#### R1/6

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

FRV Clupea

Cruise 0103C

#### **REPORT**

6-25 January 2003

#### Personnel

## Part 1

E Hatfield SIC (6

SIC (6-15 January)

P Copland

J Mills

J Drewery

J Donald

#### Part 2

J Kinnear

SIC (16-25 January)

J Drewery

J Martin

S Wear

J Donald

Out-turn days per project: 20 days, MFO1T

## Sampling Gear and Equipment

Modified PT154 with 6 mm codend BT158 demersal trawl with 10 mm codend 2.8 m beam trawl with spare beam Scanmar (Height and spread units) 2 Day grabs Simrad EK500 /RoxAnn CTD

## **Objectives**

## Part 1

1. To carry out detailed acoustic surveys in selected lochs, and the Sound of Sleat, using the EK 500 and RoxAnn to determine the distribution of herring and sprat. Concentrations of pelagic fish will be sampled using the PT154. Species composition and length-frequency distributions of the fish caught will be determined. Sub-samples will be weighed and otolithed to establish length-weight relationships and age structure. Herring samples will be analysed for sex, maturity and *lchthyophonus* infection. Stomachs, DNA samples and photographs will also be taken from selected samples for the EU projects AQCESS, HERGEN and WESTHER.

#### Part 2

- To carry out demersal trawls in each of the sea lochs to determine the abundance, distribution and variation of fish species and any epibenthic mega-fauna using the BT158 trawls and the 2.8 m beam trawl where appropriate. At each trawl station the length-frequency of all species will be taken and sub-samples of the major commercial species will be weighed and otolithed. Stomach contents will be removed from selected species for trophic studies.
- 3. Five grab samples will be taken before trawling, at each of the demersal trawl stations. A CTD will also be done at both pelagic and demersal trawl positions.

#### **Narrative**

#### Part 1

Clupea sailed from Fraserburgh on 6 January 2003, arriving in Kyle the following day where the scientific staff joined the ship. Clupea steamed to anchor in Balmacara Bay where the acoustics system was calibrated prior to the start of the survey. Acoustic transecting and pelagic trawling began the next day in Loch Nevis. A problem with the 38 kHz transducer required re-calibration for that transducer. This was carried out on the evening of 8 January 2003. Acoustic transecting and pelagic trawling was resumed the next day and carried out in Lochs Hourn, Duich and Kishorn. CTDs were carried out for each pelagic trawl haul. Work was limited to acoustic transecting in Lochs Alsh and Duich on 14 January 2003 due to increasingly inclement weather. 15 January 2003 was lost to work due to severe weather conditions and Clupea remained alongside at Kyle. Scientific staff changed over on 16 January 2003.

## Part 2

The change over of scientific staff and fishing gear took place at Kyle on 16 January. Due to severe weather conditions Clupea did not start work until the following day when she steamed to Loch Kishorn to begin the survey. Weather conditions continued to hamper work and trawling was only possible in the outer loch. Clupea then proceeded to Loch Duich where the designated grabs and one trawl were completed before poor light conditions prevented further work due to the difficulty in seeing creel floats. Clupea returned to Kyle for the night. The following morning Clupea returned to Loch Duich to complete the trawling and to lift a mooring for the sonar team, before steaming to Loch Hourn where grabbing continued until dusk. Demersal trawling, beam trawling and CTDs were completed the next day in Loch Hourn. Clupea then steamed to Loch Nevis where the sequence of mud grabs, trawling and CTDs were repeated. Exploratory trawling was also carried out on suitable ground of Armadale on the south-east side of Skye, before returning to Loch Nevis and Loch Hourn on 21 January where a series of repeat trawls were carried out in each loch to reinforce the data already collected. An exploratory haul was also carried out on hard ground in Loch Alsh. The next day trawling and grabbing were completed in Loch Kishorn and additional repeat trawls were carried out in Loch Duich. On 23 January exploratory beam trawling was carried out in Loch Alsh, poor weather preventing fishing elsewhere. With all the work completed Clupea finished at Kyle on the afternoon of 23 January where scientific staff disembarked and the ship proceeded to Fraserburgh.

#### Results

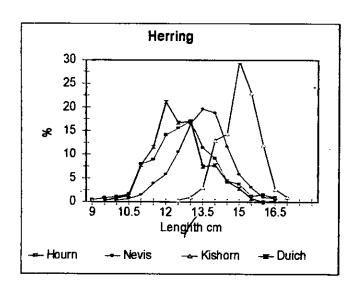
#### Part 1

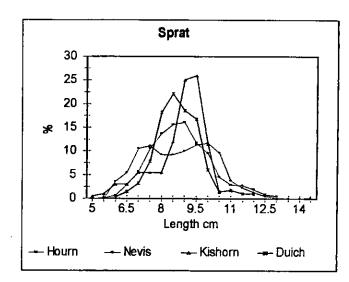
Nine pelagic tows were completed during the trip and sampling undertaken according to protocol. A problem with one of the signal processing boards meant that two acoustic frequencies (38 and 120 kHz) were used during this trip, as opposed to the usual three (38, 120 and 200). However, 38 and 120 kHz are the more commonly examined in analysis and post-processing. CTDs were taken at the centre point of each pelagic tow. Extra sampling was completed in three lochs for the EU projects HERGEN and WESTHER.

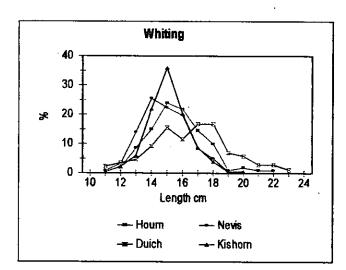
## Part 2

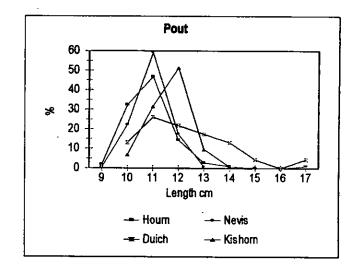
Seventeen demersal and eight beam trawls were completed during the trip and sampling undertaken according to the protocol. Forty grab samples were taken and sieved through 2 mm and 1 mm mesh, the samples being retained for later identification. Mud samples were also taken at each grab station for particle analysis. CTD and water samples were taken routinely at each trawl station. Positions for the pelagic tows (part 1) and demersal tows (part 2) are detailed in the attached table. A detailed species list has also been drawn up for each loch. Analysis of the samples is underway and will be reported at a later date as part of the AQCESS project.

E Hatfield/J Kinnear 23 April 2003









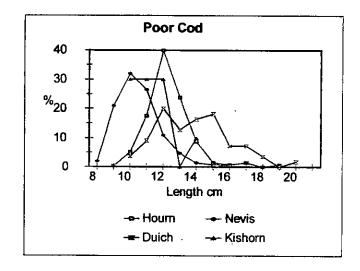


Table I Length composition of the major fish species by loch

## Generalised Species List

Species	Loch Hourn	Loch Nevis	Loch Kishorn	Loch Duich
Fish				23011241011
Herring (Clupea harengus)	•	•	*	*
Sprat (Sprattus sprattus)	· · · · · · · · · · · · · · · · · · ·	*	*	*
Whiting (Medangius medangus)	*	*	•	*
Haddock (Melanogrammus aeglefinus)	*	*	*	
Norway Pout (Trisopterus esmarki)	•	*		*
Silvery Pout (Gadiculus argenteus)	*	· ·	<del>                                     </del>	<del></del>
Poor Cod (Trisopterus minutus)	*	*		*
Cod (Gadus morhua)	*			*
Hake (Merluccius merluccius)	*			
Pearlside (Maurolicus muelleri)	*	*	*	+
Argentine (Argentina sphyraena)	<del>                                     </del>	*		
Saithe (Pollachius virens)		*		
Common Dab (Limanda limanda)	*		*	*
Long Rough Dab (Hippoglossoides platessoides)	*	*		*
Plaice (Pleuronectes platessa)	•	*		**
Dover Sole (Solea solea)	1			+
Lemon Sole (Microstomus kitt)	<del> </del>			*
Thickback Sole (Microchirus variegatus)	*	* .	<del></del>	
Solenette (Buglossidium luteum)	<del>  .</del>	· · · · · ·	<del>,_</del>	
Witch (Glyptocephalus cynoglossus)	+	*		±
Topknot (Zeugopterus punctatus)	*			
Brill (Scophthalmus rhombus)	1	*		
Flounder (Platichthys flesus)	1	*		
Scad / Horse Mackerel (Trachurus trachurus)	•			<u></u>
Blue Whiting (Micromesistius poutassou)	•		*	*
Sandeel (Ammodytes tobianus)		-		
Butterfish (Pholis gunnellus)	•			
Sand Goby (Pomatoschistus minutus)	1	•		*
Common Goby (Pornatoschistus microps)		•		
John Dory (Zeus faber)	*	*		*
Grey Gurnard (Eutrigla gurnardus)	•	*	*	*
Dragonet (Callionymus lyra)		•	-	•
Spotted Dragonet (Callionymus maculatus)				*
Bull Rout (Myoxocephalus scorpius)	•			
Rock Cook (Centrolabrus exoletus)	<del>                                     </del>		<del></del>	
Five-bearded Rockling (Ciliata mustela)	<del>                                     </del>			
Great Pipefish (Syngnathus acus)		<del></del>	<del></del>	{
Grey Skate (Raja batis)	<del>                                     </del>			- +
Thornback Ray (Raja clavata)	<del></del>	*		*
Lesser Spotted Dogfish (Scyliorhinus canicula)	1	•	<del></del>	+
Spurdog (Squalus acanthias)	<del>                                     </del>		-	

pecies	Loch Houm	Loch Nevis	Loch Kishom	Loch Duic
rusteaceans				
lephrops (Nephrops norvegicus)	*	*	*	*
uphausids	•	•	*	*
Pasiphea spp.	*	*	*	*
Calocaris macandreae	*			*
Shrimp (Dichelopandalus bonnieri)	*	*		*
Common shrimp (Crangon crangon)				*
Common prawn (Palaeomon serratus)	*	*		
Squatt lobster (Munida rugosa)	*	*		*
Squatt lobster (Mullida ragesta)	*	*		
Green crab (Carcinus maenas)	*			•
	*	*		*
Brown crab (Cancer pagurus)	*			
Velvet crab (Necora puber)		*	<del></del>	_
Harbour crab (Liocarcinus depurator)			<del> </del>	*
Harbour carb (Liocarcinus Holastus)	+		<del>                                     </del>	7
Wrinkled swimming crab (Liocarcinus corrugatus)	+	<del>                                     </del>	<del>                                       </del>	*
Hermit crab (Pagurus bernhardus)			<del>                                     </del>	
Porcelain crab (Psidia longicomis)	<del></del>		<del>                                     </del>	<del>                                     </del>
Spider crab (Hyas coractus)	<del>                                     </del>	-	<del>                                     </del>	<del> </del>
Long-legged spider crab (Macropodia rostrata)	<del></del>		<del> </del>	<del>                                     </del>
Great spider crab (Hyas araneus)		-	<del>                                     </del>	*
Scorpion spider crab (Inachus dorsettensis)	<del> </del>	<del> </del>	<del></del>	+
Echinoderms	<del>                                     </del>	<u> </u>	<del>                                       </del>	*
Common starfish (Asteria rubens)	<del>                                     </del>	<del></del>	+	*
Brittle star (Ophiura ophiura)	<del>                                     </del>	<del> </del>		+
Brittle star (Ophiura robusta)	<del>                                     </del>	<u> </u>	<del>                                     </del>	
Brittle star (Asteronyx loveni)	<del>                                     </del>	<del> </del>	<del></del>	*
Brittle star (Amphiura brachiata)		<del> </del>	<u> </u>	*
Brittle star (Ophiocomina nigra)	<del> </del>	<del>  </del>	<del> </del>	*
Sun star (Crossaster papposus)	<del> </del>		<del></del>	*
Cushion star (Asterina gibbosa)	<del></del>		<del> </del>	+
Flattened cushion star (Anseropoda placenta)	<del>                                     </del>	<del> </del>	<del> </del> -	+
Sea urchin (Echinus esculentus)	<del></del> _	<del></del>	<del> </del>	<del></del>
Sea potatoe (Echinocardium cordatum)	<del>                                     </del>	<del>                                     </del>	<u> </u>	<del>                                     </del>
Sea potatoe (Brissopsis lyrifera)		<del>                                     </del>	<del> </del>	
Bivalves and Molluscs	<del> </del>	<del>  </del>	<del></del>	+
Icelandic cyprine (Arctica islandica)	*	<del>                                     </del>	<del>                                      </del>	+
Queen scallop (Aequipecten opercularis)		<del>                                     </del>		
Great scallop (Pecten maximus)				<del></del>
Blue rayed limpet (Helcion pellucidum)		<del></del>		
Hunch-back scallop (Chlamys distorta)	*		<del></del>	<del>-</del>
Cowrie (Trivia monacha)	*			<del></del>
Red whelk (Neptunea antiqua)		*	<u> </u>	<del>-</del>
Squid (Todaropsis oblanae)	*			
Squid (Alloteuthis subulata)	*		<u> </u>	<del>-  </del>
Curled octopus (Eledon/cirrhosa)			<b>_</b>	
Cuttlefish (Rossia macrosoma)		* _		
Other invertebrates				<b>_</b>
Sea pen (Funiculina quadrangularis)	*	*		
Sea mouse (Aphroditidae aculeata)				*
Tube anemone (Cerianthus Iloydii)				*
Mud anemone	*			
Ascidians (2 species)	*			
Sabellid worms	*	I		*
Ragworms	*			
Sipunculid worms	1			*

# **Trawl Positions**

Loch Nevis   8-Jan-03   PTO1   14:39   15:00   0.21   56:9888   56:77333   56:99817   5.69067	AREA	DATE	HAUL	TIME	DURATIO	N	POSITION		Į
Loch Nevis   8-Jan-03   PT02   15-46     16-47   16-17   16-	Loch Nevis	8-Jan-03	PT01	14:39		SHOOT		HAUL	
Loch Nevis   9-Jan-03   PT03   15:07   0:31   56.89117   5.56745   57.01   5.69067   -				15:00	0:21	56.98883	-5.677333	56.99817	-5.69067
Loch Nevis   9-Jan-03   PT03   15:10	Loch Nevis	8-Jan-03	PT02	15:46	L.				
15:27   0:17   56.98817   -5.6746   56.99617   -5.6905				16:17	0:31	56.99117	-5.6745	57.01	-5.69067
Loch Hourn   10-Jan-03   PT04   15:56   16:05   0:09   57.12283   -5.506167   57.12383   -5.506   Loch Hourn   11-Jan-03   PT05   11:03   0:22   57.12483   -5.506167   57.12383   -5.5066   Loch Hourn   11-Jan-03   PT06   15:08   0.56   57.12883   -5.50667   57.13183   -5.635   Loch Duich   12-Jan-03   PT07   12:12   0:12   57.22517   -5.435   57.22667   26.62   Loch Duich   12-Jan-03   PT07   13:31   0:24   57.22783   -5.435   57.22667   26.62   Loch Duich   12-Jan-03   PT09   13:30   14:13   0:43   57.3285   -5.73667   57.3367   -5.46517   Loch Kishorn   13-Jan-03   PT09   13:30   11:135   0:15   57.2295   -5.45267   57.3367   -5.46517   Duich   17-Jan-03   DT1   11:15   0:15   57.2295   -5.452167   57.23867   -5.47683   Duich   18-Jan-03   DT3   9:00   0:15   57.24067   -5.469667   57.23567   -5.47683   Duich   19-Jan-03   DT4   10:20   Duich   19-Jan-03   DT4   10:20   Duich   19-Jan-03   DT6   10:35   0:15   57.12217   -5.610333   57.12933   -5.68517   Duich   19-Jan-03   DT6   10:15   Duich   19-Jan-03   DT7   12:25   0:15   57.01617   -5.69   57.00017   -5.6767   Nevis   20-Jan-03   DT6   10:35   0:15   57.01617   -5.69   57.00017   -5.6767   Nevis   21-Jan-03   RD17   12:25   0:15   57.01617   -5.69   57.00017   -5.6763   Nevis   21-Jan-03   RD17   12:25   0:15   57.01617   -5.688833   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:25   0:15   57.01633   -5.6935   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:25   0:15   57.01633   -5.695   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:25   0:15   57.01633   -5.695   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:25   0:15   57.01633   -5.695   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:20   0:15   57.01633   -5.695   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:20   0:15   57.00267   -5.6063   57.00267   -5.6063   Nevis   21-Jan-03   RD17   12:20   0:15   57.2283   -5.60267   57.3067   -5.6063   Nevis   22-Jan-03   RD17   12:20   0:15   57.2283   -5.60267   57.3067   -5.6063   Nevis   22-Jan-03   RD17   12:20   0:15   5	Loch Nevis	9-Jan-03	PT03	15:10					İ
16:05   0:09   57.12283   -5.596167   57.12383   -5.608	<del></del>				0:17	56.98817	-5.6745	56.99517	-5.6905
Loch Houm	Loch Hourn	10-Jan-03	PT04						
Loch Houm	<u> </u>				0:09	57.12283	-5.596167	57.12383	-5.608
Loch Houm	Loch Hourn	11-Jan-03	P105		0.00	57 40 400	5.000	57.40000	5 0000
16:04   0:56   57.12983   5.570167   57.13183   -5.635	Look House	11 Jon 02	DTOS		0:22	57.12483	-5.603	57.12883	-5.62667
Loch Duich   12-Jan-03   PT07   12:12	LOCII NOUIII	11-3a1+03	PIUO		0.50	57 12002	E E70467	57 12102	E 62E
Loch Duich   12-Jan-03   PT08   13:07   13:31   0:24   57:22517   -5.435   57:22667   26.82	Loch Duich	12- lan-03	PT07		0.50	37.12903	-5.570107	37.13163	-5.035
Loch Duich   12-Jan-03   PT08   13:07   13:31   0:24   57.22783   -5.442167   57.23867   -5.46517	Esai Balai	12 041-00	1		0.12	57 22517	-5.435	57 22667	26.82
13.31   0:24   57.22783   5.442167   57.23867   5.46517	Lock Duich	12-Jan-03	PTOS	<del></del>	0.12	01.22017	-0.400	37.22007	20.02
Lotch Kishorn   13-Jan-03   PT09   13:30	EUGH EUGH	TE Gart GO	1.00		0:24	57.22783	-5.442167	57.23867	-5.46517
Kishom         17-Jan-03         DT1         14:13         0:43         57.3285         -5.723667         57.35133         -5.69883           Duich         17-Jan-03         DT2         15:25         57.32583         -5.737667         57.31467         -5.75417           Duich         18-Jan-03         DT3         15:40         0:15         57.2295         -5.452167         57.23867         -5.47083           Duich         18-Jan-03         DT3         9:00         9:15         0:15         57.2295         -5.452167         57.23867         -5.47083           Houm         19-Jan-03         DT4         10:20         10:35         0:15         57.12217         -5.610333         57.12933         -5.58517           Houm         19-Jan-03         DT6         10:30         0:15         57.12217         -5.610333         57.12917         -5.62883           Nevis         20-Jan-03         DT6         10:36         0:15         57.01617         -5.69         57.00017         -5.67767           Nevis         20-Jan-03         DT7         12:25         0:15         57.0617         -5.69         57.00017         -5.67767           Nevis         21-Jan-03         RDT7         9:40	Loch Kishom	13-Jan-03	PT09	<del></del>	1	01121100		07.20001	0.10011
Nevis   17-Jan-03   DT1   11:16   11:30   0:15   57.32583   -5.737667   57.31467   -5.75417					0:43	57.3285	-5.723667	57.35133	-5.69883
Duich   17-Jan-03   DT2   15:25   15:40   0:15   57.2295   -5.452167   57.23867   -5.47083	Kishorn	17-Jan-03	DT1	11:15					
Duich   18-Jan-03   DT3   9:00   D15   57.2295   -5.452167   57.23867   -5.47083   D16   D17   D13   9:00   D17   D13   D17				11:30	0:15	57.32583	-5.737667	57.31467	-5.75417
Duich         18-Jan-03         DT3         9:00         9:15         57.24067         -5.469667         57.2515         -5.48767           Houm         19-Jan-03         DT4         10:20         10:35         0:15         57.12217         -5.610333         57.12933         -5.58517           Houm         19-Jan-03         DT6         10:15         57.12533         -5.6135         57.12917         -6.62883           Nevis         20-Jan-03         DT6         10:15         10:30         0:15         57.01617         -5.69         57.00017         -5.67767           Nevis         20-Jan-03         DT7         12:25         12:40         0:15         57.01617         -5.69         57.00017         -5.67767           Armadale         20-Jan-03         DT8         14:45         0:15         57.00417         -5.704833         56.99267         -5.8873           Armadale         20-Jan-03         RDT6         8:55         0:15         57.01633         -5.69         57.00267         -5.8763           Nevis         21-Jan-03         RDT7         9:40         -5.688833         57.0267         -5.68083           Houm         21-Jan-03         RDT4         13:15         -5.751313 <t< td=""><td>Duich</td><td>17-Jan-03</td><td>DT2</td><td>15:25</td><td></td><td></td><td></td><td></td><td></td></t<>	Duich	17-Jan-03	DT2	15:25					
Houm				15:40	0:15	57.2295	-5.452167	57.23867	-5.47083
Houm	Duich	18-Jan-03	DT3	9:00					
Houm					0:15	57.24067	-5.469667	57.2515	-5.48767
Houm	Hourn	19-Jan-03	DT4						
Nevis 20-Jan-03 DT6 10:16 10:30 0:15 57.12533 -5.6135 57.12917 -5.62883	<u> </u>			<del>,</del>	0:15	57.12217	-5.610333	57.12933	-5.58517
Nevis 20-Jan-03 DT6 10:15	Houm	19-Jan-03	DT5	_					
Nevis 20-Jan-03 DT7 12:25	<del></del>			<del></del>	0:15	57.12533	-5.6135	57.12917	-5.62883
Nevis 20-Jan-03 DT7 12:25	Nevis	20-Jan-03	שוט		0.45	F7.04047	5.00		- 4
Armadale 20-Jan-03 DT8 14:45	Norda	20 100 02	D.T.7		0:15	57.01617	-5.69	57.00017	-5.67767
Armadale 20-Jan-03 DT8 14:45   15:20 0:35 57.09517 -5.848833 57.07267 -5.876   15:20 0:35 57.09517 -5.848833 57.07267 -5.876   15:20 0:35 57.09517 -5.848833 57.07267 -5.876   15:20 0:15 57.01633 -5.69 57.00267 -5.68083   16:25 0:15 57.13133 -5.631833 57.00267 -5.70517   16:25 0:15 57.2833 -5.631833 57.00267 -5.70517   16:25 0:15 57.32833 -5.735667 57.3167 -5.75533   16:25 0:15 57.32833 -5.735667 57.3167 -5.75533   16:25 0:15 57.22833 -5.450333 57.23733 -5.43833   16:25 0:15 57.22833 -5.450333 57.13183 -5.63888   16:25 0:15 57.22833 -5.452333 57.13183 -5.63888   16:25 0:15 57.22833 -5.452333 57.13183 -5.63888   16:25 0:15 57.12783 -5.6225 57.12367 -5.6005   16:25 0:15 57.12783 -5.6225 57.12367 -5.6005   16:25 0:15 57.12783 -5.6225 57.12367 -5.6005   16:25 0:15 57.12783 -5.6225 57.12367 -5.6005   16:25 0:15 57.12783 -5.6225 57.12367 -5.6005   16:25 0:15 57.12783 -5.6945 57.00667 -5.70833   16:25 0:15 57.12783 -5.6945 57.00667 -5.70833   16:25 0:15 57.12783 -5.6945 57.00667 -5.70833   16:25 0:15 56.995 -5.6945 57.00667 -5.70833   16:25 0:15 56.995 -5.6945 57.00667 -5.70833   16:25 0	Mens	20-Jan-03	וטו		0.45	67 00447	E 704000	EQ 00007	5.00700
Nevis 21-Jan-03 RDT6 8:55 9:10 0:15 57.01633 -5.69 57.00267 -5.68083	Armadalo	20- lan-03	DT9	<del></del>	0.13	37.00417	-5.704633	00.99207	-0.00733
Nevis         21-Jan-03         RDT6         8:55         9:10         0:15         57.01633         -5.69         57.00267         -5.68083           Nevis         21-Jan-03         RDT7         9:40         9:55         0:15         56.99217         -5.688833         57.00267         -5.70517           Hourn         21-Jan-03         RDT5         12:20         12:35         0:15         57.13133         -5.631833         57.125         -5.6045           Hourn         21-Jan-03         RDT4         13:15         75.129         -5.589667         57.13         -5.61533           Alsh         21-Jan-03         DT9         15:15         75.26617         -5.6025         57.2705         -5.63           Kishom         22-Jan-03         DT10         9:40         9:55         0:15         57.3755         -5.6025         57.2705         -5.63           Kishom         22-Jan-03         RDT1         12:10         75.32833         -5.735667         57.31767         -5.75533           Duich         22-Jan-03         RDT2         18:10         75.22833         -5.450333         57.23933         -5.47317           Duich         18-Jan-03         BM1         10:45         75.22933         -5	Attribuble	20-381-03	טוט		0.35	57 00517	5 PAPP22	57 07067	E 076
Nevis   21-Jan-03   RDT7   9:40   9:55   0:15   56.99217   -5.688833   57.00267   -5.70517	Nevis	21- lan-03	POTE		0.55	37.03317	-0.040033	31.01201	-3.670
Nevis         21-Jan-03         RDT7         9:40         9:55         0:15         56.99217         -5.688833         57.00267         -5.70517           Hourn         21-Jan-03         RDT5         12:20         12:35         0:15         57.13133         -5.631833         57.125         -5.6045           Hourn         21-Jan-03         RDT4         13:15         -5.6045         -5.589667         57.13         -5.61533           Alsh         21-Jan-03         DT9         15:15         -5.6025         57.2705         -5.63           Kishom         22-Jan-03         DT10         9:40         -5.602167         -5.6025         57.2705         -5.63           Kishom         22-Jan-03         RDT1         12:10         -5.602167         57.36867         -5.36867           Kishom         22-Jan-03         RDT1         12:10         -5.662167         57.36867         -5.735687           Duich         22-Jan-03         RDT2         18:10         -5.732833         -5.450333         57.23933         -5.47317           Duich         22-Jan-03         RDT3         14:45         0:15         57.25017         -5.486667         57.26017         -5.50517           Duich         18-Jan-03 <td>14013</td> <td>21-Jair-05</td> <td>INDIO</td> <td></td> <td>0.15</td> <td>57 01633</td> <td>-5 69</td> <td>57 00267</td> <td>-5 68083</td>	14013	21-Jair-05	INDIO		0.15	57 01633	-5 69	57 00267	-5 68083
Post	Nevis	21-Jan-03	RDT7		0.10	01.01000	0.00	57.00201	-0.00000
Houm					0:15	56.99217	-5.688833	57.00267	-5 70517
Houm   21-Jan-03   RDT4   13:15	Houm	21-Jan-03	RDT5			00:002.1	0.00000	01.0020.	0.70011
Houm				-	0:15	57.13133	-5.631833	57.125	-5.6045
Alsh 21-Jan-03 DT9 15:15	Hourn	21-Jan-03	RDT4	13:15					
15:30		1		13:30	0:15	57.129	-5.589667	57.13	-5.61533
Kishom         22-Jan-03         DT10         9:40         9:55         0:15         57.3755         -5.662167         57.36867         -5.36867           Kishom         22-Jan-03         RDT1         12:10         12:25         0:15         57.32833         -5.735667         57.31767         -5.75533           Duich         22-Jan-03         RDT2         16:10         16:25         0:15         57.22833         -5.450333         57.23933         -5.47317           Duich         22-Jan-03         RDT3         14:30	Alsh	21-Jan-03	DT9	15:15					
Kishom         22-Jan-03         RDT1         12:10         57.3755         -5.662167         57.36867         -5.36867           Duich         22-Jan-03         RDT2         16:10         -5.735667         57.31767         -5.75533           Duich         22-Jan-03         RDT2         16:10         -5.450333         57.23933         -5.47317           Duich         22-Jan-03         RDT3         14:30         -5.486667         57.26017         -5.50517           Duich         18-Jan-03         BM1         10:45         -5.486667         57.26017         -5.50517           Duich         18-Jan-03         BM2         12:15         -5.72933         -5.452333         57.23733         -5.43833           Duich         18-Jan-03         BM2         12:15         -5.72933         -5.452333         57.23733         -5.43833           Duich         18-Jan-03         BM2         12:15         -57.239         -5.467         57.25         -5.486           Hourn         19-Jan-03         BM3         8:50         -5.6225         57.12367         -5.6005           Hourn         19-Jan-03         BM4         9:30         -57.12783         -5.591333         57.13183         -5.61883				15:30	0:15	57.26617	-5.6025	57.2705	-5.63
Kishom         22-Jan-03         RDT1         12:10         12:25         0:15         57.32833         -5.735667         57.31767         -5.75533           Duich         22-Jan-03         RDT2         16:10         -5.722833         -5.450333         57.23933         -5.47317           Duich         22-Jan-03         RDT3         14:30         -5.486667         57.26017         -5.50517           Duich         18-Jan-03         BM1         10:45         -5.486667         57.26017         -5.50517           Duich         18-Jan-03         BM2         12:15         -5.452333         57.23733         -5.43833           Duich         18-Jan-03         BM2         12:15         -5.467         57.25         -5.486           Hourn         19-Jan-03         BM3         8:50         -5.6225         57.12367         -5.6005           Hourn         19-Jan-03         BM4         9:30         -5.591333         57.13183         -5.61883           Nevis         20-Jan-03         BM5         8:50         -5.6995         -5.6945         57.00667         -5.70833           Nevis         20-Jan-03         BM6         9:30         -5.6995         -5.6945         57.00667         -5.70833	Kishom	22-Jan-03	DT10	9:40					
Duich 22-Jan-03 RDT2 16:10	<u> </u>				0:15	57.3755	-5.662167	57.36867	-5.36867
Duich         22-Jan-03         RDT2         16:10           16:25         0:15         57.22833         -5.450333         57.23933         -5.47317           Duich         22-Jan-03         RDT3         14:30         -5.450333         57.23933         -5.47317           Duich         18-Jan-03         BM1         10:45         -5.452037         -5.486667         57.26017         -5.50517           Duich         18-Jan-03         BM2         12:15         -5.452333         57.23733         -5.43833           Duich         18-Jan-03         BM2         12:15         -5.467         57.25         -5.486           Hourn         19-Jan-03         BM3         8:50         -5.6225         57.12367         -5.6005           Hourn         19-Jan-03         BM4         9:30         -57.12783         -5.6225         57.12367         -5.61883           Nevis         20-Jan-03         BM5         8:50         -57.123         -5.6945         57.00667         -5.70833           Nevis         20-Jan-03         BM6         9:30         -56.995         -5.6945         57.00667         -5.70833	Kishom	22-Jan-03	RDT1						
Duich   22-Jan-03   RDT3   14:30	<u> </u>	00 1 5	D0-5		0:15	57.32833	-5.735667	57.31767	-5.75533
Duich         22-Jan-03         RDT3         14:30         -5.488667         57.26017         -5.50517           Duich         18-Jan-03         BM1         10:45         -5.45233         57.23733         -5.43833           Duich         18-Jan-03         BM2         12:15         -5.467         57.25         -5.486           Hourn         19-Jan-03         BM3         8:50         -5.6225         57.12367         -5.6005           Hourn         19-Jan-03         BM4         9:30         -57.12783         -5.6225         57.12367         -5.61883           Nevis         20-Jan-03         BM5         8:50         -56.995         -5.6945         57.00667         -5.70833           Nevis         20-Jan-03         BM6         9:30         -56.995         -5.6945         57.00667         -5.70833	Duich	ZZ-Jan-03	KDT2		0.45	E7 00000	F 450000	E7 00000	F 450.5
Duich 18-Jan-03 BM1 10:45 11:00 0:15 57.25017 -5.486667 57.26017 -5.50517  Duich 18-Jan-03 BM1 10:45 11:00 0:15 57.22933 -5.452333 57.23733 -5.43833  Duich 18-Jan-03 BM2 12:15 12:30 0:15 57.239 -5.467 57.25 -5.486  Hourn 19-Jan-03 BM3 8:50 9:05 0:15 57.12783 -5.6225 57.12367 -5.6005  Hourn 19-Jan-03 BM4 9:30 9:45 0:15 57.123 -5.591333 57.13183 -5.61883  Nevis 20-Jan-03 BM5 8:50 9:05 0:15 56.995 -5.6945 57.00667 -5.70833	Distant	22 16- 02	DDTO		0:15	57.22833	-5.450333	57.23933	-5.47317
Duich         18-Jan-03         BM1         10:45         57.22933         -5.452333         57.23733         -5.43833           Duich         18-Jan-03         BM2         12:15         -5.467         57.25         -5.486           Hourn         19-Jan-03         BM3         8:50         -5.6225         57.12367         -5.6005           Hourn         19-Jan-03         BM4         9:30         -5.591333         57.13183         -5.61883           Nevis         20-Jan-03         BM5         8:50         -56.995         -5.6945         57.00667         -5.70833           Nevis         20-Jan-03         BM6         9:30         -56.995         -5.6945         57.00667         -5.70833	Duich	zz-Jan-03	KD13		0.45	E7 05047	E 400007	E7 0004	E FORTS
Duich   18-Jan-03   BM2   12:15		<u> </u>	<del></del>	14:45	U:15	37.25017	-0.480667	o7.26017	-5.50517
Duich   18-Jan-03   BM2   12:15	Duich	18- 120-02	RM1	10:45					
Duich         18-Jan-03         BM2         12:15         57.239         -5.467         57.25         -5.486           Hourn         19-Jan-03         BM3         8:50         -5.6225         57.12367         -5.6005           Hourn         19-Jan-03         BM4         9:30         -5.6225         57.12367         -5.6005           Nevis         20-Jan-03         BM5         8:50         -5.591333         57.13183         -5.61883           Nevis         20-Jan-03         BM6         9:30         -5.6995         -5.6945         57.00667         -5.70833	- Daign	-O DOMESTON	DIVI		0.15	57 22033	-5.452222	57 22722	-5 43932
Hourn 19-Jan-03 BM3 8:50 9:05 0:15 57.239 -5.467 57.25 -5.486  Hourn 19-Jan-03 BM4 9:30 9:45 0:15 57.12783 -5.6225 57.12367 -5.6005  Nevis 20-Jan-03 BM5 8:50 9:05 0:15 56.995 -5.6945 57.00667 -5.70833	Duich	18-Jan-03	BM2		0.13	Jr.E2833	-0.702000	J1.23133	-3.43033
Hourn 19-Jan-03 BM3 8:50 9:05 0:15 57.12783 -5.6225 57.12367 -5.6005  Hourn 19-Jan-03 BM4 9:30 9:45 0:15 57.123 -5.591333 57.13183 -5.61883  Nevis 20-Jan-03 BM5 8:50 9:05 0:15 56.995 -5.6945 57.00667 -5.70833  Nevis 20-Jan-03 BM6 9:30 -5.6945 57.00667 -5.70833	t =====	.0 0311 00	D.112		0:15	57.239	-5.467	57 25	-5 4RG
9:05   0:15   57.12783   -5.6225   57.12367   -5.6005	Hourn	19-Jan-03	BM3		3	5.,200	V. TV!	U1.20	J. 700
Hourn 19-Jan-03 BM4 9:30 9:45 0:15 57.123 -5.591333 57.13183 -5.61883  Nevis 20-Jan-03 BM5 8:50 9:05 0:15 56.995 -5.6945 57.00667 -5.70833  Nevis 20-Jan-03 BM6 9:30 -5.6945 57.00667 -5.70833				$\overline{}$	0:15	57,12783	-5,6225	57.12367	-5.6005
Nevis         20-Jan-03         BM5         8:50         57.123         -5.591333         57.13183         -5.61883           Nevis         20-Jan-03         BM6         9:05         0:15         56.995         -5.6945         57.00667         -5.70833           Nevis         20-Jan-03         BM6         9:30         -5.6945         57.00667         -5.70833	Hourn	19-Jan-03	BM4		J	2		32001	5.0000
Nevis         20-Jan-03         BM5         8:50            9:05         0:15         56.995         -5.6945         57.00667         -5.70833           Nevis         20-Jan-03         BM6         9:30					0:15	57.123	-5.591333	57.13183	-5.61883
Nevis         20-Jan-03         BM6         9:30         0:15         56.995         -5.6945         57.00667         -5.70833	Nevis	20-Jan-03	BM5						
Nevis 20-Jan-03 BM6 9:30					0:15	56.995	-5.6945	57.00667	-5.70833
9:45 0:15 57.00467 -5.684667 57.0155 -5.702	Nevis	20-Jan-03	BM6	9:30					
				9:45	0:15	57.00467	-5.684667	57.0155	-5.702

PT - Pelagic D - Demersal BM - Beam