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**DEPARTMENT OF AGRICULTURE FOR N. IRELAND
AGRICULTURAL AND ENVIRONMENTAL SCIENCES DIVISION**

CRUISE REPORT: LF/49/96: PELAGIC FISH ACOUSTIC SURVEY

VESSEL: R.V. *Lough Foyle* (DANI)

DATES: 9 - 12 December 1996

AREA OF OPERATION: Eastern Irish Sea ; ICES Division VIIa

TYPE OF SURVEY: Acoustics / midwater trawling

PERSONNEL:

M. Armstrong	(DANI; S.I.C.)
W. McCurdy	(DANI)
M. Dickey-Collas	(DANI)
M. McAliskey	(DANI)
J. Peel	(DANI)
C. Burns	(DANI)

OBJECTIVES

1. To estimate the distribution, biomass and age-composition of herring inside the eastern Irish Sea closed box for herring fishing (within 12 miles of the south coast of Scotland, west coast of England and north coast of Wales);

METHODS

A sphere-calibrated Simrad EK-500 echosounder with a 120 kHz split-beam transducer mounted in a towed body was employed to carry out echo integrations along transects in the eastern Irish Sea. (The 38 kHz split beam transducer normally used for herring surveys was unavailable due to a damaged cable.) Calibrated instrument settings obtained during cruise LF3696 (September 1996) were employed (Table 1). The survey grid is shown in Fig. 1. Acoustic targets were identified by means of aimed tows of a Maritim 54m x 47m midwater trawl fitted with a 20-mm stretched-mesh liner and a Furuno netsonde. Species compositions and length-frequencies were recorded from all trawl catches. Subsamples of up to 50 herring were taken from each catch for recording of age and other biological parameters.

CRUISE NARRATIVE

The vessel departed Belfast at 22h.00 on Sunday 8 December, and proceeded overnight to the start of transect 1 off the northwest coast of Anglesey (Fig. 1). Surveying took place between 06h.00 and 22h.00. On completion of the grid on 12 December at 14h.06 off Luce Bay, the vessel returned to Belfast.

WORK COMPLETED

Echo integration

The 120kHz echosounder was run continuously during the survey at the settings given in Table 1. Data were captured using the EP-500 software and were backed up daily on digital audio tapes. Surveying took place between 06h.00 and 22h.00. Sea surface temperatures were recorded at each 15 minute interval. Sea conditions were ideal for acoustic surveying, ranging from slight to calm.

Target identification and biological analysis

Eleven midwater trawl tows were completed for identification of acoustic targets. The trawl positions are shown on Fig. 1. Details of the tows are given in Table 2. Species compositions and length frequencies were recorded for each catch. A total of 278 herring were sampled for length, weight, age and maturity stage. 265 were aged.

RESULTS

Fish targets were generally more scattered than observed during September acoustic surveys of the same area. Patches of spent adult herring were recorded in Liverpool Bay and near St Bees Head. Juvenile herring were most abundant to the north of Morecambe Bay, where pelagic targets tended to be dominated by sprats and small herring. Three percent of the herring in the biological samples from tows 2, 3, 6, 8 and 9 had mature gonads indicating a small amount of winter spawning in the area. Whiting were common in the trawl catches, particularly at night.

Sea surface temperatures ranged from over 9°C at the offshore ends of the transects to less than 6°C inshore. Coldest temperatures were recorded off the Solway Firth and south of Morecambe Bay.

ACKNOWLEDGEMENTS

The Ship's Master, Officers, Fishing Master, Engineers, Catering Staff and Crew are thanked for their cooperation and service during this cruise. The scientific staff are also acknowledged for their hard work.

Signed:

Scientist in charge..... *M. J. Armstrong* date..... 12/12/96

Ships master..... *AMB* date..... 12 XII 1996

Head, Aquatic Sciences..... *S. J. Henry* date..... 17.1.97

Table 1 EK-500 instrument settings used during cruise LF4996

Transducer	ES120-7
Frequency	120 kHz
(1) TRANSCIVER MENU	
Absorption coefficient	38 dB/km
Pulse length	Medium (0.3 ms)
Bandwidth	Wide
Max. power	1000 W
Angle sensitivity	21.0
2-way beam angle	-20.7 dB
Sv transducer gain	25.6 dB
TS transducer gain	25.8 dB
3 dB beamwidth	7.0 dg
Alongship offset	0.0 dg (offsets not yet
Athwartship offset	0.0 dg calibrated)

(2) OTHER SETTINGS	
Operation menu:	Ping rate = 0.6 s (50m,100m range) [25m range not used]
Log menu:	Mode = ping based Ping interval = 1500 (50, 100m range)
Layer menu:	Super-layer = 9 - 150m
Printer / EP-500 settings:	Sv colour min. = -70 dB TS colour min. = -50 dB
TS detection menu: (both frequencies)	TS min. = -50 dB Min. echo length = 0.8 Max. echo length = 1.3 Max. gain compensation = 3.0 dB Max. phase deviation = 4.0 dB
Bottom detection menu:	Minimum level = -55 dB to -60 dB depending on seabed hardness

Table 2 **Details of trawl catches taken during cruise LF4996**

Tow	Date	Shooting details				Total catch kg.	percentage composition by weight					Mean length (cm)	
		Time	Lat.	Long.	depth (m)		sprat	herring	mackerel	gadoids	other	sprat	herring
1	09-Dec	20h.00	53 31.9	3 44.7	48	112	37.4	0.91	0.1	61.3	0.3	8.2	18.6
2	10-Dec	08h.29	53 27.7	3 18.7	21	195	5.7	5.9	0.0	88.2	0.2	7.4	25.8
3	10-Dec	11h.33	53 39.1	3 25.8	29	47	88.4	7.5	0.0	4.0	0.1	6.5	23.4
4	10-Dec	14h.27	53 44.8	3 14.9	22	1000	2.6	93.4	0.0	4.1	0.0	12.3	25.1
5	10-Dec	18h.45	53 56.5	3 30.8	24	94	94.6	1.5	0.0	3.9	0.0	6.1	14.3
6	11-Dec	07h.18	54 08.9	3 39.6	37	91	71.2	2.2	0.0	26.5	0.0	6.6	16.1
7	11-Dec	10h.24	54 15.1	3 31.1	30	6	98.4	1.4	0.0	0.2	0.1	6.3	13.6
8	11-Dec	13h.05	54 21.8	3 51.7	51	120	85.2	8.4	0.0	6.4	0.0	7.7	13.4
9	11-Dec	16h.13	54 26.9	3 41.7	25	900	16.9	67.3	0.0	13.5	2.3	4.0	24.3
10	12-Dec	8h.11	54 44.9	4 07.9	22	51	86.7	8.5	0.0	4.9	0.0	7.2	16.1
11	12-Dec	10h.50	54 37.2	4 17.7	57	18	98.1	0.4	0.0	1.4	0.0	6.8	13.7

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Tuesday 18 February:

Moderation in the weather enabled *RV Lough Foyle* to put to sea at 09h.00 and proceed to the scallop grounds to the NW of Belfast Lough (Area V). A trial tow to stretch new trawl warps was followed by 2 aborted tows due to up-side-down dredges. Three valid tows with good scallop catches were then completed. Forecasts of poor weather resulted in the decision to return to Belfast for the night. *RV Lough Foyle* docked at 18h.50.

Wednesday 19 February:

Owing to severe gales the ship did not sail. Scientific staff remained aboard overnight awaiting further weather information.

Thursday 20 February

Continued poor weather forecasts and information from a recently docked Stena Line vessel describing force 8 gales and large swell confirmed the decision to cancel the rest of the cruise.

RESULTS

During the cruise only 3 valid tows were completed and were in area V as indicated in Figure 1. Table 1 and Figure 2 is a summary of the results of the two ageing methods compared (shell rings/hinge lines). Table 2 and Figure 3 is the scallop catch at age expressed as catch per 4 x 2 foot dredges per 3nm of seabed fished. Both abductor muscle and gonad weights were recorded for each scallop and when combined with data from earlier cruises will enable analysis of regional and age related aspects of meat yield and gonad development. Scallop shells were retained for future morphometric analysis.

A range of benthic fauna associated with scallops were noted from the three tows and were quantified where possible (Table 4).



Richard Briggs
(Scientist in Charge)



Andrew Niblock
(Master)

February 1997

Table 1

Results of Ageing Method Comparison

AGE	TOW 3		TOW 4		TOW 5	
	shell	hinge	shell	hinge	shell	hinge
1						
2						
3	1				1	1
4	3	4	3	1	5	6
5	13	13	10	12	8	6
6	18	17	8	10	15	16
7	0	1	3	1	2	3
8	4	2	3	3	5	4
9	8	9	2	1	5	5
10	3	2		1	2	2
10+	11	13	6	6	7	7
TOTAL	61	61	35	35	50	50

Table 2

Catch at age standardised to catch per 3nm of seabed
(Ages are the mean of the two methods used)

AGE	TOW 3	TOW 4	TOW 5	mean
1	0	0	0	0
2	0	0	0	0
3	1	0	2	1
4	7	4	10	7
5	26	21	12	20
6	35	17	27	26
7	1	4	4	3
8	6	6	8	7
9	17	3	9	10
10	5	1	3	3
10+	24	12	12	16
TOTAL	122	68	87	92

Table 4

Bycatch data from LF0896

Species	Tow 1	Tow 2	Tow 3
Echinodermata			
<i>Asterias rubens</i>	**	.	***
<i>Crossaster papposus</i>	.	**	.
<i>Solaster endeca</i>			.
<i>Marthasterias glacialis</i>			
<i>Henricia oculata</i>			
<i>Anseropoda placenta</i>			
<i>Antedon bifida</i>	.		
<i>Echinus esculentus</i>	.		
<i>Psammechinus miliaris</i>	.		
<i>Pawsonia saxicola</i>	.		
Holothurian spp	.	.	
Ophiuroidea spp	.		
Urochordata			
<i>Asciidiella aspersa</i>			
Pisces			
<i>Agonus cataphractus</i>			
<i>Arnoglossus laterna</i>			
<i>Callionymus lyra</i>			
<i>Ciliata mustela</i>			
<i>Ctenolabrus rupestris</i>			
<i>Eutrigla gurnardus</i>			
<i>Gadus morhua</i>			
<i>Hippoglossoides platessoides</i>			
<i>Limanda limanda</i>			
<i>Liparis liparis</i>			
<i>Lopius piscatorius</i>			
<i>Merlangius merlangus</i>			
<i>Microstoma kitt</i>			
<i>Myxocephalus scorpius</i>			
<i>Pleuronectes platessa</i>			
<i>Pholis gunnellus</i>			
<i>Raja clavata</i>			
<i>Scophthalmus norvegicus</i>			
<i>Solea solea</i>			
<i>Glyptocephalus cynoglossus</i>			
<i>Syngnathus acus</i>			
<i>Trisopterus luscus</i>			
<i>Trisopterus minutus</i>			
<i>Zeugopterus punctatus</i>			
<i>Scyliorhinus canicula</i>			
<i>Phrynorhombus regius</i>			
<i>Zeus Faber</i>			
<i>Labrus mixtus</i>			

- * 1-10 (few)
- ** 10-20 (occasional)
- *** 20-50 (frequent)
- **** 50-100 (common)
- A/B 100+ (abundant)

Figure 1

Map showing position of Area V where 3 valid tows were completed

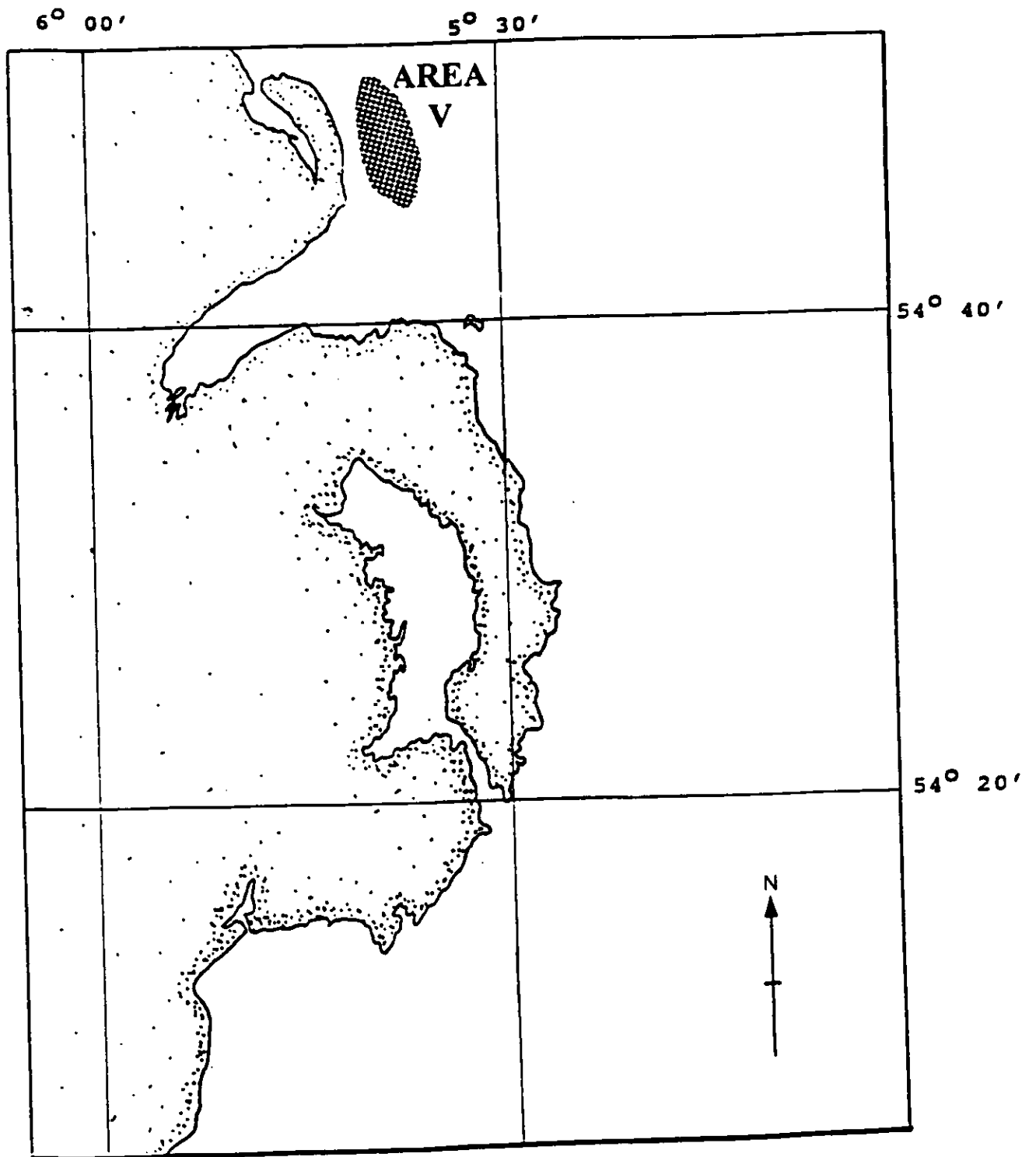


Figure 2

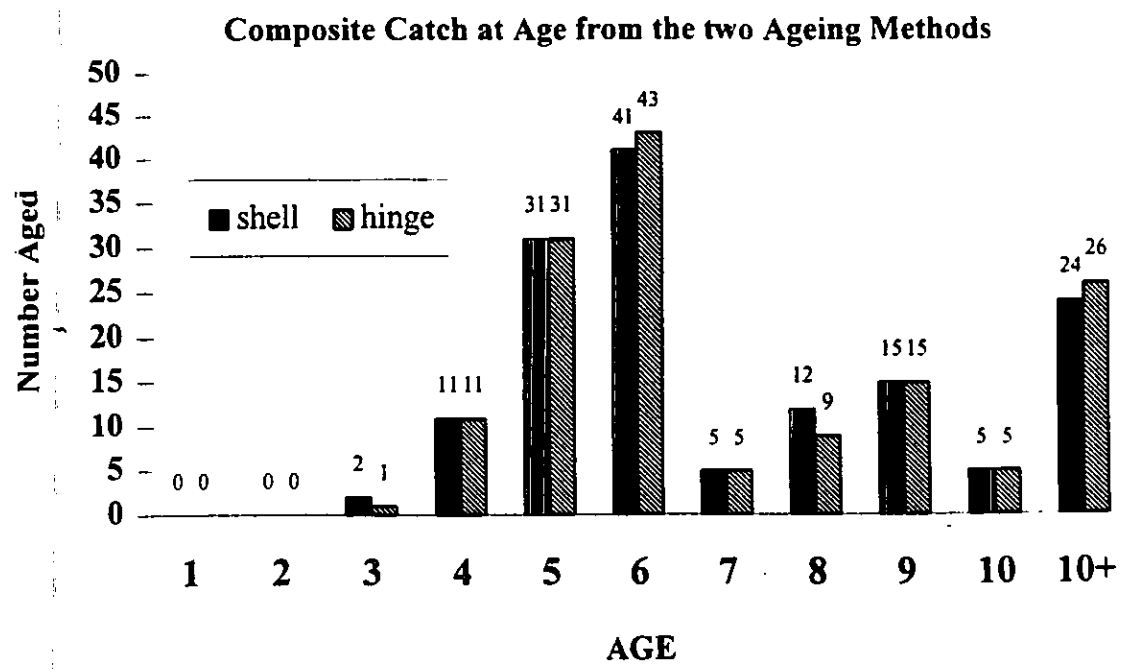


Figure 3

