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FRV *Clupea*

Cruise 1302C

REPORT

23 Aug – 5 Sept 2002

Start: 3 August, Fraserburgh

Unloading: 30 August, Lochinver, 5 September, Fraserburgh

End: 5 September, Fraserburgh

Personnel

Matt Gubbins	In charge
Phil Gillibrand	
Pippa Sammes	

Gear

SB15 (Sealogger) CTD
Zodiak inflatable
Phytoplankton sampling hose

Objectives

To conduct a 'summer' survey of a suite of sea lochs impacted to varying degrees by nutrient releases from fish farming activity. This survey forms part of a programme of work to assess the potential for eutrophication arising from nutrient 'hotspots' linked to aquaculture. This will be undertaken by measuring the following parameters at multiple stations in each loch:

1. CTD
2. Nutrients and silicates
3. Chlorophyll
4. Phytoplankton

These determinands will be assessed against criteria as defined by the OSPAR Eutrophication Task Group (ETG).

Cost to project: 14 days AE11p

Narrative

Scientific staff boarded at 0930 hours on 23 August, and *Clupea* made way for Shetland at 1200 hours, steaming overnight to arrive in the Swinister Voe area the following morning. During 24 and 25 August, a total of 25 stations in Swinning Voe, Collafirth Voe and Dales Voe (North) were sampled. CTD data, nutrient, silicate and phytoplankton water samples were collected from a total of 17 hydro-stations, and by using the Zodiak inflatable, four position transects at different distances away from the salmon farms at 'Inner Swinning Voe' and 'Collafirth 2' were also sampled for the same parameters (by reversing bottle). The

Zodiak boat was also deployed in order to sample macroalgae (*Fucus vesiculosus*) from the nearby shoreline at distances from the farm in Swinning Voe, for later nitrogen isotopic ratio determination.

26 August was spent surveying the Swarbacks Minn system of sea lochs. A total of 24 stations were sampled in Aith Voe, Olna Firth and Busta Voe. Zodiak boat work enabled water sampling alongside salmon farms at 'Olna Firth 2' in Olna Firth and *Fucus* sampling along the shoreline at distances from this farm.

Fourteen stations in Vaila Sound were surveyed during 27 August, and again the Zodiak was used to sample a transect at the 'Whitesness' salmon farm. Due to strong Southerly winds, sampling of the hydro station in Westersound (an exposed site in shallow water, West of Vaila Island) was delayed until the following day (28th). After a short passage to Sandsound Voe 15 stations were sampled from *Clupea*, including a four station transect at the salmon farm 'Brei Geo, Inshore'. Due to worsening weather conditions, further sampling in Sandsound Voe was discontinued and *Clupea* made overnight passage to Lochinver, during which, 160 L of sea water for phytoplankton culture were taken from a site three miles NW of Cape Wrath on behalf of Shellfish Hygiene Research. The night of 29 August was spent in Lochinver, where samples already collected were off-loaded at 0900 hours on 30 August and *Clupea* subsequently made passage to Loch Ewe.

Seven hydro-stations in Loch Ewe were sampled and the Zodiak was deployed in order to take water and *Fucus* samples from the 'Aultbea' farm site. Loch Torridon was surveyed during 31 August. A total of 11 hydro-stations were sampled, and water/seaweed sampling was undertaken at the salmon farm at 'Camas an Leim'. Following this survey, *Clupea* steamed to Skye and anchored overnight in Staffin Bay.

Uig Bay and Loch Snizort were surveyed during 1 September. A total of 12 hydro-stations were sampled, but strong winds prevented deployment of the Zodiak to undertake farm transect work in Uig Bay. Worsening weather meant that *Clupea* was forced to shelter at anchor West of Loch Greshornish until 1530 hours on 2 September. When strong Southerly winds had subsided sufficiently, *Clupea* steamed to Loch Erisort on Lewis and anchored overnight.

Clupea then proceeded to nearby Loch Grimshader, where five stations in the outer loch were sampled using the CTD/rosette sampler from *Clupea*. Three inner stations and a four position transect at distances from the salmon farm in the inner loch were sampled by reversing bottle from the zodiak inflatable launched from *Clupea*. The inflatable was also used for *Fucus* sampling at distances from the fish farm, and for the deployment of a small Van Veen grab for sediment sampling. Surface sediment samples were taken near the fish farm and at nine stations in the Loch, for later analysis for cypermethrin and bacterial communities.

After an overnight passage, *Clupea* returned to Fraserburgh 4 September, and was unloaded at 0900 hours on 5 September.

Results

CTD profiles were recorded and water samples were taken for nutrient, silicate and phytoplankton analysis in the lochs listed below. Details on the scope of each survey are summarised.

Loch	Survey details
Ewe	7 stations, 4 position transect
Torridon	11 stations, 4 position transect
Snizort Beg	7 stations
Uig	5 stations
Grimshader	8 stations, 4 position transect
Sandsound Voe	11 stations, 4 position transect
Vaila Sound	10 stations, 4 position transect
Aith Voe	9 stations
Olna Firth	8 stations, 4 position transect
Swinning Voe	7 stations, 4 position transect
Collafirth Voe	6 stations, 4 position transect

Busta Voe (3 stations) and Dales Voe (North) (4 stations) were also subject to a less intense survey.

In total, 13 lochs were surveyed, with 128 stations producing 525 water samples for separate analyses. Results from CTD calibration, nutrient, silicate, chlorophyll and phytoplankton analysis are pending and will ultimately be included in a report for SEERAD WEU this year.

Matt Gubbins
23 October 2002

Seen in draft: A Simpson, OIC *Clupea*