

CRUISE REPORT: LF1991 - HERRING ACOUSTIC SURVEY

28 JULY - 6 AUGUST

Personnel:

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Objectives:

1. To estimate the biomass and population structure of the Mourne and Manx herring stocks by means of echo-integration and midwater trawling;
2. To fully test the recently acquired HADAS package for echo-integration under survey conditions.

Methods:

A sphere-calibrated Simrad EY-200 echosounder and 38kHz towed transducer were employed to collect acoustic data on a grid of parallel survey transects running East-West across the Irish Sea. The original survey design (Fig. 1) was adhered to until transect 15, at which point it was decided to alter the grid in order to survey more intensively the inshore regions of the NI coast and the Manx west coast (Fig. 2). The Manx east coast was omitted as experience has shown that most of the Manx stock are found off the West Coast at this time of year.

Echo-integrations were carried out during the survey by means of the HADAS software after digitization of the echo-signal. A back-up copy of the acoustic signal was maintained on digital tape. Targets in the water column were identified on an ad-hoc basis by midwater trawling, and the species compositions and length-frequencies of the catches were recorded. Otoliths were collected from herring for ageing, and vertebral counts were carried out on random samples of herring to indicate the mixing of the Manx and Mourne stocks.

Cruise narrative:

Sunday 28 July

M.R.V. *Lough Foyle* left Belfast harbour at approx. 09h.30 on Sunday 28 July and proceeded towards Dundrum Bay where sphere calibration of the acoustic system was due to take place. Unfortunately a telephone call was received informing Captain McCormack of the death of his father-in-law, and arrangements

were made to bring Captain Niblock back on board for several days. The exchange was made at Whitehead at 15h.20. By that stage a strong southerly wind was blowing, and in view of the fact that the afternoon slack water in Dundrum Bay would be missed, it was decided to attempt calibrations off the mouth of Larne Lough instead. Lough Foyle was anchored at 16h.50, but conditions were not sufficiently good for successful calibration and the vessel headed directly for Dundrum Bay at 20h.30 to attempt further calibrations at early morning slack water.

Monday 29 July

The vessel anchored in Dundrum Bay at 06h.10, and sphere-calibration of the acoustic system took place before heading to the start of the grid at 09h.30. However, the set-up parameters for the acoustic system recommended by Simrad for the Hadas echo-integration software did not appear to be appropriate for the EY200 echosounder, and a fax was sent to Simrad asking for details. Lough Foyle commenced transect #1 at 17h.30. Prior to that, the midwater trawl was shot at 16h.00 to straighten the gear and to re-familiarize the deck-crew with the shooting procedure. Numerous small targets were observed in the upper 10m, and a small catch of juvenile sprat, herring and sandeels was taken. Transect #1 was completed at 22h.54; there were no significant targets warranting trawling.

Tuesday 30 July

A proposed calibration of the acoustic system inshore at 01h.00 was abandoned because of strong easterly winds and a sizeable swell. Transect # 3 was started at 01h17 and was completed at 10h41, again without detecting significant fish targets. A reply to the fax sent to Simrad was received in the morning, and a phone-call was placed to clarify certain points. It was suggested by Simrad that the EY200 echosounders, now two years old, may need servicing, and they clarified the settings that should be adopted to allow the survey to continue with the existing calibration parameters. Transects 4 and 5 were completed by 01h.00 on Wednesday. The scattering layer at trawl station #2 was sampled at 22h.00 yielding a small catch of juvenile sprats and whiting.

Wednesday 31 July

On completion of transect #5 at approx. 01h.00, the vessel proceeded a short distance inshore where further sphere calibrations took place in calm conditions at slack water. A strong and consistent sphere echo was obtained but there was a strong scattering layer in the upper water column preventing a clean echo of the sphere. Nonetheless, the calibration factors were very similar to those obtained during the previous calibration at Dundrum Bay. The survey grid was restarted at 04h.46. At about 07h.00, targets similar to those of herring were recorded mixed with smaller schools in the lower water column,

15-20 miles off Dundalk Bay. The herring schools were not relocated at trawl station #3, but 1/2 ton of sprat was taken. Fish targets ran out in the deeper water over the Nephrops grounds, and were not seen again until south of the Isle of Man where a small catch of sprats was taken in trawl #4. Approximately the first 10 miles of transect 9 were surveyed until midnight, but no fish targets were seen.

Thursday 1 August

Transect 09 was completed with virtually no fish targets recorded. Following completion of transect 10 at 10h.00, the work-boat was launched off Annalong to drop off Captain Niblock and pick up Captain McCormack. During transect 11, regular targets were recorded in midwater in 100-120m of water. Trawl #5 caught a mixture of horse mackerel and sprats. Herring schools were observed towards the end of transect 12 and at the commencement of transect 13, close to the Manx coastline, and were sampled by trawl #6.

Friday 2 August

Transects 13, 14 and part of 15 were surveyed until midday. Virtually no targets were observed on transect 13 until close to the coast. Trawl #7 failed to relocate the shoals, but another school-group at the commencement of transect 15 was identified as sprats and juvenile herring. During the morning it was decided to change the survey strategy entirely and to survey intensively the region within 10 miles of the Manx west coast and the NI coastline (Fig. 2). The new survey grid commenced at 15h24 in calm conditions off the northern tip of the Isle of Man. Virtually no targets were seen until off Jurby head on transect 28, where a dispersed scattering layer in the upper 15m was fished just before midnight (Trawl #9) and identified as herring.

Saturday 3 August

The survey progressed from transect 28, reaching transect 53 off Port Erin by midnight. A patch of fish was traversed off Peel, and catches of herring and sprat were taken during the morning by trawl #10 (transect 34) and #11 (transect 36). Few targets were then encountered until the stretch of coastline between Niarbyl and the Calf of Man was reached, half a ton of adult herring being taken in trawl #12, inshore to the north west of Bradda Head. Gannets were frequently observed diving close to the coast, indicating the presence of fish near the surface. Some schools were observed on the sonar in these localities. Adjustments had to be made to the inshore transects of the survey grid at the southern end of the island to avoid fouling lobster pots.

Sunday 4 August

On completion of transect 58 at 04h.30, Lough Foyle headed for transect 59 just north of Clogher Head, reaching the transect at 07h.30. The survey proceeded in fair sea conditions with force 3-4 southerly winds. Small shoals were observed very close to the seabed, merging closer into the seabed echo as the morning progressed. Some larger schools were traversed close inshore, but trawl #13 caught only a handful of sprats. Denser targets were observed offshore in the vicinity of transect 62, and were identified as sprats by trawl #14. Sea conditions were very poor by Sunday evening, causing turbulence under the transducer. By midnight this had become so bad that the survey was terminated and the vessel dodged off Dundrum Bay until Monday morning when calmer conditions prevailed. During Sunday it was brought to the attention of the SIC that the calibration sphere which had been soaking in detergent pending an ad hoc calibration exercise, had mysteriously gone missing, and all efforts to locate the sphere were unsuccessful.

Monday 5 August

The survey recommenced at approx. 07h.30. Sprats were again in evidence, and a catch was made at trawl #15 on transect 70. A large patch of horse-mackerel was encountered 5 to 10 miles offshore between Portavogie and the tip of the Ards Peninsula, the fish being located in midwater at 60-70m depth. During trawl #16 on these targets, the fish avoided the net and only a few horse mackerel were caught, mixed with whiting and sprats. No further targets of any significance were recorded off the Ards Peninsula

Tuesday 6 August

The survey was completed at approx. 04h.00 and the vessel proceeded directly to Belfast harbour, berthing at 07h.30.

Work completed

The Hadas echo-integration was operated continuously on transects throughout the survey, was easy to use, and performed well once the appropriate equipment settings had been sorted out. Some preliminary analysis of the data gave estimates of fish density that appeared to be of the correct order of magnitude for the types and frequency of targets encountered. However, it will be a priority to have the EY200 echosounders serviced to provide the correct test-signal for setting the system parameters at optimum values. The acoustic fish was towed from a forward boom and was additionally supported by the wire from the hydrographic winch, an arrangement that worked well. The acoustic system was successfully calibrated twice, giving instrument factors of 7.7×10^{-7} and 7.4×10^{-7} .

The midwater trawl was deployed at 16 stations (Table 1), and was easily targetted on fish schools throughout the water column. It was possible to fish very close to the seabed where there were no

obstructions and the ground was not hard, and this was required on several occasions to catch fish in the lower water column. At present the arrangement of the fine-mesh liner in the cod-end is not entirely satisfactory, and should be replaced with a proper fine-mesh cod-end. Also, in view of the fact that trawling often has to be carried out close to the seabed, a spare trawl should be purchased otherwise an expensive survey may at some stage in the future have to be terminated because of irreparable damage to the gear. It was found that the Scanmar equipment was not vital during trawling, as the Furuno mounted in the top panel provided nearly all the information required to control the net operation.

Species compositions were estimated for all successful trawl catches, and length-frequencies were carried out on all species caught. A total of only 137 herring were sampled for age, maturity and vertebral count because of the paucity of catches of herring, which were mostly taken off the Manx coastline (see Table 1). Catches off the Isle of Man were generally dominated by herring, whilst those off the NI coastline were mostly of sprat.

Acknowledgements

As usual, the scientific personnel wish to thank the Captain(s), officers, engineers, crew and catering staff for their willing cooperation and service at all times throughout the cruise.

Mike Armstrong

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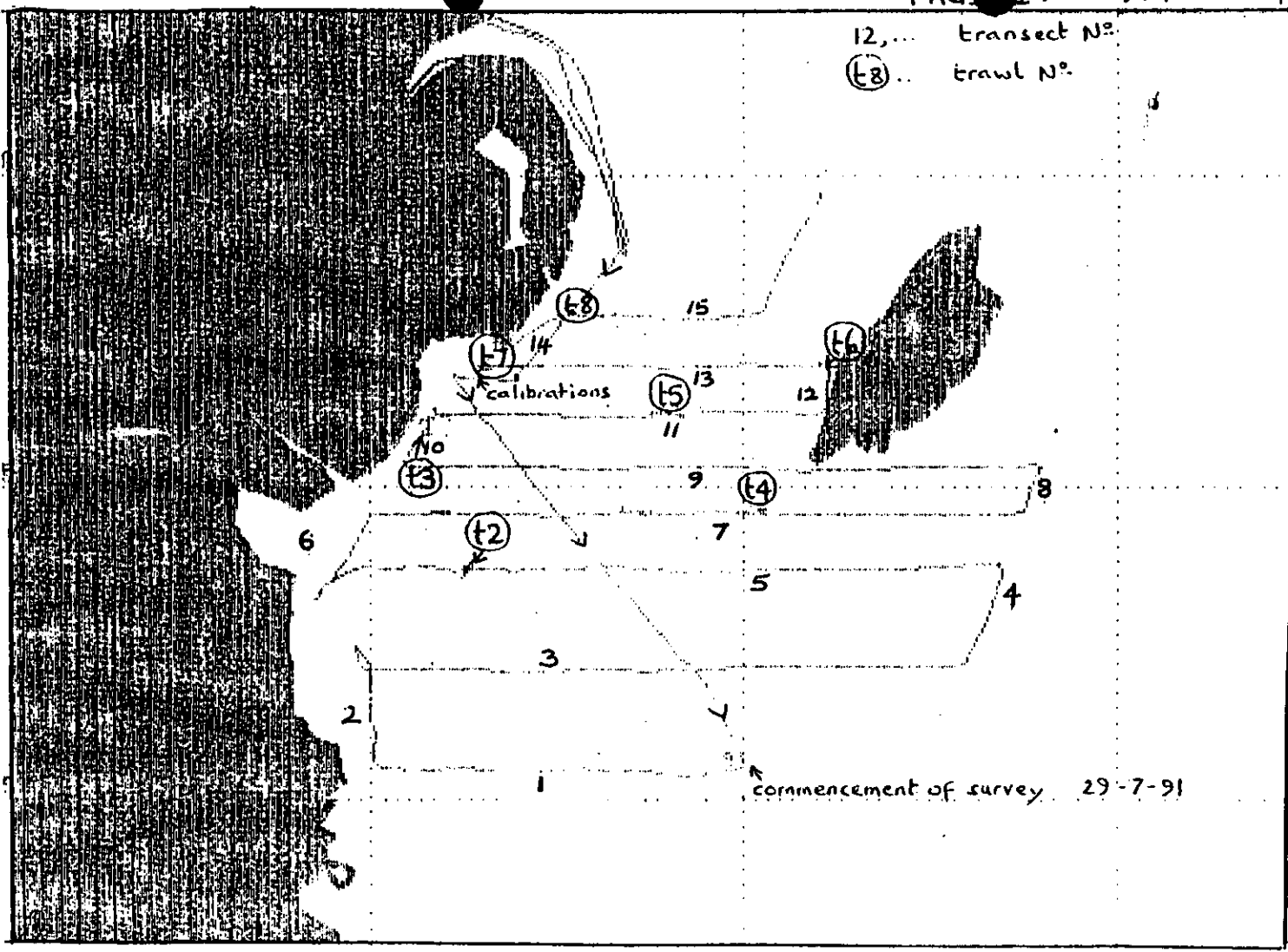
Table 1. Details of midwater trawl stations during cruise LF/19/91

Trawl	Date	Time	Latitude	Longitude	Sounding	Total catch (kg)	main species
1	29/7	16h.08	53o33.2'N	5o01.7'W	97	4	sprat
2	30/7	22h.15	53o52.7'N	5o43.7'W	65	37	sprat
3	31/7	07h.45	53o57.6'N	5o45.8'W	47	483	sprat
4	31/7	15h.07	53o57.7'N	4o56.9'W	47	59	sprat
5	31/7	17h.14	54o06.9'N	5o10.3'W	125	96	horse mackerel
6	1/8	22h.09	54o12.2'N	4o45.2'W	21	61	herring
7	2/8	06h.10	54o12.0'N	5o41.8'W	31	0	-
8	2/8	08h56	54o16.6'N	5o21.0'W	46	6	sprat
9	2/8	23h.52	54o20.3'N	4o47.9'W	39	300	herring
10	3/8	07h.16	54o17.1'N	4o48.5'W	43	185	herring
11	3/8	09h.49	54o16.3'N	4o54.0'W	80	2	herring
12	3/8	22h.46	54o05.5'N	4o51.0'W	34	375	herring
13	4/8	10h.43	54o50.0'N	6o07.3'W	24	0.5	sprat
14	4/8	15h.42	53o57.2'N	5o44.2'W	55	184	sprat
15	5/8	13h.04	54o15.5'N	5o19.3'W	54	254	sprat
16	5/8	19h.00	54o19.8'N	5o08.5'W	137	46	sprat*

* trawl targetted on horse mackerel

Phase 1: 29 JULY - 2 AUGUST

12, ... transect N^o.
(t8) .. trawl N^o.

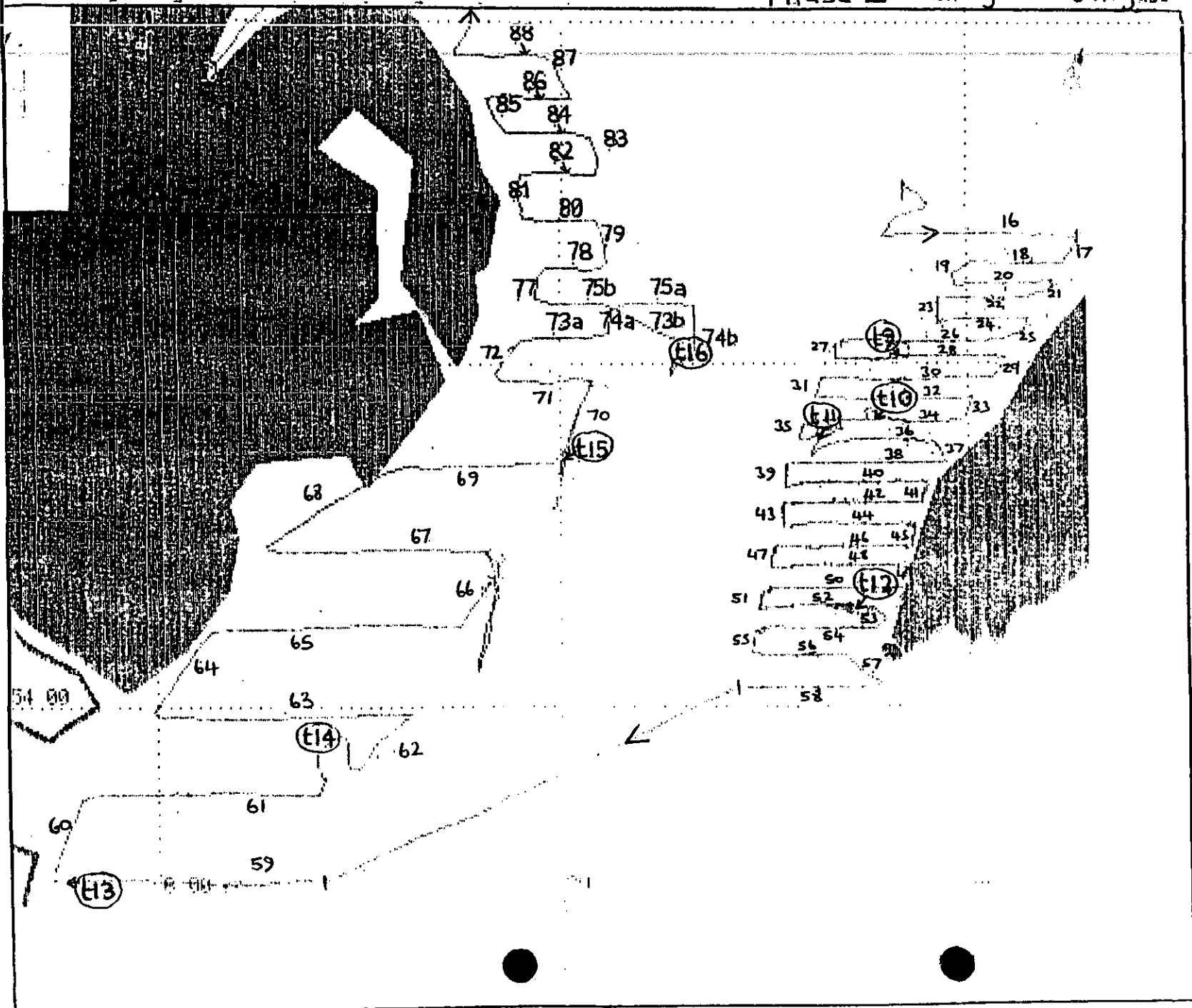


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7 00 16 00 25 00 34 00

FIGURE 1

Phase 2 : 2 August - 6 August



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