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

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SECTION C]

ESTUARINE BENTHIC STATUS

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1 INTERTIDAL SURVEY 1973 and 1985 (Fig 105 & 106)

In 1974 the Institute of Terrestrial Ecology (ITE) initiated benthic intertidal survey work in the East Coast estuaries from the Stour to the Roach estuary. Anglian Water surveyed the same area in 1985 as a pilot survey for future monitoring. The most recent intertidal work has been carried out by the NRA between 1989 and 1990 on four estuaries in Suffolk.

When comparing the 1973 and 1985 data a shift from mollusc to annelid dominance is apparent. This can largely be explained by the different sampling methodologies used in both surveys. During 1973 ITE survey a larger sieve mesh size was used and may have resulted in the difference in species dominance found, i.e. small annelid worms would have passed through the larger mesh sieve used by ITE. Also in 1973 the sample sites were accessed by land as opposed to boat in 1985.

1.1 STOUR

The 1985 survey shows that species numbers were lowest at the upper estuary sites and greatest at mid-estuary sites. Annelid worms dominated the fauna of the study area. T. benedeni was found at over 60% of the sites and it accounted for 28% of all the individuals samples with densities greatest in mid to lower reaches (Fig 107). 9 crustacean species were found, C. volutator was found at over 53% of the sites. 4 out of 11 species of mollusca occurred widely, M. balthica, A. tenius, H. ulvae and C. edule, but they had a patchy distribution.

The lower number of species found in the upper estuary is expected due to the fact that harsher conditions prevail in terms of exposure and salinity fluctuations. These habitats are characteristically inhabited by many individuals of a small number of well adapted species.

The lower estuary supported a more diverse benthic fauna. The high number of annelid species reflects the geographical extent and variation of the sampling area encompassing a range of habitats from highly stressed estuarine mud at one end to more marine sorted sand at the other. Shipping activity may well cause sufficient turbulence to periodically decimate the benthic population at some sample points.

It appears that the Stour estuary is essentially clean as indicated by the overall condition of the benthic macroinvertebrate population.

A biological survey of Holbrook Bay in 1984 concluded that the main factor determining community structure is physical heterogeneity rather than changes in salinity gradients. The highest diversity of fauna occurred where Zostera sp could be found, this is due to the greater variety of habitat. Where diversity was low the sites had relatively homogenous physical characteristics, ie bare mud or broken shell/mussel beds.

1.2 HAMFORD WATER

Number of individuals and number of species per site varied greatly throughout the estuary in 1985. Again annelid worms dominate the benthos in terms of species numbers. The most numerous oligochaete was T. benedeni which accounted for 467 of the individuals in the survey (Fig 107). The most numerous polychaete was Tharyx marioni with 7% of the total individuals. Nereis diversicolor was widely occurring at 24 out of 33 sites, accounting for 5% of the total numbers. Of the mollusc species found Hydrobia ulvae was thinly dispersed. M. edulis was found only in Walton channel. Two bivalves M. balthica and A. tenius occurred widely and in appreciable numbers.

Once again on comparison with 1973's data, a shift from mollusc dominance to annelid dominance is apparent. The drop in numbers of H. ulvae that occurred may, however, also be due to long term natural population fluctuations or some underlying form of chronic pollution. The pattern of species numbers is quiet similar suggesting a fairly stable habitat.

The average number of species per site and individuals per site in the 1985 survey compares favourably with the other estuaries sampled.

This survey has shown the Hamford Water is a reasonably healthy and stress free estuary.

1.3 COLNE

Oligochaetes again dominated the benthic fauna with T. benedeni accounting for 47.5% of all the individuals sampled, it was found at all the sites sampled (Fig 107). In comparison, H. ulvae was the most dominant species in 1973 accounting for 73.5% of all the individuals sampled and being round at 97.2% of the sites sampled.

The apparent changes, as mentioned previously, may be attributed to variations in the methods of sample collection and treatment. The species list and diversity levels are low in comparison with more marine situations but comparable with other estuarine situations.

The 1985 survey data shows high relative numbers of T. benedeni in comparison with the other estuaries surveyed, it has been suggested that it may indicate organic pollution. It was found to dominate the benthos representing 60% of all organisms at 25% of the sites. There does not appear to be any clear spatial pattern, this may be due to organic enrichment of the intertidal estuarine mud from numerous non-point sources. T. benedeni, being an opportunistic species, may well be best adapted to survive in the naturally stressed estuarine environment of the Colne with its rapid fluctuations of salinity temperature and dissolved oxygen.

From both surveys there does appear to be a reasonable degree of stability amongst the benthic population of the Colne estuary. In comparison with other estuaries the Colne appears to be of worse quality.

1.4 BLACKWATER

From the survey carried out in 1985 the general diversity of the benthic fauna improves seaward. The sites at the top of the estuary appear somewhat stressed with poor diversity whereas the sites at the mouth of the estuary, although not clean, nor stress free do not cause concern as they are similar to other comparable estuaries.

Once again, oligochaetes dominated the benthic fauna with T. benedeni accounting for 32% of all the individuals found (Fig 107). In comparison with the 1973 data, the pattern of shifting species dominance from molluscs to annelids does not occur. In 1973 the dominant group was crustaceans accounting for 72.9% of all the individuals found with C. volutator being the most dominant species. In this case it appears that this is most definitely the case as the number of C. volutator collected in 1985 was several times higher than in 1973 but because the mesh size in 1985 allowed polychaetes and oligochaetes to be collected the numbers of crustaceans did not make quite as much impact.

1.5 CROUCH

The results gained appear to show a rather stressed benthic community with a low overall diversity. Three sites had only one species present and one site had only one individual per 100 cm^2. The results of the 1973 survey also found a rather depressed benthic community.

Annelid worms dominated the benthos in 1985 representing 86.3% of the sample population. As before the 1973 survey found molluscs to be the dominant group. T. benedeni accounted for

37.2% of all the individuals sampled in 1985 (Fig 107). Whereas in 1973 H. ulvae was the most dominant species.

Various trends can be noted within the estuary. Nereis diversicolor was the dominant polychaete at the top of the estuary, but was replaced by the dominant polychaete at the top of the estuary, but was replaced by Nephtys hombergi in the outer estuary. Again there appears to be a shift from mollusc dominance in 1973 to annelid dominance in 1985. The overall diversity in the Crouch is low compared to other estuaries, the reason may be due to local physical factors in that the estuary is long and narrow with the banks being mainly sea wall. The sites with only one species are all subject to considerable tidal scour. The most sheltered sites with least tidal scour. The most sheltered sites with least tidal scour had the greatest number of individuals per m^2.

Tidal scouring in the Crouch appears to be the main reason for such a stressed benthic community although the effects of polluting discharges can not be ruled out.

1.6 ROACH

The number of individuals per site varied greatly throughout the area. The highest numbers per site were at sites either away from the main estuary channel or in its uppermost reaches. The average species number per site is relatively low at 7.19, with over 80% of the sites having less than 10 species present. The southern end of Potton Island has the largest number of species groups, whereas the sites near the large bend, Horseshoe Corner, have low numbers of species.

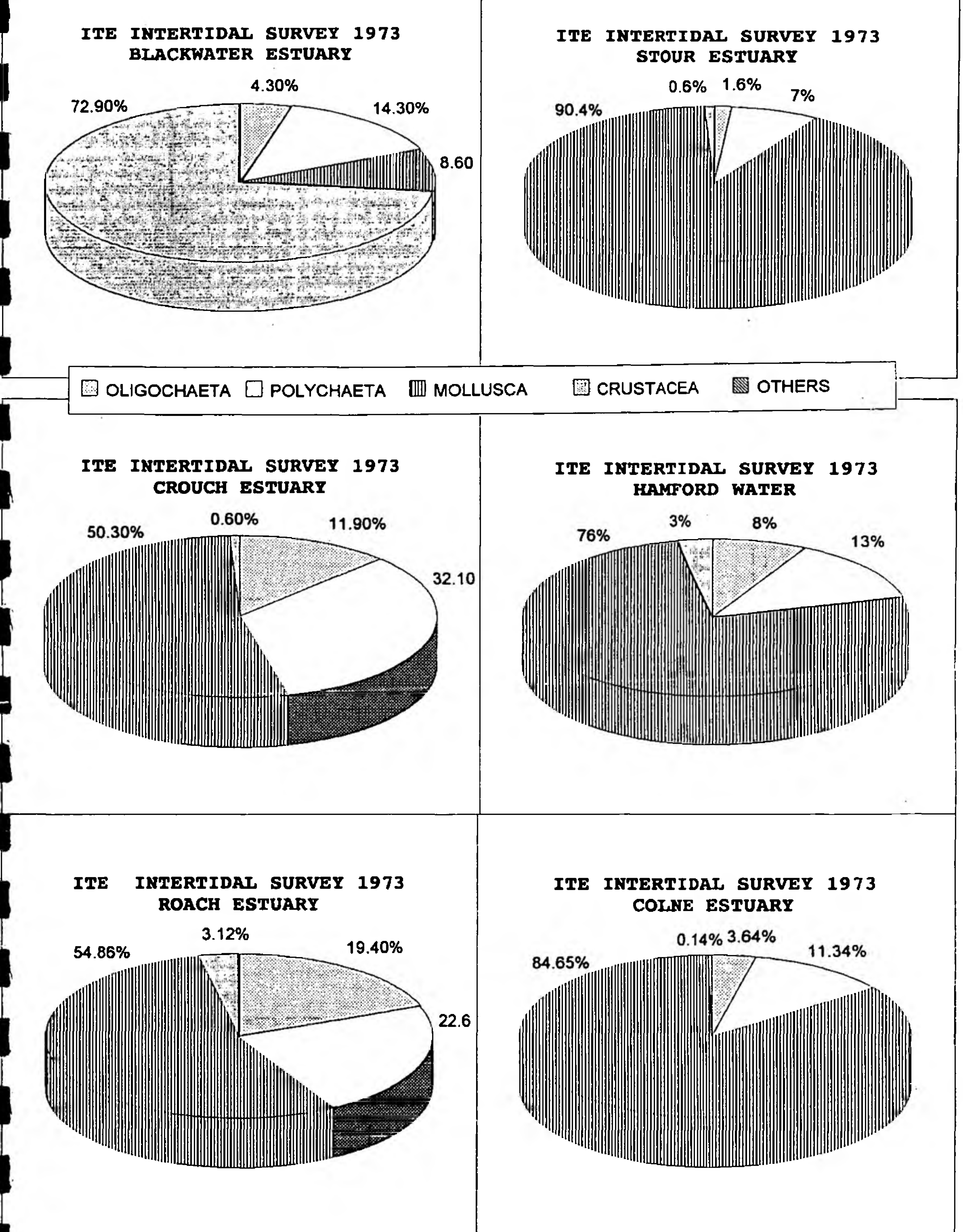
The 1985 sample population was totally dominated by annelid worms. The ten polychaete species identified formed the bulk of annalids. T. benedeni was the most numerous species being found at every sample site. It shows the highest occurrence of all the estuaries sampled, accounting for 64.5% of all the individuals

(Fig 107). Of the six mollusc species found only M. batthica was widespread. N. diversicolor was common at the top and mid estuary as expected and only one crustacean specimen was found throughout the whole estuary.

The average species number per site of 7.19 compares favourably with the Crouch at only 6.6. Where tidal scour is greatest fewer species are found. The Roach followed a similar pattern to the other estuaries surveyed in that the majority of species were polychaetes and the majority of individuals were oligochaetes. The high value of T. benedeni may reflect the tidal scour regime or may indicate some other underlying factor. As an opportunistic species it has been suggested to be an indicator of pollution.

From this survey the Roach estuary appears to be of poorer biological quality than the other estuaries in terms of the macroinvertebrate community structure. The dominance of T. benedeni and lack of crustaceans may suggest some long term form of pollution may be suppressing the benthic fauna. However, tidal scouring may also play a large part in influencing the benthic fauna in this estuary.

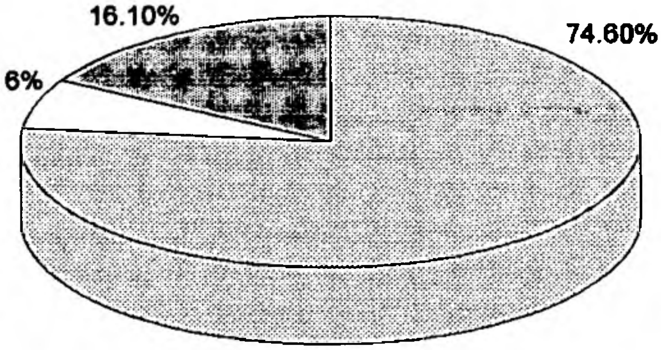
FIG 105



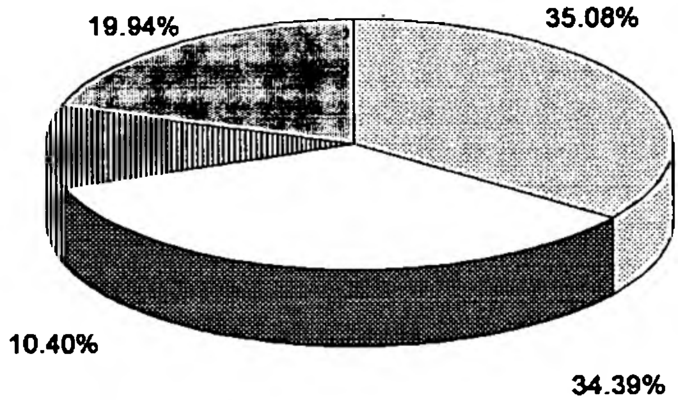
ITE INTERTIDAL SURVEY 1973
BLACKWATER ESTUARY
4.30%
72.90%
14.30%
8.60
ITE INTERTIDAL SURVEY 1973
STOUR ESTUARY
0.6%
1.6%
7%
90.4%
OLIGOCHAETA
POLYCHAETA
MOLLUSCA
CRUSTACEA
OTHERS
ITE INTERTIDAL SURVEY 1973
CROUCH ESTUARY
50.30%
0.60%
11.90%
32.10
ITE INTERTIDAL SURVEY 1973
HAMFORD WATER
76%
3%
8%
13%
ITE INTERTIDAL SURVEY 1973
ROACH ESTUARY
54.86%
3.12%
19.40%
22.6
ITE INTERTIDAL SURVEY 1973
COLNE ESTUARY
84.65%
0.14%
3.64%
11.34%

FIG 106

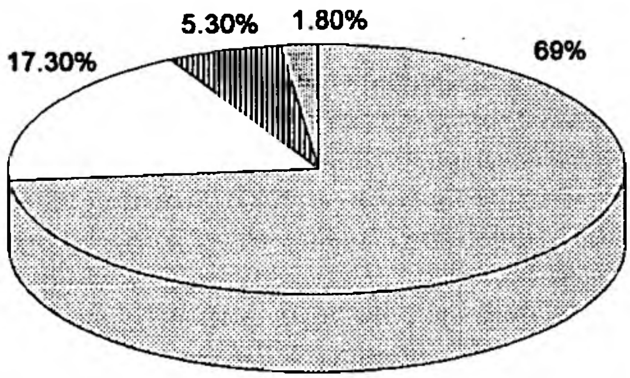
AW INTERTIDAL SURVEY 1985
BLACKWATER ESTUARY



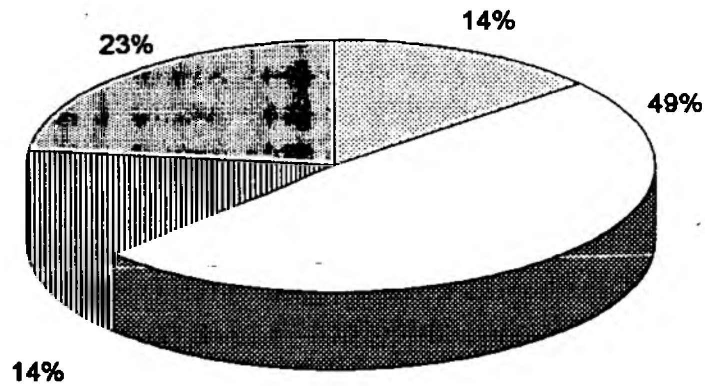
AW INTERTIDAL SURVEY 1985
STOUR ESTUARY



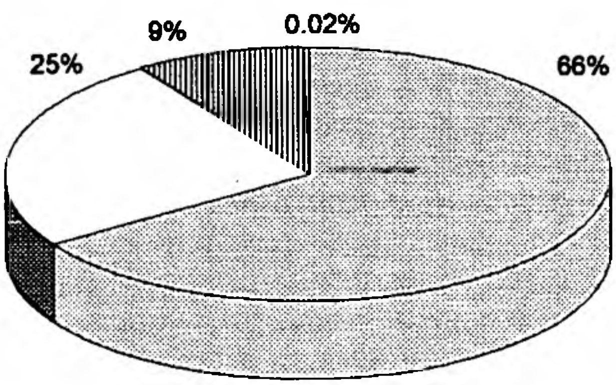
AW INTERTIDAL SURVEY 1985
CROUCH ESTUARY



AW INTERTIDAL SURVEY 1985
HAMFORD WATER



AW INTERTIDAL SURVEY 1985
ROACH ESTUARY



AW INTERTIDAL SURVEY 1985
COLNE ESTUARY

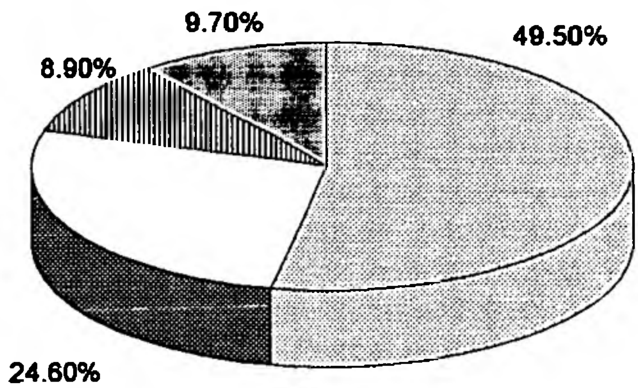
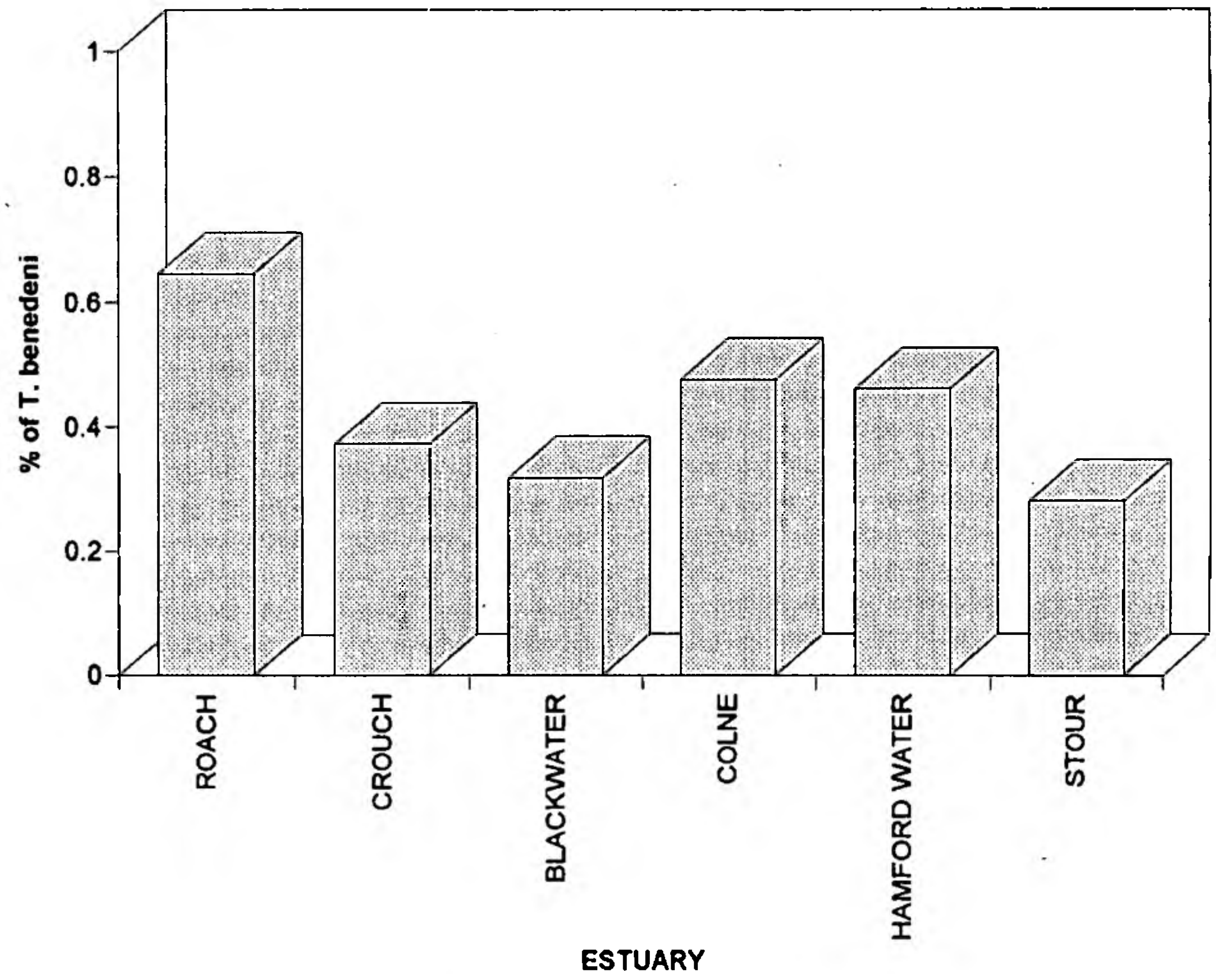


FIG 107

TOTAL PERCENTAGE OF T. benedeni
OF ALL INDIVIDUALS IN AW INTERTIDAL SURVEYS (1984-1985)



2 INTERTIDAL and SUBTIDAL SURVEYS 1989 - 92

The standardisation of sieve mesh size to 0.5 mm and sampling techniques allows more valid inter-estuary comparisons of the 1989-1992 biological surveys.

2.1 INTERTIDAL SURVEYS (Fig 108 - 110)

The percentage composition of the interidal fauna is similar in the Blyth, Ore/Alde and Deben estuaries (Fig 108). That is, polychaete Worms (mainly Tharyx sp)are the dominant group, although ologochaetes (mainly Tubificoides benedeni) and molluscs are well represented. Oligochaetes were found to be the dominant organism of the River Orwell intertidal fauna. Tubificoides pseudogaster was the most important oligochaete, especially in the upper reaches of the estuary (Fig 109).

Molluscs were a relatively less important constituent compared to the three other estuaries discussed. This may be a result of the increased organic loading which the Orwell receives.

2.2 SUBTIDAL (Fig 110 - 112)

The percentage composition of the major faunal groups varied considerably in the different estuaries (Fig 111). In general, better quality estuaries support a well balanced fauna. As such, the Blackwater and Stour estuaries supported subtidal communities which, although dominated by polychaetes and oligochaetes, also supported significant mollusc and crustacean populations. Conversely, the River Colne subtidal fauna was dominated by oligochaete worms (Tubifex costatus and Tubificoides pseudogaster). In fact, polychaetes and oligochaetes accounted for greater than 99% of all individuals (Fig 112). The mean number of species per grab was also significantly lower in the Colne estuary, compared to the Blackwater and Stour estuaries. This again reflects its poor quality status (Fig 110).

Severe organic loadings in the upper Colne estuary are the most likely cause of the poor biological conditions of the estuary.

FIG108

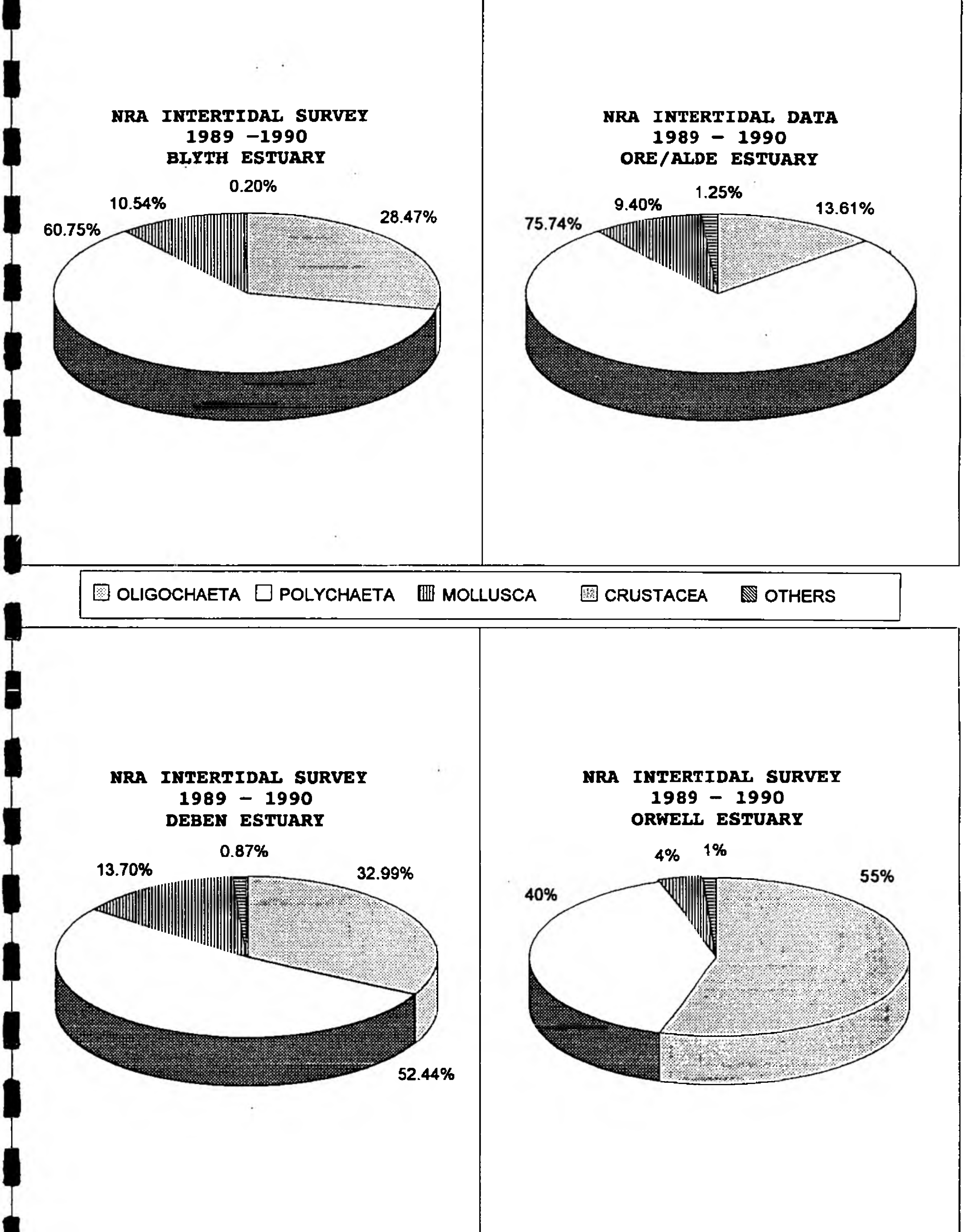

NRA INTERTIDAL SURVEY
1989 -1990
BLYTH ESTUARY
0.20%
10.54%
28.47%
60.75%
NRA INTERTIDAL DATA
1989 - 1990
ORE/ALDE ESTUARY
1.25%
9.40%
13.61%
75.74%
OLIGOCHAETA
POLYCHAETA
MOLLUSCA
CRUSTACEA
OTHERS
NRA INTERTIDAL SURVEY
1989 - 1990
DEBEN ESTUARY
0.87%
13.70%
32.99%
52.44%
NRA INTERTIDAL SURVEY
1989 - 1990
ORWELL ESTUARY
4%
1%
55%
40%

FIG 109

TOTAL PERCENTAGE OF T. benedeni AND Tharyx sp. OF ALL INDIVIDUALS IN NRA INTERTIDAL SURVEYS (1989 - 1990)

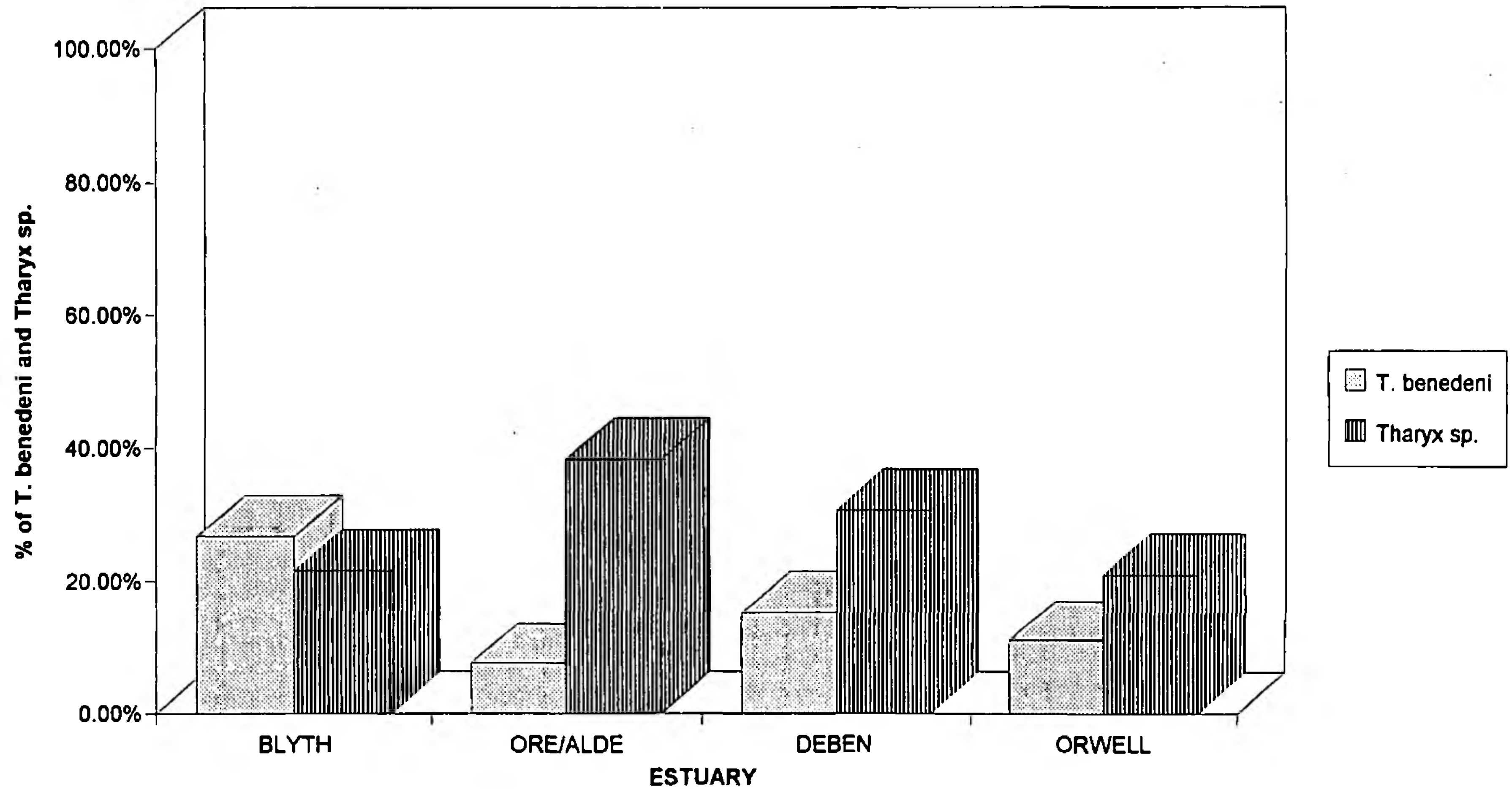
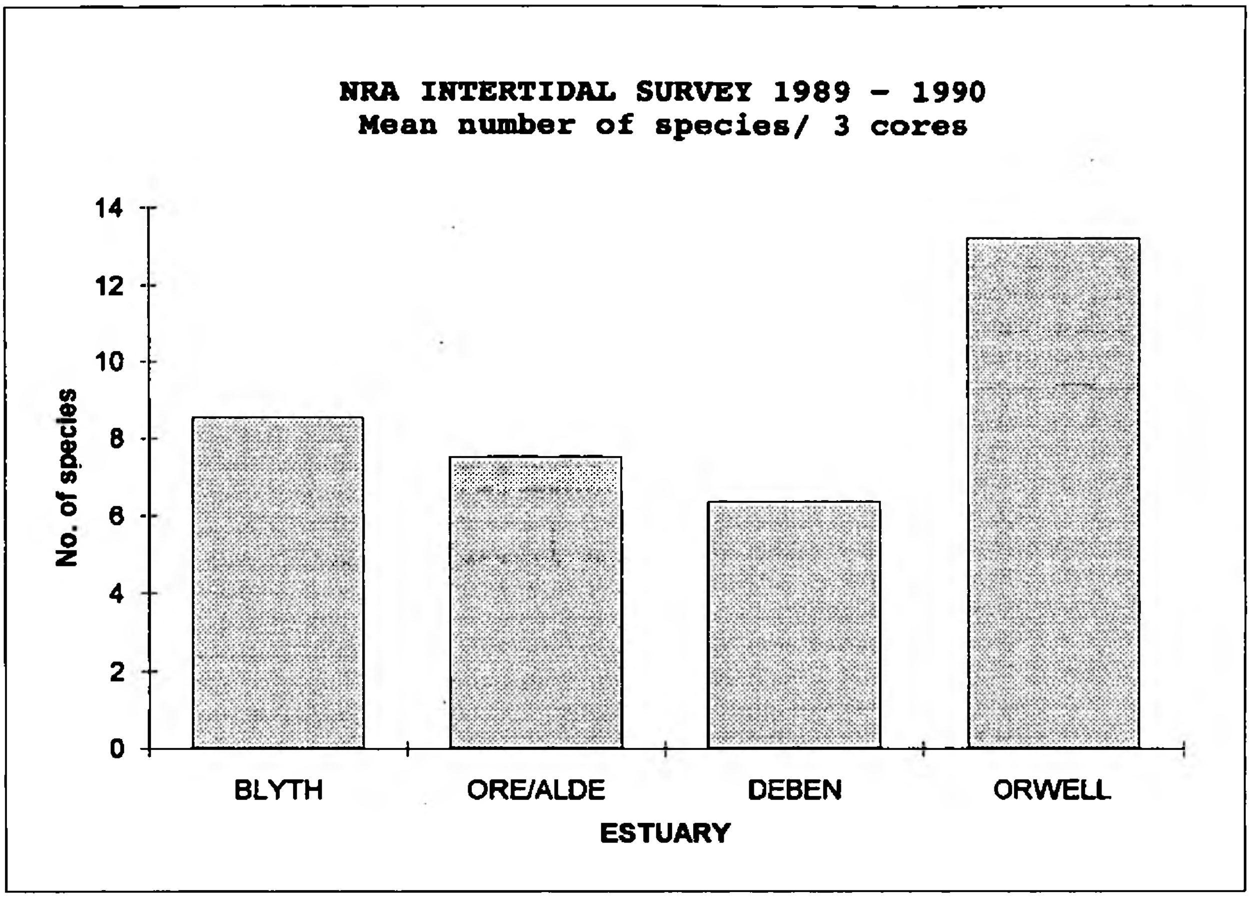


FIG 110


NRA INTERTIDAL SURVEY 1989 - 1990
Mean number of species/ 3 cores
No. of species
0
2
4
6
8
10
12
14
BLYTH
ORE/ALDE
DEBEN
ORWELL
ESTUARY

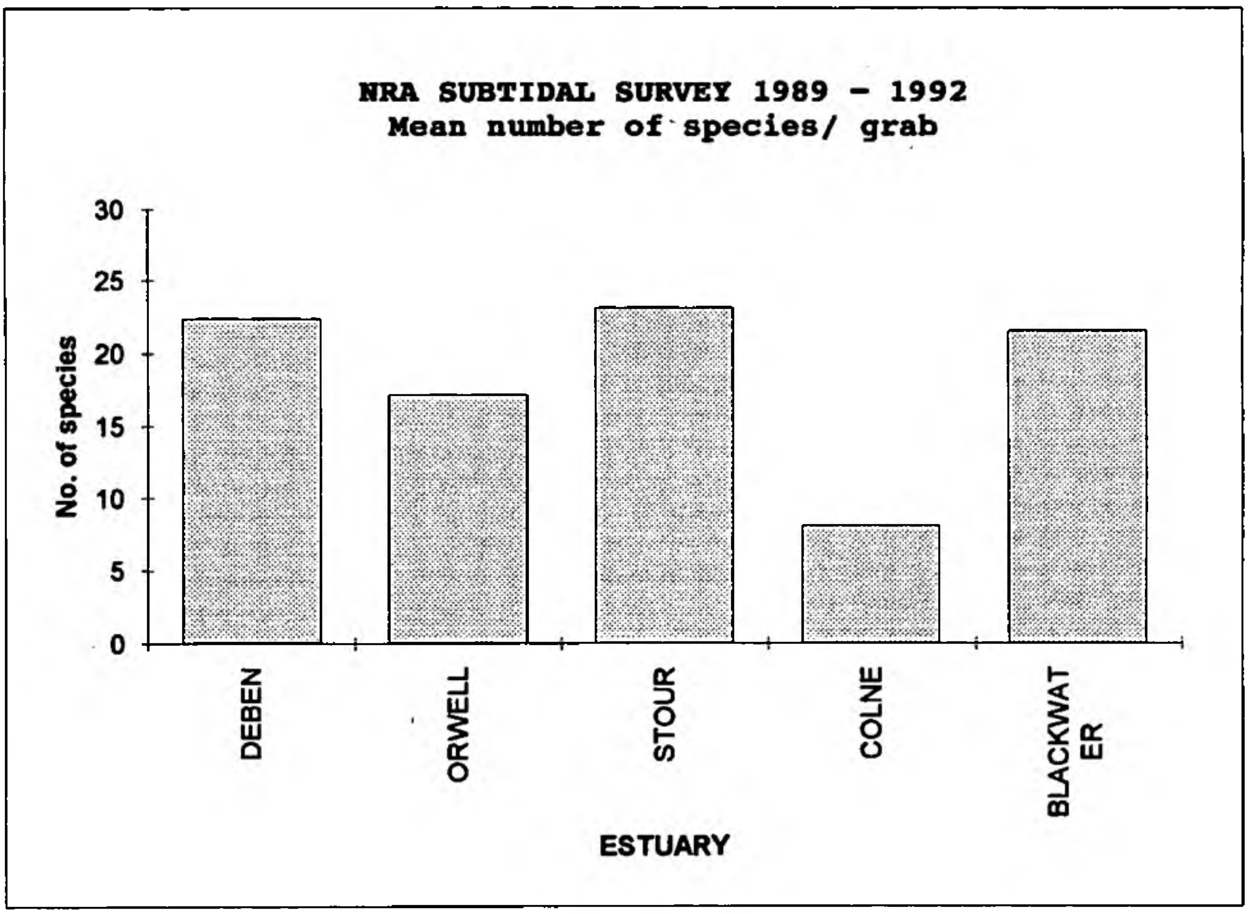

NRA SUBTIDAL SURVEY 1989 - 1992
Mean number of species/ grab
No. of species
0
5
10
15
20
25
30
DEBEN
ORWELL
STOUR
COLNE
BLACKWAT ER
ESTUARY

FIG 111

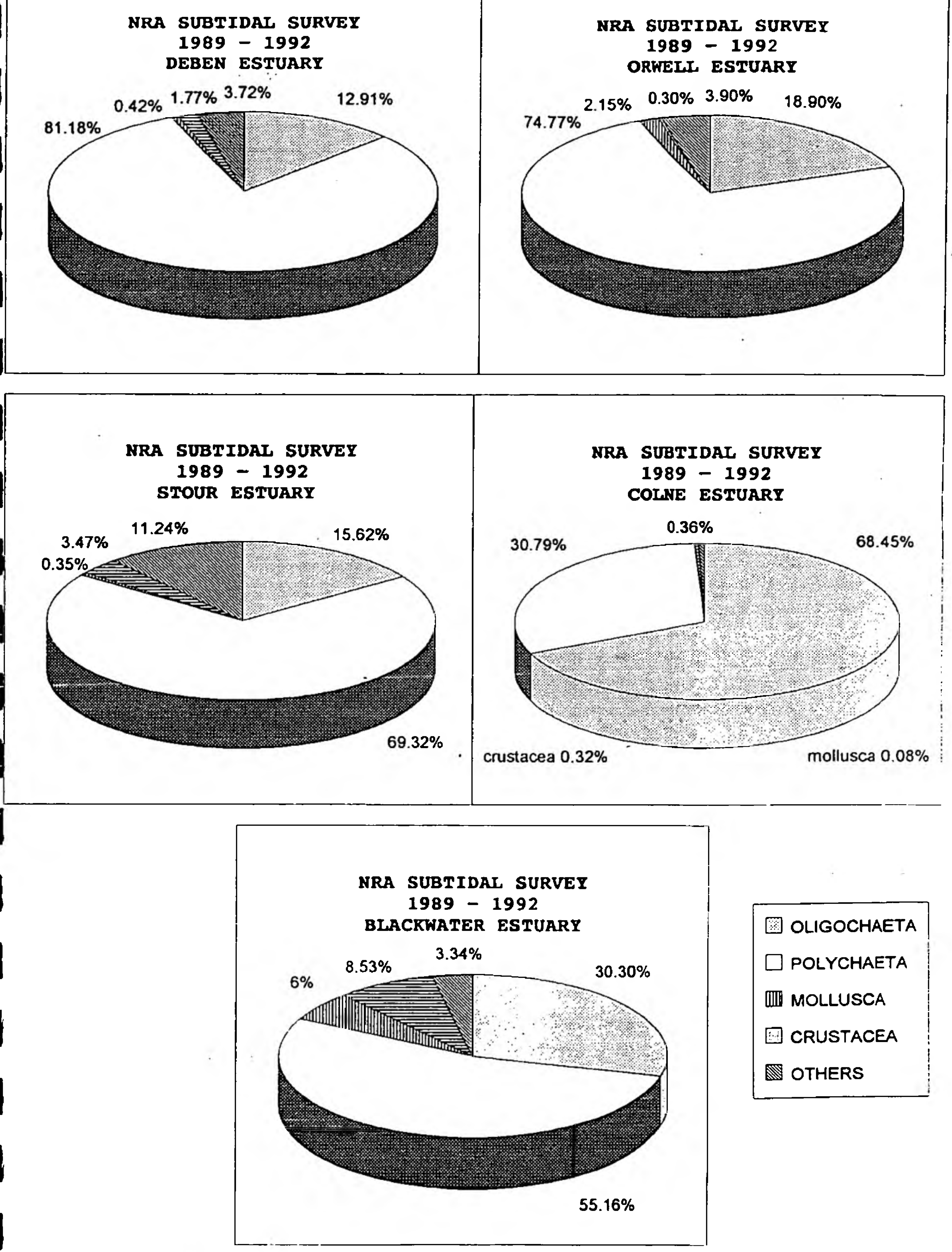
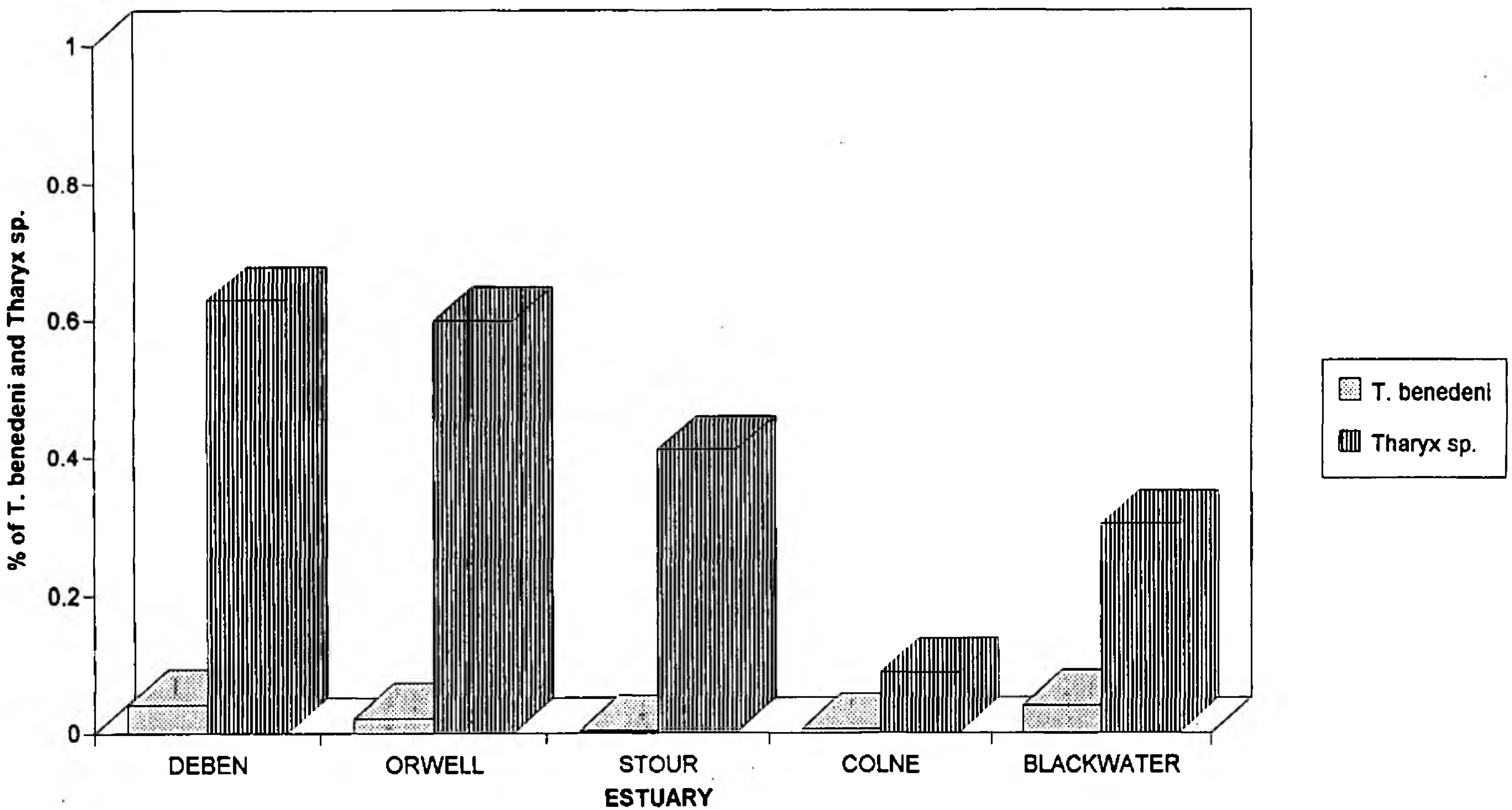

NRA SUBTIDAL SURVEY
1989 - 1992
DEBEN ESTUARY
0.42%
1.77%
3.72%
12.91%
81.18%
NRA SUBTIDAL SURVEY
1989 - 1992
ORWELL ESTUARY
2.15%
0.30%
3.90%
18.90%
74.77%
NRA SUBTIDAL SURVEY
1989 - 1992
STOUR ESTUARY
11.24%
3.47%
0.35%
15.62%
69.32%
NRA SUBTIDAL SURVEY
1989 - 1992
COLNE ESTUARY
0.36%
30.79%
68.45%
crustacea 0.32%
mollusca 0.08%
NRA SUBTIDAL SURVEY
1989 - 1992
BLACKWATER ESTUARY
3.34%
8.53%
6%
30.30%
55.16%
OLIGOCHAETA
POLYCHAETA
MOLLUSCA
CRUSTACEA
OTHERS

FIG 112

TOTAL PERCENTAGE OF T. benedeni AND Tharyx sp. OF ALL INDIVIDUALS IN NRA SUBTIDAL SURVEYS (1989 - 1992)



3 CONCLUSION

The majority of Suffolk/Essex estuaries should really be classed as tidal inlets since freshwater flow is often negligible, with flow being controlled by sluices. Thus marine conditions occur farther upstream than in a true estuary. Consequently, there is the potential for increased invertebrate diversity. Where water quality is satisfactory, this has been shown to be the case (ie. River Stour and River Blackwater). However, the rivers Colne and Orwell, which are both subjected to poorer quality organic discharges, support an invertebrate fauna that is restricted in diversity with enhanced productivity of pollution tolerant species.

SECTION D]

NUTRIENT AND CHLOROPHYLL STATUS

D] NUTRIENT AND CHLOROPHYLL STATUS

1 ESTUARINE

The introduction of the Urban Waste Water Directive (UWWD) and the Nitrate Directive necessitated monitoring and classifying sensitive areas in early 1992. Proposed designations under the UWWD include the Deben and Colne estuaries. Under the Nitrate Directive the Blyth estuary is proposed (See Appendix 8 for the criteria for designation).

Early data on chlorophyll a and nutrients are extremely limited and water quality models in existence only postulate eutrophication patterns in the estuaries to a limited extent.

The graphs (Fig 113) illustrate the difference in both chlorophyll a and nutrient values at the top and mouth of each estuary in Suffolk and Essex from March '92 to March '93 (See Appendix 9 for sample points and results).

1.1 BLYTH

The highest levels of nutrients on the Blyth occur at the mouth of the estuary at Bailey Bridge Southwold. It is, in fact, the highest levels reached of all the estuaries at any point. Most of the other estuaries have recorded higher nutrient values at the upper end. The reason may be due to the fact that this site lies in close proximity to the Southwold sewage outfall. Nutrient levels at the top of the estuary, at Bailey Bridge, have remained relatively stable during the year with higher values occurring during the winter months.

Chlorophyll levels at the mouth and top of the estuary are similar. Levels at Bailey Bridge showed no seasonal increase whilst levels at Blythburgh Bridge, at the top of the estuary, fluctuated with a peak of 19 ug/l in early June.

1.2 ORE/ALDE

The TON values for the upper estuary at Barbers Point were very high throughout the year. In comparison the values at the mouth of the estuary, at Havergate Island, showed a very low nutrient content.

At Barbers Point a gradual increase in chlorophyll occurred but mean levels were similar to those at the mouth of the estuary. A bloom in the estuary occurred during late April and was attributed to the brackish diatom *Skeletonema sp.*

1.3 DEBEN

TON values in the upper estuary, at Methersgate Reach, were high, peaking in April and decreasing over the summer. The values recorded were much higher than those expected for normal background levels in the eastern area estuaries. At the mouth of the estuary the TON values remained low.

Chlorophyll levels in the upper Deben estuary have regularly exceeded 10 ug/l with peaks of 40 ug/l during early May. This was caused by a bloom of the brackish diatom *Skeletonema sp.*. The high chlorophyll levels in June were attributed to the diatom *Chaetoceros sp.* A second bloom occurred during late July and early August with chlorophyll levels peaking at 80 ug/l. This was the highest recorded value for any of the Suffolk and Essex estuaries. The dominant bloom species was again the diatom *Chaetoceros*.

1.4 ORWELL

In the upper estuary, off Freston Hard, high nutrient levels were recorded during early April declining in late June. The mean values are higher than those found at Languard Point at the mouth of the estuary.

Chlorophyll levels in the upper estuary were low, increasing to a peak in June. They are higher than at the mouth of the estuary where the chlorophyll levels have remained low, despite showing a slight seasonal increase.

1.5 STOUR

Both TON and chlorophyll values have remained low, the higher values being present at the top of the estuary. The chlorophyll levels showed a slight seasonal increase reflecting algal activity. However, only one value at Dovehouse Point was recorded in excess of 10 ug/l.

1.7 COLNE

TON values reached high levels off Alresford Creek during April and early May. Chlorophyll and nutrient levels are particularly high in the Colne compared with the other estuaries. Seasonal increases are apparent, Alresford Creek peaked in late June at 37.9 ug/l. Both *Skeletonema sp.* and *Chaetoceros sp.* were dominant during this period.

1.8 BLACKWATER

Both TON and Chlorophyll values are low at both the upper and lower sites with no appreciable seasonal increase in chlorophyll.

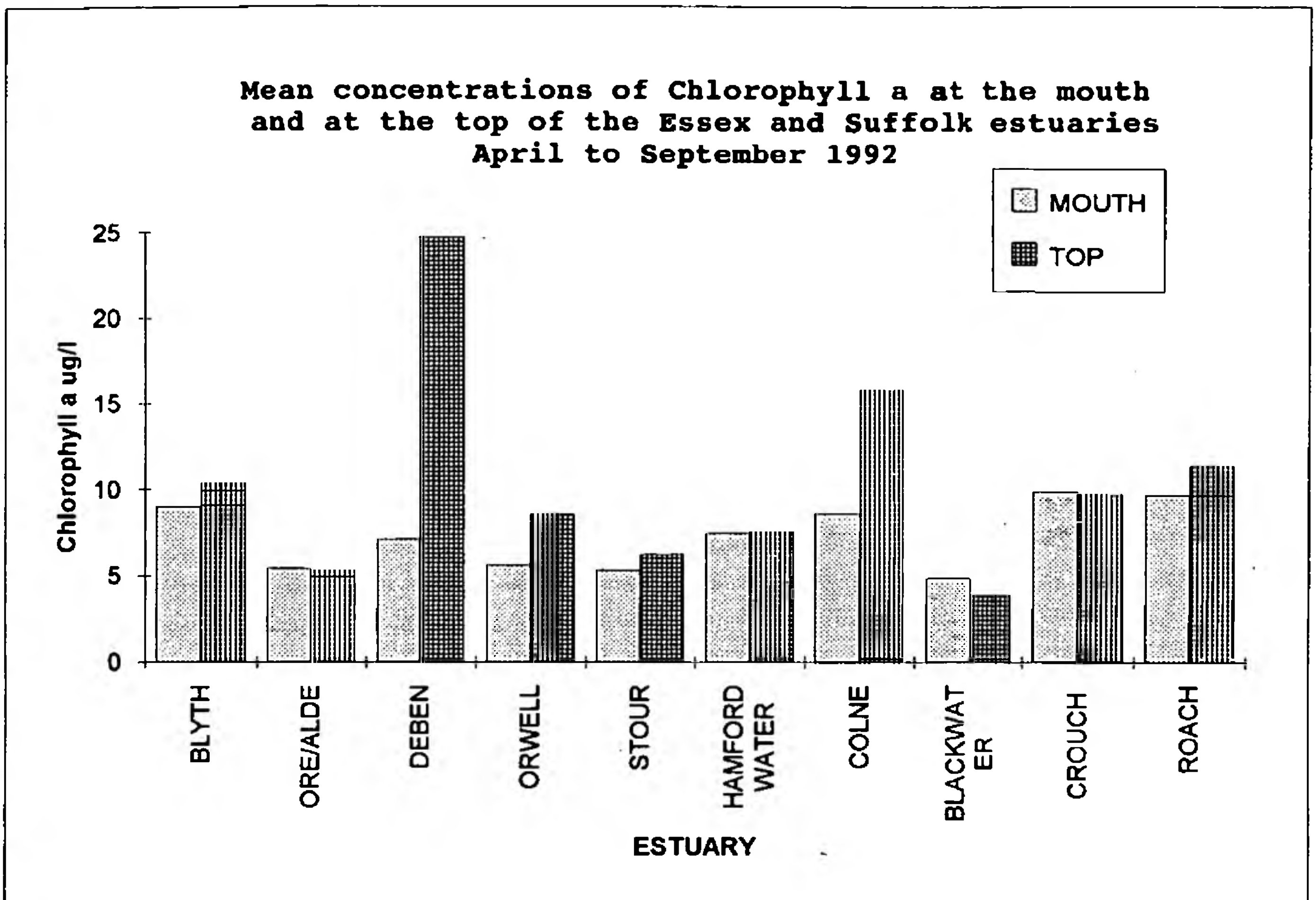
1.9 CROUCH

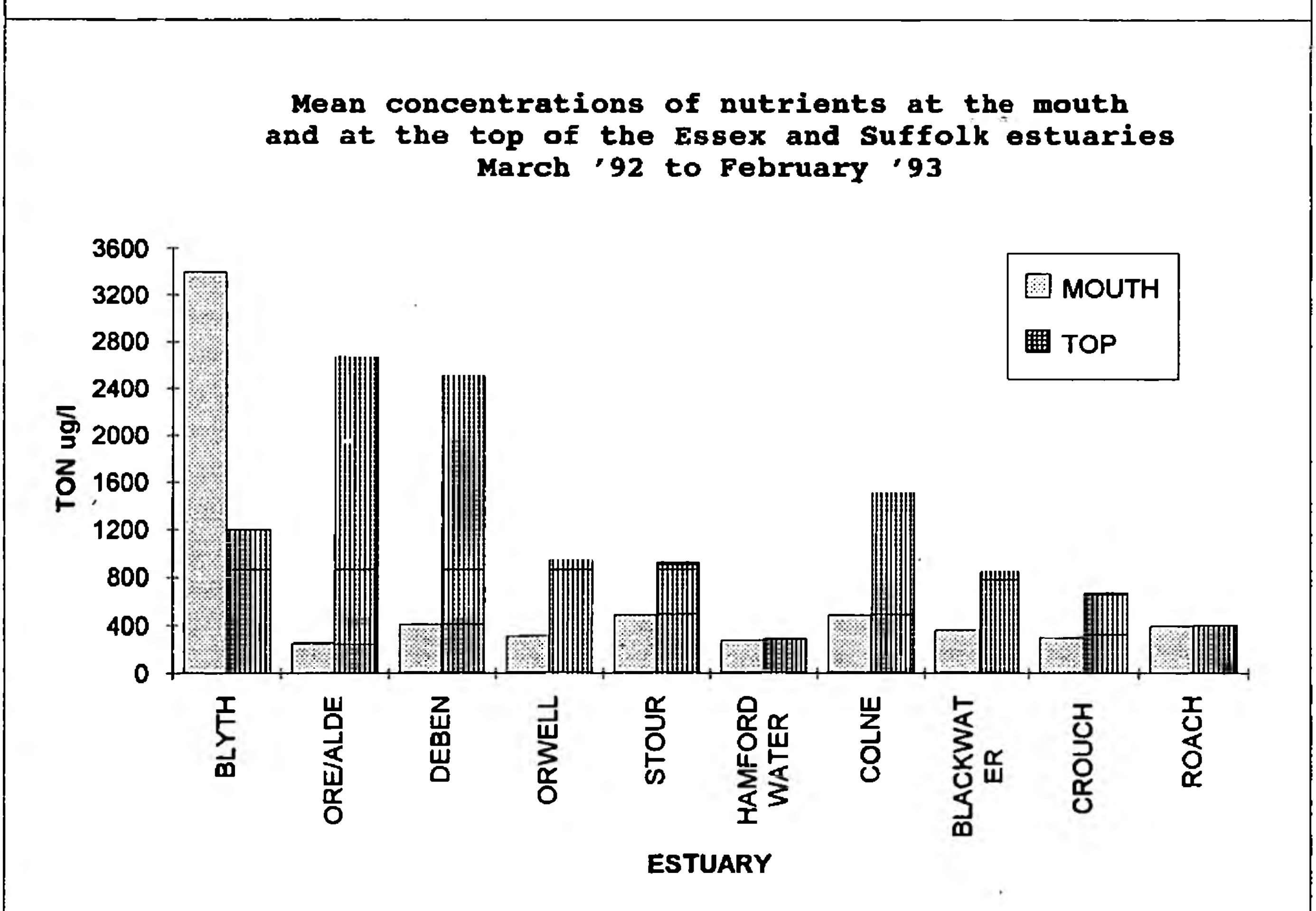
Nutrient levels at the Inner Crouch Buoy reached their peak during early April. The same pattern occurred at the top of the estuary at North Fambridge.

Chlorophyll levels at the mouth of the estuary have fluctuated with the major peak occurring in mid May. Algal sample analysis attributed this to a bloom of the marine diatom *Asterionella glacialis*. Mean chlorophyll levels are similar at the top of the estuary with the peak occurring at the beginning of April.

1.10 ROACH

Nutrient levels were very low throughout the year along the whole estuary. Chlorophyll levels at the mouth and top of the estuary have fluctuated and mean values at Paglesham have exceeded 10 ug/l since early April.


Mean concentrations of Chlorophyll a at the mouth
and at the top of the Essex and Suffolk estuaries
April to September 1992
MOUTH
TOP
Chlorophyll a ug/l
25
20
15
10
5
0
BLYTH
ORE/ALDE
DEBEN
ORWELL
STOUR
HAMFORD WATER
COLNE
BLACKWAT ER
CROUCH
ROACH
ESTUARY


Mean concentrations of nutrients at the mouth
and at the top of the Essex and Suffolk estuaries
March '92 to February '93
MOUTH
TOP
TON ug/l
3600
3200
2800
2400
2000
1600
1200
800
400
0
BLYTH
ORE/ALDE
DEBEN
ORWELL
STOUR
HAMFORD WATER
COLNE
BLACKWAT ER
CROUCH
ROACH
ESTUARY

2 CONCLUSIONS

The enhanced monitoring programme of 1992-1993 has revealed the Deben, Colne and Blyth estuaries to be the most eutrophic of the Suffolk and Essex estuaries.

The Deben estuary experienced high chlorophyll levels throughout the spring and summer period in its upper reaches, with brackish/marine diatoms (*Chaetoceros sp.* and *Skeletonema sp.*) forming 'bloom' populations. The nearby Ore estuary, although experiencing a brief spring bloom of *Skeletonema sp.* yielded chlorophyll levels <10 ug/l for the bulk of the summer. This was despite experiencing similar high TON loadings to the Deben estuary.

It is possible that nutrients other than nitrogen are limiting algal populations in this estuary. Scientists analysing phytoplankton primary production in the Dutch Oosterschelde found silica to be the limiting nutrient for diatom growth during the summer period (Wetsteyn *et al* 1990).

With the exception of the Blyth estuary, all Suffolk and Essex estuaries experienced higher chlorophyll and TON values in the upper reaches compared to the seaward end. This confirms the view that estuarine enrichment is largely from fresh/brackish sources rather than from the North Sea.

It is too early to say whether control of nutrients at sewage treatment works will alleviate eutrophication. Associated control of agricultural inputs under the Nitrate Directive is also required.

3 OFF SHORE

Coastal nutrient and chlorophyll samples were taken over a one year period along the East Anglian Coast, from Hunstanton to Shoeburyness. There were fifteen sample points used along the Suffolk and Essex coast (See Map 29 and Appendix 10 for sample points). Compared to estuarine levels both TON and chlorophyll levels were low.

Trends such as higher TON levels around March/April and very low levels in the summer were noted. Chlorophyll levels showed an inverse pattern with high levels recorded in late May (See Fig 114).

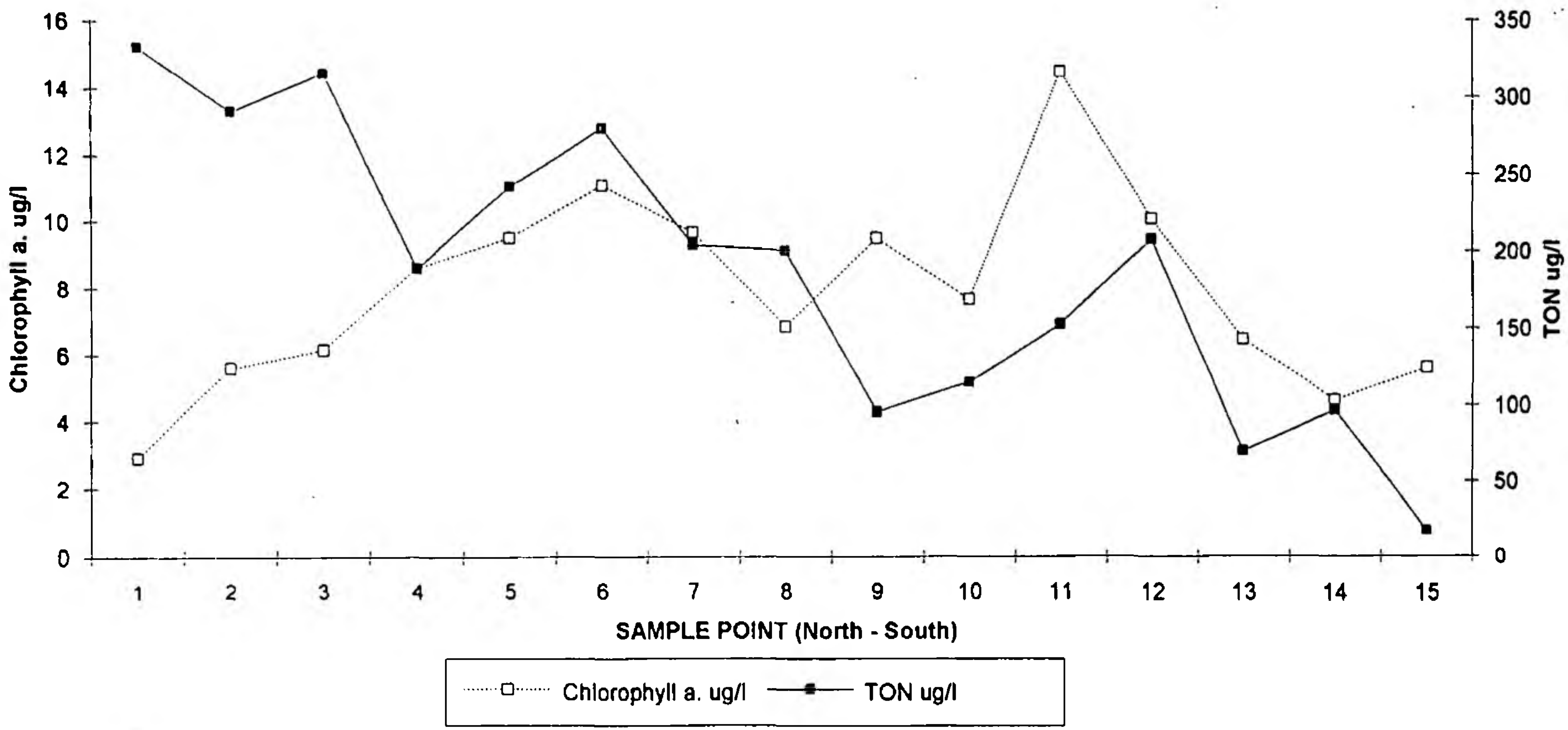
Off the Essex coast several sites exceeded 10 ug/l of chlorophyll this was mainly due to the diatom *Rhizosolenia spp*. The graph illustrates the bloom of *Rhizosolenia spp.* off the Essex coast in mid May. During late May aggregations of this genus formed extensive floating brown scums off Felixstowe. Aesthetically this resulted in considerable public anxiety.

The off-shore waters do not meet the criteria set for designation under the Urban Waste Water Directive and the Nitrate Directive. TON levels are higher closer to the estuary inputs. The threshold limit is too low as the background level in the Suffolk and Essex area is high at about 500 ug/l.

Elevated levels of chlorophyll a. off-shore tend to be transitory in comparison with the estuaries. The algal blooms off the Essex coast, from the Blackwater southwards, in June/July caused by *Noctiluca scintillans* do not contain the chlorophyll pigment and consequently did not register on the chlorophyll a test.

FIG 114

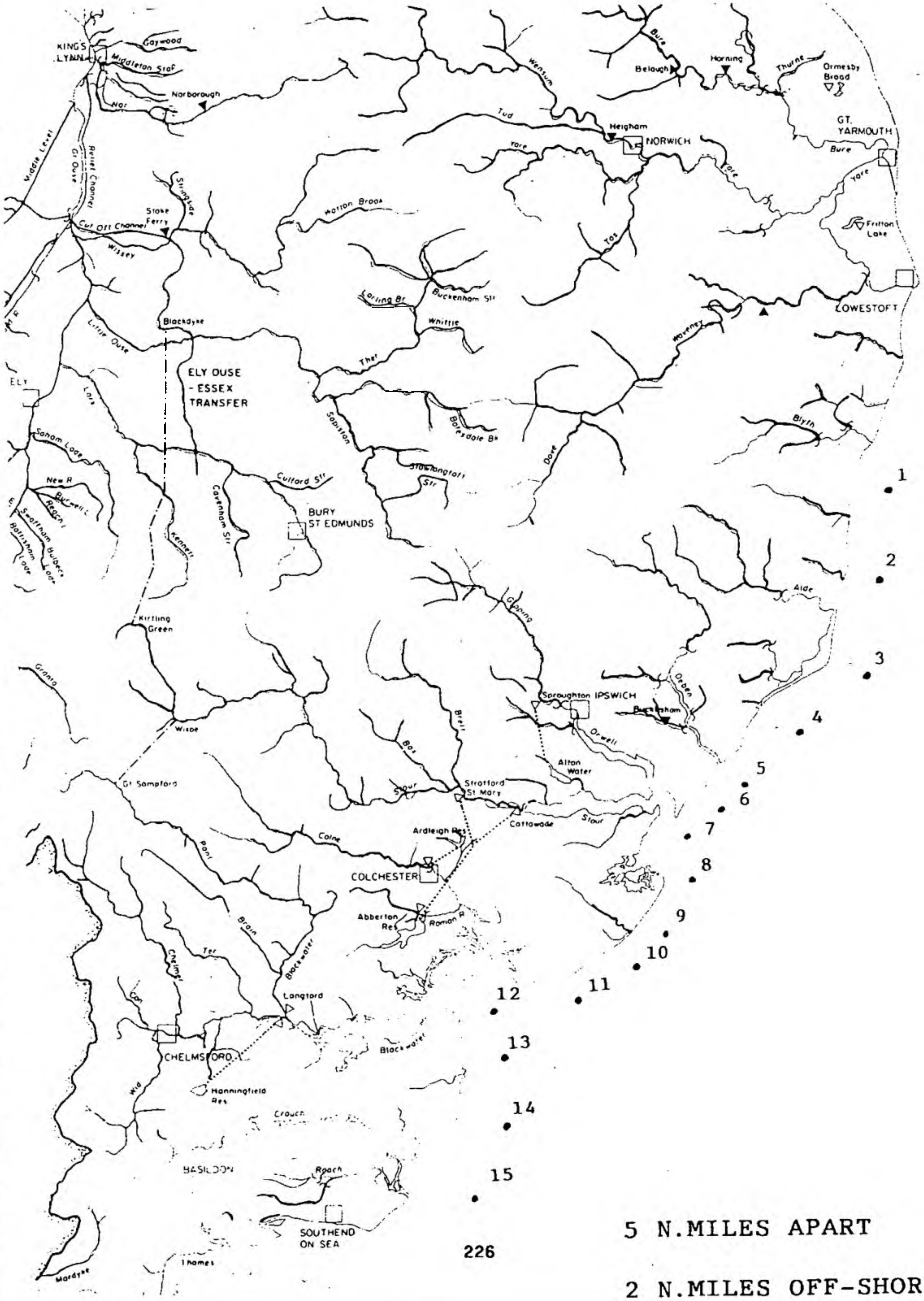
SUFFOLK AND ESSEX OFF-SHORE NUTRIENT SURVEY
11th - 15th MAY 1992



SUFFOLK AND ESSEX

MAP 29

OFF - SHORE NUTRIENT SAMPLING POINTS



5 N.MILES APART

2 N.MILES OFF-SHORE

SECTION E]

HEAVY METAL STATUS

E] HEAVY METAL STATUS

Two surveys were carried out in 1991 to assess heavy metal concentrations in East Anglian coastal waters, its aim was to establish areas of concern, highlighting the regions where the Environmental Quality Standards were exceeded (F Eley 1993). (See Appendix 11 for EQS).

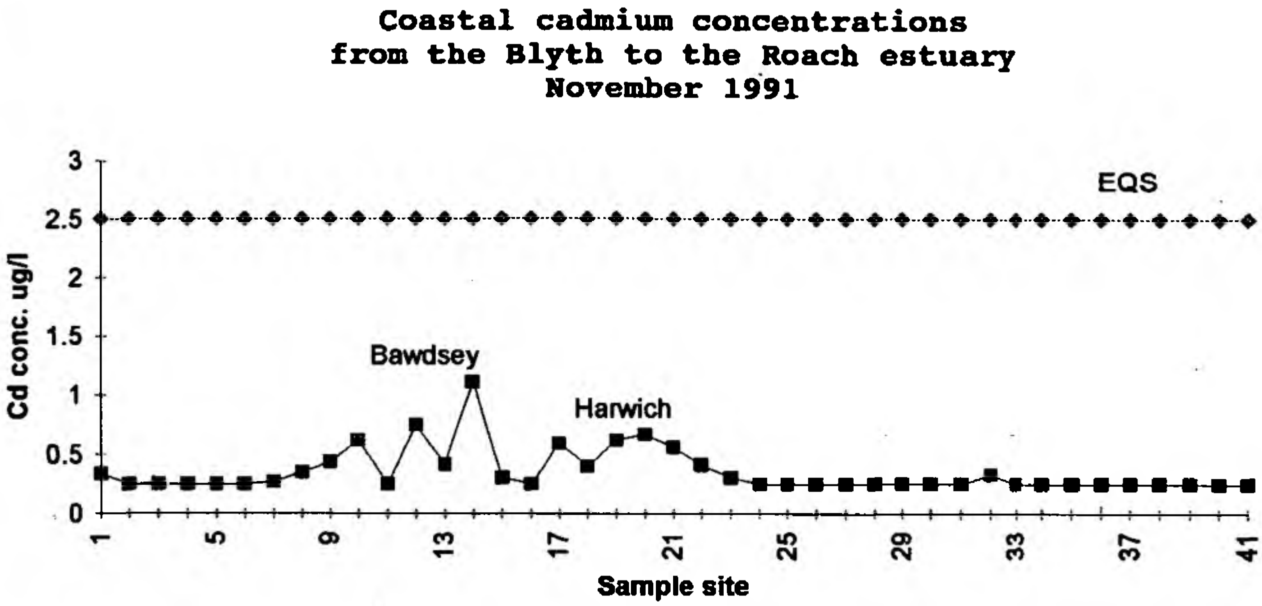
Heavy metals are naturally present in the aquatic environment in trace quantities. A threat to the biota is caused when the metals occur in higher than usual concentrations caused by anthropogenic sources mainly from industry and agriculture. Heavy metals are conservative pollutants and tend to accumulate in the environment.

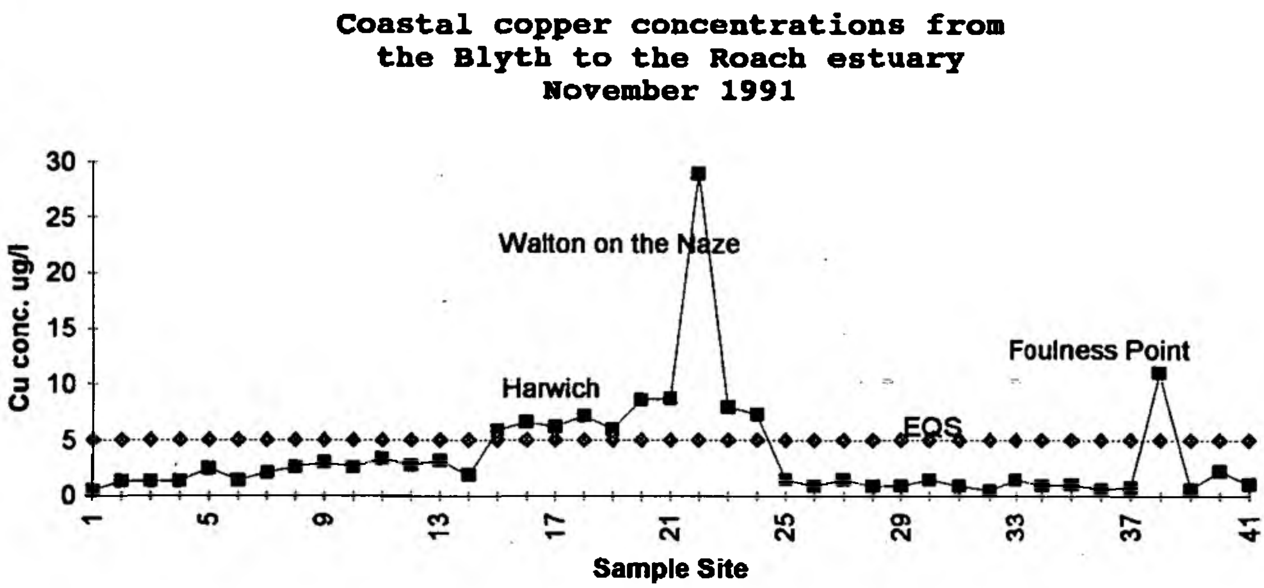
From Aldeburgh to Bawdsey (See Appendix 12 for sample site locations) high levels of cadmium and lead were discovered, at present there is no explanation for this as the Ore/Alde is considered 'clean'(Fig 115 & Fig 116). The MAFF survey of 1990 shows similar results in their study of *Mytilus edulis* flesh. Dissolved chromium, nickel and zinc concentrations were high off Jaywick, the most probable cause being Clacton STW. Dissolved copper concentrations exceeded the EQS at 30% of the sample sites around East Anglia. The highest levels were recorded off Harwich. A definite cause has not been established but possible causes may include Cliff Quay STW, antifouling paints and sludge dumping, which occurs at Rough Towers. All other dissolved metals except arsenic, lead and mercury were high off Harwich. High copper concentrations were also located off Foulness Point which is near a sludge dumping area. Copper found in *Mytilus edulis* does not appear to be high around Harwich which may be due to the fact that copper is not present as the biologically available species, however the concentrations of zinc in *Mytilus edulis* at Harwich are the highest of all the sites.

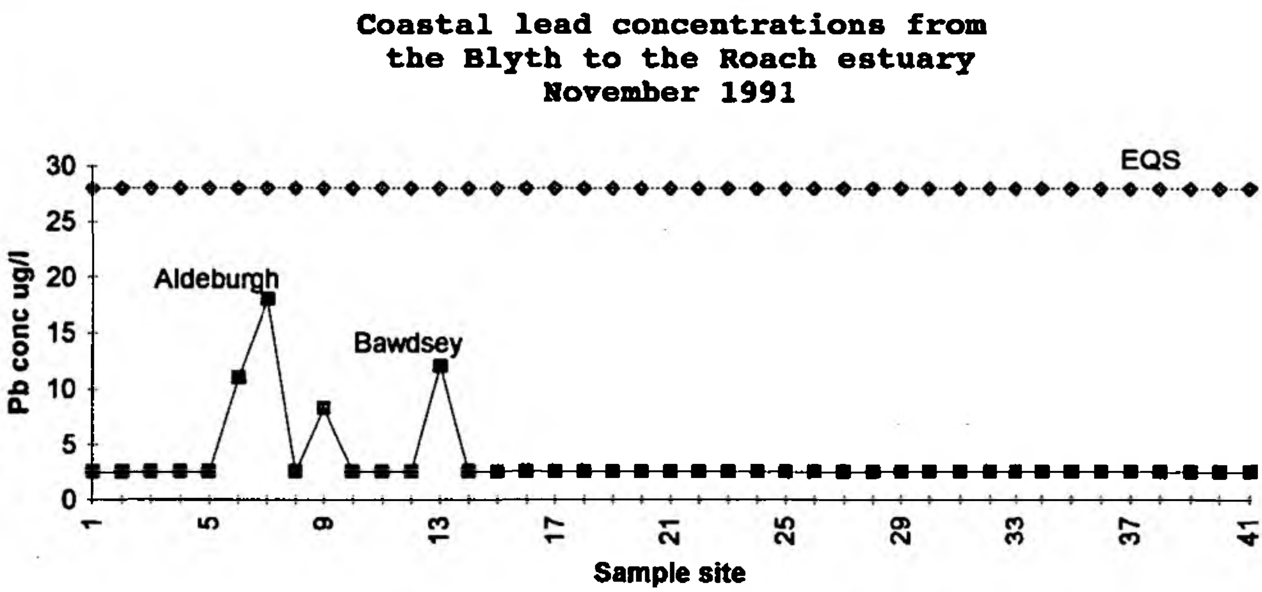
To conclude, chromium, nickel, mercury, arsenic, zinc, lead and cadmium did not exceed their EQS's on any occasion and both mercury and arsenic do not appear to present a significant problem in East Anglian coastal waters. Only copper exceeded its EQS with high values being recorded at Harwich.

It is important to point out that the EQS's refer to dissolved metal concentrations and to an annual average, in this survey only one result was obtained at each site. Also the surveys were carried out in winter so resuspension of metals due to turbidity is possible causing elevated metal concentrations.

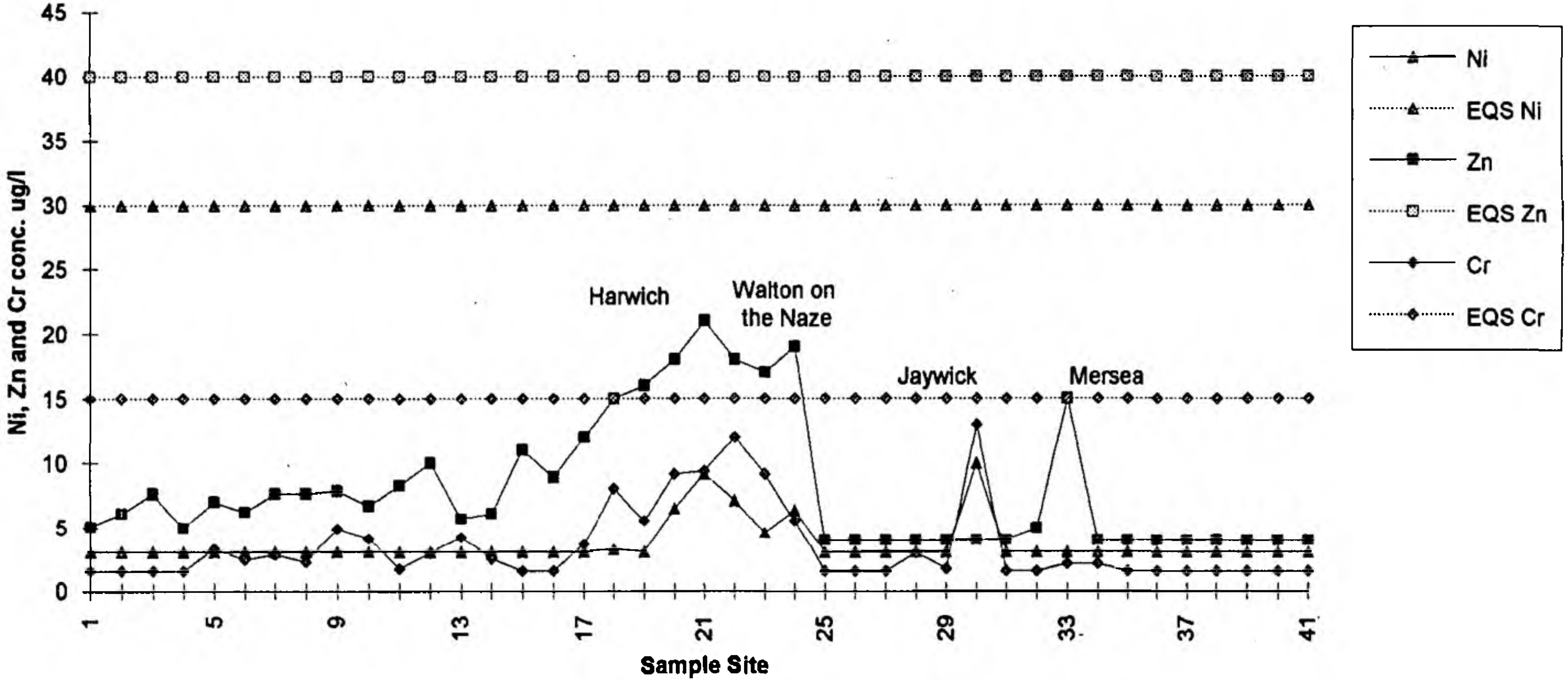
FIG 115 HEAVY METALS







Coastal concentrations of nickel, zinc and chromium from the Blyth to the Roach estuary November 1991



SECTION F]

OFF SHORE FISHERY STATUS

F] OFF - SHORE FISHERY STATUS IN SUFFOLK AND ESSEX

The NRA's jurisdiction lies 3 miles from low water mark (LWM), within this area in Suffolk and Essex are many fishing areas. The main fishing ports that service these fishing areas are at Harwich, Brightlingsea, West Mersea, Maldon, Burnham-on-Crouch, Bawdsey, Orford and Southwold.

1 HARWICH:

Cod is fished off shore mainly by trawling and long lining. Most fishing takes place in autumn and winter with a small amount in spring. Up to 400 tonnes can be caught in a season.

Juvenile sprats move up the estuaries during winter and are caught as whitebait between December and February. The numbers are variable and tend to be dependant on the weather.

Historically the shrimp industry was quite large in this region, but the last 25 years has seen the stock decline possibly due to overfishing. Roach and juvenile bass have benefitted as they are often damaged by shrimp trawling.

Gill netting and trammel netting takes place in winter for both cod and whiting and sole and bass are also fished off Harwich.

The lobster fishery off Harwich is generally quite productive as it has many areas of hard clay and rock which are ideal for lobsters. The season for lobster fishing is between March and October.

2 STOUR:

Sole and skate move up the Stour estuary from off shore and can prove to be quite a productive fishery. However herrings provide the main fishery in this area. The herring stock is in fact separate from the North Sea herring stock, it is smaller, less marketable and must be taken by drift net only. It has been suggested that the herring stocks of the Stour and Orwell may in fact be separate stocks. They move up the estuaries in December and spawn from February to March. Unfortunately the value of herrings has declined recently and as a result they are not fished as extensively.

3 MERSEA:

There are more trawlers at Mersea and less longlining for sole. Gill netting for bass is very popular as well as fyke netting for eels. West Mersea is the main sprat trawling area in Essex and Suffolk. Gill, trammel and tangle nets are also used in this area for roker and bass.

4 BLACKWATER:

Sprat populations have increased in this area possibly due to decreased usage of TBT. They move up into the Blackwater, often as far as Bradwell Marina. Up to 20 tonnes can be caught in 10 minutes.

Drift netting for herring during autumn and winter takes place as well as some gill and trammel netting for sole, bass, roker and grey mullet.

5 CROUCH AND ROACH:

Sprats shoal up estuaries as far as Paglesham but are now only caught in small quantities. Herring is taken by drift net during autumn and winter in small numbers. Sole fishing in this area is relatively profitable and occurs from April to September.

White weed, a soft fern-like hydroid, is raked from the sea bed on the edge of the Maplin Sands at the entrance to the Crouch estuary. It is quite a large industry, worth about £1.5 million per year. Most of the white weed is dried, dyed and exported to America and used in flower decorations and coffin embelishment.

SECTION G]

BATHING WATER QUALITY

G] BATHING WATER QUALITY

Since 1976 the quality of designated bathing waters has been subject to standard laid down in European Law by means of the E.C. Bathing Water Directive (76/160/EEC) (Appendix 13) and has incorporated into UK Law via a Statutory Instrument and Standards laid down in the Water Act (1989).

The NRA has established a programme for water monitoring laid down by the E.C. Bathing Water Directive throughout the bathing season, from May 1st to September 30th, at official and some unofficial identified bathing waters (See Appendix 14 & Map 30 for location of bathing beaches).

Under the E.C. legislation, mandatory levels shown in Appendix 13 have to be met. But increasingly guideline levels are important in terms of designation under several award schemes, such as the Tidy Britain Group, European Blue Flag Award 1992 and Seaside Award 1992. In assessing fully the quality of a bathing beach for guideline compliance we look for, Faecal streptococci, failure to meet guideline quality occurred at Lowestoft North and South, Dunwich and Felixstowe North.

Assessing bathing beach water quality is done by using a 95%ile compliance level, more recently median values have been used as it has several advantages over that of a threshold value. It offers a stable estimate of trend, it is relatively insensitive to changes in sampling rate and therefore it is a good way to compare bathing water quality between countries.

In Suffolk and Essex there are eleven designated bathing beaches and four, as yet, non identified beaches. The graphs (Fig 117 - 119) illustrate the trend of improving bathing water quality over the last four years. It is considered that the better than average weather over the past few summers has been a contributory factor, due to maximising the efficacy of sewage treatment processes, increasing the rate of one-off coliform organisms in sea water, and reducing the operation of storm overflows.

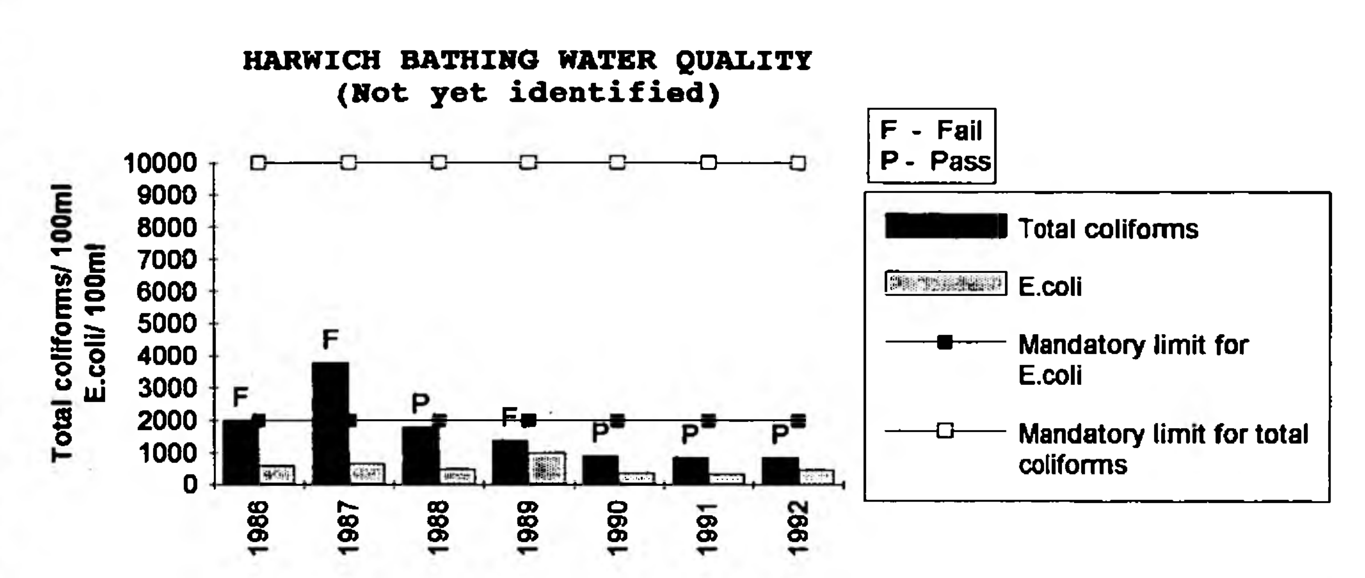
In 1989 and 1990 all the designated bathing waters in Suffolk and Essex complied with the Directive. In the whole of the Anglian region in 1991, 29 out of 33 bathing waters complied, from Suffolk and Essex only one failed, this was the recently identified West Mersea. In 1992 all of the designated beaches in Suffolk and Essex complied with the Bathing Water Directives as did the non identified bathing waters.

At present the vast majority of our coastal discharges of sewage are either macerated or only primary treated. The discharge at Walton STW is one of the few that is fully biologically treated and is within close proximity of a bathing beach. The remainder are either short or long sea outfalls and all must have at least primary settlement by the end of the century under the UWWD.

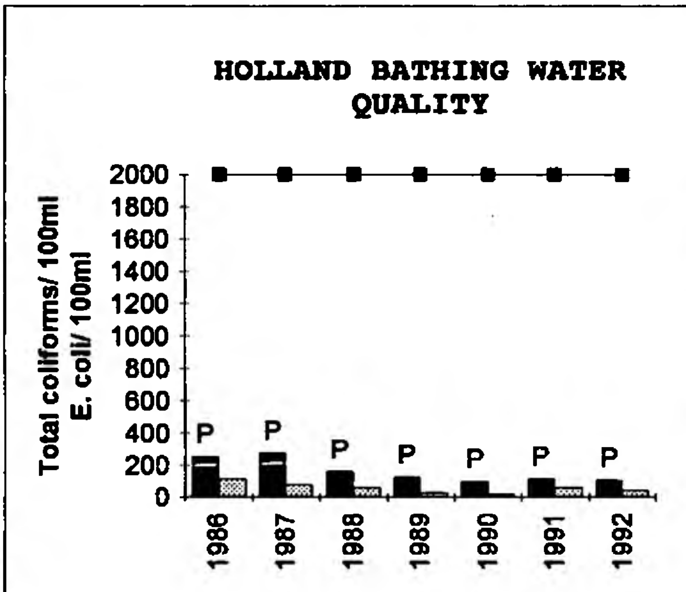
Stormwater overflows pass through short outfalls at the majority of locations and storm overflows in the Frinton and Clacton area are a particular problem and have been known to cause bathing beach failures (Appendix 15).

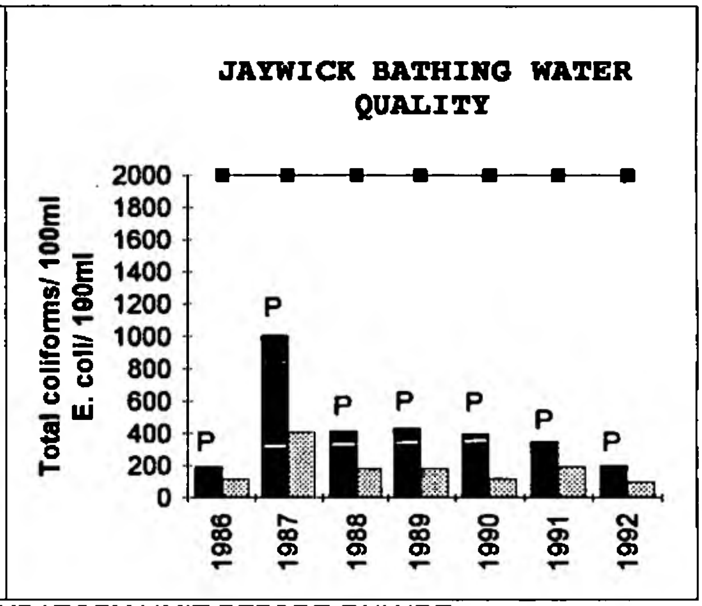
Improvements in bathing water quality is tied in with Anglian Water and DoE and compliance with E.C. mandatory limits should be achieved by 1996 at all designated sites. Consequently new sewage treatment schemes are planned at Felixstowe, where Bath Hill outfall will be diverted to the dock outfall. At Harwich and Dovercourt, the two crude sewage outfalls will be eliminated and a new treatment works set up. At West Mersea relocation or full treatment is planned for the near future.

There are, however, other sources that can have adverse effects on bathing waters such as farm run-off, bird colonies, caravan sites, marinas and harbours. Problems also arise form urban run-off such as beach litter and waste discharged from sea craft.

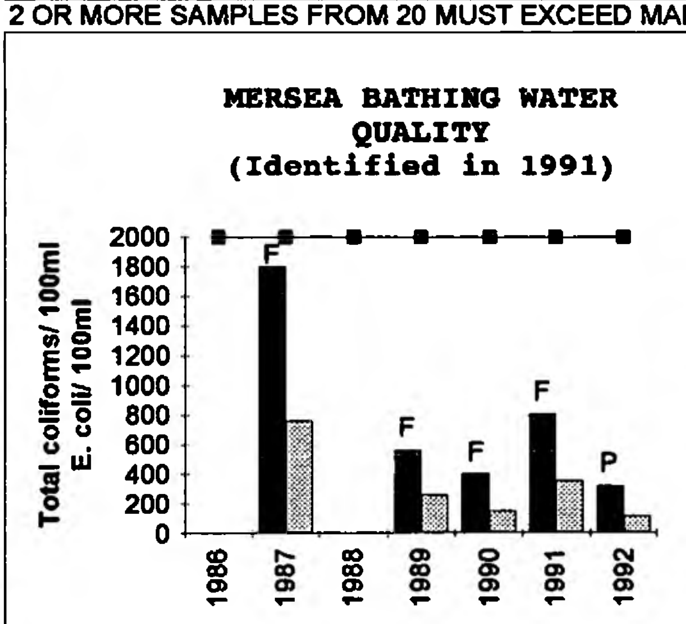


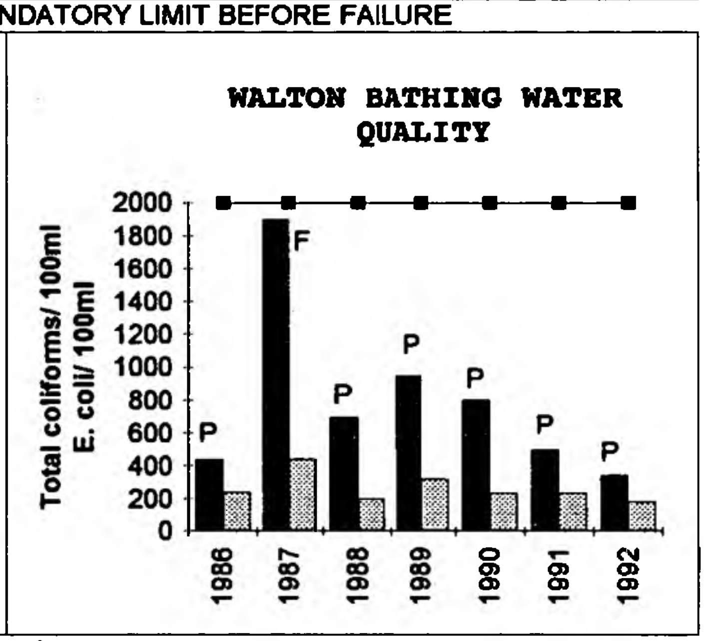
MEDIAN VALUES OF DATA SETS ILLUSTRATED





2 OR MORE SAMPLES FROM 20 MUST EXCEED MANDATORY LIMIT BEFORE FAILURE





From 1992 confirmed E. coli used as opposed to presumptive
From 1992 thermotolerant faecal coliforms used as opposed to E. coli

FIG 118 ESSEX BATHING WATER QUALITY

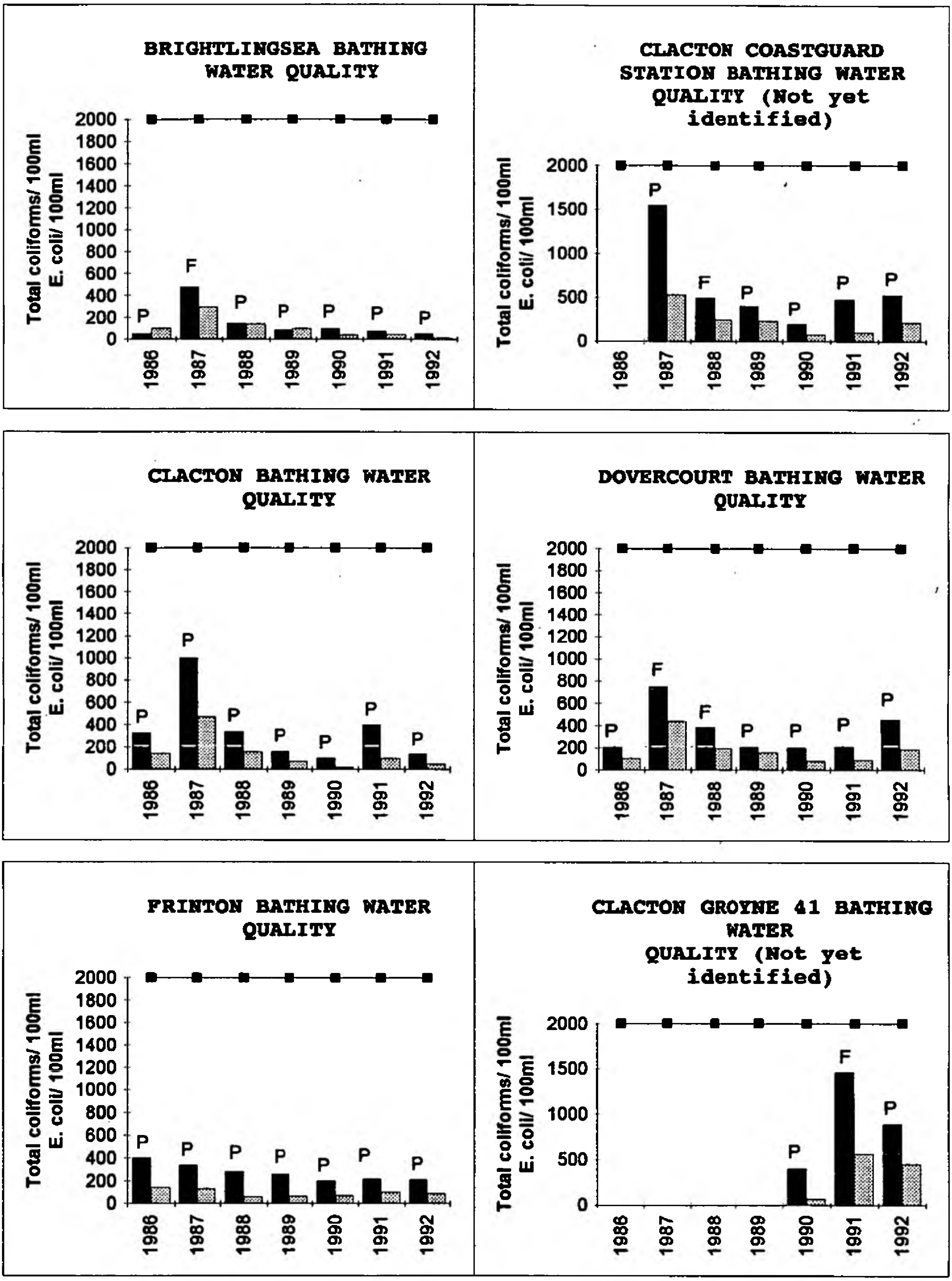
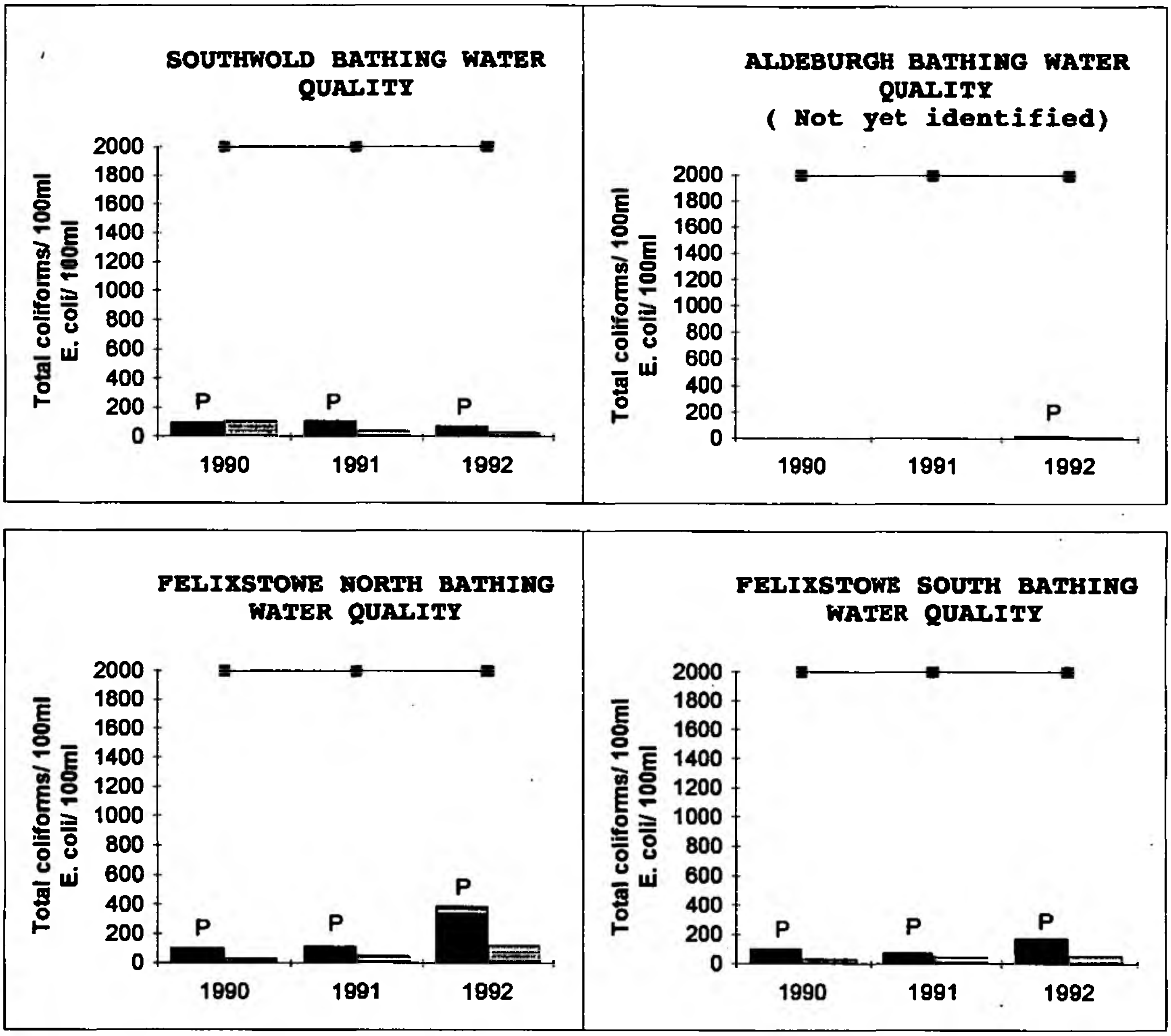
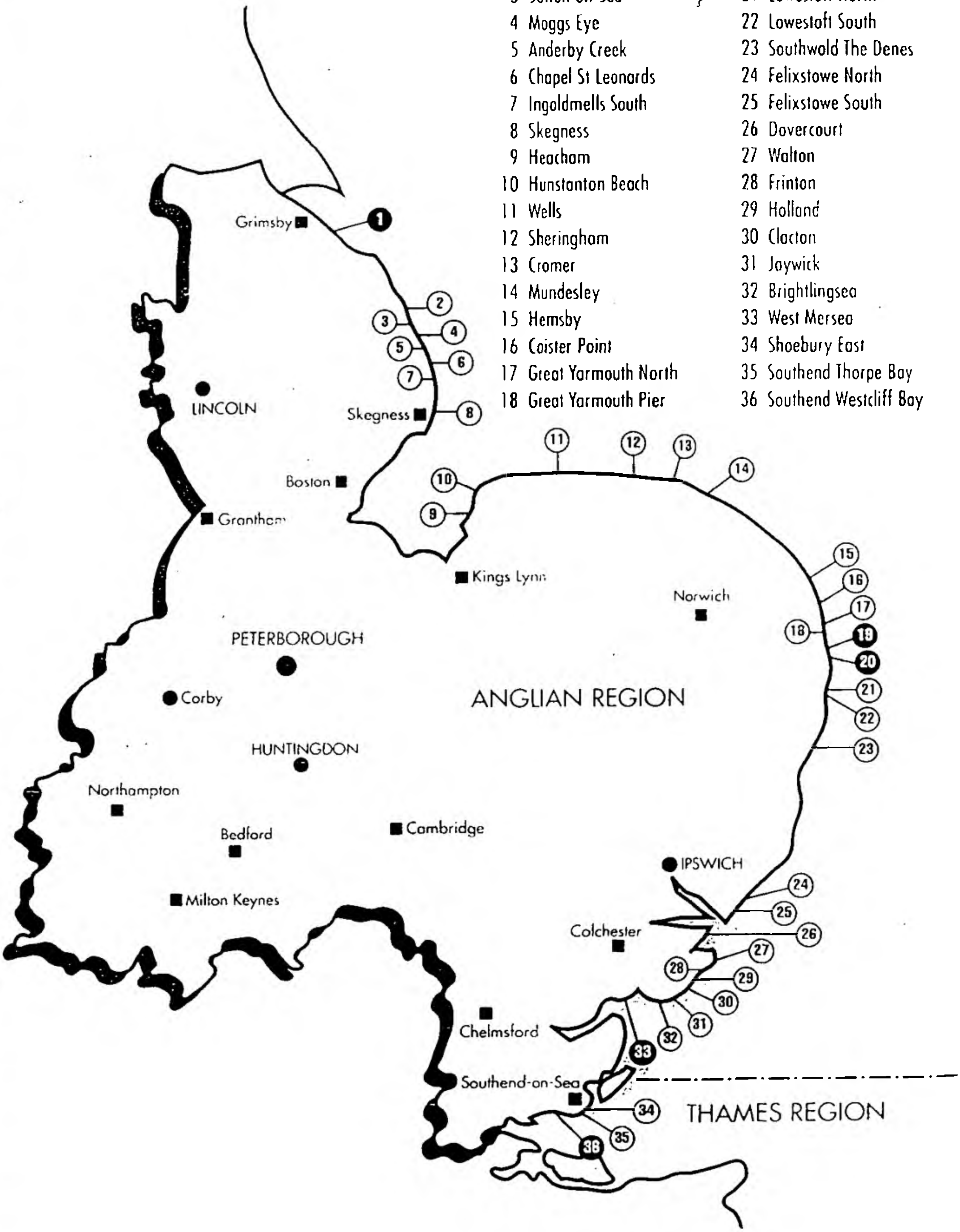


FIG 119 SUFFOLK BATHING WATER QUALITY



MAP 30
BATHING BEACHES ON THE EAST ANGLIAN COAST

Bathing Water	Bathing Water
1 Cleethorpes	19 Great Yarmouth South
2 Mablethorpe Town	20 Gorleston Beach
3 Sutton-on-Sea	21 Lowestoft North
4 Moggs Eye	22 Lowestoft South
5 Anderby Creek	23 Southwold The Denes
6 Chapel St Leonards	24 Felixstowe North
7 Ingoldmells South	25 Felixstowe South
8 Skegness	26 Dovercourt
9 Heacham	27 Walton
10 Hunstanton Beach	28 Frinton
11 Wells	29 Holland
12 Sheringham	30 Clacton
13 Cromer	31 Jaywick
14 Mundesley	32 Brightlingsea
15 Hemsby	33 West Mersea
16 Caister Point	34 Shoebury East
17 Great Yarmouth North	35 Southend Thorpe Bay
18 Great Yarmouth Pier	36 Southend Westcliff Bay



SECTION H]

WATER QUALITY MODELS

H] ESSEX AND SUFFOLK ESTUARIES WATER QUALITY MODELS

The following computer models have been used in the management of saline waters. The model can calculate discharge consent conditions to meet quality standards related to uses on that estuary. In most cases these are held by NRA Peterborough HQ who will undertake model runs.

The only remaining estuary still requiring modelling is the River Deben.

TABLE 2.

ESTUARY	TYPE	DEVELOPED BY	PRODUCED FOR	COMMENTS
CROUCH AND ROACH	1D	WRC (1992)	NRA	
BLACKWATER	1D	BIRMINGHAM UNIVERSITY (1992)	NRA	
COLNE	1D	WRC (1992)	NRA	
COLNE BARRIER	1D	ENVIRONMENTAL ASSESMENT SERVICES (1989)	NRA ENGINEERS	BARRIER ASSESMENT INCLUDED WATER QUALITY
STOUR	2D/1D	WRC (1991)	NRA	INCLUDES UPPER STOUR
ORWELL	1D	WRC (1981)	NRA	
ORWELL/STOUR COMPLEX	2D	WRC (1992)	AW plc	DISPERSION MODEL
TENDRING COAST	1D	WRC	AW plc	

SECTION I]

CONCLUSIONS AND RECOMMENDATIONS

I] CONCLUSIONS and RECOMMENDATIONS

1 BLYTH ESTUARY

The estuary is unpolluted and has a good water quality. There is little deleterious effect from Southwold STW. The restricted benthic diversity is probably due to the homogenous substrate of soft muds.

There is need to investigate further the quality status of Wolsey Creek as the data is at present insufficient. In the medium term benthic data in the subtidal estuary is needed, this should be addressed by 1995. The current discharge consent for Southwold STW appears to be appropriate for the river quality needs of the estuary, although the new storm discharge adjacent to Bailey Bridge should be closely monitored over the next two years.

2 ORE/ALDE ESTUARY

The water is very good through the majority of the estuary, Orford STW does not appear to adversely affect the estuary. However, the eutrophication status of the estuary is complicated in that there are exceptionally high TON values throughout the year but relative to other estuaries the chlorophyll levels are low, this is subject to further investigation.

The intertidal benthic studies show a well balanced estuarine community indicating all unpolluted estuary. During March 1993 subtidal sampling of the estuary was carried out to increase the biological data on the Ore/Alde.

The oysterages are a very important use of the estuary. Butley Creek must maintain its good quality as it affects the commercial viability of the oysters.

Future monitoring of the Ore and Alde should continue at its present level. A proposed Salmon farm at Hosley, with a discharge into the lower estuary will need to be closely monitored with respect to its affects on the oysterage.

3 DEBEN ESTUARY

Benthic surveys have been undertaken both intertidally and subtidally, the results show that the estuary has a well balanced benthic community. The subtidal survey shows that a large number of species are present within the estuary quite similar to the numbers found in the Blackwater estuary.

Eutrophication is surprisingly a problem in the Deben with both high TON and chlorophyll values. It has been recommended for Sensitive Area Designation. The cause of the eutrophication is being investigated but it is thought that the agricultural run off combined with the two sewage effluent inputs causes the high levels of TON.

General water quality of the lower estuary is considered good. The top end of the estuary is partly effected by the sewage treatment works and future monitoring should be centered on quantifying the effects in the upper estuary, with respect to E. coli and dissolved oxygen.

4 ORWELL ESTUARY

Benthic surveys show a community dominated by annelids as a result of the sewage enrichment in the estuary. Species diversity is low in comparison with the Blackwater and Stour estuaries. Eutrophication in the Orwell is not as high as would be expected. TON levels are elevated but chlorophyll levels are only high in the upper estuary, however, in comparison with the Deben these are low.
The Orwell estuary is polluted in the upper reaches and will not

improve until biological treatment at Cliff Quay STW is commissioned in 1995. The elimination of Pauls Maltings steep water discharge during 1995 will also improve the upper estuary water quality.

The water quality model of the River Orwell should enable the NRA to manage consents into the estuary so that River Quality Objectives are maintained. Elimination of storm sewage outfalls into the estuary within Ipswich should be achieved during the late 90's.

Existing monitoring should continue, to provide base line data but further work is needed in the area of The Cut and The Dock area to determine the dissolved oxygen regime.

5 STOUR ESTUARY

Generally the water quality of the Stour is very good with respect to the chemical parameters and the benthic community. However, some improvements are needed at Mistley around Baltic Wharf and in the Harwich Harbour area due to the crude sewage inputs and dock activity.

Benthic survey have shown a balanced intertidal community. Subtidal survey work is needed to determine the effects of the inputs of the factories at Brantham ie. Warale Storey and ICI Image Data. Although the inputs are of low volumes and low strength.

The eutrophication status is surprisingly low considering the input of nutrients. Monitoring has revealed no excessive algal activity even during the summer months. TON values are average for the East coast estuaries.

Monitoring should remain as it is at present to provide base line data. Extensive monitoring should be undertaken around Mistley

Quay outfall to determine the DO regime as treatment is planned. Further monitoring of the two factories at Brantham is also necessary.

6 WALTON BACKWATER

The eutrophic status of Walton Backwater is slightly enhanced compared with background values, but not enough to warrant a designation as a Sensitive Area. Monitoring continues in this area but little change is expected as no freshwater flow enters the Backwaters except small streams.

Benthic surveys have shown that Walton Backwaters is a stress free, unpolluted environment supporting a good species diversity. Monitoring of the EXCHEM effluent must be on ongoing to ensure no deleterious effects to the shellfisheries.

7 COLNE ESTUARY

The Colne estuary is of poor quality in its mid and upper reaches due to the influence of Colchester STW. It has been meeting its NRA consent limits but the absence of an ammonia consent has given rise to pollution. The sewage works standard has changed recently to 25 mg/l and that should result in improving estuarine quality.

In the long term a coliform standard is required for Colchester STW discharge if water contact sports are to be safely carried out. The benthic data from the subtidal survey indicate a stressed community, dominated by annelids with few other phyla. It shows a similar pattern to that of the Orwell estuary and is not satisfactorily.

The eutrophication status shows similar characteristics to the Deben. This is due to the high TON values coming from Colchester

STW and the freshwater Colne, in turn this elevates the Chlorophyll a values.

Priority must be placed on improving the discharge at Colchester STW to the River Needs Consent, as derived from the Water Quality Model. Monitoring should be extended to include quantifying the DO sag regime in the mid and lower estuary.

8 BLACKWATER ESTUARY

At present the TON and chlorophyll values are very low, however, in recent months there have been signs of eutrophication increase which should be closely monitored.

Future improvements include the following; the combined effluent may ultimately be diverted to two freshwater rivers, the Chelmer and the Blackwater and West Mersea STW is being either fully treated or diverted to a green field site by 1996. Current monitoring programmes are considered to be adequate.

The subtidal benthic survey undertaken on the Blackwater shows a well balanced and diverse estuarine community typical of an unpolluted estuary.

9 CROUCH ESTUARY

Water quality in the Crouch estuary is satisfactory for most of its area, however, the upper reaches are dominated by the effects of local sewage effluent inputs and as a result the quality is much less satisfactory. The lower estuary is influenced, to a lesser extent by Burnham STW, although this has improved in quality during 1992/93.

The benthic studies show a low diversity of species within the community. Tidal scouring is a very strong feature in the Crouch and may be a reason why the benthic population is depleted.

TON and chlorophyll levels within the Crouch have been high during the monitoring period but these levels do not warrant a sensitive area designation.

The upper Crouch requires a tightening of existing consents using the Crouch Water Quality Model to gain a less polluted section of estuary. Existing monitoring is adequate although DO surveys in the upper estuary are needed.

10 ROACH ESTUARY

The Roach estuary is surprisingly unpolluted considering the high proportion of treated sewage effluent entering it. However, the benthic status appears to be poor in comparison with other estuaries in terms of community structure, it also has a high percentage of the annelid, Tubificoides benedeii which has been linked with high levels of pollution. Tidal scouring, however, may plan an important role in determining the benthic community of the estuary as in the Crouch.
Further work would be necessary to assess the exact effects. A full benthic survey was undertaken in March 1993 and the results are being processed.

Eutrophication in the Roach estuary is a slight problem and is only just below the levels that would trigger a sensitive Area status designation.

Existing monitoring of the estuary appears to be satisfactory although the DO regimes in the head waters should be investigated.

APPENDICES

APPENDIX 1

INTRODUCTION TABLE OF THE SUFFOLK AND ESSEX ESTUARIES

ESTUARY	NGR	GEOMORPHIC TYPE	TIDAL TYPE	TOTAL AREA ha	INTERTIDAL AREA ha	SHORELINE km
BLYTH	TM4776	BAR BUILT	MESOTIDAL	311	235	25.4
ORE/ALDE	TM4357	BAR BUILT	MESOTIDAL	1821	1331.9	73.2
DEBEN	TM2945	COASTAL PLAIN	MESOTIDAL	1007	687.4	49.8
ORWELL	TM2338	COASTAL PLAIN	MESOTIDAL	1785.5	576.3	50.7
STOUR	TM1833	COASTAL PLAIN	MESOTIDAL	2531	1637	48.1
WALTON BACKWATERS	TM2325	EMBAYMENT	MESOTIDAL	2377	1569.9	54
COLNE	TM0617	COASTAL PLAIN	MACROTIDAL	2335	2001.5	89.6
BLACKWATER	TL9507	COASTAL PLAIN	MACROTIDAL	5184	3315.3	107.5
CROUCH	TQ9097	COASTAL PLAIN	MACROTIDAL	4000	2000	85
ROACH	TQ9593	COASTAL PLAIN	MACROTIDAL	1020	600	42

CONTINUED

CONTINUED

ESTUARY	TIDAL CHANNEL km	AREA OF MUDFLATS ha	AREA OF SALTMARSH ha	HUMAN POP.	NRA CLASS
BLYTH	10.8	276	55	<1000	A
ORE/ALDE	28	536	341	<1000	A
DEBEN	19.7	447	251	10 000	A + B
ORWELL	20.1	713	74	155 000	A, B, C +D
STOUR	19.6	1506	95	17 000	A
WALTON BACKWATERS	8.3	1400	900	<1 000	A
COLNE	16.2	700	300	107 000	A +B
BLACKWATER	21.2	2600	900	20 000	A
CROUCH	30	800	250	15 000	A
ROACH	14	300	120	7 000	A

APPENDIX 2

STATUTORY NATURE CONSERVATION SITES

SITE	RELEVANT LEGISLATION	STATUS	INTEREST	RESPONSIBLE BODY
RAMSAR*	Convention on Wetlands of International Importance. Ratified by UK Government 1976	International	Waterfowl and Wetland coservation of internationally important sites, including marine waters of up to 6 metres deep	NCC
SPECIAL PROTECTION AREAS (SPA)*	European Community Directive 79/409 on the Conservation of Wild Birds	International	Conservation of the habitat of birds which are either rare or vulnerable species (Article 4.1) or regularly occurring migratory species (Article 4.2). Particular attention must be paid to wetlands.	NCC
NATIONAL NATURE RESERVES*	National Parks and Access to the Countryside Act (1949) and the Wildlife & Countryside Act (1981)	National	Nationally important sites managed to promote their conservation interest	NCC
SITES OF SPECIAL SCIENTIFIC INTEREST (SSSI)	National Parks and Access to the Countryside Act (1949) and the Wildlife & Countryside Act (1981)	National	land of special nature conservation value containing plants, animals, geological features or landforms of special interest.	NCC
AREAS OF OUTSTANDING NATURAL BEAUTY (AONB)	National Parks and Access to the Countryside Act (1949)	National	Conservation of natural beauty, landscape and access to the countryside.	Countryside Commission
ENVIRONMENTALLY SENSITIVE AREAS (ESA)	EC Directive 979/85 Agriculture Act 1986	National	Encouragement of farming practices favourable to the environment and landscape character. Entry into the scheme is voluntary. ESA's recommended by NCC and Countryside Commission.	MAFF (Project Officer)
HERITAGE COASTS	National Parks and Access to the Countryside Act (1949)	National	Protection of coastal areas of special landscape and character. Derived in cooperation with Local Authorities.	Countryside Commission/ Local Authority

* All these are also SSSI's

MAIN SEWAGE INPUTS INTO THE SUFFOLK AND ESSEX ESTUARIES

ESTUARY	DISCHARGE F-Freshwater NS-North Sea	NGR	TREATMENT	CONSENT SS:BOD:AMM	EXISTING QUALITY	FUTURE IMPROVEMENTS
BLYTH	SOUTHWOLD	TM49497574	FULL	120:150 1800 m3/d	SATISFACTORY	
	WANGFORD (F)	TM464787	FULL	50:25:15 95 m3/d	SATISFACTORY	
	BERNARD MATTHEWS (F)	TM40487919	FULL	26:17:5 1500 m3/d	MARGINAL	ON GOING
ORE/ALDE	ORFORD	TM445512	FULL	60:40 140 m3/d	SATISFACTORY	
	ALDEBURGH (NS)	TM463554	MACERATION	DESCRIPTIVE	SATISFACTORY	
DEBEN	WOODBRIDGE	TM259475	FULL	70:35 4800 m3/d	SATISFACTORY	LONGTERM HIGHER QUAL.
	MELTON	TM281497	FULL	60:40 660 m3/d	SATISFACTORY	
ORWELL	CLIFF QUAY	TM172419	PRIMARY	300 33000 m3/d	POOR	1995 FULL TREATMENT
	CHANTRY (F)	TM14954151	FULL	30:15:10 5200 m3/d	GOOD	
	LEVINGTON	TM23703890	FULL	60:40 22 m3/d	GOOD	
	SHOTLEY	TM24503490	PRIMARY	250 500 m3/d	MARGINAL	SECONDARY TREATMENT
	FELIXSTOWE NORTH (NS)	TM31613425	NONE	NONE	POOR	ELIMINATION BY 1996
	FELIXSTOWE SOUTH	TM28103280	EBB TIDE DISCH.	NONE	POOR	SECONDARY TREATMENT
STOUR	MANNINGTREE	TM10103240	FULL	75:50:20 2724 m3/d	GOOD	
	MISTLEY O/F	TM124320	NONE (STEEP LIQUOR)	50:50 2450 m3/d	MARGINAL	FULLTREATMENT
	HOLBROOK	TM17403466	FULL	100:80 288 m3/d	GOOD	
	HARWICH	TM267315	NONE	NONE	POOR	FULLTREATMENT
	DOVERCOURT	TM25182953	NONE	NONE	POOR	FULLTREATMENT
WALTON BACKWATERS	WALTON	TM268247	FULL	100:95 6370 m3/d	GOOD	
	DOVERCOURT	TM25182953	NONE	DESCR. 5300 m3/d	POOR	FULLTREATMENT
	HARWICH	TM267315	MACERATION	NONE 2545 m3/d	POOR	FULLTREATMENT
	CLACTON (NS)	TM220170	MACERATION	NONE	FAIR	PRIMARY SETTLEMENT
COLNE	JAYWICK (NS)	TM150120	NONE	NONE	MARGINAL	PRIMARY SETTLEMENT
	BRIGHTLINGSEA	TM06351760	FULL	80:40 2160 m3/d	GOOD	
	ST. OYSTH	TM105133	FULL	60:50 1600 m3/d	GOOD	DIVERSION TO JAYWICK
	COLCHESTER	TM023236	FULL	50:25 26000 m3/d	MARGINAL	NH3 REDUCTIONS
	FINGRINHOE (F)	TM04202100	FULL	50:25 290 m3/d	GOOD	
BLACKWATER	WEST MERSEA	TM028126	PRIMARY	200SS 8730 m3/d	POOR	FULL TREATMENT
	TIPTREE (F)	TL938156	FULL	30:15 4188 m3/d	MARGINAL	DIVERSION
	TOLLESBURY	TL963119	FULL	40:30 600 m3/d	MARGINAL	IMPROVEMENT
	MALDON	TL889074	FULL	25:18 17700 m3/d	GOOD	
	COMBINED EFFLUENTS	TL840082	FULL	40:20:10 52050 m3/d	FAIR	DIVERSION PARTIAL
CROUCH	BURNHAM	TQ958952	FULL	45:30 2200 m3/d	MARGINAL	
	SOUTH WOODHAM	TQ800972	FULL	30:15 3900 m3/d	GOOD	
	WICKFORD	TQ76819401	FULL	45:22:10 7500 m3/d	GOOD	
	RAYLEIGH WEST	TQ796942	FULL	50:30:40 3700 m3/d	GOOD	
ROACH	ROCHFORD	TQ92909126	FULL	60:35 8630 m3/d	GOOD	
	RAYLEIGH EAST	TQ83219039	FULL	30:15 4600 m3/d	GOOD	

APPENDIX 4

TRADE EFFLUENT INPUTS INTO THE SUFFOLK AND ESSEX ESTUARIES

ESTUARY	DISCHARGE	NGR	CURRENT CONSENT	EXISTING QUALITY	FUTURE IMPROVEMENTS
NORTH SEA	SIZEWELL A	TM470636	MAX 32oC AND OTHERS	GOOD	
	SIZEWELL B	TM470636	MAX 32oC AND OTHERS	GOOD	COMMISSIONED SPRING 1994
ORWELL	BRITISH SUGAR IPSWICH	TM167439	3000 m3/d 380:200:30 EBB ONLY	GOOD	
	PAULS MALT IPSWICH	TM165441	1500 BOD & TIDAL RETENTION	FAIR	DIVERSION TO FOUL SEWER 1995
	BRITISH FERMENTATION PRODUCTS FELIXSTOWE	TM279329	5000 BOD 2 000 000 gall/d UNDER REVISION	MARGINAL	POSSIBLE DIVERSION TO FOUL SEWER
	TANKCLEAN FELIXSTOWE	TM27783315	50 m3/d 200 BOD & others	FAIR	ONGOING IMPROVEMENTS
	TANKSTORE FELIXSTOWE	TM27783315	230 m3/d 200 BOD & others	FAIR	ONGOING IMPROVEMENTS
	ANCLIFFES FELIXSTOWE	TM275342	103 m3/d 200 SS EBB ONLY	FAIR	
STOUR	CARLESS SOLVENTS PARKESTONE	TM22963259	218 m3/d pH 6-9 500:3000 BOD	GOOD	ONGOING IMPROVEMENTS
	IMAGE DATA (BEXFORD) BRANTHAM	TM11003300	220 m3/d pH 2.5-10.5 40:30 BOD	GOOD	LOW VOLUME DISCHARGE
	WARDLE STOREY BRANTHAM	TM10903260	4600 m3/d 100:100 BOD	GOOD	LOW VOLUME DISCHARGE
WALTON BACKWATERS	EXCHEM	TM21802615	COD 10 000 mg/l 200 m3/d pH 0-10	FAIR	NEUTRALISATION & NITROGEN REMOVAL
BLACKWATER	BRADWELL P/S	TL997092	1 290 909 m3/d MAX 32oC & OTHERS	EXCELLENT	PROBABLE SHUTDOWN IN 1999

NOTE - All BOD values ae expressed as mg/l

APPENDIX 5

SHELLFISH HYGIENE DIRECTIVE DESIGNATIONS

ESTUARY	SITE NAME	SHELLFISH SPECIES	CLASS	1979 EC DESIGNATION
BLYTH	BLYTHBURGH CREEK	OYSTER & MUSSEL	B	
	WOLSEY CREEK	OYSTER	B	
ORE/ALDE	BUTLEY CREEK	OYSTER / MUSSEL	A	YES
	STONEYDITCH	MUSSEL	B	
DEBEN	METHERSGATE QUAY	MUSSEL	C	
	WALDRINGFIELD	MUSSEL	(B)	
	SHOTTISHAM CREEK	OYSTER	(B)	
ORWELL	NACTON SHORES	MUSSEL / COCKLE	C	
WALTON BACKWATERS	KIRBY CREEK	OYSTER	B	YES
	THE TWIZZLE	OYSTER	B	YES
COLNE	WRECK MARKER	MUSSEL	B	
	HARBOUR ENTRANCE	MUSSEL	B	
	R. COLNE BOUY	MUSSEL	B	
	COLNE POINT	MUSSEL	C	
BLACKWATER,	GOLDHANGER CREEK	OYSTER	A	YES
WEST MERSEA AND	BENCH HEAD	OYSTER	A	
EAST MERSEA	ST. PETERS FLATS	OYSTER	A	
	THE NASS	OYSTER	B	YES
	BATCHELOR SPIT	OYSTER	B	
	THIRSLET CREEK	MUSSEL	A	YES
	BUXEY SANDS	COCKLE	B	
	THE NOTHE	OYSTER	C	
	TOLLESBURY SOUTH	OYSTER	B	
	LITTLE DITCH	OYSTER	B	
	SALCOTT CHANNEL	OYSTER	B	
	TOLLESBURY NORTH	OYSTER	B	
	PYEFLEET	OYSTER	A	YES
	BOUY 13	OYSTER	B	
	PEEWIT ISLAND	OYSTER	B	
CROUCH	ALTHORNE CREEK	OYSTER	B	
	OUTER CROUCH	OYSTER	C	
	PURLEIGH SHAWL	OYSTER	B	
ROACH	PAGLESHAM POOL	OYSTER/ MUSSEL/ COCKLES	A/B	YES
	DUNHOPES	OYSTER/ MUSSEL/ COCKLE	C/B	YES
	BLACKLEDGE	MUSSEL		YES
	MIDDLEWAY	COCKLE/ OYSTER	C	YES

APPENDIX 6

CLASSIFICATION OF LIVE, BIVALVE MOLLUSC HARVESTING AREAS UNDER THE EC SHELLFISH HYGIENE DIRECTIVE 91/ 492/ EEC.

CATEGORY	CRITERIA	COMMENTS
A	Less than 230 E. coli/ 100g flesh or less than 300 faecal coliforms	May go direct for human consumption if end product standard met.
B	Less than 4 600 E. coli/ 100g flesh (in 90% of samples) or less than 6 000 faecal coliforms/ 100g flesh (in 90% of samples)	Must be depurated, heat treated or relayed to meet Category A.
C	Less than 60 000 faecal coliforms/ 100g flesh	Must be relaid for a long period (at least two months) to meet Category A or B, or heat treated.
D	Above 60 000 faecal coliforms/ 100g flesh	Harvesting prohibited.

APPENDIX 7

SUFFOLK AND ESSEX ESTUARINE SAMPLE POINTS

KEY

SAMPLE TYPE
1 = LAND
2 = BOAT
3 = NUTRIENTS

SAMPLE FREQUENCY
A = MONTHLY
B = TWICE YEARLY
C = FORTNIGHTLY

* = HIGH AND LOW WATER SAMPLING

ESTUARY	SAMPLE POINT CODE	SAMPLE POINT NAME $ - Sample points used in report	TYPE AND FREQUENCY OF SAMPLING
BLYTH	BFBLY040	BLYFORD BRIDGE	2B 1A
	BFBLY043	BELOW BLYFORD BRIDGE	2B
	BIBLY052	1 KM D/S OF BLYFORD BRIDGE	2B
	BIBLY050	BLYTHBURGH BRIDGE	2B 1A 3A
	BIBLY060	OFF COLLINS ISLAND $	2B
	BIBLY062	OFF TINKERS HOUSE	2B
	BIBLY064	D/S OF WOLSEY SLUICE $	2B
	BIBLY066	ENTRANCE TO WOLSEY CREEK	2B
	BIBLY068	REYDON QUAY	2B
	BIBLY070	BAILEY BRIDGE, SOUTHWOLD $	2B 1A 3A
	BIBLY080	HARBOUR MOUTH	2B
ORE/ALDE	BIOAE010	SNAPE QUAY	2B 1A
	BIOAE020	IKEN CLIFFS $	2B
	BIOAE021	OFF IKEN CHURCH	2B
	BIOAE023	BARBERS POINT	3A
	BIOAE025	U/S COB ISLAND	2B
	BIOAE030	SLAUDEN QUAY	2B 1A
	BIOAE035	BLACKSTAKES REACH	3A
	BIOAE038	ORFORDNESS RESEARCH JETTY	2B
	BIOAE040	ORFORD QUAY $	2B 1A
	BIOAE042	U/S HAVERGATE ISLAND	2B
	BIOAE050	BUTLEY OYSTERAGE $	2B 1A
	BIOAE053	BUTLEY RIVER MOUTH	2B
	BIOAE055	D/S HAVERGATE ISLAND $	2B 1A
	BIOAE060	ORFORD HAVEN	2B
BUTLEY CREEK	BIOAE052	BANTORS FARM	2B
	BIOAE051	OYSTERAGE D/S BOUNDRY	2B
	BIOAE049	OYSTERAGE U/S BOUNDRY	2B
	BIOAE048	1 MILE U/S OF OYSTERAGE	2B
	BIOAE046	LOW FARM BUTLEY	2B
	BIOAE045	BUTLEY MILLS	2B
	BIOAE047	BUTLEY MILL	2B
	BIOAE045	LOW CORNER BUTLEY	2B

DEBEN	BIDEB150	BAWDSEY FERRY $	2B 1A
	BIDEB146	KINGS FLEET	2B 3C
	BIDEB140	RAMSHOLT QUAY	2B 1A 3C
	BIDEB137	OFF KIRTON CREEK	2B
	BIDEB130	WALDRINGFIELD QUAY $	2B 1A 3C
	BIDEB120	METHERSGATE QUAY	2B
	BIDEB118	0.5 KM U/S METHERSGATE QUAY	3C
	BIDEB115	KYSON POINT	2B
	BIDEB113	MARTLESHAM CREEK	2B 1A
	BIDEB110	WOODBRIDGE QUAY $	2B 1A
	BIDEB105	OFF MELTON STW	2B
	BIDEB100	WILFORD BRIDGE	2B 1A
	BIDEB1008	DECOY FARM, MELTON	2B
	BIDEB090	UFFORD BRIDGE	2B 1A
ORWELL	BIORW135	LANGUARD POINT, FELIXSTOWE	2B 1A 3A
	BIORW130	PROPANE JETTY	2B 1A
	BIORW128	TRINITY TERMINAL	2B 3A
	BIORW125	GANGES JETTY, SHOTLEY	2B
	BIORW120	COLLIMER POINT $	2B 3A
	BIORW110	OFF PINMILL	2B 3A
	BIORW100	WOOLVERSTONE MARINA $	2B 1A
	BIORW085	OFF FRESTON HARD	2B 3A
	BIORW070	BY IPSWICH STW O/F	2B
	BIORW060	BOUY NO. 12	2B
	BIORW050	OFF FISONS QUAY	2B 1A
	BIORW040	BY LOCK GATES $	2B 1A
	BIORW030	STOKE BRIDGE	2B 1A
	BIORW010	CONSTANTINE WEIR	2B 1A
	BFGIP210	U/S HORSESHOE WEIR	2B 1A 3A
STOUR	BISE19	SOUTH CHANNEL BRIDGE	2B
	BISE1650	MANNINGTREE SAILING CLUB $	2B 1A
	BISE25	NORTH CHANNEL BRIDGE	2B
	BISE15	NORMANS REACH	2B
	BISE1460	HOOK REACH	2B
	BISE14	THORN REACH	2B
	BISE13	SWAN BASIN	2B
	BISE12	BALTIC WHARF $	2B 1A
	BISE11	MILLERS REACH	2B
	BISE10	CROSS REACH	2B
	BISE09	STRAIGHT REACH	* 2B
	BISE08	DOVEHOUSE POINT	* 2B 3A
	BISE07	WRABNESS POINT $	* 2B 1A
	BISE0679	HOLBROOK CREEK	* 2B
	BISE0695	STONE POINT WRABNESS	* 2B 3A
	BISE0650	COPPERAS BAY	* 2B
	BISE06	OFF ERWARTON PIER	* 2B 3A
	BISE05	OFF PARKSSTONE QUAY	* 2B
	BISE04	CONF. DOCK RIVER	* 2B 1A
	BISE03	OFF HARWICH PIER $	* 2B 1A
	BISE02	CONF. ORWELL	* 2B
	BISE01	OFF HARWICH BREAKWATER	* 2B

WALTON BACKWATERS	BIHW05	WALTON CHANNEL CONF.	*	2B		
	BIHW06	OFF BARGE CREEK	*	2B	3A	
	BIHW30	MOUTH OF OAKLEY CREEK	*	2B		
	BIHW3020	OAKLEY CREEK D/S BRAMBLE CREEK	*	2B	3A	
	BIHW3202	BRAMBLE CREEK, BRAMBLE ISLE.	*	2B		
	BIHW09	CONF. LANDERMERE CREEK	*	2B		
	BIHW3285	LANDERMERE CREEK OFF MOZE CREEK	*	2B		
	BIHW4090	LANDERMERE CREEK OFF BEAUMONT CREEK		2B		
	BIHW5010	KIRBY CREEK OFF SKIPPERS ISLAND $	*	2B		
	BIHW5030	KIRBY CREEK SE OF HONEY ISLAND		2B		
	BIHW5050	KIRBY CREEK OFF BOATHOUSE CREEK		2B	3A	
	BIHW5080	KIRBY CREEK OFF PETERS POINT		2B		
	BIHW1560	AT THE WADE CAUSEWAY		2B		
	BIHW1540	SW OF HEDGE END ISLAND		2B		
	BIHW1520	OFF TITCHMARSH MARINA $	*	2B	1A	
	BIHW15	AT WALTON CHANNEL CONF.	*	2B		
	BIHW17	WALTON CHANNEL AT SOLE CREEK	*	2B		
	BIHW13	WALTON CHANNEL AT SALT FLEET $	*	2B	3A	
	BIHW10	WALTON CHANNEL AT STONE CREEK	*	2B		
COLNE	BINE21	EAST BRIDGE		2B		
	BINE18	HYTHE BRIDGE $		2B	1A	
	BINE1660	KING EDWARD QUAY		2B		
	BINE16	HAVEN QUAY		2B	1A	
	BINE15	WIVENHOE LODGE		2B		
	BINE13	ROWHEDGE FERRY $		2B	1A	
	BINE11	FINGRINGHOE FERRY		2B		
	BINE1050	BALLAST QUAY, FINGRINGHOE		2B		
	BINE10	OFF MARSH FARM, WIVENHOE $	*	2B		
	BINE09	OFF ALRESFORD CREEK	*	2B	3C	
	BINE08	OFF ALDBORGH POINT	*	2B	3C	
	BINE06	OFF SOUTH GEEDON CREEK	*	2B	3C	
	BINE0530	PYEFLEET OFF PEWIT ISLAND	*	2B		
	BINE04	OFF BATEMANS TOWER $	*	2B	1A	
	BINE0305	BRIGHTLINGSEA CREEK	*	2B		
	BINE03	MERSEA STONE	*	2B	3C	
BLACKWATER	BIBE33	FULLBRIDGE $	*	2B	1A	
	BIBE30	MALDON PROM.	*	2B	1A	
	BIBE28	HERONS POINT $	*	2B	1A	
	BIBE27	HEYBRIDGE BASIN	*	2B		
	BIBE26	HILL POOL POINT	*	2B		
	BIBE25	SSW OF DECOY POINT	*	2B		
	BIBE23	FORD CREEK	*	2B		
	BIBE21	W OF OSEA ISLAND	*	2B		
	BIBE20	LAWLING CREEK	*	2B		
	BIBE19	OFF OSEA PIER $	*	2B	3A	
	BIBE15	GOLDHANGER CREEK	*	2B		
	BIBE13	OFF THE STONE	*	2B	1A	3A
	BIBE11	SE OF TOLLESBURY	*	2B	3A	
	BIBE06	MERSEA QUARTERS $	*	2B		
	BIBE02	OFF WEST MERSEA	*	2B	3A	

MERSEA CHANNELS	BIBE0785	WOODROLFE CREEK	* 2B
	BIBE0790	TOLLESBURY CHANNEL. OLD HALL MARSHES	* 2B
	BIBE0768	TOLLESBURY CHANNEL.S. COB ISLE	* 2B
	BIBE0770	TOLLESBURY CHANNEL.N. COB ISLE	* 2B
	BIBE0640	SALCOTT CHANNEL QUINCES CORNER	* 2B
	BIBE0630	SALCOTT CHANNEL SUNKEN ISLE	* 2B
	BIBE0634	LITTLE DITCH	* 2B
	BIBE0620	OFF BOUY NO. 7	* 2B
	BIBE0720	OPP. SAMPSONS CREEK	* 2B
	BIBE0650	OFF PACKING MARSH	* 2B
	BIBE0250	BESOM FLEET OFFVICTORY	* 2B
	BIBE0610	OFF BOUY NO. 3	* 2B
CROUCH	BICE1730	BATTLESBRIDGE BY-PASS	* 2B
	BICE17	BATTLESBRIDGE $	* 2B 1A
	BICE16	OFF LT. HAYES FARM	* 2B
	BICE1505	FENN CREEK	* 2B
	BICE14	HULLBRIDGE $	* 2B 1A
	BICE12	BRANDY HOLE	* 2B
	BICE018	HORSE SHOAL BOUY	* 2B 3A
	BICE09	NORTH FAMBRIDGE $	* 2B 1A 3A
	BICE07	BRIDGEMARSH ISLAND	* 2B 3A
	BICE06	BLACK POINT	* 2B
	BICE05	ESSEX YACHT MARINA $	* 2B 1A 3A
	BICE03	OFF BURNHAM YACHT CLUB	* 2B 1A
	BICE02	RINGWOOD BAR	* 2B
	BICE01	INNER CROUCH BOUY	* 2B 3A
ROACH	BIRE19	STANBRIDGE MILL	* 2B
	BIRE17	OFF WALDONS	* 2B
	BIRE16	ROPERS FARM BARLING $	* 2B
	BIRE13	OFF BLACKLEDGE POINT	* 2B
	BIRE10	POTTON CREEK	* 2B
	BIRE08	EASTEND PAGLESHAM $	* 2B 1A 3A
	BIRE07	PAGLESHAM POOL	* 2B
	BIRE05	THE MIDDLEWAY	* 2B
	BIRE04	OFF TYLE BARN	* 2B
	BIRE03	MONKTON QUAY $	* 2B 1A 3A
	BIRE01	ABOVE CROUCH CONF.	* 2B

APPENDIX 8

CRITERIA USED TO DESIGNATE SENSITIVE AREAS UNDER THE URBAN WASTE WATER DIRECTIVE AND THE NITRATE DIRECTIVE

SUBSTANCE	LIMIT
NITRATE (ALSO TON)	> 200 ug/l
CHLOROPHYL A. (FOR 3 - 4 WEEKS)	> 10 mg/m3
ALGAL BLOOMS	> 5 x 10 2 cells/ ml
EVIDENCE OF OXYGEN DEFICIENCY	

APPENDIX 9

CHLOROPHYLL AND NUTRIENT DATA FROM THE ESSEX AND SUFFOLK ESTUARIES 1992 - 1993

ESTUARY	MOUTH OF ESTUARY SAMPLE	SAMPLE CODE	CHL a Av. Apr - Sept 1992	TON Av. Feb '92 - Mar '93
BLYTH	BAILEY BRIDGE SOUTHWOLD	R04BIBLY050	9.02	3400.15
ORE/ALDE	HAVERGATE ISLAND	R04BIOAE055	5.45	257.58
DEBEN	KINGS FLEET	R04BIDEB146	7.15	411.48
ORWELL	LANGUARD POINT	R04BIORW135	5.61	311.08
STOUR	OFF SHOTLEY PIER	R01BISE04	5.33	487.08
WALTON BACKWATERS	KIRBY CREEK OFF BOATHOUSE CREEK	R01BIHW5050	7.5	282.41
COLNE	OFF MERSEA STONE	R01BINE03	8.63	491.01
BLACKWATER	OFF MERSEA OUTFALL	R01BIBE02	4.87	363.03
CROUCH	INNER CROUCH BOUY	R01BICE01	9.92	304.83
ROACH	MONKTON QUAY FOULNESS	R01BIRE03	9.71	394.2

ESTUARY	TOP OF ESTUARY SAMPLE	SAMPLE CODE	CHL a Av. Apr - Sept 1992	TON Av. Feb '92 - Mar '93
BLYTH	BLYTHBURGH BRIDGE	R04BIBLY050	10.38	1204.5
ORE/ALDE	BARBERS POINT	R04BIOAE023	5.33	2676.81
DEBEN	METHERSGATE REACH	R04BIDEB118	24.72	2516.16
ORWELL	OFF FRESTON HARD	R04BIOR2085	8.6	948.2
STOUR	DOVEHOUSE POINT	R01BISE08	6.29	931.05
WATON BACKWATERS	BARGE CREEK CONF.	R01BIHE06	7.61	298.24
COLNE	OFF ALRESFORD CREEK	R01BINE09	15.8	1514.25
BLACKWATER	OFF OSEA PIER	R01BIBE19	3.89	852.21
CROUCH	NORTH FAMBRIDGE	R01BICE09	9.72	674.56
ROACH	EAST END PAGLESHAM	R01BIRE08	11.41	405.16

APPENDIX 10

OFF SHORE NUTIENTS AND CHLOROPHYLL SAMPLE POINTS

MAP POINT	NAME	CDPS CODE
1	DUNWICH CLIFFS	R04BJTM514714
2	THORPENESS	R04BJTM490576
3	ORFORDNESS	R04BJTM479512
4	SHINGLE STREET	R04BJTM396426
5	FELIXSTOWE COBBOLDS POINT	R04BJTM338347
6	FELIXSTOWE PITCHING GROUND	R04BJTM304312
7	HAMFORD OUTER RIDGE	R01BJTM301267
8	WATTON	R01BJTM275200
9	HOLLAND RADAR	R01BJTM240154
10	CLACTON PIER	R01BJTM195123
11	JAYWICK	R01BJTM160106
12	MERSEA BENCH HEAD	R01BJTM72107
13	SWIN SPITWAY	R01BJTM172049
14	W. HOOK MIDDLE	R01BJTR167997
15	MAPLIN BANK	R01BJTR133926

APPENDIX 11

DANGEROUS SUBSTANCES DIRECTIVE (76/464/EEC)

ENVIRONMENTAL QUALITY STANDARDS FOR HEAVY METALS

LIST 1 (BLACK LIST)

DETERMINAND	EQS mg/l
MERCURY	0.3
CADMIUM	2.5

LIST 2 (GREY LIST)

DETERMINAND	EQS ug/l
COPPER	5
CHROMIUM	15
ARSENIC	25
LEAD	28
ZINC	40
NICKEL	30

Standards refer to annual averages of dissolved metal concentrations.

APPENDIX 12

HEAVY METAL SAMPLE SITE LOCATIONS

MAP No.	LATITUDE / LONGITUDE COORDINATES
1	52o - 20.8 01o - 44.0
2	52o - 18.6 01o - 43.2
3	52o -16.8 01o - 41.2
4	52o - 14.6 01o - 40.4
5	52o - 12.0 01o - 39.8
6	52o - 09.6 01o - 38.8
7	52o - 06.2 01o - 37.8
8	52o - 04.4 01o - 37.0
9	52o - 03.6 01o - 35.5
10	52o - 03.0 01o - 33.5
11	52o - 02.5 01o - 31.5
12	52o - 01.55 01o - 30
13	52o - 00.5 01o - 28.7
14	51o - 59.2 01o - 27.7
15	51o - 58.3 01o - 26.2
16	51o - 57.3 01o - 24.7
17	51o - 56.4 01o - 23.2
18	51o - 56.4 01o - 21.8
19	51o - 54.4 01o - 20.9
20	51o - 53.0 01o - 20.0
21	51o - 51.7 01o - 19.8
22	51o - 50.5 01o - 19.0
23	51o - 49.4 01o - 17.7
24	51o - 48.2 01o - 16.4
25	51o - 47.1 01o - 14.8
26	51o - 46.6 01o - 13.2
27	51o - 46.0 01o - 11.2
28	51o - 45.2 01o - 09.6
29	51o - 45.0 01o - 07.2
30	51o - 44.8 01o - 05.4
31	51o - 44.6 01o - 03.1
32	51o - 45.2 01o - 01.0
33	51o - 45.0 00o - 59.4
34	51o - 43.8 00o - 59.4
35	51o - 42.0 00o - 59.1
36	51o - 40.2 00o - 59.0
37	51o - 38.4 00o - 58.8
38	51o - 36.8 00o - 58.8
39	51o - 35.0 00o - 58.4
40	51o - 33.8 00o - 56.4
41	51o - 32.6 00o - 54.2

APPENDIX 13

EC BATHING WATER DIRECTIVE 76/160/EC STANDARDS

MANDATORY BATHING WATER –	Total coliform	< 10 000 per 100ml
	Faecal coliform	< 2 000 per 100ml

There should be at least 20 samples, taken at regular intervals throughout the summer season, of which 95 % must comply with each of the above two parameters

GUIDELINE BATHING WATER –	Total coliform	< 500 per 100ml
	Faecal coliform	< 100 per 100ml

There should be at least 20 samples, taken at regular intervals throughout the summer season, of which 80 % must comply with each of the above two parameters

Other mandatory parameters include pH, transparency, Salmonella, enteroviruses, colour, mineral oils, surface active substances and phenols.

APPENDIX 14

DESIGNATED BATHING BEACHES ON THE SUFFOLK AND EAST ESSEX COAST

BATHING BEACH	SAMPLE POINT CODE	NGR	DESIGNATED/ NOT DESIGNATED - X
SOUTHWOLD	R04BJS0508754	TM50807540	
ALDEBURGH	R04BJAL466566	TM4660056630	X
FELIXSTOWE N	RO4BJFE305343	TM30503430	
FELIXSTOWE S	R04BJFE297337	TM29703370	
HARWICH	R01BISE0120	TM2630032600	X
DOVERCOURT	R01BIHW0010	TM173064	
WALTON	R01BJCW2200	TM25552156	
FRINTON	R01BJCW1850	TM23791941	
HOLLAND HAVEN	R01BJCW1765	TM22451765	
CLACTON	R01BJCW1520	TM18791525	
CLACTON-GROYNE 41	R01BJCW1430	TM1760014300	X
CLACTON-COASTGUARD	R01BJCW1423	TM1738014230	X
JAYWICK	R01BJCW1280	TM14851280	
BRIGHTLINGSEA	R01BINE045	TM07631616	
WEST MERSEA	R01BIBE0235	TM02271203	

APPENDIX 15

ESSEX AND SUFFOLK COASTAL SEWAGE OUTFALLS INFLUENCING BATHING WATER QUALITY

OUTFALL	NGR	OUTFALL TYPE	SEWAGE TYPE	TREATMENT	TOTAL LENGTH OF OUTFALL m	DIAMETER OF PIPE mm	DISTANCE BELOW LWM m	DEPTH OF OUTLET BELOW LWM m
1. ALDEBURGH	TM47285448	LSO	DOMESTIC SEWAGE	MACERATION/ COMMINUTOR	2100	202	1000	9.5
2. FELIXSTOWE NORTH	TM31613425	SSO	DOMESTIC SEWAGE	PARTIAL MACERATION	700	300	630	5.5
3. FELIXSTOWE SOUTH	TM28103280		DOMESTIC SEWAGE	MACERATION/ COMMINUTOR	2		2	2 (approx)
4. HARWICH	TM267315		DOMERTIC SEWAGE	MACERATION/ COMMINUTOR	500	500 (approx)	100	15
5. DOVERCOURT	TM25182953	SSO	DOMESTIC SEWAGE	MACERATION/ COMMINUTOR	550		340	1 (Spring)
6. WALTON	TM268247	SSO	DOMESTIC SEWAGE		200 (approx)		20	3
7. CLACTON (Holland Haven)	TM22261650	LSO	DOMESTIC SEWAGE	MACERATION/ COMMINUTOR	750	100	700	8
8. JAYWICK	TM3801210	LSO	DOMESTIC SEWAGE	MACERATION/ COMMINUTOR	2200	950	600	4
9. WEST MERSEA	TM03011212	SSO	DOMESTIC SEWAGE	PRIMARY TREATMENT	800 (approx)	600 (approx)	20	2

KEY
LSO - LONG SEA OUTFALL
SSO - SHORT SEA OUTFALL

CONTINUED

APPENDIX 15
CONTINUED

O/F	DIFFUSERS	MEAN DAILY FLOW m3/ day	POPULATION	CONSENT STATUS	CONSENT NUMBER	COMMENTS	STORM OVERFLOWS
1	2	835.5	4069 summer 2669 winter	Consented in 1992 5650 m3/d	AW4TS1382	No detectable effect on bathing beaches	**CLACTON** Victoria Road Gunfleet Collingwood Road **WALTON** Walton Pumping Station (Storm and emergency) **FRINTON-ON-SEA** Second Avenue Queens Road Holland Road (Storm and emergency) **HARWICH** Fennlea Road The Guard
2	0	115	6400	Deemed application	AW4TS1375	To be abandoned by 1996	
3	0	4900	29000 summer 20000 winter	Deemed application Not resolved	AW4TS1381	Discharged on the ebb tide Receives trade effluent from yeast manufacturer	
4	0	2545		Deemed application Not resolved	AW2TS7168	To be abandoned by 1996	
5	17m diffuser wit 16 ports	3350	15800 summer 11700 winter	Consented in 1992 25100 m3/d	AW2CS580	Outfall extension by 1995	
6	0	6370		Consented in 1966 6370 m3/d	E35766	100SS/100BOD	
7	7m diffuser with 16 ports	17280	69850 summer 32350 winter	Deemed application Not resolved	AW2CS659	22 consented trade effluents discharging to the works. Strong currents give rise to elongation of the sewage plume.	
8	Uptumed outlet	6048	38200 summer 16750 winter	Deemed application Notresolved	AW2CS660	6 consented trade effluents discharging to the works. Strong currents give rise to elongation of the sewage plume.	
9	0	3625	11823	2900 m3/d Full treatment by 1996	ASETF1320A	Maybe relocated to the tidal Colne. Bathing beach has failed its EC statutory limit .	

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