

NRA - Water Quality 44

National Rivers Authority

**SUMMARY OF MONITORING ACTIVITIES
ON THE BLACKWATER ESTUARY**

June 1996



414
1997
[Handwritten signature]

c. 1 50

HALCROW

AKNF

National Rivers Authority

**SUMMARY OF MONITORING ACTIVITIES
ON THE BLACKWATER ESTUARY**

June 1996

ENVIRONMENT AGENCY
SOUTH WEST REGION
LIBRARY

614.77/NAT
NATIONAL RIVERS AUTHORITY
Summary of monitoring
activities on the
AKNF c. 1 so .00

© Sir William Halcrow & Partners Ltd 1996

Sir William Halcrow & Partners Ltd has prepared this report in accordance with the instructions of National Rivers Authority for their sole and specific use. Any other persons who use any information contained herein do so at their own risk.

Sir William Halcrow & Partners Ltd Burderop Park Swindon Wiltshire
SN4 0QD Tel 01793 812479 Telex 44844 Halwil G Fax 01793 812089

ENVIRONMENT AGENCY



131464

NATIONAL RIVERS AUTHORITY

SUMMARY OF MONITORING ACTIVITIES ON THE BLACKWATER ESTUARY

JUNE 1996

DOCUMENT REFERENCE NO WD/ERD/009

CONTENTS

1	INTRODUCTION	1
2	NATIONAL RIVERS AUTHORITY	2
2.1	NRA Surveys	2
2.2	NRA R&D Commissioned Surveys	3
2.2.1	NRA R&D Project No. 591: Sedimentation Processes of Managed Retreat	3
2.2.2	NRA R&D Project No. 592: Set Back of Saltings: Pollution of Managed Retreat Sites	3
3	MINISTRY OF AGRICULTURE, FISHERIES AND FOOD	4
4	ENGLISH NATURE	6
5	INSTITUTE OF TERRESTRIAL ECOLOGY	7
6	ROYAL SOCIETY FOR THE PROTECTION OF BIRDS	8
	APPENDIX A - LIST OF CONTACTS	9

1 INTRODUCTION

The Blackwater Estuary, in Essex, is the focus of a number of saltmarsh research initiatives. The most notable of these is the National Rivers Authority (NRA) operational managed retreat scheme at Orplands and the Ministry of Agriculture, Fisheries and Food (MAFF) experimental managed retreat, for habitat creation, at Tollesbury. As a result of these initiatives extensive monitoring has been conducted in the Blackwater by a range of organisations, including the NRA, MAFF, HR Wallingford Ltd, Institute of Terrestrial Ecology (ITE), English Nature (EN) and Royal Society for the Protection of Birds (RSPB). A location plan of the area is shown in Figure 1.

The purpose of this report is to provide a summary of all known monitoring activities in the Blackwater, and it has been prepared in response to a request from the NRA Steering Group for the R&D programme 'Saltmarsh Management for Flood Defence'. This report will enable both current and future researchers to benefit from currently available data. Furthermore, it is intended that future monitoring programmes can be designed so that unnecessary duplication is avoided.

At the end of this report is a list of organisations who are responsible for maintaining the data sets identified within this report. These organisations should be contacted directly for further information. It is anticipated that data can be made available to individuals with legitimate research objectives at zero or minimal cost. An existing agreement already exists between some of the organisations listed which enables data to be exchanged on a reciprocal basis.

2 NATIONAL RIVERS AUTHORITY

2.1 NRA Surveys

The NRA have collected data from a range of surveys in the Blackwater, details of which are summarised below. At present the data are used for assessment of specific sites and no overview interpretative reports have been written.

- Bathymetric/Beach Surveys

Two surveys of the estuary were undertaken during November 1993 and November 1994 using the transects shown on Figure 2.

- Wave/Tide Monitoring

Data were collected, over the period January 1994 to December 1994, at five sites within the estuary. The locations of the data recorders are shown on Figure 3.

The wave measurements were recorded for 20 minutes every 3 hours, and the data consisted of:

- date/time
- still water level
- significant, maximum and minimum wave heights
- zero crossing period
- spectral peak period

The tide measurements were recorded for 1 minute every 15 minutes over blocks of time not less than a fortnightly tidal cycle. Two such periods of tidal measurement were taken at least 6 months apart. The data consisted of:

- date/time
- still water level
- standard error of still water level

- Acoustic Doppler Current Profile Monitoring (ADCP)

Three ADCP surveys were carried out during December 1993, June 1994 and November 1994. The transects, along which data were collected, are shown in Figure 3. The processed data gives current vectors (velocity and direction) through the water column.

- Aerial Photographs

Black and white stereoscopic photographs have been obtained from surveys in July 1993 and July 1994, at a nominal scale of 1:5000. Figure 4 shows the run map and extent of the photographic coverage.

2.2 NRA R&D Commissioned Surveys

2.2.1 NRA R&D Project No. 591: Sedimentation Processes of Managed Retreat

Contractor: Institute of Estuaries and Coastal Studies, Hull University (IECS), and, subsequently, Cambridge Coastal Research Unit, Cambridge University

This project commenced in February 1995 and involves a 3 year programme of detailed measurement of hydrodynamic and morphological changes around the managed retreat sites at Tollesbury and Orplands. In addition, there will be similar measurements over a wider area, but at a reduced temporal and spatial resolution. Field experiments are to be repeated during the three year duration of the project. The data to be collected include measurements of water surface elevation, tidal currents, suspended sediment concentrations and morphological changes.

At Orplands, a number of water level recorders were deployed on the mudflats outside the managed retreat site immediately before, during and after the breach of the sea defences. Future biannual monitoring of the site will include measurement of topography, tidal levels, current velocities and the volume and concentrations of suspended sediment entering the set back area.

At Tollesbury, monitoring will take place adjacent to the breach location and at far-field sites. Figure 5 shows the locations of various instruments.

2.2.2 NRA R&D Project No. 592: Set Back of Saltings: Pollution of Managed Retreat Sites

Contractor: Imperial College of Science, Technology and Medicine

This project commenced in March 1995 and will study the potential pollution effects of saline inundation of agricultural soil.

Within the set back areas at Orplands and Tollesbury, soil and sediment, groundwater and surface water samples are being taken before and after inundation for analysis of:

- physical and chemical properties of the soil
- heavy metals
- nutrients
- organic micro-pollutants including herbicides and insecticides

Plant cover and health around the sampling stations are being noted and analyses of plant tissue are being carried out for selected pollutants.

3 **MINISTRY OF AGRICULTURE, FISHERIES AND FOOD**

The Ministry, in association with English Nature, are funding a full scale experiment in the management of set back of sea defences within the Blackwater Estuary. The key participants in this study and their specific monitoring roles are outlined below. The set-back site is at Tollesbury and breaching took place in August/September 1995.

- **Silsoe College**

Soil monitoring is being undertaken within the site, with sampling carried out before and following inundation. Parameters to be examined include:

- particle size distribution
- micro morphology
- shear strength and penetration resistance
- hydraulic conductivity
- pore water pressures
- comparative analysis of samples from adjacent saltmarsh

Results from the above will be analysed for changes and trends as a function of time and/or number of inundations.

- **HR Wallingford Ltd**

Detailed bathymetric surveys of existing creeks have been undertaken along with some hydrodynamic modelling.

- **Institute of Terrestrial Ecology**

ITE are conducting topographical and botanical surveys of the site and adjacent saltmarsh and mud flat areas. The whole site has been surveyed with an infra-red theodolite to an accuracy of +/- 10 mm. A network of 28 temporary bench marks have been installed and levelled. The vegetation of the surrounding estuary has been sampled.

For the botanical monitoring, a block layout of 50 plots (2m x 2m) within the site has been established, with each subject to a variety of treatments which can be compared with an untreated control plot. The first recording of the botanical experimental procedures is scheduled for June 1996 with the main recording in September 1996 and each September thereafter.

Mapping of the general distribution of vegetation and the major plant communities of the Tollesbury/Old Hall part of the estuary will be done using aerial photography with ground verification. A vegetation map will be prepared at a scale of 1:2500.

- **Institute of Estuarine and Coastal Studies, Hull University and, subsequently, the Cambridge Coastal Research Unit, Cambridge University.**

To complement the NRA commission to study hydrodynamic and morphological outside the Tollesbury managed retreat site, IECS/CCRU are measuring waves, currents and sediment movements within the site post breaching, initially from April 1995 to September 1996.

IECS also prepared an outline environmental assessment of the scheme for planning purposes.

All monitoring activities at the Tollesbury site will be reviewed in 1996 and proposals considered for the nature and extent of continued measurements based on initial results.

4 ENGLISH NATURE

English Nature (EN) undertake monitoring of the Northey Island set back site. This involves an annual biological survey and biannual geomorphological surveys - ie accretion/erosion. The monitoring is largely confined to the site itself with a few monitoring points on the foreshore.

EN also contribute to the NRA's wider physical monitoring activities on the Blackwater, such as bathymetry measurement.

5 INSTITUTE OF TERRESTRIAL ECOLOGY

Since 1991, ITE have conducted various monitoring activities at Old Hall Marshes (see figure 1) either at or near the Mobile Laboratory on the RSPB Reserve.

- **Weather Data**

Automatic recording of weather data has been carried out since 1991, and is ongoing. Data include total and net solar radiation, wet and dry bulb temperature, rainfall, wind speed and direction and barometric pressure.

- **Tide Data**

Automatic recording of tide data has been carried out since 1991 and is ongoing.

- **Marsh Surface Level**

Between January 1991 and April 1993 monthly measurements of marsh surface level were taken at 80 points. From May 1993 until the present time the number of points was increased to 240.

- **Saltmarsh Productivity**

This was monitored monthly in 1990, 1991 and 1993.

6 **ROYAL SOCIETY FOR THE PROTECTION OF BIRDS**

As part of the Tollesbury managed retreat experiment, the RSPB undertook counts of waders and wildfowl at the site from October 1995 to March 1996 inclusive. The birds were counted four times each month, at high and low water, on a spring and neap tide. The activity of the birds was also noted during each count, eg roosting, feeding, etc.

APPENDIX A



HALCROW

APPENDIX A - LIST OF CONTACTS

Fiona Burd
Institute of Estuarine and Coastal Studies
Hull University
HULL, HU6 7RX

Tel: 01482 465667
Fax: 01482 465001

Professor John Pethick
Jeremy Lowe
University of Cambridge
Downin Street
CAMBRIDGE, CB2 3EQ

Tel: 01223 339775
Fax: 01223 333450

Dr Alan Brampton
Dr Peter Hawkes
Dr Kathryn Carpenter
Prof NWH Allsop
HR Wallingford Ltd
Howbery Park
Wallingford
Oxfordshire, OX10 8BA

Tel: 01491 835381
Fax: 01491 832233

Mr Tony Polson
Flood and Coastal Defence Division
Ministry of Agriculture, Fisheries and Food
Room 407
Eastbury House
30-34 Albert Embankment
London, SE1 7TL

Tel: 0171 238 6649
Fax: 0171 238 6665

Mr Richard Leafe
Dr Geoff Radley
English Nature
Northminster House
Peterborough, PE1 1UA

Tel: 01733 340345 or direct (RL) 318315
Fax: 01733 68834

Professor John N Lester
Dr Cecilia MacLeod
Department of Civil Engineering
Imperial College of Science, Technology and Medicine
Imperial College Road
London, SW7 2BU

Tel: 0171 589 5111
Fax: 0171 594 6053

Dr Ken Norris
Royal Society for the Protection of Birds
The Lodge
Sandy
Bedfordshire, SG19 2DL

Tel: 01767 680551
Fax: 01767 692365

Judith Dunderdale
Research Officer
Silsoe College
Cranfield University
Silsoe
Bedfordshire, MK45 4DT

Tel: 01525 863000
Fax: 01525 863001

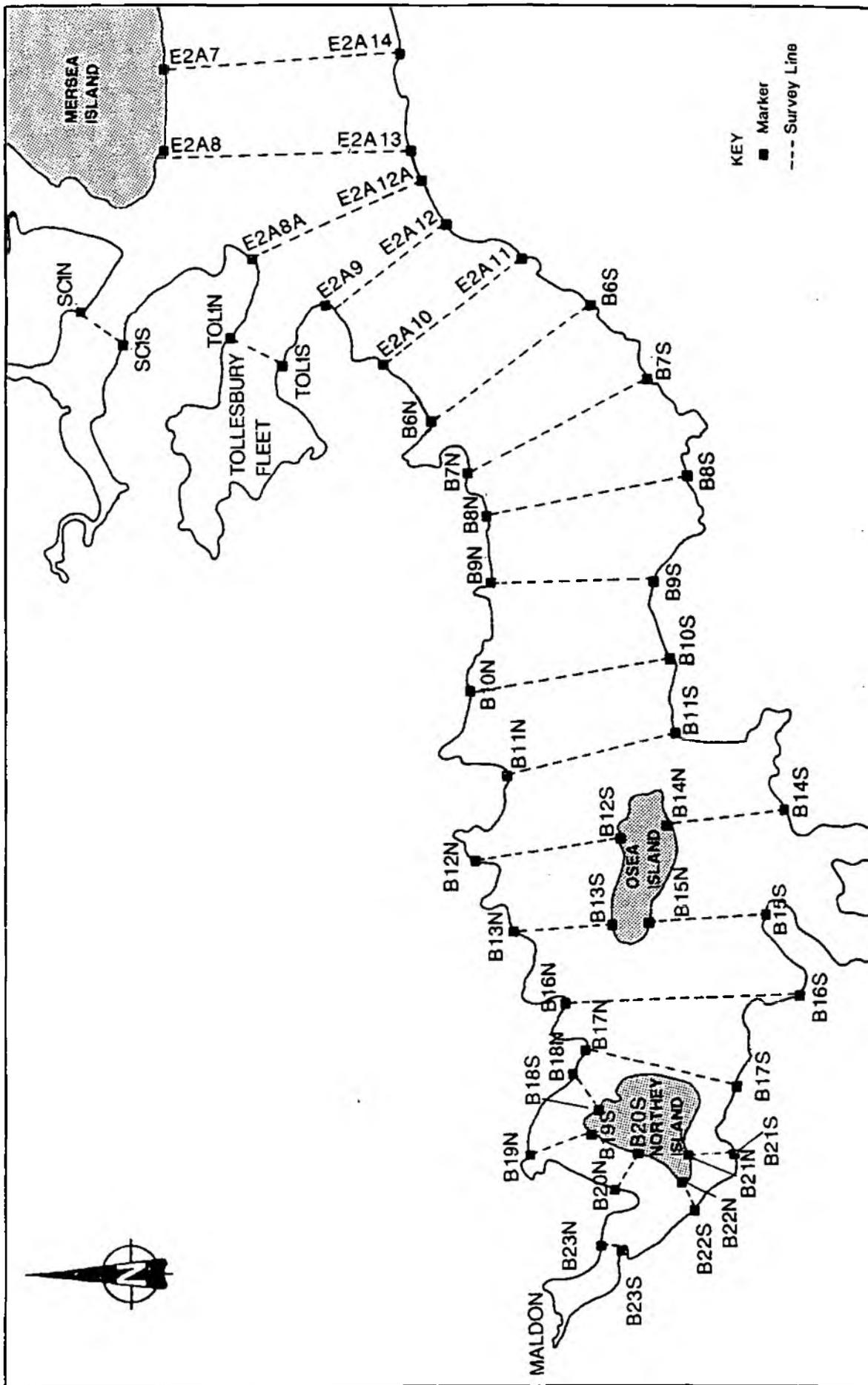
Gareth Llewlyn
NRA HQ
Rivers House
Waterside Drive
Aztec West
Almondsbury
Bristol, BS12 4UD

Tel: 0117 9624400
Fax: 0117 9624409



REPRODUCED FROM THE ORDNANCE SURVEY
 MAP WITH THE PERMISSION OF THE CONTROLLER
 H. M. STATIONERY OFFICE, CROWN COPYRIGHT.
 RANK XEROX COPY BUREAU LTD.
 LICENCE No. P.R. 396184

Figure 1 Blackwater Estuary



BLACKWATER ESTUARY

Figure 2 LOCATION OF NRA BATHYMETRIC/
BEACH TRANSECTS

Line 1 & Line 2 - Cross sections used for Acoustic Doppler Current Profiling

▲ - Wave Recorder

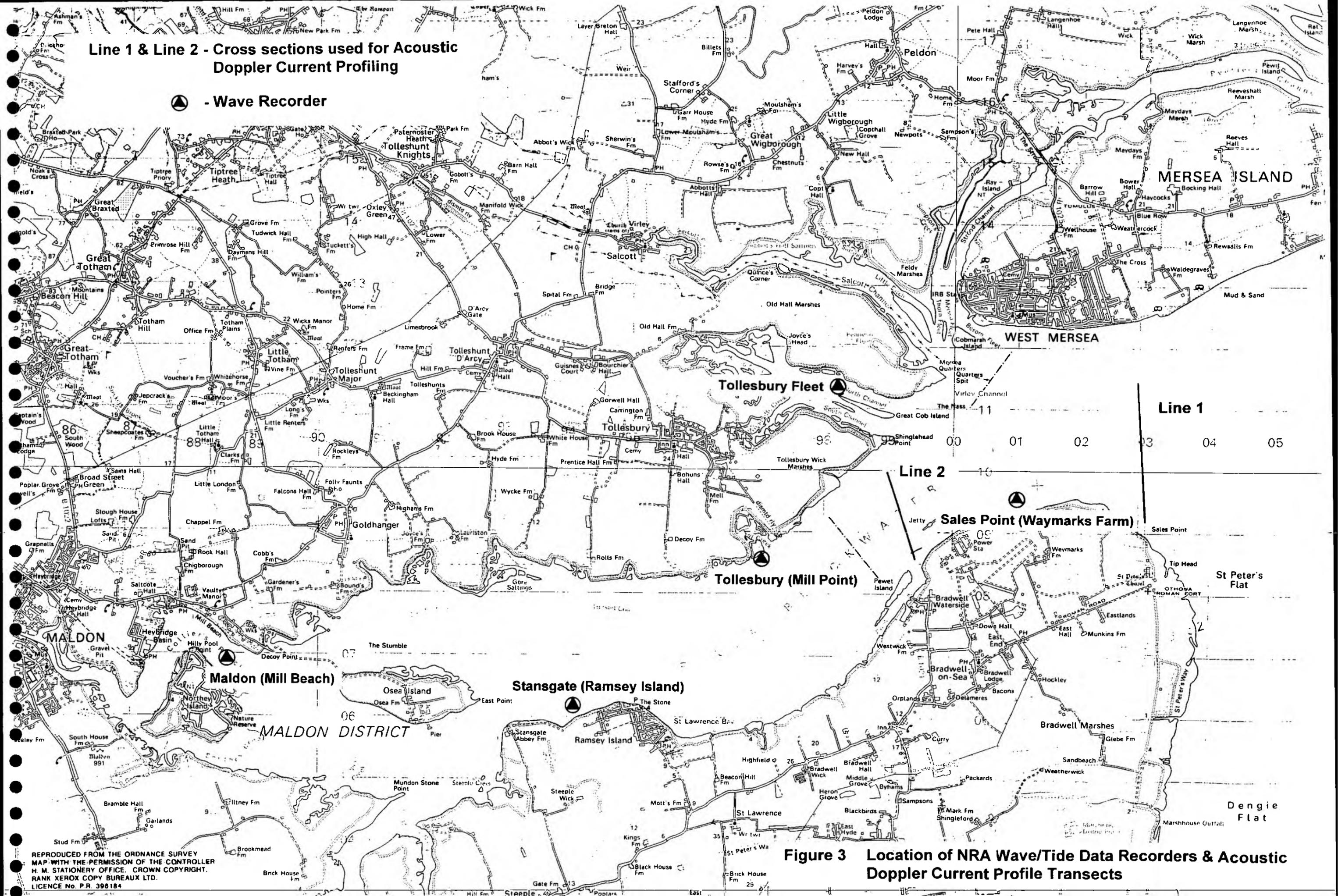


Figure 3 Location of NRA Wave/Tide Data Recorders & Acoustic Doppler Current Profile Transects

REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER H. M. STATIONERY OFFICE. CROWN COPYRIGHT. RANK XEROX COPY BUREAU LTD. LICENCE No. P.R. 398184

