

**CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK.**

1999 RESEARCH VESSEL, PROGRAMME.

REPORT: RV *CIROLANA*; CRUISE 3a/99

STAFF: J Thain (SIC)
S Feist
J Jones
M Kirby
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J Reed
W Reynolds
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D Limpenny (part time)
R Waldock (part time)

DURATION: 29 April to 20 June, 1999.

LOCATION: Irish Sea, Celtic Sea, English Channel and North Sea.

AIMS:

1. To collect samples of demersal fish for chemical analysis from the North Sea, English Channel and Irish Sea in support of the UK National Marine Monitoring Programme (NMMP) and the EC Fishery Products Directive Work.
2. To deploy fractionation/bioassay techniques on water samples from offshore and near shore/estuarine locations for chemical analysis of organics and biological effects studies.
3. To collect samples along a transect from the Dogger Bank - German Bight for use in the development and evaluation of sediment bioassays. Additional samples to be taken as appropriate at NMMP and estuarine sites.
4. To collect fish samples at NMMP sites, for fish disease and genetic toxicological analysis (e.g. DNA adducts).
5. To further investigate, the use of appropriate biochemical, cytochemical and other biological techniques in support of NMMP.
6. To collect fish, sediments and water from selected NMMP stations and dredged material disposal sites for nonylphenol analysis.

ADDITIONAL AIMS:

7. To sample sediments and whelks for TBT analysis at dredged material disposal sites located off the Tyne, Falmouth, Swansea and Liverpool Bay.
8. To collect sediment samples for benthos from NMMP locations in Dundrum Bay, SE Isle of Man and Celtic Deep.
9. To collect multi-core samples for meiofauna at NMMP locations in Dundrum Bay and SE Isle of Man and Celtic Deep
10. To collect water samples at NMMP stations for salinity, nutrient and chlorophyll analysis.
11. To collect fish samples from the Tees area for the chemical analysis of flame retardants

NARRATIVE: (all times GMT)

Scientists from the Burnham and Weymouth Laboratories boarded *RV CIROLANA* at Lowestoft on Thursday 29 April. *CIROLANA* sailed on the evening tide and arrived in the Wash (NMMP site 345) on the morning of the 30 April to commence fishing using the Granton trawl. Water and sediment samples were also taken with the churn sampler and Day grab respectfully (aims 1, 2, 4, 5 and 10). On the afternoon of 30 April *CIROLANA* steamed north to the Humber deploying the Granton trawl at a position south of the Humber (NMMP 376) and collecting water and sediment at the mouth of the Humber estuary (NMMP 375) under aims 1, 2, 4, 5 and 10. Overnight, *CIROLANA* proceeded to the Outer Silver Pit (NMMP 345, Off Humber) and further samples of biota, sediment and water were collected under aims 1, 2, 4, 5, and 10.

On the afternoon of 1 May, the Granton trawl was deployed at the fish disease trend monitoring station, (Off Flamborough). On the first tow the net was damaged and on the second tow the net was knotted. Further fishing was abandoned and *CIROLANA* steamed overnight to the Tyne dredged material disposal ground and carried out a survey of ten stations using the Reineck box corer (aims 6 and 7); water samples were also taken on the same grid using a Winchester sampler. At 1600 hr the Ship's Searider was deployed and sent in to North Shields to transfer scientific staff, David Limpenny was replaced by Rachel Waldock.

On the morning of the 3 May the Granton trawl was shot at the Tyne NMMP station (246) but failure of the winch resulted in the trawl having to be recovered semi-manually. In order to repair the fault the ships engines were isolated and no further work was possible for the ensuing 6 hrs. The station was completed during the evening. Further deployments of the Granton trawl were made on the 4 May at the Tees NMMP station

(295). Fish catches were poor and most of the day was spent trying to catch sufficient numbers of dab for analysis. Water and sediment samples were also taken using the churn and Day grab respectively. After completing this station *CIROLANA* trawled close to the mouth of the Tees estuary using the 3 m beam trawl to collect fish for chemical analysis (aim 11). Overnight *CIROLANA* steamed south-east and successfully trawled the Off Flamborough station. This was completed by 1225 hrs after which *CIROLANA* steamed for the Dogger Bank. Further samples of fish, sediment and water were successfully obtained (aims 1,2,3, 4,5, and 10) at stations on the West Dogger (NMMP 285), North Dogger (Bremerhaven 9) and German Bight (Bremerhaven 1) on the evening of the 5 May and mornings of the 6 and 7 of May, respectfully. *CIROLANA* departed the German Bight on the evening of the 7 May and sailed for the Thames estuary deploying the Agasis trawl at five stations on route, with the objective of collecting whelks close to areas of high shipping activity (aim 5).

CIROLANA arrived at the Outer Gabbard NMMP (475) station at 1100 hr on the 9 May and commenced fishing using the Agasis trawl. Sediments and water samples were also taken before *CIROLANA* sailed to the Thames Warp NMMP (465) station and this was completed on the evening of the 9 May. On the morning of the 10 May, water and sediment samples were taken using the Day grab and churn sampler at South Varne (NMMP 495) in support of aims 2, 6 and 10. The remainder of the day was spent trawling at the inner and outer Rye Bay stations (NMMP 486).

Overnight *CIROLANA* sailed to Selsey Bill (NMMP 495). Water and sediment samples were collected using the Day grab, churn and Winchester sampler (aims 2, 6 and 10). *CIROLANA* then completed a grid of six stations on the Nab Tower dredged material disposal site using the Reineck box corer for sediments and the Winchester sampler for water (aims 6 and 7). This survey was completed at 1600 hrs on the 11 May and *CIROLANA* steamed westwards and started fishing with the Granton trawl at Lyme Bay on the morning the 12 May. Fishing was very poor and three alternative tows were trawled but insufficient numbers of fish were caught for analysis. On route to the Falmouth dredged material disposal site the churn and Day grab were deployed at the Off Plymouth NMMP station (585).

CIROLANA arrived at the dredged material disposal site at 0900 hrs on the 13 May and completed a grid of six stations for sediment and water using the Reineck box corer and Winchester sampler, respectively (aims 5, 6 and 7). In addition, biota was also collected by towing the 2 m Agasis trawl across the disposal ground. This survey was completed at 1700 hrs and *CIROLANA* steamed for the Celtic Deep (NMMP 605) where fish, water and sediment were sampled (aims 1, 2, 4, 6 and 10) and, in addition, a grid of nine stations was completed using the Day grab for sediments and the multicorer for meiofauna: marobenthos was collected using a 2 m beam trawl (aims 8 and 9).

On the morning of the 15 May *CIROLANA* arrived at Dundrum Bay (NMMP 815) where the Granton trawl was deployed (aims 1, 2, 4, 6, and 10), followed by the Day grab, water samplers, multicorer and 2 m beam (aims 3, 6 and 9). *CIROLANA* then sailed to four stations south of the Isle of Man and dredged for whelks and scallops until late evening

(aims 1, 4 and 5). The following day, May 16, fish were collected using the Granton trawl at a trial station off St Bees Head (aims 1, 4 and 5). In the afternoon, *CIROLANA* steamed south to the NMMP station 805 (SE Isle of Man). An extensive grid of sediment sampling was carried out using the Day grab and multicorer (aims 6, 7, 8 and 9): water sediment and fish were also collected for aims 1, 2, 4, and 10. The Granton trawl, Day grab, churn and Winchester sampler were deployed again on the evening of the 16 May at the Off Morecambe Bay NMMP station (795). Similar gear deployments were made on the 17, 18 and 19 May as work concentrated on the Liverpool Bay NMMP and related stations (Burbo Bight, (705); Liverpool Bay, (715); Trend; and Red Wharfe Bay, (776)). In addition, sediment and water (using the Reineck box corer and Winchester sampler respectively) were collected from a grid of six stations on the dredged material disposal ground, Site Z, on the 17 May (aims 6 and 7).

On the evening of the 17 May *CIROLANA* left Red Wharfe Bay and steamed to Cardigan Bay. The Granton trawl, Day grab, churn and Winchester samplers were successfully deployed at both NMMP stations in Cardigan Bay (Outer Cardigan - NMMP 665); Inner Cardigan - NMMP 655). As fishing was poor some exploratory tows were carried out with the Granton trawl in Inner Cardigan Bay as *CIROLANA* headed south. *CIROLANA* steamed overnight to Swansea Bay and deployed the 3 m beam trawl to collect fish for aims 1 and 5. During the morning sediments and water were collected using the Reineck box core and Winchester sampler, respectively, on a grid of six stations on the Swansea Bay dredged material disposal site (aims 6 and 7). This was completed in the late morning before *CIROLANA* docked in Swansea on the mid-day tide of the 20 May.

RESULTS:

Aim 1. Samples of whiting, plaice and dab in five consecutive length stratified groups were collected for trend purposes from Liverpool Bay. Samples of Dab for chemical analysis were collected at all NMMP sites where fish were caught for biological effects and fish disease studies. Ad hoc samples of lesser-spotted dogfish were collected, to provide information on contaminants for the Fishery Products Directive. All samples were frozen and stored at -20° C for analysis at the Burnham Laboratory.

Aim 2. Fifty-five water samples were taken from NMMP stations and additional sites and extracted on-board, using C2/ENV+ solid phase cartridges, for chemical analysis of organics (fractionation processing) and biological effects studies at Burnham. Fifty-five bulk water samples were taken for biological water quality assessment using the oyster embryo bioassay. The samples were stored for analysis at the Burnham Laboratory.

Aim 3. Sediment samples were collected from 2 stations along the German Bight - Dogger Bank transect and 28 NMMP stations, using the Reineck box corer and/or Day grab. These sediments were frozen and will be bioassayed, using acute and chronic whole sediment bioassays, on return to the Burnham Laboratory. Pore water was extracted from some samples and will also be bioassayed (*Tisbe* assay) back at the Laboratory.

Aim 4. Dab (over 3500) from a total of 10 main sampling areas were length measured, examined for disease and recorded according to ICES recommended protocols for standardised disease monitoring. All suspect liver neoplasms were preserved for confirmatory diagnosis. Otoliths from these fish were taken for age correlation. Additional samples from dab were taken for comparative hepatic histopathology, immunohistochemistry and ultrastructure analysis. Samples from the same specimens were also taken for biomarker measurements, EROD and DNA adducts (see Aim 5).

Commercial species such as cod and haddock were examined macroscopically for disease and representative photographs were taken as appropriate. All results were entered onto spreadsheets for subsequent analysis.

Specimens of parasites and tissues from a variety of fish species were taken for accession into the Registry of Aquatic Pathology (RAP) for future reference and research purposes.

Aim 5. Fish tissue was collected from dab at 12 locations (including NMMP) for biological effects investigations using biomarkers. Sections of dab liver were stored in liquid nitrogen for measurement of EROD activity; accompanying bile was taken and frozen for PAH analysis. Samples of liver were taken also for supporting chemical analysis. Tissue samples for biomarker related studies were also taken from batches of lesser spotted dogfish. In addition, at 6 locations dab liver was collected for metallothionein analysis, from individual fish and as bulk liver (up to 1 kg) for reference purposes.

Whelks were collected from 8 sites for the identification of imposex and TBT analysis. In support of this work, samples of water and sediment were also collected from the same sites for TBT analysis.

Aim 6. Eighteen samples of sediments were collected for nonylphenol analysis. In addition, water samples were taken for chemical analysis: 18 for total alkylphenols and 18 for dissolved alkylphenols. All samples were stored for analysis at the Burnham Laboratory.

Aim 7. Sediments and water were taken from the Tyne, Nab Tower, Falmouth and Liverpool Bay dredged material disposal grounds and corresponding reference sites. Thirty water samples were taken for TBT analysis, 30 sediments for porewater extraction and TBT analysis, 30 sediments for bioassay and 110 sediment samples taken for chemical analysis. The latter were composed of depth profiles taken from sediment cores. All samples were stored for analysis at the Burnham Laboratory.

Aim 8. The 2 m beam trawl was successfully deployed at NMMP sites in Dundrum Bay, SE Isle of Man and Celtic Deep. Associated sediment samples were sieved on-board and all benthos preserved for identification and enumeration on return to the Burnham laboratory.

Aim 9. Sediment samples were collected with a multi-corer at NMMP sites Dundrum Bay, SE Isle of Man and Celtic Deep. The samples were stored for particle size analysis and meiofauna identification and enumeration.

Aim 10. Water samples were taken at 25 NMMP stations for the analysis of nutrients, chlorophyll and particulates. The samples were processed on-board and preserved for analysis at the Lowestoft Laboratory. Water samples for the determination of salinity were taken twice daily throughout the duration of the cruise.

Aim 11. Nine species of fish from the NMMP Tees site and five species of fish from the mouth of the River Tees were collected for the analysis of flame retardants at the Burnham Laboratory.

Acknowledgement: I should like to acknowledge the active support and help of the ship's officers and crew in completing the above programme of work.

SIC: John Thain

20 May 1999

SEEN IN DRAFT: Captain P.H. Dathan (Master)

R. Graham (Fishing skipper)

INITIALLED: M Waldock (Head of EG Group)

DISTRIBUTION:

Basic list