

R1/3

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**FV STRATHYRE**

Charter 9228H

## **REPORT**

5-15 March 1993 (excluding 6-7 March)

<b>Ports:</b>	<b>Loading:</b>	Port Seton
	<b>Unloading:</b>	Port Seton
	<b>Working port:</b>	Granton

## **Personnel**

J C McKie	HSO (5-11 March)
L Goodwin (Miss)	ASO (10-15 March)
J March	Environmental Tracing Systems (part-time)
K Ure	Lothian Regional Council (15 March)

## **Objectives**

1. To monitor a dredging operation in Port Edgar Marina.
2. To observe and monitor the release of an artificial fluorescent tracer particle injected into the seabed sediment in the area to be dredged.
3. To collect sea water samples from selected sites in the vicinity of Port Edgar Marina (see attached), for fluorescence analysis at Environmental Tracing Systems Laboratories.
4. To collect sediment samples from selected sites in the vicinity of Port Edgar Marina (see attached), for fluorescence analysis at Environmental Tracing Systems Laboratories.
5. To collect sediment samples for heavy metal analysis from selected dredge spoil disposal sites in the Firth of Forth.

**Out-turn Days Per Project:** 9 days, BEB1

## **Narrative**

The work programme coincided with water injection dredging operations in Port Edgar Marina. The relocation of the seabed sediment was of environmental concern, and was therefore monitored using fluorescent tracer particles injected into an area of the sea bed prior to dredging.

Scientific staff travelled to Port Seton on the evening of 4 March to load the charter vessel and set up the sampling equipment. The FV *Strathyre* then sailed to Granton, the working port for the duration of the cruise.

On 5 March the vessel proceeded to the survey area and scientific equipment was tested. A pre-injection grab survey was then undertaken. The FV *Strathyre* returned to Granton for the weekend of 6-7 March, and scientific staff returned to Aberdeen.

Scientific staff returned to Port Edgar on the evening of 7 March to commence the post-injection survey, but the dredging vessel had been delayed. During the period 8-9 March, water and sediment samples were collected using NIO bottles, Day grab and Craib corer, to confirm background levels of fluorescence.

On 10 March dredging operations commenced, and the fluorescent tracer was injected into the sediment to be dredged. During the next five days (10-15 March), sediment samples were collected on a daily basis at different stages of the ebb and flood tides, for subsequent fluorescence analysis to determine the extent of the relocation of the dredged sediment. Occasionally during this period, selected water samples were also collected for fluorescence analysis. All water and sediment samples were analysed for fluorescence at Environmental Tracing Systems laboratories.

During periods when the *Strathyre* was not required to collect samples for Objectives 1-4, sediment samples were collected using the Day grab from the Oxcars, Beamer Rock, Narrow Deep, Methil and Kirkcaldy dredge spoil disposal grounds, and samples were returned to Aberdeen for heavy metal analysis.

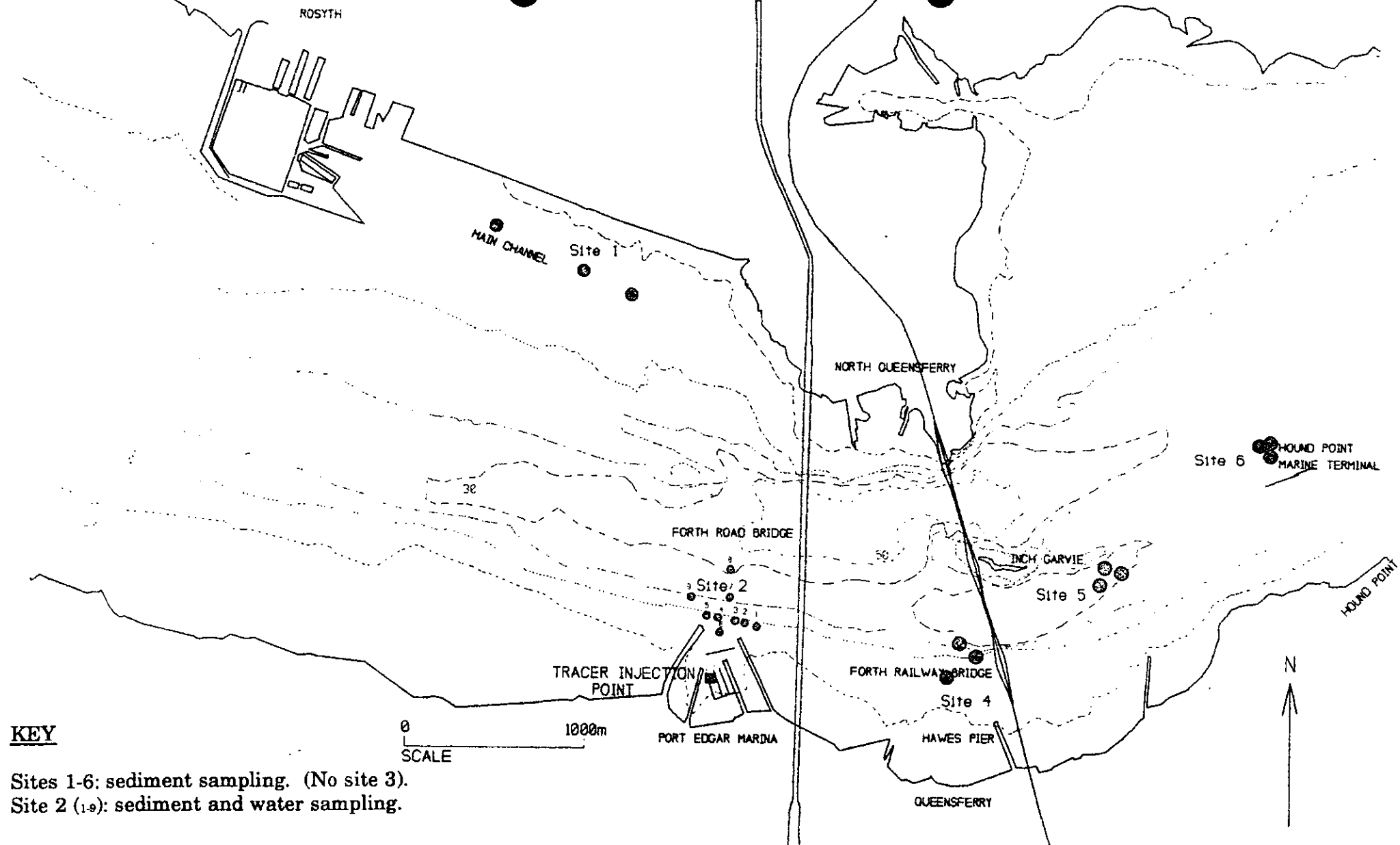
Upon completion of the monitoring programme, the FV *Strathyre* returned to Granton, to allow scientific staff to disembark and to unload the scientific equipment. All work programmes were completed on time, and the chartering arrangements proved very satisfactory.

## Results

A summary of the survey findings is detailed below:

1. The water injection method of sediment relocation proved to be an efficient dredging technique, with an estimated 96% of the disturbed sediment leaving the marina and entering the Firth of Forth.
2. The majority of the fluorescent tracer injected into the sea bed sediment was relocated during the dredging operation, and was transported from the marina into the Firth of Forth.
3. The analysis of water samples suggested that there was no vertical mixing of tracer. This is compatible with the theory of water injection dredging, which suggests that disturbed seabed sediment is relocated in a layer of reduced density solid material by gravity flow to deeper waters.
4. Tracer particles were detected in two-thirds of the sediment samples collected from the sampling sites in the Firth of Forth. The analytical data indicated that the "dredged" sediment was relocated throughout the survey area by tidal currents.
5. Sediment samples collected from the dredged spoil grounds have still to be analysed for heavy metals.

J McKie  
28 January 1994



# **KEY**

Sites 1-6: sediment sampling. (No site 3).  
 Site 2 (1,9): sediment and water sampling.

Port Edgar Marina Dredging Operation: Location of tracer injection and sampling stations