NRA

National Rivers Authority
Anglian Region

NATIONAL RIVERS AUTHORITY

ANGLIAN REGION

IPSWICH

A REVIEW OF THE QUALITY AND STATUS OF THE SUFFOLK AND ESSEX ESTUARIES AND COASTAL WATERS

MAY 1993

AUTHOR - G R L BURRELL BSc.HONS
MARINE TECHNICIAN

C I M^{C}ARTHUR BA HONS,DipIWEM
MARINE SCIENTIST

M W JOHNSON MSc
MARINE BIOLOGIST

FINAL DRAFT
VOLUME 1

SUMMARY

The objective of this report was to bring together all the pertinent details with respect to matters influencing estuarine and coastal water quality. This data gained was then used in assessing the quality status of each estuary, utilising chemical and biological data.

Historical data has also been brought together in one document for the first time, to give a perspective of changes that have occurred over several decades.

Taking into account all relevant factors influencing water quality the following grades for the estuaries were derived: (For full table of results see Table 1.)

Excellent - Ore/Alde
Good - Stour, Walton Backwaters, Blyth and Blackwater
Fair - Deben, Crouch and Roach
Poor - Orwell and Colne

Unexpected results were attained from the Blackwater, where, considering the high proportion of effluent in its upper reaches we anticipated poor quality, and the Colne, which is far worse than previously supposed, mainly due to the input from Colchester STW.

Coastal waters have limited chemical and biological data but enough to surmise that water quality is excellent. However, levels of some heavy metals are cause for concern and increased monitoring is required.

TABLE 1

SUFFOLK AND ESSEX ESTUARINE SCORING SYSTEM.

ESTUARY	CHEMICAL QUALITY	BENTHIC QUALITY	SHELLFISH QUALITY	NUTRIENTS/ ALGAL PROD.	AESTHETIC QUALITY	CONSERVATION STATUS	SCORE	OVERALL QUALITY
ORE/ALDE	5	4	5	3	5	A	27A	EXCELLENT
STOUR	4	5	5	4	3	A	26A	GOOD
WALTON BACKWATERS	4	4	4	4	4	A	25A	GOOD
BLYTH	5	4	4	3	4	A	25A	GOOD
BLACKWATER	4	5	4	4	4	B	25B	GOOD
DEBEN	4	4	3	1	3	B	19B	FAIR
CROUCH	4	3	3	3	3	C	19C	FAIR
ROACH	3	3	3	3	3	C	18C	FAIR
ORWELL	2	2	2	4	1	B	15B	POOR
COLNE	2	1	4	2	2	C	14C	POOR

1 - 2 - 3 - 4 - 5
POOR QUALITY ... GOOD QUALITY

A - B - C - D - E
HIGH CONS. STATUS ... LOW CONS. STATUS

MAP 1

THE ESSEX AND SUFFOLK ESTUARIES

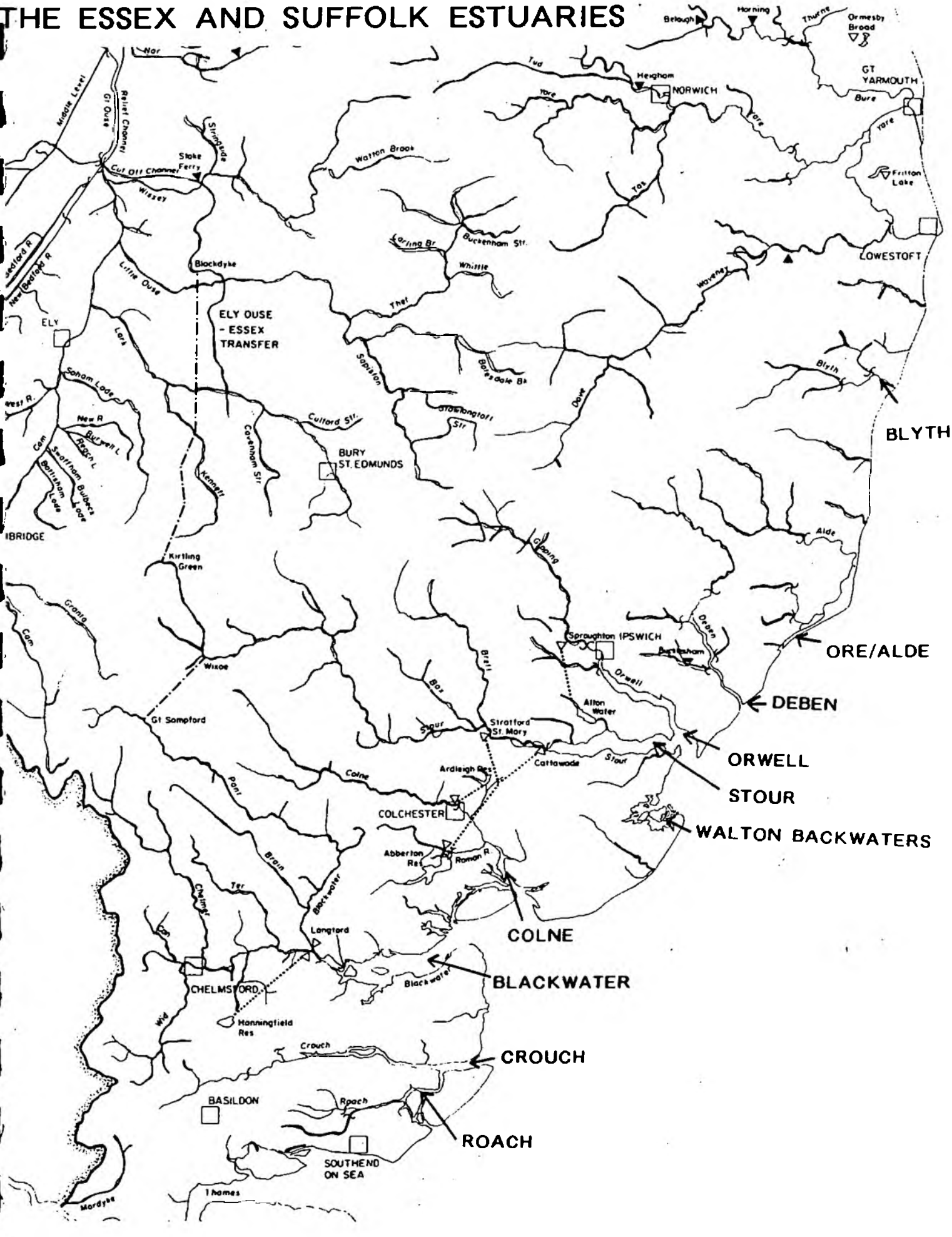


PLATE 1

River Orwell at low water looking under the Orwell Bridge into Ipswich Commercial Docks. Also used for dinghy sailing.

CONTENTS

Volume 1

CONTENTS (Continued)

Volume 2

SECTION A]

INTRODUCTION

A] INTRODUCTION

1 BLYTH ESTUARY

The Blyth estuary is a bar built estuary with an area of 311 ha. The upper estuary has a narrow channel that opens out into a wide, sheltered intertidal flat downstream of Blythburgh. Since the mid 19th century this area has been allowed to return to its natural state after being reclaimed as grazing marsh. The lower estuary is a narrow channel entering the sea at Southwold, the channel is surrounded on either side by grazing marshes which support a diverse population of invertebrate fauna.

The Blyth estuary tidal catchment has a population of less than 1,000 with two main treated sewage inputs at Wangford and Southwold. The water quality of the Blyth estuary has been classed by NRA as grade A. However, the River Wang, a tributary of the Blyth has been classed as grade 4 due to the quality of treated effluent being discharged from Bernard Matthews factory.

1.1 DESIGNATIONS (Map 2)

The SSSI of Minsmere and Walberswick heath and marshes, adjacent to the Blyth estuary covering an area of over 2003 ha, includes most of the intertidal mudflats of the Blyth estuary. This area is also a National Nature Reserve. The area of Minsmere and Walberswick was designated a RAMSAR site in 1976 and has recently been proposed as an SPA site. The estuary is also part of the Suffolk Coast and Heaths AONB.

The Suffolk Wildlife Trust and the RSPB consider areas of the estuary to be very important for wildlife and birds, particularly the adjoining site at Minsmere.

The reasons for these notifications are many, the tidal mudflats form sheltered feeding grounds for wild fowl and shore birds.

The shingle beach, although being eroded, supports a variety of scarce shingle plants and the reed beds provide a habitat for various birds and insects. The shallow lagoons at Minsmere are very important for a colony of Avocets and the large area of heathland provides a valuable habitat for the Nightjar and the Woodlark, two nationally declining birds.

1.2 USES (Map 3)

1.2.1 RECREATION:

Where the Blyth estuary widens numerous recreational activities occur, although the majority of the estuary is not accessible and therefore undisturbed. There are numerous harbour moorings along the channel for commercial and pleasure craft and a boat park at Southwold. Some dingy sailing occurs on the estuary, but most is out at sea. Power boating, windsurfing, water skiing and canoeing activities are practiced on the estuary from Blythburgh seaward. The Blyth estuary has a particularly difficult harbour entrance to navigate.

1.2.2 SHELLFISHERIES:

Blythburgh Creek has a very small oyster and mussel shellfishery. Wolsey Creek contains an oyster shellfishery from which the oysters are uv treated. The oysters from both Blythburgh Creek and Wolsey Creek are EC class B. Both creeks come under the EC Shellfish Hygiene Regulation Directive 1993 but were not designated under the 1979 Shellfish Directive.

1.2.3 FISHERIES:

Fyke netting for eels and bait digging for Arenicola marina (lugworm) and Nereis diversicolor (ragworm) occurs over some of the intertidal area in the lower estuary.

1.2.4 SEDIMENT EXTRACTION/DREDGING:

Only maintenance dredging takes place along the Blyth estuary within the harbour confines.

1.3 INPUTS

1.3.1 EFFLUENTS:

Southwold STW final effluent has a current consent of 120SS/150BOD and discharges into the harbour at Bailey Bridge. This STW also has a storm tank discharge which outfalls at the same site. Wangford STW final effluent has a present consent of 30SS/20BOD and discharges into the freshwater river some 2 miles above the tidal sluice. Both Southwold and Wangford STW have full treatment and their existing quality is satisfactory with respect to NRA discharge consent conditions.

The Bernard Matthews factory causes a significant water quality deterioration in the upper reaches of the River Wang, its affects are discernable in the estuary where the Wang joins the main channel.

1.3.2 RIVERS:

The Blyth has a very rural catchment containing only one small town, Halesworth. There are no industrial inputs into the river and the main land use around the estuary is agricultural, being cereal and pig farms. The tidal constraint is at Blyford Bridge but on occassion the flood gate is left down in winter and the estuary becomes saline above Blyford Bridge. The Blyth estuary does not possess a saline wedge.

1.4 SUMMARY

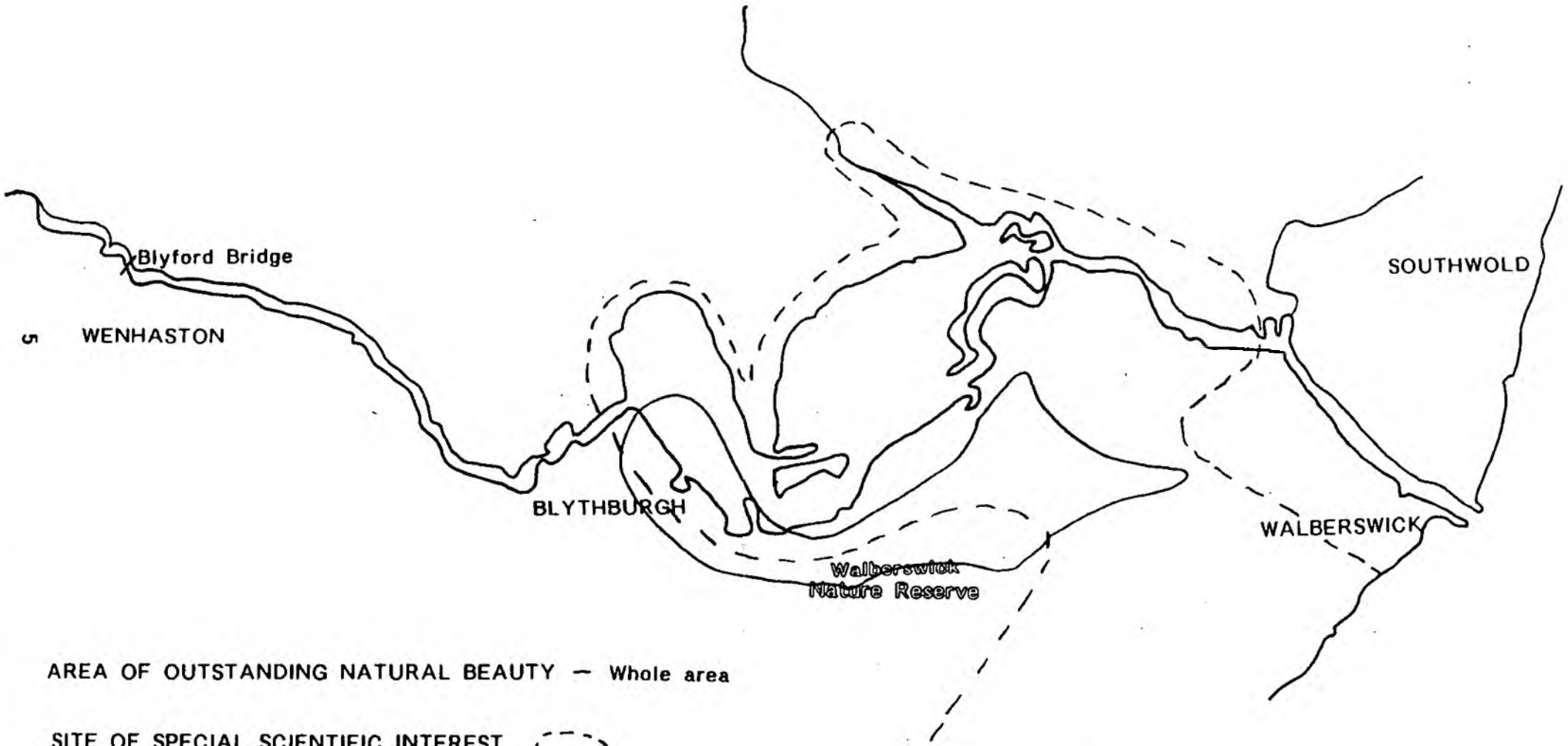
BLYTH ESTUARY

NGR	TM4776
GEOMORPHIC TYPE	BAR BUILT ESTUARY
TIDAL TYPE	MESOTIDAL
TOTAL AREA ha	311
INTERTIDAL AREA ha	235
SHORELINE km	25.4
TIDAL CHANNEL km	10.8
AREA OF MUDFLATS ha	276
AREA OF SALTMARSH ha	55
TIDAL LIMIT	BLYFORD BRIDGE
POPULATION	<1000
NRA SURVEY CLASS	A
SEWAGE INPUTS	SOUTHWOLD
	WANGFORD
DESIGNATIONS	SSSI, NNR, RAMSAR, AONB, SPA.
RECREATION USES	CANOEING, SAILING, WINDSURFING,
	POWER BOATING, WATER SKIING.
SHELLFISHERIES	WOLSEY CREEK
	BLYTHBURGH CREEK
FISHERIES	FYKE NETTING AND BAIT DIGGING
IMPORTANT BIRD SPECIES	AVOCET AND SPOTTED REDSHANK

BLYTH ESTUARY

DESIGNATIONS

MAP 2



AREA OF OUTSTANDING NATURAL BEAUTY — Whole area

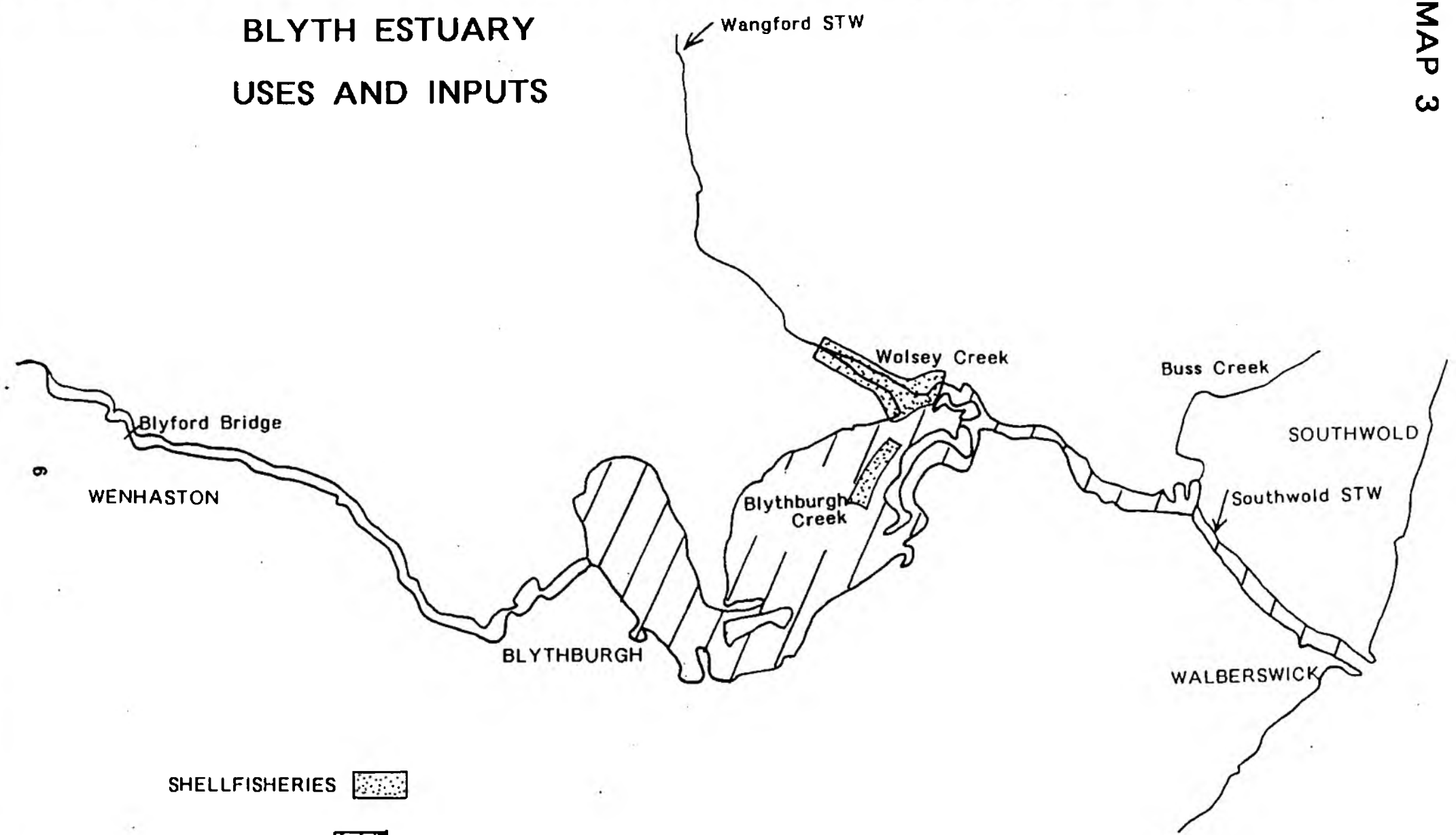
SITE OF SPECIAL SCIENTIFIC INTEREST

NATIONAL NATURE RESERVE

BLYTH ESTUARY

USES AND INPUTS

MAP 3



2 ORE/ALDE ESTUARY

The Ore/Alde estuary is a bar built estuary with a total area of over 1820 ha. The estuary is dominated by the Orfordness shingle spit, known as Orford Beach. This spit is one of three major shingle landforms in the British Isles and the only one to combine a shingle spit with a cuspate foreland. Ord Beach possesses highly specialised shingle vegetation, and a diverse population of lichens and bryophytes. The lagoons to the west of the estuary mouth have a specialist invertebrate fauna and are very important in terms of botanical and ornithological value.

The River Alde flows into the River Ore at Orford, the Ore then continues to the estuary mouth. The Ore is deeper and more narrow than the Alde with less mudflat area. Along the fringes of both rivers saltmarsh is dominant, however, the saltmarsh on the Ore shows signs of erosion.

The Ore/Alde tidal catchment has a population of less than 1000 and has only one treated sewage input at Orford. The water quality has been classed by NRA as grade A.

The shellfishery at Butley Creek is a very important historical oysterage, it was designated under the original EC Shellfish Directive 1979 and is classified as a class A fishery under the Shellfish Hygiene Directive 1993.

2.1 DESIGNATIONS (Map 4)

The whole of the Ore/Alde estuary is an SSSI, from Bawdsey to Aldeburgh, for biological and geomorphilogical reasons, the area that the SSSI covers is also covered by the designation of AONB. The SSSI includes the Orfordness-Havergate NNR.
It is considered to be an Environmentally Sensitive Area (ESA) and is partly designated as an SPA. At present the Ore/Alde estuary is a proposed RAMSAR site. The Suffolk Wildlife Trust have a reserve at Snapes Saltings and the RSPB have one at Havergate Island. Orfordness was purchased by the National Trust

in April 1993 and will be managed as a Nature Reserve.

The reasons for notification are mainly due to the variety of habitats present at this site. In places the intertidal mudflats support the rare intertidal flowering plant, *Zostera angustifolia* (Eel grass). The saltmarsh areas support a wide variety of species including the rare Tasselpondweeds *Ruppia spirilis* and *R. maritima*. Sea Pea and Sea Kale can be found on the exposed and shifting shingle.

The site is of national importance for its birdlife. Havergate Island holds the largest breeding colony of Avocets in Britain. Another nationally important species, the Wigeon, is also present during migration.

The lagoons west of the estuary mouth are notable for a number of rare brackish water invertebrate species including the anthozoan *Nematostella vectensis*.

2.2 USES (Map 5)

2.2.1 RECREATION:

Sailing occurs throughout most of the estuary and there are moorings with associated dingy parks at Aldeburgh and Orford. Windsurfing and canoeing are permitted as is power boating, but speed is limited. Bathing occurs at the estuary mouth, Orford and Iken Beach.

2.2.2 SHELLFISHERIES:

There are two shellfisheries on the estuary, at Butley Creek and Stoneyditch. Butley Creek has been designated under the EC Shellfish Hygiene Directive 1993 and is at present of class A standard. The oysters collected from this creek undergo a two-phase treatment system, they are layed in the creek and then transferred to a holding tank. The creek is clean, but occasional contamination by seabirds and boats causes uncontrollable contamination peaks. Stoneyditch contains a

mussel shellfishery, at present it is also class A. It is a very clean creek and is not affected by the adjacent STW at Orford, since it is situated within the Orfordness complex.

2.2.3 FISHERIES:

Fyke netting for Eels and fish trawling for Plaice, Dab and Cod is practiced on the estuary. Some bait digging occurs for Lugworm and Ragworm around Aldeburgh.

2.3 INPUTS

2.3.1 EFFLUENTS:

Orford STW has a present consent of 30SS/15BOD/10AMMONIA and discharges some 1/2 km downstream of the village. It undergoes full treatment and is, at present, satisfactory with respect to NRA discharge conditions. Aldeburgh STW discharges into the North Sea after maceration and has a descriptive consent standard. It currently meets its discharge consent conditions.

2.3.2 RIVERS:

The Ore/Alde estuary has a very rural catchment similar to the Blyth estuary. Within the catchment area the land use is mainly cereal agriculture and forestry. The tidal constraint on the Alde is at Snapes sluice and on Butley River it is at Butley Mill. The Ore/Alde estuary does not possess a saline wedge.

PLATE 2

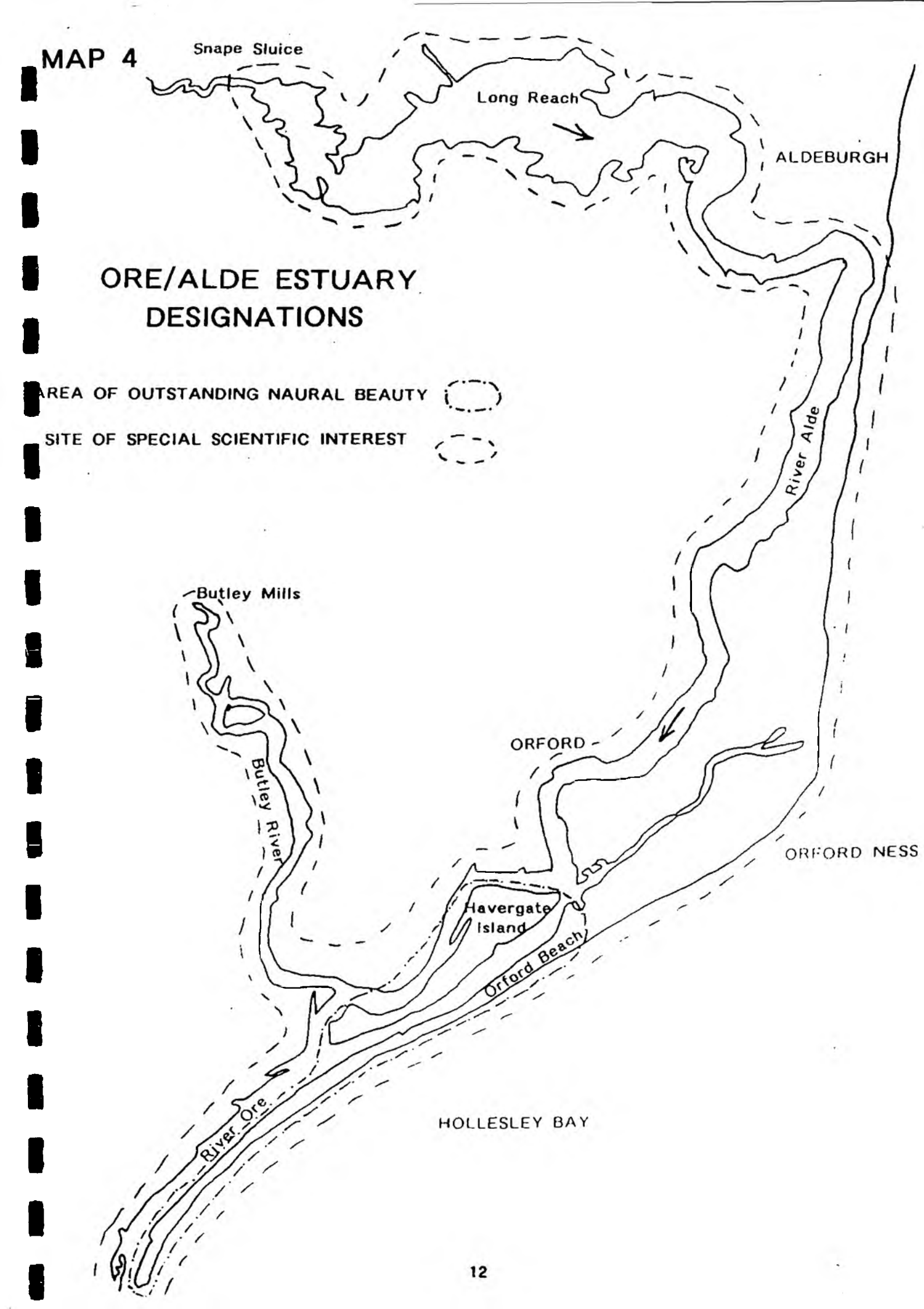
ORFORDNESS - The unique shingle spit is in the foreground and supports many rare plants and birds. Stoneyditch is the mussel fishery in the centre of the picture, the tidal River Ore/Alde is infront of Orford village and castle.

2.4 SUMMARY

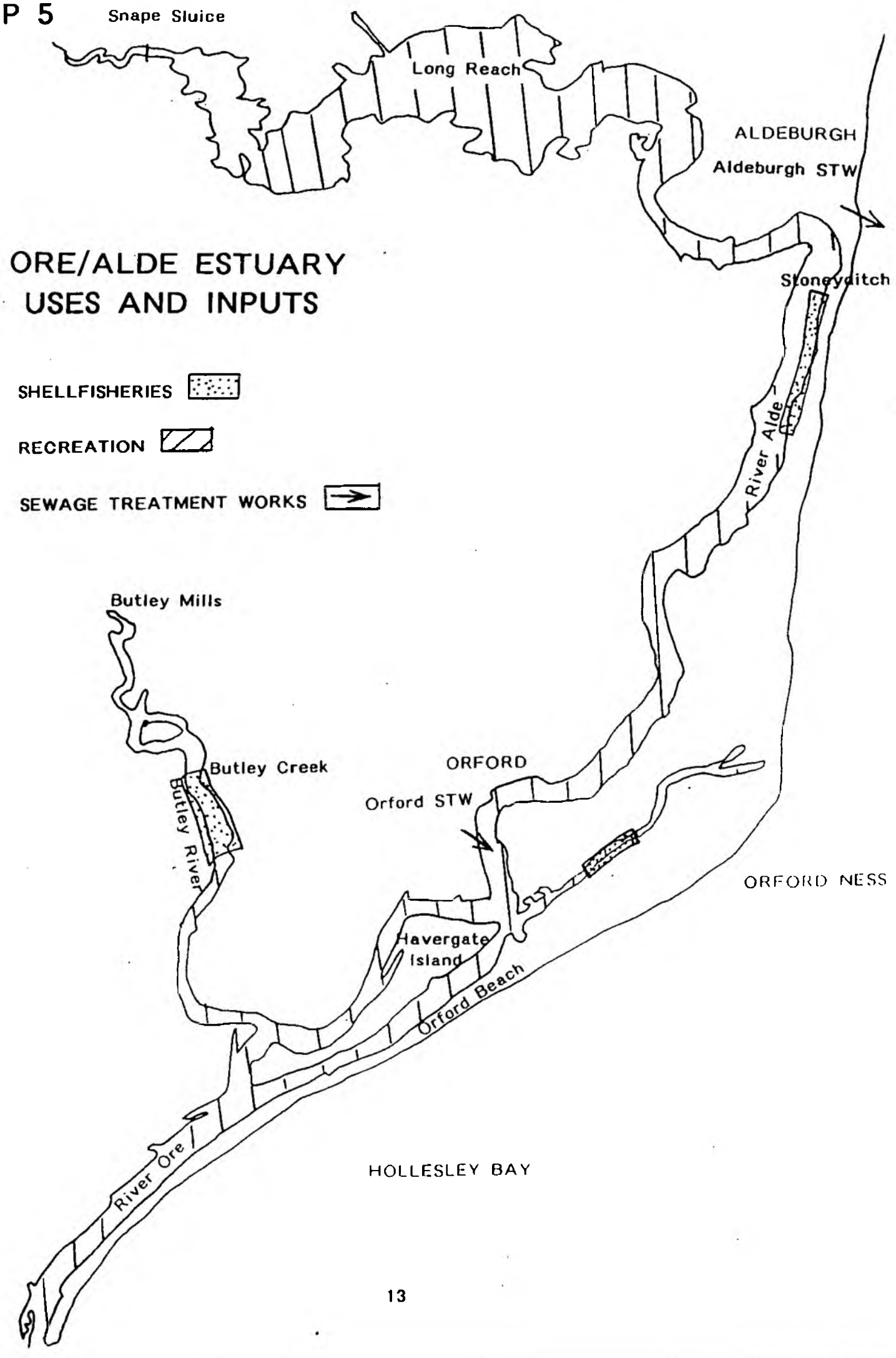
ORE/ALDE ESTUARY

NGR	TM4357
GEOMORPHIC TYPE	BAR BUILT ESTUARY
TIDAL TYPE	MESOTIDAL
TOTAL AREA ha	1821
INTERTIDAL AREA ha	1331.9
SHORELINE km	73.2
TIDAL CHANNEL km	28
AREA OF MUDFLATS ha	536
AREA OF SALTMARSH ha	341
TIDAL LIMIT	SNAPES SLUICE & BUTLEY MILLS
POPULATION	<1000
NRA SURVEY CLASS	A
SEWAGE INPUTS	ORFORD
DESIGNATIONS	SSSI, NNR, AONB, ESA, SPA.
RECREATION USES	SAILING, CANOEING, WINDSURFING, BATHING.
SHELLFISHERIES	BUTLEY CREEK STONEYDITCH
FISHERIES	FYKE NETTING & TRAWLING.
IMPORTANT BIRD SPECIES	AVOCET & WIDGEON

MAP 4


Snape Sluice
Long Reach
ALDEBURGH
ORE/ALDE ESTUARY
DESIGNATIONS
AREA OF OUTSTANDING NAURAL BEAUTY
SITE OF SPECIAL SCIENTIFIC INTEREST
River Alde
Butley Mills
Butley River
ORFORD
ORFORD NESS
Havergate
Island
Orford Beach
River Ore
HOLLESLEY BAY

MAP 5


Snape Sluice
Long Reach
ALDEBURGH
Aldeburgh STW
ORE/ALDE ESTUARY
USES AND INPUTS
SHELLFISHERIES
RECREATION
SEWAGE TREATMENT WORKS
Stoneyditch
River Alde
Butley Mills
Butley Creek
Butley River
ORFORD
Orford STW
ORFORD NESS
Havergate
Island
Orford Beach
River Ore
HOLLESLEY BAY

3 DEBEN ESTUARY

The Deben estuary is a an example of a coastal plain estuary with a total area of 1007 ha. It is an estuary that is over 12km long with 251ha of saltmarsh. It supports 40% of Suffolks area of saltmarsh, from Melton to Bawdsey. The Deben estuary is narrow and relatively sheltered with extensive mudflats on its inner reaches with more sandy deposits occurring where exposed Red Crag erodes from the cliffs. Historically the saltmarsh and mudflats have been lost to agriculture as reclaimed land.

The estuary supports a diverse saltmarsh community including some uncommon species of invertebrate fauna. The estuary is also very important for over-wintering waders and wildfowl.

The Deben tidal catchment has population of over 10 000 mainly from the towns of Woodbridge, Wikcham Market and Debenham. It has two main treated sewage inputs at Melton and Woodbridge. The water quality has been classified by NRA as grade B for a small section in the upper reaches and grade A further downstream. The tidal limit of the estuary is at Ufford Mill.

The estuary supports three small shellfisheries at Methersgate quay, Waldringfield and Shottisham Creek. Shottisham Creek is a small oysterage, whereas the other two are mussel shellfisheries.

3.1 DESIGNATIONS (Map 6)

The estuary lies within the Suffolk Coast and Heaths AONB and the Suffolk Heritage Coast. It is also part of the Suffolk River Valleys ESA, and has been proposed as a RAMSAR and SPA site. The designated SSSI area covers 976 ha which is most of the estuary. The reasons for notification include the estuaries importance with respect to the Redshank that overwinter on the estuary. The site is also important for the winter populations of Dark-bellied

Brent Goose, Shelduck and Black-tailed Godwit.

As mentioned before the estuary supports 40% of Suffolks area of saltmarsh which also displays the most complete range of the floral community types in the county. The estuary supports three nationally scarce plant species; Marsh Mallow, Shrubby seablite and Small cord grass. The nationally rare mollusc Vertigo augusior and the nationally scarce V. pusilla have been recorded on the estuary.

3.2 USES (Map 7)

3.2.1 RECREATION:

Water contact sports on the estuary are numerous. Sailing, windsurfing and canoeing take place over much of the estuary and water skiing is permitted in Falkenham Creek. There are large numbers of moorings at Woodbridge, Waldringfield and Felixstowe Ferry and a marina at Woodbridge.

3.2.2 SHELLFISHERIES:

There are three shellfisheries on the Deben estuary. Shottisham Creek has an oysterage of class B, Methersgate Quay has a mussel shellfishery of class C and Waldringfield has a mussel shellfishery of class B. None of the three sites are designated under the original EC Shellfish Directive 1979. The sites are not commercial and are owned by several people, the necessity of a depuration plant makes the sites commercially unviable.

3.2.3 FISHERIES:

Trawling and seine-netting for fish occurs over a small area of the estuary.

3.2.4 INDUSTRY:

The industrial activity on the estuary is small but includes a working tidal mill and several boat yards at Woodbridge, Waldringfield and Old Felixstowe. There is also a small extensively used public quay at Feixstowe Ferry.

3.3 INPUTS

3.3.1 EFFLUENTS:

There are two main treated sewage inputs into the Deben, at Woodbridge and at Melton. Melton STW has a current consent of 60SS/40BOD, has full treatment, and the existing quality is satisfactory. Woodbridge STW has a current consent of 70SS/35BOD, it also undergoes full treatment and its quality is satisfactory with respect to its consent conditions.

3.3.2 RIVERS:

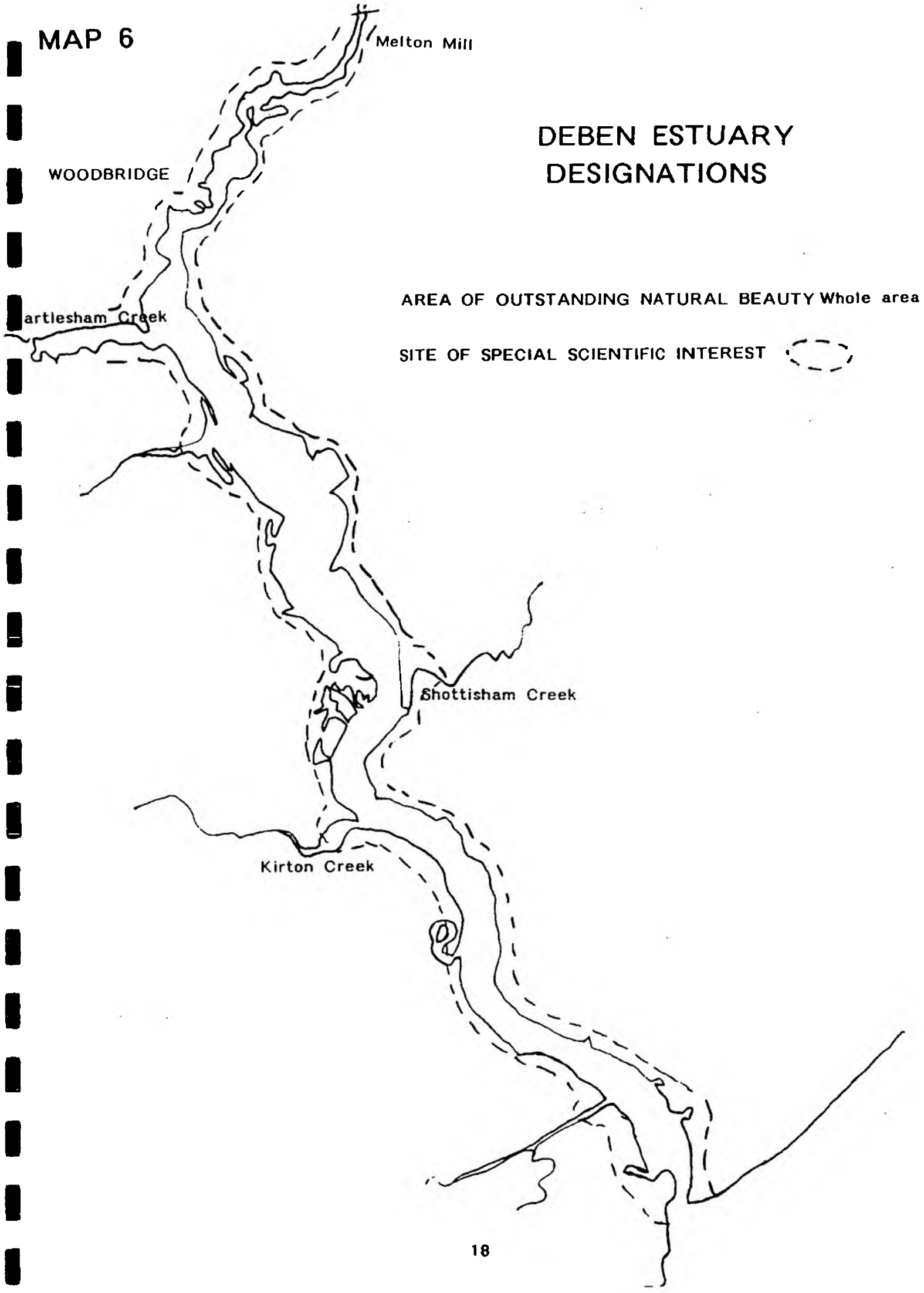
The tidal limit of the Deben is at Ufford Mill and the estuary does not possess a saline wedge. The catchment is largely agricultural cereal farming, with some forestry. And large numbers of agricultural licensed abstractors along the freshwater river result in low residual flows entering the estuary.

3.4 SUMMARY

DEBEN ESTUARY

NGR	TM2945
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MESOTIDAL
TOTAL AREA ha	1007
INTERTIDAL AREA ha	687.4
SHORELINE km	49.8
TIDAL CHANNEL km	19.7
AREA OF MUDFLATS ha	447
AREA OF SALTMARSH ha	251
TIDAL LIMIT	MELTON MILL
POPULATION	10 000
NRA SURVEY CLASS	A, UPPER REACHES B
SEWAGE INPUTS	WOODBRIDGE, MELTON
DESIGNATIONS	SSSI, AONB, ESA.
RECREATION USES	SAILING, CANOEING, WINDSURFING, WATER SKIING.
SHELLFISHERIES	SHOTTISHAM CREEK, WALDRINGFIELD, METHERSGATE QUAY
FISHERIES	TRAWLING & SEINE NETTING
IMPORTANT BIRD SPECIES	REDSHANK, DARK BELLIED BRENT GOOSE, SHELDUCK, BLACK-TAILED GODWIT

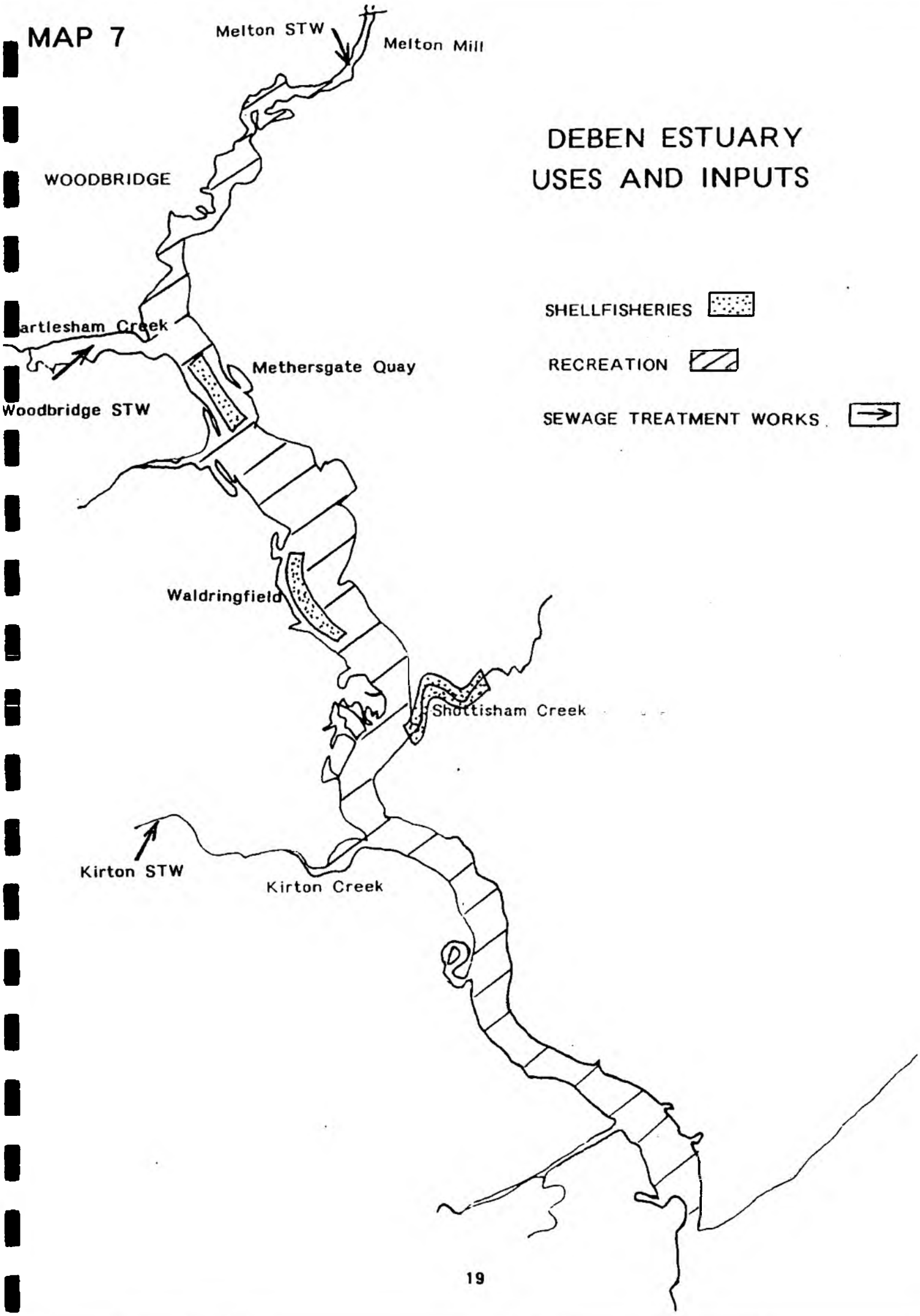
MAP 6



DEBEN ESTUARY DESIGNATIONS

AREA OF OUTSTANDING NATURAL BEAUTY Whole area

SITE OF SPECIAL SCIENTIFIC INTEREST


MAP 7
Melton STW
Melton Mill
DEBEN ESTUARY
USES AND INPUTS
WOODBRIDGE
SHELLFISHERIES
RECREATION
SEWAGE TREATMENT WORKS
artlesham Creek
Methersgate Quay
Woodbridge STW
Waldringfield
Shottisham Creek
Kirton STW
Kirton Creek

4 ORWELL ESTUARY

The Orwell estuary is a coastal plain estuary with an area of 1785 ha. The tidal channel of the Orwell estuary extends about 20 km from Constantine Weir in Ipswich to Feixstowe. The intertidal zone of the upper estuary has been extensively developed to create Ipswich dock. The intertidal flats consist of a wide diversity of substrates but are dominated by fine silt. It is a long, narrow and relatively sheltered estuary that is heavily influenced by the sea.

Saltmarshes have developed within the embayments and although they are not large they support a diverse floral population. The most extensive areas are at Levington and Colton Creeks.

The Orwells lower reaches are adjacent to the Stour estuary, at the mouth the estuary is dominated by the ports of Harwich and Felixstowe.

During the last century the Orwell estuary has come under increasing pressure from both industrial and recreational activities that substantially affect the water quality of the estuary.

With a tidal catchment population of 155,000 the Orwell has sewage treatment works at Cliff Quay, Levington, Shotley and Felixstowe South. The high numbers of discharge points have resulted in mixed water quality. It moves from a grade D in the upper reaches improving to grade A at the mouth. There are 9.5 km of grade A quality, 8 km of grade B, 2 km of grade C and 2 km of grade D.

Industrial effluent also enters from treatment works at British Sugar Corporation (Sproughton), Pauls Malt (Ipswich), Felixstowe Tankstore, Ancliffe and British Fermentation (Felixstowe).
The mid estuary is flanked by farmland and wet meadows and much

of the industry around the estuary is agriculture related. The freshwater marshes near the estuary mouth provide a habitat for waterfowl, breeding waders and sea birds, some internationally and nationally important species roost here.

Occasional cockle and mussel collection takes place at Nacton shores but it is not extensive and is class C under the E.C. Shellfish Hygiene Directive 1993.

4.1 DESIGNATIONS (Map 8)

The Orwell estuary is part of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty and part of the Stour-Orwell proposed SPA and RAMSAR site. 1229.4 ha of the Orwell estuary has been designated as an SSSI, it extends from the New Channel at Ipswich to Shotley Point at Harwich Harbour. The reasons for its notification are the large numbers of wading birds visiting the estuary in winter including the Redshank, Dunlin and Turnstone. Up to 18 species of wildfowl winter on the estuary such as Wigeon, Shelduck and the Dark bellied Brent Goose.

The extensive mudflats support large patches of Eel grass Zostera marina, and Dwarf Eel grass, Z. noltii. The nationally rare plant, the Stinking goosefoot, Chenopodium vulvuaria, can also be found on the estuary.

In addition to the designated areas there are Local Nature Reserves and Suffolk Wildlife Trust Reserves.

4.2 USES (Map 9)

4.2.1 RECREATION:

The Orwell estuary has a high amenity value. There are marinas at Wherstead, Shotley, Levington, Woolverstone and Ipswich with moorings at Pin Mill, Orwell and Freston.

Sailing, power boating, water skiing, canoeing and SCUBA diving all take place on the estuary. Canoeing tends to take place on the upper estuary, sailboarding from Ipswich to Levington and cruising from Ipswich to the estuary mouth.

4.2.2 SHELLFISHERIES:

There is only a small, non commercial mussel and cockle shellfishery at Nacton shore, although potential exists in future in the lower reaches.

4.2.3 FISHERIES:

Seine netting, tangle netting in the creeks, trawling and fyke netting for Eels occurs over most of the estuary. Bass is caught in limited numbers up to Pin Mill, Eels are prolific up to the freshwater limit, Grey mullet can be caught from the lock gates to Harwich and both Sole and Plaice can be found between Pin Mill and Felixstowe. Flounders, Skate and Dabs are found on the estuary but only in small numbers.

Bait digging occurs in 70% of the estuary margins and Lobster pots are used off Harwich and Felixstowe.

4.2.4 INDUSTRY:

There are two large container ports at Ipswich and Felixstowe and two small boat building yards at Ipswich and one at Chelmondiston. Other associated industries in dock side areas include, malting, an oil depot and chemical storage.

4.2.5 SEDIMENT EXTRACTION AND DREDGING:

Capital dredging has deepened the dock at Felixstowe and dredging maintains the shipping channels through the estuary at approximately 13 m. There are future plans to deepen the channel at Levington and Dovercourt.

4.3 INPUTS

4.3.1 EFFLUENTS:

There are five main sewage outfalls affecting the tidal Orwell, Cliff Quay which has primary treatment and is considered to be of poor quality, Chantry and Levington, which both have full treatment and whose quality is compliant with respect to their NRA consents. Shotley STW only undergoes primary treatment and is considered to have marginal quality, Felixstowe South is macerated and only discharge on the ebb tide, with an effluent quality that is considered to be marginal. Both Shotley and Felixstowe South are scheduled to introduce secondary treatment under the UWWTD. Cliff Quay has a current consent of 300SS and is to have biological treatment by September 1995 to a 120mg/l BOD standard. Levington has a current consent of 60SS/ 40BOD, Shotley has a current consent of 200SS and Felixstowe South has an exemption order consent and discharges into the outer harbour.

The Orwell estuary has three trade wastes entering it from Burtons Confectionery Factory, which has recently closed down and Pauls Maltings both at Ipswich docks. The third being at British Sugar at Sproughton. Pauls and British Sugar are both balanced discharges, only discharging during specific tidal windows.

4.3.2 RIVERS:

The tidal constraint on the Orwell estuary is at Horseshoe weir, Ipswich. There is no saline wedge present in the Orwell estuary for most of the time. The catchment land use of the Orwell is mainly agricultural, with cereal farming predominating. The small towns of Stowmarket and Needham Market do, however, have industry and associated trade discharges.

PLATE 3

River Orwell looking downstream towards Woolverstone - illustrating the use of the estuary for pleasure pursuits and wildfowl and waders.

PLATE 4

Foxes Marina, Wherstead. A typical East Coast estuaries marina that has an impact on the water quality of the estuary.

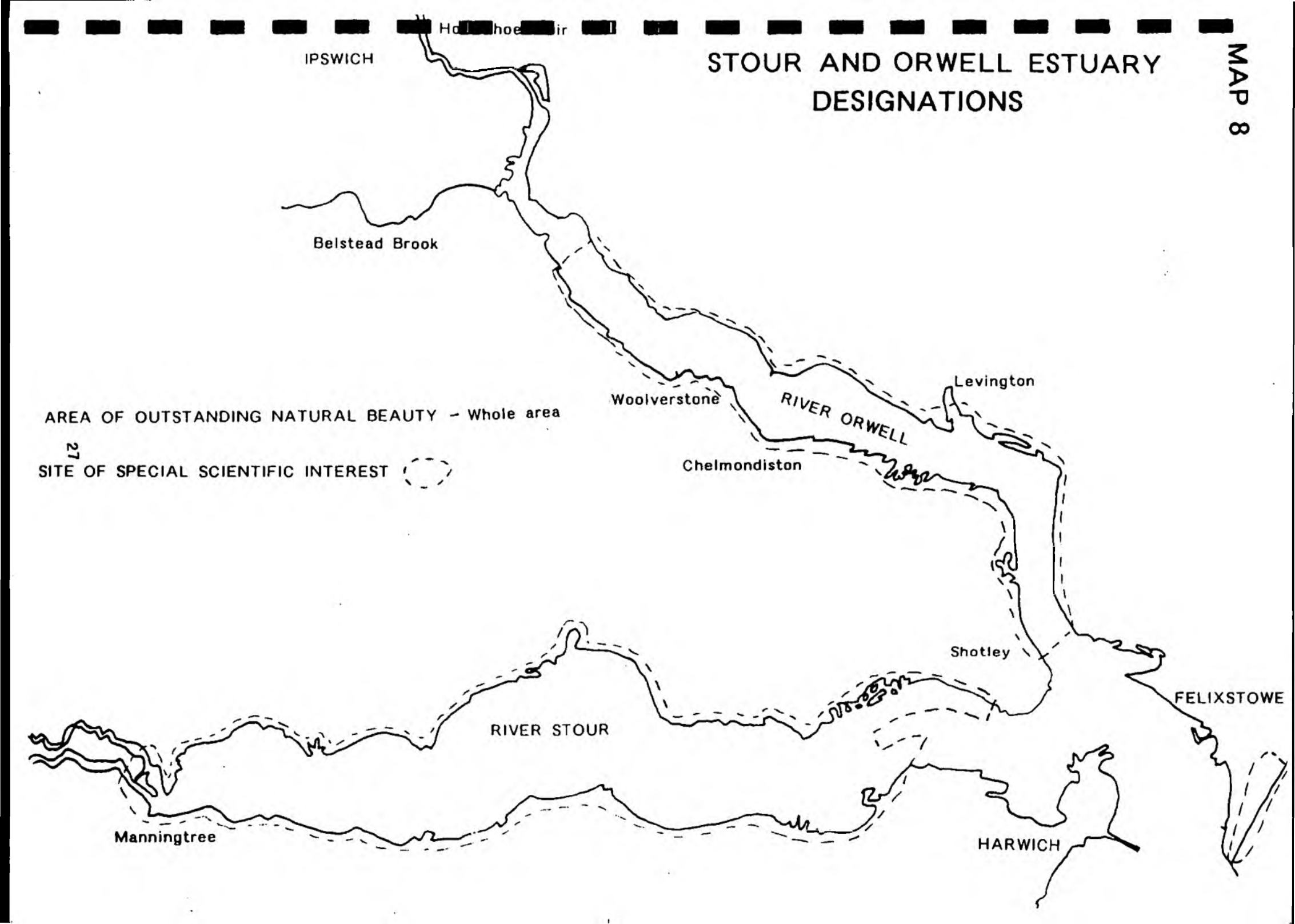
4.4 SUMMARY

ORWELL ESTUARY

NGR	TM2338
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MESOTIDAL
TOTAL AREA ha	1786
INTERTIDAL AREA ha	577
SHORELINE km	51
TIDAL CHANNEL km	20
AREA OF MUDFLATS ha	713
AREA OF SALTMARSH ha	74
TIDAL LIMIT	HORSESHOE WEIR
POPULATION	155 000
NRA SURVEY CLASS	UPPER REACHES D, LOWER REACHES A
SEWAGE INPUTS	CLIFF QUAY, CHANTRY LEVINGTON, SHOTLEY
INDUSTRIAL INPUTS	BURTONS, PAULS & BRITISH SUGAR
DESIGNATIONS	SSSI, AONB, ESA
RECREATION USES	SAILING, CANOEING, SCUBA DIVING, POWER BOATING, WATER SKIING.
SHELLFISHERIES	NACTON SHORES
FISHERIES	FYKE NETTING, TRAWLING, TANGLE NETTING, SEINE NETTING
IMPORTANT BIRD SPECIES	REDSHANK, SHELDUCK & DUNLIN

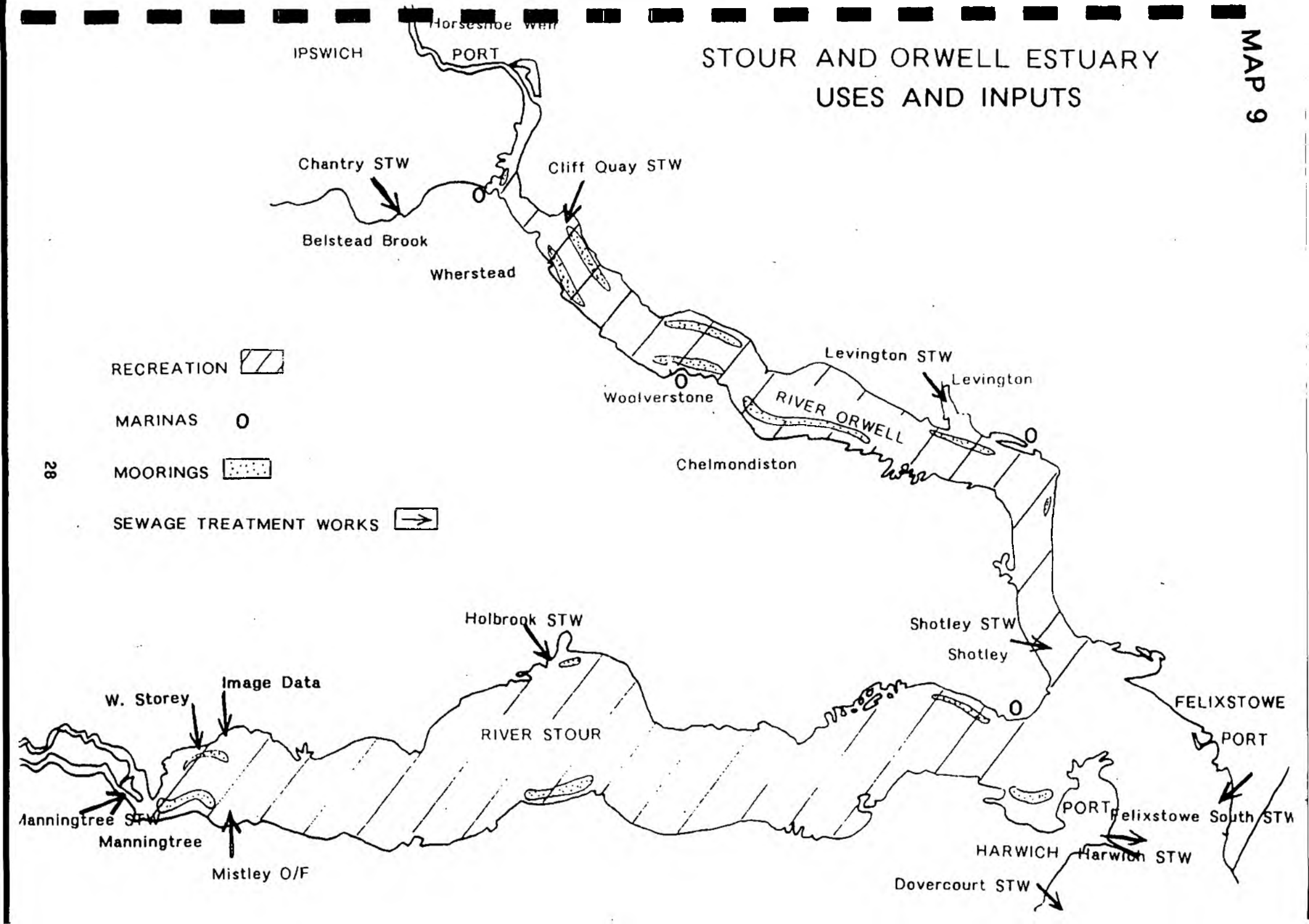
STOUR AND ORWELL ESTUARY DESIGNATIONS

MAP 8



STOUR AND ORWELL ESTUARY
USES AND INPUTS

MAP 9



5 STOUR ESTUARY

The Stour estuary is a coastal plain estuary with a total area of 2531 ha. The Stour estuary runs almost due east west for 19 km between a tidal barrage upstream of Manningtree to Harwich. The banks are natural for most of its length and the width varies from 10 m to 2 km. A series of bays on both shores create an intertidal zone of up to 1.5 km in places leaving some 1600 ha of mud exposed at low water. Flourishing populations of Eel grass exist in the mid to lower reaches most notably in Holbrook Bay on the north shore and Copperas Bay on the south.

Much of the estuary is lined by sharply rising land or even boulder clay cliffs so there is little saltmarsh in this area, Erwarton Bay and Copperas Bay support the largest area of saltmarsh. Cattawade marshes at the top of the estuary is an area of grazing marsh with associated open water and fen, it is an important habitat for both flora and fauna. However erosion infront of the factories at Brantham has become a problem and is subject to an NRA investigation.

The tidal Stour catchment has a population of 17,000 and has three sewage outfalls into the estuary at Manningtree, Mistley and Holbrook. Harwich and Dovercourt sewage treatment works have outfalls into the North Sea. The water quality of the Stour estuary has been classe by NRA as grade A.

5.1 DESIGNATIONS (Map 8)

The Stour estuary along with the Orwell estuary is a proposed SPA and RAMSAR site. It lies within the Suffolk River Valleys ESA and the Suffolk Coast and Heath AONB. 2150 ha of the estuary has been designated an SSSI for its biological and geological interest. The estuary also has an RSPB reserve at Copperas Bay and an Essex Wildlife Trust Reserve. Tourism is very important on the

estuary, it is 'Constable Country'and many people come here to paint and walk.

Notification reasons are due to the fact that the mud is extremely rich in invertebrates, also the estuary is relatively free from disturbance which enables the estuary to support internationally significant wildfowl and waders. The shoreline is one of the most natural in the region, often with low cliffs. The cliffs at Stutton and Wrabness contain nationally important geological exposures.

Nine species of wildfowl and wader occur in nationally important numbers including the Redshank, Grey Plover, Shelduck and Wigeon. The main concentration of birds is in Holbrook Bay.

The higher salt marsh is dominated by Saltmarsh grass, Puccinellia spp., and Sea Purslane, Halimione portulacoides. The shoreline vegetation varies from oak dominated wooded cliffs, through scrub covered banks to coarse grasses over sea walls. The fauna found includes 43 notable species.

5.2 USES (Map 9)

5.2.1 RECREATION:

The tidal Stour is used for boating activity in a traditional manner. The area hosts everything from commercial container ports and ferry terminals to local dinghy hards. There are at present only one marina that at Shotley, and moorings at Wrabness, Mistley and Holbrook. Water skiing is limited to a small section in the mid estuary, sailing occurs along the estuary but it is not intensive. Other water contact sports practised include Windsurfing and sailboarding.

5.2.2 FISHERIES:

A variety of fish are netted up the estuary, they include Eels, Mullet, Bass and Herrings. Commercially the fish stocks within the estuaries are not viable for larger fisheries.

Bait digging for Lugworm and Ragworm also takes place over a small part of the estuary.

5.2.3 INDUSTRY:

Industrial activity includes three ports at Mistley, Parkstone Quay and Harwich. There is a dock extension currently in construction at Bathside Bay. There are also two plastic film factories at Brantham but with only a small effluent discharge from each and limited estuarine impact. Two maltings exist at Mistley, discharging to the estuary via an AW plc sewer.

5.2.4 SEDIMENT EXTRACTION AND DREDGING:

Capital dredging maintenance of the shipping channels occurs throughout the estuary, as well as some commercial estuarine aggregates extraction, which over the years has extensively damaged the bed channel.

5.3 INPUTS

5.3.1 EFFLUENTS:

Manningtree STW undergoes full treatment with existing quality that is considered to be satisfactory. At present it has a consent of 75SS/ 50BOD/ 20AMMONIA. Mistley outfall has a consent of 50SS/50BOD and at present has no treatment, its existing quality is only marginal since it contains Maltings Steep Liquors. There are plans to treat the effluent for BOD reduction in 1994. Holbrook STW undergoes full treatment and is considered to be compliant with respect to its current consent of 100SS/80BOD. Both Harwich and Dovercourt effluent are untreated and their existing quality is consequently poor. There are plans to fully treat both effluents at a new site by 1999.

5.3.2 RIVERS:

The tidal constraint on the Stour is at Cattawade sluice and Judas Gap. As with the Orwell the main catchment land use is agricultural and the area is of grade 2 and 3 under the MAFF classification scheme. It is mainly arable but there is

increasing reversion to grazing in the valleys. The industrial towns of Haverhill and Sudbury contribute significant volumes of treated trade and domestic effluent to the freshwater Stour. The flow in the River Stour is supplemented by water from the Ely-Ouse to Essex transfer scheme and the Stour Augmentation Groundwater Scheme.

There is no evidence of a saline wedge on the Stour estuary.

PLATE 5

Felixstowe Docks from the bathing beach at Harwich. Industrial discharges and dockside activities have an impact on water quality in the Stour/ Orwell area.

5.4 SUMMARY

STOUR ESTUARY

NGR	TM1833
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MESOTIDAL
TOTAL AREA ha	2531
INTERTIDAL AREA ha	1637
SHORELINE km	48
TIDAL CHANNEL km	20
AREA OF MUDFLATS ha	1506
AREA OF SALTMARSH ha	95
TIDAL LIMIT	CATTAWADE SLUICE
POPULATION	17 000
NRA SURVEY CLASS	A
SEWAGE INPUTS	MANNINGTREE, MISTLEY & HOLBROOK
DESIGNATIONS	SSSI, AONB, ESA
RECREATION USES	SAILING, WATER SKIING, WINDSURFING & SAILBOARDING
FISHERIES	FYKE NETTING, TRAWLING
IMPORTANT BIRD SPECIES	REDSHANK, GREY PLOVER, SHELDUCK, WIGEON

6 WALTON BACKWATERS

Walton Backwaters is a mesotidal embayment, it is not an estuary in the true sense. Walton Backwaters is a large, shallow estuarine basin whose mouth is about threee miles south of Harwich. It is flanked by two shingle spits, one from Dovercourt southwards and one from Naze northwards. The intertidal area is a mosaic of islands, tidal creeks, mudflats, sandflats and saltmarsh. Skippers Island was once formerly enclosed from the sea as grazing marsh, it has reverted to saltmarsh as a result of a breach in the seawall. The largest island Horsey Island is inhabited and farmed.

The mudflats are very rich in vegetation. There is a great diversity of waterfowl in winter, Wigeon often use the estuary as shelter during harsh winters. As with the Orwell the bird population is interchangable with the Stour.

Walton Backwaters tidal catchment has a population of less than 1,000 and has three main sewage effluents potentially affecting it; Walton, Dovercourt and Harwich. The EXCHEM factory on Bramble Island also discharges directly into the estuary of Bramble Creek. The water quality of Walton Backwaters has been classed as potentially grade A.

The estuary supports two important commercial shellfisheries at The Twizzle and Kirby Creek both were designated under the EC Shellfish Directive 1979.

6.1 DESIGNATIONS (Map 10)

Walton Backwaters is a designated SSSI, the area notified covers an area of 2140 ha, nearly the whole of the estuary. Most of this area is a National Nature Reserve and a Nature Conservation

Review Site. The Nature Reserve on Skippers Island is managed by the County Wildlife Trust. Walton Backwaters has been proposed as a SPA and RAMSAR site.

The reasons for notifications are due to its international importance for breeding Little Terns and overwintering Dark-bellied Brent Geese, wildfowl and waders. Walton Backwaters supports rare communities of of coastal plants, including Hog's Fennel Peucedanum officinale.

Extensive salt marsh covers one third of the area providing a habitat for flora such as Thrift, Rock Sea Lavender and Sea Aster. The uncommon Slender Hare's-ear is often found on the sea wall. The intertidal area supports an abundant invertebrate community comprising mainly of annelids and thin shelled molluscs. The mudflats support a number of local plants and area major feeding ground for approximatley 6,000 over wintering Brent Geese. Walton Backwaters is also home to the internationally important Shelduck, Teal, Grey Plover, Blacktailed Godwit and Sanderling.

6.2 USES (Map 11)

6.2.1 RECREATION:

Aquatic sports take place all along the main Walton Channel and Hamford Water with the marina and moorings concentrated on Walton Channel and The Twizzle. Fishing, sailboarding, windsurfing, sailing and some water skiing occurs some areas of the estuary.

6.2.2 SHELLFISHERIES:

Both The Twizzle and Kirby Creek are commercially important oyster shellfisheries and have been for the last 50 years. They are graded as class B under the Shellfish Hygiene Directive and are designated shellfisheries under the EC Shellfish Directive 1979.

6.2.3 FISHERIES:

Fyke-netting for eels and trawling occurs over limited parts of the estuary, as does bait digging for Lugworm and Ragworm.

6.2.4 INDUSTRY:

The EXCHEM explosives factory at Bramble Island discharges directly into the estuary at Bramble Creek. It is consented for a tidal discharge around high water only with limitation in respect of its chemical quality.

6.3 INPUTS

6.3.1 EFFLUENTS:

The two main effluents potentially affecting Walton Backwaters are Walton, Dovercourt and Harwich. Walton undergoes full treatment and is at present meeting its consent of 100SS/95BOD. Harwich and Dovercourt have no treatment and enter the North Sea as crude sewage, they are both considered as having a poor quality.

6.3.2 RIVERS:

There is no saline wedge in Walton Backwaters since it has no inputs.

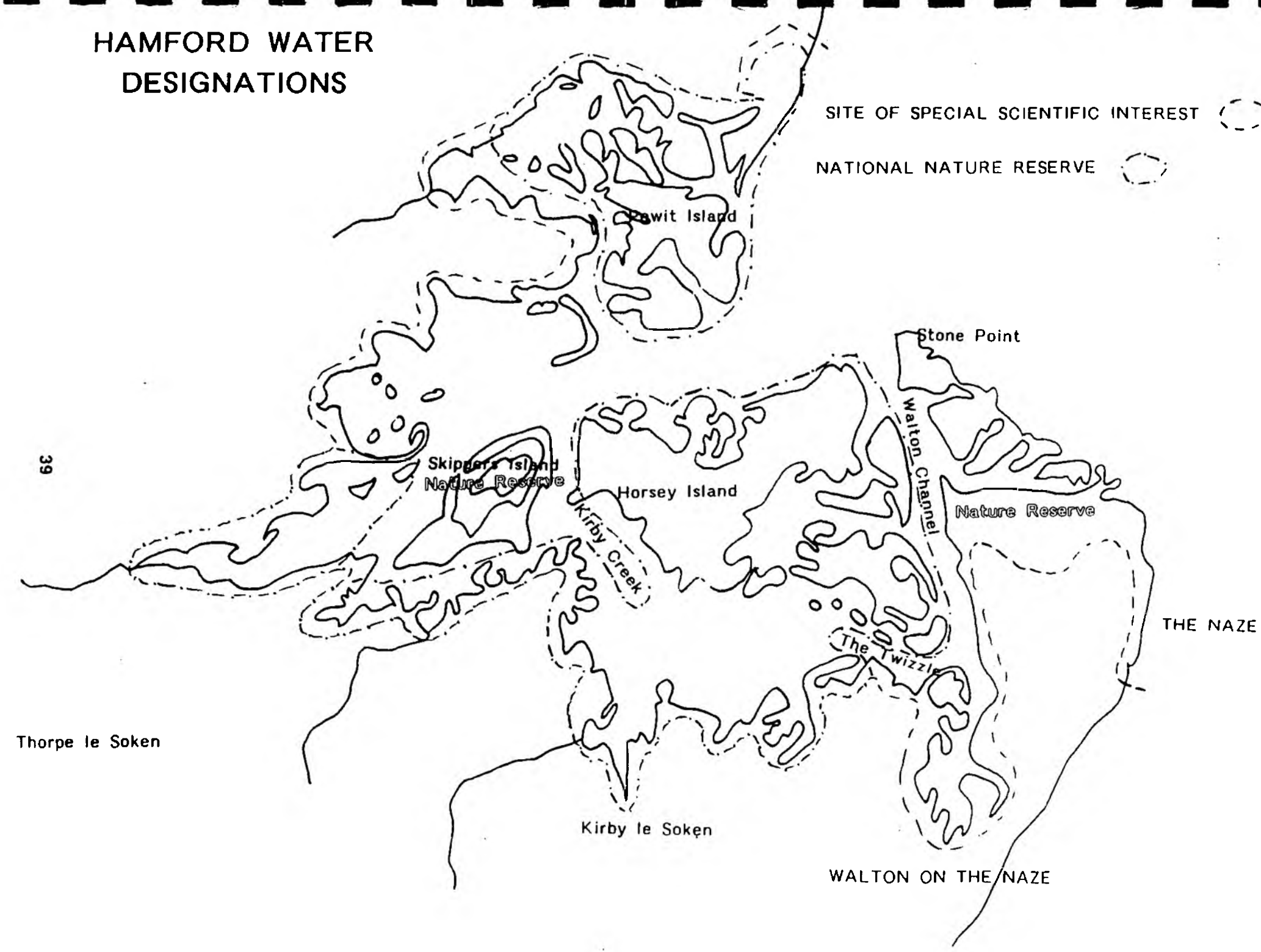
No freshwater inputs of any significance enter the backwaters and the system is fully saline. Surrounding agricultural land is largely arable.

6.4 SUMMARY

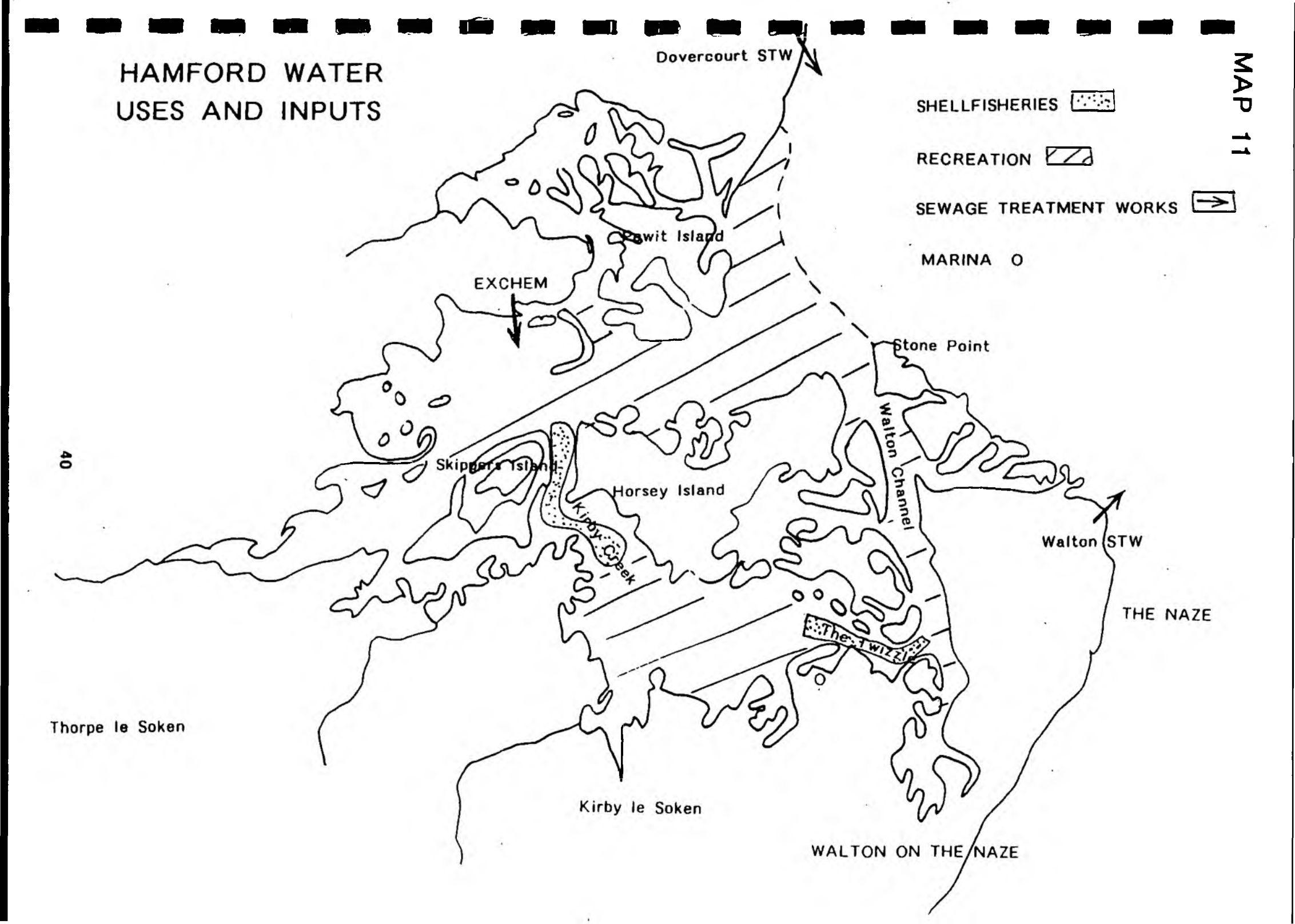
WALTON BACKWATERS

NGR	TM2325
GEOMORPHIC TYPE	EMBAYMENT
TIDAL TYPE	MESOTIDAL
TOTAL AREA ha	2377
INTERTIDAL AREA ha	1570
SHORELINE km	54
TIDAL CHANNEL km	8
AREA OF MUDFLATS ha	1400
AREA OF SALTMARSH ha	900
TIDAL LIMIT	BEAUMONT QUAY
POPULATION	<1 000
NRA SURVEY CLASS	A
SEWAGE INPUTS	WALTON (Seaward only)
INDUSTRIAL INPUTS	EXCHEM
DESIGNATIONS	NNR, SSSI
RECREATION USES	SAILING, WINSURFING, SAILBOARDING.
FISHERIES	FYKE NETTING & TRAWLING
IMPORTANT BIRD SPECIES	SHELDUCK, TEAL, GREY PLOVER, BLACK TAILED GODWIT & SANDERLING

HAMFORD WATER DESIGNATIONS



MAP 10


HAMFORD WATER
USES AND INPUTS
MAP 11
Dovercourt STW
SHELLFISHERIES
RECREATION
SEWAGE TREATMENT WORKS
MARINA O
Pawit Island
EXCHEM
Stone Point
Walton Channel
Skippers Island
Horsey Island
Kirby Creek
Walton STW
THE NAZE
The Twizzle
Thorpe le Soken
Kirby le Soken
WALTON ON THE NAZE
40

7 COLNE ESTUARY

The Colne estuary is a coastal plain estuary with a total area of 2335 ha. The estuary is comparatively short and branching, with five tidal arms which flow into the main river channel, these tidal arms have extensive mudflats that are exposed at low tide. The intertidal flats become a mixture of mud and sand in the lower reaches of the estuary. The Colne has quite an extensive area of undisturbed saltmarsh of which the most notable areas are Fingringhoe and Geedons Creek, Colne Point on the eastern shore has saltmarsh that is showing signs of degradation.

At Colne Point two shingle spits exist which enclose a large area of saltings. Before the mid 19th century this area used to be extensive shingle ridges. The habitats that the Colne estuary provides are quite diverse, it supports a varied invertebrate fauna and supports a large number of wintering wildfowl.

The Colne estuary has a population of 107,000, the main centres of population being Colchester, Brightlingsea and Wivenhoe. The Colne has several sewage discharges that directly affect its quality; Jaywick, Brightlingsea, St. Oysth, Colchester and Fingrinhoe. The main body of water in the estuary has been classed as grade A, in terms of water quality, the upper reaches of the estuary have however been downgraded to grade B and C.

There are several important shellfisheries on the Colne estuary; Pyefleet Channel, Bench Head, Batchelor Spit, The Nothe and Buoy 13 at the harbour entrance, these have been in use since Roman Times but have been badly affected by TBT or Bonamia in recent times.

7.1 DESIGNATIONS (Map 12)

2,915 ha of the Colne estuary is covered by the designation of

SSSI. The SSSI includes a large area of National Nature Reserve and two Geological Conservation Review sites. Essex Wildlife Trust also manage reserves within the estuary at Abberton and Colne Point. The Colne estuary has been proposed as a SPA and RAMSAR site.

The reasons for SSSI notification are many, the variety of habitats support outstanding assemblages of invertebrates and plants. The Colne estuary has a narrow intertidal zone predominantly composed of flats of fine silt with mudflat communities typical of south eastern estuaries where the fauna is dominated by Hydrobia ulvae. The nationally uncommon species, Golden Samphire, Inula crithmoides, and Shrubby Seablite, Suaeda vera, occur frequently in the upper marsh and at the foot of the sea walls. The transitional habitat that occurs from saltmarsh to sand dune is important for the rare Sea Heath, Frankenia laevis.

The saltmarsh and intertidal mud, with Mersea Flats provide an extensive feeding area of the internationally important Brent Geese. Redshank, Dunlin, Sanderling and Blacktailed Godwit are also present in nationally important numbers. The grazing marsh at East Mersea and the Geedon Saltings provide the main high tide roost for waders.

Much of the invertebrate interest is in the ungrazed marsh on Fingringhoe Ranges and it is believed to be the best Essex site for aquatic invertebrates outside the Thames estuary. Langenhoe is the only Essex site for the uncommon Hairy Dragonfly, Brachytron pratense.

7.2 USES (Map 13)

7.2.1 RECREATION:

Water based sports are particularly dominant in the lower Colne estuary. Sailing and windsurfing occur over most of the estuary, but power boating and water skiing are restricted to

Brightlingsea Creek and East Mersea.

7.2.2 SHELLFISHERIES:

There are important shellfisheries in the Colne estuary and around Mersea Island. The shellfisheries are all mussel shellfisheries with a grading of class B, apart from Bench Head, and Pyefleet Channel, which are oysterages of class A quality, Batchelor Spit and Buoy 13 are class B and The Nothe which is an oysterage of class C. Only Pyefleet Channel has been designated under the original E.C. Shellfish Directive 1979.

7.2.3 FISHERIES:

Fish netting and trawling as well as fyke netting for eels occurs over much of the estuary.

7.2.4 INDUSTRY:

There are small docks based at Brightlingsea, Wivenhoe, Rowhedge and Hythe. Brightlingsea also has a light engineering works and boat building yard. St. Osyth has a boat building yard and a gravel extraction area.

7.2.5 SEDIMENT EXTRACTION AND DREDGING:

Capital dredging and maintenance dredging occurs along the entire estuary.

7.3 INPUTS

7.3.1 EFFLUENTS:

There are several sewage effluents that potentially affect the Colne estuary; Jaywick outfall has no treatment and discharges into the North Sea, at present it has marginal quality but primary settlement is planned under the UWWWTD. Brightlingsea, St. Oysth, Colchester and Fingringhoe all have full treatment and are at present of variable quality in relation to their impact on the estuary. Colchester STW has a current consent of 60SS/25BOD, Fingringhoe has a consent of 50SS/25BOD, Brightlingsea has a consent of 80SS/40BOD, St. Oysth has a current consent of 60SS/50BOD and Jaywick has an exemption order

consent.

7.3.2 RIVER:

The tidal limit of the Colne estuary is at East Mills, Colchester. There is no apparent saline wedge on the Colne. The freshwater catchment is largely arable agricultural.

7.3.3 COLNE ESTUARY BARRAGE SCHEME:

Currently in the course of construction is a barrier for flood defence purposes at Wivenhoe. It will remain open normally and be closed on 3 or 4 occasions a year with consequently little effect on water quality.

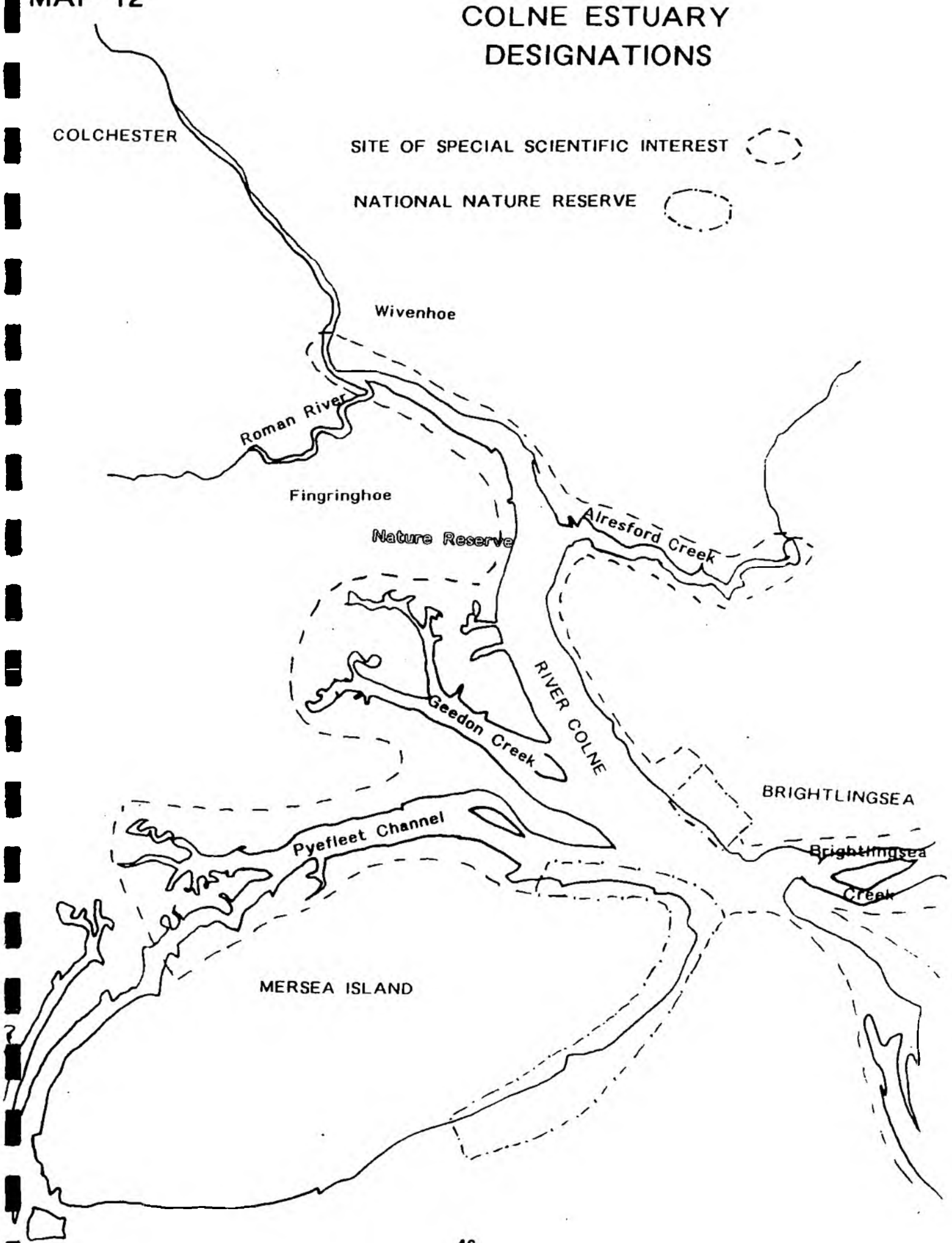
7.4 SUMMARY

COLNE ESTUARY

NGR	TM0617
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MACROTIDAL
TOTAL AREA ha	2335
INTERTIDAL AREA ha	2002
SHORELINE km	90
TIDAL CHANNEL km	16
AREA OF MUDFLATS ha	700
AREA OF SALTMARSH ha	300
TIDAL LIMIT	East Mills, Colchester
POPULATION	107 000
NRA SURVEY CLASS	A, UPPER REACHES B
SEWAGE INPUTS	ST. OYSTH, COLCHESTER & FINGRINGHOE
DESIGNATIONS	SSSI, NNR
RECREATION USES	SAILING, POWER BOATING, CANOEING, SAILBOARDING & WINDSURFING
SHELLFISHERIES	PYEFLEET CHANNEL, BATCHELOR SPIT, BENCH HEAD, THE NOTHE & HARBOUR ENTRANCE
FISHERIES	TRAWLING AND FYKE NETTING
IMPORTANT BIRD SPECIES	BRENT GEESE, SANDERLING, REDSHANK, DUNLIN & BLACKTAILED GODWIT

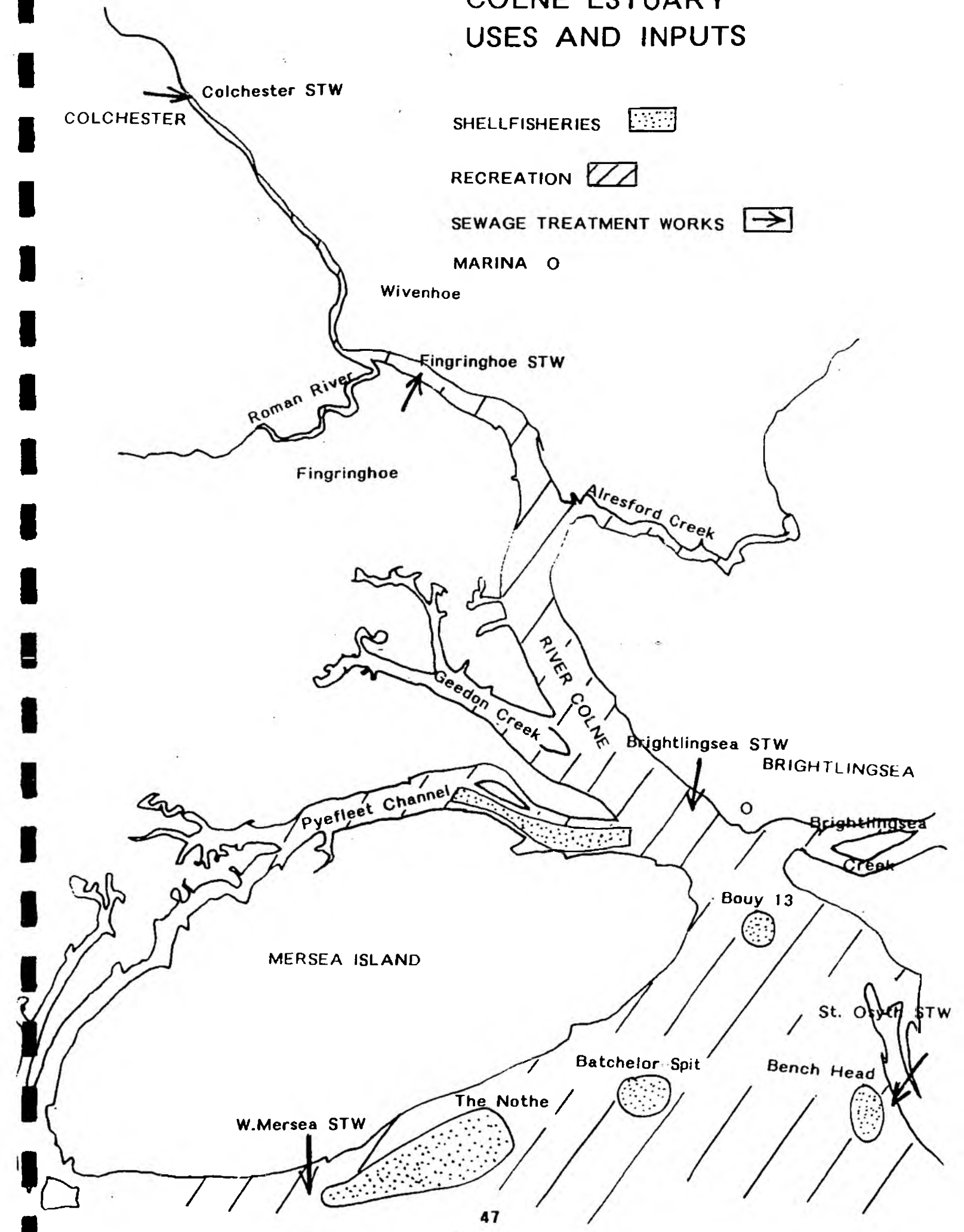
MAP 12

COLNE ESTUARY DESIGNATIONS



MAP 13

COLNE ESTUARY USES AND INPUTS



8 BLACKWATER ESTUARY

The Blackwater estuary is the largest estuary in Essex, apart from the Thames. To the north of its mouth the Blackwater is joined by the Colne and to the south it is continuous with the Dengie flats. The Blackwater has two islands, Osea Island and Northey Island. It has many creeks, river channels and saltmarsh which provide a diversity of habitats.

Its remote position, great extent, variety of habitats and abundant supply of food make it very attractive for a great range of sea and shore birds, especially Brent Geese. Together with the Colne, Dengie flats and the Maplin Sands this site is one of the most important over wintering sites for wildfowl and waders in Western Europe.

Most of the intertidal area of the Blackwater estuary is mudflats, saltmarsh is not extensive and tends to occur in pockets, at present the saltmarsh is suffering from erosion.

A large proportion of the saltings have been reclaimed along the estuary shore, and much of this area has been converted into arable land.

The Blackwater Estuary tidal catchment has a population of 20,000 with the main centre of population at Maldon. There are a number of sewage effluents entering the estuary and its tributaries at West Mersea, Tiptree, Tollesbury, Maldon and the combined effluents from Chelmsford and Witham. The water quality is of NRA grade A standard, with a small section of grade B in the upper reaches.

The Blackwater estuary has many important shellfisheries, they are all oysterages apart from Thirslet Creek. The main areas are Goldhanger Creek, Salcott Channel and Tollesbury Fleet and were designated under the 1979 Shellfish Directive.

8.1 DESIGNATIONS (Map 14)

The Blackwater estuary is proposed as part of the Mid-Essex Coast SPA and RAMSAR site. The Blackwater estuary NNR is situated on the north shore and combines the mud flats extending from Tollesbury Wick westwards to Gore Saltings, the intertidal area to the north of Salcott Channel, and the RSPB reserve at Old Hall Marshes. The National Trust own several areas of land on the Blackwater, the Essex Wildlife Trust manage Ray Island, which is owned by NT. The Blackwater SSSI covers the whole of the estuary excluding some of Northey Island and most of Osea Island, this is land that has lost its special interest since the last notification.

The Blackwater estuary is one of the largest estuarine complexes in East Anglia. Its mudflats, fringed by saltmarsh on the upper shores, support internationally and nationally important numbers of overwintering waterfowl. Shingle and shellbanks and offshore islands support a diverse population of nationally scarce plants and nationally important rare invertebrates, with 16 Red Data Book species and 94 notable and local species.

The Blackwater holds 4.7% of the world population of Dark bellied Brent Geese as well as supporting important numbers of Ringed Plover, Dunlin, Shelduck, Gadwall, Curlew, Teal, Grey Plover and Redshank. The estuary contains the largest area of saltmarsh in Essex, 1 103 ha, the fifth largest area in Great Britain. It provides refuge for many birds and invertebrates.

In the low marsh areas the nationally scarce Lax-flowered Sea-lavender, Limonium humile, can often be found interspersed among the more common species. Scarce saltmarsh grasses such as Stiff Saltmarsh-grass, Puccinellia rupestris, are also found. On the foreshore of West Mersea the county rarity Sea Spurge, Euphorbia paralias, has been discovered.

The saltmarsh vegetation supports rare moths and a rare green beetle as well as the specialist jumping spiders. The aquatic

invertebrate species associated with the ditch systems of the Blackwater's coastal marshes are very diverse. The larvae of the Red Data Book horsefly, Hybomitra expolicata, and the endangered Red Data Book water beetle, Paracymus aeneus, are found here.

8.2 USES (Map 15)

8.2.1 RECREATION:

Leisure persuits cover the whole of the Blackwater estuary, there are over 1,000 moorings and a marina at Bradwell. Sailing, windsurfing, sailboarding, power boating, waterskiing and canoeing take place over parts of the estuary, as well as pleasure angling.

8.2.2 SHELLFISHERIES:

The Blackwater has several commercially important shellfisheries. Goldhanger Creek, Thirslet Creek and The Nass have been designated under the E.C. Shellfish Directive 1993. Both Goldhanger Creek and The Nass contain oysterages whereas Thirslet Creek contains a mussel shellfishery. At present The Nass has been graded at class B, and the other two are at class A.

Peewit Island, Tollesbury North and South, Salcott Channel, Little Ditch, and St. Peter's Flats have a shellfish grading of class B, except St. Peter's Flats which is class A. Cockles are also harvested at Buxey Sands at class B.

8.2.3 FISHERIES:

Fyke netting for eels as well as digging for bait occurs along the estuary.

8.2.4 INDUSTRY:

Industry is limited to boat building, repair yards and small engineering works. However on the south shore Bradwell Power Station imparts some limited local thermal effect on the estuary.

8.2.5 SEDIMENT EXTRACTION AND DREDGING:
Only maintenance dredging occurs in the estuary, in the upper reaches.

8.3 INPUTS

8.3.1 EFFLUENTS:
There are several sewage effluents affecting the Blackwater estuary. West Mersea has a current consent of 200SS, it only undergoes primary treatment and its quality is considered to be poor. Tiptree, Tollesbury, Maldon and the combined effluents from Chelmsford and Witham STW all have full treatment. Apart from Maldon, the effluents are of marginal quality with respect to their consents, Maldon has satisfactory effluent quality. Tiptree has a current consent of 30SS/15BOD, Tollesbury of 40SS/30BOD and Chelmsford and Witham of 40SS/20BOD. The outfall pipe of the combined effluents is at Beeleigh falls, the head of the tidal river.

Bradwell Power Station discharges cooling water into the estuary at a rate 2290909 m^3/d with a maximum temperature of 32°C.

8.3.2 RIVERS:
The tidal limit of the Blackwater estuary is at Beeleigh falls in Maldon.

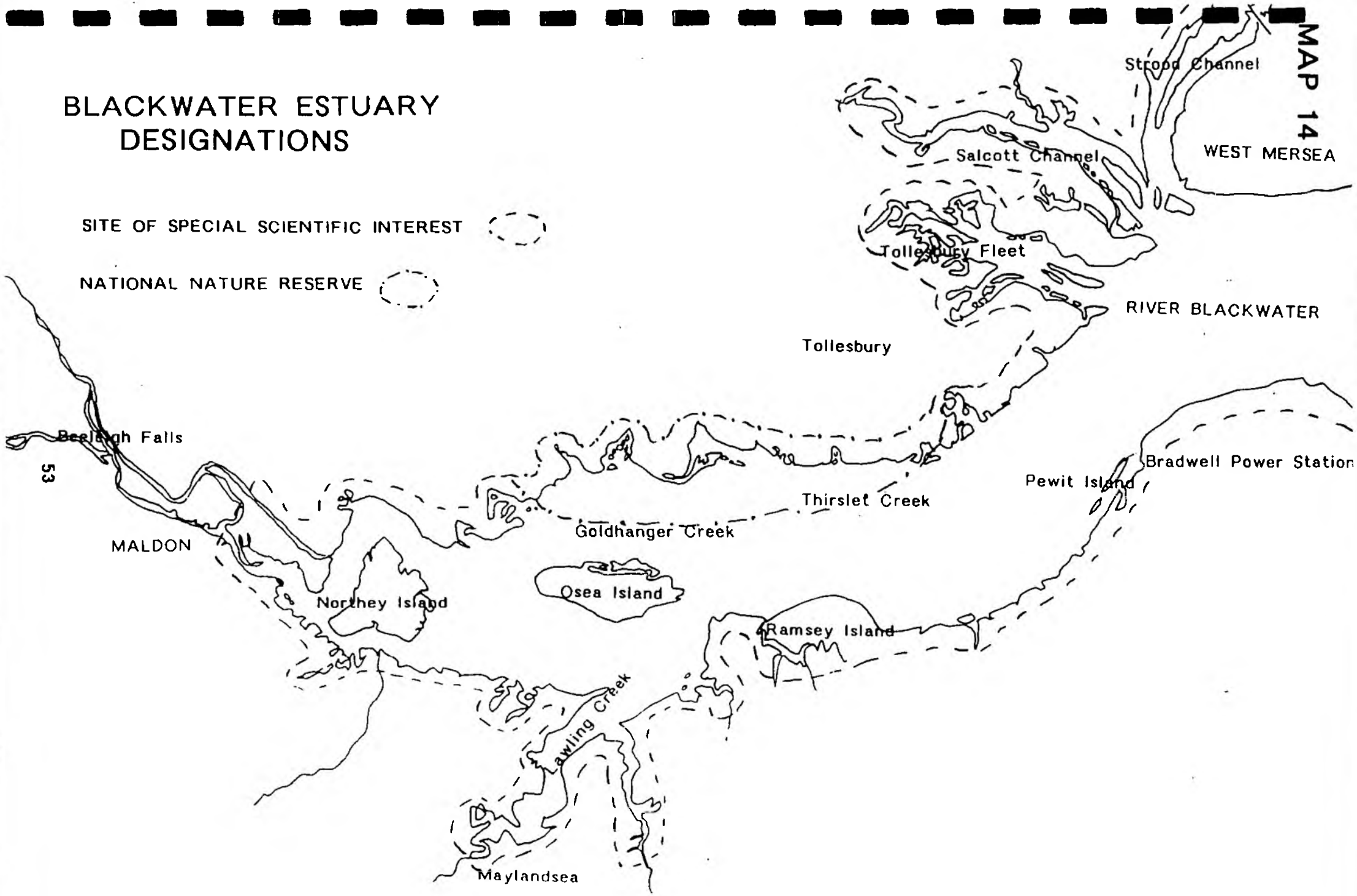
The Blackwater does not possess a discernable saline wedge.
The freshwater catchment of the Blackwater/Chelmer includes towns such as Braintree, Witham and Chelmsford influencing water quality on these potable water supply rivers.

8.4 SUMMARY

BLACKWATER ESTUARY

NGR	TL9507
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MACROTIDAL
TOTAL AREA ha	5184
INTERTIDAL AREA ha	3315
SHORELINE km	108
TIDAL CHANNEL km	21
AREA OF MUDFLATS ha	2600
AREA OF SALTMARSH ha	900
TIDAL LIMIT	BEELEIGH FALLS
POPULATION	20 000
NRA SURVEY CLASS	A and B
SEWAGE INPUTS	WEST MERSEA, TIPTREE, MALDON, TOLLESBURY, COMBINED EFFLUENTS
INDUSTRIAL INPUTS	BRADWELL POWER STATION
DESIGNATIONS	SSSI, NNR
RECREATION USES	SAILING, CANOEING, WINDSURFING POWERBOATING, WATERSKIING
SHELLFISHERIES	GOLDHANGER CREEK, TOLLESBURY NORTH & SOUTH, THIRSLET CREEK, THE NASS, ST. PETERS FLATS, BUXEY SANDS, SALCOTT CHANNEL & LITTLE DITCH
IMPORTANT BIRD SPECIES	BRENTGEESE, SHELDUCK & DUNLIN

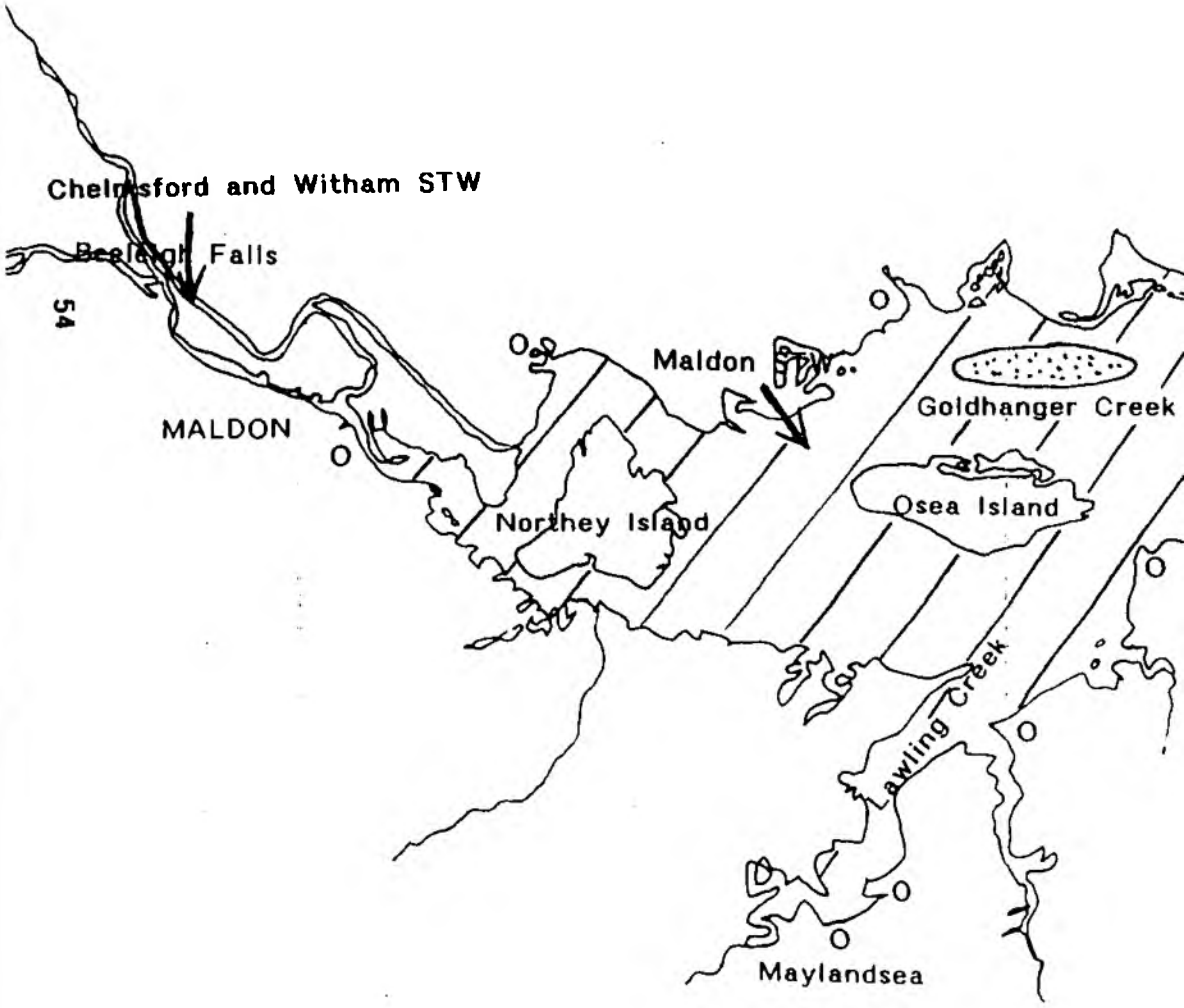
BLACKWATER ESTUARY DESIGNATIONS

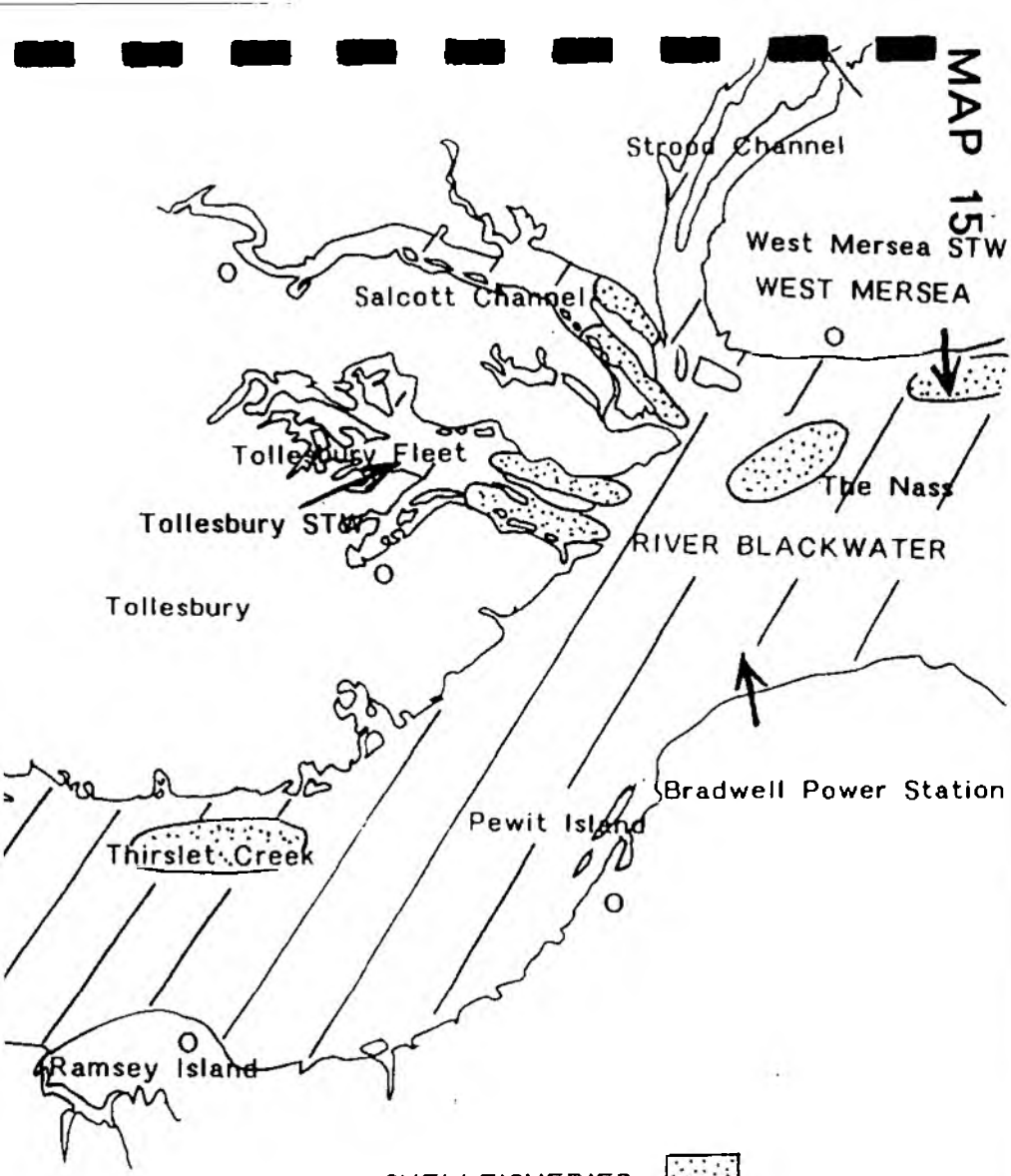


SITE OF SPECIAL SCIENTIFIC INTEREST

NATIONAL NATURE RESERVE

BLACKWATER ESTUARY
USES AND INPUTS




MAP 15
Strood Channel
West Mersea STW
WEST MERSEA
Salcott Channel
Tollesbury Fleet
The Nass
Tollesbury STW
RIVER BLACKWATER
Tollesbury
Bradwell Power Station
Pewit Island
Thirslet Creek
Ramsey Island
SHELLFISHERIES
RECREATION
MARINA
SEWAGE TREATMENT WORKS

9 CROUCH ESTUARY

The Crouch estuary is a long, narrow coastal plain estuary with narrow intertidal mudflats flanked by reclaimed land and saltmarsh in its upper reaches. It occupies a shallow valley between two ridges of London clay in south Essex. The tidal section is 20 km long and forms a narrow estuarine habitat.

Much of the river channel is used intensively for recreational activities and is of relatively little value for wildlife. Despite this the estuary is important in supporting several internationally important wintering wildfowl and an extensive bed of Slipper Limpets, Crepidula fornicata. Slipper Limpits are considered to be a pest in the estuary as they compete with the more commercial oysters.

Since the Middle Ages the shore of the Crouch has been embanked to provide grazing and arable land. There are a few small areas that have been left as saltmarsh, including Woodham Fenn and the upper sections of Paglesham Pool. Other saltmarshes have formed due to breaches in the sea wall including Bridgemarsh Island, Brandy Hole and North Fambridge Marsh, these have all developed during the course of this century.

The Crouch estuary catchment has a population of 15,000 with centres of population at Burnham, Hullbridge and Woodham Ferrers. Sewage effluents enter the Crouch estuary at Burnham, South Woodham, Wickford and Rayleigh West. The Crouch estuary has been given an NRA classification of grade A and B with respect to its water quality.

There are three oysterages on the Crouch; Althorne Creek, Purleigh Shawl and the Outer Crouch. These are extensively used.

9.1 DESIGNATIONS (Map 16)

The Crouch-Roach estuary is a proposed SPA and RAMSAR site. 939 ha of the Crouch estuary is covered by the River Crouch Marshes SSSI. The Dengie Flats and Foulness also come under the designation of an SSSI. Essex Wildlife Trust also have several reserves within the SSSI boundary. Bridgemarsh Island is a seperate SSSI due to its large area of saltmarsh and intertidal mud. With the exception of Dengie it is the largest unit of continuous saltmarsh in Essex.

The reasons for notification include the range of plant species found on the saltmarsh including the uncommon Lax-flowered Sea-lavender, Limonium humile, and Shrubby sea-blite, Sueda vera. At Lion Creek a rare butterfly, the Brown Argus, Aricia agestis, can be found.

Where reclaimed land has not been used for intensive agriculture grazing marsh is found, it is increasingly becoming less common as a recent survey suggests that 80% of saltmarsh in Essex has been lost due to drainage and conversion to arable land. On the marsh occasional uncommon flora is found, such as the Mousetail, Myosurus minimus.

The complex of saltmarsh, grazing marsh and intertidal habitats is of major importance to birds, especially as feeding and roosting sites for wildfowl. Wigeon, Teal and Pintail are found in internationally important numbers. Dark-bellied Brent Geese overwinter on this estuary as well as the other estuaries in Essex.

9.2 USES (Map 17)

9.2.1 RECREATION:

The amenity value of this estuary is high, it has three marinas

and over 200 moorings, as a result the estuary is widely used for sailing. Windsurfing and canoeing take place over most of the estuary whereas power boating and water skiing are controlled by bye-laws.

9.2.2 SHELLFISHERIES:

The Crouch estuary supports three oysterages at Althorne Creek, Purleigh Shawl and the Outer Crouch. Under the E.C. Shellfish Hygiene Directive 1993 Althorne Creek and Purleigh Shawl have been given a class of B, and the Outer Crouch class C. Designations of these fisheries also took place under the 1979 Shellfish Directive.

9.2.3 SEDIMENT EXTRACTION AND DREDGING:

Maintenance dredging and commercial terrestrial aggregates extraction occurs along parts of the lower Crouch estuary.

9.3 INPUTS

9.3.1 EFFLUENTS:

There are four sewage effluents that influence the Crouch water quality; Burnham, South Woodham, Wickford and Rayleigh West. All these sewage treatment works have full treatment and are considered to have a satisfactory effluent quality with respect to their current NRA consent conditions. Burnham has a current consent of 40SS/30BOD, Wickford has a consent of 45SS/22BOD and Rayleigh West has a consent of 50SS/30BOD/40AMMONIA.

9.3.2 RIVER:

The tidal limit of the Crouch is at Memorial Park and the estuary does not possess a detectable saline wedge.

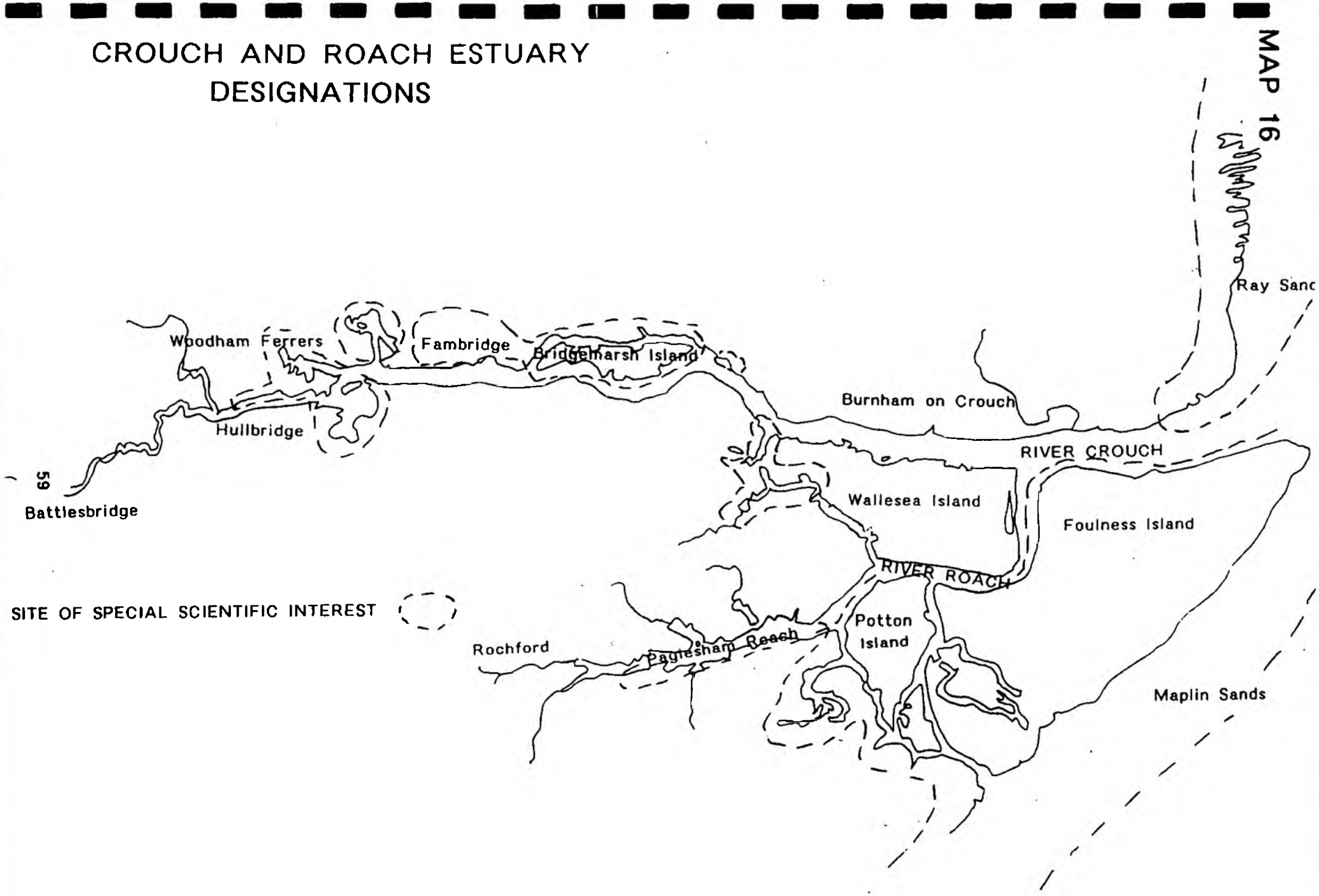
The freshwater catchment is largely urban areas with a small proportion of arable agricultural area.

9.4 SUMMARY

CROUCH ESTUARY

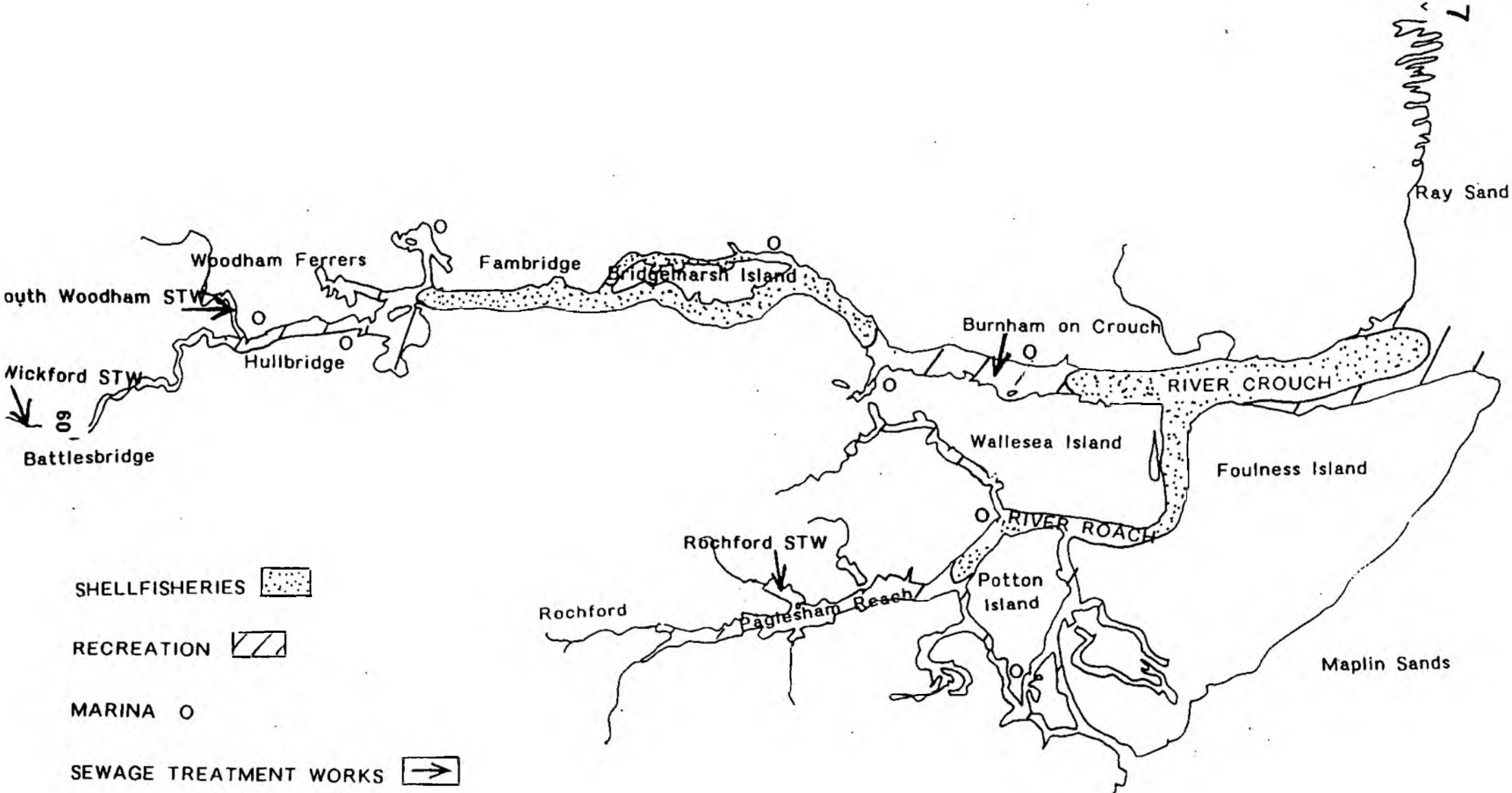
NGR	
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MACROTIDAL
TOTAL AREA ha	4000
INTERTIDAL AREA ha	2000
SHORELINE km	85
TIDAL CHANNEL km	30
AREA OF MUDFLATS ha	800
AREA OF SALTMARSH ha	250
TIDAL LIMIT	MEMORIAL PARK
POPULATION	15 000
NRA SURVEY CLASS	A
SEWAGE INPUTS	RAYLEIGH WEST, BURNHAM, WICKFORD, SOUTH WOODHAM
DESIGNATIONS	SSSI
RECREATION USES	SAILING, CANOEING, WINDSURFING, POWER BOATING & WATER SKIING
SHELLFISHERIES	OUTER CROUCH, PURLEIGH SHAWL & ALTHORNE CREEK
IMPORTANT BIRD SPECIES	WIGEON, TEAL, PINTAIL & DARK-BELLIED BRENT GEESE

CROUCH AND ROACH ESTUARY DESIGNATIONS



CROUCH AND ROACH ESTUARY
USES AND INPUTS

MAP 17



10 ROACH ESTUARY

The main part of the Roach estuary is long and narrow extending 14 km from its mouth in the lower Crouch estuary to Rochford. The Roach estuary only has an average width of 250 m and as a result only 60 ha of intertidal mudflat is exposed at low water.

The estuary flows through a network of creeks where small areas of saltmarsh have developed. Within these saltmarshes there is a good diversity of saltmarsh communities.

Foulness lies on the north shore of the Thames estuary between Southend in the south and the Roach to the north. It comprises extensive intertidal sand-silt flats, saltmarsh, beaches, grazing marshes, rough grass and scrubland. The flats are of international and national importance as winter feeding grounds for twelve species of wildfowl and waders. The complex matrix of habitats also supports an outstanding assemblage both of plants and invertebrates with some species being nationally uncommon or rare.

Empty cockle shells are washed up at Foulness Point to form the most extensive shell beach in Britain.

The Roach tidal catchment has a population of 7,000 with the main centre of population at Rochford. The sewage effluents that affect the Roach estuary are Rochford STW and Rayleigh East STW. The current quality of the Roach estuary is good with respect to the NRA classifications and is classified as grade A and B.

The Roach estuary has several shellfisheries which are all designated under the EC Shellfishery Directive 1993 and 1979. They include oyster, mussel and cockle beds at Paglesham Pool, Dunhopes and Middleway.

10.1 DESIGNATIONS (Map 16)

The Roach estuary is part of the Crouch-Roach estuary proposed SPA and RAMSAR site. Foulness is a designated SSSI which covers the southern shore of the Roach estuary, the creeks to the south of the estuary, Foulness sands and Maplin Sands. The area supports four species of wildfowl at nationally important levels; Shelduck, Shoveler, Wigeon and Teal. Dark-bellied Brent Geese occur in internationally significant numbers. Of the waders, Curlew and Dunlin occur in nationally important numbers and Bar-tailed Godwit, Grey Plover, Knot, Redshank and Oystercatcher occur in internationally important numbers. The shellbeach supports a nationally important colony of Terns and Black-headed gulls.

There are number of uncommon plants associated with the saltmarshes including Borrers Saltmarsh-grass, Puccinellia fasciculata, Lax-flowered Sea-lavender, Limonium humile, and Annual Beard-grass, Polypogon monspeliensis. At Gunners Park, unimproved grassland has developed over relict sand dunes and in consequence supports a flora which is unique in Essex.

Foulness is also of prime importance for its invertebrates. There are no less than 83 species listed as of notable occurrence or nationally rare, including such Red Data Book species as the Scarce Emerald Damselfly, Lestes dryas, the beetle, Tachys scutellaris, and the fly Stratiomys longicornis.

10.2 USES (Map 17)

10.2.1 RECREATION:

The Roach estuary is used quite extensively for leisure activities. It has approximately 100 moorings and consequently sailing is widespread throughout the estuary. Paglesham Creek suffers considerable problems of disturbance from water sports such as water skiing.

10.2.2 SHELLFISHERIES:

There are three shellfisheries in the Roach estuary, Paglesham Pool contains oysters, mussels and cockles and these have been graded as class A/B, Dunhopes contains mussels and cockles and is of class C for mussels and B for cockles, The Middleway has a cockle bed which is of class C. All three sites have been designated under the EC Shellfish Hygiene Directive 1993 and the 1979 Shellfish Directive.

10.3 INPUTS

10.3.1 EFFLUENTS:

The Roach is principally affected by two sewage effluents, both have tertiary sewage treatment and, at present, are considered to be of satisfactory quality with respect to their current NRA consent standard. The sewage treatment works are at Rochford and Rayleigh East. The current consent for Rochford is 60SS/35BOD and for Rayleigh East is 30SS/15BOD.

10.3.2 RIVERS:

The tidal limit of the Roach estuary is at Broomhill.

No saline wedge has been detected in the estuary. The freshwater catchment is largely urban and consequently the River Roach has a large proportion of treated effluent as its base flow.

For all estuary introductions:

See Appendix 1 - Full summary table
Appendix 2 - Statutory Nature Conservation Sites
Appendix 3 - Main sewage inputs into estuaries
Appendix 4 - Trade effluent inputs
Appendix 5 - Shellfisheries present on the estuaries
Appendix 6 - EC Shellfish Hygiene Directive 91/492/EEC

SECTION B]

CHEMICAL WATER QUALITY TRENDS

10.4 SUMMARY

ROACH ESTUARY

NGR	
GEOMORPHIC TYPE	COASTAL PLAIN
TIDAL TYPE	MACROTIDAL
TOTAL AREA ha	1020
INTERTIDAL AREA ha	600
SHORELINE km	42
TIDAL CHANNEL km	14
AREA OF MUDFLATS ha	300
AREA OF SALTMARSH ha	120
TIDAL LIMIT	BROOMHILL
POPULATION	7 000
NRA SURVEY CLASS	A
SEWAGE INPUTS	ROCHFORD & RAYLEIGH EAST
DESIGNATIONS	SSSI
RECREATION USES	WATER SKIING, SAILING & WINDSURFING
SHELLFISHERIES	PAGLESHAM POOL, DUNHOPES & MIDDLEWAY
IMPORTANT BIRD SPECIES	SHELDUCK, SHOVELER, WIGEON, TEAL, DARK-BELLIED BRENT GEESE, REDSHANK, CURLEW & DUNLIN

B] CHEMICAL WATER QUALITY TRENDS

It should be noted that some graphs have gaps in the data during the 1980's, this is due to data being archived on inaccessble tape. Earlier data is recorded on paper and subsequent data is held on CDPS and LIMS.

Only three or four representative sample points have been highlighted for each estuary, to illustrate the overall, chemical water quality. The full list of sample points and freguency of sampling can be seen in Appendix 7.

1 BLYTH ESTUARY

1.1 Historical Events from E.Suffolk and Norfolk Rivers Authority Annual Reports 1966-1974

1969 - New sewage works at Halesworth completed resulting in a good quality effluent.

1971 - 'Le Grice' turkey processing plant polluted the upper reaches of the River Wang as a result it was forced to close down.

1972 - Bernard Matthews turkey processing plant established on old 'Le Grice' site.

1973 - Prosecution of Bernard Matthews for polluting effluent entering the River Wang.

Historically the quality of the Blyth estuary has, in general, been good.

1.2 Interpretation of Chemical Trends

Both Collins Island and Wolsey Sluice are NRA survey points. DO and ammonia results show that the estuary is unpolluted and the water is of good quality. BOD levels show little evidence of eutrophication and E. coli results suggest that there may be some influence on the estuary due to the large bird population present particularly in the winter months (Fig 1 & 2).

Wolsey Sluice is mainly fed by the River Wang at ebb tide and low water periods, as the sluice is tide locked at high water. The samples are taken at high water only, so to gain a clearer picture of the overall quality, and effects of Bernard Matthews factory, sampling over a tidal cycle would be necessary. However, at present, the effects of the factory appear to be minimal in the estuary (Fig 2).

Bailey Bridge is sampled monthly, it is approximately 10 m below the treated effluent of Southwold STW. The slightly elevated BOD, ammonia and E. coli values, compared with the other two sampling points, can be attributed to this proximity to the sewage treatment works (Fig 3 & 4).

Flesh samples from the oysterage at Wolsey Creek are of class B quality. The oysters are uv treated before they are sold but the oysterage is of limited commercial importance (Fig 5).

(See Map 18 for location of sample points)

FIG 1

SAMPLE POINT CODE - BIBLY060

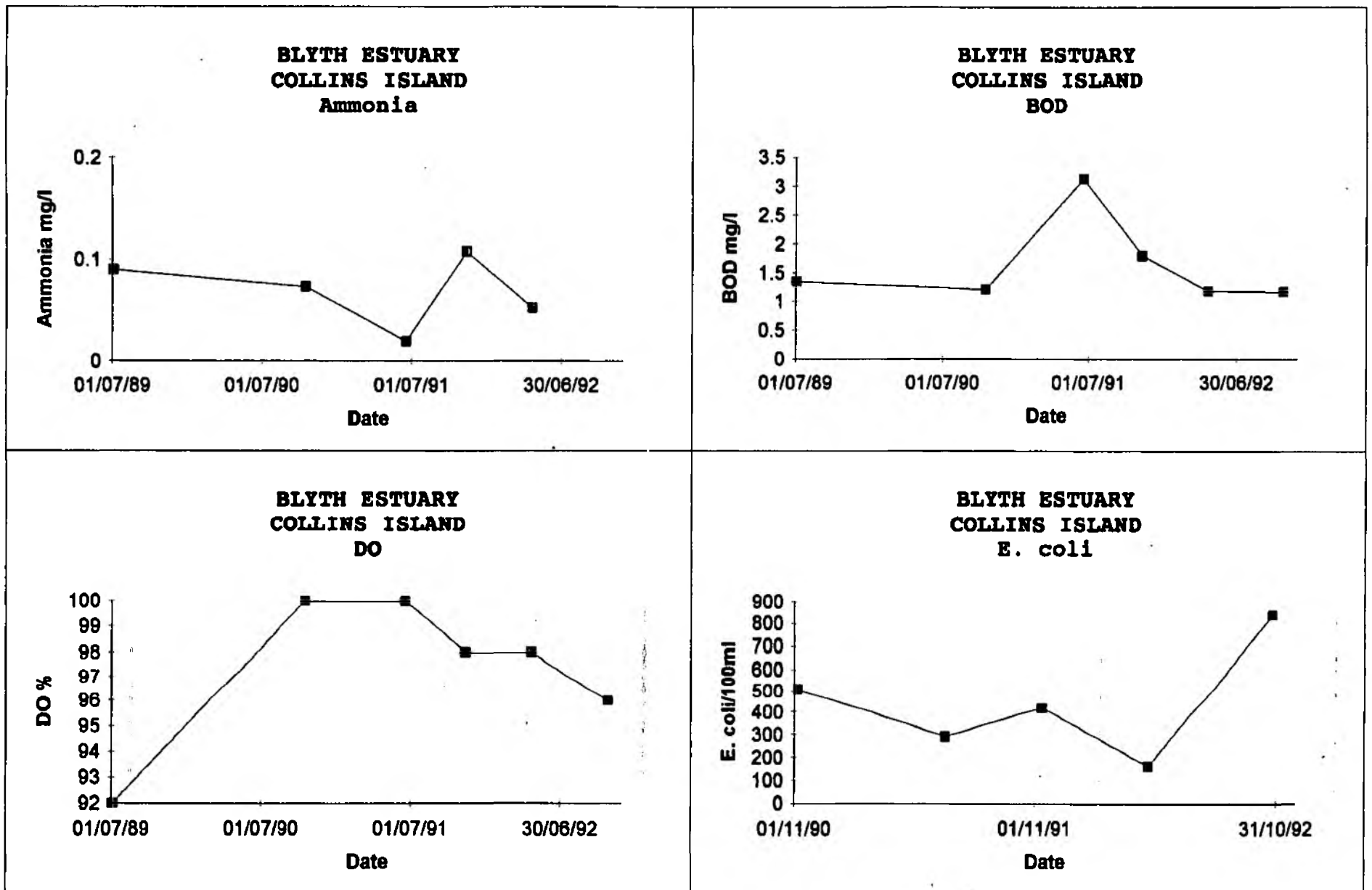


FIG 2

SAMPLE POINT CODE - BIBLY084

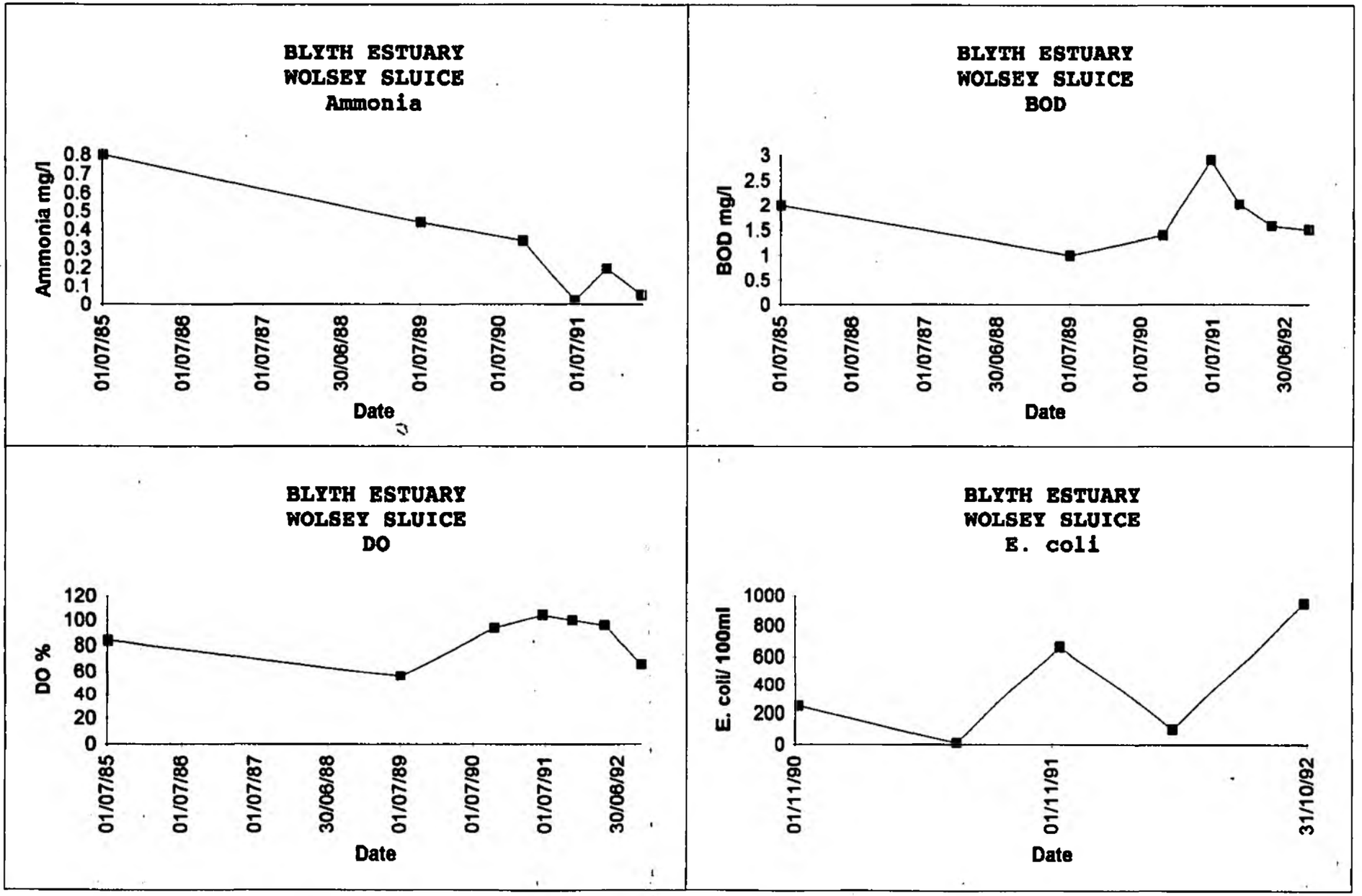
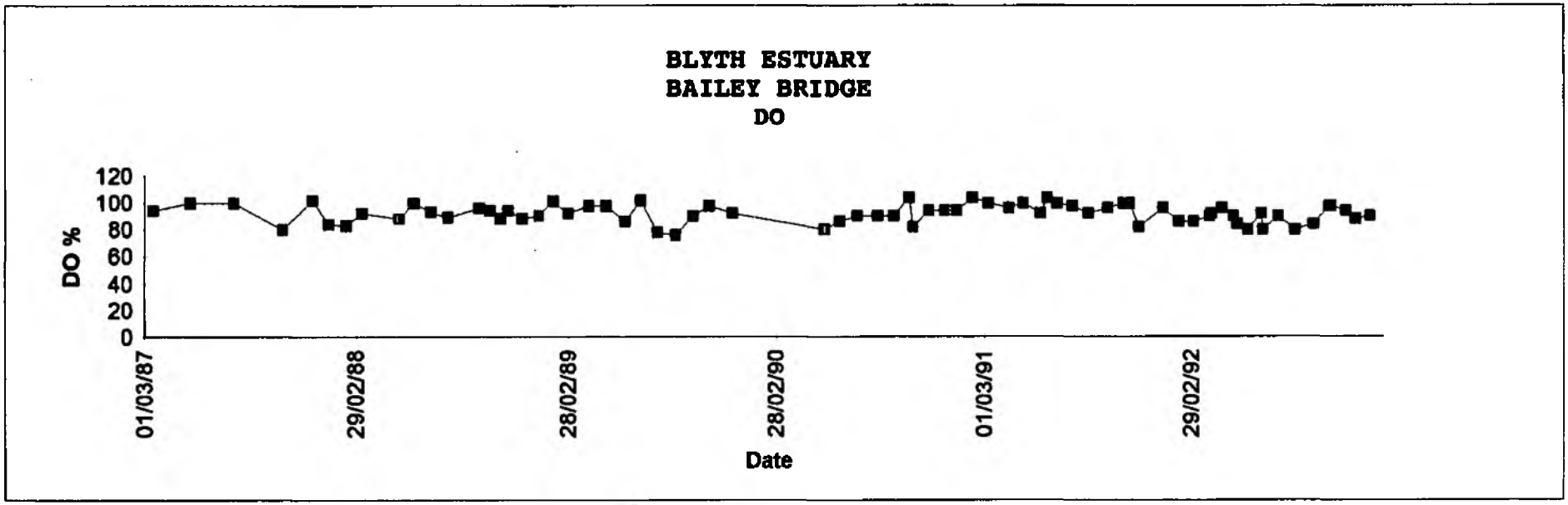


FIG 4

SAMPLE POINT CODE - BIBLY070



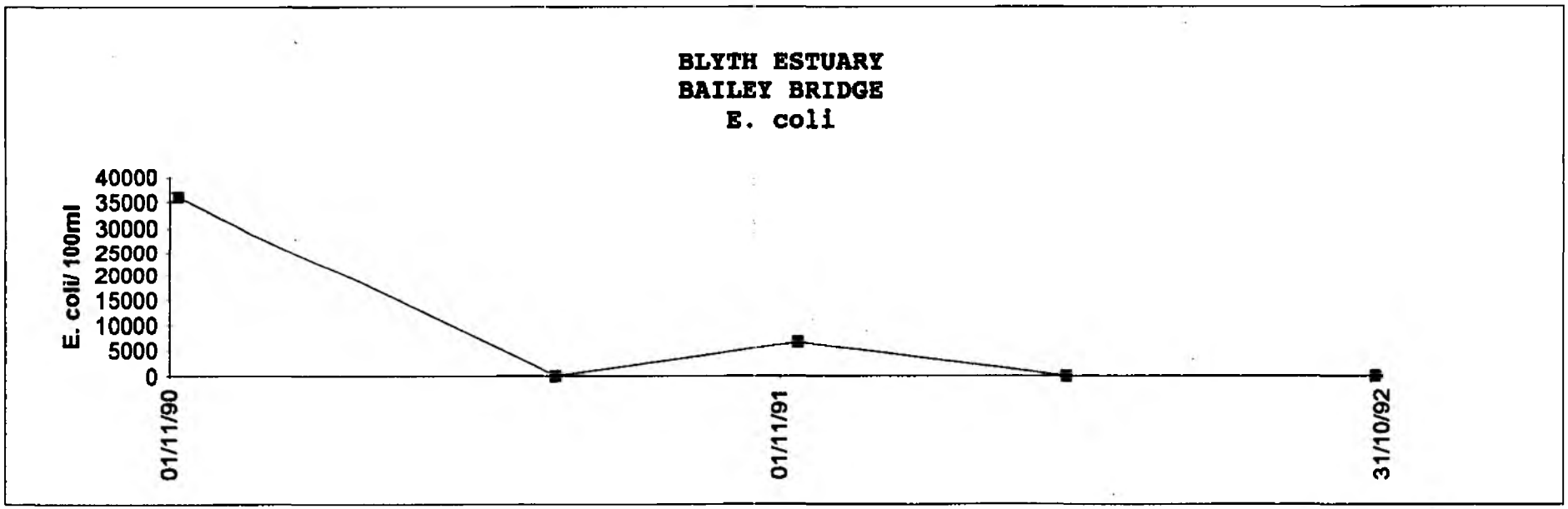
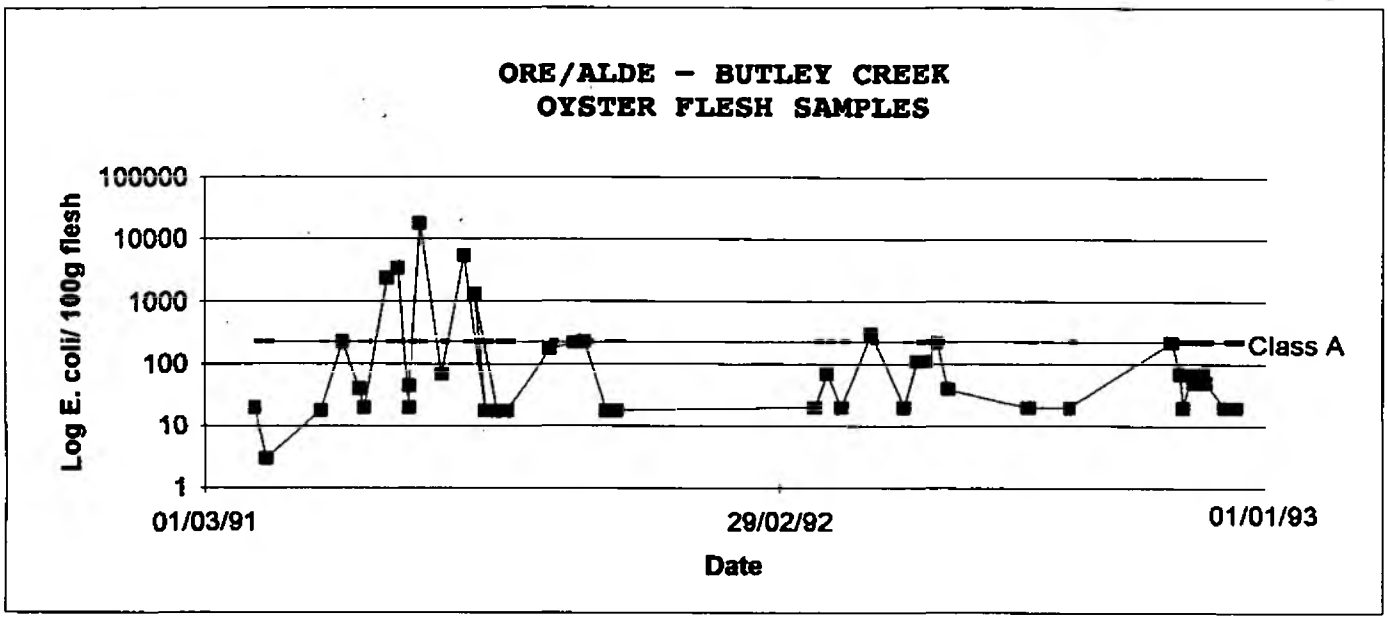
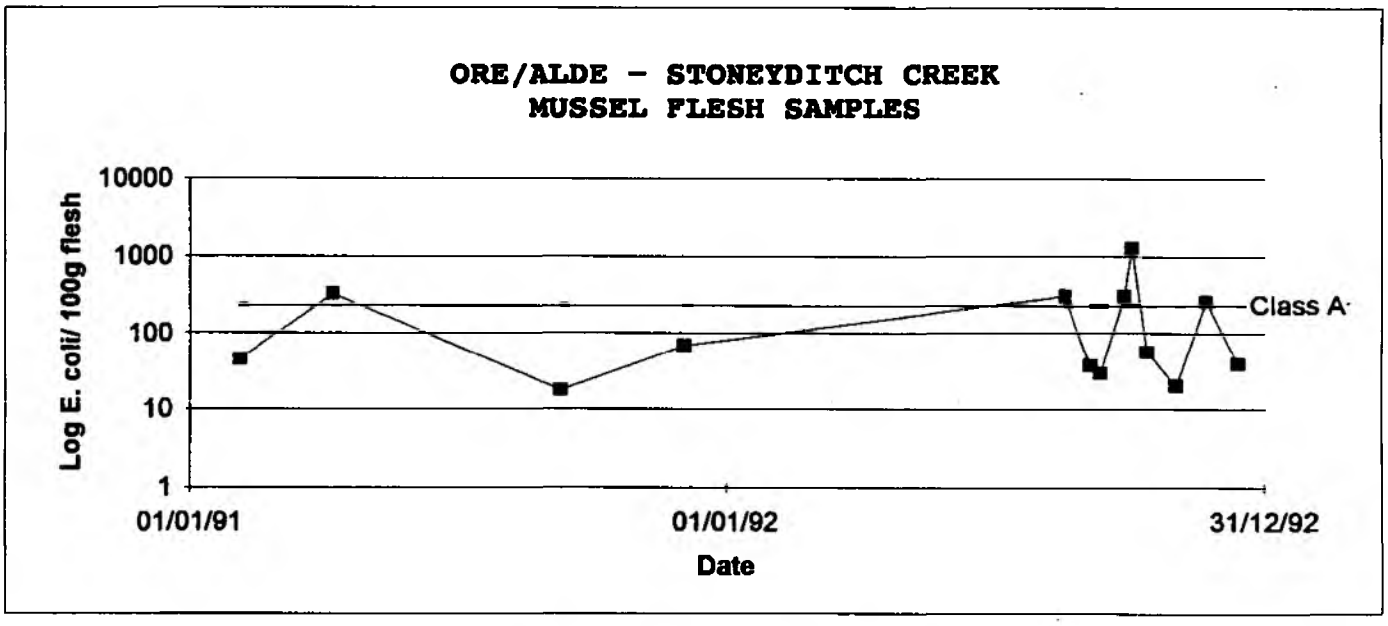
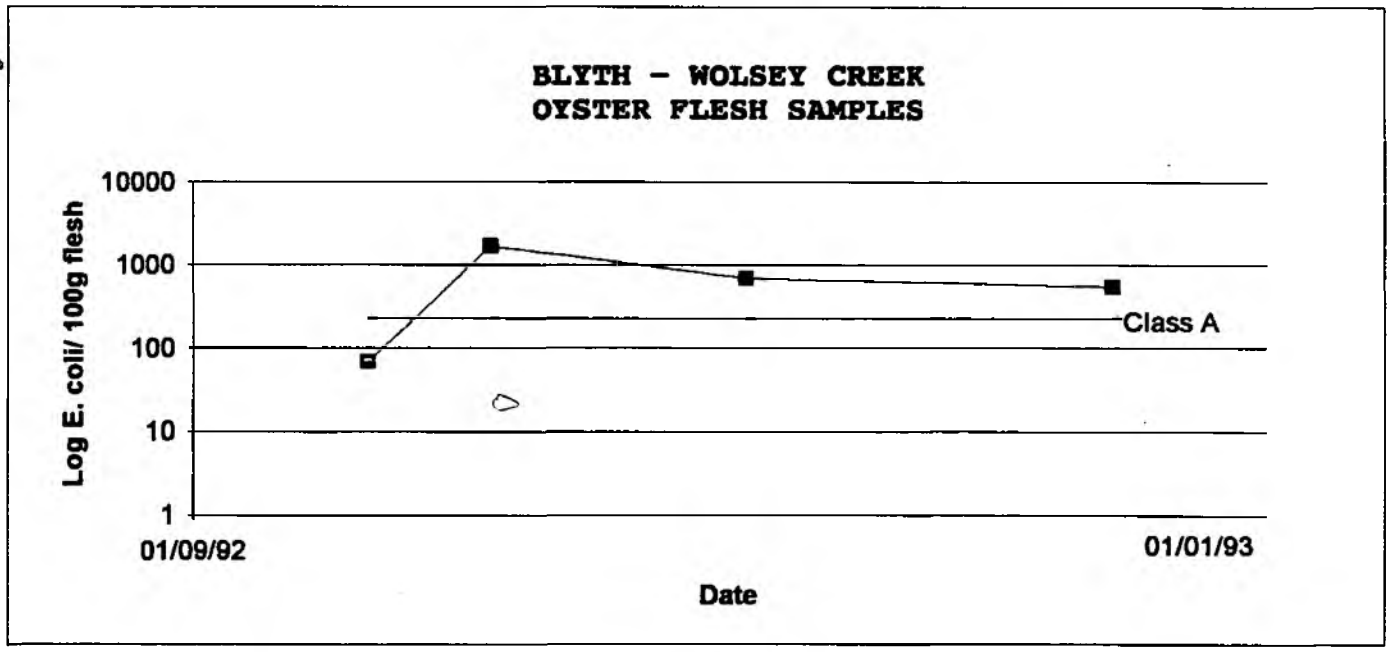
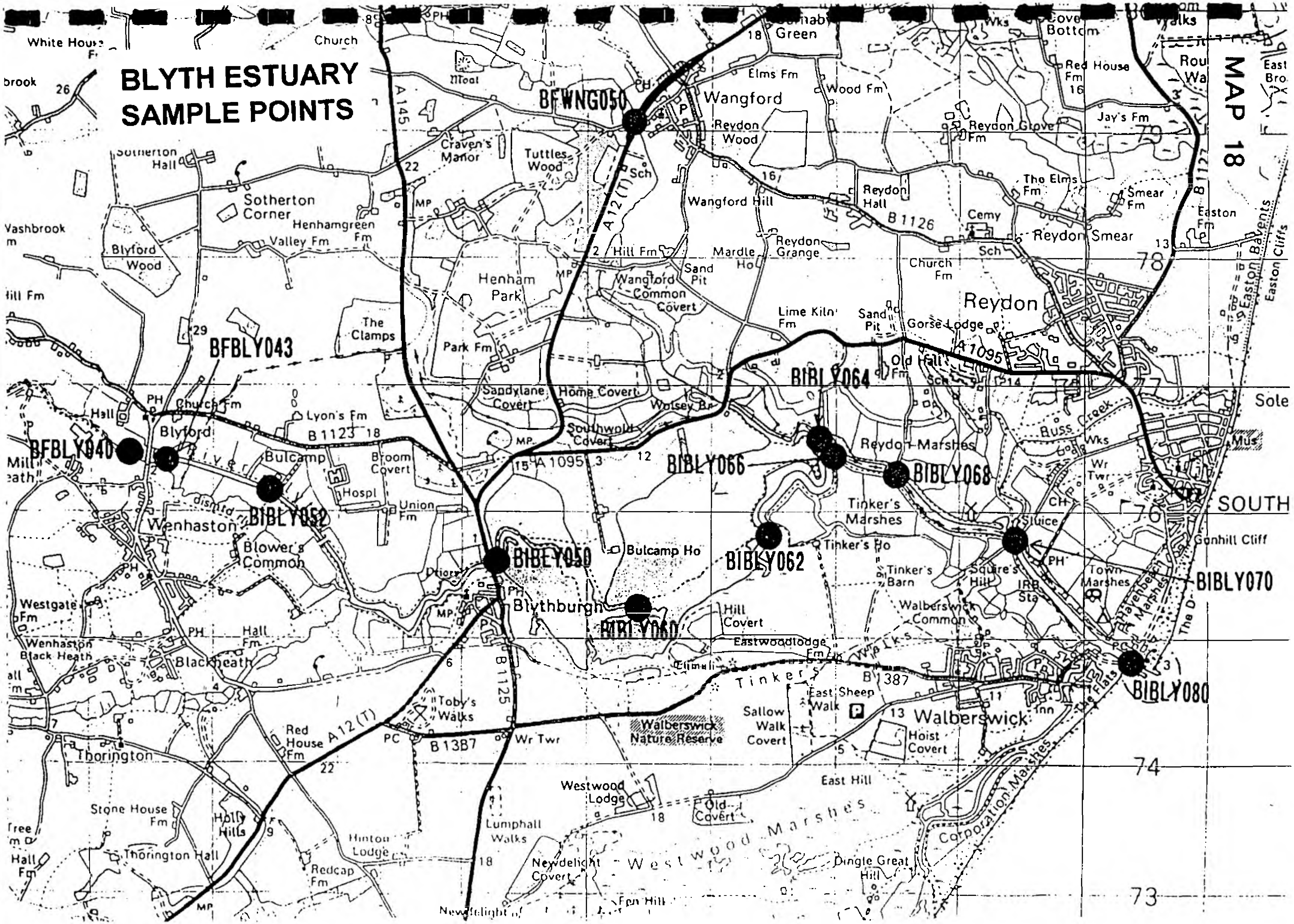


FIG 5 BLYTH AND ORE/ALDE SHELLFISH SAMPLES








BLYTH ESTUARY
SAMPLE POINTS
MAP 18
BFWNG050
BFBLY043
BFBLY040
BIBLY052
BIBLY050
BIBLY060
BIBLY062
BIBLY064
BIBLY066
BIBLY068
BIBLY070
BIBLY080
Wangford
Reydon
Blyford
Bulcamp
Wenhaston
Blythburgh
Walberswick
Henham Park
Reydon Marshes
Tinker's Marshes
Town Marshes
Westwood Marshes
Corporation Marshes
Walberswick Nature Reserve
Thorington
Blackheath
Sotherton Corner
Blower's Common
Reydon Smear
Easton Bavents
Gunhill Cliff
SOUTH
A 12 (T)
A 145
A 1095
B 1123
B 1125
B 1126
B 1127
B 1387

2 ORE/ALDE ESTUARY

2.1 Historical Events from E.Suffolk and Norfolk River Authority Annual Report 1966-1974

1967 - Effluent from Saxmundham STW contained high volumes of suspended solids.

1969 - Silage pollution in the estuary resulted in fish deaths leading to a prosecution.

1971 - The new Aldeburgh STW did not perform to expectations. Framlingham and Saxmundham STW, which input into the River Ore showed signs of deterioration.

1972 - Saxmundham STW was abandoned.

1974 - Saxmundham STW was replaced by regional 'Benhall' Scheme.

2.2 Interpretation of Chemical Trends

Iken Cliffs shows good quality with respect to E. coli and DO however, there is some evidence of eutrophication in the BOD results. There is no effluent input in the vicinity and the freshwater flow from the Ore and Alde is unpolluted (Fig 6).

Orford Quay shows ammonia level improvements since the 1980's and within the last few years all parameters show a satisfactory water quality. The discharge from Orford STW appears to be of good quality and is not affecting this point (Fig 7 & 8).

Havergate Island is below Orford STW and shows excellent quality. The E. coli levels are exeptionally low partly due to dilution given by the deep water channel present at this sampling point (Fig 9).

Butley oysterage which is in a creek off the main estuary is sampled frequently by land as the oysterage is of commercial importance. The quality is variable due to eutrophication effects, but in general the BOD and E. coli levels are low. The odd peak in E. coli flesh values is thought to be due to boating activities and excessive use of the estuary by wildfowl. Under the 1993 Shellfish Hygiene Directive, Butley Creek is classed as a class A shellfishery. Stoneyditch is not as clean as Butley Creek as it is situated nearer to the Orford sewage works and it borders on class A/B. It is a small non-commercial mussel shellfishery (Fig 10, 11 & 5).

(See Map 19 for location of sample points)

FIG 6

SAMPLE POINT CODE - BIOAE020

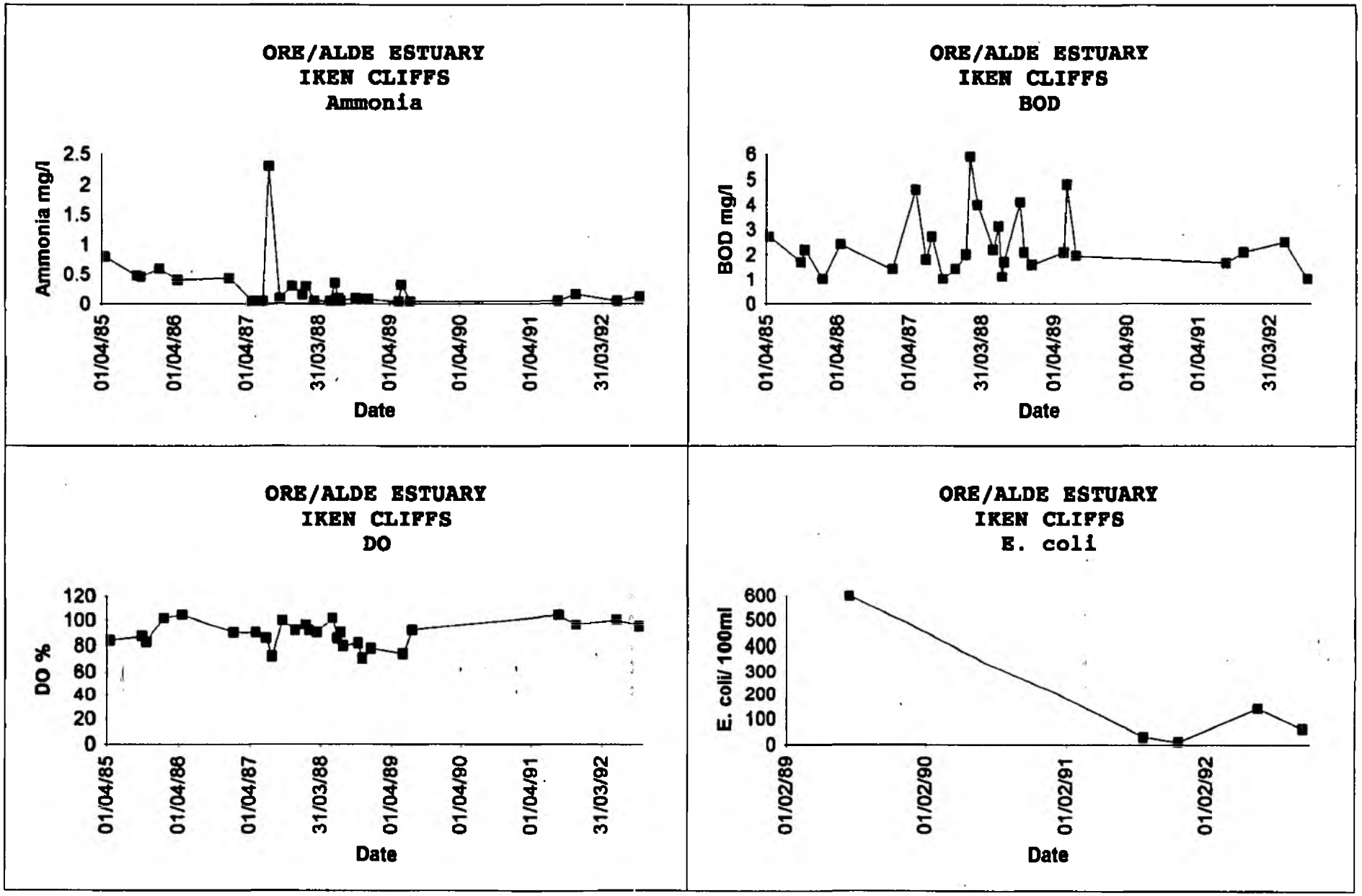
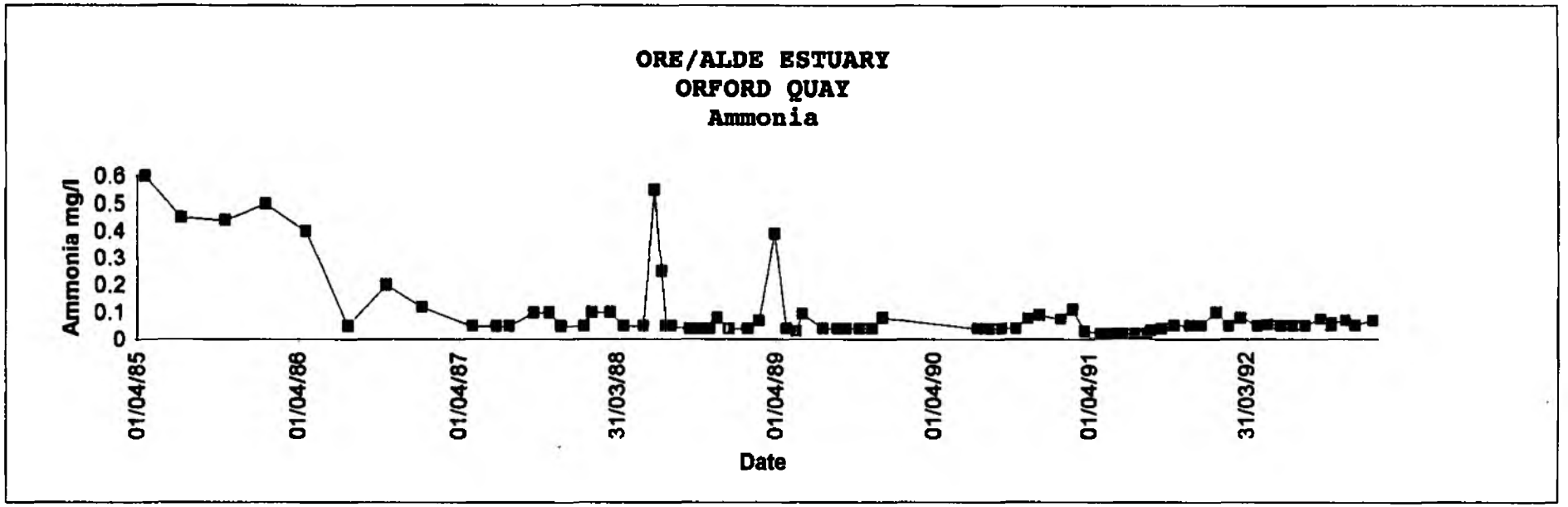


FIG 7

SAMPLE POINT CODE - BIOAE040



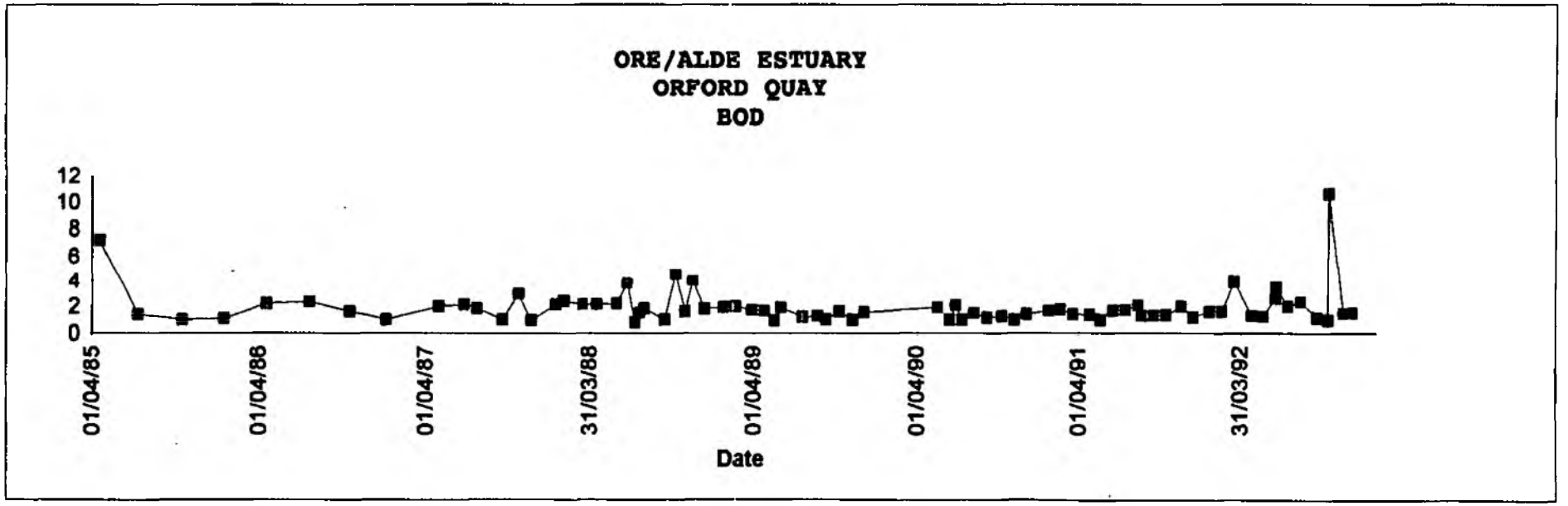
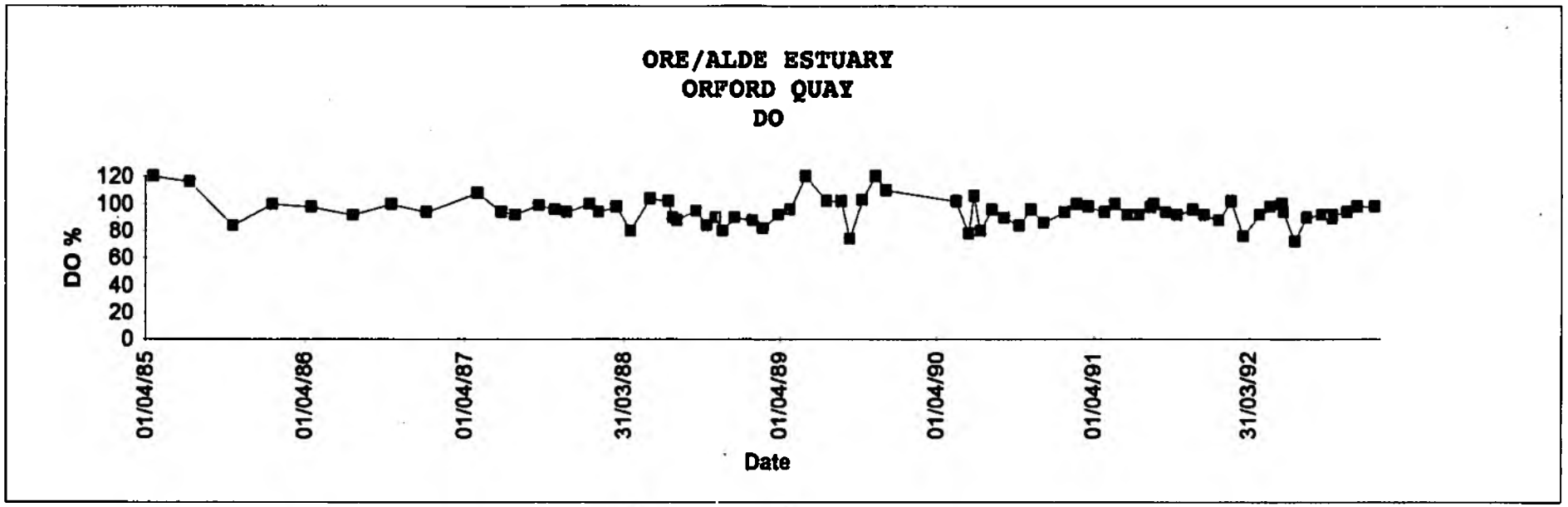


FIG 8

SAMPLE POINT CODE - BIOAE040



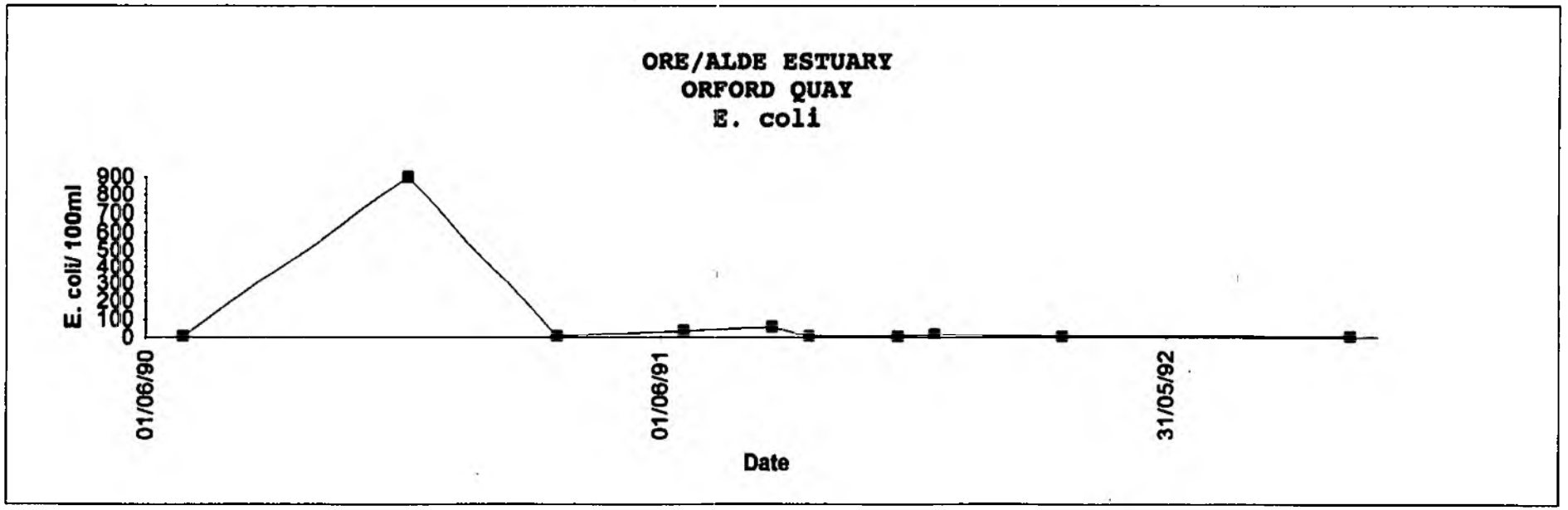


FIG 9

SAMPLE POINT CODE - BIOAE055

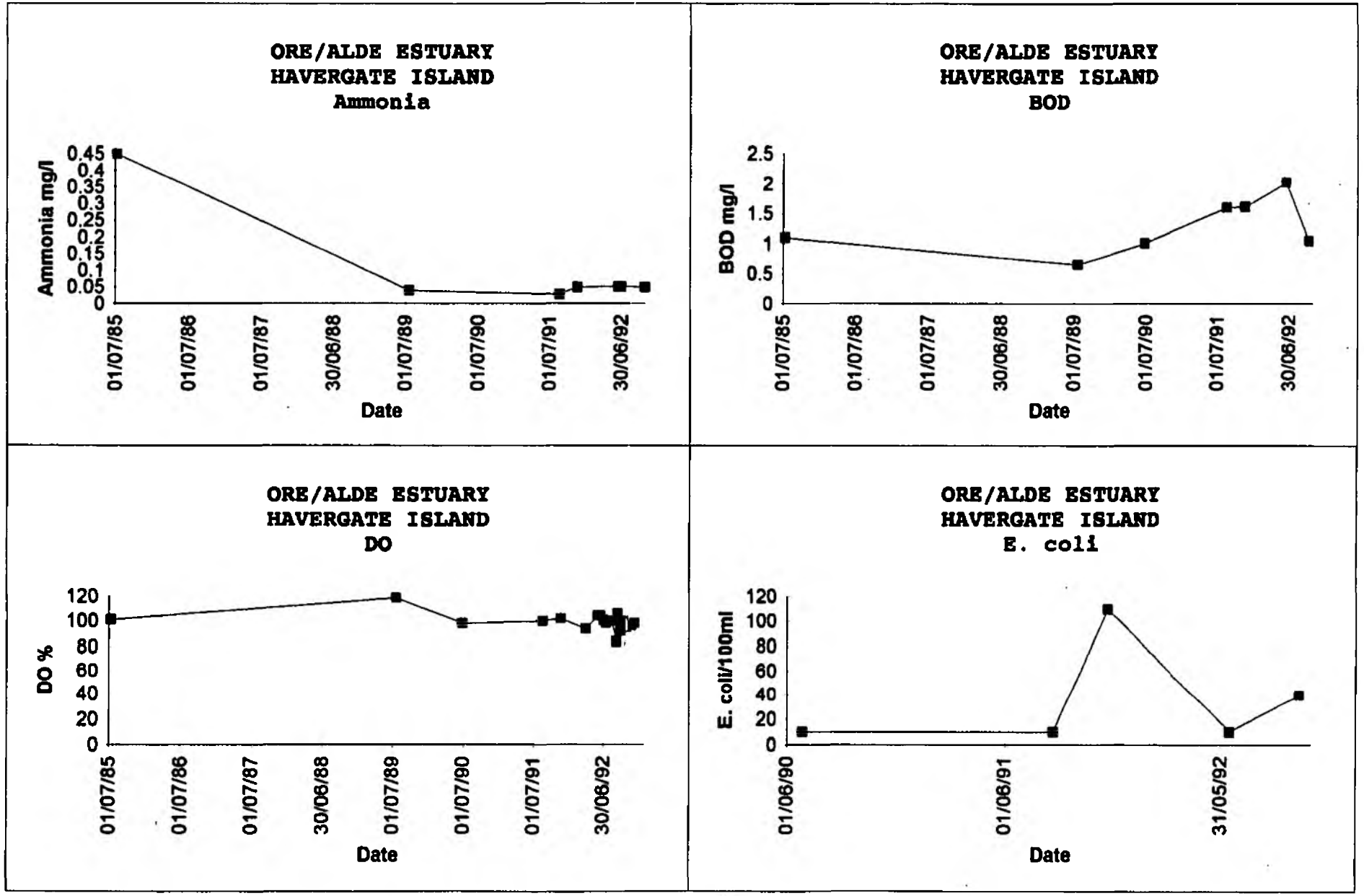
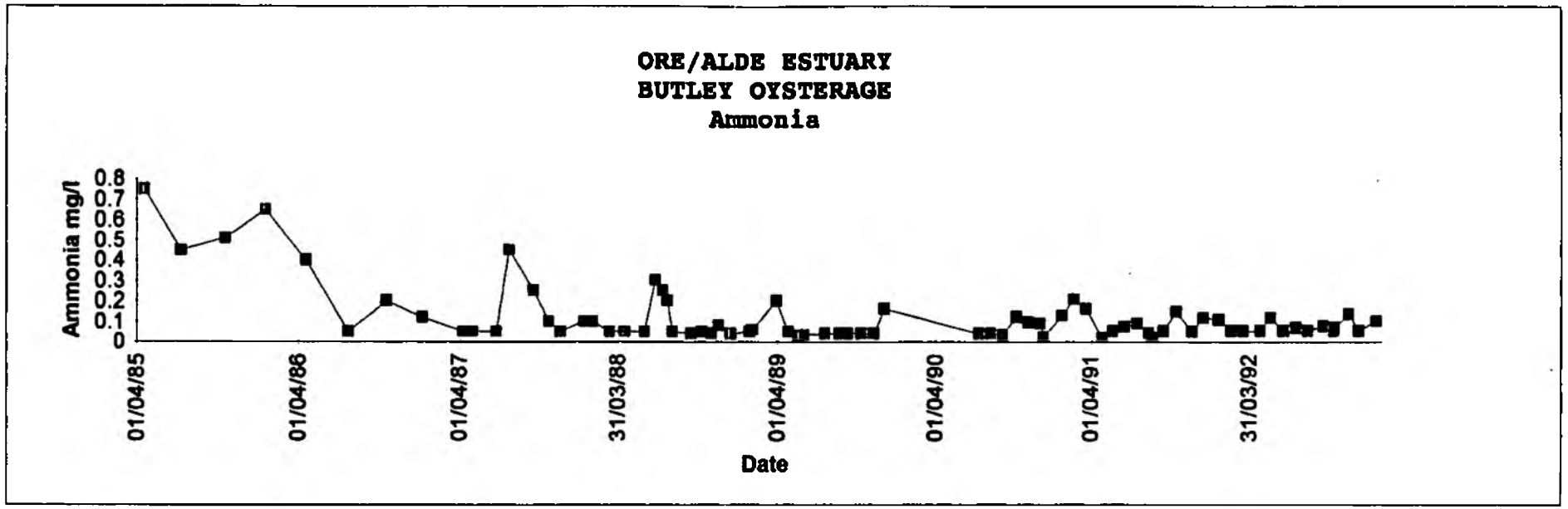


FIG 10

SAMPLE POINT CODE - BIOAE050



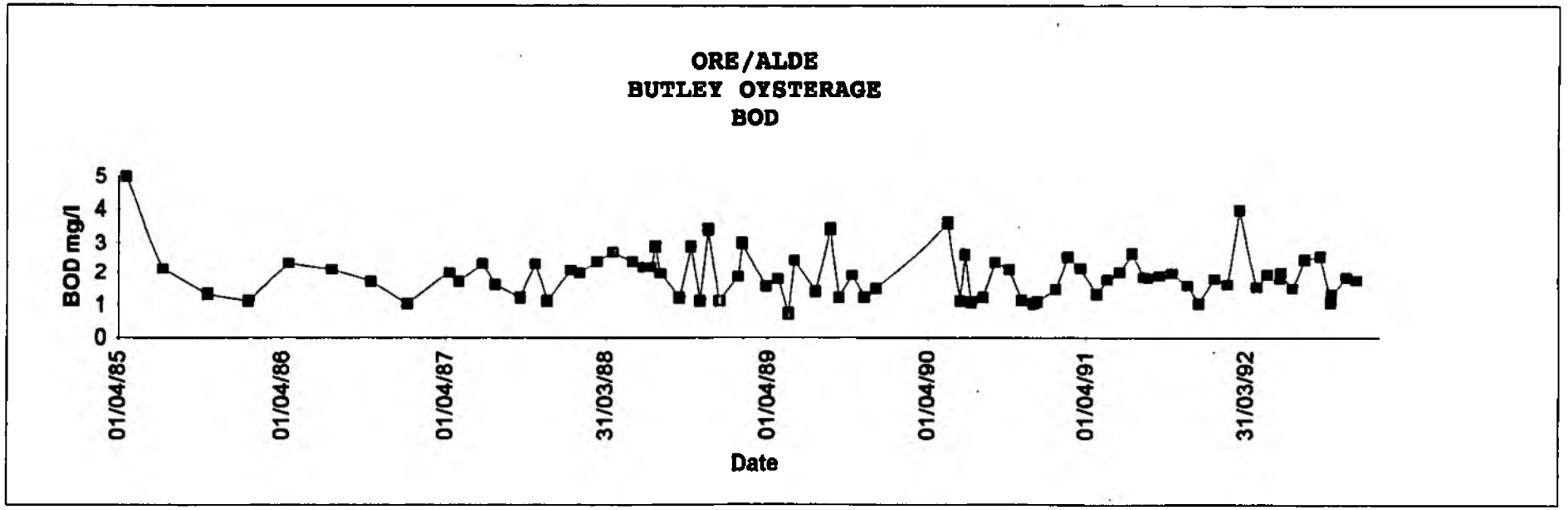
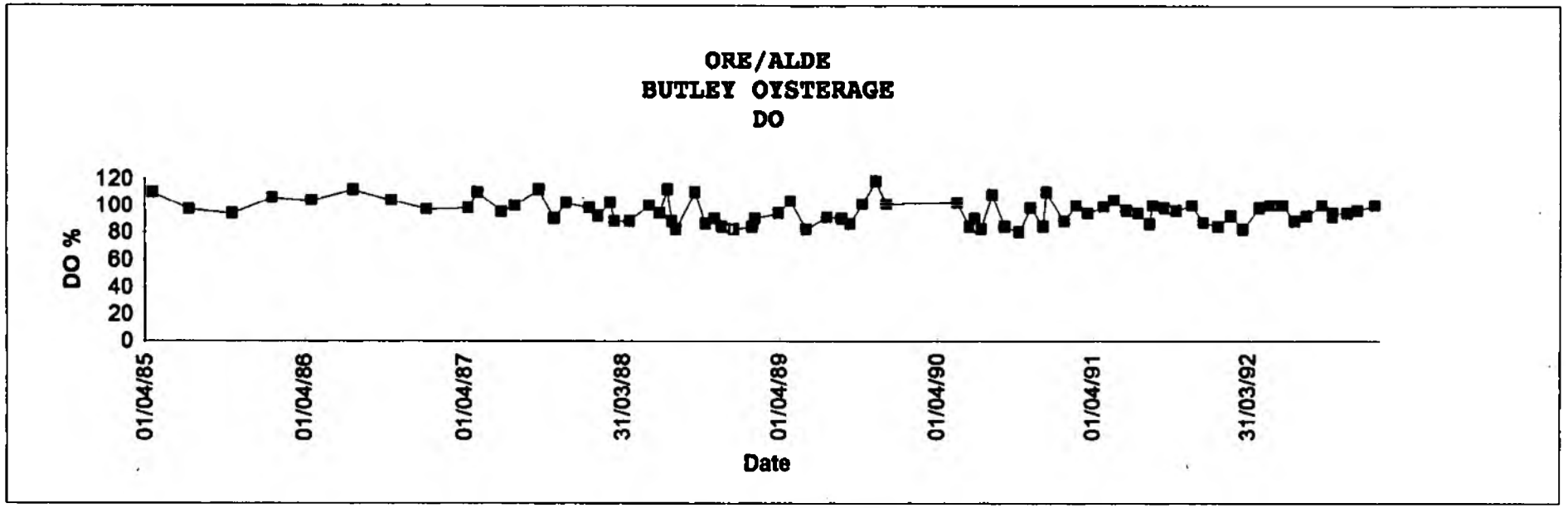
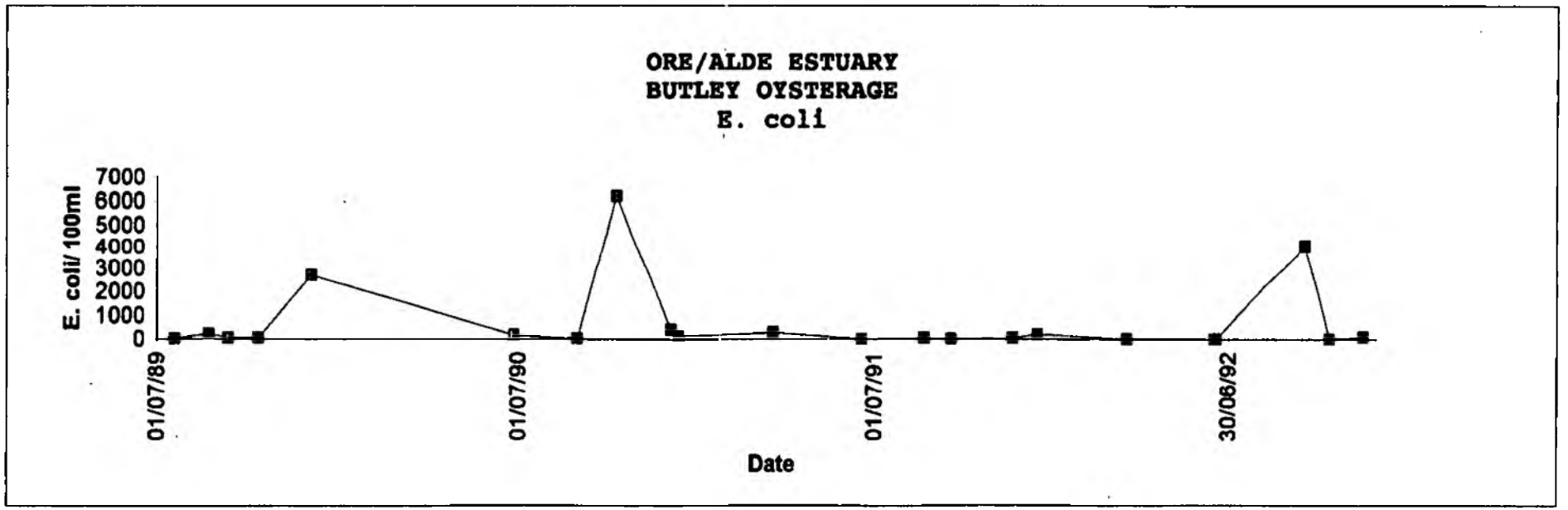


FIG 11

SAMPLE POINT CODE - BIOAE050





3 DEBEN ESTUARY

3.1 Historical Events from E.Suffolk and Norfolk River Authority Annual Report 1966-1974

1966 - Woodbridge and district STW completed resulting in good quality effluent.

1968 - Kesgrave and district STW phase I and III extension completed.

Historically the quality of the Deben estuary has been good.

3.2 Interpretation of Chemical Trends

Woodbridge Quay is upstream of Martlesham Creek and this point shows variable ammonia values, possibly due to the influence of Melton STW. DO values are satisfactory however, BOD values show signs of eutrophication particularly in recent years (Fig 12 & 13).

Waldringfield Quay is sampled frequently as it is below all the effluent inputs. There is more eutrophication evident in this stretch frequently reaching a BOD value of 6 mg/l. Apart from being below effluent inputs this site is below a large slow flowing stretch of water. Ammonia has improved since the mid 80's. The E. coli average values are exceptionally good in this area with values below 50, this is probably due to natural die off (Fig 14 & 15).

Bawdsey Ferry at the mouth of the estuary has excellent quality with an improvement in quality since the mid 80's for no apparent

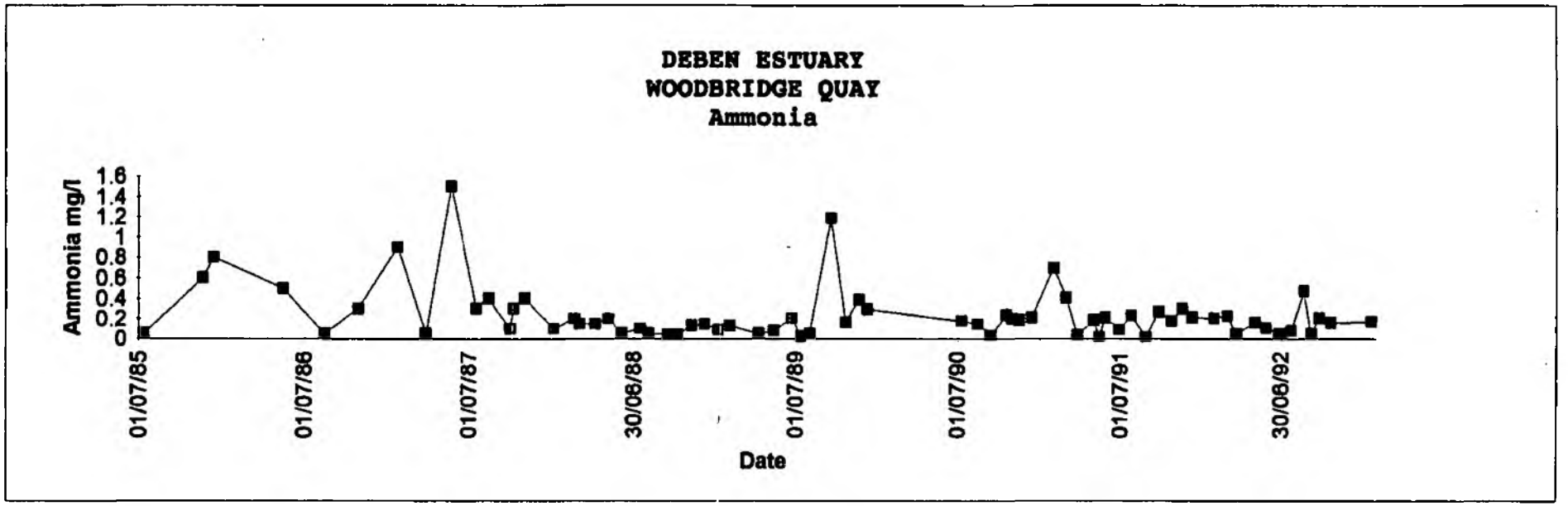
reason (Fig 16 & 17).

Shellfish flesh samples at Methersgate Quay show that it was class A throughout 1991-92 but during the early part of 1993 the E. coli values are tending towards the classification of class C. The shellfishery at Methersgate Quay was not of great commercial importance but it has plans for development. The mussel samples show contamination from Woodbridge and Melton STW and only occasional gathering is undertaken (Fig 18).

(See Map 20 for location of sample points)

FIG 12

SAMPLE POINT CODE - BIDEB110



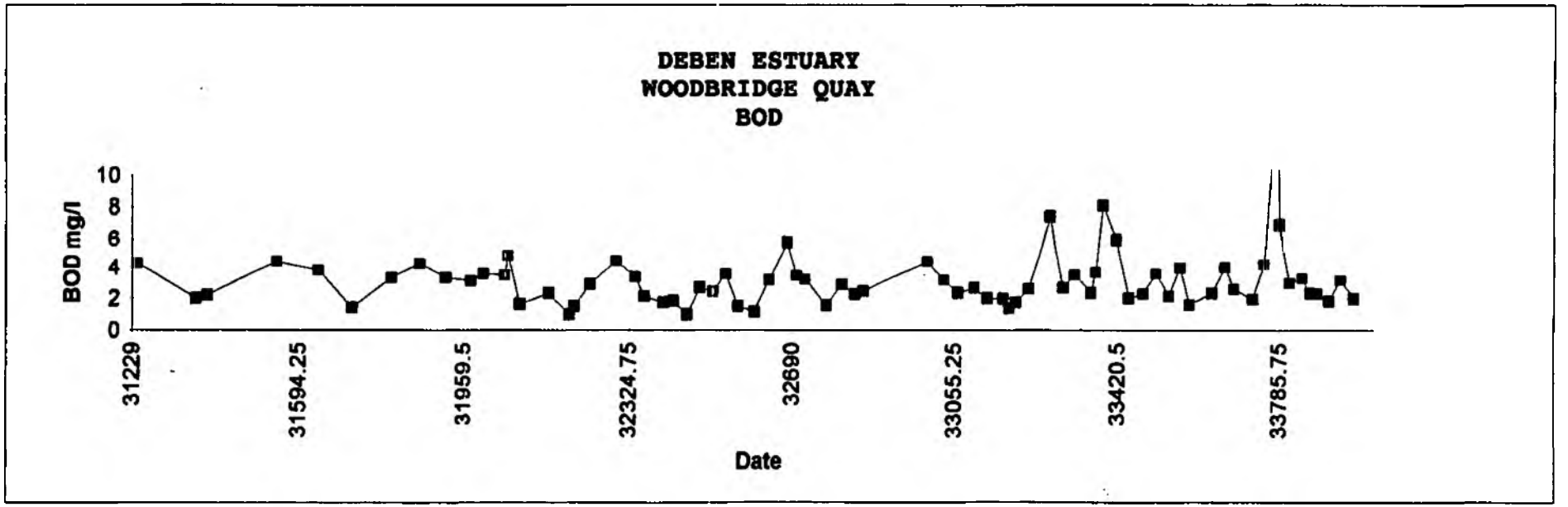
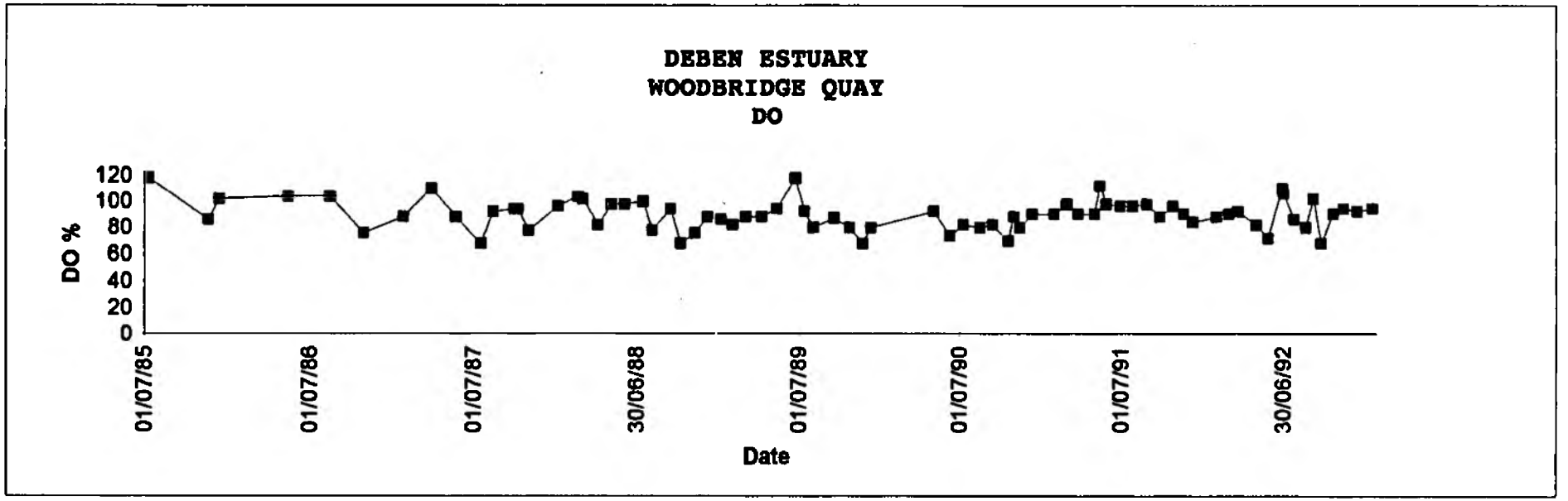


FIG 13

SAMPLE POINT CODE - BIDEB110



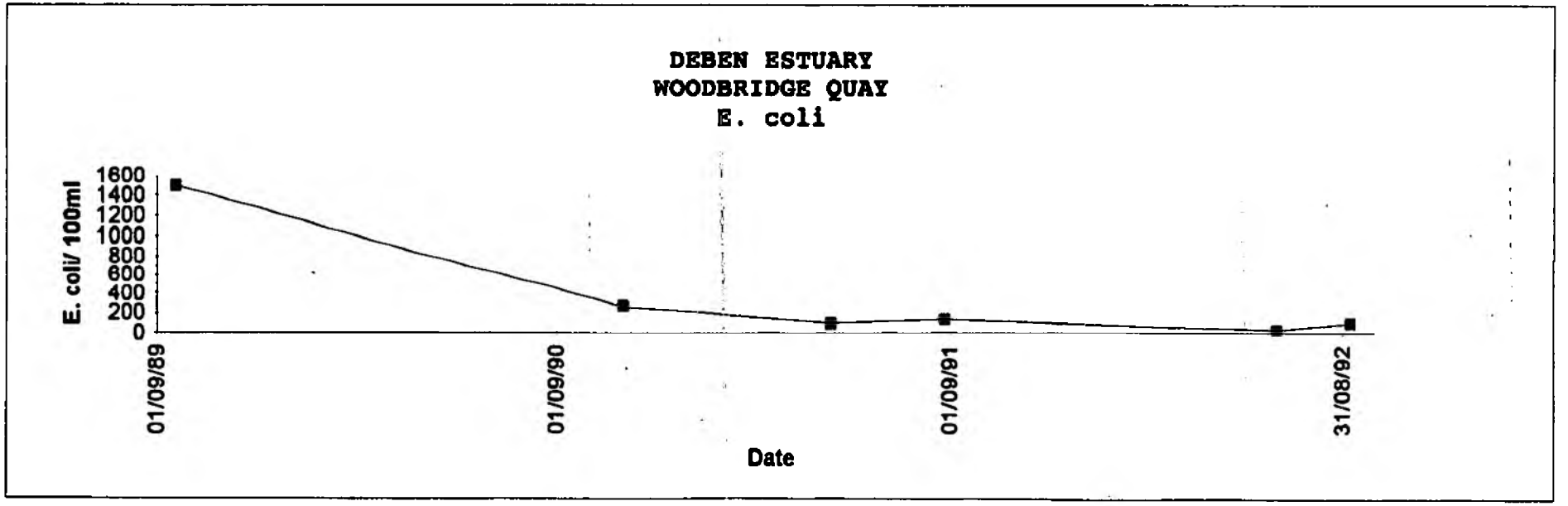
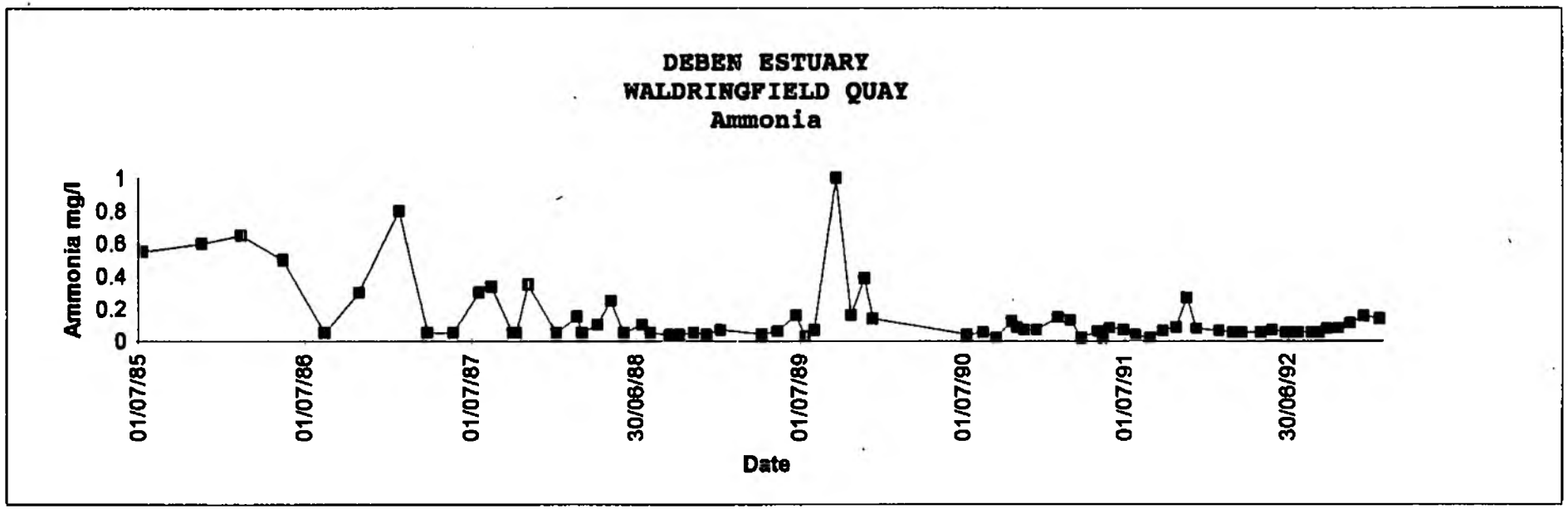


FIG 14

SAMPLE POINT CODE - BIDEB130



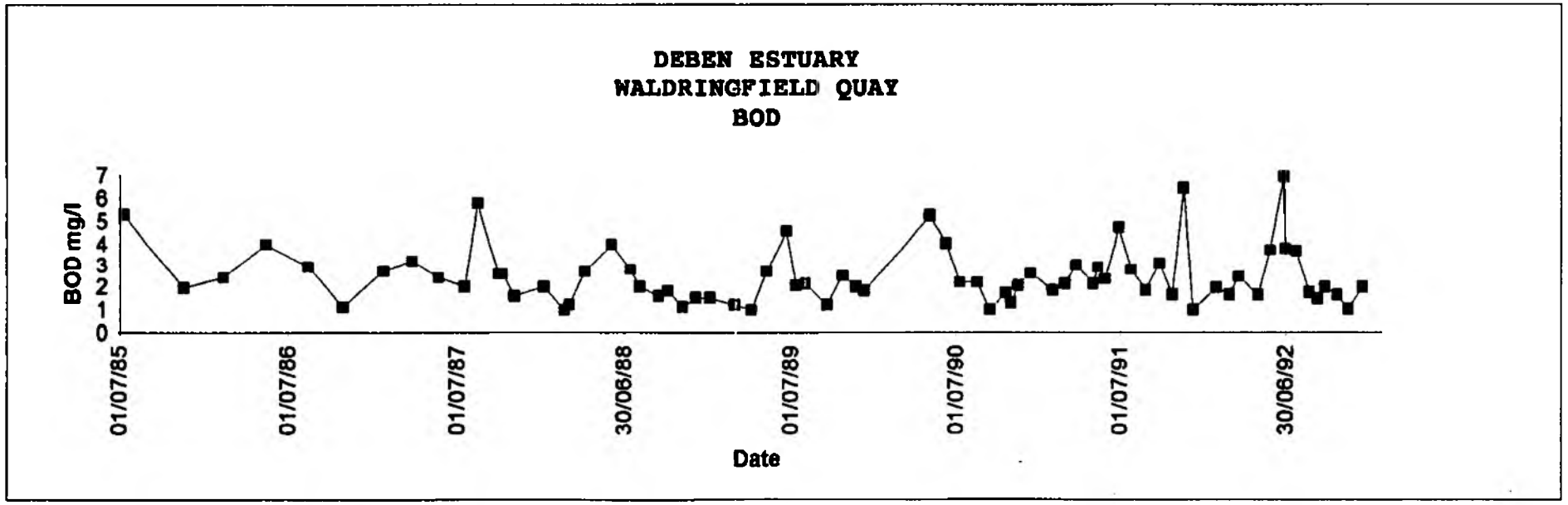
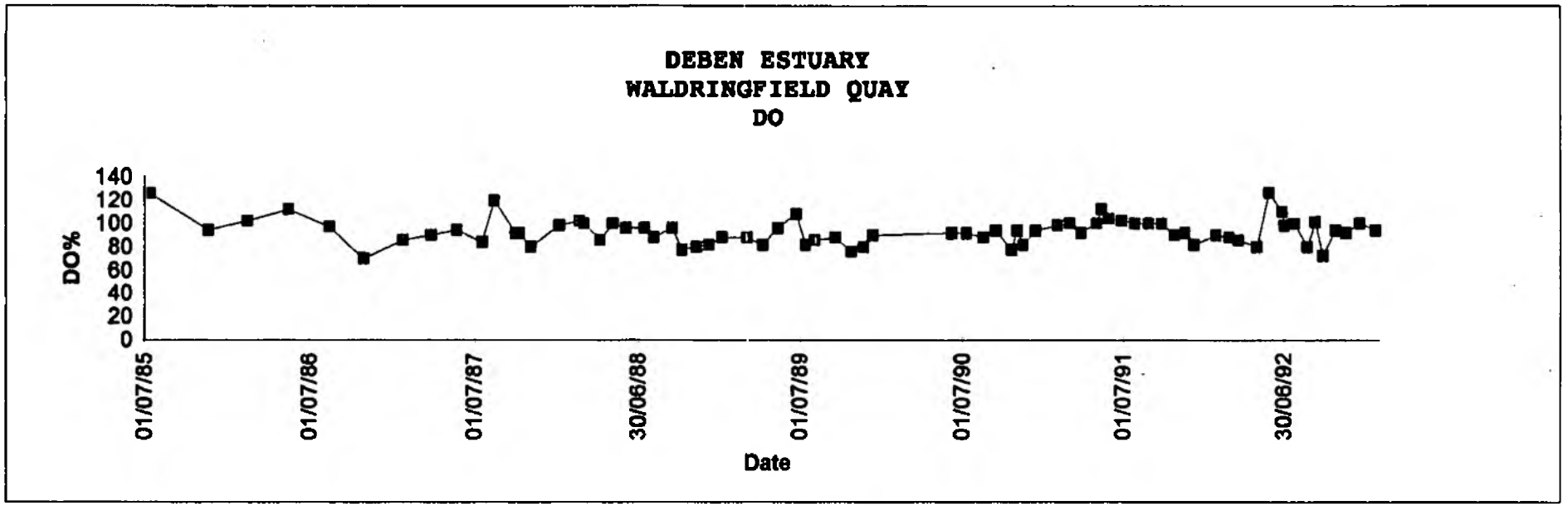


FIG 15

SAMPLE POINT CODE - BIDEB130



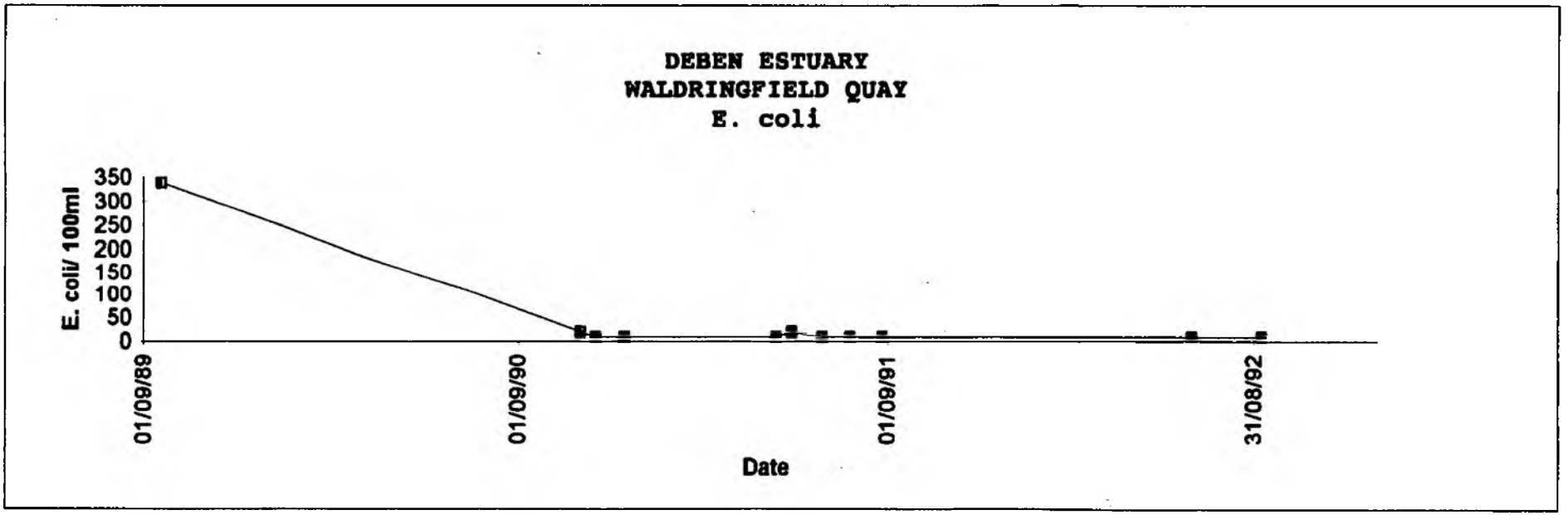
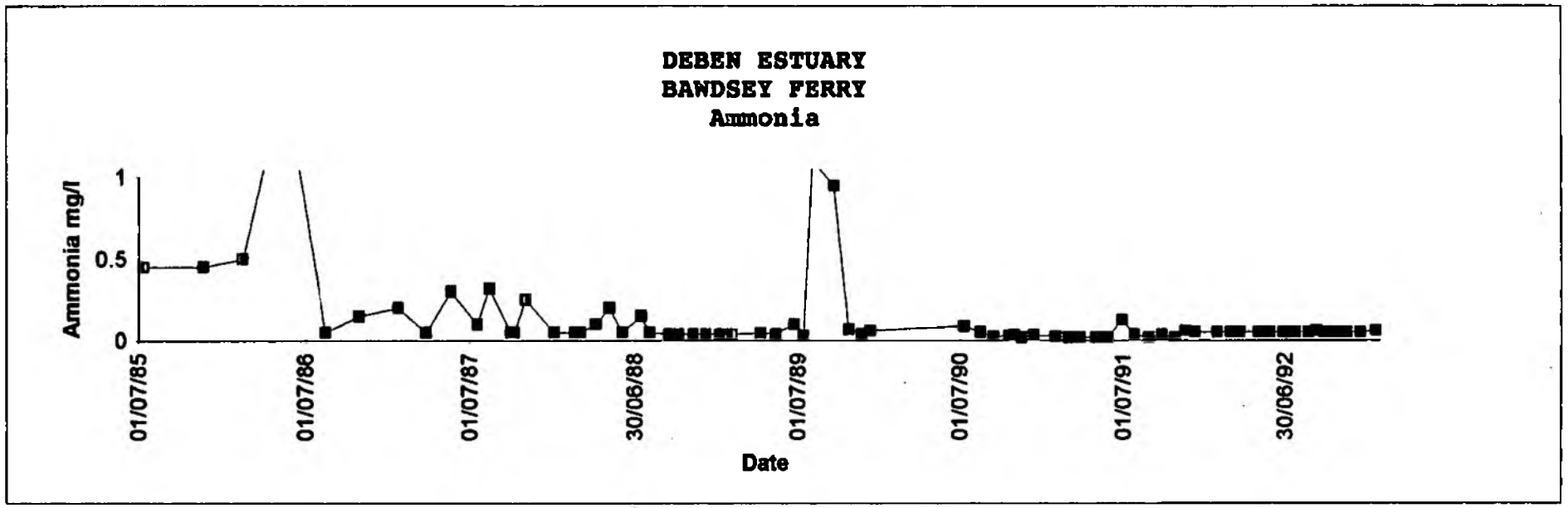


FIG 16

SAMPLE POINT CODE - BIDEB150



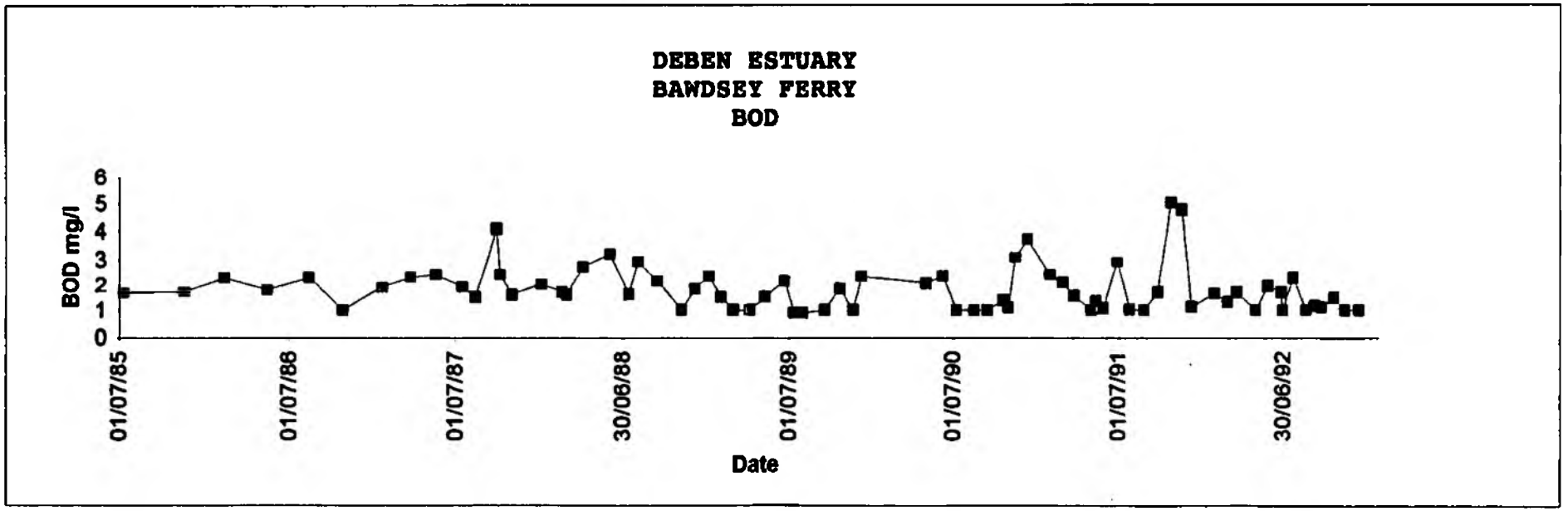
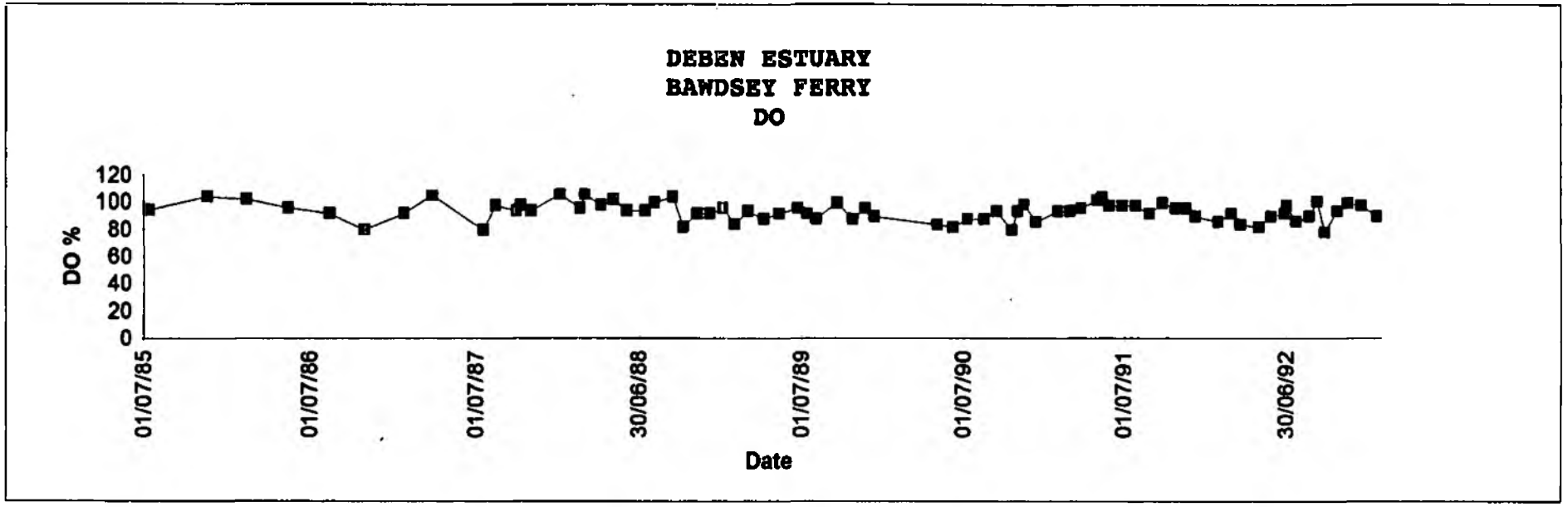


FIG 17

SAMPLE POINT CODE - BIDEB150



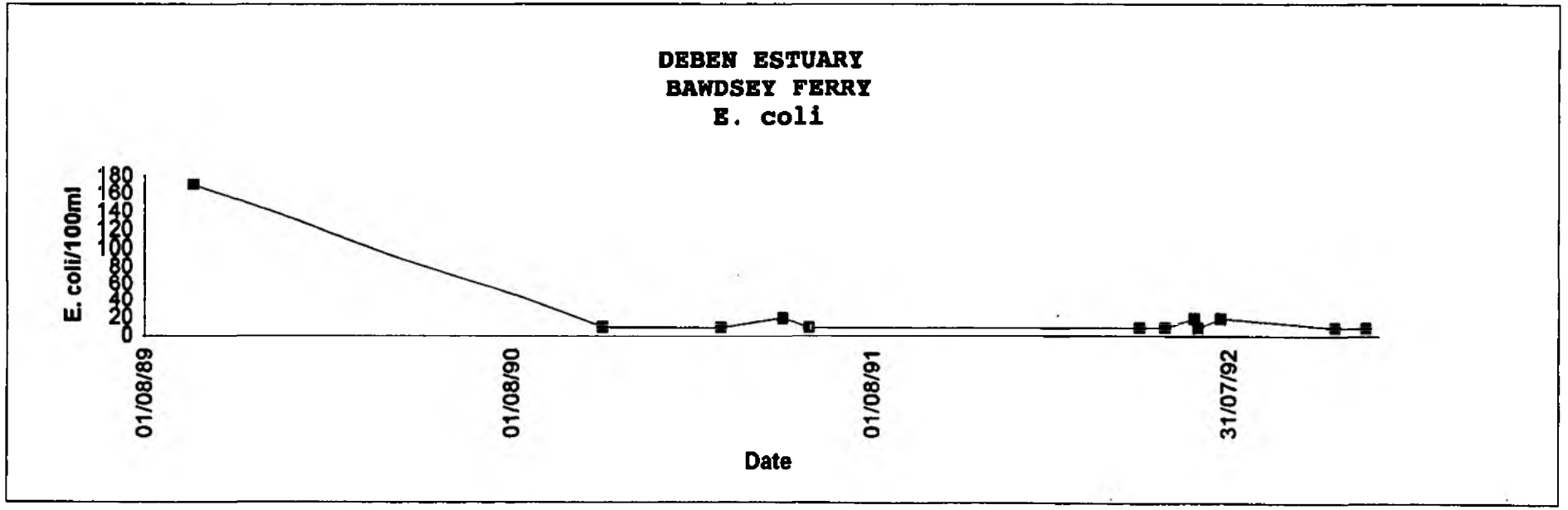
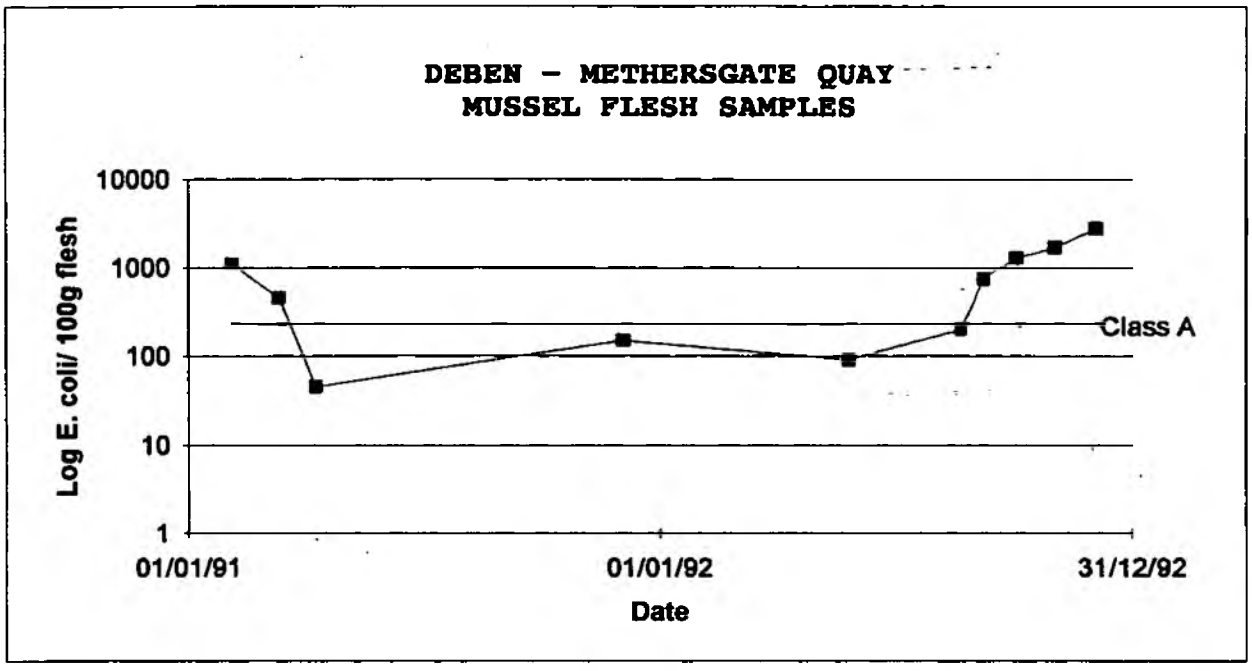
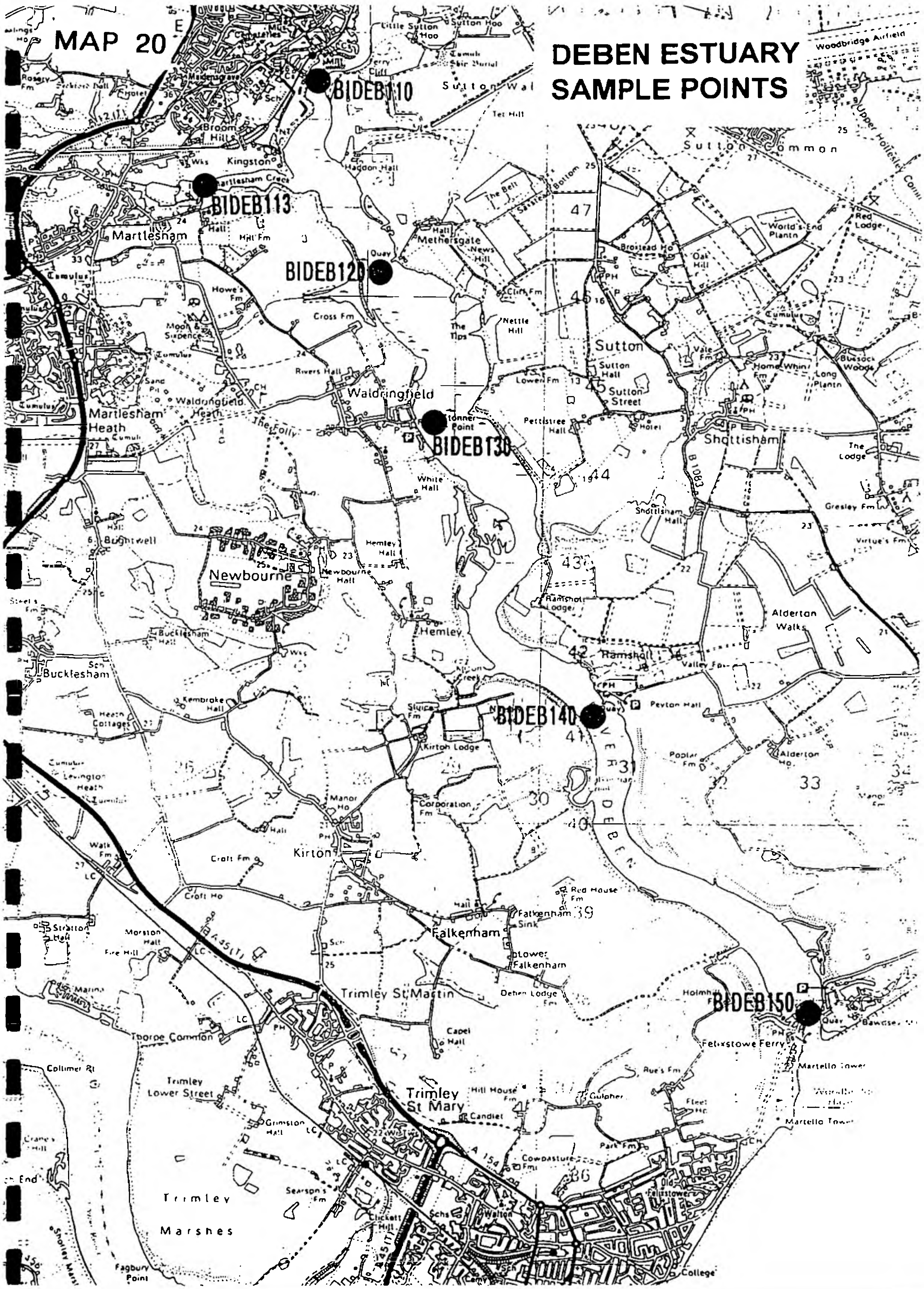


FIG 18 DEBEN SHELLFISH SAMPLES




MAP 20
DEBEN ESTUARY
SAMPLE POINTS
BIDEB110
BIDEB113
BIDEB120
BIDEB130
BIDEB140
BIDEB150
Martlesham
Martlesham Heath
Waldringfield
Newbourne
Bucklesham
Hemley
Kirton
Falkenham
Trimley St Martin
Trimley St Mary
Sutton
Shottisham
Alderton Walks
Ramsholt
Felixstowe Ferry
Trimley Marshes

4 ORWELL ESTUARY

4.1 Historical Events from E.Suffolk and Norfolk River Authority Annual Report 1966-1974

1966 - A marked evidence of pollution is noted from Ipswich sewage works and industrial effluents, particularly from the sugar beet factory from September to February.

1967 - Modifications to Cliff Quay STW completed but still caused pollution.

1969 - Chantry STW produced good quality effluent and the quality of the wider estuary was satisfactory.

1970 - Sproughton STW showed great improvement and further expansion is planned. Cliff Quay STW is still polluting and began sedimentation and sludge disposal.

1972 - Maltings at Stowmarket caused pollution and led to prosecution. British Sugar extended their discharge pipe to deeper water.

1973 - Leaks of oil from British Rail were stopped with a new oil interceptor and fitting an impervious plastic membrane under the track in the station area.

1974 - Sugar beet waste polluted the port area.

4.2 Interpretation of Chemical Trends

Poor quality is noted at Lock gates frequently. The variability of quality if partially due to the fact that the site is sampled at all tidal states. There does not however appear to be any significant improvement since the mid 80's. At lock gates there is the influence of British Sugar, a tidally controlled discharge, Pauls Maltings and until recently Burtons. This has resulted in values of ammonia being between 1 - 1.5 mg/l and BOD values of between 4 and 6 mg/l. This sampling point is also influenced by the effluent from Cliff Quay Sewage Treatment Works which is untreated. The DO levels are the most significant parameter at this site with concentrations of 30% recorded frequently (Fig 19).

The graph of Ipswich sewer outfall (Fig 20) clearly illustrates the chronic pollution that existed in the '60's and '70's with BOD values between 40 and 140 mg/l. It has improved quite clearly since then during the '80's and '90's but the values are still not acceptable.

Woolverstone Marina is much less polluted than lock gates due to its distance downstream and the diluting effects of the estuary. However, some high ammonia values have been recorded with a trend of quality deterioration in recent years. Little signs of eutrophication are noted with the Orwell estuary (Fig 21).

Heavy metal analysis is carried out at this sample point, and copper values appear to exceeded the annual average limit for the last four years. Other metals are not causing problems, although some zinc results appear high. These high values of copper are in part probably due to the trade discharge at Cliff Quay Sewage works, but also the extensive use of the Orwell estuary in recreational boating pursuits. Since TBT based antifouling paints were banned, copper antifouling points are used and this may add to the elevated copper values experienced at this site

(Fig 22).

Collimer Point is influenced by Harwich, Dovercourt and Felixstowe effluents, however, their effects are minimal and the water quality at this site is satisfactory (Fig 23).

(See Map 21 for location of sample points)

FIG 19

SAMPLE POINT CODE - BIORW040

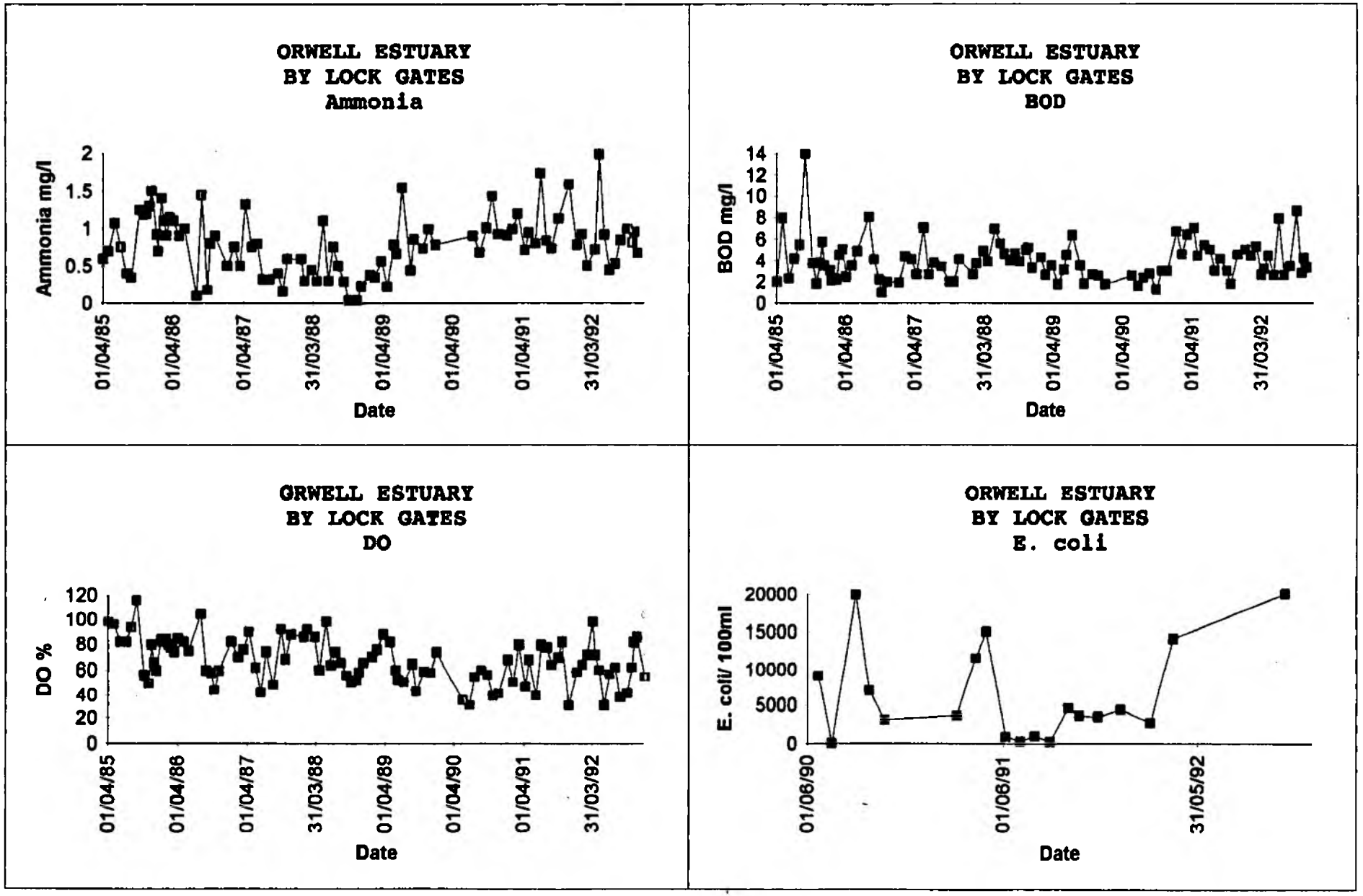
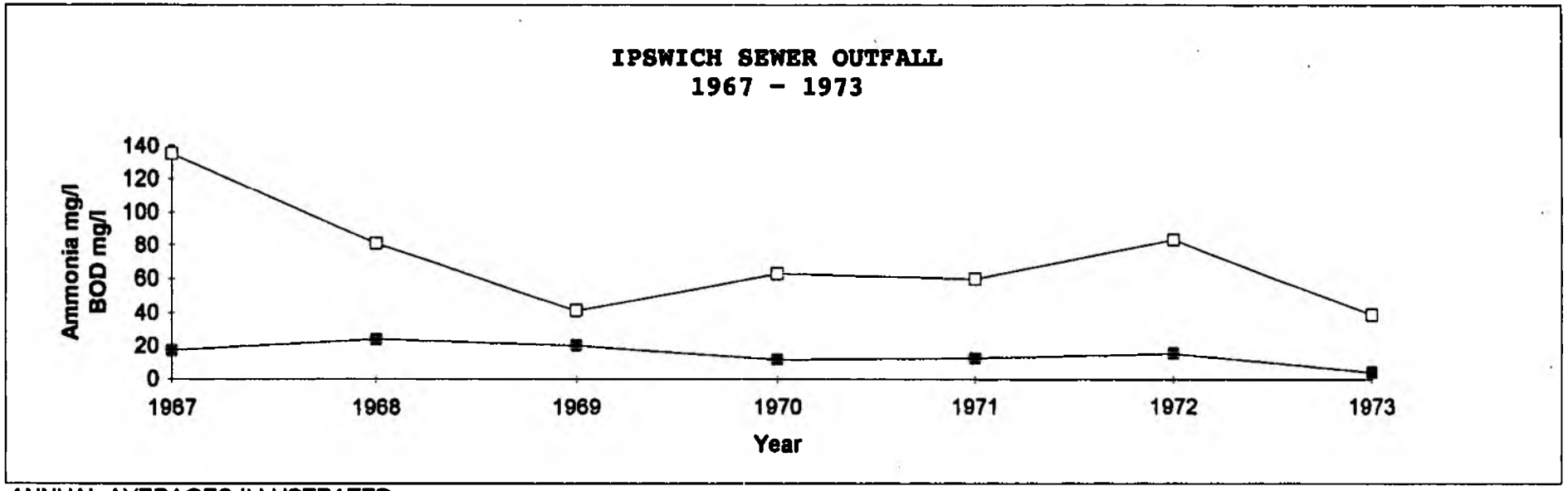


FIG 20



ANNUAL AVERAGES ILLUSTRATED

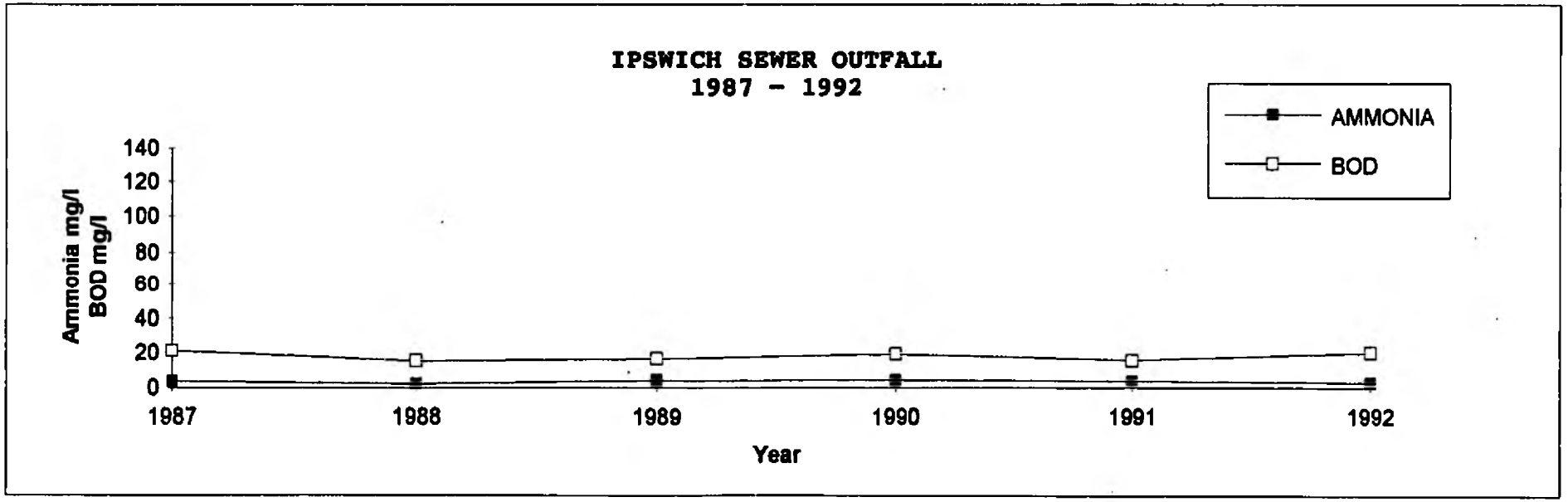


FIG 21

SAMPLE POINT CODE - BIORW100

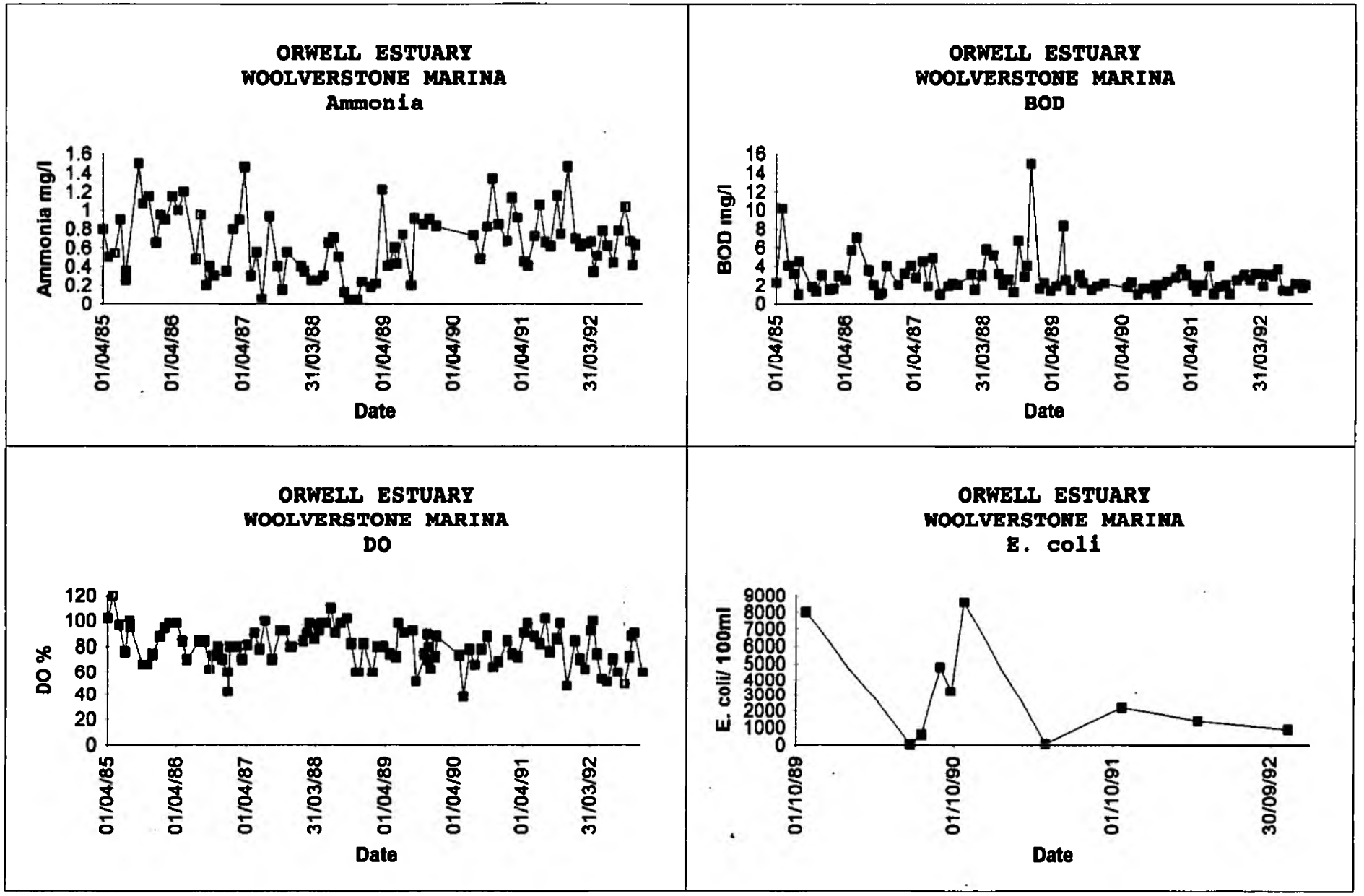


FIG 22

ANNUAL METAL LEVELS AT WOOLVERSTONE MARINA

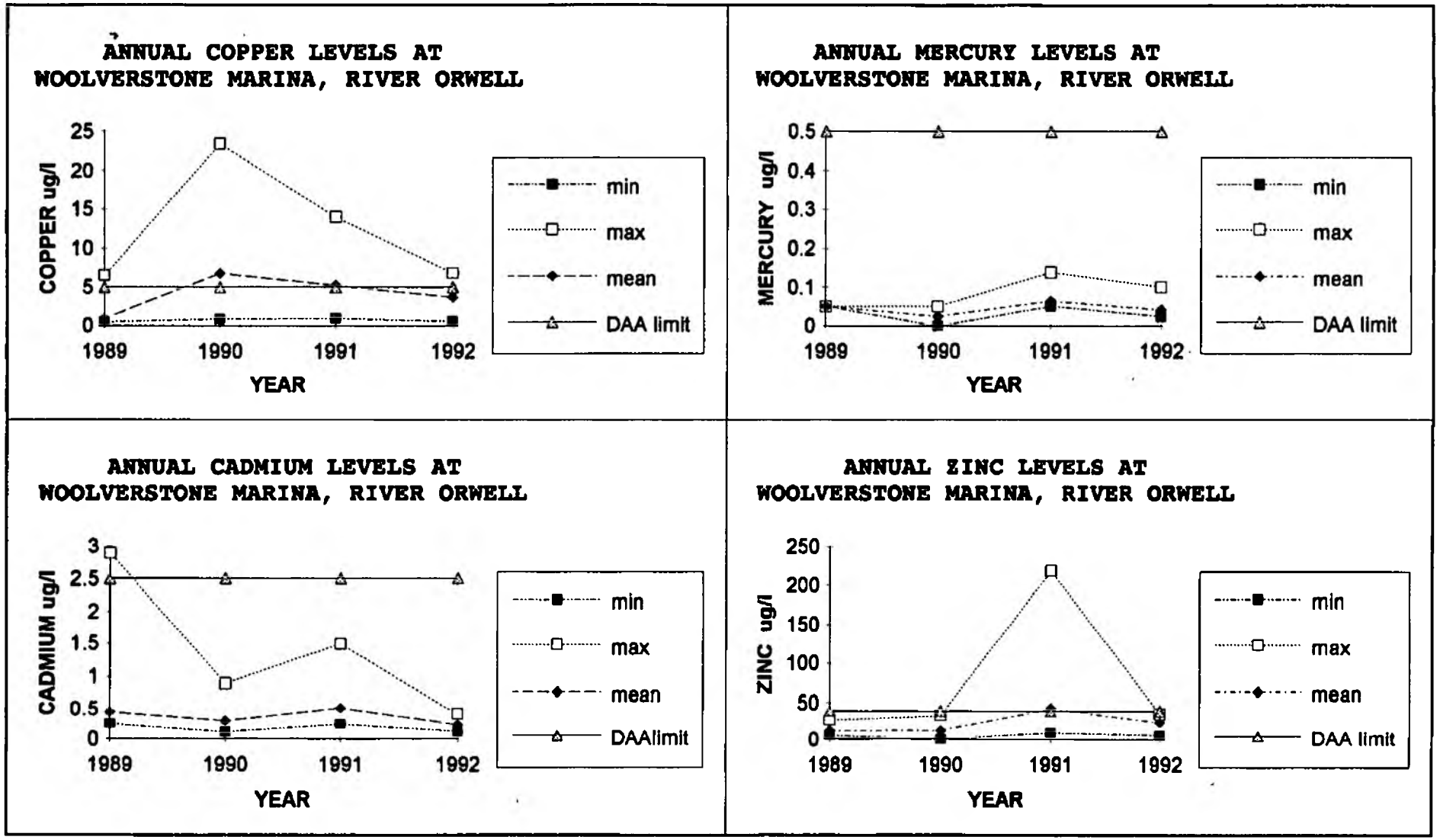
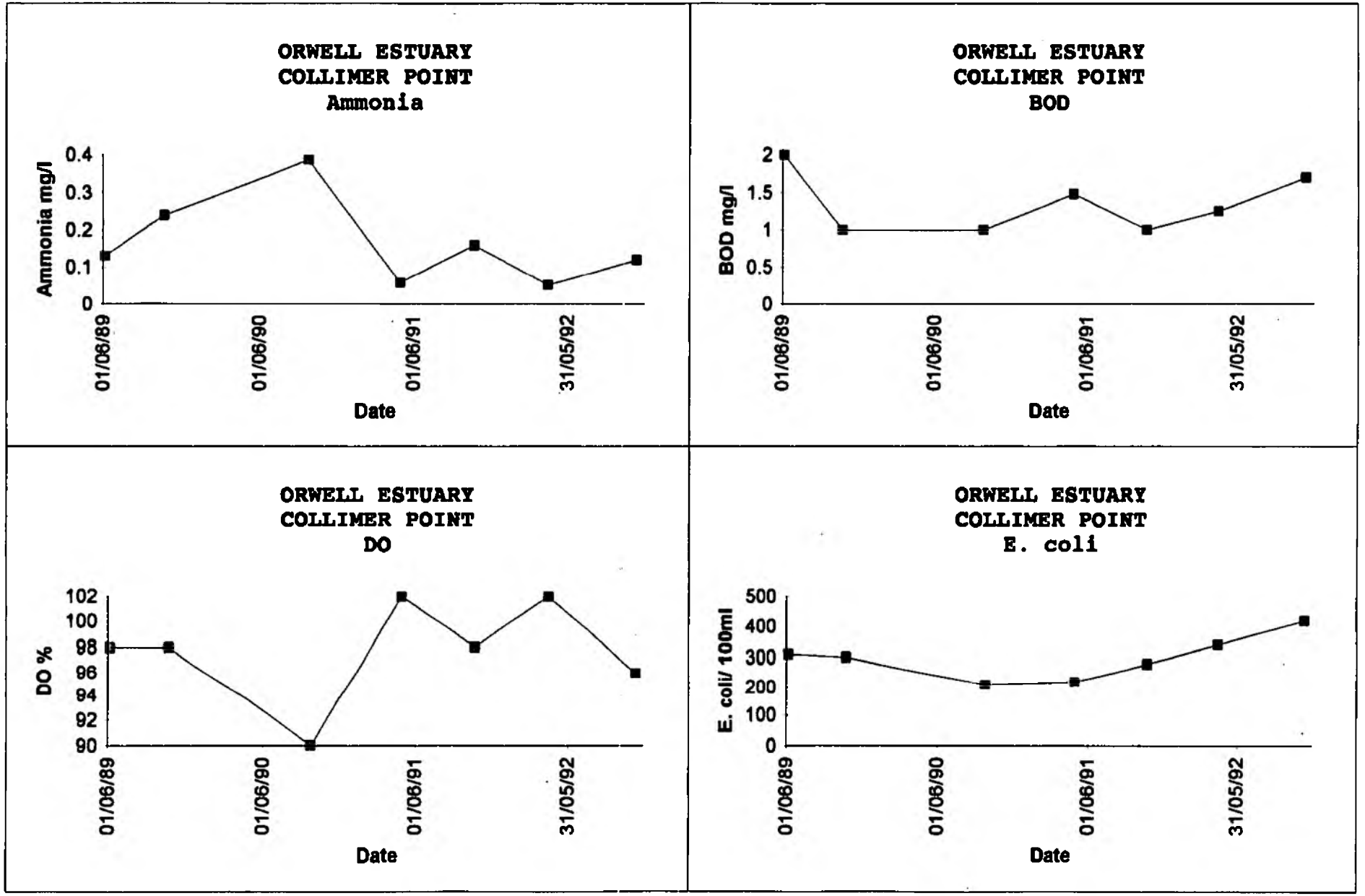
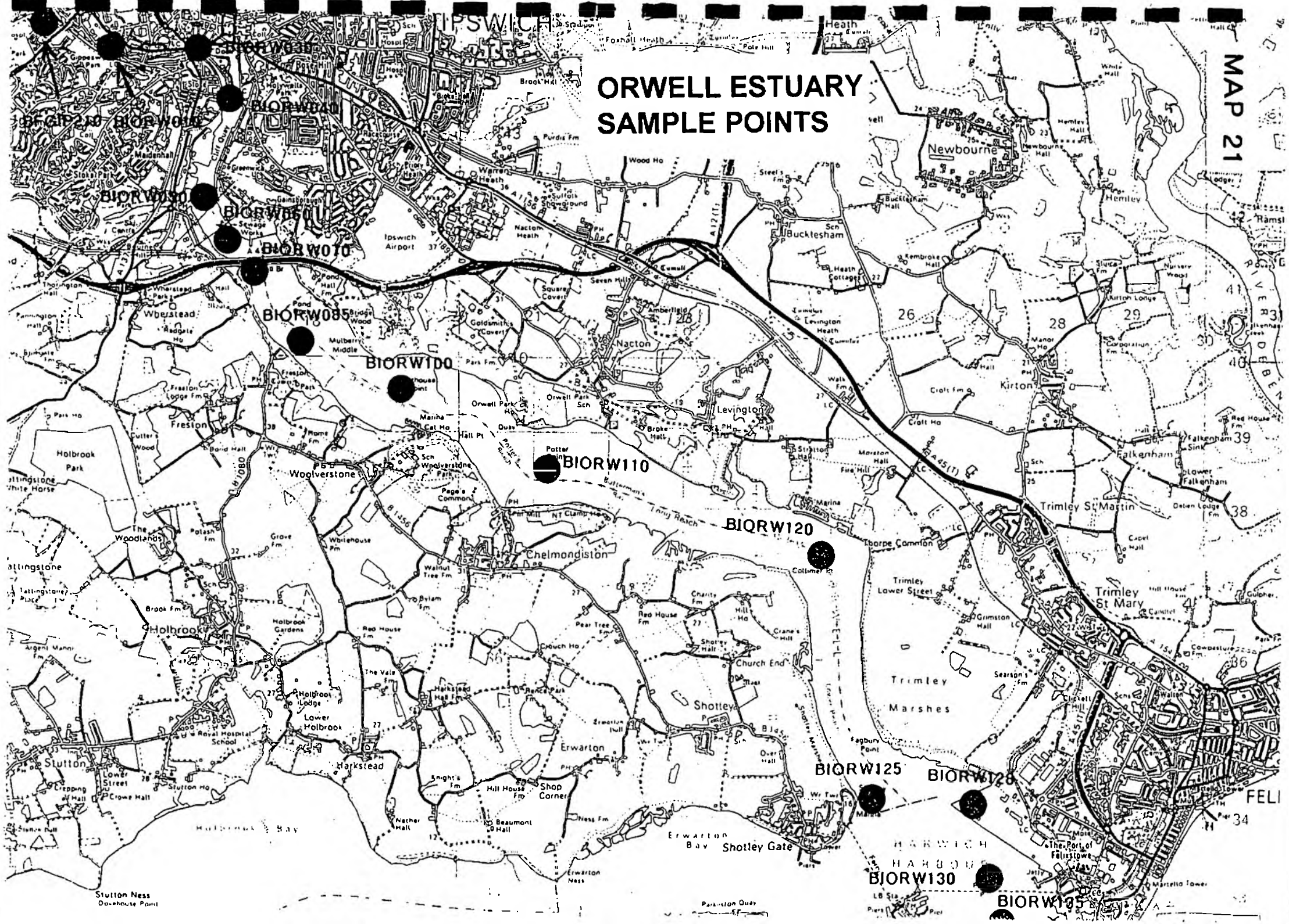


FIG 23

SAMPLE POINT CODE - BIORW120




ORWELL ESTUARY
SAMPLE POINTS
MAP 21
IPSWICH
BIORW030
BIORW040
BIORW050
BIORW060
BIORW070
BIORW085
BIORW100
BIORW110
BIORW120
BIORW125
BIORW126
BIORW130
BIORW135
Wherstead
Nacton
Levington
Freston
Woolverstone
Chelmondiston
Holbrook
Stutton
Harkstead
Erwarton
Shotley
Shotley Gate
Erwarton Bay
Trimley Marshes
Trimley St Martin
Trimley St Mary
Kirton
Falkenham
Newbourne
Hemley
Bucklesham
Ipswich Airport
Holbrook Park
Stutton Ness
HARWICH HARBOUR
The Port of Felixstowe

5 STOUR ESTUARY

5.1 Historical Events from Essex River Authority Annual Report 1953-74

1958 - Trade and sewage effluent caused pollution between Brantham and Mistley. The estuary was relatively clean below Mistley.

1963 - Continued pollution in upper reaches and restriction was placed on any further developments until the area sewage scheme has been provided.

1964 - Discharge of settled sewage from Parkeston STW caused pollution to the Ramsey River.

1968 - The Stour, which was previously affected by phytoplankton growths, was cleaner, although nitrate values were still high. Apart from the effluents at Parkeston and Harwich the water quality was satisfactory.

1971 - Brantham STW was completed.

1974 - Northern Area STW connecting Mistley and Manningtree was completed.

1975 - Parkeston STW connected to Harwich guard outfall.

5.2 Interpretation of Chemical Trends

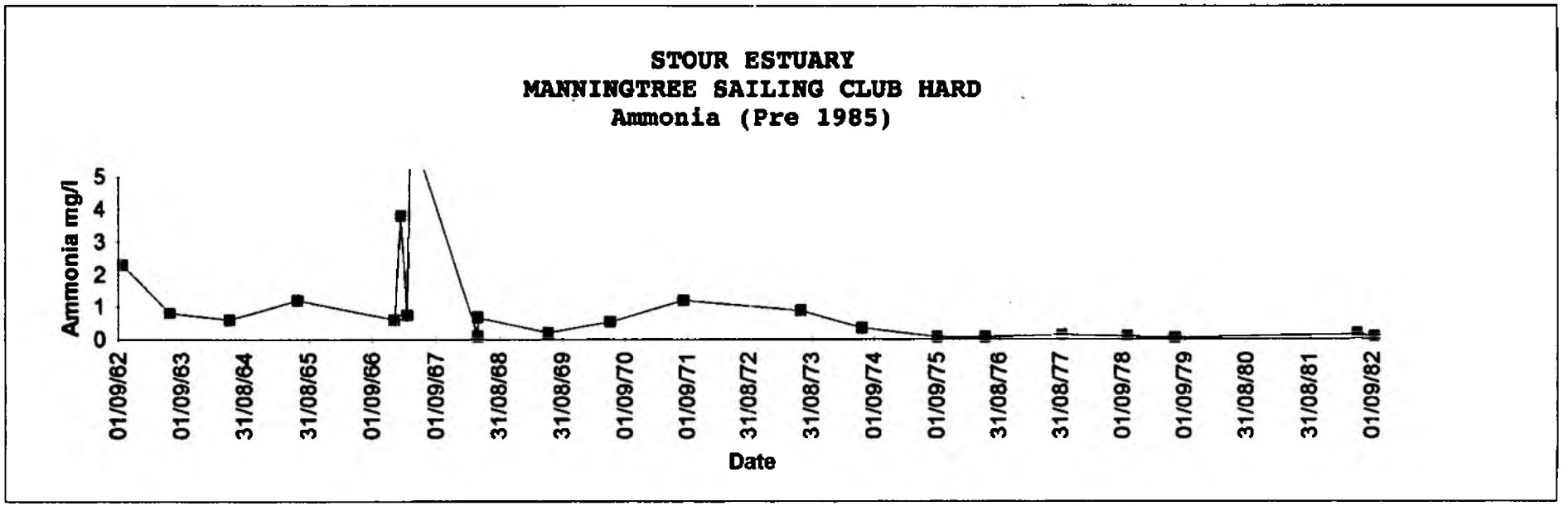
At Manningtree Sailing Club a deterioration in ammonia since the

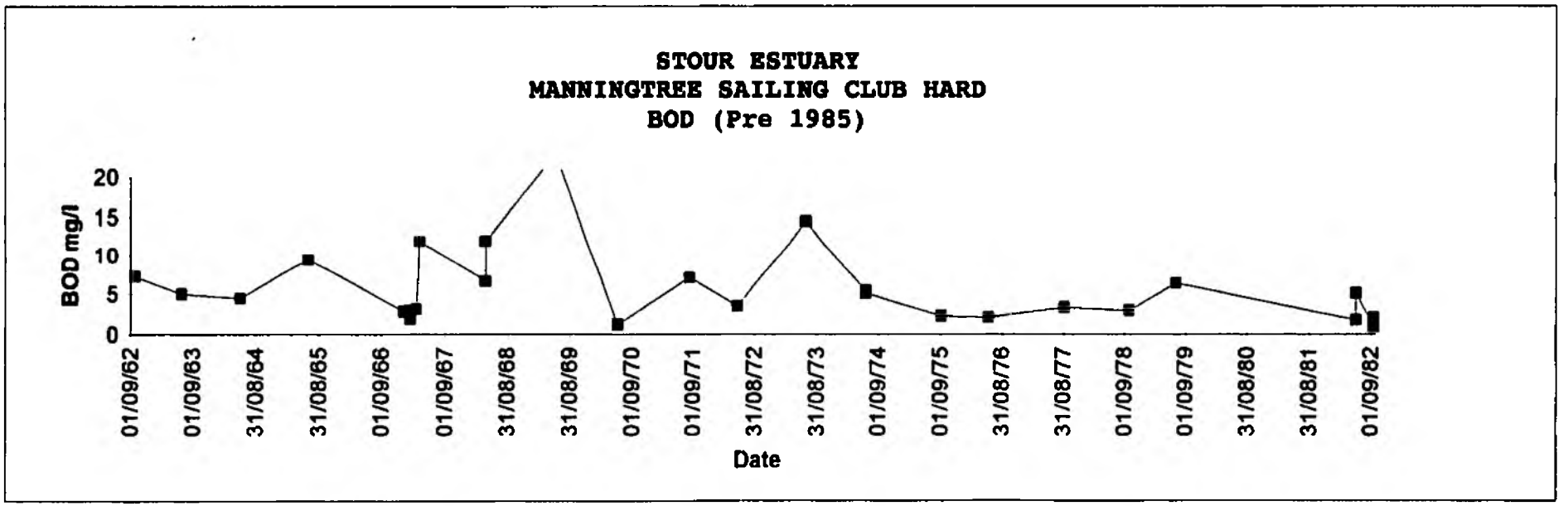
1980's is apparent. This may possibly due to Manningtree STW taking additional loading. However, BOD levels have improved and any fluctuations tend to be due to eutrophication (Fig 24 - 27).

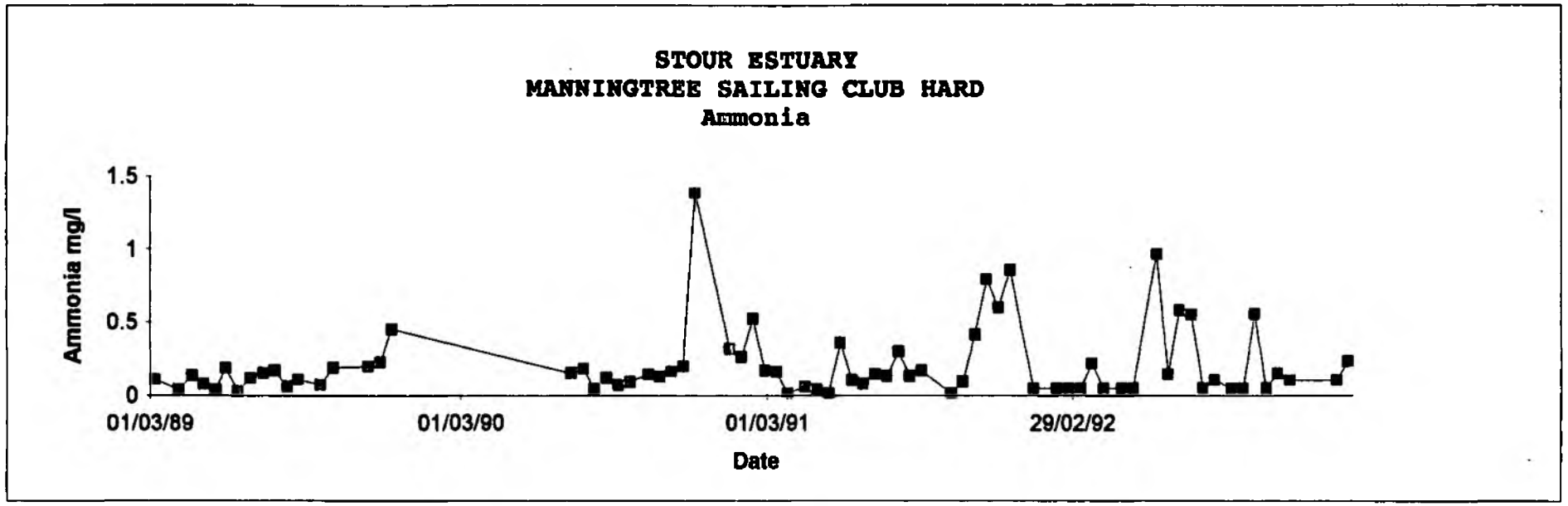
At Baltic Wharf, Mistley, ammonia shows a deterioration in the water quality. BOD has remained within a range of 4 - 8 mg/l and is unlikely to improve until the effluent from Mistley Quay is treated since the maltings effluent is a large proportion of this discharge. No DO sag appears at this sample site (Fig 28 - 31).

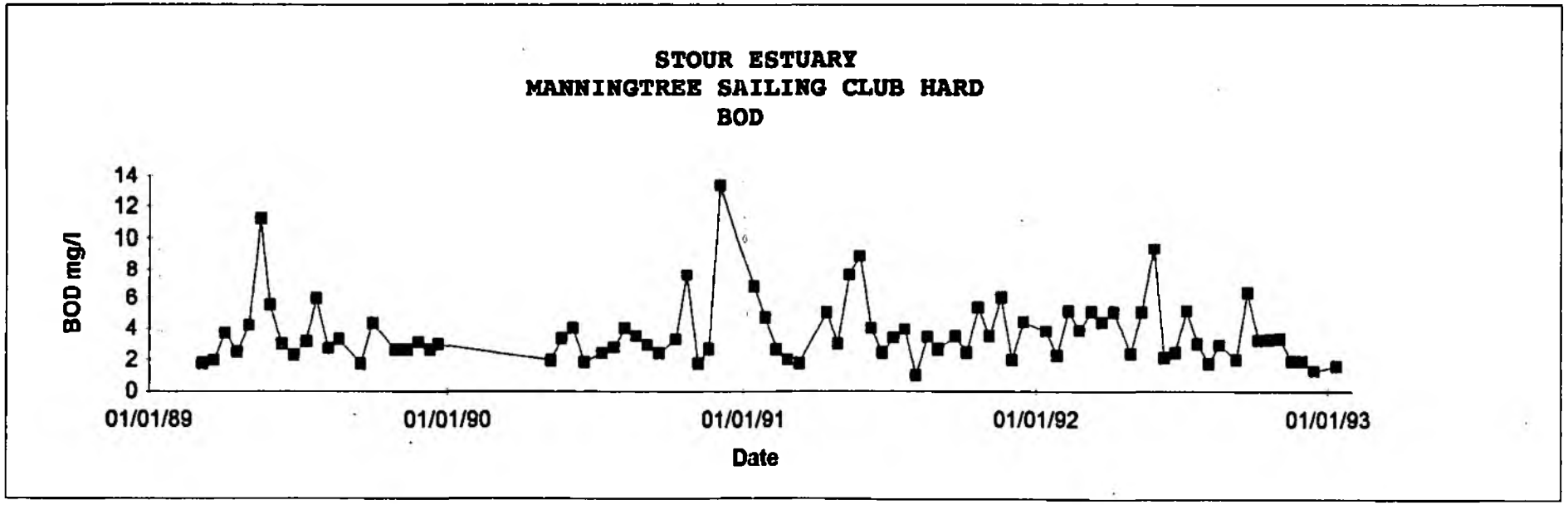
Wrabness Point shows some oxygen depletion but both BOD and E. coli are low and the water quality is satisfactory, as is the water quality downstream at Harwich Pier, with respect to all parameters (Fig 32, 33, 34 & 35).

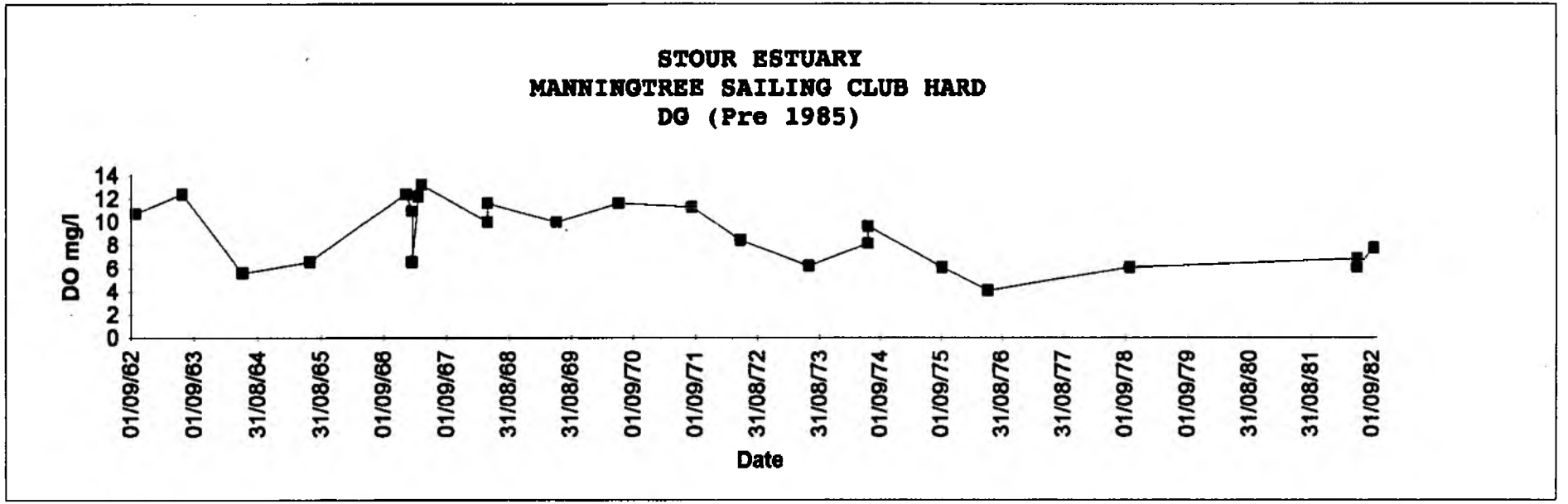
(See Map 22 for location of sample points)


STOUR ESTUARY
MANNINGTREE SAILING CLUB HARD
Ammonia (Pre 1985)
Ammonia mg/l
0
1
2
3
4
5
01/09/62
01/09/63
31/08/64
31/08/65
01/09/66
01/09/67
31/08/68
31/08/69
01/09/70
01/09/71
31/08/72
31/08/73
01/09/74
01/09/75
31/08/76
31/08/77
01/09/78
01/09/79
31/08/80
31/08/81
01/09/82
Date


STOUR ESTUARY
MANNINGTREE SAILING CLUB HARD
BOD (Pre 1985)
BOD mg/l
0
5
10
15
20
01/09/62
01/09/63
31/08/64
31/08/65
01/09/66
01/09/67
31/08/68
31/08/69
01/09/70
01/09/71
31/08/72
31/08/73
01/09/74
01/09/75
31/08/76
31/08/77
01/09/78
01/09/79
31/08/80
31/08/81
01/09/82
Date


STOUR ESTUARY
MANNINGTREE SAILING CLUB HARD
Ammonia
Ammonia mg/l
1.5
1
0.5
0
01/03/89
01/03/90
01/03/91
29/02/92
Date


STOUR ESTUARY
MANNINGTREE SAILING CLUB HARD
BOD
BOD mg/l
14
12
10
8
6
4
2
0
01/01/89
01/01/90
01/01/91
01/01/92
01/01/93
Date


STOUR ESTUARY
MANNINGTREE SAILING CLUB HARD
DO (Pre 1985)
DO mg/l
14
12
10
8
6
4
2
0
01/09/62
01/09/63
31/08/64
31/08/65
01/09/66
01/09/67
31/08/68
31/08/69
01/09/70
01/09/71
31/08/72
31/08/73
01/09/74
01/09/75
31/08/76
31/08/77
01/09/78
01/09/79
31/08/80
31/08/81
01/09/82
Date

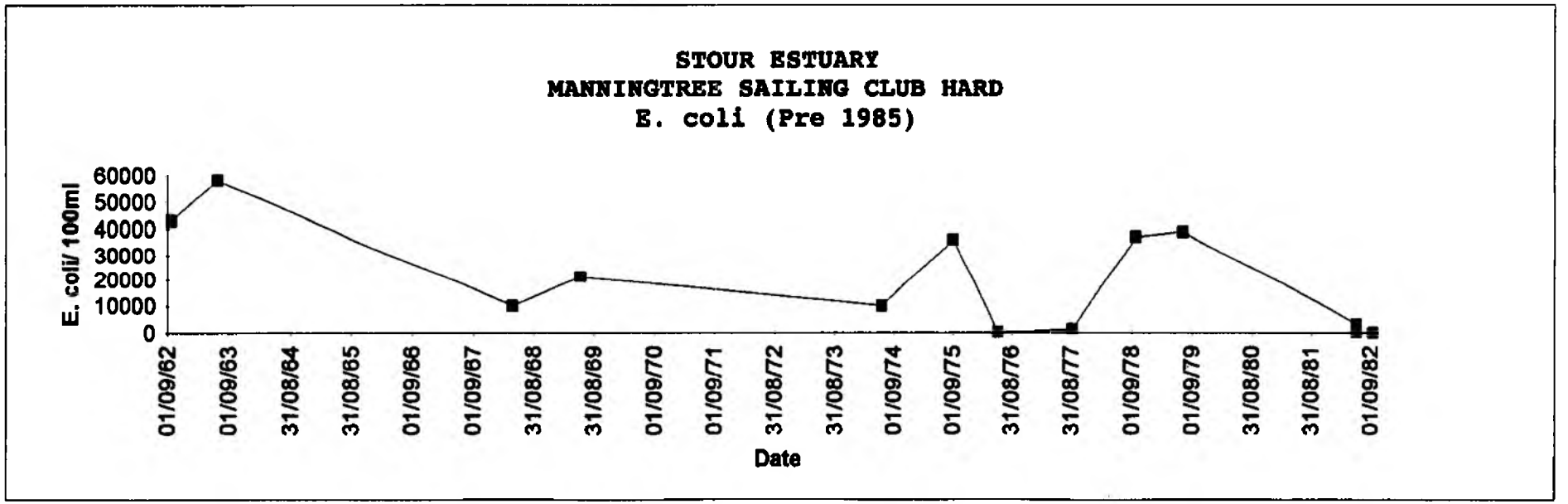
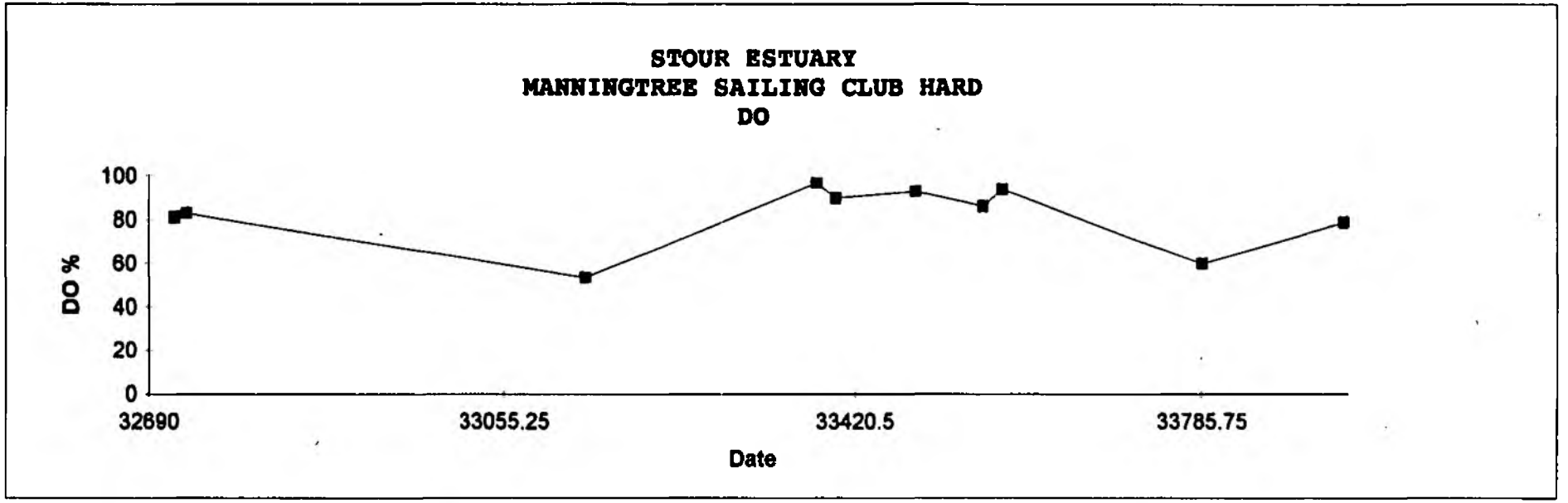
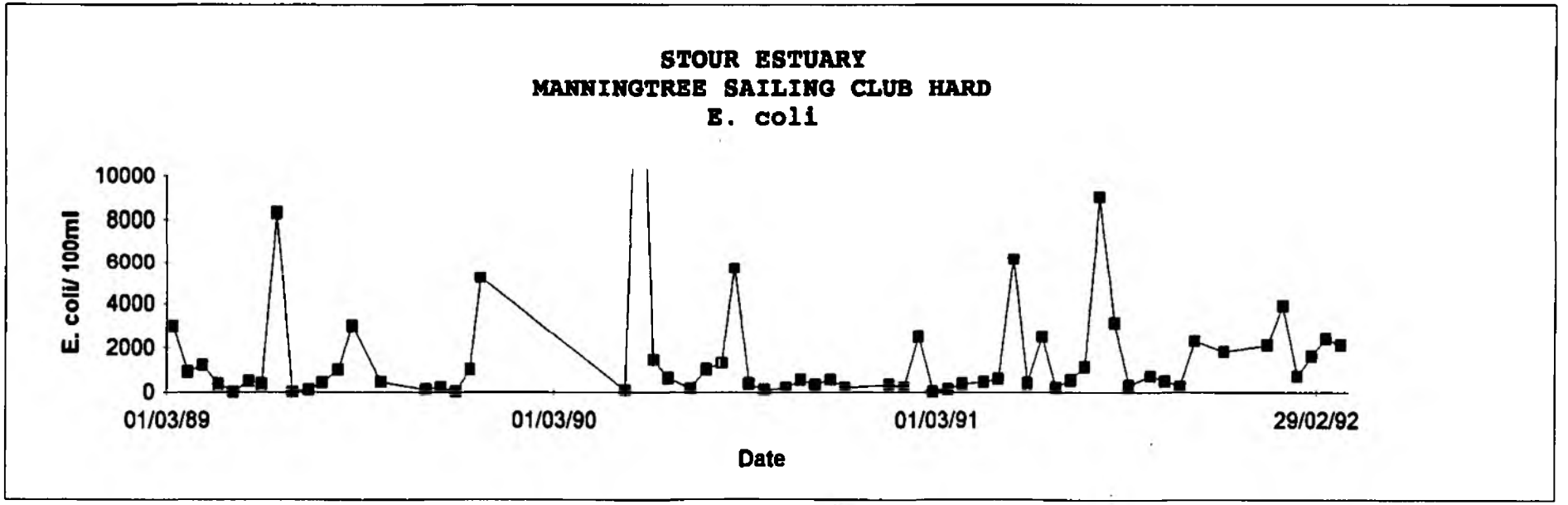
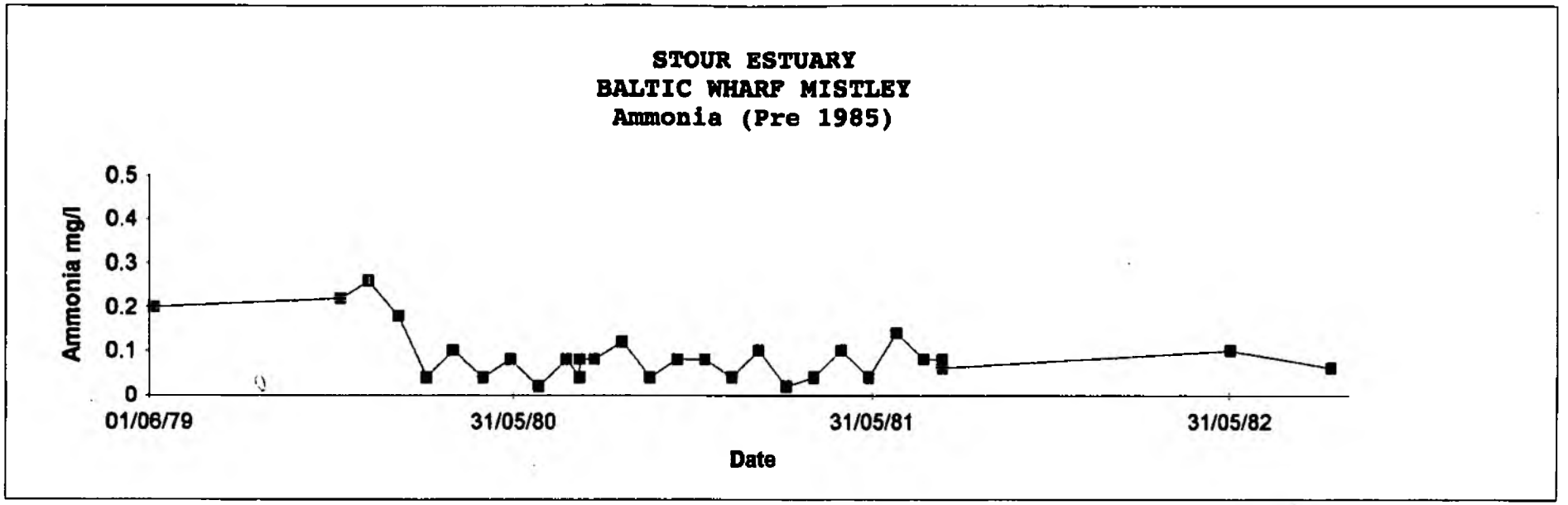

STOUR ESTUARY
MANNINGTREE SAILING CLUB HARD
E. coli (Pre 1985)
E. coli/ 100ml
60000
50000
40000
30000
20000
10000
0
01/09/62
01/09/63
31/08/64
31/08/65
01/09/66
01/09/67
31/08/68
31/08/69
01/09/70
01/09/71
31/08/72
31/08/73
01/09/74
01/09/75
31/08/76
31/08/77
01/09/78
01/09/79
31/08/80
31/08/81
01/09/82
Date

FIG 27

SAMPLE POINT CODE - BISE1650






STOUR ESTUARY
BALTIC WHARF MISTLEY
Ammonia (Pre 1985)
Ammonia mg/l
0.5
0.4
0.3
0.2
0.1
0
01/06/79
31/05/80
31/05/81
31/05/82
Date

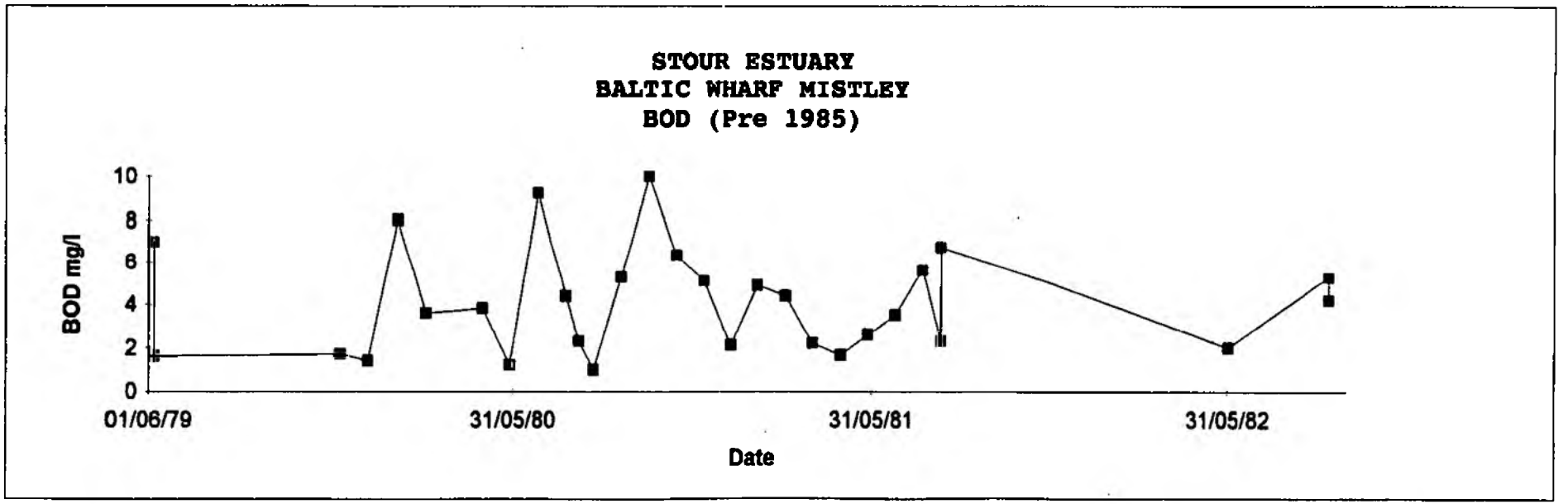
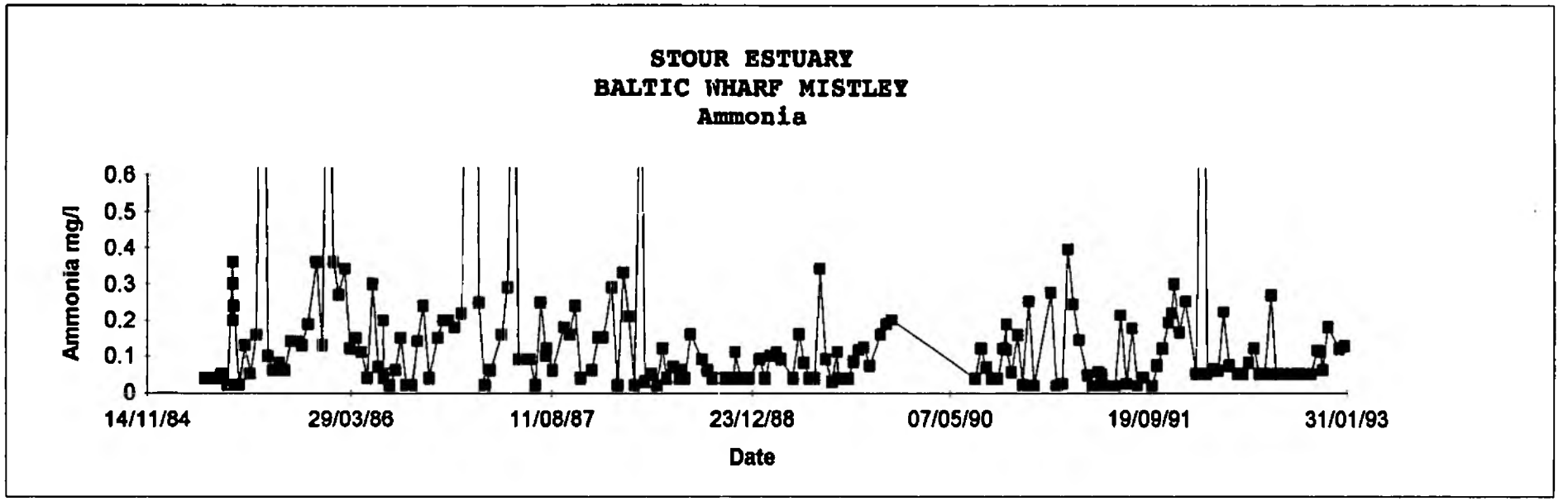
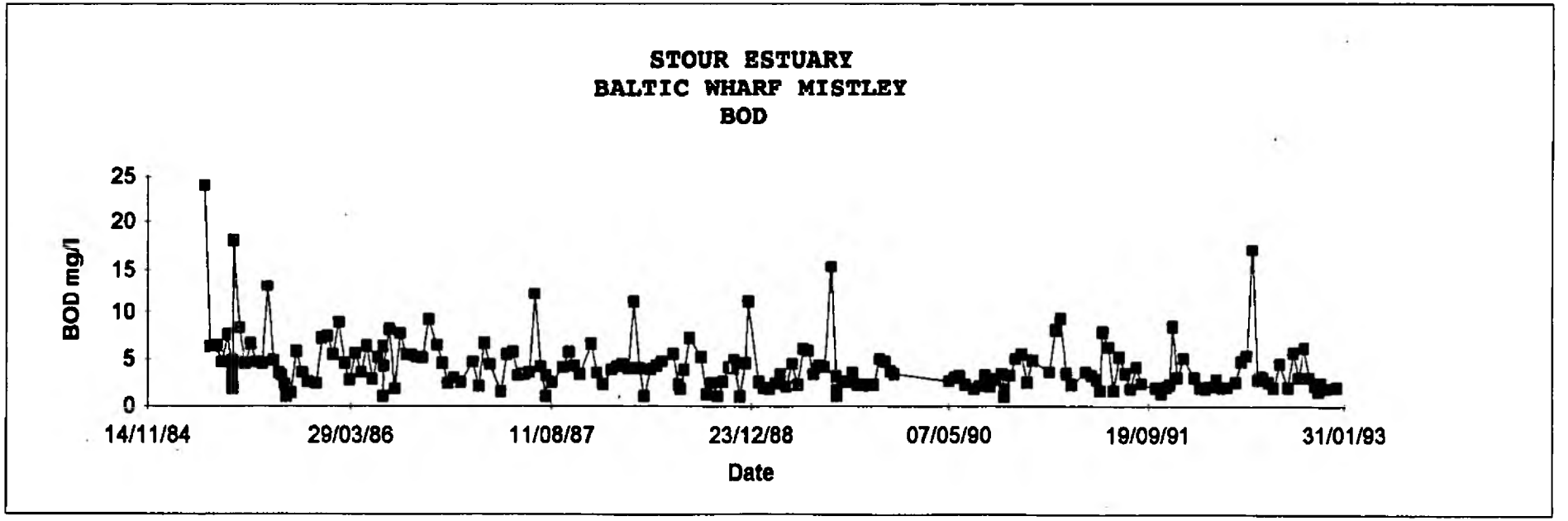
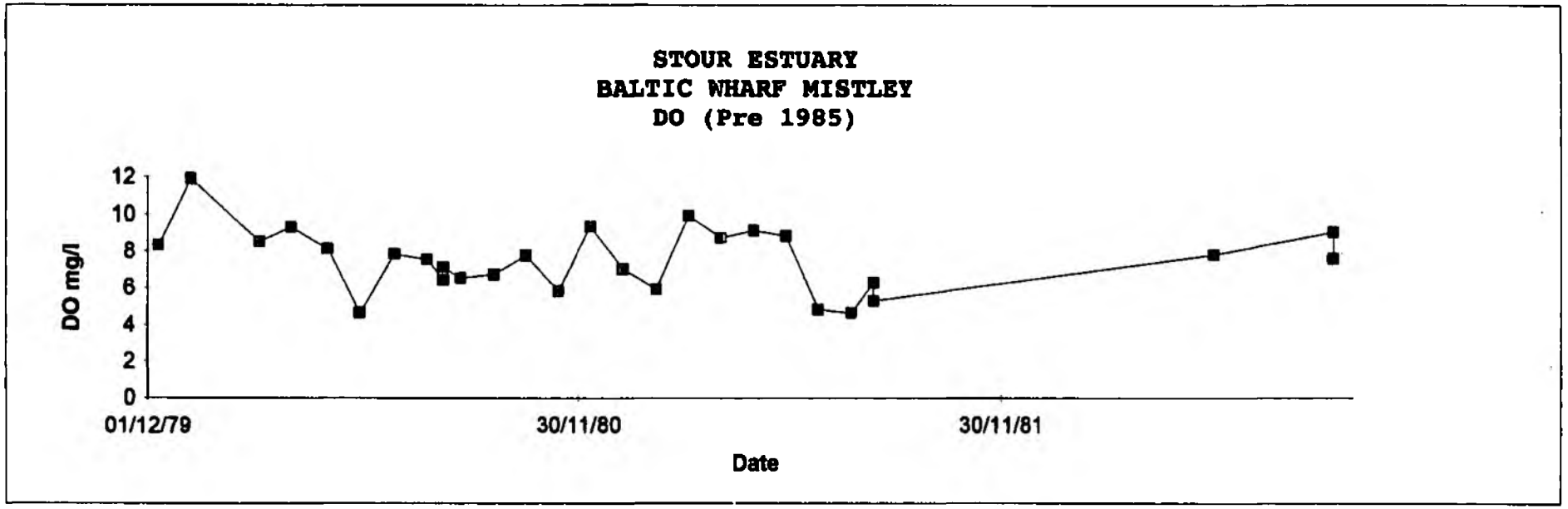

STOUR ESTUARY
BALTIC WHARF MISTLEY
BOD (Pre 1985)
BOD mg/l
10
8
6
4
2
0
01/06/79
31/05/80
31/05/81
31/05/82
Date

FIG 29

SAMPLE POINT CODE - BISE12






STOUR ESTUARY
BALTIC WHARF MISTLEY
DO (Pre 1985)
DO mg/l
12
10
8
6
4
2
0
01/12/79
30/11/80
30/11/81
Date

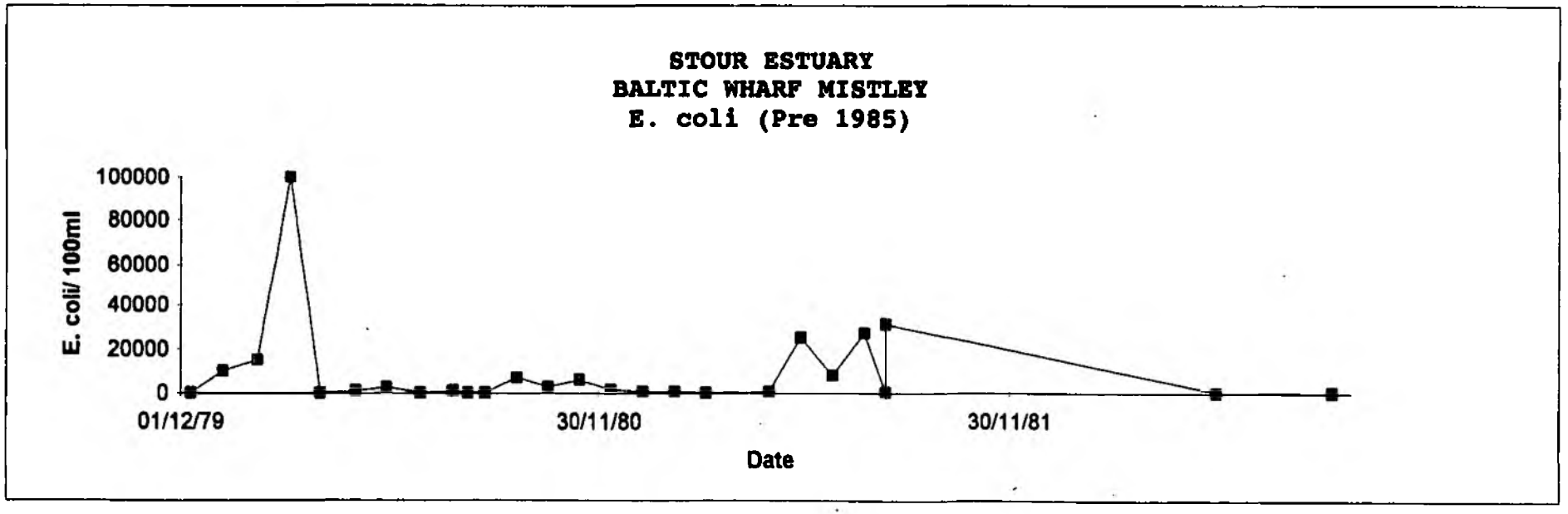
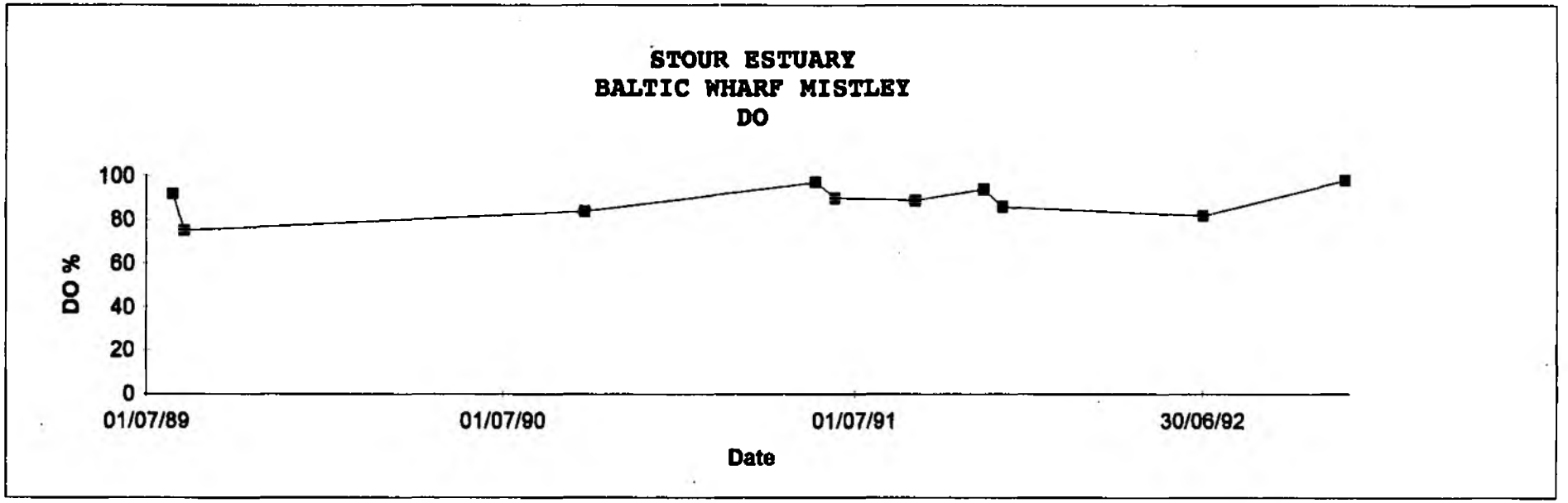

STOUR ESTUARY
BALTIC WHARF MISTLEY
E. coli (Pre 1985)
E. coli/ 100ml
100000
80000
60000
40000
20000
0
01/12/79
30/11/80
30/11/81
Date

FIG 31

SAMPLE POINT CODE - BISE12



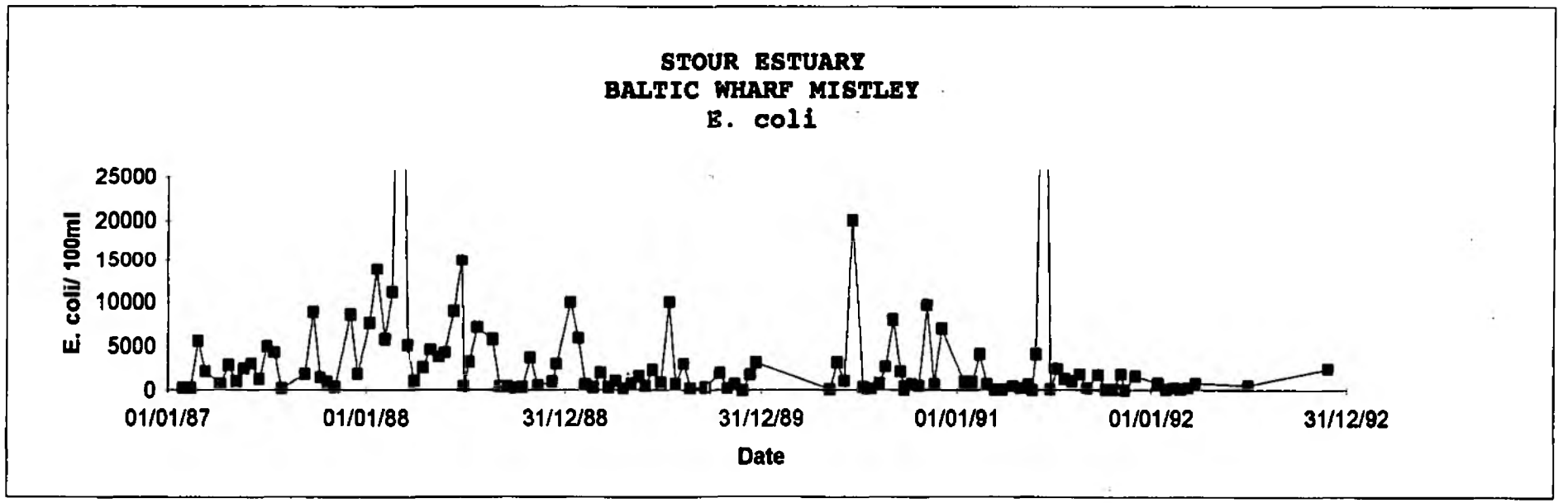
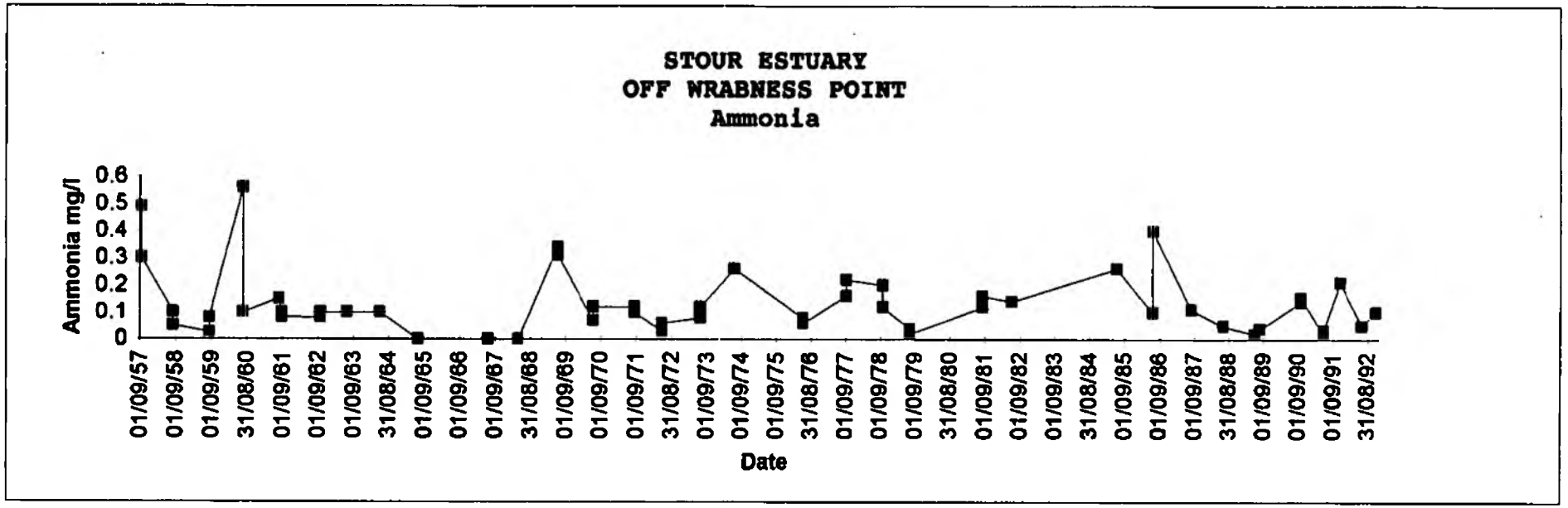


FIG 32

SAMPLE POINT CODE - BISE07



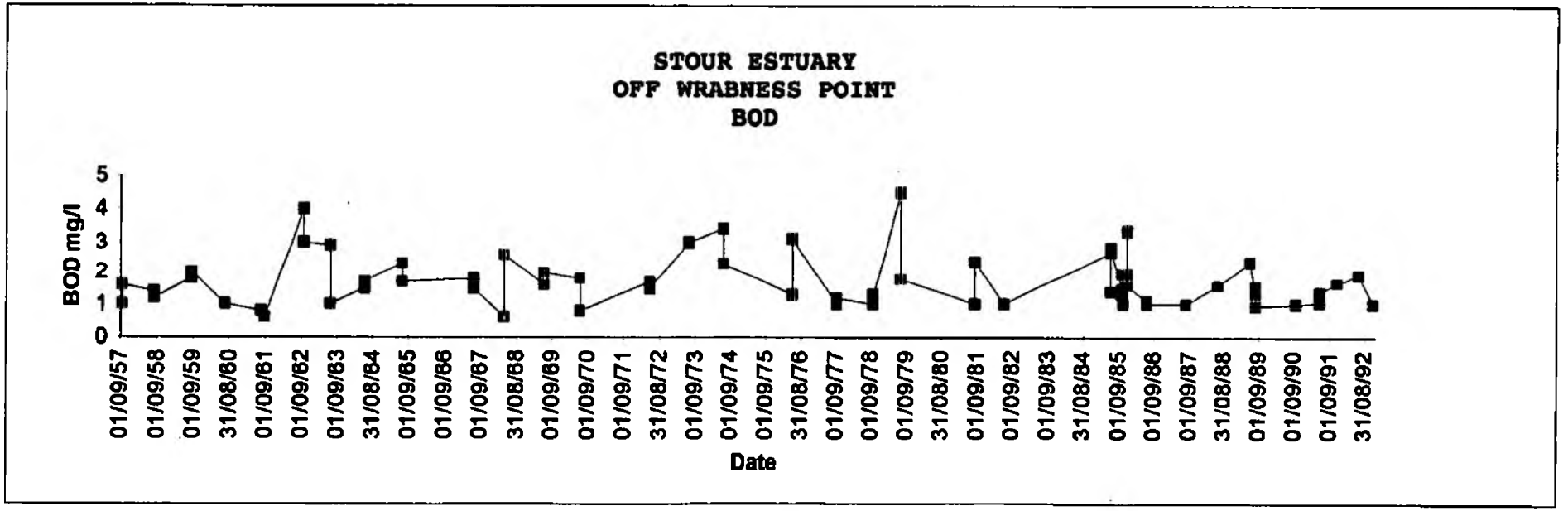
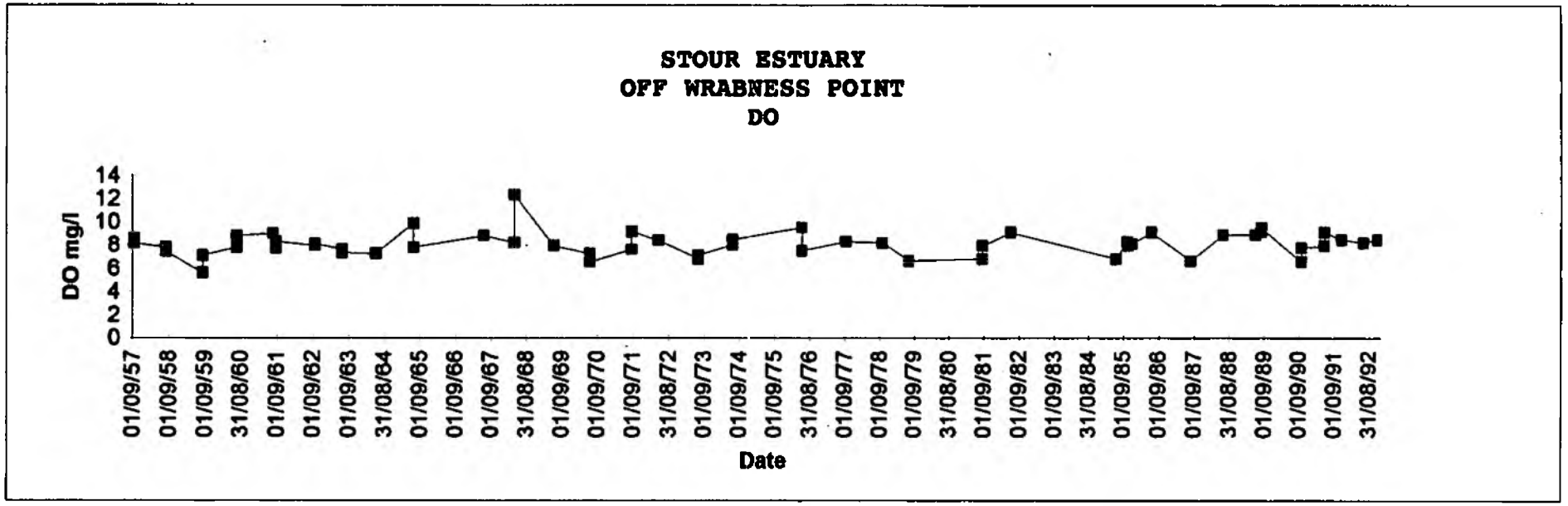
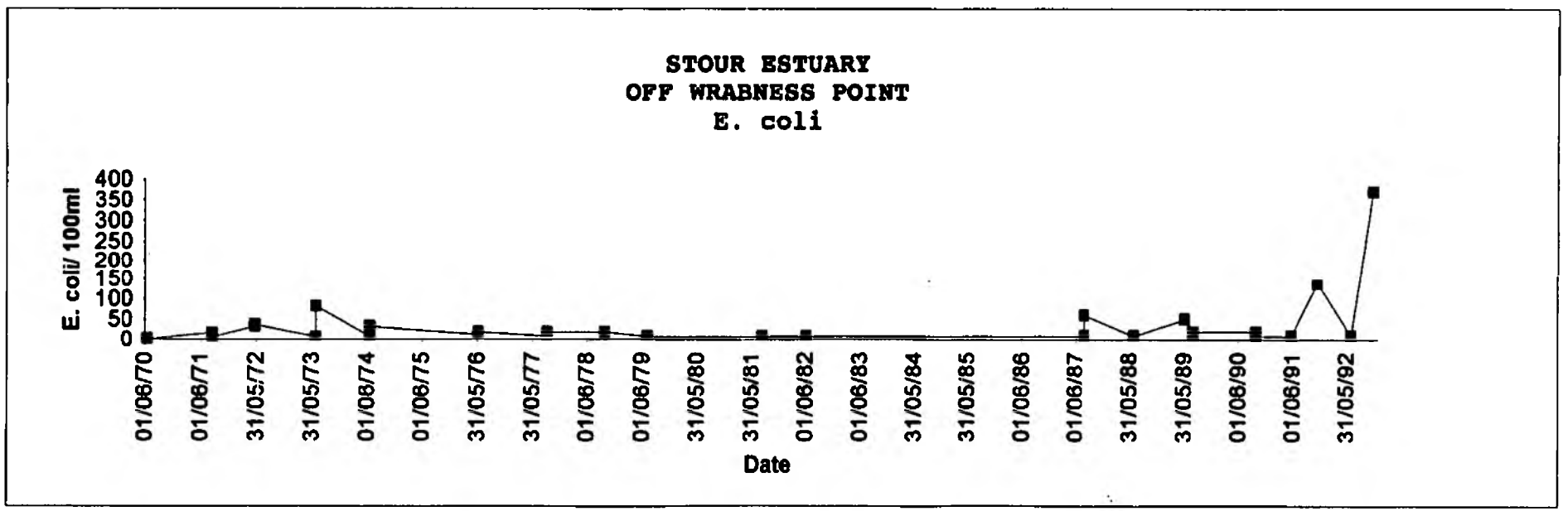
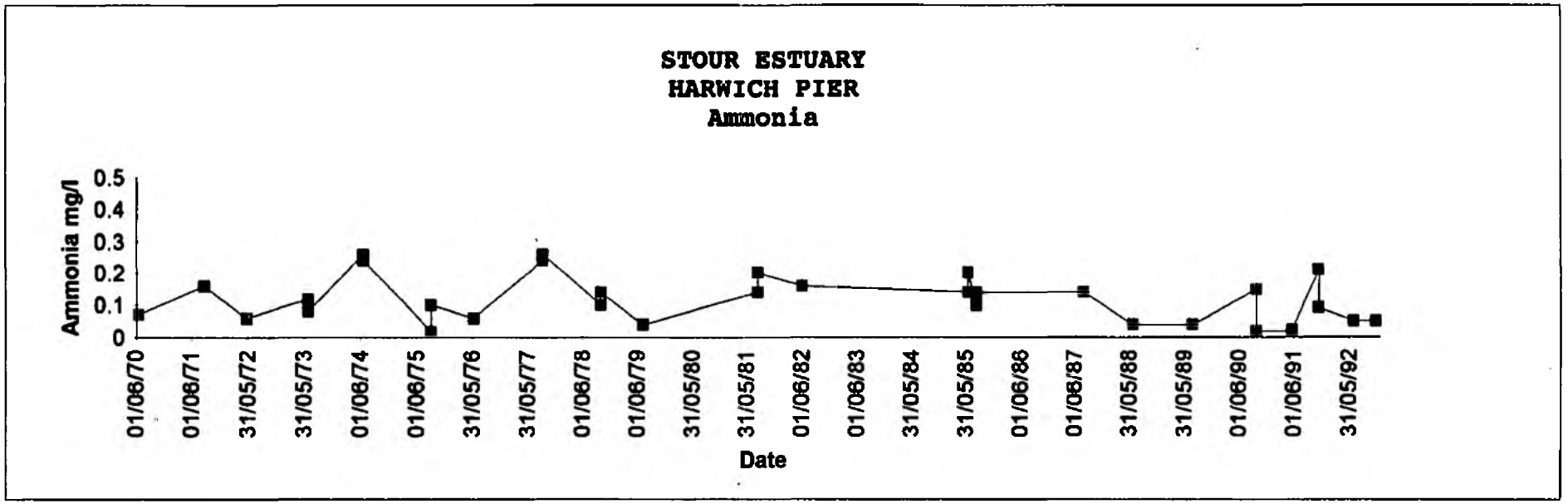


FIG 33

SAMPLE POINT CODE - BISE07






STOUR ESTUARY
HARWICH PIER
Ammonia
Ammonia mg/l
0.5
0.4
0.3
0.2
0.1
0
01/06/70
01/06/71
31/05/72
31/05/73
01/06/74
01/06/75
31/05/76
31/05/77
01/06/78
01/06/79
31/05/80
31/05/81
01/06/82
01/06/83
31/05/84
31/05/85
01/06/86
01/06/87
31/05/88
31/05/89
01/06/90
01/06/91
31/05/92
Date

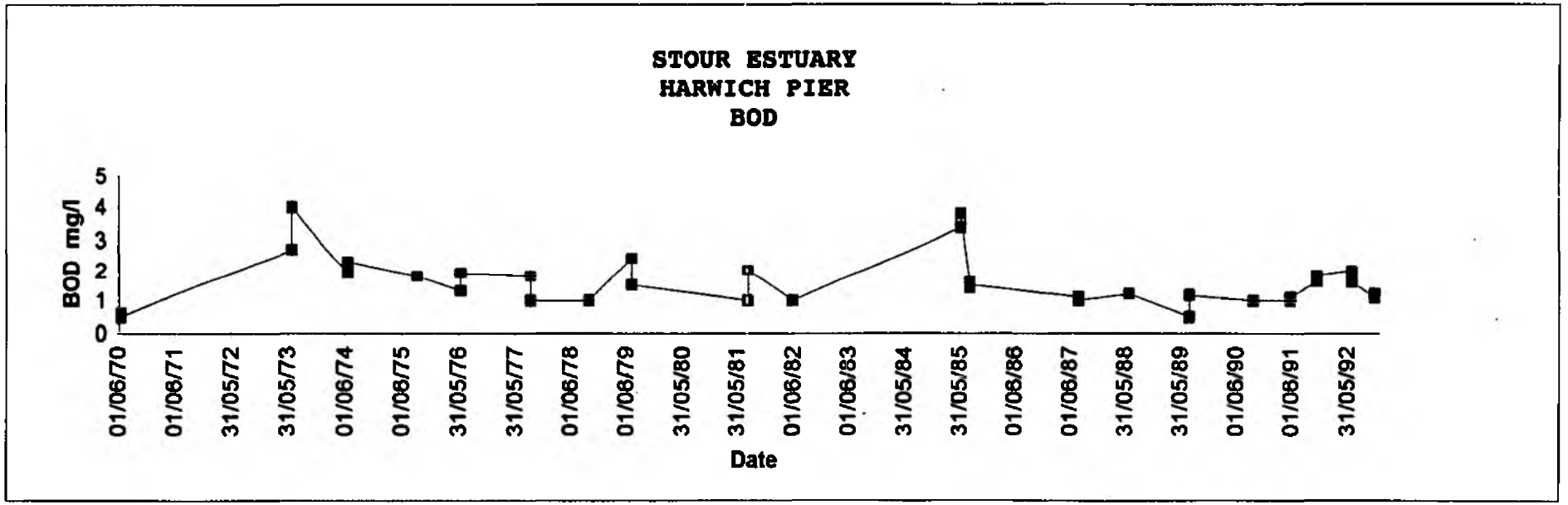
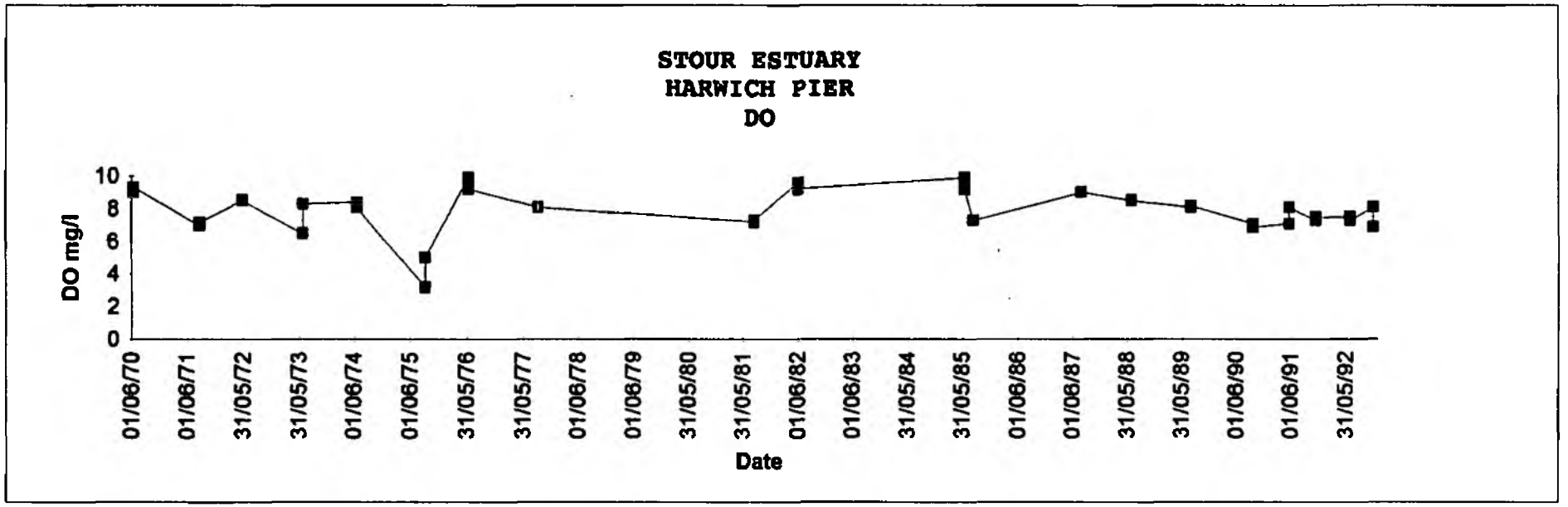
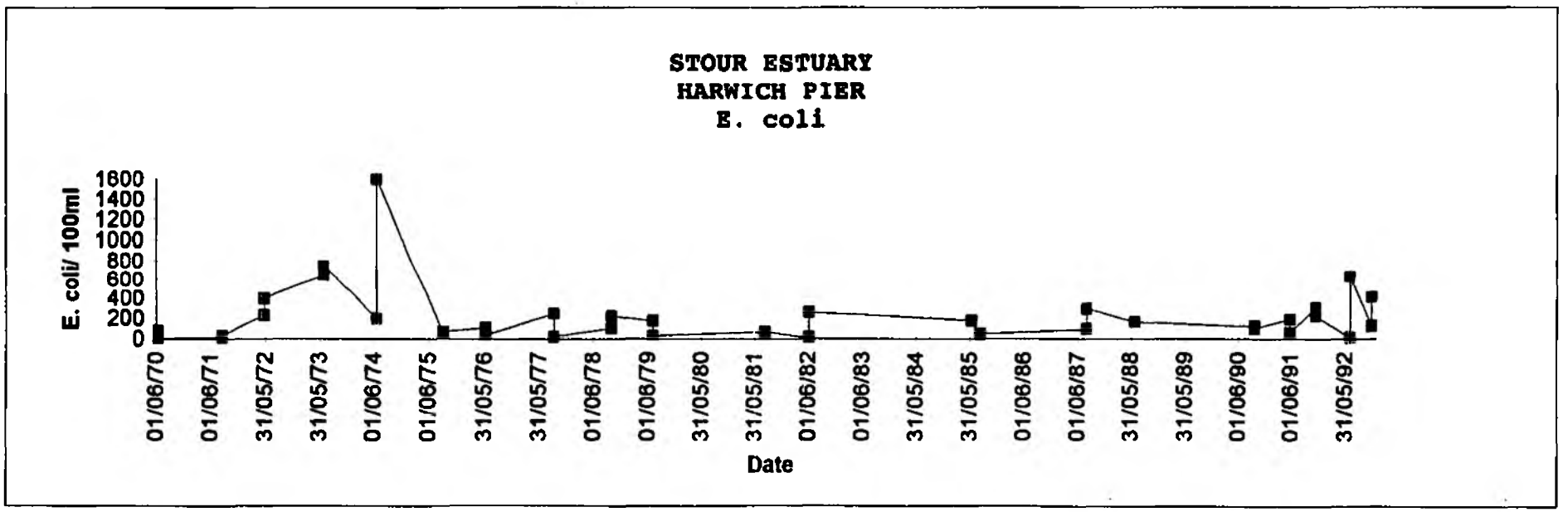

STOUR ESTUARY
HARWICH PIER
BOD
BOD mg/l
5
4
3
2
1
0
01/06/70
01/06/71
31/05/72
31/05/73
01/06/74
01/06/75
31/05/76
31/05/77
01/06/78
01/06/79
31/05/80
31/05/81
01/06/82
01/06/83
31/05/84
31/05/85
01/06/86
01/06/87
31/05/88
31/05/89
01/06/90
01/06/91
31/05/92
Date

FIG 35

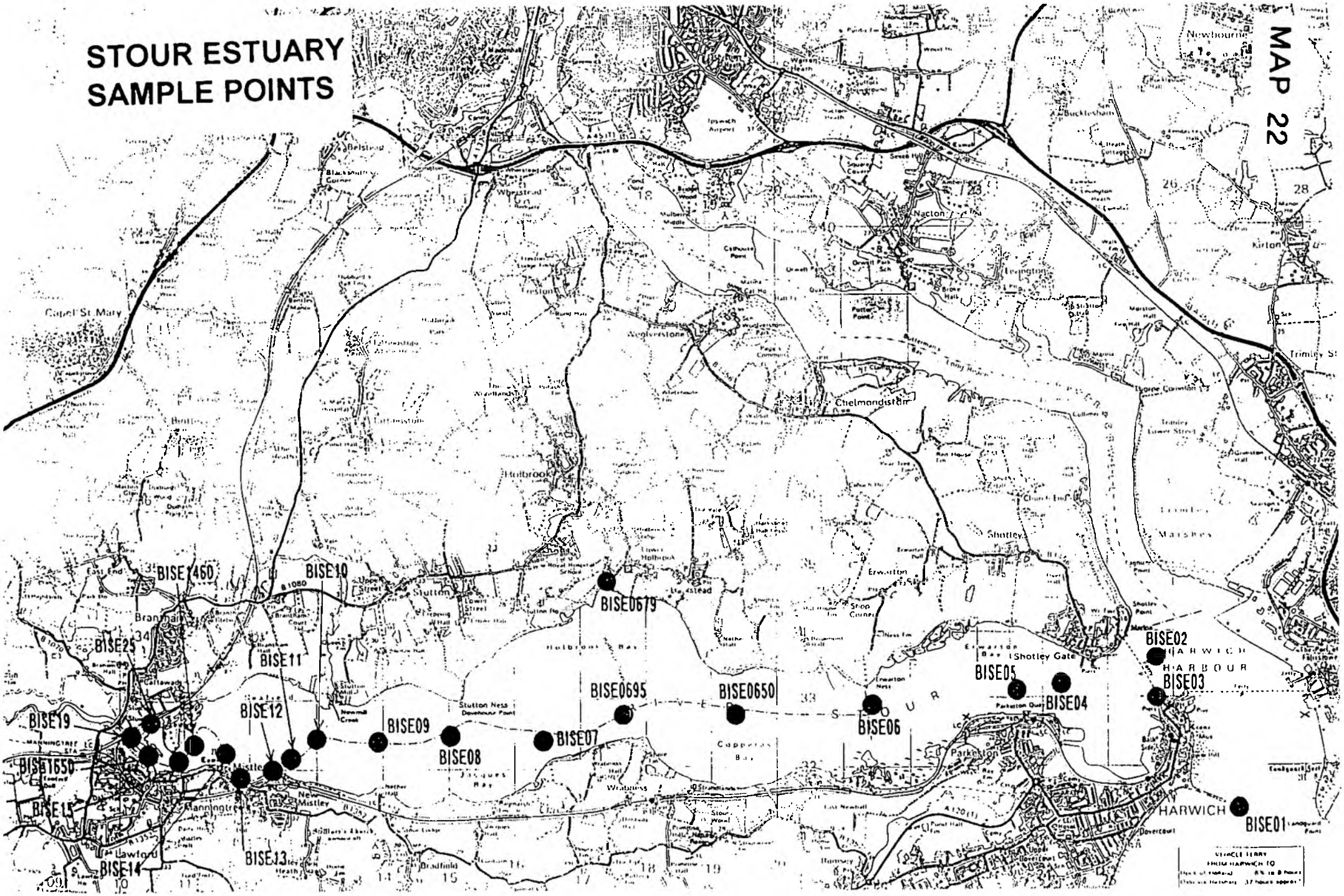
SAMPLE POINT CODE - BISE03





STOUR ESTUARY SAMPLE POINTS

MAP 22



6 WALTON BACKWATERS

6.1 Historical Events from Essex River Authority Annual Report 1953-1974

1982 - TBT was discovered to be in high concentration at West Mersea oyster layings and Walton Backwaters.

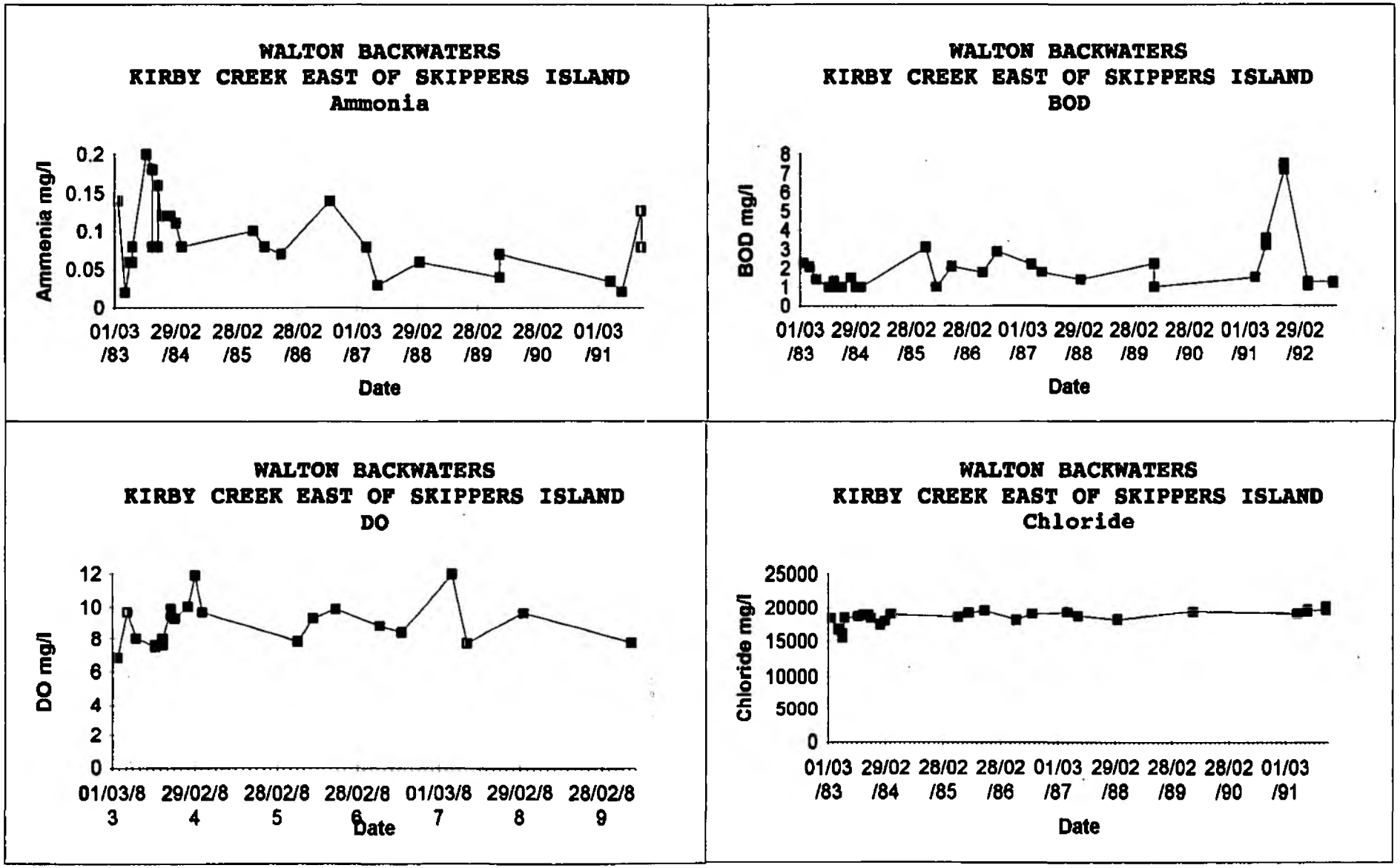
1984 - The outfalls at Clacton and Harwich were improved by extension.

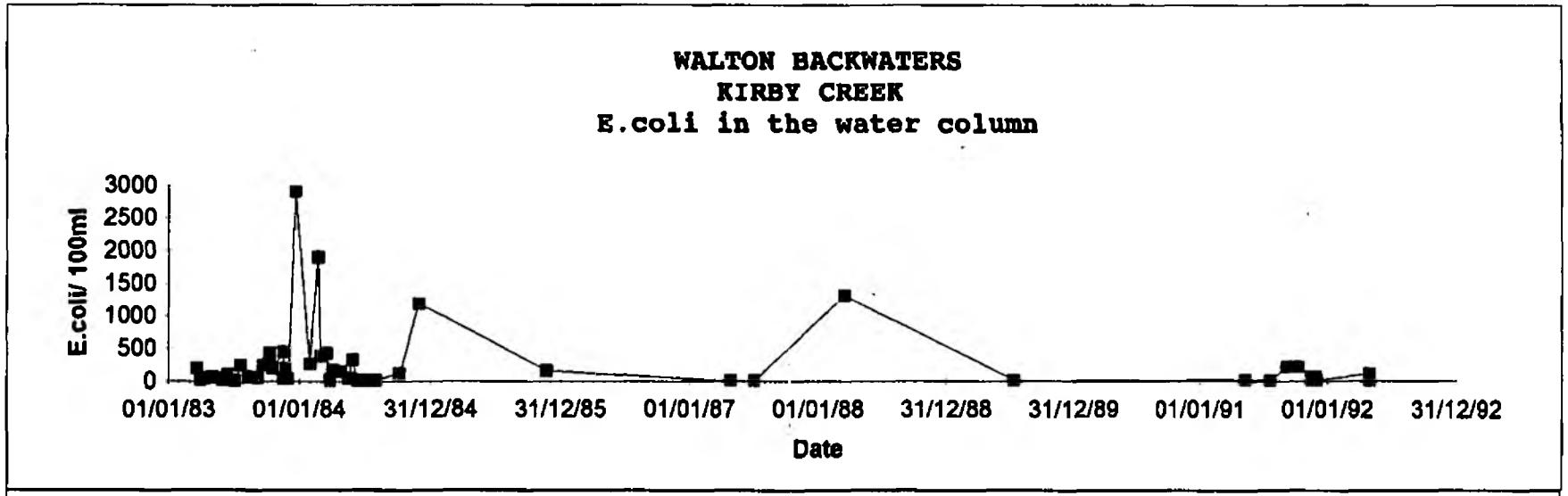
6.2 Interpretation of Chemical Trends

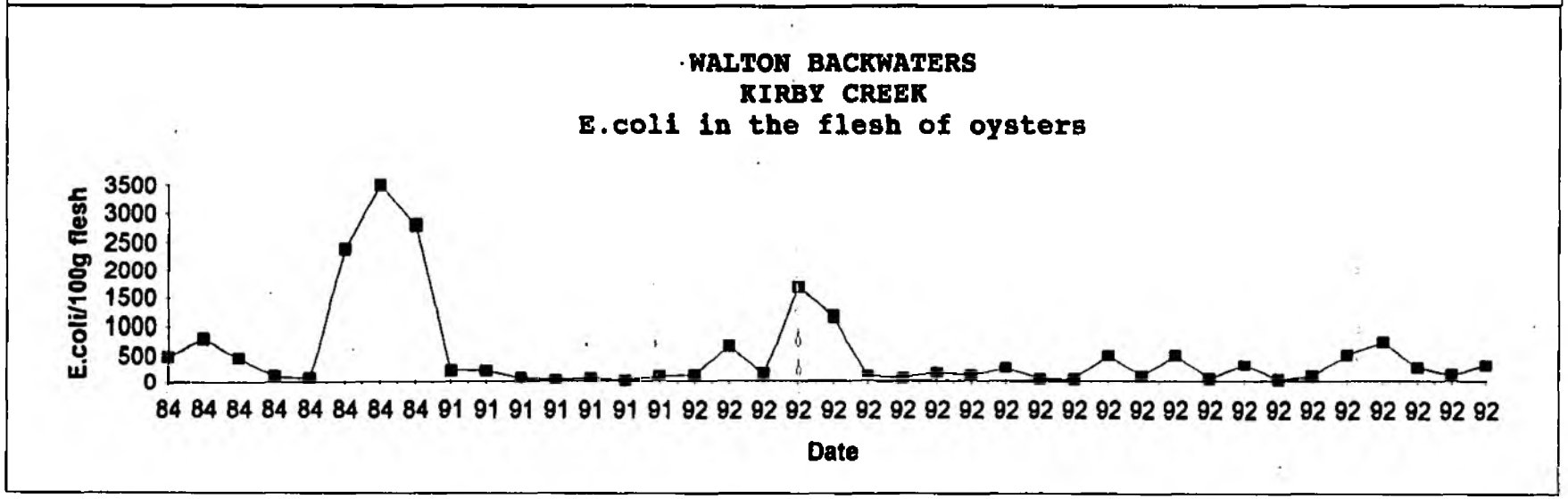
The quality of Kirby Creek, East of Skippers Island is variable. The ammonia levels are on average 0.1 mg/l and BOD values between 1 - 3 mg/l. It can be considered clean. The shellfish flesh results at this sample point show a classification of A/B. The NRA believe that quality over 1991 - 1993 has not deteriorated as has been thought by locals and the graphs illustrate this point (Fig 36, 37 & 43).

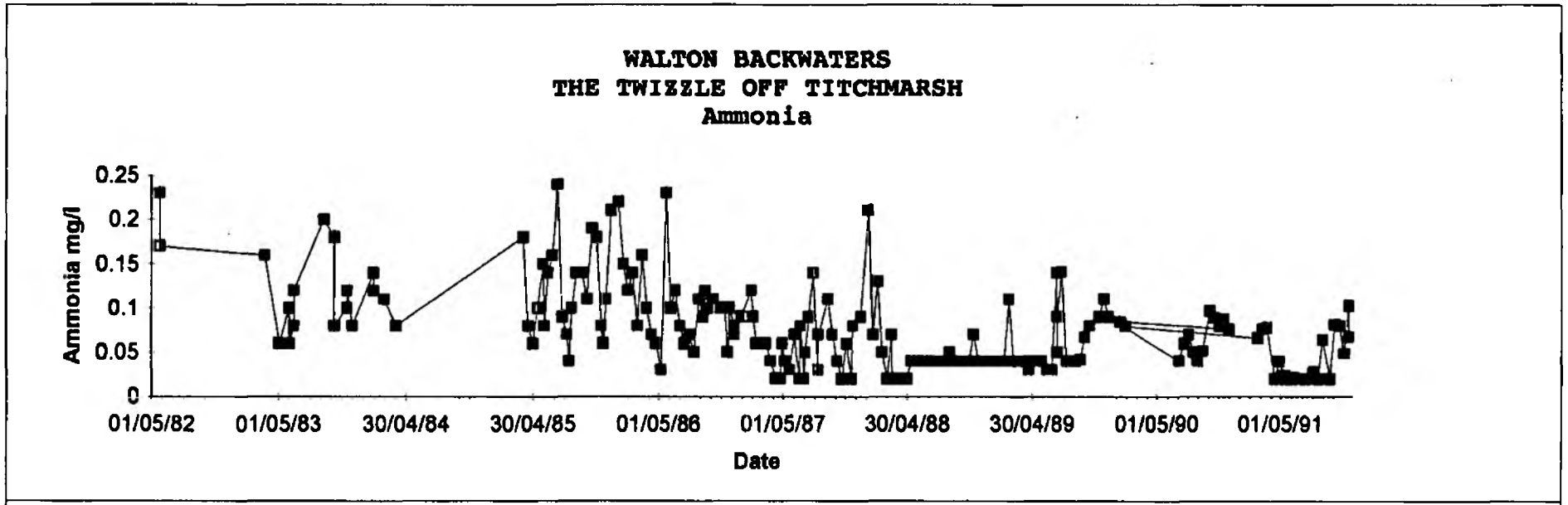
The Twizzle off Titchmarsh Marina shows similar trends. More data is illustrated as this is a land based sampling point. There are no sewage discharges into Walton Backwaters and any fluctuations in BOD are probably due to eutrophication. However, there is an acidic discharge from the explosives factory, EXCHEM which has a limited deleterious effect. E. coli in shellfish flesh show a shellfish quality of between class A and B. This has not changed in the last decade. From the histogram of Dovercourt STW it can be seen that there has been minimal change in effluent quality. The quality of both shellfisheries should improve as Dovercourt outfall is abandoned in 1996/7 (Fig 38, 39, 40 & 43).

Saltfleet (Fig 41).
Dovercourt (Fig 42).
(See Map 23 for location of sample point)


WALTON BACKWATERS
KIRBY CREEK EAST OF SKIPPERS ISLAND
Ammonia
Ammenia mg/l
0.2
0.15
0.1
0.05
0
01/03/83
29/02/84
28/02/85
28/02/86
01/03/87
29/02/88
28/02/89
28/02/90
01/03/91
Date
WALTON BACKWATERS
KIRBY CREEK EAST OF SKIPPERS ISLAND
BOD
BOD mg/l
8
7
6
5
4
3
2
1
0
01/03/83
29/02/84
28/02/85
28/02/86
01/03/87
29/02/88
28/02/89
28/02/90
01/03/91
29/02/92
Date
WALTON BACKWATERS
KIRBY CREEK EAST OF SKIPPERS ISLAND
DO
DO mg/l
12
10
8
6
4
2
0
01/03/83
29/02/84
28/02/85
28/02/86
01/03/87
29/02/88
28/02/89
Date
WALTON BACKWATERS
KIRBY CREEK EAST OF SKIPPERS ISLAND
Chloride
Chloride mg/l
25000
20000
15000
10000
5000
0
01/03/83
29/02/84
28/02/85
28/02/86
01/03/87
29/02/88
28/02/89
28/02/90
01/03/91
Date


WALTON BACKWATERS
KIRBY CREEK
E.coli in the water column
E.coli/ 100ml
3000
2500
2000
1500
1000
500
0
01/01/83
01/01/84
31/12/84
31/12/85
01/01/87
01/01/88
31/12/88
31/12/89
01/01/91
01/01/92
31/12/92
Date


WALTON BACKWATERS
KIRBY CREEK
E.coli in the flesh of oysters
E.coli/100g flesh
3500
3000
2500
2000
1500
1000
500
0
84 84 84 84 84 84 84 84 91 91 91 91 91 91 91 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92 92
Date


WALTON BACKWATERS
THE TWIZZLE OFF TITCHMARSH
Ammonia
Ammonia mg/l
0.25
0.2
0.15
0.1
0.05
0
01/05/82
01/05/83
30/04/84
30/04/85
01/05/86
01/05/87
30/04/88
30/04/89
01/05/90
01/05/91
Date

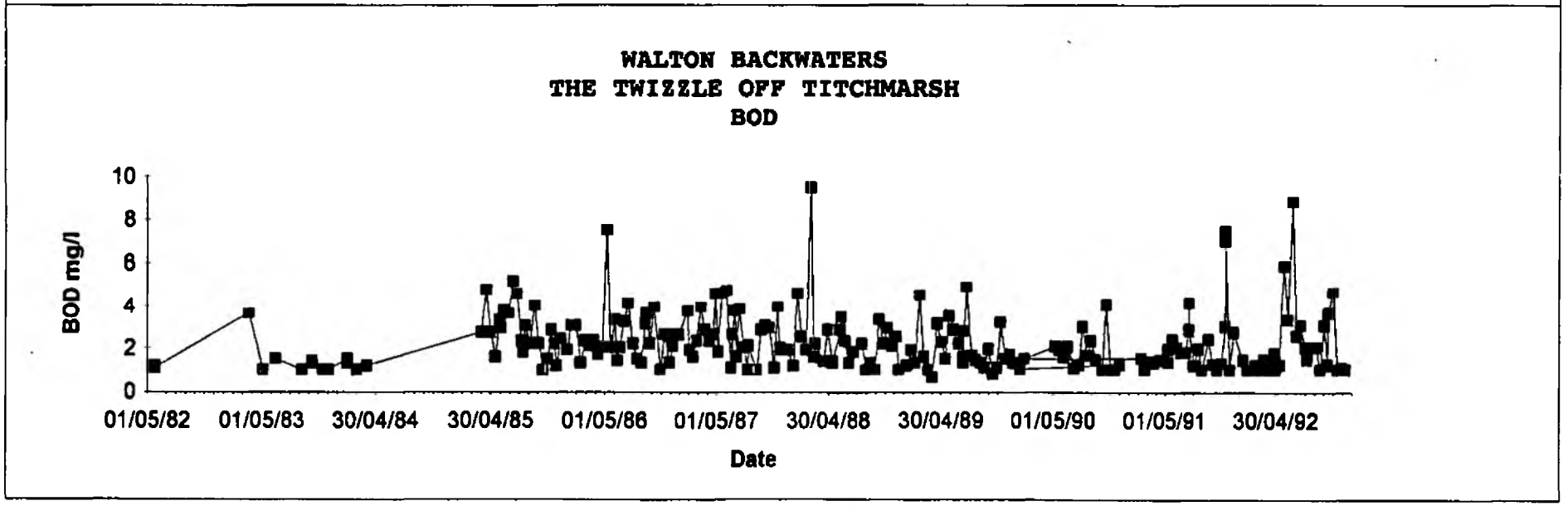
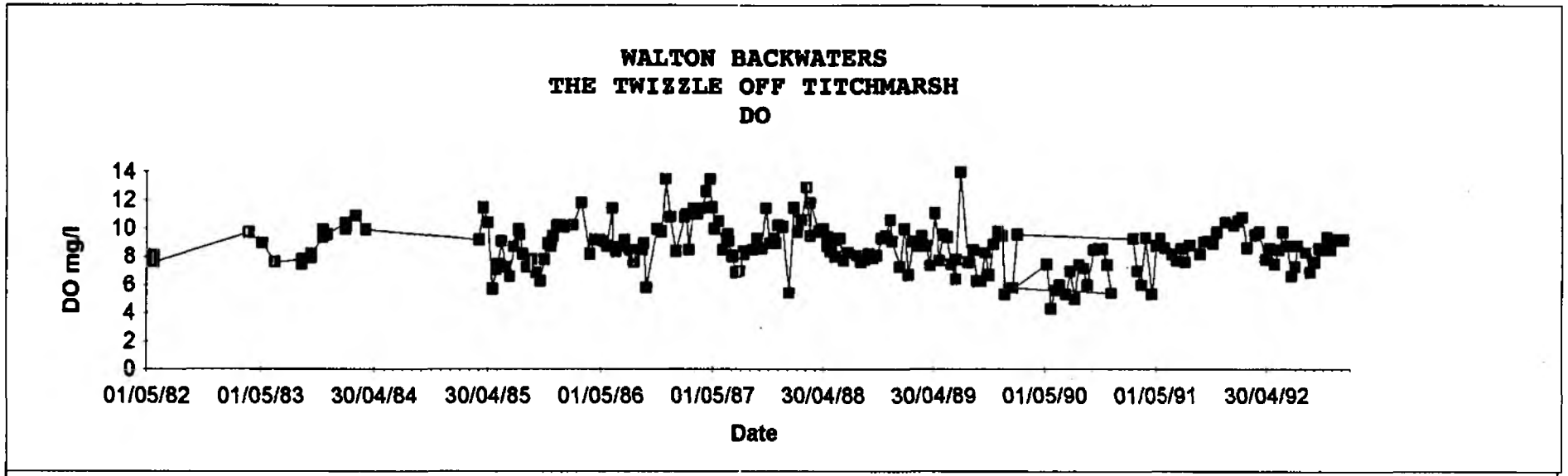

WALTON BACKWATERS
THE TWIZZLE OFF TITCHMARSH
BOD
BOD mg/l
10
8
6
4
2
0
01/05/82
01/05/83
30/04/84
30/04/85
01/05/86
01/05/87
30/04/88
30/04/89
01/05/90
01/05/91
30/04/92
Date

FIG 39

SAMPLE POINT CODE - BIHW1520



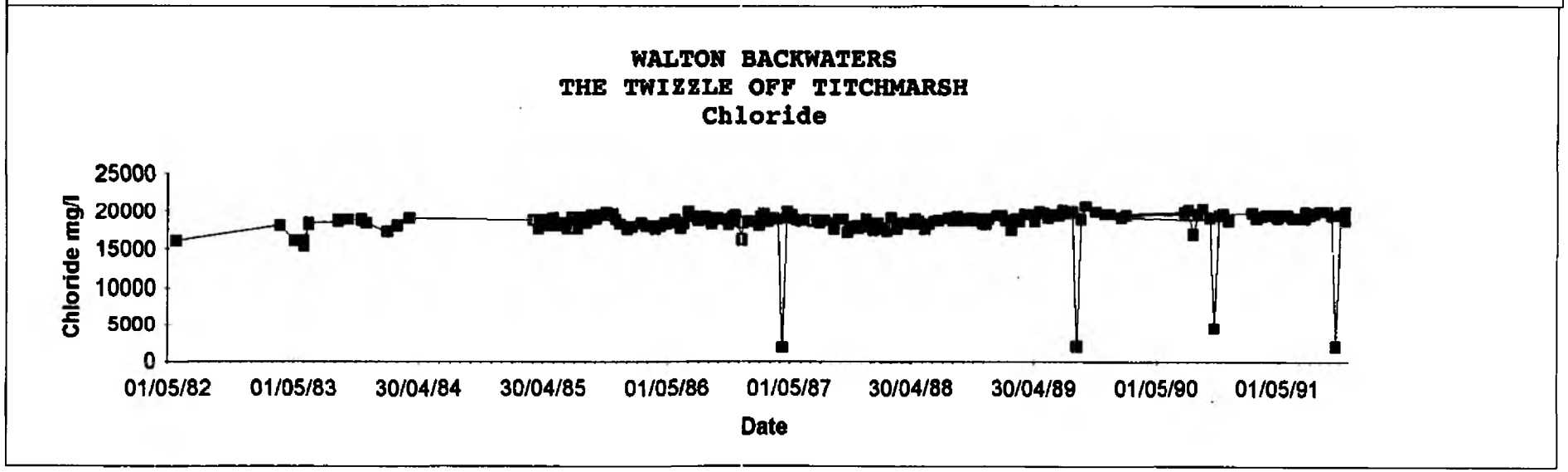
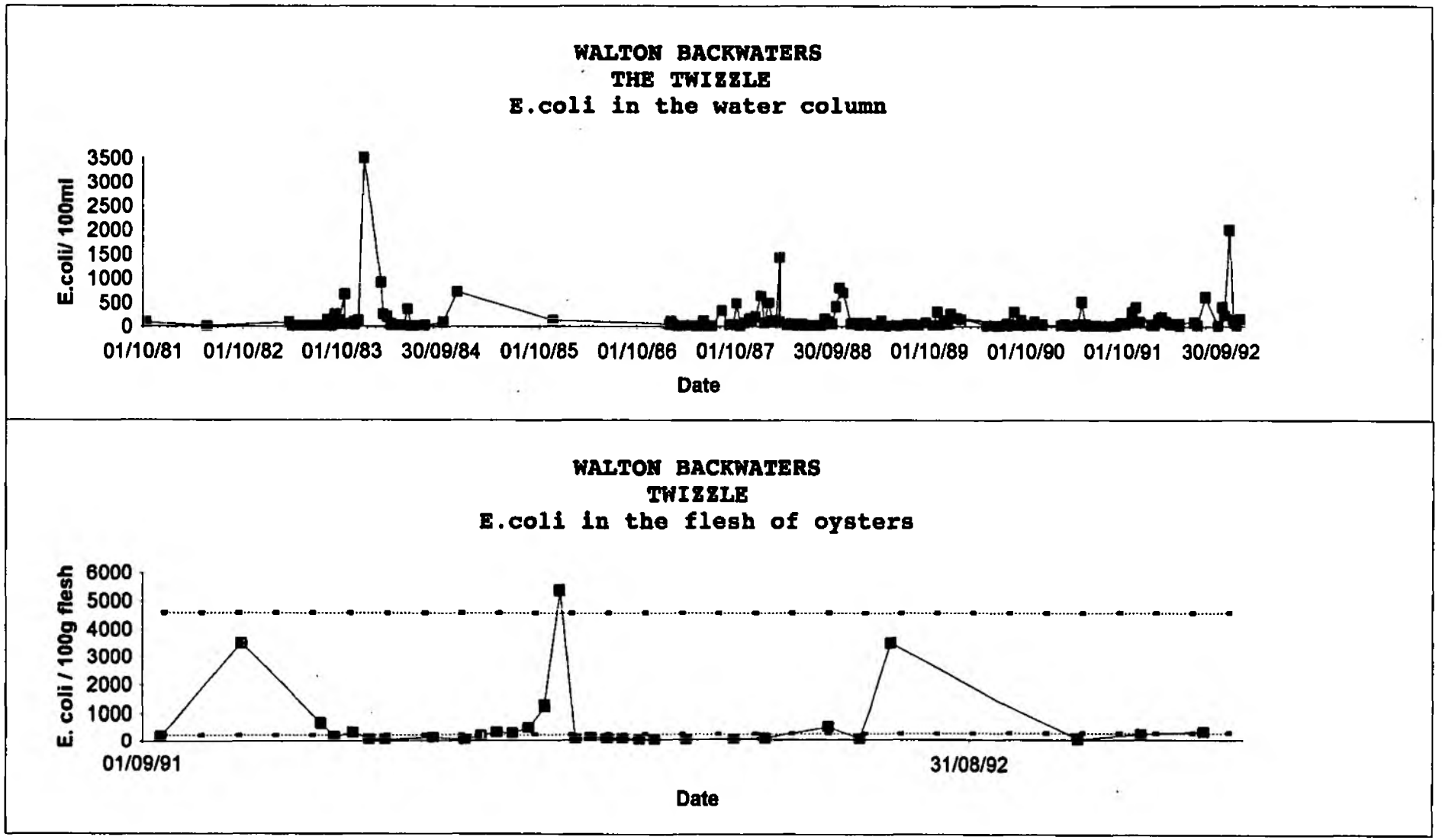


FIG 40

SAMPLE POINT CODE - BIHW1520



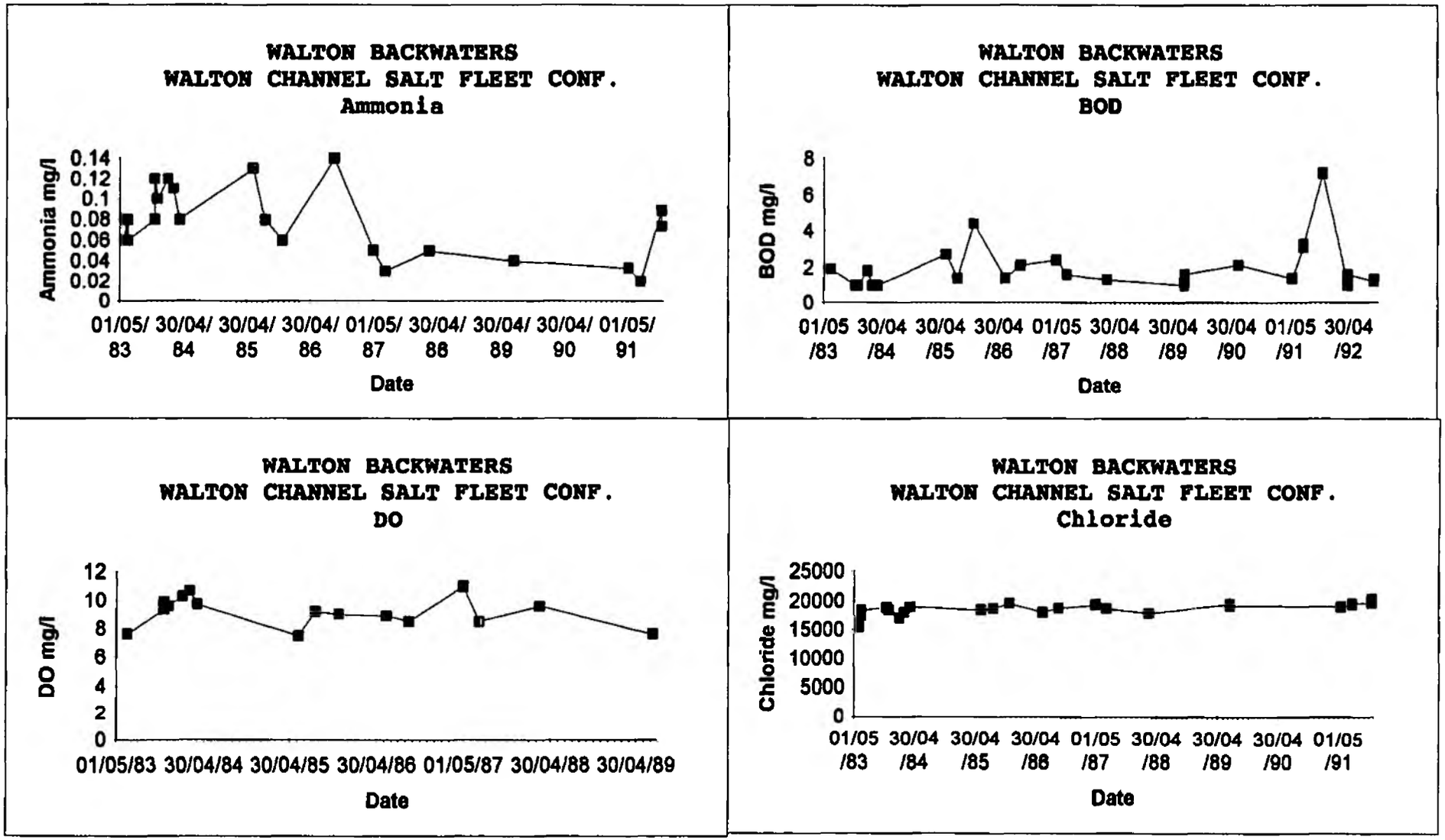
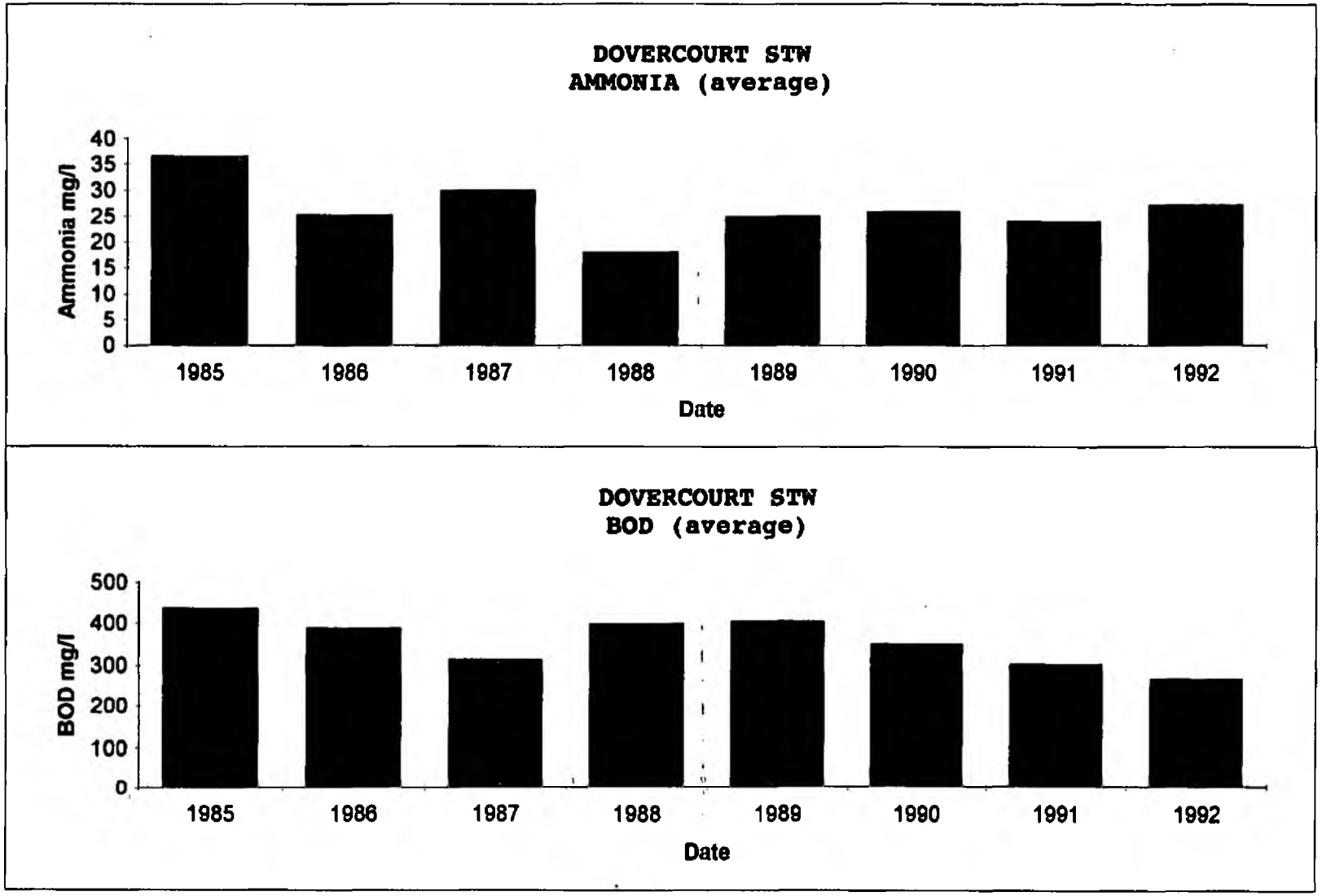
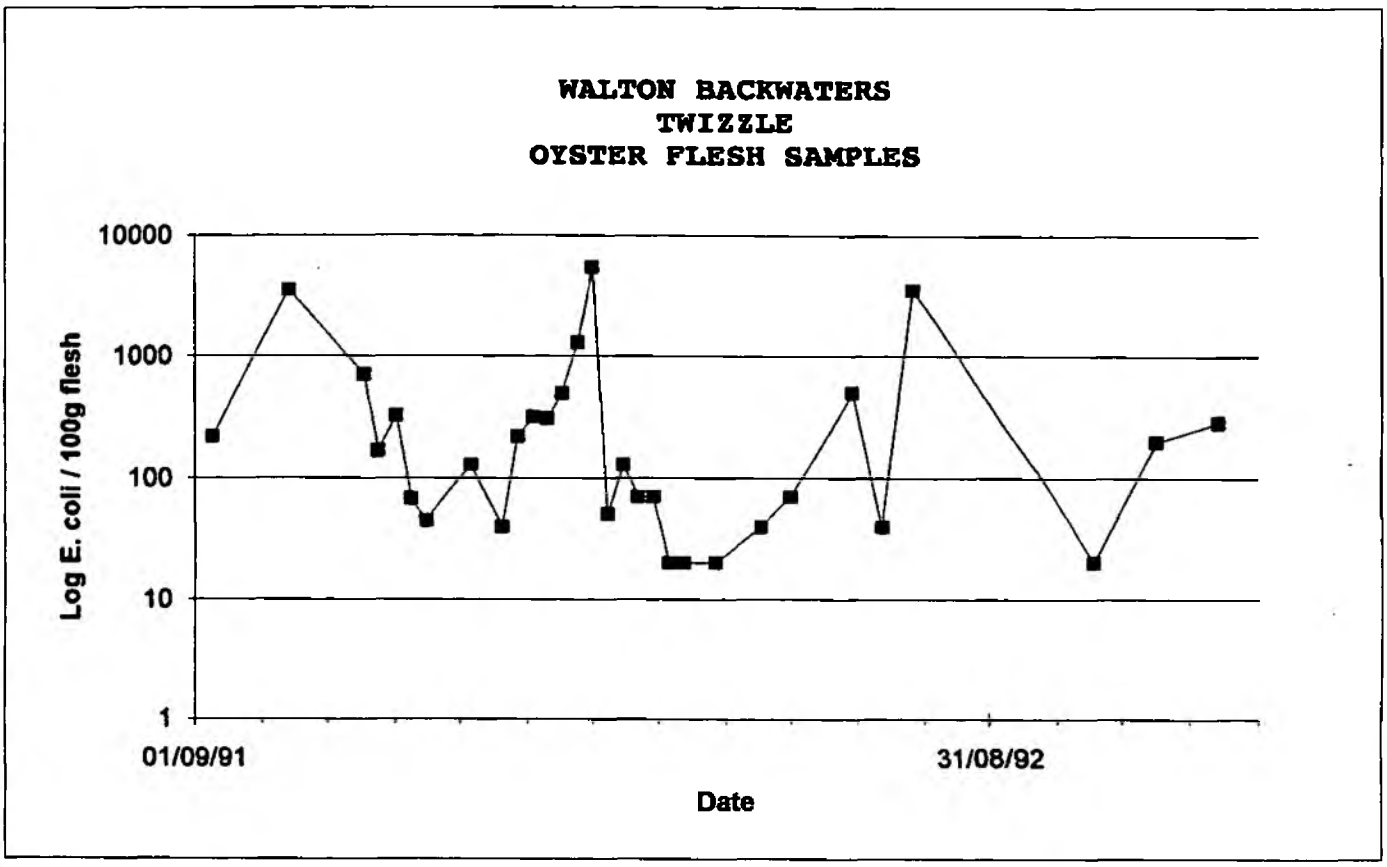
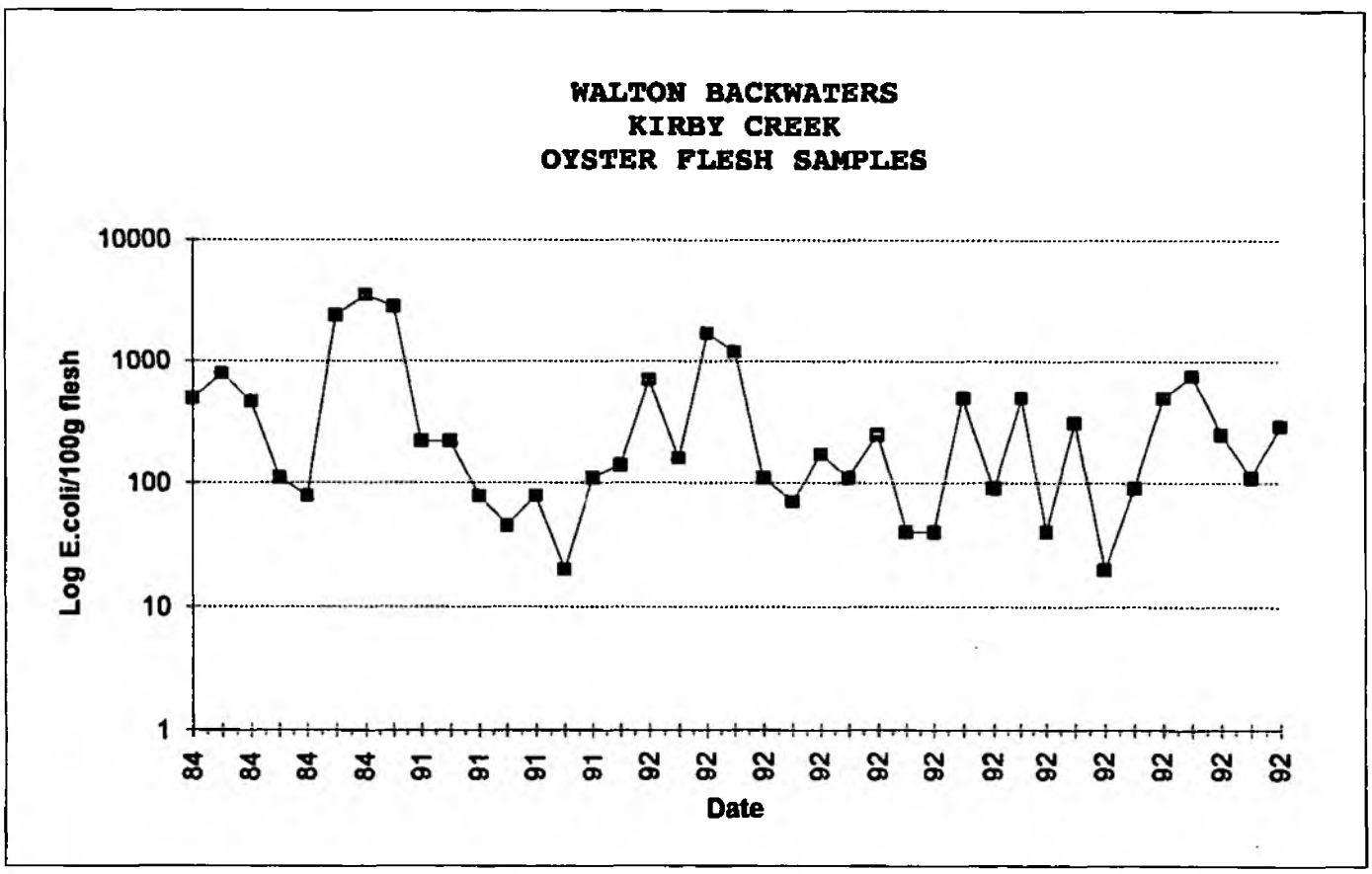
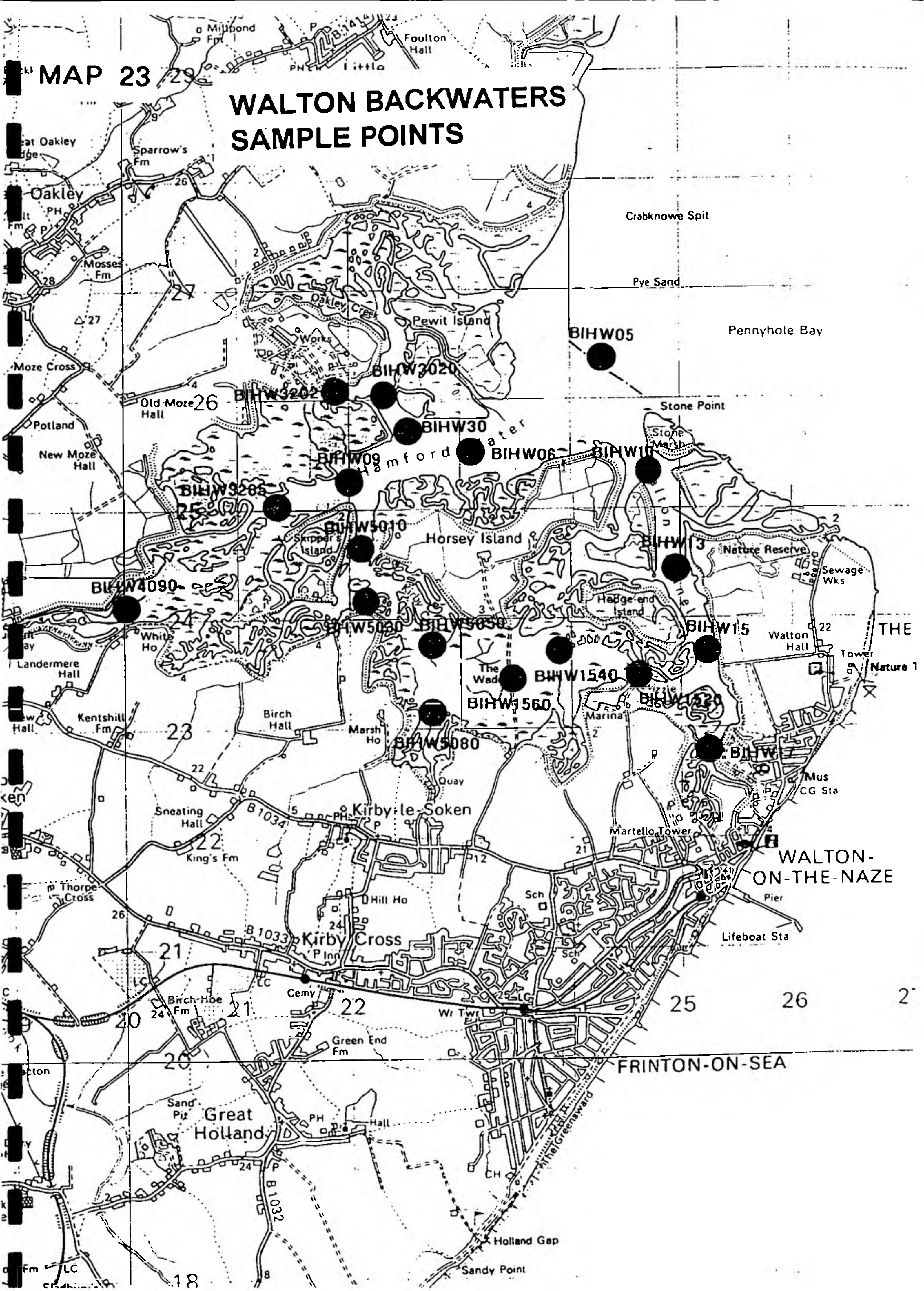

WALTON BACKWATERS
WALTON CHANNEL SALT FLEET CONF.
Ammonia
Ammonia mg/l
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
01/05/ 83
30/04/ 84
30/04/ 85
30/04/ 86
01/05/ 87
30/04/ 88
30/04/ 89
30/04/ 90
01/05/ 91
Date
WALTON BACKWATERS
WALTON CHANNEL SALT FLEET CONF.
BOD
BOD mg/l
8
6
4
2
0
01/05 /83
30/04 /84
30/04 /85
30/04 /86
01/05 /87
30/04 /88
30/04 /89
30/04 /90
01/05 /91
30/04 /92
Date
WALTON BACKWATERS
WALTON CHANNEL SALT FLEET CONF.
DO
DO mg/l
12
10
8
6
4
2
0
01/05/83
30/04/84
30/04/85
30/04/86
01/05/87
30/04/88
30/04/89
Date
WALTON BACKWATERS
WALTON CHANNEL SALT FLEET CONF.
Chloride
Chloride mg/l
25000
20000
15000
10000
5000
0
01/05 /83
30/04 /84
30/04 /85
30/04 /86
01/05 /87
30/04 /88
30/04 /89
30/04 /90
01/05 /91
Date

FIG 42


DOVERCOURT STW
AMMONIA (average)
Ammonia mg/l
40
35
30
25
20
15
10
5
0
1985
1986
1987
1988
1989
1990
1991
1992
Date
DOVERCOURT STW
BOD (average)
BOD mg/l
500
400
300
200
100
0
1985
1986
1987
1988
1989
1990
1991
1992
Date


WALTON BACKWATERS
TWIZZLE
OYSTER FLESH SAMPLES
10000
1000
100
10
1
Log E. coli / 100g flesh
01/09/91
31/08/92
Date


WALTON BACKWATERS
KIRBY CREEK
OYSTER FLESH SAMPLES
10000
1000
100
10
1
Log E.coli/100g flesh
84 84 84 84 91 91 91 91 92 92 92 92 92 92 92 92 92 92 92 92
Date



MAP 23
WALTON BACKWATERS
SAMPLE POINTS
BIHW05
BIHW2020
BIHW3202
BIHW30
BIHW06
BIHW10
BIHW09
BIHW3285
BIHW5010
BIHW13
BIHW4090
BIHW5030
BIHW5050
BIHW15
BIHW1540
BIHW1560
BIHW1520
BIHW5080
Millpond Fm
Foulton Hall
Sparrow's Fm
Oakley
Mosses Fm
Oakley Creek
Pewit Island
Works
Moze Cross
Old Moze Hall
Potland
New Moze Hall
Crabknowe Spit
Pye Sand
Pennyhole Bay
Stone Point
Stone Marsh
Hamford Water
Skipper's Island
Horsey Island
Nature Reserve
Sewage Wks
Hedge-end Island
Walton Hall
Tower
White Ho
Landermere Hall
Kentshill Fm
Birch Hall
Marsh Ho
The Wade
Marina
Quay
Sneating Hall
Kirby-le-Soken
King's Fm
Thorpe Cross
Martello Tower
Mus
CG Sta
WALTON-ON-THE-NAZE
Pier
Hill Ho
Sch
Kirby Cross
Lifeboat Sta
Birch Hoe Fm
Cemy
Wr Twr
Green End Fm
FRINTON-ON-SEA
Sand Pit
Great Holland
Hall
The Greensward
Holland Gap
Sandy Point
B 1034
B 1033
B 1032

7 COLNE ESTUARY

7.1 Historical Events from Essex River Authority Annual Report 1953-1974

1958 - Below Colchester the estuary was polluted by sewage and trade effluents. Downstream of Wivenhoe the estuary becomes clean.

1961 - Indications showed that pollution was getting worse, pollution from Colchester STW was evident as far as Alresford.

1967 - Improved effluent quality from Haven STW. Chemically clean at Alresford but high bacterial content was noted during low water as far as Brightlingsea where an additional polluting discharge of settled sewage occurs.

1971 - The upper estuary was grossly polluted by discharges from Colchester gas works and the overloaded STW.

1973 - Diversion of Wivenhoe STW to Colchester resulted in improvement but Brightlingsea was still not producing an effluent of satisfactory quality.

7.2 Interpretation of Chemical Trends

Hythe Bridge shows a considerable improvement in BOD in the 1990's. Prior to that the BOD was reaching 15 - 20 mg/l on occasions. The industrial discharges in the Hythe area that have now ceased, were the cause of these polluted conditions. DO

values are satisfactory but there is room for improvement, to achieve a class A/B designation. E. coli values are also high at this site. This point is significantly affected by Colchester Sewage Works effluent on the rising tide and there is minimal flow from the freshwater river into the estuary (Fig 44 - 47).

Rowhedge Ferry shows the correlation between high ammonia levels at Colchester sewage works and Rowhedge Ferry. There was a particularly bad period during 1990 - 1991 with a much improved situation in 1992 - 1993. This highlights the need for an ammonia standard at Colchester STW. DO shows poor levels throughout the year with it regularly dropping to 40%, E. coli levels are also regularly very high at this point. The estuary is used for many water contact sports and naturally the poor quality is of concern (Fig 48 - 53).

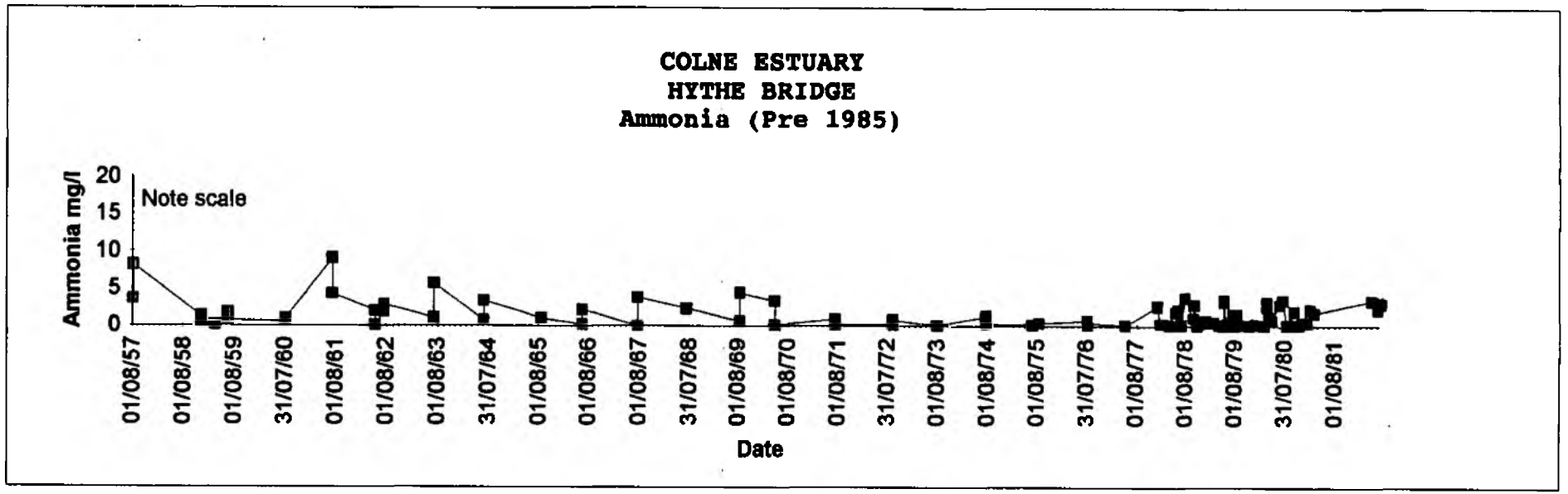
Marsh Farm, Wivenhoe shows the most significant oxygen depletion in the estuary, this is due to the effects of Colchester STW. The ammonia levels are unsatisfactory although the E. coli values have decreased down the river length due to natural decay and dilution (Fig 54 - 57).

Off Batemans Tower the water quality is generally satisfactory. It is much improved on the upper estuary with respect to all parameters. The nearby discharge at Brightlingsea does not appear to influence this point (Fig 58 - 61). Shellfish quality in this area is excellent considering the chemical quality of the estuary and the shellfishery in the main river borders on class A/B although parts of the Pyefleet Creek shellfishery is classed as 'A' under the 1993 E.C. Shellfish Hygiene Directive (Fig 62).

(See Map 24 for location of sample points)

FIG 44

SAMPLE POINT CODE - BINE18



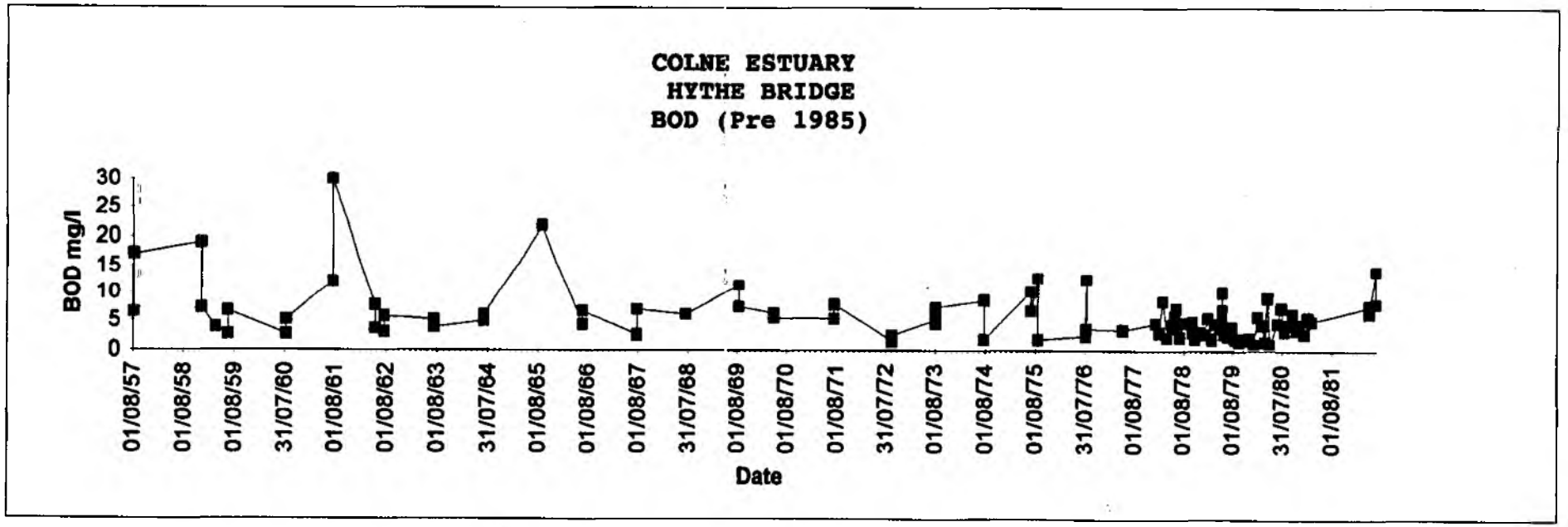
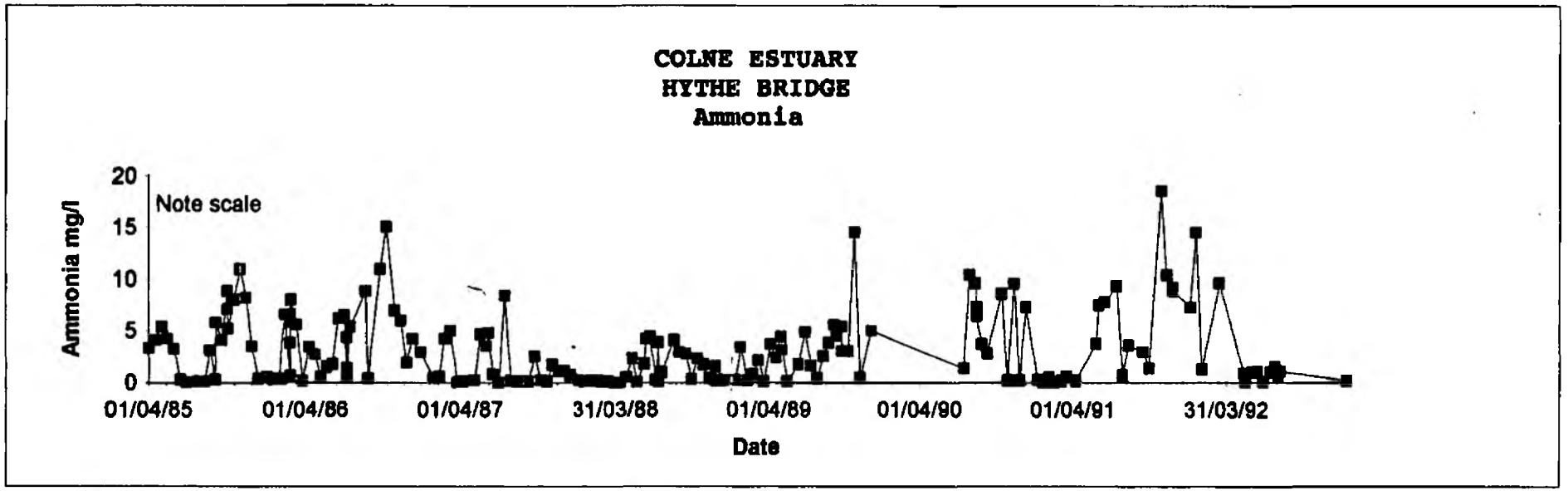


FIG 45

SAMPLE POINT CODE - BINE18



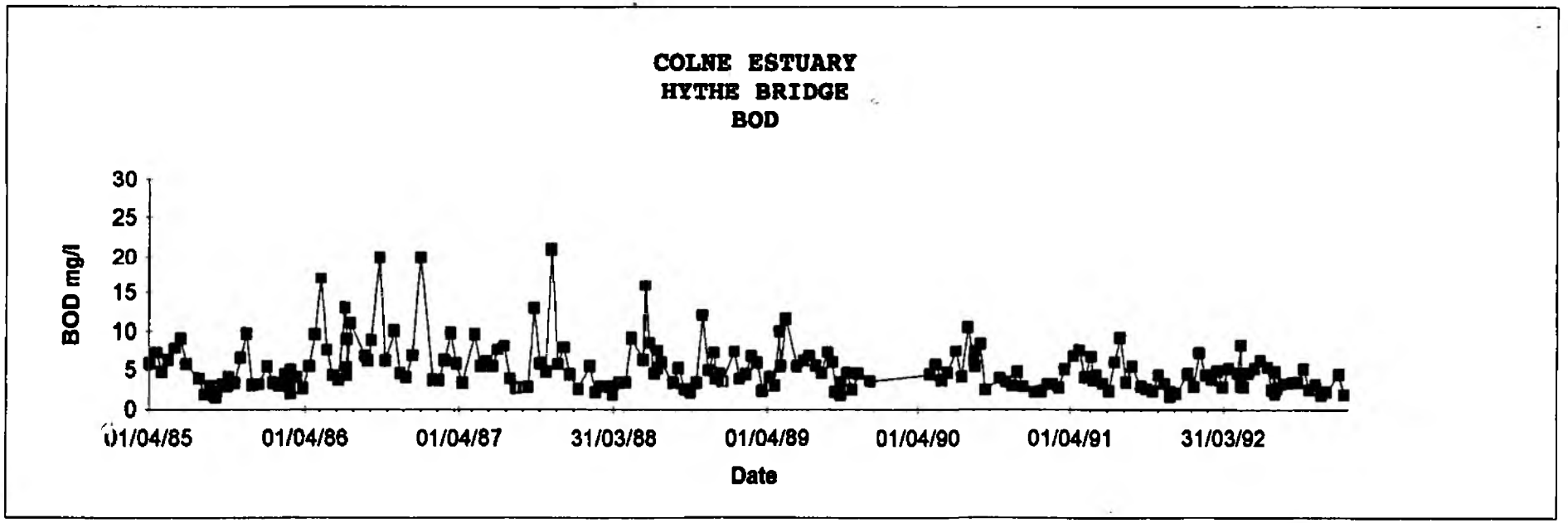
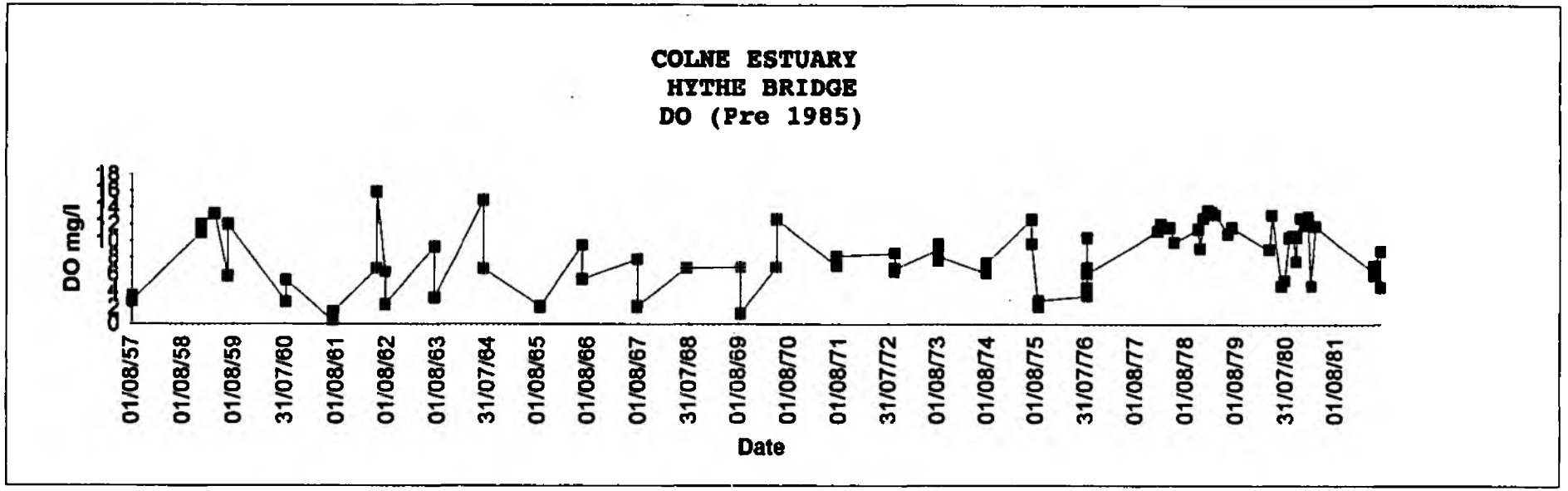


FIG 46

SAMPLE POINT CODE - BINE18



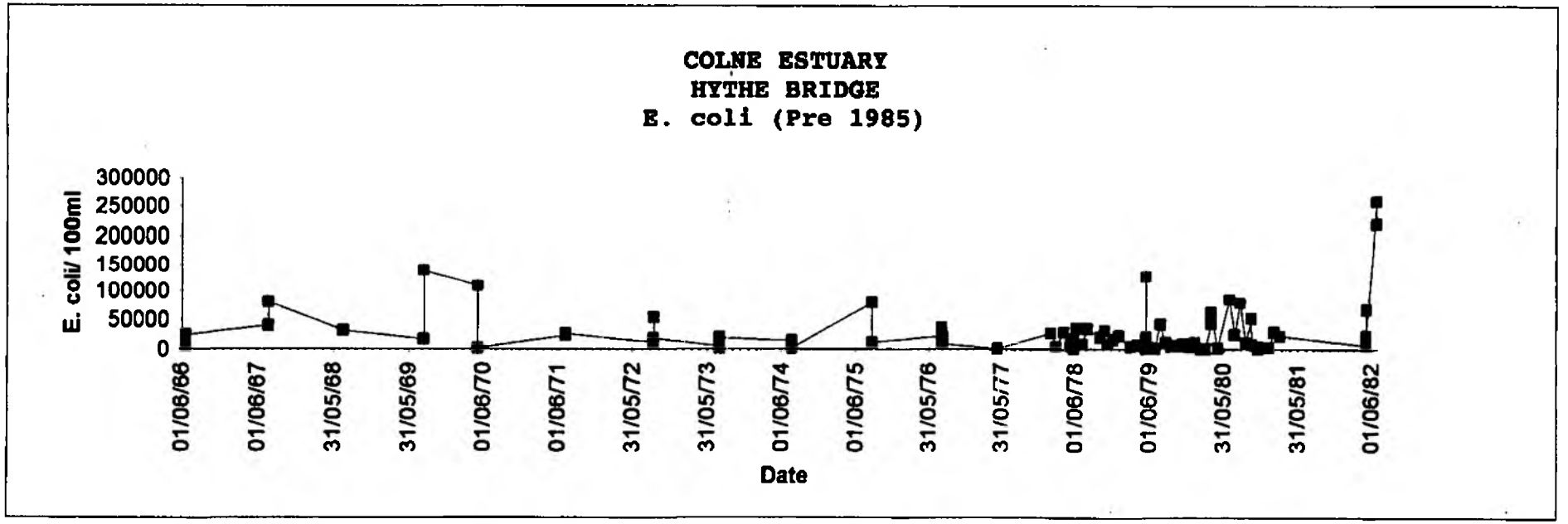
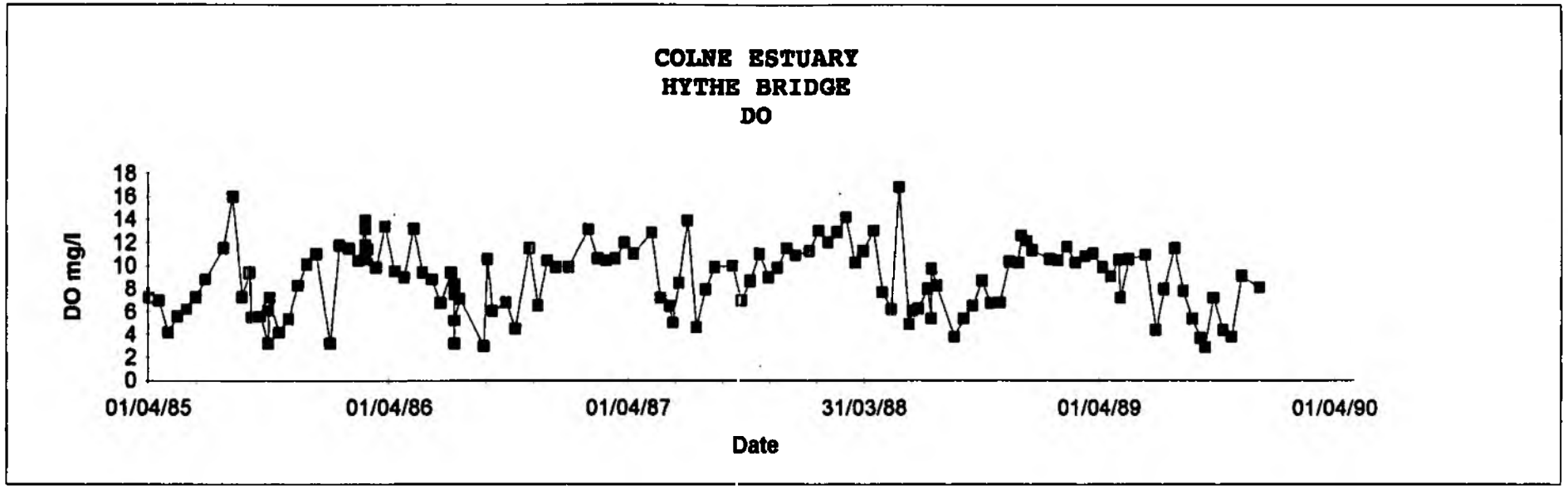


FIG 47

SAMPLE POINT CODE - BINE18



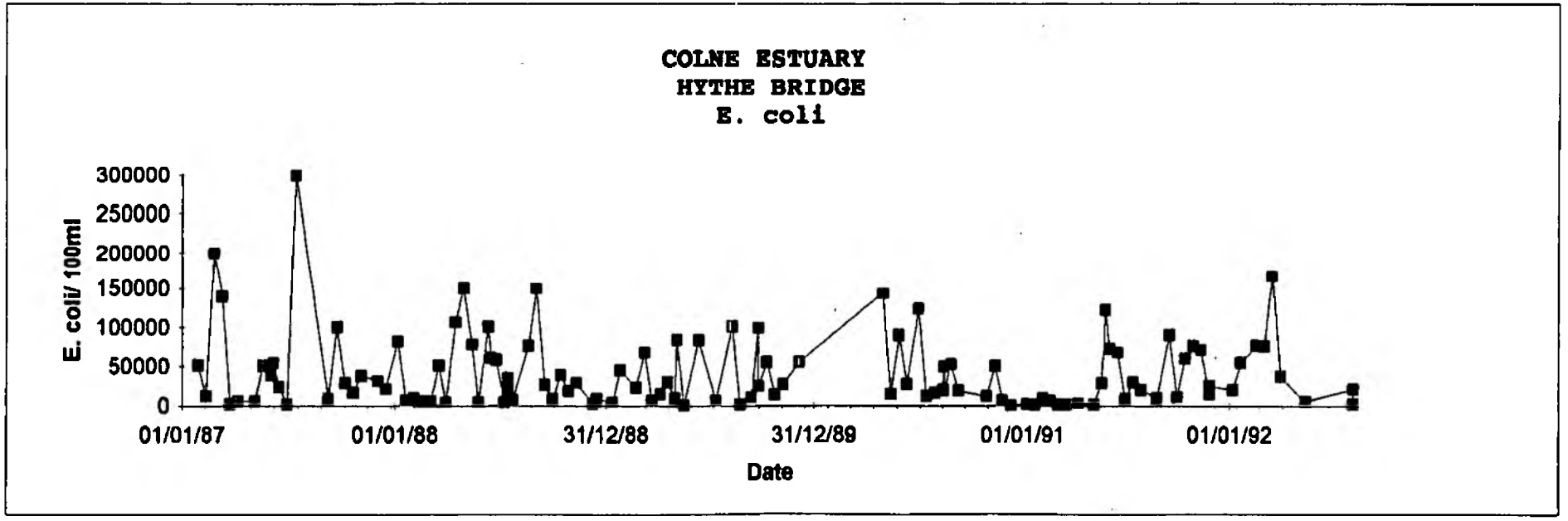
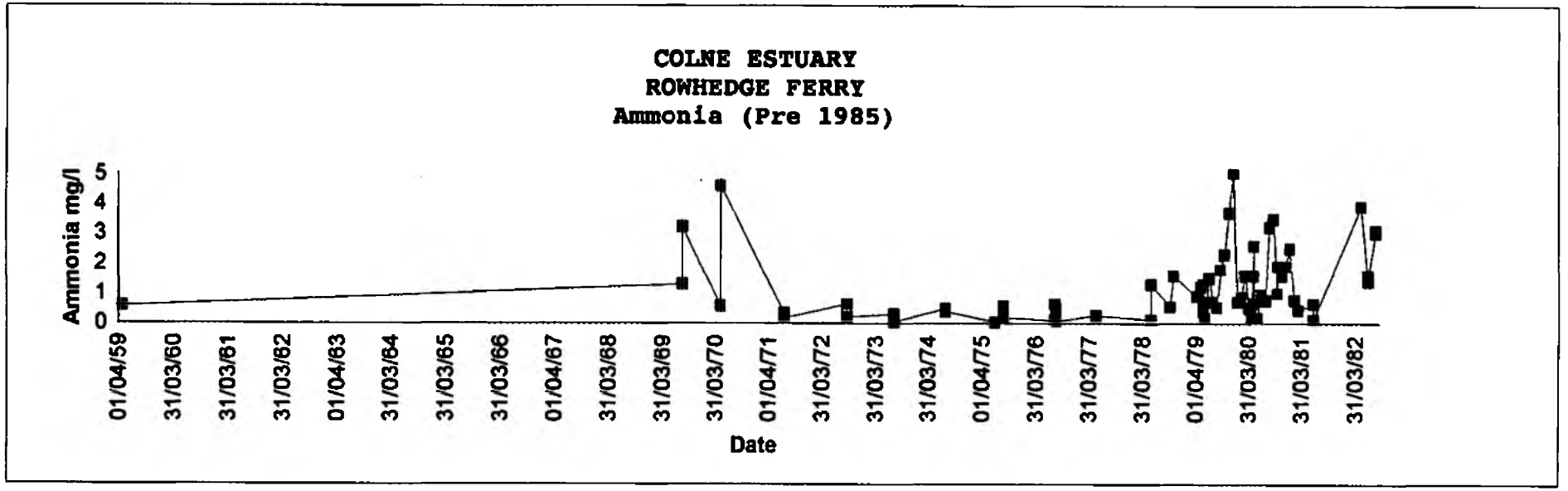


FIG 48

SAMPLE POINT CODE - BINE13



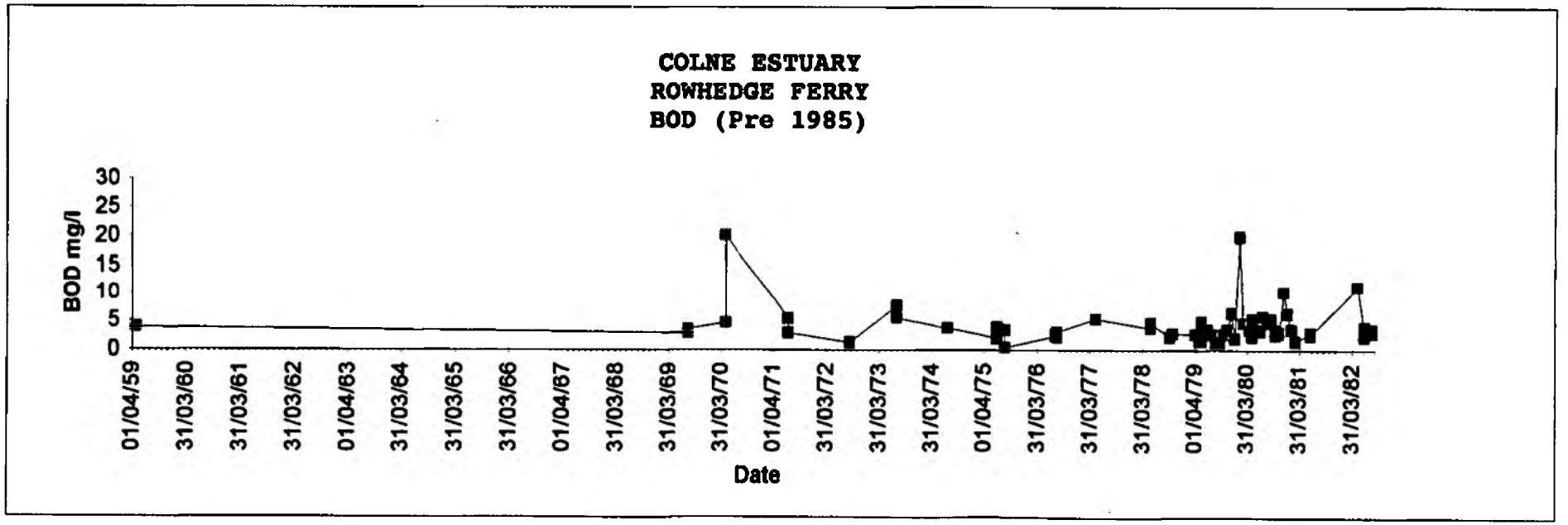
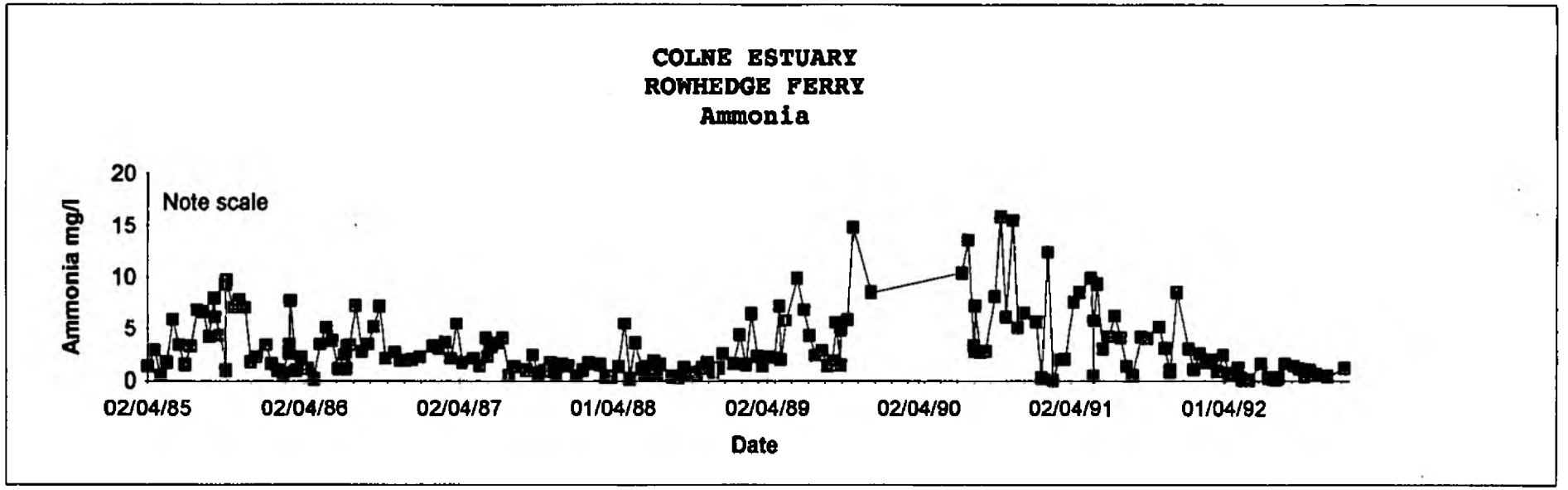


FIG 49

SAMPLE POINT CODE - BINE13



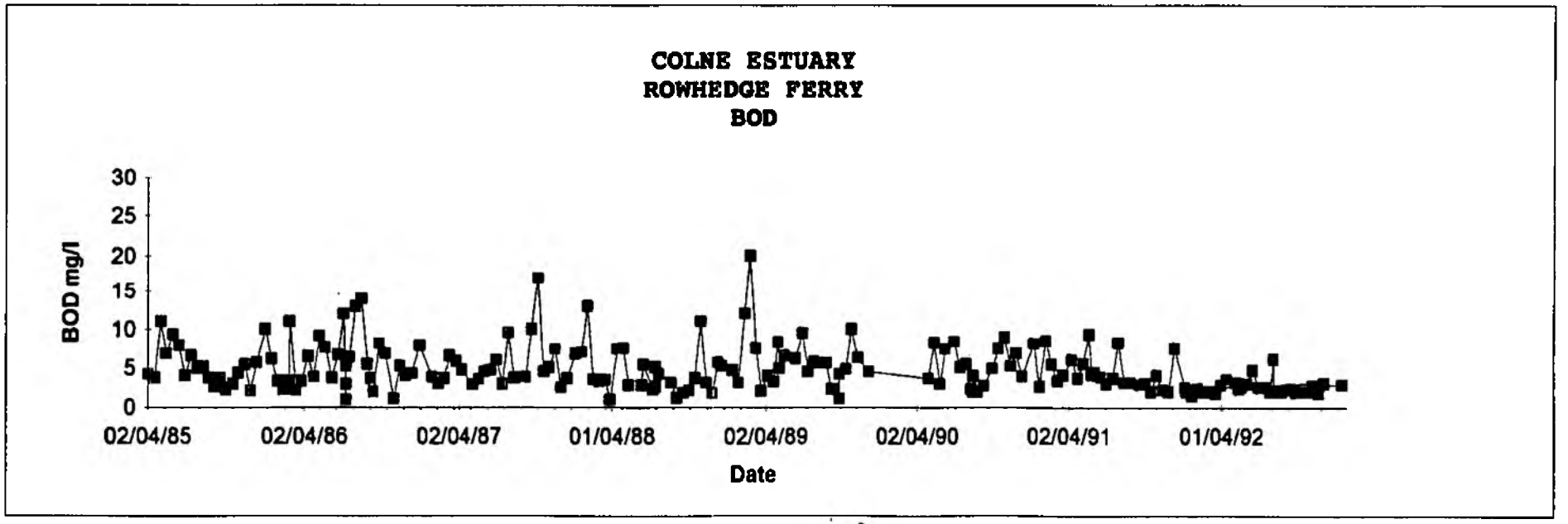
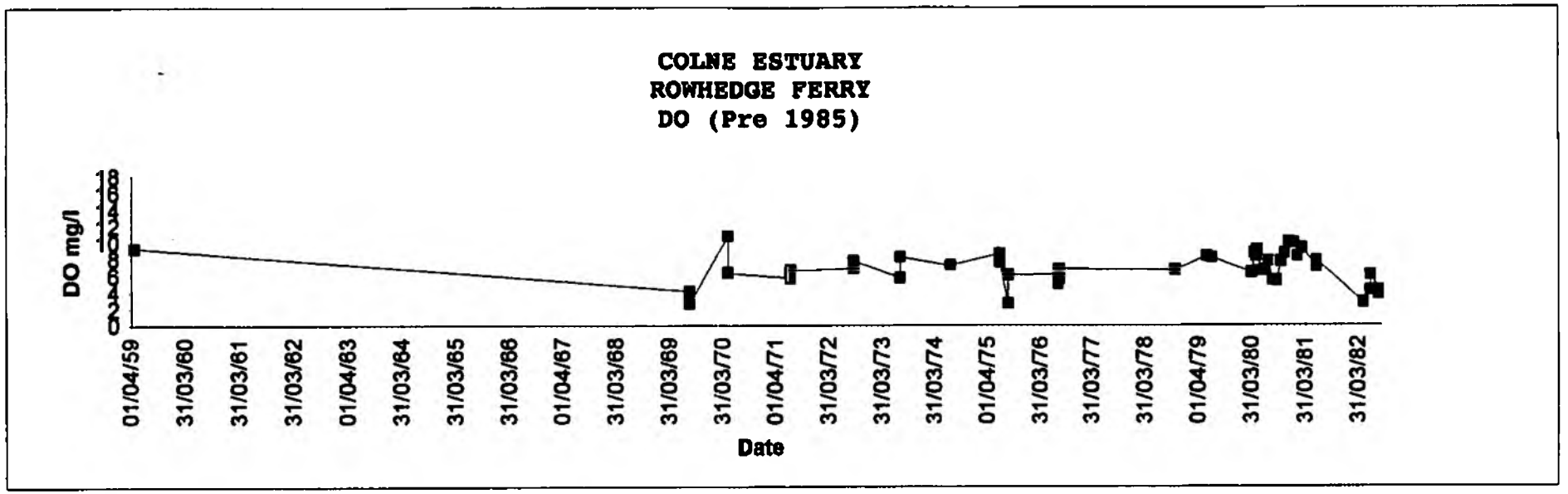


FIG 50

SAMPLE POINT CODE - BINE13



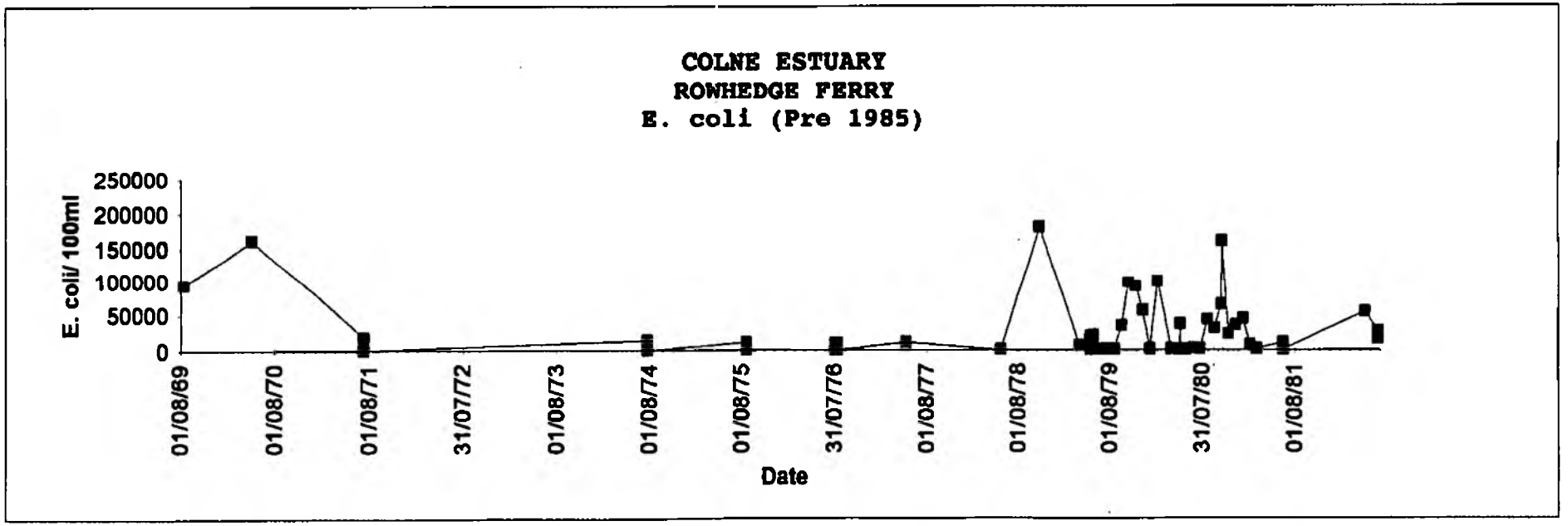
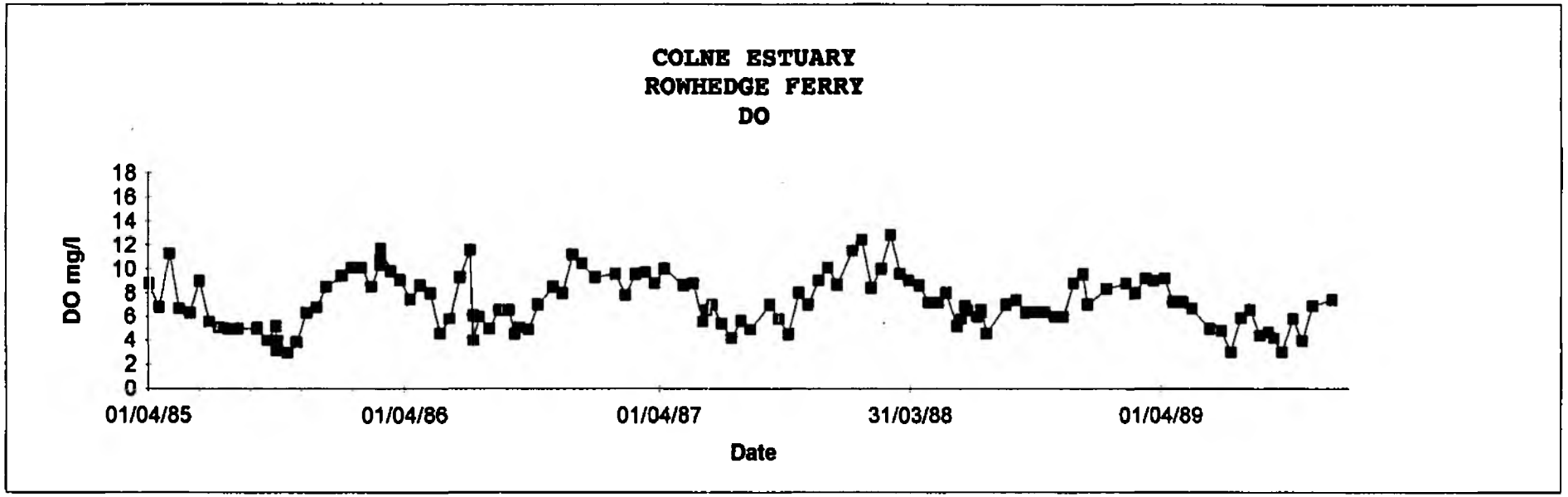


FIG 51

SAMPLE POINT CODE- BINE13



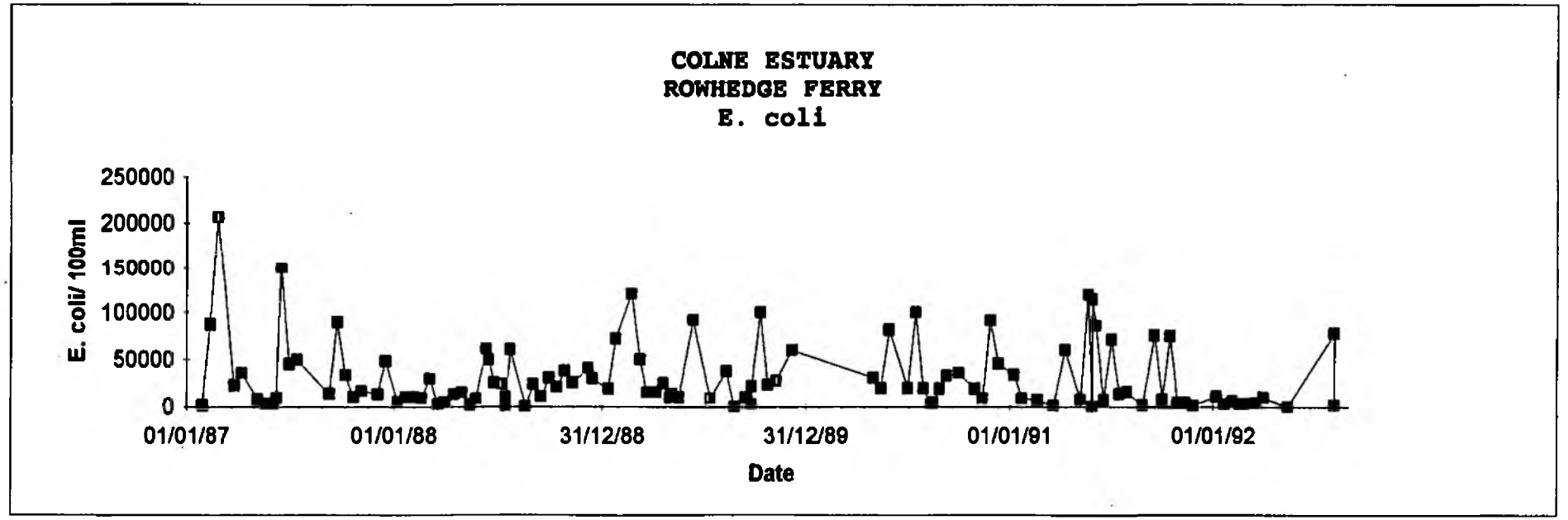


FIG 52

BOD OF ROWHEDGE FERRY AND COLCHESTER STW COMBINED EFFLUENT

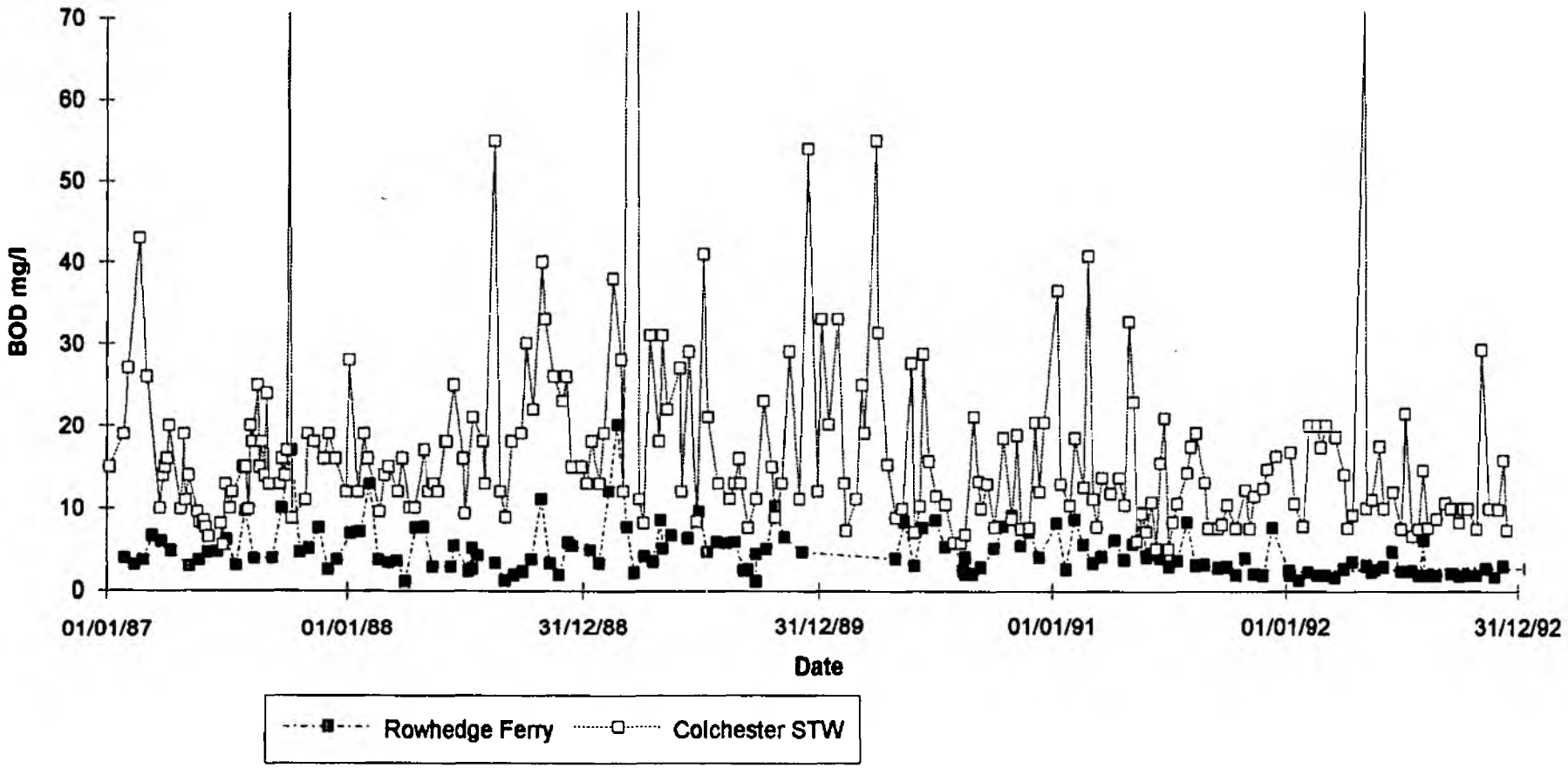


FIG 53

AMMONIA CONTENT OF ROWHEDGE FERRY AND COLCHESTER STW COMBINED EFFLUENT

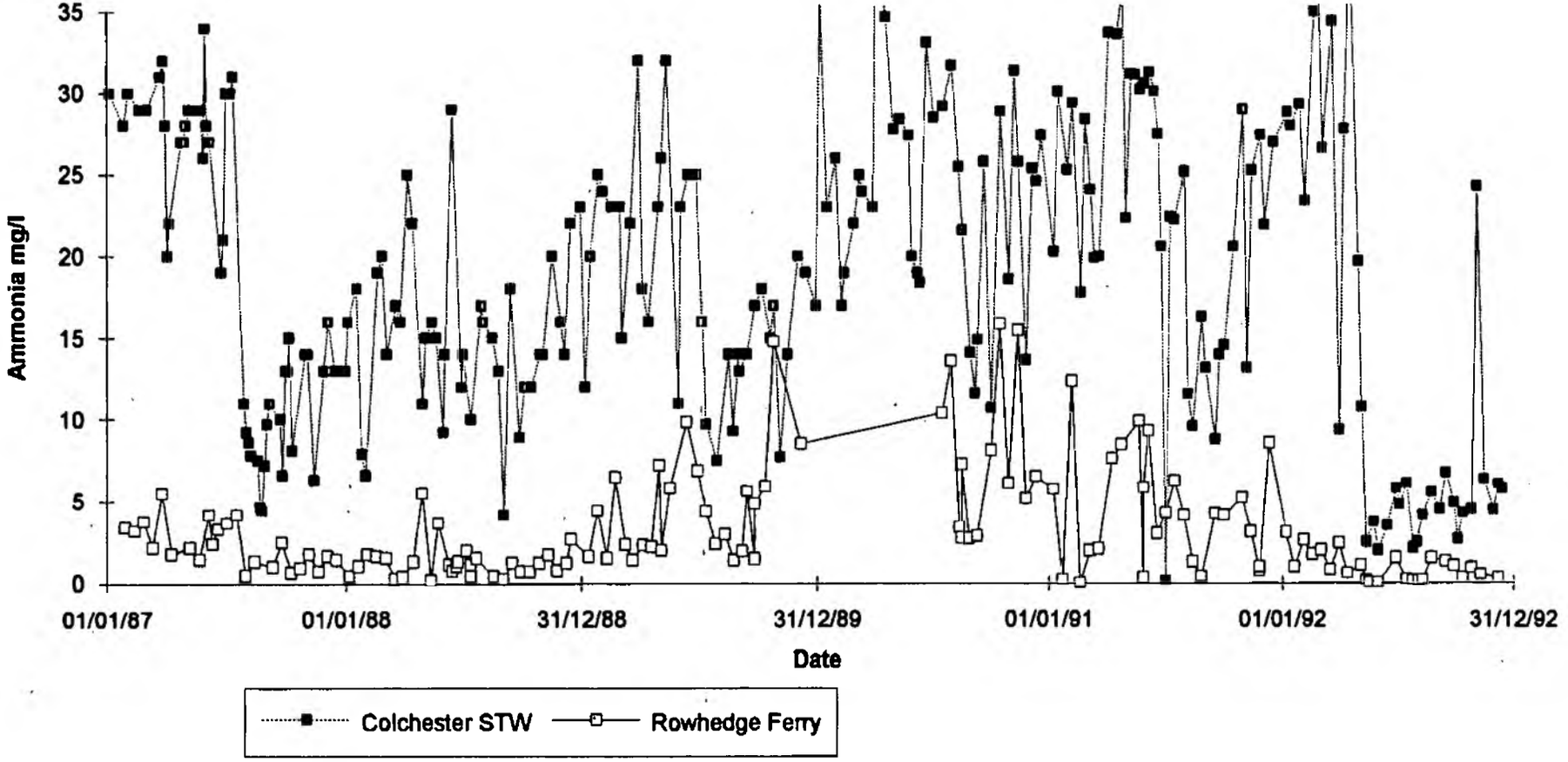
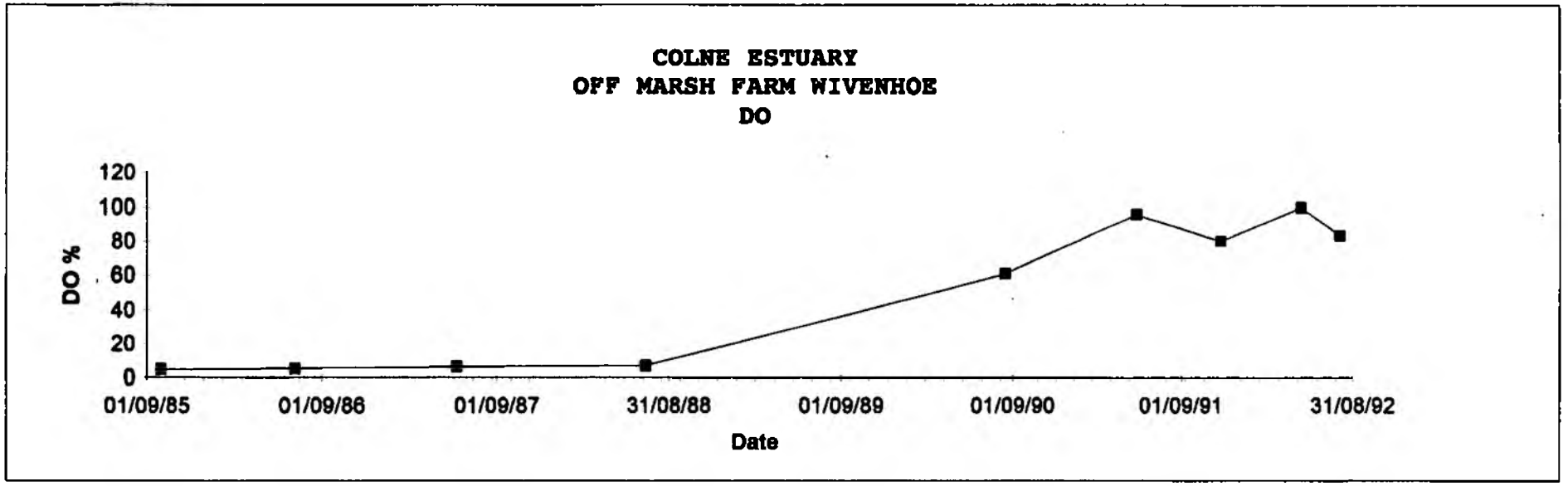


FIG 57

SAMPLE POINT CODE - BINE10



MEAN DAILY VALUE ILLUSTRATED WHEN MORE THAN ONE READING HAS BEEN TAKEN

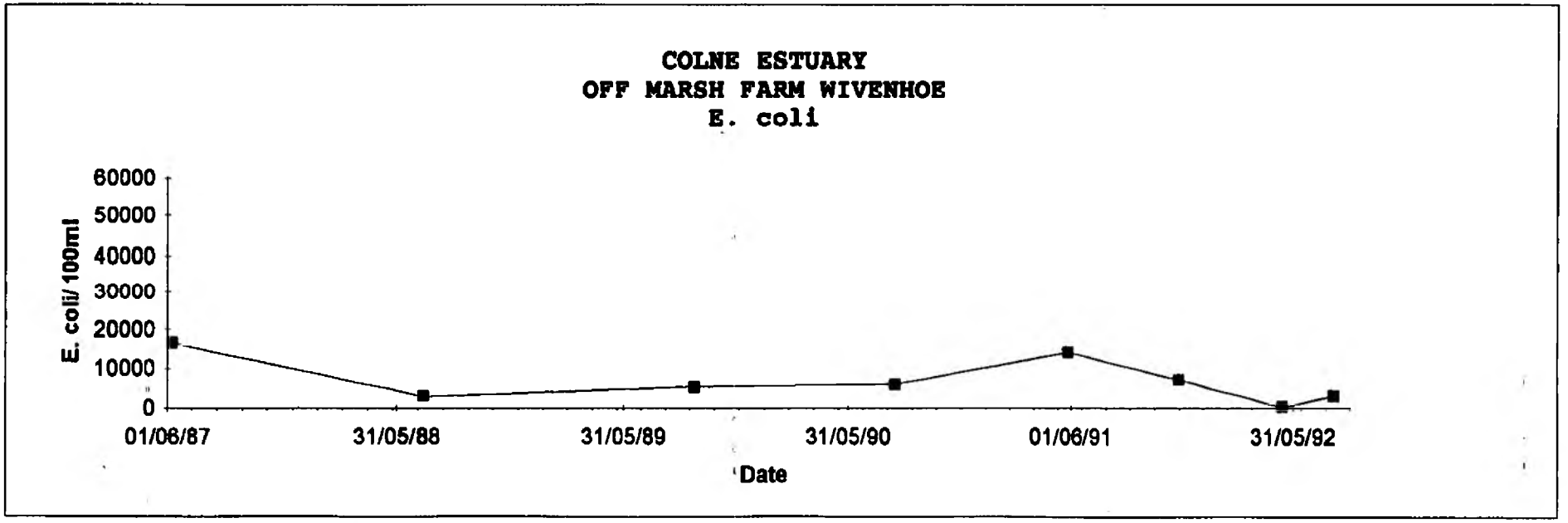
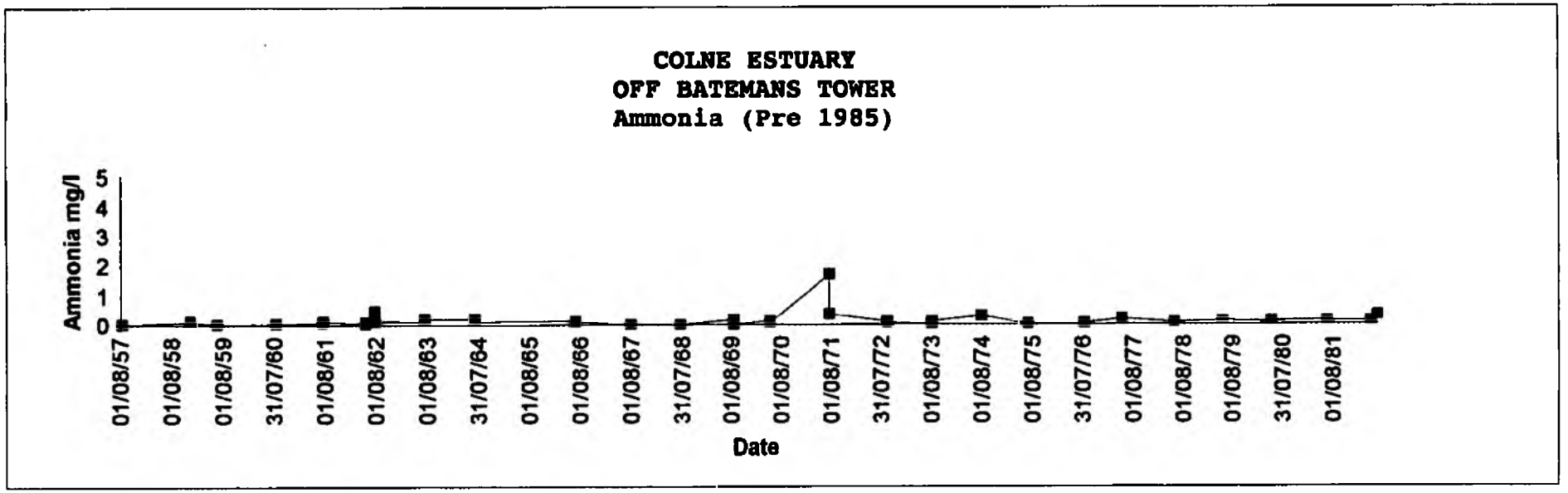


FIG 58

SAMPLE POINT CODE - BINE04



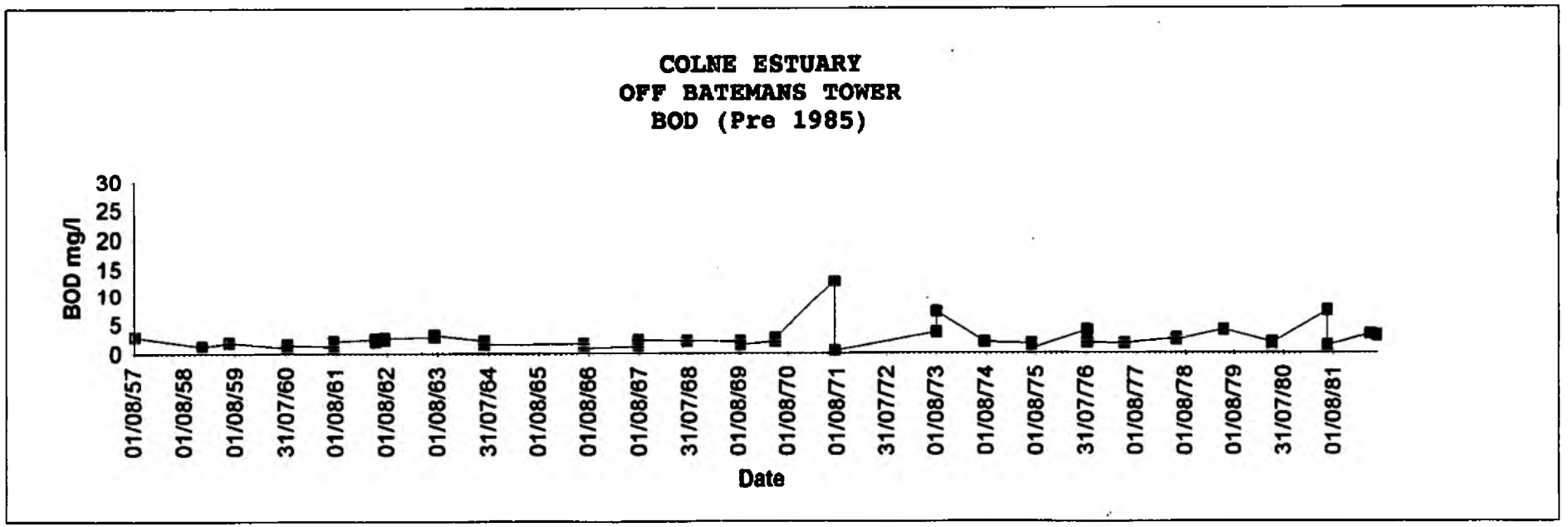
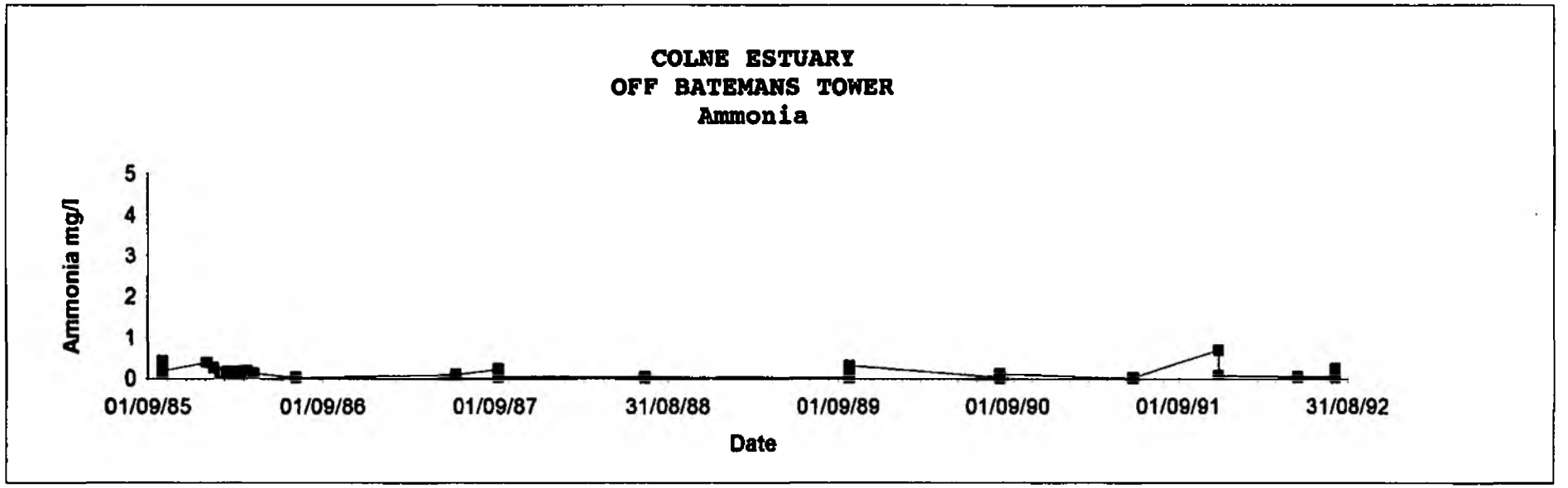


FIG 59

SAMPLE POINT CODE - BINE04



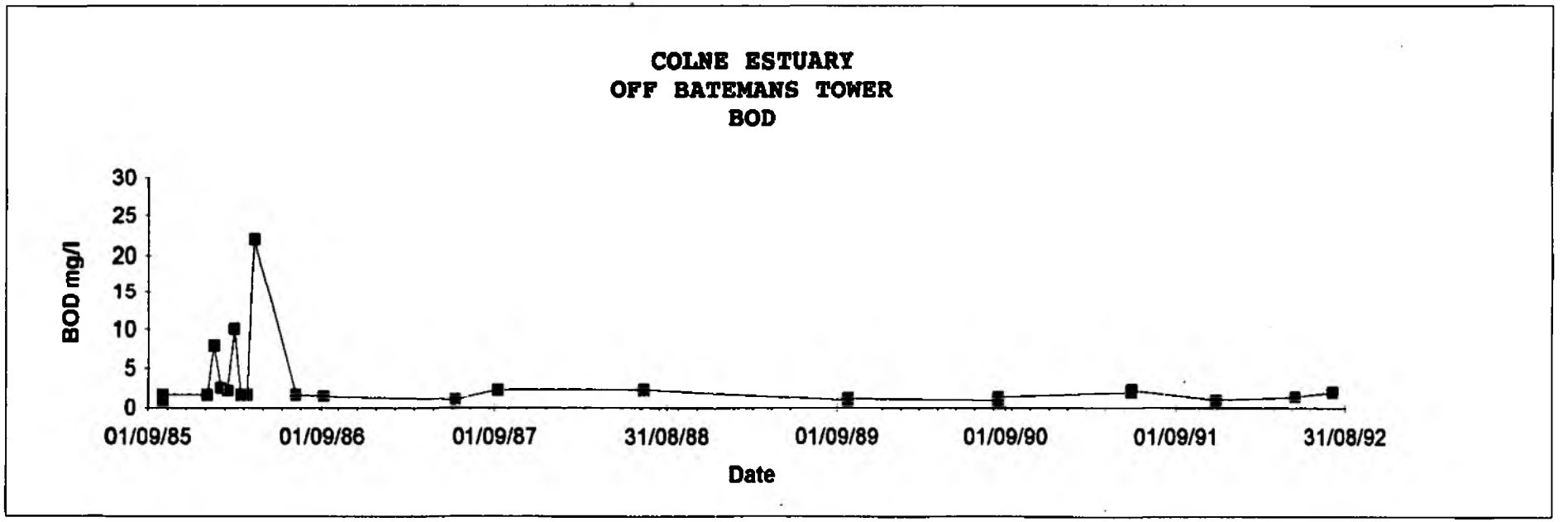
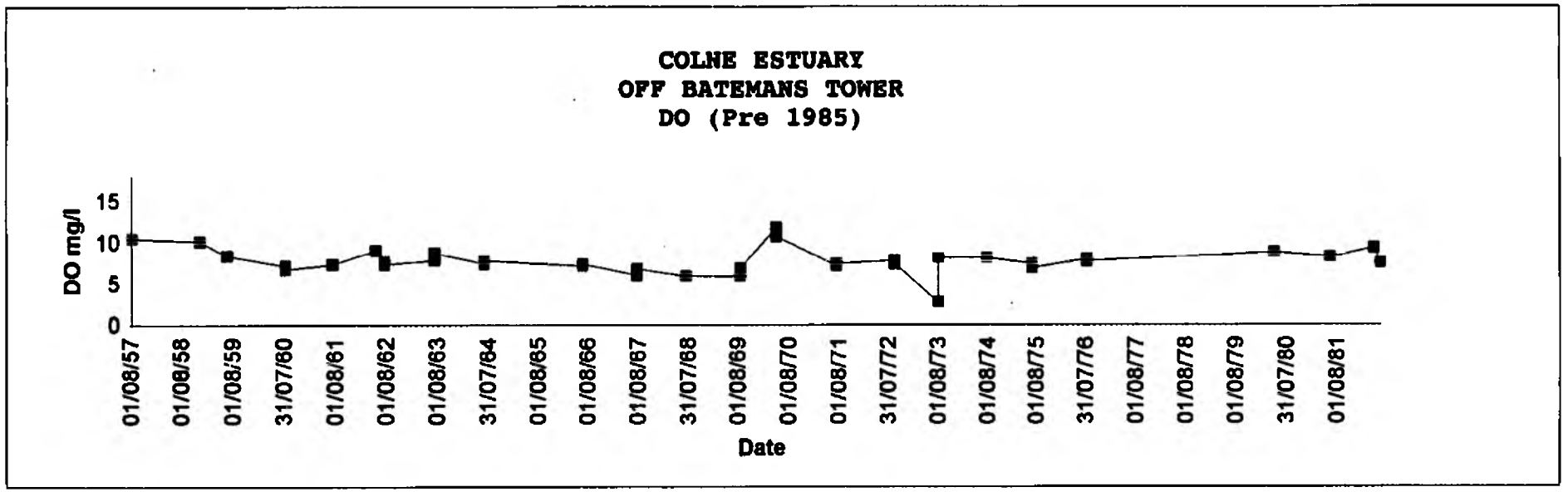


FIG 60

SAMPLE POINT CODE - BINE04



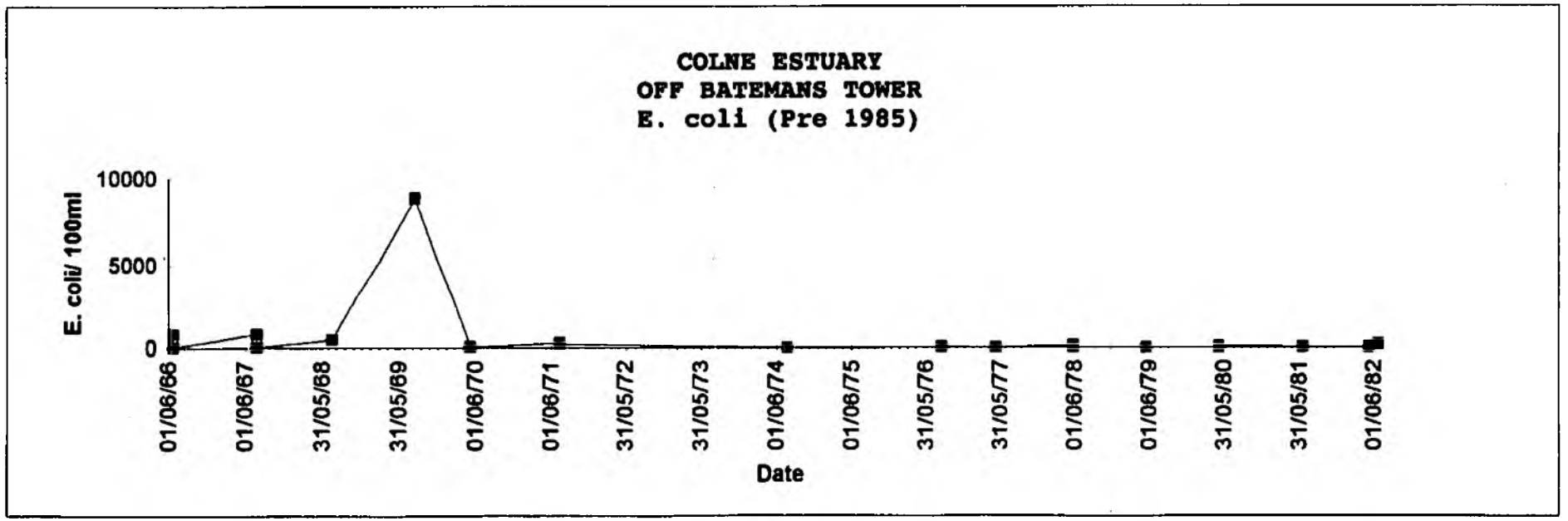
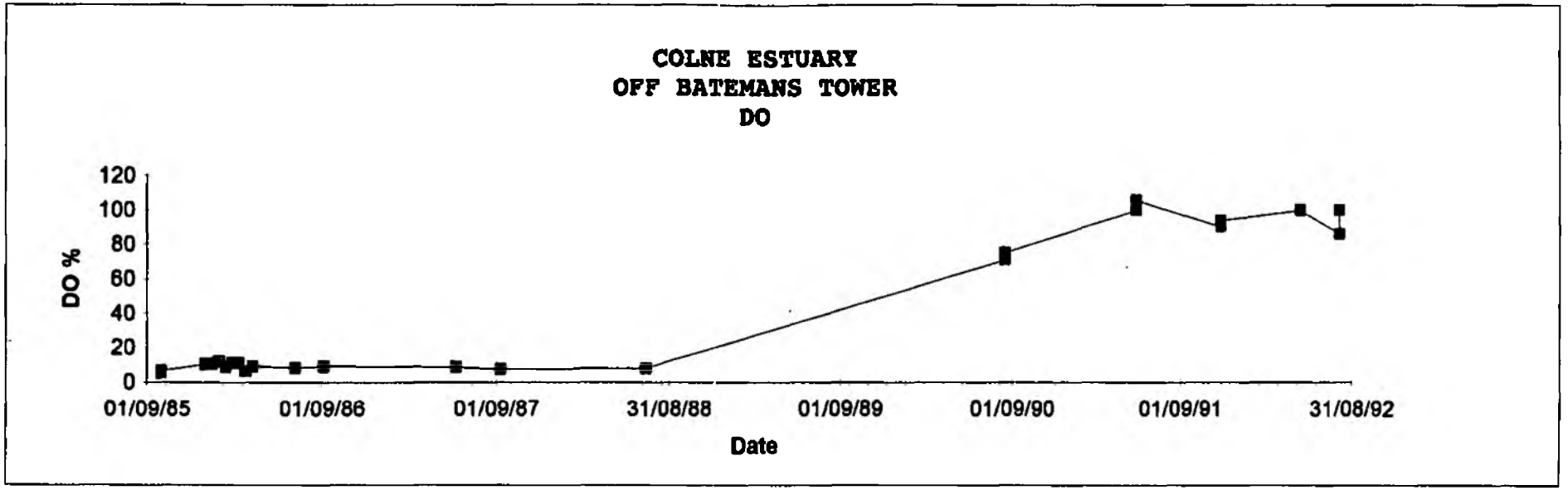
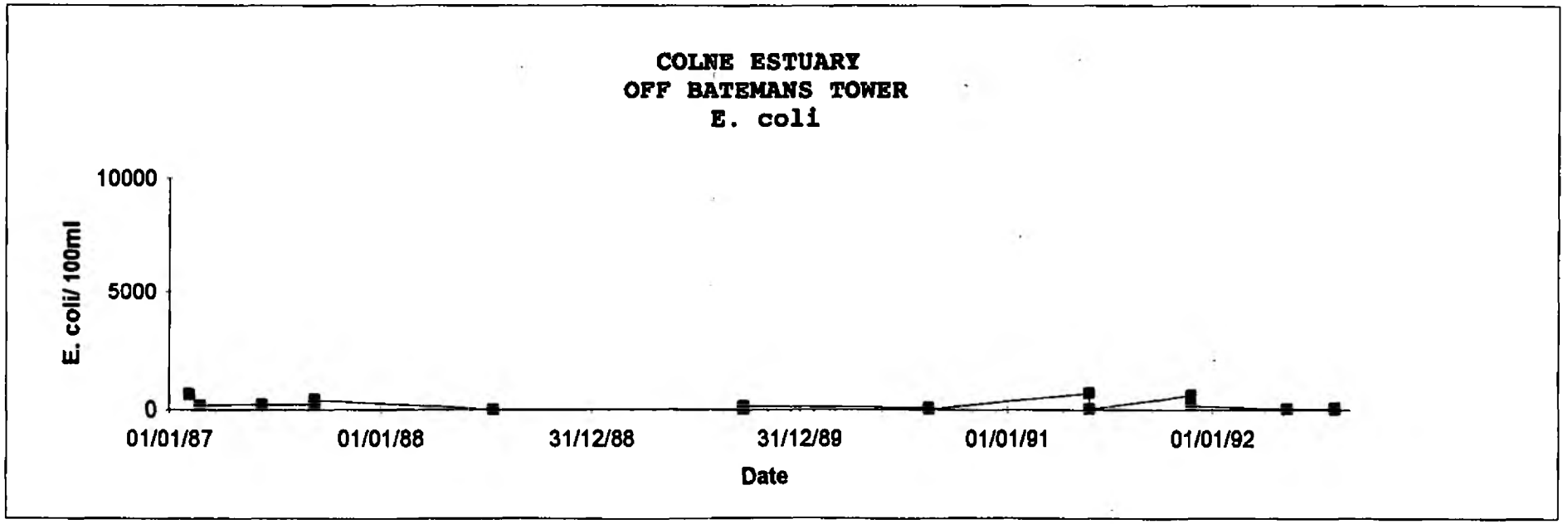


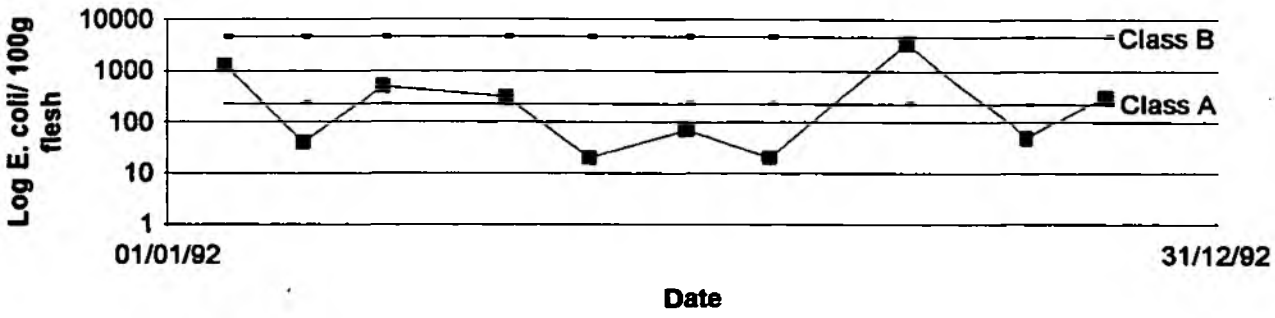
FIG 61

SAMPLE POINT CODE - BINE04

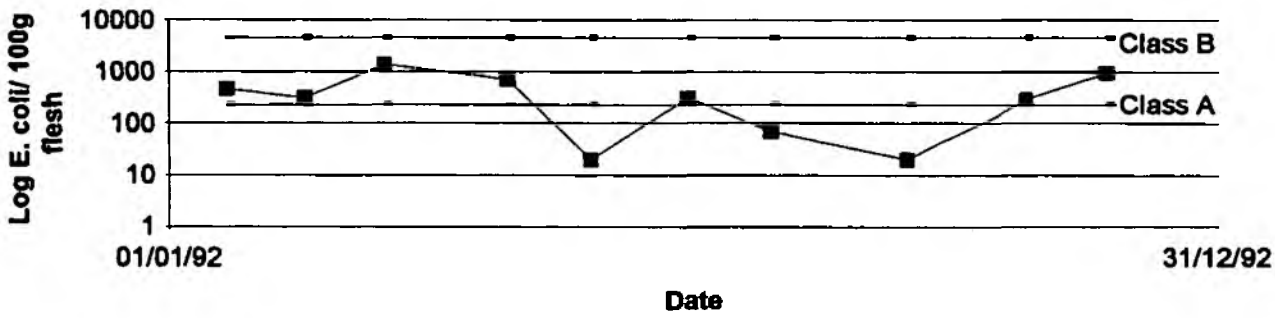




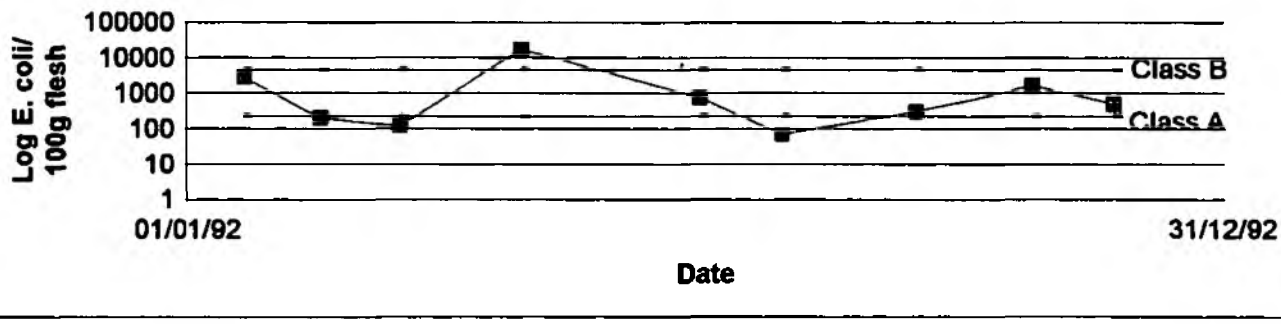
WRECK MARKER OFF E. MERSEA
MUSSEL FLESH SAMPLES



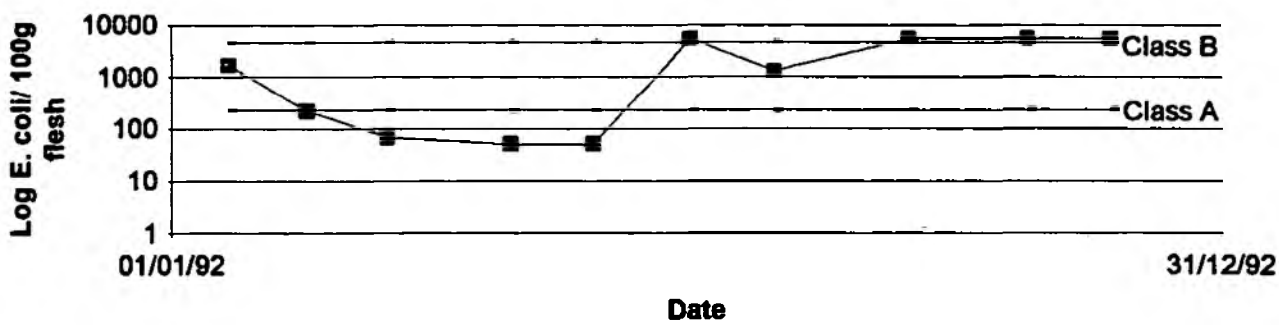
BRIGHTLINGSEA HARBOUR ENTRANCE
MUSSEL FLESH SAMPLES



RIVER COLNE BOUY
MUSSEL FLESH SAMPLES



COLNE POINT
MUSSEL FLESH SAMPLES



8 BLACKWATER ESTUARY

8.1 Historical Events from Essex River Authority Annual Report 1953-1974

1953 - New sewage treatment works completed at Goldhanger.

1955 - New sewage treatment works completed at Purleigh.

1958 - Pollution was apparent in the vicinity of Maldon and Brookend/Witham STW.

1960 - Bradwell Power Station was built.

1963 - Maldon STW (old site) caused gross pollution but plans for Maldon to be diverted to Decoy Point were approved.

1964 - Improvement noted at Brookend STW and Witham STW.

1966 - Lagooning of effluent from Witham resulted in a good quality effluent.

1967 - Decoy Point STW was completed and an improvement noted.

1974 - Main part of estuary was considered clean, above Maldon the water quality was unsatisfactory.

8.2 Interpretation of Chemical Trends

Fullbridge is at the head of the estuary within Maldon town. On

a falling tide the sample point is heavily influenced by effluent from the combined effluents from Chelmsford and Witham. There are only very limited estuary uses at this point and consequently the current quality is considered quite satisfactory. Ammonia levels show a deterioration in quality from 1988 - 1990 but more recently there has been a trend of improved, lower ammonia values (Fig 63 - 66).

Herons Point shows a stable trend of satisfactory water quality results over the past few years. The combined effluents of Witham and Chelmsford pass through this point with little dilution but do not appear to have a deleterious effect. The flow from the freshwater Blackwater and Chelmer dilute any significant effects that could be caused by the combined effluents. Maintaining this quality in future is important as there are shellfisheries situated in close proximity (Fig 67 - 70).

Stansgate Abbey shows an excellent water quality partly due to the fact that this sample point is within a large body of water capable of diluting any effluent effects. The E. coli values are very low, they are mirrored in the flesh results from the Shellfisheries resulting in a class 'A' shellfishery (Fig 71 - 74).

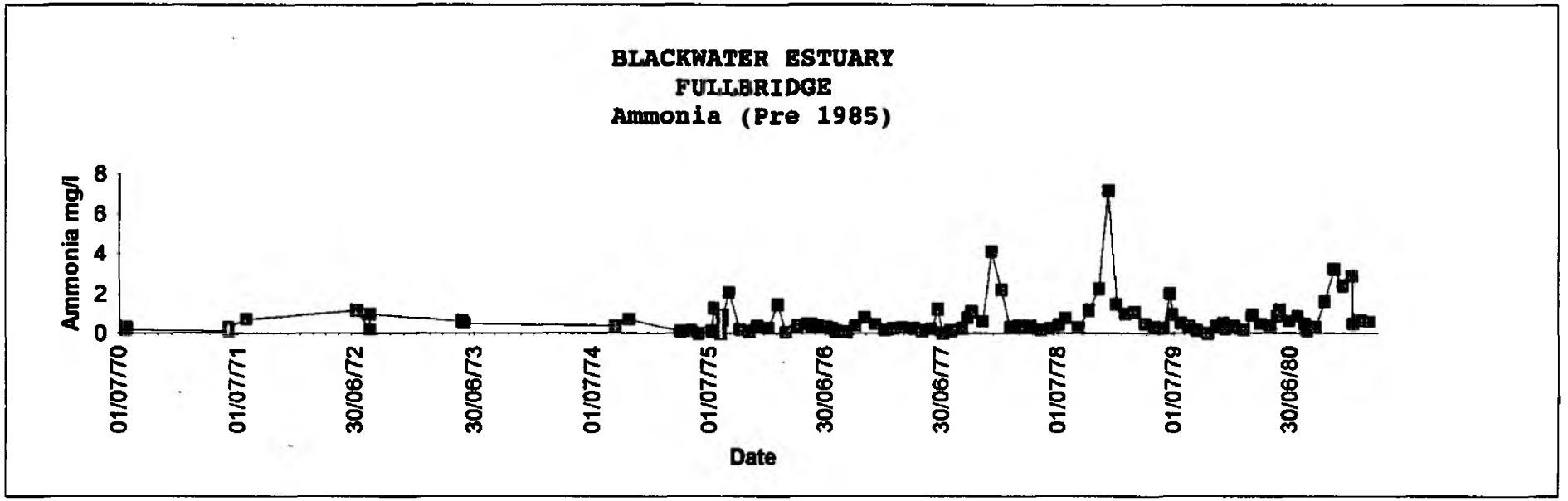
Mersea quarters is marginally affected by Bradwell Power Stations cooling water discharge and the West Mersea STW. Despite this, water quality is excellent with respect to all parameters (Fig 75 & 76).

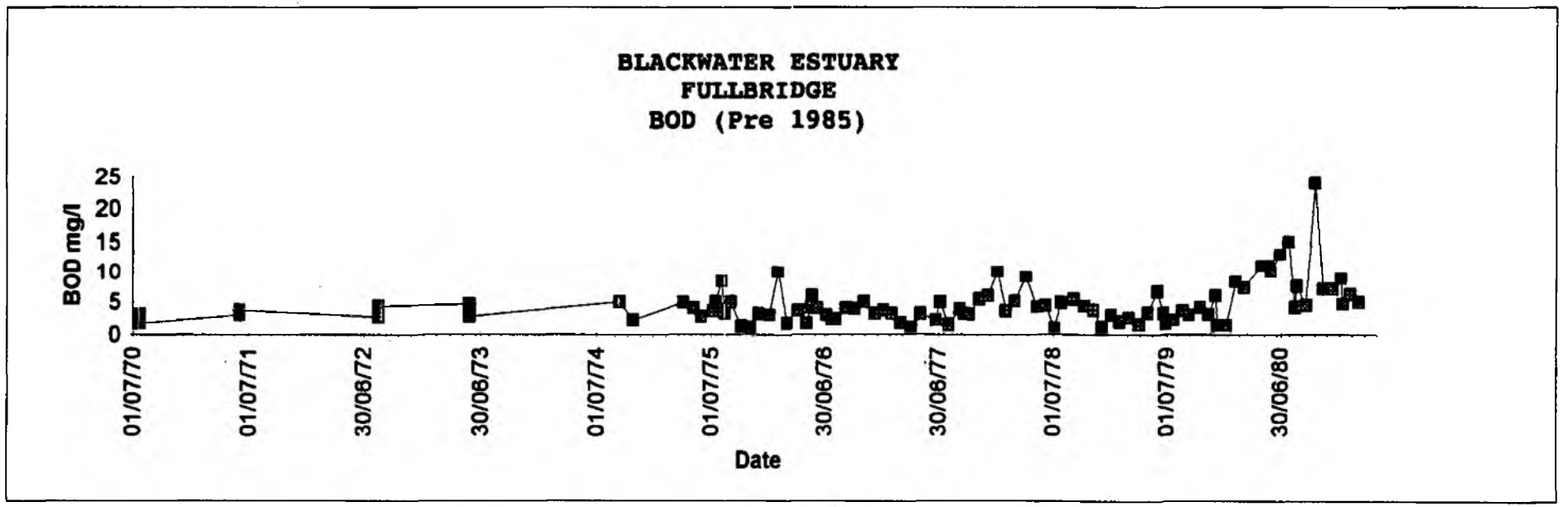
Shellfish (Fig 77 - 79).

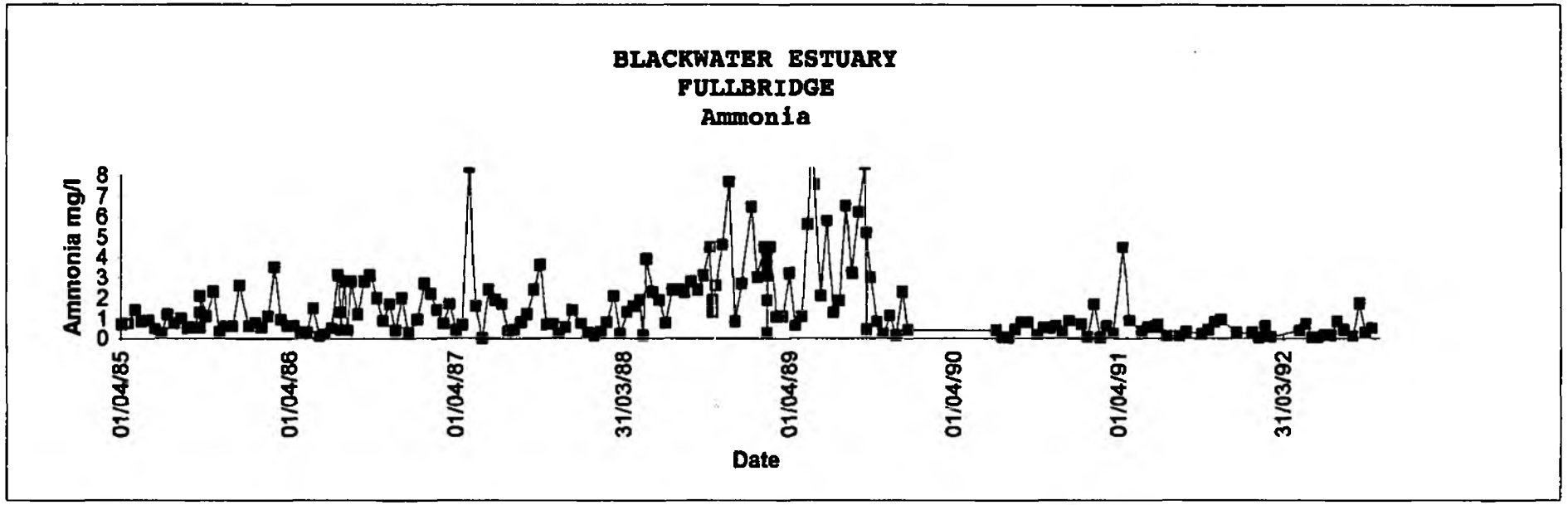
(See Map 25 & 26 for location of sample points)

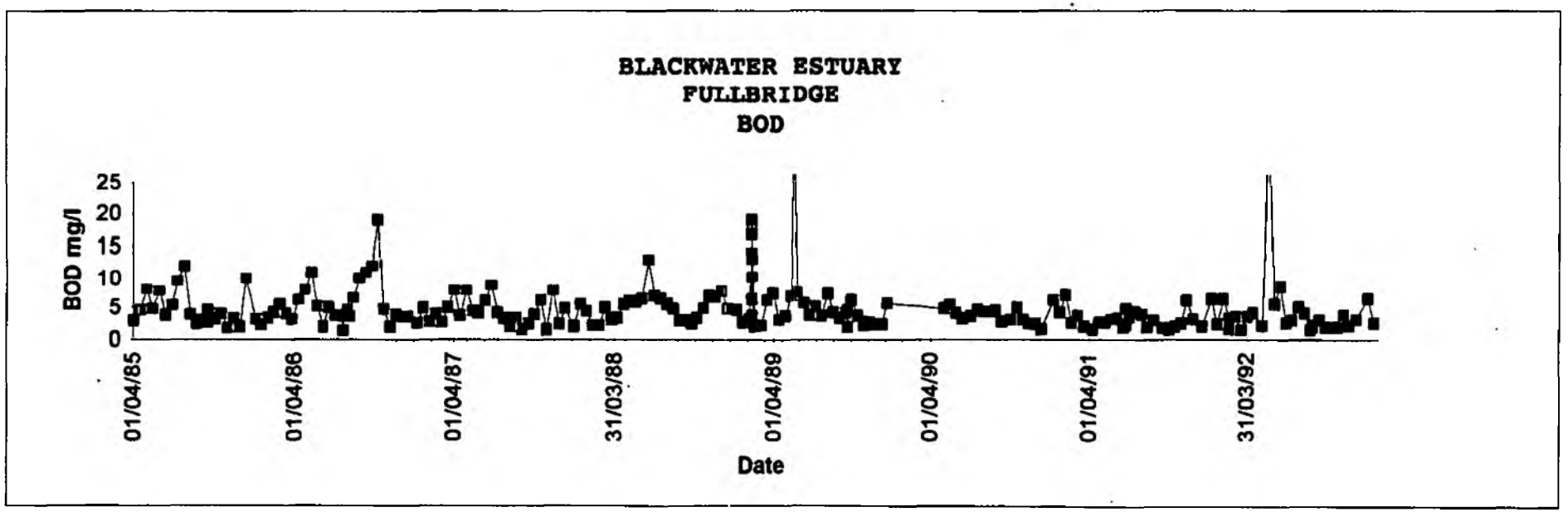
FIG 63

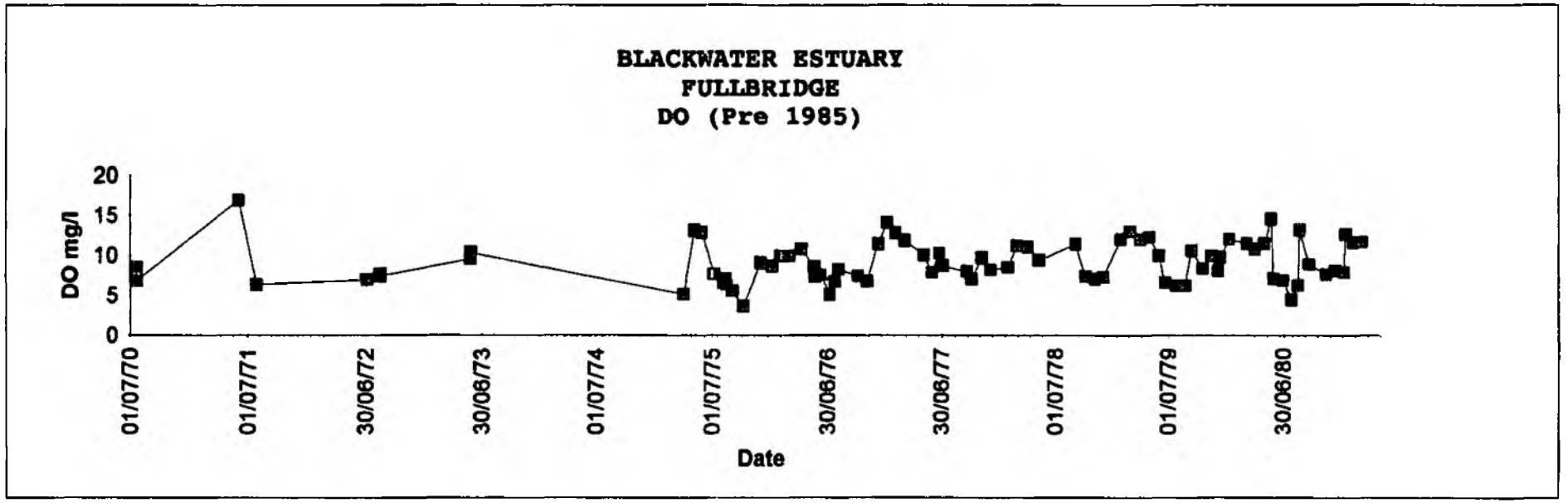
SAMPLE POINT CODE - BIBE33

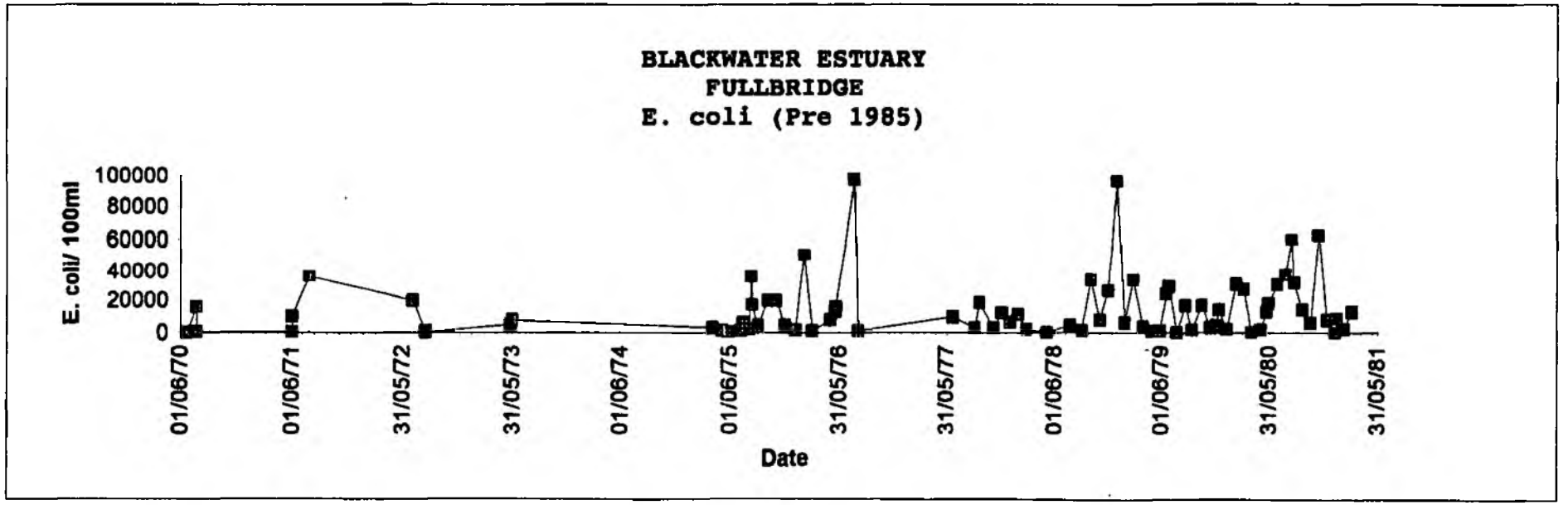


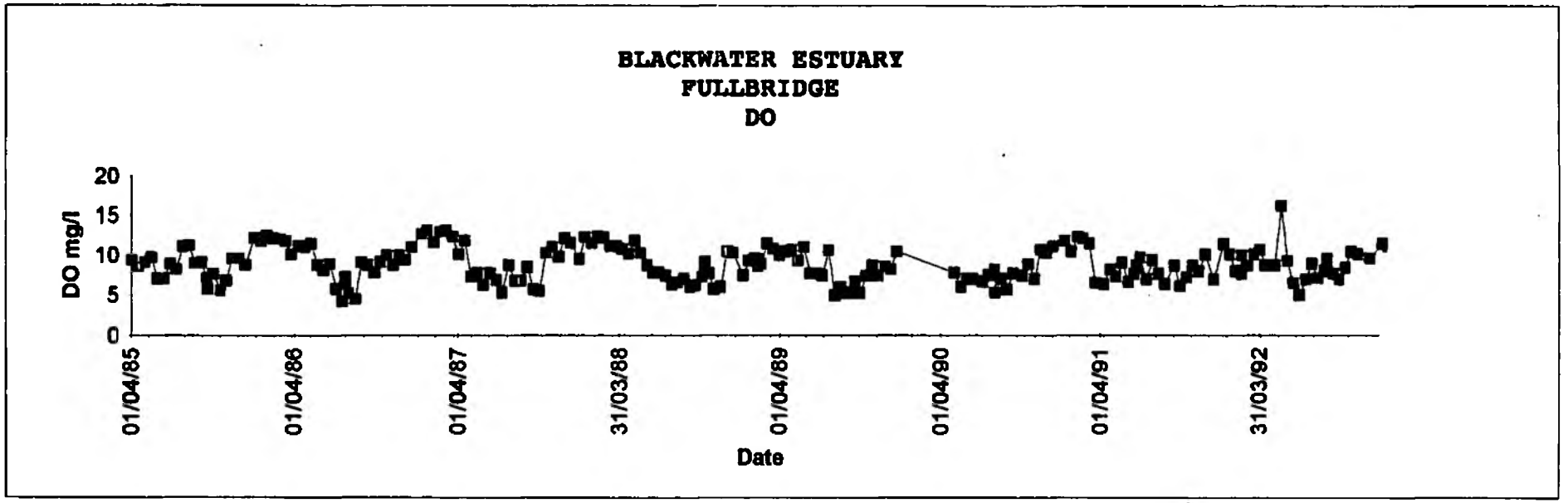


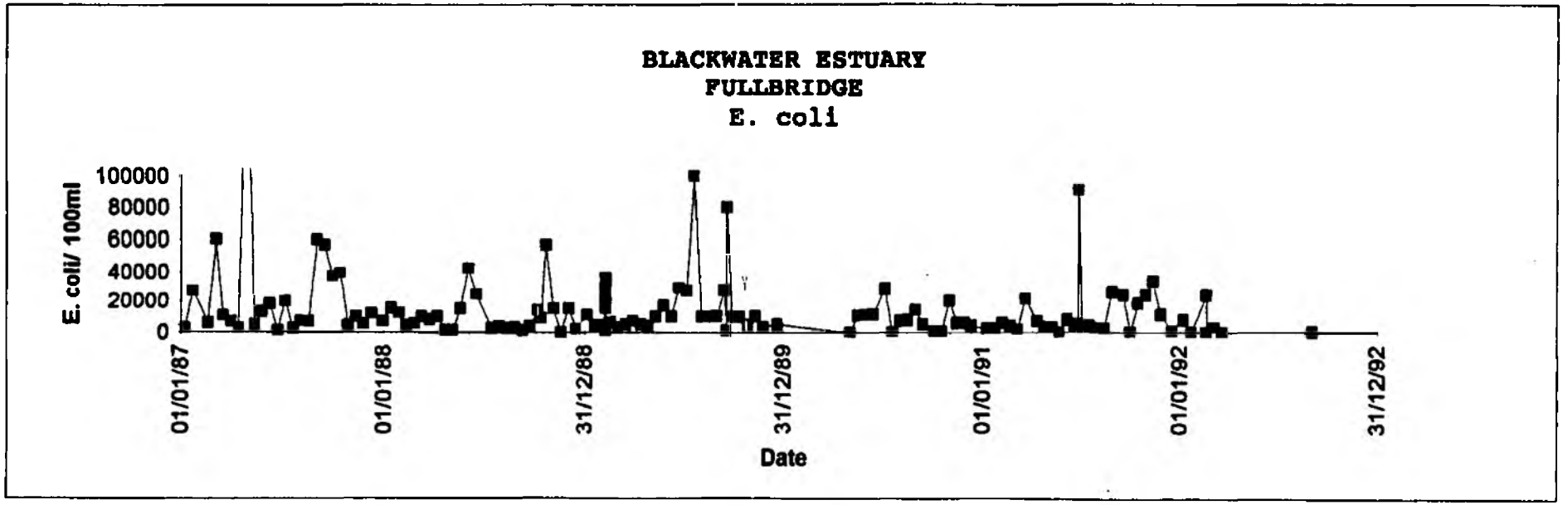

BLACKWATER ESTUARY
FULLBRIDGE
Ammonia
Ammonia mg/l
0
1
2
3
4
5
6
7
8
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date

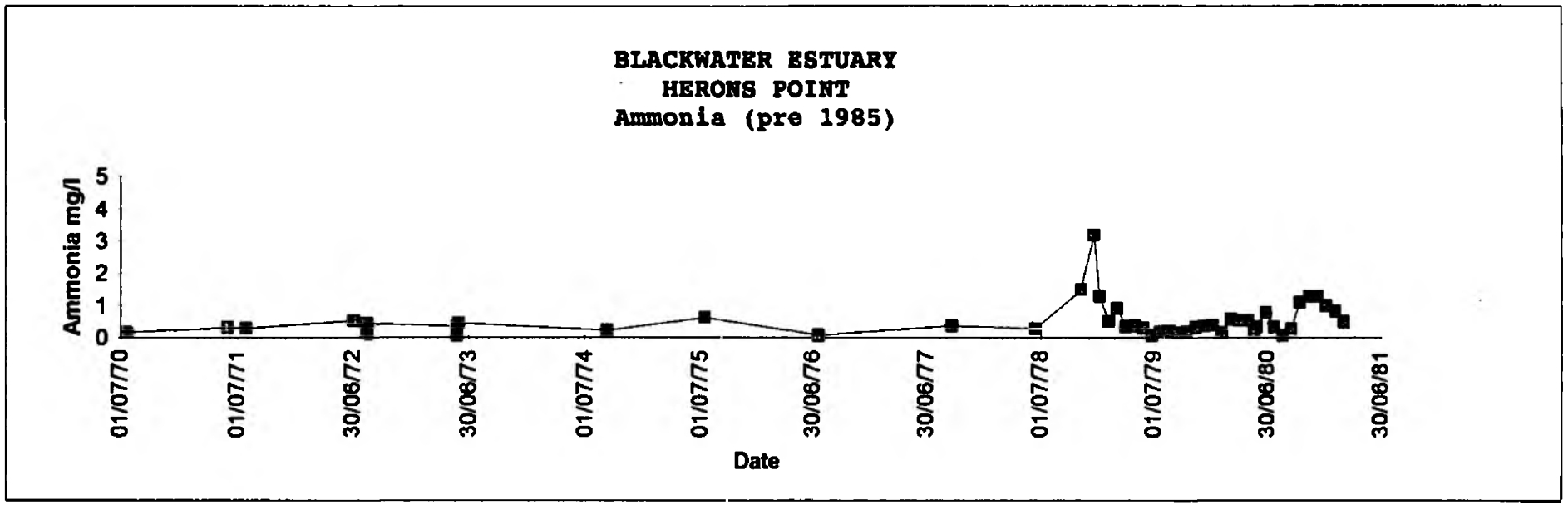

BLACKWATER ESTUARY
FULLBRIDGE
BOD
BOD mg/l
0
5
10
15
20
25
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date

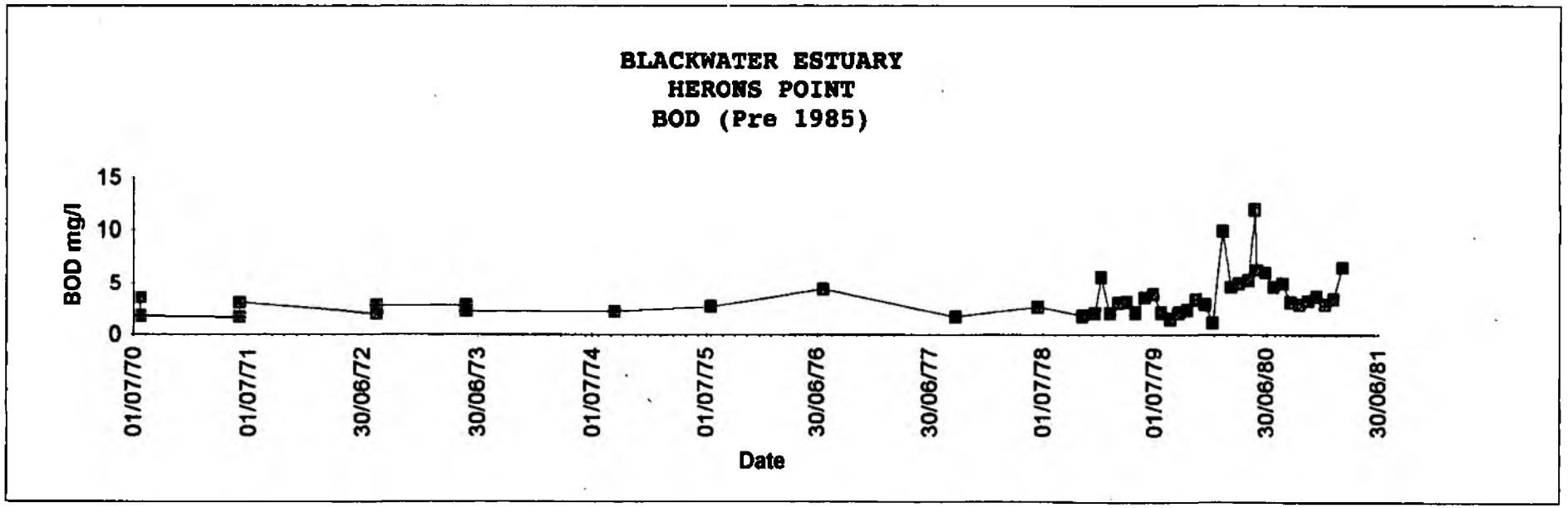

BLACKWATER ESTUARY
FULLBRIDGE
DO (Pre 1985)
DO mg/l
20
15
10
5
0
01/07/70
01/07/71
30/06/72
30/06/73
01/07/74
01/07/75
30/06/76
30/06/77
01/07/78
01/07/79
30/06/80
Date

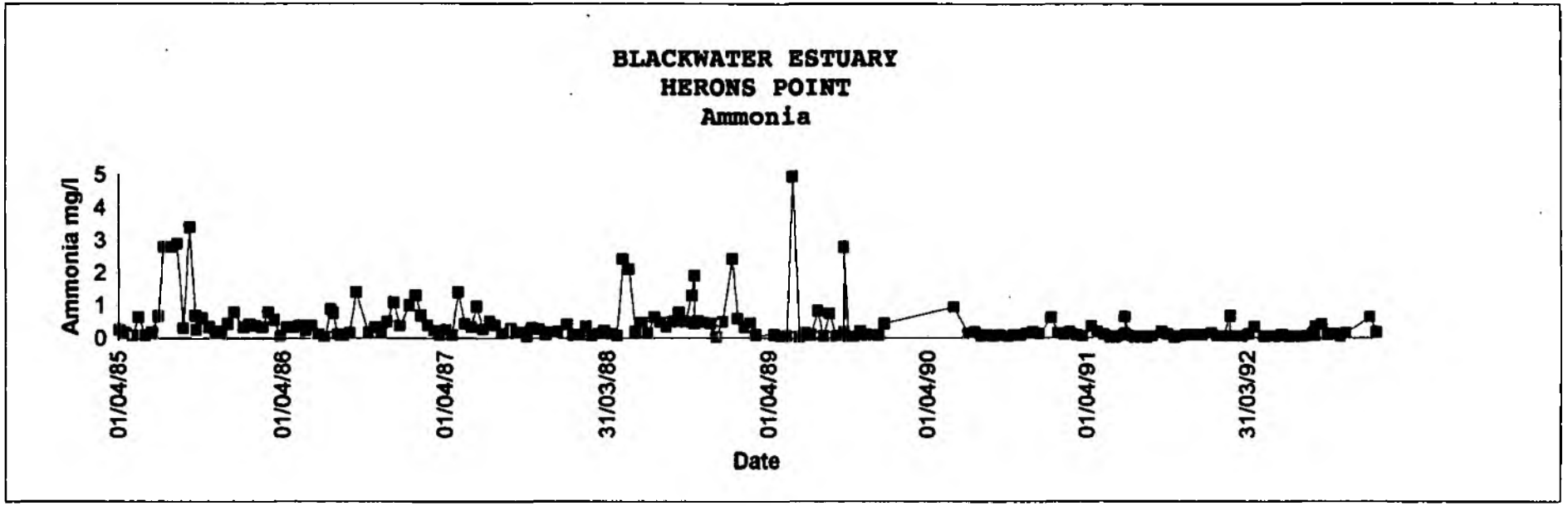

BLACKWATER ESTUARY
FULLBRIDGE
E. coli (Pre 1985)
E. coli/ 100ml
100000
80000
60000
40000
20000
0
01/06/70
01/06/71
31/05/72
31/05/73
01/06/74
01/06/75
31/05/76
31/05/77
01/06/78
01/06/79
31/05/80
31/05/81
Date

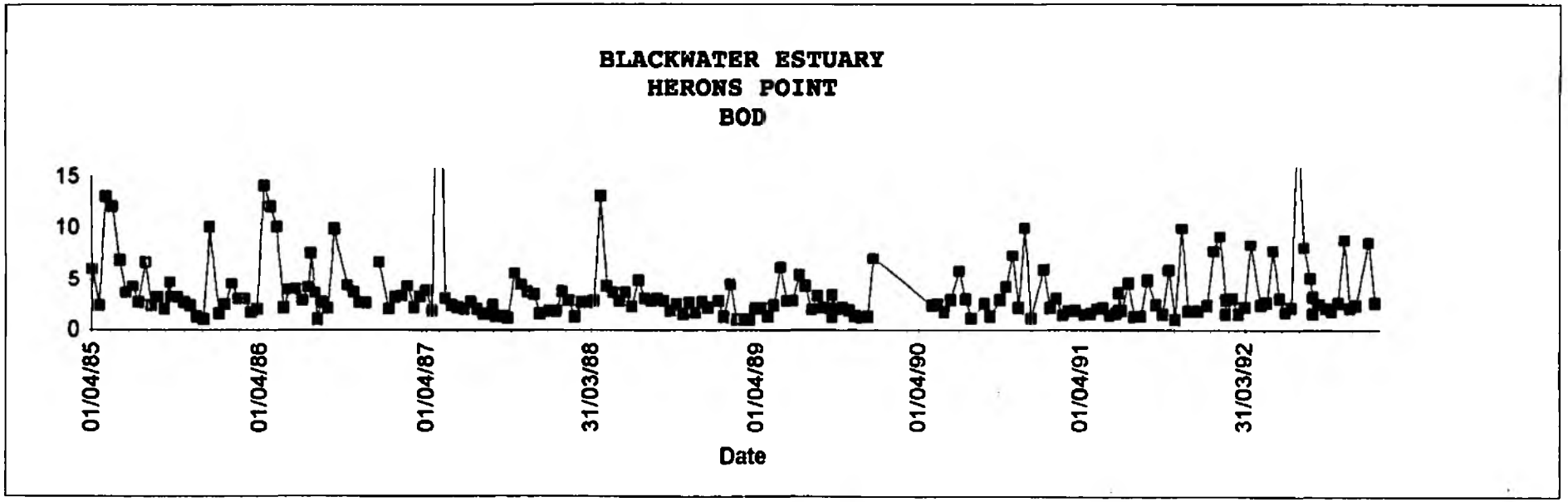

BLACKWATER ESTUARY
FULLBRIDGE
DO
DO mg/l
20
15
10
5
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date

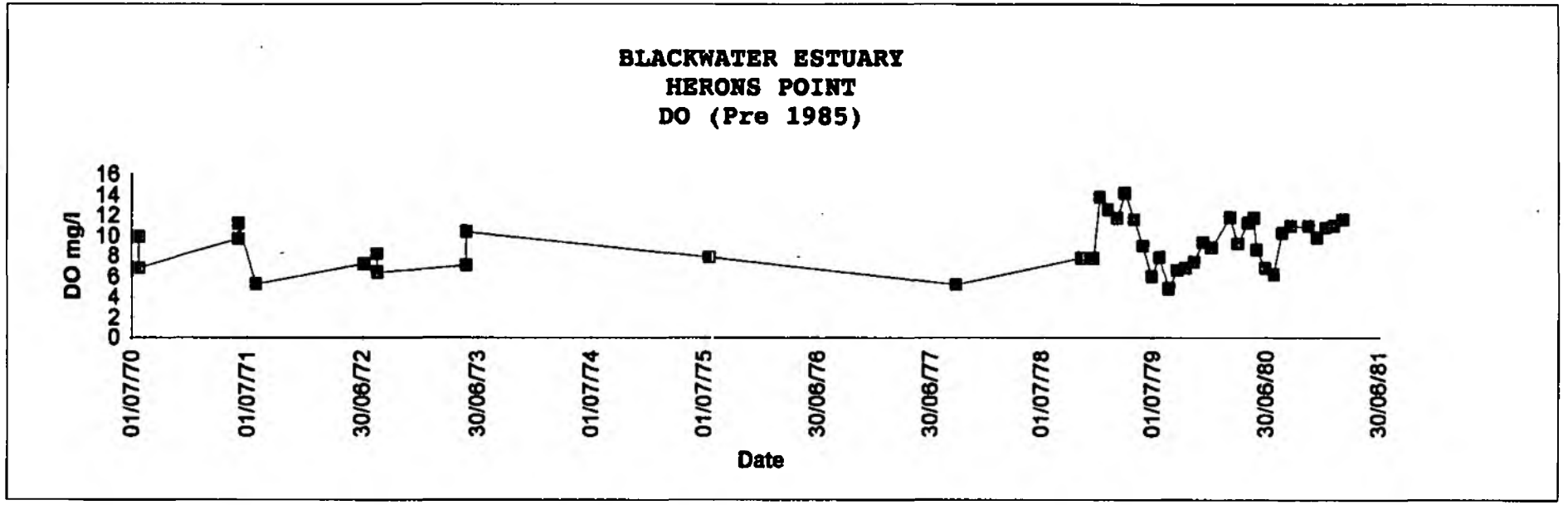

BLACKWATER ESTUARY
FULLBRIDGE
E. coli
E. coli/ 100ml
100000
80000
60000
40000
20000
0
01/01/87
01/01/88
31/12/88
31/12/89
01/01/91
01/01/92
31/12/92
Date


BLACKWATER ESTUARY
HERONS POINT
Ammonia (pre 1985)
Ammonia mg/l
5
4
3
2
1
0
01/07/70
01/07/71
30/06/72
30/06/73
01/07/74
01/07/75
30/06/76
30/06/77
01/07/78
01/07/79
30/06/80
30/06/81
Date


BLACKWATER ESTUARY
HERONS POINT
BOD (Pre 1985)
BOD mg/l
15
10
5
0
01/07/70
01/07/71
30/06/72
30/06/73
01/07/74
01/07/75
30/06/76
30/06/77
01/07/78
01/07/79
30/06/80
30/06/81
Date


BLACKWATER ESTUARY
HERONS POINT
Ammonia
Ammonia mg/l
5
4
3
2
1
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date


BLACKWATER ESTUARY
HERONS POINT
BOD
15
10
5
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date


BLACKWATER ESTUARY
HERONS POINT
DO (Pre 1985)
DO mg/l
16
14
12
10
8
6
4
2
0
01/07/70
01/07/71
30/06/72
30/06/73
01/07/74
01/07/75
30/06/76
30/06/77
01/07/78
01/07/79
30/06/80
30/06/81
Date

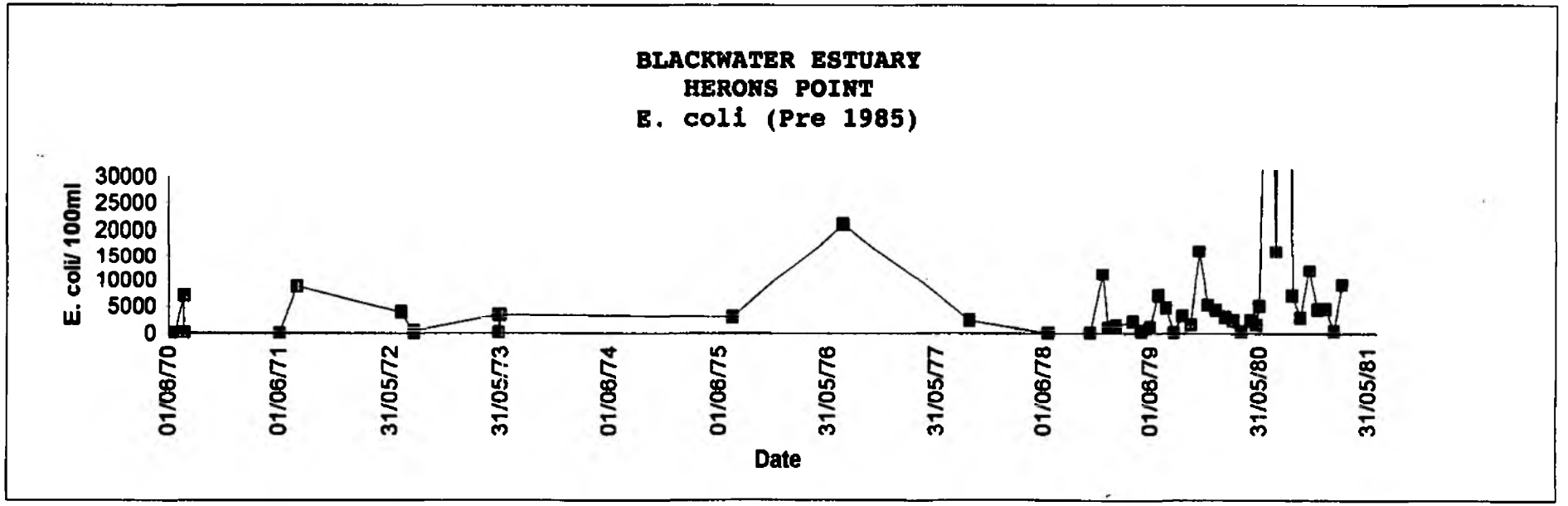
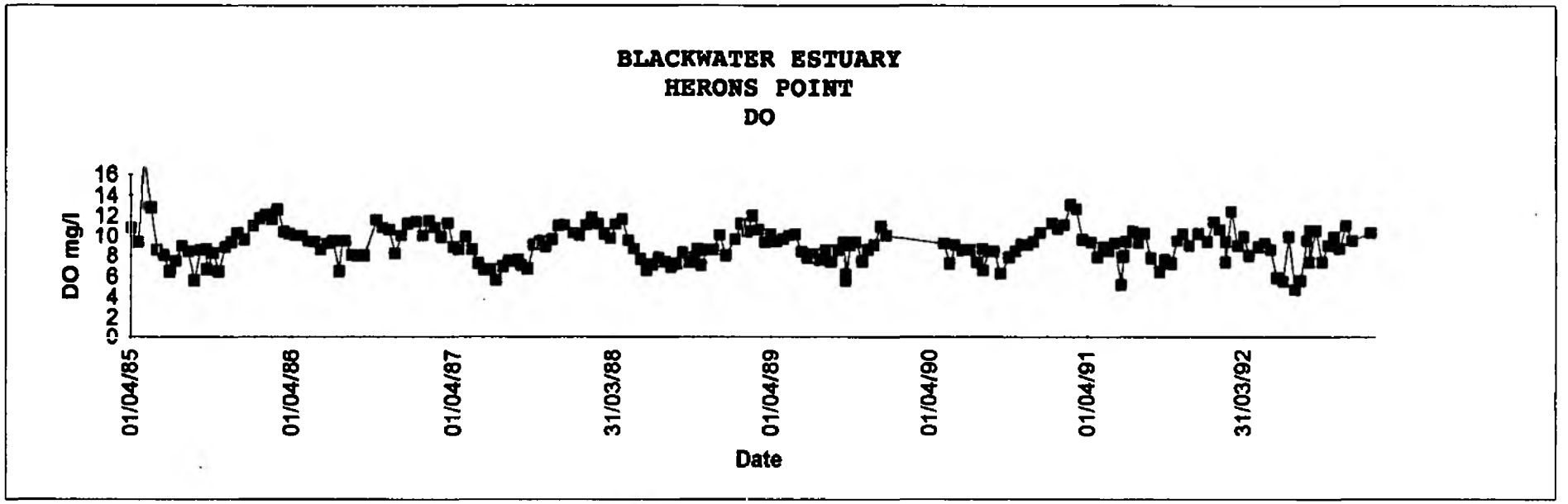
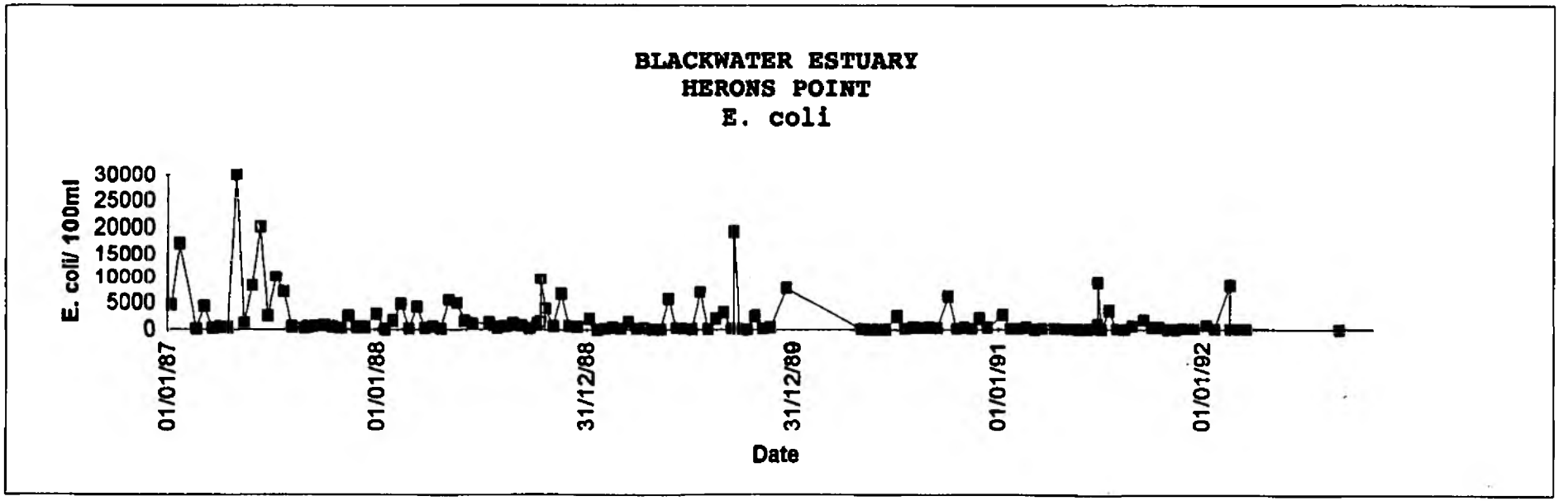
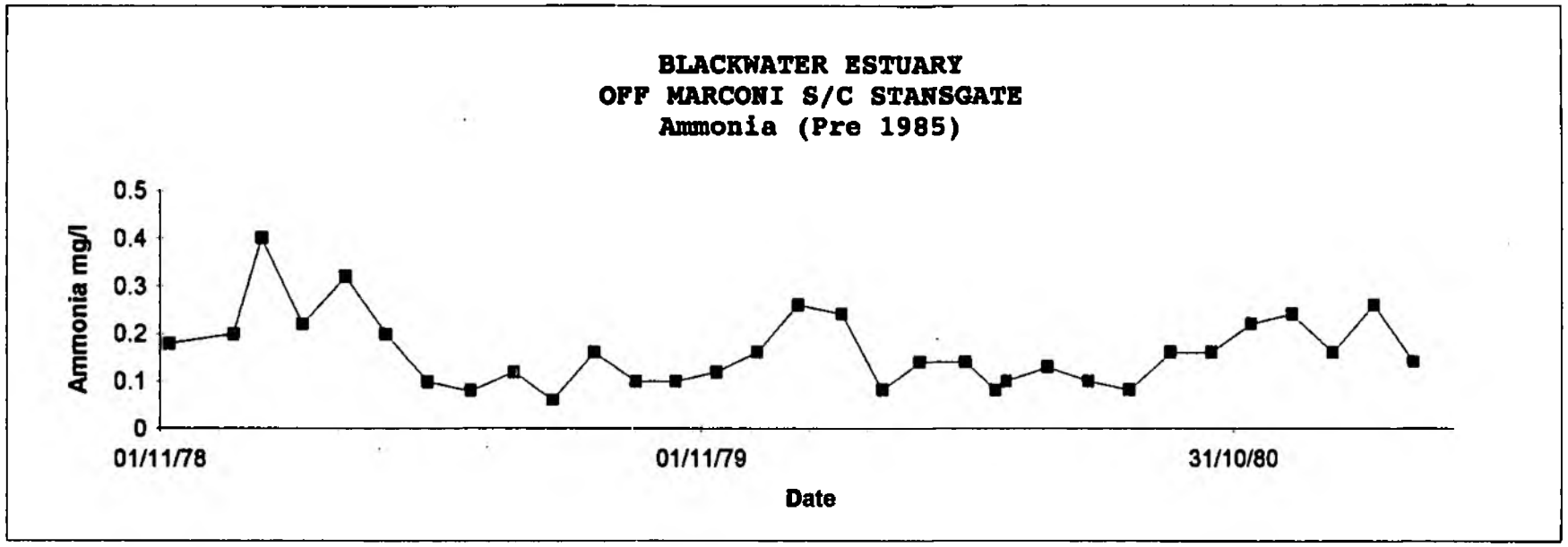

BLACKWATER ESTUARY
HERONS POINT
E. coli (Pre 1985)
E. coli/ 100ml
30000
25000
20000
15000
10000
5000
0
01/06/70
01/06/71
31/05/72
31/05/73
01/06/74
01/06/75
31/05/76
31/05/77
01/06/78
01/06/79
31/05/80
31/05/81
Date

FIG 70

SAMPLE POINT CODE - BIBE28






BLACKWATER ESTUARY
OFF MARCONI S/C STANSGATE
Ammonia (Pre 1985)
Ammonia mg/l
0.5
0.4
0.3
0.2
0.1
0
01/11/78
01/11/79
31/10/80
Date

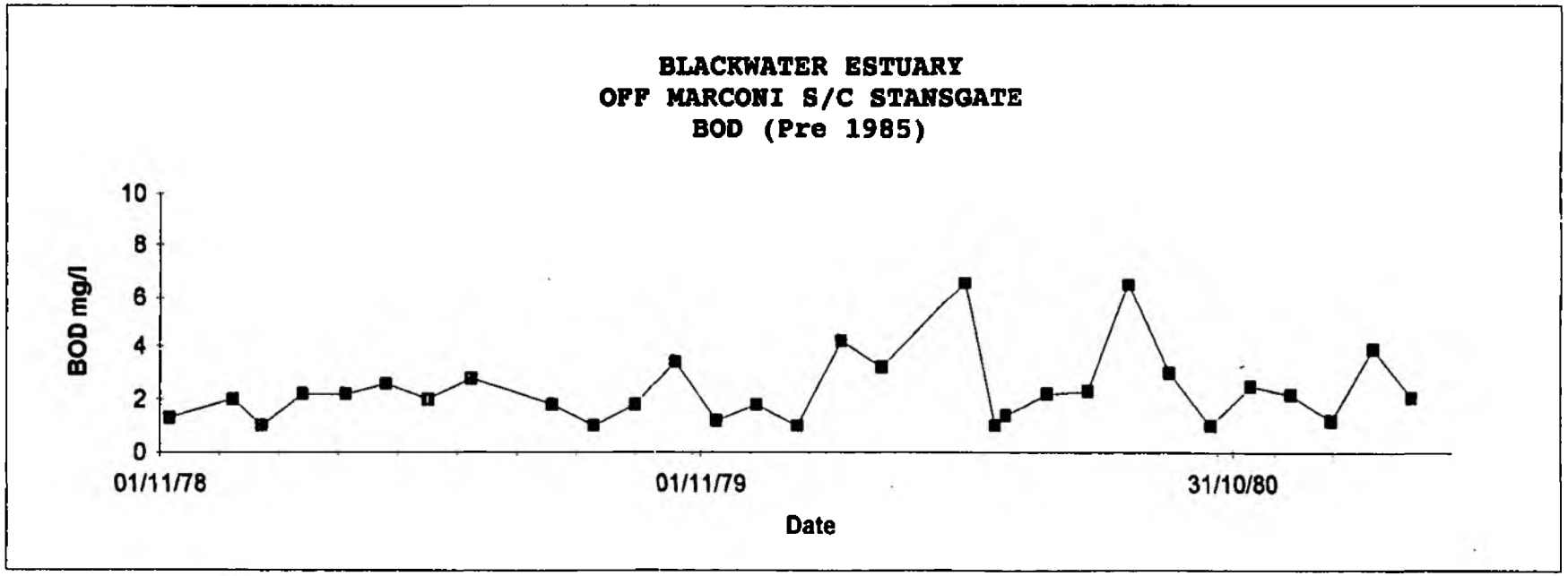
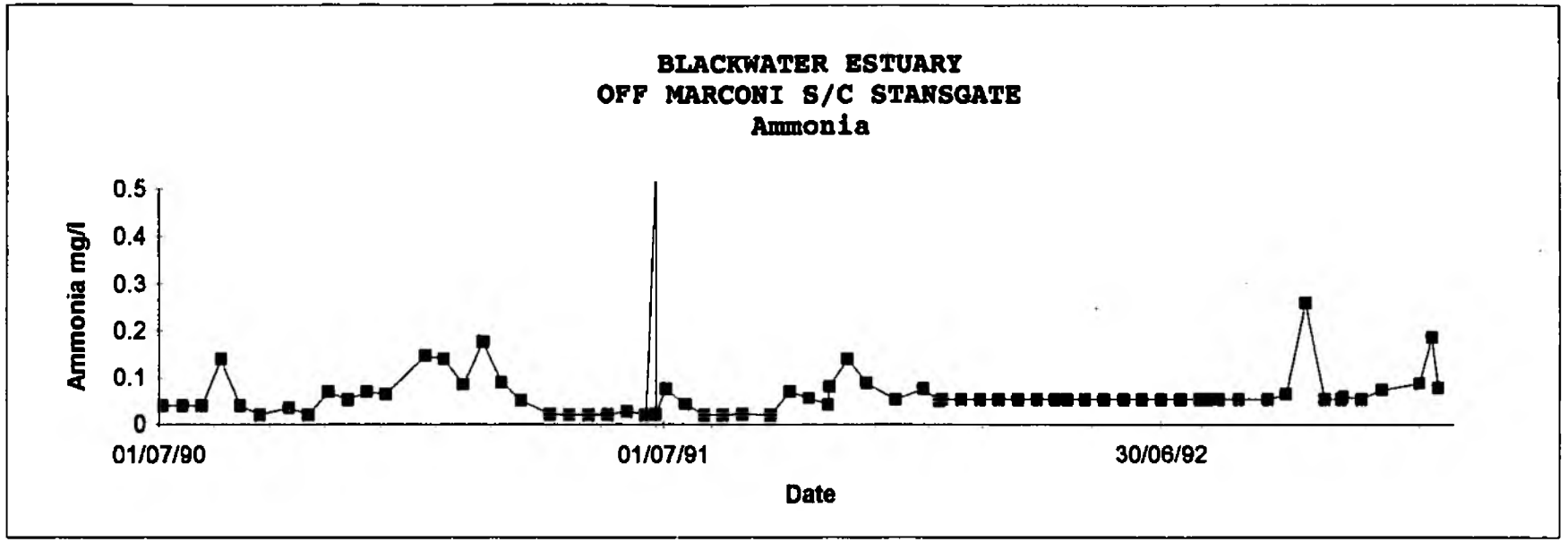

BLACKWATER ESTUARY
OFF MARCONI S/C STANSGATE
BOD (Pre 1985)
BOD mg/l
10
8
6
4
2
0
01/11/78
01/11/79
31/10/80
Date

FIG 72

SAMPLE POINT CODE - BIBE19



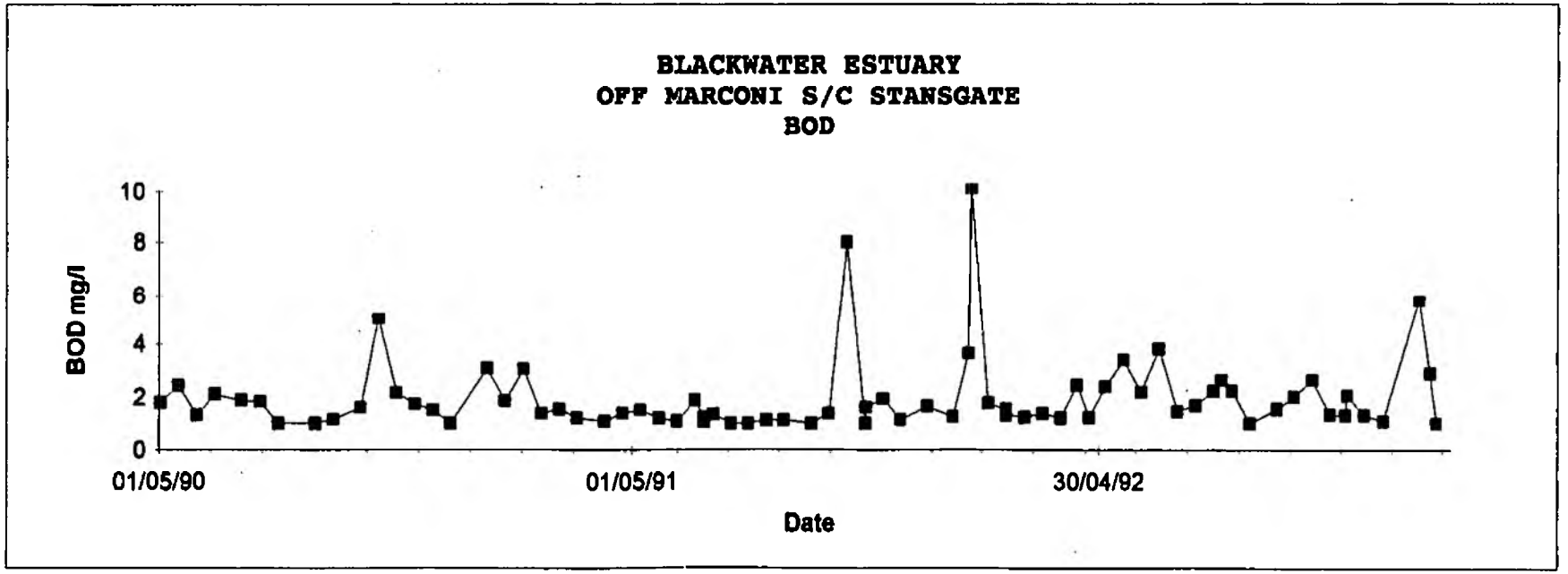
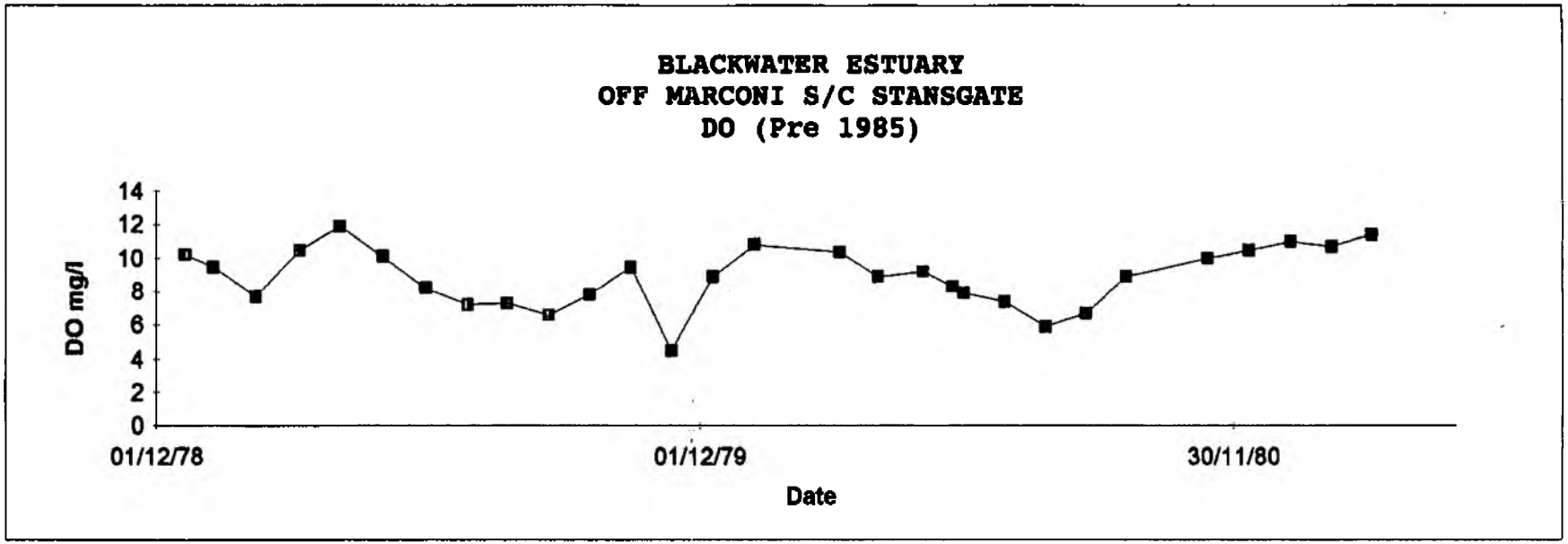


FIG 73

SAMPLE POINT CODE - BIBE19



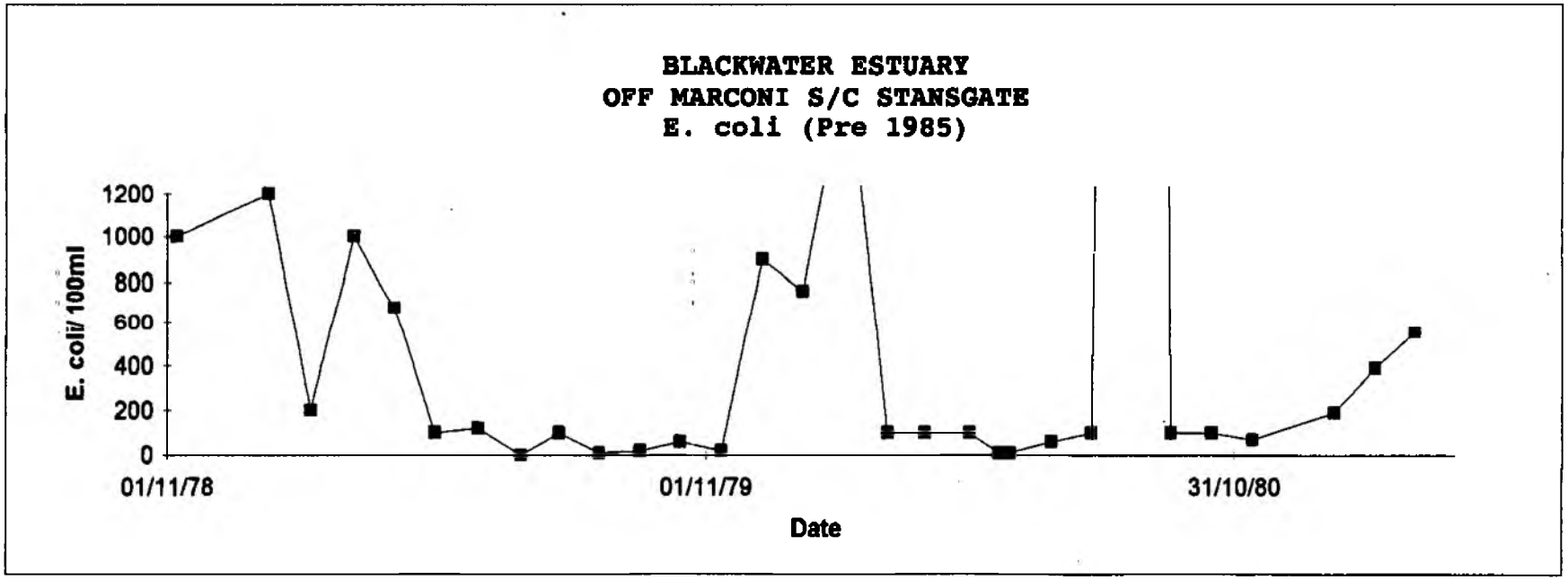
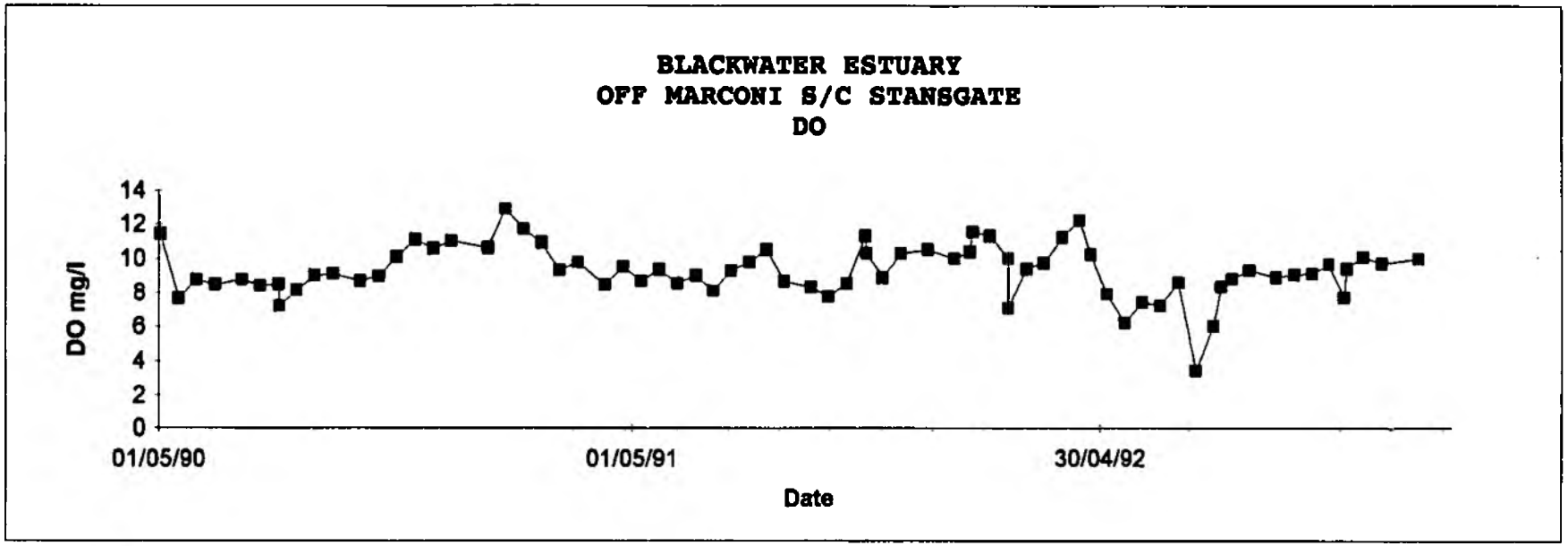


FIG 74

SAMPLE POINT CODE - BIBE19



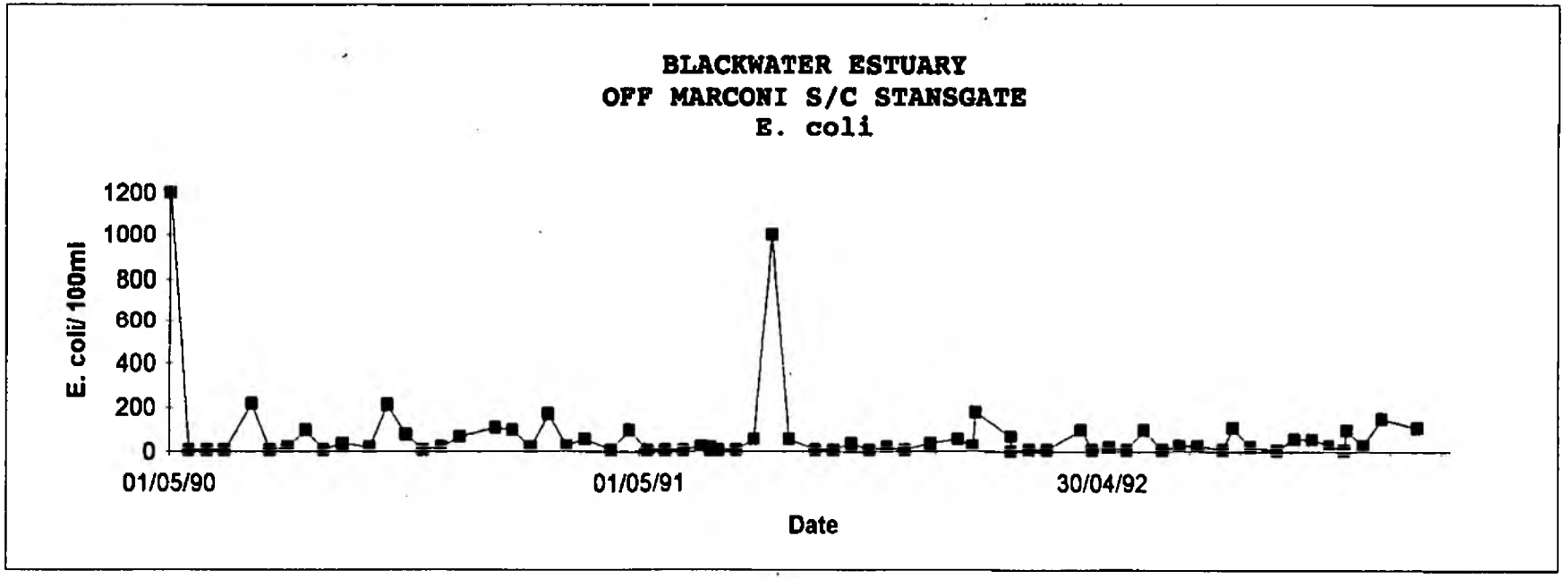
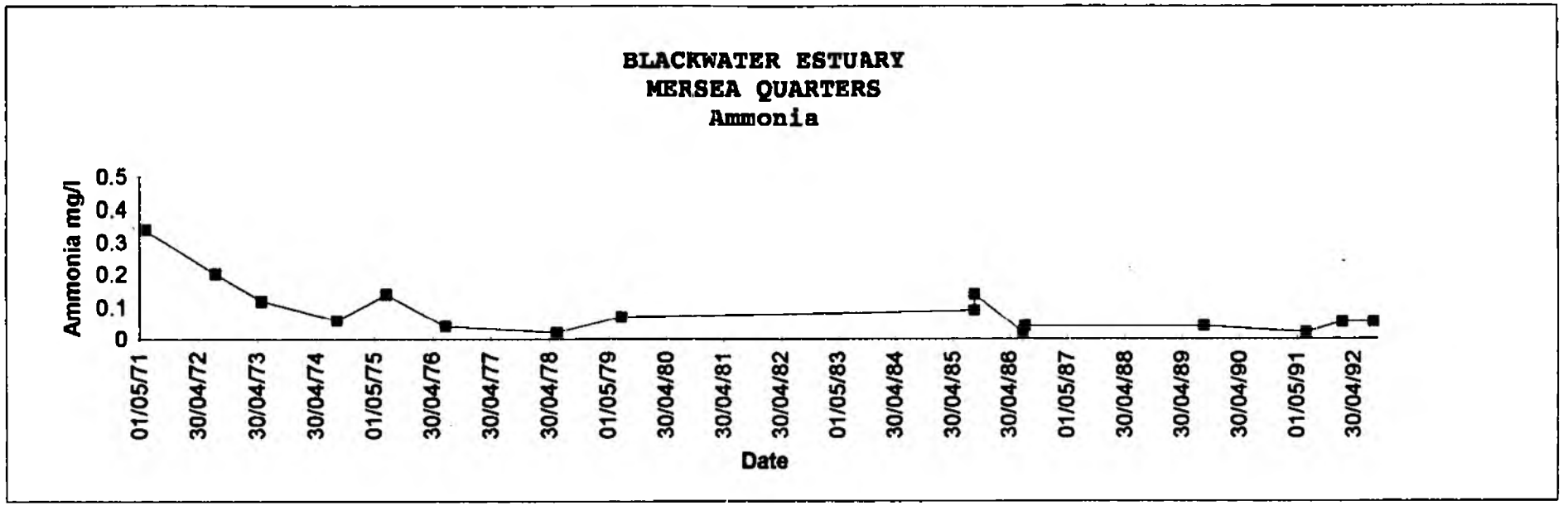


FIG 75

SAMPLE POINT CODE - BIBE06



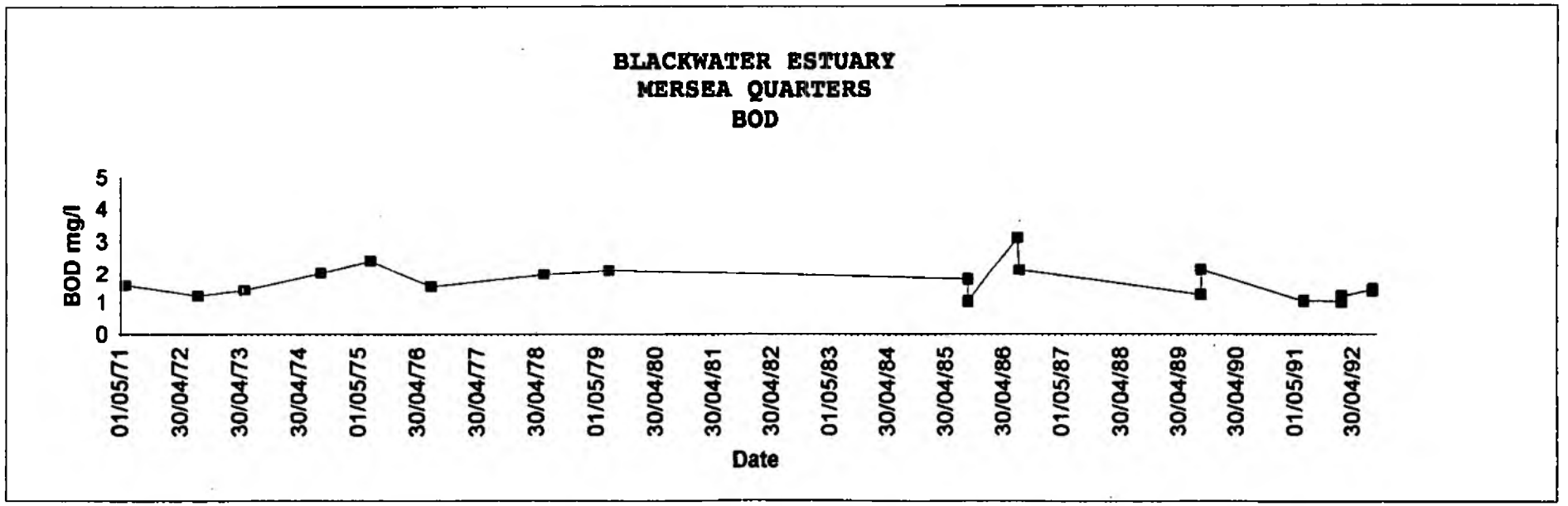
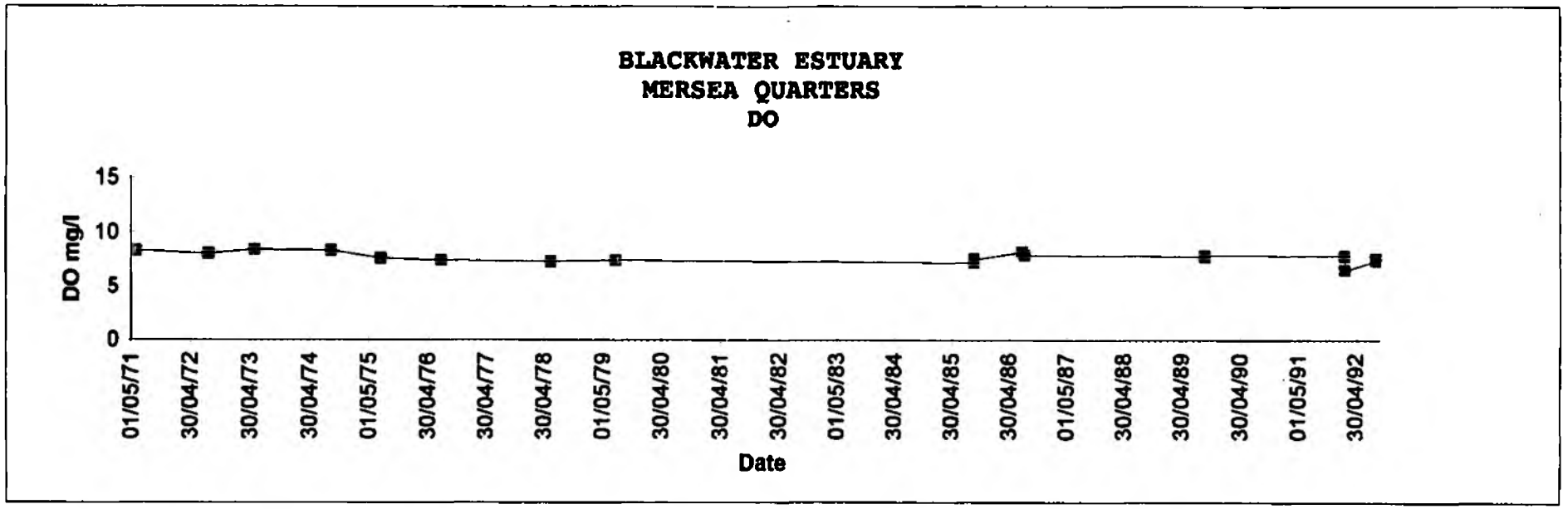
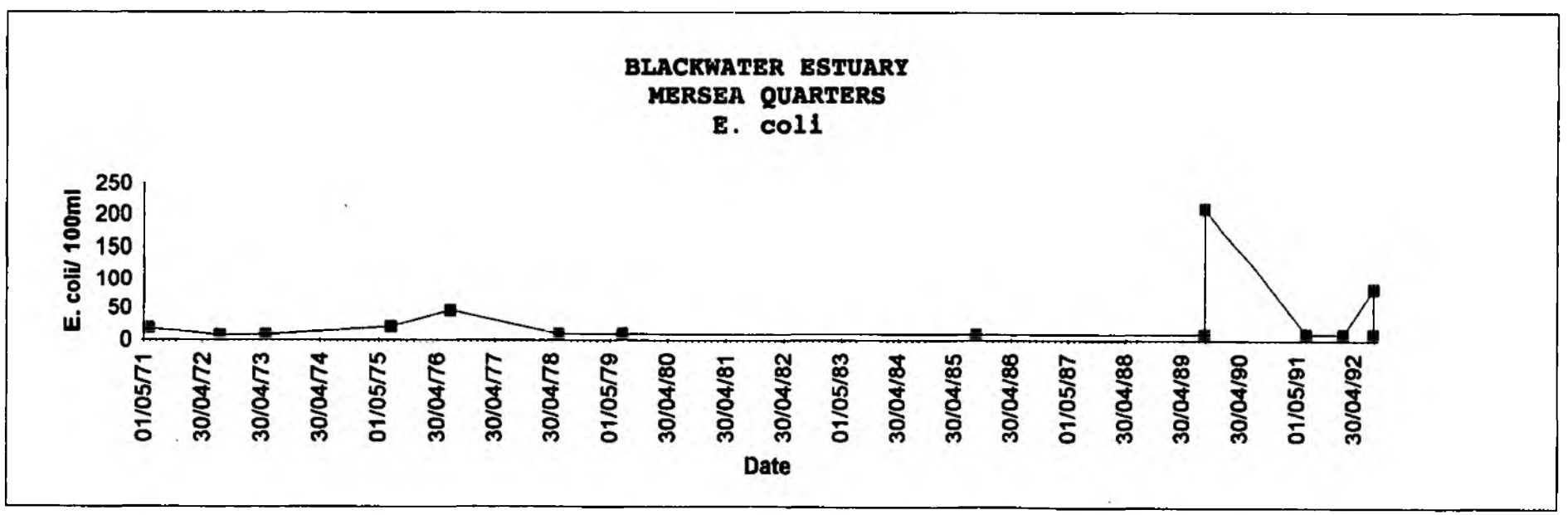


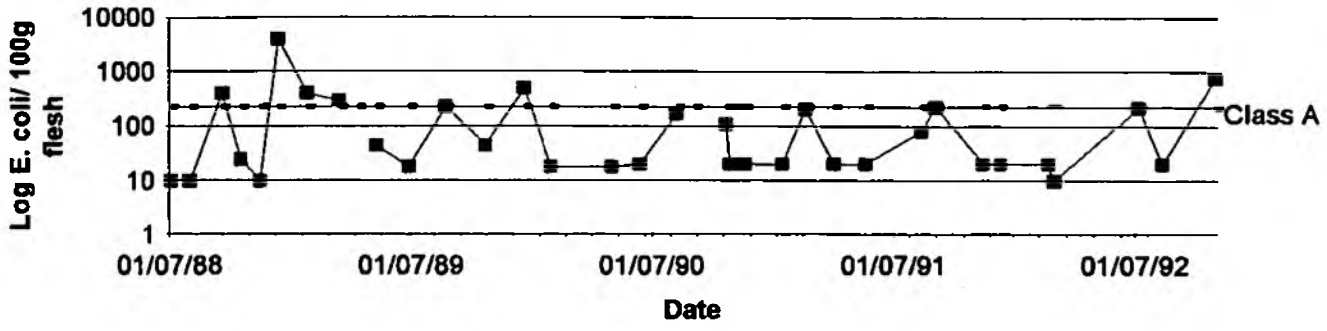
FIG 76

SAMPLE POINT CODE - BIBE06

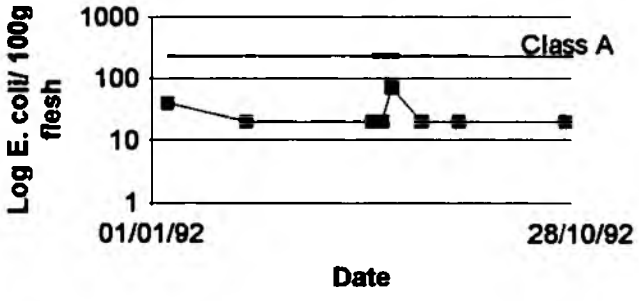




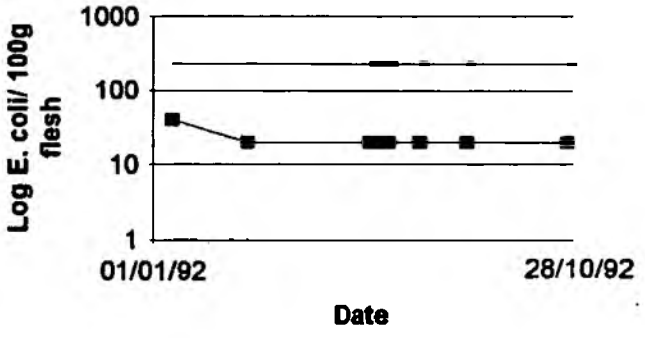
GOLDHANGER CREEK
PACIFIC OYSTER FLESH SAMPLES



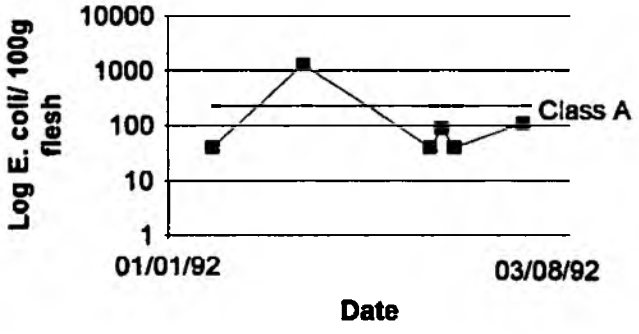
BENCH HEAD
OYSTER FLESH SAMPLES



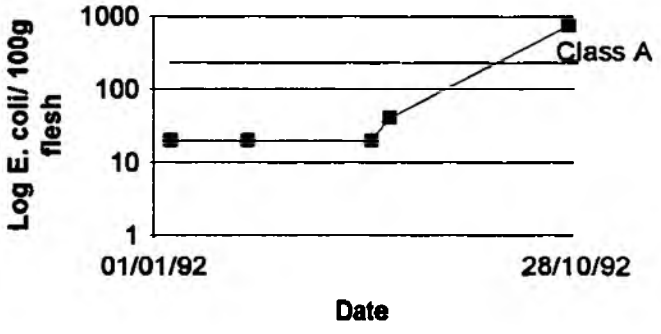
ST. PETERS FLATS
OYSTER FLESH SAMPLES



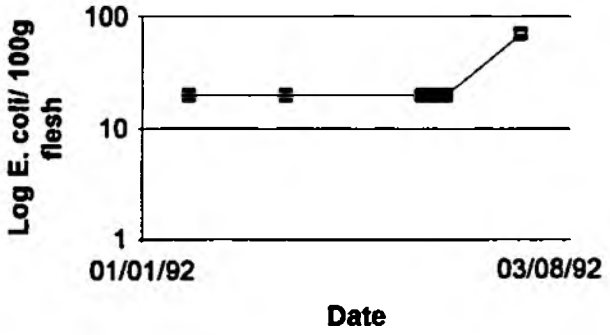
THE NASS
OYSTER FLESH SAMPLES



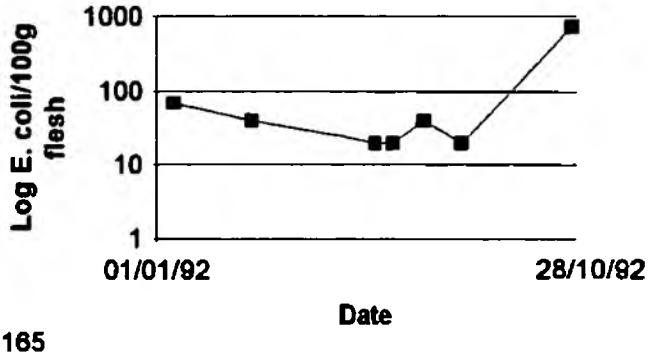
BATCHELOR SPIT
OYSTER FLESH SAMPLES

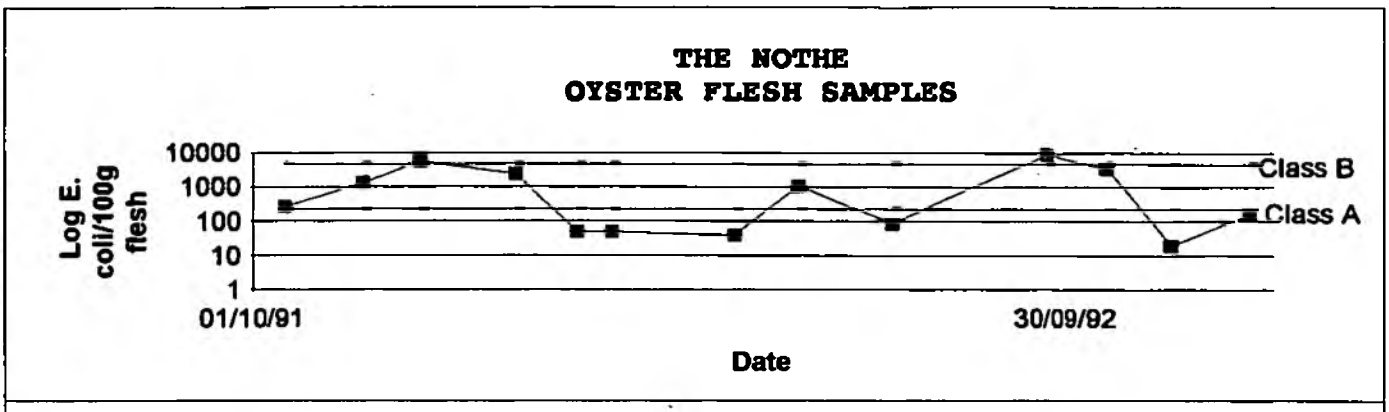


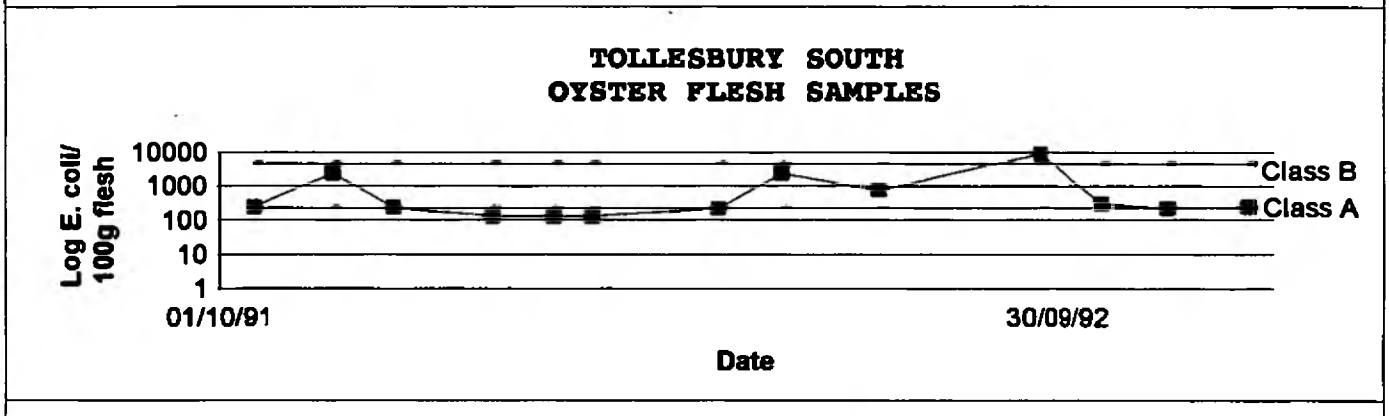
THIRSLET CREEK
MUSSEL FLESH SAMPLES

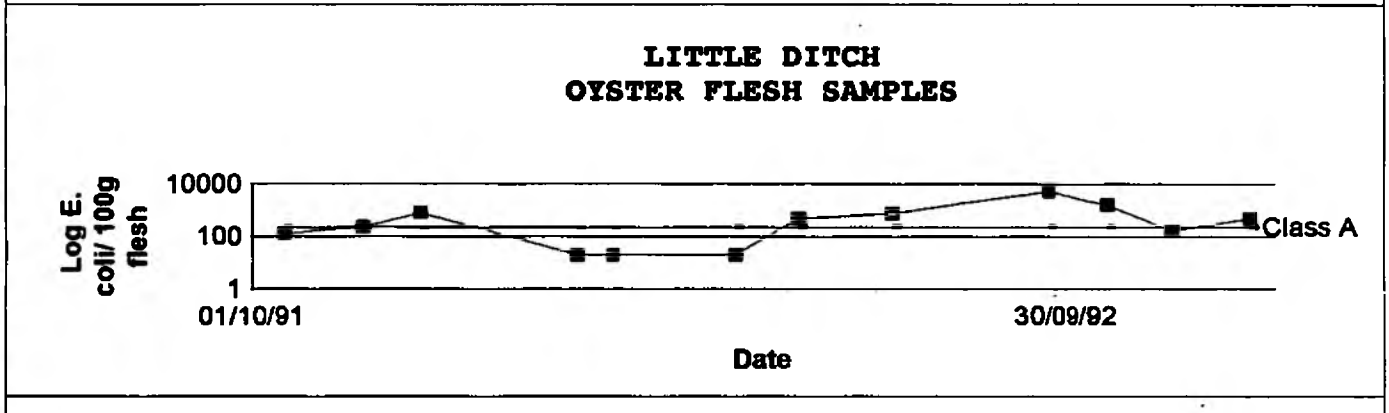


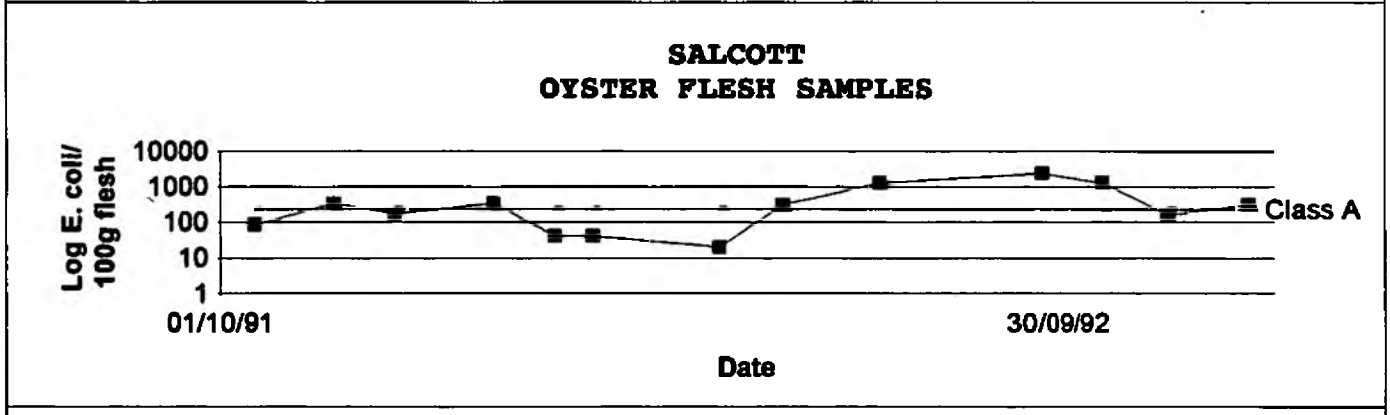
BUXEY SANDS
COCKLE FLESH SAMPLES

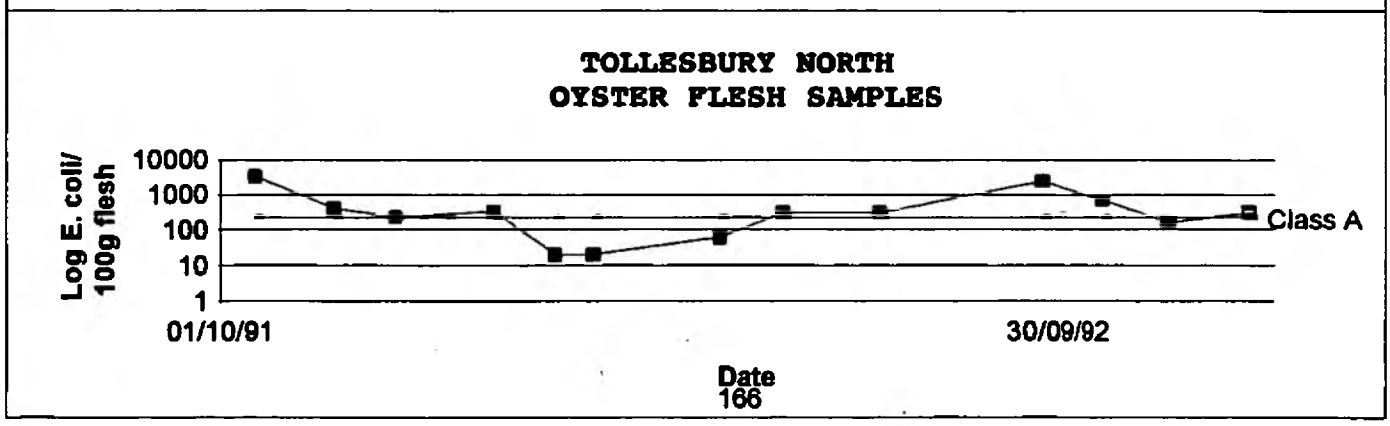


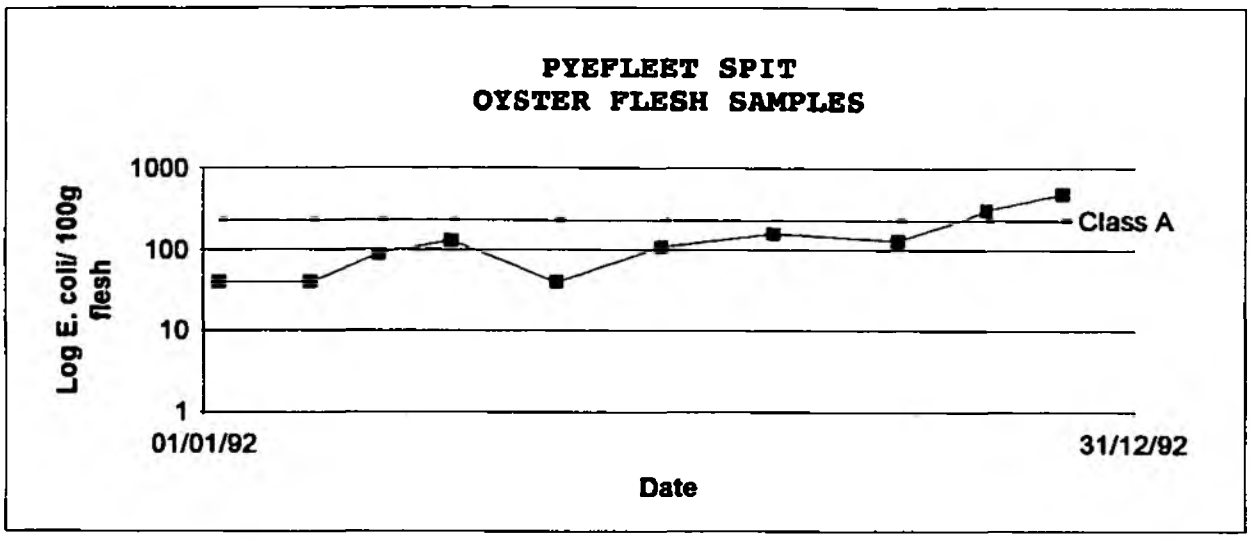

THE NOTHE
OYSTER FLESH SAMPLES
Log E. coli/100g flesh
10000
1000
100
10
1
Class B
Class A
01/10/91
30/09/92
Date

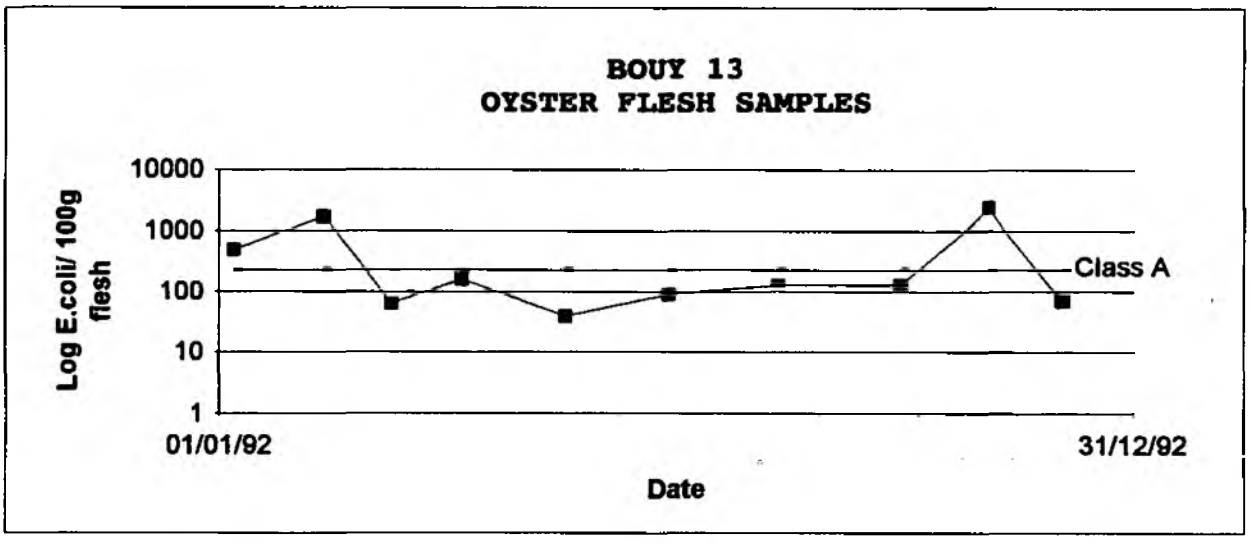

TOLLESBURY SOUTH
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class B
Class A
01/10/91
30/09/92
Date

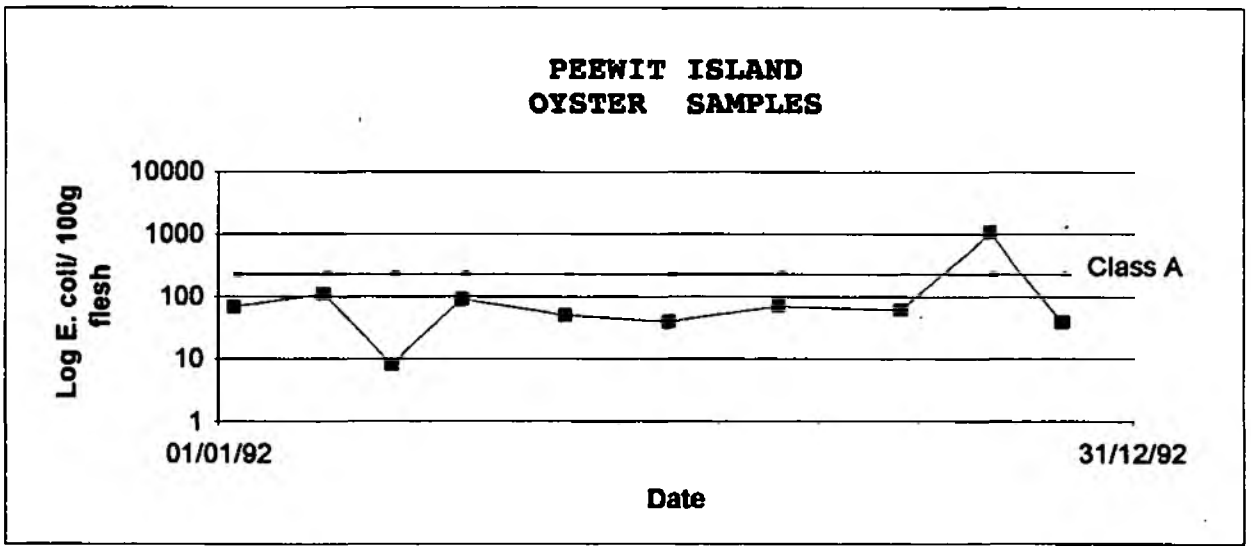

LITTLE DITCH
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
100
1
Class A
01/10/91
30/09/92
Date

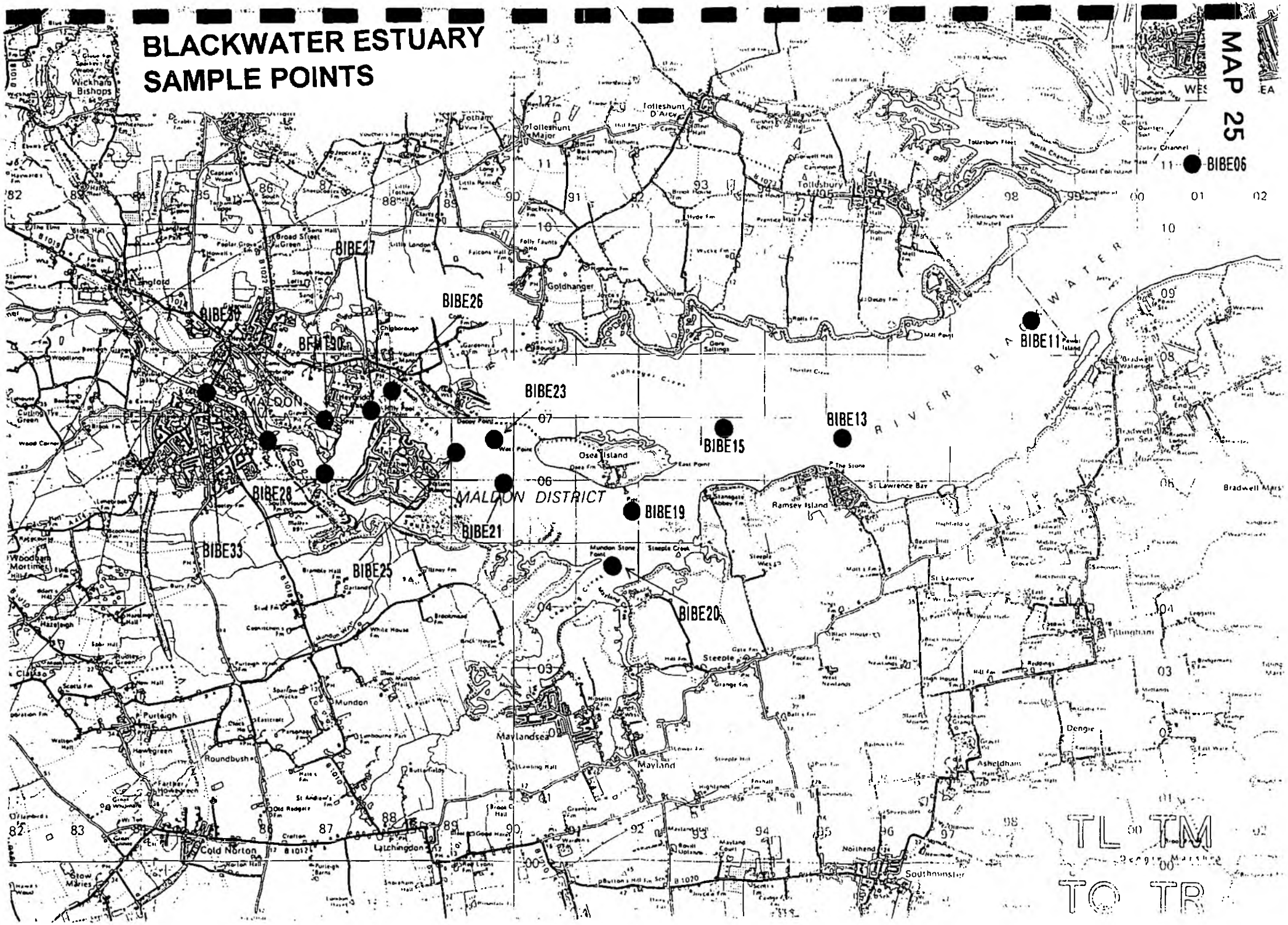

SALCOTT
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class A
01/10/91
30/09/92
Date

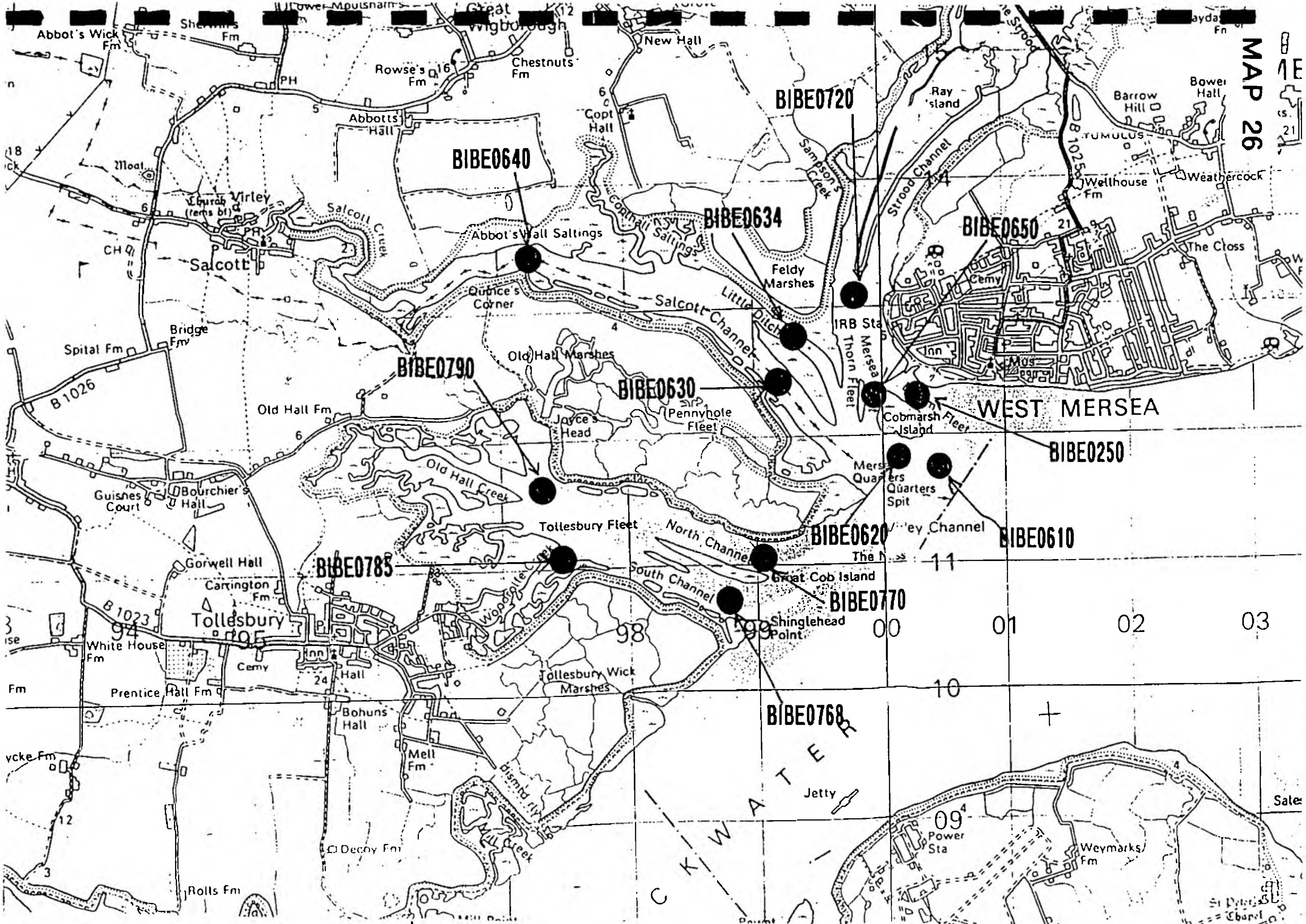

TOLLESBURY NORTH
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class A
01/10/91
30/09/92
Date


PYEFLEET SPIT
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
1000
100
10
1
Class A
01/01/92
31/12/92
Date


BOUY 13
OYSTER FLESH SAMPLES
Log E.coli/ 100g flesh
10000
1000
100
10
1
Class A
01/01/92
31/12/92
Date


PEEWIT ISLAND
OYSTER SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class A
01/01/92
31/12/92
Date


BLACKWATER ESTUARY
SAMPLE POINTS
MAP 25
BIBE06
BIBE11
BIBE13
BIBE15
BIBE19
BIBE20
BIBE21
BIBE23
BIBE25
BIBE26
BIBE27
BIBE28
BIBE33
MALDON DISTRICT
MALDON
Osea Island
Mundon Stone Point
Steeple Creek
Goldhanger
Tolleshunt Major
Tolleshunt D'Arcy
Tollesbury
Mayland
Maylandsea
Steeple
Mundon
Purleigh
Cold Norton
Latchingdon
Roundbush
Ramsey Island
Bradwell Waterside
Bradwell on Sea
Dengie
Asheldham
Southminster
Northend
TL
TM
TQ
TR


MAP 26
BIBE0720
BIBE0640
BIBE0634
BIBE0650
BIBE0790
BIBE0630
BIBE0250
BIBE0620
BIBE0610
BIBE0785
BIBE0770
BIBE0768
WEST MERSEA
Abbot's Wick Fm
Rowse's Fm
Chestnuts Fm
New Hall
Abbotts Hall
Copt Hall
Ray Island
Barrow Hill
Bower Hall
Wellhouse Fm
Weathercock
The Close
Virley
Salcott
Salcott Creek
Abbot's Hall Saltings
Quince's Corner
Salcott Channel
Feldy Marshes
Little Ditch
Strood Channel
Sampson's Creek
Copthall Saltings
Bridge Fm
Spital Fm
B 1026
B 1025
Old Hall Marshes
Old Hall Fm
Joyce's Head
Pennyhole Fleet
Old Hall Creek
Mersea Quarters
Quarters Spit
Cobmarsh Island
Thorn Fleet
Tollesbury Fleet
North Channel
South Channel
Great Cob Island
Shinglehead Point
Guisnes Court
Bourchier's Hall
Gorwell Hall
Carrington Fm
B 1023
Tollesbury
White House Fm
Prentice Hall Fm
Bohuns Hall
Mell Fm
Tollesbury Wick Marshes
Decoy Fm
Rolls Fm
Jetty
Power Sta
Weymarks Fm
Woodrolfe Creek
Mill Creek
94
95
98
99
00
01
02
03
09
10
11

9 CROUCH ESTUARY

9.1 Historical Events from Essex River Authority Annual Report 1953-1974

1958 - The estuary showed signs of pollution in the upper reaches.

1959 - Extensions to the Western STW were completed.

1963 - Gross localised pollution occurred around Burnham STW.

1964 - Unsatisfactory effluent was noted at Western STW.

1968 - Activated sludge treatment plant at Burnham resulted in some effluent improvement.

1972 - Head of the estuary was heavily polluted by Shotgate and Western STW's.

1974 - Water quality has much improved.

9.2 Interpretation of Chemical Trends

Battlesbridge shows effects from the STW at Wickford and others in this locality. Ammonia levels regularly exceed the 1.5 mg/l requirement. The BOD shows similar trends with values in excess of 4 mg/l frequently. The elevated levels of E. coli are of some concern as there is a shellfishery immediately downstream (Fig 80 - 83).

Hullbridge shows a similar pattern to Battlesbridge with a slight

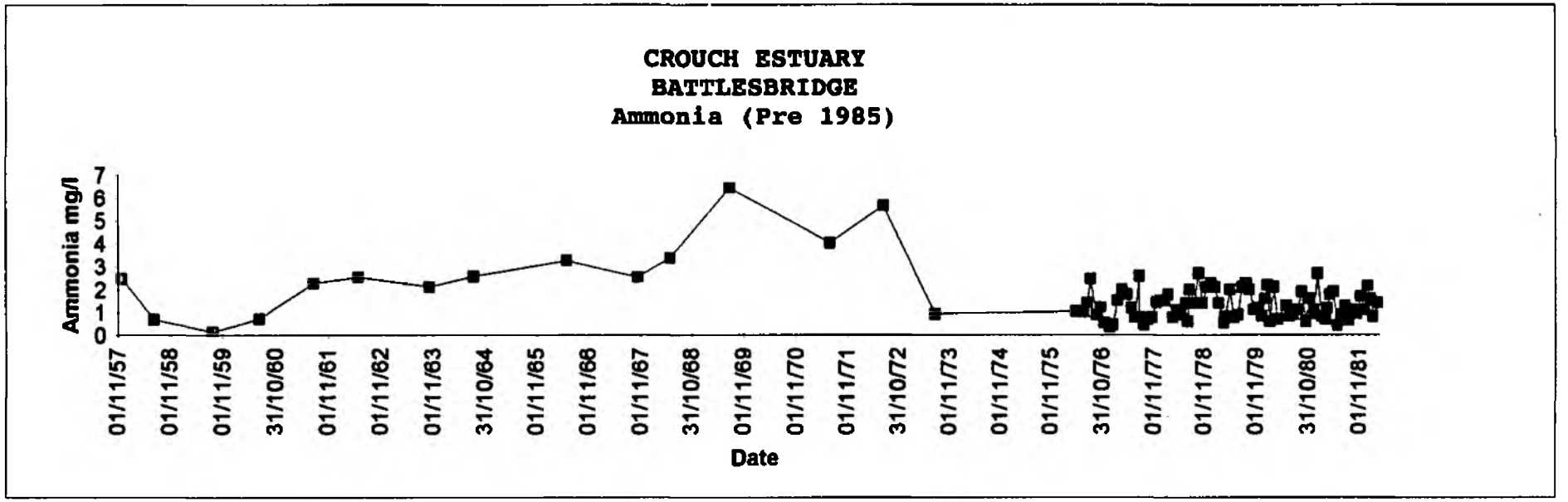
improvement. The quality is not satisfactory when you take into consideration the extensive usage of the estuary (Fig 84 - 87).

Ammonia levels at North Fambridge show a definite improvement on those found at Battlesbridge and Hullbridge upstream. Similarly the BOD and DO levels show that the water is of a satisfactory quality (Fig 88 - 90).

Essex Yacht Marina shows similar results to North Fambridge. However, the sewage treatment works at Burnham-on-Crouch does have some influence on the water quality in this area. BOD's are marginally higher than North Fambridge and appears to be influenced partly by eutrophication effects. E. coli levels are low and considered satisfactory (Fig 91 - 93).

Shellfish analysis results are to infrequent to show a true picture of quality. There appears to be widespread variation at all three sampling areas encompassing all three classes, A, B and C. The samples in the mid estuary are most probably affected by the poor quality of the upper estuary whereas the lower Crouch shellfisheries are affected by the Burnham-on-Crouch STW (Fig 94).

(See Map 27 for location of sample points)


CROUCH ESTUARY
BATTLESBRIDGE
Ammonia (Pre 1985)
Ammonia mg/l
0
1
2
3
4
5
6
7
01/11/57
01/11/58
01/11/59
31/10/60
01/11/61
01/11/62
01/11/63
31/10/64
01/11/65
01/11/66
01/11/67
31/10/68
01/11/69
01/11/70
01/11/71
31/10/72
01/11/73
01/11/74
01/11/75
31/10/76
01/11/77
01/11/78
01/11/79
31/10/80
01/11/81
Date

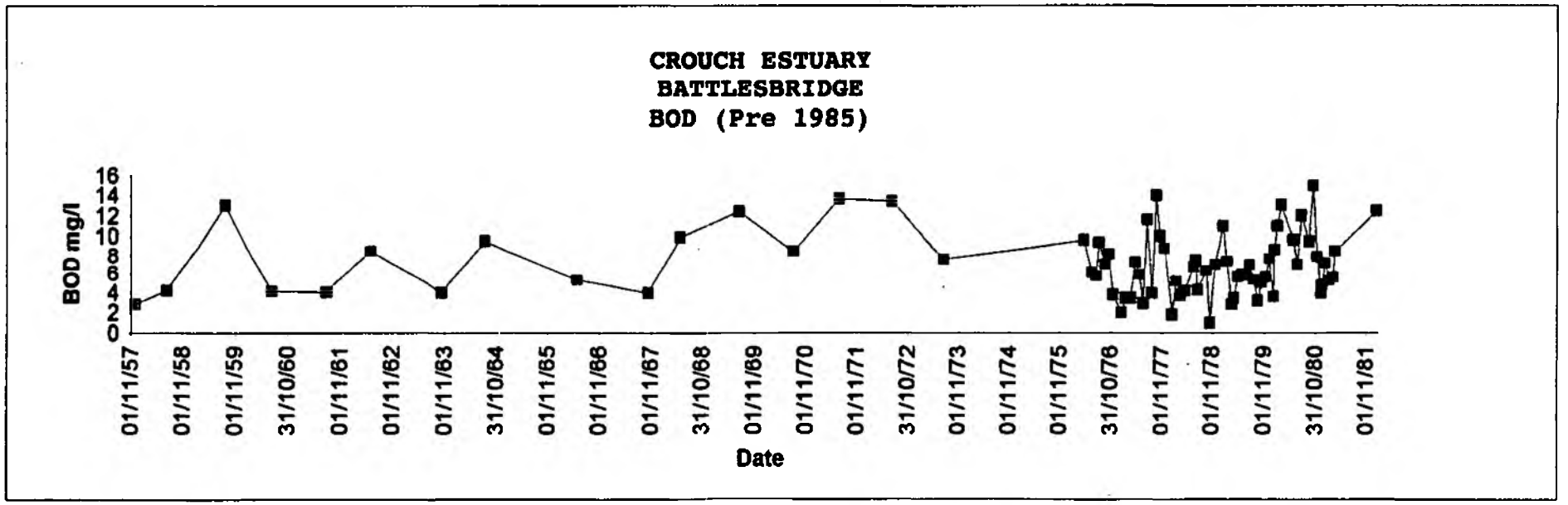
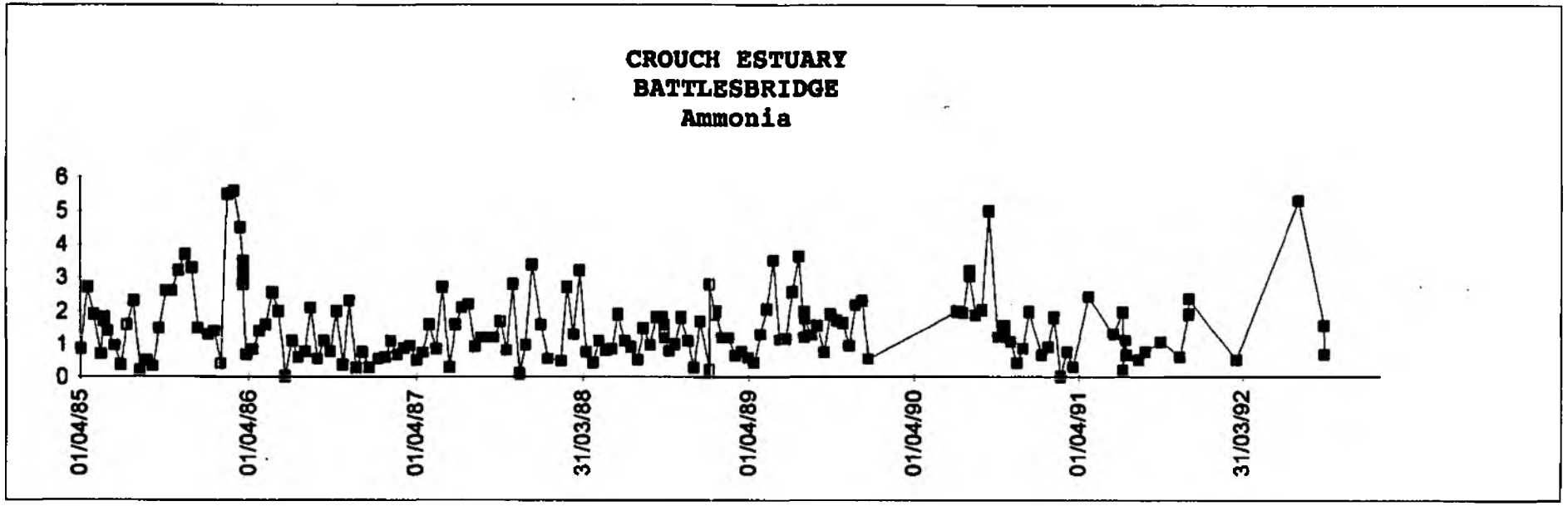

CROUCH ESTUARY
BATTLESBRIDGE
BOD (Pre 1985)
BOD mg/l
0
2
4
6
8
10
12
14
16
01/11/57
01/11/58
01/11/59
31/10/60
01/11/61
01/11/62
01/11/63
31/10/64
01/11/65
01/11/66
01/11/67
31/10/68
01/11/69
01/11/70
01/11/71
31/10/72
01/11/73
01/11/74
01/11/75
31/10/76
01/11/77
01/11/78
01/11/79
31/10/80
01/11/81
Date

FIG 81

SAMPLE POINT CODE - BICE17



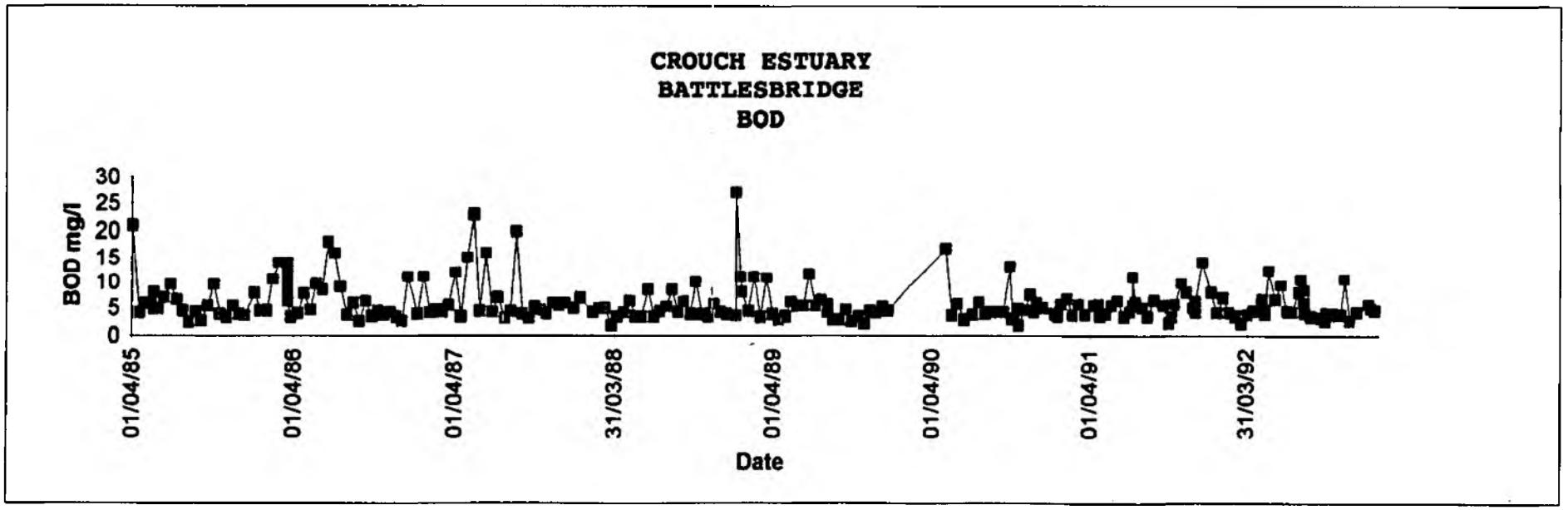
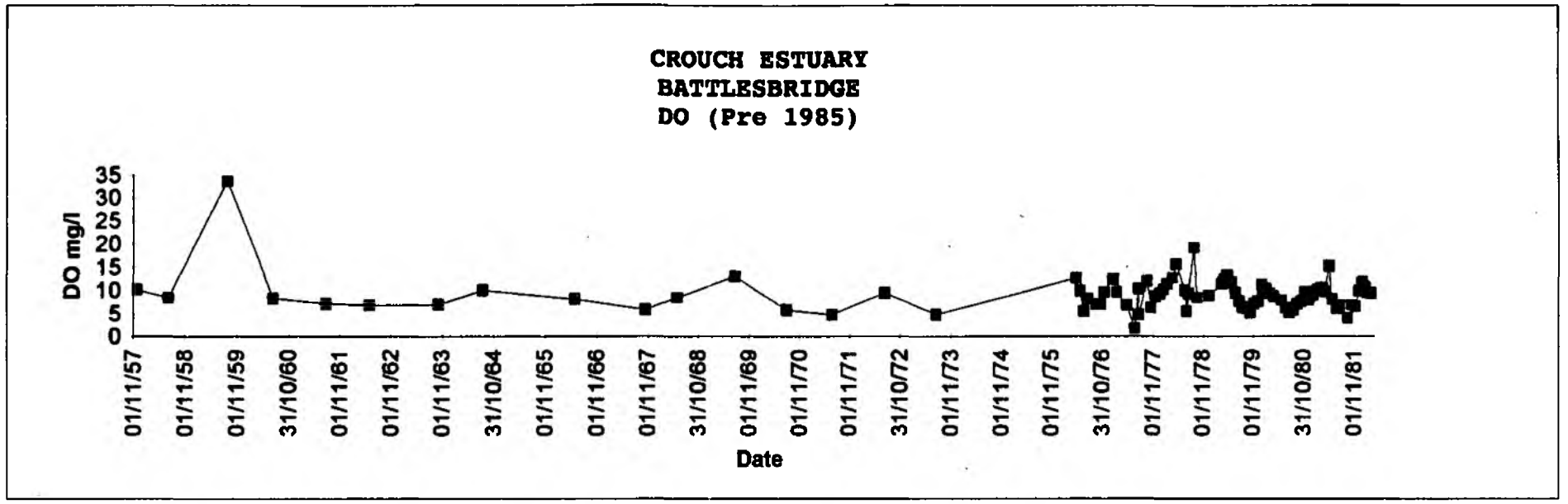


FIG 82

SAMPLE POINT CODE - BICE17



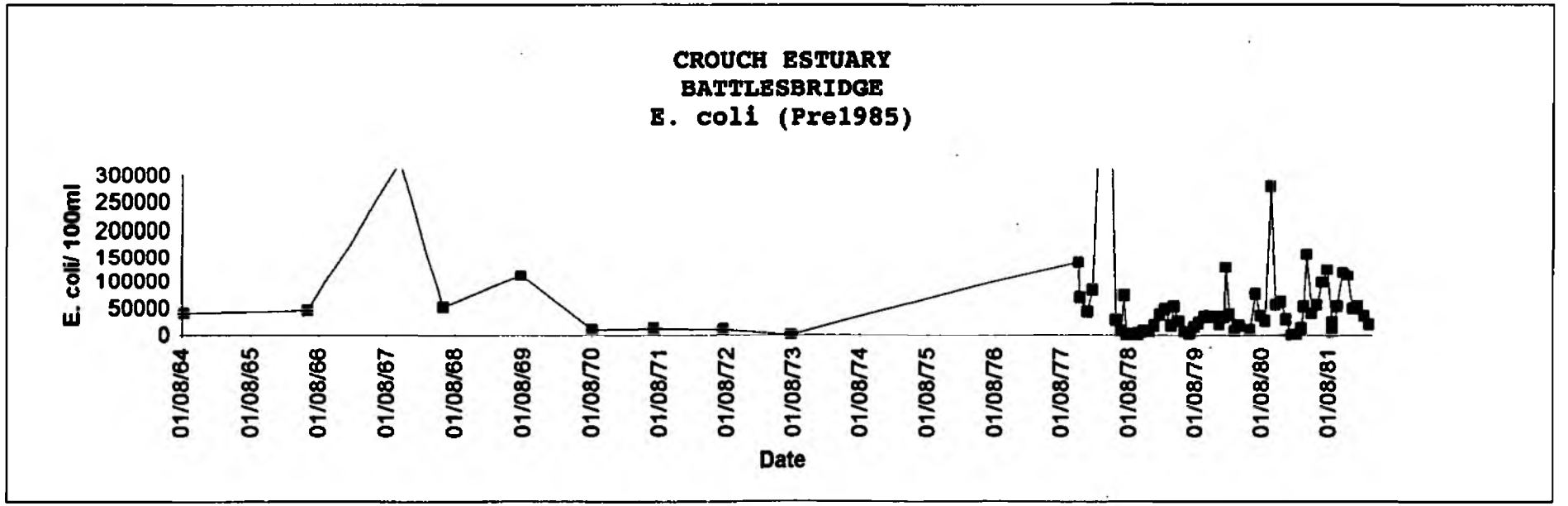
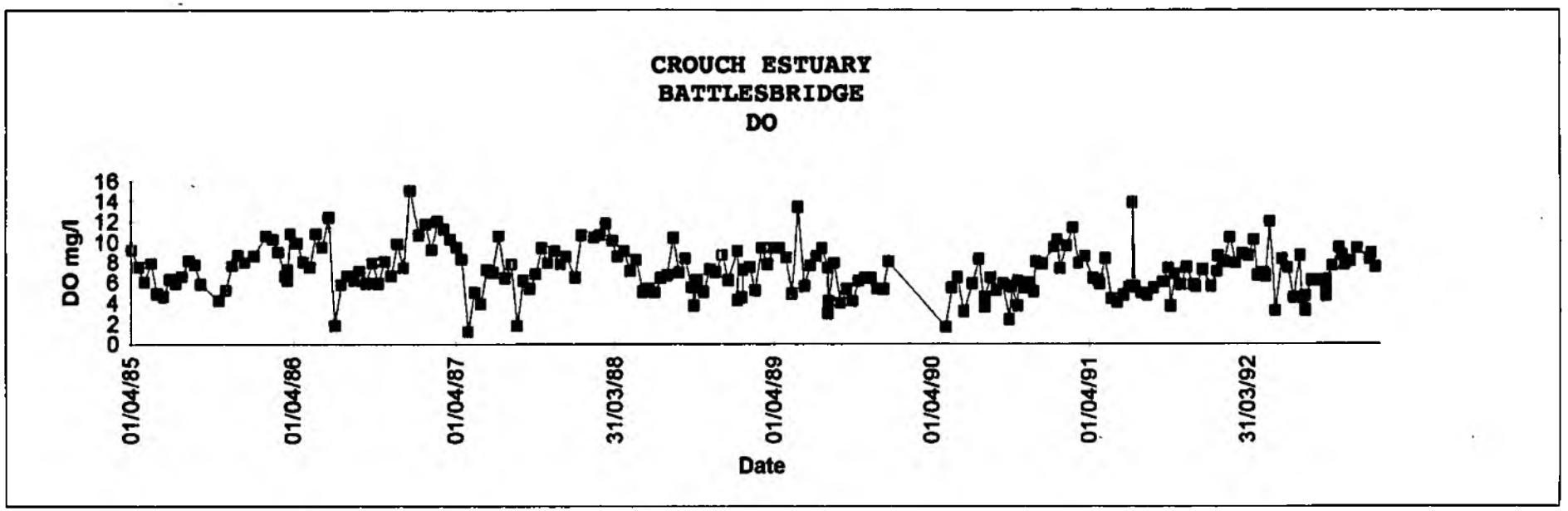


FIG 83

SAMPLE POINT CODE - BICE17



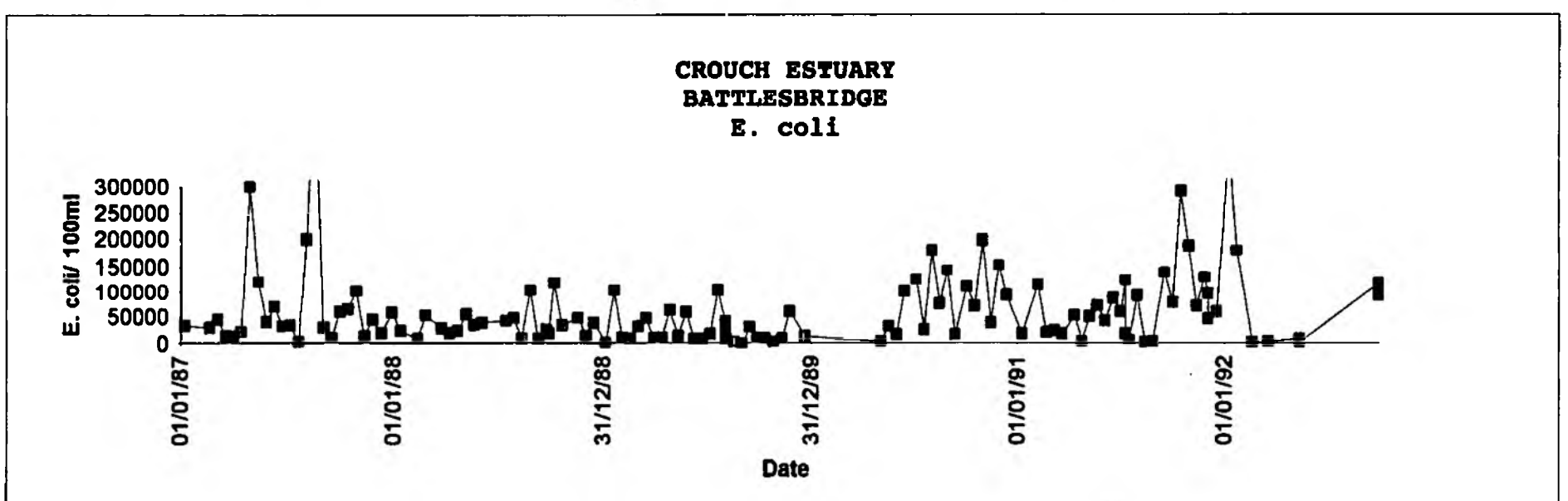
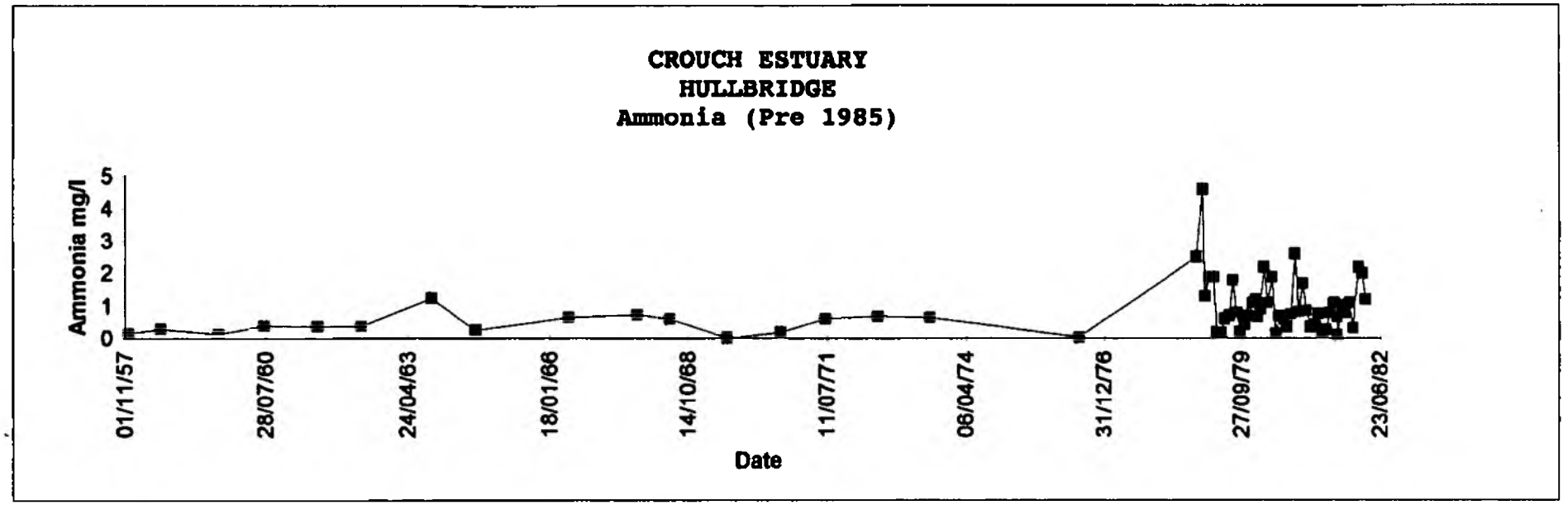


FIG 84

SAMPLE POINT CODE - BICE14



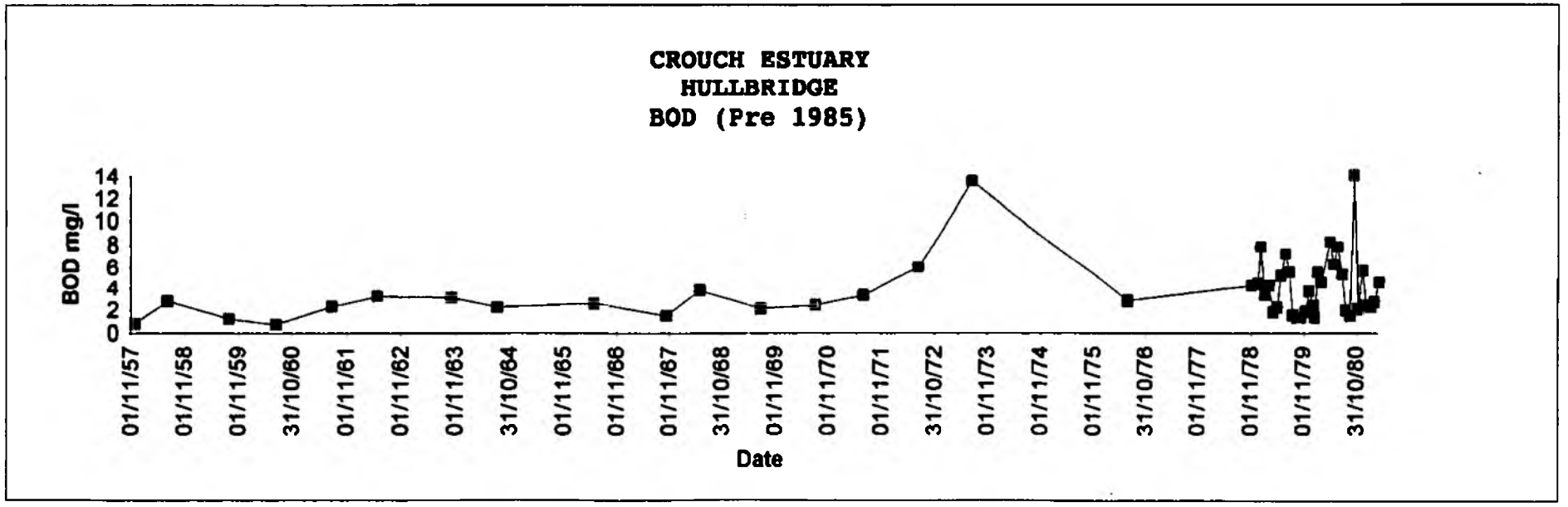
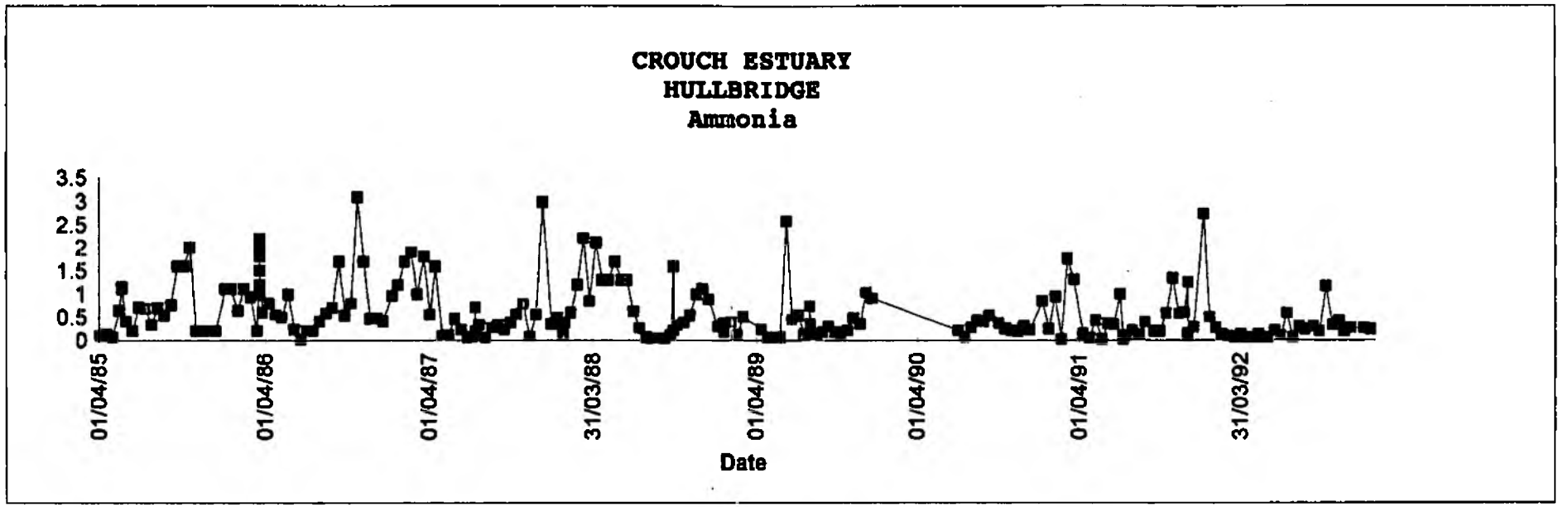


FIG 85

SAMPLE POINT CODE - BICE14



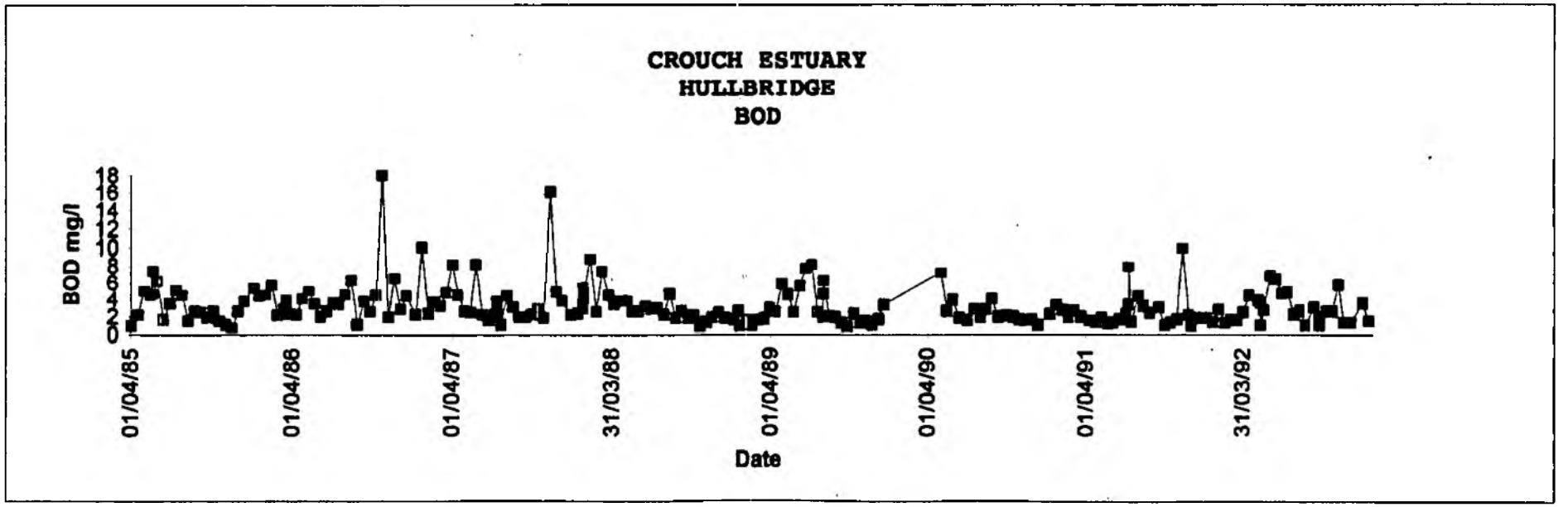
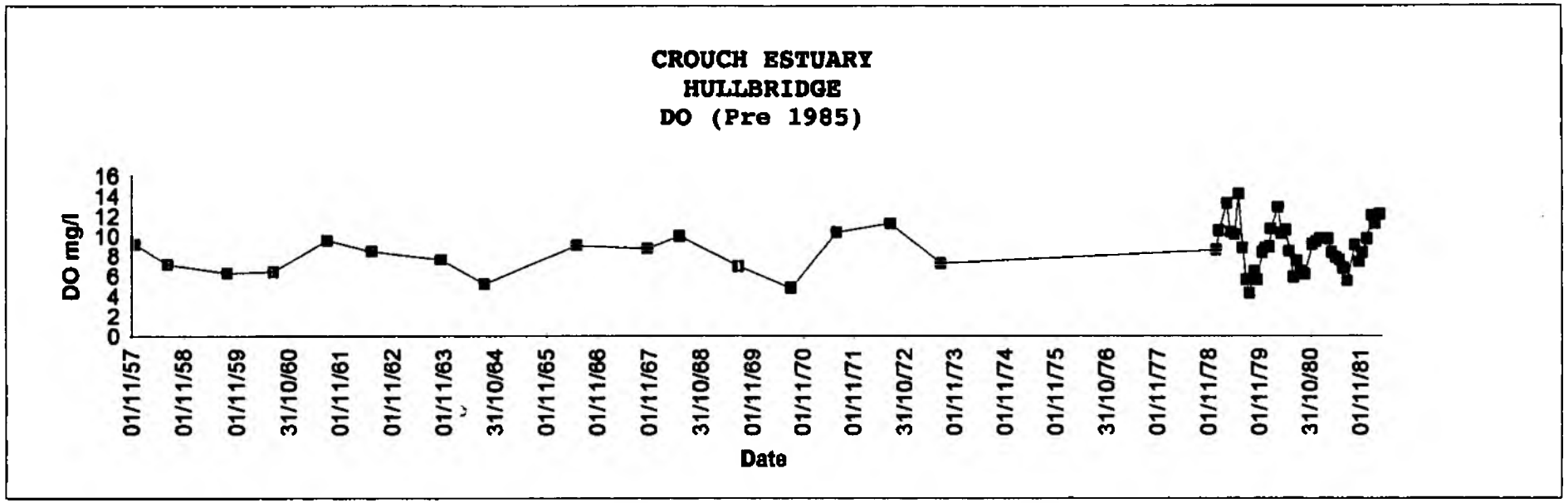


FIG 86

SAMPLE POINT CODE - BICE14



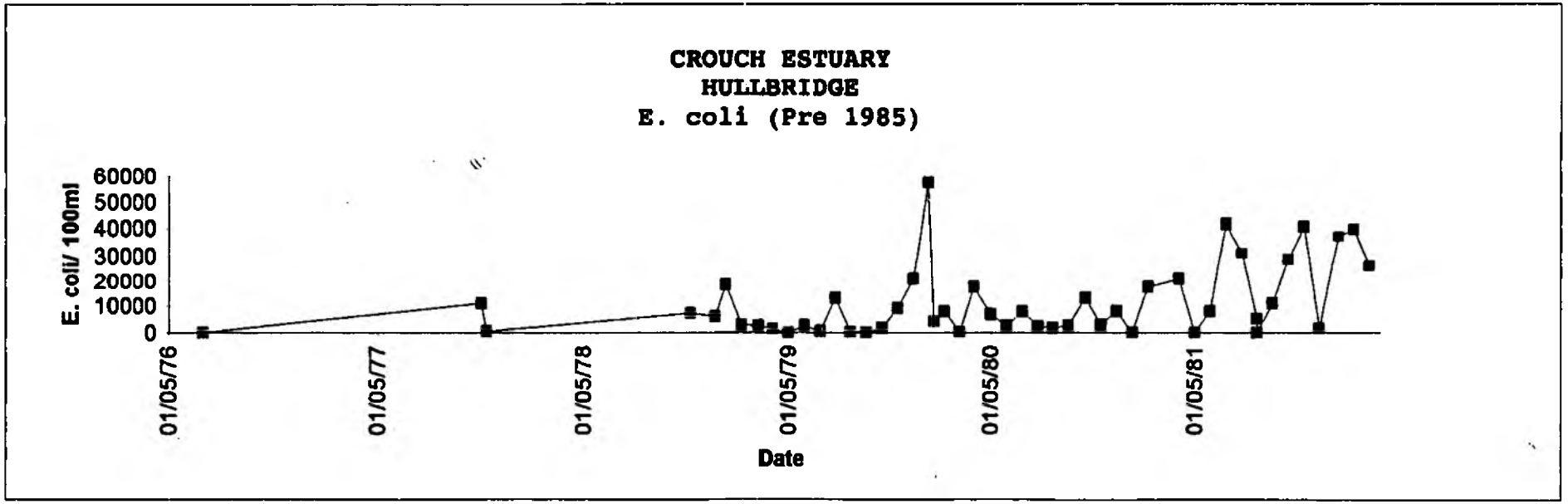
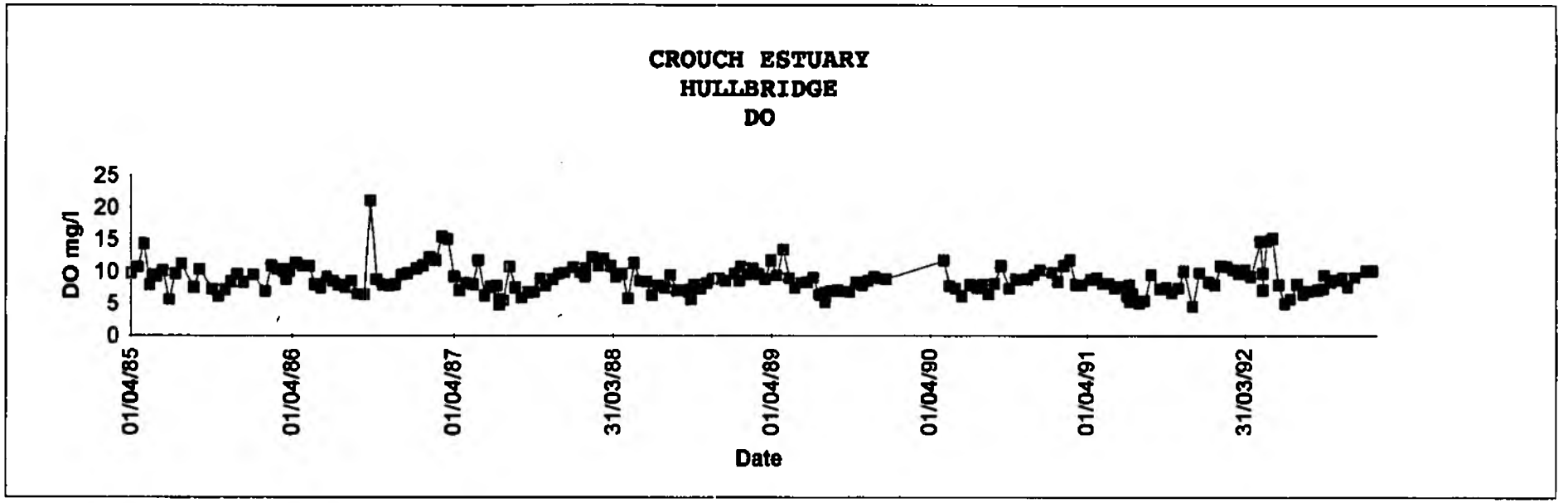


FIG 87

SAMPLE POINT CODE - BICE14



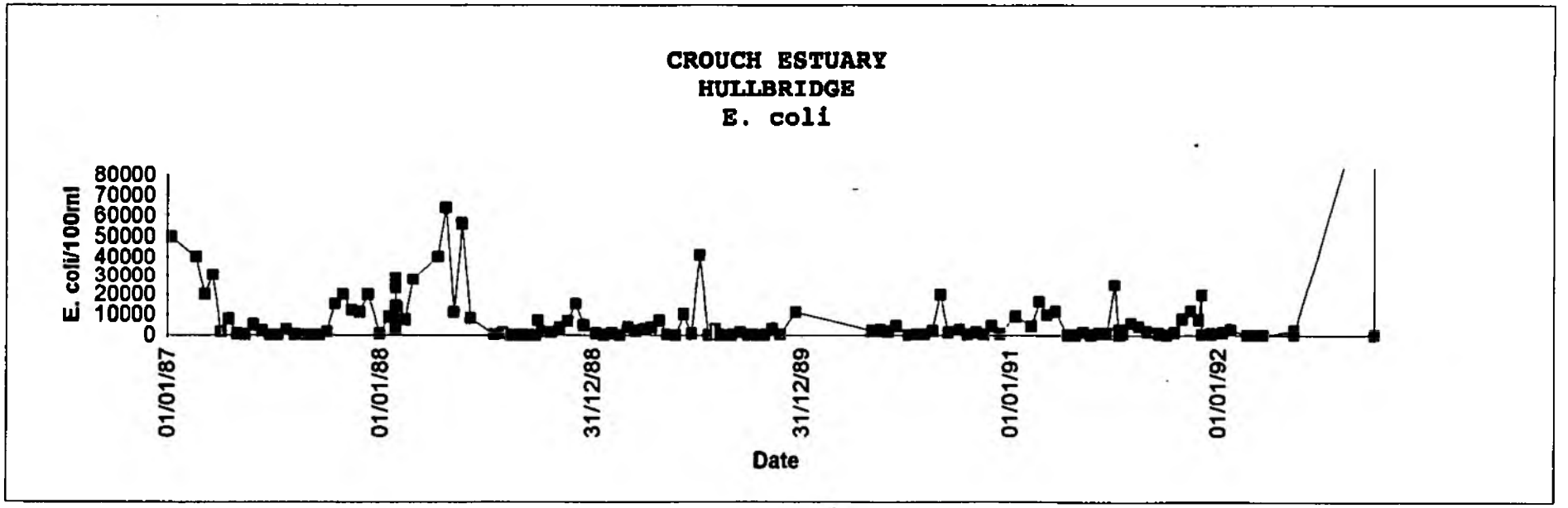


FIG 88

SAMPLE POINT CODE - BICE09

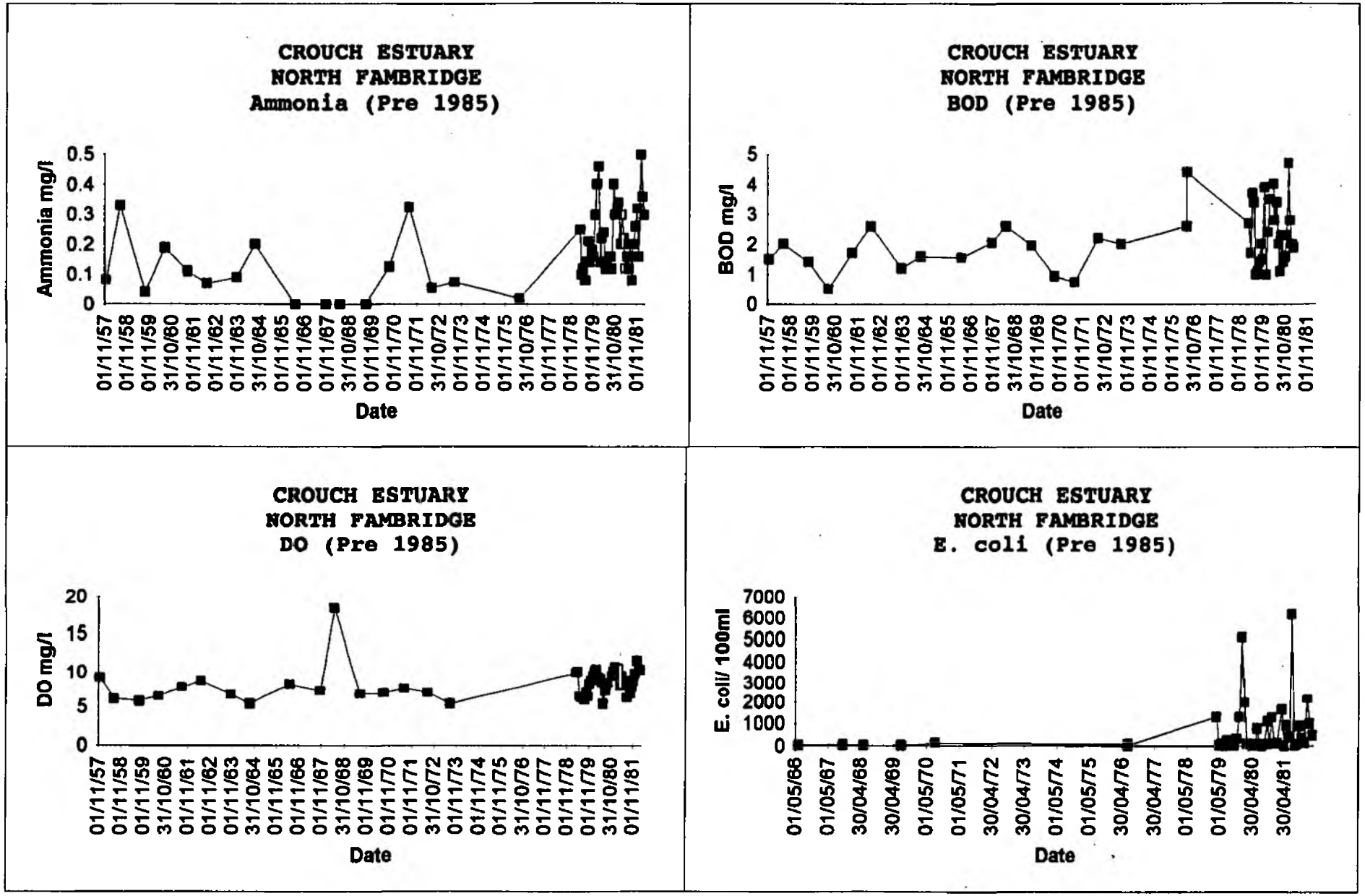
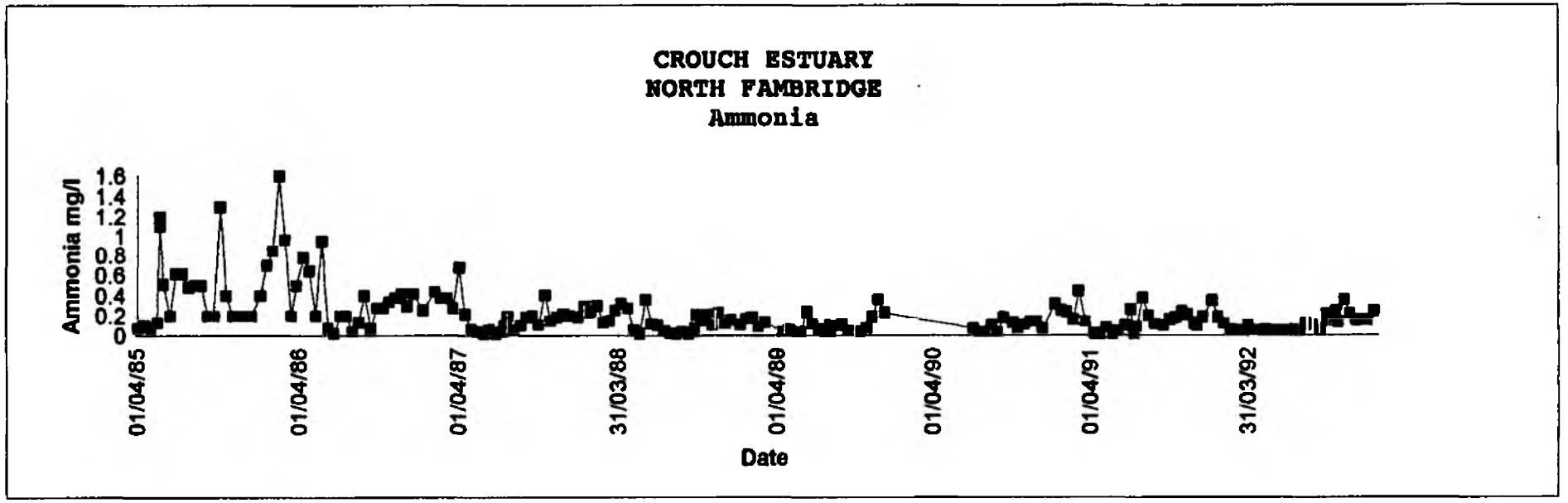


FIG 89

SAMPLE POINT CODE - BICE09



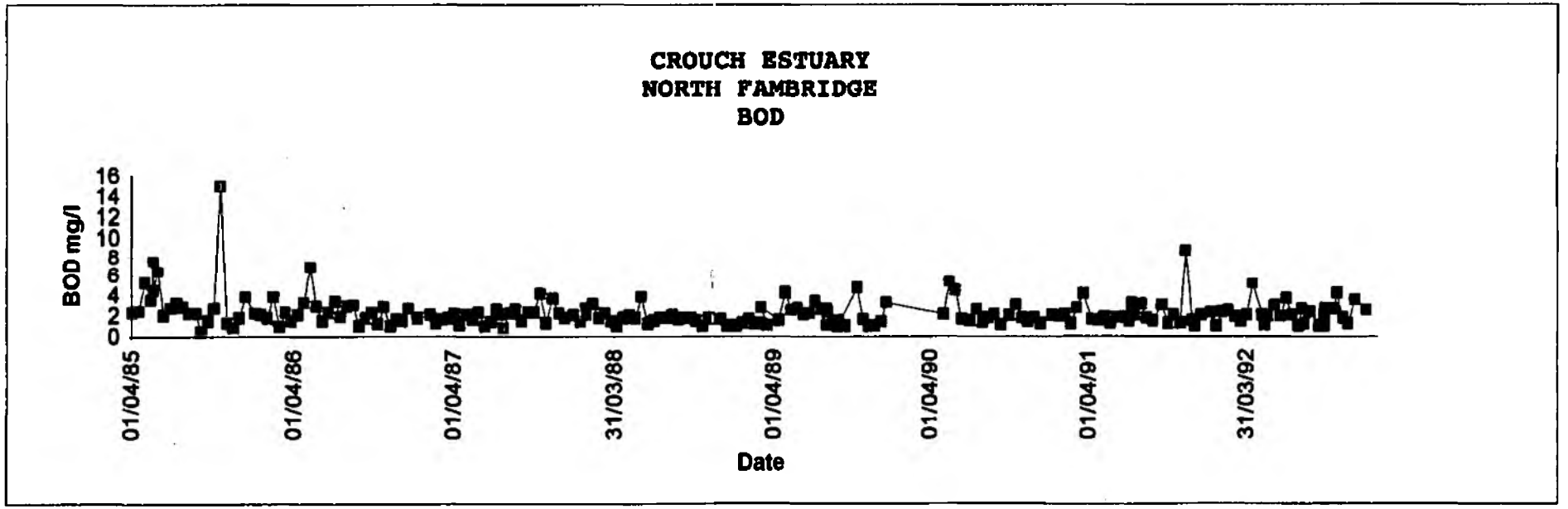
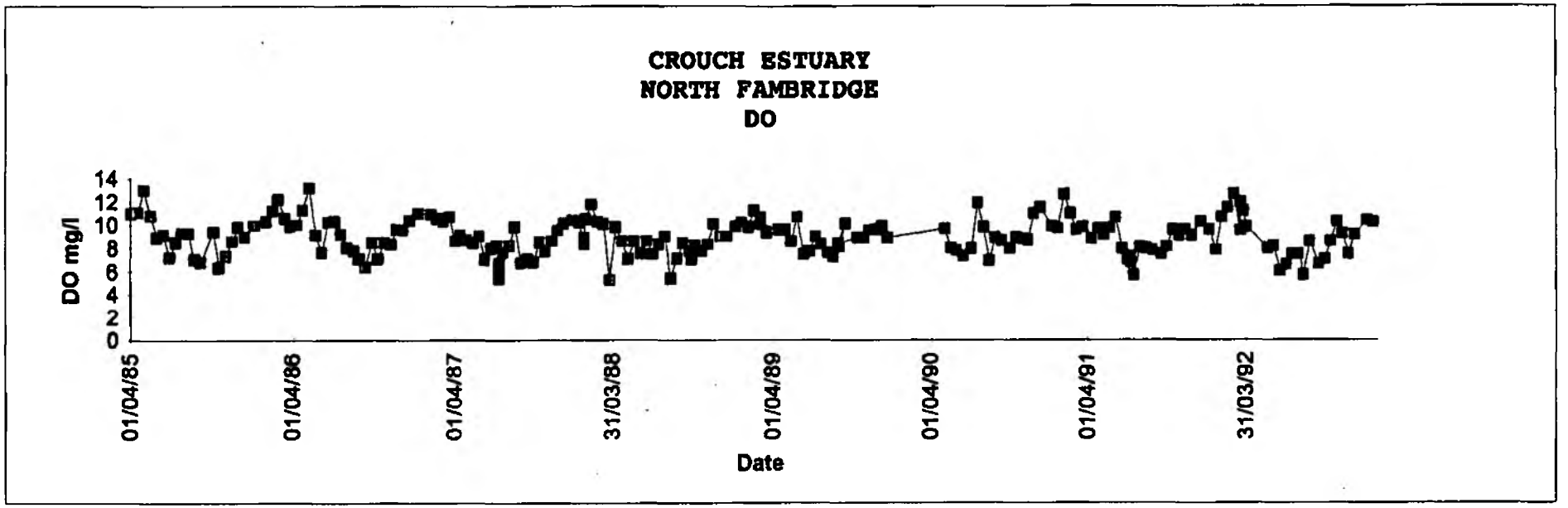


FIG 90

SAMPLE POINT CODE - BICE09



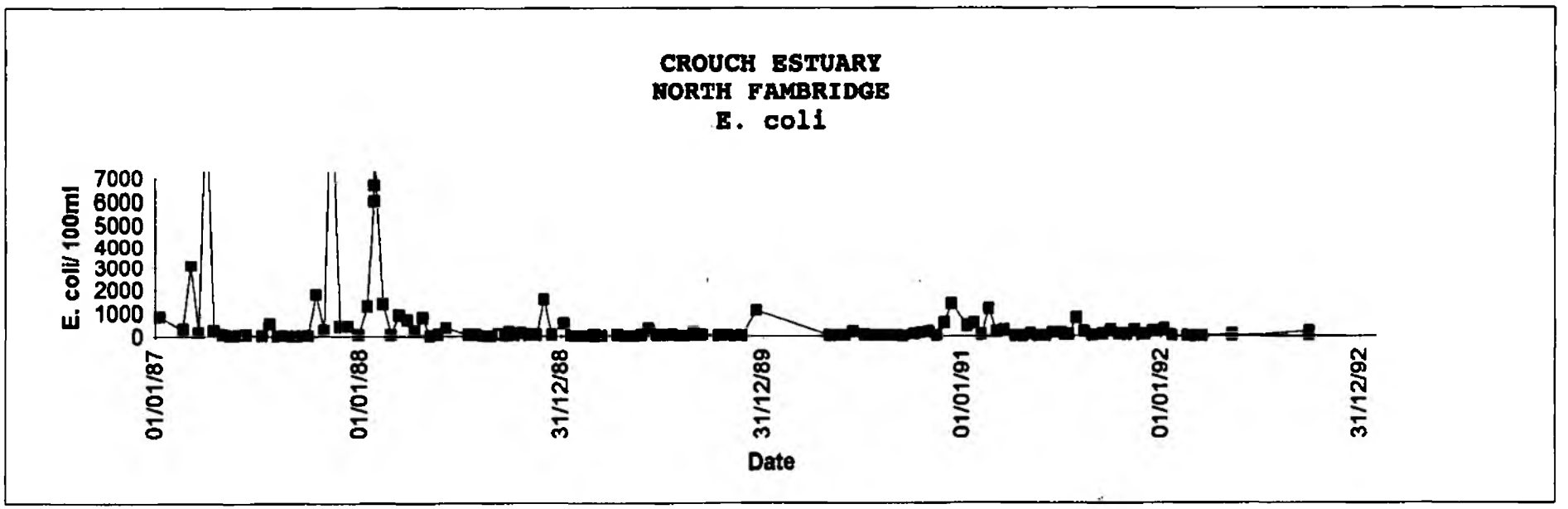
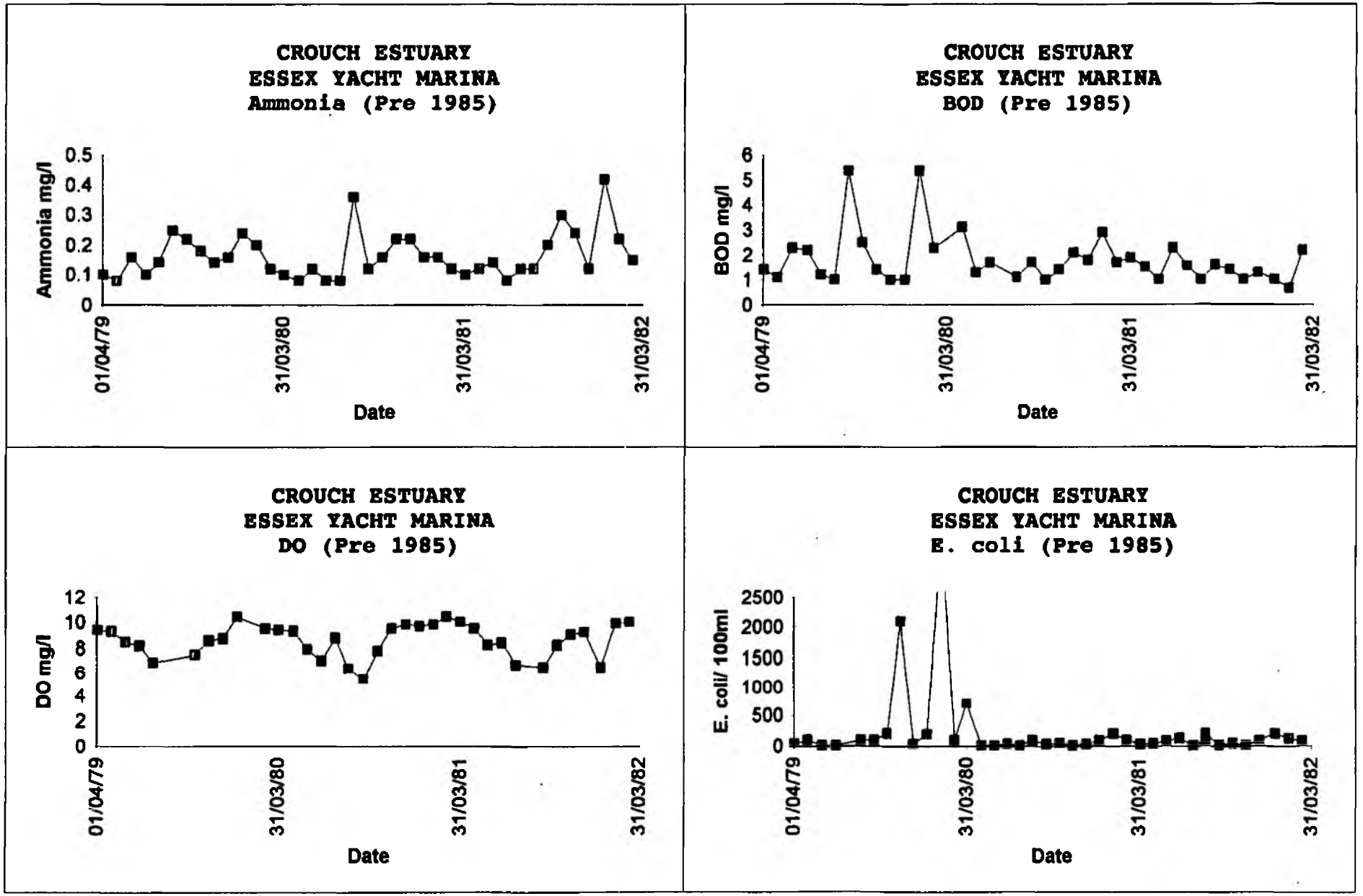
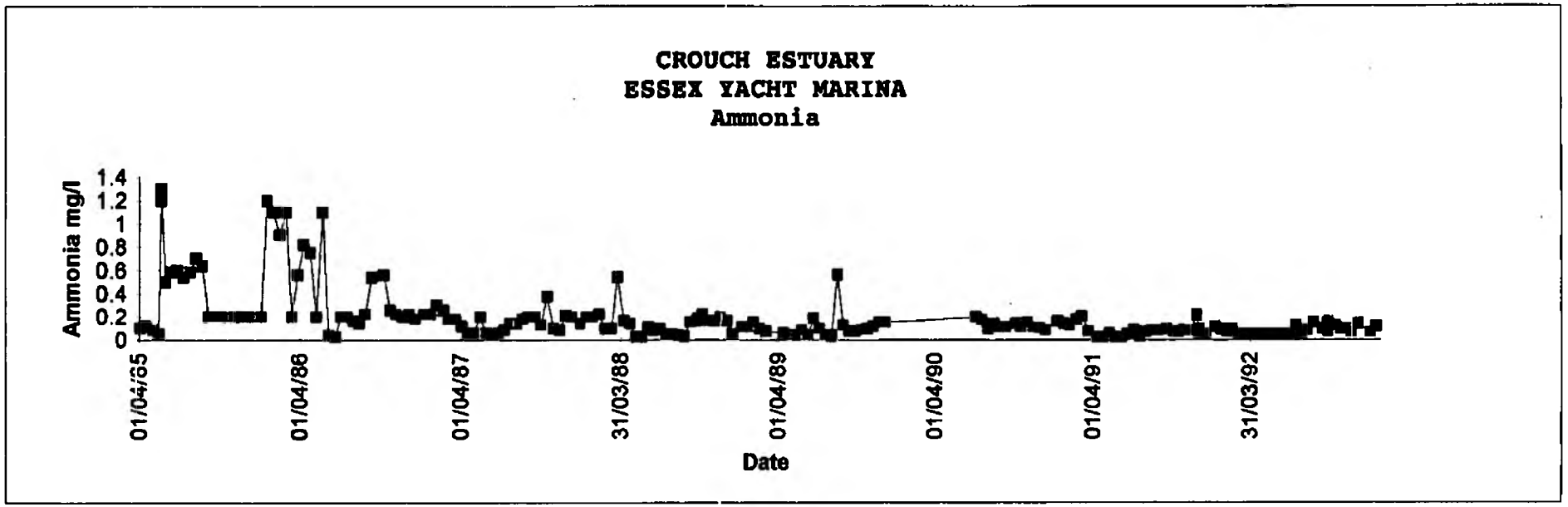


FIG 91

SAMPLE POINT CODE - BICE05




CROUCH ESTUARY
ESSEX YACHT MARINA
Ammonia
Ammonia mg/l
1.4
1.2
1
0.8
0.6
0.4
0.2
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date

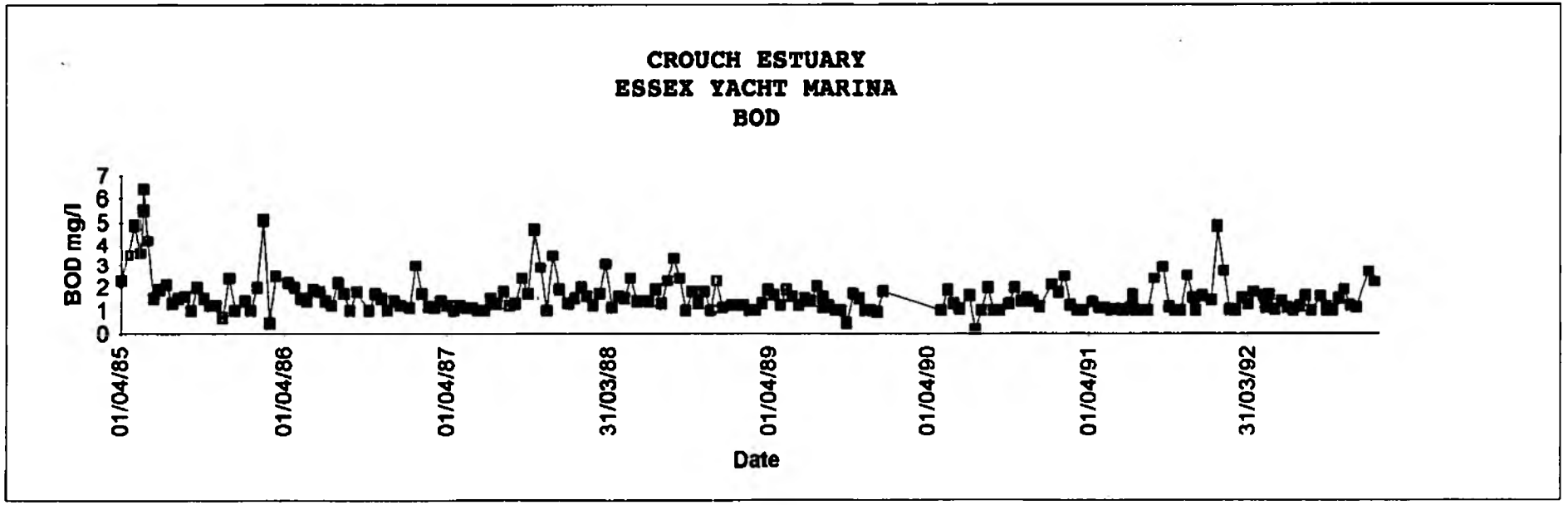
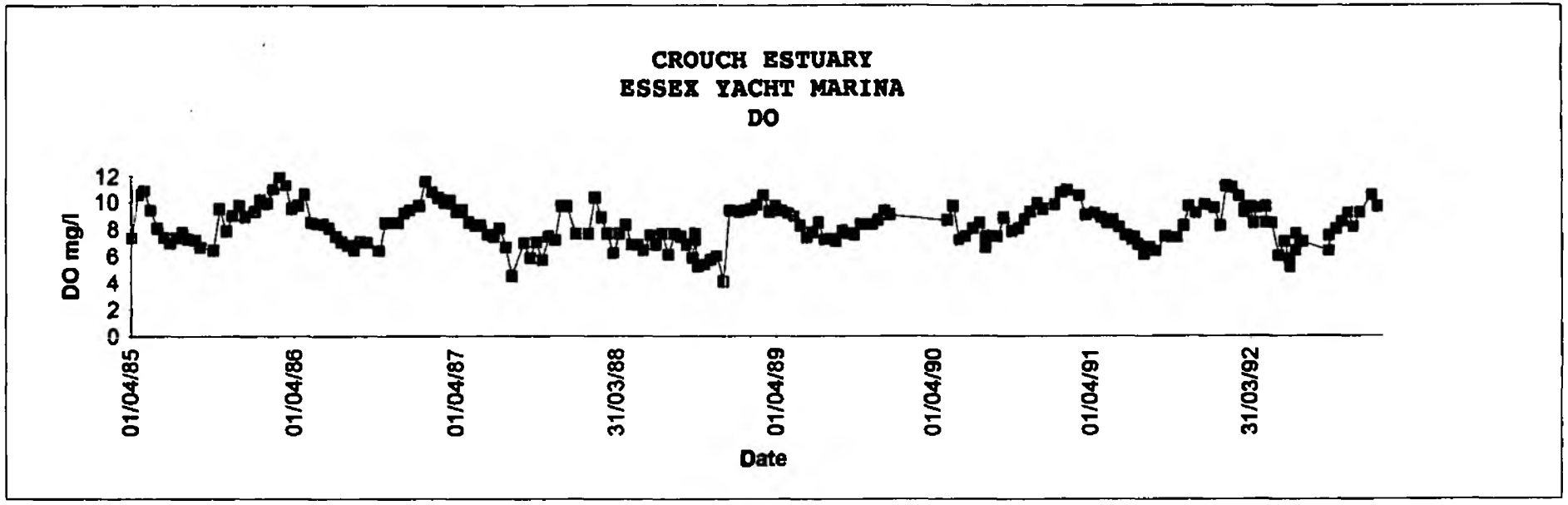
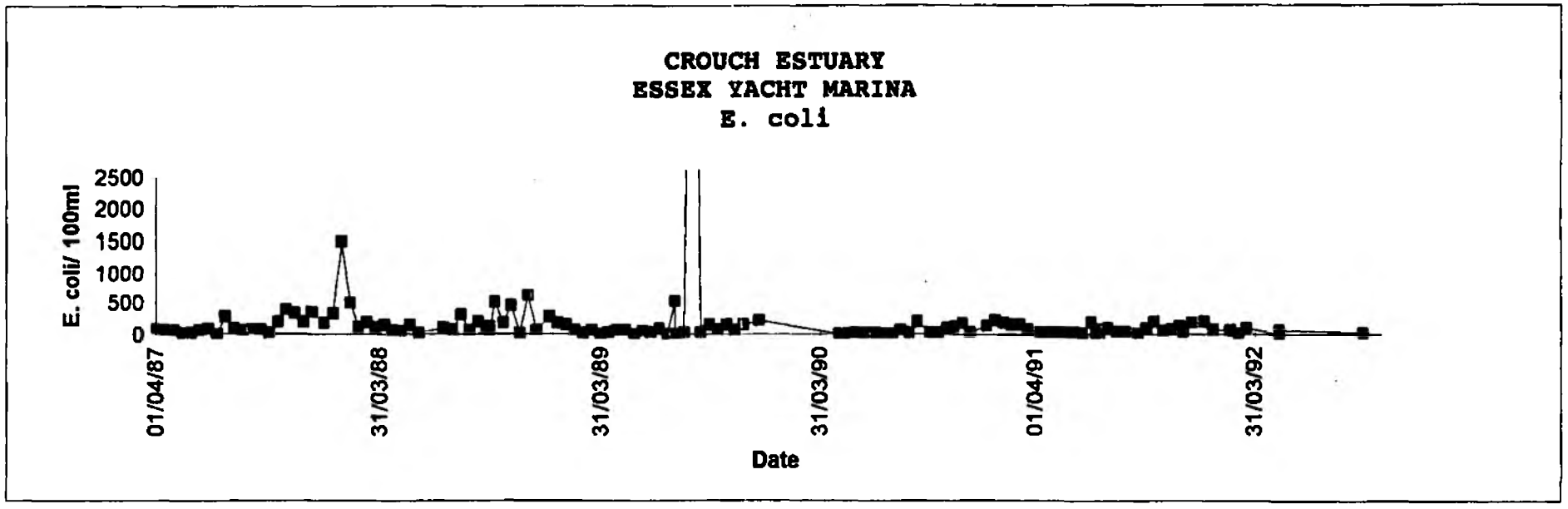
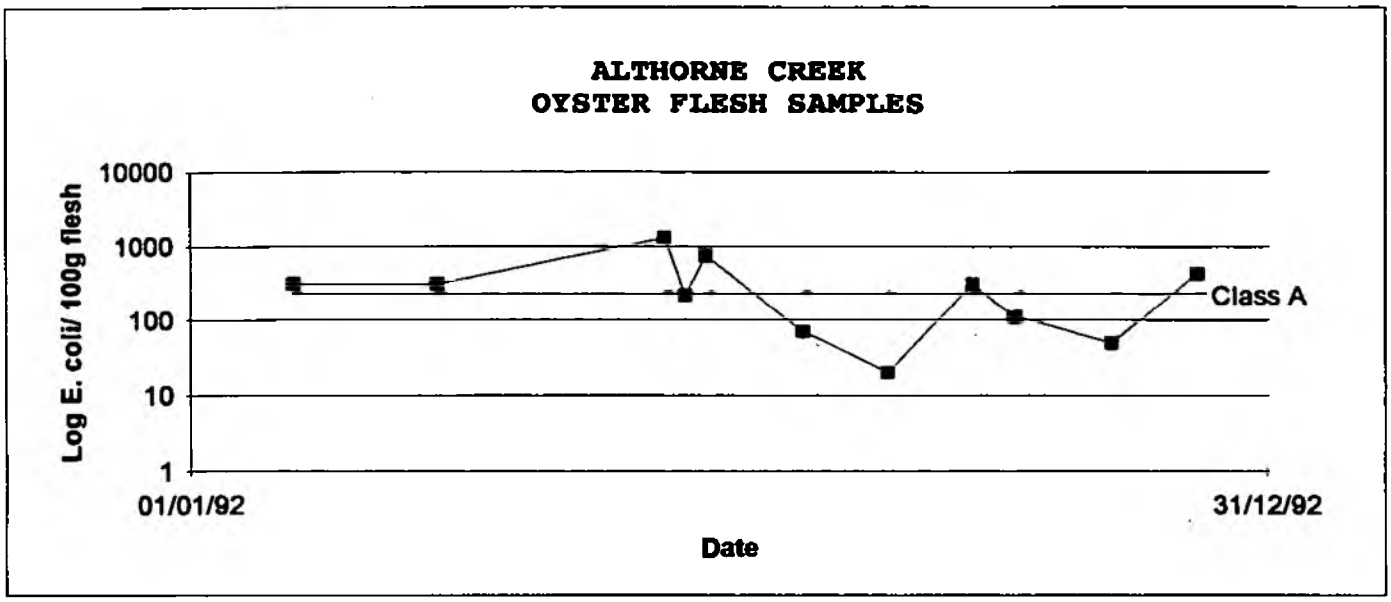

CROUCH ESTUARY
ESSEX YACHT MARINA
BOD
BOD mg/l
7
6
5
4
3
2
1
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date

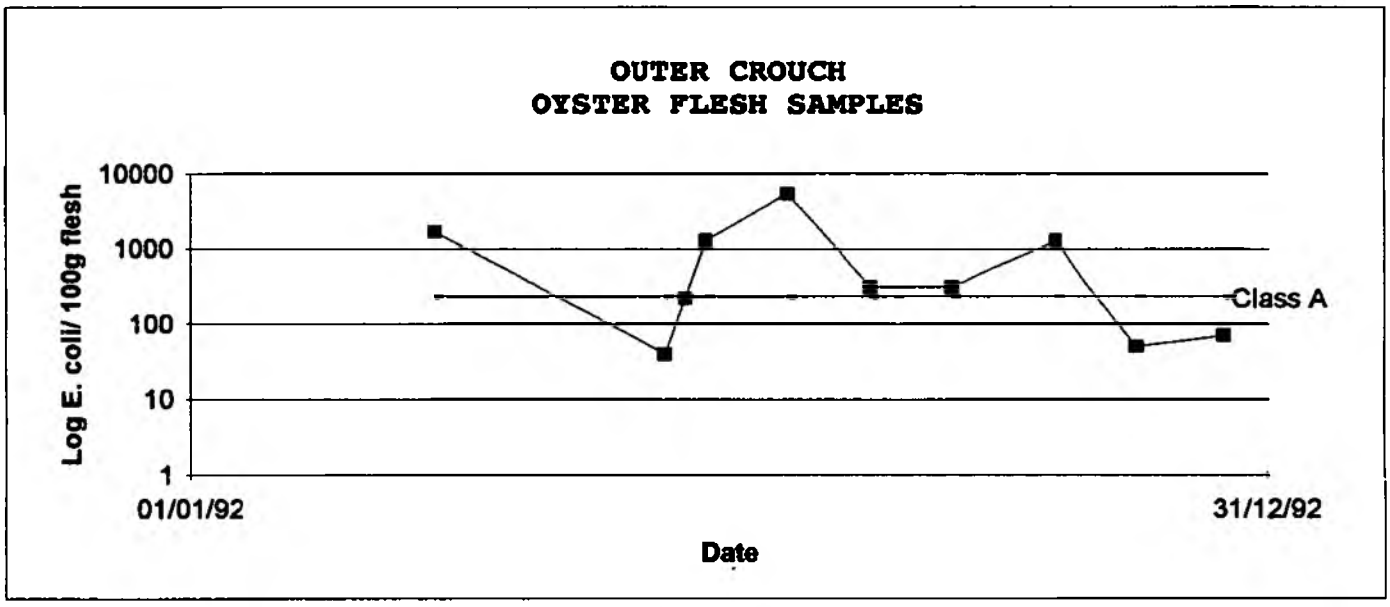
FIG 93

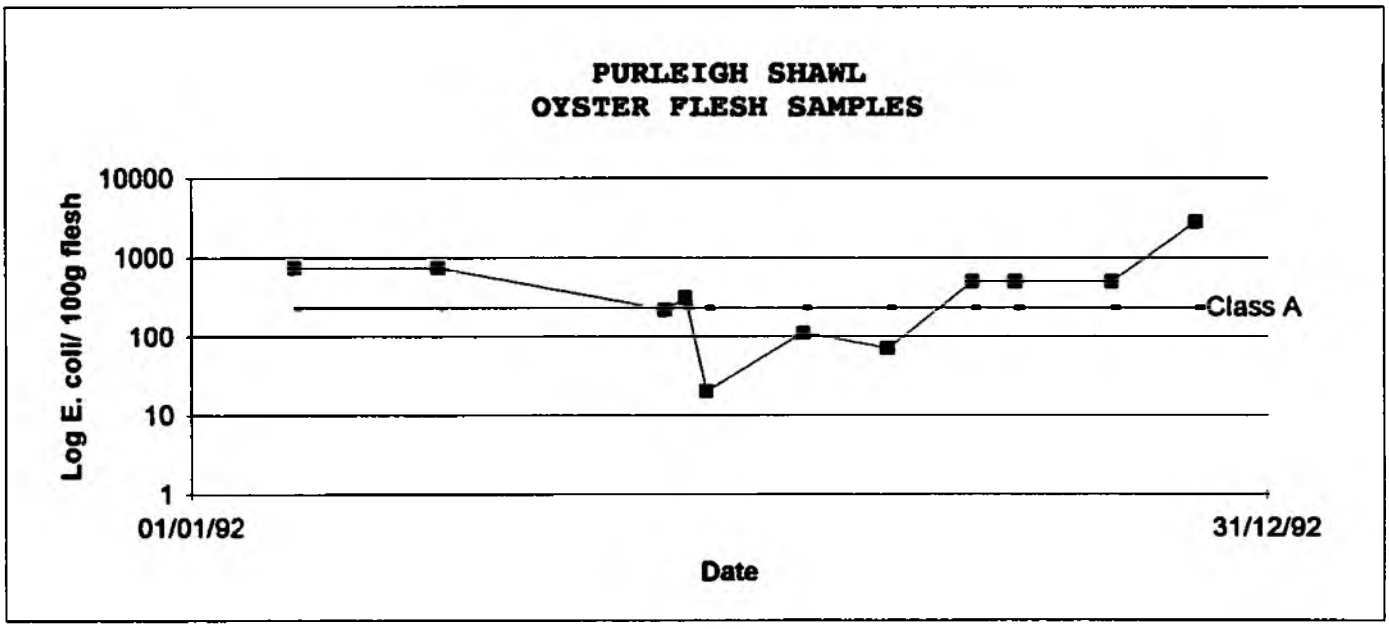
SAMPLE POINT CODE - BICE05

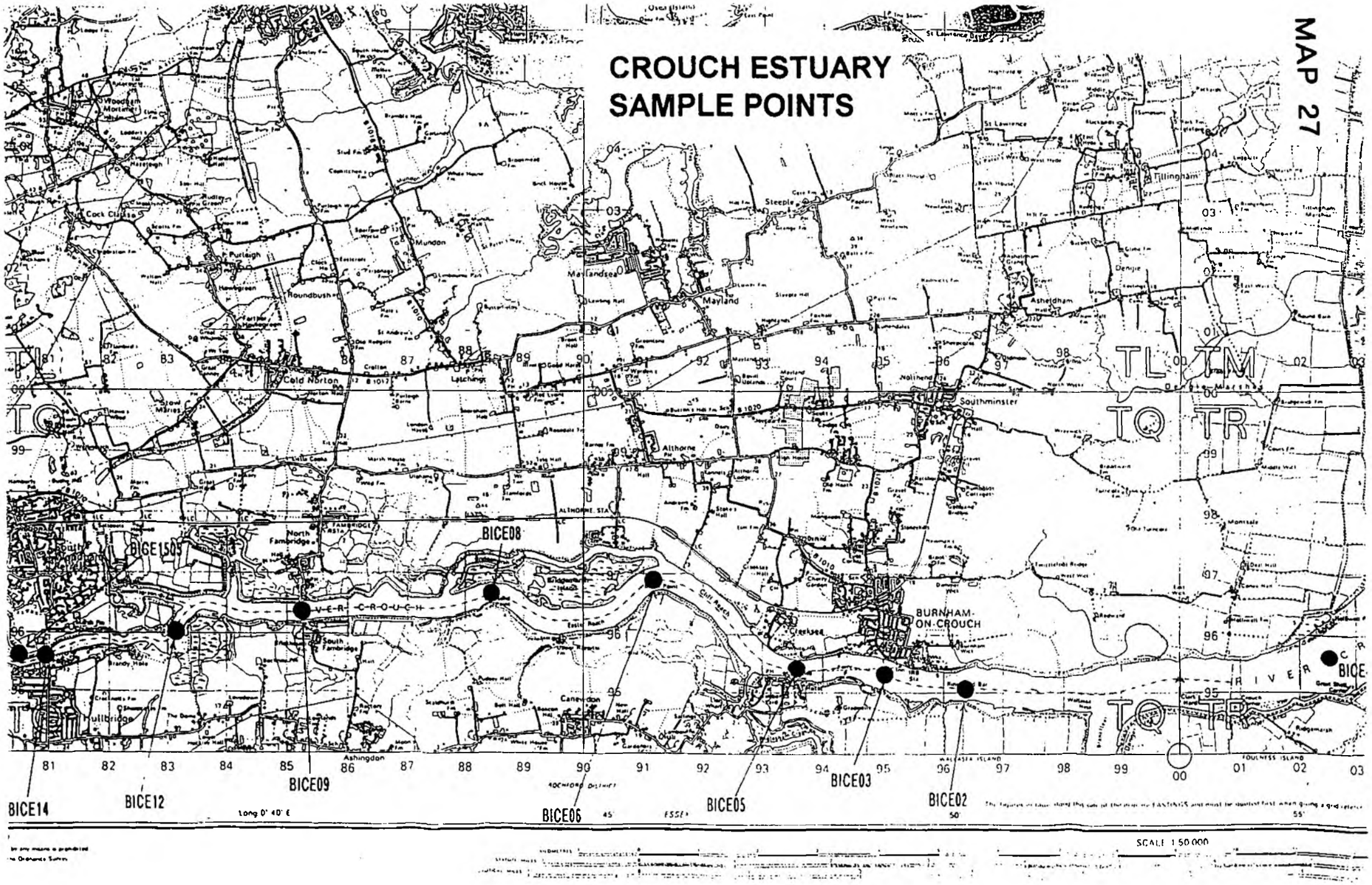





ALTHORNE CREEK
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class A
01/01/92
31/12/92
Date


OUTER CROUCH
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class A
01/01/92
31/12/92
Date


PURLEIGH SHAWL
OYSTER FLESH SAMPLES
Log E. coli/ 100g flesh
10000
1000
100
10
1
Class A
01/01/92
31/12/92
Date


CROUCH ESTUARY
SAMPLE POINTS
MAP 27
BICE14
BICE12
BICE09
BICE06
BICE05
BICE03
BICE02
BICE08
BICE15
BURNHAM-ON-CROUCH
SCALE 1:50 000

10 ROACH ESTUARY

10.1 Historical Events from Essex River Authority Annual Report 1953-1974

1967 - Evidence of estuarine pollution was noted at Rochford due to the sewage discharges.

1972 - The estuary was frequently polluted by discharges of settled sewage from the overloaded Rochford STW and Great Stambridge STW. Oysters were affected.

1974 - Some improvements resulted from the extensions at Eastern STW.

10.2 Interpretation of Chemical Trends

It is apparent the ammonia levels have improved since the late 1980's at Ropers Farm, Barling and levels are now considered to be satisfactory. Eutrophication effects appear to be partly influencing the BOD. Both E. coli and DO values are considered to be satisfactory. However, occasional erratic values of E. coli may influence the nearby shellfishery (Fig 95 - 97).

At East End Paglesham the trend of improving ammonia is noted and BOD values again show the effects of eutrophication. The E. coli values tend to be quite erratic and this may be due to storm overflows (Fig 99 & 100).

At Monkton Quay the ammonia levels are lower than those found at East End Pagelsham, similarly BOD, DO and E. coli show a water quality of a good standard (Fig 101 - 103). The levels are

satisfactory for the nearby shellfishery which supports both oysters and mussels at class A/B (Fig 104).

(See Map 28 for location of sample points)

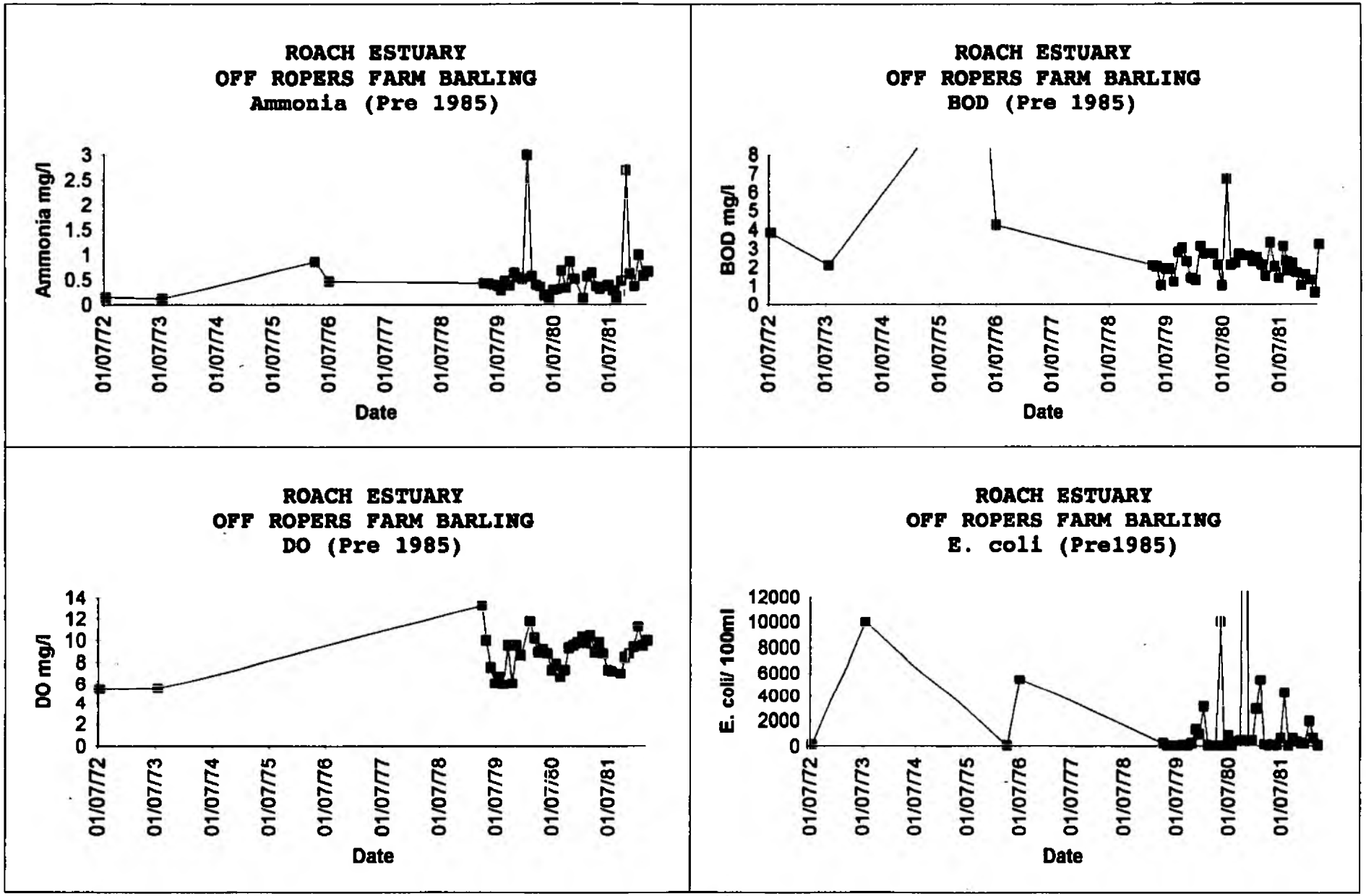
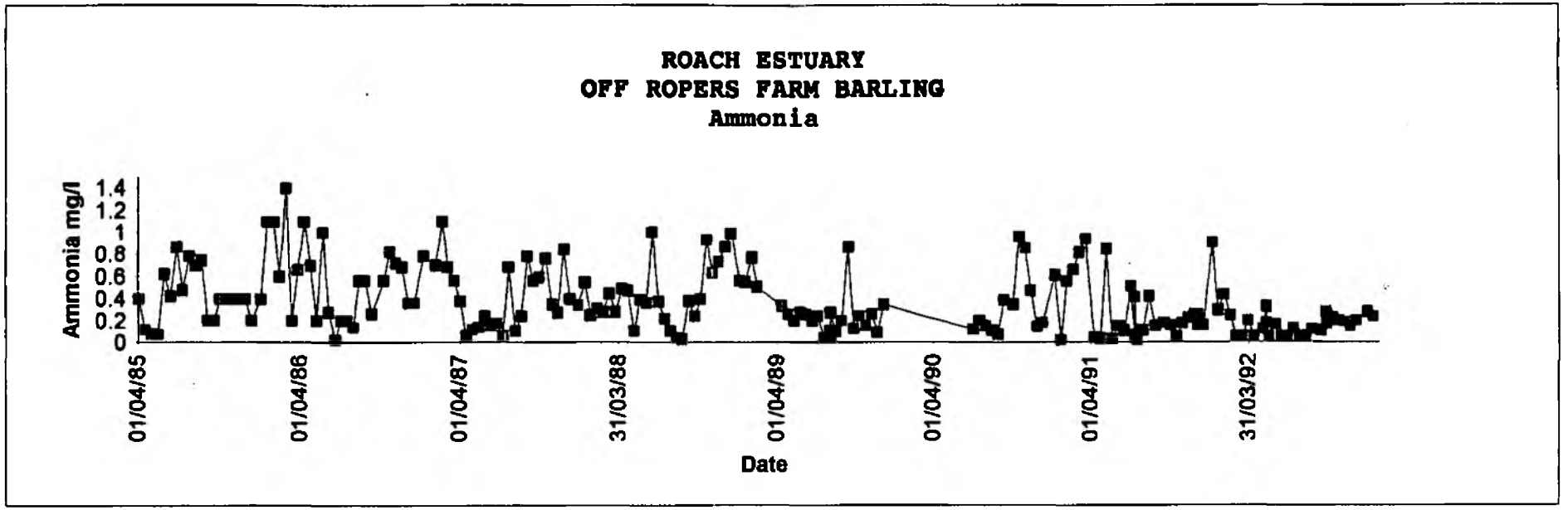

ROACH ESTUARY
OFF ROPERS FARM BARLING
Ammonia (Pre 1985)
Ammonia mg/l
3
2.5
2
1.5
1
0.5
0
01/07/72
01/07/73
01/07/74
01/07/75
01/07/76
01/07/77
01/07/78
01/07/79
01/07/80
01/07/81
Date
ROACH ESTUARY
OFF ROPERS FARM BARLING
BOD (Pre 1985)
BOD mg/l
8
7
6
5
4
3
2
1
0
01/07/72
01/07/73
01/07/74
01/07/75
01/07/76
01/07/77
01/07/78
01/07/79
01/07/80
01/07/81
Date
ROACH ESTUARY
OFF ROPERS FARM BARLING
DO (Pre 1985)
DO mg/l
14
12
10
8
6
4
2
0
01/07/72
01/07/73
01/07/74
01/07/75
01/07/76
01/07/77
01/07/78
01/07/79
01/07/80
01/07/81
Date
ROACH ESTUARY
OFF ROPERS FARM BARLING
E. coli (Pre1985)
E. coli/ 100ml
12000
10000
8000
6000
4000
2000
0
01/07/72
01/07/73
01/07/74
01/07/75
01/07/76
01/07/77
01/07/78
01/07/79
01/07/80
01/07/81
Date

FIG 96

SAMPLE POINT CODE - BIRE16



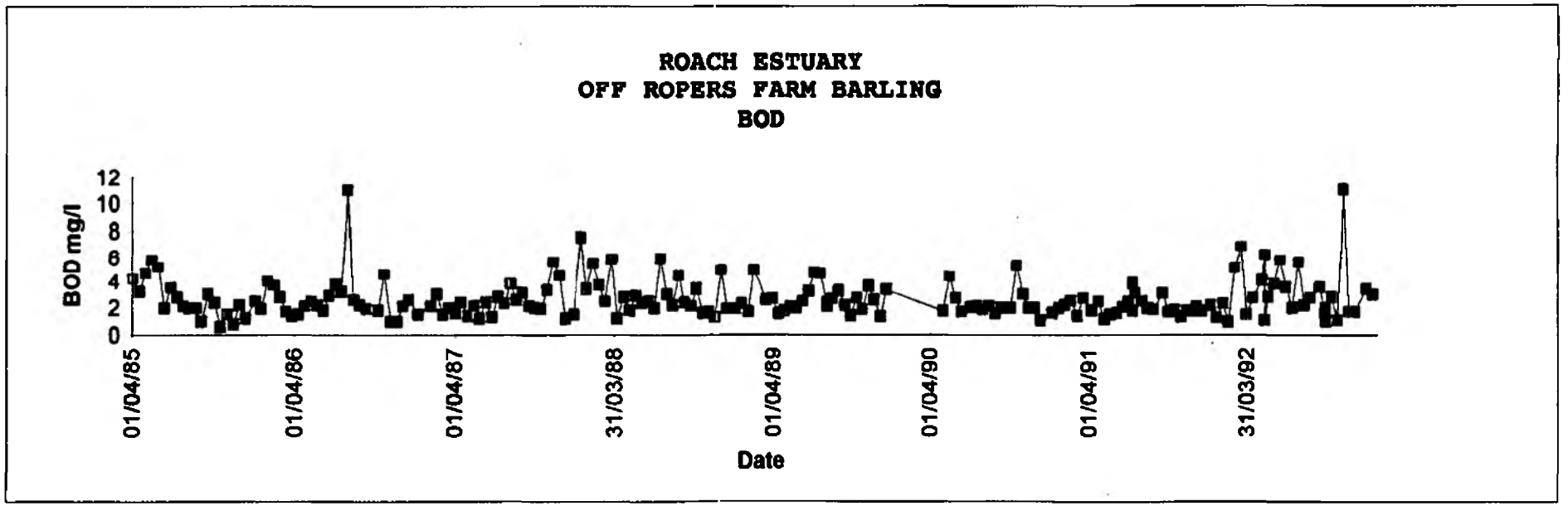
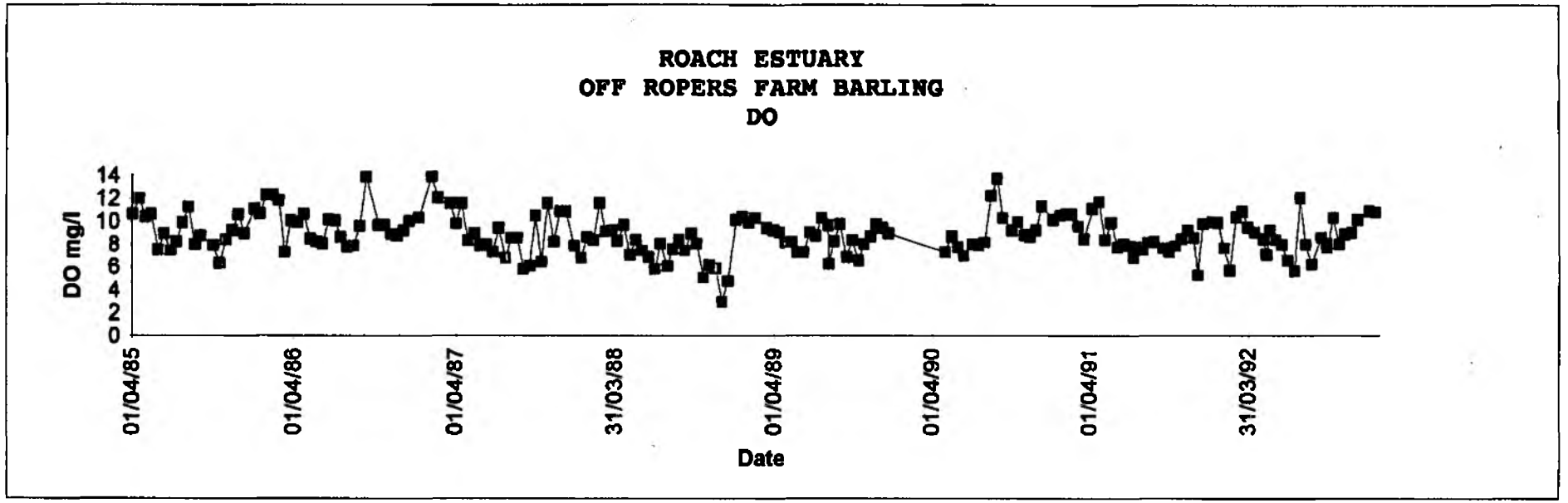


FIG 97

SAMPLE POINT CODE - BIRE16



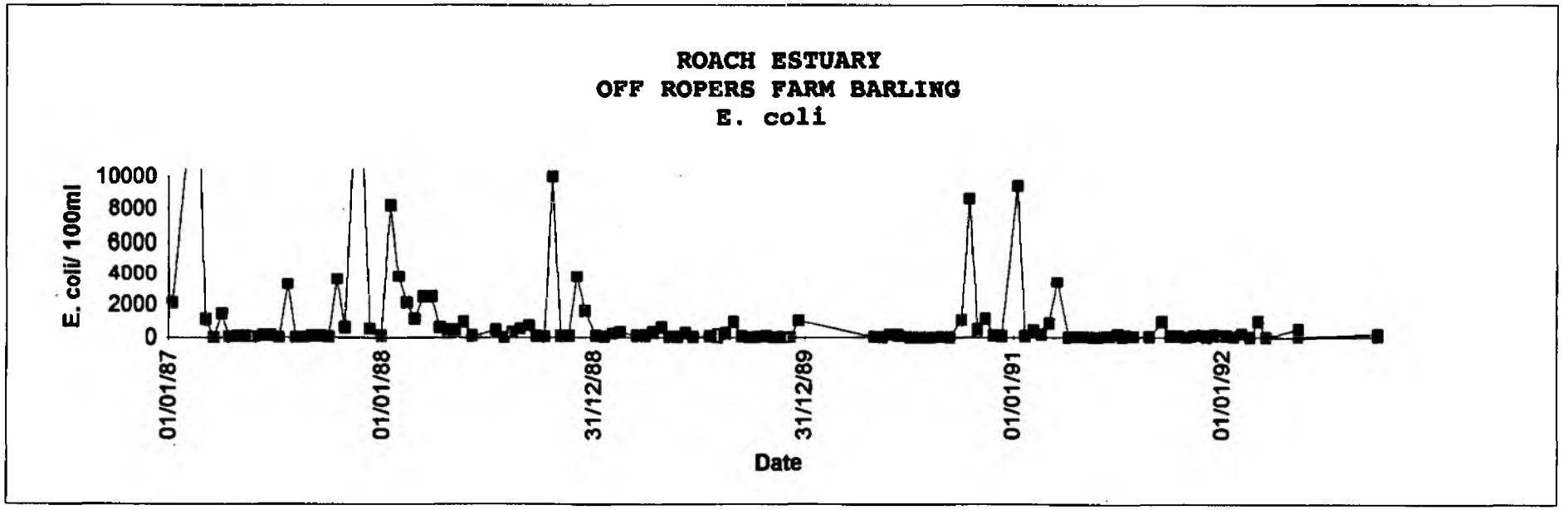
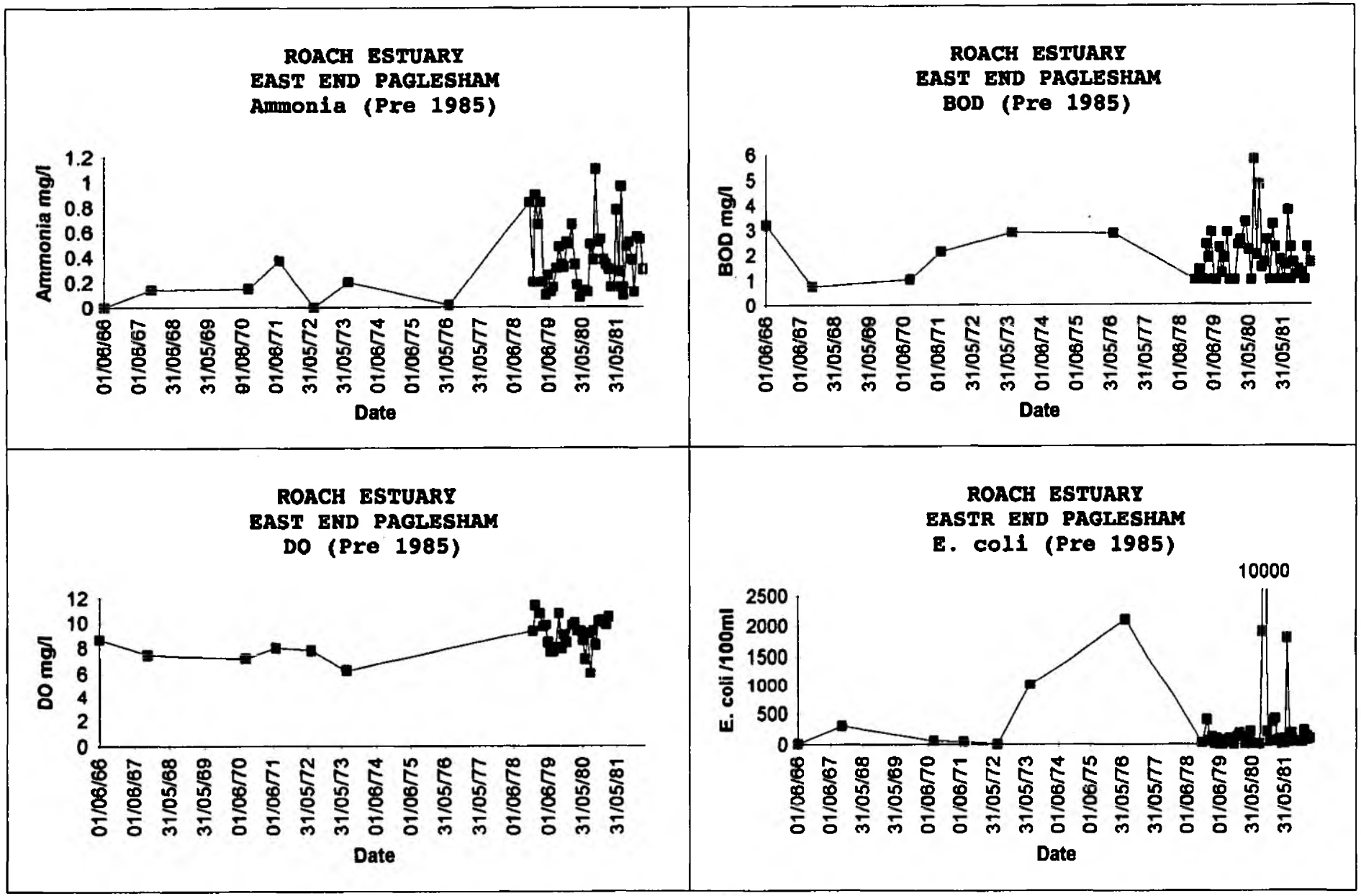
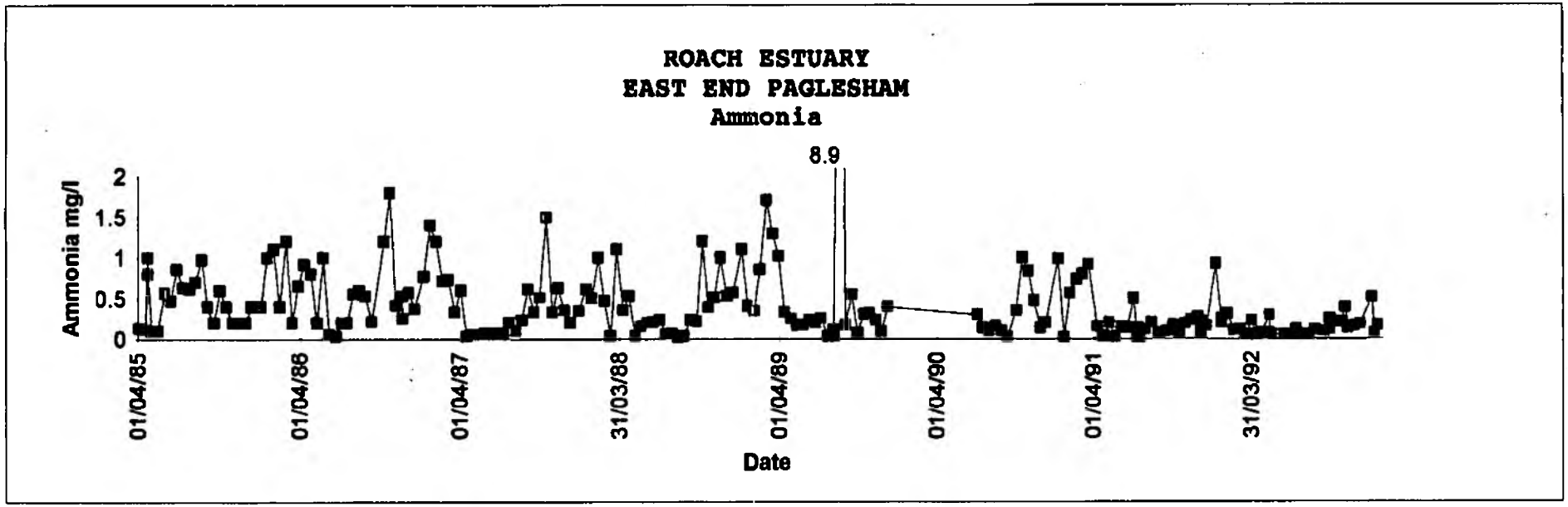
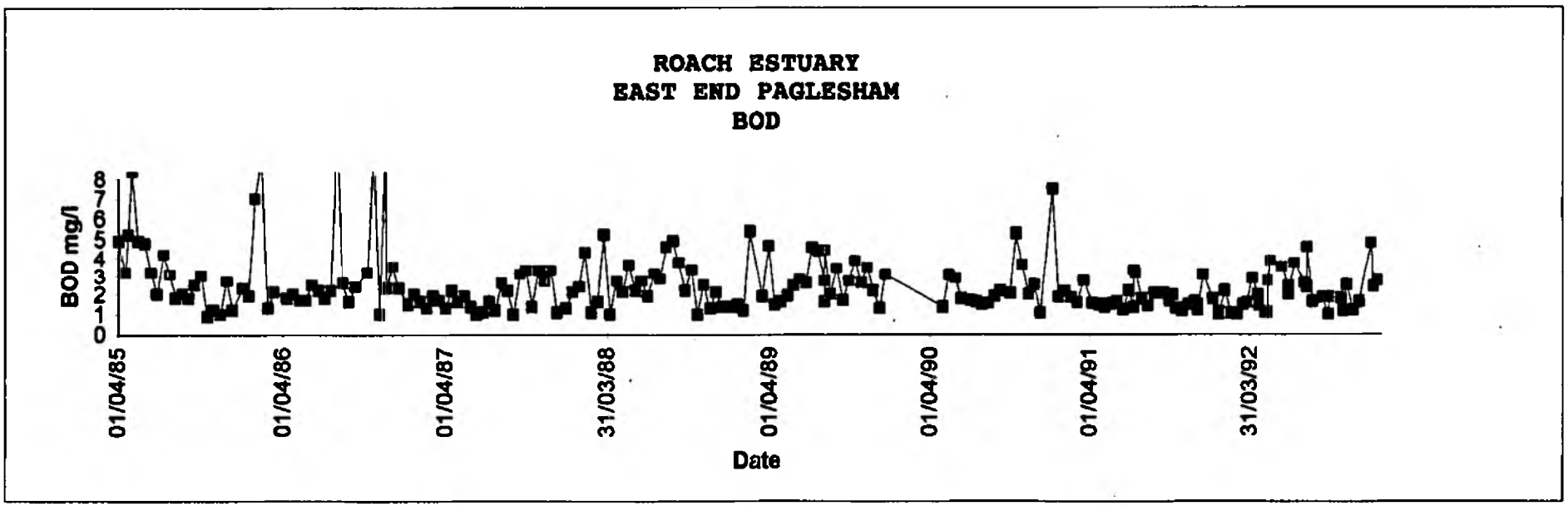


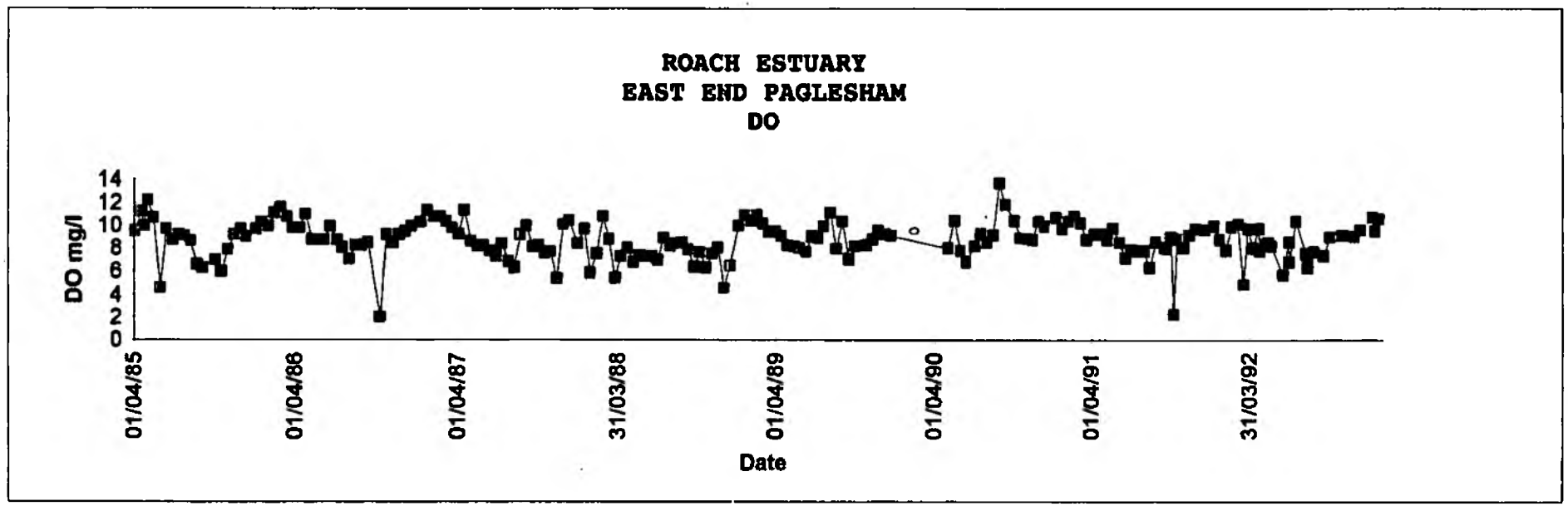
FIG 98

SAMPLE POINT CODE - BIRE08




ROACH ESTUARY
EAST END PAGLESHAM
Ammonia
8.9
Ammonia mg/l
2
1.5
1
0.5
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date


ROACH ESTUARY
EAST END PAGLESHAM
BOD
BOD mg/l
8
7
6
5
4
3
2
1
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date


ROACH ESTUARY
EAST END PAGLESHAM
DO
DO mg/l
14
12
10
8
6
4
2
0
01/04/85
01/04/86
01/04/87
31/03/88
01/04/89
01/04/90
01/04/91
31/03/92
Date

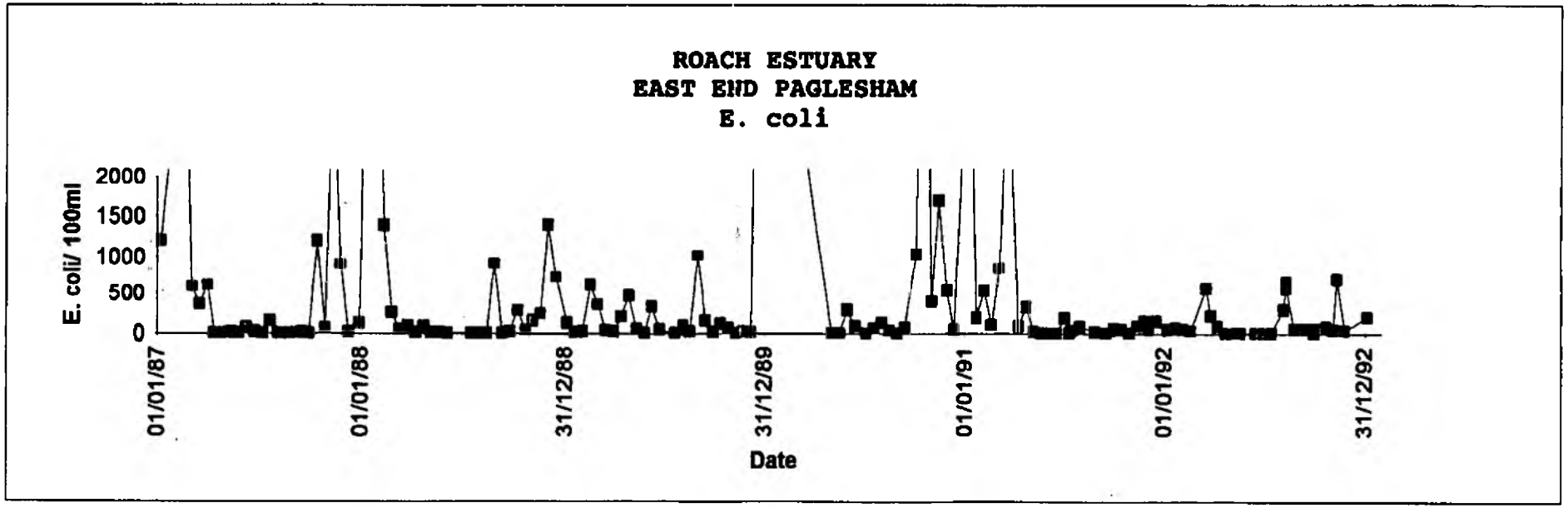
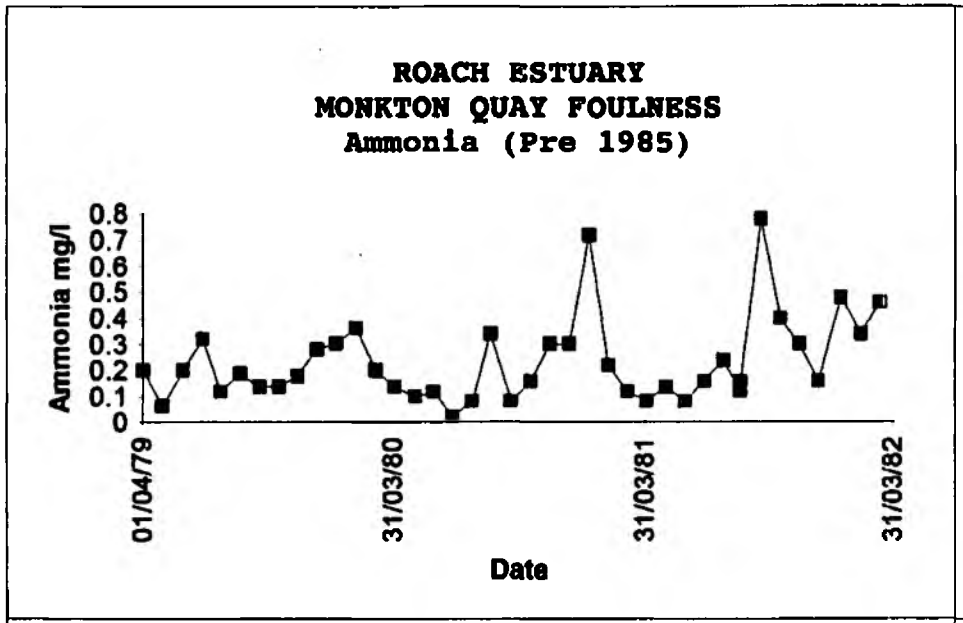
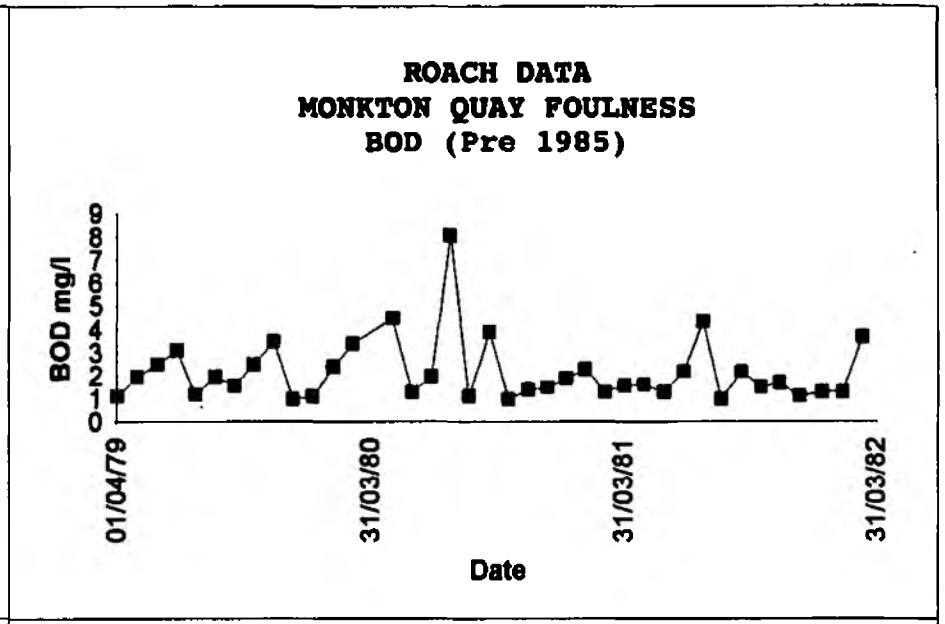
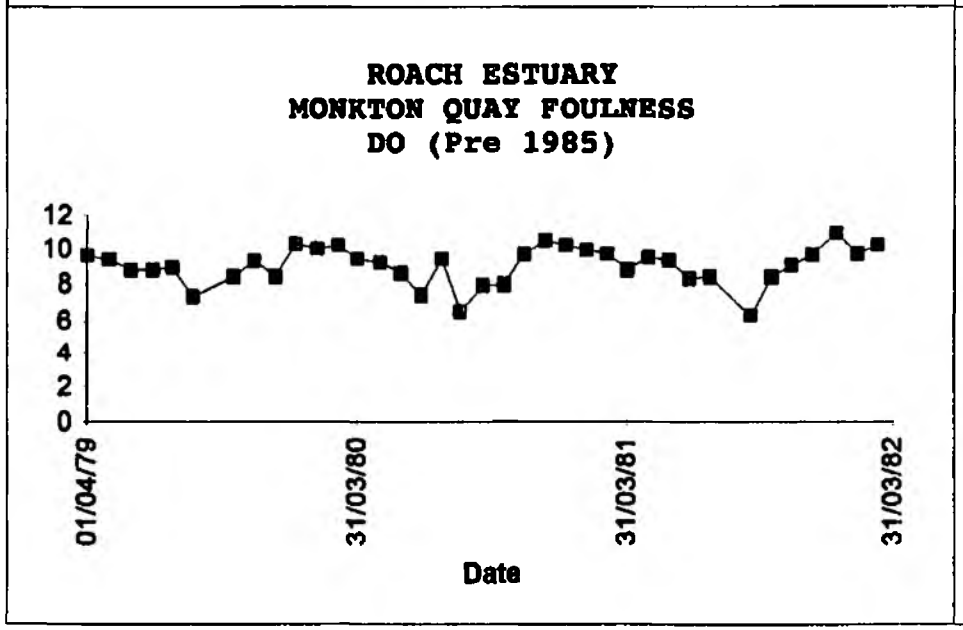

ROACH ESTUARY
EAST END PAGLESHAM
E. coli
E. coli/ 100ml
2000
1500
1000
500
0
01/01/87
01/01/88
31/12/88
31/12/89
01/01/91
01/01/92
31/12/92
Date

FIG 101

SAMPLE POINT CODE - BIRE03







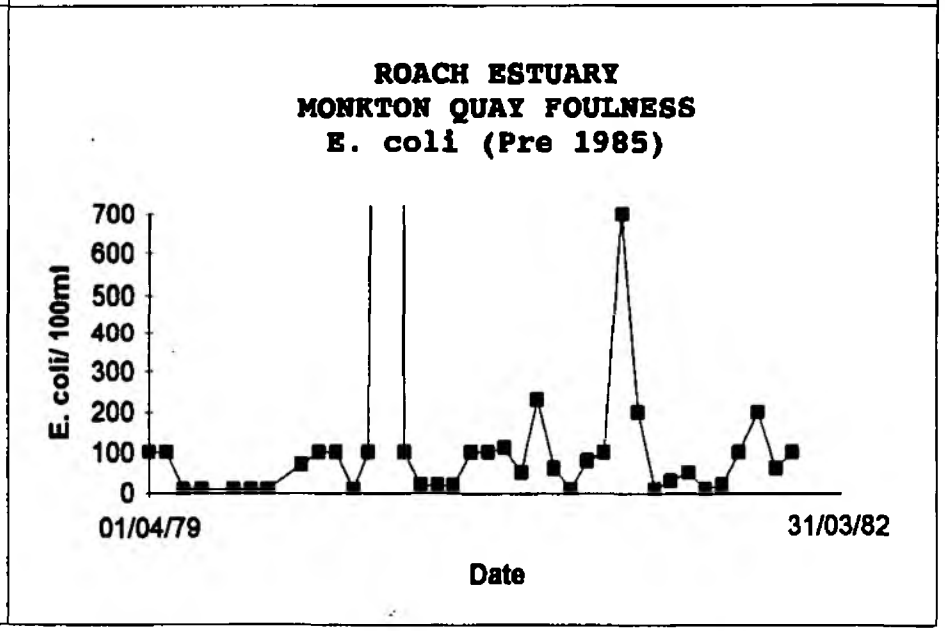
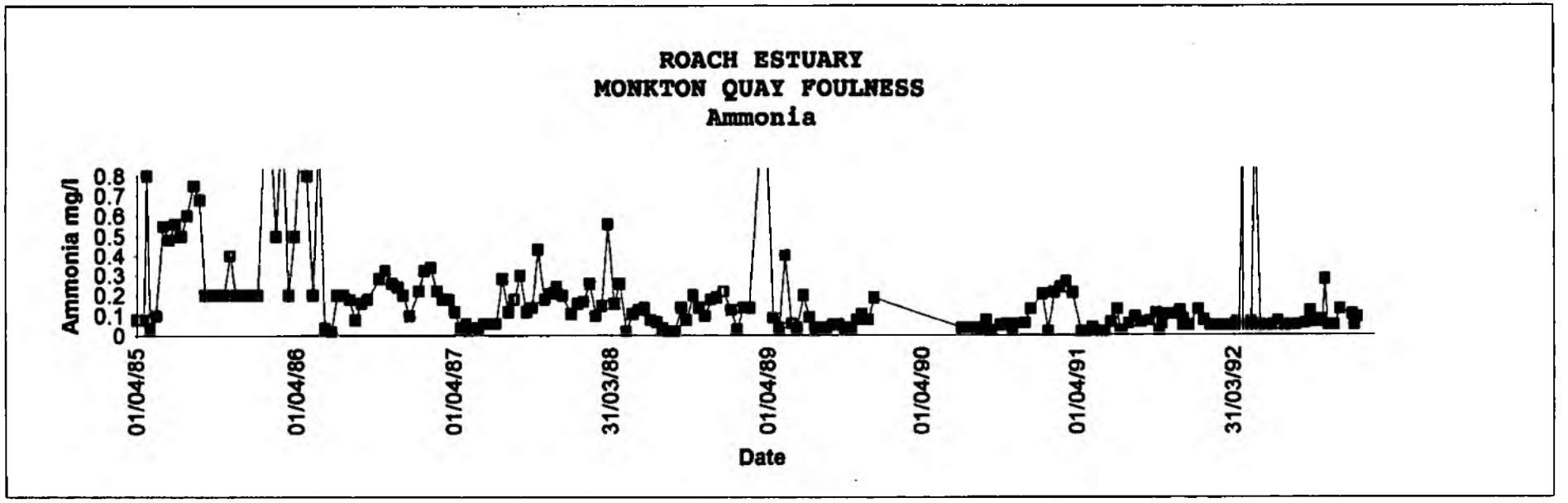


FIG 102

SAMPLE POINT CODE - BIRE03



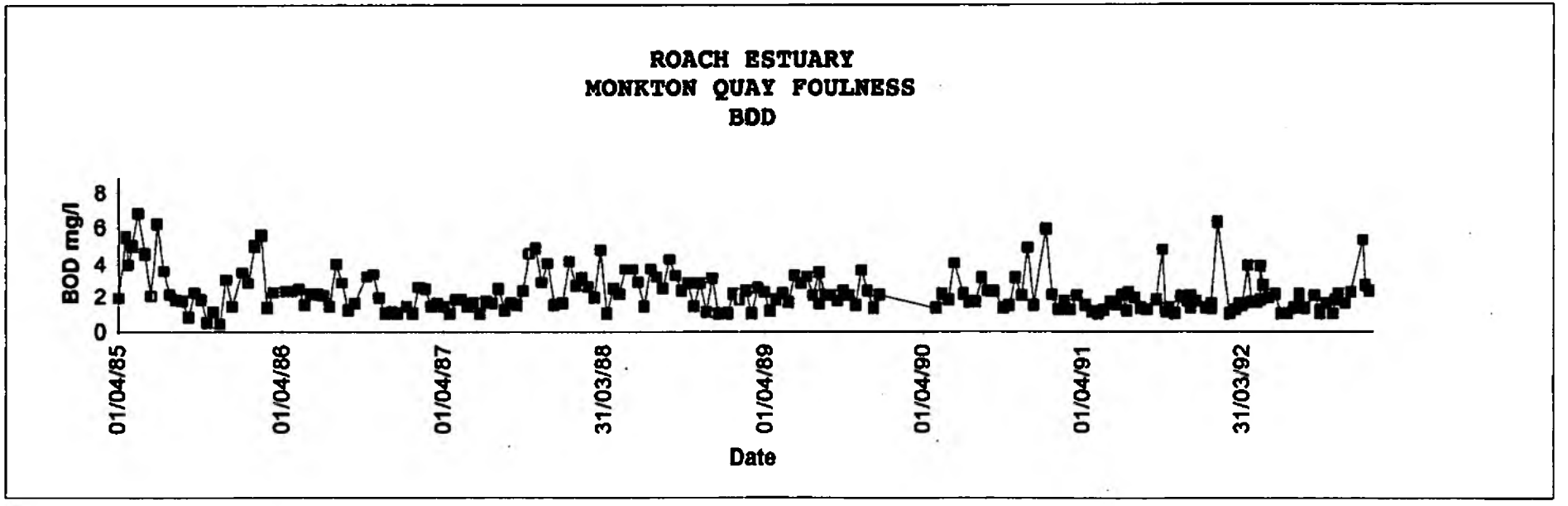
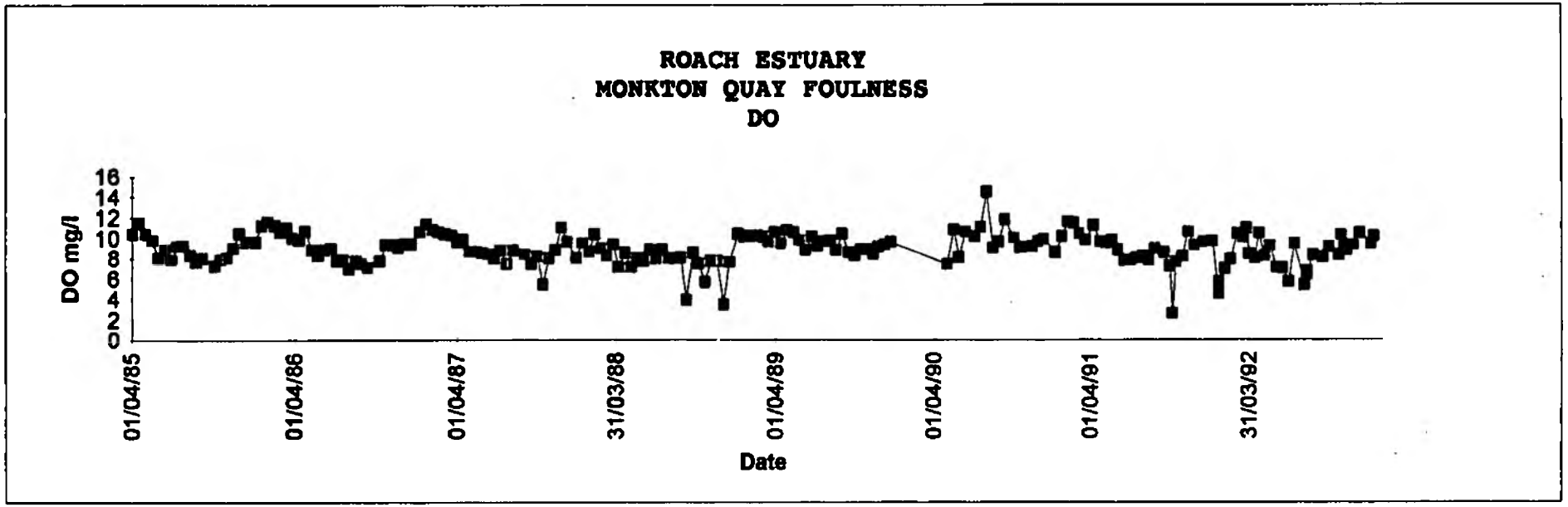
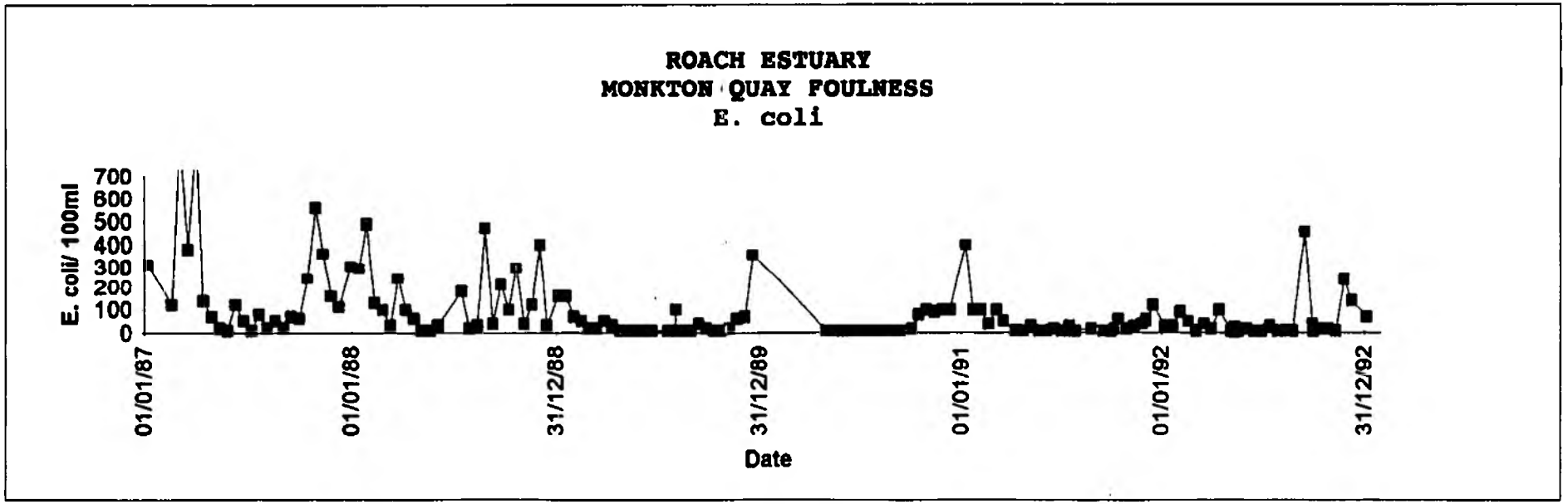
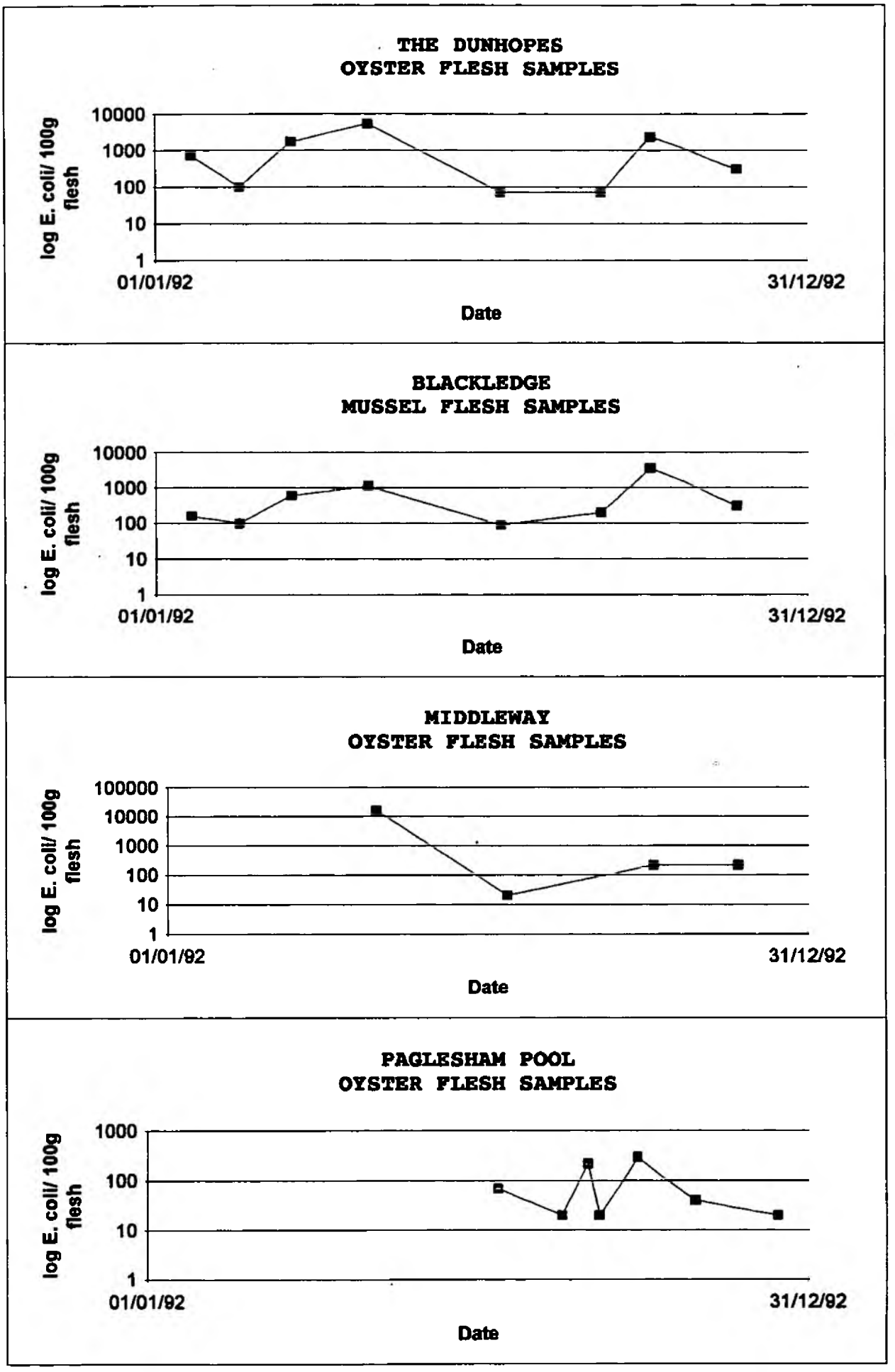


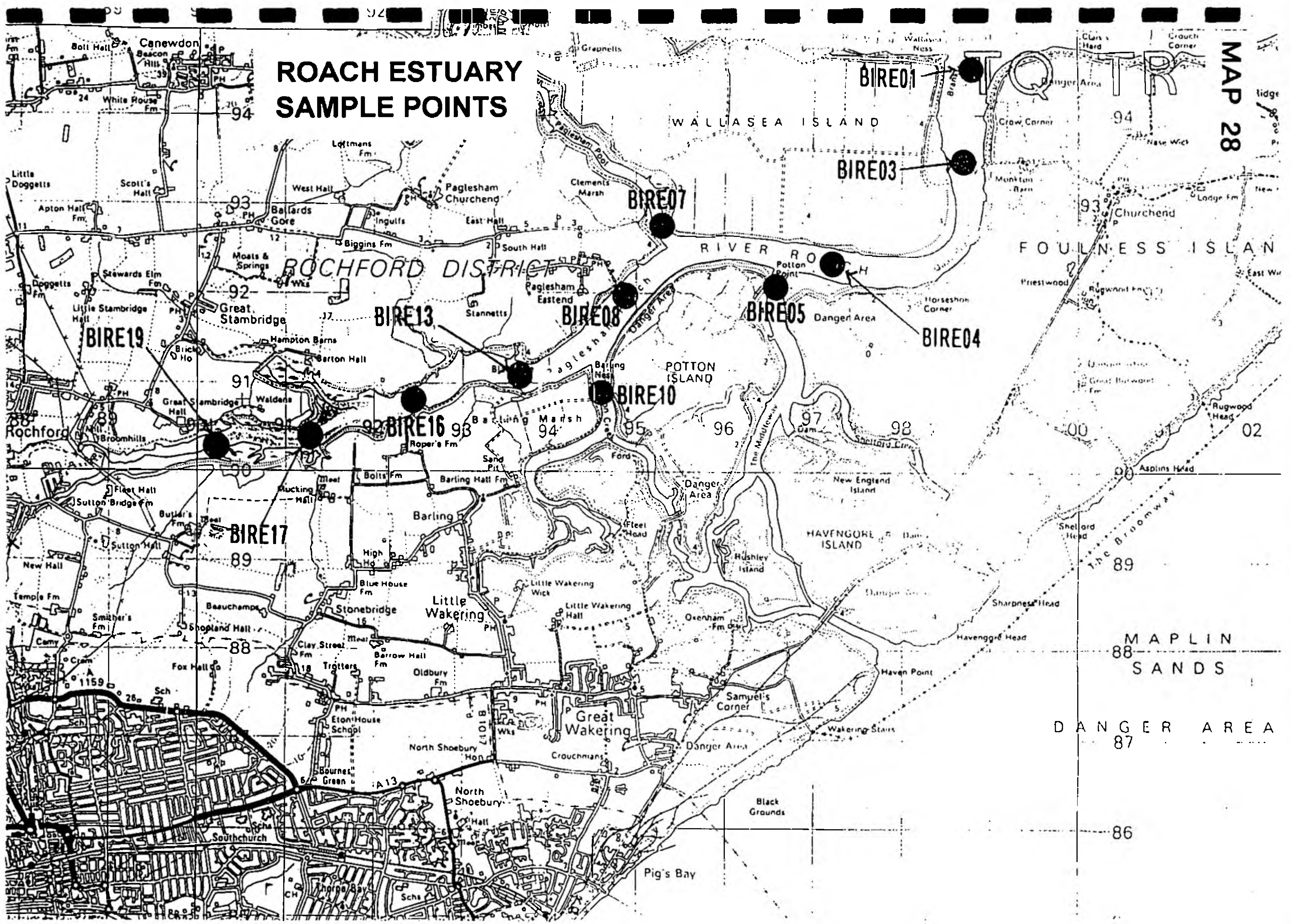
FIG 103

SAMPLE POINT CODE - BIRE03






THE DUNHOPES
OYSTER FLESH SAMPLES
log E. coli/ 100g flesh
10000
1000
100
10
1
01/01/92
31/12/92
Date
BLACKLEDGE
MUSSEL FLESH SAMPLES
log E. coli/ 100g flesh
10000
1000
100
10
1
01/01/92
31/12/92
Date
MIDDLEWAY
OYSTER FLESH SAMPLES
log E. coli/ 100g flesh
100000
10000
1000
100
10
1
01/01/92
31/12/92
Date
PAGLESHAM POOL
OYSTER FLESH SAMPLES
log E. coli/ 100g flesh
1000
100
10
1
01/01/92
31/12/92
Date



ROACH ESTUARY
SAMPLE POINTS
MAP 28
BIRE01
BIRE03
BIRE04
BIRE05
BIRE07
BIRE08
BIRE10
BIRE13
BIRE16
BIRE17
BIRE19
WALLASEA ISLAND
FOULNESS ISLAND
RIVER ROACH
ROCHFORD DISTRICT
POTTON ISLAND
HAVENGORE ISLAND
MAPLIN SANDS
DANGER AREA
Canewdon
Rochford
Great Stambridge
Paglesham Churchend
Paglesham Eastend
Barling
Little Wakering
Great Wakering
North Shoebury
Southchurch
Pig's Bay