

R1/6

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FRV *Clupea*

Cruise 0604C

## **REPORT**

2-21 April 2004

**Loading:** 2 April, Fraserburgh  
**Unloading:** 11 April, Lochinver  
21 April, Fraserburgh

## **Personnel**

Matt Gubbins	In charge
Pippa Sammes	
John Beaton	2–11 April
Jennifer Graham	2–11 April
Dougal Lichtman	11–21 April
Craig Robinson	11–21 April

**Out-turn Days:** 17 days AE11p, 3 days AE1192

## **Gear**

SB15 (Seallogger) CTD / Rosette sampler  
Day grab  
Zodiac inflatable and 2 outboard engines  
Snella line  
Reversing bottles / mini-logger  
3 x Phytoplankton sampling hoses  
>1600 nutrient and silicate sample bottles  
Second freezer for lab

## **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
2. Nutrients (inc silicates)
3. Chlorophyll a
4. Phytoplankton
5. Shoreline macroalgae
6. Organic carbon in sediments
7. Algal toxins in wild shoreline mussels

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 2002 and will be used to inform estimates of internal mixing within sea lochs / voes to improve laboratory models to predict nutrient enhancement from aquaculture.

## **Narrative**

Scientific staff boarded *Clupea* at 1020 on 2 April, but sailing was delayed until 0730 on 3 April due to strong Northerly winds. After steaming to the West coast, *Clupea* anchored overnight in Clashnessie Bay before starting survey work in nearby Calbha Bay on 4 April. Six hydrostations were sampled by CTD/rosette, Day grab and phytoplankton hose. Two of these stations were sampled for zooplankton and toxic phytoplankton and the zodiac was launched to take water and sediment samples along a transect from the most Northerly fish farm in the bay. Shoreline macroalgae was also sampled at a single site. *Clupea* spent the night of 4 April at anchor in Loch Ewe and arrived at Loch Portree at midday on 5 April. Similar survey work was completed in Loch Portree on 5 April and Loch Snizort on 6 April, whereupon *Clupea* moored alongside Uig pier for the night. Survey work (CTD, water, phytoplankton and macroalge) was conducted up Loch Seaforth on 7 April and *Clupea* anchored near the head of the loch overnight before sediment samples were collected by Day grab at every hydrostation on the way out of the loch on 8 April. Loch Odhairn was then surveyed from *Clupea* and the zodiac, before steaming to Loch Erisort for an overnight anchorage. Lochs Erisort and Leurbost were surveyed for all determinands on 9 April and Loch Grimshader on 10 April. Most of the sampling at Loch Grimshader had to be undertaken from the Zodiac using a reversing bottle in place of the CTD/rosette, due to the shallow nature of the loch. The hand-held sediment grab was snagged on an underwater obstruction in this loch, which prevented further sediment sampling from the zodiac for the remainder of the cruise. *Clupea* then steamed to Lochinver arriving late on 10 April.

The 11 April was spent at rest alongside the pier at Lochinver and a crew changeover was effected. Frozen samples were also transported back to the laboratory for analysis. *Clupea* steamed to Shetland on 12 April and arrived at Vaila Sound at 0300 hours on 13 April. Stations inside Vaila Sound were surveyed by CTD/rosette, phytoplankton hose, plankton nets and Day grab and the zodiac was launched to sample a transect from the Cloudin fish farm and collect macroalgae from 6 stations on the shoreline. Stations outside Vaila Sound could only be sampled for plankton since conditions were too rough to deploy heavy gear using the hydro winch. *Clupea* steamed to Ronas Voe for an overnight anchorage before surveying Whalefirth Voe on 14 April. On completion of survey work in Whalefirth Voe, *Clupea* steamed to Sullom Voe to commence sampling by CTD/rosette, before mooring alongside the construction pier overnight. Survey work was completed in Sullom Voe on the 15 April and a survey of voes in the Swinister Voe area was commenced. A total of 19 hydrostations were sampled from Dales Voe North, Swining Voe and Collafirth Voe from the 15–17 April. Worsening weather on 17 April meant that zodiac work (fish farm transect and macroalgae sampling) had to be abandoned and *Clupea* sheltered from strong Southerly winds in Whalsay harbour.

Dury Voe was surveyed for all determinands on 18 April and after a night spent alongside the pier in Dales Voe, scientific work was completed by sampling Dales Voe. Shallow waters at the head of Dales Voe meant that some hydrostations needed to be sampled from the zodiac boat. New methods for quantifying the presence of nuisance green macroalgae by visual assessment were also trialled at 6 sites in Dales Voe.

*Clupea* put into Lerwick on the evening of 19 April to effect repairs to radar equipment, then after an overnight passage, *Clupea* returned to Fraserburgh on 20 April, and was unloaded by 1100 hours on 21 April.

## Results

Details on the scope of each loch survey are summarised below:

Loch	Hydro-stations	Farm transect	Phyto-samples	Toxic phyto-samples	Zoo-samples	Macroalgae sites	Sediment samples
Calbha Bay (04/04/04)	6	Y	6	2	2	1	10
Portree (05/04/04)	5	Y	5	2	2	6	9
Snizort Beg (06/04/04)	8	N	5	2	2	6	8
Seaforth (07/04/04)	8	Y	6	2	2	6	12
Odhairn (08/04/04)	7	Y	6	2	2	6	11
Erisort/Leurbost (09/04/04)	14	Y	7	3	3	6	18
Grimshader (10/04/04)	6	Y	6	2	2	6	6
Vaila Sound (13/04/04)	9	Y	6	2	2	6	9
Whalefirth Voe (14/04/04)	9	N	7	2	2	6	9
Sullom Voe (15/04/04)	11	N	9	6	2	6	11
Dales Voe N (15/04/04)	4	N	1	2	0	0	4
Collafirth Voe (16/04/04)	8	Y	6	4	2	6	8
Swining Voe (17/04/04)	7	N	7	5	2	0	7
Dury Voe (18/04/04)	9	Y	6	2	2	6	9
Dales Voe (19/04/04)	8	Y	7	7	2	6	7

Rapid screening of phytoplankton samples by immunochromatography revealed that algal toxins (ASP/DSP) may have been present in Whalefirth Voe, Sullom Voe and Dales Voe. Shoreline mussel samples indicated the presence of trace levels of these toxins along the East coast of Shetland, but not at levels that would cause closure of any shellfisheries.

Results from CTD calibration, nutrient, silicate, chlorophyll, phytoplankton, macroalgae, and sediment analysis in the laboratory are awaited and will ultimately be included in a report for SEERAD WED and OSPAR.

Matt Gubbins  
14 June 2004

**CLUPEA VESSEL**

Programmes - Mr J A Morrison for approval. Reports - Mr J A Morrison for approval.

Issue two copies of Record of Haul and Station Numbers pro-forma with Scientist-in-Charge's copy of *Scotia* and *Clupea* programmes.

Two xerox copies of track chart for reports to be sent to Dr L Rickards.

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**PROGRAMMES ONLY**

**Lab staff**

~~Mr J T M Hunter~~  
~~Mr T Reid~~  
~~Mr P J Copland~~  
~~Mr J Dunn~~  
~~Mr A Beaton~~  
~~J Petrie~~  
~~Security~~

**Non-lab staff**

~~Island Cmdr Faroes (Faroes only)~~  
~~Flag Officer, Denmark (Danish part of N Sea only)~~  
~~Coastguard~~  
~~Dr J Baxter~~

**PROGRAMMES AND REPORTS**

**Lab staff**

Mr J A Morrison  
Capt R Denholm  
Mr R S T Ferro ) Fish Man team  
Mr C Hall ) progs only  
Dr R M Stagg  
Dr C Moffat  
Mr M R Heath  
Mr A Macdonald  
D Lichtman (+ additional copy of track chart  
of reports only)  
Mrs E Morrison  
CO/OIC of Vessel (*Scotia*) (to be faxed)  
Library (2)  
File

**Non-lab staff**

~~Library, Danmarks Fisk (reports only)~~  
~~Mr J Mortensen (Faroes only)~~  
~~Mr A Souplet (Fishing Cruises only)~~  
~~Dr S Ehrich (Entering German Waters) (reports only)~~  
  
W J McCurdy, Belfast  
Technical Director, SFIA (J E Tumilty)  
Dr L Rickards  
Dr I Joint  
Director – Havfor Inst, Norway  
Dr S Ehrich  
Monsieur le Chef du dépt, Nantes  
Mr J C Brabant  
Mrs van Duyvenvoorde  
Dr J G Gordon  
G Kane  
R de Clerck  
Mr B Stewart  
Capt J Cannan (*Scotia* and *Clupea* only)  
Controller Coastal Ops - A Stewart  
Dr P Grieg-Smith  
Mr H C Boyar  
Dr R J A Atkinson  
Mr H i Jákupsstovu  
Mr C Bullimore (To be faxed: 01923 846392)

**Laboratory Personnel on Vessel**

Matt Gubbins  
Pippa Sammes  
John Beaton  
Jennifer Graham  
Dougal Lichtman  
Craig Robinson

**Fishery Officers at**

Fraserburgh