

# HARVEST RATES FOR THE 2005 COLVILLE RIVER FALL FISHERY

June 2006



Prepared by

**MJM Research  
1012 Shoreland Drive  
Lopez Island, WA 98261**

for

**ConocoPhillips Alaska, Inc.,  
P.O. Box 100360  
Anchorage, AK 99510-0360**

©ConocoPhillips Alaska, Inc.

This document is copyright ConocoPhillips Alaska and can not be released or published without the express written consent of ConocoPhillips Alaska, Inc.

HARVEST RATES FOR THE 2005 COLVILLE RIVER FALL FISHERY

June 2006

Conducted by:

Lawrence L. Moulton  
Brent T. Seavey  
and  
Jerry Pausanna  
MJM Research  
1012 Shoreland Drive  
Lopez Island, WA 98261

Prepared for:

ConocoPhillips Alaska, Inc.,  
P.O. Box 100360  
Anchorage, AK 99510-0360

## EXECUTIVE SUMMARY

Moulton, L.L., B.T. Seavey and J. Pausanna. Harvest rates for the 2005 Colville River fall fishery.

Objectives of the 2005 survey were to 1) continue to obtain catch rate estimates for the fall fishery in the Nigliq Channel of the Colville River, which targets qaaqtaq (Arctic cisco), 2) evaluate the harvest predictions made prior to the fishing season, and 3) provide an outlook for the 2006 season. The emphasis in 2005 changed from generating an estimate of total catch to obtaining a catch rate estimate that can be used to track trends in abundance.

Recent oil field development has raised concerns that contamination from petroleum hydrocarbons may enter the local food supply. To address these concerns, Arctic cisco liver, muscle and whole fish caught in the 2005 fishery were checked for polyaromatic hydrocarbons (PAH) in fish tissues. PAH levels were non-detectable in all samples.

In 2005, log books were issued to 10 fisherman who had regularly participated in the fishery during the preceding 10 years. The 2005 fishery was characterized by moderately high catch rates of qaaqtaq (Arctic cisco) through the season, ending up with the seventh highest catch rate recorded in the 20 years of monitoring.

The catch rate of qaaqtaq (Arctic cisco) in 2006 is likely to substantially decrease from that seen in 2005, and fishermen may not meet expectations. Fish caught in 2006 should be larger than those in 2005 because of growth in the 1999 year class that will comprise the bulk of the catch as 7-year olds. Catch rates will likely continue at low levels through 2007 and 2008 as the remnants of the 1999 year class leave the region. This prediction is based on the absence of recruitment into the region from 2000 to 2004 as measured by fyke net monitoring in Prudhoe Bay. The 2005 harvest was supported by the 1999 year class and remaining members of the 1998 year class. Catches in fyke nets from summer studies in Prudhoe Bay indicate there are few young fish in the region that will be of harvestable size prior to 2009/2010.

## TABLE OF CONTENTS

LIST OF FIGURES.....	iv
LIST OF TABLES .....	vi
INTRODUCTION.....	1
METHODS.....	4
RESULTS .....	6
Fishing Effort.....	6
Catch Composition .....	7
Comparative Catch Rates .....	7
Age of Harvested Fish .....	7
Tissue Hydrocarbons.....	8
DISCUSSION.....	8
PREDICTIONS FOR 2006.....	9
ACKNOWLEDGMENTS .....	10
LITERATURE CITED .....	11
APPENDIX A. Fishery Data .....	A-1
APPENDIX B. Tissue Hydrocarbon Data .....	A-1

LIST OF FIGURES

Figure 1. Colville Delta region showing locations of major fishing areas. .... 16

Figure 2. Major fishing areas on the Nigliq Channel with location of salinity monitoring stations.  
..... 17

Figure 3. Distribution of fishing effort in the Nigliq Channel by fishing area, all meshes combined,  
1986 to 2005. .... 18

Figure 4. Salinity distribution in the Nigliq Channel, Colville Delta, during the fall gill net fishery,  
1986-2005. .... 19-20

Figure 5. Salinities measured at 3 m below the ice surface at Nigliq Channel fishing areas, 1990 –  
2005. .... 21-22

Figure 6. Catch rates of arctic cisco and least cisco in the Nigliq Channel fishery, 1985-2005.  
..... 23

Figure 7. Mean daily catch rate of Arctic cisco in 76-mm (3 inch) mesh in the Nigliq Channel,  
1986-2005. .... 24-25

Figure 8. Catch rates of young-of-the-year (YOY) Arctic cisco by year class in Prudhoe Bay fyke  
nets, 1985-2005. .... 26

Figure 9. Age distribution of Arctic cisco caught in the Nigliq Channel fishery, 1985 - 2005, scaled  
to CPUE. .... 27

Figure 10. Cumulative harvest for each year class of Arctic cisco, expressed as cumulative catch  
rate for harvest years 1984 to 2005. .... 28

## LIST OF TABLES

Table 1. Estimated onset of fishing effort in the Nuiqsut fall fishery, 1985-2005. ....	29
Table 2. Catch contribution by species as observed during fisher interviews in the Nigliq Channel, by percent of sampled catch (does not include commercial fishery). ....	30
Table 3. Mean catch rate of Arctic cisco in 76-mm (3 inch) mesh gill nets in the Colville Delta fall fishery, 1985-2005 (in fish per day per 18 m of net). ....	31
Table 4. Mean catch rate of least cisco in 76-mm (3 inch) mesh gill nets in the Colville Delta fall fishery, 1985-2005 (in fish per day per 18 m of net). ....	32

# **HARVEST RATES FOR THE 2005 COLVILLE RIVER FALL FISHERY**

Lawrence L. Moulton

Brent T. Seavey

and

Jerry Pausanna

## **INTRODUCTION**

For nearly 30 years, there have been 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; Fechhelm et al. 2005).

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 qaaqtaq (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).

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. This study was initiated in 1985 when the local government for Alaska's

would, in turn, be affected. This study was initiated in 1985 when the local government for Alaska's Arctic Coastal Plain region, the North Slope Borough, requested that information be collected to assess fisheries in the Colville River that were considered to be most at risk. 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 2004) focused assessing fishing patterns, total catches and catch rates in the fall fishery for Arctic cisco.

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). Recruitment of age 0 Arctic cisco into the Colville River region is aided by westerly currents generated by predominantly easterly winds in the Beaufort Sea region. Strength of recruitment has been correlated to 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 2005 fishery represents the twentieth year since 1985 that the fishery in the delta was subjected to a harvest rate assessment; the survey was not conducted in 1999. Results from 1985 to 2004 are reported in Moulton and Field (1988), previous editions of the Endicott Monitoring Program Annual Report Series, Moulton (2001, 2003) and Moulton and Seavey (2004, 2005). Additional information on the fall gill net fishery in the Colville River was developed by George and Nageak (1986) and George and Kovalsky (1986).

Specific objectives of the 2005 survey were to 1) continue to obtain catch rate estimates for the fall fishery in the Nigliq Channel of the Colville River, which targets Arctic cisco, 2) evaluate the harvest predictions made prior to the fishing season, and 3) provide an outlook for the 2006 season. The emphasis in 2005 changed from generating an estimate of total catch to obtaining a catch rate estimate that can be used to track trends in abundance.



Recent oil field development has raised concerns that contamination from petroleum hydrocarbons may enter the local food supply. To address these concerns, samples of Arctic cisco caught in the 2005 fishery were obtained to check for polycyclic aromatic hydrocarbons (PAH) in fish tissues.

## **METHODS**

### **Fishery Assessment**

The study area includes the Colville River from the Itkillik River downstream to Harrison Bay (Figure 1). The 2005 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).

Assessment and monitoring of the fall under-ice fishery based in Nuiqsut began on October 7 and continued through November 16. The initial fishing date of October 7 was a normal start date for this fishery (Table 1).

Salinity measurements were taken every other day between November 1 and 9 with a YSI 30 salinity/conductivity/temperature meter at standard locations in three monitoring areas on the Nigliq Channel (Figure 2). Salinity was measured from a vertical profile of the water column at 0.5 m increments.

In 2005, log books were issued to 10 fishermen who had regularly participated in the fishery during the preceding 10 years. In previous years, the survey attempted to estimate total catch and effort in the fall fishery. In 2005, fishermen recorded their catch by species when they emptied their nets. Set duration, net length, 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.

Within the main sampling areas, catch rates (CPUE) were estimated by obtaining catch and effort data by mesh size in each fishing area during the season. In the village fishery, 76-mm (3 inch) 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 (3 inch) mesh.

In previous years, otoliths were obtained from Arctic cisco and least cisco caught in 76-mm (3 inch) mesh in the commercial fishery to estimate the age distribution of the harvest. Otoliths were obtained from Arctic cisco caught in the Nigliq Channel during 2005. 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.

### Evaluation of Contaminants

Samples of Arctic cisco from the Upper Nigliq and Nanuk fishing areas were obtained to test for potential tissue contamination. Ten samples each of whole fish, muscle tissue and liver tissue were screened for PAH levels from both locations. Fish were wrapped in clean aluminum foil as they were pulled from the water, then double-bagged. Fish were frozen and maintained in that state until delivered to the Analytical Resources, Inc. laboratory. At the lab, the fish were processed as needed to acquire extracts of the desired tissue (10 homogenized whole fish, 10 skinless muscle samples, 10 livers). Extracts were analyzed by combined gas chromatography –mass spectrometry (GCMS) for quantitative identification of 18 individual PAH’s as follows:

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1, 2, 3 -cd) pyrene	10	< 10 U
53-70-3	Dibenz (a, h) anthracene	10	< 10 U
191-24-2	Benzo (g, h, i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

## RESULTS

### Fishing Effort

Total estimated effort by Nuiqsut villagers who fished the Nigliq Channel and recorded catches in logbooks was 644 net-days. Recorded effort in 2005 was highest in the Nigliq Delta area (249 net-days), closely followed by the Nanuk area (246 net-days, Figure 3).

Effort has gradually shifted downstream in the Nigliq Channel during the twenty year monitoring period (Figure 3). 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. Since 1998, the Nigliq Delta has had the highest effort of the three Nigliq Channel areas. In 2005, 39% of the measured effort was in the Nigliq Delta area, closely followed by 38% in the Nanuk Area, with 23% in the Upper Nigliq.

Salinity is monitored in conjunction with the fishery because Arctic cisco are commonly associated with salinities in the range of 15 to 25‰ (parts per thousand). During east winds, water level in the river drops, and channels become fresh. When the wind reverses to the west, water levels rise and saline water moves into the delta, which brings in Arctic cisco, and displaces least cisco, piquktuuq (humpback whitefish, *Coregonus pidschian*) and aanaakliq (broad whitefish, *C. nasus*). 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 4). In 2005, salinity in the Nigliq Channel was high compared to previous years, with the Upper Nigliq increasing to 11‰ by November 9 (Figure 5). In the Nanuk region, salinity rose to over 23‰ by early November, and to 27‰ in the Nigliq Delta region. As was the case in 2004, this salinity distribution is considered ideal for Arctic cisco fishing.

### Catch Composition

Arctic cisco, the target species, comprised over 81% of the total observed catch in the Nigliq Channel in 2005 (Table 2). Least cisco accounted for almost 15% of the observed catch, with

humpback whitefish third most abundant at 3.5%. In 2005, tiipuuq (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. Siquilaraaq (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. Only 1 uugaq (saffron cod, *Eleginus gracilis*) was in the reported catch in 2005, which seems low considering the high salinity in the main fishing areas during the fishing season.

### **Comparative Catch Rates**

Overall, the Arctic cisco catch rates in the Nigliq Channel were average for the period 1986-2004, being the seventh highest observed since monitoring began in 1985 (Table 3, Figure 6). While there is considerable variation on a daily basis, catches tend to remain high through the season when Arctic cisco are abundant, and remain low when they are scarce (Figure 7). Least cisco mean catch rates in Nigliq Channel areas were the fourth highest yet observed, although they were close to the recent 10-year average (Table 4).

### **Age of Harvested Fish**

Information from fyke nets fished in Prudhoe Bay during the summer is used to obtain information on the relative strength of Arctic cisco year classes when they recruit into the region as young-of-the-year (YOY) (Figure 8). During 2005, ages 6 and 7, corresponding to the 1999 and 1998 year classes, dominated the catches. Abundant year classes in the mid-1980's produced high catches in the early 1990's, while the abundant 1990 and 1992 year classes produced high catches in 1997-1998 (Figure 6). The absence of a dominant year class from 1993 to 1996 resulted in a period of low catches from 1998 to 2002. The strong recruitments from 1997-1999 allowed the fishery to rebound when the 6 and 7 year old fish from these recruitments entered the fishery beginning in 2003.

Ages of Arctic cisco taken in the fishery were estimated from 1984 to 2005 (Figure 9). The age data

were used to partition the catch rate in the fishery by year class to evaluate the relative year class strength (Figure 10). 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 essentially 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. Recent high catches from 2003-2005 were the result of three strong year classes from 1997 to 1999.

### **Tissue Hydrocarbons**

Tissues from 20 Arctic cisco from both the Upper Nigliq and Nanuk areas were analyzed for polyaromatic hydrocarbons (PAH) in 2005. Ten fish from each area were processed for whole body analysis, the other 10 fish from each area were dissected for separate muscle and liver analysis. Tissues were analyzed by Analytical Resources, Inc., a laboratory that specializes in detecting PAH in water, sediments or tissues. The analyses were unable to detect any PAH in the sampled tissues at the part per billion level, thus it appears there is at present very little exposure to these compounds. Results of all the laboratory analyses are included in Appendix B.

### **DISCUSSION**

The 2005 fishery was characterized by high abundance of Arctic cisco caused by recruitment of the 1999 year class into the fishery and continuing strong representation by the 1997 and 1998 year classes. Catches were consistently strong through the season. Studies from previous years have established that Arctic cisco move into the Colville River channels as salinity increases after ice formation (Moulton and Field 1988; Moulton 1994). For years in which salinity does not increase, such as 1988 and 1999, catches of Arctic cisco are lower than expected. In 2005, salinity in the Nigliq Delta and Nanuk areas was high by early November thus allowing the main group of Arctic

cisco to move into the Nigliq Channel early in the season and be available for harvest throughout the channel. Bering cisco, which had been unusually abundant and a dominant portion of the catch in 1990, remained essentially absent in 2005.

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. 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 2005, the catch rates were higher than expected because of a strong 1999 year class. The status of this year class was unclear as fyke net sampling was not conducted in Prudhoe Bay during the recruitment summer. In subsequent years, the year class was abundant in Prudhoe Bay, suggesting that it represented a moderate to strong recruitment. Sampling in Prudhoe Bay during summer 2005 demonstrated a moderate recruitment during August. These fish should begin to reach harvestable size by age 5 in 2010.

### **PREDICTIONS FOR 2006**

The 1997-1999 year classes should leave the region as the fish mature and return to the Mackenzie River to spawn. A moderate number of fish from the 1999 year class may be available for harvest during fall 2006. Fish caught in 2006 should be larger in size to those caught in 2005 because of growth in the remaining members of the 1999 year class that will comprise the bulk of the catch. Catches should decrease substantially in 2006, as compared to 2004 and 2005, being supported primarily by the remaining portion of the 1999 year class. Subsequent year classes from 2000 through 2004 appear to be weak or non-existent, thus harvests are expected to decrease even farther in 2007 and beyond. Catch rates may increase in 2009/2010 when the 2005 recruitment begins to reach harvestable size.

## **ACKNOWLEDGMENTS**

The study was funded by the ConocoPhillips Alaska, Inc. The study was administered by Caryn Rea and J. Brady Crouch of ConocoPhillips Alaska. Data from fishery logbooks was provided by Nuiqsut residents, including Marjorie Ahnupkana, Patrick Hopson, Bernice Keigelak, Paul Kittick, Leonard Lampe, Eric Levitt, Doreen Nukapigak, David Pausanna, Lydia Souvalik, and Joeb Woods, Sr.



## LITERATURE CITED

- Bendock, T.N. 1979. Beaufort Sea estuarine fishery study. Pp. 670-729 in Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators. Vol. 4. BLM/NOAA OCSEAP, Boulder, CO. 4: 670-729.
- Craig, P.C. 1987. Subsistence fisheries at coastal villages in the Alaskan Arctic, 1970-1986. Minerals Management Service, Anchorage, AK. Alaska OCS Socioeconomic Studies Program. Technical Report 129. 63 p.
- Craig, P.C., and L. Haldorson. 1981. Beaufort Sea barrier island-lagoon ecological process studies: Final Report, Simpson Lagoon (Part 4, Fish). Pp. 384-678 in Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators. Vol. 7. BLM/NOAA OCSEAP, Boulder, CO.
- Critchlow, K.R. 1983. Fish study. Pp. 1-327 in Prudhoe Bay Waterflood Environmental Monitoring Program 1982. Report by Woodward-Clyde Consultants for Alaska District, U.S. Army Corps of Engineers, Anchorage, AK.
- Envirosphere Company. 1987. Endicott Environmental Monitoring Program, Final Report, 1985. Alaska District, U.S. Army Corps of Engineers, Anchorage, AK. 7 vols.
- Fawcett, M.H., L.L. Moulton, and T.A. Carpenter. 1986. Colville River Fishes: 1985 Biological Report. Chap. 2. Colville River Fish Study. 1985 Annual Report. Prepared by Entrix, Inc., Anchorage, AK, for ARCO Alaska, Inc., North Slope Borough, and City of Nuiqsut. 86 p.
- Fechhelm, R.G., and D.B. Fissel. 1988. Wind-aided recruitment of Canadian Arctic cisco (*Coregonus autumnalis*) into Alaskan waters. Can. J. Fish. Aquat. Sci. 45:906-910.
- Fechhelm, R.G., B. E. Haley, G.B. Buck, G.D. Wade, and M.R. Link. 2005. Nearshore Beaufort

Sea Fish Monitoring in the Prudhoe Bay Region, 2004. Report for BP Exploration (Alaska) Inc. Anchorage, AK. 72 p + appendices.

Furniss, R.A. 1975. Prudhoe Bay study. Inventory and cataloging of arctic area waters. Alaska Dept. Fish and Game. Federal Aid in Fish Restoration, Annual Report of Progress, 1974-1975, Project F-9-7, 16(G-I-1):31-47.

Gallaway, B.J., W.J. Gazey, and L.L. Moulton. 1989. Population trends for the Arctic cisco (*Coregonus autumnalis*) in the Colville River of Alaska as reflected by the commercial fishery. Biol. Pap. Univ. Alaska. 24:153-165.

Gallaway, B.J., W.B. Griffiths, P.C. Craig, W.J. Gazey, and J.W. Helmericks. 1983. An assessment of the Colville River delta stock of Arctic cisco -- migrants from Canada? Biol. Pap. Univ. Alaska. 21:4-23.

George, J.C., and R. Kovalsky. 1986. Observations on the Kupigruak Channel (Colville River) subsistence fishery. October 1985. Dept. of Wildlife Management, North Slope Borough, Barrow, AK. 60 p.

George, J.C., and B.P. Nageak. 1986. Observations on the Colville River subsistence fishery at Nuiqsut, Alaska. Dept. of Wildlife Management, North Slope Borough, Barrow, AK. 35 p.

Griffiths, W. and B.J. Gallaway. 1982. Prudhoe Bay Waterflood Project fish monitoring program 1981. Pp. D1-D98 in Prudhoe Bay Waterflood Environmental Monitoring Program. Vol. 4. Report by LGL Alaska Research Associates, Inc. for Woodward-Clyde Consultants and Alaska District, U.S. Army Corps of Engineers, Anchorage, AK.

Griffiths, W.B., D.R. Schmidt, R.G. Fechhelm, B.J. Gallaway, R.E. Dilinger, Jr., W. Gazey, W.H. Neill, and J.S. Baker. 1983. Fish ecology. Vol. 3 in B.J. Gallaway and R. Britch, editors. Environmental Summer Studies (1982) for the Endicott Development. Report by LGL Alaska

Research Associates, Inc. and Northern Technical Services for Sohio Alaska Petroleum Co., Anchorage, AK. 342 p.

LGL (see LGL Alaska Research Associates, Inc.)

LGL Alaska Research Associates, Inc. 1990. The 1988 Endicott Development Fish Monitoring Program. Vol. II: Recruitment and Population Studies, Analysis of 1988 Fyke Net Data. Anchorage, AK. Report for BP Exploration (Alaska) Inc. and North Slope Borough. 317 p.

LGL Alaska Research Associates, Inc. 1992. The 1990 Endicott Development Fish Monitoring Program. Vol. II: Analysis of Fyke Net Data. Anchorage, AK. Report for BP Exploration (Alaska) Inc. and North Slope Borough. 160 p.

LGL Alaska Research Associates, Inc. 1994. The 1993 Endicott Development Fish Monitoring Program. Vol. I: Fish and Hydrography Data Report. Anchorage, AK. Report for BP Exploration (Alaska) Inc. and North Slope Borough. 217 p.

LGL Alaska Research Associates, Inc. 1996. The 1995 Endicott Development Fish Monitoring Program. Vol. I: Fish and Hydrography Data Report. Anchorage, AK. Report for BP Exploration (Alaska) Inc. and North Slope Borough. 180 p.

LGL Alaska Research Associates, Inc. 2000. The 1999 Point Thomson Unit nearshore marine fish study. Report for BP Exploration (Alaska) Inc. Anchorage, AK. 71 p + appendices.

Moulton, L.L. 1994. The 1993 Endicott Development Fish Monitoring Program. Vol. II: The 1993 Colville River Fishery. Report by MJM Research, Bainbridge Island, WA, for BP Exploration (Alaska) Inc. and North Slope Borough. 60 p. + App.

Moulton, L.L. 1995. The 1994 Endicott Development Fish Monitoring Program. Vol. II: The 1994 Colville River Fishery. Report by MJM Research, Bainbridge Island, WA, for BP Exploration

(Alaska) Inc. and North Slope Borough. 55 p. + App.

Moulton, L.L. 2001. Harvest estimate and associated information for the 2000 Colville River fall fishery. Report by MJM Research to Phillips Alaska, Inc and BP Exploration (Alaska). Lopez Island, WA. 53p. + appendices.

Moulton, L.L. 2003. Harvest estimate and associated information for the 2002 Colville River fall fishery. Report by MJM Research to ConocoPhillips Alaska, Inc. Lopez Island, WA. 161p.

Moulton, L.L. and M.H. Fawcett. 1984. Oliktok Point Fish Studies - 1983. Woodward-Clyde Consultants. Report for Kuparuk River Unit, Anchorage, AK. 77 p.

Moulton, L.L., and L.J. Field. 1988. Assessment of the Colville River fall fishery 1985-1987. Report by Environmental Sciences and Engineering, Inc. for ARCO Alaska, Inc., North Slope Borough, and the City of Nuiqsut. 42 p.

Moulton L.L., J. Field, and S. Brotherton. 1986b. Assessment of the Colville River fishery in 1985. Chap. 3 *in* Colville River Fish Study, Final Report. Report by Entrix Inc. for ARCO Alaska Inc., North Slope Borough, and the City of Nuiqsut. 83 p.

Moulton, L.L., B.J. Gallaway, M.H. Fawcett, W.B. Griffiths, K.R. Critchlow, R.G. Fechhelm, D.R. Schmidt, and J.S. Baker. 1986a. 1984 Central Beaufort Sea Fish Study. Waterflood Monitoring Program Fish Study. Report by Entrix, Inc., LGL Ecological Research Associates, Inc., and Woodward-Clyde Consultants, for Envirosphere Co. Anchorage, AK. 300 p.

Moulton, L.L., and B.T. Seavey. 2004. Harvest estimate and associated information for the 2002 Colville River fall fishery. Report by MJM Research to ConocoPhillips Alaska, Inc. Lopez Island, WA. 79p.

USACE (see U.S. Army Corps of Engineers)

U.S. Army Corps of Engineers, Alaska District. 1980. Prudhoe Bay Oil Field Waterflood Project. Final Environmental Impact Statement. Anchorage, AK. 3 vols.

U.S. Army Corps of Engineers, Alaska District and Environmental Research and Technology, Inc. 1984. Endicott Development Project. Final Environmental Impact Statement. Anchorage, AK. 3 vols.

Woodward-Clyde Consultants. 1983. Lisburne Development Area: 1983 environmental studies. Report for ARCO Alaska Inc., Anchorage, AK. 722 p

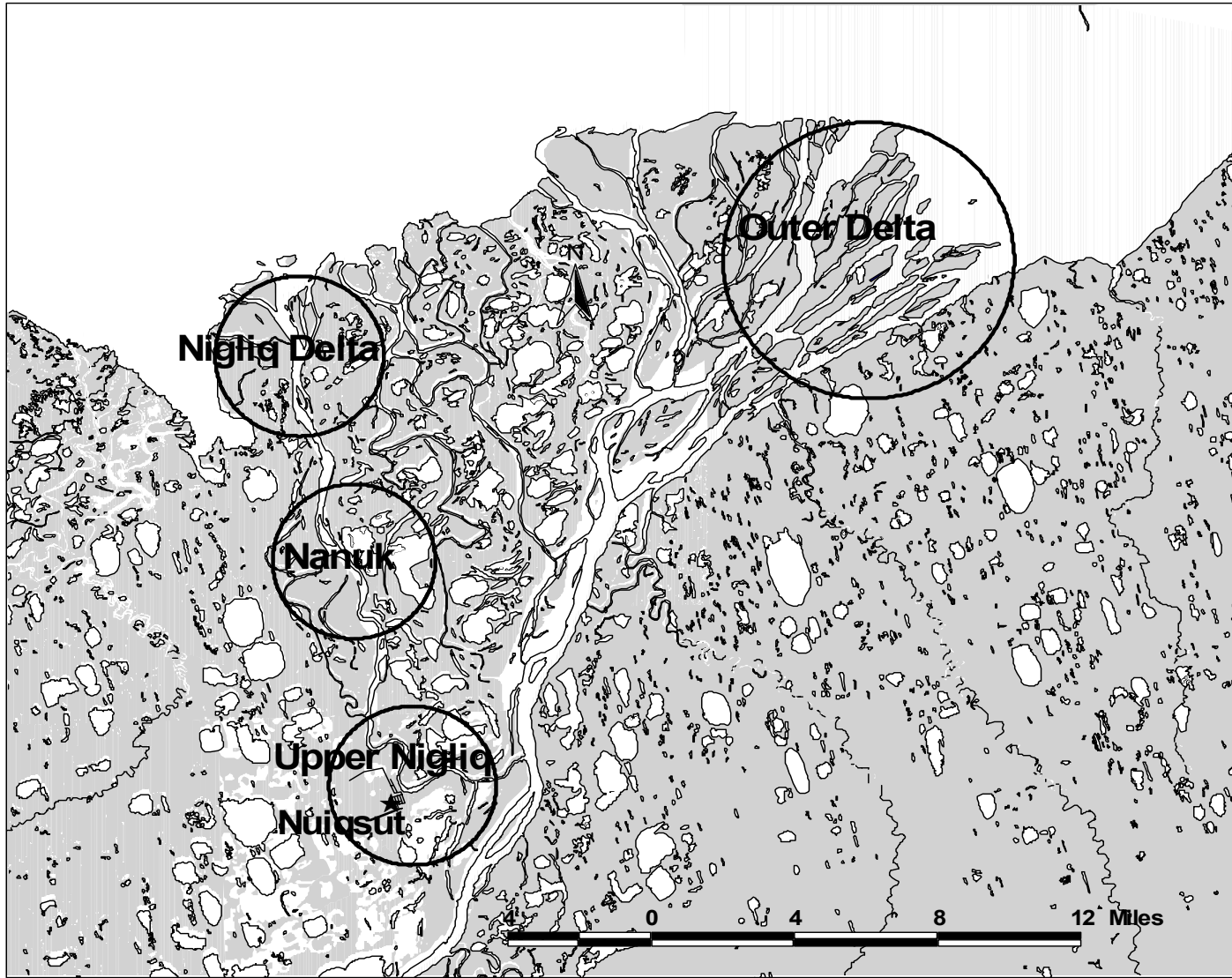


Figure 1. Colville Delta region showing locations of major fishing areas.

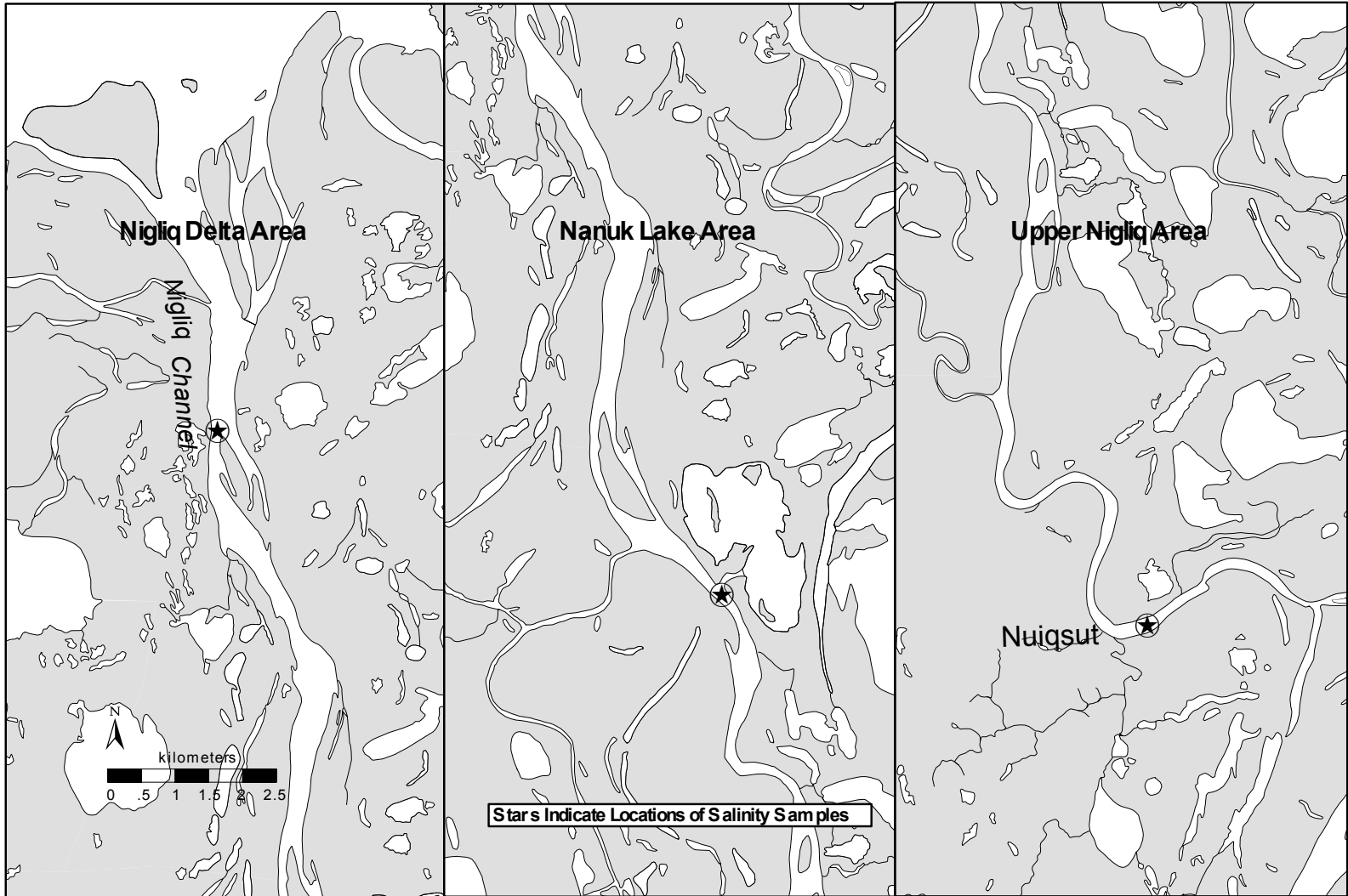


Figure 2. Major fishing areas on the Nigliq Channel with location of salinity monitoring stations.

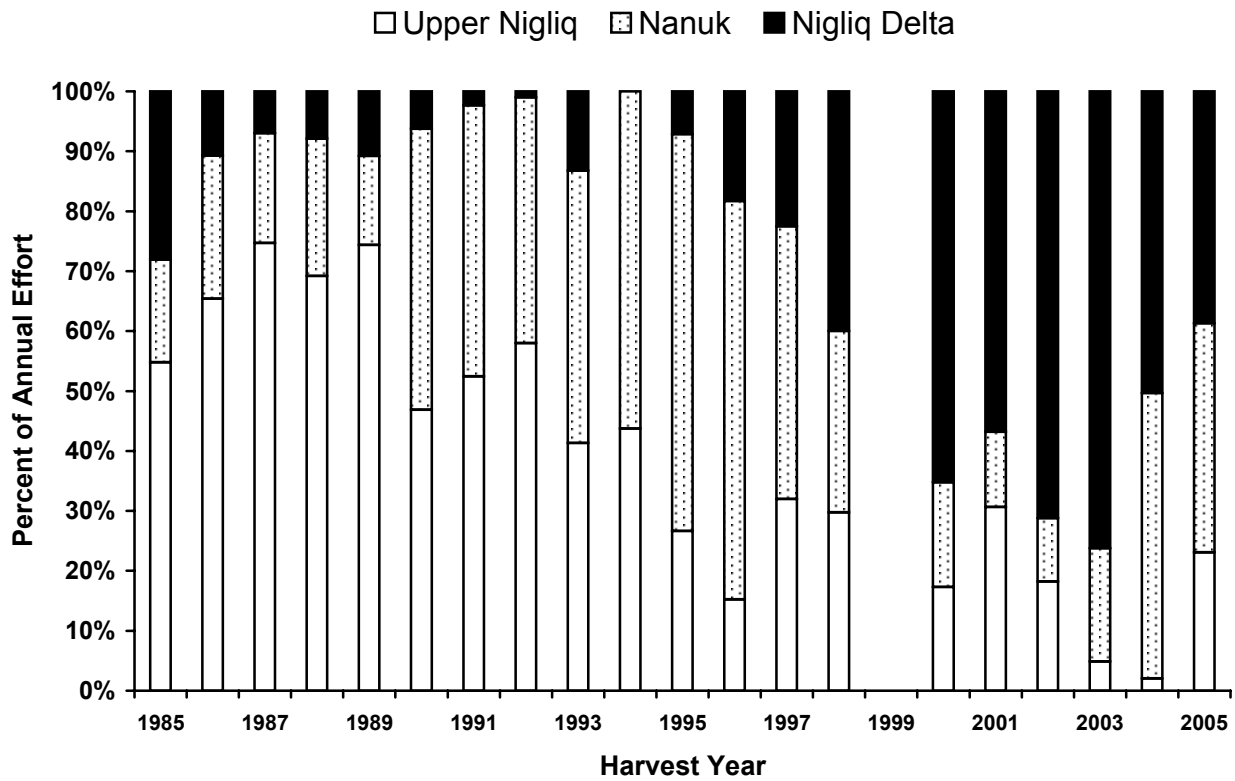


Figure 3. Distribution of fishing effort in the Nigliq Channel by fishing area, all meshes combined, 1986 to 2005 (2005 effort includes only data from log book participants, not total fishery)



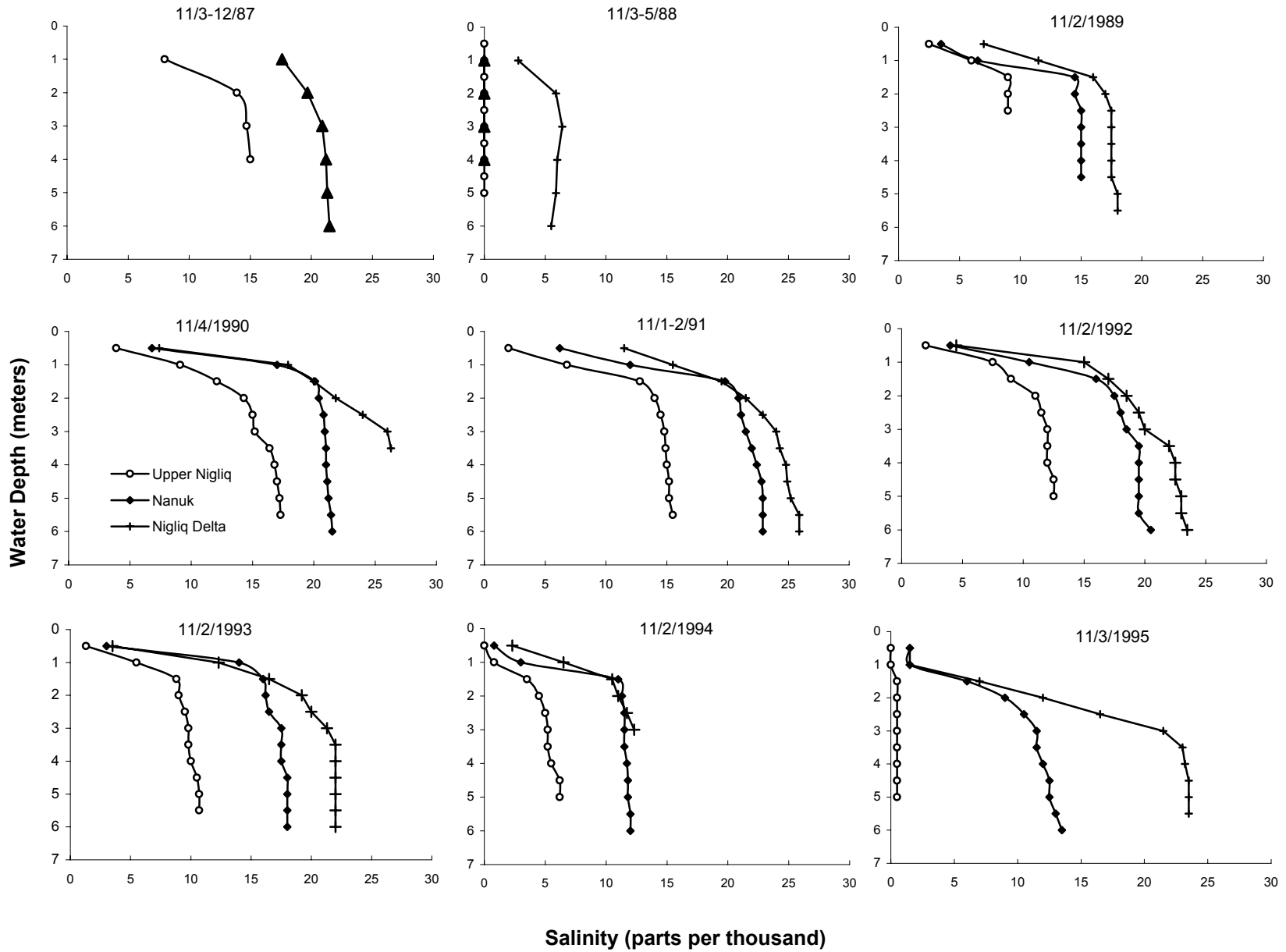


Figure 4. Salinity distribution in the Nigliq Channel, Colville Delta, during the fall gill net fishery, 1987-2005.

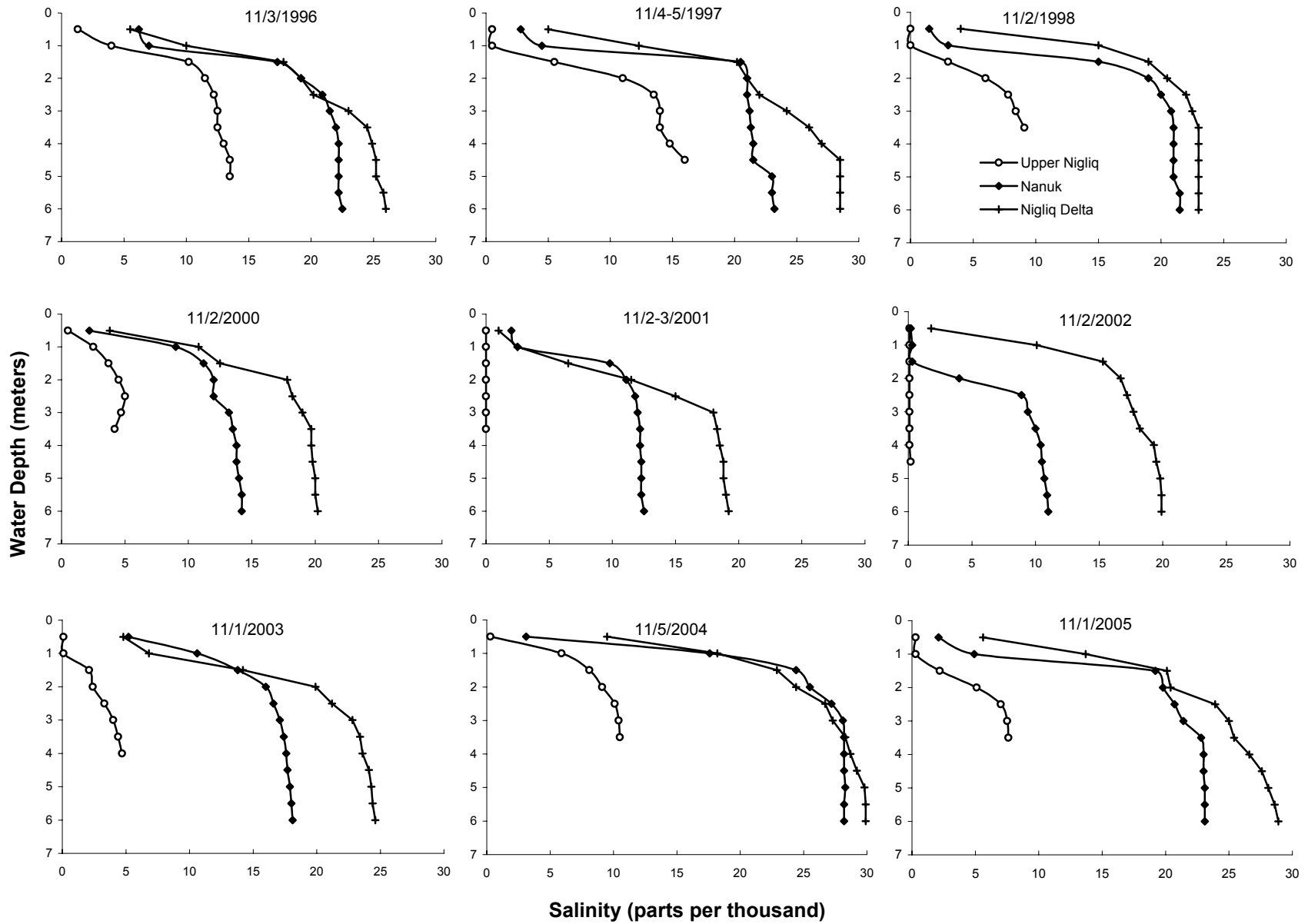


Figure 4. Salinity distribution in the Nigliq Channel, Colville Delta, during the fall gill net fishery, 1987-2005.

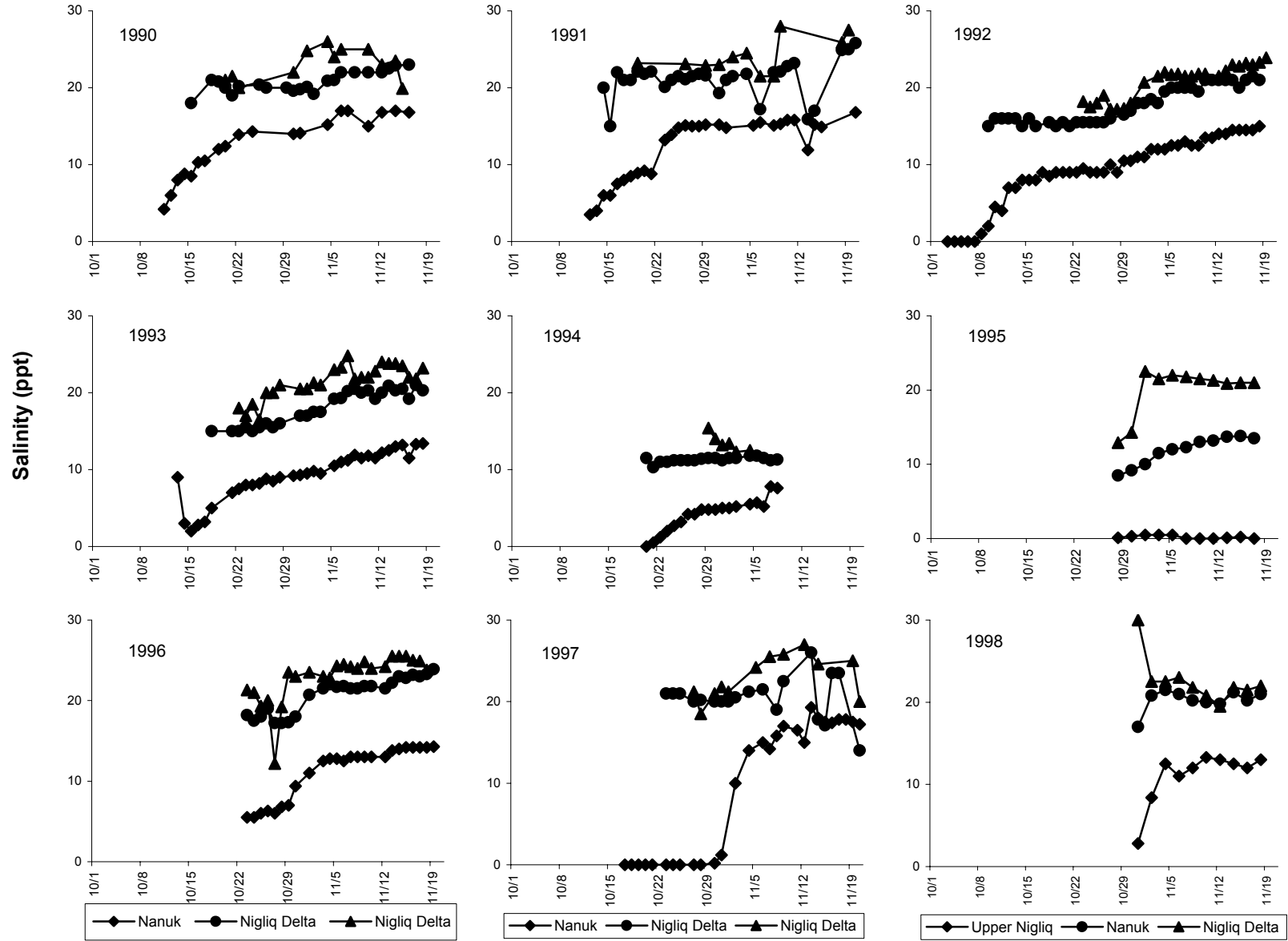


Figure 5. Salinities (in parts per thousand) measured at 3 m below the ice surface at Nigliq Channel fishing areas, 1990-2005.

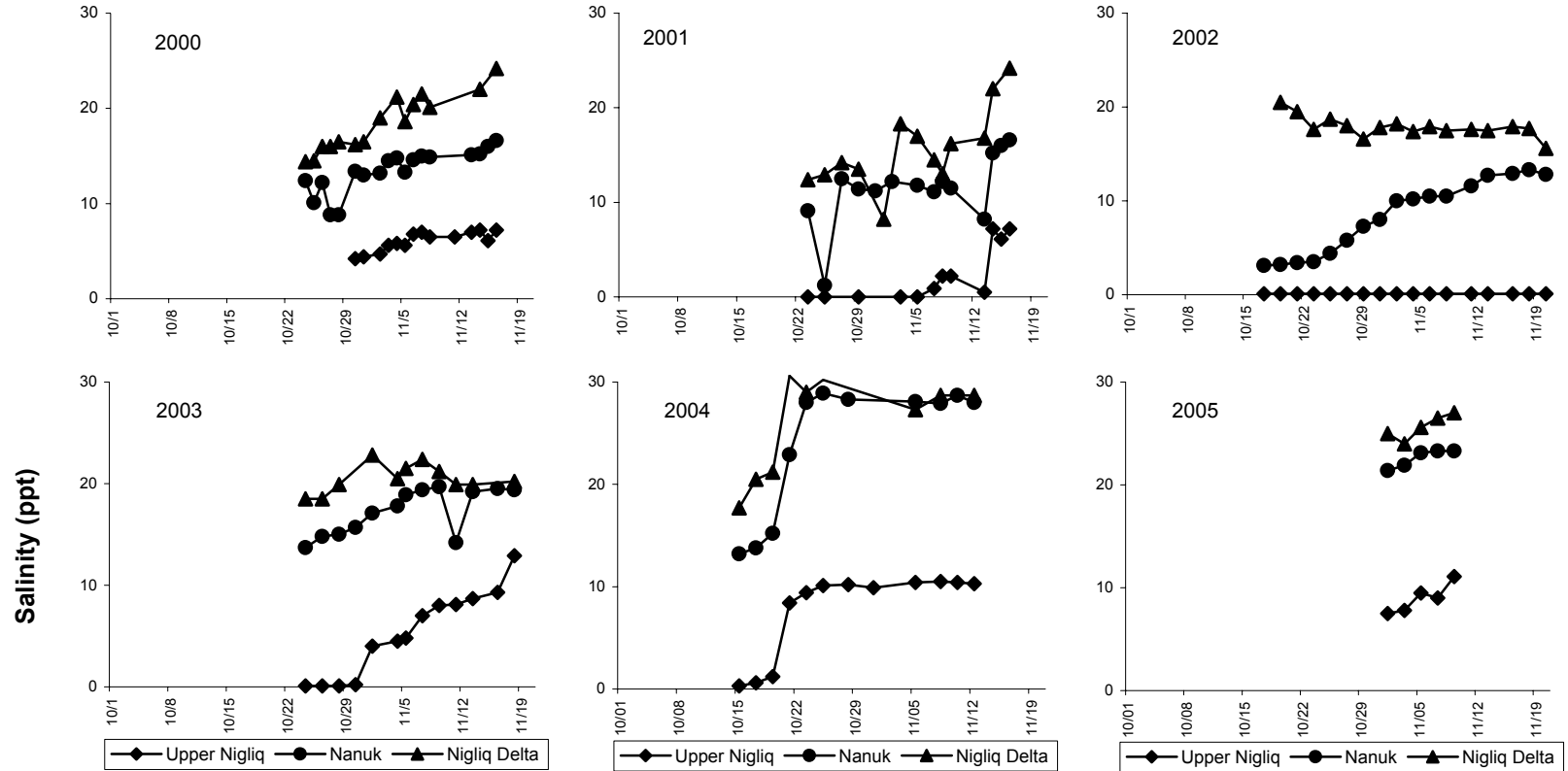


Figure 5. Salinities (in parts per thousand) measured at 3 m below the ice surface at Nigliq Channel fishing areas, 1990-2005.

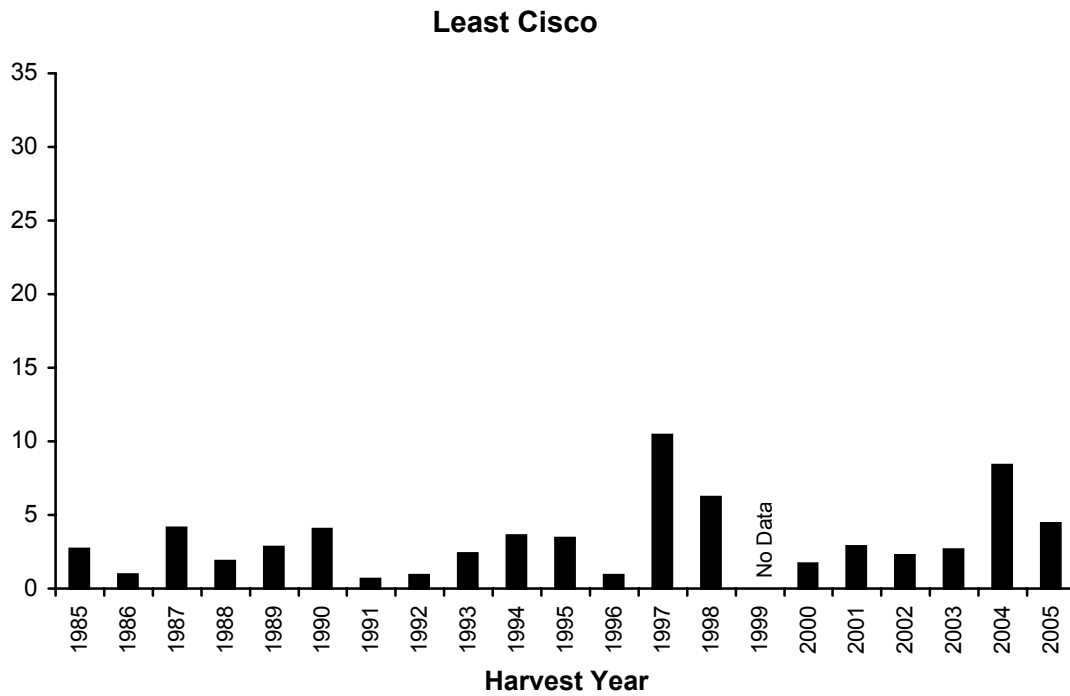
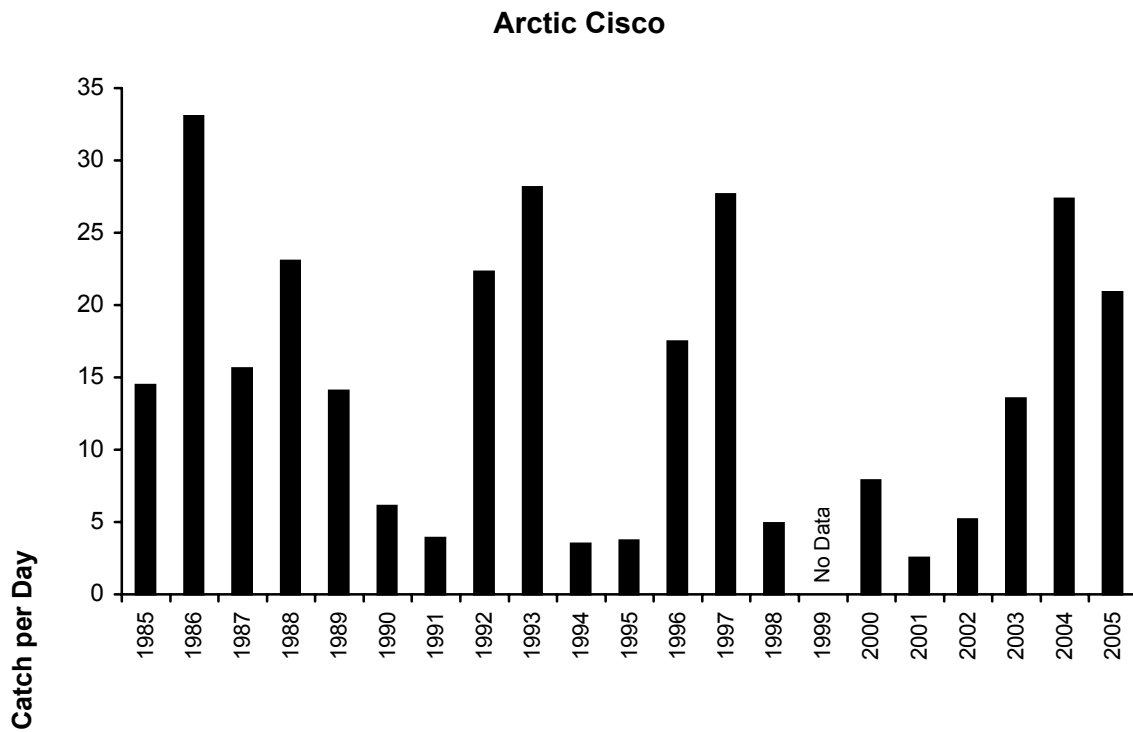


Figure 6. Catch rates of arctic cisco and least cisco in the Nuiqsut Channel fishery, 1985-2005.

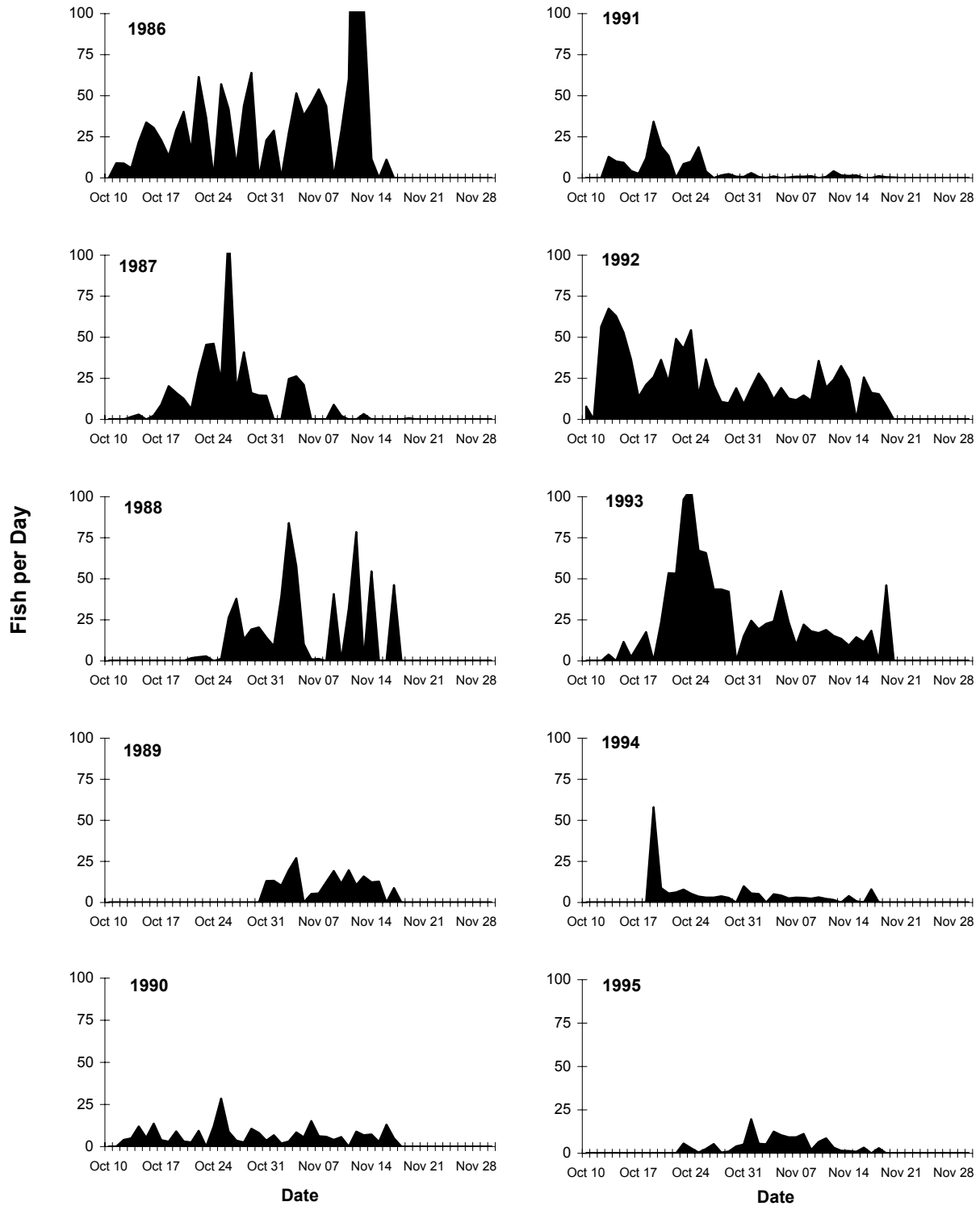


Figure 7. Mean daily catch rate of Arctic cisco in 76-mm (3 inch) mesh in the Nigliq Channel, 1986-2005.

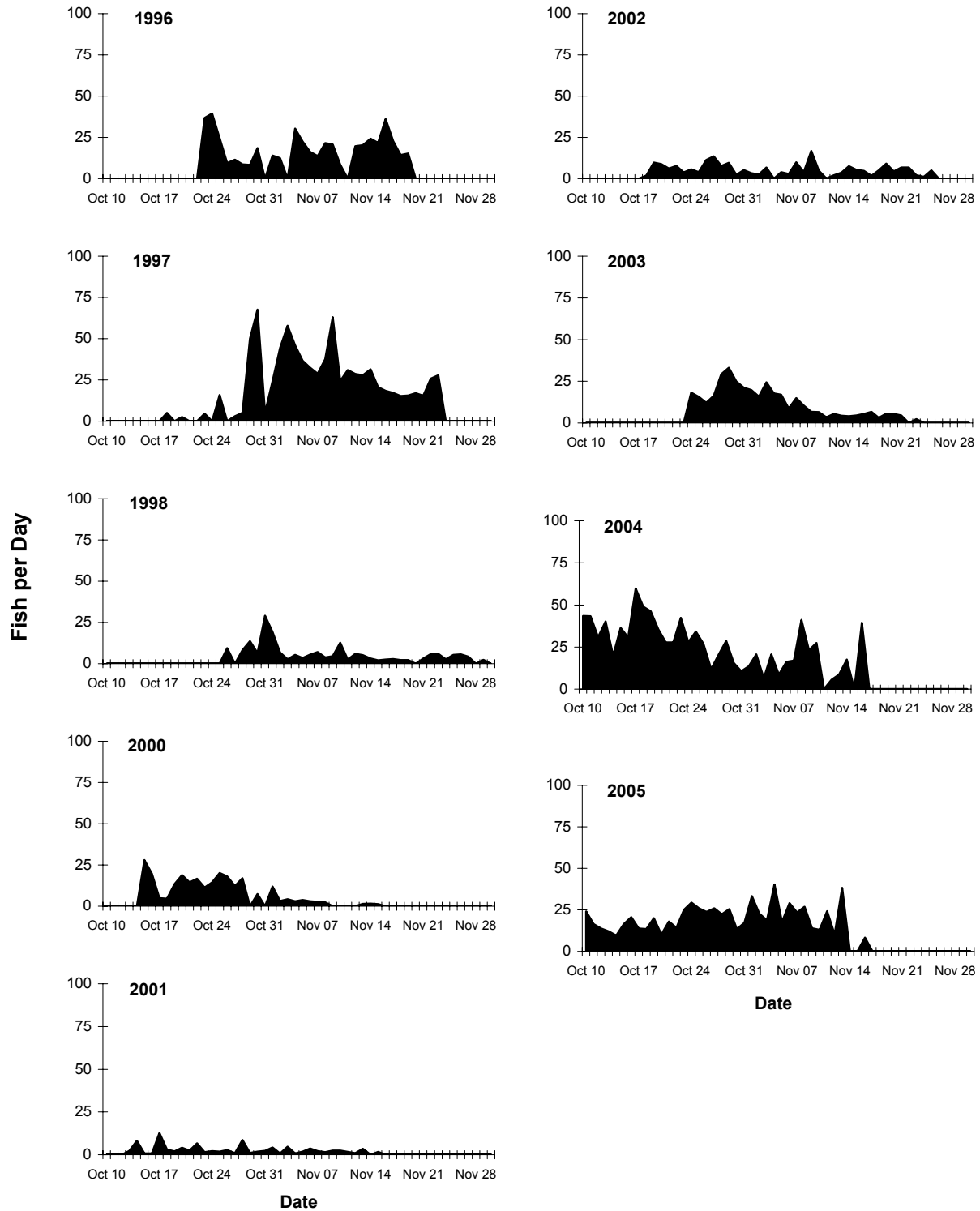


Figure 7. Mean daily catch rate of Arctic cisco in 76-mm (3 inch) mesh in the Nigliq Channel, 1986-2005.

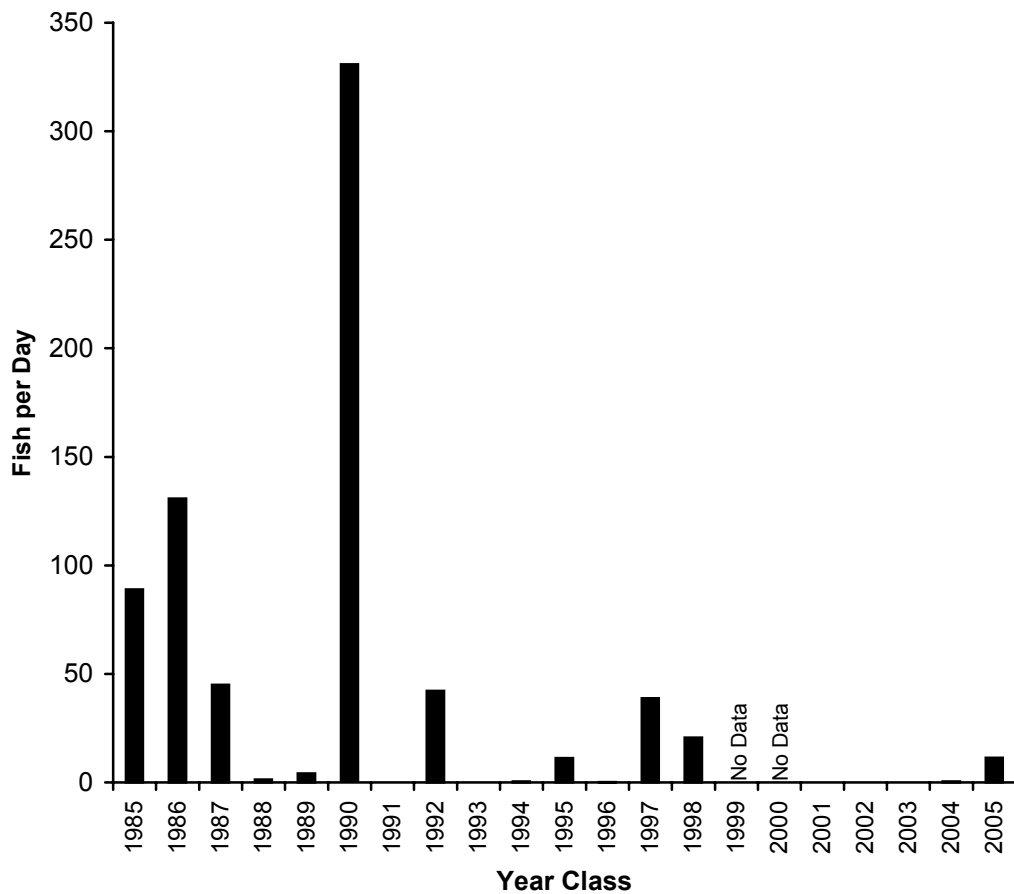


Figure 8. Catch rates of young-of-the-year (YOY) arctic cisco by year class in Prudhoe Bay fyke nets, 1985-2005.

(source: LGL Alaska Research Associates 2000, B. Fechhelm, pers. comm. 2003, 2005).



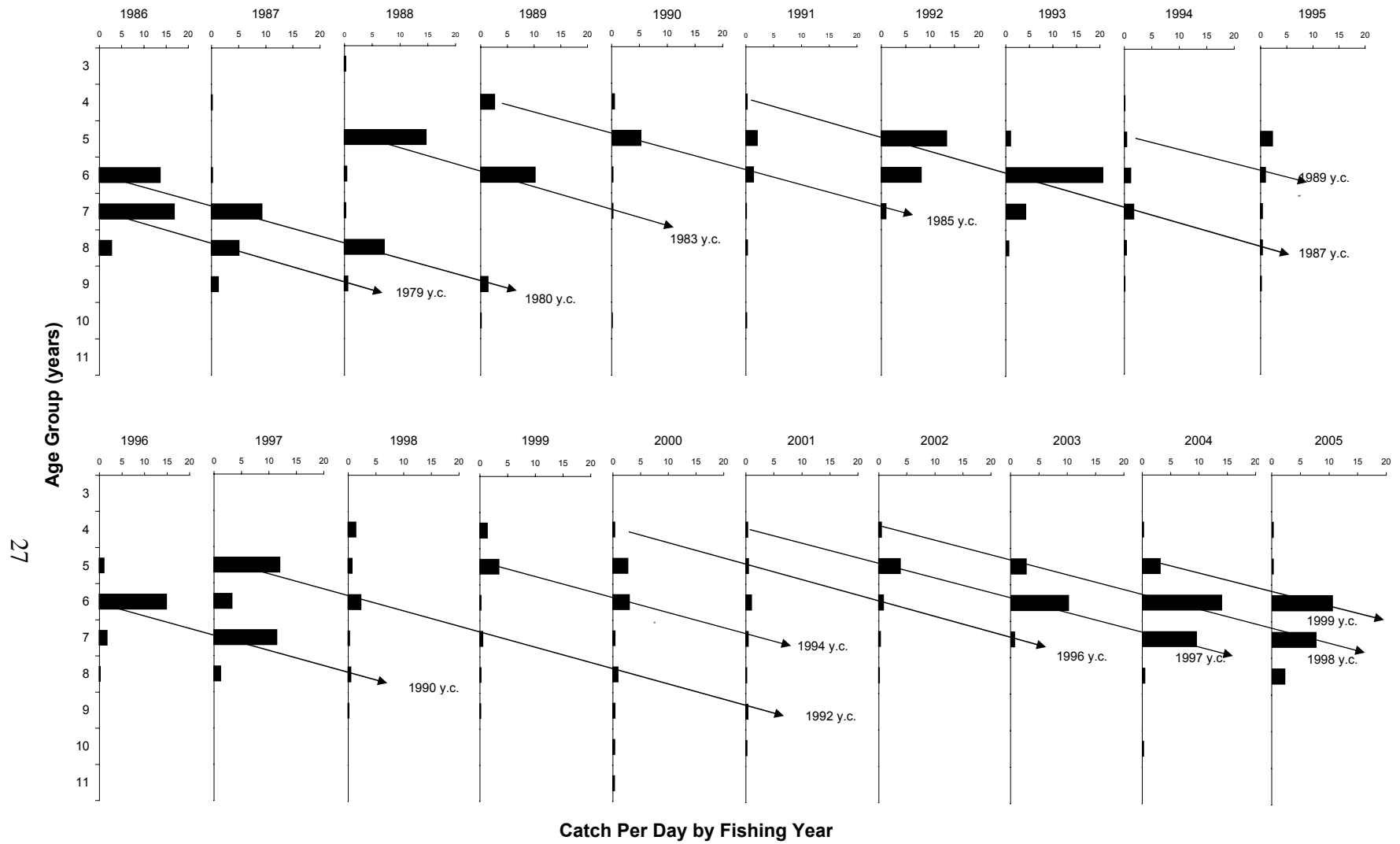


Figure 9. Age distribution of arctic cisco caught in the Colville River commercial fishery, 1984 - 2005, scaled to CPUE (from fish caught in 76-mm mesh nets, arrows indicate progression of year classes through the fishery).

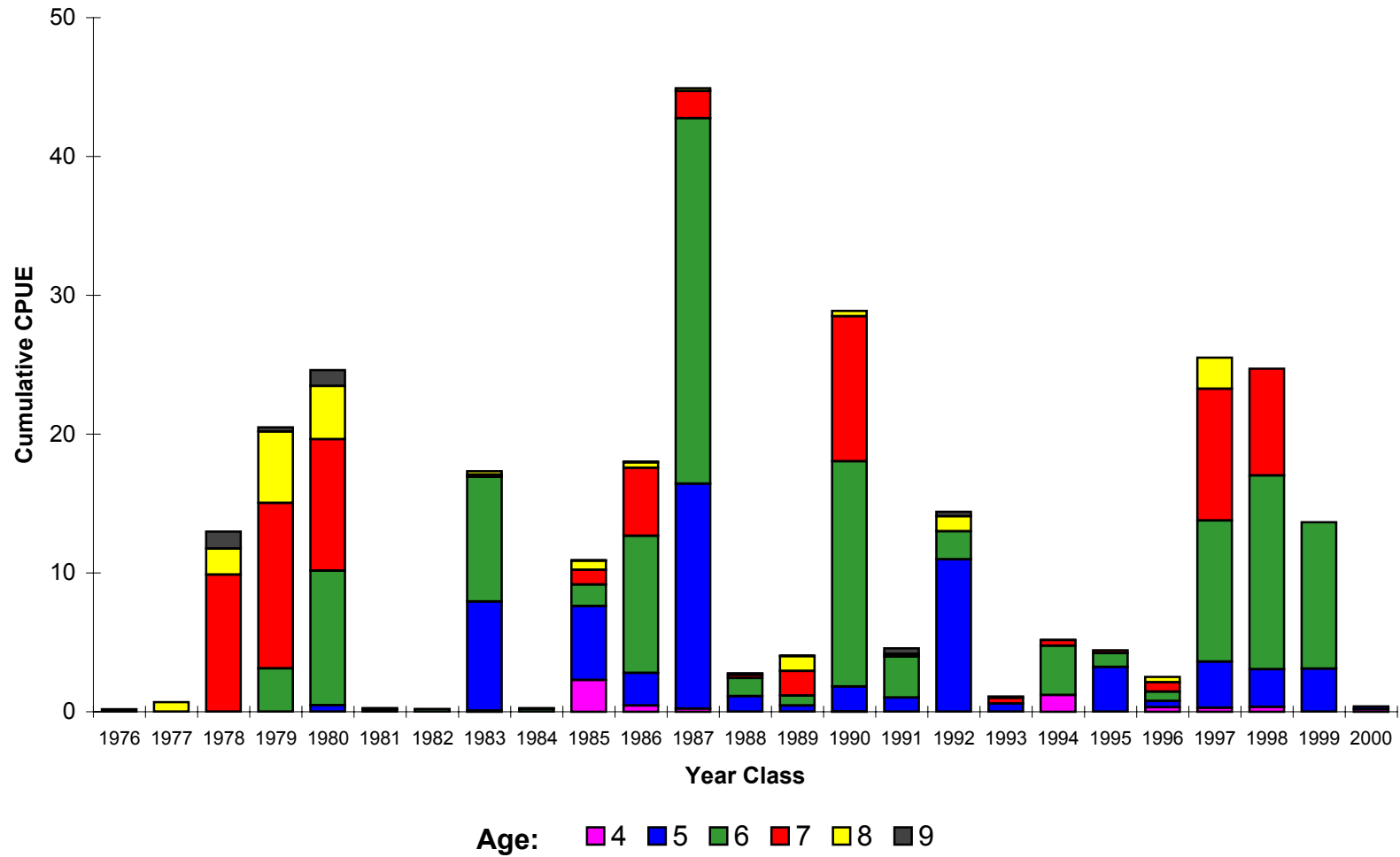


Figure 10. Cumulative harvest for each year class of arctic cisco, expressed as cumulative catch rate in the Nuiqsut fishery for harvest years 1984 to 2005.

Table 1. Estimated onset of fishing effort in the Nuiqsut fall fishery, 1985-2005.

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
2001	Oct 6
2002	Oct 14
2003	Oct 16
2004	Oct 9
2005	Oct 7

Average start date for 1985-2005 = October 7.

Table 2. Catch contribution by species as observed during fisherman interviews in the Nigliq Channel, by percent of sampled catch, 1985-2005.

Species	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000	2001	2002	2003	2004	2005
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	35.6	49.8	66.3	74.7	81.3
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	0.1	0.1	0.2	0.06	0.0
Least cisco	14.8	3.8	18.7	8.3	23.7	30.2	30.0	6.0	11.1	44.6	35.0	4.8	22.9	50.8	14.0	29.6	30.6	22.3	24.2	14.8
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	5.5	1.6	0.2	0.03	0.20
Humpback whitefish	0.5	0.03	3.8	0.5	3.1	2.9	3.8	0.1	0.4	13.2	22.3	0.4	0.9	8.9	6.0	27.8	17.5	9.4	0.85	3.5
Arctic grayling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	0.2	0.9	0.08	0.15
Round whitefish	0.0	0.01	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Dolly Varden char	0.0	0.0	0.03	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern Pike	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.1	0.6	0.04	0.01
Burbot	0.0	0.0	0.06	0.1	0.03	0.01	0.09	0.0	0.0	0.0	0.1	0.02	0.0	0.0	0.0	1.3	0.2	0.1	0.03	0.0
Arctic flounder	0.0	0.0	0.00	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fourhorn sculpin	(b)	(b)	(b)	(b)	(b)	(b)	(b)	4.4	2.7	(b)	(b)	12.5	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)
Total Observed:	2,705	8,952	6,826	2,948	2,946	7,911	7,576	24,305	17,155	3,792	7,155	5,730	19,758	6,481	3,871	3,515	8,445	16,654	20,705	13,957

(a) = included with Arctic cisco prior to 1990

(b) = always present but not counted

Table 3. Mean catch rate of arctic cisco in 76-mm (3 inch) mesh gill nets in the Nuiqsut fall fishery, 1985-2005 (in fish per day per 18 m of net).

(see Appendix Table A-12 for supporting data on the Nigliq Channel)

Year	Upper Nigliq	Nanuk	Nigliq Delta	Nigliq Channel Average
1985	--	--	--	14.5
1986	19.2	29.9	65.8	33.0
1987	11.0	29.1	21.1	15.6
1988	6.4	8.1	55.7	23.1
1989	10.9	18.0	24.7	14.1
1990	4.4	7.5	7.3	6.1
1991	3.7	4.1	2.0	3.9
1992	15.3	17.8	51.5	22.3
1993	16.1	36.5	27.2	28.1
1994	3.7	3.4	--	3.5
1995	1.1	3.2	22.3	3.7
1996	11.5	18.6	--	17.5
1997	21.3	27.8	41.4	27.7
1998	2.0	2.6	7.8	4.9
1999	--	--	--	--
2000	1.0	3.5	9.6	7.9
2001	1.5	1.6	2.9	2.5
2002	0.9	3.7	6.3	5.2
2003	5.3	14.4	13.6	13.6
2004	15.4	29.9	25.1	27.3
2005	15.4	19.0	25.5	20.9
1995-2004				
Mean	6.7	11.7	16.1	12.2
Standard Deviation	7.6	11.4	12.8	9.9

-- = not available

Table 4. Mean catch rate of least cisco in 76-mm (3 inch) mesh gill nets in the Nuiqsut fall fishery, 1985-2005 (in fish per day per 18 m of net).

(see Appendix Table A-13 for supporting data on the Nigliq Channel)

Year	Upper Nigliq	Nanuk	Nigliq Delta	Nigliq Channel Average
1985	--	--	--	2.7
1986	1.3	0.6	0.5	1.0
1987	5.5	1.9	0.4	4.1
1988	1.6	0.7	2.8	1.9
1989	3.7	1.1	0.5	2.8
1990	4.8	2.8	6.5	4.0
1991	0.3	0.8	0.0	0.7
1992	0.8	0.7	1.6	0.9
1993	1.7	3.1	1.7	2.4
1994	3.3	3.7	--	3.6
1995	4.7	2.8	7.8	3.4
1996	0.4	1.0	--	0.9
1997	11.5	12.2	3.8	10.5
1998	5.9	6.9	6.0	6.2
1999	--	--	--	--
2000	1.4	1.6	1.7	1.7
2001	2.1	9.8	2.4	2.9
2002	1.5	4.5	2.2	2.2
2003	2.1	4.4	2.3	2.7
2004	7.6	9.2	7.4	8.4
2005	4.5	5.1	4.0	4.5
1995-2004				
Mean	4.1	5.8	4.2	4.3
Standard Deviation	3.6	3.9	2.5	3.3

-- = not available

**APPENDIX A.**

**Fishery Data**

LIST OF APPENDIX TABLES

Appendix Table A-1. Fishing effort used to estimate Nigliq Channel catch rates by mesh size and fishing area, 2005. ....A-3

Appendix Table A-2. Calculation of Arctic cisco catch rate in 76-mm mesh in the Nigliq Channel, 1986-2005. ....A-4

Appendix Table A-3. Calculation of least cisco catch rate in 76-mm mesh in the Nigliq Channel, 1986-2005. ....A-5

Appendix Table A-4. Age frequencies of Arctic cisco caught in 76 mm mesh, 1976-2005. ....A-6

Appendix Table A-5. Catch rate of Arctic cisco in the Nigliq Channel fishery by year-class, 1985-2005 (outlined boxes indicate year-class CPUE at age-5, based on CPUE corrected for effect of variable effort, 76-mm mesh). ....A-7

Appendix Table A-6. Salinity profiles from the Nigliq Channel, Colville Delta, 2005. ....A-8



Appendix Table A-1. Fishing effort used to estimate Nigliq Channel catch rates by mesh size and fishing area, 2005

Fisher Code	Data Type	Fishing Area	Net	Net Code	Start Date	End Date	Net Length (ft)	Stretched Mesh (inch)	Effort in NetDays
1	logbook	610	A	0501A	10/23/2005	11/8/2005	80	3.00	21.3
1	logbook	610	B	0501B	10/24/2005	10/30/2005	60	3.50	6.0
4	logbook	670	A	0504A	10/24/2005	11/11/2005	80	3.00	24.0
4	logbook	670	B	0504B	10/24/2005	11/11/2005	80	3.00	24.0
4	logbook	670	C	0504C	10/28/2005	11/11/2005	80	3.25	18.7
25	logbook	610	A	0525A	10/8/2005	10/16/2005	100	3.00	13.3
25	logbook	610	B	0525B	10/8/2005	10/12/2005	60	3.50	4.0
25	logbook	610	C	0525C	10/13/2005	10/21/2005	100	3.00	13.3
25	logbook	650	D	0525D	10/17/2005	10/22/2005	100	3.00	8.3
25	logbook	650	E	0525E	10/17/2005	10/25/2005	80	3.50	10.7
25	logbook	650	F	0525F	10/22/2005	11/7/2005	100	3.00	26.7
25	logbook	650	G	0525G	10/26/2005	11/7/2005	100	3.00	20.0
30	logbook	650	A	0530A	10/22/2005	11/1/2005	120	3.00	20.0
30	logbook	650	B	0530B	10/22/2005	11/1/2005	100	3.00	16.7
30	logbook	650	C	0530C	10/22/2005	11/3/2005	80	3.50	16.0
30	logbook	650	D	0530D	10/22/2005	11/1/2005	120	3.00	20.0
30	logbook	650	E	0530E	10/22/2005	11/9/2005	80	3.50	24.0
37	logbook	670	A	0537A	10/23/2005	11/9/2005	80	3.00	22.7
37	logbook	670	B	0537B	10/27/2005	11/9/2005	60	3.00	13.0
41	logbook	670	A	0541A	10/15/2005	11/11/2005	80	3.00	36.0
41	logbook	670	B	0541B	10/15/2005	11/11/2005	80	3.00	36.0
51	logbook	670	A	0551A	10/23/2005	11/9/2005	80	3.00	22.7
51	logbook	670	B	0551B	10/23/2005	10/27/2005	80	3.00	5.3
51	logbook	670	C	0551C	10/27/2005	11/9/2005	80	3.50	17.3
57	logbook	650	A	0557A	10/26/2005	11/16/2005	60	2.50	21.0
57	logbook	650	B	0557B	10/26/2005	11/16/2005	80	3.00	28.0
72	logbook	610	A	0572A	10/6/2005	11/7/2005	100	3.00	53.3
72	logbook	670	B	0572B	10/21/2005	10/23/2005	100	3.00	3.3
72	logbook	670	C	0572C	10/21/2005	10/26/2005	100	3.00	8.3
72	logbook	670	D	0572D	10/28/2005	11/6/2005	120	3.25	18.0
79	logbook	650	A	0579A	10/11/2005	10/24/2005	80	3.00	17.3
79	logbook	650	B	0579B	10/11/2005	10/24/2005	80	3.00	17.3
79	logbook	610	C	0579C	11/2/2005	11/10/2005	80	3.00	10.7
79	logbook	610	D	0579D	10/18/2005	11/7/2005	80	3.00	26.7
20	volunteer	610	A	0520A	11/3/2005	11/12/2005	60	3.00	9.0
32	volunteer	650	A	0532A	10/12/2005	10/31/2005	80	3.00	25.3
32	volunteer	650	B	0532B	10/12/2005	10/31/2005	80	3.50	25.3
33	volunteer	610	A	0533A	10/25/2005	10/28/2005	80	3.00	4.0
33	volunteer	610	B	0533B	10/25/2005	10/28/2005	80	3.00	4.0
65	volunteer	650	A	0565A	10/24/2005	11/12/2005	60	2.75	19.0
65	volunteer	650	B	0565B	10/24/2005	11/8/2005	60	2.75	15.0

Appendix Table A-2. Calculation of Arctic cisco catch rate in 76-mm mesh in the Nigliq Channel, 1986-2005.

Harvest Year	Upper Nigliq			Nanuk			Nigliq Delta			Nigliq Channel Total		
	Observed			Observed			Observed			Observed		
	Catch (no. of Fish)	Observed Effort (net-days)	CPUE (fish per net Day)	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)
1986	2,218	115.7	19.2	752	25.1	29.9	3,379	51.3	65.8	6,349	192.2	33.0
1987	1,451	131.7	11.0	948	32.6	29.1	661	31.3	21.1	3,060	195.7	15.6
1988	366	56.9	6.4	146	18.0	8.1	2,078	37.3	55.7	2,590	112.3	23.1
1989	993	90.8	10.9	258	14.3	18.0	535	21.7	24.7	1,786	126.8	14.1
1990	650	147.1	4.4	1,114	148.5	7.5	202	27.6	7.3	1,966	323.1	6.1
1991	522	143.0	3.7	1,327	326.9	4.1	16	8.0	2.0	1,865	477.9	3.9
1992	4,825	316.2	15.3	2,322	130.4	17.8	4,956	96.2	51.5	12,103	542.8	22.3
1993	1,709	106.2	16.1	5,783	158.3	36.5	1,568	57.7	27.2	9,060	322.2	28.1
1994	366	99.0	3.7	642	190.2	3.4	0	0.0	--	1,008	289.2	3.5
1995	56	50.3	1.1	568	178.3	3.2	267	12.0	22.3	891	240.7	3.7
1996	413	36.0	11.5	3,591	193.3	18.6	0	0.0	--	4,004	229.3	17.5
1997	2,539	119.0	21.3	3,586	128.8	27.8	2,207	53.3	41.4	8,332	301.2	27.7
1998	189	92.3	2.0	218	83.7	2.6	1,214	155.3	7.8	1,621	331.3	4.9
1999	0	0.0	--	0	0.0	--	0	0.0	--	0	0.0	--
2000	8	8.0	1.0	217	62.0	3.5	1,826	190.4	9.6	2,051	260.4	7.9
2001	92	62.0	1.5	36	22.7	1.6	611	208.8	2.9	739	293.4	2.5
2002	103	115.7	0.9	137	36.7	3.7	2,925	460.9	6.3	3,165	613.2	5.2
2003	62	11.7	5.3	1,495	104.0	14.4	6,187	455.7	13.6	7,744	571.3	13.6
2004	338	22.0	15.4	8,102	270.9	29.9	5,021	199.7	25.1	13,461	492.6	27.3
2005	1,387	90.0	15.4	3,222	169.5	19.0	4,512	177.0	25.5	9,121	436.5	20.9

Appendix Table A-3. Calculation of least cisco catch rate in 76-mm mesh in the Nigliq Channel, 1986-2005.

Harvest Year	Upper Nigliq			Nanuk			Nigliq Delta			Nigliq Channel Total		
	Observed			Observed			Observed			Observed		
	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)	Catch (No. of Fish)	Observed Effort (Net-days)	CPUE (Fish per Net Day)
1986	146	115.7	1.3	16	25.1	0.6	24	51.3	0.5	186	192.2	1.0
1987	730	131.7	5.5	63	32.6	1.9	12	31.3	0.4	805	195.7	4.1
1988	93	56.9	1.6	12	18.0	0.7	105	37.3	2.8	210	112.3	1.9
1989	332	90.8	3.7	16	14.3	1.1	10	21.7	0.5	358	126.8	2.8
1990	711	147.1	4.8	416	148.5	2.8	179	27.6	6.5	1,306	323.1	4.0
1991	50	143.0	0.3	272	326.9	0.8	0	8.0	0.0	322	477.9	0.7
1992	261	316.2	0.8	88	130.4	0.7	151	96.2	1.6	500	542.8	0.9
1993	181	106.2	1.7	498	158.3	3.1	96	57.7	1.7	775	322.2	2.4
1994	330	99.0	3.3	711	190.2	3.7	0	0.0	--	1,041	289.2	3.6
1995	238	50.3	4.7	494	178.3	2.8	94	12.0	7.8	826	240.7	3.4
1996	14	36.0	0.4	195	193.3	1.0	0	0.0	--	209	229.3	0.9
1997	1,370	119.0	11.5	1,575	128.8	12.2	203	53.3	3.8	3,148	301.2	10.5
1998	544	92.3	5.9	577	83.7	6.9	935	155.3	6.0	2,056	331.3	6.2
1999	0	0.0	--	0	0.0	--	0	0.0	--	0	0.0	--
2000	11	8.0	1.4	97	62.0	1.6	330	190.4	1.7	438	260.4	1.7
2001	129	62.0	2.1	222	22.7	9.8	491	208.8	2.4	842	293.4	2.9
2002	176	115.7	1.5	165	36.7	4.5	1,033	460.9	2.2	1,374	613.2	2.2
2003	25	11.7	2.1	459	104.0	4.4	1,038	455.7	2.3	1,522	571.3	2.7
2004	167	22.0	7.6	2,493	270.9	9.2	1,483	199.7	7.4	4,143	492.6	8.4
2005	405	90.0	4.5	710	140.3	5.1	700	177.0	4.0	1,815	407.3	4.5

A-5

Appendix Table 4. Age frequencies of arctic cisco caught in 76 mm mesh, 1976-2005.

Age (Years)	Percent																								
	1976	1977	1978	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
3	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.5	10.7	0.0	0.0	0.0	0.5	0.0	18.3	7.3	4.9	0.0	0.0	0.7	0.0	0.0	0.0	28.7	24.5	3.5	10.3	7.6	0.0	0.7	1.0
5	3.2	57.7	10.2	10.2	3.3	0.0	0.0	63.5	0.0	86.0	51.0	59.7	3.4	10.8	59.5	5.3	43.2	14.0	65.0	33.6	16.5	72.9	20.0	11.3	1.0
6	54.8	15.4	74.0	77.2	21.5	41.2	1.0	1.6	72.0	3.3	33.6	36.4	79.7	31.7	23.6	84.7	11.6	48.3	2.8	37.1	37.1	14.6	75.0	51.1	50.5
7	6.4	23.6	0.9	9.1	68.2	50.8	59.0	0.8	0.0	2.7	1.4	3.9	14.9	46.8	7.4	9.3	41.1	4.2	8.4	4.2	14.4	4.2	5.0	34.8	36.9
8	29.0	1.6	2.8	0.0	4.8	8.0	32.0	31.0	0.0	0.0	5.6	0.0	2.0	9.4	7.4	0.7	4.1	9.1	2.8	11.2	4.1	0.7	0.0	1.4	10.7
9	6.4	0.5	0.0	0.0	1.3	0.0	7.6	2.4	9.3	0.0	0.0	0.0	0.0	0.7	2.0	0.0	0.0	1.4	1.4	4.2	12.4	0.0	0.0	0.0	0.0
10	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	5.2	0.0	0.0	0.7	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0
N =	31	182	215	est.	est.	199	196	126	est.	150	143	154	148	139	148	150	146	151	150	143	97	144	est.	141	103

1984, 1985, 1989 and 2003 age distributions estimated by comparing length frequencies of Arctic cisco caught in gill nets to fish caught in fyke nets

Appendix Table 5. Catch rate of arctic cisco in the Nigliq Channel fishery by year-class, 1985-2005 (outlined boxes indicate year-class CPUE at age-5).

Year Class	Fishing Year																				Year Class Total		
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004		2005	
1976	0.2																					0.2	
1977	0.7																						0.7
1978	9.9	2.6	1.2																				13.7
1979	3.1	16.8	5.0	0.6	0.0																		25.5
1980	0.5	13.6	9.2	7.2	1.3	0.0																	31.8
1981			0.2	0.2	0.0	0.0	0.1																0.4
1982				0.4	0.0	0.0	0.0																0.4
1983			0.1	14.6	10.1	0.2	0.2																25.2
1984				0.0	0.0	0.2	0.1																0.3
1985				0.2	2.6	5.2	1.3	0.9	0.6	0.0													10.8
1986					0.4	2.0	8.1	4.2	0.3	0.1													15.1
1987						0.2	13.3	22.4	1.6	0.3													37.8
1988							0.9	1.1	0.3	0.1													2.4
1989								0.4	0.9	1.6	1.1	0.1	--	0.2									4.3
1990								0.0	2.2	14.8	11.4	0.4	--	0.3									29.1
1991									0.9	3.2	0.2	--	0.3	0.1									4.8
1992										11.9	2.2	--	0.9	0.3									15.4
1993											0.6	--	0.3	0.1									1.1
1994												1.3	--	2.9	0.4	0.0				0.2			4.8
1995															2.6	0.9	0.2			0.0			3.8
1996															0.3	0.4	0.8	0.7	0.4				2.5
1997																0.3	3.8	10.2	9.5	2.2			25.9
1998																	0.4	2.7	14.0	7.7			24.8
1999																			3.1	10.6			13.7
2000																			0.2	0.2			0.4
2001																					0.2		0.2
Total CPUE	14.5	33.0	15.6	23.1	14.1	6.1	3.9	22.3	28.1	3.5	3.7	17.5	27.7	4.9	no data	7.9	2.5	5.2	13.6	27.3	20.9		

A-7

Appendix Table 6. Salinity profiles from the Nigliq Channel, Colville Delta, 2005.

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

Upper Nigliq (RK 29)

Depth (m)	Salinity (ppt)				
	Nov 1	Nov 3	Nov 5	Nov 7	Nov 9
0.5	0.3	0.3	0.4	0.4	0.6
1.0	0.3	1.9	1.9	2.0	5.1
1.5	2.7	4.1	7.5	8.0	9.3
2.0	5.1	6.4	8.7	8.7	10.2
2.5	7.0	7.2	9.1	8.9	10.7
3.0	7.5	7.8	9.5	9.0	11.1
3.5	7.6	8.0	9.6	9.1	11.3
4.0					

Nanuq Lake (RK 15)

Depth (m)	Salinity (ppt)				
	Nov 1	Nov 3	Nov 5	Nov 7	Nov 9
0.5	2.1	3.0	4.1	3.8	4.1
1.0	4.9	6.1	10.2	9.9	4.5
1.5	19.2	20.3	19.5	19.3	19.1
2.0	19.8	22.6	21.7	22.8	22.8
2.5	20.7	21.3	22.9	23.1	23.2
3.0	21.4	21.9	23.1	23.3	23.3
3.5	22.8	22.8	23.3	23.3	23.4
4.0	23.0	23.4	23.5	23.4	23.4
4.5	23.0	23.4	23.6	23.6	23.5
5.0	23.1	23.8	23.7	23.8	23.6
5.5	23.1	23.8	23.7	23.7	23.8
6.0	23.1	23.9	23.8	23.7	23.8
6.5	23.1	23.9	23.8	24.0	23.8
7.0	23.1	24.3			

Nigliq Delta (RK 6)

Depth (m)	Salinity (ppt)				
	Nov 1	Nov 3	Nov 5	Nov 7	Nov 9
0.5	5.6	6.1	5.5	7.7	16.3
1.0	13.7	14.0	18.1	19.4	20.1
1.5	20.1	19.7	19.6	20.9	22.0
2.0	20.4	20.3	20.5	21.2	23.3
2.5	23.9	20.8	23.0	24.0	25.6
3.0	25.0	24.0	25.6	26.5	27.0
3.5	25.4	25.5	26.4	27.7	28.2
4.0	26.6	25.9	27.3	28.1	28.8
4.5	27.6	27.8	28.6	28.7	29.1
5.0	28.1	28.3	28.7	28.7	29.1
5.5	28.6	29.4	28.9	28.8	29.4
6.0	28.9	30.0	28.8	29.0	29.5
6.5					

**APPENDIX B**

**Tissue Hydrocarbon Data**



**Analytical Resources, Incorporated**  
Analytical Chemists and Consultants

December 14, 2005

Larry Moulton  
MJM Research  
[lmoulton@rockisland.com](mailto:lmoulton@rockisland.com)

**RE: Project: Nuiqsut Arctic Cisco - Bodies**  
**ARI Job: IU71**

Dear Larry,

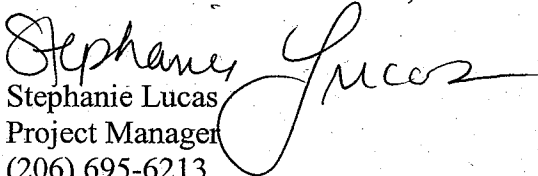
Please find enclosed chain of custody records and analytical results for the above referenced project. Analytical Resources, Inc. accepted 20 fish samples in good condition on November 16, 2005.

The fish samples were prepared and analyzed for SIM PNA's, as requested.

Please refer to the case narrative for anomalies associated with these samples.

Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file electronically at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,  
ANALYTICAL RESOURCES, INC.

  
Stephanie Lucas  
Project Manager  
(206) 695-6213  
[www.arilabs.com](http://www.arilabs.com)

Enclosures





**Case Narrative**

**Project: Nuiqsut Arctic Cisco - Bodies**

**ARI Job: IU71**

**December 14, 2005**

**SIM PNA by Method 8270**

The samples were extracted on 12/06/05 and analyzed on 12/08/05 within the method recommended holding time.

**Samples:** The d12-perylene and/or the d12-chrysene internal standards failed high in the initial analysis of samples **C3 Nanook 650 Body**, **C5 Nanook 650 Body**, and **D4 Station 610 Body**. The samples were re-analyzed with similar IS failure indicating matrix effects. Both runs are reported for all samples.

There were no other anomalies associated with these samples.

**Method Blank:** The method blanks were free of contamination.

**Surrogates:** The d14-Dibenzo(a,h)anthracene surrogate recovery was low in samples **C1 Nanook 650 Body** and **C2 Nanook 650 Body**. As the limits are advisory, no corrective action was taken. All other surrogate recoveries were within the advisory limits of 30% - 160%

**LCS/LCSD:** All percent recoveries were within the advisory limits of 30% - 160%.

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: C1 Nanook 650 Body

SAMPLE

Lab Sample ID: IU71A

LIMS ID: 05-20537

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/12/05 12:28

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatle Surrogate Recovery**

d10-2-Methylnaphthalene 42.3%  
d14-Dibenzo (a,h) anthracen 21.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: C2 Nanook 650 Body

SAMPLE

Lab Sample ID: IU71B

LIMS ID: 05-20538

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/12/05 12:51

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatle Surrogate Recovery**

d10-2-Methylnaphthalene 39.3%  
d14-Dibenzo (a,h) anthracen 20.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: C3 Nanook 650 Body

SAMPLE

Lab Sample ID: IU71C

LIMS ID: 05-20539

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/12/05 13:14

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 88.7%  
d14-Dibenzo (a,h) anthracen 41.3%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: C3 Nanook 650 Body

REANALYSIS

Lab Sample ID: IU71C

LIMS ID: 05-20539

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 14:42

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 87.7%  
d14-Dibenzo (a,h) anthracen 47.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: C4 Nanook 650 Body  
SAMPLE

Lab Sample ID: IU71D

LIMS ID: 05-20540

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 13:09

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo(a)anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo(b)fluoranthene	10	< 10 U
207-08-9	Benzo(k)fluoranthene	10	< 10 U
50-32-8	Benzo(a)pyrene	10	< 10 U
193-39-5	Indeno(1,2,3-cd)pyrene	10	< 10 U
53-70-3	Dibenz(a,h)anthracene	10	< 10 U
191-24-2	Benzo(g,h,i)perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 87.7%  
d14-Dibenzo(a,h)anthracen 51.3%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: C5 Nanook 650 Body

SAMPLE

Lab Sample ID: IU71E

LIMS ID: 05-20541

Matrix: Tissue

Data Release Authorized: *[Signature]*

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/12/05 14:01

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 76.7%  
d14-Dibenzo (a,h) anthracen 53.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS


Page 1 of 1

Sample ID: C5 Nanook 650 Body  
REANALYSIS

Lab Sample ID: IU71E

LIMS ID: 05-20541

Matrix: Tissue

Data Release Authorized: 

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 15:05

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 79.3%  
d14-Dibenzo (a,h) anthracen 68.0%



**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: D1 Station 610 Body

**SAMPLE**

Lab Sample ID: IU71F

LIMS ID: 05-20542

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 12:23

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 75.0%  
d14-Dibenzo (a,h) anthracen 50.3%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1


Sample ID: D2 Station 610 Body

**SAMPLE**

Lab Sample ID: IU71G

LIMS ID: 05-20543

Matrix: Tissue

Data Release Authorized: 

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 12:46

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 67.3%  
d14-Dibenzo (a,h) anthracen 42.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1


Sample ID: D3 Station 610 Body

SAMPLE

Lab Sample ID: IU71H

LIMS ID: 05-20544

Matrix: Tissue

Data Release Authorized: 

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 13:32

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatle Surrogate Recovery**

d10-2-Methylnaphthalene 80.7%  
d14-Dibenzo (a,h) anthracen 54.3%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: D4 Station 610 Body

SAMPLE

Lab Sample ID: IU71I

LIMS ID: 05-20545

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 14:19

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 80.7%  
d14-Dibenzo (a,h) anthracen 46.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: D4 Station 610 Body  
DILUTION

Lab Sample ID: IU71I

LIMS ID: 05-20545

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 15:28

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 2.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	20	< 20 U
91-57-6	2-Methylnaphthalene	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
83-32-9	Acenaphthene	20	< 20 U
86-73-7	Fluorene	20	< 20 U
85-01-8	Phenanthrene	20	< 20 U
120-12-7	Anthracene	20	< 20 U
206-44-0	Fluoranthene	20	< 20 U
129-00-0	Pyrene	20	< 20 U
56-55-3	Benzo (a) anthracene	20	< 20 U
218-01-9	Chrysene	20	< 20 U
205-99-2	Benzo (b) fluoranthene	20	< 20 U
207-08-9	Benzo (k) fluoranthene	20	< 20 U
50-32-8	Benzo (a) pyrene	20	< 20 U
193-39-5	Indeno (1, 2, 3-cd) pyrene	20	< 20 U
53-70-3	Dibenz (a, h) anthracene	20	< 20 U
191-24-2	Benzo (g, h, i) perylene	20	< 20 U
132-64-9	Dibenzofuran	20	< 20 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 83.3%  
d14-Dibenzo (a, h) anthracen 46.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: D5 Station 610 Body

SAMPLE

Lab Sample ID: IU71J

LIMS ID: 05-20546

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/13/05 13:55

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 81.3%  
d14-Dibenzo (a,h) anthracen 45.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: Grinder Rinsate #1

**SAMPLE**

Lab Sample ID: IU71K

LIMS ID: 05-20686

Matrix: Water

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 12/05/05

Date Received: 12/06/05

Date Extracted: 12/07/05

Date Analyzed: 12/08/05 18:26

Instrument/Analyst: NT1/VTS

Sample Amount: 500 mL

Final Extract Volume: 0.5 mL

Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	0.10	< 0.10 U
91-57-6	2-Methylnaphthalene	0.10	< 0.10 U
208-96-8	Acenaphthylene	0.10	< 0.10 U
83-32-9	Acenaphthene	0.10	< 0.10 U
86-73-7	Fluorene	0.10	< 0.10 U
85-01-8	Phenanthrene	0.10	< 0.10 U
120-12-7	Anthracene	0.10	< 0.10 U
206-44-0	Fluoranthene	0.10	< 0.10 U
129-00-0	Pyrene	0.10	< 0.10 U
56-55-3	Benzo (a) anthracene	0.10	< 0.10 U
218-01-9	Chrysene	0.10	< 0.10 U
205-99-2	Benzo (b) fluoranthene	0.10	< 0.10 U
207-08-9	Benzo (k) fluoranthene	0.10	< 0.10 U
50-32-8	Benzo (a) pyrene	0.10	< 0.10 U
193-39-5	Indeno (1,2,3-cd) pyrene	0.10	< 0.10 U
53-70-3	Dibenz (a,h) anthracene	0.10	< 0.10 U
191-24-2	Benzo (g,h,i) perylene	0.10	< 0.10 U
132-64-9	Dibenzofuran	0.10	< 0.10 U

Reported in  $\mu\text{g/L}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 75.0%

d14-Dibenzo (a,h) anthracen 91.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: Grinder Rinsate #2  
SAMPLE

Lab Sample ID: IU71L

LIMS ID: 05-20687

Matrix: Water

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 12/05/05

Date Received: 12/06/05

Date Extracted: 12/07/05

Date Analyzed: 12/08/05 18:49

Instrument/Analyst: NT1/VTS

Sample Amount: 500 mL

Final Extract Volume: 0.5 mL

Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	0.10	< 0.10 U
91-57-6	2-Methylnaphthalene	0.10	< 0.10 U
208-96-8	Acenaphthylene	0.10	< 0.10 U
83-32-9	Acenaphthene	0.10	< 0.10 U
86-73-7	Fluorene	0.10	< 0.10 U
85-01-8	Phenanthrene	0.10	< 0.10 U
120-12-7	Anthracene	0.10	< 0.10 U
206-44-0	Fluoranthene	0.10	< 0.10 U
129-00-0	Pyrene	0.10	< 0.10 U
56-55-3	Benzo (a) anthracene	0.10	< 0.10 U
218-01-9	Chrysene	0.10	< 0.10 U
205-99-2	Benzo (b) fluoranthene	0.10	< 0.10 U
207-08-9	Benzo (k) fluoranthene	0.10	< 0.10 U
50-32-8	Benzo (a) pyrene	0.10	< 0.10 U
193-39-5	Indeno (1,2,3-cd) pyrene	0.10	< 0.10 U
53-70-3	Dibenz (a,h) anthracene	0.10	< 0.10 U
191-24-2	Benzo (g,h,i) perylene	0.10	< 0.10 U
132-64-9	Dibenzofuran	0.10	< 0.10 U

Reported in  $\mu\text{g/L}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 79.7%

d14-Dibenzo (a,h) anthracen 85.3%



**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: MB-120605

METHOD BLANK

Lab Sample ID: MB-120605

LIMS ID: 05-20537

Matrix: Tissue

Data Release Authorized:

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted: 12/06/05

Date Analyzed: 12/12/05 12:05

Instrument/Analyst: NT1/YZ

GPC Cleanup: No

Sample Amount: 10.0 g-dry-wt

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 65.7%  
d14-Dibenzo (a,h) anthracen 83.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: MB-120705

METHOD BLANK

Lab Sample ID: MB-120705

LIMS ID: 05-20686

Matrix: Water

Data Release Authorized: *AS*

Reported: 12/09/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted: 12/07/05

Date Analyzed: 12/08/05 17:40

Instrument/Analyst: NTI/VTS

Sample Amount: 500 mL

Final Extract Volume: 0.5 mL

Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	0.10	< 0.10 U
91-57-6	2-Methylnaphthalene	0.10	< 0.10 U
208-96-8	Acenaphthylene	0.10	< 0.10 U
83-32-9	Acenaphthene	0.10	< 0.10 U
86-73-7	Fluorene	0.10	< 0.10 U
85-01-8	Phenanthrene	0.10	< 0.10 U
120-12-7	Anthracene	0.10	< 0.10 U
206-44-0	Fluoranthene	0.10	< 0.10 U
129-00-0	Pyrene	0.10	< 0.10 U
56-55-3	Benzo (a) anthracene	0.10	< 0.10 U
218-01-9	Chrysene	0.10	< 0.10 U
205-99-2	Benzo (b) fluoranthene	0.10	< 0.10 U
207-08-9	Benzo (k) fluoranthene	0.10	< 0.10 U
50-32-8	Benzo (a) pyrene	0.10	< 0.10 U
193-39-5	Indeno (1,2,3-cd) pyrene	0.10	< 0.10 U
53-70-3	Dibenz (a,h) anthracene	0.10	< 0.10 U
191-24-2	Benzo (g,h,i) perylene	0.10	< 0.10 U
132-64-9	Dibenzofuran	0.10	< 0.10 U

Reported in  $\mu\text{g/L}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 73.0%

d14-Dibenzo (a,h) anthracen 84.7%

**SIM SW8270 SURROGATE RECOVERY SUMMARY**

Matrix: Tissue

QC Report No: IU71-MJM Research  
Project: Nuiqsut Arctic Cisco

<u>Client ID</u>	<u>MNP</u>	<u>DBA</u>	<u>TOT OUT</u>
MB-120605	65.7%	83.0%	0
LCS-120605	77.3%	88.7%	0
C1 Nanook 650 Body	42.3%	21.7%*	1
C2 Nanook 650 Body	39.3%	20.0%*	1
C3 Nanook 650 Body	88.7%	41.3%	0
C3 Nanook 650 Body DL	87.7%	47.0%	0
C4 Nanook 650 Body	87.7%	51.3%	0
C5 Nanook 650 Body	76.7%	53.0%	0
C5 Nanook 650 Body DL	79.3%	68.0%	0
D1 Station 610 Body	75.0%	50.3%	0
D2 Station 610 Body	67.3%	42.7%	0
D3 Station 610 Body	80.7%	54.3%	0
D4 Station 610 Body	80.7%	46.0%	0
D4 Station 610 Body D	83.3%	46.0%	0
D5 Station 610 Body	81.3%	45.7%	0

<b>LCS/MB LIMITS</b>	<b>QC LIMITS</b>
<b>(Advisory)</b>	<b>(Advisory)</b>

(MNP) = d10-2-Methylnaphthalene	(30-160)	(30-160)
(DBA) = d14-Dibenzo(a,h)anthracene	(30-160)	(30-160)

Prep Method: TISSM  
Log Number Range: 05-20537 to 05-20546

**SIM SW8270 SURROGATE RECOVERY SUMMARY**

Matrix: Water

QC Report No: IU71-MJM Research  
Project: Nuiqsut Arctic Cisco

<u>Client ID</u>	<u>MNP</u>	<u>DBA</u>	<u>TOT OUT</u>
MB-120705	73.0%	84.7%	0
LCS-120705	74.3%	85.0%	0
Grinder Rinsate #1	75.0%	91.0%	0
Grinder Rinsate #2	79.7%	85.3%	0

	<u>LCS/MB LIMITS</u>	<u>QC LIMITS</u>
(MNP) = d10-2-Methylnaphthalene	(38-109)	(29-112)
(DBA) = d14-Dibenzo(a,h)anthracene	(28-131)	(10-133)

Prep Method: SW3520C  
Log Number Range: 05-20686 to 05-20687

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: LCS-120605

LAB CONTROL SAMPLE

Lab Sample ID: LCS-120605

LIMS ID: 05-20537

Matrix: Tissue

Data Release Authorized: *AB*

Reported: 12/14/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted: 12/06/05

Sample Amount LCS: 10.0 g-dry-wt

LCS D: 10.0 g-dry-wt

Date Analyzed LCS: 12/12/05 10:48

Final Extract Volume LCS: 1.0 mL

LCS D: 12/12/05 11:11

LCS D: 1.0 mL

Instrument/Analyst LCS: NT1/YZ

Dilution Factor LCS: 1.00

LCS D: NT1/YZ

LCS D: 1.00

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCS D	Spike Added-LCS D	LCS D Recovery	RPD
Phenanthrene	239	300	79.7%	227	300	75.7%	5.2%
Chrysene	261	300	87.0%	272	300	90.7%	4.1%
Benzo(k)fluoranthene	178	300	59.3%	174	300	58.0%	2.3%

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

RPD calculated using sample concentrations per SW846.

**SIM Semivolatile Surrogate Recovery**

	LCS	LCS D
d10-2-Methylnaphthalene	77.3%	68.0%
d14-Dibenzo(a,h)anthracen	88.7%	86.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: LCS-120705

LAB CONTROL SAMPLE

Lab Sample ID: LCS-120705

LIMS ID: 05-20686

Matrix: Water

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU71-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted LCS/LCSD: 12/07/05

Date Analyzed LCS: 12/08/05 18:03

Instrument/Analyst LCS: NT1/VTS

Sample Amount LCS: 500 mL

Final Extract Volume LCS: 0.50 mL

Dilution Factor LCS: 1.00

Analyte	LCS	Spike Added	Recovery
Phenanthrene	2.51	3.00	83.7%
Chrysene	2.57	3.00	85.7%
Benzo(k)fluoranthene	1.70	3.00	56.7%

Reported in  $\mu\text{g/L}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 74.3%

d14-Dibenzo(a,h)anthracen 85.0%



**Analytical Resources, Incorporated**  
Analytical Chemists and Consultants

December 14, 2005

Larry Moulton  
MJM Research  
[lmoulton@rockisland.com](mailto:lmoulton@rockisland.com)

**RE: Project: Nuiqsut Arctic Cisco - Muscle**  
**ARI Job: IU70**

Dear Larry,

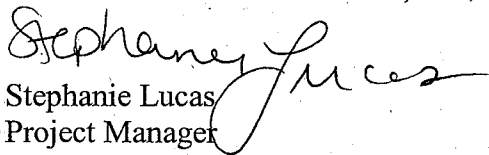
Please find enclosed chain of custody records and analytical results for the above referenced project. Analytical Resources, Inc. accepted 20 fish samples in good condition on November 16, 2005.

The fish samples were prepared and analyzed for SIM PNA's, as requested.

There were no anomalies associated with these samples.

Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file electronically at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,  
ANALYTICAL RESOURCES, INC.

  
Stephanie Lucas  
Project Manager  
(206) 695-6213  
[www.arilabs.com](http://www.arilabs.com)

Enclosures

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: A1 Nanook 650 Muscle

SAMPLE

Lab Sample ID: IU70A

LIMS ID: 05-20527

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 13:49

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 92.3%  
d14-Dibenzo (a,h) anthracen 92.0%



**ORGANICS ANALYSIS DATA SHEET**  
**PNAs by SW8270D-SIM GC/MS**  
 Page 1 of 1

Sample ID: A2 Nanook 650 Muscle  
**SAMPLE**

Lab Sample ID: IU70B  
 LIMS ID: 05-20528  
 Matrix: Tissue  
 Data Release Authorized:  
 Reported: 12/09/05

QC Report No: IU70-MJM Research  
 Project: Nuiqsut Arctic Cisco  
 Event: NA  
 Date Sampled: 11/09/05  
 Date Received: 11/16/05

Date Extracted: 12/06/05  
 Date Analyzed: 12/08/05 14:12  
 Instrument/Analyst: NT1/VTS  
 GPC Cleanup: No

Sample Amount: 10.0 g-as-rec  
 Final Extract Volume: 1.0 mL  
 Dilution Factor: 1.00  
 Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene	94.0%
d14-Dibenzo (a,h) anthracen	92.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: A3 Nanook 650 Muscle

SAMPLE

Lab Sample ID: IU70C

LIMS ID: 05-20529

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 14:35

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 79.0%  
d14-Dibenzo (a,h) anthracen 85.3%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: A4 Nanook 650 Muscle

**SAMPLE**

Lab Sample ID: IU70D


QC Report No: IU70-MJM Research

LIMS ID: 05-20530

Project: Nuiqsut Arctic Cisco

Matrix: Tissue

Event: NA

Data Release Authorized: 

Date Sampled: 11/09/05

Reported: 12/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Sample Amount: 10.0 g-as-rec

Date Analyzed: 12/08/05 14:59

Final Extract Volume: 1.0 mL

Instrument/Analyst: NT1/VTS

Dilution Factor: 1.00

GPC Cleanup: No

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 95.3%  
d14-Dibenzo (a,h) anthracen 93.0%

**ORGANICS ANALYSIS DATA SHEET**

**PNAs by SW8270D-SIM GC/MS**

Page 1 of 1

Sample ID: A5 Nanook 650 Muscle

**SAMPLE**

Lab Sample ID: IU70E

LIMS ID: 05-20531

Matrix: Tissue

Data Release Authorized: *AB*

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 15:22

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 89.7%  
d14-Dibenzo (a,h) anthracen 78.3%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: BI Station 610 Muscle

SAMPLE

Lab Sample ID: IU70F

LIMS ID: 05-20532

Matrix: Tissue

Data Release Authorized: *AB*

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 15:45

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatle Surrogate Recovery**

d10-2-Methylnaphthalene 83.0%  
d14-Dibenzo (a,h) anthracen 83.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B2 Station 610 Muscle

**SAMPLE**

Lab Sample ID: IU70G

LIMS ID: 05-20533

Matrix: Tissue

Data Release Authorized: *[Signature]*

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 16:08

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1, 2, 3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a, h) anthracene	10	< 10 U
191-24-2	Benzo (g, h, i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 83.7%  
d14-Dibenzo (a, h) anthracen 83.0%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B3 Station 610 Muscle  
SAMPLE

Lab Sample ID: IU70H

LIMS ID: 05-20534

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 16:31

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 85.7%  
d14-Dibenzo (a,h) anthracen 88.0%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B4 Station 610 Muscle

SAMPLE

Lab Sample ID: IU70I

LIMS ID: 05-20535

Matrix: Tissue

Data Release Authorized: *MS*

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 16:54

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatle Surrogate Recovery**

d10-2-Methylnaphthalene 85.7%  
d14-Dibenzo (a,h) anthracen 87.7%



**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1


Sample ID: B5 Station 610 Muscle  
SAMPLE

Lab Sample ID: IU70J

LIMS ID: 05-20536

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05 

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 17:17

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 86.7%  
d14-Dibenzo (a,h) anthracen 88.7%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: MB-120605

METHOD BLANK

Lab Sample ID: MB-120605

LIMS ID: 05-20527

Matrix: Tissue

Data Release Authorized: *AB*

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted: 12/06/05

Date Analyzed: 12/08/05 12:40

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 10.0 g-dry-wt

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 84.7%  
d14-Dibenzo (a,h) anthracen 96.0%

**SIM SW8270 SURROGATE RECOVERY SUMMARY**

Matrix: Tissue

QC Report No: IU70-MJM Research  
Project: Nuiqsut Arctic Cisco

<u>Client ID</u>	<u>MNP</u>	<u>DBA</u>	<u>TOT OUT</u>
MB-120605	84.7%	96.0%	0
LCS-120605	82.3%	81.0%	0
A1 Nanook 650 Muscle	92.3%	92.0%	0
A2 Nanook 650 Muscle	94.0%	92.7%	0
A3 Nanook 650 Muscle	79.0%	85.3%	0
A4 Nanook 650 Muscle	95.3%	93.0%	0
A5 Nanook 650 Muscle	89.7%	78.3%	0
B1 Station 610 Muscle	83.0%	83.0%	0
B2 Station 610 Muscle	83.7%	83.0%	0
B3 Station 610 Muscle	85.7%	88.0%	0
B4 Station 610 Muscle	85.7%	87.7%	0
B5 Station 610 Muscle	86.7%	88.7%	0

<b>LCS/MB LIMITS</b>	<b>QC LIMITS</b>
<b>(Advisory)</b>	<b>(Advisory)</b>

(MNP) = d10-2-Methyl-naphthalene	(30-160)	(30-160)
(DBA) = d14-Dibenzo(a,h)anthracene	(30-160)	(30-160)

Prep Method: TISSM  
Log Number Range: 05-20527 to 05-20536

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: LCS-120605

LAB CONTROL SAMPLE

Lab Sample ID: LCS-120605

LIMS ID: 05-20527

Matrix: Tissue

Data Release Authorized: *AB*

Reported: 12/09/05

QC Report No: IU70-MJM Research

Project: Nuiqsut Arctic Cisco

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted: 12/06/05

Sample Amount LCS: 10.0 g-dry-wt

LCS D: 10.0 g-dry-wt

Date Analyzed LCS: 12/08/05 13:03

Final Extract Volume LCS: 1.0 mL

LCS D: 12/08/05 13:26

LCS D: 1.0 mL

Instrument/Analyst LCS: NT1/VTS

Dilution Factor LCS: 1.00

LCS D: NT1/VTS

LCS D: 1.00

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCS D	Spike Added-LCS D	LCS D Recovery	RPD
Phenanthrene	253	300	84.3%	259	300	86.3%	2.3%
Chrysene	244	300	81.3%	259	300	86.3%	6.0%
Benzo(k)fluoranthene	155	300	51.7%	182	300	60.7%	16.0%

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

RPD calculated using sample concentrations per SW846.

**SIM Semivolatile Surrogate Recovery**

	LCS	LCS D
d10-2-Methylnaphthalene	82.3%	85.7%
d14-Dibenzo(a,h)anthracen	81.0%	88.7%



**Analytical Resources, Incorporated**  
Analytical Chemists and Consultants

December 14, 2005

Larry Moulton  
MJM Research  
[lmoulton@rockisland.com](mailto:lmoulton@rockisland.com)

**RE: Project: Nuiqsut Arctic Cisco - Livers**  
**ARI Job: IU69**

Dear Larry,

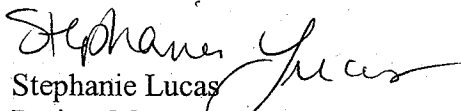
Please find enclosed chain of custody records and analytical results for the above referenced project. Analytical Resources, Inc. accepted 20 fish samples in good condition on November 16, 2005.

The fish samples were prepared and analyzed for SIM PNA's, as requested.

There were no anomalies associated with these samples.

Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file electronically at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,  
ANALYTICAL RESOURCES, INC.

  
Stephanie Lucas  
Project Manager  
(206) 695-6213  
[www.arilabs.com](http://www.arilabs.com)

Enclosures

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: A1 Nanook 650 Liver

**SAMPLE**

Lab Sample ID: IU69A

LIMS ID: 05-20517

Matrix: Tissue

Data Release Authorized: *[Signature]*

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 16:19

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 2.78 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	36	< 36 U
91-57-6	2-Methylnaphthalene	36	< 36 U
208-96-8	Acenaphthylene	36	< 36 U
83-32-9	Acenaphthene	36	< 36 U
86-73-7	Fluorene	36	< 36 U
85-01-8	Phenanthrene	36	< 36 U
120-12-7	Anthracene	36	< 36 U
206-44-0	Fluoranthene	36	< 36 U
129-00-0	Pyrene	36	< 36 U
56-55-3	Benzo (a) anthracene	36	< 36 U
218-01-9	Chrysene	36	< 36 U
205-99-2	Benzo (b) fluoranthene	36	< 36 U
207-08-9	Benzo (k) fluoranthene	36	< 36 U
50-32-8	Benzo (a) pyrene	36	< 36 U
193-39-5	Indeno (1,2,3-cd) pyrene	36	< 36 U
53-70-3	Dibenz (a,h) anthracene	36	< 36 U
191-24-2	Benzo (g,h,i) perylene	36	< 36 U
132-64-9	Dibenzofuran	36	< 36 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 75.0%  
d14-Dibenzo (a,h) anthracen 71.3%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: A2 Nanook 650 Liver

**SAMPLE**

Lab Sample ID: IU69B

QC Report No: IU69-MJM Research

LIMS ID: 05-20518

Project: NUIQSUT ARCTIC CISCO

Matrix: Tissue

Event: NA

Data Release Authorized:

Date Sampled: 11/09/05

Reported: 12/09/05 

Date Received: 11/16/05

Date Extracted: 12/06/05

Sample Amount: 6.22 g-as-rec

Date Analyzed: 12/07/05 16:42

Final Extract Volume: 1.0 mL

Instrument/Analyst: NT1/VTS

Dilution Factor: 1.00

GPC Cleanup: No

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	16	< 16 U
91-57-6	2-Methylnaphthalene	16	< 16 U
208-96-8	Acenaphthylene	16	< 16 U
83-32-9	Acenaphthene	16	< 16 U
86-73-7	Fluorene	16	< 16 U
85-01-8	Phenanthrene	16	< 16 U
120-12-7	Anthracene	16	< 16 U
206-44-0	Fluoranthene	16	< 16 U
129-00-0	Pyrene	16	< 16 U
56-55-3	Benzo (a) anthracene	16	< 16 U
218-01-9	Chrysene	16	< 16 U
205-99-2	Benzo (b) fluoranthene	16	< 16 U
207-08-9	Benzo (k) fluoranthene	16	< 16 U
50-32-8	Benzo (a) pyrene	16	< 16 U
193-39-5	Indeno (1,2,3-cd) pyrene	16	< 16 U
53-70-3	Dibenz (a,h) anthracene	16	< 16 U
191-24-2	Benzo (g,h,i) perylene	16	< 16 U
132-64-9	Dibenzofuran	16	< 16 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 79.3%  
d14-Dibenzo (a,h) anthracen 78.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1


Sample ID: A3 Nanook 650 Liver

SAMPLE

Lab Sample ID: IU69C

LIMS ID: 05-20519

Matrix: Tissue

Data Release Authorized: 

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 17:05

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 3.84 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	26	< 26 U
91-57-6	2-Methylnaphthalene	26	< 26 U
208-96-8	Acenaphthylene	26	< 26 U
83-32-9	Acenaphthene	26	< 26 U
86-73-7	Fluorene	26	< 26 U
85-01-8	Phenanthrene	26	< 26 U
120-12-7	Anthracene	26	< 26 U
206-44-0	Fluoranthene	26	< 26 U
129-00-0	Pyrene	26	< 26 U
56-55-3	Benzo (a) anthracene	26	< 26 U
218-01-9	Chrysene	26	< 26 U
205-99-2	Benzo (b) fluoranthene	26	< 26 U
207-08-9	Benzo (k) fluoranthene	26	< 26 U
50-32-8	Benzo (a) pyrene	26	< 26 U
193-39-5	Indeno (1,2,3-cd) pyrene	26	< 26 U
53-70-3	Dibenz (a,h) anthracene	26	< 26 U
191-24-2	Benzo (g,h,i) perylene	26	< 26 U
132-64-9	Dibenzofuran	26	< 26 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 76.3%  
d14-Dibenzo (a,h) anthracen 77.3%



**ORGANICS ANALYSIS DATA SHEET**

**PNAs by SW8270D-SIM GC/MS**

Page 1 of 1

**Sample ID: A4 Nanook 650 Liver**

**SAMPLE**

Lab Sample ID: IU69D

QC Report No: IU69-MJM Research

LIMS ID: 05-20520

Project: NUIQSUT ARCTIC CISCO

Matrix: Tissue

Event: NA

Data Release Authorized:

Date Sampled: 11/09/05

Reported: 12/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Sample Amount: 2.84 g-as-rec

Date Analyzed: 12/07/05 17:28

Final Extract Volume: 1.0 mL

Instrument/Analyst: NT1/VTS

Dilution Factor: 1.00

GPC Cleanup: No

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	35	< 35 U
91-57-6	2-Methylnaphthalene	35	< 35 U
208-96-8	Acenaphthylene	35	< 35 U
83-32-9	Acenaphthene	35	< 35 U
86-73-7	Fluorene	35	< 35 U
85-01-8	Phenanthrene	35	< 35 U
120-12-7	Anthracene	35	< 35 U
206-44-0	Fluoranthene	35	< 35 U
129-00-0	Pyrene	35	< 35 U
56-55-3	Benzo(a)anthracene	35	< 35 U
218-01-9	Chrysene	35	< 35 U
205-99-2	Benzo(b)fluoranthene	35	< 35 U
207-08-9	Benzo(k)fluoranthene	35	< 35 U
50-32-8	Benzo(a)pyrene	35	< 35 U
193-39-5	Indeno(1,2,3-cd)pyrene	35	< 35 U
53-70-3	Dibenz(a,h)anthracene	35	< 35 U
191-24-2	Benzo(g,h,i)perylene	35	< 35 U
132-64-9	Dibenzofuran	35	< 35 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 72.0%  
d14-Dibenzo(a,h)anthracen 75.7%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: A5 Nanook 650 Liver  
SAMPLE

Lab Sample ID: IU69E

LIMS ID: 05-20521

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 17:51

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 5.82 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	17	< 17 U
91-57-6	2-Methylnaphthalene	17	< 17 U
208-96-8	Acenaphthylene	17	< 17 U
83-32-9	Acenaphthene	17	< 17 U
86-73-7	Fluorene	17	< 17 U
85-01-8	Phenanthrene	17	< 17 U
120-12-7	Anthracene	17	< 17 U
206-44-0	Fluoranthene	17	< 17 U
129-00-0	Pyrene	17	< 17 U
56-55-3	Benzo (a) anthracene	17	< 17 U
218-01-9	Chrysene	17	< 17 U
205-99-2	Benzo (b) fluoranthene	17	< 17 U
207-08-9	Benzo (k) fluoranthene	17	< 17 U
50-32-8	Benzo (a) pyrene	17	< 17 U
193-39-5	Indeno (1, 2, 3-cd) pyrene	17	< 17 U
53-70-3	Dibenz (a, h) anthracene	17	< 17 U
191-24-2	Benzo (g, h, i) perylene	17	< 17 U
132-64-9	Dibenzofuran	17	< 17 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 78.0%  
d14-Dibenzo (a, h) anthracen 80.3%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B1 Station 610 Liver  
SAMPLE

Lab Sample ID: IU69F

LIMS ID: 05-20522

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 18:14

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 4.52 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	22	< 22 U
91-57-6	2-Methylnaphthalene	22	< 22 U
208-96-8	Acenaphthylene	22	< 22 U
83-32-9	Acenaphthene	22	< 22 U
86-73-7	Fluorene	22	< 22 U
85-01-8	Phenanthrene	22	< 22 U
120-12-7	Anthracene	22	< 22 U
206-44-0	Fluoranthene	22	< 22 U
129-00-0	Pyrene	22	< 22 U
56-55-3	Benzo (a) anthracene	22	< 22 U
218-01-9	Chrysene	22	< 22 U
205-99-2	Benzo (b) fluoranthene	22	< 22 U
207-08-9	Benzo (k) fluoranthene	22	< 22 U
50-32-8	Benzo (a) pyrene	22	< 22 U
193-39-5	Indeno (1,2,3-cd) pyrene	22	< 22 U
53-70-3	Dibenz (a,h) anthracene	22	< 22 U
191-24-2	Benzo (g,h,i) perylene	22	< 22 U
132-64-9	Dibenzofuran	22	< 22 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 83.0%  
d14-Dibenzo (a,h) anthracen 81.0%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B2 Station 610 Liver  
SAMPLE

Lab Sample ID: IU69G

LIMS ID: 05-20523

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 18:37

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 4.32 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	23	< 23 U
91-57-6	2-Methylnaphthalene	23	< 23 U
208-96-8	Acenaphthylene	23	< 23 U
83-32-9	Acenaphthene	23	< 23 U
86-73-7	Fluorene	23	< 23 U
85-01-8	Phenanthrene	23	< 23 U
120-12-7	Anthracene	23	< 23 U
206-44-0	Fluoranthene	23	< 23 U
129-00-0	Pyrene	23	< 23 U
56-55-3	Benzo (a) anthracene	23	< 23 U
218-01-9	Chrysene	23	< 23 U
205-99-2	Benzo (b) fluoranthene	23	< 23 U
207-08-9	Benzo (k) fluoranthene	23	< 23 U
50-32-8	Benzo (a) pyrene	23	< 23 U
193-39-5	Indeno (1,2,3-cd) pyrene	23	< 23 U
53-70-3	Dibenz (a,h) anthracene	23	< 23 U
191-24-2	Benzo (g,h,i) perylene	23	< 23 U
132-64-9	Dibenzofuran	23	< 23 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 76.7%  
d14-Dibenzo (a,h) anthracen 83.3%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B3 Station 610 Liver

SAMPLE

Lab Sample ID: IU69H


QC Report No: IU69-MJM Research

LIMS ID: 05-20524

Project: NUIQSUT ARCTIC CISCO

Matrix: Tissue

Event: NA

Data Release Authorized: 

Date Sampled: 11/03/05

Reported: 12/09/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Sample Amount: 4.66 g-as-rec

Date Analyzed: 12/07/05 19:00

Final Extract Volume: 1.0 mL

Instrument/Analyst: NT1/VTS

Dilution Factor: 1.00

GPC Cleanup: No

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	22	< 22 U
91-57-6	2-Methylnaphthalene	22	< 22 U
208-96-8	Acenaphthylene	22	< 22 U
83-32-9	Acenaphthene	22	< 22 U
86-73-7	Fluorene	22	< 22 U
85-01-8	Phenanthrene	22	< 22 U
120-12-7	Anthracene	22	< 22 U
206-44-0	Fluoranthene	22	< 22 U
129-00-0	Pyrene	22	< 22 U
56-55-3	Benzo (a) anthracene	22	< 22 U
218-01-9	Chrysene	22	< 22 U
205-99-2	Benzo (b) fluoranthene	22	< 22 U
207-08-9	Benzo (k) fluoranthene	22	< 22 U
50-32-8	Benzo (a) pyrene	22	< 22 U
193-39-5	Indeno (1,2,3-cd) pyrene	22	< 22 U
53-70-3	Dibenz (a,h) anthracene	22	< 22 U
191-24-2	Benzo (g,h,i) perylene	22	< 22 U
132-64-9	Dibenzofuran	22	< 22 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 78.0%  
d14-Dibenzo (a,h) anthracen 87.3%

**ORGANICS ANALYSIS DATA SHEET**

PNAs by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B4 Station 610 Liver  
SAMPLE

Lab Sample ID: IU69I

LIMS ID: 05-20525

Matrix: Tissue

Data Release Authorized: *AS*

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 19:23

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 4.56 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	22	< 22 U
91-57-6	2-Methylnaphthalene	22	< 22 U
208-96-8	Acenaphthylene	22	< 22 U
83-32-9	Acenaphthene	22	< 22 U
86-73-7	Fluorene	22	< 22 U
85-01-8	Phenanthrene	22	< 22 U
120-12-7	Anthracene	22	< 22 U
206-44-0	Fluoranthene	22	< 22 U
129-00-0	Pyrene	22	< 22 U
56-55-3	Benzo (a) anthracene	22	< 22 U
218-01-9	Chrysene	22	< 22 U
205-99-2	Benzo (b) fluoranthene	22	< 22 U
207-08-9	Benzo (k) fluoranthene	22	< 22 U
50-32-8	Benzo (a) pyrene	22	< 22 U
193-39-5	Indeno (1,2,3-cd) pyrene	22	< 22 U
53-70-3	Dibenz (a,h) anthracene	22	< 22 U
191-24-2	Benzo (g,h,i) perylene	22	< 22 U
132-64-9	Dibenzofuran	22	< 22 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 83.0%  
d14-Dibenzo (a,h) anthracen 90.3%

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: B5 Station 610 Liver  
SAMPLE

Lab Sample ID: IU69J

LIMS ID: 05-20526

Matrix: Tissue

Data Release Authorized: *[Signature]*

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: 11/03/05

Date Received: 11/16/05

Date Extracted: 12/06/05

Date Analyzed: 12/07/05 19:47

Instrument/Analyst: NT1/VTS

GPC Cleanup: No

Sample Amount: 5.12 g-as-rec

Final Extract Volume: 1.0 mL

Dilution Factor: 1.00

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	20	< 20 U
91-57-6	2-Methylnaphthalene	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
83-32-9	Acenaphthene	20	< 20 U
86-73-7	Fluorene	20	< 20 U
85-01-8	Phenanthrene	20	< 20 U
120-12-7	Anthracene	20	< 20 U
206-44-0	Fluoranthene	20	< 20 U
129-00-0	Pyrene	20	< 20 U
56-55-3	Benzo (a) anthracene	20	< 20 U
218-01-9	Chrysene	20	< 20 U
205-99-2	Benzo (b) fluoranthene	20	< 20 U
207-08-9	Benzo (k) fluoranthene	20	< 20 U
50-32-8	Benzo (a) pyrene	20	< 20 U
193-39-5	Indeno (1, 2, 3-cd) pyrene	20	< 20 U
53-70-3	Dibenz (a, h) anthracene	20	< 20 U
191-24-2	Benzo (g, h, i) perylene	20	< 20 U
132-64-9	Dibenzofuran	20	< 20 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 77.3%  
d14-Dibenzo (a, h) anthracen 87.0%

**ORGANICS ANALYSIS DATA SHEET**

**PNAs by SW8270D-SIM GC/MS**

Page 1 of 1

**Sample ID: MB-120605**

**METHOD BLANK**

Lab Sample ID: MB-120605

QC Report No: IU69-MJM Research

LIMS ID: 05-20517

Project: NUIQSUT ARCTIC CISCO

Matrix: Tissue

Event: NA

Data Release Authorized: *MB*

Date Sampled: NA

Reported: 12/09/05

Date Received: NA

Date Extracted: 12/06/05

Sample Amount: 10.0 g-dry-wt

Date Analyzed: 12/07/05 15:06

Final Extract Volume: 1.0 mL

Instrument/Analyst: NT1/VTS

Dilution Factor: 1.00

GPC Cleanup: No

Percent Moisture: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	10	< 10 U
91-57-6	2-Methylnaphthalene	10	< 10 U
208-96-8	Acenaphthylene	10	< 10 U
83-32-9	Acenaphthene	10	< 10 U
86-73-7	Fluorene	10	< 10 U
85-01-8	Phenanthrene	10	< 10 U
120-12-7	Anthracene	10	< 10 U
206-44-0	Fluoranthene	10	< 10 U
129-00-0	Pyrene	10	< 10 U
56-55-3	Benzo (a) anthracene	10	< 10 U
218-01-9	Chrysene	10	< 10 U
205-99-2	Benzo (b) fluoranthene	10	< 10 U
207-08-9	Benzo (k) fluoranthene	10	< 10 U
50-32-8	Benzo (a) pyrene	10	< 10 U
193-39-5	Indeno (1,2,3-cd) pyrene	10	< 10 U
53-70-3	Dibenz (a,h) anthracene	10	< 10 U
191-24-2	Benzo (g,h,i) perylene	10	< 10 U
132-64-9	Dibenzofuran	10	< 10 U

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

**SIM Semivolatile Surrogate Recovery**

d10-2-Methylnaphthalene 82.3%  
d14-Dibenzo (a,h) anthracen 66.3%



**SIM SW8270 SURROGATE RECOVERY SUMMARY**

Matrix: Tissue

QC Report No: IU69-MJM Research  
Project: NUIQSUT ARCTIC CISCO

<u>Client ID</u>	<u>MNP</u>	<u>DBA</u>	<u>TOT OUT</u>
MB-120605	82.3%	66.3%	0
LCS-120605	69.0%	71.0%	0
A1 Nanook 650 Liver	75.0%	71.3%	0
A2 Nanook 650 Liver	79.3%	78.7%	0
A3 Nanook 650 Liver	76.3%	77.3%	0
A4 Nanook 650 Liver	72.0%	75.7%	0
A5 Nanook 650 Liver	78.0%	80.3%	0
B1 Station 610 Liver	83.0%	81.0%	0
B2 Station 610 Liver	76.7%	83.3%	0
B3 Station 610 Liver	78.0%	87.3%	0
B4 Station 610 Liver	83.0%	90.3%	0
B5 Station 610 Liver	77.3%	87.0%	0

	<b>LCS/MB LIMITS</b>	<b>QC LIMITS</b>
	<b>(Advisory)</b>	<b>(Advisory)</b>

(MNP) = d10-2-Methylnaphthalene	(30-160)	(30-160)
(DBA) = d14-Dibenzo (a,h) anthracene	(30-160)	(30-160)

Prep Method: TISSM  
Log Number Range: 05-20517 to 05-20526

**ORGANICS ANALYSIS DATA SHEET**

PNA's by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: LCS-120605

LAB CONTROL SAMPLE

Lab Sample ID: LCS-120605

LIMS ID: 05-20517

Matrix: Tissue

Data Release Authorized:

Reported: 12/09/05

QC Report No: IU69-MJM Research

Project: NUIQSUT ARCTIC CISCO

Event: NA

Date Sampled: NA

Date Received: NA

Date Extracted: 12/06/05

Sample Amount LCS: 10.0 g-dry-wt

LCSD: 10.0 g-dry-wt

Date Analyzed LCS: 12/07/05 15:29

Final Extract Volume LCS: 1.0 mL

LCSD: 12/07/05 15:52

LCSD: 1.0 mL

Instrument/Analyst LCS: NT1/VTS

Dilution Factor LCS: 1.00

LCSD: NT1/VTS

LCSD: 1.00

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Phenanthrene	215	300	71.7%	210	300	70.0%	2.4%
Chrysene	228	300	76.0%	252	300	84.0%	10.0%
Benzo(k)fluoranthene	154	300	51.3%	155	300	51.7%	0.6%

Reported in  $\mu\text{g}/\text{kg}$  (ppb)

RPD calculated using sample concentrations per SW846.

**SIM Semivolatile Surrogate Recovery**

	LCS	LCSD
d10-2-Methylnaphthalene	69.0%	72.7%
d14-Dibenzo(a,h)anthracen	71.0%	69.3%