DEPARTMENT OF AGRICULTURE FOR N. IRELAND
AQUATIC SCIENCES RESEARCH DIVISION

CRUISE REPORT: CRUISE LF/18/92: PELAGIC FISH ACOUSTIC SURVEY

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

DATES: 19 July - 31 July

AREA OF OPERATION: Irish Sea (North); ICES Division VIIa

TYPE OF SURVEY: Acoustics / midwater trawling

PERSONNEL:

M. Armstrong	SSO	(S.I.C.)
W. Clarke	SSO	
R. Rosell	SSO	
C. Reavey	SO	
C. MacOscar	SO	(disembarked 25 July)
C. Burns	ASO	
J. Peel	ASO	
P. Dunwoody	TLA	

OBJECTIVES

1. To estimate the biomass and age-composition of the mixed Manx and Mourne stocks of herring in the northern Irish Sea;
2. To determine the distribution and biomass of sprat.
3. To further improve acoustic survey methods on *Lough Foyle*.

METHODS

A sphere-calibrated EY-200 echosounder and a 38-kHz transducer mounted in a towed body were employed to carry out echo integrations along transects in the Northern Irish Sea (see Fig. 1 for survey grid). The grid was stratified to allow increased sampling intensity in areas of high abundance of fish. Attempts were made to restrict surveying of herring in areas of known abundance to the hours of darkness, when the fish rise off the seabed. This, however, was not always possible owing to the need to cover a large area. Acoustic targets were identified by means of aimed tows of a midwater trawl fitted with a 10-mm sprat brailer and a Furuno netsonde.

Acoustic data was digitized and stored using the Hadas echo-integration software. Data were stored on 40 MB cartridges. Sphere calibrations were carried out opportunistically during the cruise when calm weather prevailed.

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

Sunday 19 July

Lough Foyle departed Belfast harbour at 22h.00 local time and proceeded southwards towards Dundrum Bay.

Monday 20 July

The vessel anchored in Dundrum Bay at approx. 05h.10. Sphere calibrations commenced in southerly winds at about 08h.00. To improve stability of the calibration rig, the anchor was lifted at 09h.20 and the vessel allowed to drift with the rig in the lee of the wind. A fault in the EY-200 echosounder caused some delay pending repair, with the result that calibrations were not completed until 17h.50. The vessel then proceeded to the start of the survey grid 2 miles north of Ardglass (Fig. 1). On the way, the acoustic signal became weak and intermittent because of water leakage, requiring the transducer to be changed. Whilst this was carried out, the new midwater trawl was shot to square-up the gear. During this operation, the Furuno netsonde was found to be inoperative. The survey commenced at 21h.00 local time.

Tuesday 21 July

The survey proceeded to Dundalk Bay. Four trawl samples (tows 1 - 4) were taken during the day, mostly targetted on small schools of sprats and juvenile herring. During the morning the Furuno netsonde was repaired and subsequently performed well.

Wednesday 22 July

The survey proceeded from Dundalk Bay to Lambay Island. Four trawl samples were taken (tows 5 to 8), comprising mainly sprats.

Thursday 23 July

The Irish coastal grid was completed in the early morning, and the vessel proceeded towards Liverpool Bay on the most southerly transect. At approx. 10h.00 the vessel deviated southwards to the northern Anglesey coast to determine if sufficient shelter was available for calibrations. Conditions remained unfavourable, and the survey was resumed, reaching transect segment 22G (approx. 15 miles NW of Anglesey) by midnight. Three trawl samples were taken (tows 9, 10 and 11), again mainly on sprat targets.

Friday 24 July

The vessel proceeded to approx. 20 miles SE of the Isle of Man, where a trawl sample of sprats (tow 12) was taken in the early afternoon. During the trawl, a break in the transducer cable was repaired. On

completion of fishing at approx. 15h.45, the vessel proceeded to the east coast of the Isle of Man to find sheltered water for calibration of the echo-sounder, and anchored in Laxey Bay at approx. 18h.45. Both the transducer in use, and a spare, were calibrated. The anchor was heaved at 21h.45 and the vessel proceeded to Belfast to take on water, fuel and spares for the acoustic system.

Saturday 25 July

The vessel berthed at 07h.06 and remained in harbour throughout the day.

Sunday 26 July

After departure from Belfast at 09h.00, the vessel proceeded to the start of transect 26 off Ballyhalbert and surveyed eastwards to the Isle of Man, deviating from the transect to investigate the "herring peaks" to the south of the Mull of Galloway. Conditions were poor with SW winds, force 5-6 causing a large swell. Transect 30, just south of the Bahama Banks off the Manx north-east coast, was reached by midnight.

Monday 27 July

The planned survey of the east coast of the Isle of Man was completed by approx. 20h.00. During the morning, a break was again evident in the transducer cable, necessitating replacement with the second transducer that had been calibrated in Laxey Bay. After dark, an additional grid of transects extending to about 1.5 miles offshore and spaced 1 mile apart was surveyed between the Calf of Man and Douglas after 20h.00. Herring targets, which were scarce during daylight, were found to have risen from the seabed after dark and were abundant close inshore off Port St. Mary. Juvenile sprats were taken in tow 13, and a catch of adult herring (tow 14) was taken off the Calf of Man. Strong westerly winds during the day moderated by the evening.

Tuesday 28 July

The inshore grid was completed at approximately 04h.00, off Douglas Head. Three trawls were targetted on adult herring (tows 15 - 17). Tow 16 was unsuccessful. Transects to the southwest of the Isle of Man were surveyed during daylight, with calm conditions prevailing. One trawl catch of sprats and young herring (tow 18) was taken in this region. Six transects at the southern end of the island were truncated to approx. 5 miles to allow more of the inshore region to be surveyed during darkness.

Wednesday 29 July

The offshore regions of the truncated transects between the Calf of Man and Peel were completed and the vessel then surveyed two transects across the deep central channel. Concentrations of herring were found at the Targets on the NW coast of the Island. Additional transects were surveyed inshore in this region after dark, extending southwards

again towards Peel. Conditions were very calm, and many basking sharks were present near the Targets. Four tows were completed (19 - 22), taking mainly juvenile sprats and herring. Tow 22 was unsuccessful as the target was probably plankton.

Thursday 30 July

The inshore grid on the NW coast of the Island was completed south of Peel after dawn. Adult and young herring were caught near the Targets after midnight (tow 23). The vessel then proceeded offshore and northwards, and then across to the Solway Firth where two transects were surveyed. A catch of sprats and jellyfish was taken off Whitehaven (tow 24). On completion of these transects the vessel anchored at Laxey at 16h.40 for sphere-calibrations of the echosounder. The tidal run proved to be strong, and at 18h.30 the anchor was lifted and the vessel allowed to drift. Both transducers used during the survey were successfully calibrated. On completion of calibrations at 10h.00, the vessel proceeded northwards to the Point of Ayre and then westwards towards the Irish Coast.

Friday 31 July

During the early morning a survey of the "Peaks" south of the Mull of Galloway took place. The vessel then proceeded southwards to an area approx. 12 miles west of Jurby on the Isle of Man to fish on mixed herring and sprat targets recorded earlier in the survey, but which had not been identified by trawling (tow 25). On completion of work at about 6h.30, the survey was terminated and the vessel proceeded directly to Belfast, berthing at 11h.00.

WORK COMPLETED

The survey provided good coverage of the mixed stocks of Manx and Mourne herring, through suitable stratification of the grid and intensive surveying at night in areas of known herring concentration (Fig. 1). The bulk of the population of sprat in the northern Irish Sea was also covered, and it is expected that good estimates of biomass will be obtained for both species. All acoustic data was captured and digitized using the Hadas software, and stored on 40 MB disks.

Transducer No. 22311 was employed for the first calibrations but was replaced by a new transducer (No. 21994) prior to the commencement of the first transect due to a malfunction. Transducer 21994 and a spare (22317) were calibrated at Laxey Bay on 24 July, and again on 30 July. Calibration details are given in Table 1. The calibration rig proved unstable in conditions other than ideal and was subsequently modified to improve rigidity. Further work is needed to improve the stability of the system.

Twenty five midwater trawl tows were completed for identification of acoustic surveys. The trawl positions are shown on Figure 1. Details of the tows are given in Table 2.

The Furuno netsonde proved faulty during the test trawl and the first targetted trawl (tow 1), and the receiver was changed using a spare unit which was suspect but proved satisfactory.

Both EY-200 echosounders developed faults at the beginning of the cruise. The spare EY-200 was finally used with parts from the unit that had previously been used on surveys.

The towed body was towed from the port boom and supported on the hydrographic cable. Initially the transducer cable was taped to the hydrographic wire but repeatedly came loose, resulting in at least two breaks in the cable causing loss of signal. This problem was resolved by running the cable through a length of alkathene water piping which was secured to the hydrographic wire. This arrangement proved very satisfactory.

ACKNOWLEDGEMENTS

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

Signed:

Scientist in charge M.J. Armstrong date 31/7/92

Ships master [signature] date 31-7-92

Division Head S.J. Hansen date 3/8/92

ıble 1. Calibration parameters for cruise LF/18/92

ate:	24 July	30 July	24 July	30 July
ransducer:	TR21994	TR21994	TR22317	TR22317
alf-beam angle:	7.9	7.9	7.8	7.8
ettings:				
ulse length (ms)	1	1	1	1
eceiver gain	3	3	3	3
ower	1/1	1/1	1/1	1/1
ttenuation	-15dB	-15dB	-15dB	-15dB
Instrument factor X 10^6	10.78	6.76	6.97	6.53

Note:
1. Conditions on 30 July better for calibrating.
2. Target strength of reference sphere = -33.6 dB
3. Half beam angle for TR21994 to be confirmed

ble 2. Details of midwater-trawl catches during cruise LF/18/92 survey on R.V. Lough Foyle. Times are in GMT, catches in kg.

		Shooting Details				Approximate total catch		
ate	Tow. No	Time	Lat.	Long	Depth	Herring	Sprat	Other
1 July	1	00h.40	54 14.4	5 17.1	74	.80	22.80	12.00
	2	10h.45	54 07.6	5 31.1	51	4.20	327.00	4.80
	3	13h.40	54 03.9	5 39.3	40	.30	57.00	18.00
	4	21h.40	53 58.0	5 47.3	48	.85	18.00	3.90
2 July	5	02h.00	53 53.7	6 07.1	30	1.60	3.90	2.90
	6	08h.30	53 45.7	6 05.7	20	.45	31.70	.30
	7	12h.15	53 41.4	5 56.0	45	7.00	565.00	
	8	21h.50	53 30.7	5 49.8	57	1.90	83.00	45.00
3 July	9	03h.50	53 28.5	5 28.5	92	.70	2.70	23.00
	10	17h.35	53 38.1	3 54.6	40	.84	50.00	101.00
	11	21h.25	53 38.0	4 32.0	74	10.00	356.00	5[illegible]0
24 July	12	13h.30	53 54.5	4 08.1	48	.11	6.00	
27 July	13	01h.25	54 13.9	4 02.6	18	3.10	280.00	27.00
	14	21h.25	54 01.7	4 47.0	41	460.00		
28 July	15	00h.20	54 03.2	4 41.5	27	1250.00		
	16	04h.00	54 07.8	4 26.2	29	1.50		.30
	17	06h.50	54 02.7	4 35.2	33	3000.00		
	18	18h.40	53 56.4	5 12.2	63	17.40	28.20	3.50
29 July	19	02h.00	54 10.2	4 53.3	59	.60	2.20	5.00
	20	08h.20	54 04.0	5 01.0	52	36.30	73.60	.50
	21	13h.10	54 11.5	5 16.0	76	74.40	7.70	4.00
	22	16h.00	54 16.1	4 53.3	56	.00	.00	.00
30 July	23	01h.00	54 22.6	4 34.7	27	240.00		
	24	10h.30	54 31.7	3 42.7	25	13.00	29.00	10.[illegible]
31 July	25	04h.40	54 19.5	4 55.1	80	18.80	44.00	15.00

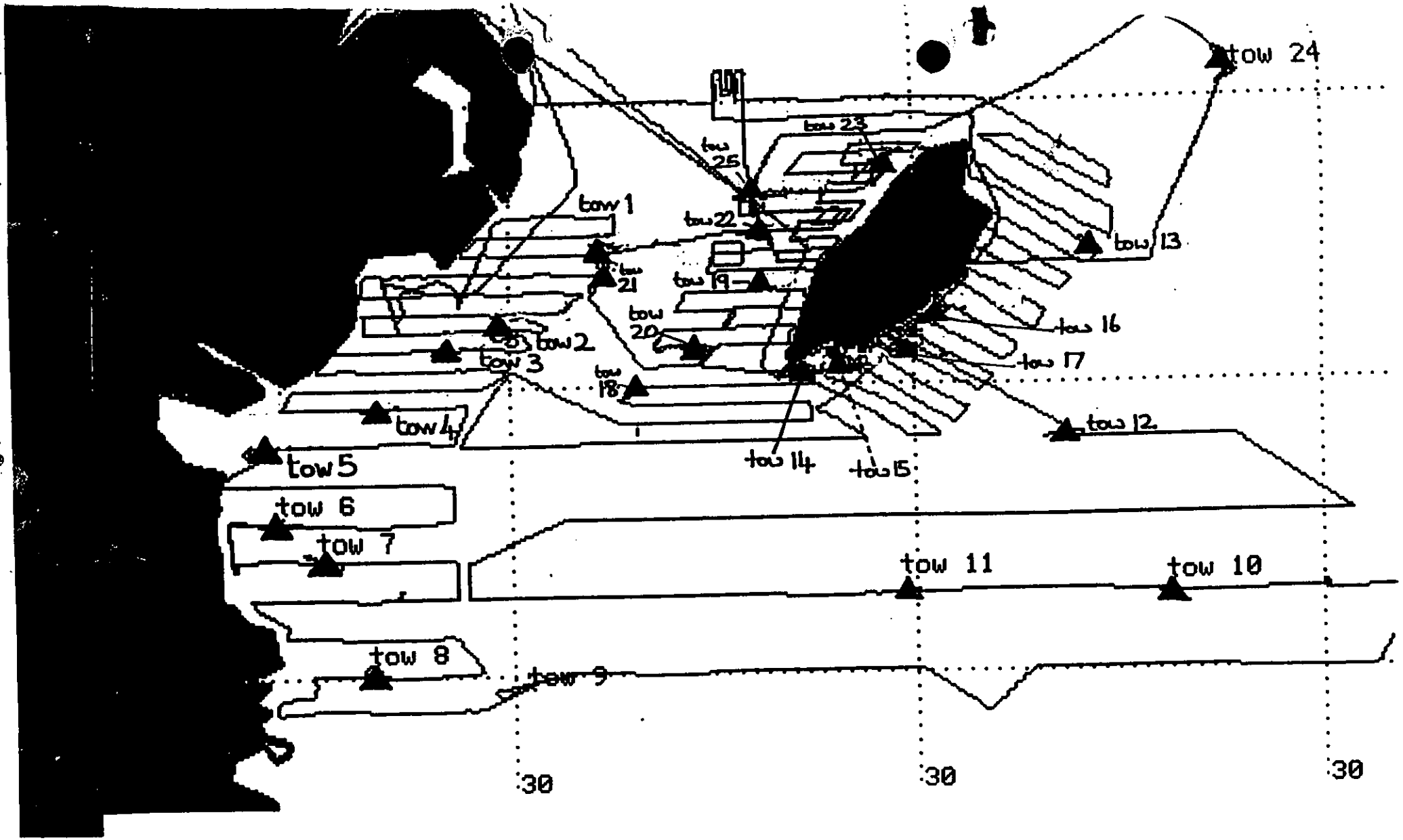

Figure 1a. Microplot print-out of general cruise track during the July 1992 acoustic survey on R.V. *Lough Foyle*. (Coastline files for Britain were not loaded).

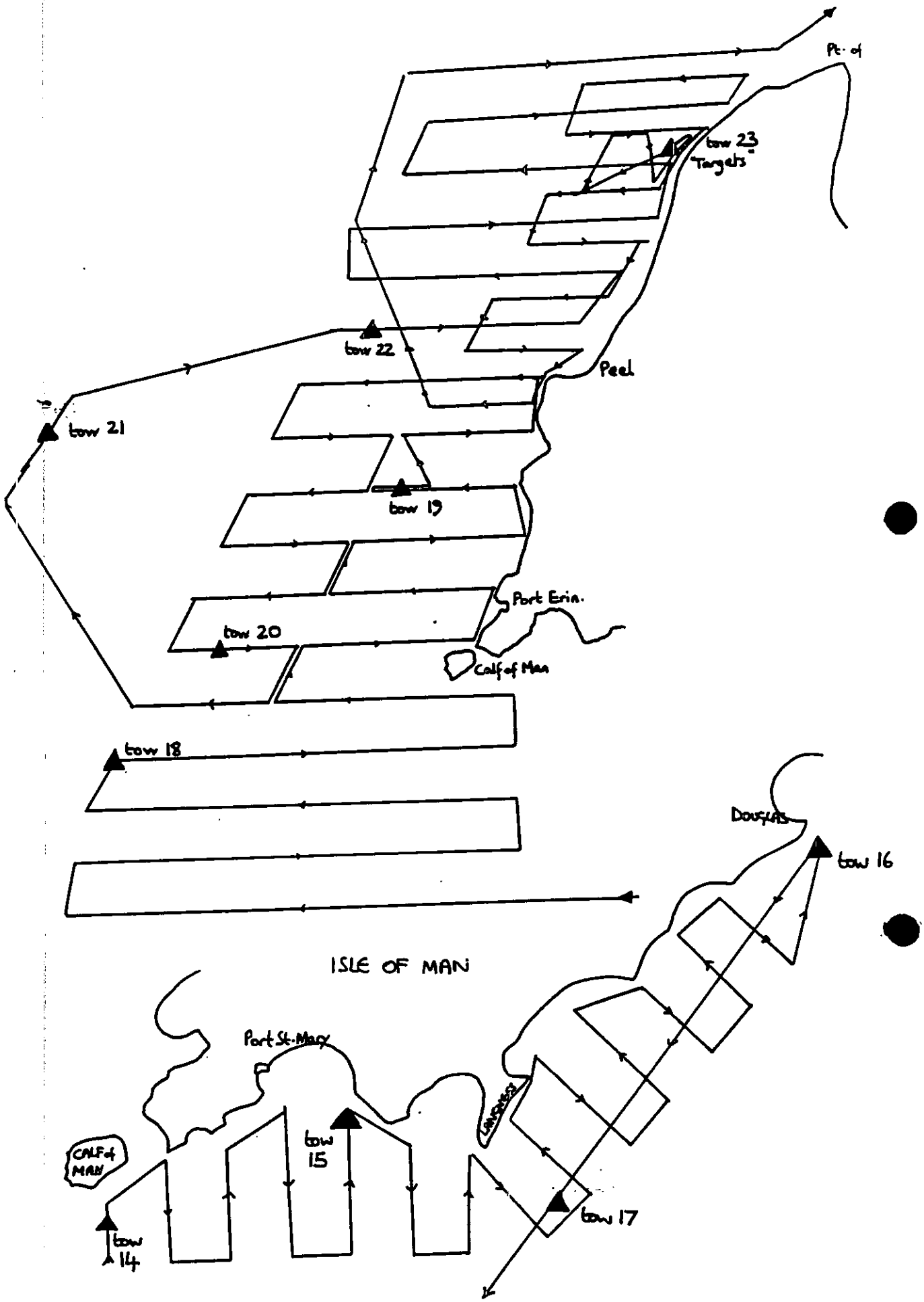

Figure 1b. Detailed map of the survey grid off the west coast of the Isle of Man, and of the additional inshore grid surveyed at night off the south-east coast of the island.