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Cross-shelf Distributions of Cod in NAFO Divisions 2J3KL in May
and June 1995: Some Preliminary Findings of a Longer Term Study

by

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Introduction

There has been much speculation about apparent changes in the cross-shelf distribution of cod in recent years. The overall objective of this research was to determine the current population density and distribution of cod and other acoustically measurable species (capelin, arctic cod) across the shelf in two study areas: 1) Trinity and Bonavista Bays outward to the shelf edge (3KL); and 2) Black Tickle outward across the Hawke Channel (2J). An acoustic survey approach was used. This work forms part of a longer term study of the population structure and dynamics¹ of the northern cod. Here I report some preliminary findings on cod.

Methods

A total of approximately 3000 nmiles of transects were run using calibrated scientific echosounders on RV's Teleost and Shamook (38 kHz). All acoustic interpretations were supported by trawl sampling. A total of 44 fishing sets were made as directed by the acoustic record with the Campelen 1800 ground trawl and Diamond IX mid-water trawls on the Teleost and the Western Ila and Diamond V trawls on the Shamook.

Results

1) Southern block

Smith Sound

Three acoustic surveys of Smith Sound Trinity Bay were conducted in the spring of 1995: May 3-4; May 16-18; and a more extensive survey that included most of Trinity Bay during the last week of June (Fig. 1). The first survey located high densities of mature cod within Smith Sound. The mean estimate of abundance was 10.5 million fish (mean weight was approximately 1.6 kg hence biomass is estimated at 16.8 t (95% CI's 12.2-21.4 t)) (Table 1). Estimates from surveys 2 and 3 are somewhat lower and distributions more dispersed and into Trinity Bay (the Bay area was surveyed only in survey 3). Sizes and ages of fish were similar in surveys 1 and 2 but

differed in 3 when many more juvenile fish were captured (Fig. 2). Whether or not this represents a true change in distribution or gear selectivity (Teleost vs Shamook with their gear) is being investigated by comparing trawl and acoustic TS data.

Trinity and Bonavista Bays

A large scale survey of Trinity Bay was conducted in early late June (Fig. 3). Cod were located *only* in the NW part of the Bay from Random Island to south of Catalina at low densities. The total number of fish was estimated to be 2 million (95% CI's 1-3 million; 1.6-4.8 t)(Fig. 4).

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These fish are believed to be some of the same fish found in surveys 1 and 2 in Smith Sound. Cod were found only in the inner Sound areas of Bonavista Bay but surveying there was not possible using the Teleost hence no abundance estimates have been attempted.

Offshore

Cod were located only in one area at the outer edge of the shelf at low densities (Fig. 5).

Cross-shelf distribution

Most all of the cod surveyed in the southern block were located inshore (Fig. 6). Densities were high where cod occurred (somewhat less but comparable to those of the early 1990's when cod were much more abundant) no doubt as a result of the influence of spawning behavior. Most of these fish were not feeding heavily or at all at the time of observation.

2) Northern Block

Cod were widely distributed in the Hawke Channel at depths of 350-450 m over an area spanning 50 nmiles at very low densities (temps 2.5-3 C) (Fig. 7). There were patches of higher density. Abundance is estimated at 6.4 million fish (4.6-8.3). These fish were mostly juveniles (30-40 cm) (Fig. 8) with a portion of spawning adults in a spent condition. Preliminary comparisons suggest that there were fewer larger fish in 1995 than in 1994.

Cod were located at the edges of the Hawke Channel in the mid-portion of the shelf - virtually the same distribution as in 1994 (Fig. 9). No fish were located inshore. These cod were located in an area of high shrimp density and were feeding heavily on shrimp. They did not exhibit any of the typical migratory behaviors of this species and did not appear to move appreciably during the period of observation.

Cod densities from survey 1 Smith Sound May 3-5, 1995

FILENAME		Cod density (/sq.m.)		
		Count	Mean	Std Deviation
1	1200	.21	.15	
2	105	.20	.22	
3	131	.15	.25	
4	133	.10	.11	
5	125	.09	.08	
6	192	.22	.14	
7	119	.19	.09	
8	78	.12	.07	
9	130	.08	.06	
10	76	.07	.10	
11	76	.07	.07	
12	104	.08	.07	
13	82	.06	.05	
14	101	.06	.09	
15	110	.04	.04	
16	377	.05	.05	
17	126	.09	.06	
18	235	.07	.05	
19	180	.09	.12	
20	145	.16	.19	
21	45	.41	.21	
22	469	.15	.29	

Summary:

Area: 75 sq. km.
n: 4339
density: 0.14
sd: 0.07
mean#: 10.5 million
up95#: 13.4 million
lo95#: 7.6 million

Overall mean cod density (/m2)

	Count	Mean	Std Deviation	Std Err of Mean
Mean cod density (/m2)	4339	.14	.07	.0010

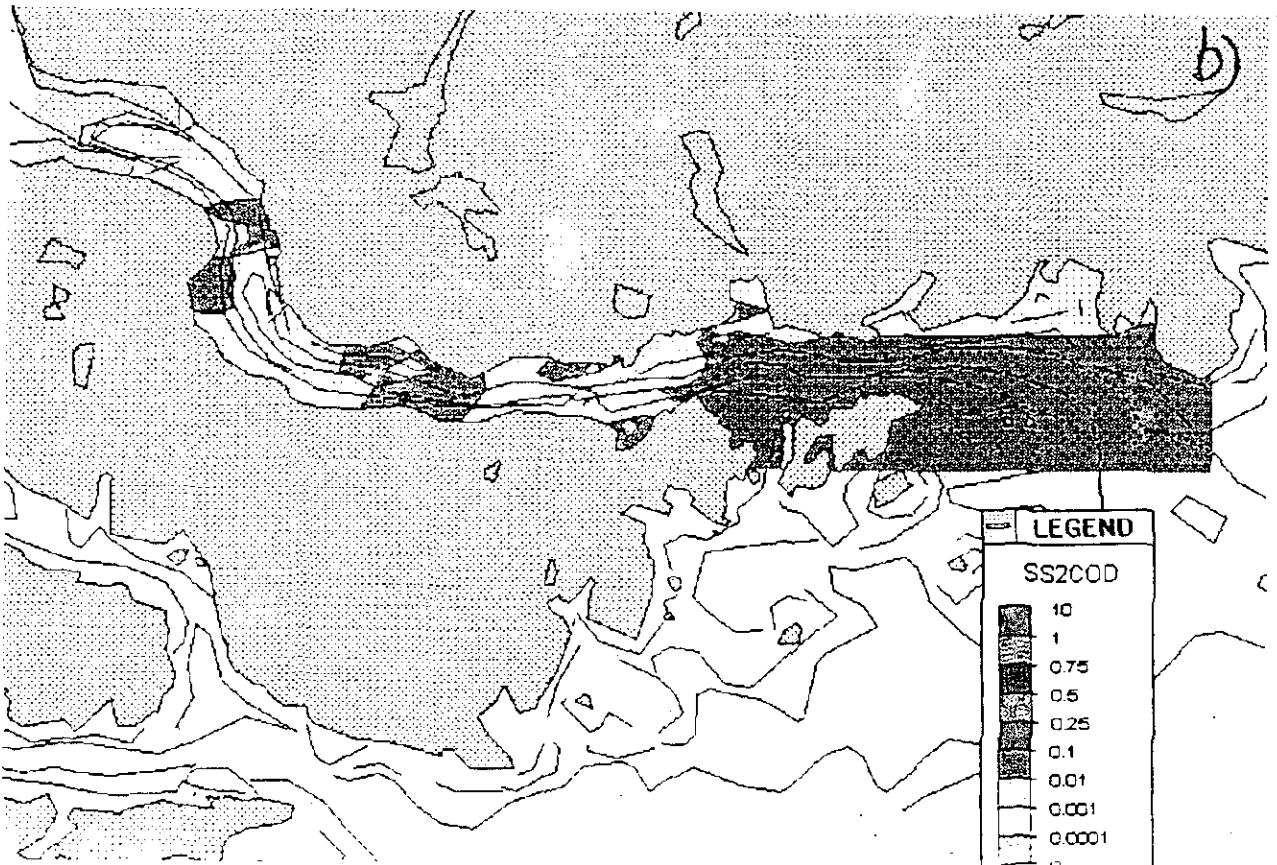
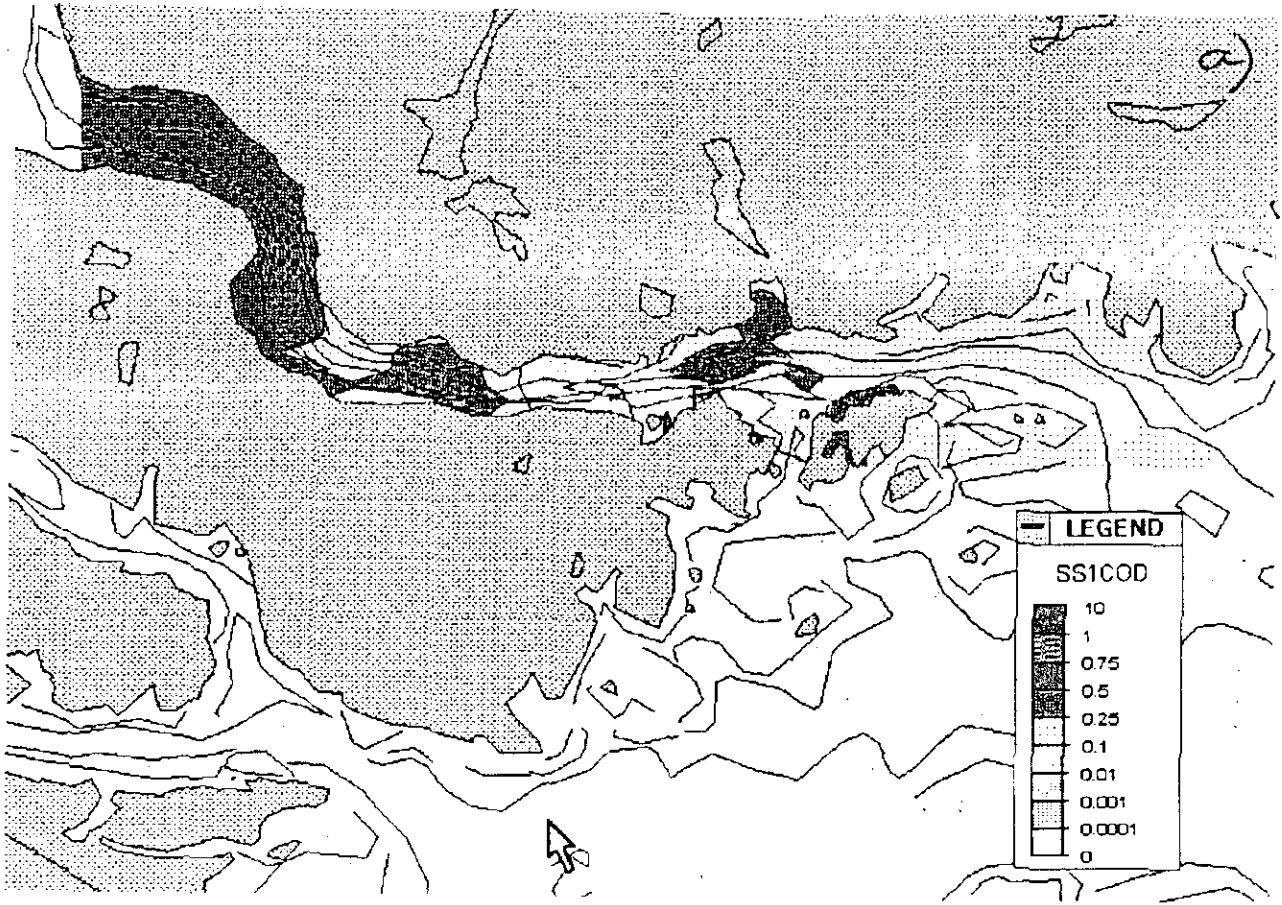
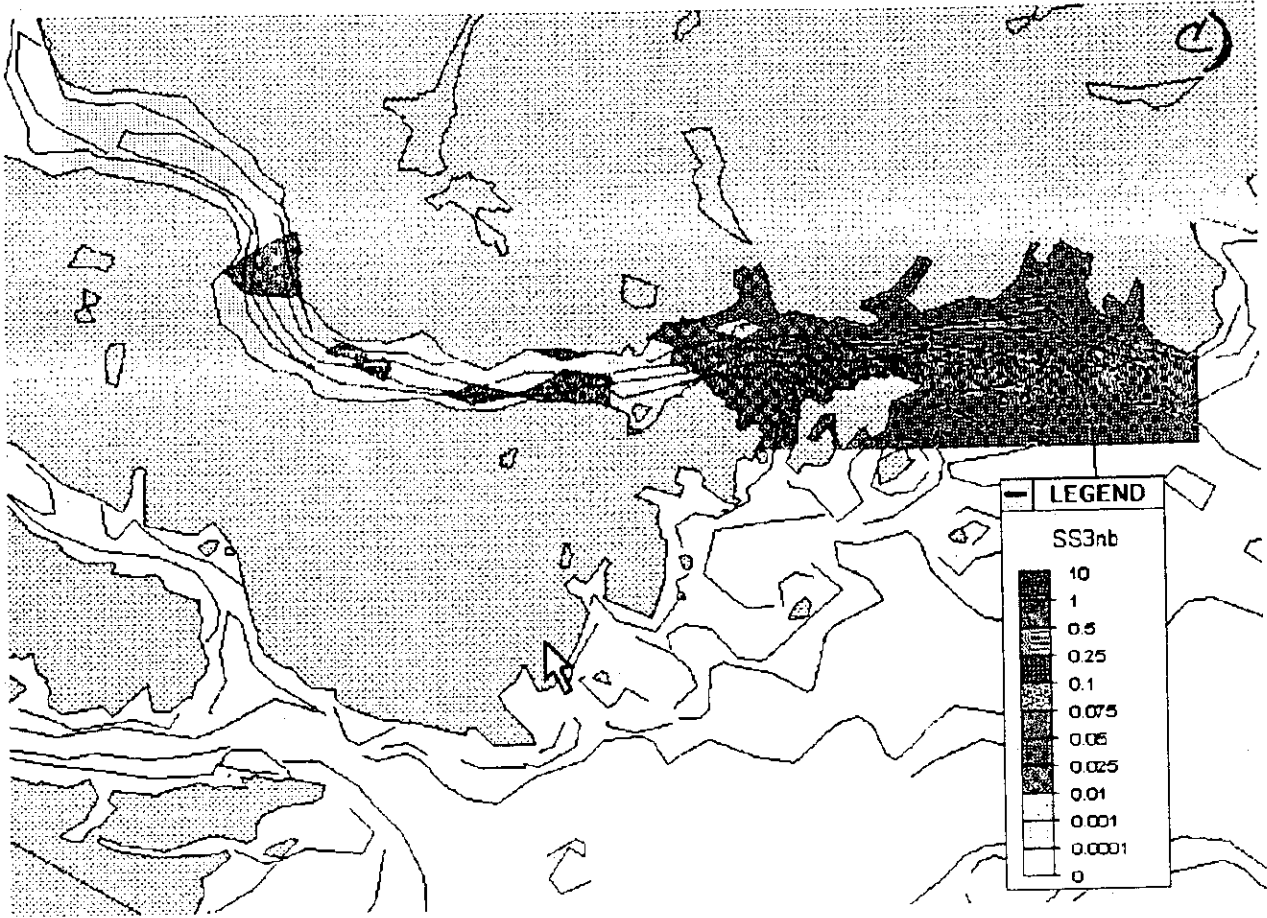


FIG 1



Length Frequency

Cod, Smith Sound, Trinity Bay

Shamook 239, 1995

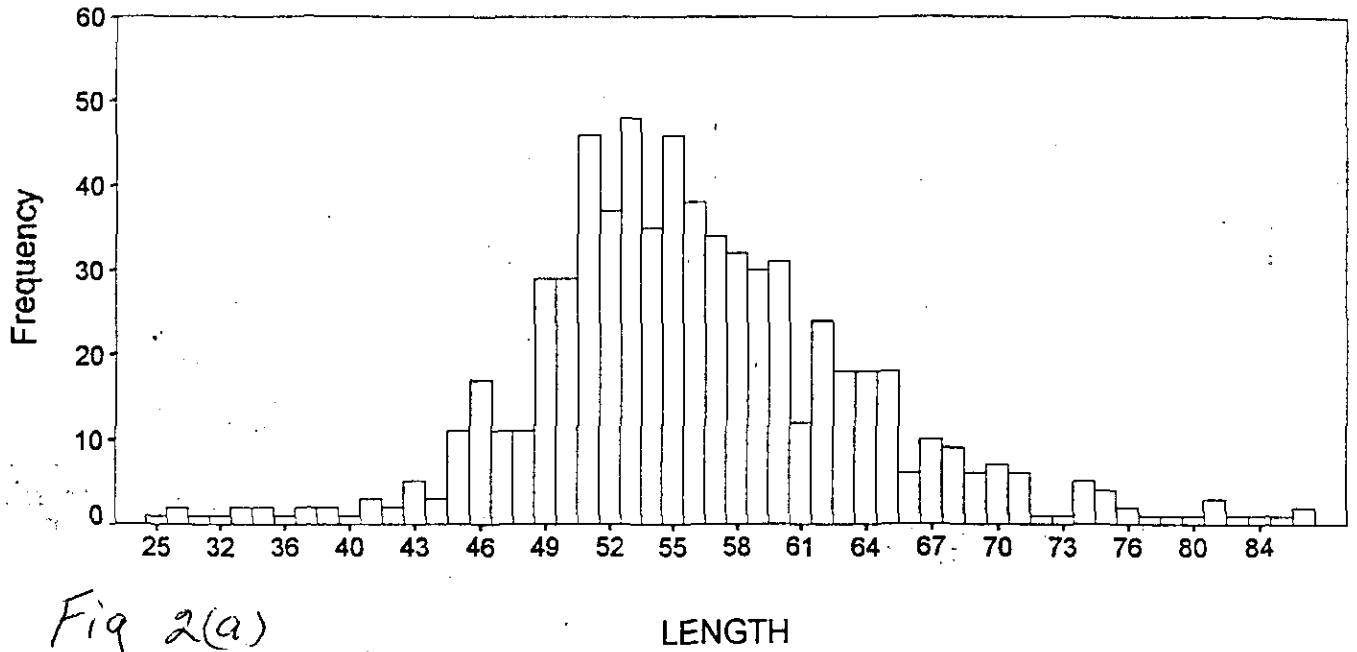


Fig 2(a)

Length Frequency

Cod, Smith Sound, Trinity Bay

Shamook 240, 1995

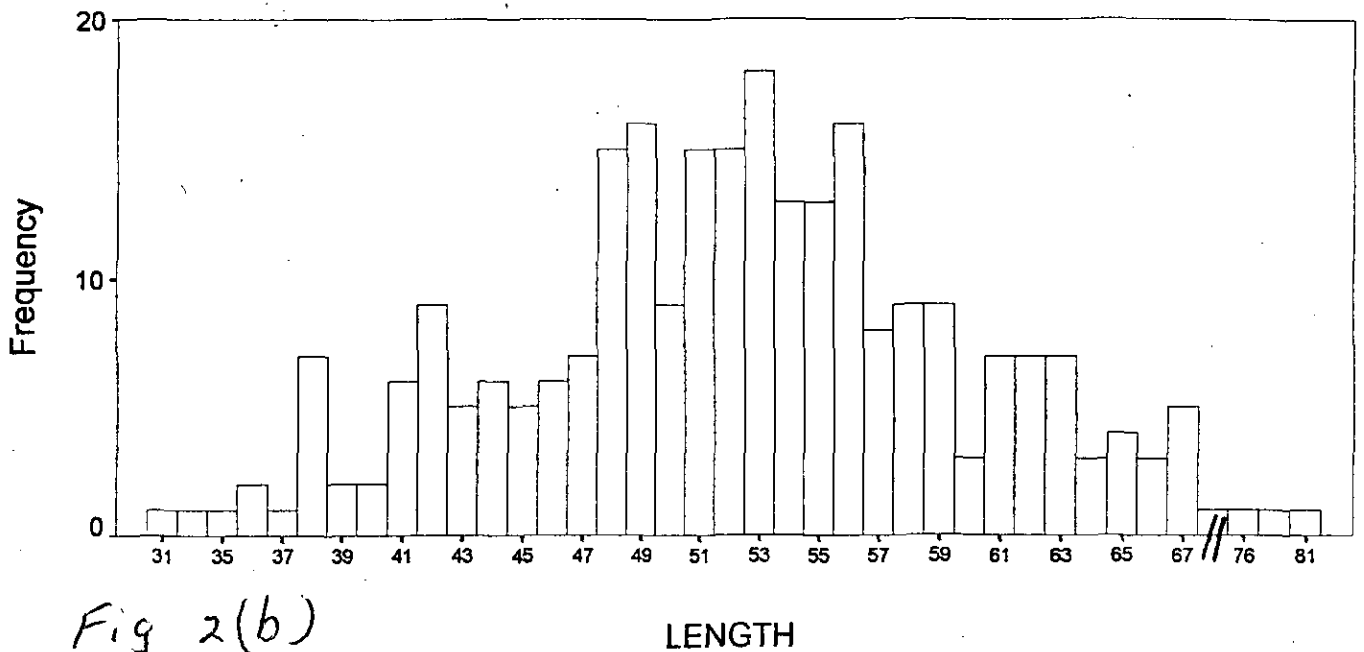


Fig 2(b)

Length Frequency, Cod

Teleost 14, 1995

Smith Sound, T. Bay. Sets 1-7

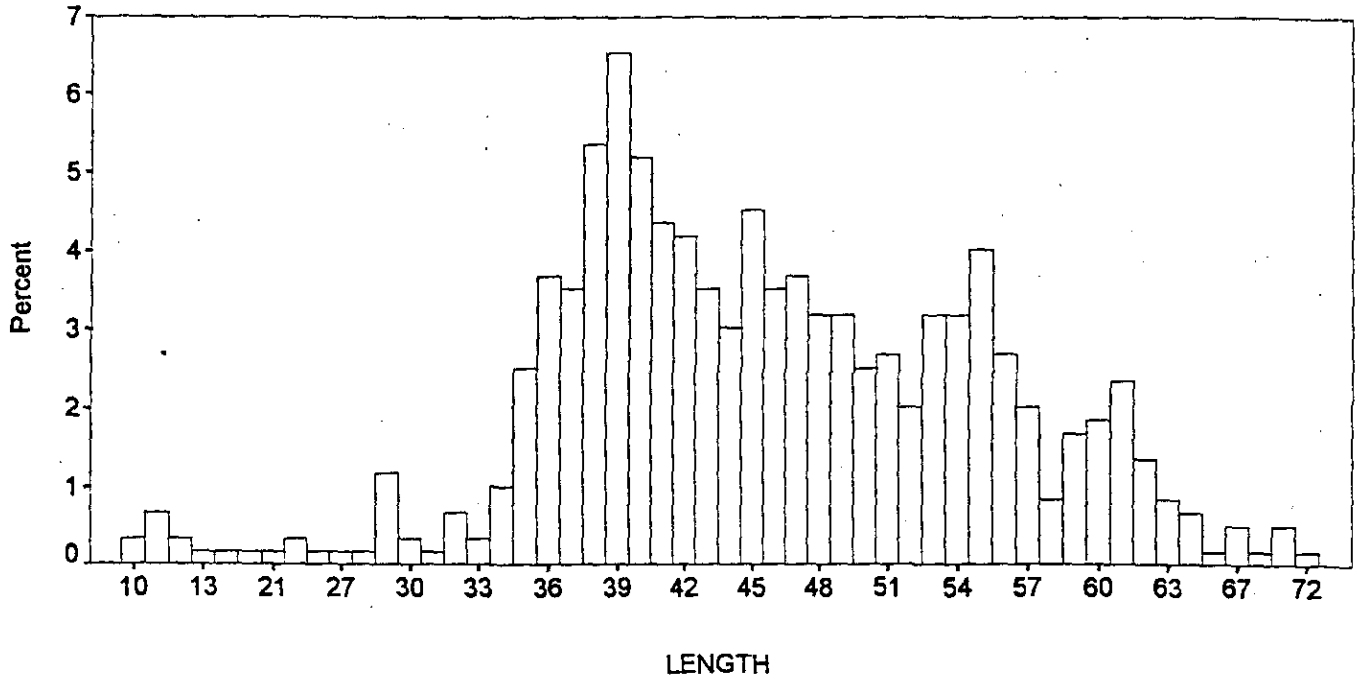
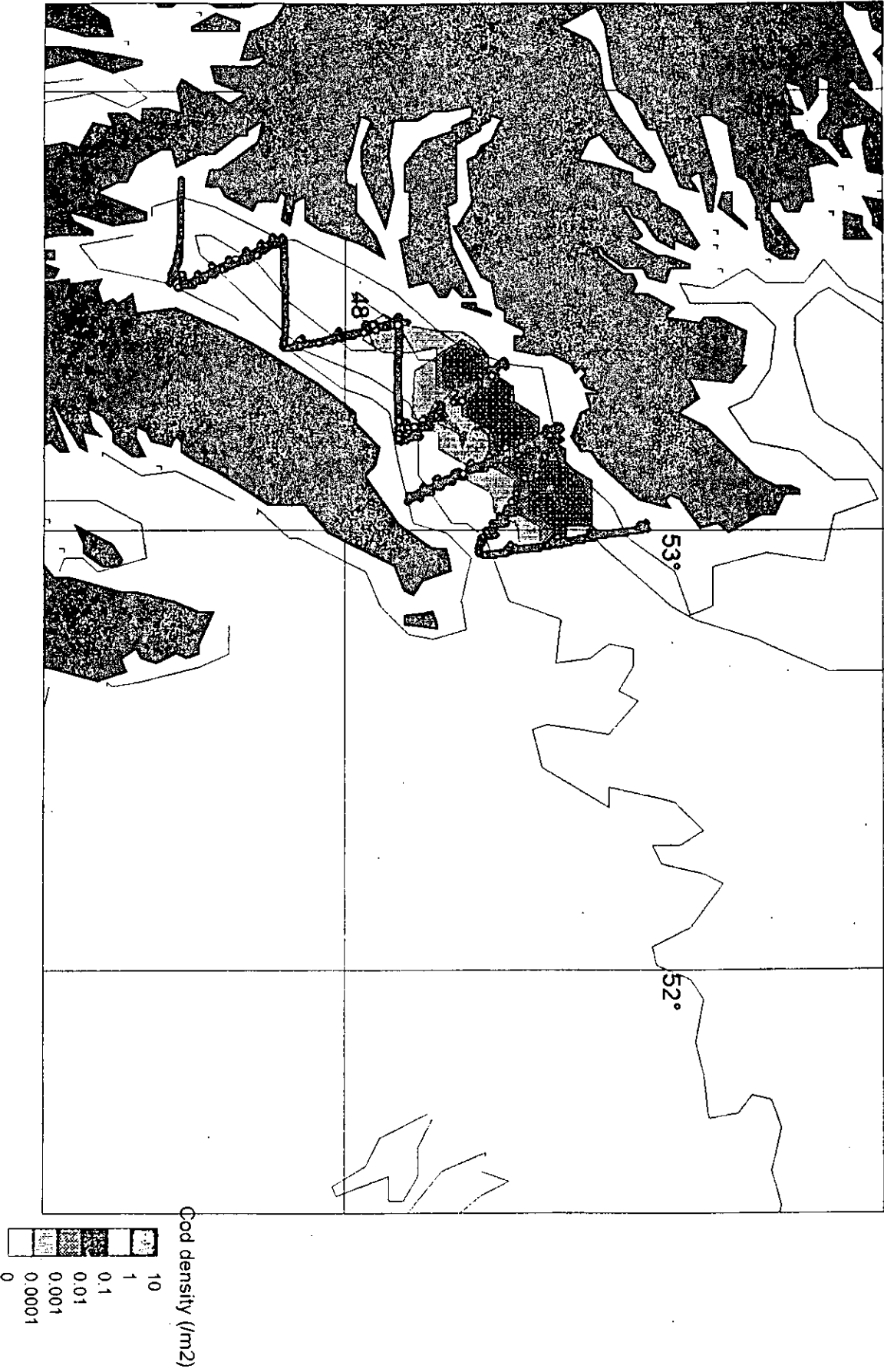


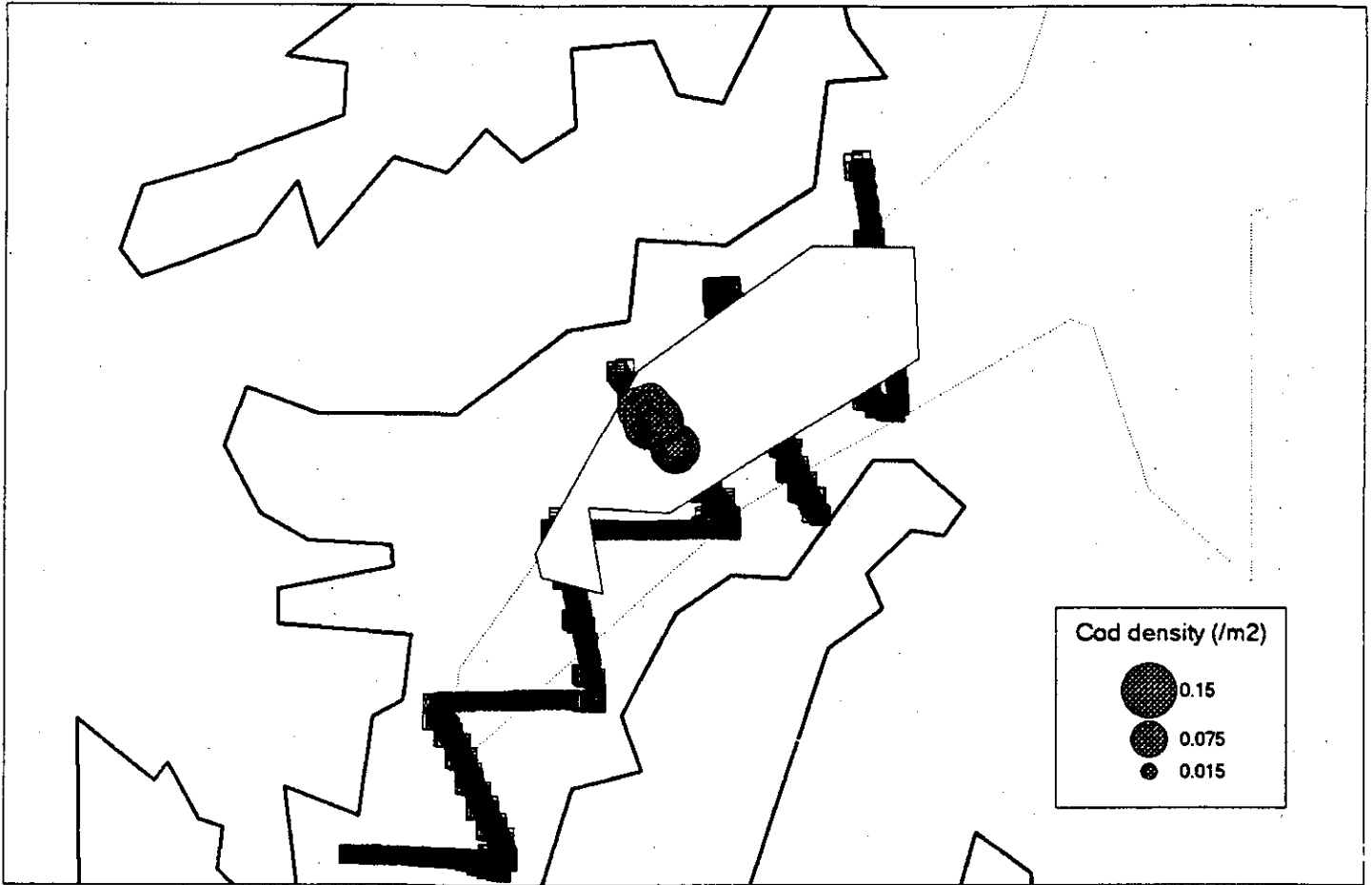
Fig 25c

FIG 3

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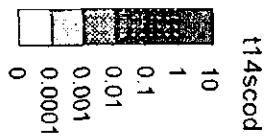
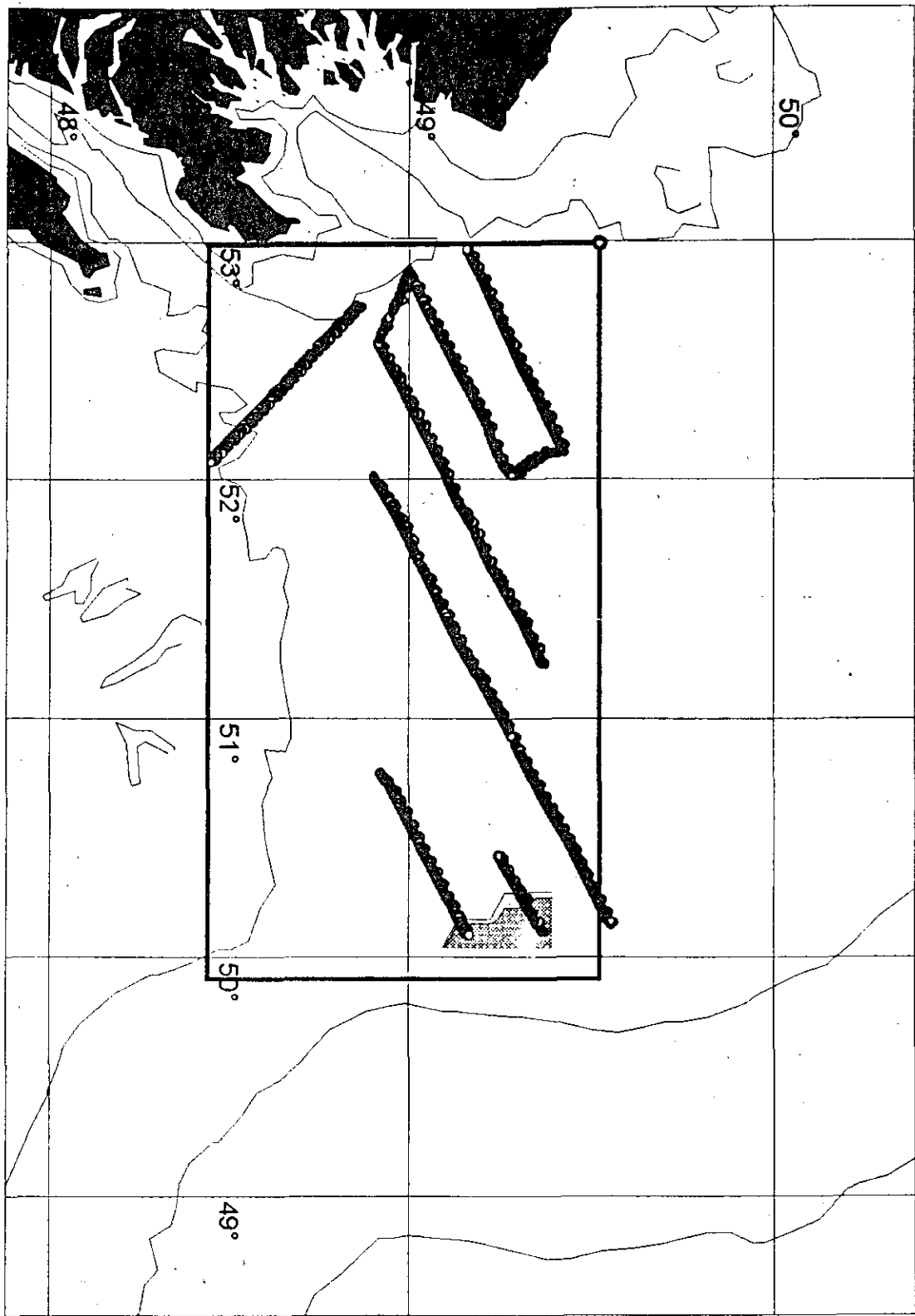
INGVA





1995 Trinity Bay

Area: 704 sq. km.
n: 1849
density: 0.0028
sd: 0.0146
mean#: 2.0 million
up95#: 3.1 million
lo95#: 1.0 million



Graph: Southern block cross-shelf cod densities
June 1995 - Trinity Bay to Tobin's Point

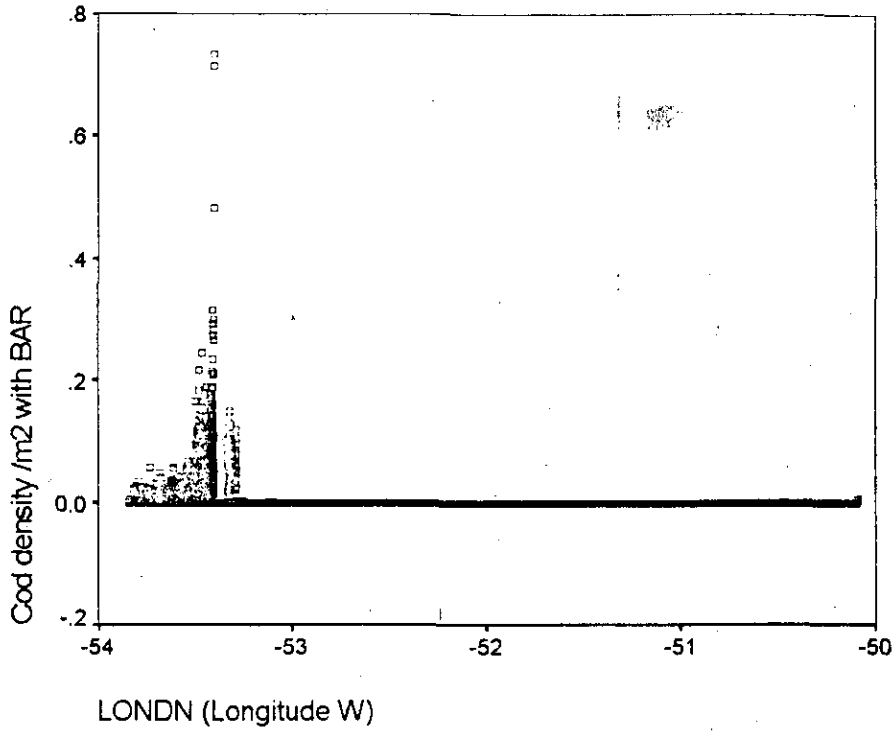
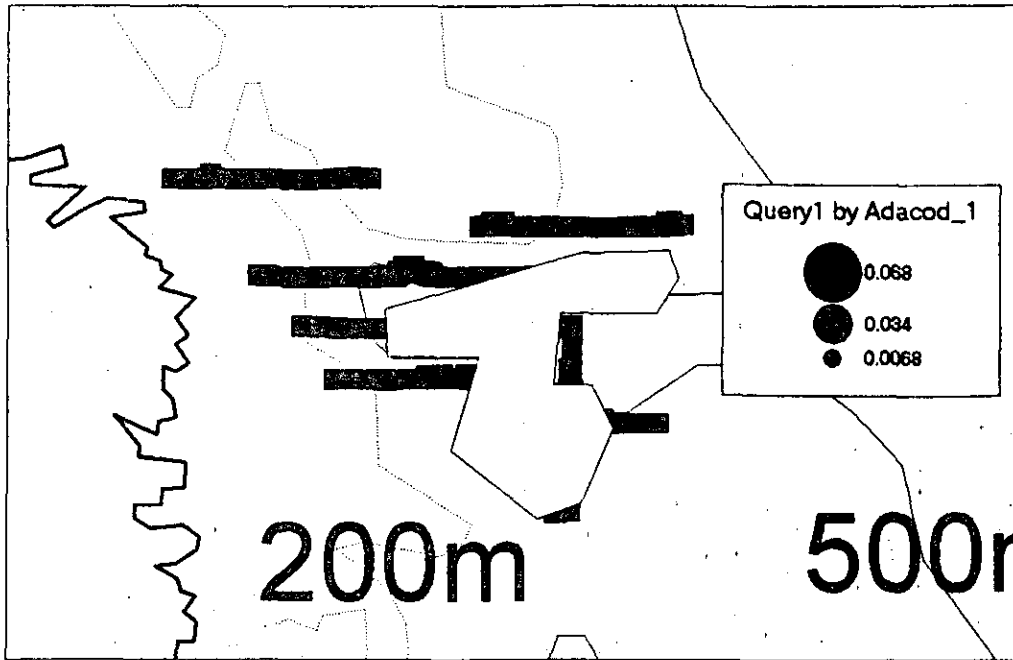


FIG 5



1995 Hawke Channel

Area: 5500 sq. km.
 n: 6515
 density: 0.0117
 sd: 0.0112
 mean#: 6.4 million
 up95#: 8.3 million
 lo95#: 4.6 million

Note: CI's include sampling and TS uncertainties (+-1dB=26%)

Length Frequency, Cod

Teleost 14, 1995

Hawke Channel, S. Labrador

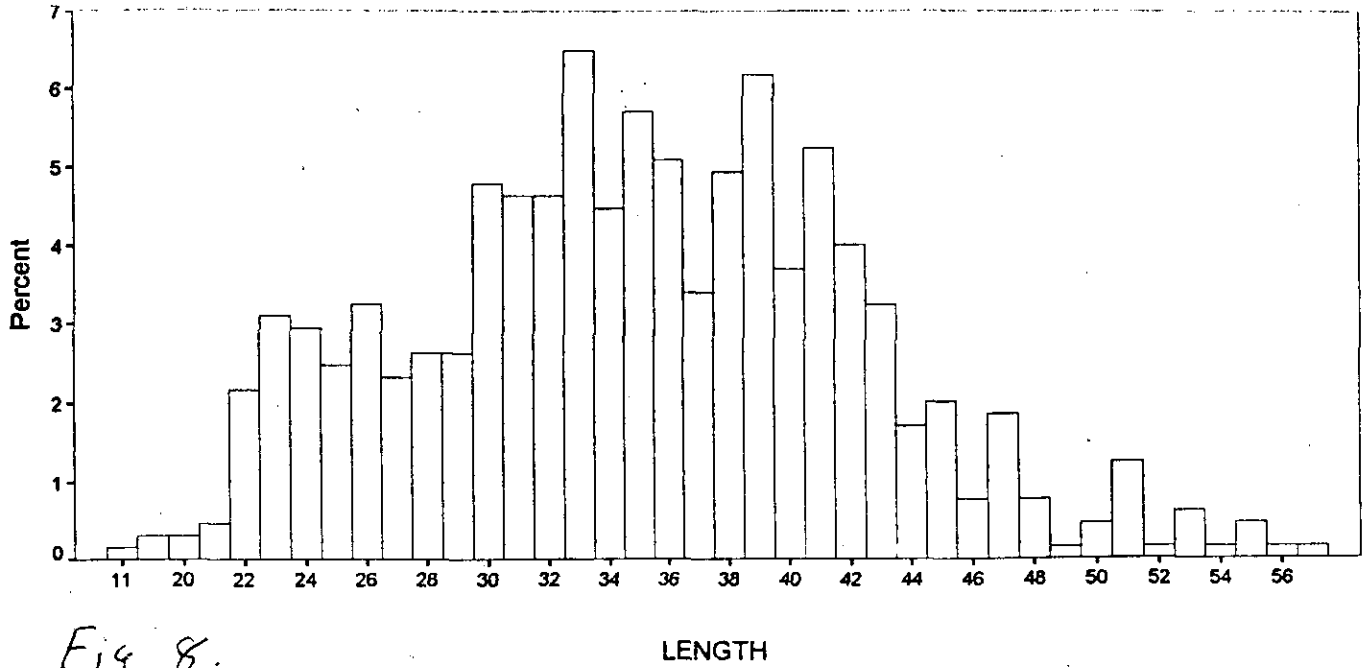


Fig 8.

Graph: Northern block cross-shelf cod densities June 1995 - Black Tickle through Hawke Channel

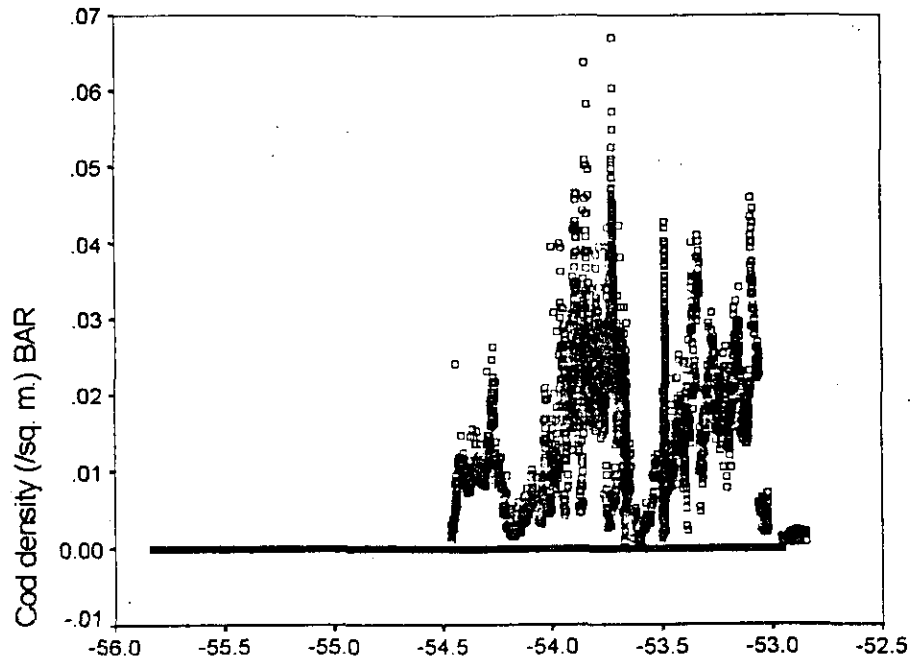


Fig 9. LONDN