Arctic Development

Kinguk Survey; Exploratory Survey For Marine Groundfish And Invertebrates In Western Hudson Strait, Northern Hudson Bay

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Project Report

"KINGUK SURVEY"

EXPLORATORY SURVEY FOR
MARINE GROUNDFISH AND INVERTEBRATES IN
WESTERN HUDSON STRAIT, NORTHERN HUDSON BAY

prepared by

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for

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NATIVE ECONOMIC DEVELOPMENT PROGRAM
CANADA-QUEBEC SUBSIDIARY AGREEMENT ON FISHERIES DEVELOPMENT
CANADA-NORTHWEST TERRITORIES AGREEMENT ON RENEWABLE RESOURCES

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A) SUMMARY

An exploratory survey for marine groundfish and invertebrates was conducted in the western Hudson Strait area in August of 1989. A commercial shrimp trawler was chartered and 105 exploratory tows were undertaken using commercial trawl gear.

Although these tows were spread out over a large area, no commercial potential was exhibited for any marine resources. Total catches were very low usually averaging around 25 kg per tow,

Physical and chemical conditions in the study area are influenced by both Atlantic and Arctic waters, each having separate characteristics (temperature, salinity, etc.). The result of this mixture is an environment which does not seem to support any commercial concentrations of benthic marine resources within the study area.

B) INTRODUCTION

In the late 1970's, several exploratory cruises were undertaken in Canada's northeastern waters. In several of the areas surveyed biological production was deemed capable of supporting commercial harvests. Some of these investigations were conducted on behalf of ' the Inuit of Northern Québec (Makivik Corporation) who upon identifying trawlable biomass of Pandalid shrimp in the area of Ungava Bay and eastern Hudson Strait, proceeded in developing a strategy to harvest these resources. Initial efforts met with limited success, but over the years have gradually proven to be viable.

These resources have been fished commercially along the west coast of Greenland (Davis Strait) since the late 60's and have since proven to be very profitable.

The main species of shrimp harvested in the Atlantic waters are the pink shrimp (Pandalus borealis), however the predominant species in the Hudson Strait and Ungava Bay area is the striped pink shrimp (Pandalus montagui).

These resources are harvested from the deeper offshore waters contiguous to eastern Canada's coastline, from Newfoundland up along the Labrador coast to Davis Strait and into the eastern portion of Hudson Strait (Resolution Island) and the north-east sector of Ungava Bay.

Turbot (Reinhardtius hippoglossoides), also known as Greenland halibut, are known to inhabit the deeper waters of Hudson Strait and Ungava Bay but to date have not been the focus of commercial activities. This species is harvested commercially in the Labrador Sea and Davis Strait area.

At present, in eastern Canada, there are a total of 16 offshore shrimp licenses which have been issued to Canadian interests. Each license represents 1,200 MT (metric tonnes) plus additional catches under a competitive exploratory fishery ranging from 300-800 MT. The Inuit from Northern Québec and Baffin Island represented by the Makivik Corporation/Seaku Fisheries Inc. and the Baffin Regional Inuit Association/Qikiqtaaluk Corporation respectively, have each been issued a licence and jointly share a third (Unaaq Fisheries Inc.).

These three licences, and inherently the harvesting of the allocated resources, represent one of the most successful economic development ventures undertaken in the north on behalf of the Inuit. These endeavors have created several employment opportunities for the Inuit in an area where unemployment rates of 50% or more are not uncommon.

The vessels fishing the Inuit licences, operate with a full crew complement of 22 people. The number of positions aboard each vessel presently filled by Inuit fishermen is 12, up from 6-7 a few years ago. To date some 130 Inuit have been employed on-board these vessels for at least one trip. Of these, more than 50 Inuit can be considered as full-time fishermen, having received advanced training and actively participate in this fishery on an on going basis. The economic returns to some of these fishermen has been considerable.

Many of the other positions (officers, engineers and gear specialists) cannot be filled by Inuit at this time without specialized training. Some of this training is done at sea, while the more advanced technicaI training must be completed at various recognized institutions in eastern Canada which have been established as training centres relating to the fishing industry.

Several Inuit have already completed, or are enrolled in, courses relating to these activities (Marine Emergency Duties I and II, Fishing Master Class III and IV) and others will soon be entering programs designed to increase their knowledge in the construction and repair of shrimp trawls, general deck skills and mechanics.

It is possible that in the near future Inuit personnel will fill several of these key positions on-board the vessels.

The long term objective of these efforts is to create a stable pool of experienced Inuit (offshore) fishermen which can be drawn upon to man the vessels fishing the Inuit Iicences.

Given the positive results of the most recent fishing ventures (Seaku Fisheries Inc., Qikiqtaaluk Corporation and Unaaq Fisheries Inc.) and in anticipation of expanding these activities on behalf of the Inuit, it was deemed essential that some of the adjacent areas which had been previously unexplored be the focus of research oriented exploratory fishing. Recent commercial exploratory fishing by the Canadian offshore shrimp fleet in the Labrador Sea and Davis Strait areas has in many cases proven to be quite lucrative.

It is in this context that a proposal to undertake an exploratory fishing program in Western Hudson Strait and northern Hudson Bay was produced.

Funding for this program was secured through various agencies involved in northern economic development and more specifically fisheries development. The funding sources include;

1) Native Economic Development Program (NEDP) Project # 223-315901

2) Canada-Quebec Subsidiary Agreement on Fisheries Development (ERDA) Project # CR 5505-6-14-89

3) Canada-Northwest Territories Subsidiary Agreement on Renewable Resources (EDA) Project # 561-525

4) from the Inuit themselves through the Qikiqtaaluk Corporation (Baffin Island) and also from Unaaq Fisheries Inc., the holder of the Inuit's joint licence.

c) METHODOLOGY

1) Vessel and Gear Description

The vessel chartered to undertake this exploratory program was the M.V. ''KINGUK", owned and operated by Farocan Inc. The ' M. V.'' KINGUK" has been fishing for the Inuit of Baffin Island (Qikiqtaaluk Corporation) since its construction in 1988. This vessel is identical to the M. V.'' AQVIQ" which fishes the licence issued to the Inuit of Northern Québec, represented by the Makivik Corporation/Seaku Fisheries Inc. (Appendix 1).

This modern factory/freezer trawler has an overall length of 49.95 m and a breadth of 11.0 m. It has the capability of processing between 20-35 MT (metric tonnes) of shrimp per day on a continuous basis, depending on the product form (raw or cooked).

The full range of on-board processing includes the sorting, grading, cooking (when applicable), freezing and packaging. The quality control practice is strictly adhered to prior to the freezing process.

The M. V.'' KINGUK" has an autonomy of 5 weeks at sea and the capacity to store approximately 200 MT of frozen shrimp product on-board. Its steel reinforced hull allows it to fish safely and economically in ice of up to one metre in thickness. These vessels can accommodate a crew of 22 and regularly employs 10-12 Inuit fishermen during commercial fishing operations.

Included in the list of electronic equipment normally carried aboard this type of vessel was a satellite navigation system (SATNAV) which provided positioning data during the survey. This is the only complete navigation system presently available as the study area lies outside the effective and reliable range of Loran-C coverage.

The main gear used during the exploratory cruise was the "SJERVOY" shrimp trawl although another, the "HOPEDALE", was also used when repairs or changes to the main trawl were being completed. Main specifications of the gear used for this survey are found in Table 1.

TABLE 1. DESCRIPTION **OF FISHING GEAR, "KINGUK SURVEY", AUGUST, 1989.**

DESCRIPTION	"SJERVOY"	"HOPEDALE"
A) Total length of trawl (m)	93.8	94.8
B) Width of trawl mouth (m)	22.0	35.0
C) Height of trawl mouth (m)	15.0	9.4
D) Distance between trawl doors (m)	50	70
E) Mesh sizes of trawl panels (mm)	75-40-30-26	75-40-26
F) No. of meshes around trawl mouth	3200 X 20 mm	2950 X 20 mm
G) Trawl doors (model and weight)	140" Thy boron type 2 (2680 kg)	160" Thy boron type 2 (3700 kg)

*courtesy Dantrawl, Nfld.

These gear are classified as otter trawls, which are basically a cone-shaped net with a large open mouth at the front and tapering to an apex (cod-end). The mesh sizes in these trawls gets progressively smaller towards the apex. As the gear is towed along the ocean floor, shrimp are gathered into the mouth of the net and pass into the cod-end where they are collected.

In order to function properly the mouth of the net must remain open. Several floats are attached to the upper edge of the net mouth for buoyancy and large weights are attached to the lower edge for ballast. The sides, or "wings" of the net are attached to two vane-shaped boards called "doors". When this gear is towed along the bottom, water resistance forces the doors to spread apart opening the net's mouth.

Detailed gear diagrams may be seen in Appendix II.

The project's exploratory efforts targeted both groundfish and invertebrates. Knowing that the larger mesh sizes in the panels of groundfish gear would have allowed a high escapement of shrimp, it was decided that a shrimp trawl would be used to conduct all research tows as it would capture both species. In addition, should ' groundfish have been present over the areas towed, the shrimp gear would definitely have provided an indication of their abundance and in light of these results groundfish could have been targeted specifically by switching to the groundfish trawl which had been placed on-board for this purpose.

2) Survey Design and Sampling Procedures

> Hudson Strait provides the connecting link between the North Atlantic Ocean and Hudson Bay. It is bounded on the North by Baffin Island, Northwest Territories, and on the south by the Province of Quebec. The strait extends in a general NW direction for a distance of approximately 450 miles from its eastern entrance between Lacy Island and Resolution Island to its western entrance between Leyson Point on Southampton Island, and Pointe Nuvuc on Peninsule d'Ungava. The strait varies in width from 60 to over 100 miles (Canadian Hydrographic Service, 1988).

In general the bathymetric data available for northern areas, especially the coastal areas, are not as reliable as those of the newer "charts presently being produced.

> Only a small part of Hudson Bay and Strait has been surveyed to modem standards....The relatively small scale charts are considered quite adequate for navigating through Hudson Strait (Canadian Hydrographic Service, 1988).

As the main area of interest in this survey were those waters in the central and western portion of Hudson Strait where water depths exceeded 200 metres (Figure 1) and not the shallower coastal zones, absolutely no navigational hazards or problems were encountered.

SATNAV is the only navigational system which is available in this area on a 24 hour basis. Although a fairly accurate vessel

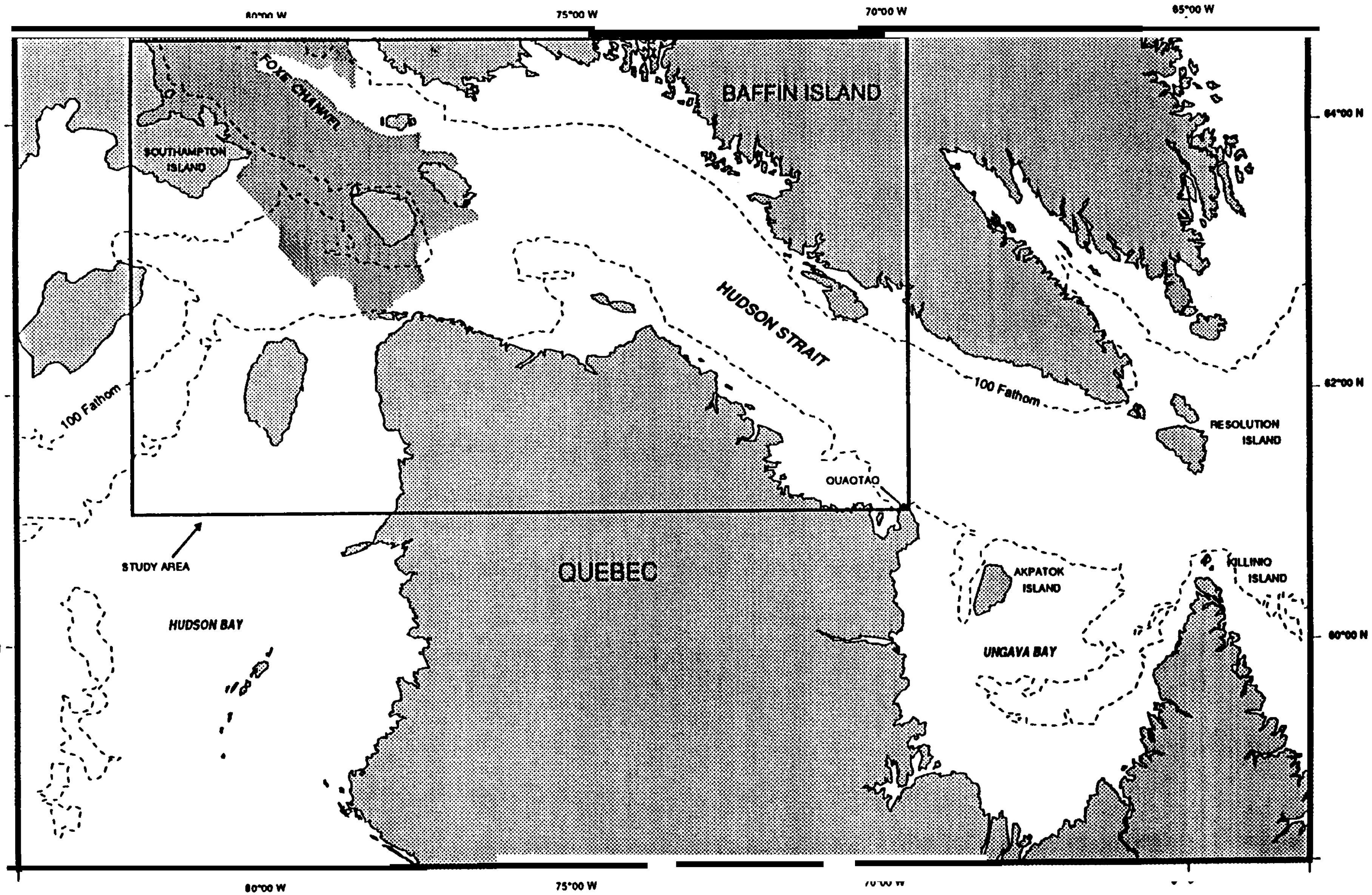


FIGURE 1. STUDY AREA, "KINGUK SURVEY", AUGUST, 1989. (▒ = PACK ICE > 10%)

position (usually within 300 metres) can be determined from satellite "fixes", which usually occur every hour or two depending on latitude, the vessel's position between satellite passes must be determined on a "dead reckoning" basis. The problem encountered during "dead reckoning" is that even though the log and compass , continuously update the speed and direction of the vessel between satellite "fixes", it is extremely difficult to determine the speed and direction of the constantly varying tidal streams predominant in the area with the same degree of accuracy as the log and compass.

The net result is a navigation system which is more than satisfactory for navigation purposes, but lacking the accurate positioning often required for exploratory and commercial fishing purposes (Gillis and Allard, 1988).

A greatly improved satellite navigation system, the "Global Positioning System" (GPS), is presently being developed by the U.S. military and should be completely operational within the next few years. This new system will provide constant positioning data to an accuracy of 50 metres and no "dead reckoning'[1] will be necessary. This system will most probably replace all other navigation systems, however for the time being this system does not provide 24 hours of marine coverage a day and the cost of these units are still quite high.

As a result of the large survey area (approximately. 75,000 sq. km.), and the limited number of vessel charter days, a relatively wide station grid had to be adopted to ensure good coverage of the area.

In the absence of any knowledge of the distribution of the targeted species within the survey area, the exploratory station grid was established solely on a geographic basis. Grid lines were set equidistantly along lines of latitude (every 15 minutes) and those of longitude (every 30 minutes) forming a lattice in an attempt to cover the entire study area within the allotted time frame.

The survey proceeded in a westerly fashion moving from one longitudinal grid line to the next using the grid line intersects as the station locations where exploratory tows were to be undertaken. Due to positioning difficulties, previously explained, the M. V.'' KINGUK" strayed a little off course on several occasions. This problem, however, did not interfere with the coverage of the survey area. '

A standard exploratory tow can be best defined as the towing of the shrimp trawl, described above, over the ocean floor for a 30 minute period at an average speed of 2.3 knots. Bottom time commenced once the trawl gear had settled on the bottom and regular towing power had been applied, and ended with the removal of towing power and the start of gear retrieval.

At each station, set and catch data were routinely recorded, however the format in which catch data was recorded changed slightly during the field period. As this cruise was commercially oriented only two researchers were on-board, each working two 6 hour shifts per day in accordance with the vessels regular work schedule. The researchers routinely recorded all the relevant set, catch and operational data, however it was not always possible to sort and identify the entire catch down to species. Special attention was paid to commercial species when present.

Set data always included the date, time, location, water depth, speed and direction of each tow and whenever possible operational data such as the time required to set and haul gear at various water depths.

Catch data was mostly recorded as total number and weight by species but catches by species were often expressed as a percentage of the total volume of the catch.

Data sheets used to record set and catch data are shown in Appendix III-A.

As can be seen from the gear diagram in Appendix II, the cod-end of the shrimp trawl, where the catch concentrates, is split into two identical halves. For sampling purposes it was assumed that the contents of these two bags would be similar. The contents of one bag was collected and the total weight recorded as representing 50% of the total catch. Subsequently a smaller random subsample was collected, sorted and recorded as a total number and weight per species whenever possible. On several occasions, catch was visually sorted and recorded as a percentage of the total volume of the catch.

As a protective measure, the contents of the other bag was dumped on deck and visually examined to ensure that the samples were similar and that no obvious discrepancies had been overlooked. A summary of catch data may be seen in Appendix III-B.

Additional biological data was collected by performing length frequencies and autopsies on turbot (Reinhardtius hippoglossoides) because of their commercial potential (Appendix IV). Length frequencies were also taken for Arctic cod (Boreogadus saida) because of their noted importance in the arctic food web (Appendix V). The sizes of these samples are small but important as very little biological data exists for these species in this region.

3) Analyses

Small samples of miscellaneous marine fish were taken as reference collections and used by Dr. D.E. McAllister of the Museum of Natural History in Ottawa to verify the taxonomic identification of certain species.

The turbot otoliths collected for ageing purposes during the field autopsies were stored in a mixture of glycerin and alcohol and sent to Dr. Ray Bowering from the North Atlantic Fisheries Centre (NAFC) in St. John’s, Nfld. In their laboratory, the otoliths were submerged in a small watchglass containing alcohol and the growth rings were counted (read) under a microscope using reflected light.

Turbot samples were also collected for Mr. Jean-Marie Sévigny at the Institut Maurice Lamontagne in Mont-Joli, Québec, to be included in his on going stock affinity studies. His analyses are not yet completed but preliminary results should be available shortly.

D) DISCUSSION

1) General Results

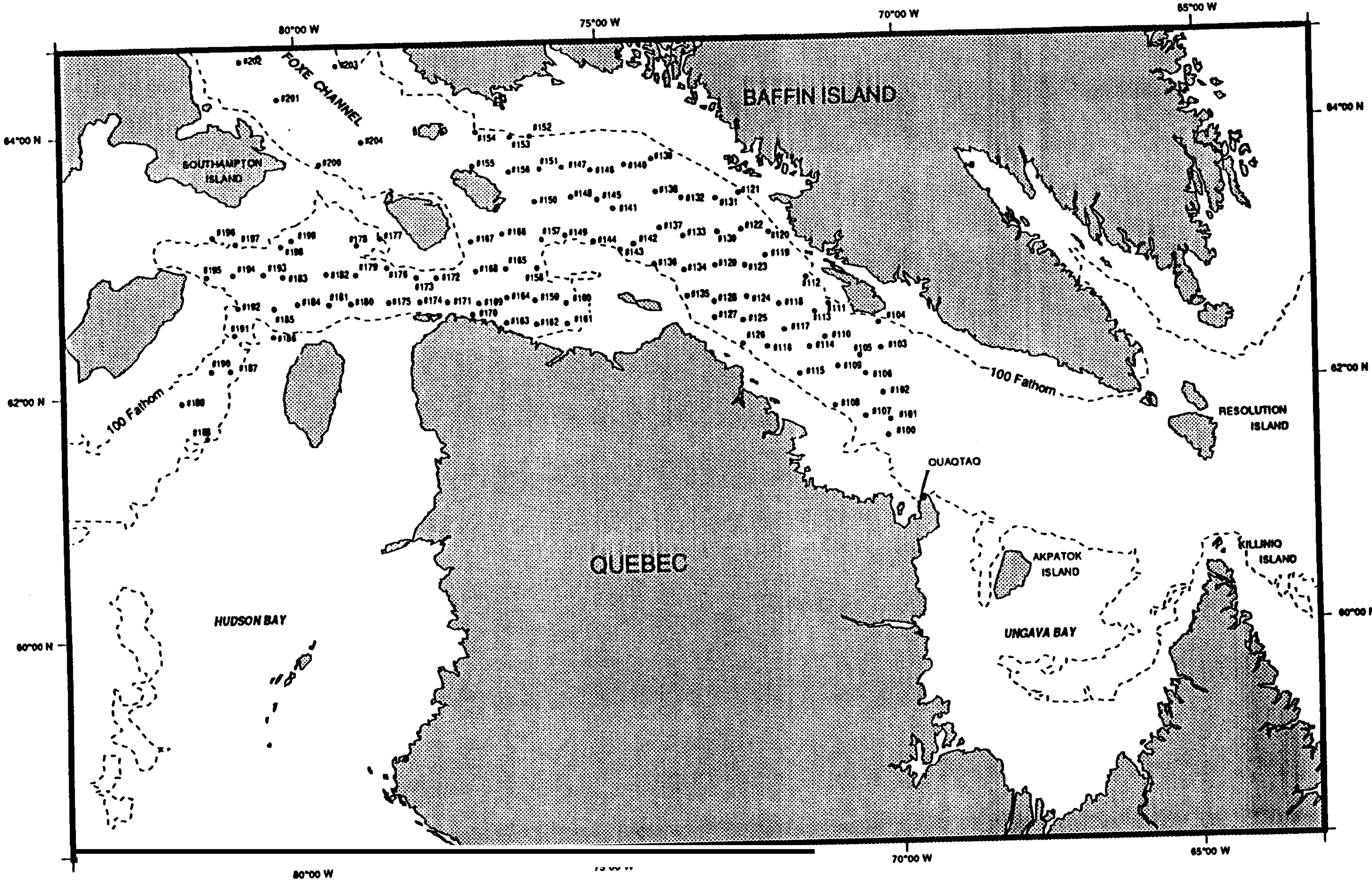
The M. V.'' KINGUK" arrived in Quaqtaq, Northern Qu6bec on August 9th and departed for the study site as soon as the research team and equipment were aboard and crew changes had been completed. The first research tows were completed that same evening.

The research team on-board for the field period consisted of Marc Allard from the Makivik Corporation, Montreal, and Shirley Leach of the Dept. of Fisheries and Oceans, Arctic Biological Station, Ste. Anne-de-Bellevue, Qu6bec.

A total of 105 exploratory tows were completed by the crew and vessel working on a 24 hour a day basis during the charter period (Figure 2). The vessel returned to Quaqtaq on August 21st, after having completed the research program and departed the next day to resume commercial fishing activities in adjacent waters.

In general the weather and seas were calm and as a result no lost fishing time was experienced. However, towards the end of the survey, ice conditions varying between 10%-90% ice cover (Figure 1), were encountered in Western Hudson Strait and Foxe Channel resulting in fewer stations in this area. Ice conditions such as those witnessed did not preclude deployment of gear but increased the possibilities of gear damage which could not be justified based on the current exploratory catches.

The results of the exploratory program were somewhat disappointing. Not only were catches of commercial species very low, but also the total catches of all species combined. On average each research tow resulted in a catch of 25 kg total weight as summarized in Appendix III-B. A list of the major species encountered in the study area and adjacent zones may be seen in Appendix III-C.



ꟳIGURE 2. STATION MAP, K NGUK S R E AUGUST, 1989.

2) Groundfish

The main species of finfish encountered were predominantly snailfish (Liparids), lumpfish (Cyclopterids), sculpins (Cottids), eelpouts (Zoarcids), Arctic cod (Boreogadus saida), turbot (Reinhardtius hippoglossoides) and the thorny skate (Raja radiata). A' few other species were also captured in very small quantities.

The species composition within these catches varied greatly from station to station (Appendix III-B).

Turbot are large deep-water flatfish common in the cold northern waters of the Atlantic Ocean and were the only species known to exist in commercial quantities in adjacent areas. They have been collected in the deeper waters of Ungava Bay, eastern Hudson Strait, and the north Labrador sea (Fontaine and Pilote, 1979). They have also been reported in the Killiniq region by inshore vessels using gillnets (Gillis and Allard, 1984,1986; Gillis et al.,1987).

Turbot resources have also been identified in the Cumberland Sound region (Capt. C.W. Mackay, 1986) and a more recent commercial operation, fishing off the ice edge with longline gear, has been quite successful (Simpson, 1990, pers. comm.).

Although present at many stations, the specimens captured were consistently small and encountered mostly in the central portion of the study area. No turbot were captured west of 79°00" W (Figure 3).

The average length of the 84 turbot autopsied was 22.3 cm with measurements ranging from 11.6 -30.3 cm. The average weight of autopsied turbot was 0.10 kg with a range of 0.01-0.27 kg. An average length and weight at age table was produced from the autopsy and ageing analyses and is summarized in Table 2. Note that the number of observations within certain age classes are low.

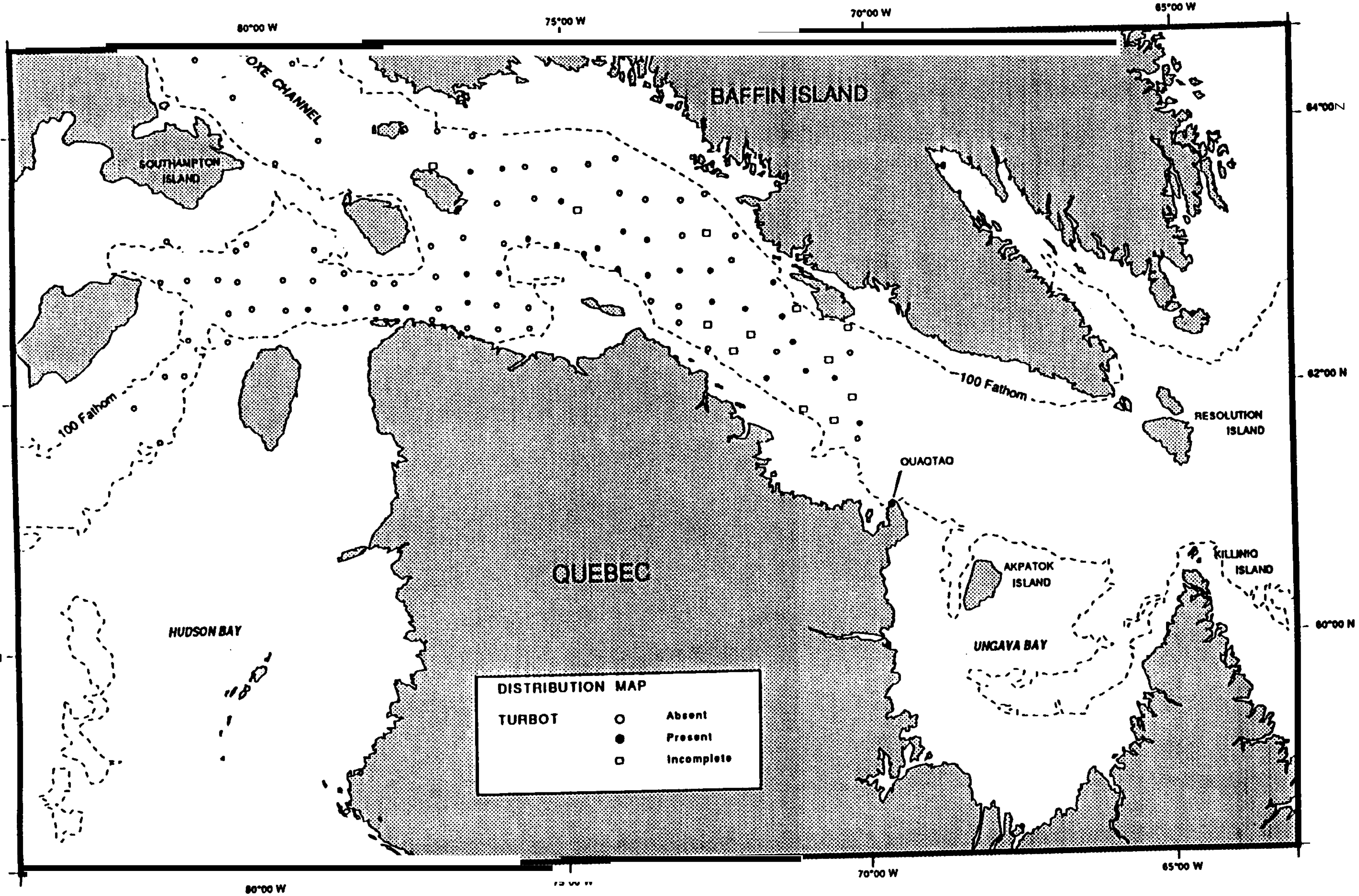


FIGURE 3. DISTRIBUTION MAP, TURBOT (Reinhardtius hippoglossoides), "KINGUK SURVEY" , AUGUST, 1989.

Fontaine and Pilote, 1979, reported an average length of 40.8 cm for turbot in Ungava Bay and Hudson Strait. Although the average length was nearly twice that found in our catches, the authors stated that only 39.7% were of commercial size.

Table 2: Length and Weight at Age, Turbot (Reinhardtius hippoglossoides), 'Kinguk Survey", ' August, 1989.

Age Class	Ave. Length (cm)	Length Range	Ave. Weight (kg)	Weight Range	Sample Size (N)
2	12.30	11.6 -13.1	0.01	0.01-0.02	3
3	17.95	14.6 -19.4	0.05	0.03-0.06	13
4	21.78	18.0 -25.8	0.09	0.05-0.17	38
5	26.07	21.0 -30.3	0.16	0.08-0.27	27
6	27.60	27.2 -28.0	0.19	0.19	2
*	17.80		0.045		1*
				TOTAL	84

The average length and weight of turbot from the Killiniq region were 55.5 cm and 1.9 kg respectively (Gillis et al.,1987). The average weight of turbot from commercial catches in eastern Canada range between 4.5-11.5 kg.

The length frequency for turbot is shown in Figure 4 and Appendix IV-A.

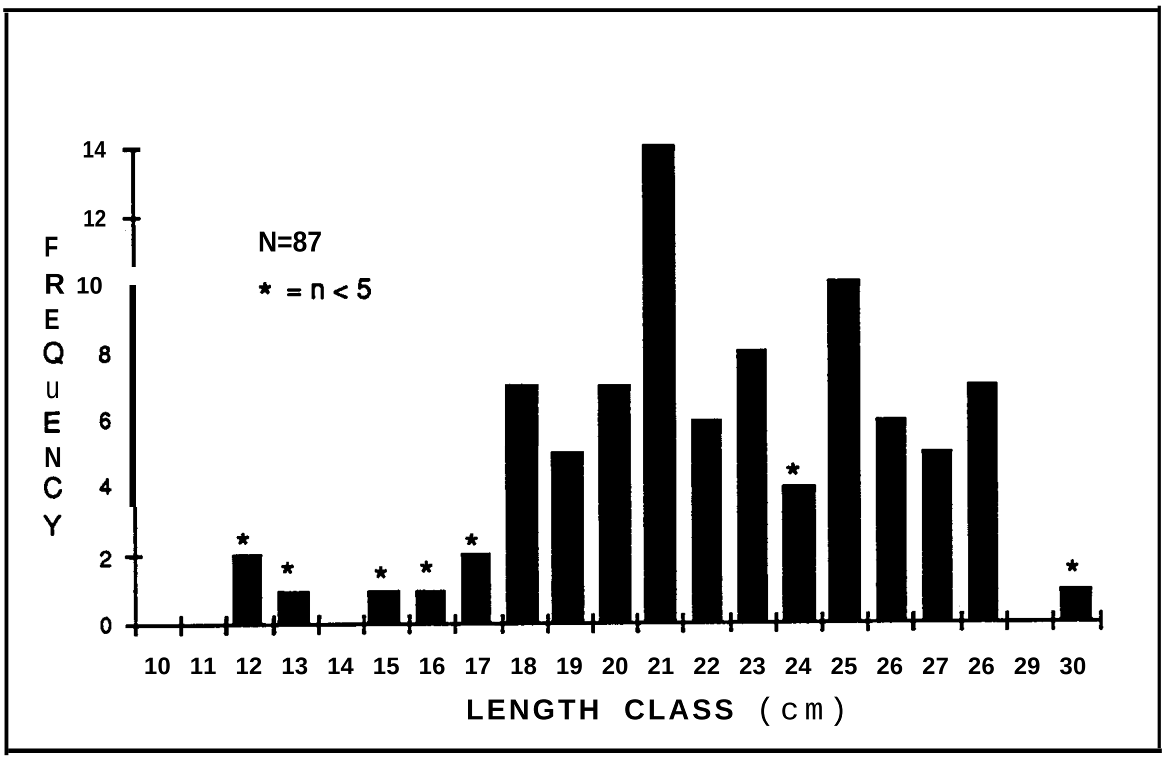


FIGURE 4. LENGTH FREQUENCY DISTRIBUTION, TURBOT (Reinhardtius hippoglossoides), "KINGUK SURVEY", AUGUST, 1989.

Turbot tend to move into deeper water as they grow and larger mature specimens from these areas are known to migrate annually into the deeper waters of Davis Strait to spawn. Spawning takes place in water depths of 650-1,000 metres (Scott and Scott, 1988).

Although turbot can be found in small numbers at depths of less than 100 metres, most are caught near the sea bottom at depths of between 200-600 metres and further south as deep as 1,500 metres.

It would seem that the water depths within the study area are not deep enough for the larger commercial size turbot. It may be that this area is used as a "nursery" for juvenile fish who may then move into the deeper regions of eastern Hudson Strait, Ungava Bay and ultimately Davis Strait as they grow and reach maturity.

According to Fontaine and Pilote, 1979, catch rates in eastern Hudson Strait and northeast Ungava Bay averaged 212.4 kg/hr and 112.0 kg/hr respectively and catches as high as 486 kg/hr have been recorded in eastern Hudson Strait.

In any case, the exploratory data clearly demonstrates the ‘ absence of commercial turbot resources within the survey area.

Although Arctic cod is not considered a commercial species, it is included in this discussion because of its wide distribution and its extreme importance in the Arctic food chain (Figure 5).

> The Arctic cod is a cold water marine species living in the upper part of the water column of Arctic seas... Arctic cod are primarily plankton feeders, eating mainly pelagic invertebrates unlike most gadids which generally seek food on the bottom... frequently seen at the surface and near drifting ice (Scott and Scott, 1988).

The catches of Arctic cod during the exploratory program were considered as incidental because this pelagic species was unlikely to be captured by a shrimp trawl fishing on the bottom. These catches probably resulted while the shrimp trawl was being lowered and lifted through the water column.

The length frequency for Arctic cod is shown in Figure 6 and Appendix V.

> Observers, almost without exception, who have worked in the regions where Arctic cod occur have remarked on its importance in the arctic food web. A pelagic plankton feeder itself, indeed the principal plankton consumer in arctic waters, the Arctic cod in turn becomes an important seasonal food supply for marine mammals, seabirds and fishes that live in the region (Scott and Scott, 1988).

3) Invertebrates

Several species of invertebrates were collected in small quantities during the study period, but catches of the targeted commercial shrimp species were sporadic and consistently low.

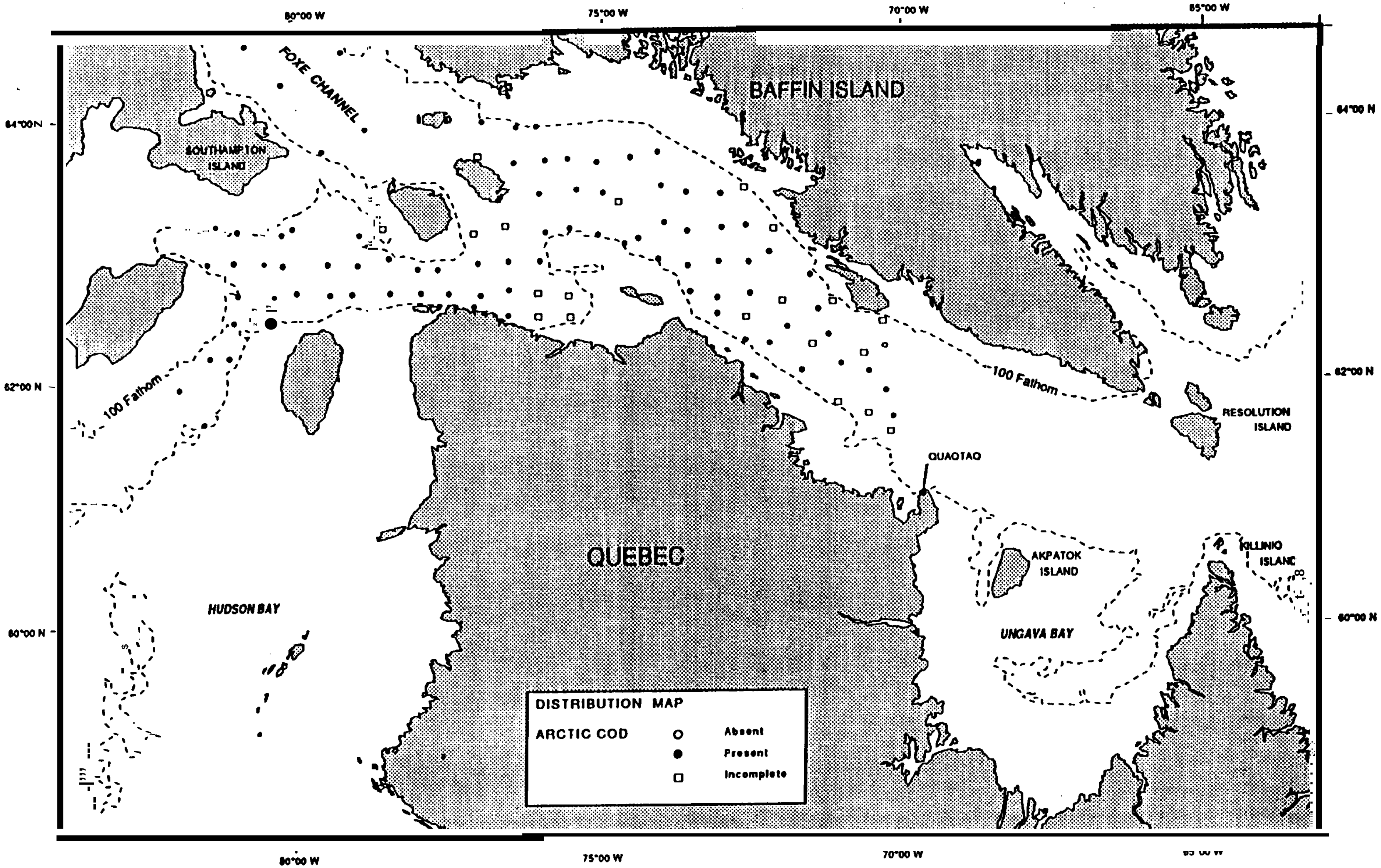


FIGURE 5. DISTRIBUTION MAP, ARCTIC COD (Boreogadus saida), "KINGUK SURVEY", AUGUST, 1989.

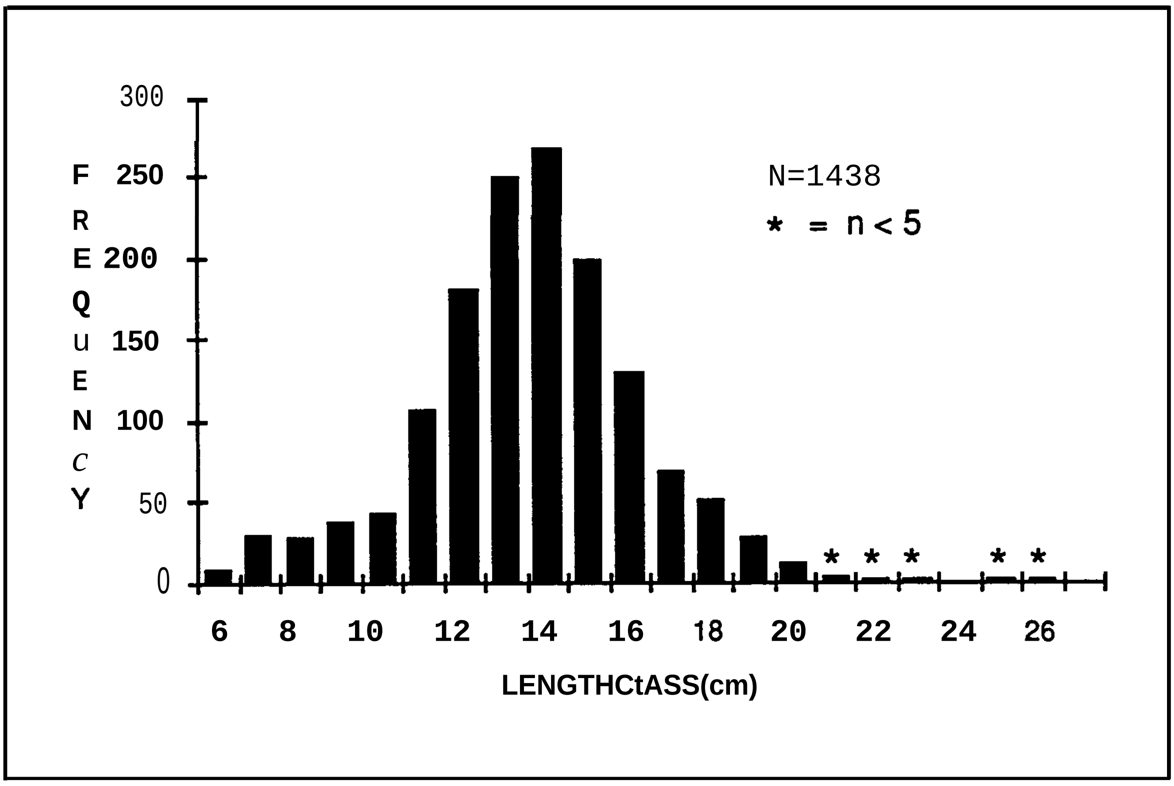


FIGURE 6. LENGTH FREQUENCY DISTRIBUTION, ARCTIC COD (Boreogadus saida), "KINGUK SURVEY", AUGUST, 1989.

Our best tow (station #169) resulted in a total catch of 121 pandalid shrimp weighing 0.81 kg (Figure 7).

In Ungava Bay, striped pink shrimp (Pandalus montagui) catch rates of just over 500 kg/hr were observed 40 nautical miles west of Killiniq (MacLaren Marex Inc.,1979) and as high as 750 kg/hr in northeastern Ungava Bay (Fontaine and Pilote, 1979).

More recent surveys in eastern Hudson Strait have documented catch rates in the range of 5,000-8,000 kg/hr from these areas (Parsons et al., 1987) and catch rates from the commercial shrimp fleet support this harvesting figure.

Given the commercial catch rates of striped pink shrimp exhibited in eastern Hudson Strait near Resolution Island, it is

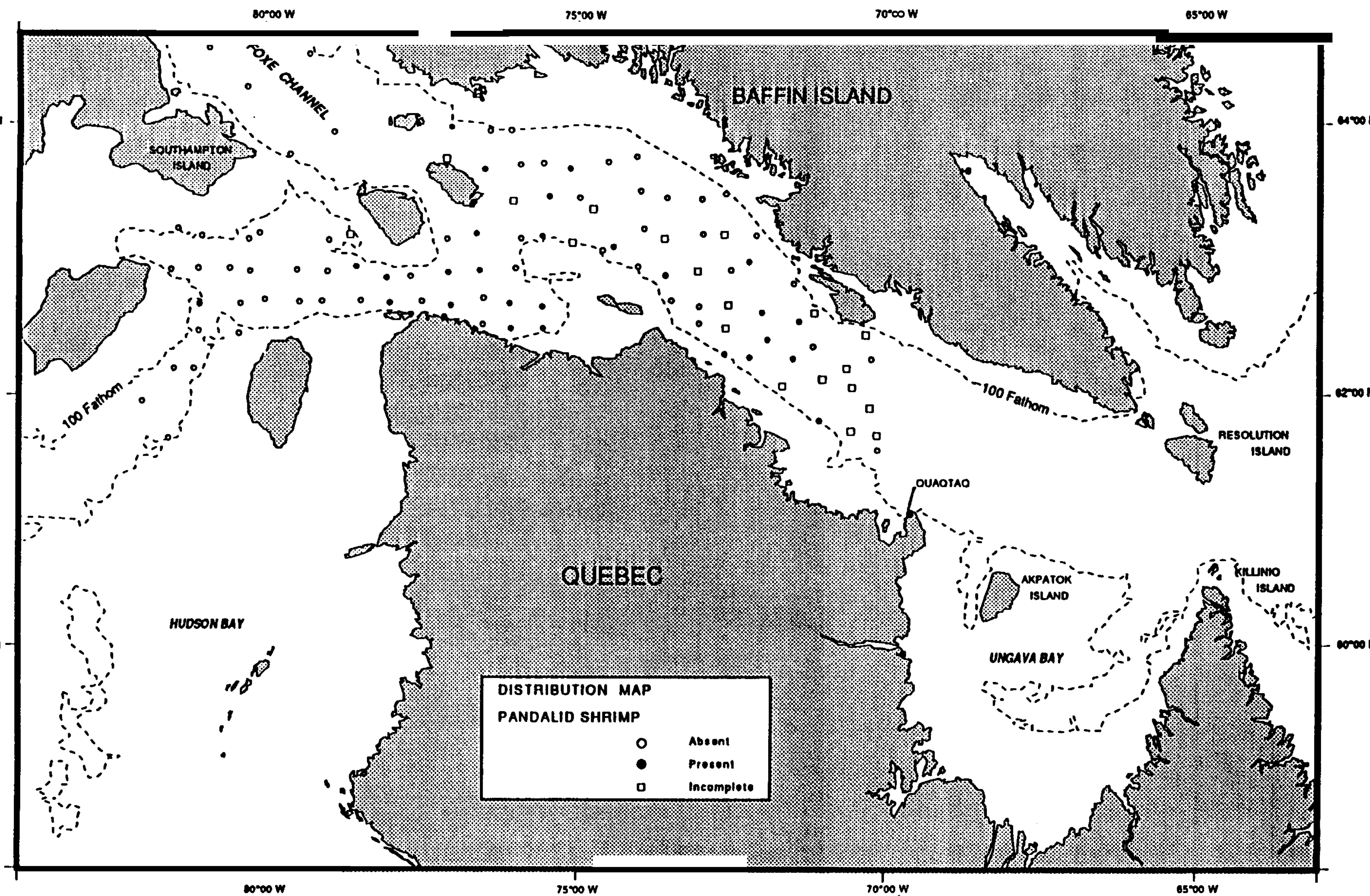


FIGURE 7. DISTRIBUTION MAP, PANDALID SHRIMP (Pandalus sp.), "KINGUK SURVEY" , AUGUST, 1989.

surprising that more of this species was not encountered in at least the eastern portion of the study area.

> The marine environment of eastern Canada is strongly influenced by interacting water masses from the Arctic Ocean and the central North Atlantic. In Hudson Strait, Arctic water from Hudson Bay and Foxe Basin flows eastward along the Quebec shore, while a mixture of Atlantic and Arctic waters from Davis Strait moves westward along the Baffin Island coast. In the eastern part of the strait, a crosschartnel southward current merges with the outflow from Ungava Bay (Hudon, 1990).

Although both areas are predominantly a mixture of Atlantic and Arctic waters, the Resolution Island and northeastern Ungava Bay area are zones of intense mixing resulting from strong tidal streams associated with this area. These latter two areas are also in the transition zone between Arctic and Atlantic waters (Hudon, 1990). Such transition zones are usually associated with higher biological productivity.

The brown shrimp (Argis dentata) was by far the most common and abundant invertebrate species recorded (Figure 8). Nevertheless, catch rates were still low and never in commercial quantities. The largest single catch of this species was at Station #116 where 7.28 kg were taken in a half hour tow (14.6 kg/hr).

Brown shrimp were also the second most abundant species encountered in Ungava Bay according to Fontaine and Pilote, 1979. Their research tows west of Akpatok Island yielded average catch rates of 83.4 kg/hr, and one tow south of Akpatok Island yielded 182.0 kg/hr. According to MacLaren Marex Inc., 1979, concentrations of brown shrimp were also found in central and southern Ungava Bay but catch rates seldom exceeded 100 kg/hr.

Another species of shrimp (Sclerocrangon boreas) was also prevalent over the study area, but again in low numbers. These species were encountered frequently in the by-catch of the Iceland scallop (Chlamys islandica) exploratory surveys in Ungava Bay and Hudson Strait undertaken in the coastal waters at depths ranging

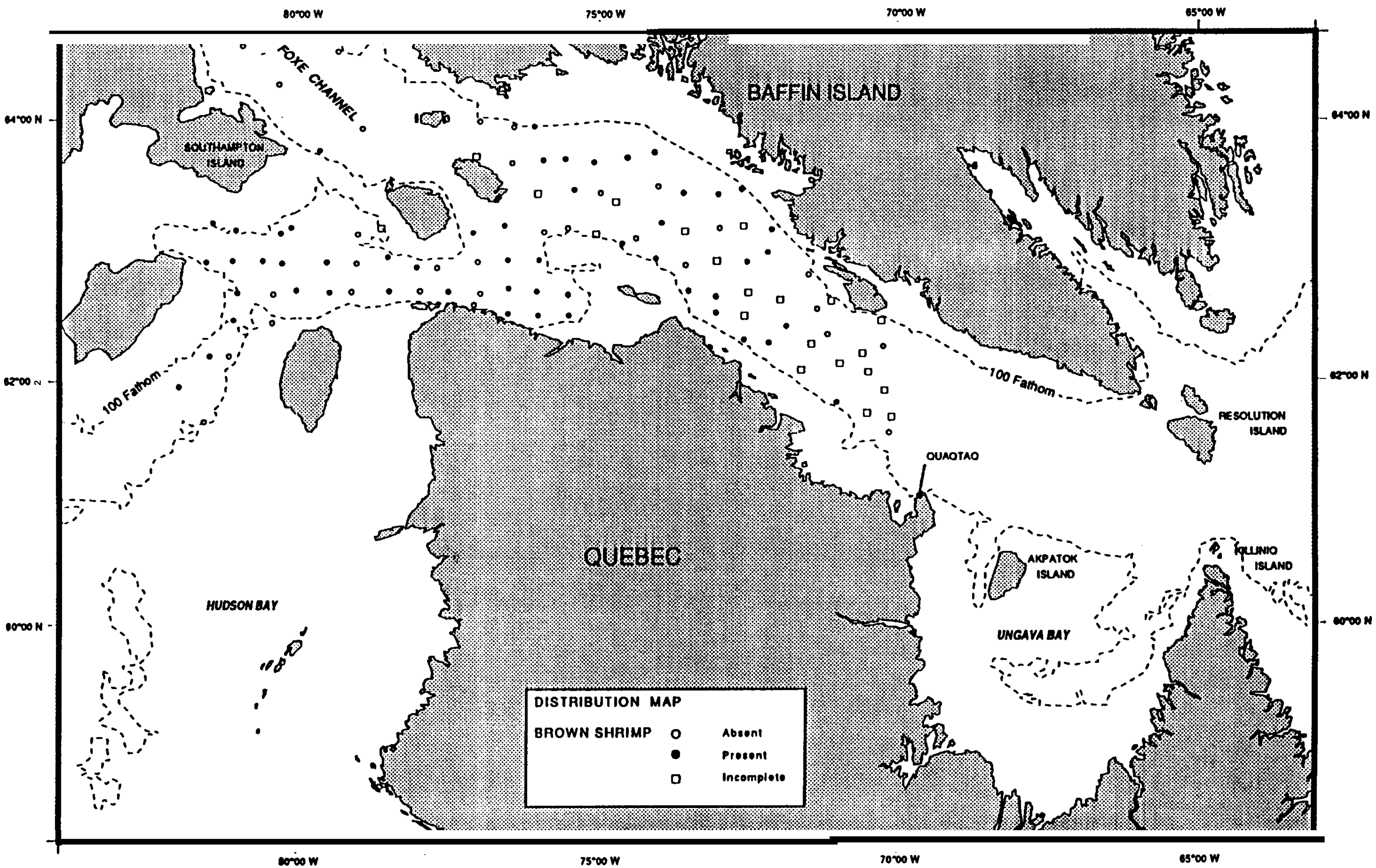


FIGURE 8. DISTRIBUTION MAP, BROWN SHRIMP (Argis dentata), "KINGUK SURVEY" , AUGUST, 1989.

between 20-60 fathoms (Allard and Gillis,1989; Gillis and Allard, 1986,1987).

This larger species and brown shrimp however may both be targeted by local inshore vessels with the use of beam trawls or baited pots if found in more abundance in the shalIower coastal ‘ areas. Neither of these species are harvested at present, but both are very palatable and could easily be marketed locally. If these directed efforts do not prove to be viable, these species could then become important by-catches in the local scallop fisheries.

E) CONCLUSIONS

In light of the above discussion of the catch results during the study period, it would appear that no commercial potential exists for any of the species encountered within the study area.

It is also very unlikely that this condition would improve at different times of the year. According to Captain Jogvan Kjolbrø, who has been involved in the development of northern shrimp fisheries for many years, if commercial quantities of shrimp or groundfish were to be found in this area either earlier or later in the season, we would have had a better indication of their presence. From the number of tows that were completed over the study area there should have been at least a few tows yielding catches of a few hundred kilograms or more.

It would seem that for turbot, the only commercial groundfish species captured, the depths which were encountered over the study area were not of sufficient depth to harbour the larger commercial size fish. Larger fish are found in the deeper waters of eastern Hudson Strait and Ungava Bay, but to date have not been the focus of commercial exploitation. At present the main areas of exploitation are the deeper waters in Davis Strait and the Labrador Sea.

An inshore exploratory survey of the coastal waters of Northern Québec (Hudson Strait) was also conducted this summer. Using scallop drags, gillnets and a limited use of longlines, this survey failed to locate any turbot resources inshore, however several concentrations of Iceland scallops were located (Grant Green, pers. comm.).

Although Pandalid shrimp are presently the focus of commercial activity in adjacent waters no commercial potential was exhibited for these species anywhere within the study area. Two other species (Sclerocrangon boreas) and (Argis dentata) might be encountered in larger densities in the shallower inshore areas and could be the focus of more exploratory fishing using beam-trawls or baited pots. Even though no market exists for these species at present, they are quite palatable and a small local market could be developed.

In general it seems that both species diversity and abundance decrease as one moves westward from the entrance to Hudson Strait (Appendix III-C).

In terms of northern fisheries development, it is unfortunate that no commercial potential was exhibited for any marine species in the survey area. Nevertheless, this survey was a necessary exercise in the hopes of increasing the sustainable harvesting of marine resources.

Further exploratory surveys may be required in yet other previously unexplored areas which may lead to the expansion of existing commercial activities or the identification of unexploited or underutilized marine resources greatly benefiting the Inuit of eastern Canada.

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G) ACKNOWLEDGEMENTS

Field Crew, "M.V. KINGUK";

Jogvan Kjolbrø	Captain
Olavur Biskopstø	1st Mate
Barnabas Dollimont	2nd Mate
Frank Joensen	Chief Engineer
Kristian Nattestad	1st Engineer
Clinton Conrad	2nd Engineer
Edward Hjalt	Bosun (Net Specialist)
Donald Rooke	Cook
"Laurits Thommasen	Factory Chief
Jakup-Aksel Haraldsen	Deckhand
Hanus Kjolbrø	Deckhand
Richard Immaroitok	Deckhand
Paul Ohituk	Deckhand
Joannie Alaralak	Deckhand
Sam Tologanok	Deckhand
Amie Kunilusie	Deckhand
Andrew Sowdluapik	Deckhand

<u>Other Project Personnel:</u>

Marc R. Allard	Project Manager
Shirley Leach	Cruise Assistant

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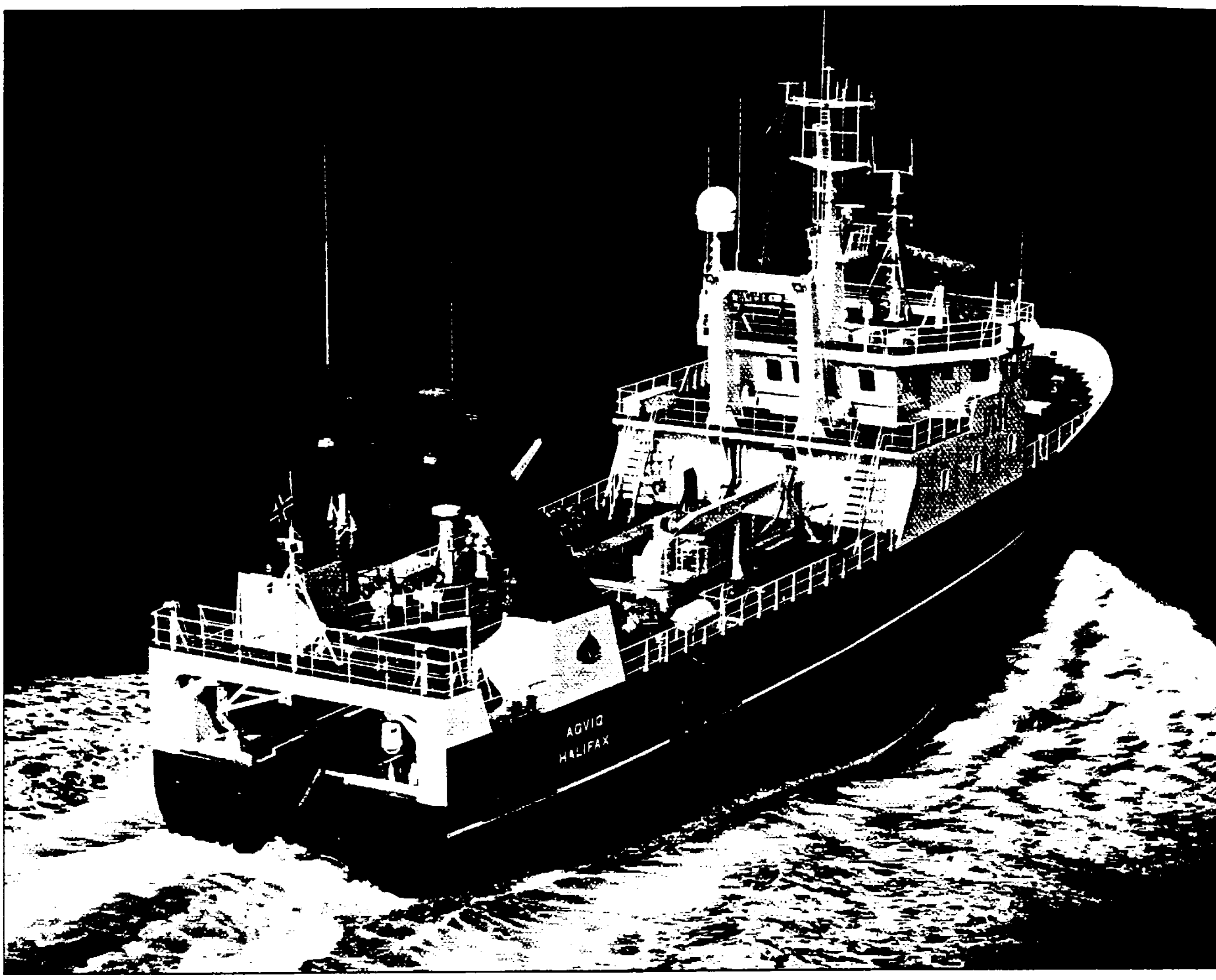
APPENDICES

APPENDIX I

VESSEL SPECIFICATIONS BROCHURE

FISHING VESSEL



RD NO M/TR AQ Q
R RAWN RAW ER

Newbu ld ng of Sh ps Convert ons & Repa rs

- High-Tech Offshore Vessels
- Economical Fishing Vessels
- Advanced Specialized Vessels
- Air Cushion Catamarans

BRATTVAAG
SKIPSVERFT AS

Built at:	**Brattvaag SkipsverftAS** **N-6270 Brattvåg, Norway**
Year:	**July 1988**
Type of fisheries:	Prawns in Arctic areas. Processing deck equipped for sorting, cooking and freezing of prawns, and processingline for "Japan prawns" are installed.
Design by:	Nordvestconsult,llalesund
Owners:	Farocan Inc. Ottawa, Canada

PRINCIPAL PARTICULARS:

Length o.a.	49.95 m
Length p.p.	41.90m
Breadth mid.	11.00m
Depth tomaindeck	4.564 m
Depth to shefterdeck	6.964m
Depth to forecastle deck	9.264m
Gross tonnage	1200 tonnes
Dead weight	500 tonnes
Accommodation (No. of crew)	24 men+ hospital
Freezing hold capcity	appr. 676 m^3
Fuel oiltankcapacity	appr. 191 m^3
Fresh watertankcapacity	appr. 32 m^3
Speed	appr. 14 knots
class	DNV+ IA1 ICE IC "Stem trawler"

MAIN ENGINE:

Make	Wartsila Wichmann Norway
Type	6 L28B
Power	1800 kW(2450 HP) at 600 mm
Main gearbox	Ulstein Propeller 600 AGSC:KP
P-repeller	Wichmann PR 82/4

AUXILIARY ENGINES:

Make	Caterpillar
Typs	3412 TA
Power	755 HP at 1800 rpm
Generator	Stamford MHC 634 AS. 650 kva

WINCHING EQUIPMENT:

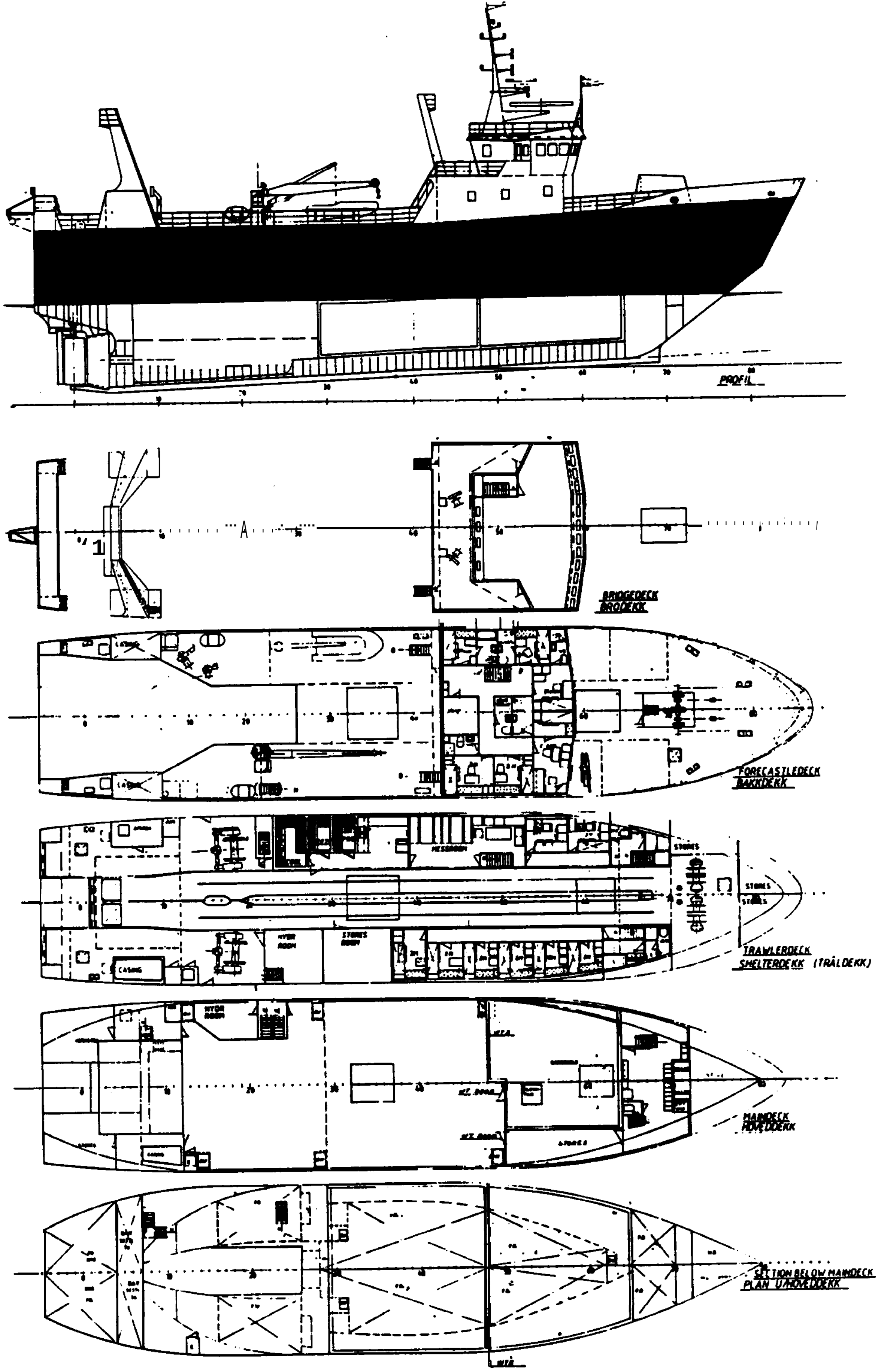
A/S Hydreulik Brettvaag, Datasyncro	
Trawl winches	2x20 tonnes
Outhaul winches	1 x3tonnes
Gilson winches	2x 6tonnes
Sweepline winches	4x6tonnes
Dumping winch	1 x 6tonnes
Anchor winch	1 x4tonnes

SPECIAL EQUIPMENT:

Deck cranes	Hydralift MCTV 1085-3-8
	1 x 3tonnesat 8 m
	Hiab Sea crane 120
	1 x 1.38 tonnes at 8.2 m
Ice trawling posts	Hydraulically operated,
	remote controlled
Exhaust boiler	PyroA450/s1961
Steering gear	Tenfjord16M200/2GM415
	Becker rudder
Freshwater generator	AtlasAFGU 1 -E-1 0,10 m^3/24 h
Hold freezing equipment	KvaernerA/S
Ventilation	GF Marine A/S
Lifesaving equipment	Viking/Dunlop/Fritz Wright
External lighting lantemsetc	Tranberg/lbakk/Philips
Air compressors	Sperre 30 bar, 2x 20 m^3/h
	starting/working air
Separators	Alfa Laval/Heli-Sep
Engine room Halon firefighting	Heien-Larsen Engineering

ELECTRONICAL EQUIPMENT:

RadarA	Atlas 7600ARPA
Radar B	JRC-JMA361O
Video plotting system	JRC-NWK 761
Echo sounder	Atlas fishfinder 782
Radiotelephone	Skanti TRP-8750 D
Sat. Corn. system	Satum3, with telex
Radio receiver	Sailor RT2022
VHF	3 x Saiior RT2047
Direction finder	TayoTDL 1620
Watch raceiver	Skanti WR-6000
Weatherfaximile	Furuno Fax-208
Loran C	JRC-JLE761
Sat. navigator	JRC-JLN 3800, Magnavax
Gyro/autopilot	Anschutz St 14
Catch control	Scanmar
Log/econometer	Ben Galatea
Calling system	Vingtor



BRATTVAAG
SKIPSVERFT AS

N-6270 BRATTVÅG NORWAY - TELEPHONE +47 71 15644- TELEFAX +47 71 15834- TELEX 42598 SKIPS N

APPENDIX II

GEAR SPECIFICATIONS

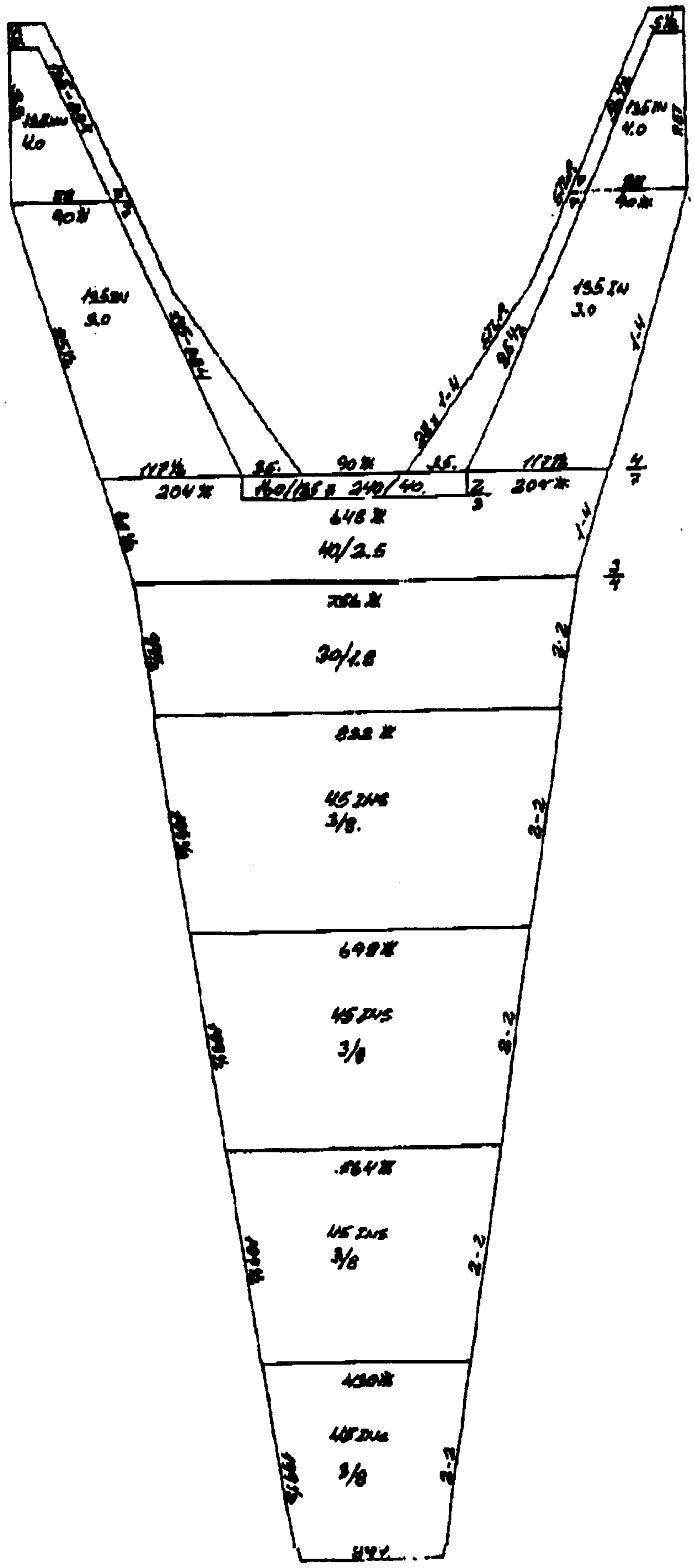
A) Sjervoy Shrimp Trawl

B) Hopedale Shrimp Trawl

APPENDIX II-A

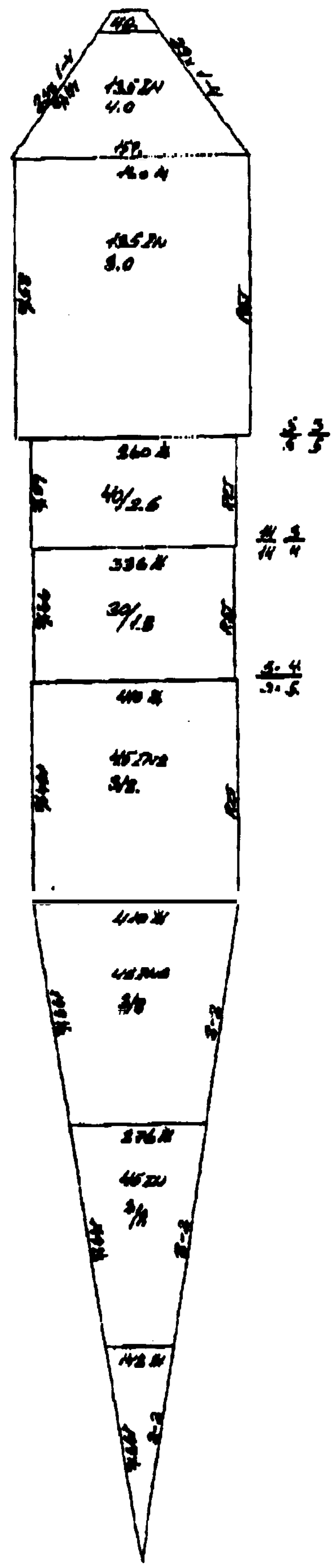
SJERVOY SHRIMP TRAWL

OVER PANEL



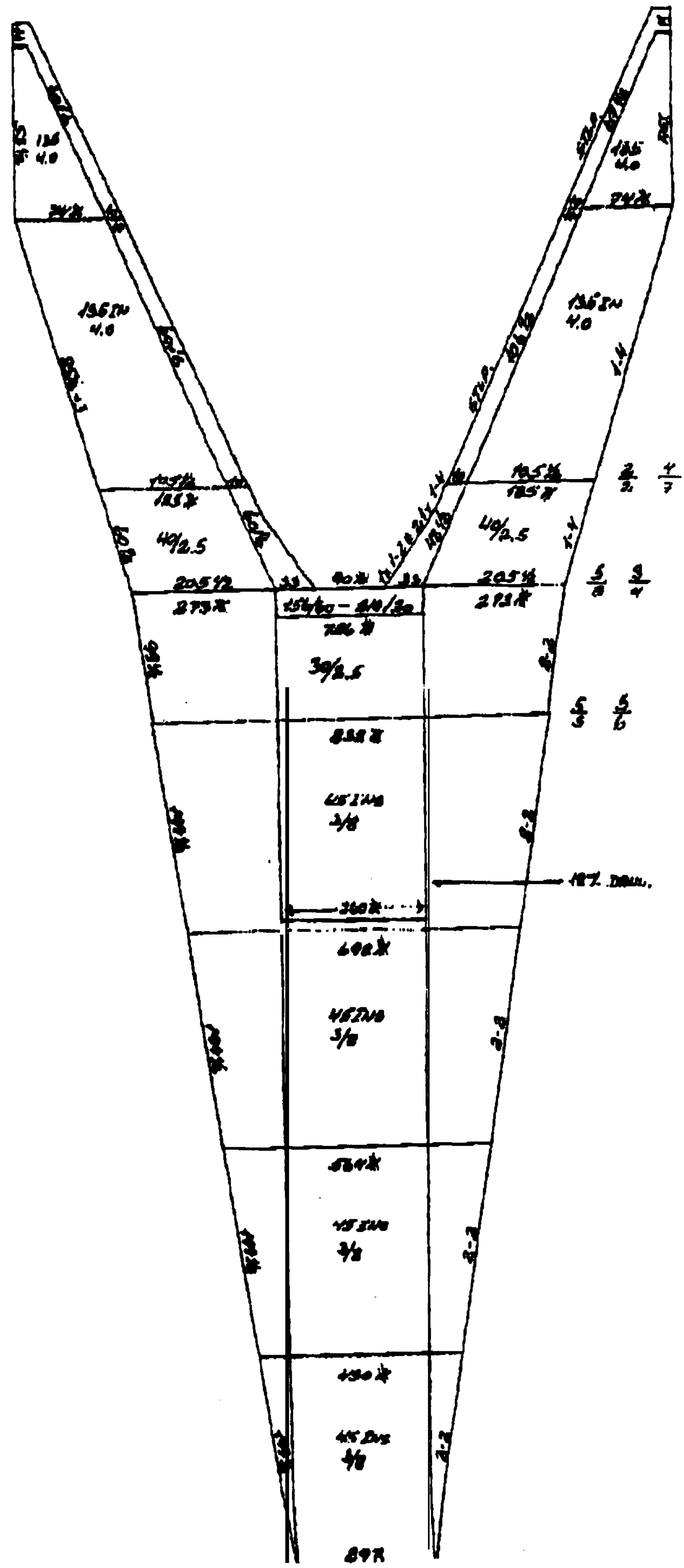
3200#20#ARTIC HEJHTHAN.
KINGUU

SIDE PANKL



3200*20*ARTIC TIEJETHAM.
** K I N G U G

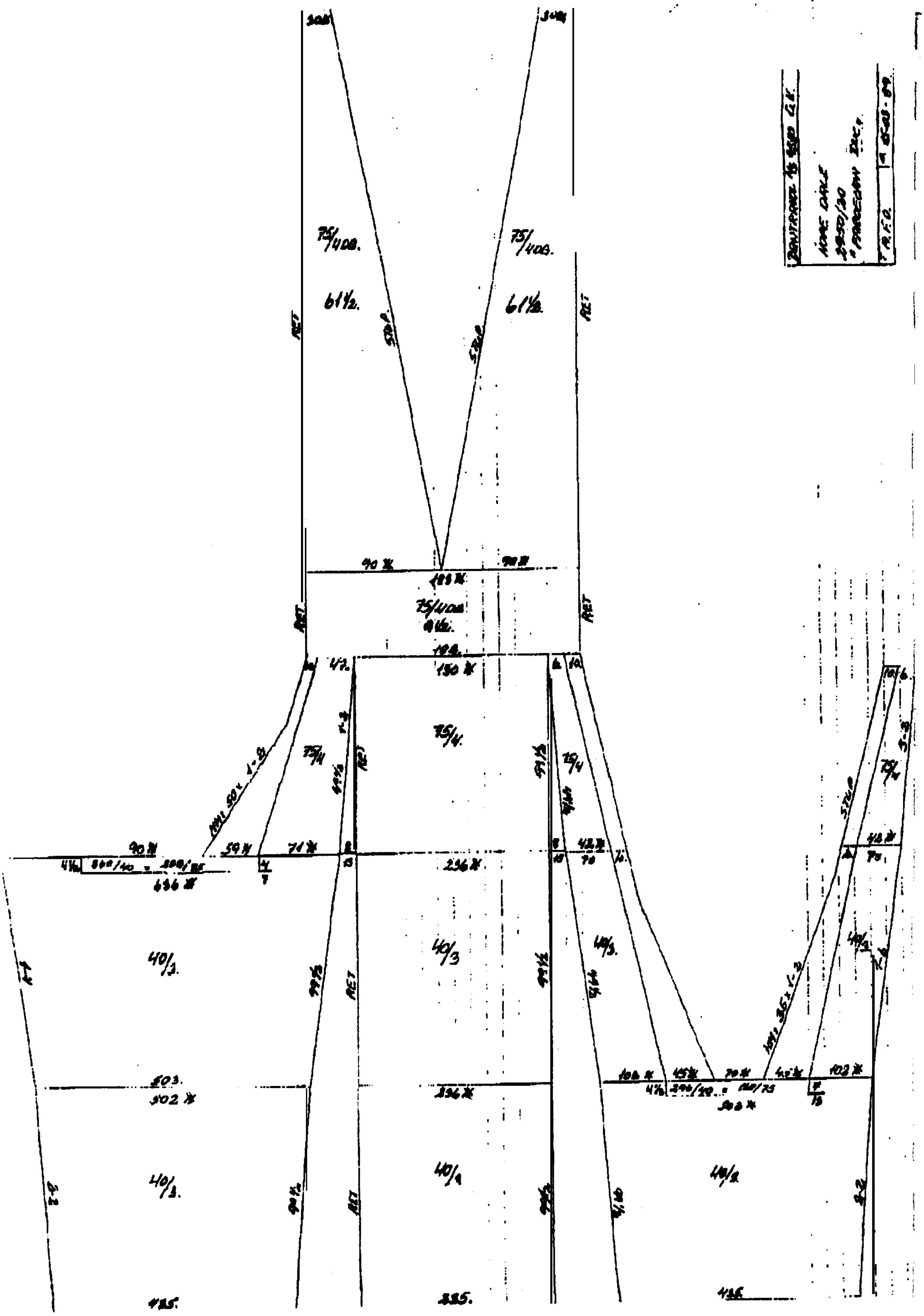
UNDER PANEL



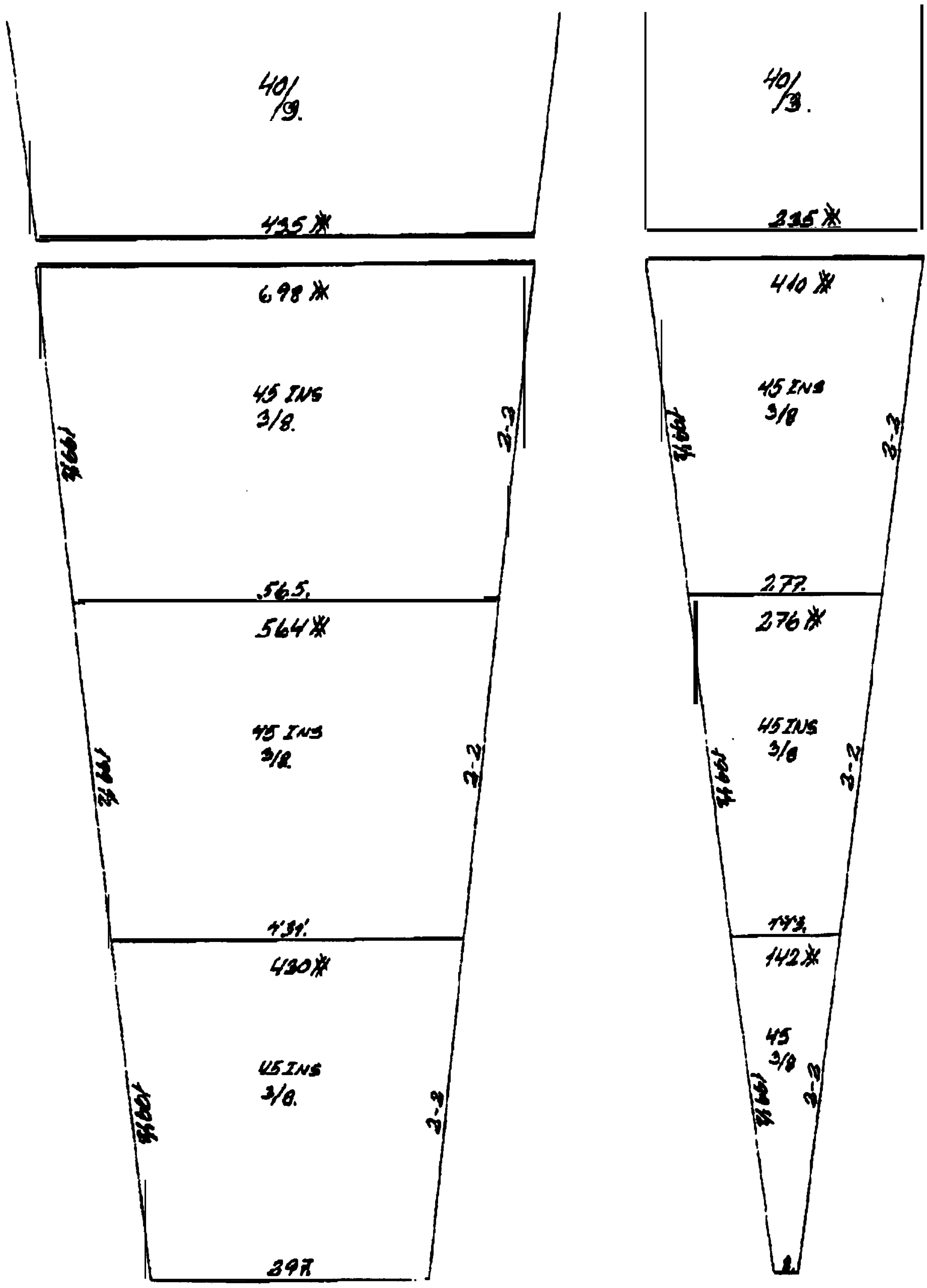
3200*20*ARTIC REJETRAN.
KINGUQ

APPENDIX II-B

HOPEDALE SHRIMP TRAWL



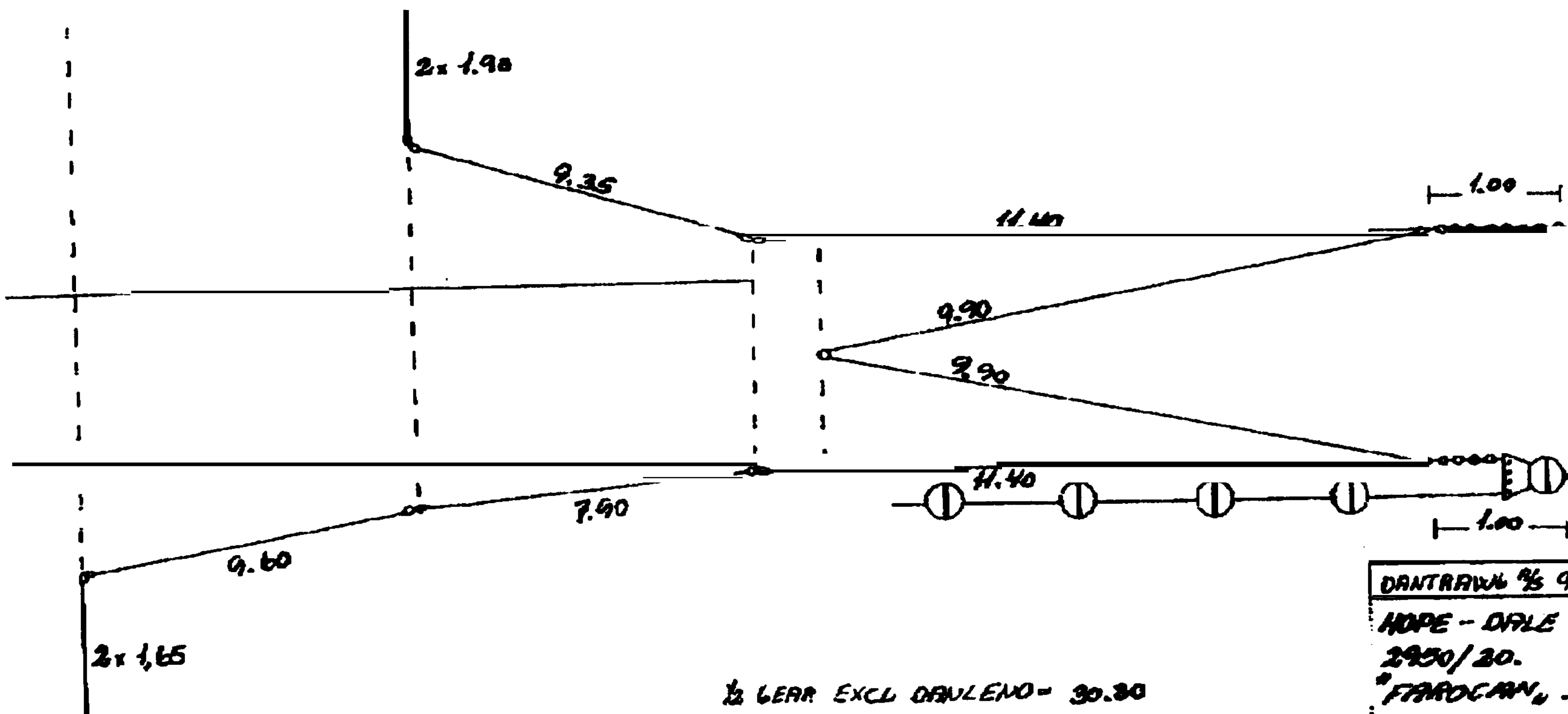
75/40B.
61½.
75/4.
40/3
40/1.
40/4
40/2
RET
225.
425.
436 K
302 K
236 K



DANTRAWL A/S 9850 O.H.
BAGPOSE 2450/30 HOPE O. "FAROECAN"
D. 15-03-89. / T. A.F.O.

TRILLER : OVERTELLE = 26 m/m TRIF.
BRYSTER = 24 m/m TRIF.
UNDTELLE = KL HADE 13-8.
BOLSH = 14 m/m DANL.
LEISELINER = 26 m/m DANL.

KUGLER : OVER = 1 x 212 = 212
BRYST = 2 x 13 = 26
UNDERT = 1 x 80 = 80
LEISEL = 2 x 36 = 72
390 STK.



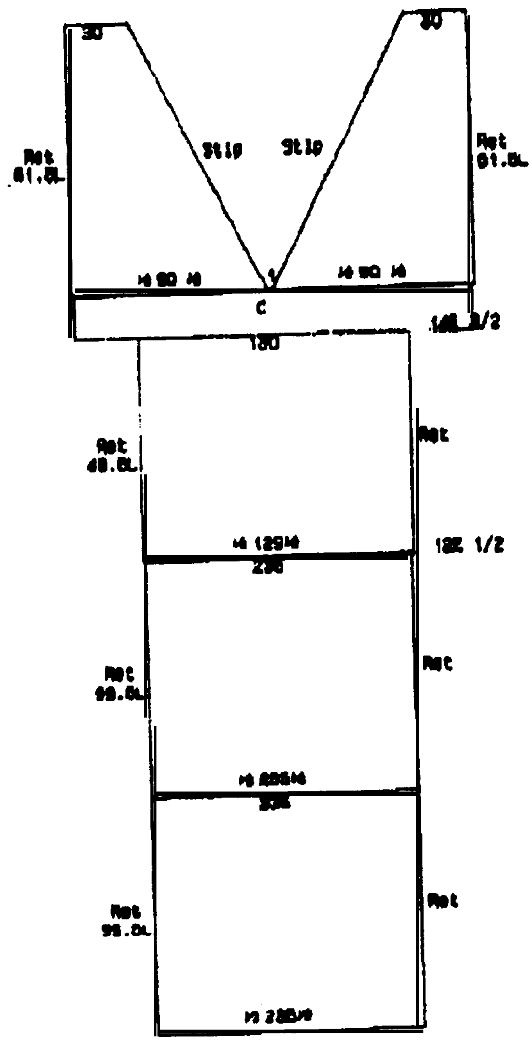
½ GEAR EXCL DANLENO = 30.30

½ GEAR INCL DANLENO = 31.30

DANTRAWL A/S 9850 D.K.	
HOPE - DALE 2950/20. "FAROCAN" INC.	
D. 7.3-89	T. R.F.O.

Masker mm	Tråd	strakt lngd m	Knuder i ase
75.0	4IDP	5.30	1
75.0	4IDP	1 .W	1
75.0	4IP	7.50	4
40.0	3U	8.00	6
40.0	al	8.00	6

SIDE PANEL

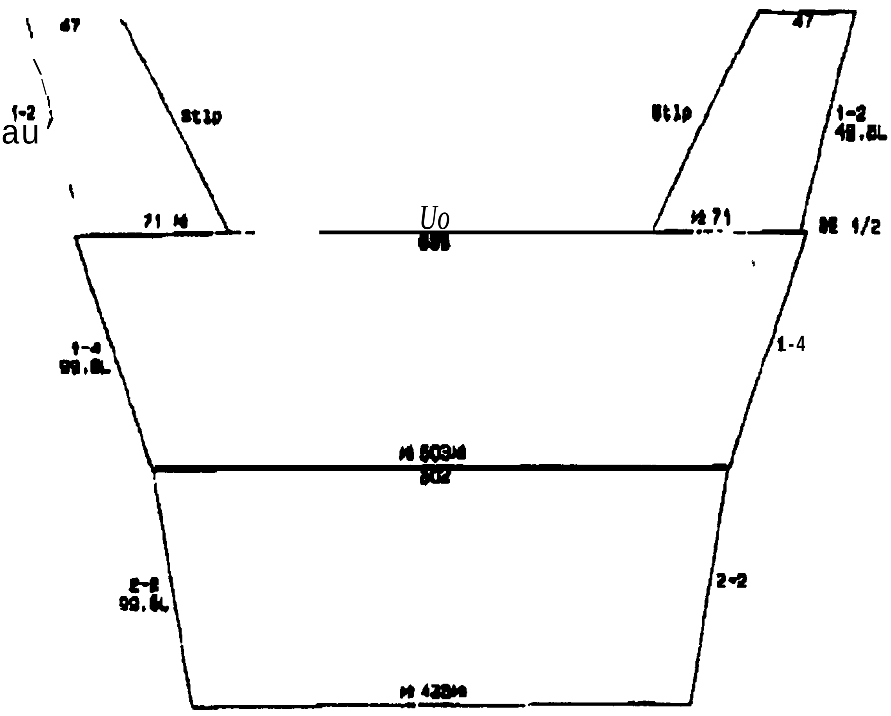


sek	top	bund	længde	V skæring	H
C	183	182	9.5L	Ret	Ret

FAROCAN AQVIQ KINGUK
HOPE DALE 2950/20

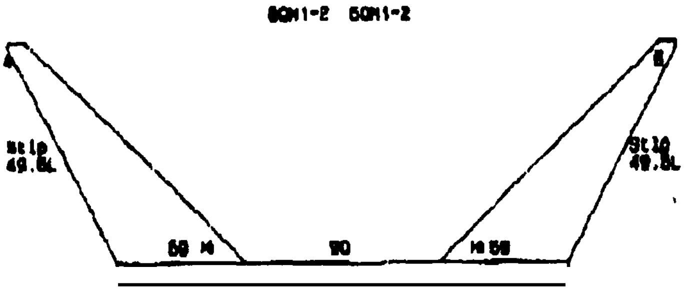
Masker mm	Tråd	Strakt lngd m	Knuder i mm
78,0	4IP	7.00	4
40.0	3U	8.00	6
40.0	3U	8.00	6

OVER PANEL



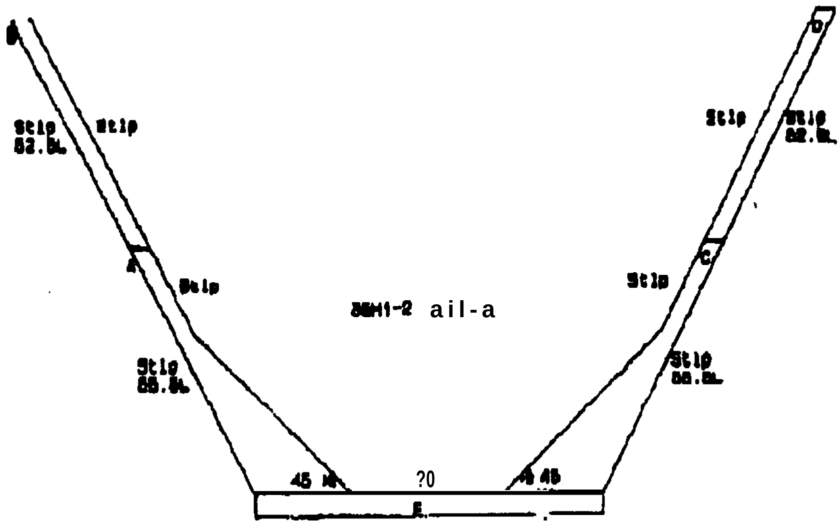
FAROCAN AQVIQ KINGUK
HOPE DALE 29 50/20

Masker mm	Tråd	Strekning m i sem	Knuder
70.0	4IDP	7.60	2



FAROCAN AQVIQ KINGUK
HOPE DALE 2950/20

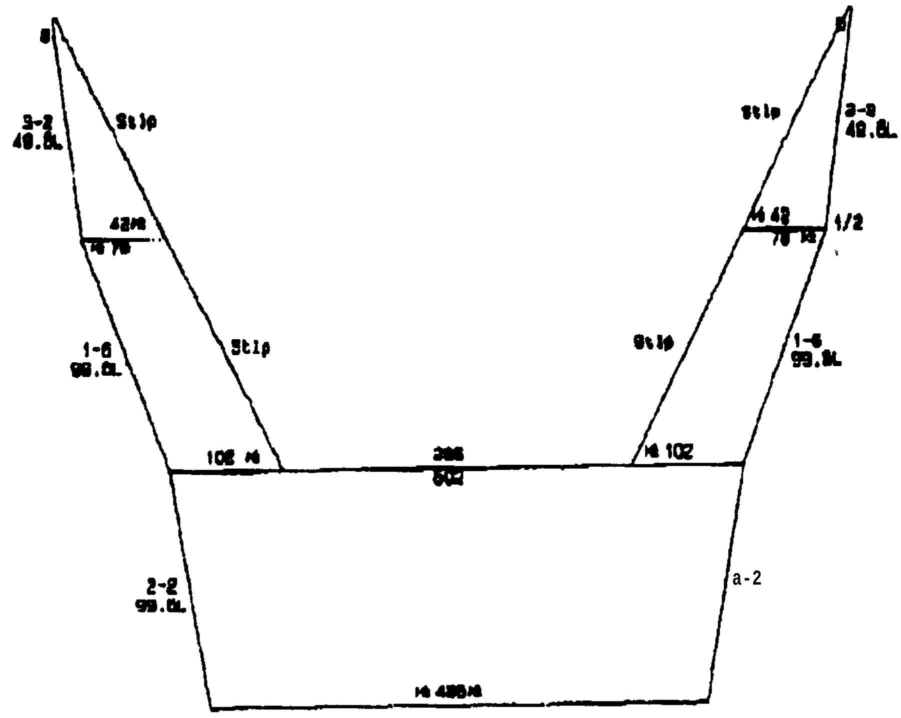
Masker mm	Tråd	Strekt lngd m	Knuder
75.0	4[illegible]	7.00	2
?5.0	4[illegible]	0.40	2



FAROCAN AQVIQ KINGUK
I-I(3PE DALE 29 S0/20

Masker mm	tråd	strakt lngd m	knuder i omm
78,0	41P	7.50	4
40,0	2U	8,00	5
M.o	W	8,00	5

UNDER PANEL



sek	top	bund	lengde	v skaring	H
B	42	6	49.5L	3-2	Stip
D	42	6	49.5L	Stip	3-2

FAROCAN AUVIQ KINGUK
HOPE DALE 2960/20

APPENDIX III

SET AND CATCH DATA

A) Data Sheets

B) Summary of Set and Catch Data

C) Species List (All Areas)

APPENDIX III-A

DATA SHEETS

OFFSHORE EXPLORATORY PROGRAM 1989
UNAAQ FISHERIES

SET DATA

Vessel: M/V KINGUK Gear Type: ______ Crew: ______

Station No.: ______ Date (dd/mm/yy): ______ Chart No. ______

Start Time: ______ End Time: ______ Bottom Time: ______

Set: ______

Haul: ______

Warp Length: ______

Start Depth: ______ End Depth: ______ Average Depth: ______

Min: ______

Max: ______

Start Latitude: ° ' " N End Latitude: ° ' " N

Start Longitude: ° ' " W End Longitude: ° ' " W

Speed (knots): ______ Bearing: ______ Distanoe Towed (Naut. Miles): ______

General Looation: ______ Bottom: ______

D mag ______

mm nt ______

S. T. D.:

CATCH DATA

BEST ESTIMATE:

SPECIES	TOTAL CATCH #	TOTAL CATCH Kg.	CPUE/ Naut. Mile #	CPUE/ Naut. Mile Kg.	NO. SAMPLED Lf.	NO. SAMPLED Aut.	Ref. #

BY - CATCH INDEX

SPECIES	None	Few	Many	Extreme
1.Crab				
2. Starfish				
.3 Sea Cucumber				
4 Sea Plants				

SPECIES	None	Few	Many	Extreme
5. Rocks I Mud				
6				
7				
8				

Comments: ______

OFFSHORE EXPLORATORY PROGRAM 1989
UNAAQ FISHERIES
AUTOPSY DATA

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL
COMMENTS

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL
COMMENTS

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL
COMMENTS

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL
COMMENTS

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL
COMMENTS

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL

STATION # | FISH # | DATE (d/m/y) | GEAR TYPE
SPECIES | LENGTH | WEIGHT | SEX
MATURITY | PARASITES | AGE
STOMACH CONTENTS | % FULL
COMMENTS

OFFSHORE EXPLORATORY PROGRAM 1989
UNAAQ FISHERIES
LENGTH FREQUENCY

DATE:		SPECIES:		STATION # (s)	
LENGTH:	T/F	# ♂		# ♀	
# TOTAL		TOTAL WT.	kg.	WHO?	

M	♂ MALES ♂	N
7		
8		
9		
0		
1		
2		
3		
4		
8		
9		
0		
1		
2		
3		
4		
5		
8		
9		
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2		
3		
4		
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1		
n		
3		
4		
5		
6		
7		
8		
9		
0		
1		

M	♀ FEMALES ♀	N
7		
8		
9		
0		
1		
2		
3		
4		
5		
6		
7		
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8		
9		
0		
1		
2		
3		
A		

ODD SIZES ♂

M		N	M		N

ODD SIZES ♀

M		N	M		N

APPENDIX III-B

SUMMARY OF SET AND CATCH DATA

***Modified** from C. Hudon

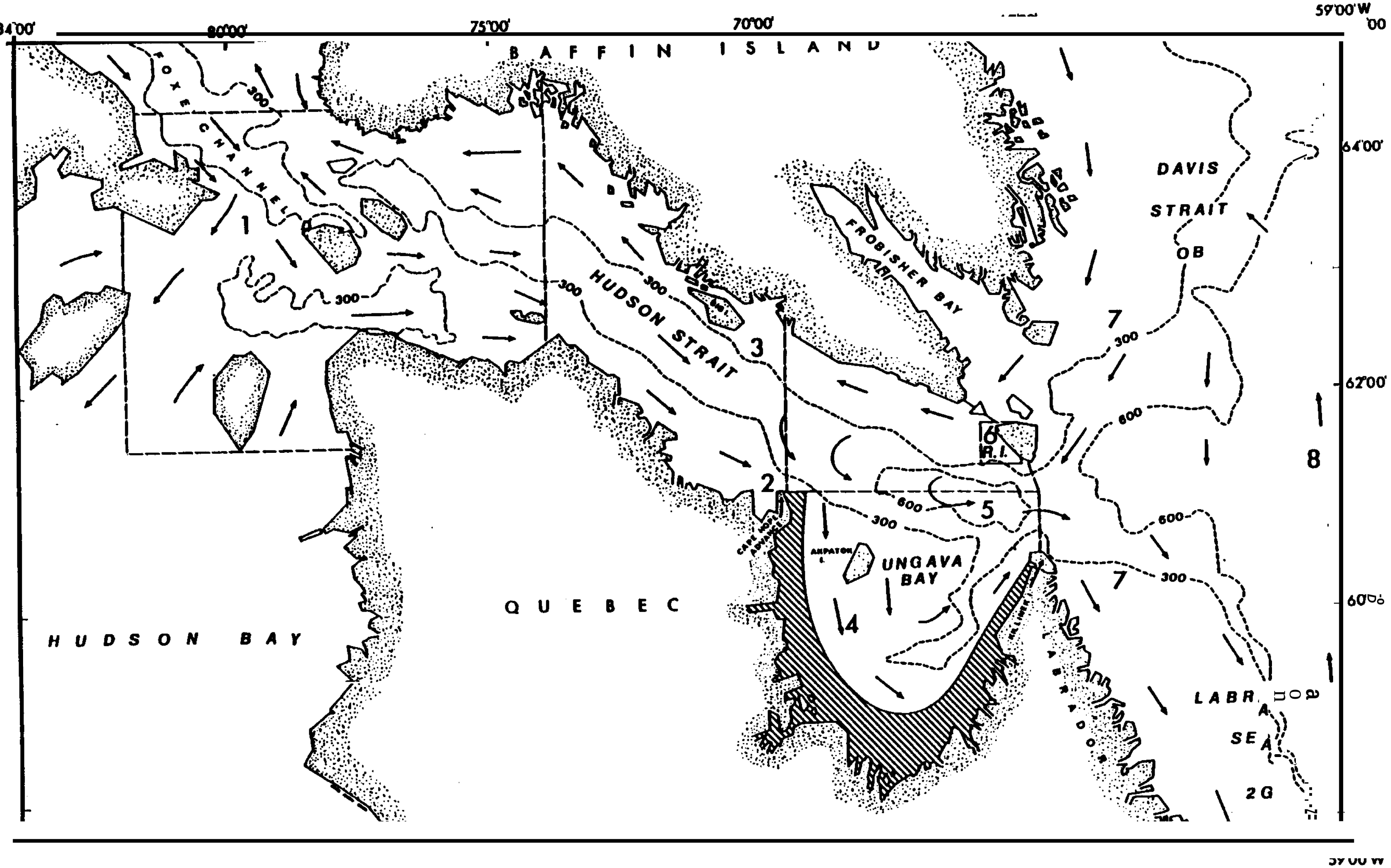
Station	Depth (fms)	Latitude	Longitude	Totwght	TOTCOL	Misc. fish	Raja	Allgatd	Turbot	Saida	Triglops	Poacher	Lumpsuck	Lycodes	Liparis	Decapods	Pandalus	Argis	Sclerocr	Squid
100	120-123	61 00	70 06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101	145-148	61 42	70 10	4.87	5.27	0	0	0	1.08	3.79	0.1	0.1	0.1	0	0.1	0	0	0	0	
102	167-169	61 51	70 12		0														0	
103	173-173	62 13	70 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	169-174	62 29	70 24		0															
105	173-174	62 15	70 31		0															
106	172-174	62 00	70 31		0.3	0	0	0	0.1	0.1	0	0	0	0	0.1	0	0	0	0	0
107	130-134	61 46	70 31		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	132-134	61 54.28	71 02.74	1.08	1.09		0	0	0	0	0	0	0	0	0	0	0.01	1.08	0	0
109	182-184	62 05.26	70 58.26		3.68	0	0	0	0.32	1.6	0.08	0.02	0.02	0.04	1.2	0.4	0	0	0	0
110	187-188	62 21.05	71 10.23	4.59	6.48	0	0.4	0.04	2	0.2	0.4	0	0.02	1.2	2.2	0	0	0	0	0.02
111	147-155	62 36.94	71 00.54		0	0														
112	135-142	62 50.03	71 31.46		3	0	0	0	0.3	2.25	0	0	0	0	0.3	0	0	0	0.15	0
113	182-184	62 34.27	71 34.15		5.06	0.34	0	0	0.45	2.7	0	0	0.01	0.1	0.45	0	0.01	0	1	0
114	190-192	62 16.42	71 30.73		0.06	0	0	0	0	0	0	0	0	0	0	0	0.06	0	0	0
115	140-150	62 04.20	71 31.69		3.2	0	0	0	1	1	0	0	0.1	0	1	0.1	0	0	0	0
116	111-119	62 11.62	72 01.96	10	12.9	0	0	0	0	1.2	0.28	0.54	0.08	0	3.2	0	0.24	7.28	0.08	0
117	195-195	62 27.33	71 59.06	27.5	25.71	11	0	0	1	4.4	0.5	0.1	0.15	1	6.7	0	0.07	0.74	0.05	0
118	177-177	62 38.55	71 58.22		6.01	6											0.01			
119	151-158	62 59.60	72 05.15	21	23.25	0	0	0	0	20	0	0	0	0	2	0	0.2	0.64	0.41	0
120	126-128	63 07.81	72 01.70	10	9.81	3.02										1.04		3.02	2.73	
121	132-136	63 26.87	72 34.42	4	3.79	3	0	0.01	0	0	0	0	0.02	0	0	0	0	0.16	0.6	0
122	128-130	63 23.65	72 25.91	15	0	0														
123	156-157	62 56.29	72 30.17	18	18.05	4	0	0.06	0.05	1.78	0	0.12	3.2	1	6.7	0	0.1	0.79	0.13	0.12
124	198-199	62 40.63	72 31.11	17	15.4	0.9	0	0	1.7	11.9	0	0	0	0	0.1	0.8	0	0	0	0
125	195-195	62 30.79	72 31.88		0	0														
126	123-136	62 18.89	72 31.52	19	20.54	0	0	0	0	3	1.12	0.78	1.1	1.06	9	0	0.2	4.28	0	0
127	125-125	62 30.72	73 02.75	29	28.92	22	0	0	0	1.92	0	0	0	3.08	0	0	0	1.92	0	0
128	184-187	62 41.00	73 00.00	26	26	0.09	0	0.48	0	1.8	0.22	0.22	0.31	0	22.84	0	0	0.04	0	0
129	204-206	62 53.97	72 58.58	56	49.41	0	0	0	5.28	17.35	0.41	0	0	0	26.17	0.2	0	0	0	0
130	157-162	63 09.24	72 59.66	20	18.07	0	0	0	0	11.51	0.29	0.15	1.25	0	4.87	0	0	0	0	0
131	125-128	63 24.90	72 59.40	14	17.31	0	0	0.04	0	2.63	1.12	0.06	3.92	1.42	1.68	0	0	1.62	4.82	0
132	152-153	63 24.96	73 31.59	28	27.99	0	0	0	0	5.92	0.27	0	13.36	0	8.12	0	0	0.17	0.15	0
133	185-189	63 07.69	73 32.27	44	52.65	0	0	0	0.64	14.15	0.74	0	6.15	0	30.76	0.21	0	0	0	0
134	223-224	62 56.49	73 28.09	16	16.47	0	0	0	1.12	2.89	0.73	0	0	0	11.68	0	0.05	0	0	0
135	111-115	62 39.90	73 30.20	26	29.77	0	0	0	0	6.17	2.12	0	3.58	0	7.1	0.61	0	6.72	3.47	0
136	173	62 54.47	73 58.71	19	13.71	0	0	0	0.23	3.95	3.2	0	1.91	0	3.95	0.05	0	0.42	0	0
137	188-192	63 13.74	73 57.11	38	44.97	0	0	0	4.42	14.08	1.72	1.96	1.46	1.33	19.87	0	0	0.13	0	0
138	155-155	63 26.14	74 00.20	18	0	0														
139	143-153	63 42.84	74 03.24	14	12.62	0	0	0	0	3.87	0.55	0	3.65	0	4.39	0	0	0.16	0	0
140	100-116	63 41.00	74 27.58	24	21.7	0	0	0	0	1.79	0.81	0	6.59	0	9.19	0.23	0	2.08	1.01	0
141	174-185	63 26.08	74 27.38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
142	238-240	63 08.74	74 25.74	18	17.85	0	0	0	0.69	3.8	1.37	0	0.08	0.1	11.73	0	0.08	0	0	0
143	163-164	63 01.16	74 29.89	70	71.66	0	0	0	0.9	52.89	4.34	0.23	2.92	2.48	6.43	0	0	0.23	1.24	0
144	252-258	63 06.99	74 56.88	8	9.77	0	1	0	0.76	2.04	0.66	0	0	0	4.89	0.42	0	0	0	0
145	177-182	63 30.29	75 00.02	36	32.84	0	0	0	0.09	10.83	5.28	0.28	16.36	0	0	0	0	0	0	0
146	126-127	63 39.18	75 02.10	34	34.04	5.1	0	0	0	17	0	0	0	0	11.9	0	0.03	0.01	0	0
147	117-118	63 41.37	75 31.25	40	27.51	0	0	0	0	0	3.54	0	7	0	12.34	0	0	2.49	2.14	0
148	188-192	63 24.90	75 27.65	16	15.9	0	0	0	0	5.47	1.57	0.15	3.92	0	4.56	0.15	0.08	0	0	0
149	233-233	63 10.38	75 29.81	18	12.69	0.05	0	0	0.83	1.61	3.22	0	1.07	0.13	5.7	0	0.08	0	0	0
150	219-220	63 25.00	76 00.00	12	8.21	0	0	0	0	4.66	0.75	0	0.13	0.04	2.58	0	0.05	0	0	0
151	149-158	63 45.60	76 16.14	34	32.07	0	0	0	0.73	10.05	5.68	0.02	3.96	0.12	11.27	0	0	0.19	0.05	0
152	135-137	63 54.76	75 58.95	36	35.28	0	0	0	0	7.03	3.86	0.12	4.03	0	19.79	0	0	0.45	0	0
153	151-152	63 54.95	76 27.54	38	37.92	0	0	0	0	6.54	4.18	0	4.57	0	22.63	0	0	0	0	0

Station	Depth (fms)	Latitude	Longitude	Totwght	TOTCOL	Misc. fish	Raja	Aligatd	Turbot	Saida	Triglops	Poacher	Lumpsuck	Lycodes	Liparis	Decapods	Pandalus	Argis	Sclerocr	Squid
154	208-210	63 55.01	77 02.02	18	20.88	0	0	0	0	4.84	2.03	0	2.03	0.11	11.7	0	0.17	0	0	0
155	297-299	63 42.07	77 03.12	73	73	73														
156	221-226	62 39.66	76 28.24	28	33.05	0	3.3	0	0.71	3.72	4.3	0	0.97	10.07	9.81	0	0.17	0	0	0
157	115-124	63 08.97	75 59.61	32	32.06	1.6	0	0	0	4.6	0	0	12.8	0	12.8	0.05	0	0	0.01	0
158	167-179	62 55.06	75 57.31	57	58.69	0	0	0	1.63	22.8	2.85	0	0.02	2.85	28.5	0.02	0	0.02	0	0
159	188-192	62 40.28	75 55.48	28	16.36	8.18	6									0	0.32	1.86	0	0
160	127-130	62 39.82	75 29.55	22	22.98	21.84										0	0.09	1.05	0	0
161	123-123	62 30.92	75 28.36	36	36	32.94										0.3	0.24	2.52	0	0
162	162-162	62 25.96	76 04.79	16	16.01	13.16										0	1.18	1.64	0.03	0
163	135-151	62.31.03	76 30.79	74	74.09	0	0	0	0	18.5	3.7	0	3.7	18.5	29.6	0	0	0.08	0.01	0
164	216-217	62 39.69	76 26.90	41	40.18	0	4.1	0.82	8.2	8.2	0.82	0.82	0	0.82	16.4	0	0	0	0	0
165	185-187	62 55.44	76 29.60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166	124-126	63 10.25	76 31.20	34	32.66	30.8										0	0.1	0.04	1.72	0
167	149-155	63 09.34	77 01.97	94	92.64	92										0	0	0.6	0.04	0
168	162-174	62 55.32	77 01.23	50	50.02	50											0.02	0	0	0
169	220-221	62 40.55	76 58.59	46	44.81	44											0.81			
170	230-233	62 34.80	77 03.00	30	30.14	0	1.5	0	0	6	3.75	0	0	3.75	15	0	0.14	0	0	0
171	242-244	62 39.35	77 25.54	76	69.92	0	1.5	0	3.8	11.4	3.8	3.8	0	15.2	30.4	0.01	0	0.01	0	0
172	153-153	62 52.87	77 37.16	96	96	4.8	0	0	0	28.8	14.4	0	9.6	0	38.4	0	0	0	0	0
173	117	62 53.41	77 59.96	20	19.02	0	0	0	0	8	1	0	2	0	8	0	0.01	0.01	0	0
174	264-265	62 40.46	77 57.35	22	21.93	0	0	0	0	8.8	2.2	0	0	1	9.9	0	0.03	0	0	0
175	266-267	62 40.26	78 28.61	57	53.41	0	0	0	0.1	22.8	1	1	0	5.7	22.8	0	0	0.01	0	0
176	137-139	62 53.55	78 28.00	88	79.42	0	0	0	0	52.8	0.1	0	0.1	8.8	17.6	0	0.01	0.01	0	0
177	102-103	63 07.71	78 27.86	50	0	0														
178	114-117	63 06.47	79 02.69	16	16.32	0.32	0	0	0	8	0	0	8	0	0	0	0	0	0	0
179	161-162	63 54.30	79 02.38	30	30	0.5	1	0	0	12	0	0	4.5	0	12	0	0	0	0	0
180	198-201	62 40.55	79 08.25	36	37.2	0	10.8	0	1	12.6	1	0	1	0	10.8	0	0	0	0	0
181	174-178	62 40.41	79 28.81	34	35.36	0	1.7	1	0	17	1	1	0	3.4	10.2	0	0	0.06	0	0
182	168-170	62 54.59	79 30.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183	152	62 54.62	80 04.21	50	50.03	2.5	0	0	0	45	0	0	0	0	2.5	0	0	0.03	0	0
184	150-151	62 42.41	80 01.87	28	28.05	1.4	0	0	0	22.4	0	0	0	0	4.2	0	0	0.05	0	0
185	130-132	62 38.93	80 28.42	12	12	0	0	0	0	10.8	0	0	0.6	0	0.6	0	0	0	0	0
186	100-103	62 26.60	80 31.40	5	5.5	0.9	0	0	0	3.5	0	0	1	0	0.1	0	0	0	0	0
187	109-110	62 12.19	81 04.80	7	7.65	1	0	0	0	5.6	0	0	0	0	1.05	0	0	0	0	0
188	105-108	61 40.20	81 30.36	10	10.04	0.04	0	0	0	10	0	0	0	0	0	0	0	0	0	0
189	118-119	61 54.85	82 00.65	8	8.04	0.4	0	0	0	7.6	0	0	0	0	0	0	0	0.02	0	0.02
190	118-119	62 09.53	81 33.30	8	8.01	0.2	0	0	0	7.6	0	0	0	0	0.2	0	0	0.01	0	0
191	107-108	62 24.24	81 02.10	3	2.72	0	0	0	0	2.1	0	0	0.3	0	0.3	0	0	0.02	0	0
192	108-111	62 38.39	80 59.97	6	5.81	0	0	0	0	2	0	0	1.2	0	0.6	0	0.01	2	0	0
193	147-148	62 54.66	80 34.14	42	41.08	0	0	0	0	39	0	0	0	0	2	0	0	0.08	0	0
194	140-142	62 55.00	80 59.88	28	27.7	0	0	0	0	27	0	0	0	0	0.5	0	0	0.2	0	0
195	122-125	62 55.57	81 25.68	7	7.24	0.76	0	0	0	3.84	0.2	0	0.2	0	0.4	0	0	1.84	0	0
196	101-104	63 09.32	81 32.24	5	4.85	0	0	0	0	4.25	0	0	0.1	0	0	0	0	0.5	0	0
197	101-103	63 08.92	81 01.66	5	4.95	0.5	0	0	0	4.25	0	0	0.05	0	0.05	0	0	0.1	0	0
198	112-115	63 07.10	80 28.06	4.04	4.02	0.06	0	0	0	2.84	0	0	1	0	0	0	0	0.12	0	0
199	126-130	63 06.47	80 03.78	30	28.84	0	0	0	0	22.5	0	0	6	0	0	0.04	0	0.3	0	0
200	119-140	63 42.66	79 31.90	27	26.68	0.29	0	0	0	18.19	0.29	0	0.36	0	7.24	0	0	0.05	0.21	0.05
201	185-186	64 11.90	80 20.76	49	48.3	0	0	0.09	0	17.49	0	0	0	0	30.36	0	0	0	0.36	0
202	188-192	64 30.66	80 57.45	55	53.76	0	0	0	0	32.64	0	0	0	0	21.09	0.02	0	0	0.01	0
203	161-164	64 27.50	79 17.61	74	74	3.7	0	0	0	29.6	0	0	0	0	40.7	0	0	0	0	0
204	169-169	63 56.79	78 57.42	32	32.14	1.6	0	0	0	16	0.14	0	0	1.6	12.8	0	0	0	0	0
			TOTAL =	2583.08	2482.49	441.99	31.3	2.54	39.13	849.13	91.69	11.47	146.55	84.9	706.1	4.65	4.57	47.85	20.42	0.21

APPENDIX III-C

SPECIES LIST (All Areas)

*Modified from C. Hudon, **in** press


84°00'
80°00'
75°00'
70°00'
59°00'W
64°00'
62°00'
60°00'
BAFFIN ISLAND
FOXE CHANNEL
HUDSON STRAIT
FROBISHER BAY
DAVIS STRAIT
UNGAVA BAY
QUEBEC
HUDSON BAY
LABRADOR
LABR A SEA
R.I.
300
600
1
2
3
4
5
6
7
7
8

Common Name	Family/Genus	Species	WHS	CHS	EHS	JB	R	JB-G
VERTEBRATES								
Hagfish	Myxine	glutinosa						1
Greenland Shark	Somniosus	microcephalus			2			
Thorny Skate	Raja	radiata	3	2	3	3	3	3
Spinytail Skate	Raja	spinicauda				1	1	
Jensen's Skate	Raja	jenseni			1	1		
Unidentified	Rajidae				2	2		
Unidentified	Chimaeridae						1	
Capelin	Mallotus	villosus	2	2	2		2	
Viperfish	Chauliodus	sloani					1	
Barracudina	Arctozenus	rossoi					* * 1	
Krøyer's Lanternfish	Notoscopelus	kroyeri						2
Largescale Lanternfish	Symbolophorus	veranyi				1		
Unidentified	Myctophidae				3	3	3	3
Daggertooth	Anotopterus	pharao					1	
Arctic Cod	Boreogadus	saida	3	3	2	3	2	3
Atlantic Cod	Gadus	morhua		1	1	1	1	2
Three Beard Rockling	Gaidropsarus	ensis			2	3	2	3
Longfin Hake	Urophycis	chesteri				1		
Roughhead Grenadier	Macrourus	berglax				3	3	3
Northern Wolffish	Anarhichas	denticulatus				2		
Atlantic Wolffish	Anarhichas	lupus					1	2

FREQ.EXL ##

Common Name	Family/Genus	Species	WHS	CHS	m	UB	RI	OB-2G
Spotted Wolffish	Anarhichas	minor				1	2	1
Unidentified	Anarhichadidae				2	2	2	2
Fourline Snakeblenny	Eumesograrnmus	praecisus		*1		1		
Daubed Shanny	Leptoclinus	m aculatus					● 2	
Snake Blenny	Lumpenus	lumpretaeformis			2		2	
Stout Eelblenny	Lumpenus	medius				2	2	
Unidentified	Stichaeidae				3	2	2	2
Fish Doctor	Gymnelus	virldis				1		
Checkered Wolf Eel	Lycenchelys	koethoffi					*1	
Common Wolf Eel	Lycenchelys	paxillus				2	1	
Wolf Eelpout	Lycenchelys	verrilli				2	2	
Esmark's Eelpout	Lycodes	esmarki		*2	2	2	2	3
Laval's Eelpout	Lycodes	lavalaei				1		
	Lycodes	mucosus	1	*1				
Pale Eelpout	Lycodes	pallidus	*2			1		
Arctic Eelpout	Lycodes	reticulates	*2	*3	2	2	* 2	2
Polar Eelpout	Lycodes	polaris				1		
Vahl's Eelpout	Lycodes	vahlii			2	2	2	3
Unidentified	Zoarcidae		3	3	3	3	3	2
Redfish	Sebastes	Spp.		*1	3	3	● 3	2
Arctic Hookear Sculpin	Artediellus	uncinatus			2	3	* 2	2
Polar Sculpin	Cottunculus	microps				2	*1	1
Arctic Staghorn Sculpin	Gymnocanthus	tricuspis				1		
Twohorn Sculpin	Icelus	bicornis				2		
Spatulate Sculpin	Icelus	spatula		*1	2	2	* 2	
Gmbby	Myoxocephalus	aenaeus			2	1	1	
Longhorn Sculpin	Myoxocephalus	octodecemspinosus			2			
Shorthorn Sculpin	Myoxocephalus	scorpius			2		2	
Nybelin's Sculpin	Triglops	nybelini	3	*3	3	3	● 3	3
Mailed Sculpin	Triglops	murrayi	1		3	3	*3	3

FREQ.E%L ##

Common Name	Family/Genus	Species	WHS	CHS	E-is	UB	RI	0B-2G
Ribbed Sculpin	Triglops	pingeli	3	*3	3		●3	
Unidentified	Cottidae		3	3	3	2	3	2
Atlantic Sea Poacher	Agonus(Leptagonus)	decagonus	3	*3	2	2	●2	2
Atlantic Alligatorfish	Aspidophoroides	monopterygius			2	2	2	2
Arctic Ailigatorfish	Aspidophoroides	oiriki	2	*3	3	3	2	3
Lumpfish	Cyclopterus	iumpus			2	2	2	2
Leatheriin Lumpsucker	Eumicrotremus	derjugini	2	*3		2	1	
Spiny Lumpsucker	Eumicrotremus	spinosus	3	*3	3	3	3	2
Longfin Seasnail	Careproctus	longlpinnis					2	
Sea Tadpole	Careproctus	reinhardti		*2	1	2	2	
Atiantic Seasnaii	Liparis	atlanticus				2		
Striped Seasnaii	Liparis	liparis				2	2	1
Greenland Seasnaii	Liparis	tunicatus	*3	3		2	1	1
Poikadot Seasnail	Liparis	cyclostigma(gibbus)	2	*3		2	*1	
Gelatinous Seasnail	Liparis	koefoedi(fabricii)	3	*3	3	3	* 3	3
Unidentified	Cyclopteridae		3	3	3	3	3	3
American Plaice	Hippogiossoides	platessoides			2	2	2	2
Greenland Haiibut	Reinhardtius	hippoglossoides	3	*3	3	3	*3	2
INVERTEBRATES								
Pink Shrimp	Pandaius	boreaiis			2	2	2	3
Striped Pink Shrimp	Pandalus	montagui			2	3	3	2
Unidentified	Pandalids		3	3				

FREQ.EXL ##

Common Name	Family/Genus	Species	WHS	CHS	EHS	UB	RI	OB-2G
	Lebbeus	polaris	2	1	2	2	2	2
	Lebbeus	groenlandicus				2		
	Lebbeus	spinosus				2		
Brown Shrimp	Argis	dentata	3	3	3	3		
	Pasiphea	tarda					2	
	Pasiphea	muitidentata				1		
Unidentified	Pasiphaea					2		
	Sclerocrangon	boreas	3	3	2	2	2	2
	Sclerocrangon	ferox .				2		
Unidentified	Sclerocrangon					2		
	Spirontocaris	gaimardi			2			
	Spirontocaris	phippsii				2		
	Spirontocaris	spinus	2			1	2	
Unidentified	Spirontocaris			2	2	2		
	Eualus	gaimardi				2		
	Eualus	belcheri				2		
	Eualus	fabricii				2		
Unidentified	Eualus					2		
	Sabinea	septemcarinata	3	2				
Unidentified	Sabinea				2			
	Crangon	septemspinosus	1	1				

APPENDIX IV

TURBOT (*Reinhardtius hippoglossoides*)

A) Length Frequency Table .

B) Autopsy Table

APPENDIX IV-A

TURBOT LENGTH FREQUENCY TABLE

Turbot 89 lf table

LENGTH CLASS (cm)	#no	#129	#134	#136	#158	#164	#175	TOTAL
10								0
11								0
12		1					1	2
13	1							1
14								
15						1		1
16			1					1
17	1					1		2
18	1		1			5		7
19	5							5
20	6					1		7
21	7	1	1	1		4		14
22	4				1	1		6
23	5					3		8
24	2		1			1		4
25	4					6		10
26	3				1	2		6
27	1	2	1			1		5
28	3	1				3		7
29								
30	1							1
TOTAL	44	5	5	1	2	29	1	87

APPENDIX IV-B

TURBOT AUTOPSY DATA

1989 Offshore Program- Turbot Autopsies

STATION #	FISH #	LENGTH (CM)	WEIGHT (KG)	AGE
110	1	25.2	0.14	5
110	2	30.3	0.27	5
110	3	27.6	0.17	5
110	4	25.8	0.17	4
110	5	27.6	0.22	5
110	6	23.2	0.12	4
110	7	27.2	0.19	6
110	8	28.0	0.20	5
110	9	22.6	0.09	4
110	10	21.5	0.09	4
110	11	21.2	0.09	4
110	12	25.2	0.16	5
110	13	23.0	0.10	4
110	14	21.1	0.08	4
110	15	24.6	0.13	5
110	16	21.3	0.08	4
110	17	21.7	0.09	4
110	18	24.2	0.12	5
110	19	26.3	0.18	5
110	20	20.0	0.07	4
110	21	26.3	0.17	5
110	22	20.8	0.075	4
110	23	22.9	0.11	4
110	24	20.5	0.07	4
110	25	24.4	0.135	5
110	26	21.7	0.09	4
110	27	22.3	0.10	4
110	28	24.6	0.15	4
110	29	20.2	0.07	4
110	30	22.6	0.10	4
110	31	20.4	0.06	4
110	32	19.4	0.06	3
110	33	20.5	0.07	4
110	34	20.4	0.07	4
110	35	19.5	0.06	3
110	36	19.2	0.06	3
110	37	20.1	0.07	4
110	38	19.2	0.06	3
110	39	20.5	0.07	4
110	40	19.4	0.06	3
110	41	17.6	0.04	3
110	42	18.8	0.05	3
110	43	13.1	[illegible]	2

1989 Offshore Program- Turbot Autopsies

STATION #	FISH #	LENGTH (CM)	WEIGHT (KG)	AGE
129	1	21.2	0.07	4
129	2	27.3	0.18	5
129	3	11.6	0.01	2
129	4	26.7	0.14	5
129	5	27.5	0.18	5
134	1	27.0	0.15	5
134	2	23.6	0.115	4
134	3	21.2	0.08	4
134	4	17.6	0.04	3
134	5	15.8	0.03	3
158	1	26.2	0.15	5
158	2	22.4	0,08	4
164	1	24.8	0.125	4
164	2	28.2	0.18	5
164	3	22.5	0.1	4
164	4	23.9	0.14	5
164	5	25.1	0.135	5
164	6	28.0	0.185	6
164	7	24.6	0.125	4
164	8	24.9	0.14	5
164	9	22.6	0.095	4
164	10	22.3	0.1	4
164	11	28.1	0.205	5
164	12	26.3	0.17	5
164	13	25.8	0.165	5
164	14	25.0	0.13	5
164	15	26.8	0.15	5
164	16	24.5	0.12	5
164	17	22.9	0.11	4
164	18	21.0	0.08	4
164	19	21.0	0.08	5
164	20	20.6	0.07	4
164	21	20.1	0.07	4
164	22	21.0	0.075	4
164	23	18.0	0.05	4
164	24	17.8	0.045	*
164	25	18.0	0.05	3
164	26	17.7	0.04	3
164	28	14.6	0.025	3
164	29	16.6	0,04	3
175	1	12.2	0.013	2
Averages		22.321	0.105	

APPENDIX V

ARCTIC COD (*Boreogadus saida*)

Length Frequency Table

Boreogadus saida lf -89

LENGTH CLASS	#127	#128	#129	#130	#131	#132	#134	#135	#136	#138	#140	#145	#147	#152	#195	#200	#201	#202	TOTAL
6															7	1			8
7										2			1		23	2	1		29
8						1				1	1	1			14	4	4	2	28
9				1	1	1	1		2			2	2		20	4	1	3	38
10	1	1	1	2		2	3		1	2		3	1	2	13	4	1	5	42
11		1	3	4	2	4	1	1	3	7	1	5	6	5	17	10	10	26	106
12			2	13	3	12	2	10	4	14	1	10	6	6	15	20	19	42	179
13	4	3	8	33	5	22	11	8	2	14	1	13	15	4	27	23	12	44	249
14	6	3	13	43	11	35	13	11	2	18		12	4	8	19	22	15	32	267
15	5	2	16	31	2	13	4	7	8	7		13	9	4	7	34	13	23	198
16	7	3	11	9	5	9	6	2	5	2	1	8	4	5	3	25	10	14	129
17	2	1	4	1		6	3	1	6	1	2	3	5	4	4	16	6	3	68
18	2	3	6	2			1	1	4	4		3	4	2	3	5	5	6	51
19	1		2	2		1	2	3	1	1	2	1		2		5	1	3	27
20	1		1					1	2		1	2		2				1	11
21			1									1	1						3
22												1		1					2
23									1										1
24																			0
25																[illegible]			[illegible]
TOTAL	30	17	68	141	29	106	47	45	41	73	10	78	58	45	172	176	98	204	1438