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FRV *Clupea*

Cruise 0805C

REPORT

3–17 June 2005

Loading: Fraserburgh
Unloading: Fraserburgh

Personnel

E Hatfield (In charge)
R Campbell
O Goudie
M Stewart
C Wylie

Out-turn days: 15 days - MF01ta

Sampling Gear and Equipment

Modified PT154 with 6 mm cod end
Scanmar (height and spread units)
Simrad EK500
Reson SEABAT
Seabird CTD
1 m plankton net (vertically towed)
Licor light level unit

Objectives

1. To carry out detailed acoustic surveys in selected lochs and bays on the mainland side of the North Minch and southern Skye using the EK 500 and SEABAT to determine the distribution and abundance of juvenile 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 age-length and length-weight relationships. Herring samples will be analysed for sex, maturity, *Ichthyophonus* and *Cryptocotyle lingua* infection. Sprat samples will be analysed for *Lernaeenicus sprattae, L. encrasicoli* and *Cryptocotyle lingua* infection. Stomach samples will also be taken from both herring and sprat.

2. For each haul from which stomachs are taken a vertical plankton net dip will be carried out.

3. A series of CTDs will be carried out through each loch and bay sampled.

Survey Areas

Summer Isles area/Little Loch Broom; Lochs Hourn, Kishorn, Nevis; the west of Mull including Lochs Tuath, na Keal and Scridain.

Narrative

Staff joined the *Clupea* in Fraserburgh on 3 June 2005, from where she sailed at 1600. She arrived in Loch Broom around midday on 4 June where an acoustic calibration was performed prior to beginning transecting. *Clupea* steamed to the start of the Summer Isles area transects, inside Isle Martin, on the morning of 5 June to begin acoustic transecting and pelagic trawling. Transecting and trawling continued all day in the open water area. The following day, 6 June, transecting and trawling was carried out in Little Loch Broom, and then *Clupea* returned to the open water area and continued transecting for the rest of the day. On 7 and 8 June, transecting and trawling in the open water of the Summer Isles area then continued. A naval exercise in the area prevented a trawl from being carried out on marks in the outer area surveyed. *Clupea* moved down the Loch Hourn on the morning of 9 June and worked there for the day. She then headed up to Kyle for the night to take on water and receive some supplies from Aberdeen. Transecting continued in Loch Hourn in the morning of 10 June, then *Clupea* moved round to Loch Nevis to begin work there. Work continued in Loch Nevis in the morning of 11 June until around 1030. *Clupea* then steamed down to Mull to begin work in that area. Work began in Loch Tuath around 1400 and continued for the rest of the day there. On the morning of 12 June the last piece of work in Loch Tuath was completed and transecting began in the open water to the west of Mull. The open water transects continued until the entrance to Loch na Keal was reached in mid-afternoon. Transecting began there at around 1600 and continued to the end of the working day. Work in Loch na Keal continued on the morning of 13 June. The decision was made to then work in Loch Scridain as the weather was considered to be too poor to continue the Mull open water transects and the forecast for the following day was fair. Transecting and trawling was then carried out in Loch Scridain for the rest of that day and work was completed by 1000 on 14 June. *Clupea* then moved back to the Mull open water transects and completed work there by 1600. Breakdown of the sonar meant that two of the transects going through shallow areas had to be shortened, by a distance of around 3 miles. *Clupea* then steamed for an overnight stop in Mallaig, to take on water. On the morning of 15 June she steamed for Loch Kishorn, where work commenced, until around 1600 when the surveying was cut short, two and a half transects away from the head of the loch. A buoy had been snagged and in the attempt to untangle the rope from the pole carrying the acoustic equipment the pole got badly bent, rendering further acoustic surveying impossible. Work finished in the loch around 1900 and *Clupea* steamed for Fraserburgh where she arrived at 1830 on 16 June 2005. Staff disembarked there at 1000 on 17 June, after unloading and debrief, and returned to Aberdeen by minibus.

The light gauge recorded data throughout the cruise to determine ambient light levels. The mini-logger was deployed on the headline during each trawl, along with the Scanmar sensors. In each area and loch a CTD was carried out at the centre point of each tow. A number of CTD dips were then carried out through each loch to determine vertical structure throughout.

In the Summer Isles area (including Little Loch Broom) four pelagic tows and nine CTD deployments were carried out; in Loch Hourn there were two pelagic tows and five CTD deployments; in Loch Kishorn, one pelagic tow and five CTD deployments; in Loch Nevis, zero pelagic tows and five CTD deployments and in the Mull area three pelagic tows and 16 CTD deployments were carried out. The time and position data for these tows and CTDs are in Tables 1 and 3 respectively.

All areas were characterised by a lack of fish and an abundance of jellyfish, both coelenterates (primarily *Aurelia aurita* and *Cyanea capillata*) and ctenophores (most likely *Pleurobrachia pileus*). In 7 of the 10 hauls, jellyfish comprised more than 98% of the catch (Table 2). In only 1 haul (off the west coast of Mull) were fish the dominant component of the catch (85%). Many of the fish were young-of-the-year and have been retained for identification.

Biological data on length-frequency are shown as plots in Figure 1.

E Hatfield
22 June 2005

Seen in draft: A Simpson

Table 1. Haul data for each pelagic tow (PT154) carried out during *Clupea* cruise 0805.

LOCH	HAUL	YEAR	MONTH	DAY	HOUR	MIN	DURATION	WATER DEPTH	HEADLINE DEPTH	LAT DEG	LAT MIN	LONG DEG	LONG MIN	NO. BASKETS
OUTER LOCH BROOM	C05/181	2005	6	5	15	3	30	76	41-47	57	56.08	-5	13.76	4
LITTLE LOCH BROOM	C05/182	2005	6	6	12	36	30	56	21-25	57	51.71	-5	15.42	5
OUTER LOCH BROOM RUBHA BEAG	C05/183	2005	6	7	10	8	29	78	SURFACE	57	56.7	-5	29.44	4.5
OUTER LOCH BROOM GREENSTONE PT.	C05/184	2005	6	8	9	36	30	128	SURFACE	57	57.3	-5	36.26	1
LOCH HOURN	C05/185	2005	6	9	11	55	15	152	60-70	57	7.77	-5	41.25	3.33
LOCH HOURN	C05/186	2005	6	9	15	22	33	127	76-86	57	7.45	-5	34.54	10.5
MULL OPEN WATER	C05/187	2005	6	12	9	49	11	102	16-25	56	28.24	-6	20.26	5
LOCH SCRIDAIN	C05/188	2005	6	13	14	25	17	48	20-24	56	21.39	-6	7.39	~45
MULL OPEN WATER	C05/189	2005	6	14	13	48	15	79	61-64	56	26.38	-6	11.53	2.5
LOCH KISHORN	C05/190	2005	6	15	12	41	30	88	39-47	57	21.52	-5	41.91	15

Table 2. Percentage and approximate breakdown of jellyfish in each pelagic haul carried out on Clupea cruise 0805.

HAUL	Catch weight (kg)	% Jellyfish	% *Aurelia*	% *Cyanea*	% *Pleurobrachia*
C05/181	128.25	99.802	-	-	-
C05/182	160.35	99.784	-	-	-
C05/183	144.00	99.998	80	5	15
C05/184	32.03	99.906	25	5	70
C05/185	108.05	98.752	80	10	10
C05/186	342.24	68.442	90	5	5
C05/187	161.45	14.791	100	0	0
C05/188	1440.00	100.000	-	-	-
C05/189	79.60	78.326	70	25	5
C05/190	484.31	98.003	80	18	2

Table 3. CTD deployment data for each CTD deployed using the "SEABIRD 911plus" during *Clupea* cruise 0805.

Hydro Sta No	Assoc Haul No	Chlorophyll Tube #	AREA/LOCH	Date	Time	Depth	Sampler Depth	Lat Deg	Lat Min	Long Deg	Long Min
C05/260	C05/181	E1	Outer Loch Broom - Martin Bank	5-Jun-05	16:07	71	61	57	56.36	-5	14.97
C05/261	-	E2	Little Loch Broom head	6-Jun-05	12:09	33	28	57	51.18	-5	14.72
C05/262	C05/182	E3	Little Loch Broom haul	6-Jun-05	13:42	70	65	57	51.86	-5	16.58
C05/263	-	E4	Little Loch Broom inner	6-Jun-05	14:01	93	88	57	52.07	-5	17.94
C05/264	-	E5	Little Loch Broom middle	6-Jun-05	14:24	75	70	57	53.02	-5	19.68
C05/265	-	E6	Little Loch Broom outer	6-Jun-05	14:50	55	50	57	54.07	-5	21.81
C05/266	-	E7	Little Loch Broom mouth	6-Jun-05	15:14	66	61	57	54.96	-5	24.39
C05/267	C05/183	E8	Outer Loch Broom - Rubha Beag	7-Jun-05	11:01	76	71	57	56.15	-5	30.39
C05/268	C05/184	E9	Outer Loch Broom - Greenstone Point	8-Jun-05	10:32	100	95	57	56.79	-5	37.12
C05/269	C05/186	E10	Loch Hourn	9-Jun-05	16:24	134	129	57	7.59	-5	35.56
C05/270	C05/185	E11	Loch Hourn	9-Jun-05	18:03	101	96	57	7.98	-5	41.45
C05/271	-	E12	Loch Hourn head	10-Jun-05	11:12	47	42	57	5.62	-5	32.18
C05/272	-	E13	Loch Hourn mid upper loch	10-Jun-05	11:36	83	78	57	5.62	-5	32.18
C05/273	-	E14	Loch Hourn mid lower loch	10-Jun-05	12:09	145	140	57	8.11	-5	33.88
C05/274	-	E15	Loch Nevis head	11-Jun-05	07:38	79	75	56	58.98	-5	38.96
C05/275	-	E16	Loch Nevis mid upper loch	11-Jun-05	08:01	103	98	56	59.80	-5	41.05
C05/276	-	E17	Loch Nevis mid loch	11-Jun-05	08:32	90	85	57	1.08	-5	42.68
C05/277	-	E18	Loch Nevis entrance	11-Jun-05	08:50	125	120	57	1.47	-5	43.83
C05/278	-	E19	Loch Nevis mouth	11-Jun-05	09:12	53	48	57	1.38	-5	45.66
C05/279	-	E20	Loch Tuath upper	12-Jun-05	07:29	17	12	56	30.06	-6	10.49
C05/280	-	E21	Loch Tuath mid upper	12-Jun-05	07:43	22	18	56	30.18	-6	11.90
C05/281	-	E22	Loch Tuath mid lower	12-Jun-05	08:03	37	32	56	30.71	-6	14.93
C05/282	-	E23	Loch Tuath outer	12-Jun-05	08:25	35	30	56	30.77	-6	18.62
C05/283	C05/187	E24	Mull Open Water	12-Jun-05	10:21	97	92	56	28.40	-6	20.43
C05/284	-	E25	Loch Na Keal – head	13-Jun-05	07:13	14	9	56	29.23	-6	1.25
C05/285	-	E26	Loch Na Keal - mid upper	13-Jun-05	07:32	22	18	56	28.46	-6	3.38
C05/286	-	E27	Loch Na Keal – North Channel	13-Jun-05	07:49	35	30	56	28.47	-6	5.38
C05/287	-	E28	Loch Na Keal - mid lower	13-Jun-05	08:11	53	48	56	27.59	-6	6.48
C05/288	-	E29	Loch Na Keal - South Channel	13-Jun-05	08:29	36	31	56	27.56	-6	6.44
C05/289		E30	Loch Na Keal - mouth	13-Jun-05	10:06	63	58	56	27.59	-6	8.66
C05/290	C05/188	E31	Loch Scridain	13-Jun-05	15:16	49	44	56	21.24	-6	8.20
C05/291	-	E32	Loch Scridain – head	14-Jun-05	07:12	17	12	56	22.82	-6	1.55
C05/292	-	E33	Loch Scridain middle	14-Jun-05	07:36	60	55	56	21.96	-6	4.75
C05/293	-	E34	Loch Scridain mouth	14-Jun-05	08:19	57	52	56	21.34	-6	12.93
C05/294	C05/189	E35	Mull Open Water	14-Jun-05	14:27	74	69	56	21.18	-6	11.85
C05/295	-	E36	Loch Kishorn head	15-Jun-05	16:23	34	29	57	23.32	-5	37.98
C05/296	-	E37	Loch Kishorn upper middle	15-Jun-05	16:38	64	59	57	22.74	-5	39.58
C05/297	-	E38	Loch Kishorn middle	15-Jun-05	16:57	89	84	57	21.83	-5	41.13
C05/298	C05/190	E39	Loch Kishorn tow	15-Jun-05	17:15	125	120	57	20.85	-5	42.38
C05/299	-	E40	Loch Kishorn outer	15-Jun-05	17:51	95	90	57	19.87	-5	45.39

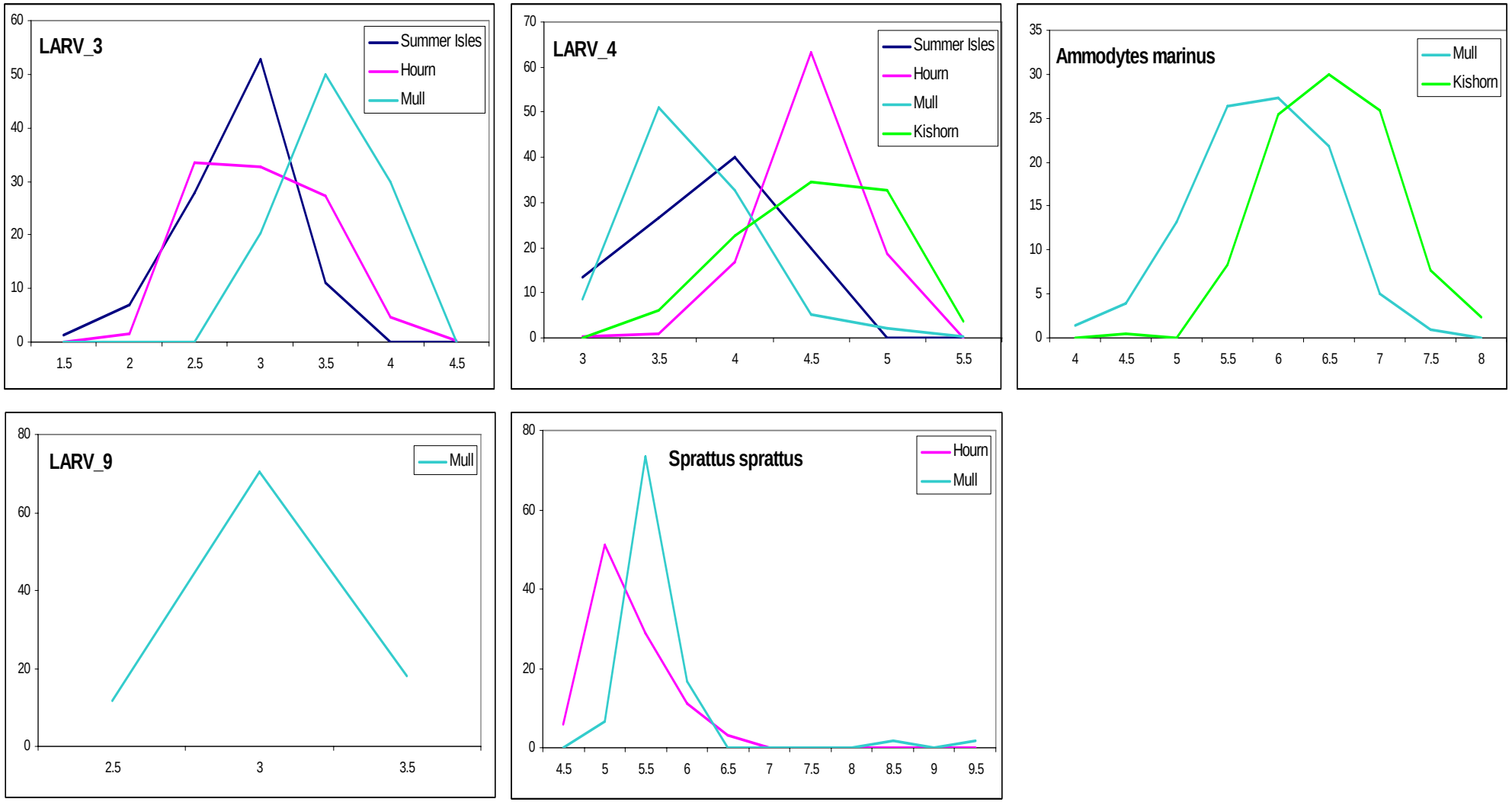

Figure 1. Length-frequency of selected fish species sampled from pelagic tows during *Clupea* cruise 0805.