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Not to be cited without reference to the FRS Marine Laboratory, Aberdeen

FRV *Clupea*

Cruise 0605C

PROGRAMME

25 April – 14 May 2005

Loading: Fraserburgh 25 April

Unloading: Fraserburgh 14 May

Half Landing: Lochinver, 4 May

***In setting the cruise programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in FRS' Working Time Policy (which is published on the Intranet). In addition, the Scientist-in-Charge must formally review the risk assessments for the cruise with staff on-board before work is commenced.**

In the interest of efficient data management it is now mandatory to return the Cruise Report, to John Morrison and the Cruise Summary Report (old ROSCOP form) to Dougal Lichtman, within four weeks of a cruise ending. In the case of the Cruise Summary Report a nil return is required, if appropriate.

Personnel

*Matt Gubbins	(In charge)	25 April – 14 May
Dougal Lichtman		25 April – 14 May
Jennifer Graham		25 April – 14 May
Clare Greathead		25 April – 4 May
Lesley Stobo		4–14 May

Project codes: AE11s 17 days, AE1192 3 days

Equipment

Zodiac inflatable
2 outboard engines
SB 15 Sealogger CTD/Rosette
2 Day grabs, 1 wooden table
2nd freezer for wetlab
80 L unleaded fuel
Zooplankton 'bongo' net
3x phytoplankton hoses

Objectives

To conduct a 'spring' survey of a suite of sea lochs / voes impacted to varying degrees by nutrient releases from fish farming activity. This survey forms part of an ongoing 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 and dissolved oxygen
2. Nutrients (inc. silicates)
3. Chlorophyll a
4. Phytoplankton
5. Shoreline macroalgae
6. Organic carbon in sediments
7. Algal toxins in wild shoreline mussels, phytoplankton and water

These determinands will be assessed against criteria as defined by the OSPAR Eutrophication Task Group and used for future eutrophication assessment of Scottish coastal waters. Data will also be compared to that collected during previous cruises and will be used to inform estimates of internal mixing within sea lochs / voes to improve laboratory models to predict nutrient enhancement from aquaculture.

In addition zooplankton will be sampled by bongo net from 2 hydrostations in each loch and fixed in ethanol and formalin.

Water samples for radioisotope analysis will also be taken from CEFAS collection sites in the Pentland Firth and Minch on an ad hoc basis when steaming between survey areas. Sampling will be via the non-toxic supply into 25L carboys and 1L polybottles.

Procedure

Scientific staff will board on 25 April and *Clupea* will be taken to the West coast to commence survey work. The survey will try to cover a total of 16 sea lochs and voes from the list given below. The areas to be surveyed may require amendment subject to weather considerations or the absence of fish from farms due to the unpredictable nature of aquaculture production.

West Coast/Western Isles

Loch Ewe
Loch Torridon
Loch Skipport
Loch Shell
Loch Meanervagh
Loch Greshornish
Uig Bay
Loch Snizort Beg, Skye (control, no fish)

Shetland

Stromness Voe
Weisdale Voe
Laxfirth Voe
Ronas Voe

Seli Voe
Whitesness Voe
Sandsound Voe
Gruting Voe
Basta Voe
Baltasound
Whalefirth Voe, Shetland (control, no fish)
Sullom Voe, Shetland (control, no fish)

At each survey area, CTD, dissolved oxygen and transmissometer profiles, water samples (from 4-6 depths), sediment samples by Day grab and surface phytoplankton samples will be taken at a maximum of 10 stations up each loch / voe (including one station offshore from the entrance to the loch/voe. At two stations in each loch/voe, phytoplankton and zooplankton will be sampled by net to provide data on toxic algal species (using molecular probes), algal toxins in phytoplankton and water and zooplankton abundance/diversity.

In addition, water and sediment samples will be taken from 4 stations at: 10, 25, 50 and 100 m distant, in a downstream direction, from a single active fish farm in each loch (excluding Snizort Beg, Sullom Voe and Whalefirth Voe). Weather permitting, sampling of stations close to individual fish farms will be undertaken by reversing bottles/minilogger on a Snella line and hand held grab from the small zodiac launched from *Clupea*. When the Zodiac is launched for water and sediment sampling during periods of low tide, the opportunity will be taken to collect shoreline samples of macroalgae (for nitrogen isotope analysis) and wild mussels (for algal toxin analysis) from six sites in each loch to complement the survey.

Clupea will be unable to enter some of the lochs to be surveyed. These areas will therefore also be surveyed by scientific staff aboard the Zodiac inflatable, launched from *Clupea*.

Due to the overall length of the cruise, a rest day is scheduled for 4 May. It is expected that all the lochs on the West coast and Western Isles will have been surveyed by this time. Due to insufficient freezer space aboard *Clupea* for storage of water samples from the entire cruise, an unloading of samples from the first half of the cruise will also be required on this date. It is envisaged that 4 May will be spent at Lochinver and during this time, samples will be unloaded and scientific staff will be changed.

On 5 May, *Clupea* will be taken to Shetland to complete the survey of Shetland Voes before returning to Fraserburgh for unloading on 14 May.

Normal contacts will be maintained with the Laboratory.

J A Morrison
8 April 2005