

Sea Vigil Water Quality Monitoring

The East Anglian Coast : 1994



National Rivers Authority
Anglian Region - Marine Section
Peterborough

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Contents

EXECUTIVE SUMMARY	3
BACKGROUND.....	5
DESCRIPTION OF THE EAST COAST AREA.	6
Bathymetry and Tides	6
OBJECTIVES.....	7
WORK PROGRAMME DETAILS.	7
PRESENTATION OF RESULTS.	9
GENERAL COMMENTS.	9
JANUARY, 1994 SURVEY.	11
MARCH, 1994 SURVEY.	11
APRIL, 1994 SURVEY.....	11
MAY, 1994 SURVEY.	11
JUNE, 1994 SURVEY.....	11
JULY, 1994 SURVEY.....	11
SEPTEMBER, 1994 SURVEY.....	11
NOVEMBER, 1994 SURVEY.	12
COASTAL NUTRIENTS USING CONTINUOUS ON-BOARD ANALYSIS.	12
COASTAL NUTRIENTS BY SITE.	12
INDIVIDUAL DETERMINAND COMPARISONS.	12
ELECTRONIC DATA COLLECTION.	13
COMMENTS	13
Site Data.....	13
Continuously Collected Nutrient Data.....	13
Data from Transects.	14
CONCLUSIONS.....	14
FUTURE YEARS.	15

EXECUTIVE SUMMARY

The NRA has an obligation to monitor and safeguard the coastal waters of England and Wales out to a designated 3 nautical mile limit. To meet this obligation, Anglian Region uses a purpose-designed coastal survey vessel, *Sea Vigil*, purchased in 1991.

Data from surveys carried out along the coast of East Anglia during 1994, from the edge of the Wash to the Thames, are reported here. Their purpose was to gain information on the nutrient levels along the coast of East Anglia. This complements the previous report on 1992-1993 data and earlier "Zone" reports already issued by the Eastern Area of NRA Anglian Region, which provide a broader picture of water quality, with emphasis on the estuaries.

The character of the coastline changes as one moves eastwards and southwards from the Wash to the Thames Estuary. The Wash features shallow water with extensive drying saltmarsh and mudflats. The North Norfolk coast is generally low lying with no river inputs to sea except at Great Yarmouth. Here and at Lowestoft, the Bure and Waveney rivers discharge to the part of the coast with least tidal movement and hence dispersing effect. There are small rivers discharging to sea between Lowestoft and Felixstowe, with larger ones discharging between Felixstowe and the Thames Estuary. There are a number of designated Bathing Waters along much of the coast of East Anglia.

There are seven High Natural Dispersion Areas along this part of the coast. Some of the data collected were within the HNDA 10 km zones.

During 1994, *Sea Vigil* again carried out sampling for the National Coastal Baseline Surveillance Programme. Surface water samples were collected from 33 sites. With *Sea Vigil* needing to make passage between other survey programmes, the opportunity was taken to collect further nutrient samples on such occasions. Data was collected at approximately two monthly intervals.

Samples were analysed on-board *Sea Vigil* for nitrate, ammonia, phosphate, silicate and nitrite. Field data were also collected for Temperature, Salinity and Dissolved Oxygen.

Sites between the Wash and Great Yarmouth showed nutrient concentrations to be at the summer minimum for longer periods of time than all sites south of Lowestoft.

The monitoring programme continued until 1995 with added emphasis on chlorophyll data. A review of all Regional coastal nutrient data would then be carried out, in order to define an appropriate monitoring programme, in line with the NRA's newly issued National Marine Monitoring Strategy.

Knowledge of the phytoplankton and zooplankton would be an added benefit.

EAST ANGLIAN COAST

WATER COLUMN SURVEYS

SEA VIGIL, 1994.

BACKGROUND.

Following its formation in September, 1989, the National Rivers Authority has had an obligation to monitor and safeguard the coastal waters of England and Wales out to a designated 3 nautical mile limit. This responsibility was defined differently for the previous Water Authorities. Consequently, there was very little data collected for offshore coastal water sites between the Humber and the Thames, the area covered by the Anglian Region of the NRA.

The Coastal Survey Vessel of the Anglian Region of the NRA, *Sea Vigil*, has been collecting nutrient information from along the Anglian Coast since March 1992, using an on-board autoanalyser, permitting immediate analysis. Analytical techniques have been developed to measure the low levels of nutrients encountered in outer estuaries and coastal waters. This report is a summary of sampling carried out along the East Anglian Coast during 1994. The data from surveys during 1992-1993 were reported previously. Separate reports cover the *Wash*, the *Lincolnshire Coast* and the *Humber Estuary*.

The 3-mile limit is not solely measured from the coastline; sandbanks are also used to determine territorial responsibilities. This leads to the unusual contour lines shown in Figure 1 where the limit is over 5 miles offshore at Great Yarmouth and Lowestoft and 15 miles or more offshore south of Clacton. There is also a discontinuous patch off Bacton, about 1½ miles outside the regular limit. This means that these surveys have not collected data from the 3 mile limit, but from points about 1½ miles offshore, thought to be representative of the coastal zone.

With a lack of historical data, it is difficult to make comparisons and provide explanations. A continuing programme of nutrient monitoring is planned until 1995, in order to overcome these deficiencies. An overall report will be produced at the end of 1995, with the aim of putting the 1992-1995 data into geographical and historical perspective.

The Eastern Area of NRA Anglian Region issued "Zone" reports covering the Norfolk Coast in 1994 and the Suffolk and Essex Coasts in 1993. These present a broader picture of water quality, with emphasis on the estuaries.

DESCRIPTION OF THE EAST COAST AREA.

The North Norfolk Coast from the Wash to east of Sheringham is a low barrier beach system with a number of small creeks with areas of intertidal flats, saltmarshes and sand dunes. The tidal catchment area has a low population.

From Sheringham to Mundesley there are low lying chalk cliffs with sandy beaches. Parts of the coastal water have an underlying shallow chalk platform. With there being no river inputs in this stretch, the coastal waters are the clearest within the Anglian Region of the NRA. The larger towns are also seaside resorts, with bathing beaches.

From Mundesley to Great Yarmouth, the coast is low-lying with sandy beaches and no river inputs.

At Great Yarmouth, the Bure and Yare Estuaries discharge to sea via Breydon Water and at Lowestoft the Waveney Estuary discharges to sea via Oulton Broad and Lake Lothing, although both estuary systems are interconnected. Both estuaries, with moderate fresh water inputs, discharge into that part of the coast with least tidal movement, and this leads to comparatively slower dilution with the sea.

Southward from Lowestoft to Felixstowe, the low-lying and sandy coast is broken by the estuaries of the Rivers Blyth, Alde and Deben, each with comparatively small freshwater inputs.

From Felixstowe to the Thames Estuary, there are major riverine inputs from the Stour, Orwell, Colne and Blackwater estuaries and lesser ones from the Crouch and Roach estuaries. From the Blackwater to the Thames, the coast is low-lying saltmarsh with very shallow and extensive mudflats.

Along the coast between the Wash and the Blackwater Estuary there are many EC designated Bathing Waters. There is a further designated Bathing Water inside the Thames Estuary at Southend-on-Sea.

The sea area around seven sewage outfalls have been designated as High Natural Dispersion Areas (HNDA's) under the terms of the Urban Waste Water Treatment Directive (UWWTD). Locations are shown in Figure 1.

Under the UWWTD, Anglian Region currently has no designated coastal "Sensitive Areas [Eutrophic]".

More extensive information is available elsewhere, e.g. NRA "Zone" reports.

Bathymetry and Tides

The depths of water within 3 miles of the coast of East Anglia do vary along its length. In the outer Wash on the Norfolk coast, between Thornham and Wells, most of the sea within the 3-mile limit is charted at a depth of less than 10m. This increases to nearly 15m at Cromer. Between Cromer and the Deben Estuary, the charted depth is mostly less than 20m. From there to the Thames, the charted depth is less than 10m.

The tides also vary along the coast. At the Wash, there is a mean Spring Range of about 6m. This gradually diminishes along the coast, down to about 2½m between Great Yarmouth and the Alde Estuary. From here it rises again until the Spring Range is about 5m at the outer Thames Estuary.

The strongest tidal currents occur between Cromer and Lowestoft, often reaching 3 knots, maximum 3.4 knots.

OBJECTIVES.

The purpose of the 1994 surveys was to extend knowledge on nutrient levels and their variation along the coast of East Anglia, particularly on a seasonal basis, building on the 1992-1993 data set. Furthermore, the EC Urban Waste Water Treatment and Nitrate Directives, along with the high political profile of North Sea matters, particularly nutrients, require information on nutrients, chlorophyll and water quality.

Whilst Anglian Region currently does not have any coastal areas designated as "Sensitive Areas [Eutrophic]" under the UWWTD, this work will provide data for any necessary reassessment.

Some surveys were part of the National Coastal Baseline Surveillance programme, initiated by the NRA's National Centre for Marine Surveillance at Twerton (Bath). Since this programme used a coarse grid of sites, 15 km apart, additional samples were taken to "fill-in" for Regional monitoring purposes.

In addition to the sample programme for the National Coastal Baseline Surveillance programme, "opportunistic" sampling was also undertaken during passages between work on the various Area Marine Monitoring programmes.

The intention has been to collect data from all the coastal waters of the Anglian Region and produce a series of reports.

WORK PROGRAMME DETAILS.

For operational reasons, surveys of the East Anglian coast occupied two of the three days of a coastal run covering from Hull in the Humber Estuary to Shoeburyness in the outer Thames Estuary (or vice versa, since the survey might be in either direction).

Tidal constraints meant that it is more effective for *Sea Vigil* to travel with the tide than against it. As a consequence, surveys usually took place under a similar tidal state for a particular direction, although there was no differentiation between Spring and Neap tides.

The sample sites were based on those originally set up by Eastern Area when carrying out helicopter surveys in 1990. The complete set of these sites, at about 4 km intervals, number 77 in total, and would only be used for a special intensive survey, carried out not more than once every few years.

The 33 sites sampled by *Sea Vigil* in 1994 were the same as those during 1992-1993 coastal surveys, with the exception of Mersea "Bench Head". This was dropped as a sampling site as it was not felt appropriate as a coastal site. The deeper sites off Maplin Sands in Essex, site 70 onward, were again used, the originals being too far inshore for the shallowness of the coast.

The National Coastal Baseline Survey in July was carried out for Anglian Region by the identical vessel from Northumbria and Yorkshire Region, *Water Guardian*, as *Sea Vigil* was engaged on a major benthic survey in the Humber Estuary.

With no reason to suspect stratification, water was collected from the surface layer of the sea, at pre-defined sites, shown in Figure 1, with site details in Table 1. Not all sites were sampled on each survey. Field data was collected at the same time, including temperature, salinity and dissolved oxygen. Samples were immediately filtered and then put through the autoanalyser, when available. Results were then sent to Peterborough for entering onto the laboratory database. The methods employed contained built-in Analytical Quality Control procedures and have satisfactorily passed special marine AQC exercises, particularly the stringent ones prepared for International Council for the Exploration of the Seas (ICES) exercises. Chlorophyll samples were filtered on-board, preserved and sent to the NRA Eastern Area Biology Laboratory at Ipswich for analysis. No formal AQC was undertaken.

During 1992 and 1993, the Anglian Region operated its own analytical laboratory. This was closed at the end of 1993. During 1994, there was no Marine Chemist available within the Region to control the nutrient analysis on-board *Sea Vigil*. Sometimes it was possible to borrow or hire a chemist from other NRA laboratories. Otherwise, samples had to be frozen and sent to an NRA laboratory (Fobney Mead, Llanelli or Nottingham).

In order to assess a finer degree of detail in coastal nutrients, the National Coastal Baseline surveys of 1994 attempted to monitor nutrients on a more continuous basis whilst the *Sea Vigil* was on-passage. Essentially, this meant setting up the autoanalyser to sample at roughly 2 minute intervals from a flow cell in the survey cabin, the cell being filled from a continuously running peristaltic pump drawing water through the ship's hull from about 1m below the sea surface. There were no discernible problems associated with this arrangement.

At this time, it was not possible to link the autoanalyser to the *Sea Vigil* position fixing equipment. Since the sample was collected over a 2 minute period, it provides a result integrated over a distance proportional to the speed of the vessel. At 8 knots, this distance is about 500 metres. Development was in progress to determine whether a longer time interval might be preferable, this providing a more stable chemistry. The autoanalyser was operated to the same standard as the spot sample analysis.

At present, it is difficult to assess what the chlorophyll analysis measures. The results are method dependent and so likely to include a variety of pigments, including phaeophytin. It is probably most correct to say the chlorophyll data represents "acetone extracted plant pigments". The dilemma is further exacerbated by the fluorescence data measurements for chlorophyll suggesting many results are higher than laboratory analysis indicates. A Regional project is in hand to resolve these difficulties. The relationship between chlorophyll and algae abundance or biomass is complex.

It was clear from the 1992-1993 surveys that conclusions could not be directly drawn as to the consistency of nutrient concentrations between the coast and the 3-mile limit. It was therefore decided to carry out transects at a limited number of locations along the coast, these being lines perpendicular to the shore. Samples were collected at 1 km intervals between the shore and a point just outside the 3-mile limit.

PRESENTATION OF RESULTS.

Two types of nutrient data are reported here. The spot samples are from the water column, which after collection, were filtered through 0.45µm membrane filters and are therefore termed "dissolved nutrients". The nutrients are: nitrate, reactive phosphate, silicate, ammonia and nitrite. All results are in microgrammes per litre (µg.l⁻¹) and are given, by survey, in Tables 4 to 12. There is some chlorophyll data. Available field data are also given.

Some of the nutrient data comes from continuous analysis on-board *Sea Vigil* or *Water Guardian*. Whilst some of these analyses did not use an in-line filter, it is unlikely that the technique overestimates dissolved nutrients by very much. It will be avoided in future.

In this summary, the term nitrate is used in preference to Total Oxidised Nitrogen (TON). There is an analytical distinction, TON being the summation of nitrate and nitrite results. Since the levels of nitrate are generally vastly higher than those of nitrite, the distinction does not significantly influence the data interpretation.

The data is presented as a series of graphs, by survey. Tables 3.1 to 3.3 list the figure and table numbers. For each survey there is a:

- Table of Data;
- Chart of Nutrient data against Site Location (Wash to Thames Estuary).

For ease of presentation, sites appear to be equally spaced. Whilst this is not the case, the trends and their locations are readily obvious.

Figure 10 shows data from the transects out from the coast at Walton-on-the-Naze, Dunwich Cliffs and Mundesley (11-12 November).

In addition, graphs are presented, four to a page, showing seasonal changes in nutrients, by Site, in Figures 11 to 19.

Figures 20 to 28 show grouped seasonal changes for individual nutrients and general water quality parameters.

Figures 29 to 40 show colour banded maps of the data measured continuously by autoanalyser during the National Coastal Baseline Surveys of May, July and September.

GENERAL COMMENTS.

Nutrient, plankton and chlorophyll concentrations follow a seasonal pattern. During winter, there is negligible planktonic activity due to low light irradiance, with the majority of old biomass being regenerated into dissolved nutrients. Hence maximum nutrient concentrations are found in late Winter (January-February)

Spring is the period for fastest planktonic growth and nutrient uptake. Consequently, chlorophyll concentrations are expected to be at their highest concentrations within the water column. This usually commences in Anglian Region in early March, through to May.

Mid-summer is the period when dissolved nutrients first reach minimum concentrations within the water column, having been consumed by the phytoplankton. The

reason this does not coincide with high chlorophyll concentrations is because of grazing of phytoplankton by zooplankton.

The nutrient concentrations along the coast are expected to be low relative to concentrations within estuaries, with higher values expected where the larger estuaries of Suffolk and Essex input to sea.

Nitrate is normally the most abundant of the nutrients. Nitrite is at low concentrations and rapidly oxidised to nitrate but can provide valuable information for nutrient processes.

The survey provides information in two forms:

- 1) Variations in spatial distribution of nutrient concentrations;
- 2) Variations in seasonal distribution of nutrient concentrations.

There are a number of factors to be borne in mind when considering the data:

- there are no large fresh water inputs along the North Norfolk coast between the Wash and Great Yarmouth;
- there are major fresh water nutrient inputs along the Essex and Suffolk coasts;
- there are numerous sewage outfalls discharging along the coast, particularly between Cromer and Jaywick; many of these are seasonally influenced by major holiday resorts;
- there are seven designated HNDA's along the coast (marked in Figure 1);
- the tidal currents and tidal ranges vary along the coast and give rise to differing degrees of mixing;
- the tidal effects would be most noticeable at sample points close to the mouths of estuaries, since the ebb and flood tides would provide different influences;
- whilst a thermocline is unlikely to develop in such shallow waters in summer, nutrient stripping is a possibility because of this shallowness;
- the deposition and resuspension of sedimentary material will influence the budgets of the dissolved nutrients;
- the consistent, high salinity levels should enable a stable plankton species diversity in the water column;
- soluble nutrients are part of a very complex chemical equilibrium, involving phytoplankton, zooplankton and sediments;
- turbidity of coastal waters is low compared to the estuaries of the Region, particularly along the North Norfolk coast, where the highest light levels and thus greatest amount of photosynthetic activity would be expected.

JANUARY, 1994 SURVEY.

Results for 33 sites are given in Table 4 with nutrient and chlorophyll data presented in Figure 2. The sampling direction was southward.

MARCH, 1994 SURVEY.

Results for 33 sites are given in Table 5 with nutrient and chlorophyll data presented in Figure 3. The sampling direction was southward.

APRIL, 1994 SURVEY.

Results for 33 sites are given in Table 6 with nutrient and chlorophyll data presented in Figure 4. The sampling direction was northward.

MAY, 1994 SURVEY.

Results for 33 sites are given in Table 7 with nutrient and chlorophyll data presented in Figure 5. The sampling order was southward.

Continuous nutrient data are presented in Figures 29 to 32.

JUNE, 1994 SURVEY.

Results for 33 sites are given in Table 8 with nutrient and chlorophyll data presented in Figure 6. The sampling order was northward.

JULY, 1994 SURVEY.

Results for 33 sites are given in Table 9 with nutrient and chlorophyll data presented in Figure 7. The sampling order was northward.

Continuous nutrient data are presented in Figures 33 to 36.

SEPTEMBER, 1994 SURVEY.

Results for 33 sites are given in Table 10 with nutrient and chlorophyll data presented in Figure 8. The sampling order between the Wash and Great Yarmouth was southward, with the Thames to Great Yarmouth being northward.

Continuous nutrient data are presented in Figures 37 to 40.

NOVEMBER, 1994 SURVEY.

Results for 33 sites are given in Table 11 with nutrient and chlorophyll data presented in Figure 9. The sampling order was southward.

Results for transects at Walton-on-the-Naze, Dunwich Cliffs and Mundesley are given in Table 12 with nutrient data presented in Figure 10.

COASTAL NUTRIENTS USING CONTINUOUS ON-BOARD ANALYSIS.

The continuously measured nutrient data from the National Coastal Baseline surveys of May, July and September, 1994, are presented in Figures 29 to 40. There are too many data to be listed in a Table.

There is a separate plot for Ammonia, Phosphate, Silicate and T.O.N. for each survey. The results are banded into 5 colours for each determinand and are the same for all seasons. The colour bands have been chosen to emphasise the seasonal differences, i.e. high concentration bands expected in winter, low concentration bands expected in summer, with the lowest concentration band being related to detection limits. Results that were measured as "less-than" figures have been plotted at one half of the quoted detection limit.

COASTAL NUTRIENTS BY SITE.

The data from all surveys is presented in Figures 11 to 19 showing seasonal changes in nutrients and chlorophyll concentrations at each of the 33 sites, four sites to a page.

From these plots, the expected seasonal trends are evident, with the major nutrients of Nitrate, Silicate and Phosphate being diminished by plankton uptake in the Summer months but not being regenerated before the Winter months.

The nutrient profiles for the 4 sites closest to the Wash have the sharpest Spring depletion in nutrients.

During July, nutrients were almost at detection limits.

Sites between the Wash and Great Yarmouth show nutrient concentrations to be at Summer minima for longer periods of time than all sites south of Lowestoft.

In general, Ammonia is the first nutrient to be consumed and the first to be replenished, particularly south of Lowestoft.

INDIVIDUAL DETERMINAND COMPARISONS.

Data from all surveys is presented in Figures 20 to 28 showing seasonal changes at all sites for each determinand, split over three graphs.

This shows similarities or otherwise between sites.

Sites between the Wash and Lowestoft showed seasonal changes in Salinity, being noticeably lower in the Winter than in the Summer.

The level of dissolved oxygen along the coast was consistently around 98% saturation, but with significant deviations during May, June and July surveys. Many sites showed elevated dissolved oxygen at nearly 120% during May. This phenomenon is associated with algal blooms.

Many sites had chlorophyll measured at over $10 \mu\text{g.l}^{-1}$ during May, further confirmation of the existence of algal blooms.

ELECTRONIC DATA COLLECTION.

On-board electronic sensors and towed arrays have been used to measure temperature, dissolved oxygen, salinity, turbidity, pH and chlorophyll along the East Anglian Coast, on longitudinal profiles. These profiles, taking recordings every 10 seconds, collected data at about 40m intervals. Examples of this data are presented in Figures 41 to 49 for salinity, dissolved oxygen, temperature, turbidity and chlorophyll, both around the coast and along two transects.

However, additional work is still required to confirm the values of this data as well as the validity of the techniques.

Data show trends rather than absolute values.

COMMENTS

Site Data.

In winter and early Spring, nitrate and silicate had similar concentrations, being highest at the Wash end, diminishing down to the Thames.

In March, silicate levels had fallen faster than nitrate at sites south of the Alde estuary.

In April, most silicate had been consumed with nitrate levels still moderate (obviously diatom bloom first).

In May, chlorophyll was over $10 \mu\text{g.l}^{-1}$ between Great Yarmouth and Lowestoft together with parts of the North Norfolk Coast.

In May and June, there were elevated concentrations of ammonia south of Lowestoft, except off the mouth of the Stour/Orwell.

In September, nutrients were still very low (almost detection limit levels) north of Great Yarmouth.

In November, nutrients south of Lowestoft were more towards winter levels than sites along the Norfolk Coast.

Continuously Collected Nutrient Data.

May:	high ammonia concentrations south of Lowestoft; low phosphate between the Wash and Felixstowe; moderate nitrate concentrations (low near Wash); low silicate along all coast.
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- July: High ammonia between Thames and Lowestoft; low along Norfolk Coast (continuous data from *Water Guardian* measured high ammonia along all the coast, with moderate concentrations north of Humber); low phosphate outside the Thames Estuary and Colne/Blackwater zone; low silicate along all coast; low nitrate outside Thames Estuary.
- September: ammonia still high around major estuaries and Wash, low elsewhere; phosphate moderate to high south of Dunwich; silicate concentrations moderate to low along all coast; nitrate moderate south of Dunwich, low between Dunwich and Wash.

Data from Transects.

Walton-on-the-Naze and Dunwich show downward trend in nutrient concentration without clearly reaching a steady minimum, although furthest offshore sample was outside the 3-mile limit.

At Mundesley, levels appear steady from 3 to 7 km offshore but concentrations are lower inshore of this.

CONCLUSIONS.

- It is clear that there are differences between sections of the coast of East Anglia.
- The data presented show evidence of a number of inputs to the coastal zone, the most obvious being associated with estuaries.
- Ammonia concentrations were the most variable of all the nutrients measured.
- During autumn surveys, the soluble nutrient concentrations in coastal waters were noticeably higher at sites to the south of Great Yarmouth than at all sites to the north.
- The minimum salinity measured during each survey along the coast was always at the Wash end.
- During June, distinctive peaks in ammonia concentration were evident near the Stour/Orwell and Colne/Blackwater estuaries.
- There are insufficient chlorophyll data to identify peak areas of algal activity.
- Whilst it is not possible to be certain how the direction of sampling affects the value of the data, it is unlikely to be very significant, since the most important changes are seasonal.
- There are a number of NRA sampling sites within each of the designated HNDA's. This should be helpful when the NRA has to make any judgements.

FUTURE YEARS.

It is planned to continue the programme of quarterly National Coastal Baseline surveys along the East Coast during 1995.

The additional opportunistic sampling will be continued during the National Coastal Surveillance Programme, as well as during coastal passages.

The electronic data is in the process of being worked up and will be reported on in due course. It consists of continuous surface profiles collected during these reported coastal surveys.

It may be necessary to sample further out from current sites between Felixstowe and the Thames, possibly out to the three mile limit, in order to gain full information on the influence of the estuaries in that area. The outer Thames Estuary extends far offshore but is still within Anglian Region boundaries. Some data is required from this area in order to characterize its quality.

It is also hoped to investigate further the levels of phytoplankton, zooplankton, chlorophyll and turbidity.

Tidal cycle data from sites along the coast would usefully help assess the influence of tides on nutrient concentrations. This report is one of a series covering the coastal waters of the Anglian Region of the NRA. Further reports on East Anglian Coast water quality data will be produced on an annual basis.

Future work should lead to an assessment of the influence of the major estuaries within the Region on localised coastal waters.

An overall report will be produced early in 1996, with the aim of putting the 1992-1995 data into geographical and historical perspective and comparing the Lincolnshire Coast data with results from other coastal areas. It will also permit a reassessment of the Coastal Monitoring Programme, in line with the NRA's National Marine Monitoring Strategy.

NRA - Anglian Region

NRA (AMS Graphics) 1996



Figure 1 : East Anglian Coast - 'Sea Vigil' Survey Sites

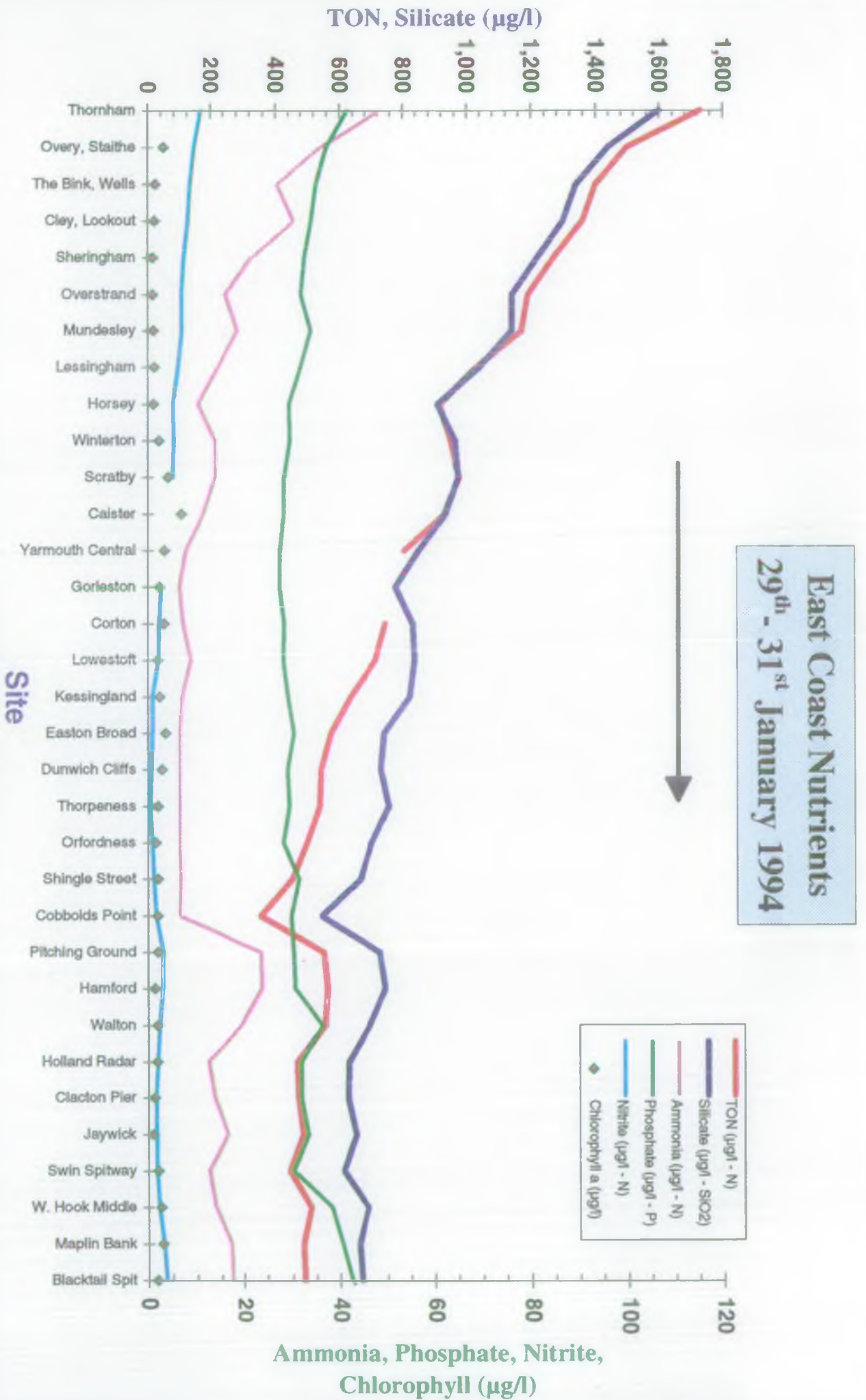


Figure : 2

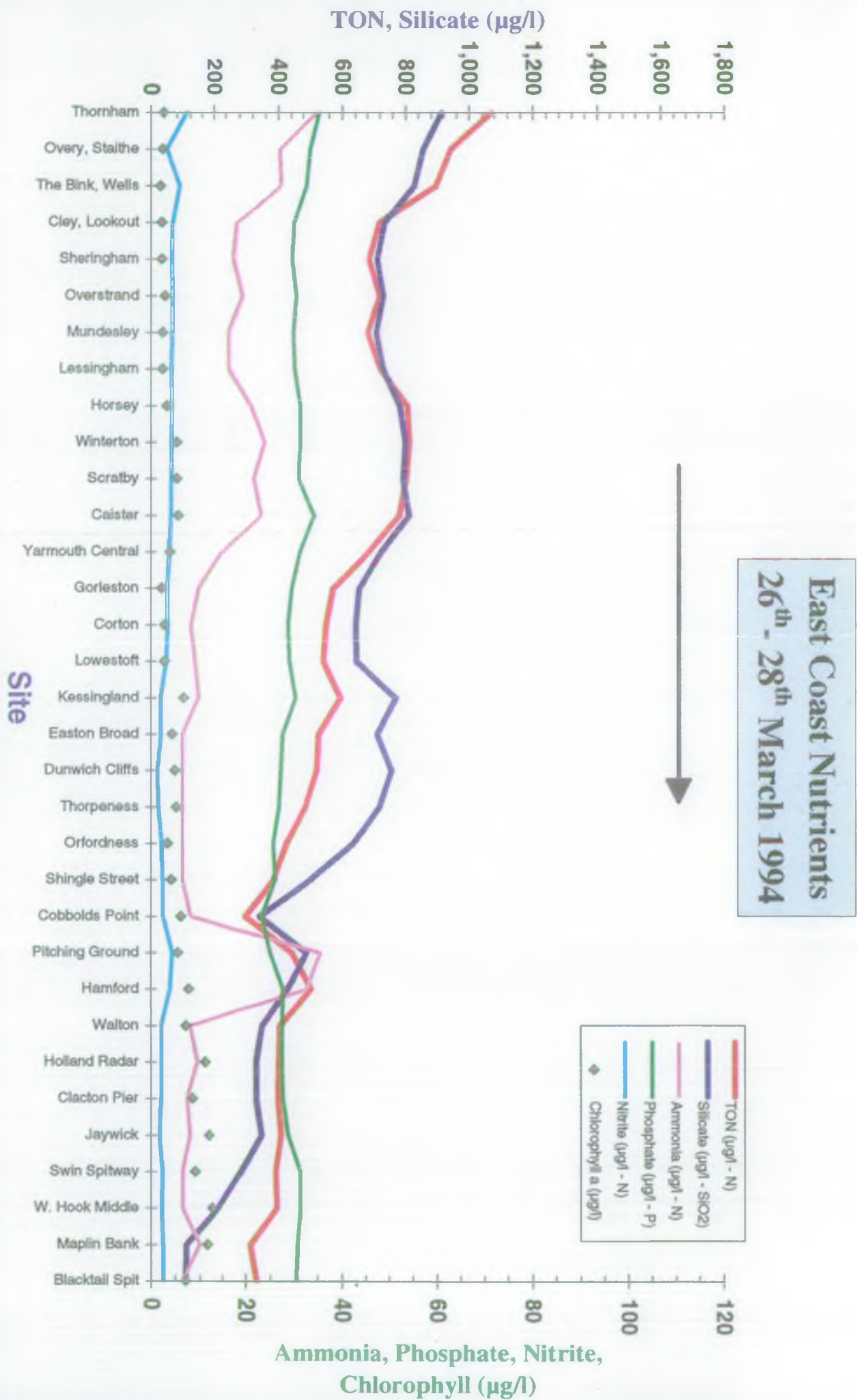
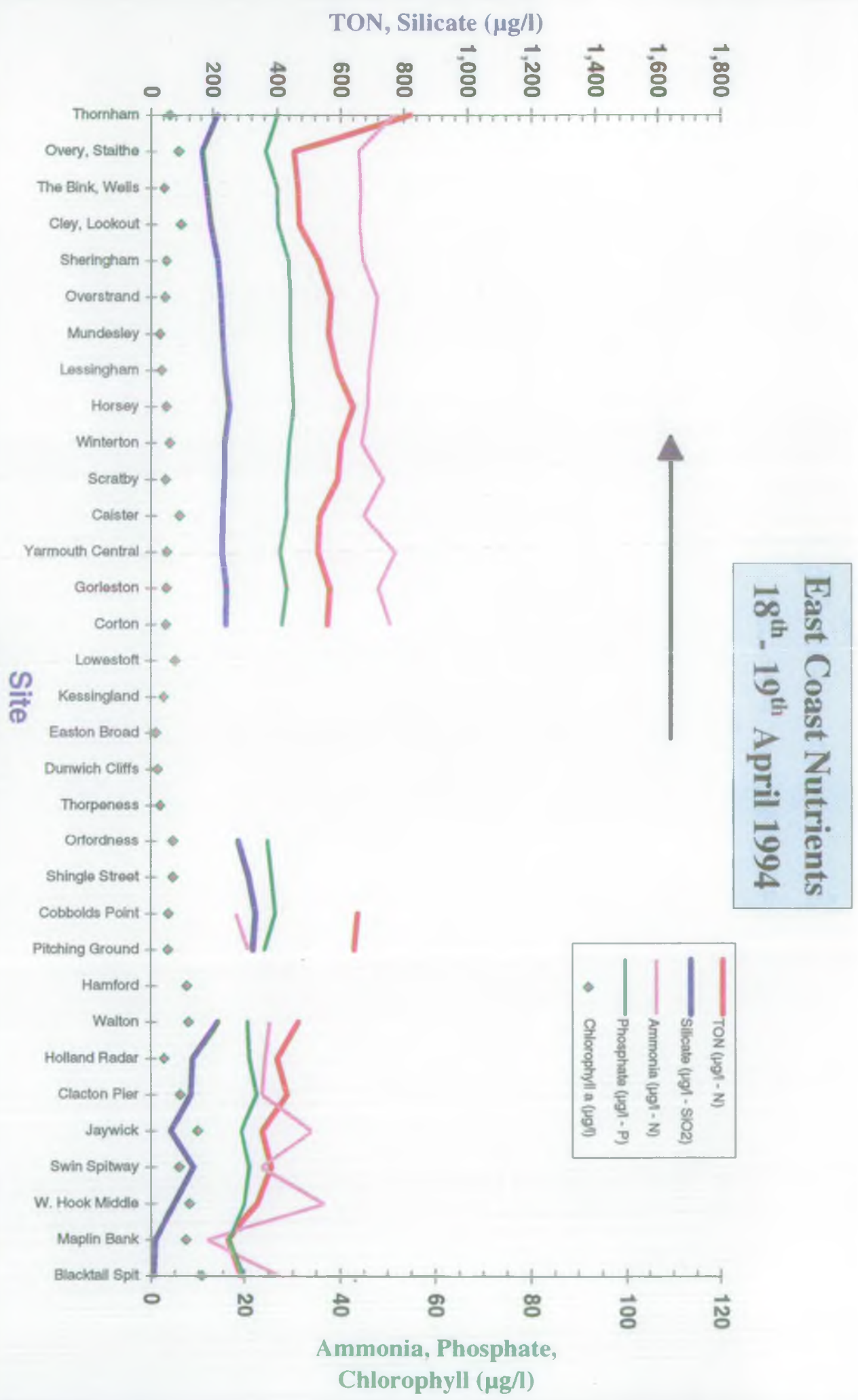


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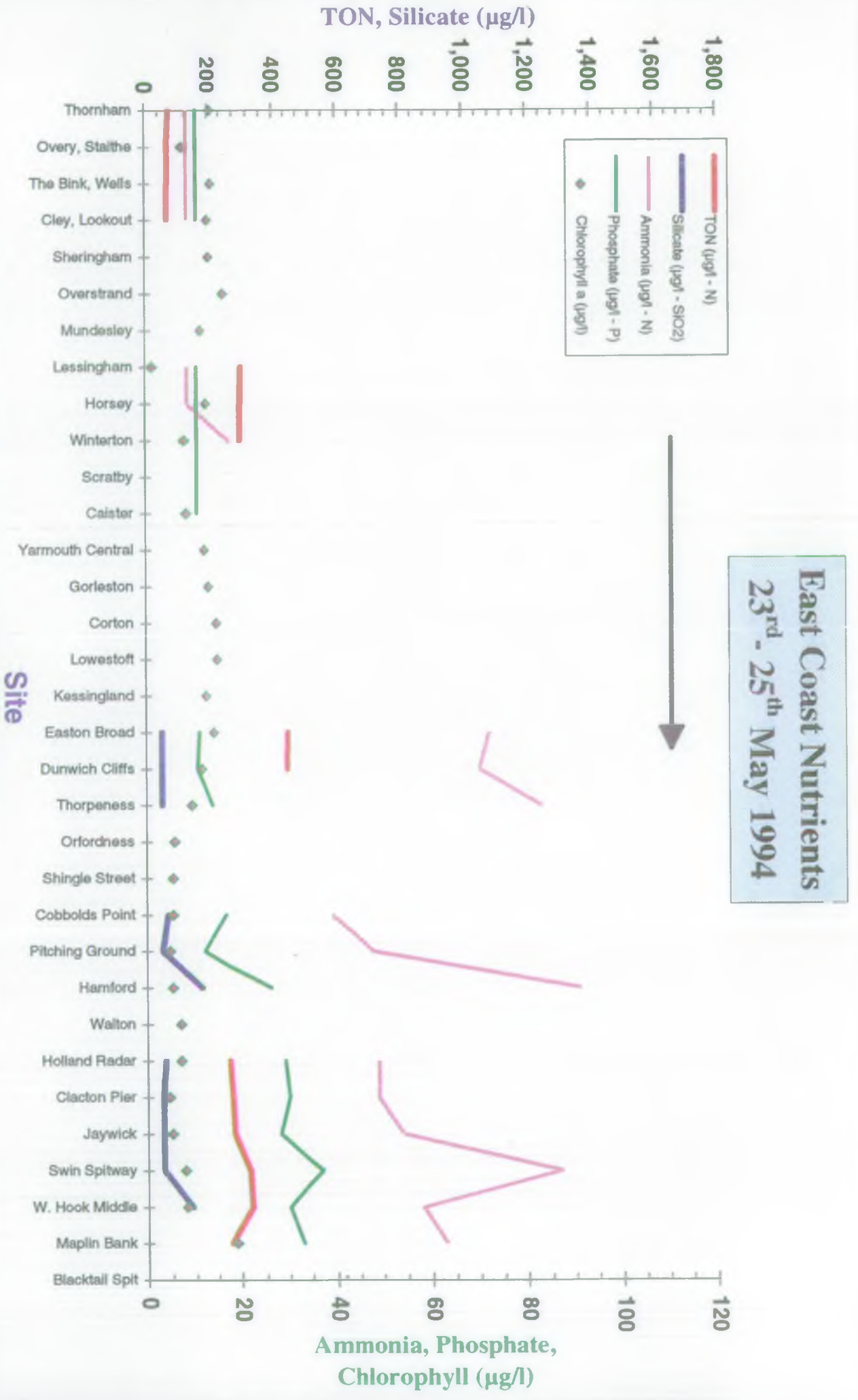


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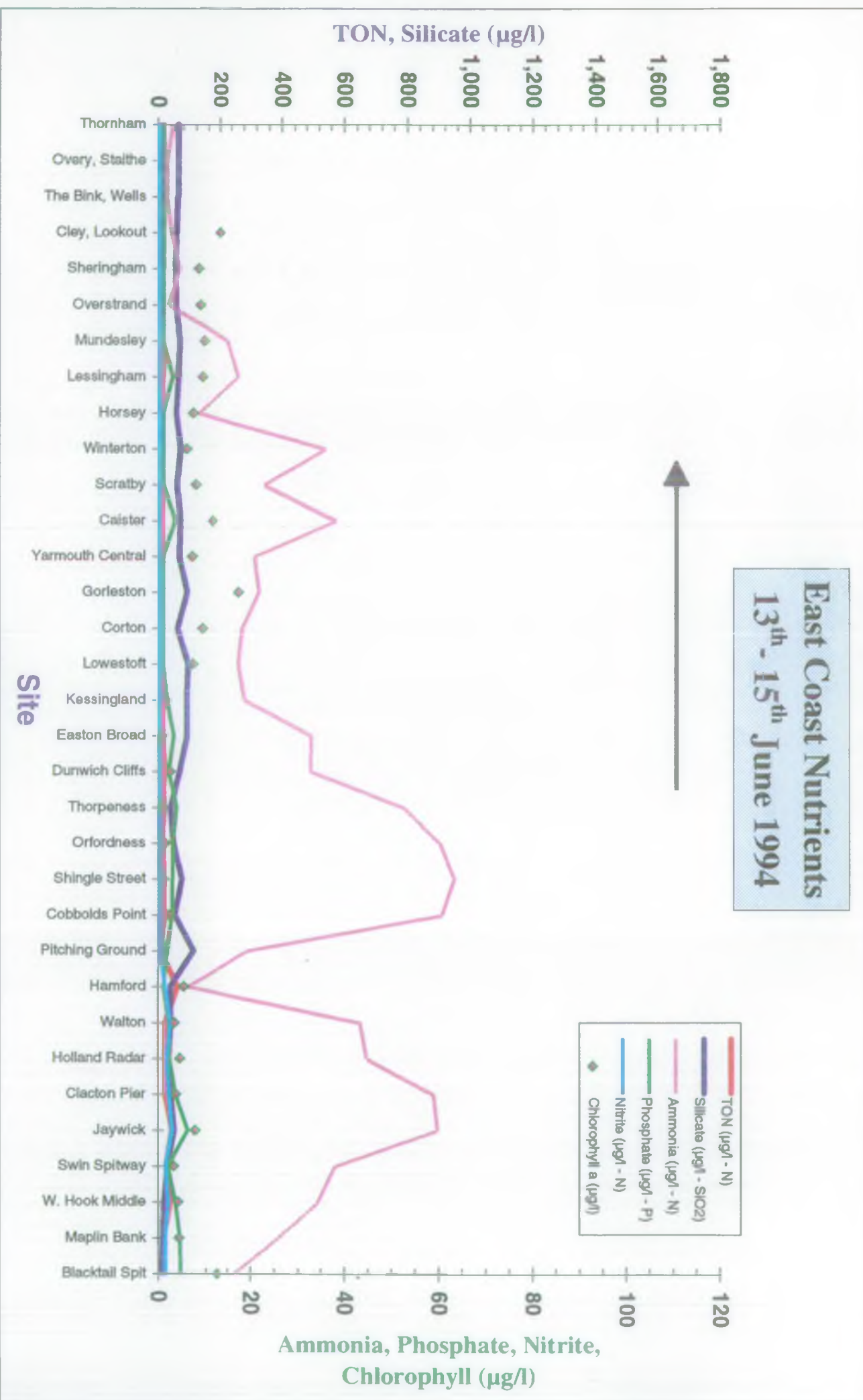
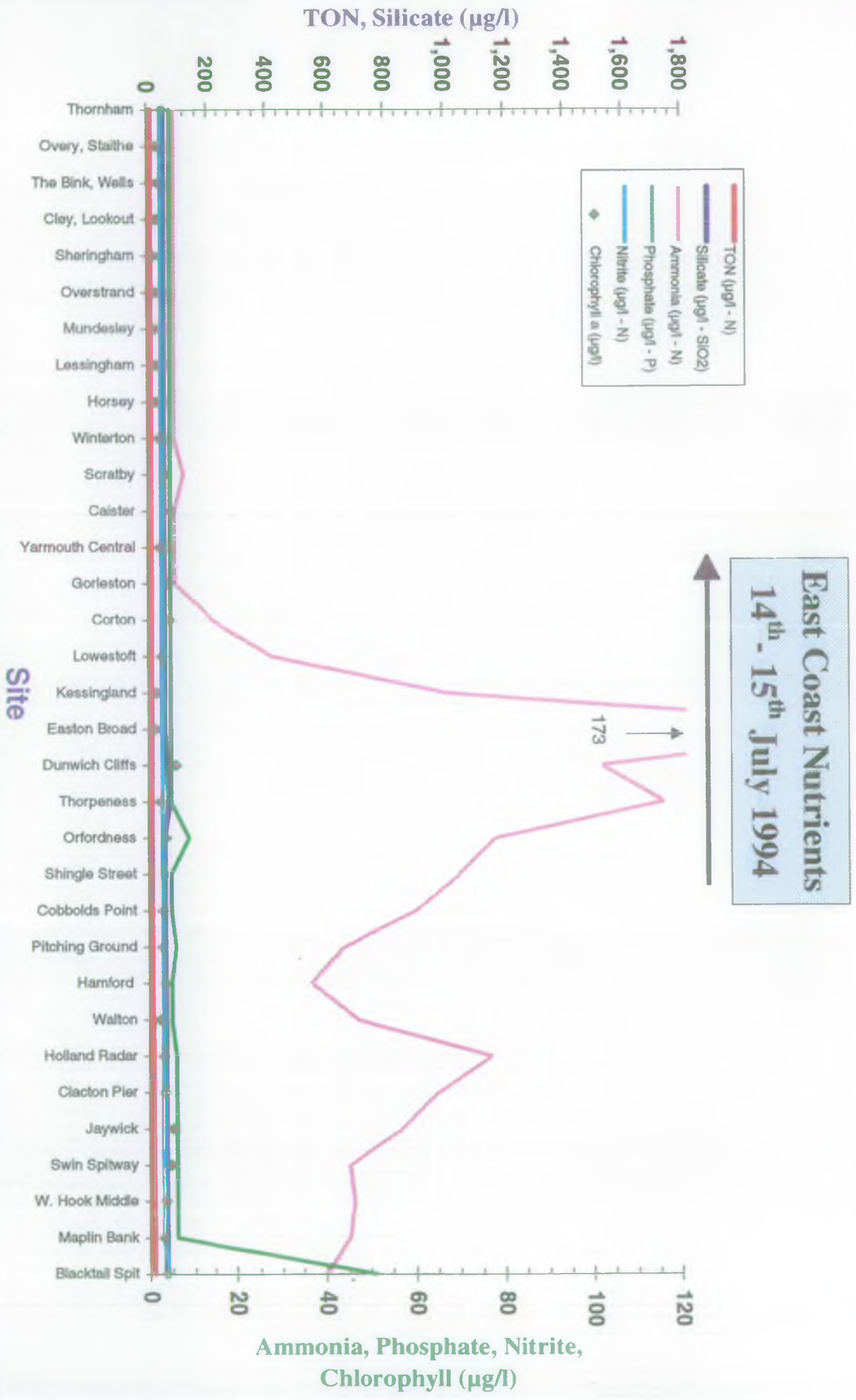


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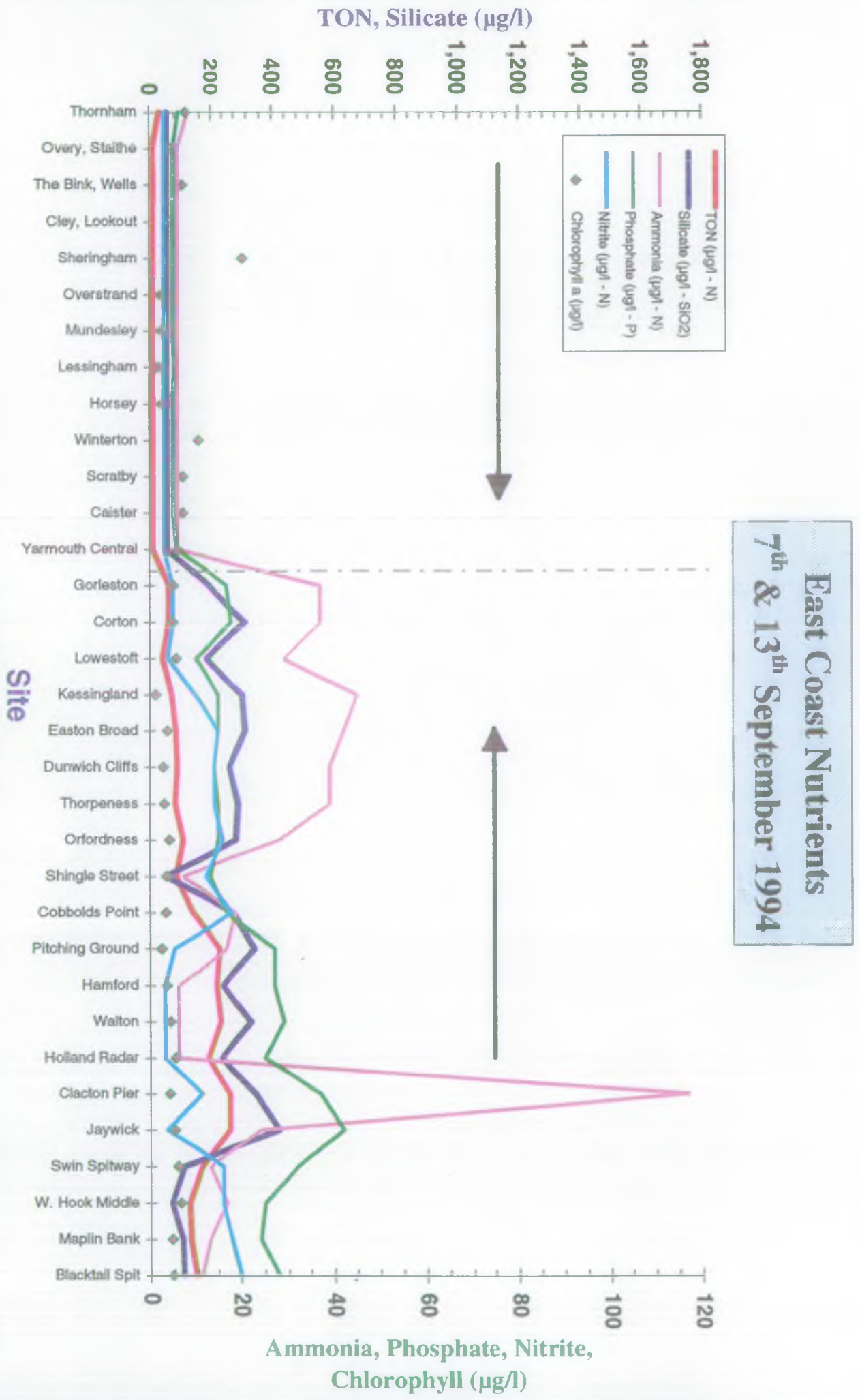


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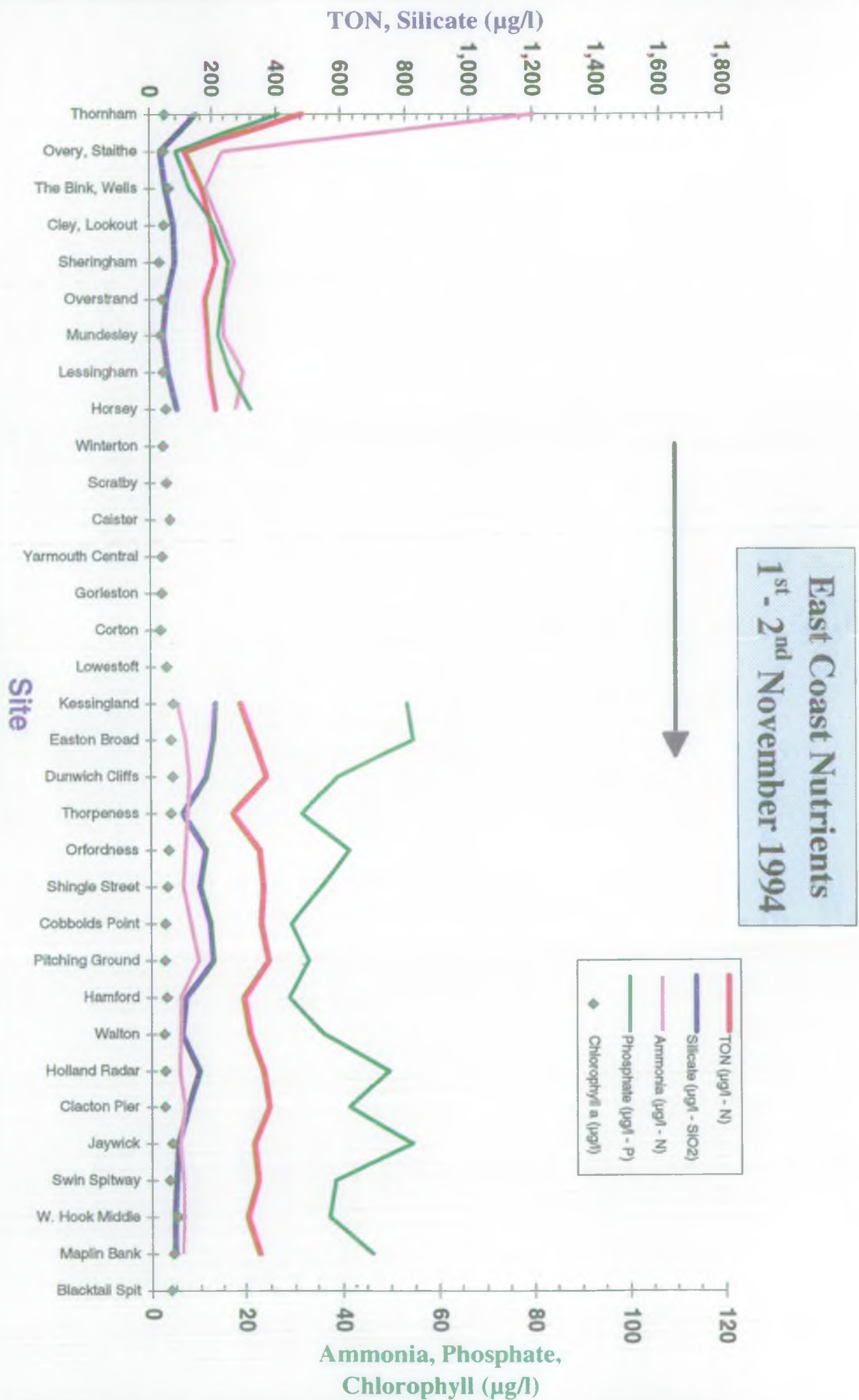


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East Coast Transects 11th - 12th November 1994

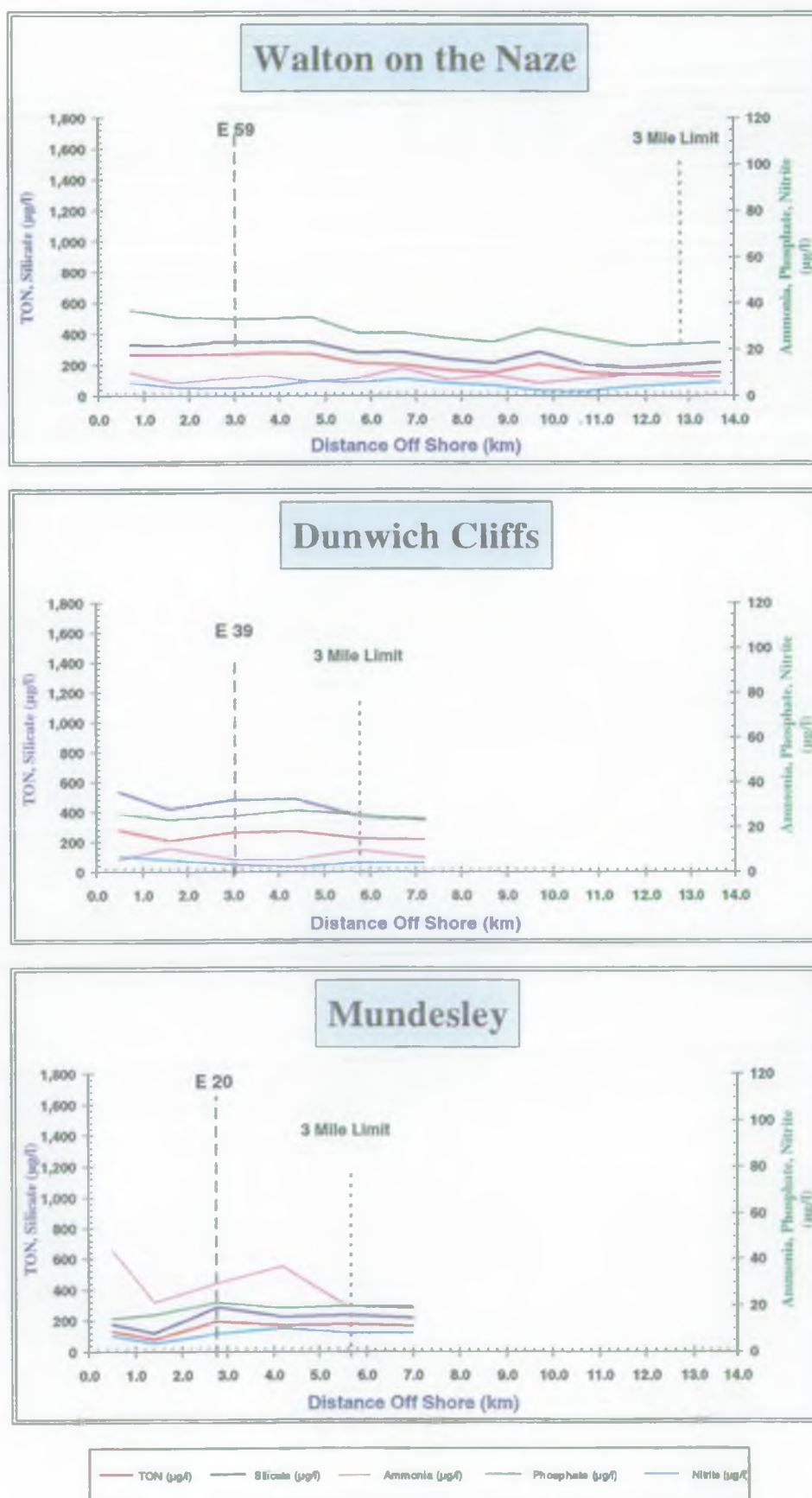
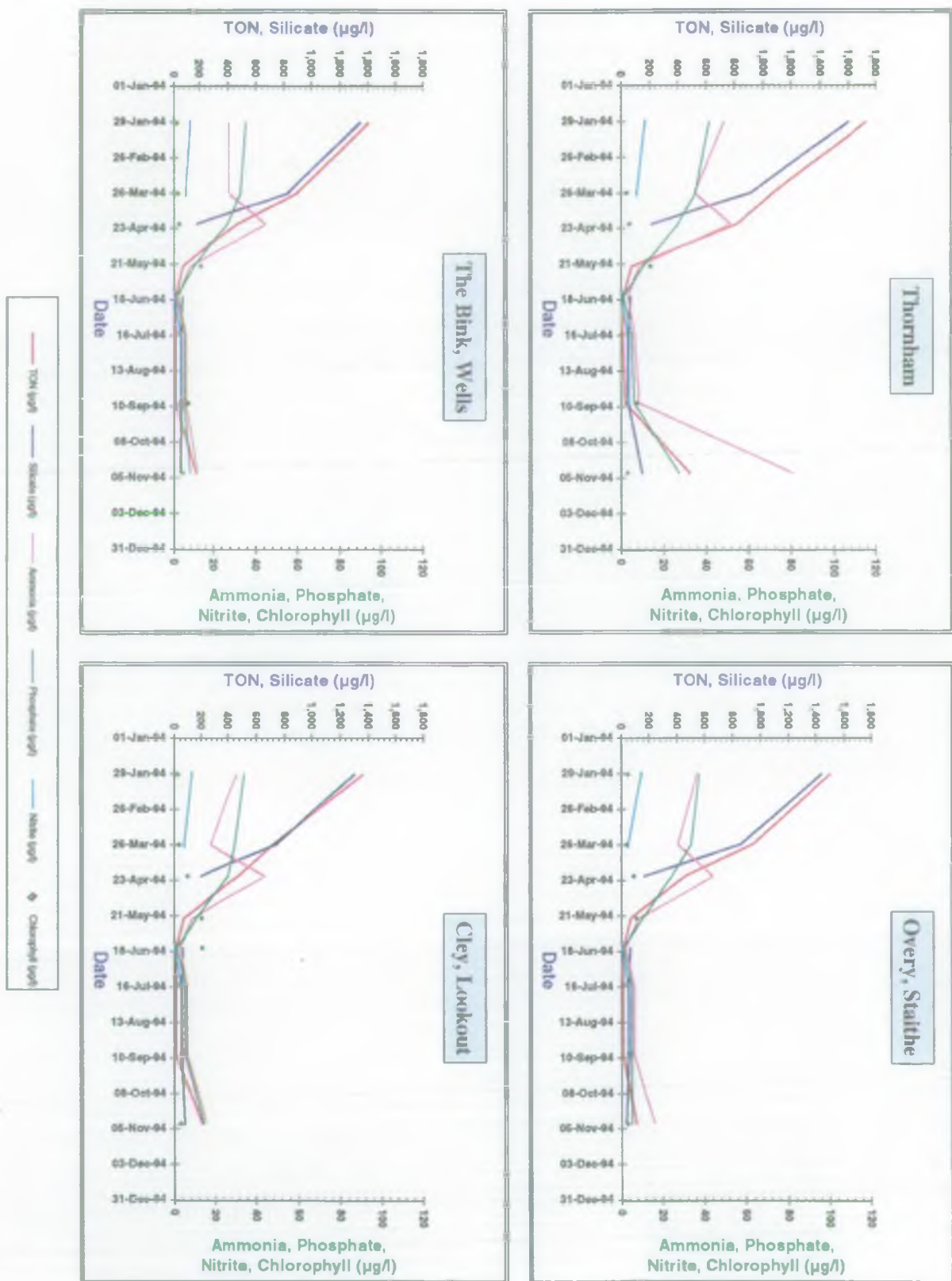
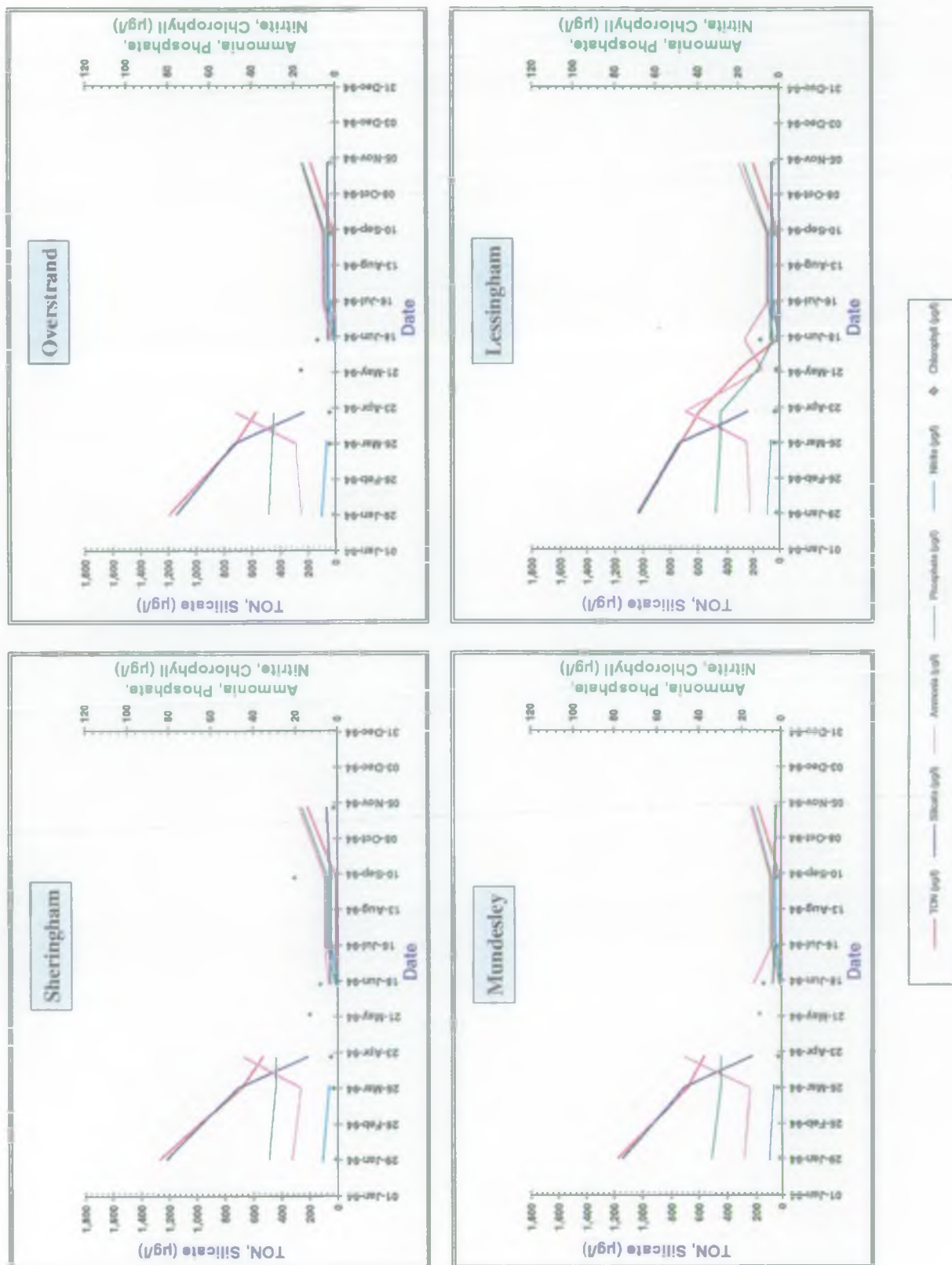


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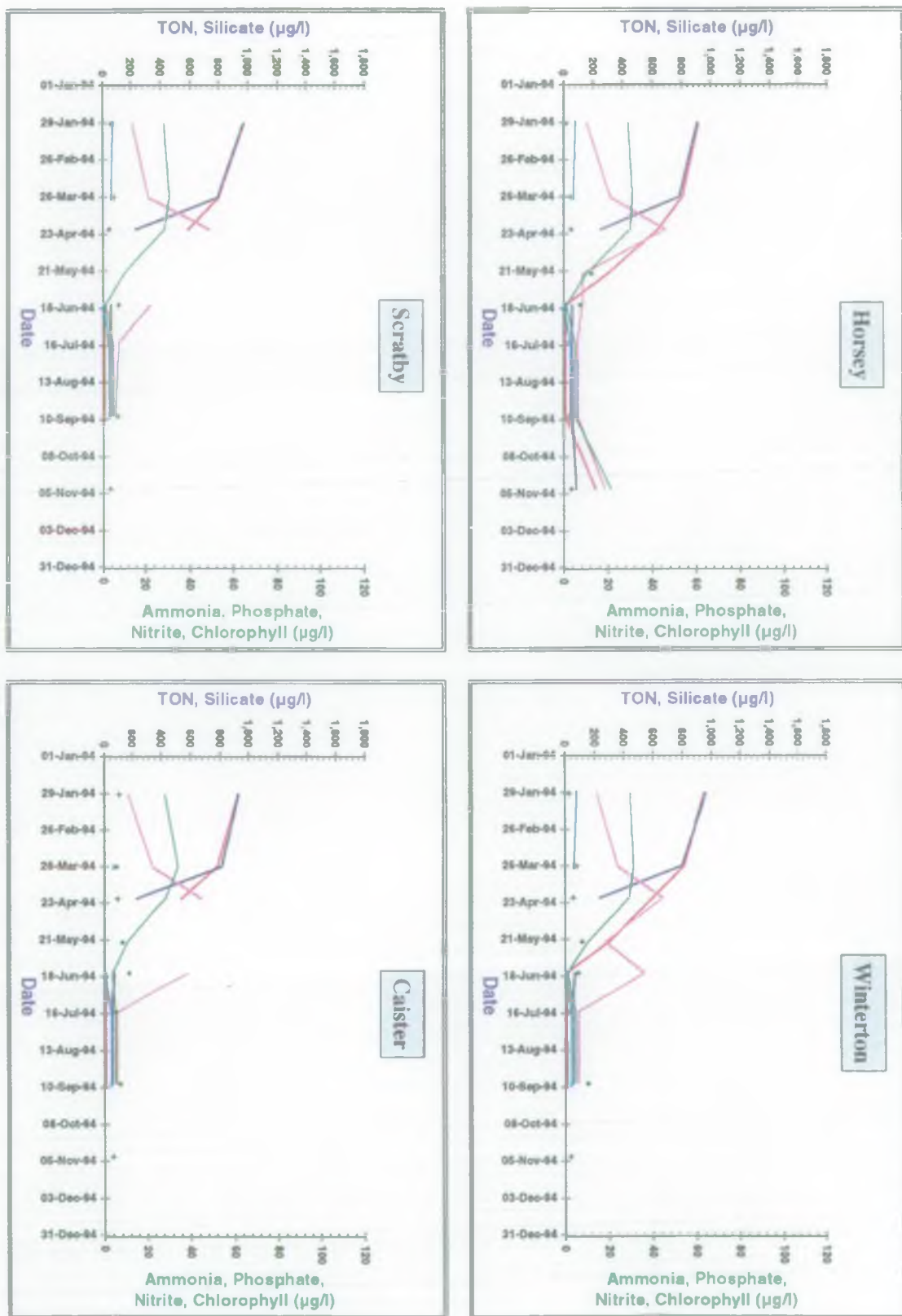


East Coast Nutrients 1994
Figure : 11

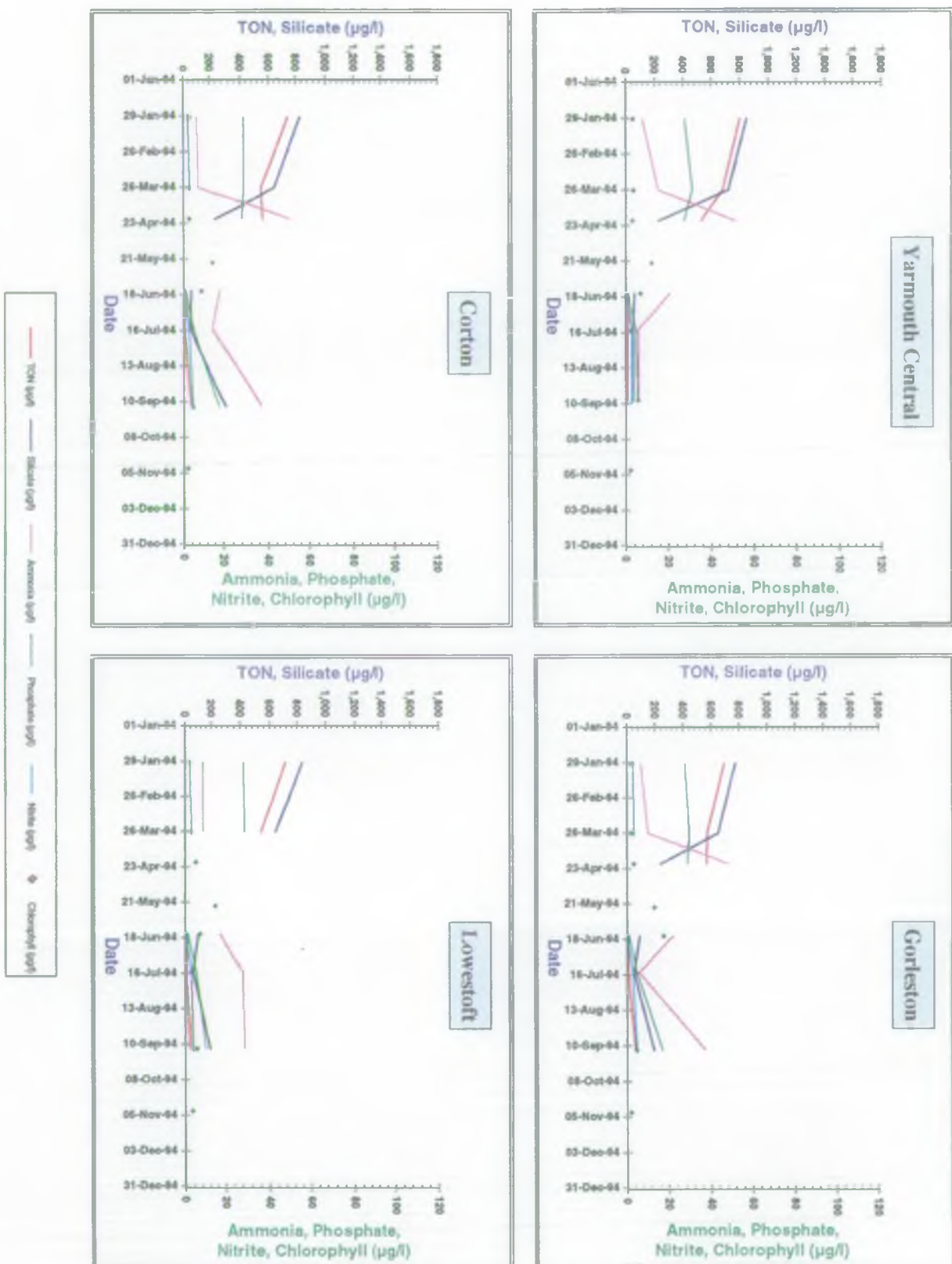


East Coast Nutrients 1994

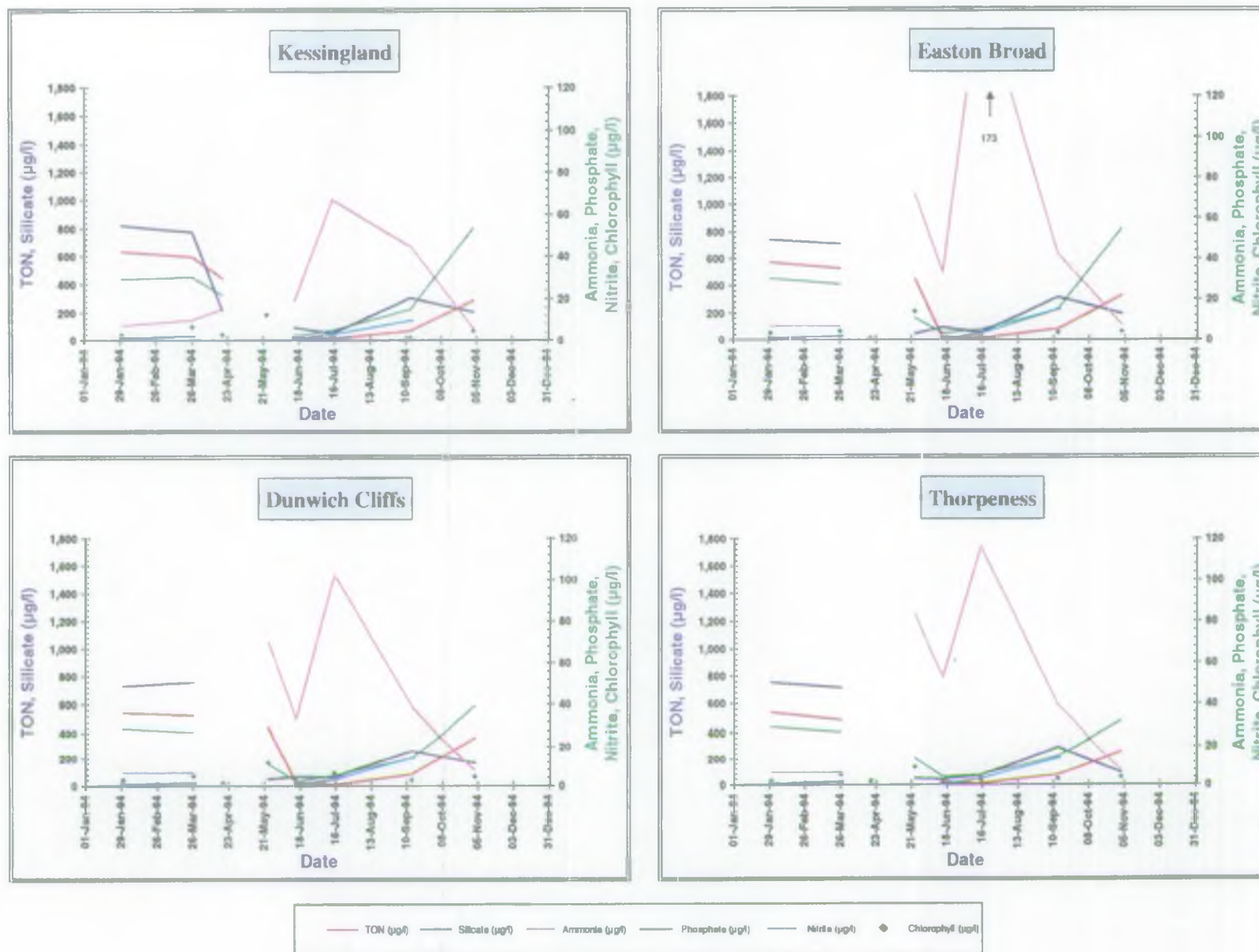
Figure : 12



East Coast Nutrients 1994
Figure : 13

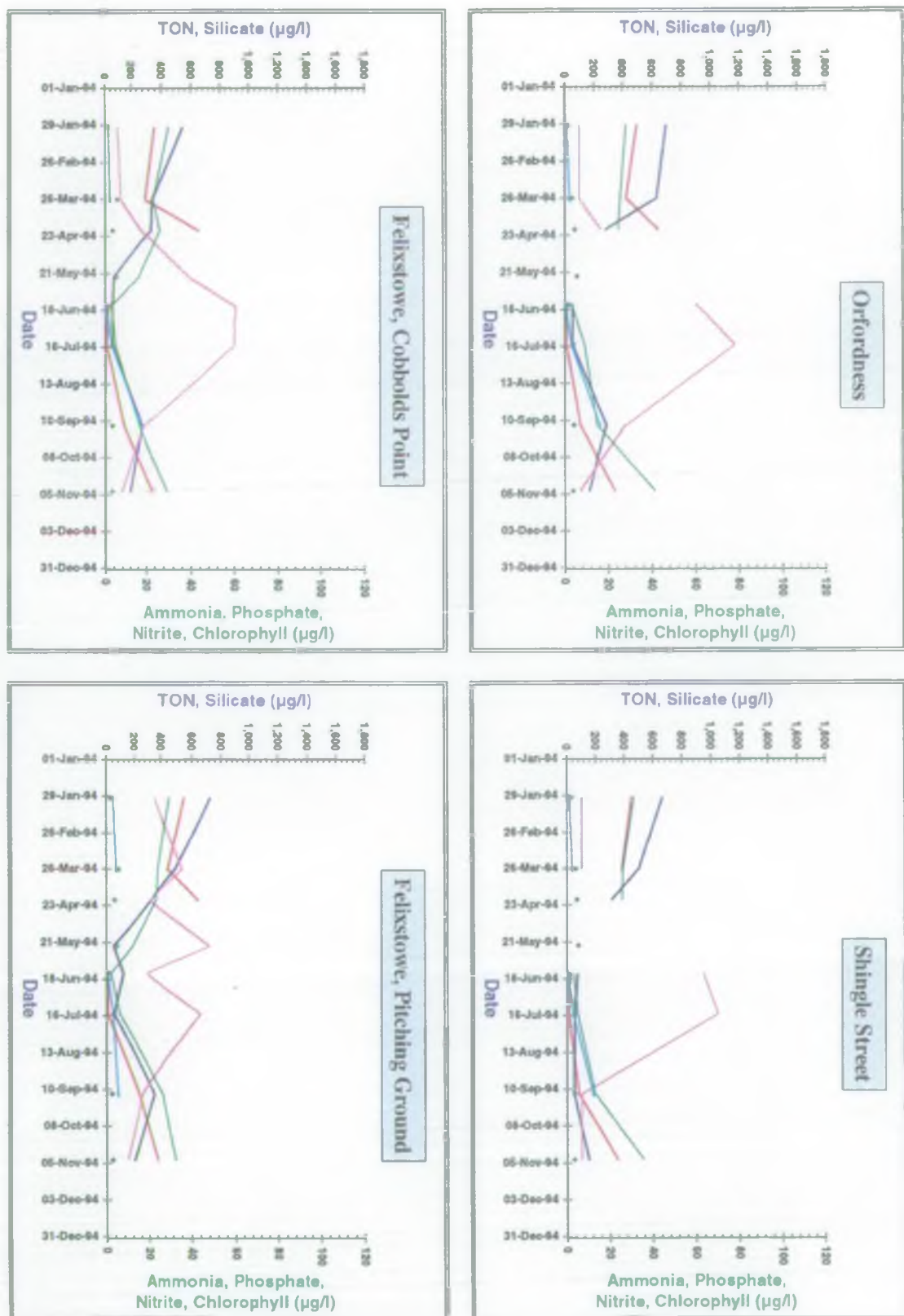


East Coast Nutrients 1994
Figure : 14

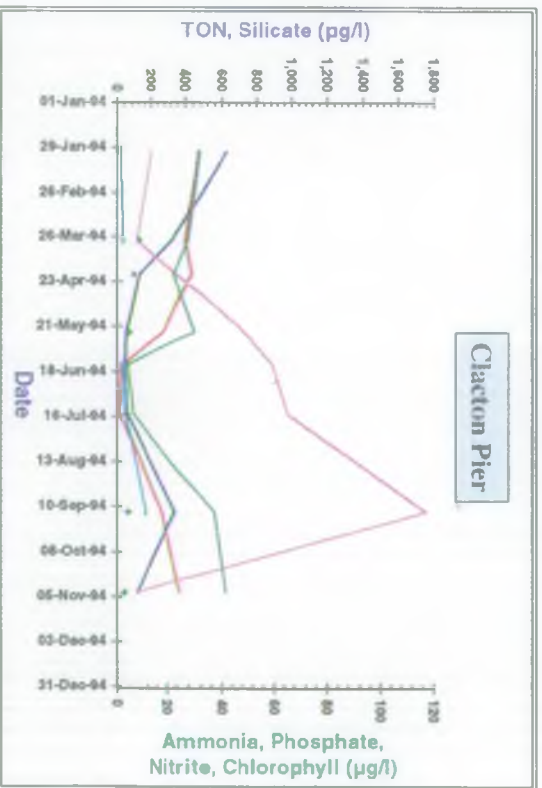
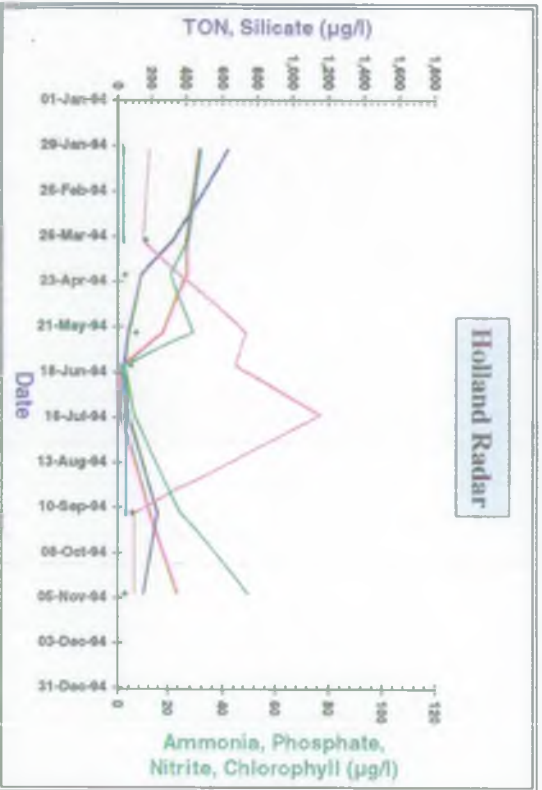
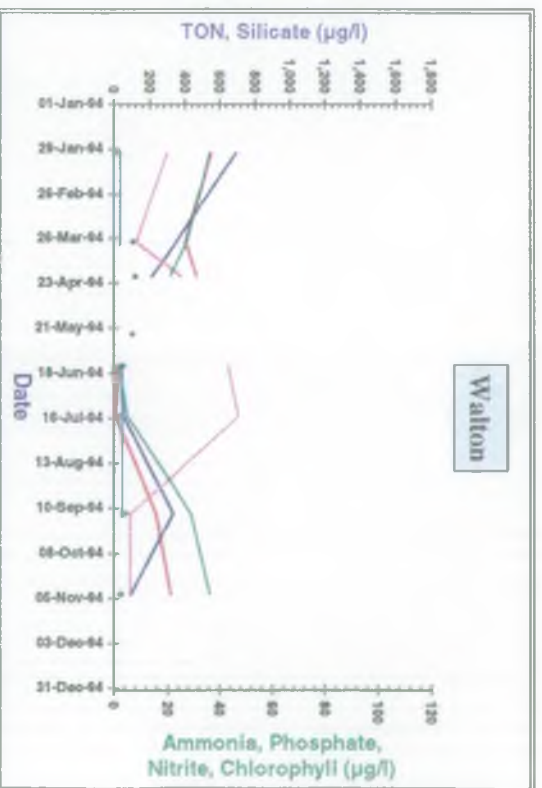
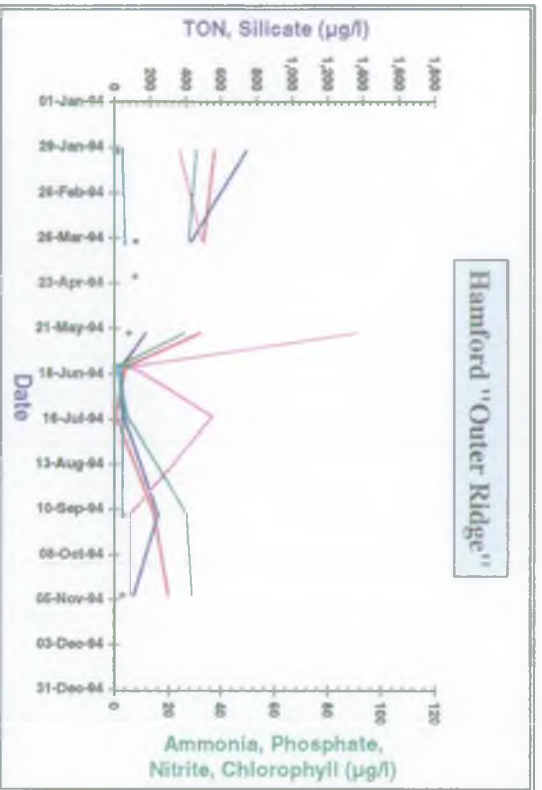


East Coast Nutrients 1994

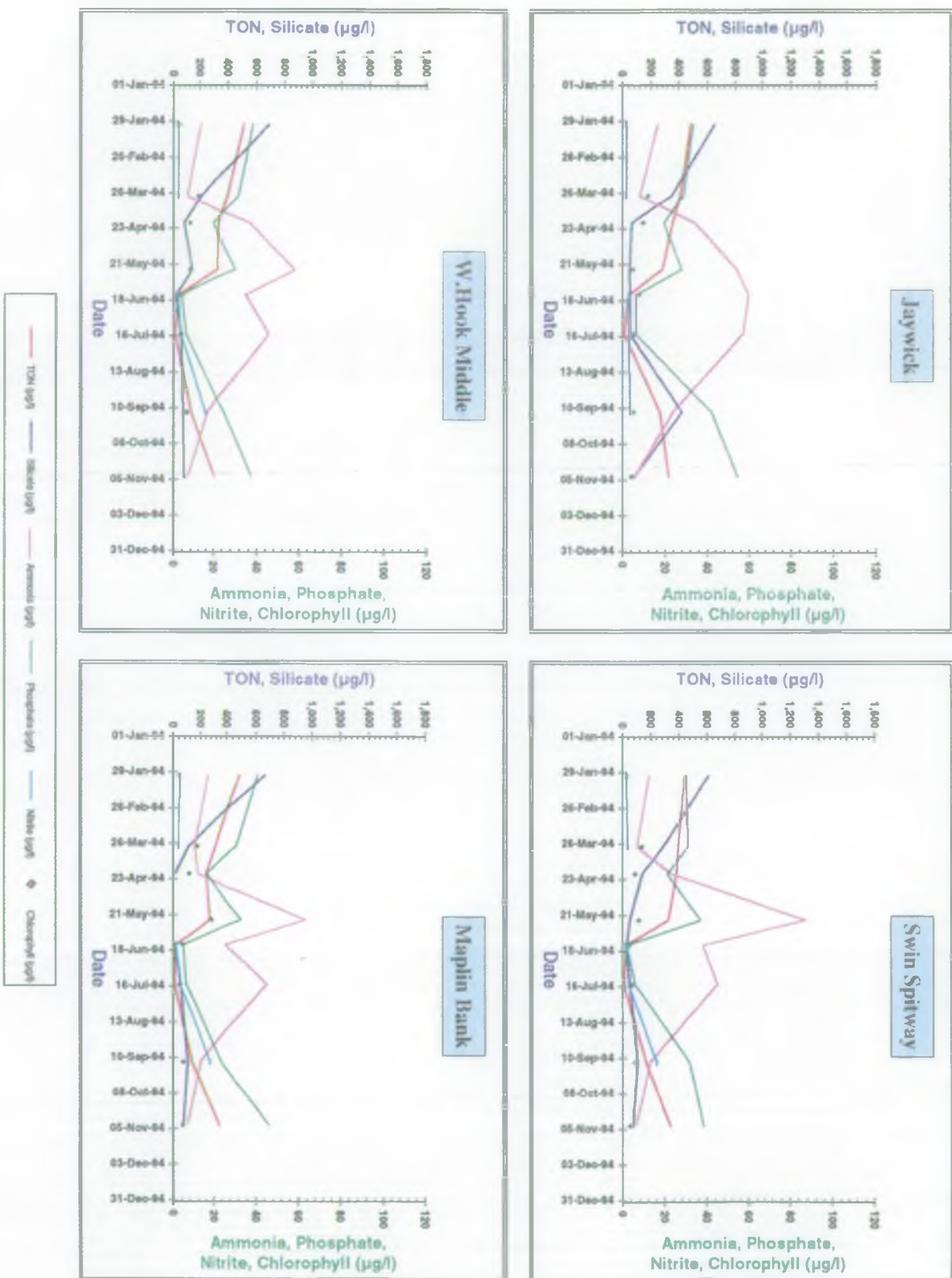
Figure : 15



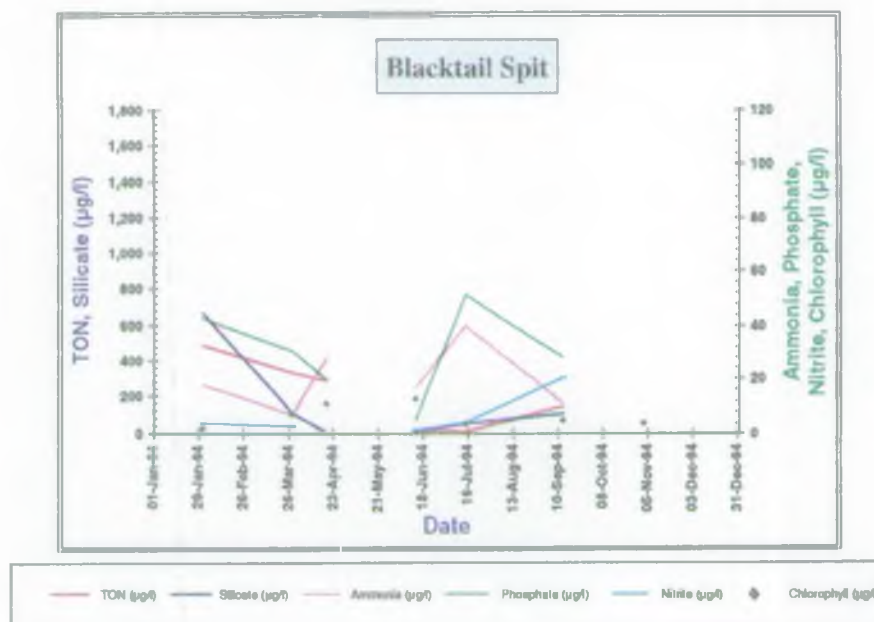
East Coast Nutrients 1994
Figure : 16



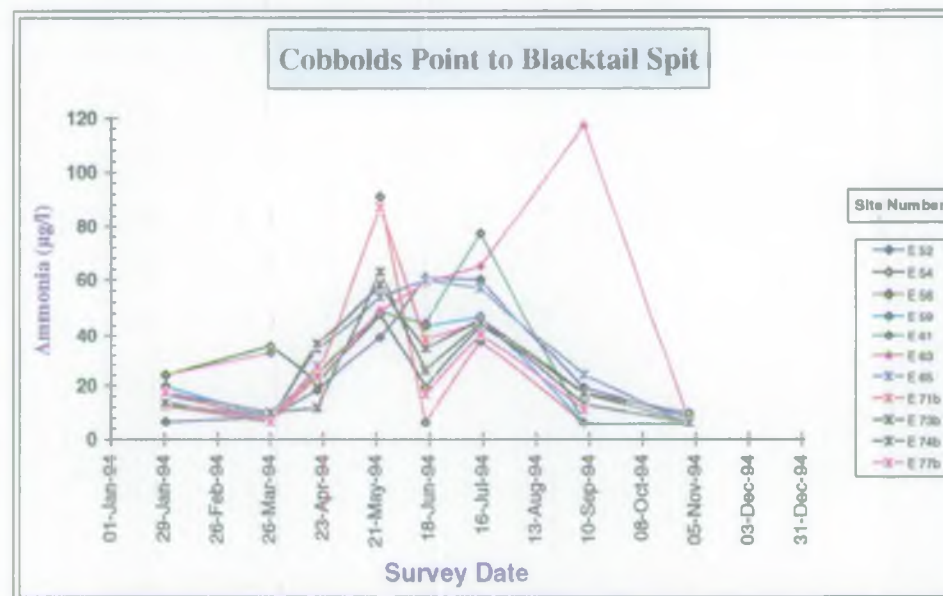
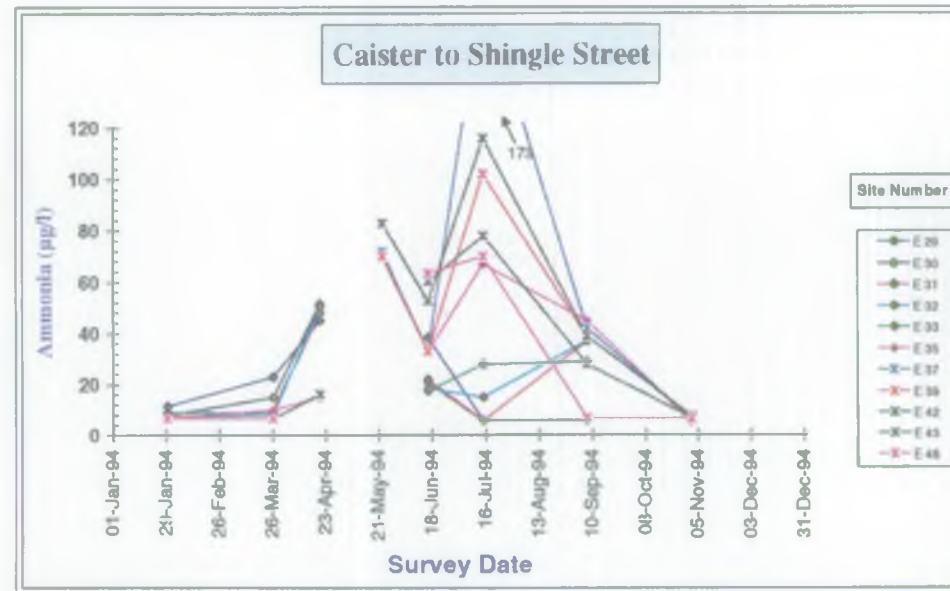
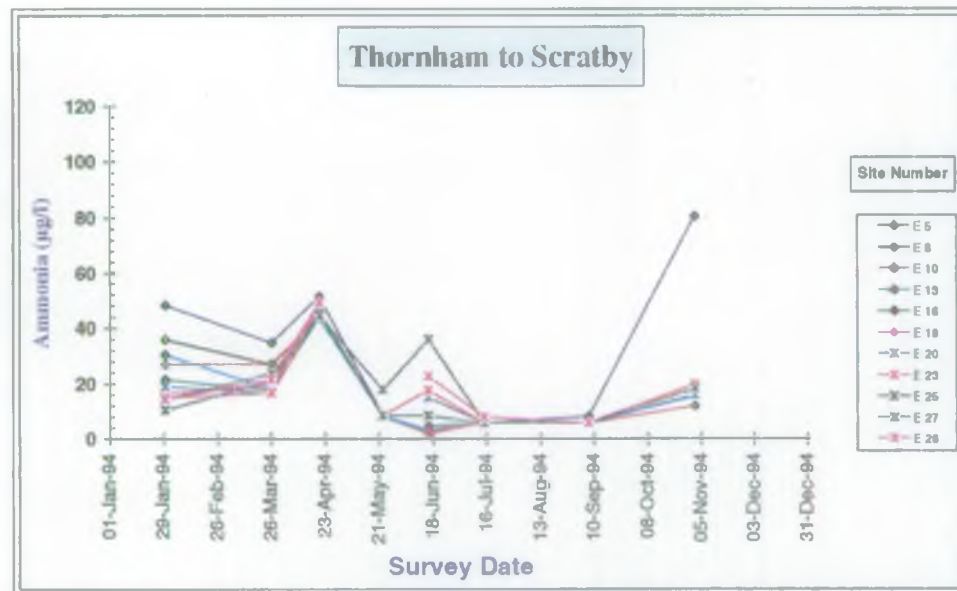
East Coast Nutrients 1994
Figure : 17



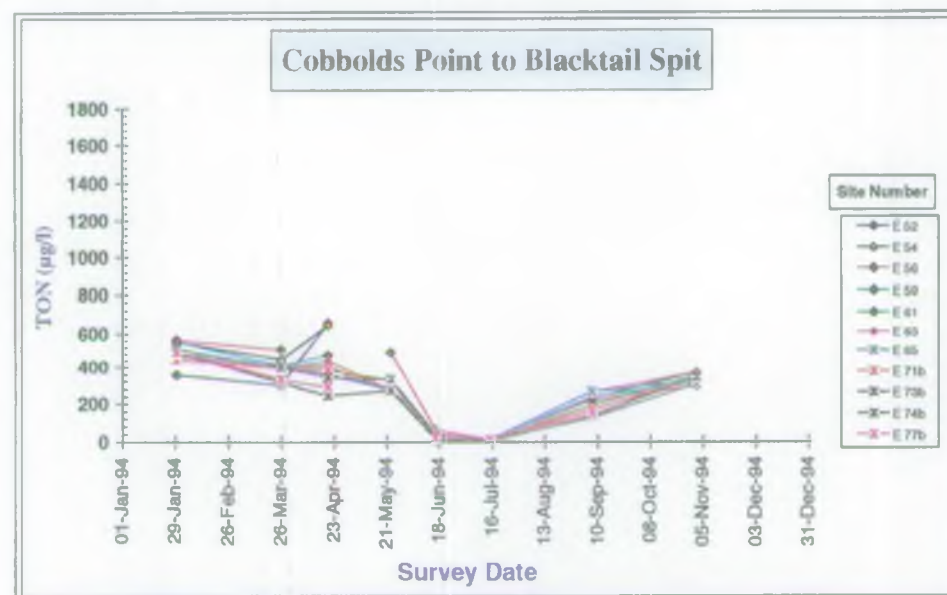
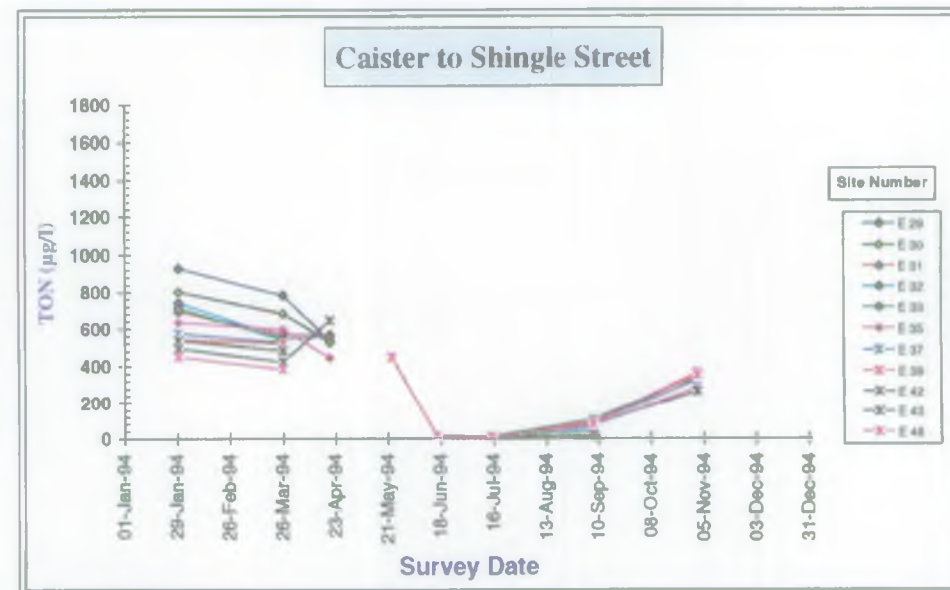
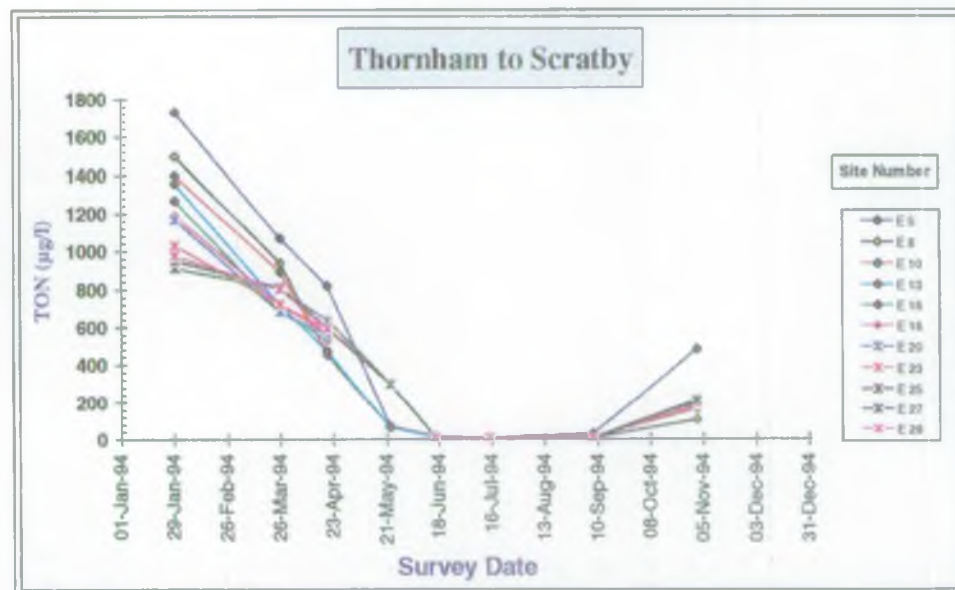
East Coast Nutrients 1994
Figure : 18



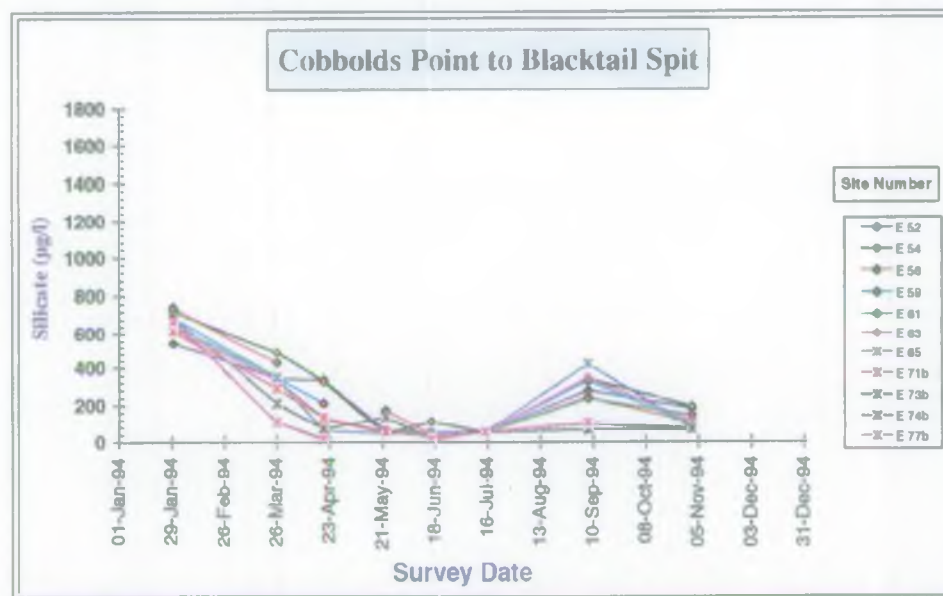
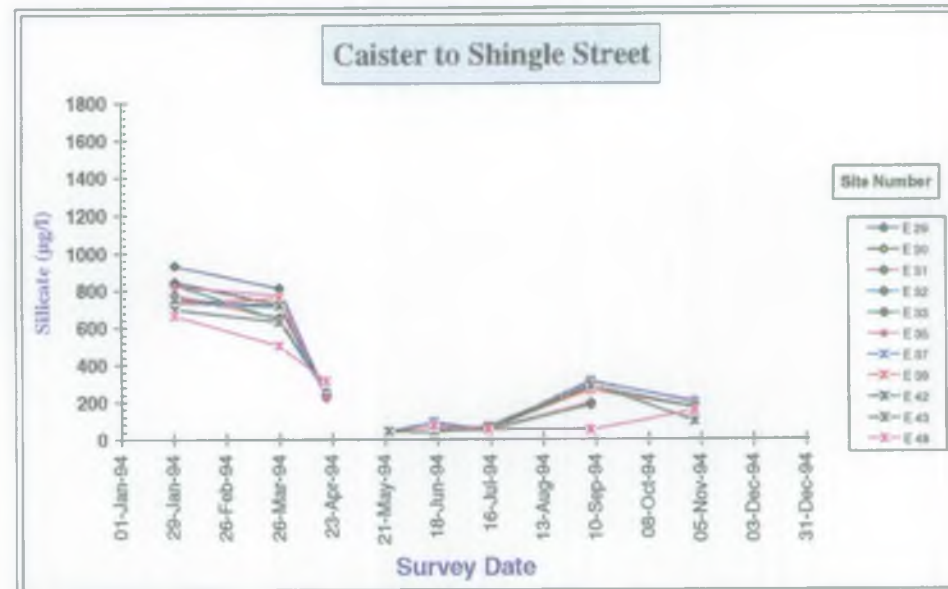
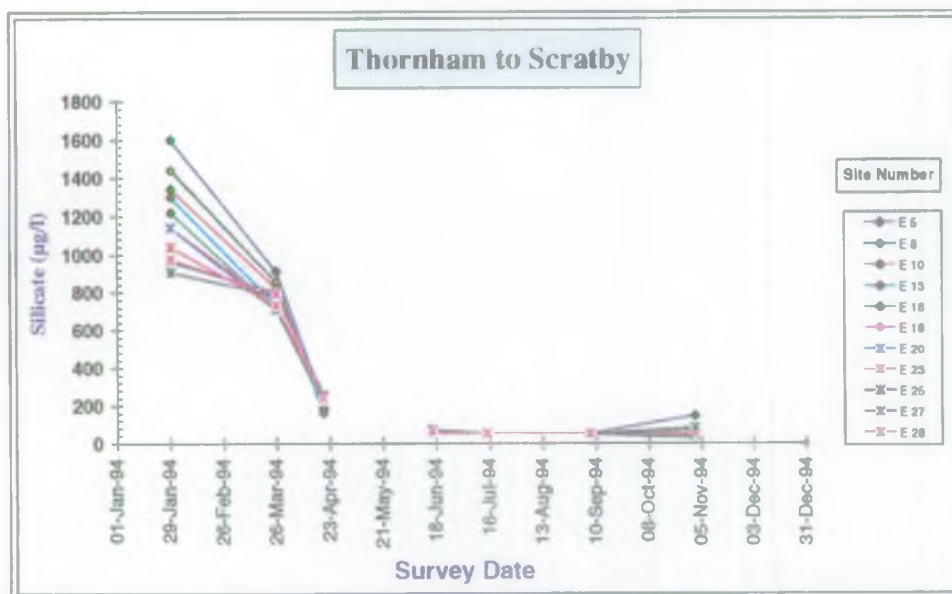
East Coast Nutrients 1994
Figure : 19



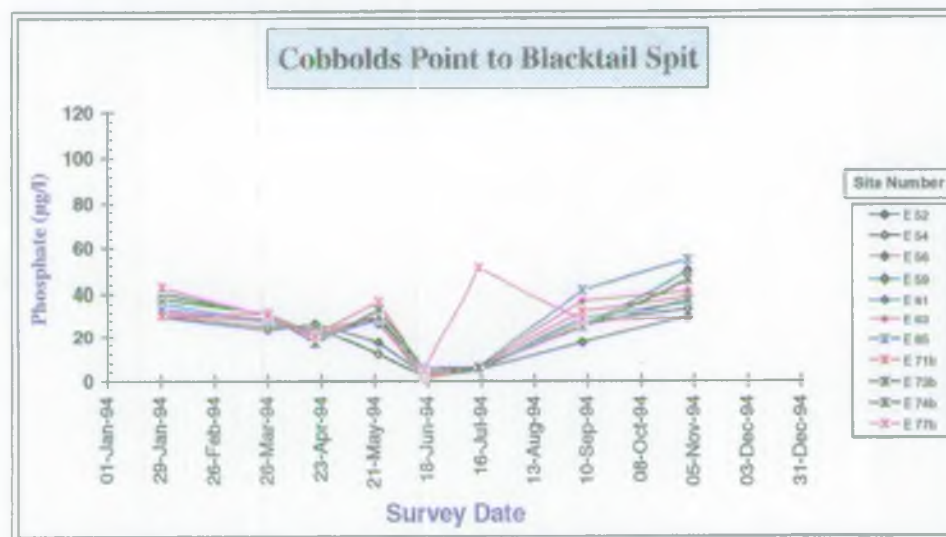
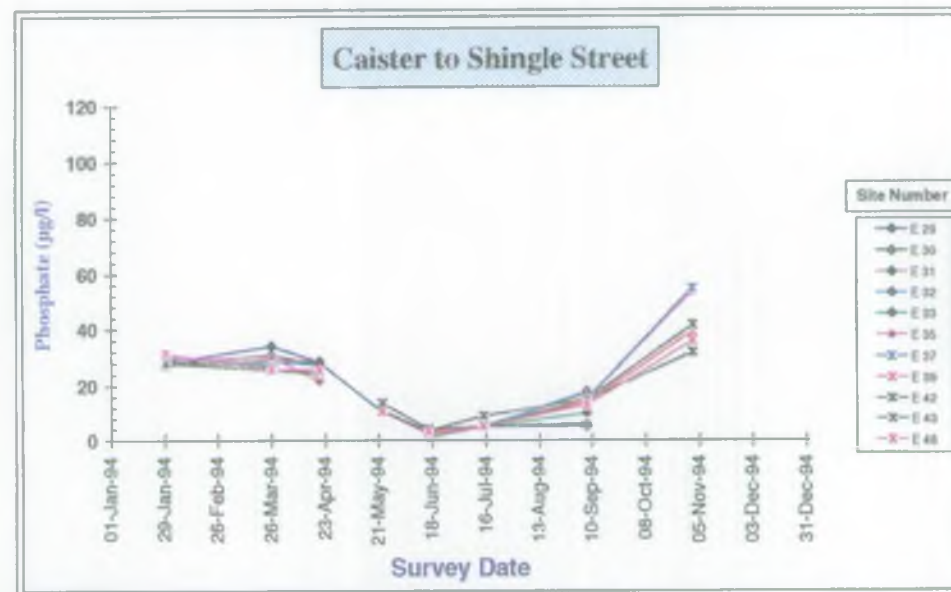
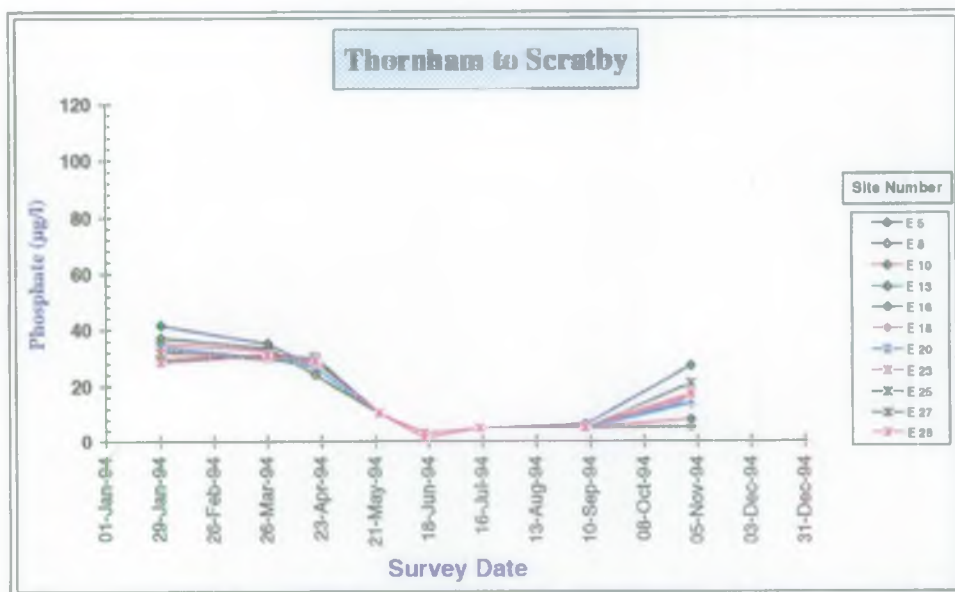
East Coast 1994 - Ammonia Seasonal Changes
Figure : 20



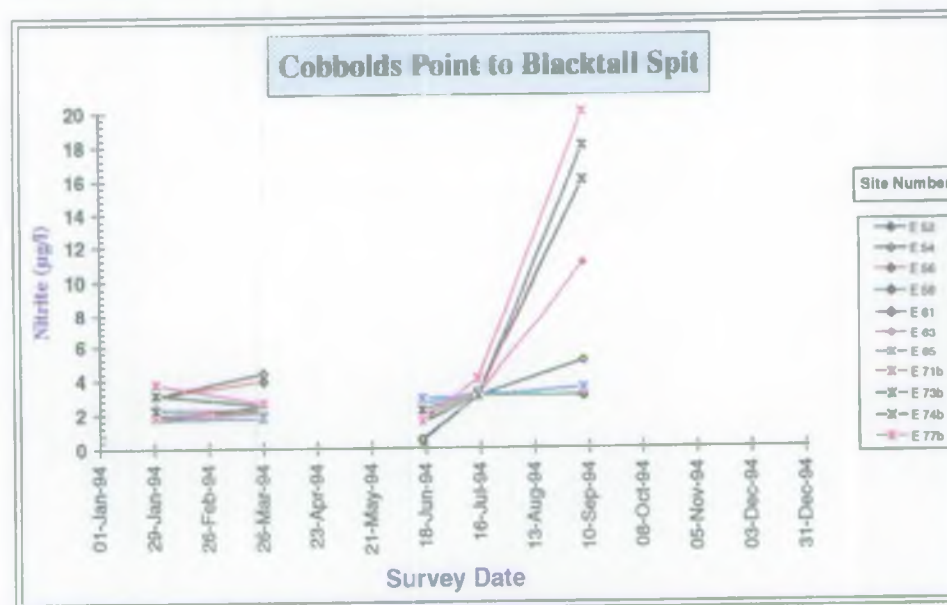
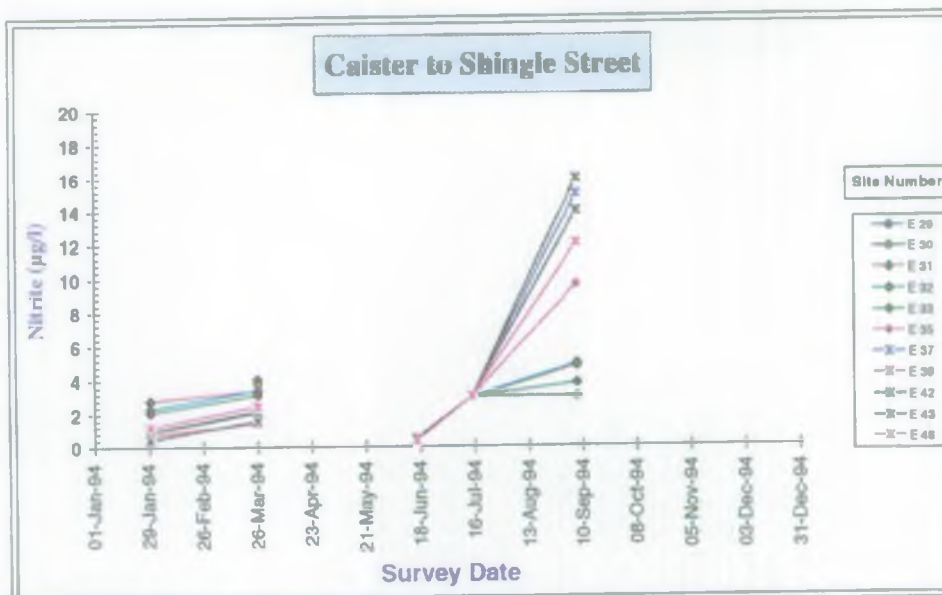
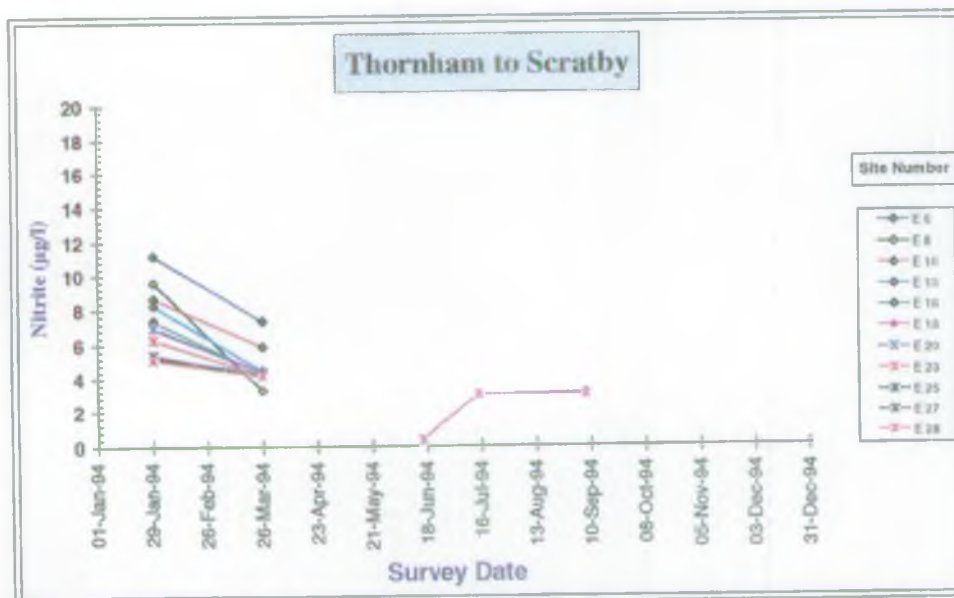
East Coast 1994 - TON Seasonal Changes
Figure : 21



East Coast 1994 - Silicate Seasonal Changes
Figure : 22

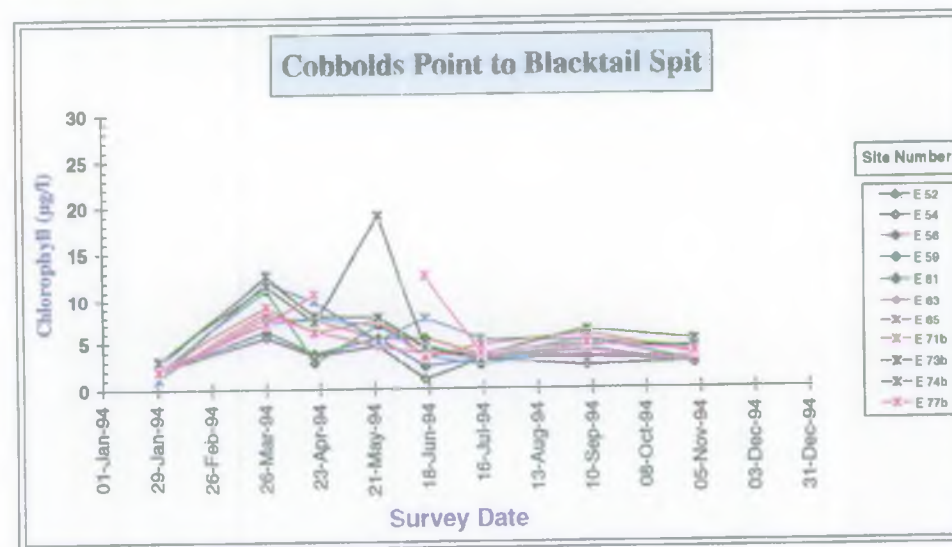
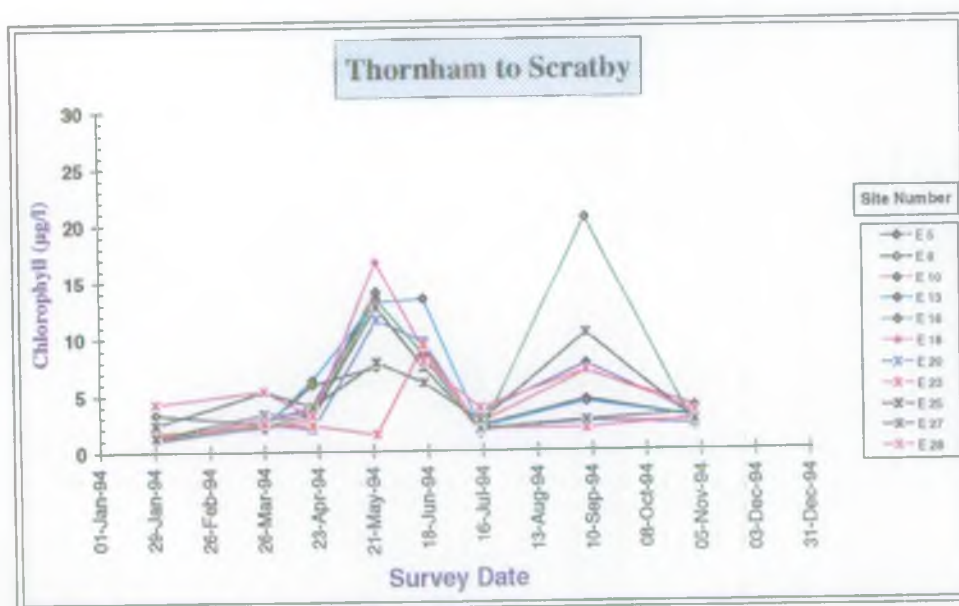


East Coast 1994 - Phosphate Seasonal Changes
Figure : 23

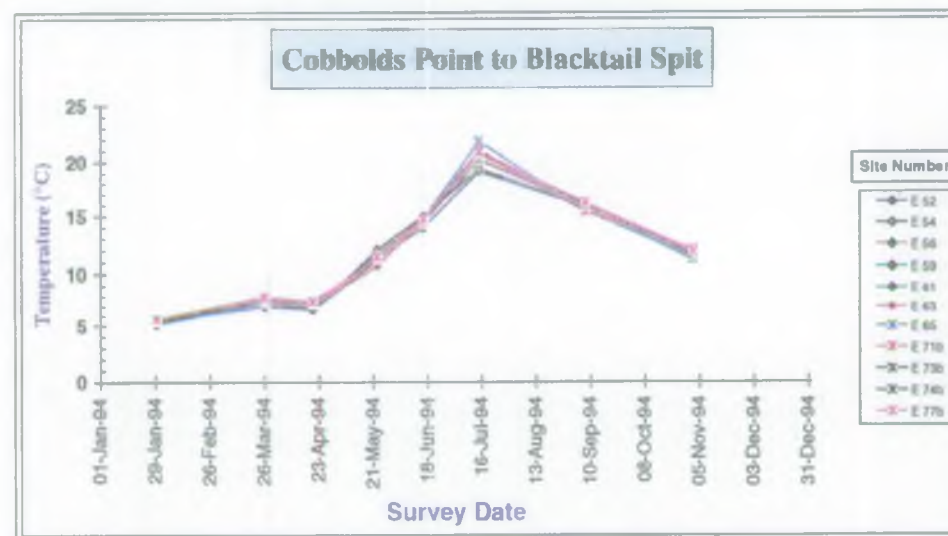
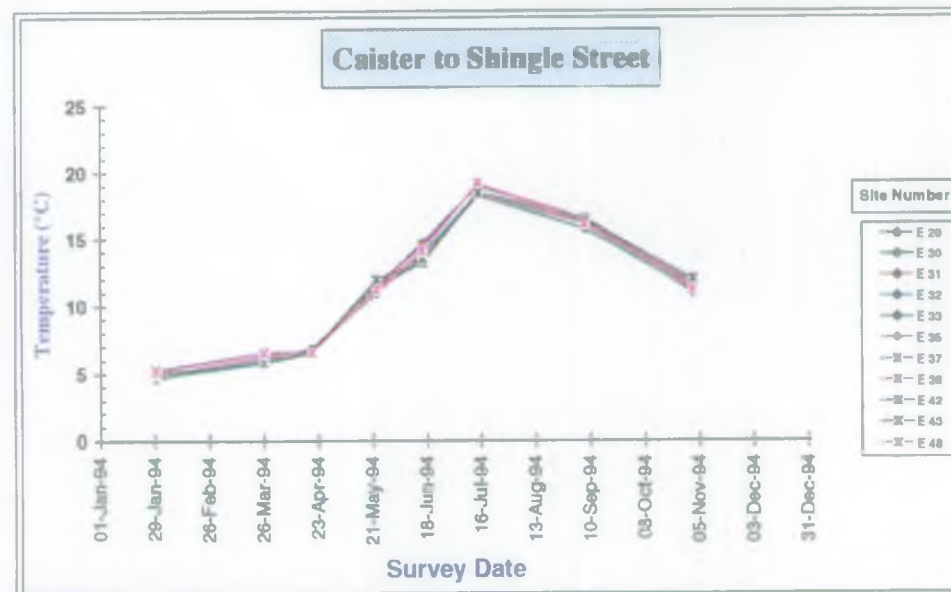
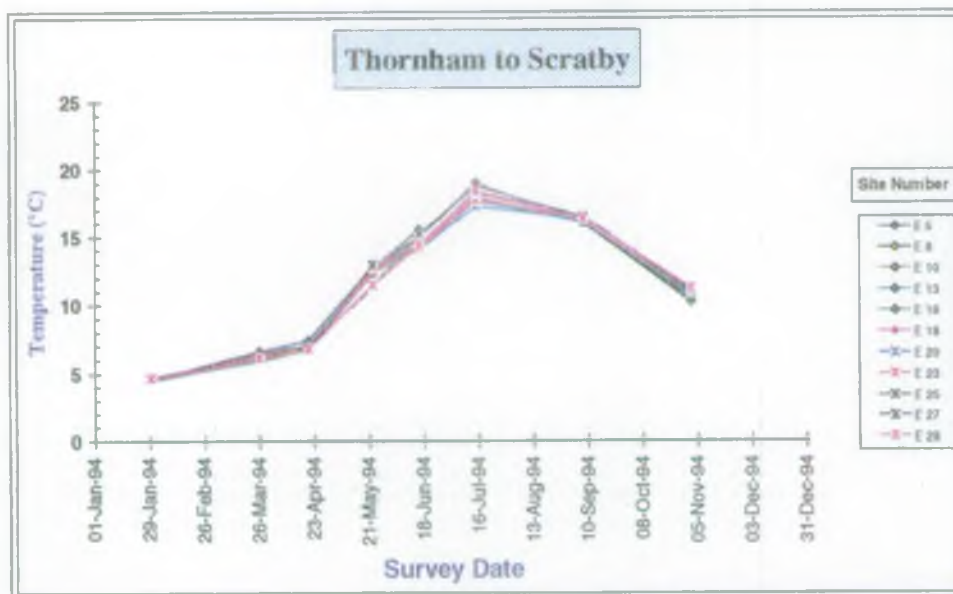


East Coast 1994 - Nitrite Seasonal Changes
Figure : 24

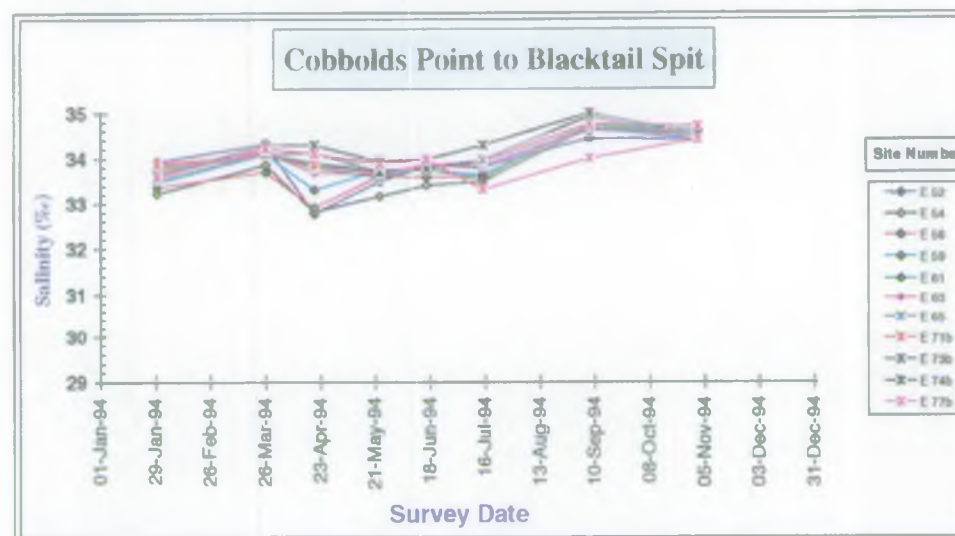
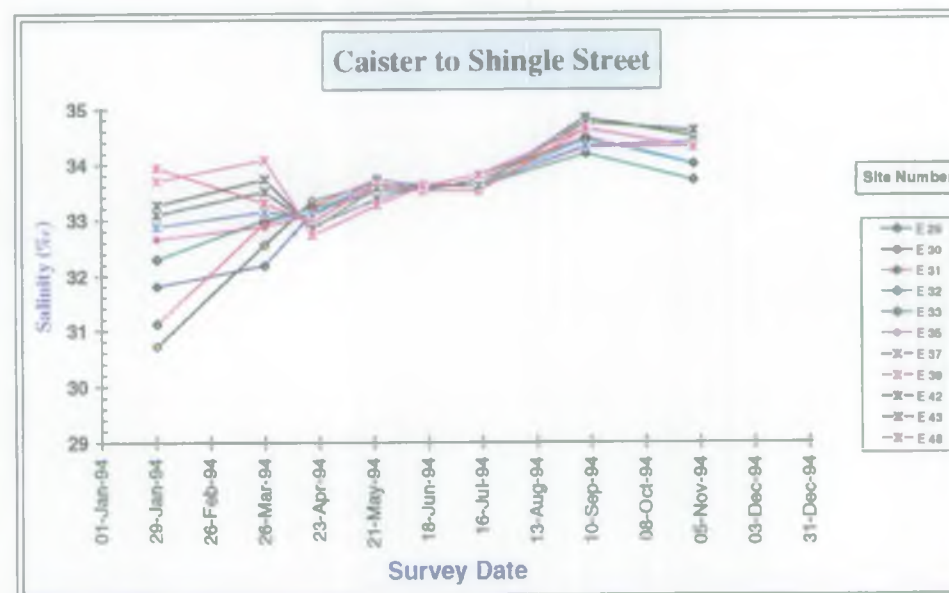
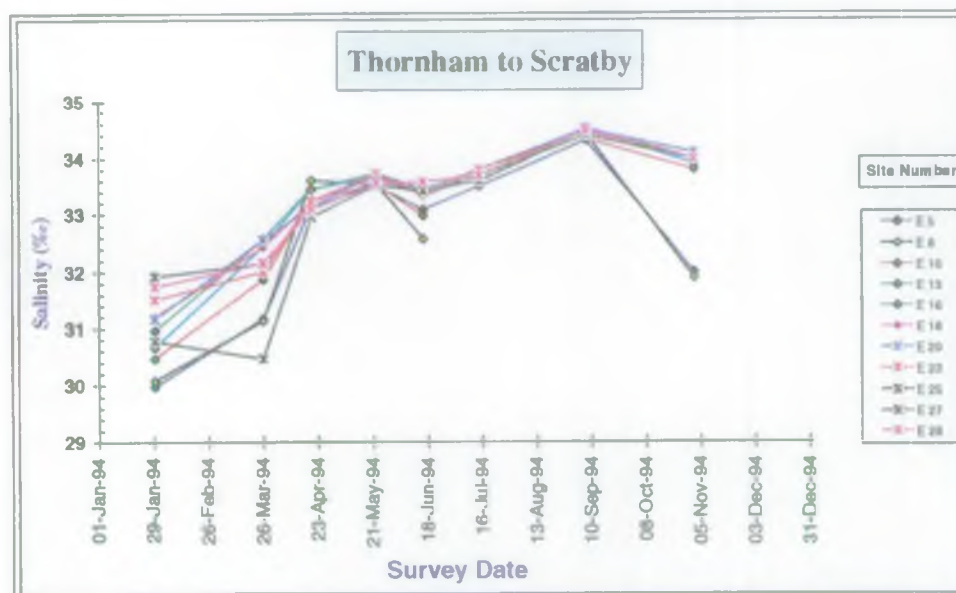
EC94_1C.XLS - Fig 25



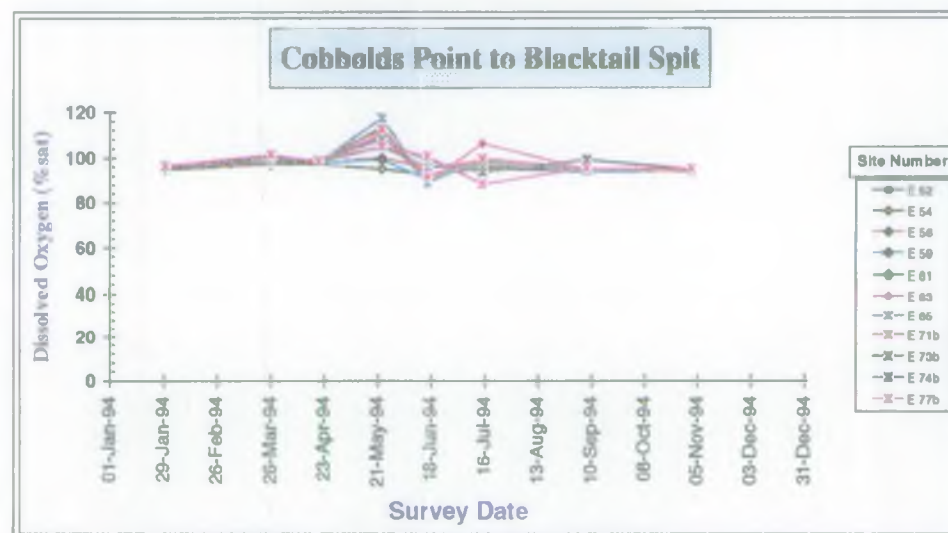
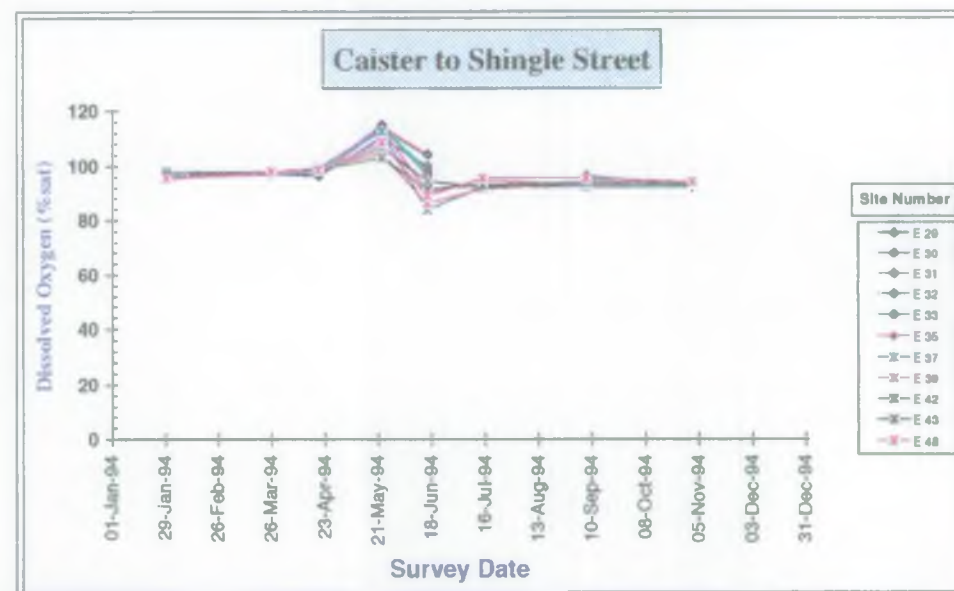
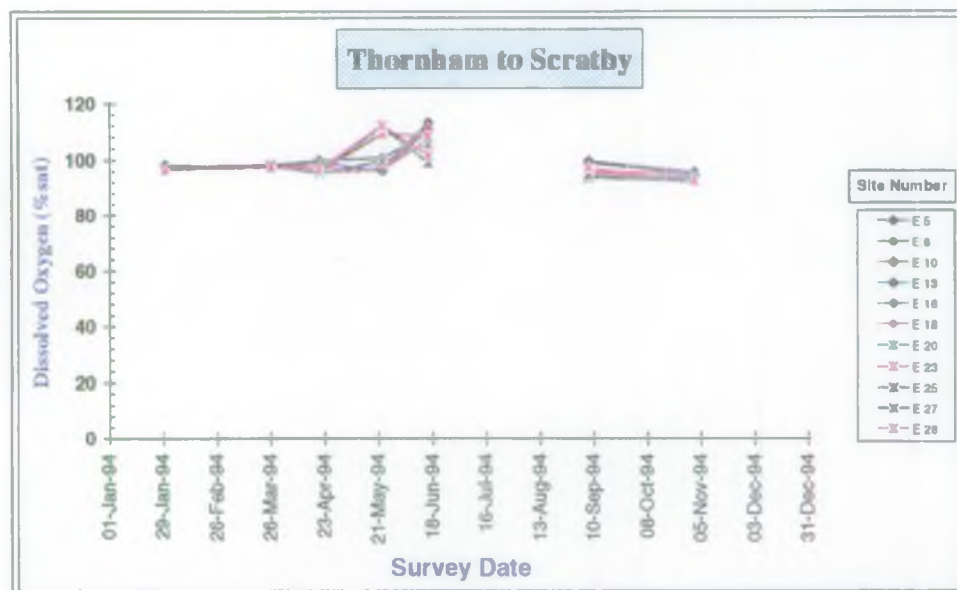
East Coast 1994 - Chlorophyll Seasonal Changes
Figure : 25



East Coast 1994 - Temperature Seasonal Changes
Figure : 26



East Coast 1994 - Salinity Seasonal Changes
Figure : 27



East Coast 1994 - Dissolved Oxygen Seasonal Changes
Figure : 28

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Figure 29 : 'Sea Vigil' Coastal Survey - May, 1994

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Figure 30 : 'Sea Vigil' Coastal Survey - May, 1994

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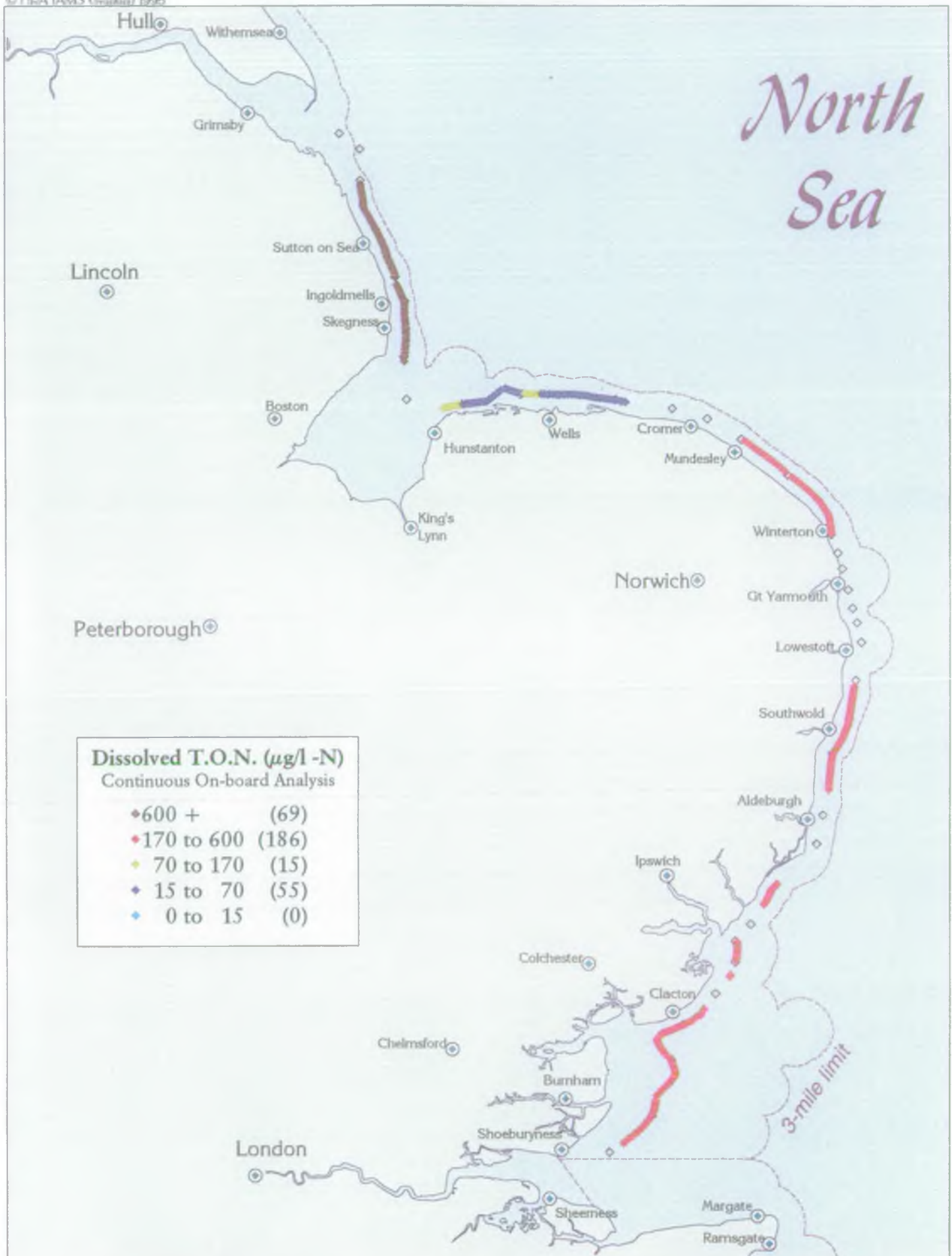


Figure 31 : 'Sea Vigil' Coastal Survey - May, 1994

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Figure 32 : 'Sea Vigil' Coastal Survey - May, 1994

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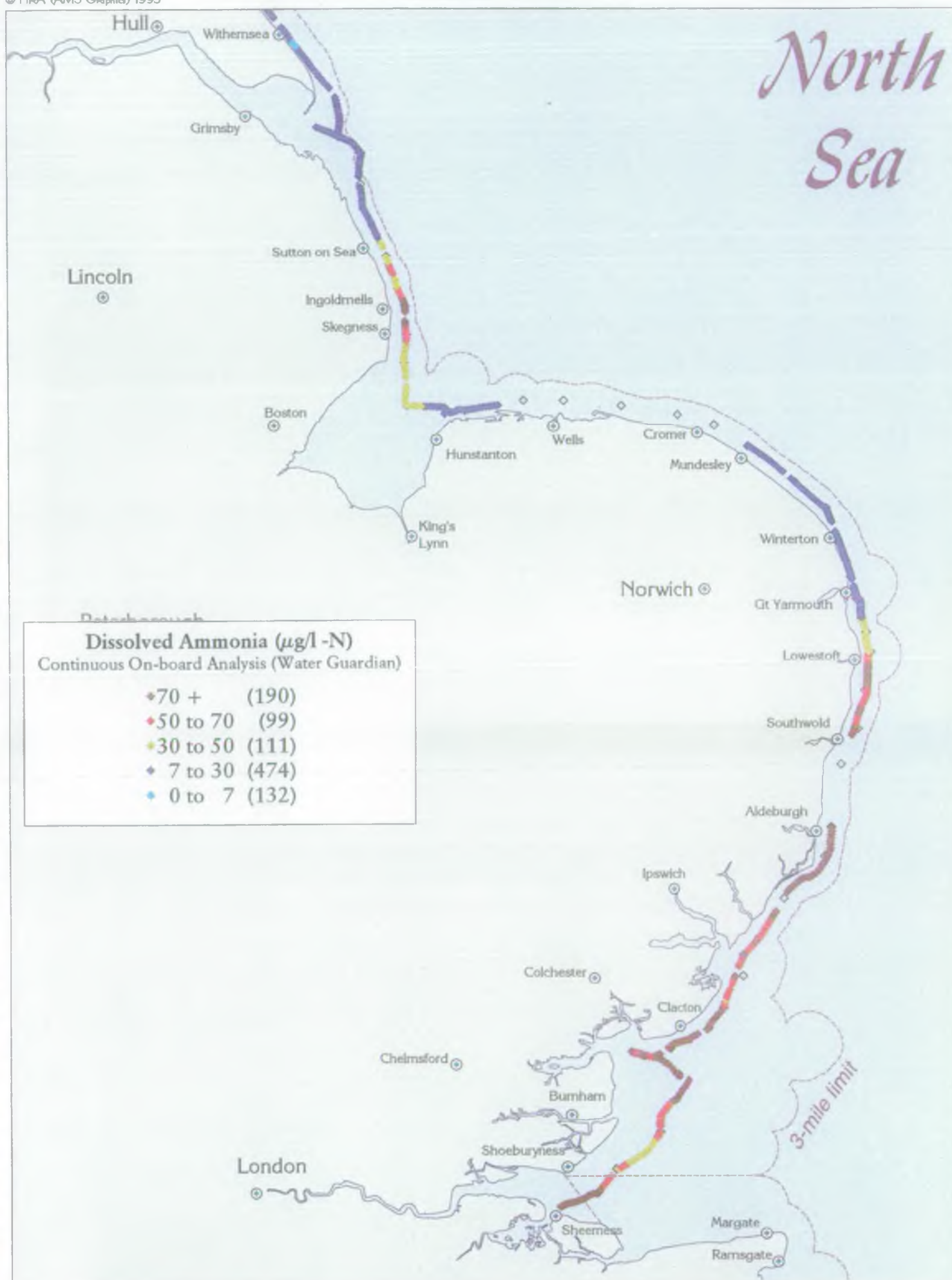


Figure 33 : 'Water Guardian' Coastal Survey - July, 1994

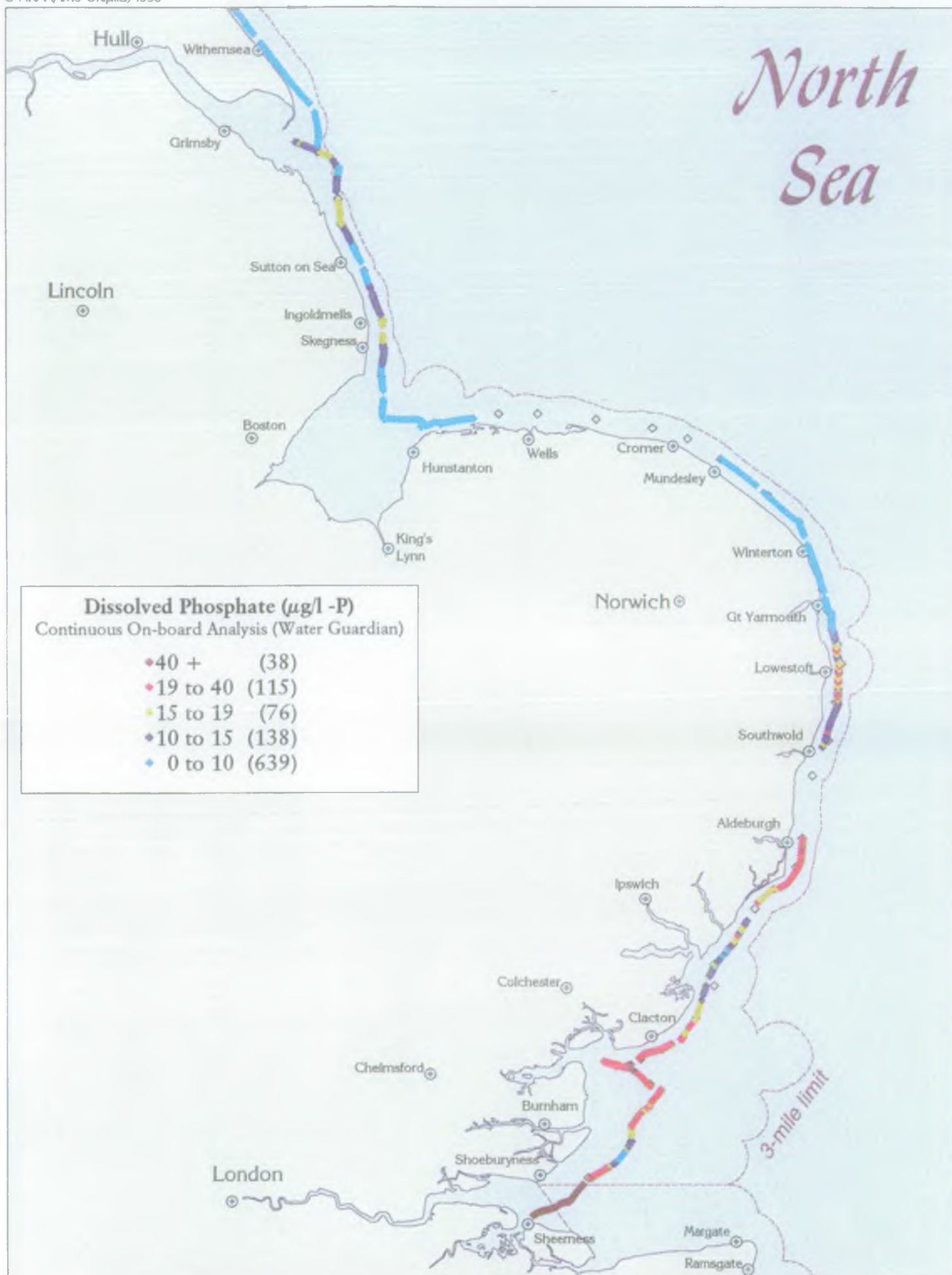


Figure 34 : 'Water Guardian' Coastal Survey - July, 1994

NRA - Anglian Region

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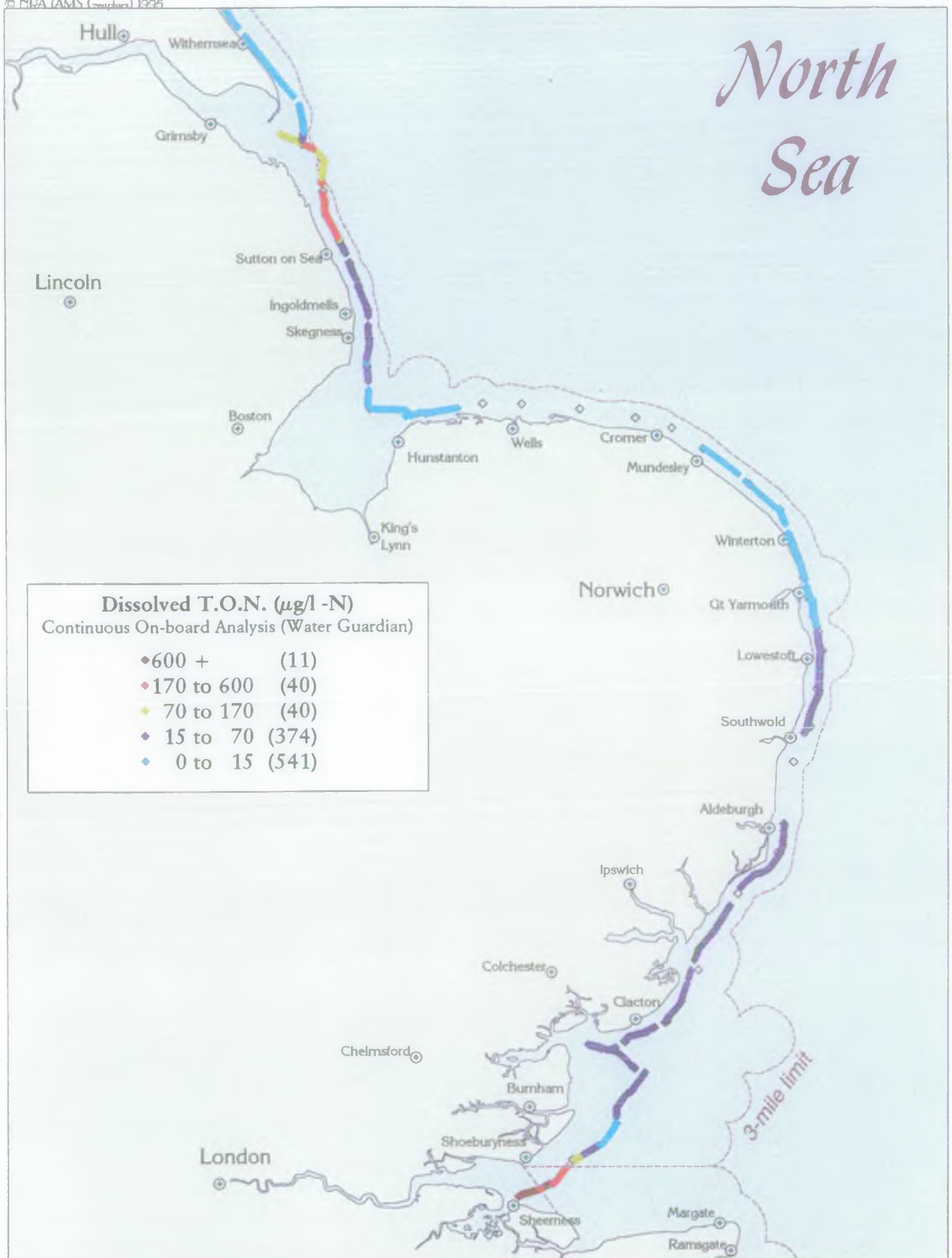


Figure 35 : 'Water Guardian' Coastal Survey - July, 1994

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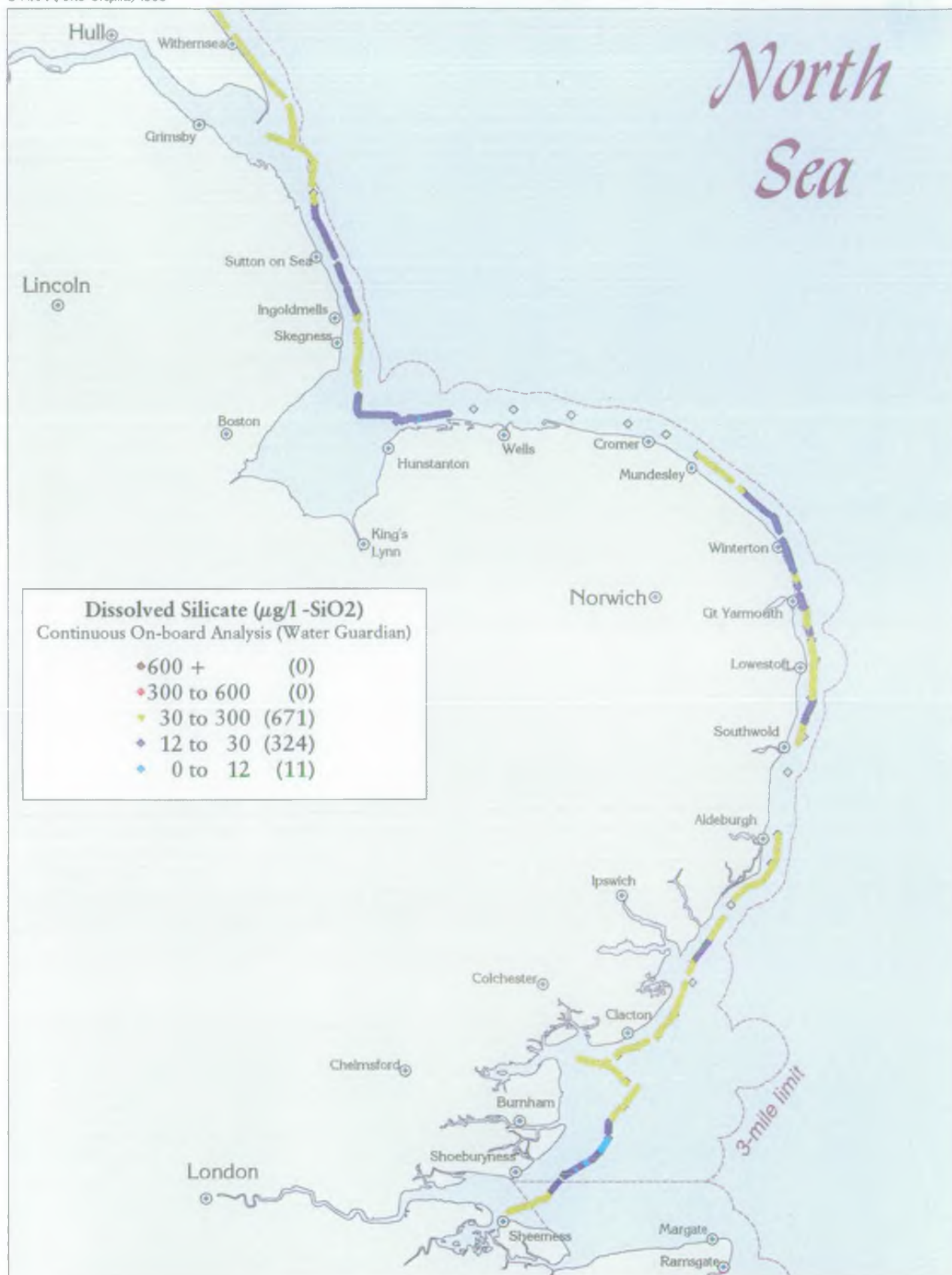


Figure 36 : 'Water Guardian' Coastal Survey - July, 1994



Figure 37 : 'Sea Vigil' Coastal Survey - September, 1994

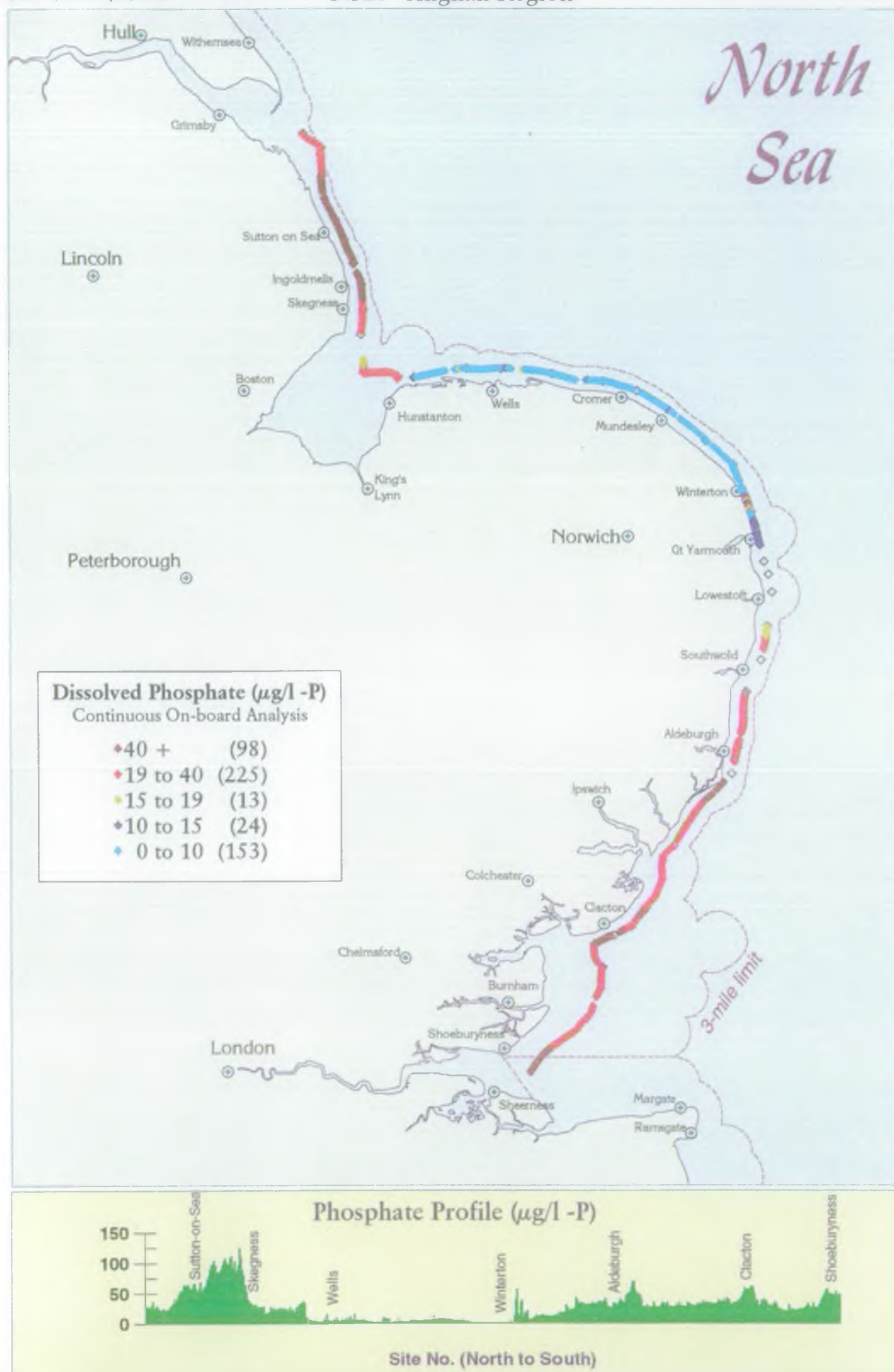


Figure 38 : 'Sea Vigil' Coastal Survey - September, 1994

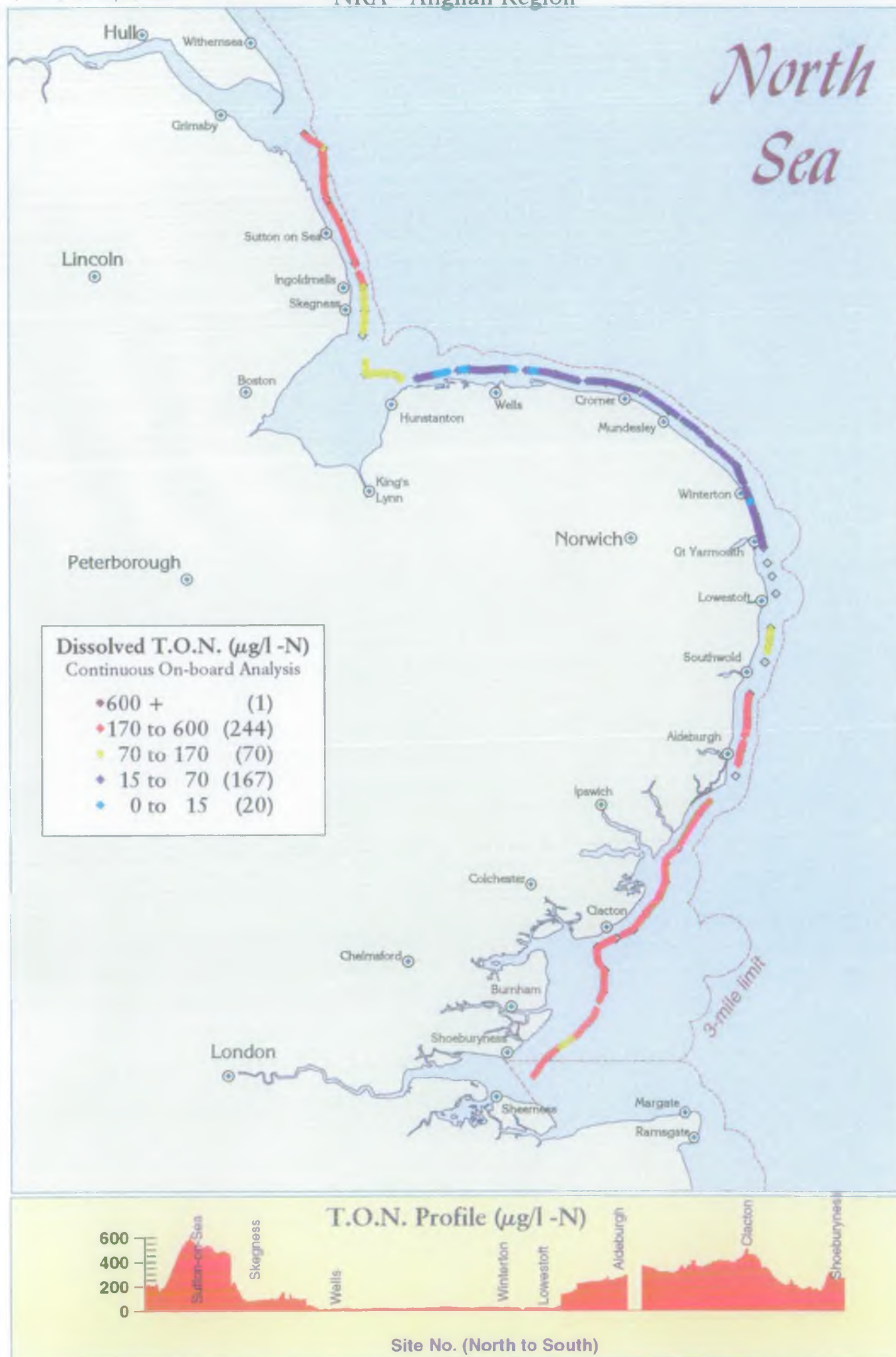


Figure 39 : 'Sea Vigil' Coastal Survey - September, 1994

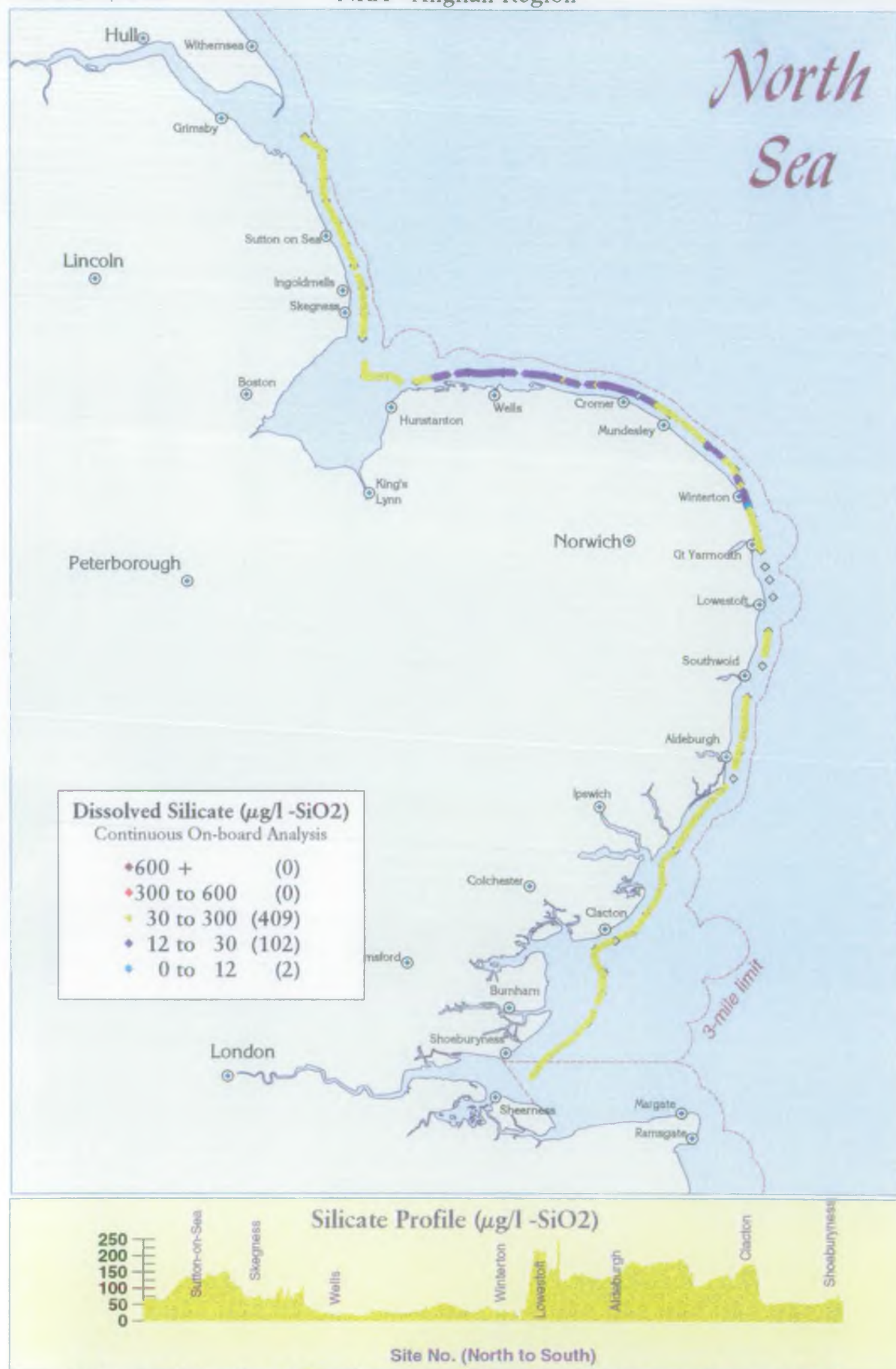


Figure 40 : 'Sea Vigil' Coastal Survey - September, 1994

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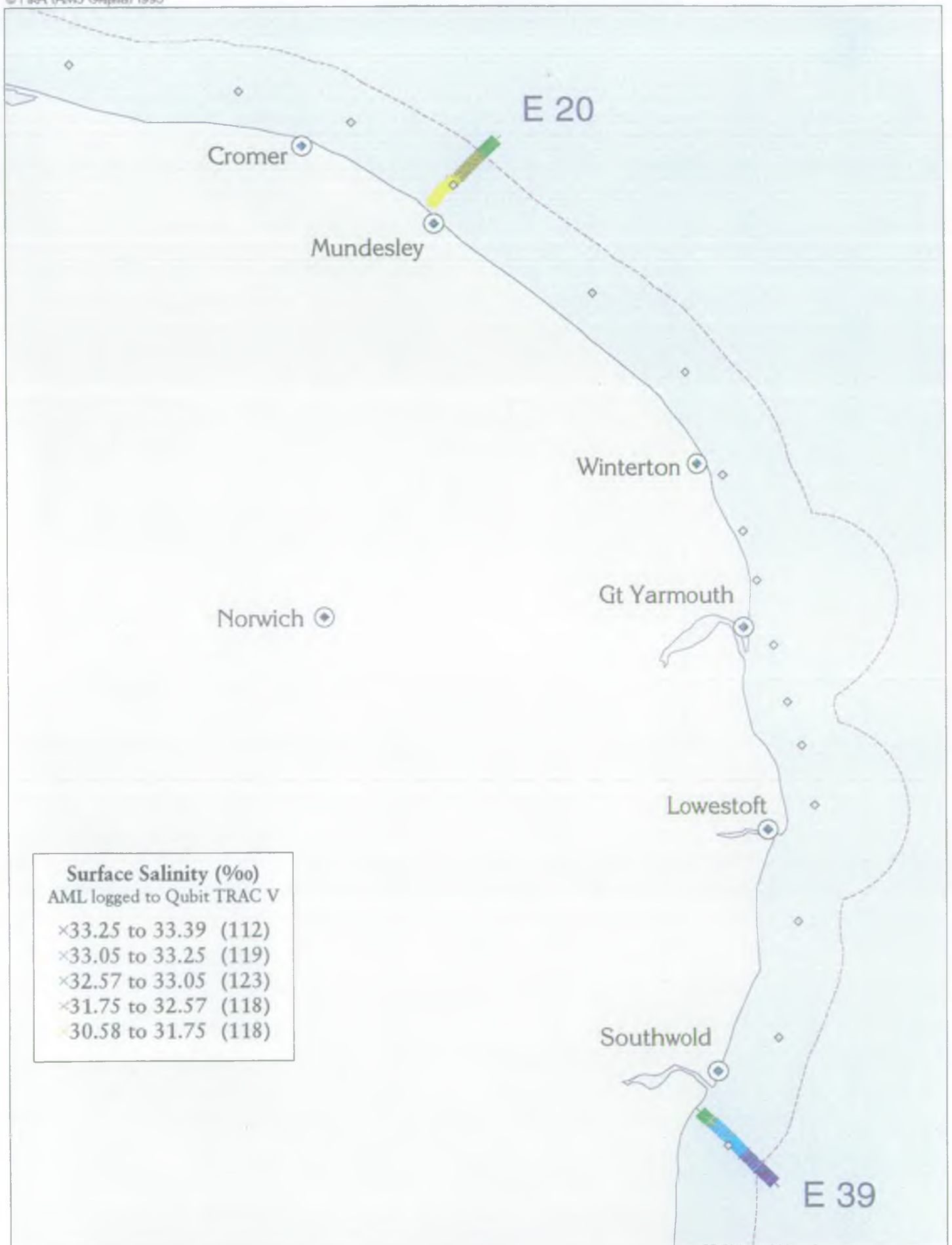


Figure 41 : 'Sea Vigil' Coastal Transects - 2nd February, 1994.

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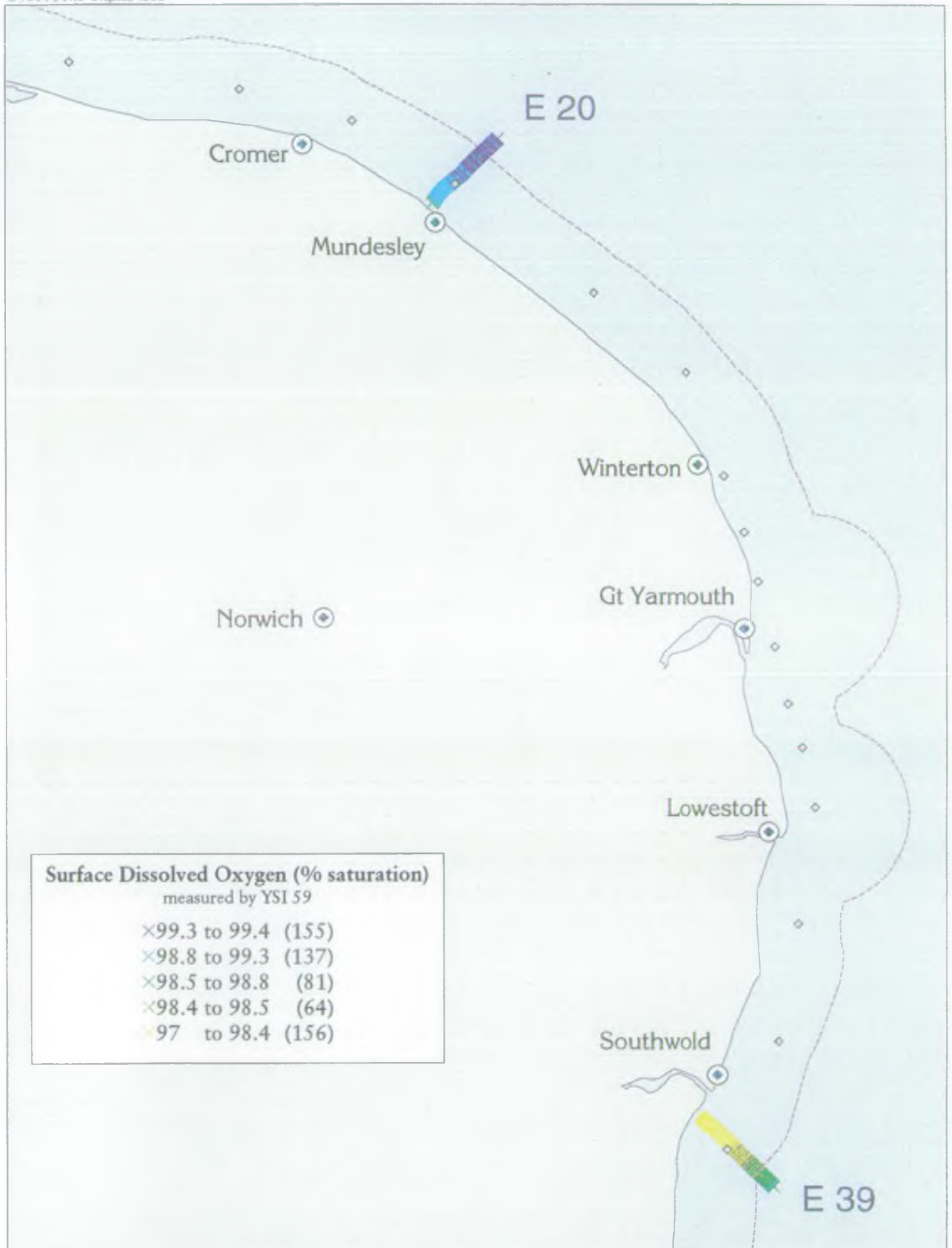


Figure 42 : 'Sea Vigil' Coastal Transects - 2nd February, 1994.

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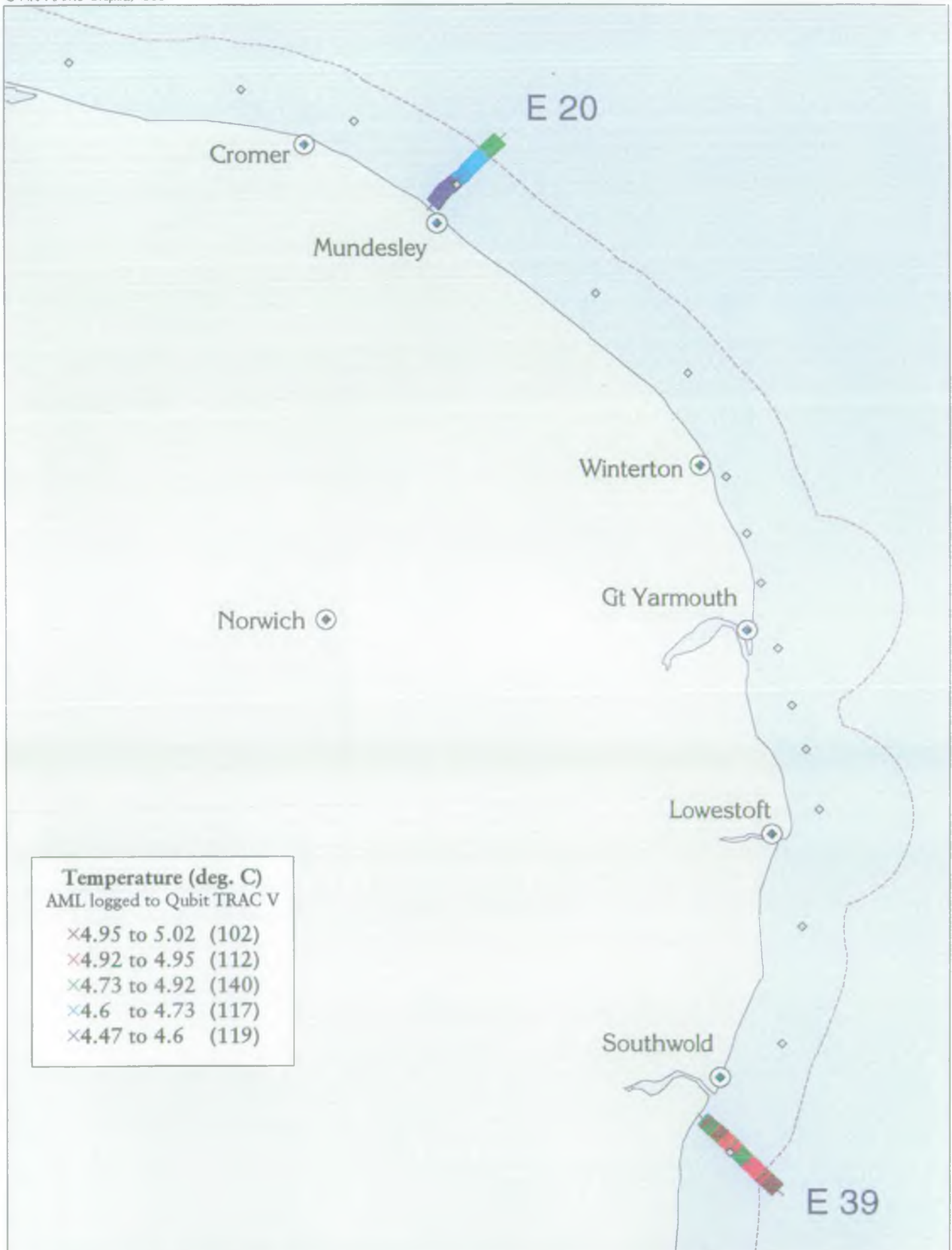


Figure 43 : 'Sea Vigil' Coastal Transects - 2nd February, 1994.

NRA - Anglian Region

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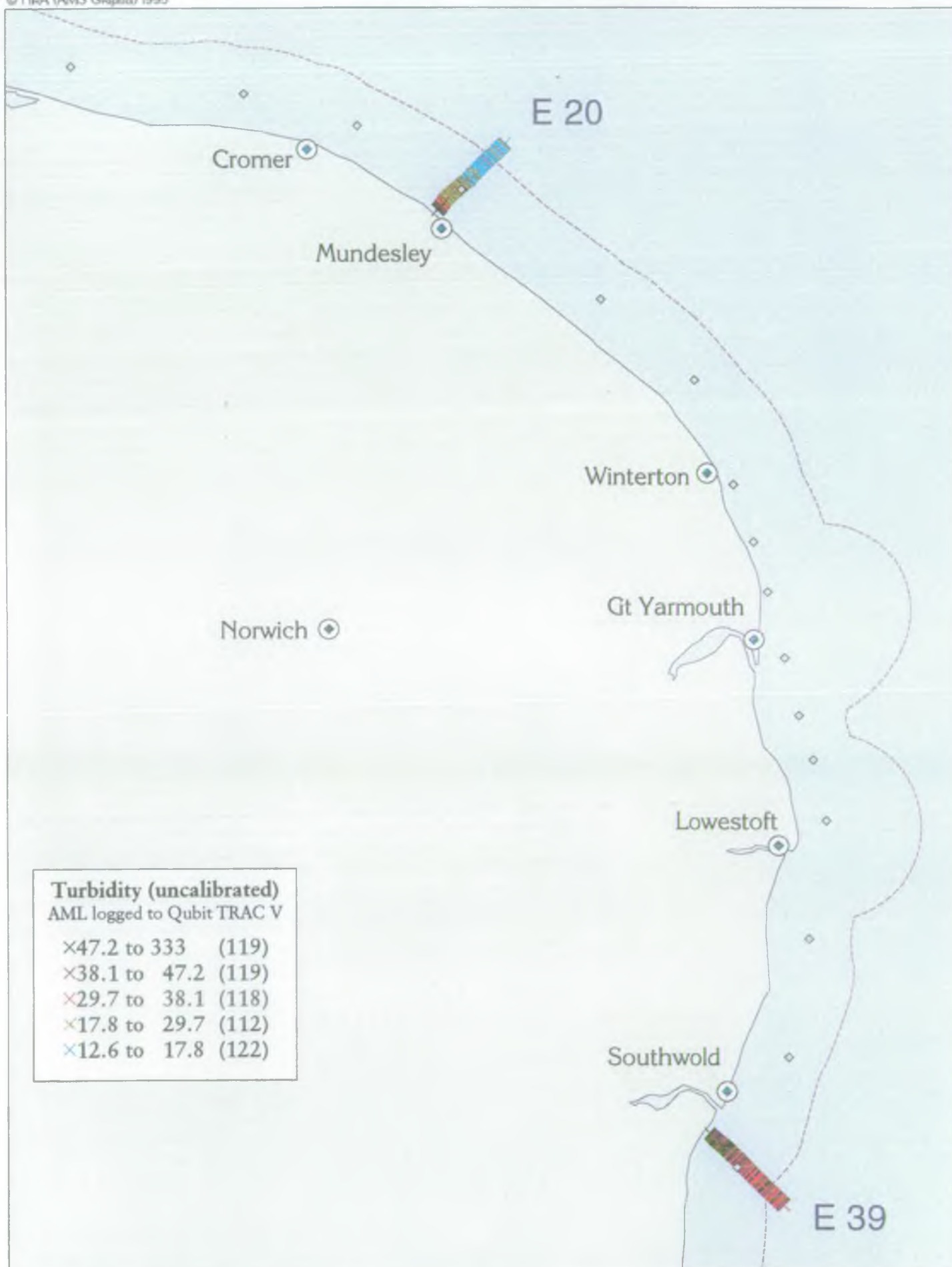


Figure 44 : 'Sea Vigil' Coastal Transects - 2nd February, 1994.

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Figure 45 : 'Sea Vigil' Coastal Survey - 19-21 April, 1994.

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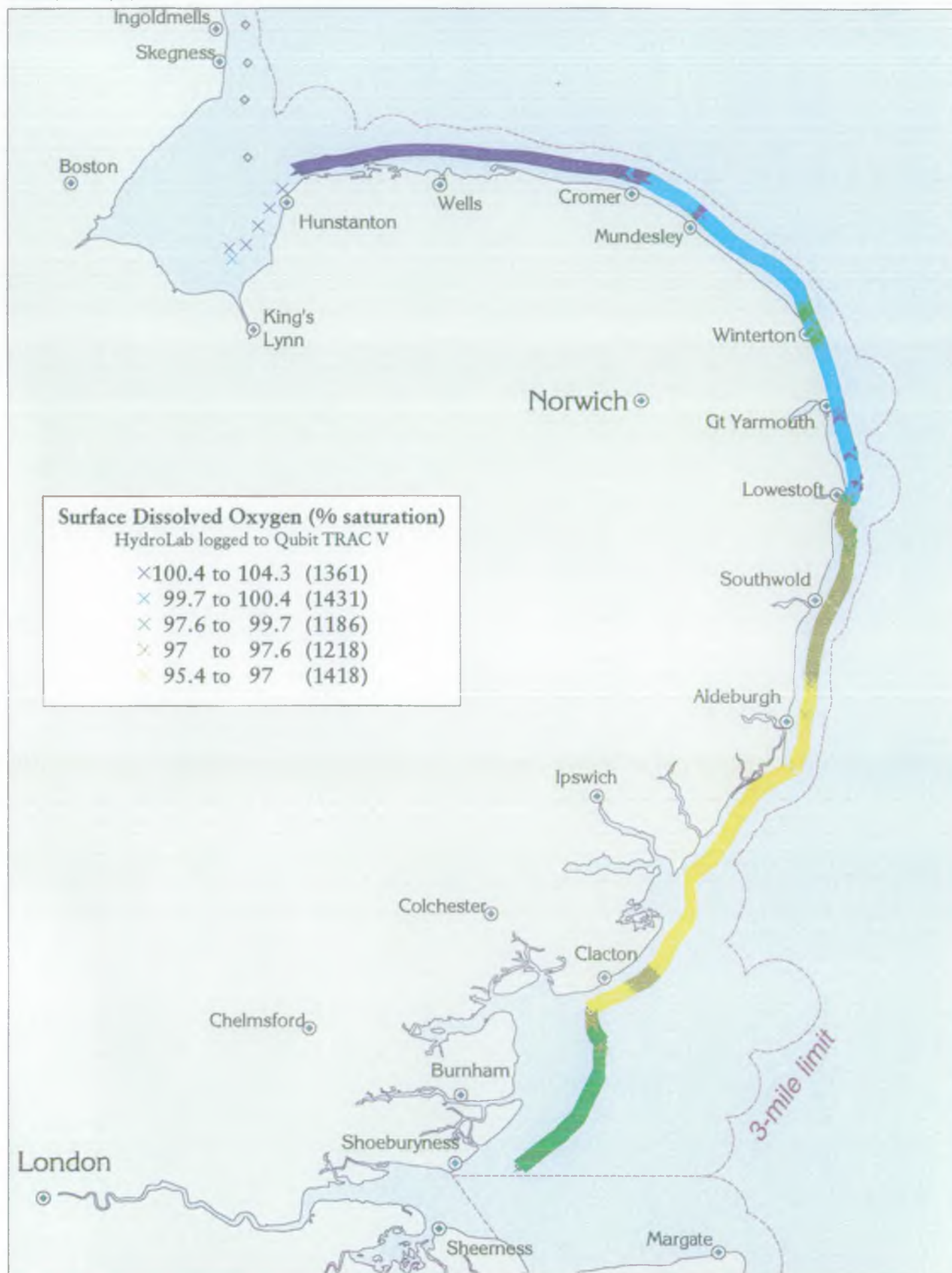


Figure 46 : 'Sea Vigil' Coastal Survey - 19-21 April, 1994.

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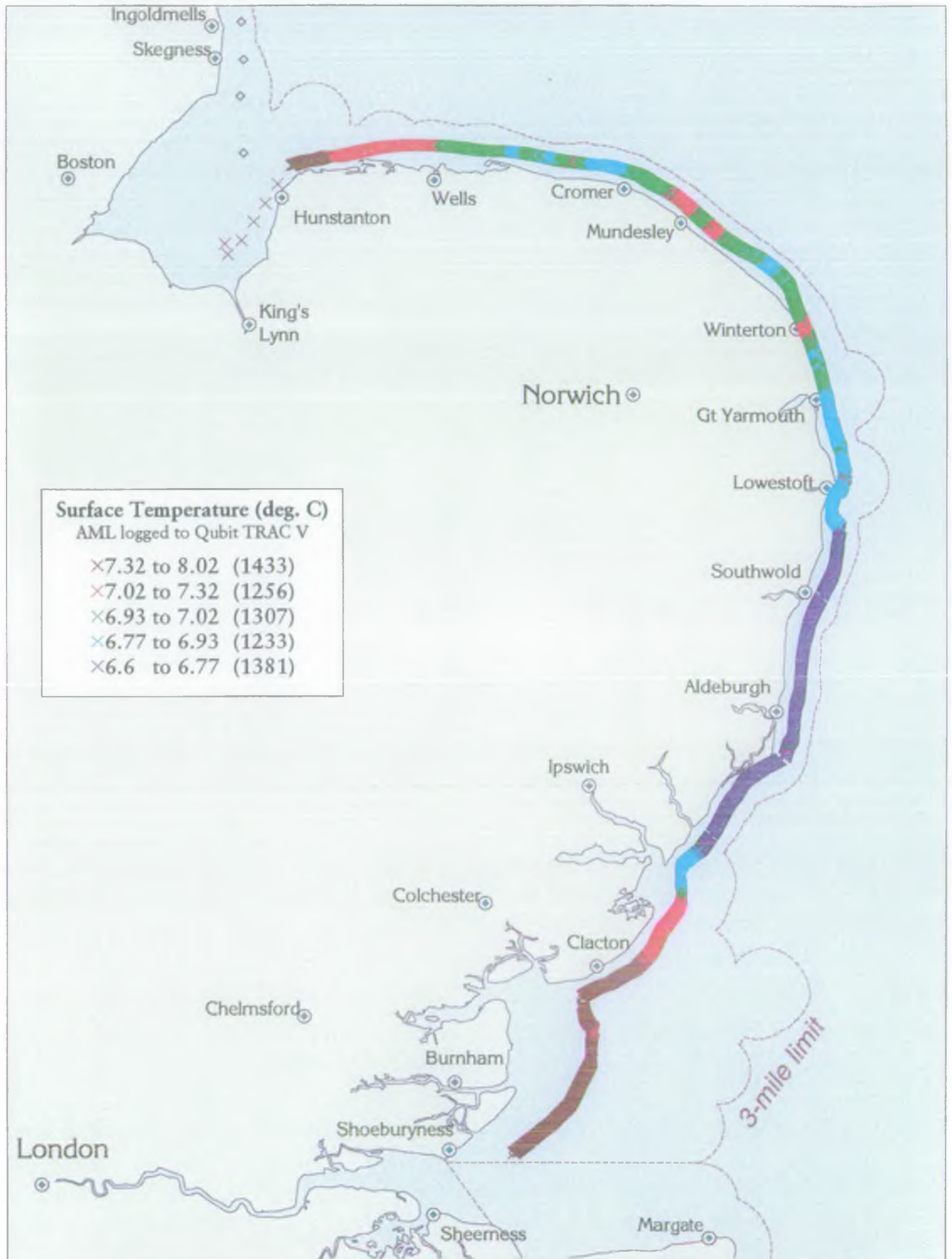


Figure 47 : 'Sea Vigil' Coastal Survey - 19-21 April, 1994.

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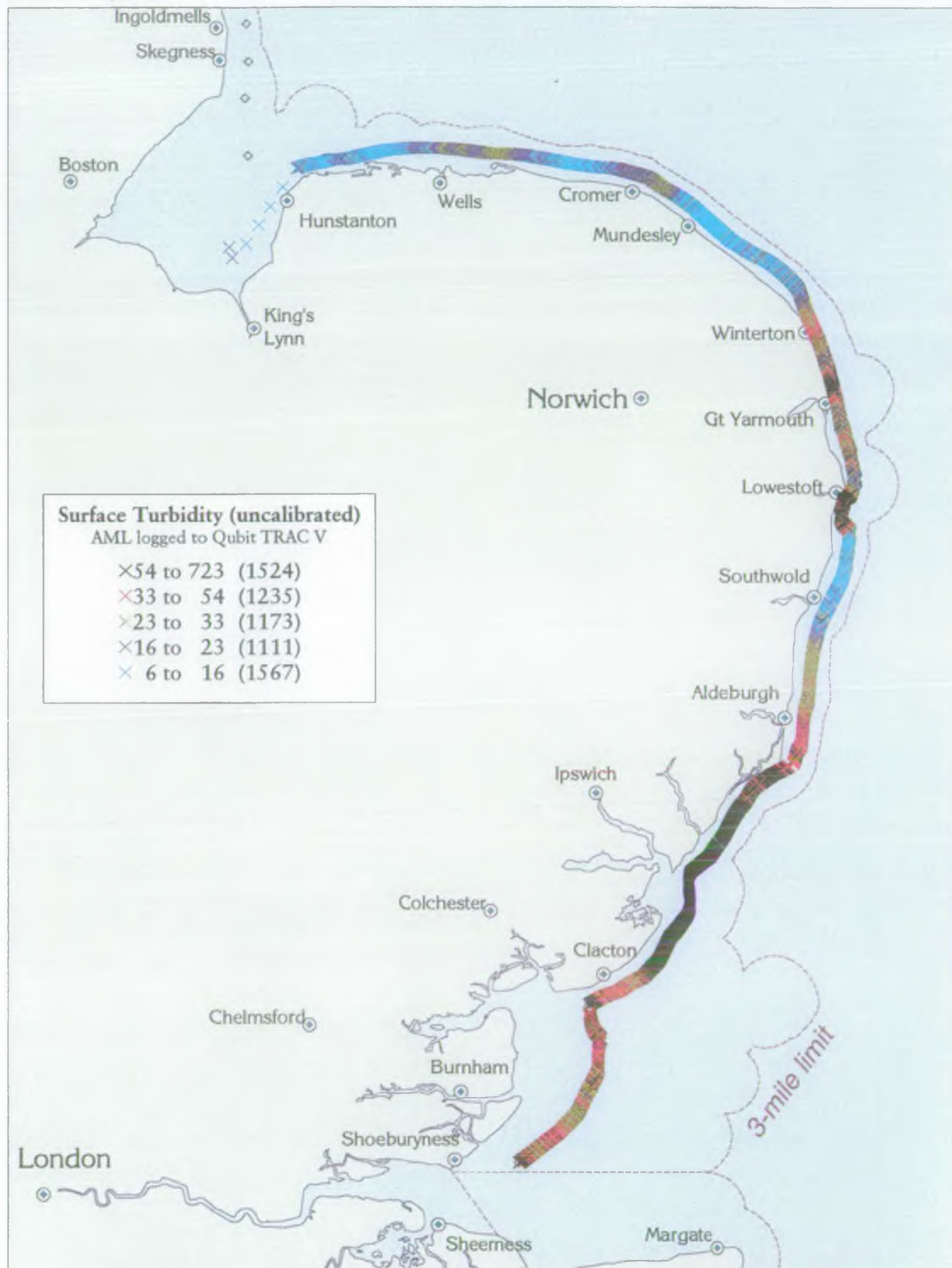


Figure 48 : 'Sea Vigil' Coastal Survey - 19-21 April, 1994.

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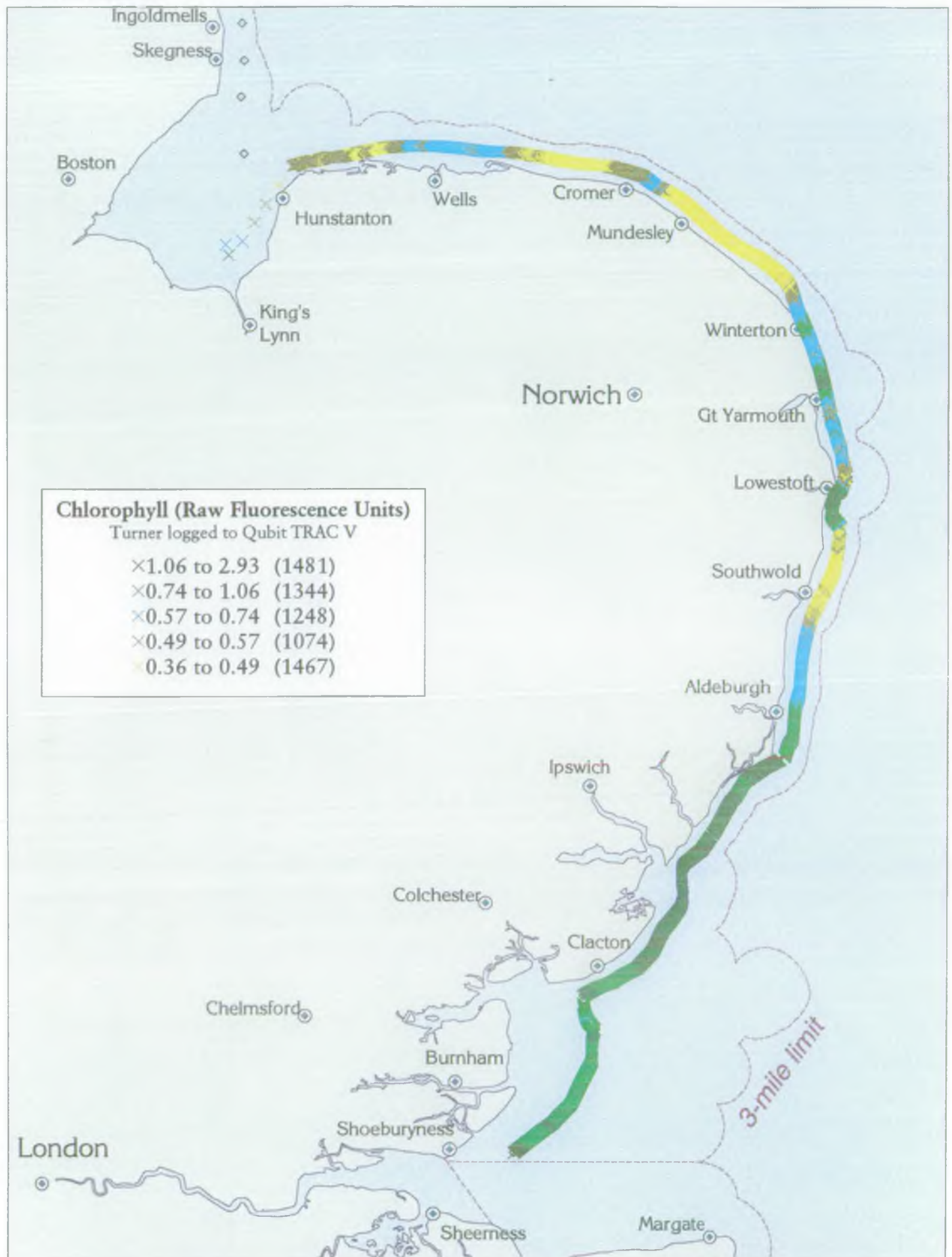


Figure 49 : 'Sea Vigil' Coastal Survey - 19-21 April, 1994.

Anglian Site Name	Location	Easting	Northing	Sample Point Name	Sample Point Code
E 05	Thornham	573100	348500	NORTH SEA AT 53-00.2N 00-34.8E NO.5	R04BJTF731485
E 08	Overy, Staithe	585400	349600	NORTH SEA AT 53-00.4N 00-45.8E NO.8	R04BJTF854496
E 10	The Bink, Wells	593500	349300	NORTH SEA AT 53-00.2N 00-53.2E NO.10	R04BJTF935493
E 13	Cley, Lookout	605700	347800	NORTH SEA AT 52-59.3N 01-04.0E NO.13	R04BJTG057478
E 16a	Sheringham	618000	346200	NORTH SEA AT 52-58.1N 01-14.8E NO.16a	R04BJNC618346
E 18	Overstrand	625000	343400	NORTH SEA AT 52-55.9N 01-21.3E NO.18	R04BJTG250434
E 20	Mundesley	632100	339700	NORTH SEA AT 52-54.0N 01-27.5E NO.20	R04BJTG321397
E 23	Lessingham	642300	331000	NORTH SEA AT 52-48.8N 01-35.7E NO.23	R04BJTG423310
E 25	Horsey	648300	326400	NORTH SEA AT 52-46.4N 01-41.2E NO.25	R04BJTG483264
E 27a	Winterton	651200	318600	NORTH SEA AT 52-42.4N 01-43.1E NO.27a	R04BJNC651318
E 28a	Scratby	652600	314600	NORTH SEA AT 52-40.2N 01-44.2E NO.28a	R04BJNC652314
E 29a	Caister	653500	311100	NORTH SEA AT 52-38.3N 01-44.8E NO.29a	R04BJNC653311
E 30a	Yarmouth Central	654600	306600	NORTH SEA AT 52-35.8N 01-45.6E NO.30a	R04BJNC654306
E 31a	Gorleston	655600	302500	NORTH SEA AT 52-33.6N 01-46.3E NO.31a	R04BJNC655302
E 32a	Corton	656600	299400	NORTH SEA AT 52-31.9N 01-47.0E NO.32a	R04BJSC656299
E 33	Lowestoft	657800	295400	NORTH SEA AT 52-29.6N 01-48.2E NO.33	R04BJTM578954
E 35	Kessingland	656200	287300	NORTH SEA AT 52-25.2N 01-46.2E NO.35	R04BJTM562873

**Table 1 : East Anglian Coast
Sea Vigil Sample Sites**

Anglian Site Name	Location	Easting	Northing	Sample Point Name	Sample Point Code
E 37	Easton Broad	654200	278700	NORTH SEA AT 52-20.8N 01-44.0E NO.37	R04BJTM452787
E 39a	Dunwich Cliffs	652800	271400	NORTH SEA AT 52-16.9N 01-42.4E NO.39a	R04BJSC652271
E 42	Thorpeness	649000	257600	NORTH SEA AT 52-09.6N 01-38.8E NO.42	R04BJTM490576
E 43b	Orfordness	647600	251700	NORTH SEA AT 52-06.5N 01-37.0E NO.43b	R04BJSC647251
E 48a	Shingle Street	639600	242500	NORTH SEA AT 52-01.7N 01-29.6E NO.48a	R04BJSC639242
E 52a	Felixstowe, Cobbolds Point	634000	234000	NORTH SEA AT 51-57.3N 01-24.4E NO.52a	R04BJSC634234
E 54	Felixstowe, Pitching Ground	630400	231200	NORTH SEA AT 51-55.4N 01-21.8E NO.54	R04BJTM304312
E 56	Hamford "Outer Ridge"	630100	226700	NORTH SEA AT 51-53.0N 01-20.0E NO.56	R01BJTM301267
E 59	Walton	627500	220000	NORTH SEA AT 51-49.4N 01-17.7E NO.59	R01BJTM275200
E 61	Holland Radar	624000	215400	NORTH SEA AT 51-47.1N 01-14.8E NO.16	R01BJTM240154
E 63	Clacton Pier	619500	212300	NORTH SEA AT 51-46.0N 01-11.2E NO.63	R01BJTM195123
E 65	Jaywick	616000	210600	NORTH SEA AT 51-45.0N 01-07.2E NO.65	R01BJTM160106
E 71b	Swin Spitway	617200	204900	NORTH SEA AT 51-42.0N 01-08.6E NO.71B	R01BJTM172049
E 73b	W. Hook Middle	616700	199700	NORTH SEA AT 51-39.2N 01-08. E NO.73B	R01BJTR167997
E 74b	Maplin Bank	613300	192600	NORTH SEA AT 51-35.5N 01-04.8E NO.74B	R01BJTR133926
E 77b	Blacktail Spit	604200	184800	NORTH SEA AT 51-31.5N 00-56.6E NO.77B	R01BJTR042848

Table 1 : East Anglian Coast
Sea Vigil Sample Sites

Anglian Site Name	Location	Easting	Northing	Sample Point Name	Sample Point Code
E20a	Mundesley	630500	337500	Mundesley Transect - 0.5 km O/S	R04BJMUNDXTR
E20b	Mundesley	631500	338500	Mundesley Transect - 1.4 km O/S	R04BJMUNDXTR
E20c	Mundesley	632500	339500	Mundesley Transect - 2.8 km O/S	R04BJTG321397
E20d	Mundesley	633500	340500	Mundesley Transect - 4.2 km O/S	R04BJMUNDXTR
E20e	Mundesley	634500	341500	Mundesley Transect - 5.6 km O/S	R04BJMUNDXTR
E20f	Mundesley	635500	342500	Mundesley Transect - 7.0 km O/S	R04BJMUNDXTR
E39a	Dunwich Cliffs	649500	273500	Dunwich Cliffs Transect - 0.5 km O/S	R04BJDUNWXTR
E39b	Dunwich Cliffs	650500	272500	Dunwich Cliffs Transect - 1.6 km O/S	R04BJDUNWXTR
E39c	Dunwich Cliffs	652500	271500	Dunwich Cliffs Transect - 3.0 km O/S	R04BJSC652271
E39d	Dunwich Cliffs	652500	270500	Dunwich Cliffs Transect - 4.4 km O/S	R04BJDUNWXTR
E39e	Dunwich Cliffs	653500	269500	Dunwich Cliffs Transect - 5.8 km O/S	R04BJDUNWXTR
E39f	Dunwich Cliffs	654500	268500	Dunwich Cliffs Transect - 7.2 km O/S	R04BJDUNWXTR
E39g	Dunwich Cliffs	655500	267500	Dunwich Cliffs Transect - 7.5 km O/S	R04BJDUNWXTR
E39h	Dunwich Cliffs	656500	266500	Dunwich Cliffs Transect - 8.7 km O/S	R04BJDUNWXTR
E59a	Walton on the Naze	625500	220500	Walton on the Naze Transect - 0.7 km O/S	R01BJWNAZEXTR
E59b	Walton on the Naze	626500	220500	Walton on the Naze Transect - 1.7 km O/S	R01BJWNAZEXTR
E59c	Walton on the Naze	627500	220500	Walton on the Naze Transect - 2.7 km O/S	R01BJTM275200
E59d	Walton on the Naze	628500	220500	Walton on the Naze Transect - 3.7 km O/S	R01BJWNAZEXTR
E59e	Walton on the Naze	629500	220500	Walton on the Naze Transect - 4.7 km O/S	R01BJWNAZEXTR

**Table 1 : East Anglian Coast
Sea Vigil Sample Sites**

Anglian Site Name	Location	Easting	Northing	Sample Point Name	Sample Point Code
E59f	Walton on the Naze	630500	220500	Walton on the Naze Transect - 5.7 km O/S	R01BJWNAZEXTR
E59g	Walton on the Naze	631500	220500	Walton on the Naze Transect - 6.7 km O/S	R01BJWNAZEXTR
E59h	Walton on the Naze	632500	220500	Walton on the Naze Transect - 7.7 km O/S	R01BJWNAZEXTR
E59i	Walton on the Naze	633500	220500	Walton on the Naze Transect - 8.7 km O/S	R01BJWNAZEXTR
E59j	Walton on the Naze	634500	220500	Walton on the Naze Transect - 9.7 km O/S	R01BJWNAZEXTR
E59k	Walton on the Naze	635500	220500	Walton on the Naze Transect - 10.7 km O/S	R01BJWNAZEXTR
E59l	Walton on the Naze	636500	220500	Walton on the Naze Transect - 11.7 km O/S	R01BJWNAZEXTR
E59m	Walton on the Naze	637500	220500	Walton on the Naze Transect - 12.7 km O/S	R01BJWNAZEXTR
E59o	Walton on the Naze	638500	220500	Walton on the Naze Transect - 13.7 km O/S	R01BJWNAZEXTR

**Table 1 : East Anglian Coast
Sea Vigil Sample Sites**

Survey Date	Survey Area	No. of Samples
29-January-94	NACoMS V - Wash to Great Yarmouth	13
30-January-94	NACoMS V - Great Yarmouth to Harwich	11
31-January-94	NACoMS V - Harwich to Thames	9
26-March-94	Wash to Shotley	24
28-March-94	Shotley to Thames	9
18-April-94	Thames to Lowestoft	16
19-April-94	Lowestoft to Kings Lynn	17
23-May-94	NACoMS VI - Wash to Great Yarmouth	13
24-May-94	NACoMS VI - Great Yarmouth to Wolveston	12
25-May-94	NACoMS VI - Wolveston to Thames	8
13-June-94	Thames to Shotley	10
14-June-94	Shotley to Lowestoft	7
15-June-94	Lowestoft to Wash	16
14-July-94	NACoMS VII - Thames to Lowestoft	17
15-July-94	NACoMS VII - Lowestoft to Wash	16
07-September-94	NACoMS VIII - Wash to Great Yarmouth	13
13-September-94	NACoMS VIII - Thames to Great Yarmouth	20
01-November-94	Wash to Lowestoft	16
02-November-94	Lowestoft to Bradwell	17
11-November-94	Transects - Walton on the Naze and Dunwich Cliffs	15
12-November-94	Transects - Dunwich Cliffs and Mundesley	11

Table 2 : East Anglian Coast Surveys

Survey Date	Survey Area	Data Table	Data Plots
	East Anglian Coast - <i>Sea Vigil</i> Survey Sites	Table 1	Figure 1
	East Anglian Coast Surveys, 1994	Table 2	
	Summary of Data Tables & Figures	Table 3	
29-January-94 30-January-94 31-January-94	NACoMS V - Wash to Great Yarmouth NACoMS V - Great Yarmouth to Harwich NACoMS V - Harwich to Thames	Table 4	Figure 2
26-March-94 28-March-94	Wash to Shotley Shotley to Thames	Table 5	Figure 3
18-April-94 19-April-94	Thames to Lowestoft Lowestoft to Kings Lynn	Table 6	Figure 4
23-May-94 24-May-94 25-May-94	NACoMS VI - Wash to Great Yarmouth NACoMS VI - Great Yarmouth to Wolveston NACoMS VI - Wolveston to Thames	Table 7	Figure 5
13-June-94 14-June-94 15-June-94	Thames to Shotley Shotley to Lowestoft Lowestoft to Wash	Table 8	Figure 6
14-July-94 15-July-94	NACoMS VII - Thames to Lowestoft NACoMS VII - Lowestoft to Wash	Table 9	Figure 7
07-September-94 13-September-94	NACoMS VIII - Wash to Great Yarmouth NACoMS VIII - Thames to Great Yarmouth	Table 10	Figure 8
01-November-94 02-November-94	Wash to Lowestoft Lowestoft to Bradwell	Table 11	Figure 9
11-November-94 11/12-November-94 12-November-94	Transect - Walton on the Naze Transect - Dunwich Cliffs Transect - Mundesley	Table 12	Figure 10

**Table 3.1 : East Anglian Coast Surveys
Summary of Data Tables and Figures**

Survey Date	Survey Site	Data Table	Data Plots
1994	Thornham Overy, Statthe The Bink, Wells Cley, Lookout	included in Tables above	Figure 11
	Sheringham Overstrand Mundesley Lessingham		Figure 12
	Horsey Winterton Scratby Caister		Figure 13
	Yarmouth Central Gorleston Corton Lowestoft		Figure 14
	Kessingland Easton Broad Dunwich Cliffs Thorpeness		Figure 15
	Orfordness Shingle Street Felixstowe, Cobbolds Point Felixstowe, Pitching Ground		Figure 16
	Hamford "Outer Ridge" Walton Holland Radar Clacton Pier		Figure 17
	Jaywick Swin Spitway W. Hook Middle Maplin Bank		Figure 18
	Blacktail Spit		Figure 19

**Table 3.2 : East Anglian Coast Surveys
Summary of Data Tables and Figures**

Survey Date	Survey Area	Determinand	Data Table	Data Plots
1994	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Ammonia	Included in Tables above	Figure 20
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	TON		Figure 21
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Silicate		Figure 22
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Phosphate		Figure 23
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Nitrite		Figure 24
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Chlorophyll		Figure 25
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Temperature		Figure 26
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Salinity		Figure 27
	Thornham to Scratby Caister to Shingle Street Cobbolds Point to Blacktail Spit	Dissolved Oxygen		Figure 28

**Table 3.3 : East Anglian Coast Surveys
Summary of Data Tables and Figures**

Survey Date	Survey Area	Determinand	Data Plots
23rd - 25th May 1994	Wash to Thames NaCoMS VI	Ammonia Phosphate TON Silicate	Figure 29 Figure 30 Figure 31 Figure 32
14th - 19th July 1994	Thames to Wash (Water Guardian) NaCoMS VII	Ammonia Phosphate TON Silicate	Figure 33 Figure 34 Figure 35 Figure 36
7th - 19th September 1994	Wash to Thames NaCoMS VIII	Ammonia Phosphate TON Silicate	Figure 37 Figure 38 Figure 39 Figure 40
2nd February 1994	Transects at E 20 & E 39	Salinity DO Temperature Turbidity	Figure 41 Figure 42 Figure 43 Figure 44
19th-21st April 1994	Coastal Survey	Salinity DO Temperature Turbidity Fluorescence	Figure 45 Figure 46 Figure 47 Figure 48 Figure 49

**Table 3.4 : East Anglian Coast Surveys
Summary of Figures for Continuous Plots**

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
31-January 13:18	E65	Jaywick	33.68	5.44	8.7		96.2	9.72	16.50	483	650	33.30	1.69	1.0
31-January 13:47	E71b	Swin Spitway	33.88	5.52	11.8		96.4	9.73	12.50	443	612	30.20	1.79	2.1
31-January 14:10	E73b	W. Hook Middle	33.54	5.51	17.5		96.3	9.72	13.80	507	688	38.30	2.24	2.6
31-January 14:39	E74b	Maplin Bank	33.65	5.63	11.3		96.2	9.67	17.20	483	660	40.60	3.15	3.0
31-January 15:27	E77b	Blacktail Spit	33.60	5.70	16.9		96.3	9.66	17.50	488	669	42.60	3.73	1.9

Table 4 : East Anglian Coast Survey Data
29th - 31st January 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
29-January 16:41	E5	Thornham	29.98	4.53	6.0	8.21	98.2	10.22	48.40	1730	1600	41.60	11.20	
29-January 17:32	E8	Overy, Statthe	30.08	4.46	9.0	8.21	97.8	10.34	36.10	1500	1440	37.30	9.62	3.3
29-January 18:04	E10	The Bink, Wells	30.46	4.62	14.0	8.21	96.8	10.19	27.00	1400	1340	35.20	8.67	1.6
29-January 18:45	E13	Cley, Lookout	30.66	4.60	16.8	8.21	96.9	10.20	30.60	1360	1300	34.20	8.26	1.4
29-January 19:23	E16	Sheringham	30.96	4.54	17.8	8.21	97.1	10.24	21.80	1270	1220	32.80	7.39	1.0
29-January 19:48	E18	Overstrand	31.20	4.51	14.8	8.21	97.2	10.25	16.60	1190	1140	32.10	6.89	1.0
29-January 20:13	E20	Mundesley	31.17	4.51	16.1	8.21	97.1	10.25	19.00	1170	1140	34.10	7.01	1.2
29-January 20:50	E23	Lessingham	31.52	4.59	18.2	8.21	96.9	10.13	15.10	1030	1040	32.00	6.27	1.4
29-January 21:16	E25	Horsey	31.93	4.68	20.8	8.21	96.7	10.05	10.50	915	909	29.40	5.28	1.2
29-January 21:40	E27	Winterton	30.78	4.65	18.4	8.20	96.4	10.03	14.40	951	964	29.60	5.43	2.3
29-January 21:53	E28	Scratby	31.75	4.65	18.5	8.20	96.4	10.03	14.30	976	973	28.40	5.12	4.2
29-January 22:04	E29	Caister	31.80	4.66	8.8	8.20	96.6	10.04	11.50	931	933	28.30		6.9
29-January 22:19	E30	Yarmouth Central	30.72	4.70	18.5	8.20	96.9	10.07	7.85	804	849	27.60		3.5
30-January 09:38	E31	Gorleston	31.12	4.76	19.0	8.44	96.5	10.01	<6.57	694	777	27.50	2.81	2.4
30-January 09:48	E32	Corton	32.29	4.74	15.1	8.45	96.4	9.95	7.32	745	832	28.45	2.35	3.4
30-January 10:02	E33	Lowestoft	32.30	4.74	12.4	8.45	96.0	9.90	8.84	714	837	28.20	2.11	2.1
30-January 10:37	E35	Kessingland	32.65	4.82	10.0	8.41	95.6	9.85	7.10	633	822	29.20	0.94	2.4
30-January 11:06	E37	Easton Broad	32.88	4.88	18.1	8.36	98.0	9.80	<6.57	573	740	30.40	0.94	3.6
30-January 11:45	E39	Dunwich Cliffs	33.94	4.90	11.9		95.2	9.80	<6.57	543	731	29.10	0.70	2.9
30-January 12:40	E42	Thorpeness	33.09	5.24	15.5	8.33	95.9	9.76	<6.57	538	755	29.40	0.47	2.1
30-January 13:11	E43	Orfordness	33.26	5.06	20.3	8.28	97.0	9.69	<6.57	498	700	28.20	0.94	1.6
30-January 14:22	E48	Shingle Street	33.69	5.13	12.5		95.4	9.78	6.78	451	664	31.40	1.17	2.1
30-January 15:52	E52	Cobbolds Point	33.92	5.41	10.9		95.7	9.67	<6.57	355	544	29.80	1.64	2.0
30-January 16:30	E54	Pitching Ground	33.24	5.26	13.3		94.9	9.63	23.70	550	726	30.30	3.05	2.1
31-January 11:54	E56	Hamford	33.36	5.20	12.5		95.5	9.74	23.90	562	743	30.60	3.01	1.4
31-January 12:24	E59	Walton	33.47	5.16	10.0		96.6	9.83	19.70	552	693	36.40	2.31	2.0
31-January 12:43	E61	Holland Radar	33.76	5.44	10.3		96.3	9.73	12.40	465	628	31.80	1.95	1.9
31-January 13:00	E63	Clacton Pier	33.82	5.50	13.0		96.3	9.71	13.60	470	625	31.80	1.59	1.3

Table 4 : East Anglian Coast Survey Data
29th - 31st January 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
28-March 10:53	E65	Jaywick	34.09	7.35	8.7	7.83	98.2		8.09	410	348	28.70	1.78	12.0
28-March 11:26	E71b	Swin Spitway	34.09	7.43	12.0	7.85	98.7		<6.57	393	288	31.20	2.39	9.1
28-March 11:49	E73b	W. Hook Middle	34.10	7.58	17.6	7.85	98.9		<6.57	396	210	31.30	2.23	12.6
28-March 12:24	E74b	Maplin Bank	34.28	7.64	11.6	7.87	100.5		10.10	314	109	30.70	2.51	11.6
28-March 13:43	E77b	Blacktail Spit	34.21	7.84	8.5	7.91	101.2		<6.57	332	107	30.40	2.57	7.1

Table 5 : East Anglian Coast Survey Data
26th - 28th March 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chloro phyll (µg/l)
26-March 02:31	E5	Thornham	31.17	6.62	7.5	7.89	97.4		34.80	1070	913	35.30	7.36	2.6
26-March 03:25	E8	Overy, Staithe	31.14	6.57	10.5	7.89	98.4		27.00	942	855	33.45	3.29	2.4
26-March 03:54	E10	The Bink, Wells	31.87	6.45	15.2	7.90	98.2		27.30	894	827	32.70	5.90	2.0
26-March 04:33	E13	Cley, Lookout	32.45	5.95	16.0	7.88	98.3		18.20	719	736	30.00	4.49	2.2
26-March 05:10	E16	Sheringham	32.58	5.94	18.0	7.91	98.5		17.60	686	712	29.50	4.30	2.2
26-March 05:34	E18	Overstrand	32.44	6.06	16.5	7.90	98.5		19.30	721	732	30.50	4.48	2.9
26-March 00:00	E20	Mundesley	32.56	5.98	15.1	7.88	98.2		16.60	682	709	29.80	4.38	2.4
26-March 06:35	E23	Lessingham	32.01	6.11	19.5	7.73	98.2		16.73	724	732	30.10	4.24	2.4
26-March 07:00	E25	Horsey	32.15	6.22	28.3	7.83	98.1		21.00	808	784	31.30	4.38	3.3
26-March 07:23	E27	Winterton	30.46	6.16	17.8	7.78	97.6		23.80	813	801	31.30	4.16	5.3
26-March 07:35	E28	Scratby	32.16	6.13	21.5	7.75	97.3		21.60	803	794	30.90	4.16	5.3
26-March 07:45	E29	Caister	32.18	6.15	10.3	7.78	97.2		23.07	782	811	34.30	4.07	5.6
26-March 08:00	E30	Yarmouth Central	32.56	5.94	19.6	7.73	97.7		15.20	684	725	31.20	3.82	3.9
26-March 08:12	E31	Gorleston	32.94	5.76	17.0	7.70	98.1		9.95	572	653	29.40	3.40	2.2
26-March 08:22	E32	Corton	33.00	5.79	15.0	7.70	98.1		8.30	551	642	28.70	3.43	2.8
26-March 08:35	E33	Lowestoft	33.00	5.86	15.5	7.71	98.0		9.17	543	645	28.97	3.15	2.8
26-March 09:01	E35	Kessingland	32.88	6.30	10.7	7.66	97.0		9.92	595	772	30.30	2.06	6.7
26-March 09:28	E37	Easton Broad	33.14	5.85	18.3	7.66	97.8		<6.57	529	712	27.60	2.14	4.4
26-March 09:55	E39	Dunwich Cliffs	33.29	5.86	11.7	7.64	98.0		<6.57	523	759	27.20	1.43	5.0
26-March 10:43	E42	Thorpeness	33.50	6.55	15.1	7.66	98.1		<6.57	486	719	26.80	1.60	5.2
26-March 11:08	E43	Orfordness	33.73	5.81	19.7	7.66	98.1		<6.57	426	633	25.63	2.20	3.5
26-March 12:06	E48	Shingle Street	34.08	6.51	11.4	7.67	98.2		<6.57	385	502	26.00	2.47	4.2
26-March 12:52	E52	Cobbolds Point	34.32	6.89	10.5	7.71	98.3		8.19	298	341	23.20	2.52	6.2
26-March 13:17	E54	Pitching Ground	33.86	7.26	12.2	7.70	97.1		35.60	443	489	25.00	4.40	5.5
28-March 09:29	E56	Hamford	33.70	7.63	11.0	7.70	96.9		32.70	505	429	27.70	3.90	7.8
28-March 09:58	E59	Walton	34.10	7.24	9.1	7.76	98.0		8.13	405	349	27.50	2.14	7.2
28-March 10:18	E61	Holland Radar	34.09	7.33	9.9	7.80	98.2		9.60	402	331	27.40	2.19	11.1
28-March 10:35	E63	Clacton Pier	34.13	7.35	12.5	7.80	98.3		7.50	399	331	27.70	2.11	8.5

Table 5 : East Anglian Coast Survey Data
26th - 28th March 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
19-April 19:04	E16	Sheringham	33.45	6.75	14.7	8.02	95.6	9.37	44.82	533	217	29.20		3.3
19-April 19:52	E13	Cley, Lookout	33.45	6.80	13.0	8.03	95.8	9.38	44.00	473	193	26.90		6.3
19-April 20:35	E10	The Bink, Wells	33.26	6.83	11.0	8.02	97.4	9.53	44.30	469	179	26.70		2.8
19-April 21:05	E8	Overy, Staithe	33.61	6.99	6.4	8.05	100.0	9.75	43.84	456	164	24.30		5.9
19-April 21:54	E5	Thornham	33.14	7.38	6.0	8.03	99.2	9.56	51.30	820	217	26.80		4.0

**Table 6 : East Anglian Coast Survey Data
18th - 19th April 1994**

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chloro phyll (µg/l)
18-April 16:38	E77b	Blacktail Spit	34.10	7.40	13.0	8.03	98.4	9.54	27.40	289	9	19.81		10.6
18-April 17:28	E74b	Maplin Bank	34.28	7.43	10.3	8.03	98.6	9.62	11.80	244	14	16.60		7.4
18-April 17:59	E73b	W. Hook Middle	34.13	7.26	16.5	8.01	98.2	9.61	36.70	340	75	20.10		8.1
18-April 18:18	E71b	Swin Spitway	33.85	7.15	10.5	8.00	98.2	9.63	23.40	384	135	21.13		6.0
18-April 18:41	E65	Jaywick	33.81	7.30	7.9	8.00	97.8	9.58	34.10	356	63	19.40		9.8
18-April 18:58	E63	Clacton Pier	33.68	7.20	11.7	7.99	97.9	9.53	23.70	433	125	22.60		6.2
18-April 19:13	E61	Holland Radar	33.90	7.18	9.5	7.99	98.7	9.52	24.40	402	132	21.10		2.8
18-April 19:30	E59	Walton	33.30	7.04	8.6	7.97	98.1	9.49	25.30	467	210	20.70		7.9
18-April 19:57	E56	Hamford	32.90	6.88	9.6	7.97	97.7	9.49						7.6
18-April 20:10	E54	Pitching Ground	32.81	6.72	11.5	7.96	97.3	9.49	20.90	643	326	24.20		3.6
18-April 20:30	E52	Cobbolds Point	32.77	6.64	9.2	7.97	98.5	9.63	18.30	654	335	26.30		3.7
18-April 21:05	E48	Shingle Street	32.73	6.57	10.1	7.98	98.5	9.64			314	25.60		4.7
18-April 21:52	E43	Orfordness	32.84	6.61	14.0	7.99	98.7	9.65	16.50	643	281	24.70		4.7
18-April 22:18	E42	Thorpeness	32.89	6.61	12.5	7.99	98.5	9.63						2.0
18-April 23:14	E39	Dunwich Cliffs	32.95	6.58	9.5	8.01	99.0	9.68						1.4
18-April 23:48	E37	Easton Broad	33.05	6.56	16.3	8.00	99.4	9.73						1.0
19-April 00:27	E35	Kessingland	33.09	6.64	7.3	8.00	99.2	9.69	15.00	447	219	21.80		2.7
19-April 14:21	E33	Lowestoft	33.21	6.74	11.4	8.01	97.9	9.61						5.1
19-April 14:42	E32	Corton	33.11	6.74	13.7	8.01	97.7	9.59	50.60	560	241	27.70		3.2
19-April 15:00	E31	Gorleston	33.23	6.69	16.1	8.00	97.4	9.57	48.10	567	243	28.70		3.3
19-April 15:22	E30	Yarmouth Central	33.34	6.76	18.5	8.01	97.3	9.54	51.70	530	229	27.30		3.4
19-April 15:44	E29	Caister	33.13	6.80	9.3	7.99	96.5	9.45	44.95	536	232	28.64		6.1
19-April 16:02	E28	Scratby	33.09	6.79	20.1	8.01	96.6	9.46	49.20	591	238	28.70		3.1
19-April 16:21	E27	Winterton	32.96	6.87	17.5	7.99	95.9	9.38	44.50	600	240	29.30		4.0
19-April 16:45	E25	Horsey	33.09	6.80	25.4	7.98	95.3	9.34	45.80	639	255	30.30		3.3
19-April 17:30	E23	Lessingham	33.23	6.79	17.1	8.00	95.4	9.35	46.10	589	241	29.90		2.2
19-April 18:14	E20	Mundesley	33.12	6.97	12.4	7.99	95.9	9.36	47.00	562	233	29.48		1.9
19-April 18:41	E18	Overstrand	33.21	6.84	12.2	8.01	95.6	9.36	47.90	569	227	29.60		3.0

Table 6 : East Anglian Coast Survey Data
18th - 19th April 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
25-May 07:49	E65	Jaywick	33.58	12.76	7.3	7.91	96.1		54.00	280	<47	28.00		5.0
25-May 08:24	E71b	Swin Spitway	33.68	12.68	10.5	7.96	100.9		87.00	325	51	37.00		7.6
25-May 08:45	E73b	W. Hook Middle	33.70	12.96	15.2	7.95	99.7		58.00	332	137	30.00		8.0
25-May 09:11	E74b	Maplin Bank	33.93	12.78	9.5	8.03	109.2		63.00	270		33.00		19.0
25-May 09:53	E77b	Blacktail Spit	33.87	12.96	13.1	8.04	109.8							

Table 7 : East Anglian Coast Survey Data
23rd - 25th May 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chloro phyll (µg/l)
23-May 14:53	E5	Thornham	33.51	11.37	8.5	8.30	112.1		8.57	74		10.50		13.9
23-May 15:44	E8	Overy, Staithe	33.54	11.44	11.1	8.31	112.2		8.57	68		10.50		7.5
23-May 16:12	E10	The Bink, Wells	33.53	11.40	15.0	8.29	110.4		8.57	69		10.50		14.0
23-May 16:52	E13	Cley, Lookout	33.69	11.01	16.7	8.23	113.5		8.57	67		10.50		13.1
23-May 17:39	E16	Sheringham	33.74	10.98	18.5	8.22	114.5							13.4
23-May 18:06	E18	Overstrand	33.69	11.08	15.0	8.22	115.0							16.7
23-May 18:34	E20	Mundesley	33.74	11.04	16.0	8.21	114.6							11.5
23-May 19:26	E23	Lessingham	33.73	11.10	18.3	8.22	113.9		8.57	305		10.50		1.4
23-May 19:59	E25	Horsey	33.62	11.30	25.0	8.23	112.7		<8.568	302		<10.5		12.7
23-May 20:28	E27	Winterton	33.52	11.62	15.0	8.24	104.8		18.00	301		<10.5		7.9
23-May 20:53	E28	Scratby	33.57	11.55	21.1	8.24	106.8					<10.5		
23-May 21:07	E29	Caister	33.50	11.95	9.3	8.20	103.1					<10.5		8.3
23-May 21:27	E30	Yarmouth Central	33.64	11.24	18.1	8.22	109.4							12.3
24-May 07:01	E31	Gorleston	33.73	11.20	16.9	8.19	108.5							13.1
24-May 07:20	E32	Corton	33.69	11.27	14.3	8.18	108.0							15.0
24-May 07:34	E33	Lowestoft	33.51	11.41	12.3	9.16	105.2							15.2
24-May 08:05	E35	Kessingland	33.59	11.53	10.4	8.18	104.8							12.6
24-May 08:40	E37	Easton Broad	33.71	11.15	17.4	8.17	113.2		72.00	450	<47	11.00		14.4
24-May 09:08	E39	Dunwich Cliffs	33.66	11.34	12.0	8.18	112.5		70.00	447	<47	<10.5		11.5
24-May 10:06	E42	Thorpeness	33.36	11.39	15.1	8.10	117.4		83.00		<47	14.00		9.3
24-May 10:44	E43	Orfordness	33.56	10.62	18.1	8.02	110.3							5.7
24-May 11:52	E48	Shingle Street	33.26	11.29	11.1	7.91	99.2							5.3
24-May 12:58	E52	Cobbolds Point	33.49	11.49	10.3	7.93	99.8		39.00		64	17.00		5.4
24-May 13:26	E54	Pitching Ground	33.16	11.98	11.8	7.89	95.2		48.00		<47	12.00		4.6
24-May 13:56	E56	Hamford	33.62	12.42	11.0	7.92	97.2		91.00	481	171	26.00		5.3
25-May 06:52	E59	Walton	33.75	12.38	8.6	7.92	96.9							6.9
25-May 07:14	E61	Holland Radar	33.72	12.38	8.4	7.93	97.3		49.00	266	56	29.00		6.9
25-May 07:30	E63	Clacton Pier	33.65	12.57	11.1	7.92	96.4		49.00	275	<47	30.00		4.5

Table 7 : East Anglian Coast Survey Data
23rd - 25th May 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
15-June 16:33	E16	Sheringham	33.34	14.13	13.7	8.56	113.3	9.18	4.62	16	55	1.25	<0.3	8.5
15-June 17:24	E13	Cley, Lookout	33.35	14.05	12.9	8.55	113.2	9.21	2.80	13	59	1.20	<0.3	13.4
15-June 18:28	E10	The Bink, Wells	32.98	14.75	11.1	8.62	107.3	8.50	<2	15	63	1.26	<0.3	
15-June 19:19	E8	Overy, Staithe	32.58	15.54	6.6	8.66	109.5	8.70	2.09	15	63	<1.1	<0.3	
15-June 20:21	E5	Thornham	33.08	14.98	7.2	8.59	110.7	8.84	3.09	18	65	<1.1	<0.3	

Table 8 : East Anglian Coast Survey Data
13th - 15th June 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chloro phyll (µg/l)
13-June 14:46	E77b	Blacktail Spit	33.98	14.64	6.1	8.18	100.7	7.85	16.50	20	11	4.75	1.51	12.5
13-June 15:37	E74b	Maplin Bank	33.98	14.57	10.6	8.19	98.7	8.21	25.70	17	15	4.60	1.47	4.4
13-June 16:05	E73b	W. Hook Middle	33.77	14.66	16.3	8.17	96.1	7.99	34.50	38	19	3.61	2.18	4.2
13-June 16:25	E71b	Swin Spitway	33.84	14.31	9.6	8.21	91.9	7.68	38.00	25	30	2.06	1.47	3.3
13-June 16:51	E65	Jaywick	33.83	14.66	7.1	8.15	88.8	7.44	59.70	45	50	6.27	2.86	7.8
13-June 17:05	E63	Clacton Pier	33.86	14.50	10.7	8.17	89.0	7.45	58.90	23	41	3.64	2.24	3.7
13-June 17:23	E61	Holland Radar	33.76	14.40	9.0	8.20	89.8	7.55	44.70	22	34	2.44	1.91	4.6
13-June 17:42	E59	Walton	33.75	14.59	8.1	8.19	90.4	7.59	43.30	23	41	2.23	2.53	3.5
13-June 18:10	E56	Hamford	33.58	14.68	9.1	8.28	95.7	8.00	6.28	61	39	<1.1	1.53	5.4
13-June 18:27	E54	Pitching Ground	33.41	14.97	10.6	8.33	92.5	7.61	19.40	7	113	1.98	0.50	1.0
14-June 16:24	E52	Cobbolds Point	33.83	13.97	11.0	8.25	92.2	7.51	60.70	20	53	3.00	0.43	2.4
14-June 17:16	E48	Shingle Street	33.60	14.06	10.5	8.29	89.1	7.20	63.40	18	76	3.11	0.33	1.2
14-June 18:20	E43	Orfordness	33.60	13.51	17.0	8.29	91.4	7.43	60.30	16	50	3.21	0.46	1.6
14-June 18:48	E42	Thorpeness	33.61	13.24	12.5	8.28	94.6	7.82	52.70	19	40	3.95	0.36	1.0
14-June 19:37	E39	Dunwich Cliffs	33.50	14.35	10.1	8.21	86.1	6.90	32.90	19	69	2.29	0.49	2.6
14-June 20:06	E37	Easton Broad	33.61	13.66	15.5	8.20	83.8	6.75	33.10	17	92	3.41	0.33	1.0
14-June 20:37	E35	Kessingland	33.64	13.58	7.1	8.20	90.5	7.42	18.90	14	91	2.00	<0.3	1.7
15-June 10:32	E33	Lowestoft		13.73	8.6	8.26	96.9	7.98	17.60	14	95	1.15	<0.3	7.3
15-June 10:57	E32	Corton		13.83	14.3	8.29	98.3	7.99	18.40	9	62	<1.1	<0.3	9.3
15-June 11:17	E31	Gorleston		13.82	15.9	8.36	104.3	8.52	21.90	11	92	1.15	<0.3	17.6
15-June 11:42	E30	Yarmouth Central		13.89	15.9	8.36	104.3	8.52	20.90	11	67	<1.1	<0.3	7.2
15-June 12:08	E29	Caister	33.53	14.66	9.0	8.39	99.9	8.01	38.30	14	71	3.60	<0.3	11.6
15-June 12:29	E28	Scratby	33.58	14.36	17.9	8.41	101.6	8.17	22.80	12	61	1.19	<0.3	7.9
15-June 12:51	E27	Winterton	33.42	15.18	18.0	8.43	99.0	7.86	36.10	13	71	<1.1	<0.3	6.1
15-June 13:27	E25	Horsey	33.39	14.36	24.9	8.53	105.6	8.56	8.50	9	57	<1.1	0.33	7.4
15-June 14:08	E23	Lessingham	33.38	14.13	17.6	8.53	108.5	8.86	17.60	13	64	3.10	<0.3	9.3
15-June 15:02	E20	Mundesley	33.44	14.05	12.0	8.52	108.9	8.84	15.10	14	68	<1.1	<0.3	9.7
15-June 15:49	E18	Overstrand	33.35	14.32	12.0	8.56	111.7	9.01	2.25	14	57	<1.1	<0.3	8.9

Table 8 : East Anglian Coast Survey Data
13th - 15th June 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
15-July 18:16.	E16	Sheringham	33.70	18.00		8.05			<6	<10	<53	<5	<3	1.5
15-July 18:54	E13	Cley, Lookout	33.80	17.70		8.05			<6	<10	<53	<5	<3	2.1
15-July 19:54	E10	The Bink, Wells							<6	<10	<53	<5	<3	2.5
15-July 20:20	E8	Overy, Staithe							<6	<10	<53	<5	<3	2.2
15-July 21:04	E5	Thornham	33.50	19.00		8.07			<6	<10	<53	<5	<3	3.4

Table 9 : East Anglian Coast Survey Data
14th - 15th July 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
14-July 11:22	E77b	Blacktail Spit	33.30	20.81		8.13	88.1		40.00	<10	<53	51.00	4.00	3.7
14-July 12:06	E74b	Maplin Bank	34.28	20.23		8.15	93.6		45.00	<10	<53	6.00	<3	3.1
14-July 12:50	E73b	W. Hook Middle	33.97	21.00		8.11	95.9		46.00	<10	<53	6.00	3.20	3.5
14-July 13:22	E71b	Swin Spitway	33.92	20.84		8.11	99.6		45.00	<10	<53	6.00	<3	4.7
14-July 14:34	E65	Jaywick	33.83	21.79		8.07	99.6		57.00	<10	<53	6.00	<3	5.2
14-July 15:04	E63	Clacton Pier	33.78	20.18		8.09	106.2		65.00	<10	<53	6.00	<3	3.4
14-July 15:24	E61	Holland Radar	33.57	20.24		8.09	98.4		77.00	<10	<53	6.00	<3	3.2
14-July 15:44	E59	Walton	33.64	20.94		8.09	98.5		47.00	<10	<53	<5	3.20	2.5
14-July 16:12	E56	Hamford	33.58	20.63		8.13	98.7		37.00	<10	<53	<5	<3	3.6
14-July 16:35	E54	Pitching Ground	33.50	19.40		8.13	96.6		44.00	<10	<53	6.00	<3	3.1
14-July 16:56	E52	Cobbolds Point	33.80	19.10		8.15	95.4		60.00	<10	<53	<5	<3	3.2
14-July 17:25	E48	Shingle Street	33.80	19.20		8.14	95.5		70.00	<10	<53	<5	<3	3.7
14-July 18:38	E43	Orfordness	33.60	18.50		8.12	93.0		78.00	<10	<53	9.00	<3	3.9
14-July 18:57	E42	Thorpeness	33.60	18.60		8.10	92.1		116.00	<10	71	<5	<3	2.8
14-July 19:43	E39	Dunwich Cliffs	33.50	19.10		8.08	91.7		102.00	<10	62	<5	<3	6.2
14-July 20:12	E37	Easton Broad	33.60	18.40		8.09	92.4		173.00	<10	<53	<5	<3	1.6
14-July 20:40	E35	Kessingland	33.60	18.30		8.09	94.8		67.00	<10	<53	<5	<3	1.8
15-July 12:24	E33	Lowestoft	33.60	18.30		7.99			28.00	<10	<53	<5	<3	3.1
15-July 12:42	E32	Corton	33.60	18.50		8.00			15.00	<10	<53	<5	<3	4.9
15-July 12:59	E31	Gorleston	33.70	18.50		8.03			<6	<10	<53	<5	<3	4.5
15-July 13:26	E30	Yarmouth Central	33.80	18.40		8.04			<6	<10	<53	<3	<3	2.8
15-July 13:50	E29	Caister	33.70	19.00		8.04			<6	<10	<53	<5	<3	5.3
15-July 14:06	E28	Scratby	33.70	18.40		8.05			8.00	<10	<53	<5	<3	3.8
15-July 14:24	E27	Winterton	33.60	18.80		8.05			<6	<10	<53	<5	<3	2.7
15-July 15:00	E25	Horsey	33.70	18.30		8.05			<6	<10	<53	<5	<3	1.9
15-July 15:32	E23	Lessingham	33.80	17.80		8.04			<6	<10	<53	<5	<3	1.9
15-July 16:17	E20	Mundesley	33.80	17.30		8.04			<6	<10	<53	<5	<3	1.7
15-July 17:52	E18	Overstrand	33.70	18.00		8.04			<6	<10	<53	<5	<3	1.8

Table 9 : East Anglian Coast Survey Data
14th - 15th July 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
13-September 16:03	E37	Easton Broad	34.33	16.42	17.4	8.00	92.5		42.00	82	314	15.00	15.00	3.7
13-September 16:36	E35	Kessingland	34.30	16.18	9.6	8.01	92.9		45.00	70	306	15.00	9.60	1.2
13-September 17:08	E33	Lowestoft	34.19	15.79	10.1	8.03	92.1		29.00	41	182	9.80	3.80	5.6
13-September 17:23	E32	Corton	34.46	15.80	14.1	8.08	94.3		37.00	60	314	18.00	4.90	4.9
13-September 17:34	E31	Gorleston	34.48	15.80	14.6	8.08	94.4		37.00	61	193	17.00	4.80	5.0

Table 10 : East Anglian Coast Survey Data
7th - 13th September 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chloro phyll (µg/l)
07-September 06:41	E5	Thornham	34.32	16.04	10.0	7.81	99.8		8.30	31	<53	6.20	3.10	7.7
07-September 07:24	E8	Overy, Stalthe	34.43	16.12	10.5	7.86	99.3		<6	<10	<53	<5	<3	4.6
07-September 07:59	E10	The Bink, Wells	34.34	16.13	15.0	7.85	96.3		<6	13	<53	<5	<3	7.0
07-September 08:42	E13	Cley, Lookout	34.52	16.13	15.8	7.84	95.0		<6	<10	<53	<5	<3	4.4
07-September 09:30	E16	Sheringham	34.53	16.14	16.7	7.84	93.9		<6	<10	<53	<5	<3	20.5
07-September 10:10	E18	Overstrand	34.49	16.21	13.7	7.85	96.3		<6	<10	<53	<5	<3	2.5
07-September 10:45	E20	Mundesley	34.52	16.33	17.0	7.84	94.0		<6	<10	<53	<5	<3	2.6
07-September 11:50	E23	Lessingham	34.46	16.48	17.1	7.86	95.2		<6	<10	<53	<5.3	<3	1.8
07-September 12:47	E25	Horsey	34.40	16.49	22.7	7.86	93.8		<6	<10	<53	<5	<3	2.7
07-September 13:27	E27	Winterton	34.48	16.50	14.7	7.84	94.8		<6	<10	<53	<5	<3	10.4
07-September 14:03	E28	Scratby	34.48	16.40	15.6	7.85	97.4		<6	<10	<53	<5	<3	7.1
07-September 14:22	E29	Caister	34.48	16.51	7.6	7.85	96.4		<6	<10	<53	<5	<3	7.1
07-September 14:47	E30	Yarmouth Central	34.47	16.57	17.2	7.85	94.8		<6	<10	<53	<5.8	<3	5.9
13-September 07:35	E77b	Blacktail Spit	34.00	16.22	6.0	8.02	95.6		11.00	146	105	28.00	20.00	4.8
13-September 08:16	E74b	Maplin Bank	35.00	16.20	9.0	7.49	99.3		13.00	129	101	24.00	18.00	4.6
13-September 08:47	E73b	W. Hook Middle	34.92	15.94	14.6	8.03	95.6		17.00	125	66	25.00	16.00	6.4
13-September 09:06	E71b	Swin Spitway	34.75	15.34	7.5	8.02	95.6		13.00	165	107	32.00	16.00	5.8
13-September 09:30	E65	Jaywick	34.67	15.46	6.2	7.98	94.1		24.00	265	419	42.00	3.50	5.1
13-September 09:54	E63	Clacton Pier	34.60	15.79	8.0	7.97	94.8		117.00	265	344	37.00	11.00	4.1
13-September 10:10	E61	Holland Radar	34.74	15.92	8.4	7.99	94.5		<6	190	237	25.00	<3	5.3
13-September 10:29	E59	Walton	34.74	15.95	8.0	7.99	94.4		<6	235	332	29.00	<3	4.2
13-September 11:07	E56	Hamford	34.76	16.14	9.2	8.01	95.5		<6	220	242	27.00	3.10	3.5
13-September 11:24	E54	Pitching Ground	34.67	15.88	9.3	8.00	94.8		17.00	230	342	27.00	5.10	2.4
13-September 11:55	E52	Cobbolds Point	34.43	15.79	9.0	7.97	93.7		19.00	138	276	17.00	18.00	3.3
13-September 12:39	E48	Shingle Street	34.64	16.08	10.3	7.99	95.4		6.90	82	48	13.00	12.00	3.4
13-September 13:46	E43	Orfordness	34.75	16.37	16.7	8.01	94.1		28.00	106	285	15.00	16.00	4.1
13-September 14:16	E42	Thorpeness	34.84	16.63	14.0	8.02	94.1		39.00	79	293	15.00	14.00	3.0
13-September 15:25	E39	Dunwich Cliffs	34.63	16.57	11.5	8.01	93.5		39.00	87	265	14.00	14.00	2.8

Table 10 : East Anglian Coast Survey Data
7th - 13th September 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
02-November 11:45	E65	Jaywick	34.40	11.20	9.4	8.02	94.2		5.80	327	82	54.40		4.2
02-November 12:12	E71b	Swin Spitway	34.70	12.00	11.0	8.05	93.8		6.50	338	75	38.50		3.6
02-November 12:45	E73b	W. Hook Middle	34.40	11.60	16.0	8.05	95.3		6.60	307	69	37.30		5.2
02-November 13:38	E74b	Maplin Bank	34.50	11.80	9.6	8.06	94.8		6.40	342	70	46.20		4.4
02-November 14:48	E77b	Blacktail Spit	34.40	11.80	9.0	8.06	95.3							3.9

Table 11 : East Anglian Coast Survey Data
1st - 2nd November 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
01-November 14:05	E5	Thornham	32.00	10.30	7.7	7.99	95.7		80.40	484	145	27.30		3.1
01-November 14:50	E8	Overy, Stalthe	31.90	10.20	9.0	7.99	95.0		15.90	108	32	5.30		2.9
01-November 15:18	E10	The Bink, Wells	33.80	10.50	14.4	8.07	95.4		12.00	167	48	8.10		3.9
01-November 15:57	E13	Cley, Lookout	33.90	10.70	16.6	8.08	94.2		15.50	200	73	13.90		2.9
01-November 16:34	E16	Sheringham	34.00	10.90	19.9	8.02	93.4		18.20	216	77	17.00		2.0
01-November 16:59	E18	Overstrand	34.00	10.90	16.1	8.01	92.5		16.10	176	51	15.80		2.5
01-November 17:24	E20	Mundesley	34.10	11.00	15.2	8.00	94.5		16.00	185	40	14.70		2.2
01-November 18:01	E23	Lessingham	34.00	10.90	20.0	8.01	93.1		19.90	192	55	17.30		2.7
01-November 18:26	E25	Horsey	34.00	11.10	25.0	8.01	92.3		18.40	213	82	21.30		3.3
01-November 18:51	E27	Winterton	34.00	11.00	18.1	8.01	92.9							2.6
01-November 19:04	E28	Scratby	34.00	11.20	19.2	8.00	92.5							3.4
01-November 19:15	E29	Caister	34.00	11.00	9.5	8.01	92.5							4.0
01-November 19:30	E30	Yarmouth Central	34.00	11.30	18.8	8.00	92.2							2.4
01-November 19:43	E31	Gorleston	34.00	11.30	17.7	8.00	93.2							2.3
01-November 19:54	E32	Corton	34.00	11.20	13.8	8.00	93.2							2.1
01-November 20:08	E33	Lowestoft	33.70	11.20	9.0	7.99	92.4							3.3
02-November 06:10	E35	Kessingland	34.30	11.50	8.3	7.98	92.9		5.50	287	205	53.50		4.6
02-November 06:37	E37	Easton Broad	34.40	11.80	17.2	8.00	93.2		7.20	326	196	54.70		4.1
02-November 07:05	E39	Dunwich Cliffs	34.30	11.60	10.9	8.01	93.4		7.90	365	172	39.20		4.5
02-November 07:50	E42	Thorpeness	34.50	11.70	14.6	8.03	93.6		7.60	264	98	31.80		4.1
02-November 08:09	E43	Orfordness	34.60	12.00	18.0	8.04	93.7		7.10	344	170	41.50		3.6
02-November 08:49	E48	Shingle Street	34.30	11.20	11.6	8.01	94.0		6.60	354	150	35.80		3.4
02-November 09:23	E52	Cobbolds Point	34.40	11.10	11.1	8.01	94.4		8.20	348	184	29.30		2.9
02-November 09:41	E54	Pitching Ground	34.50	11.30	12.6	8.03	94.5		9.80	370	193	33.20		2.8
02-November 09:58	E56	Hamford	34.50	11.40	14.8	8.03	94.5		6.00	297	106	28.90		3.2
02-November 10:32	E59	Walton	34.60	11.30	11.3	8.03	93.9		6.00	315	94	36.40		2.6
02-November 10:55	E61	Holland Radar	34.50	11.50	11.1	8.04	93.9		5.80	354	147	49.70		2.8
02-November 11:18	E63	Clacton Pier	34.50	11.40	13.4	8.05	94.5		6.80	371	114	41.40		2.7

Table 11 : East Anglian Coast Survey Data
1st - 2nd November 1994

Date and Time	Site No.	Site Location	Salinity (‰)	Temp (°C)	Water Depth (m)	pH	DO (%sat)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO ₂)	Phosphate (µg/l P)	Nitrite (µg/l N)	Chlorophyll (µg/l)
11-November 19:28	E59a	Walton-on-Naze 0.7km o/s	34.50	11.70	4.9	8.03	92.8	10.10	265	330	36.90	5.77	
11-November 19:32	E59b	Walton-on-Naze 1.7km o/s	34.50	11.70	7.9	8.03	93.2	5.49	265	320	33.90	3.69	
11-November 19:36	E59c	Walton-on-Naze 2.7km o/s	34.50	11.70	9.2	8.04	93.4	7.04	266	347	33.00	3.15	
11-November 19:40	E59d	Walton-on-Naze 3.7km o/s	34.50	11.70	9.8	8.03	93.5	8.69	275	347	33.20	3.91	
11-November 19:45	E59e	Walton-on-Naze 4.7km o/s	34.40	11.70	11.0	8.03	93.7	6.28	271	346	33.90	6.23	
11-November 19:49	E59f	Walton-on-Naze 5.7km o/s	34.40	11.60	9.8	8.03	93.6	7.49	210	277	27.10	5.62	
11-November 19:53	E59g	Walton-on-Naze 6.7km o/s	34.40	11.60	10.5	8.03	93.8	12.00	201	283	27.10	7.33	
11-November 19:57	E59h	Walton-on-Naze 7.7km o/s	34.40	11.70	11.6	8.04	93.6	6.89	165	236	24.80	5.43	
11-November 20:01	E59i	Walton-on-Naze 8.7km o/s	34.70	12.00	14.1	8.06	94.2	8.71	145	210	23.00	4.52	
11-November 20:06	E59j	Walton-on-Naze 9.7km o/s	34.60	12.10	14.3	8.07	94.0	<5.4	202	282	28.80	2.30	
11-November 20:10	E59k	Walton-on-Naze 10.7km o/s	34.70	12.10	12.8	8.07	94.0	7.36	151	200	25.20	1.94	
11-November 20:14	E59l	Walton-on-Naze 11.7km o/s	34.70	12.30	14.3	8.08	93.9	8.81	133	179	21.40	3.94	
11-November 20:18	E59m	Walton-on-Naze 12.7km o/s	34.80	12.50	14.3	8.09	94.0						
11-November 20:22	E59o	Walton-on-Naze 13.7km o/s	34.70	12.50	17.0	8.09	93.9	8.16	150	214	22.90	5.85	
11-November 23:57	E39a	Dunwich Cliffs 0.5km o/s	34.10	11.60	4.6	8.03	92.3	<5.4	279	535	26.00	7.01	
12-November 00:02	E39b	Dunwich Cliffs 1.6km o/s	34.20	11.70	10.7	8.03	92.7	10.30	208	417	23.10	5.16	
12-November 00:10	E39c	Dunwich Cliffs 3.0km o/s	34.30	11.70	11.0	8.05	93.7	<5.4	262	483	24.90	3.25	
12-November 00:17	E39d	Dunwich Cliffs 4.4km o/s	34.40	11.70	13.0	8.05	93.8	<5.4	269	487	27.30	2.23	
12-November 00:24	E39e	Dunwich Cliffs 5.8km o/s	34.60	11.90	18.0	8.07	93.5	9.59	222	371	25.40	4.25	
12-November 00:31	E39f	Dunwich Cliffs 7.2km o/s	34.50	11.80	20.0	8.06	93.5	6.14	216	351	22.90	4.15	
12-November 06:51	E20a	Mundesley 0.5km o/s	34.00	10.80	19.3	8.04	94.6	19.60	165	215	18.80	8.00	
12-November 06:59	E20b	Mundesley 1.4km o/s	34.00	10.80	19.3	8.04	94.1	19.50	176	234	19.60	8.20	
12-November 07:07	E20c	Mundesley 2.8km o/s	34.00	10.80	15.5	8.05	94.0	36.70	170	221	18.80	9.98	
12-November 07:14	E20d	Mundesley 4.2km o/s	34.00	10.70	12.2	8.05	93.6	29.20	193	285	21.10	7.61	
12-November 07:21	E20e	Mundesley 5.6km o/s	33.80	10.60	12.0	8.04	93.1	21.00	81	118	15.90	3.71	
12-November 07:27	E20f	Mundesley 7.0km o/s	33.70	10.50	3.3	8.04	92.7	43.40	131	176	14.10	6.80	

Table 12 : East Anglian Coast Transect Data
11th - 12th November 1994