

R1/12

Not to be cited without reference to the Marine Laboratory, Aberdeen

FRV *Scotia*

Cruise 1406S

## Report

### Dates

8-29 September

### Personnel

K J Peach	(In charge)
F Neat	
E Jones	
H Dobby	
A Weetman	
C Shand	
M Gault	
Finlay Burns	(Part 2)
Jim Drewery	(Part 2)
L Allan	(Aberdeen University)
K Howell	(Plymouth University - Part1)
V Blyth-Skyrme	(JNCC - Part1)
A Jamieson	(University of Aberdeen - Part 1)
V Khlivnoy	(Pinro - Part 1)
Tom Blasdale	(JNCC - Part 2)

**Out-turn days:** RV0610 14 days MF01TA 8 days

### Part 1 Rockall Haddock Survey

#### Fishing Gear

GOV Trawl fitted with ground gear C (BT 137)

#### FRS Objectives

1. Routine daylight survey of the Rockall Plateau to assess the haddock stock within the 200 metre contour.
2. *Nephrops* TV observation work along the East edge of the bank to depths of 500 metres.
3. Identify, quantify and record all benthic invertebrate species caught.
4. Obtain temperature and salinity data from the surface and seabed at each trawling station.
5. Collect additional biological data in connection with the EU Data Directive 1639/2001.

## **PU / JNCC Objectives**

1. Opportunistic use of the drop frame and to contribute to mapping distribution of Annex I reef habitat as required under the EC Habitats Directive.
2. Collection of invertebrate fauna from trawl samples.

## **Aberdeen and Bristol University Objectives**

1. Carry out behavioural experiments on bioluminescent organisms retrieved using deep-water free-fall traps (maximum of 3 deployments).
2. Collect fish eyes from a range of depths (<200m to 1800m) for visual pigment studies; spectroscopy and molecular studies of pressure sensitivity of enzymes.

## **Narrative**

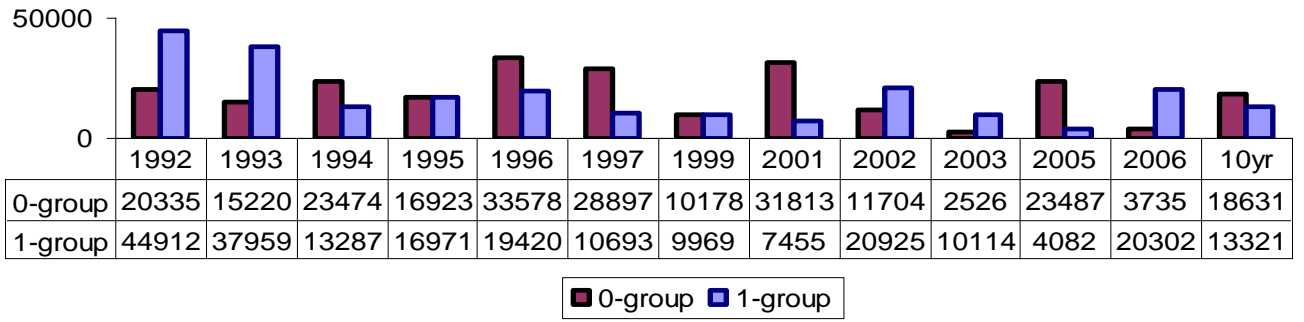
*Scotia* sailed from Aberdeen at 1530 on Friday 8 Sept and proceeded to make passage to the first fish trap deployment at position 57.36°N 12.52°W. *Scotia* arrived on station at 0410 10 Sept and the trap was successfully deployed at a depth of 1039metres. *Scotia* continued west to position 57.31 N13.25W where fishing commenced at 0700. Trawling continued during daylight hours for the next 6 days, with a 5 hour interruption for weather on the morning of the 14 Sept. In line with the WTD 6-7 hauls were completed within the 13 hour working day. On the afternoon of 15 Sept the net was badly damaged by a boulder and with an increasing forecast the decision was taken to drop the last 3 hauls of the haddock survey. Prior to the weather deteriorating the 2000kg trawl doors were dropped into position in readiness for deepwater fishing. During trawling downtime the Drop Frame was deployed at various locations to (1) Assess *Nephrops* abundance and (2) Map distribution of Annex I reef habitat at selected sites.

## **Results**

In recent years the regular annual survey to the Rockall Plateau has been restricted to a biennial survey (in odd years) alternating with a deepwater survey in the even dated years. This year as in 2002 & 2005 the surveys have been combined allowing 6 days for the Rockall Haddock survey with the remaining time being spent trawling in deep water. The standard Rockall survey consists of 42 hauls; time constraints limited this year's survey to 33 hauls, one of which was foul due to a large boulder bursting through the codend (see Map 1).

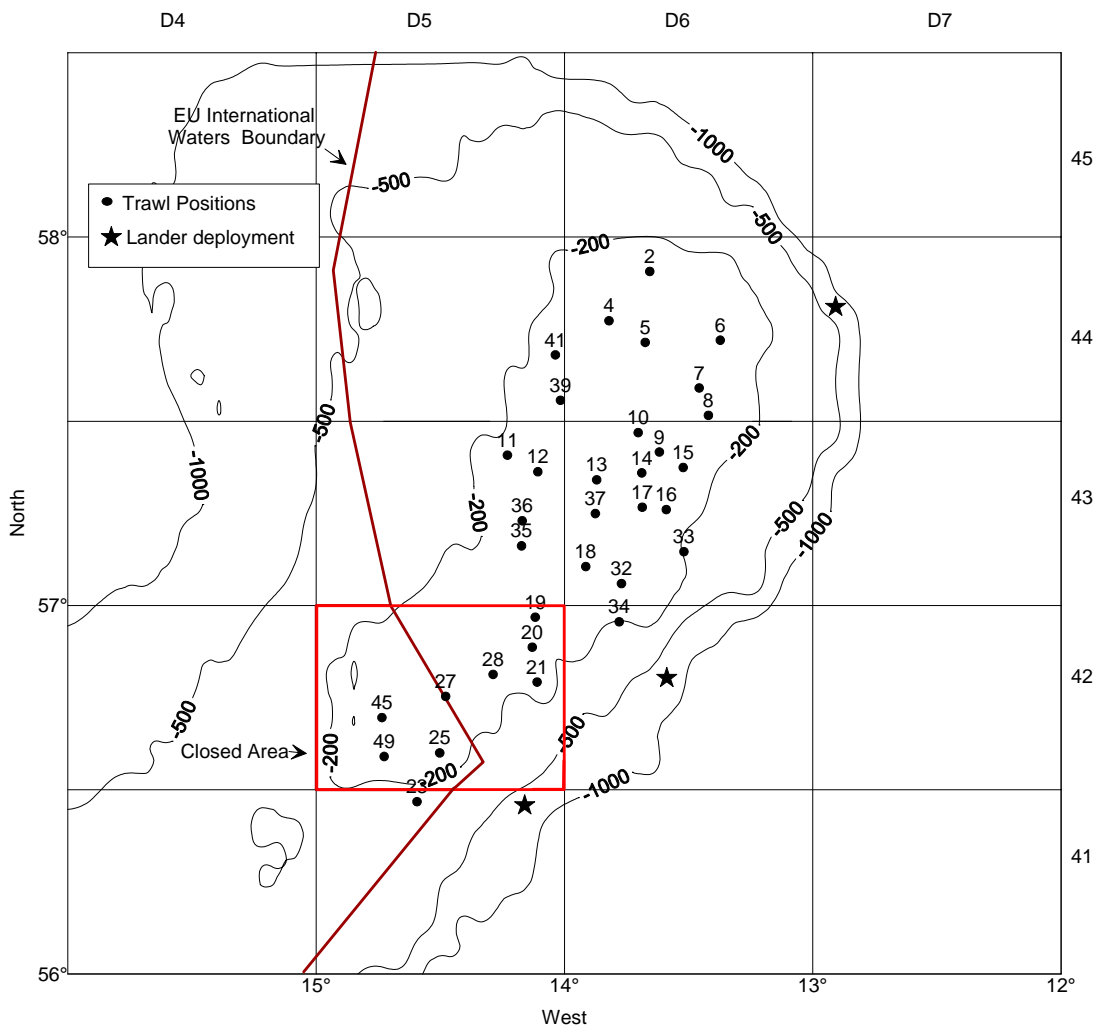
The primary objective of the survey is to assess the state of the haddock stock on the Rockall Plateau: this is done by comparing the strength of the respective year classes in the current year with those of previous years. The provisional indices, using a length rather than age based delimiter, indicate a very poor recruitment this year compared with the 2005 results and the 10 year mean. The strength of 1 year old fish very much reflects the strong recruitment in 2005.

0 & 1-group haddock numbers caught per 10 hours



Map 1

Rockall 2006 Trawl Positions



In line with the EU Data Directive 1639/2001 length weight data were collected for all cod, haddock, whiting & saithe. These were collected on a 1 per cm per haul basis. In addition to this, all megrim and anglerfish were sampled for length, weight, sex and maturity.

All benthic invertebrate species caught were identified and quantified.

Net geometry was monitored throughout the survey using the scanmar system coupled with a bottom contact sensor. The NOAA single axis bottom contact sensor was attached to the centre of the trawl ground gear each haul. Temperature and salinity were recorded at each station using a Seabird 19 CTD.

The Drop Frame was deployed in various locations to assess *Nephrops* abundance and a total of 9 deployments were carried out to map distribution of Annex I reef habitat (see Map 2). The deepwater free fall trap was deployed on three occasions at depths ranging from 780-1039 metres. Large numbers of amphipods were trapped, but unfortunately no target species (ostracods) were captured.

## **Part 2 Rockall, Anton Dohrn Seamount, Shelf Edge Deepwater Survey**

### **Fishing Gear**

Jackson Deepwater trawl (BT184)

### **Objectives**

1. To map the composition, distribution and abundance of continental slope species including anglerfish (*Lophius spp.*) on the south east edge of the Rockall Plateau, the Anton Dohrn seamount and the deepwater slope west of the Hebrides.
2. To carry out comparative fishing hauls with the *Celtic Explorer*.
3. To identify, quantify and record all benthic invertebrate species caught.
4. To collect temperature and salinity at depth during use of a data storage tag attached to the trawl headline.
5. To investigate the occurrence of *Nephrops* on the south east edge of the Rockall Plateau and the upper shelf slope using the drop frame system.
6. To collect biological samples and morphometric digital images for key species from both slope and seamount to investigate the possibility of an isolated and distinct seamount community.

### **Narrative**

Deepwater fishing commenced on the morning of the 16 Sept on the east edge of the Rockall plateau, with 2 exploratory hauls of 1 hour duration at depths of 650 & 850 metres completed. *Scotia* made passage for the Anton Dohrn seamount overnight arriving on station at 0600 on the 17 Sept. Three exploratory hauls of 20-44 minutes duration were made at depths ranging from 640-760 metres. *Scotia* then made passage to the shelf edge arriving on station at 0700 on the 18 Sept where 6 survey hauls of 2 hours duration were completed prior to a port call in Killybegs on the 20 Sept. The vessel sailed at 0730 21 Sept and recommenced fishing at 1300. Fishing continued in a northerly direction until 2100 on the 27 Sept when, with the survey completed and an increasing forecast, the decision was taken to head for Aberdeen, *Scotia* docked at 2000 28 September.

## Results

A total of 34 hauls were completed; 29 time series hauls on the shelf edge; 5 short exploratory hauls on the east edge of the Rockall Plateau and the Anton Dohrn seamount. The Marine Institute vessel Celtic Explorer completed a deepwater survey earlier in September and 6 time- series hauls were completed by both vessels as a comparative fishing exercise (Map1). Catches ranged from 194-1811kgs with Roundnose grenadier (*Coryphaenoides rupestris*) the most abundant by weight and numbers. A total of 134 species were caught. The species list with total weights caught is shown in (Table 1). Temperature at depth was recorded for all hauls using a data storage sensor (Table2). Additional weight/length information was collected from various species to augment the FRS weight/length database (Table 3). Where possible, benthic invertebrate species caught were identified and quantified. A new recording spreadsheet and identification key is currently being developed. The drop frame was deployed on 23 occasions to assess *Nephrops* abundance (see Map 2).

### Additional biological sampling

#### 1. Geographical comparison to investigate population sub-structuring

The objective was to collect otoliths, genetic samples and morphometric images for future work associated with the EcoSDEEP ROAME and possible collaboration with a NERC consortium and a ESF project. Selected key species were sampled along a Rockall-Anton Dohrn - Shelf Edge transect.

- a. Bluemouth (*H. dactyloscopus*) – samples were collected from Rockall (n = 100) and the shelf edge (n = 100). Fish were photographed for morphometric image analysis, a gill clip taken for genetic analysis and the otoliths removed for chemistry analysis. The length, sex and maturity of each individual was recorded. No bluemouth were found on Anton Dohrn.
- b. Black scabbard (*A. carbo*) – samples were collected from Rockall (n = 9), the Anton Dohrn seamount (n=100) and the shelf edge (n = 100). Otoliths were removed for chemical analysis and aging studies and length, sex and maturity recorded.
- c. Roundnose grenadier (*C. rupestris*) – samples were collected from the shelf edge (n = 150) and Rockall (n = 36). Otoliths were removed for future chemical analysis and genetic samples were taken (n = 100). The fish were weighed and measured and sex and maturity stage determined. Small juveniles were also sampled for otoliths (n = 50) to assess temporal stability of otolith chemistry signatures over the next 3 years. No roundnose grenadier were found on Anton Dohrn.

#### 2. Pollutant accumulation studies

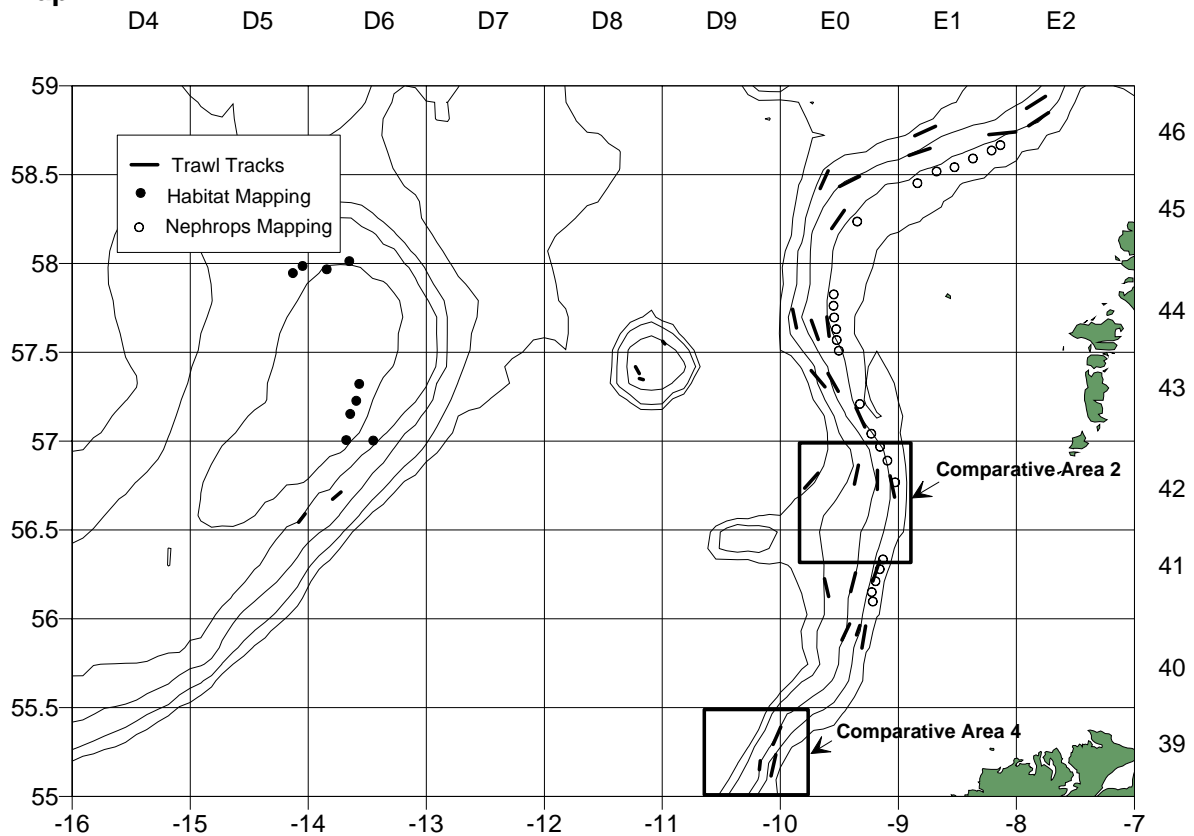
- a. Roundnose grenadier: fish were collected from the shelf edge at 1000 m (n=25) and 1500 (n = 25)
- b. Black scabbard: fish were collected from Anton Dohrn at approx. 800 m (n = 25) and the shelf edge at 1000 (n = 25) and 1500 m (n = 25).
- c. *C. fabricii* (black dogfish) were collected from the shelf slope at (1000m?) (n = 25).

3. Genetic samples for MAR-ECO project

Kitefin shark (all caught - 8) Portuguese dogfish (all caught – 35)  
Leafscale gulper shark (all caught – 37) Longnose velvet dogfish (100)  
Birdbeak dogfish (100) Roundnose grenadier (100) Black scabbard (100)

4. Photographs of the main species encountered during the survey were taken for reference.

**Map 2**



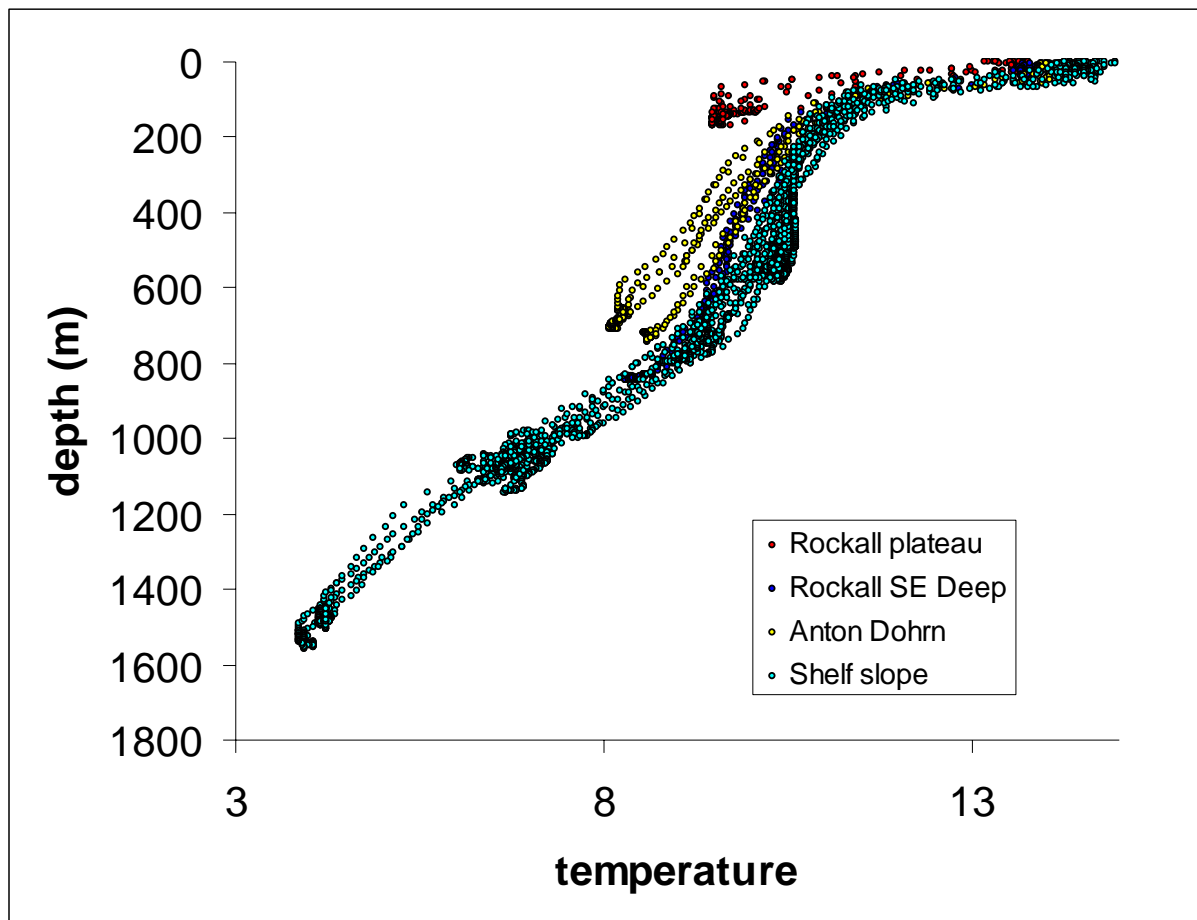
**Table 1: Species Summary**

Species	Weight kg	Species	Weight kg
Round Nosed Grenadier	6026.43	Dealfish	7.25
Rabbit Ratfish	4577.60	Deepwater Ray	6.95
Smoothhead	4105.57	Softhead Rat tail	6.90
Black Scabbardfish	3087.05	Apristurus - Unidentified	6.66
Hake	929.61	Mouse catshark	6.38
Greater Argentine	929.02	Risso's Spiny Eel	6.03
Shovelnosed Shark	831.58	Spectrunculus grandis	5.90
Blue-mouth	785.96	Greenland Halibut	5.30
Longnose velvet dogfish	727.83	Borostomias antarcticus	4.39
Lepidion eques	691.38	Blackfish	4.14
Angler (Monk)	647.22	Madeiran smooth-head	4.05
Blue Whiting	625.20	Fylla's Ray	4.02
Horse Mackerel (Scad)	590.11	Snake Pipefish	3.96
Black Mouthed Dogfish	505.47	Shagreen Ray	3.95
Greater Forkbeard	493.02	Southern Atlantic smooth-head	3.50
Murray's Rat tail	379.62	Venifica proboscidea	3.35
Hollowsnout Rat tail	335.30	Norway Haddock	3.11
Portuguese Shark	292.20	Bathylagus euryops	2.99
Leafscale Gulper Shark	285.65	Ilyophis blachei	2.20
Cataetyx latceps	262.35	Four-spot Megrin	2.19
Bentnose rabbitfish	252.30	Sandy Ray	2.00
Blue Ling	220.40	Norway Lobster	1.66

Smalleye rabbitfish	217.95	Malacosteus niger	1.62
Smooth Rat tail	202.34	Halosauropsis macrochir	1.48
Ling	199.69	Bigelow's ray	1.46
Softskin smooth-head	178.08	Lesser Smoothhead	1.36
Greater lantern shark	149.66	Mackerel	1.25
Cut-throat Eel	146.69	multipore searsid	1.21
Mora	146.34	Stomias boa ferox	1.19
Witch	126.90	Cuckoo Ray	1.15
Large-eyed Rabbitfish	114.66	Deepwater arrowtooth eel	1.12
Pale Catshark	112.25	Bathysaurus ferox	1.10
Velvet Belly	110.39	Bighead searsid	1.08
Mediterranean Grenadier	103.57	Three-bearded Rockling	1.06
Torsk	98.77	Bigeye searsid	1.05
Black dogfish	96.69	Duckbill oceanic eel	0.94
Silvery Pout	94.25	Snipe Eel	0.89
Spear-snouted grenadier	82.84	Sloan's Viperfish	0.77
Skate	79.50	Fangtooth	0.60
Gunther's grenadier	70.83	Paraliparis bathybius	0.51
Conger Eel	67.69	Lantern fishes unidentified	0.47
Darkie Charlie	67.65	Beryx decadactylus	0.32
Hydrolagus pallidus	62.95	Melanonus zugmayeri	0.26
Halargyreus johnsonii	54.38	Scopelogadus beanii	0.24
Bluntnout Smooth-head	42.26	Lampanyctus crocodilus	0.24
Short Finned Squid	40.63	Whiteheaded hagfish	0.23
Bonaparte's Spiny Eel	38.00	Hatchetfish	0.18
Antimora	36.93	Frostfish	0.14
Bullseye	36.79	Rocklings unidentified	0.12
Agassiz's smooth-head	36.31	Polymetme corythaeola	0.12
Chemnitz's Spiny Eel	27.92	Pandalus unidentified	0.11
Saithe	26.41	Gonostoma elongatum	0.10
Straightnose rabbitfish	26.40	Argyropelecus hemigymnus	0.07
Lesser Spotted Dogfish	25.78	Chiasmodon niger	0.06
Long Nosed Skate	25.00	Melanostigma atlanticum	0.05
Pallid sculpin	18.44	Poor Cod	0.04
Six Gilled Shark	15.65	Poromitra capito	0.03
Lycodes atlanticus	15.21	Lesser Barracudina	0.03
Megrim	12.34	Gonostoma bathyphilum	0.02
Bean's sawtoothed eel	11.53	Lycodonus flagellicauda	0.02
Ghost Catshark	11.07	Pearlfish	0.02
Redfish (mentella)	10.79	Paraliparis unidentified	0.02
Orange Roughy	10.77	Lyconus brachycolus	0.02
Spiderfish	10.29	Laemonena latifrons	0.01
Murray's smooth-head	9.85	Aldrovandia phalacra	0.01
Jelly Cat	9.45	Lycodonus flagellicauda	0.01
Iceland Catshark	7.58	Eelpout unidentified	0.01
		<b>Total</b>	<b>30670.33</b>



**Table 2:** Temperature at depth



Temperature as expected decreased with depth over all regions, interesting to note that temps on both Rockall and Anton Dohrn were colder at depth than the shelf edge.

**Table 3:** Weight Length Summary

<b>Species</b>	<b>Obs</b>	<b>Tot W</b>	<b>Gut W</b>	<b>Sex</b>
<i>Centroscymnus crepidator</i>	306	Y	Y	Y
<i>Etmopterus spinax</i>	259	Y	Y	Y
<i>Deania calceus</i>	165	Y	Y	Y
<i>Apristurus aphyodes</i>	165	Y	Y	Y
<i>Centroscyllium fabricii</i>	162	Y	Y	Y
<i>Galeus melastomus</i>	128	Y	Y	Y
<i>Etmopterus princeps</i>	106	Y	Y	Y
<i>Centrophorus squamosus</i>	37	Y	Y	Y
<i>Centroscymnus coelolepis</i>	35	Y	Y	Y
<i>Apristurus laurussonii</i>	11	Y	Y	Y
<i>Scymnorhinus licha</i>	8	Y	Y	Y
<i>Lophius piscatorius</i>	82	Y	Y	Y
<i>Aphanopus carbo</i>	297	Y	Y	Y
<i>Coryphaenoides rupestris</i>	296	Y	Y	Y
<i>Helicolenus dactylopterus</i>	171	Y	Y	Y
<i>Antimora rostrata</i>	60	Y	Y	Y
<i>Phycis blennoides</i>	58	Y	Y	Y
<i>Cataetyx laticeps</i>	47	Y	Y	Y
<i>Lepidorhombus whiffiagonis</i>	35	Y	Y	Y
<i>Notacanthus bonapartei</i>	34	Y	Y	Y
<i>Mora moro</i>	29	Y	Y	Y
<i>Halargyreus johnsonii</i>	20	Y	Y	Y
<i>Lepidion eques</i>	15	Y	Y	Y
<i>Notacanthus chemnitzii</i>	14	Y	Y	Y
<i>Cottunculus thomsonii</i>	9	Y		Y
<i>Nezumia aequalis</i>	138	Y		
<i>Charlinura mediterranea</i>	90	Y	Y	Y
<i>Chimaera monstrosa</i>	77	Y		Y
<i>Hydrolagus mirabilis</i>	25	Y	Y	Y
<i>Hariotta raleighana</i>	25	Y		Y
<i>Hydrolagus affinis</i>	20	Y		Y
<i>Epigonus telescopus</i>	9	Y	Y	Y
<i>Hydrolagus pallidus</i>	3	Y	Y	Y
<b>Total</b>	2936			

Kevin Peach  
22-October-2006