1.9
00104	670	A/B	10/27/2000	49	89	48	72	ARCS	58	0	5.33	10.9
00104	670	A/B	10/27/2000	49	89	48	72	HBWF	2	0	5.33	0.4
00104	670	A/B	10/27/2000	49	89	48	72	LSCS	17	0	5.33	3.2
00106	670	C	10/27/2000	30	89	48	72	ARCS	29	0	3.33	8.7
00106	670	C	10/27/2000	30	89	48	72	HBWF	5	0	3.33	1.5
00106	670	C	10/27/2000	30	89	48	72	LSCS	20	0	3.33	6.0
00107	670	A	10/28/2000	30	89	24	32	ARCS	0	0	1.67	0.0
00108	670	B	10/28/2000	30	76	24	32	ARCS	6	0	1.67	3.6
00108	670	B	10/28/2000	30	76	24	32	HBWF	1	0	1.67	0.6
00109	670	A/B	10/28/2000	49	83	24	54	ARCS	5	5	2.67	1.9
00109	670	A/B	10/28/2000	49	83	24	54	HBWF	1	0	2.67	0.4
00111	670	A	10/28/2000	30	76	24	11	ARCS	48	48	1.67	28.8
00112	670	A/B	10/28/2000	49	89	24	72	ARCS	40	0	2.67	15.0
00112	670	A/B	10/28/2000	49	89	24	72	HBWF	6	0	2.67	2.3
00112	670	A/B	10/28/2000	49	89	24	72	LSCS	11	0	2.67	4.1
00114	670	C	10/28/2000	30	89	24	72	ARCS	18	0	1.67	10.8
00114	670	C	10/28/2000	30	89	24	72	LSCS	7	0	1.67	4.2
00115	670	A/B	10/28/2000	37	76	24	4	ARCS	37	37	2.00	18.5
00115	670	A/B	10/28/2000	37	76	24	4	HBWF	7	0	2.00	3.5
00115	670	A/B	10/28/2000	37	76	24	4	LSCS	19	19	2.00	9.5
00117	670	A/B	10/29/2000	49	83	24	54	ARCS	7	7	2.67	2.6
00119	670	A	10/30/2000	30	89	48	32	ARCS	2	0	3.33	0.6
00120	670	B	10/30/2000	30	76	48	32	ARCS	8	0	3.33	2.4
00121	650	A	10/30/2000	30	76	72	25	ARCS	9	0	5.00	1.8
00122	610	A	10/30/2000	24	89	24	17	ARCS	9	0	1.33	6.8
00123	670	A	10/30/2000	30	76	48	11	ARCS	42	42	3.33	12.6
00123	670	A	10/30/2000	30	76	48	11	HBWF	1	0	3.33	0.3
00123	670	A	10/30/2000	30	76	48	11	LSCS	6	6	3.33	1.8
00124	650	A	10/30/2000	24	89	48	48	ARCS	0	0	2.67	0.0
00125	650	B	10/30/2000	24	89	48	48	ARCS	2	2	2.67	0.8
00125	650	B	10/30/2000	24	89	48	48	HBWF	1	0	2.67	0.4
00126	650	C	10/30/2000	18	89	48	48	ARCS	0	0	2.00	0.0
00127	670	A/B/C	10/30/2000	61	76	48	4	ARCS	46	18	6.67	6.9
00127	670	A/B/C	10/30/2000	61	76	48	4	LSCS	9	9	6.67	1.4
00130	670	A	10/30/2000	24	76	48	24	ARCS	52	52	2.67	19.5
00130	670	A	10/30/2000	24	76	48	24	LSCS	2	2	2.67	0.8
00131	650	A	10/30/2000	24	76	96	33	ARCS	5	5	5.33	0.9
00131	650	A	10/30/2000	24	76	96	33	BDWF	1	0	5.33	0.2
00131	650	A	10/30/2000	24	76	96	33	HBWF	1	0	5.33	0.2
00132	610	A	10/31/2000	24	89	24	17	ARCS	2	0	1.33	1.5
00133	670	A	10/31/2000	24	83	48	54	ARCS	10	10	2.67	3.8
00133	670	A	10/31/2000	24	83	48	54	HBWF	2	0	2.67	0.8
00134	670	B	10/31/2000	24	83	48	54	ARCS	12	12	2.67	4.5
00135	650	A	11/1/2000	30	76	48	25	ARCS	7	7	3.33	2.1
00135	650	A	11/1/2000	30	76	48	25	HBWF	1	0	3.33	0.3
00136	670	A	11/1/2000	18	76	24	4	ARCS	32	0	1.00	32.0
00136	670	A	11/1/2000	18	76	24	4	HBWF	2	0	1.00	2.0
00137	670	B	11/1/2000	18	76	24	4	ARCS	14	0	1.00	14.0
00137	670	B	11/1/2000	18	76	24	4	HBWF	4	0	1.00	4.0
00138	670	C	11/1/2000	24	76	24	4	ARCS	26	0	1.33	19.5
00138	670	C	11/1/2000	24	76	24	4	HBWF	7	0	1.33	5.3
00139	650	A	11/1/2000	24	89	48	48	ARCS	3	3	2.67	1.1
00140	650	B	11/1/2000	24	89	48	48	ARCS	1	1	2.67	0.4
00141	650	C	11/1/2000	18	89	48	48	ARCS	1	1	2.00	0.5
00142	670	A	11/1/2000	24	76	48	24	ARCS	12	12	2.67	4.5
00142	670	A	11/1/2000	24	76	48	24	HBWF	1	0	2.67	0.4
00142	670	A	11/1/2000	24	76	48	24	LSCS	3	3	2.67	1.1
00143	670	A	11/1/2000	30	76	48	11	ARCS	32	32	3.33	9.6
00143	670	A	11/1/2000	30	76	48	11	LSCS	1	1	3.33	0.3

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00144	650	A	11/1/2000	24	76	48	33	ARCS	5	5	2.67	1.9
00144	650	A	11/1/2000	24	76	48	33	HBWF	1	0	2.67	0.4
00145	610	A	11/1/2000	24	89	24	17	ARCS	3	0	1.33	2.3
00146	650	A	11/2/2000	24	89	48	69	ARCS	4	4	2.67	1.5
00146	650	A	11/2/2000	24	89	48	69	LSCS	1	1	2.67	0.4
00147	650	B	11/2/2000	24	76	48	64	ARCS	5	5	2.67	1.9
00147	650	B	11/2/2000	24	76	48	64	HBWF	3	0	2.67	1.1
00148	670	A	11/2/2000	24	89	48	56	ARCS	13	13	2.67	4.9
00148	670	A	11/2/2000	24	89	48	56	HBWF	1	0	2.67	0.4
00148	670	A	11/2/2000	24	89	48	56	RBSM	1	0	2.67	0.4
00149	650	A	11/2/2000	30	76	24	25	ARCS	5	5	1.67	3.0
00149	650	A	11/2/2000	30	76	24	25	HBWF	1	0	1.67	0.6
00150	670	A	11/2/2000	30	76	48	11	ARCS	8	8	3.33	2.4
00150	670	A	11/2/2000	30	76	48	11	HBWF	1	0	3.33	0.3
00150	670	A	11/2/2000	30	76	48	11	LSCS	3	3	3.33	0.9
00151	610	A	11/2/2000	24	89	24	17	ARCS	9	0	1.33	6.8
00152	670	A	11/2/2000	18	76	120	63	ARCS	26	26	5.00	5.2
00152	670	A	11/2/2000	18	76	120	63	LSCS	1	1	5.00	0.2
00153	670	A	11/2/2000	24	83	48	54	ARCS	9	9	2.67	3.4
00153	670	A	11/2/2000	24	83	48	54	HBWF	1	0	2.67	0.4
00154	670	B	11/2/2000	24	83	48	54	ARCS	4	4	2.67	1.5
00155	610	A	11/3/2000	24	89	24	17	ARCS	10	0	1.33	7.5
00155	610	A	11/3/2000	24	89	24	17	HBWF	3	0	1.33	2.3
00156	610	A	11/3/2000	24	89	24	43	ARCS	15	15	1.33	11.3
00156	610	A	11/3/2000	24	89	24	43	BDWF	1	1	1.33	0.8
00156	610	A	11/3/2000	24	89	24	43	HBWF	4	0	1.33	3.0
00156	610	A	11/3/2000	24	89	24	43	LSCS	3	3	1.33	2.3
00157	670	A	11/3/2000	24	76	48	24	ARCS	9	9	2.67	3.4
00158	670	A/B	11/3/2000	37	76	48	4	ARCS	20	20	4.00	5.0
00158	670	A/B	11/3/2000	37	76	48	4	LSCS	6	6	4.00	1.5
00160	670	C	11/3/2000	24	76	48	4	ARCS	20	20	2.67	7.5
00160	670	C	11/3/2000	24	76	48	4	LSCS	1	1	2.67	0.4
00161	670	A	11/3/2000	30	89	48	32	ARCS	8	0	3.33	2.4
00161	670	A	11/3/2000	30	89	48	32	HBWF	1	0	3.33	0.3
00162	670	B	11/3/2000	30	76	48	32	ARCS	4	4	3.33	1.2
00162	670	B	11/3/2000	30	76	48	32	RBSM	1	0	3.33	0.3
00163	650	A	11/3/2000	24	89	48	48	ARCS	3	3	2.67	1.1
00164	650	B	11/3/2000	24	89	48	48	ARCS	10	10	2.67	3.8
00165	650	C	11/3/2000	18	89	48	48	ARCS	1	0	2.00	0.5
00166	610	A	11/4/2000	24	89	24	43	ARCS	16	16	1.33	12.0
00166	610	A	11/4/2000	24	89	24	43	HBWF	3	0	1.33	2.3
00167	610	A	11/4/2000	24	89	24	17	ARCS	11	0	1.33	8.3
00167	610	A	11/4/2000	24	89	24	17	HBWF	3	0	1.33	2.3
00168	670	A	11/4/2000	30	76	48	11	ARCS	17	17	3.33	5.1
00168	670	A	11/4/2000	30	76	48	11	LSCS	3	3	3.33	0.9
00169	670	A/B	11/4/2000	49	83	48	54	ARCS	11	11	5.33	2.1
00169	670	A/B	11/4/2000	49	83	48	54	RBSM	1	0	5.33	0.2
00171	670	A	11/4/2000	18	76	48	63	ARCS	2	2	2.00	1.0
00171	670	A	11/4/2000	18	76	48	63	LSCS	1	1	2.00	0.5
00172	650	A	11/4/2000	30	76	48	25	ARCS	5	5	3.33	1.5
00173	670	A	11/4/2000	24	76	96	61	ARCS	10	10	5.33	1.9
00173	670	A	11/4/2000	24	76	96	61	LSCS	6	6	5.33	1.1
00174	670	A	11/4/2000	18	89	48	1	ARCS	7	7	2.00	3.5
00174	670	A	11/4/2000	18	89	48	1	HBWF	1	0	2.00	0.5
00175	670	A/B/C	11/4/2000	79	89	48	72	ARCS	28	0	8.67	3.2
00175	670	A/B/C	11/4/2000	79	89	48	72	HBWF	3	0	8.67	0.3
00175	670	A/B/C	11/4/2000	79	89	48	72	LSCS	4	0	8.67	0.5
00178	670	A	11/4/2000	24	89	48	56	ARCS	9	0	2.67	3.4
00179	670	B	11/4/2000	18	76	48	56	ARCS	11	0	2.00	5.5
00179	670	B	11/4/2000	18	76	48	56	HBWF	2	0	2.00	1.0
00179	670	B	11/4/2000	18	76	48	56	LSCS	5	0	2.00	2.5
00180	650	A	11/5/2000	24	89	48	48	ARCS	3	3	2.67	1.1

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00181	650	B	11/5/2000	24	89	48	48	ARCS	2	2	2.67	0.8
00182	650	C	11/5/2000	18	89	48	48	ARCS	7	7	2.00	3.5
00182	650	C	11/5/2000	18	89	48	48	RBSM	1	0	2.00	0.5
00183	610	C	11/5/2000	24	89	24	43	ARCS	8	8	1.33	6.0
00183	610	C	11/5/2000	24	89	24	43	HBWF	1	0	1.33	0.8
00184	670	A	11/5/2000	24	76	24	65	ARCS	5	5	1.33	3.8
00185	650	A	11/6/2000	30	76	48	25	ARCS	8	0	3.33	2.4
00185	650	A	11/6/2000	30	76	48	25	LSCS	1	0	3.33	0.3
00186	650	A	11/6/2000	24	76	48	64	ARCS	1	1	2.67	0.4
00186	650	A	11/6/2000	24	76	48	64	LSCS	2	2	2.67	0.8
00187	650	A	11/6/2000	24	89	72	69	ARCS	8	0	4.00	2.0
00188	670	C	11/6/2000	18	76	24	65	ARCS	3	3	1.00	3.0
00189	670	A/B/C	11/6/2000	61	76	72	4	ARCS	74	0	10.00	7.4
00189	670	A/B/C	11/6/2000	61	76	72	4	HBWF	2	0	10.00	0.2
00189	670	A/B/C	11/6/2000	61	76	72	4	LSCS	11	0	10.00	1.1
00189	670	A/B/C	11/6/2000	61	76	72	4	RBSM	1	0	10.00	0.1
00192	610	A	11/6/2000	24	89	48	17	ARCS	8	8	2.67	3.0
00193	670	A	11/6/2000	24	76	48	24	ARCS	10	10	2.67	3.8
00193	670	A	11/6/2000	24	76	48	24	HBWF	1	0	2.67	0.4
00194	670	A	11/6/2000	24	83	48	54	ARCS	3	3	2.67	1.1
00195	670	B	11/6/2000	24	83	48	54	ARCS	12	12	2.67	4.5
00196	650	A	11/6/2000	24	76	72	33	ARCS	10	10	4.00	2.5
00196	650	A	11/6/2000	24	76	72	33	LSCS	2	2	4.00	0.5
00197	610	A	11/6/2000	18	76	24	20	ARCS	1	1	1.00	1.0
00197	610	A	11/6/2000	18	76	24	20	LSCS	3	3	1.00	3.0
00198	610	A	11/6/2000	24	89	24	43	ARCS	11	11	1.33	8.3
00199	650	A	11/7/2000	24	89	24	69	ARCS	21	0	1.33	15.8
00200	670	A	11/7/2000	24	76	72	61	ARCS	8	8	4.00	2.0
00200	670	A	11/7/2000	24	76	72	61	LSCS	4	4	4.00	1.0
00201	650	A	11/7/2000	24	89	48	48	ARCS	9	0	2.67	3.4
00202	650	B	11/7/2000	24	89	48	48	ARCS	10	0	2.67	3.8
00202	650	B	11/7/2000	24	89	48	48	HBWF	1	0	2.67	0.4
00203	650	C	11/7/2000	18	89	48	48	ARCS	4	0	2.00	2.0
00204	670	A	11/7/2000	30	76	48	11	ARCS	17	17	3.33	5.1
00204	670	A	11/7/2000	30	76	48	11	LSCS	2	0	3.33	0.6
00205	670	A	11/7/2000	24	83	24	54	ARCS	3	3	1.33	2.3
00206	670	B	11/7/2000	24	83	24	54	ARCS	0	0	1.33	0.0
00206	670	B	11/7/2000	24	83	24	54	LSCS	12	0	1.33	9.0
00207	670	A	11/7/2000	18	76	48	63	ARCS	2	2	2.00	1.0
00207	670	A	11/7/2000	18	76	48	63	LSCS	1	1	2.00	0.5
00208	610	A	11/7/2000	24	89	24	43	ARCS	12	12	1.33	9.0
00208	610	A	11/7/2000	24	89	24	43	BDWF	1	1	1.33	0.8
00208	610	A	11/7/2000	24	89	24	43	LSCS	1	1	1.33	0.8
00209	670	A	11/8/2000	24	76	48	24	ARCS	0	0	2.67	0.0
00209	670	A	11/8/2000	24	76	48	24	LSCS	1	1	2.67	0.4
00210	670	A	11/8/2000	18	76	48	65	ARCS	9	9	2.00	4.5
00210	670	A	11/8/2000	18	76	48	65	LSCS	1	1	2.00	0.5
00211	670	A	11/8/2000	30	76	24	11	ARCS	2	2	1.67	1.2
00212	650	A	11/8/2000	30	76	48	25	ARCS	17	17	3.33	5.1
00212	650	A	11/8/2000	30	76	48	25	HBWF	1	0	3.33	0.3
00213	610	A	11/8/2000	18	76	48	20	ARCS	2	2	2.00	1.0
00213	610	A	11/8/2000	18	76	48	20	LSCS	1	1	2.00	0.5
00214	610	A	11/8/2000	24	89	24	43	ARCS	10	10	1.33	7.5
00214	610	A	11/8/2000	24	89	24	43	HBWF	1	0	1.33	0.8
00215	610	A	11/17/2000	24	89	24	43	ARCS	30	30	1.33	22.5
00215	610	A	11/17/2000	24	89	24	43	HBWF	3	0	1.33	2.3
00216	670	B	11/16/2000	24	89	24	69	ARCS	8	8	1.33	6.0
00217	670	C	11/16/2000	24	89	24	69	ARCS	17	17	1.33	12.8
00217	670	C	11/16/2000	24	89	24	69	RBSM	2	0	1.33	1.5
00218	610	A	11/16/2000	24	89	24	17	ARCS	5	5	1.33	3.8
00219	610	A	11/15/2000	24	89	24	17	ARCS	3	0	1.33	2.3
00219	610	A	11/15/2000	24	89	24	17	HBWF	1	0	1.33	0.8

Appendix Table 33. Fishery effort and catch data obtained during fisherman interviews in Nuiqsut fishing areas, 2000.

Set No.	Area	Rep.	Date	Net Length (m)	Mesh (mm)	Duration (hours)	Fisher Code	Species	No. Caught	No. Measured	Effort (18 m day)	CPUE
00220	670	B	11/15/2000	24	89	144	69	ARCS	10	10	8.00	1.3
00220	670	B	11/15/2000	24	89	144	69	HBWF	1	0	8.00	0.1
00220	670	B	11/15/2000	24	89	144	69	LSCS	3	3	8.00	0.4
00221	670	C	11/15/2000	24	89	144	69	ARCS	1	1	8.00	0.1
00221	670	C	11/15/2000	24	89	144	69	HBWF	3	0	8.00	0.4
00222	650	A	11/15/2000	24	76	144	33	ARCS	10	0	8.00	1.3
00222	650	A	11/15/2000	24	76	144	33	HBWF	2	0	8.00	0.3
00223	670	A	11/14/2000	18	76	120	65	ARCS	8	8	5.00	1.6
00223	670	A	11/14/2000	18	76	120	65	LSCS	3	3	5.00	0.6
00224	670	A	11/14/2000	24	83	120	54	ARCS	3	3	6.67	0.5
00224	670	A	11/14/2000	24	83	120	54	RBSM	1	0	6.67	0.2
00225	670	B	11/14/2000	24	83	120	54	ARCS	4	4	6.67	0.6
00226	670	A	11/14/2000	24	76	120	24	ARCS	11	11	6.67	1.7
00226	670	A	11/14/2000	24	76	120	24	LSCS	4	0	6.67	0.6
00226	670	A	11/14/2000	24	76	120	24	RBSM	1	0	6.67	0.2
00226	670	A	11/14/2000	24	76	120	24	SFCD	1	0	6.67	0.2
00227	610	A	11/14/2000	24	89	72	17	ARCS	23	23	4.00	5.8
00228	610	A	11/13/2000	18	76	120	20	ARCS	5	5	5.00	1.0
00228	610	A	11/13/2000	18	76	120	20	LSCS	7	7	5.00	1.4
00229	650	A	11/13/2000	30	76	120	25	ARCS	14	14	8.33	1.7
00229	650	A	11/13/2000	30	76	120	25	HBWF	1	1	8.33	0.1
00230	670	A	11/13/2000	18	76	120	63	ARCS	5	5	5.00	1.0
00230	670	A	11/13/2000	18	76	120	63	HBWF	1	0	5.00	0.2
00231	670	A	11/13/2000	24	76	120	61	ARCS	13	13	6.67	2.0
00231	670	A	11/13/2000	24	76	120	61	LSCS	3	3	6.67	0.5
00232	650	A	11/12/2000	24	89	96	48	ARCS	5	5	5.33	0.9
00232	650	A	11/12/2000	24	89	96	48	HBWF	1	0	5.33	0.2
00233	650	B	11/12/2000	24	89	96	48	ARCS	2	2	5.33	0.4
00234	650	C	11/12/2000	18	89	96	48	ARCS	0	0	4.00	0.0
00234	650	C	11/12/2000	18	89	96	48	LSCS	1	1	4.00	0.3

Set No. = consecutive numbering of sets checked during survey
Area = fishing area (610 = Upper Nigliq; 650 = Nanuk Lake; 670 = Nigliq Delta; 150, 200 = Lower River; 100 = Outer Delta
Rep = code used to identify each fisherman's individual net and location
Date = date of interview
Net length = net length in meters
Mesh = stretched mesh in mm
Duration = duration of set in hours
Fisher Code = code to fisherman's name
Species = species caught
- ARCS = arctic cisco
- BRCS = Bering cisco
- LSCS = least cisco
- BDWF = broad whitefish
- HBWF = humpback whitefish
- BURB = burbot
- RBSM = rainbow smelt
- SFCD = saffron cod
- ARFL = arctic flounder
- FHSC = fourhorn sculpin

Number Caught = number of each species caught
No. Measured = number of catch measured
Effort = fishing effort expended in days per 18 m of net
CPUE = number of fish caught per day per 18 m of net

Appendix Table 34. Salinity profiles from the Nigliq Channel, Colville Delta, 2000.

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	Salinity (ppt)											
(m)	Oct 30	Oct 31	Nov 2	Nov 3	Nov 4	Nov 5	Nov 6	Nov 7	Nov 8	Nov 11	Nov 13	Nov 14
0.5	0.3	0.2	0.5	0.3	2.3	2.0	0.3	0.7	0.5	0.3	0.9	1.0
1.0	0.5	0.6	2.5	1.3	3.3	2.6	1.0	2.3	3.3	3.1	4.1	4.2
1.5	0.9	3.0	3.7	4.3	4.8	3.5	5.0	4.9	5.0	5.5	5.0	5.2
2.0	3.3	3.7	4.5	4.8	5.1	4.9	6.0	6.0	6.0	5.8	5.2	6.3
2.5	3.9	4.0	5.0	5.1	5.5	5.2	6.2	6.0	6.3	6.3	6.5	7.2
3.0	4.2	4.4	4.7	5.6	5.8	5.6	6.8	7.0	6.5	6.5	7.0	7.2
3.5	4.1	4.3	4.2	6.4	6.2	6.0	6.8	7.1	6.2	6.5	7.2	7.2

Upper Nigliq (continued)

Depth	Salinity (ppt)	
(m)	Nov 15	Nov 16
0.5	1.2	0.9
1.0	4.5	3.9
1.5	5.2	5.2
2.0	6.5	6.2
2.5	6.1	6.9
3.0	6.1	7.2
3.5	6.0	8.0

Nanuq Lake (RK 15)

Depth	Salinity (ppt)											
(m)	Oct 24	Oct 25	Oct 26	Oct 27	Oct 28	Oct 30	Oct 31	Nov 2	Nov 3	Nov 4	Nov 5	Nov 6
0.5	2.3	2.2	2.3	5.3	2.6	1.6	1.8	2.2	3.8	2.5	2.7	2.5
1.0	2.3	2.2	9.1	6.0	3.8	1.6	8.1	9.0	2.3	6.6	3.5	7.1
1.5	10.3	2.3	10.6	7.2	7.9	6.1	12.2	11.2	14.5	12.0	11.6	12.4
2.0	10.2	10.4	11.0	8.1	8.1	12.2	12.4	12.0	14.5	13.5	12.6	13.9
2.5	12.1	10.1	11.2	8.5	8.5	12.8	12.7	12.0	14.5	14.6	13.2	14.5
3.0	12.4	10.1	12.2	8.8	8.8	13.4	13.0	13.2	14.5	14.8	13.3	14.6
3.5	13.0	11.8	13.2	9.9	10.0	13.8	13.4	13.5	14.5	14.9	13.3	14.5
4.0	13.6	12.0	13.8	10.0	9.8	14.0	13.5	13.8	14.5	14.9	13.3	14.7
4.5	13.9	12.7	13.7	9.9	9.9	14.3	13.5	13.8	15.0	14.9	13.2	14.7
5.0	14.0	13.2	13.9	10.1	10.1	14.4	13.6	14.0	15.1	14.9	13.2	14.8
5.5	14.1	13.8	14.1	11.1	10.3	14.5	13.8	14.2	15.3	14.9	13.1	15.0
6.0	14.1	14.4	14.2	12.4	10.8	14.8	13.9	14.2	15.4	14.9	13.0	15.4
6.5	14.2	14.1	14.0	13.0	11.1	14.9	13.9	14.2		14.9	13.0	15.8

Appendix Table 34. continued.

Nanuq Lake (RK 15)

Depth	Salinity (ppt)					
(m)	Nov 7	Nov 8	Nov 13	Nov 14	Nov 15	Nov 16
0.5	3.4	3.2	3.2	3.2	3.5	3.9
1.0	8.2	5.8	4.2	12.2	10.2	12.7
1.5	13.5	12.9	13.5	13.2	12.8	14.2
2.0	14.8	14.2	14.8	14.9	13.9	16.0
2.5	15.0	14.5	15.0	15.2	14.5	16.5
3.0	15.0	14.9	15.1	15.2	16.0	16.6
3.5	15.0	14.9	15.1	15.8	16.2	16.9
4.0	15.1	15.0	15.5	15.8	16.0	17.0
4.5	15.1	15.0	15.5	15.8	16.1	17.0
5.0	15.1	15.0	15.8	15.8	16.2	17.2
5.5	14.8	15.5	15.8	16.0	16.2	17.2
6.0	14.0	15.8	16.2	16.0	16.5	17.2
6.5	14.0	15.8	16.2	16.0	16.9	17.7

Nigliq Delta (RK 6)

Depth	Salinity (ppt)											
(m)	Oct 24	Oct 25	Oct 26	Oct 27	Oct 28	Oct 30	Oct 31	Nov 2	Nov 4	Nov 5	Nov 6	Nov 7
0.5	4.6	4.3	5.8	3.9	4.4	4.6	7.4	3.8	4.1	7.9	3.8	4.5
1.0	5.2	4.4	10.8	5.8	5.6	5.2	8.1	10.8	11.4	8.4	9.7	11.2
1.5	9.4	5.1	12.0	11.0	11.2	11.0	12.1	12.5	12.8	11.8	13.0	12.8
2.0	11.4	11.6	13.1	13.9	14.6	14.6	14.3	17.8	13.2	14.9	15.5	17.0
2.5	12.9	13.9	15.0	15.4	15.4	15.5	15.5	18.2	18.5	16.9	18.2	19.5
3.0	14.4	14.5	16.0	16.0	16.5	16.2	16.5	19.0	21.2	18.6	20.4	21.5
3.5	15.0	15.1	17.2	16.6	17.0	16.9	17.4	19.7	21.9	19.0	21.0	21.5
4.0	15.7	15.8	17.8	17.1	17.4	17.8	17.7	19.7	22.2	19.1	21.2	21.0
4.5	16.0	16.4	17.9	18.5	17.9	17.6	18.4	19.8	22.6	19.1	21.0	21.0
5.0	16.3	16.5	17.9	18.4	17.8	18.2	18.6	20.0	22.9	19.3	21.5	21.3
5.5	16.5	16.5	18.1	17.9	18.0	18.8	18.7	20.0	23.0	18.9	21.8	21.5
6.0	16.6	16.6	18.2	18.6	18.2	19.1	18.8	20.2	23.0	18.5	23.0	22.0
6.5	16.8	16.8	18.3	19.0	18.8	19.2						

Nigliq Delta (RK 6)

Depth	Salinity (ppt)		
(m)	Nov 8	Nov 14	Nov 16
0.5	3.5	4.0	4.8
1.0	10.8	11.5	7.5
1.5	13.5	15.2	11.9
2.0	16.5	18.9	19.5
2.5	19.0	21.0	23.9
3.0	20.1	22.0	24.2
3.5	20.8	22.0	24.2
4.0	20.8	22.2	24.5
4.5	21.0	22.2	24.9
5.0	21.0	22.5	24.9
5.5	21.1	22.5	25.1
6.0	21.0	23.2	25.0
6.5			

Appendix Table 35. Cumulative length frequencies of arctic cisco and least cisco by mesh size, Nuiqsut fishery, 1986-2000. (data used to evaluate mesh selectivity)

Arctic Cisco - Village Catch

Fork Length (mm)	Village Mesh Sizes in mm				
	64	70	76	83	89
200	0	0	1	0	0
210	0	0	0	0	0
220	1	1	2	1	0
230	0	0	5	0	0
240	3	0	1	0	0
250	9	0	9	0	1
260	64	0	3	0	1
270	145	8	29	1	4
280	189	19	238	3	3
290	251	53	705	5	17
300	207	130	1,798	33	53
310	158	197	2,580	133	128
320	111	127	2,497	309	316
330	50	71	2,220	465	707
340	24	32	1,564	558	1,050
350	11	7	962	349	945
360	1	5	559	244	724
370	1	3	285	160	370
380	3	2	125	67	209
390	1	0	68	24	81
400	0	0	34	12	48
410	0	0	11	2	23
420	0	0	2	5	9
430	0	0	1	1	2
440	0	0	1	1	3
450	0	0	0	1	0
Total:	1,229	655	13,700	2,374	4,694

Least Cisco - Village Catch

Village Mesh Sizes in mm				
64	70	76	83	89
2	0	2	0	0
7	0	2	0	2
16	0	2	0	3
63	0	5	1	4
129	0	7	1	12
201	0	12	0	12
181	4	91	1	5
172	3	255	2	11
141	5	362	11	7
107	6	495	7	19
50	2	485	14	29
38	3	357	27	27
15	1	227	10	25
6	0	132	12	23
2	2	67	10	28
2	0	25	4	13
1	0	15	2	14
1	0	10	4	9
0	0	4	2	5
0	0	1	2	3
0	0	0	0	4
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
1,134	26	2,556	110	255

Appendix Table 36. Cumulative length frequencies of arctic cisco by mesh size, commercial fishery, 1985-2000. (data used to evaluate mesh selectivity)

Arctic cisco - Commercial Catch

Fork Length (mm)	Commercial 76-mm Mesh															
	1985	1986	1987	1988	1989	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
200	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
220	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
240	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	1
260	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	1
280	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	6
290	7	1	0	2	4	7	16	0	0	25	5	8	1	1	0	77
300	36	8	0	18	22	16	45	0	12	77	23	19	19	10	5	310
310	92	39	5	50	35	60	109	17	28	106	50	36	41	37	4	709
320	103	51	22	69	24	54	129	56	39	68	91	57	30	62	23	878
330	112	49	61	38	35	54	84	91	40	52	47	41	46	60	51	861
340	67	43	88	26	49	24	46	65	47	30	13	42	44	44	65	693
350	21	27	93	31	79	8	9	55	58	12	8	28	51	23	56	559
360	13	19	49	41	66	9	9	10	50	13	2	15	31	18	62	407
370	7	8	20	47	35	3	3	5	21	8	3	4	24	18	34	240
380	3	4	10	43	24	3	0	1	1	4	6	0	8	11	30	148
390	5	1	1	24	8	2	1	0	0	4	2	0	4	8	12	72
400	1	0	1	7	12	5	0	0	0	0	0	0	1	6	8	41
410	0	0	0	0	5	2	0	0	1	0	0	0	0	1	0	9
420	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	3
430	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2
440	0	0	0	0	1	1	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
Total:	471	250	350	396	400	250	451	300	300	400	250	250	300	300	351	5,019

Appendix Table 37. Historical population estimates for harvestable arctic cisco and least cisco in the Colville River delta, 1976-1993.

	Least Cisco			Arctic Cisco		
		95% Confidence Int.			95% Confidence Int.	
Year	Population Estimate	Lower Bound	Upper Bound	Population Estimate	Lower Bound	Upper Bound
1976	305,000	271,000	343,000	777,000	508,000	1,244,000
1977	355,000	145,000	888,000	146,000	65,000	366,000
1978	434,000	311,000	629,000	202,000	140,000	303,000
1979	1,773,000	1,010,000	3,626,000	110,000	52,000	253,000
1980	717,000	512,000	1,000,000	185,000	105,000	317,000
1981	949,000	774,000	1,164,000	374,000	293,000	478,000
1982	314,000	277,000	356,000	465,000	306,000	701,000
1983	--	--	--	--	--	--
1984	355,000	317,000	396,000	970,000	790,000	1,190,000
1985	334,000	304,000	367,000	1,020,000	869,000	1,197,000
1986	--	--	--	--	--	--
1987	--	--	--	--	--	--
1988	185,000	134,000	256,000	307,000	207,000	451,000
1989	--	--	--	--	--	--
1990	442,000	365,000	534,000	468,000	258,000	817,000
1991	375,292	293,791	478,970	247,202	170,682	356,245
1992	255,989	214,695	305,155	848,441	670,217	1,073,229
1993	318,583	261,124	388,535	612,365	485,351	772,053

Population estimates based on Petersen estimator for tags released along the Beaufort Sea coast during July, August and September and recaptured in the Colville Delta during October and November.

1976-1979 estimates from Craig and Haldorson (1980)