

R1/6

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

FRV *Clupea*

Cruise 1598C

REPORT

4-21 September 1998

Ports

Loading: Fraserburgh, 4 September
 Unloading: Fraserburgh, 21 September
 Half-landing: Oban, 12 September

Personnel

S J Hay	B3 (in charge)
P A Gillibrand	B2
E M Macdonald	B2
R D Adams	B1
N S Collie	B1
M Pizzamei	Visitor (UCNW)

Objectives

1. To conduct a large scale hydrographic, chemical and biological survey of the Minches area, from 56°20'N - 58°30'N between the mainland and the Outer Hebrides.
2. To investigate gradients of nutrients, chlorophyll and plankton between a selected sea loch (Loch Ewe) and the adjacent coastal waters.
3. To carry out some additional physical measurements (ie temperature and salinity) to assist in the development of a circulation model of the Scottish continental shelf.

Out Turn Costs per Project: 18 days to project AE1252 (BKF1)

Narrative

The scientific staff joined the *Clupea* at Fraserburgh on the morning of 4 September. After loading, gear was set up and stowed. *Clupea* sailed at 1600 hours, initially to a site in the Moray Firth to test equipment, and then to Cape Wrath where the first station was sampled at 0700 hours on 5 September. Sampling was carried out using three gears, a fine mesh "Ocean" multi-depth plankton sampler with onboard instrument pack consisting of CTD meter, Transmissometer, Fluorometer and an Oxygen Electrode, a coarse mesh Dual Methot net and an SBE 25 Sealogger CTD and rosette water sampler also equipped with a Fluorometer and Transmissometer. Due to severe technical problems only two stations were completed on the first day. The following two days a further 17 stations were sampled in the north Minch and the *Clupea* then proceeded to Lochinver in the evening of 7 September to collect replacements for malfunctioning equipment parts which were delivered from Aberdeen. Many of the equipment faults were due to a broken light meter and it was thus not possible to make measurements of incident light during the cruise. Over the following four days a further 34 stations were sampled in transects across the North Minch, on a line of stations into Loch Ewe and

at stations around Raasay, between the Isle of Skye and the mainland. The *Clupea* then steamed to Oban arriving on the evening of 11 September where samples were unloaded and new equipment and sample containers collected.

Leaving Oban at 0600 hours on 13 September the *Clupea* sailed to the north of Mull and recommenced sampling. Over the next three days 28 stations were sampled before the weather broke and a day was lost sheltering at the Isle of Eigg. Sampling began again at 0700 hours on 17 September with the last 27 stations completed by 1730 hours on Saturday 19 September. The *Clupea* then steamed back to Fraserburgh arriving at 1400 hours on 20 September. Equipment and samples were packed and unloaded for return to Aberdeen on the morning of 21 September.

Results

The hydrographic, chemical and plankton survey was successfully conducted with 109 hydrographic stations worked and with 59 "Ocean" and 52 "Dual Methot" zooplankton hauls yielding 286 and 91 depth resolved plankton samples respectively. At each station, temperature, salinity, fluorescence, and light transmission was measured and water samples taken for subsequent nutrient, chlorophyll and phytoplankton analysis. In addition, surface temperature and salinity was recorded continuously by thermosalinograph. Samples of water for salinity and chlorophyll were taken as appropriate to calibrate the conductivity and fluorescence sensors. Some extra CTD stations were sampled on some transects to gain better resolution for hydrographic profiles. This was done to support objective three and indeed the thermohaline structure of the survey area appears to have been more complex during this survey than the structure that had been noted during previous surveys of the area in other seasons of the year.

In the areas of North Minch, and Sea of the Hebrides covered during the cruise, preliminary results showed intrusion of cooler and more saline Atlantic water into the western side of the deeper basins with warmer and less saline coastal water on the eastern side. The Little Minch area between the north and south basins was well mixed throughout the water column.

The large mesh zooplankton sampling caught large numbers of the salp species *Salpa fusiformis* in the North Minch along with numbers of the euphausiid species *Meganyctiphanes norvegica*. This euphausiid was also prevalent in the basin of the Sea of the Hebrides but the salp species was not found in the south. The deep water shrimp *Pasiphaea* was occasionally caught in the deeper hauls and considerable numbers of small siphonophores and other small jellyfish were caught mostly in the surface waters and most abundantly in the south. There were quite a few fish larvae caught and occasionally the large scyphomedusan *Cyanea capillata* was found.

The fine mesh samples indicated that surface waters contained considerable numbers of decapod larvae and chaetognaths alongside many small neritic copepods. In the deeper samples the larger copepod *Calanus* was often present in quite large numbers. Further analysis should yield interesting depth resolved data on plankton community structure which will indicate species distributions across the environmental gradients measured in the hydrographic and chemical analysis of this diverse area.

Steve Hay (Scientist in charge)
30 September 1998

Seen in draft by A Simpson: OIC FRV *Clupea*

Clupea 15/98 Cruise Track

