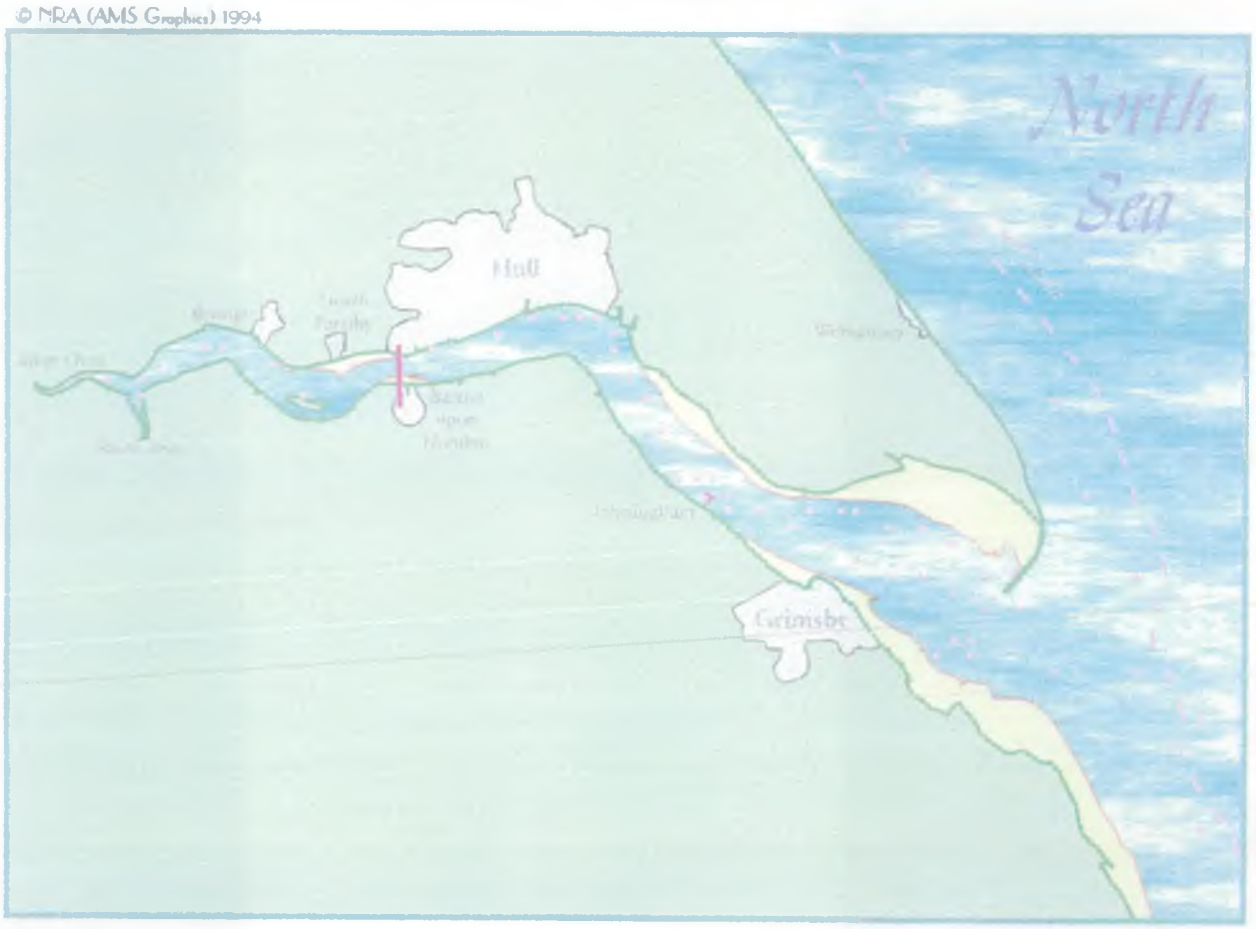
Sea Vigil Water Quality Monitoring

The Humber Estuary

1992-1993



National Rivers Authority
Anglian Region - Marine Section
Peterborough

NRA
Anglian Region

June, 1995

Sea Vigil Water Quality Monitoring

The Humber Estuary

1992 - 1993

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ACKNOWLEDGEMENTS.

Thanks are due to the crew of *Sea Vigil*, for their efforts in carrying out the survey work:
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Survey Officer, Tim Rhodes, B.Sc.,

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Contents

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 within the Humber Estuary are reported here. Their purpose was to gain information on the nutrient levels within one of the major estuaries in the U.K.

During 1992 and 1993, Sea Vigil was involved in sampling for the MAFF JoNuS Project, initially every 2 months and monthly during 1993. Surface water samples were collected from 10 sites upstream of Hull and 31 sites downstream of Hull. Some sub-surface samples were also collected. With *Sea Vigil* being based at Hull Marina during Humber Estuary survey programmes, the opportunity was taken to collect further nutrient samples on other occasions, collecting surface samples at 11 sites between Hull and Haile Sand at the Estuary mouth.

From June 1992, samples were analysed on-board *Sea Vigil* for nitrate, ammonia, phosphate, silicate and nitrite. Field data was also collected.

The Humber is a very turbid estuary, making it most unlikely that high levels of planktonic activity could occur and lead to events such as algal blooms but tidal action is strong enough to turn the water over sufficiently for enough light energy to be absorbed to support normal planktonic activity.

It is anticipated that the monitoring programme will continue in the short term, especially as part of the LOIS Project, with more emphasis on the collection of chlorophyll data and turbidity. Knowledge of the phytoplankton and zooplankton would be an added benefit.

HUMBER ESTUARY

WATER COLUMN SURVEYS

SEA VIGIL, 1992 - 1993.

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.

During August, 1991, the Anglian Region of the NRA took delivery of its first coastal survey vessel. Analytical techniques were developed during the following months to measure the low levels of nutrients encountered in outer estuaries and coastal waters. *Sea Vigil* has been collecting nutrient information from along the East Anglian coastline since March 1992, using an on-board auto-analyser, permitting immediate analysis. The data from surveys within the Humber Estuary are presented here. Separate reports cover the Wash, the Lincolnshire Coast and the East Coast (outer Wash to outer Thames).

Geographically, all of the Humber Estuary is within the defined 3-mile limit. However, it is clear from a number of sources that the influence of the Humber extends well outside the 3-mile limit. In the future, it may be necessary to sample further offshore, since there is evidence that the Humber plume returns inshore, hitting the south Lincolnshire Coast around the Skegness area.

The Humber Estuary Committee (HEC) has a substantial programme of monitoring throughout the Humber Estuary and produces an annual report on the data. There have also been two long term reviews produced (1961-1980 and 1981-1990). However, the majority of the water column monitoring is shoreline based. Within the Anglian part of the Estuary, no routine monitoring is carried out for all nutrients at these sites.

The JoNuS Project (Joint Nutrient Study) has focused on the Humber since 1992. The NRA initially provided the vessel to assist MAFF with extensive nutrient data collection within the Estuary, later taking over the on-board analysis as well. This JoNuS data is included within the report. The LOIS Project (Land Ocean Interaction Study) has also targeted the Humber Estuary, again with assistance from the NRA. The Project commenced in 1993 and uses airborne surveillance in addition to water sampling.

As there is a lack of historical nutrient data, it is difficult to make comparisons and provide explanations. A continuing programme of nutrient monitoring is planned in order to overcome these deficiencies.

Description of the Humber Estuary Area.

The Humber is an estuary extending for 62 km from the confluence of the Yorkshire Ouse and Trent river systems at Trent Falls to its mouth between Spurn Head on the North Bank and Donna Nook on the South Bank. It possesses the largest catchment of any UK estuary, covering an area of 24,240 km^2, a fifth of the area of England.

As the largest contributor of freshwater from the UK to the North Sea, the Humber has a special importance with regard to its quality. Much of the county's coal output, electricity generating capacity and manufacturing industry is concentrated within this catchment. Some 11 million people live within the catchment and on the banks of the Humber. Unlike many other UK estuaries, most of the population lives in inland cities, such as Birmingham, Leeds, Sheffield, Bradford, Leicester and Nottingham, and not in its immediate vicinity.

The Humber is a valuable resource for the community in terms of fisheries and wildlife. Its immediate environs are predominantly rural with localised industrial areas. Two oil refineries, several chemical manufacturers and the ports of Grimsby, Hull and Immingham are all located along its banks. The Estuary is one of the UK's largest shipping complexes, handling both cargo and passengers. Additionally, there are vast areas of intertidal mudflats and sandbanks within the estuary, supporting large populations of overwintering wildfowl and waders, and are of international importance to eight bird species. As a consequence, a large majority of these areas have been designated as Sites of Special Scientific Interest (SSSI's) and Nature Reserves. The recreational use of the Humber is underdeveloped in comparison to other British estuaries. Sea angling, wildfowling and other forms of outdoor recreation have been inhibited by problems of access and restricted provision of basic facilities, such as car parking. Cleethorpes is the only traditional seaside holiday resort within the Humber area, with a sandy bathing beach and associated tourist amenities. It has a designated EC Bathing Water. Some sailing also occurs on the estuary, although conditions are not ideal. The outer Humber still supports a sea fishery and a shell fishery, although the fishing industry located in this area has declined during the second half of this century. Nevertheless, the estuary remains important to North Sea fisheries because it is a nursery ground for flatfish.

The Humber is a highly energetic estuary with a characteristic turbid, swirling appearance and a tidal range only exceeded in Britain by the Bristol Channel. The tidal excursion of the Humber is several times greater than the displacement of seawater by freshwater input during the tidal cycle. This asymmetric tidal flow results in an extended residence period of effluents discharged to the estuary whilst they are progressively diluted and edged towards the North Sea. The main inputs of polluting load to the Humber are from the freshwater rivers, which carry high effluent loads from Yorkshire and the industrial Midlands, as well as the direct discharges of sewage, particularly from Hull and Grimsby, and industrial effluents. There is a high level of nutrients within the Humber system, derived from these sewage and industrial sources. In 1993, the Humber was responsible for around one fifth of the UK's nitrogen and phosphorus inputs to the North Sea. However, there are currently no EQS values (Environmental Quality Standard) stipulated for nutrients within the Estuary.

Bathymetry

The Humber Estuary is of classic shape, being about 8km wide at its mouth, narrowing to less than 500 metres in the Ouse and Trent. The maximum tidal range is 7m, which is only exceeded by the Bristol Channel within Britain. Current velocities can reach 11 km/hour (6.8 knots) at Spring tides.

Whilst the sea is relatively shallow at the mouth along the southern side, there is a clearly defined deep water channel throughout the Estuary, although it does require dredging. The maximum charted depth is around 25m at the mouth, with the channel depth being less than 10m up as far as Hull and less than 5m above Hull. The channel shape changes regularly, especially above the Humber Bridge.

It is the combination of these particular features that gives rise to complex tidal patterns and mixing of river water with estuary water. This is apparent from the results of these nutrient surveys.

Objectives.

The initial purpose of these surveys was to gain information on nutrient levels and their variation within the main body of the Humber Estuary, particularly on a seasonal basis.

Subsequently, sampling for the JoNuS Project took over, with the added benefit of providing data for the UWWT Directive.

In addition to the sample programme for the JoNuS Project, "opportunistic" sampling was also undertaken during the National Coastal Surveillance programme and at other appropriate times when *Sea Vigil* was travelling to its Humber Estuary base at Hull Marina.

Work Programme Details.

The intention of nutrient sampling in the Humber Estuary was to collect data that would produce a regression profile against salinity. Two different survey programmes were carried out. The routine "NRA" survey sampled at 11 sites, surface only, between Hull Marina and Haile Sand at the mouth. The larger "JoNuS" survey usually took place over two days, 41 sites were sampled with 11 subsurface samples, whilst the vessel was based at Hull Marina. One day would cover 10 sites upstream of Hull, as far as Blacktoft on the Ouse; the other day would cover 31 sites downstream of Hull, as far as Haile Sand. It is more effective for *Sea Vigil* to travel with the tide than against it and so surveys usually took place under a similar tidal state for a particular direction.

The sample sites were defined at regular intervals on either side of the main channel, pilotage buoys being used as site markers. Some surveys were more intensive than others and different surveys would use a different set of sample points.

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 auto-analyser.

The methods employed contained built-in Analytical Quality Control procedures and have satisfactorily passed special marine AQC exercises, particularly the stringent ones prepared for ICES (International Council for the Exploration of the Seas). Results were then sent to Peterborough for entering onto the laboratory database.

Presentation of Results.

The nutrient data reported here is from water column samples, filtered after collection 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 ($\mu g.l^{-1}$) and are given, by site, in Tables 4 to 29. There is some chlorophyll a data. Available field data are also given.

In this summary, the term nitrate is used in preference to T.O.N. (Total Oxidised Nitrogen). There is an analytical distinction, caused by the presence of nitrite (it contributes to the TON value). 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. Table 3 lists the figure and table numbers. For each survey (i.e. 2-day period) there is:

- Table of Data;
- Chart of Nutrient data against Salinity;
- Chart of Dissolved Oxygen data against Salinity.

It is traditional to represent estuary data as a regression against salinity for two reasons. Firstly, it will clearly show the pattern of dilution of river water with sea water, which, in a simple estuary with the river at the head (and no other inputs) would show a straight line of negative gradient for conservative parameters. A complex estuary like the Humber will have additional peaks and troughs due to other inputs or changes in parameter behaviour, e.g. remobilisation of phosphate from sediments. The second reason is that by definition, the water in an estuary moves upstream as well as downstream, so making geographical interpretation somewhat meaningless. If the variation of any parameter is known in relation to salinity throughout the estuary, then a knowledge of the salinity regime at any point will be enough to deduce the necessary parameter values.

To date, no allowance has been made for the variations in tidal state, nor an estimate of how critical it is to the interpretation of the data. This will require a number of tidal cycle experiments, at a variety of sites throughout the Estuary.

Detailed freshwater flow-to-tide data was not processed for this report but will be available for future reports.

General Comments.

Mid-summer is usually the peak period for planktonic growth and nutrient uptake. Consequently, dissolved nutrients are expected to be at minimum concentrations within the water column.

The nutrient levels are expected to be relatively high within the Humber Estuary, partly because it is an estuary as opposed to coastal water and also because of significant effluent inputs in the lower estuary.

Nitrate is normally the most abundant of the nutrients at a level around twice the silicate concentration. There is only limited data for Nitrite which is at much lower levels than the other nutrients. It is rapidly oxidised to nitrate but can provide meaningful information on nutrient processes.

The surveys provide 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 major fresh water nutrient inputs to the Humber Estuary, via the Trent and Ouse river systems;
- there are other less significant fresh water inputs via the Hull and Ancholme rivers;
- there are sewage outfalls discharging to the Estuary at Hull, Immingham, Grimsby and Cleethorpes; Grimsby has a long outfall reaching to the deep water channel;
- there are numerous industrial discharges to the Estuary, particularly from the South Bank between Immingham and Grimsby; of these, Hydro Fertilisers, SCM Chemicals and Tioxide UK have locally significant nutrient loads;
- the fast tidal currents and large tidal range should ensure good mixing;
- high turbidity usually inhibits photosynthetic activity, although the strong tides may create enough water turnover for sufficient light energy to be absorbed to facilitate a normal level of photosynthetic activity;
- the deposition and resuspension of sedimentary material will influence the budgets of the dissolved nutrients;
- in the middle estuary, the salinity range is wide; at Blacktoft the extremes can vary between 0 and 20‰ during the year;
- the variable salinity levels should prevent a stable biological species diversity in the water column;
- soluble nutrients are part of a very complex chemical equilibrium, involving phytoplankton, zooplankton and sediments.
- the salinity of an estuary would be expected to range from less than 1‰ at low water at the freshwater end to close to 35‰ at high water at the seaward end;

Further information is available from the annual HEC reports and the recent report 'The Quality of the Humber Estuary, 1980-1990' (NRA Water Quality Series No. 12).

JANUARY, 1992 SURVEY.

Results are given in Table 4 with nutrient data presented in Figure 2, with 41 sites sampled between Blacktoft and Spurn as part of the JoNuS programme.

Subsurface data profiles matched surface data profiles, although the reduced number of samples created a smoother profile.

There was evidence of stratification at the seaward end, with more saline water subsurface.

FEBRUARY, 1992 SURVEY.

Results are given in Table 5 with nutrient data presented in Figure 3, with 41 sites sampled.

The subsurface profiles did not show the same degree of variation as the surface data, due to their lesser number.

The surface profiles appeared erratic and indicate poor mixing in the Humber.

The salinity did not reach freshwater levels at the upper end as would have been expected in Winter.

JUNE, 1992 SURVEY.

Results are given in Table 6 with nutrient data presented in Figure 4, with 50 sites sampled.

The sample at around 18‰ is anomalous and may be due to sampling error.

There were noticeable deviations from a conservative profile, particularly at the freshwater end and to a lesser extent at the seaward end.

There was a noticeable ammonia peak towards the seaward end of the estuary.

JULY, 1992 SURVEY.

Results are given in Table 7 with nutrient data presented in Figure 5, with 11 sites sampled.

The salinity difference between Hull and Haile Sand were less than quarter of the estuary range.

Ammonia concentrations at the freshwater end were large compared to the rest of the Estuary.

AUGUST, 1992 SURVEY.

Results from six surveys are given in Tables 8 to 13 with nutrient data presented in Figures 6 to 11. On all but one, 11 sites were sampled. On the other survey, 31 sites were sampled with 10 sampled subsurface.

The salinity difference between Hull and Haile Sand was about quarter of the estuary range.

The salinity difference between Blacktoft and Spurn Head was about half of the estuary range.

The minimum recorded salinity reflects summer conditions with low rainfall and indicates saline intrusion up both the Trent and Ouse.

The four surveys between Hull and Haile Sand gave similar profiles.

SEPTEMBER, 1992 SURVEY.

Results from 2 surveys are given in Tables 14 and 15 with nutrient data presented in Figures 12 and 13, with 11 sites sampled each time.

The salinity difference between Hull and Haile Sand was about a third of the estuary range.

The maximum recorded salinity was less than 27‰.

OCTOBER, 1992 SURVEY.

Results are given in Table 16 with nutrient data presented in Figure 14. 11 sites were sampled.

The salinity difference between Hull and Haile Sand was about a third of the estuary range.

The maximum recorded salinity was less than 27‰.

DECEMBER, 1992 SURVEY.

Results are given in Table 17 with nutrient data presented in Figure 15, with 42 sites sampled; 11 were also sampled subsurface.

The maximum recorded salinity was less than 25‰.

The very large deviations in the silicate profile are indicative of riverine inputs after periods of heavy rainfall.

The ammonia profile was not conservative.

JANUARY, 1993 SURVEY.

Results are given in Table 18 with nutrient data presented in Figure 16, with 41 sites sampled; 11 were also sampled subsurface.

The maximum recorded salinity was less than 27‰.

The ammonia profile was not conservative.

MARCH, 1993 SURVEY.

Results are given in Table 19 with nutrient data presented in Figure 17, with 41 sites sampled; 11 were also sampled subsurface.

The minimum recorded salinity at Blacktoft was higher than expected, indicative of previous low rainfall and saline intrusion into the Trent and Ouse.

There was a very large concentration of ammonia close to the seaward end.

APRIL, 1993 SURVEY.

Results from 2 surveys are given in Tables 20 and 21 with nutrient data presented in Figures 18 and 19. 41 sites were sampled on one survey, with 11 also sampled subsurface; 10 sites were sampled on the other survey.

The salinity difference between Hull and Haile Sand was less than a third of the estuary range.

Ammonia levels were at a minimum in the Middle Estuary.

There were major deviations in the silicate profile.

MAY, 1993 SURVEY.

Results are given in Table 22 with nutrient data presented in Figure 20. 11 sites were sampled.

The salinity difference between Hull and Haile Sand was less than half of the estuary range.

JUNE, 1993 SURVEY.

Results are given in Table 23 with nutrient data presented in Figure 21, with 41 sites sampled; 11 were also sampled subsurface.

The profiles for all nutrients were erratic, although the general trend was as expected. These profiles are indicative of poor mixing of water masses having differing chemical characteristics. They are also indicative of processes other than dilution taking place, for example remobilisation or deposition of nutrients within sediments.

AUGUST, 1993 SURVEY.

Results are given in Table 24 with nutrient data presented in Figure 22, with 11 sites sampled.

The salinity difference between Hull and Haile Sand was less than quarter of the estuary range.

The nutrient profiles were erratic.

OCTOBER, 1993 SURVEY.

Results from 2 surveys are given in Tables 25 and 26, with nutrient data presented in Figures 23 and 24. On one survey 41 sites were sampled, with 11 also sampled subsurface. The other survey sampled at 11 sites.

The salinity difference between Hull and Haile Sand was more than half of the estuary range.

The salinity difference between Blacktoft and Spurn Head was less than the full estuary range.

The profiles for Nitrate and Silicate were erratic, although the general trend was as expected.

The profile for Phosphate was unusual, being both erratic and not showing the expected downward trend.

The ammonia concentrations were at a minimum in the Middle Estuary.

These profiles are indicative of poor mixing of water masses having differing chemical characteristics. They are also indicative of processes other than dilution taking place, for example remobilisation or deposition of nutrients within sediments.

NOVEMBER, 1993 SURVEY.

Results from 2 surveys are given in Tables 27 and 28, with nutrient data presented in Figures 25 and 26. On one survey 41 sites were sampled, with 11 also sampled subsurface. The other survey sampled at 11 sites.

The salinity difference between Hull and Haile Sand was less than half of the estuary range.

The profiles were slightly erratic, indicative of poor mixing of water masses having differing chemical characteristics or other processes such as remobilisation or deposition of nutrients within sediments.

DECEMBER, 1993 SURVEY.

Results are given in Table 29 with nutrient data presented in Figure 27, with 11 sites sampled.

The salinity difference between Hull and Haile Sand was nearly three-quarters of the estuary range, the only time such a large range was measured. This was indicative of large freshwater inputs from recent heavy rainfall.

Except for Phosphate, the profiles indicated good mixing of the water masses.

Electronic Data.

On-board electronic sensors and towed arrays have been used to measure temperature, dissolved oxygen, salinity, turbidity, pH and chlorophyll a in the Humber estuary, either on longitudinal profiles or cross-estuary transects. The longitudinal profiles, using a recording interval of 10 seconds, collect data at about 40m intervals, whilst the transects have intervals of 2 seconds and about 5m respectively. This data will be presented in a future report.

Conclusions.

- It is clear that on a local basis, the Humber is not well mixed horizontally, across the Estuary. This is accentuated in the sampling programme which, by design, does not consistently sample from the main deep water channel. To do so, would lose data on this important aspect. In order to obtain a fuller picture of nutrient behaviour within the Humber system, horizontal profiles across the estuary are required.
- The data presented reflects the known inputs of nutrients throughout the Estuary, which include riverine, industrial and sewage effluents.
- Ammonia concentrations frequently rose at the seaward end, whilst other nutrients decreased.
- The profiles often contained spikes of increased phosphate concentration.
- The maximum salinity of the Estuary as measured was always less than that of full seawater (35‰). At Spurn Head, maximum measured salinity was mostly in the range of 28‰ to 30‰.
- Surveys that only went upstream as far as Hull (the NRA "opportunistic" surveys) rarely measured salinity less than 15‰, it usually being greater than 20‰.
- Surveys that covered the anticipated full length of the estuary up to Trent Falls at Apex or the Ouse at Blacktoft, did not always reach freshwater levels of salinity, on occasions the minimum being greater than 5‰.
- The tidal state did not affect the nutrient-salinity profiles, although the minimum and maximum salinities were not always sampled.

The largest changes were either seasonal or as a result of possible inputs.

Future Years.

The programme of monthly surveys in the Humber was repeated in 1994 and is planned to continue as part of the NRA assistance with the LOIS Project during 1995.

Opportunistic sampling will also be continued during the National Coastal Surveillance Programme, although the number of sites and their location will be reviewed.

The electronic data is being worked up and will be reported on in due course. It consists of profiles of the Humber Estuary from minimum to maximum salinity as well as transects across the Humber at a number of locations. This includes the fluorescence determination of chlorophyll a and turbidity. Some of this data is expected to appear in the 1993 Humber Estuary Report.

It may be necessary to sample further out than Spurn Head, even outside the three mile limit, in order to gain full information on the influence of the Humber Estuary on the coastal zone and the waters of the Lincolnshire Coast.

Data should become available from the LOIS Project, providing information on nutrient changes at fixed points over a tidal cycle.

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

This report is one of a series covering the coastal waters of the Anglian Region of the NRA. The other reports are for the *Lincolnshire Coast* (already issued), *The Wash* and the *East Coast* (Norfolk, Suffolk & Essex) both in preparation. It is intended to summarize and compare the results from all coastal waters into a single report.

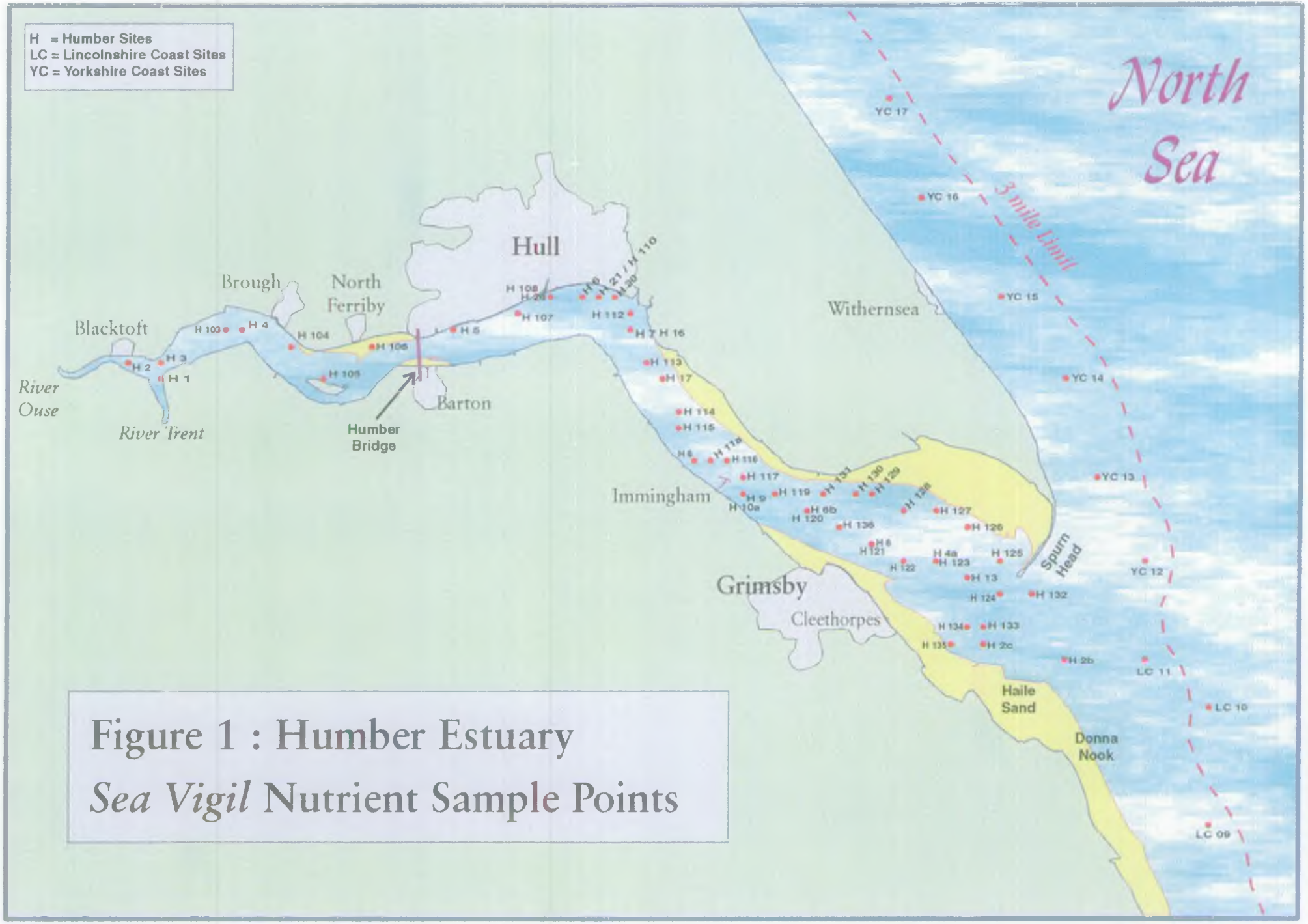


Figure 1 : Humber Estuary
Sea Vigil Nutrient Sample Points

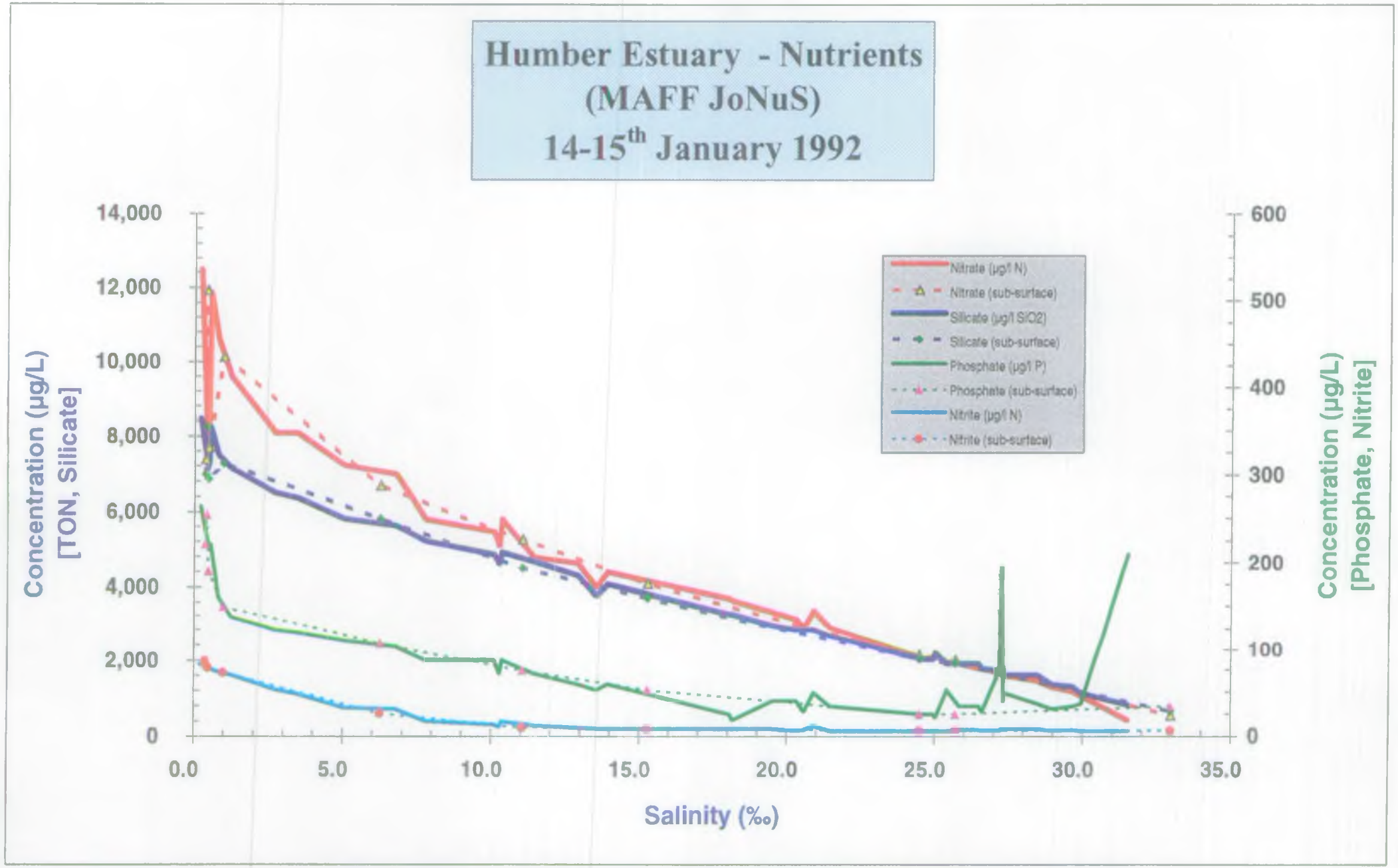


Figure 2 : Samples analysed by MAFF on-board Sea Vigil - January 1992.

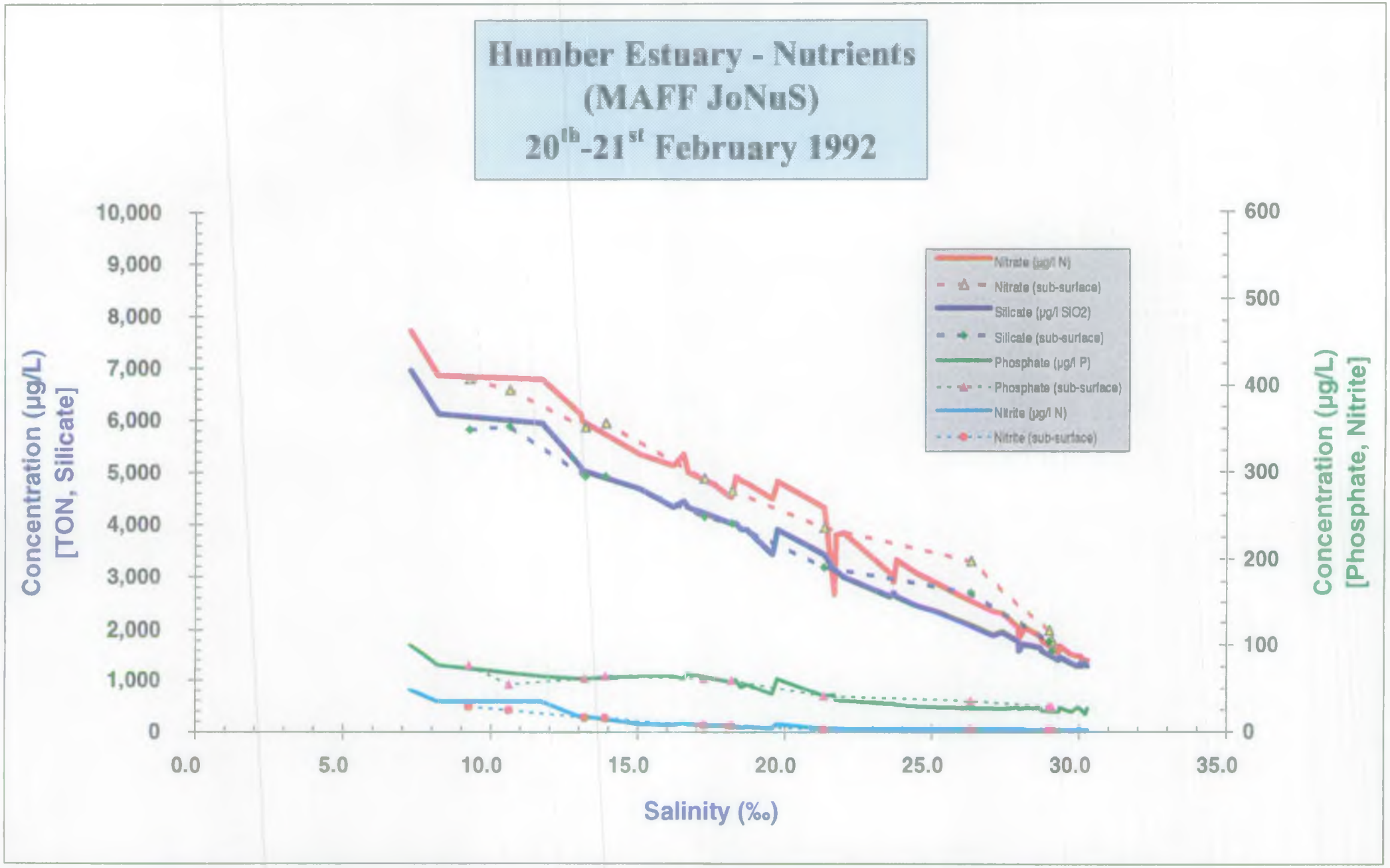


Figure 3 : Samples analysed by MAFF on-board Sea Vigil - February 1992.

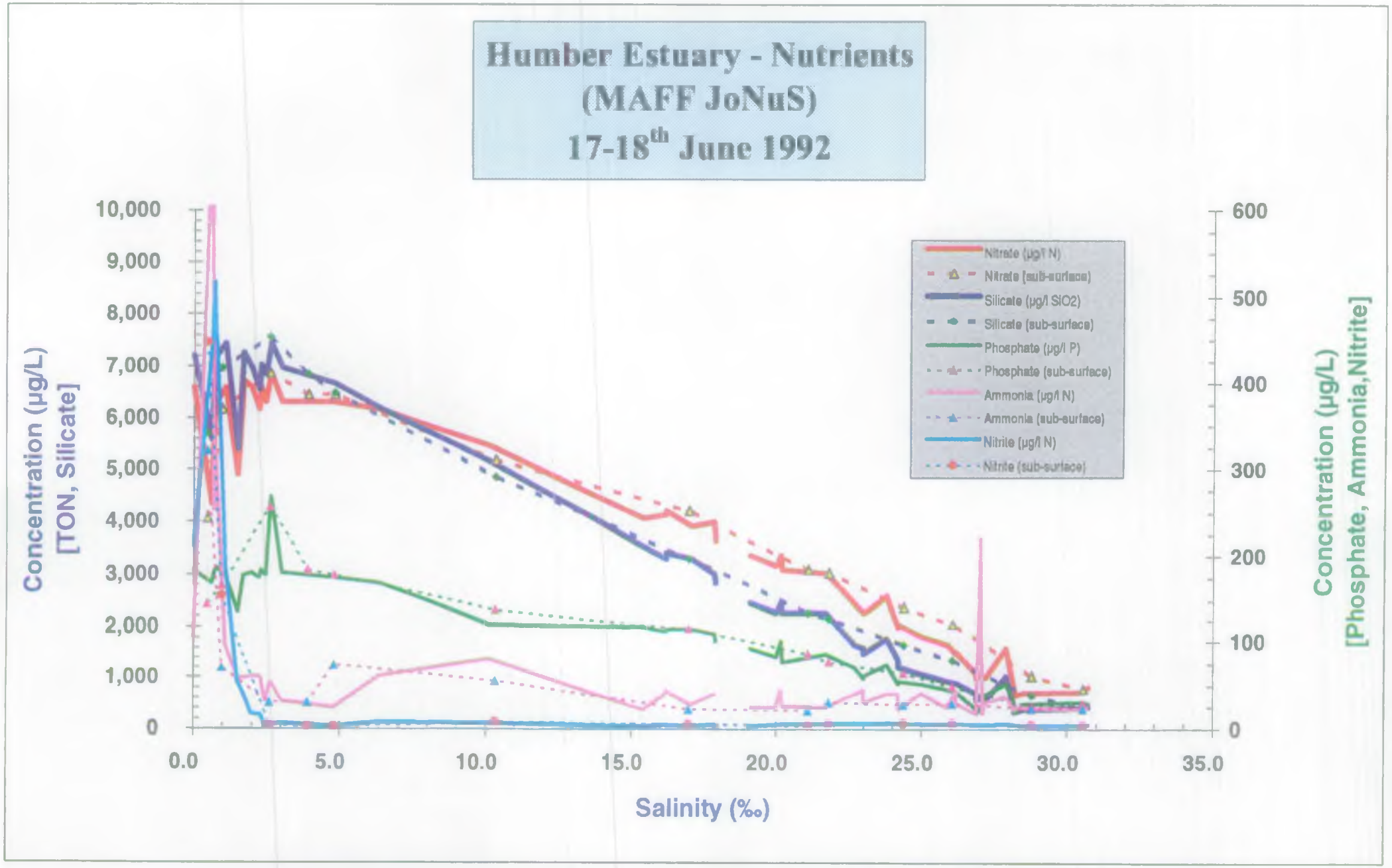


Figure 4 : Samples analysed by MAFF on-board Sea Vigil - June 1992.

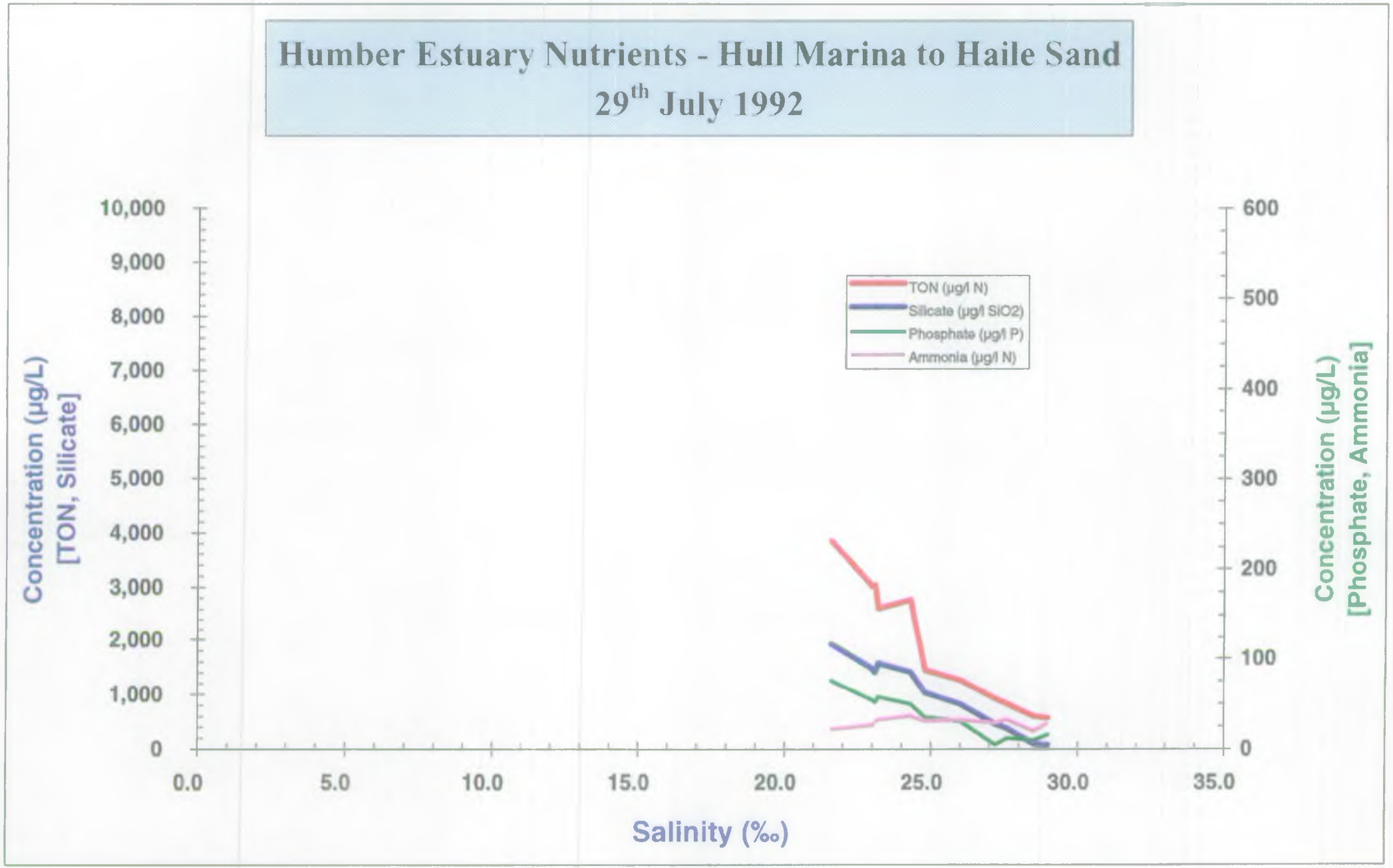


Figure 5

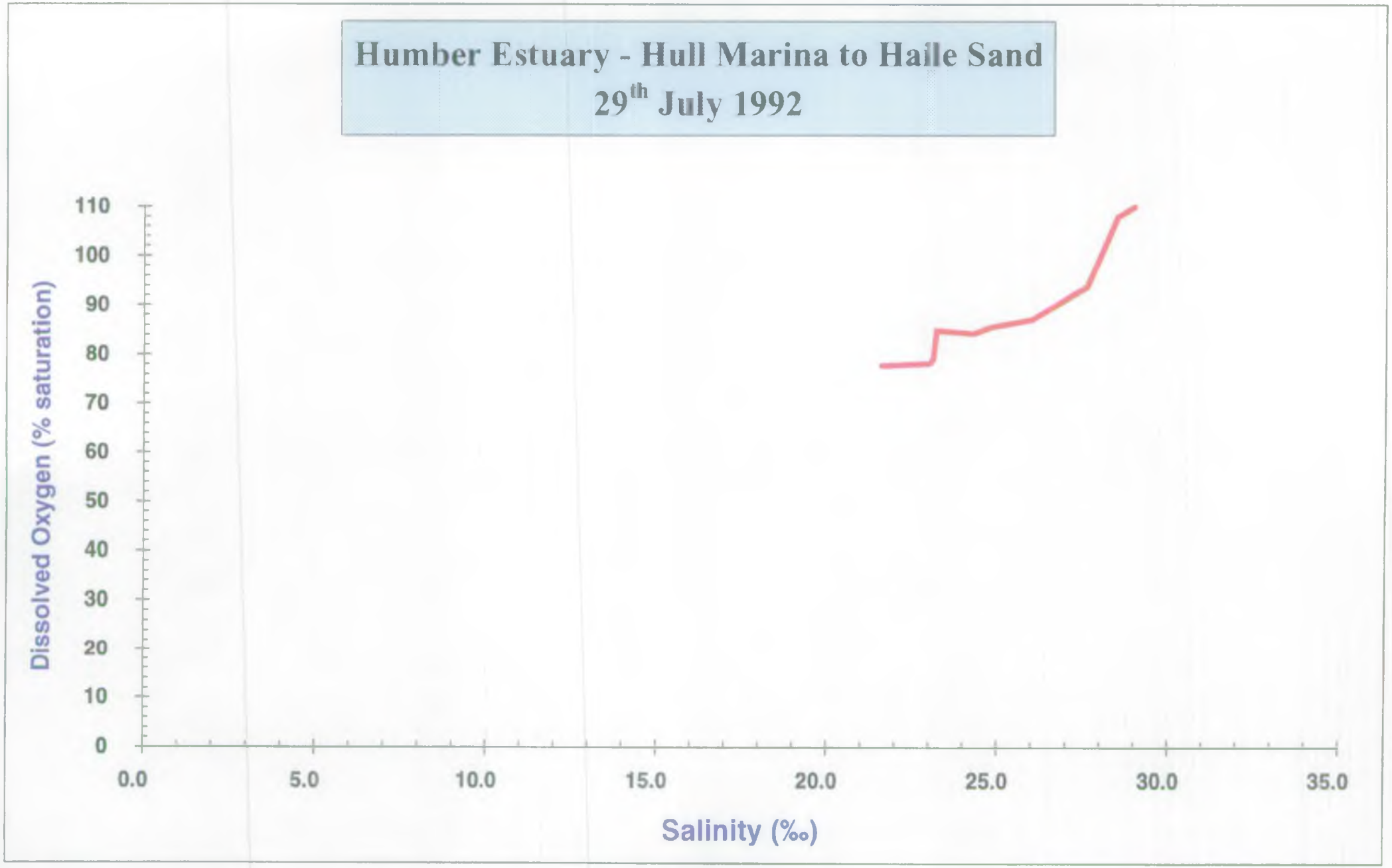


Figure 5a

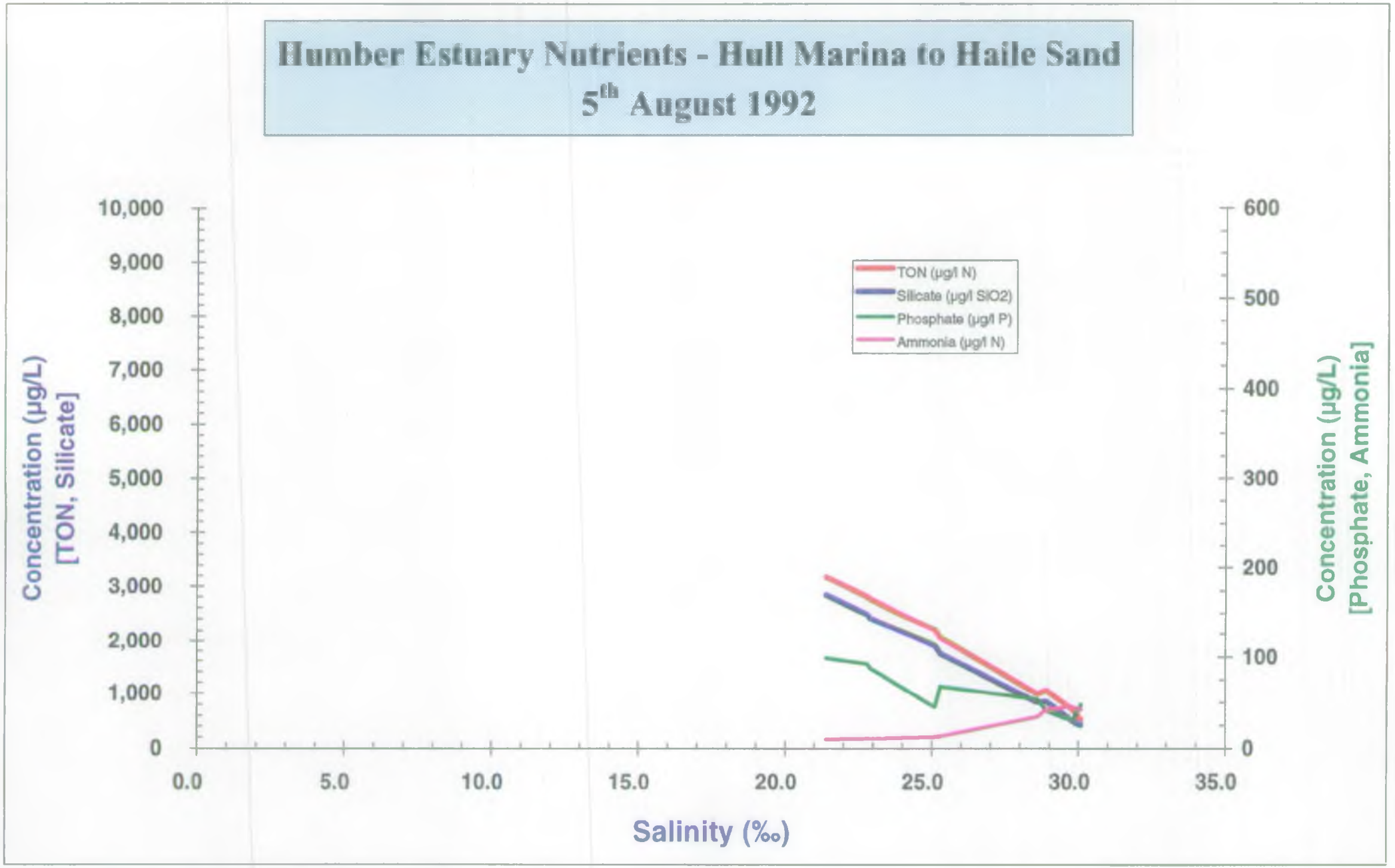


Figure 6

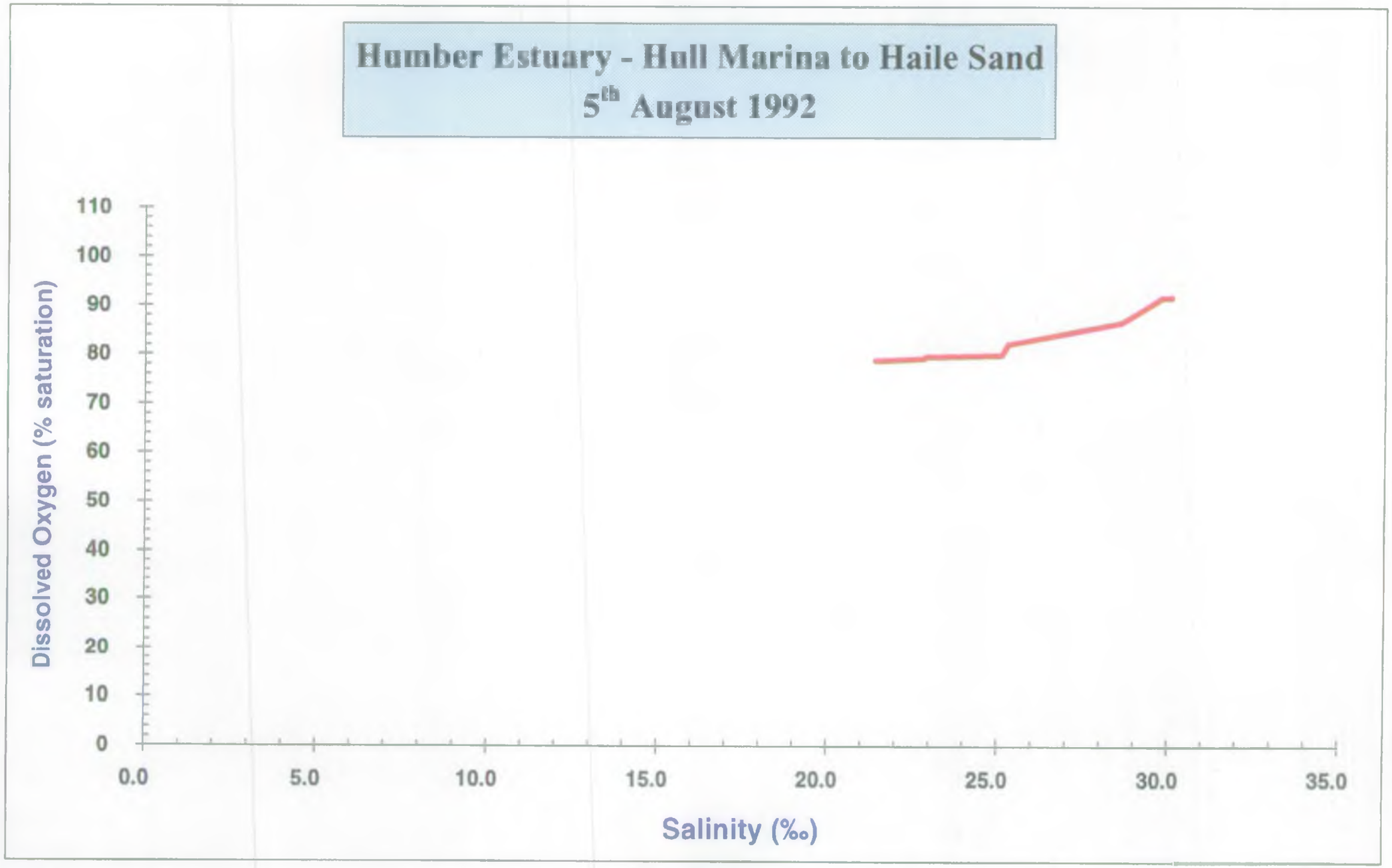


Figure 6a

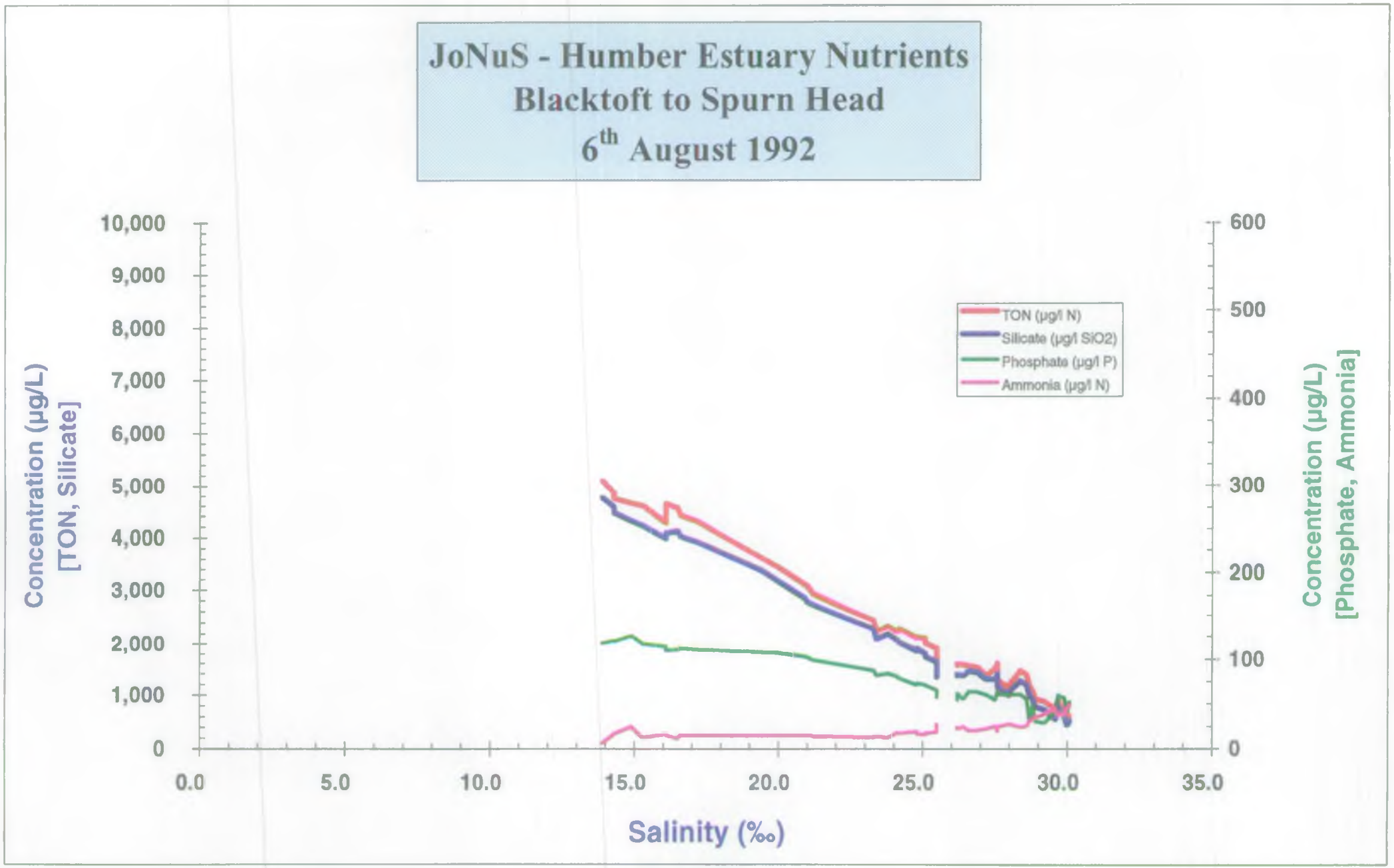


Figure 7

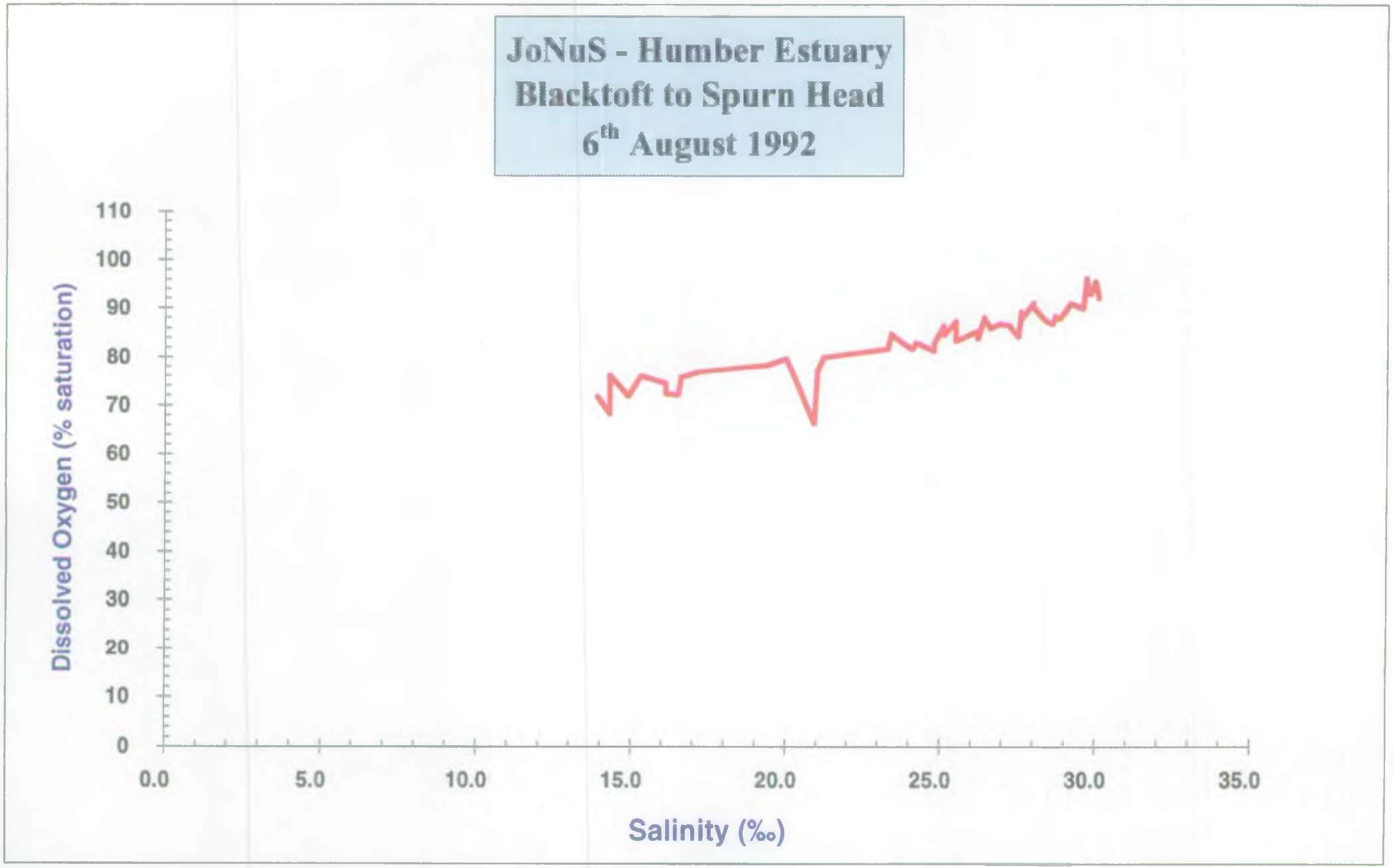


Figure 7a

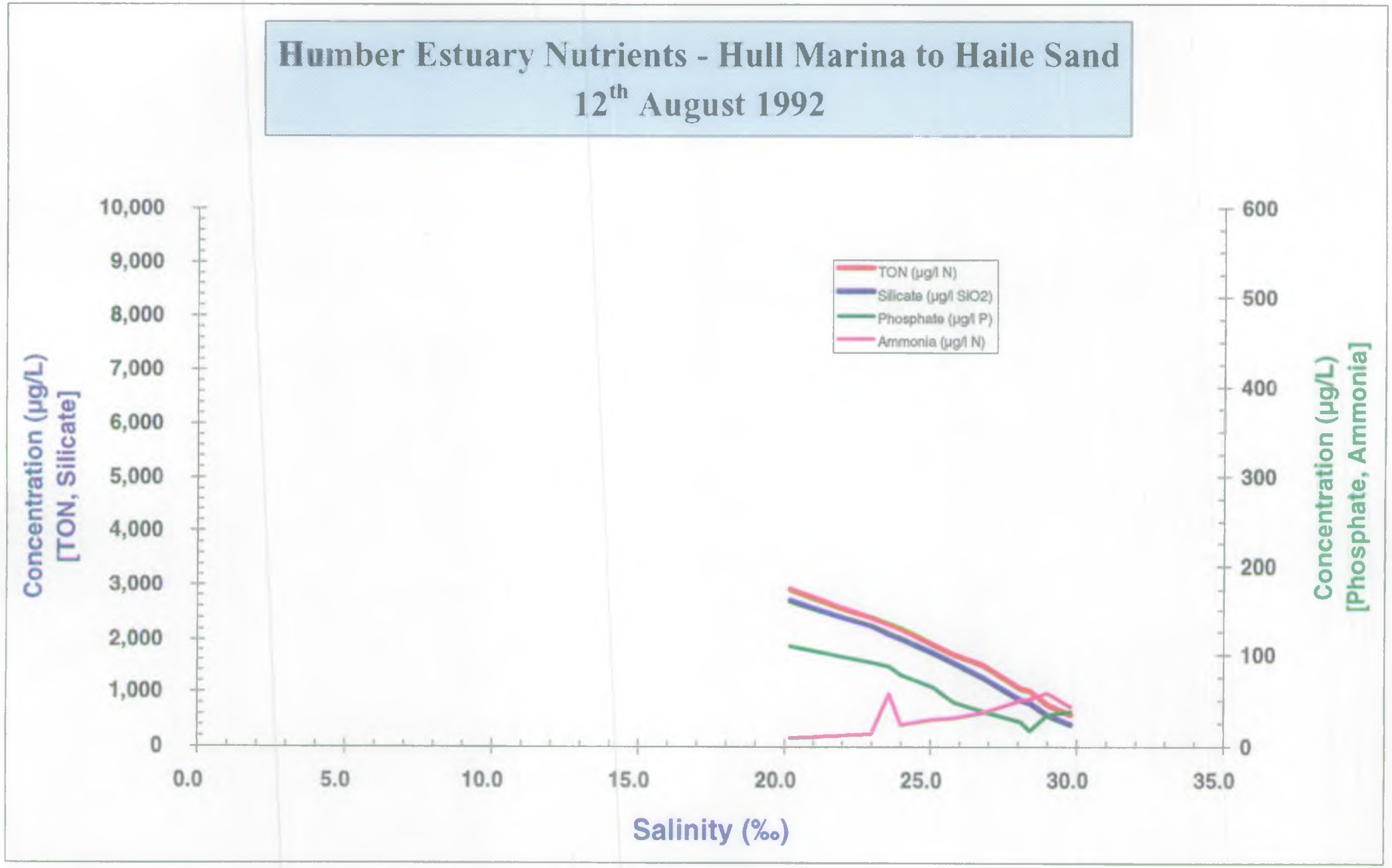


Figure 8

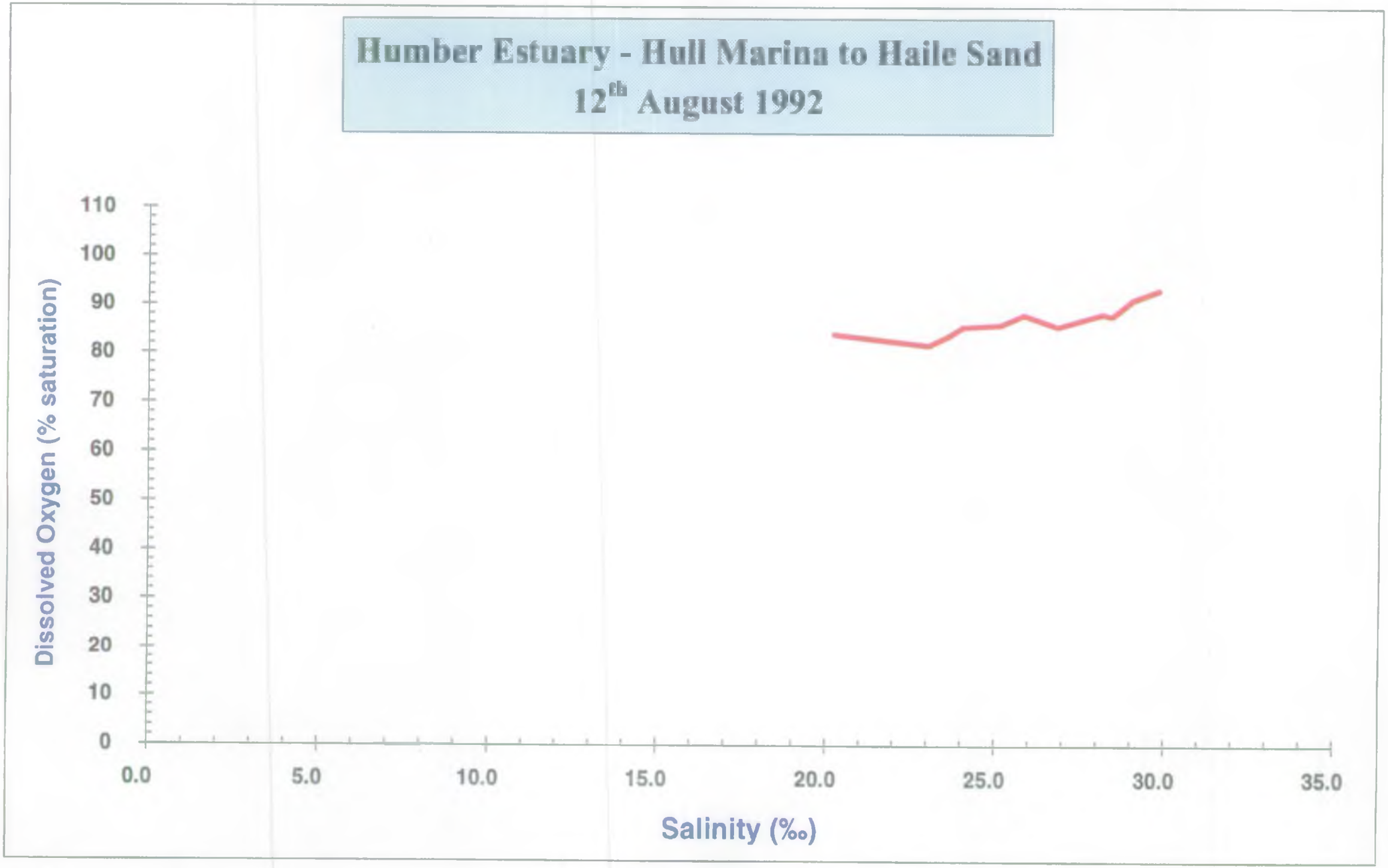


Figure 8a

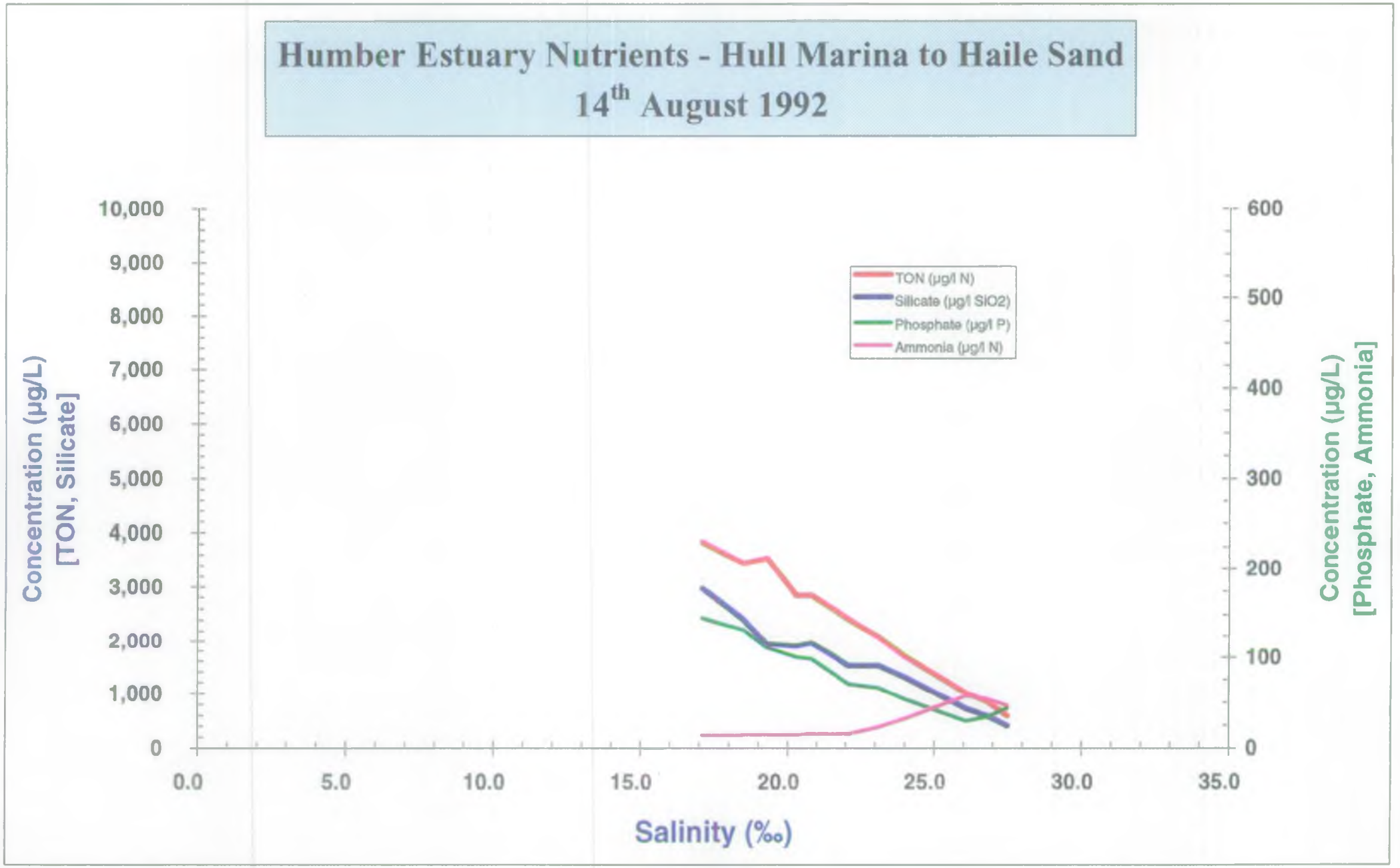


Figure 9

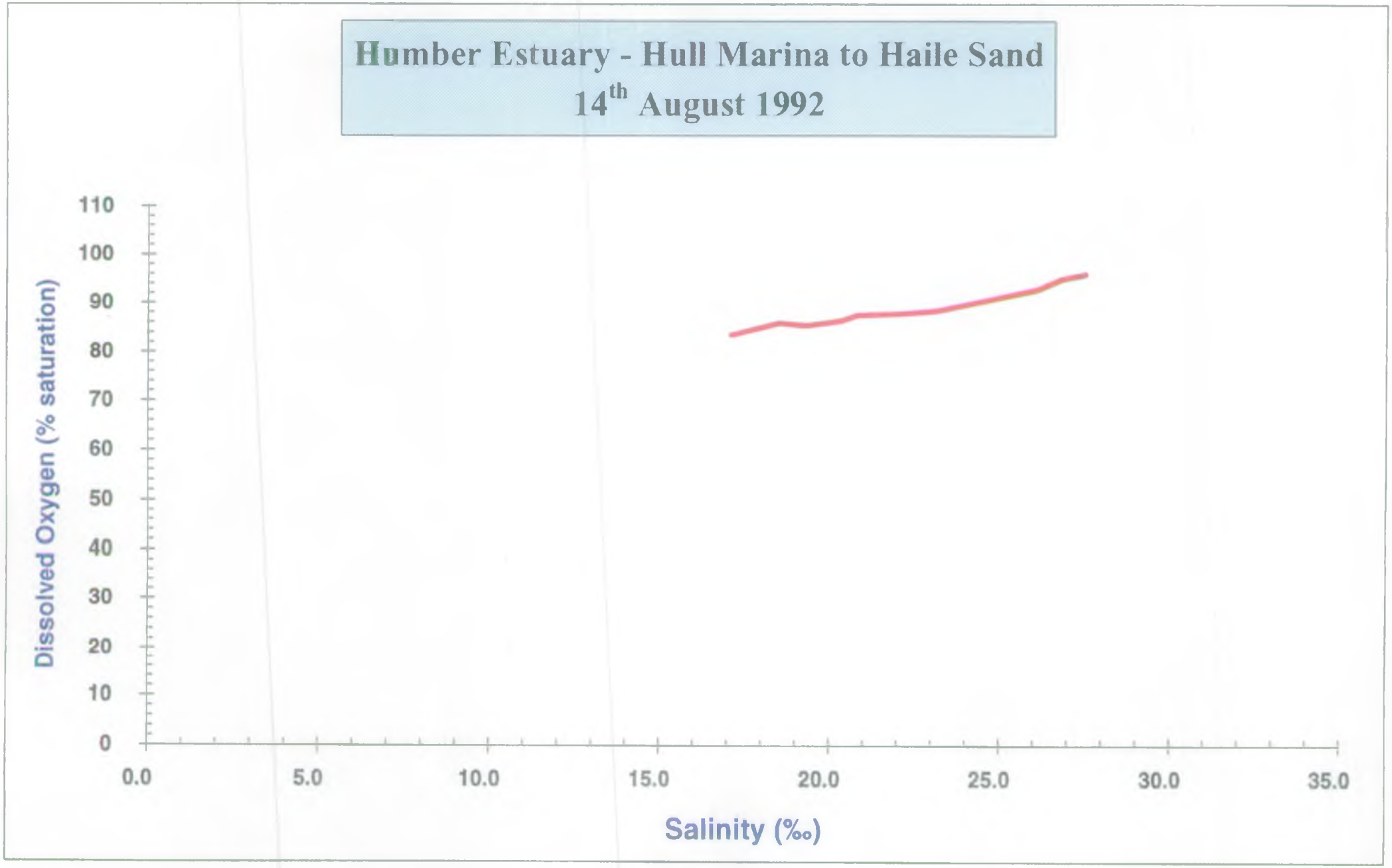


Figure 9a

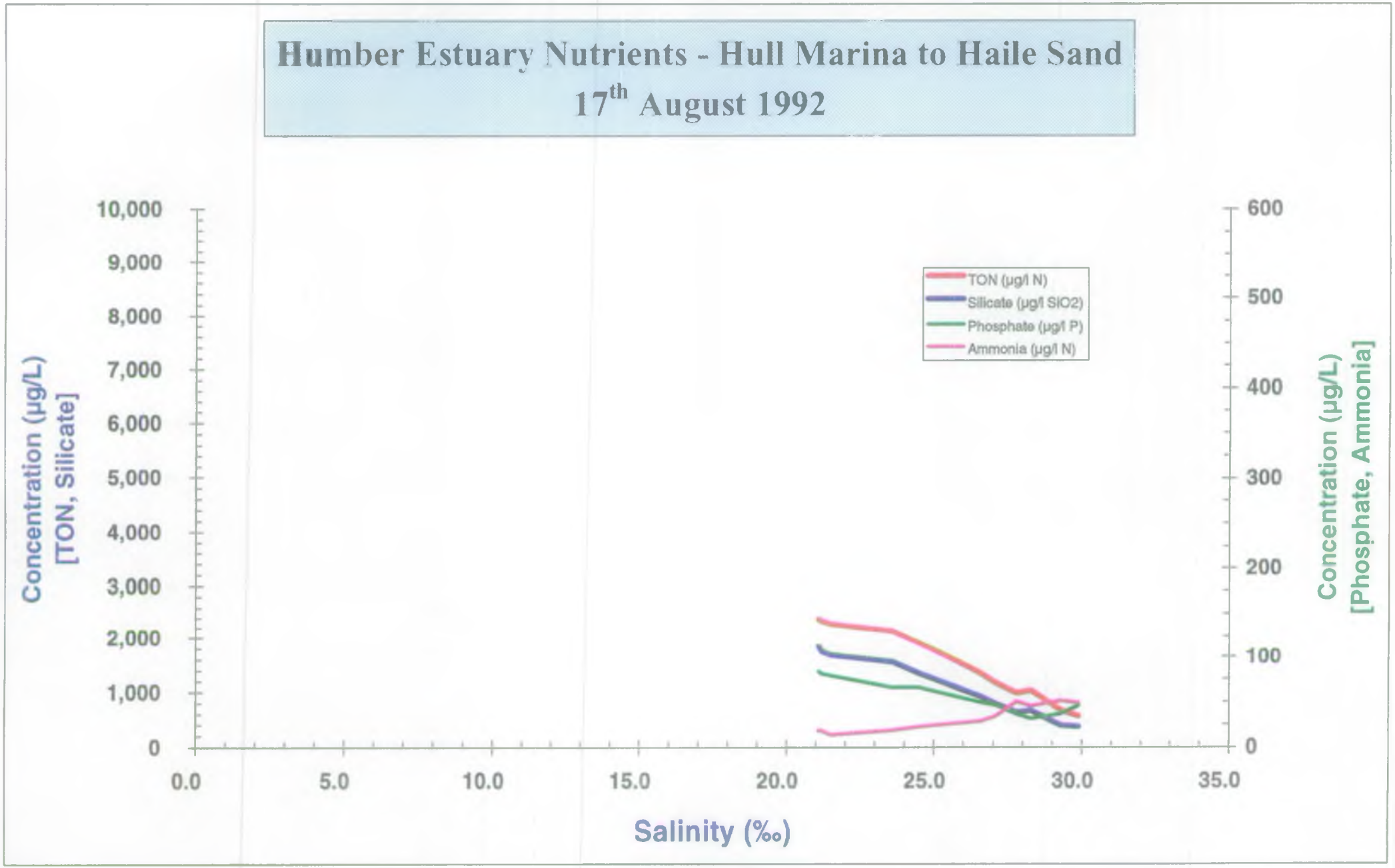


Figure 10

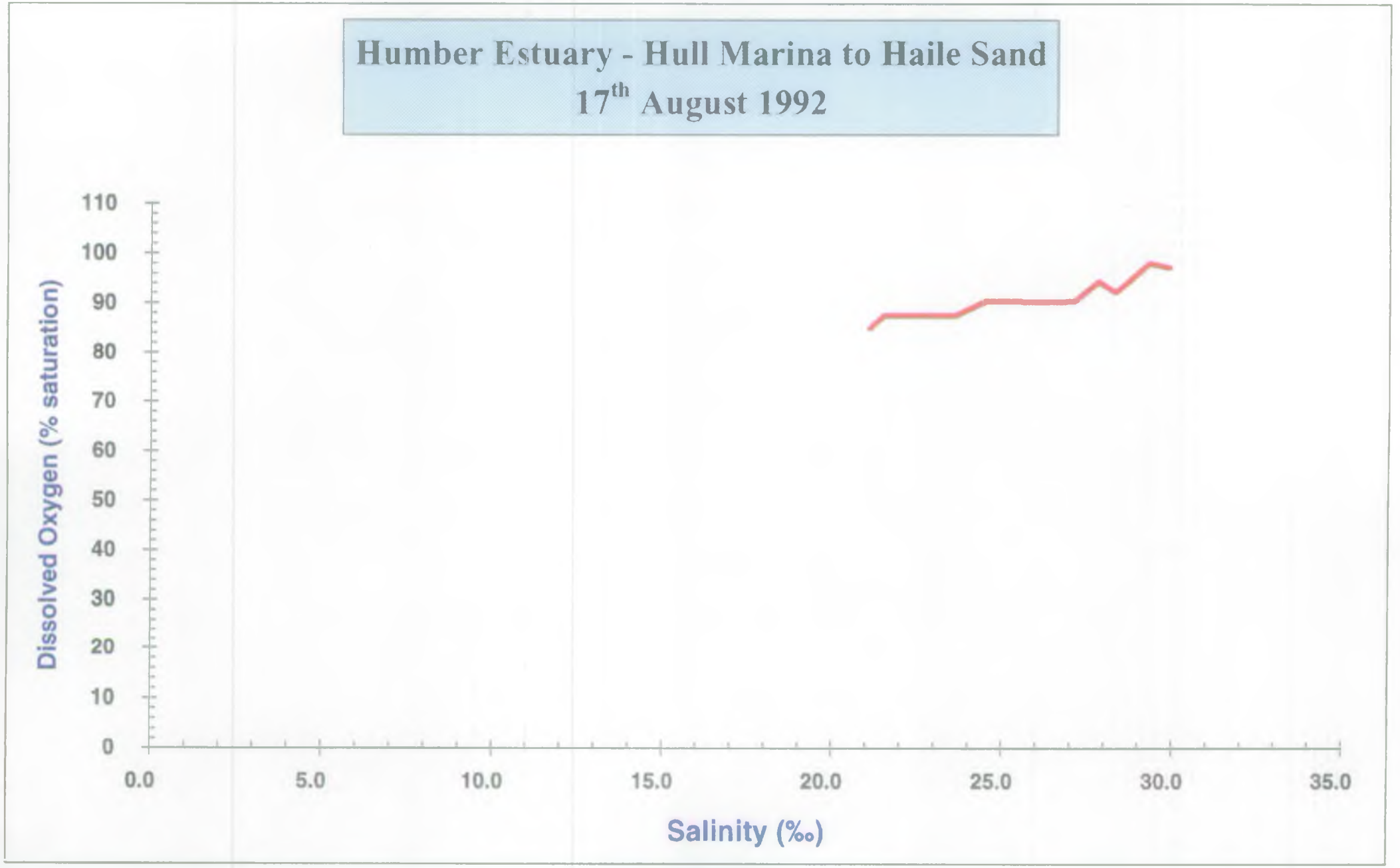
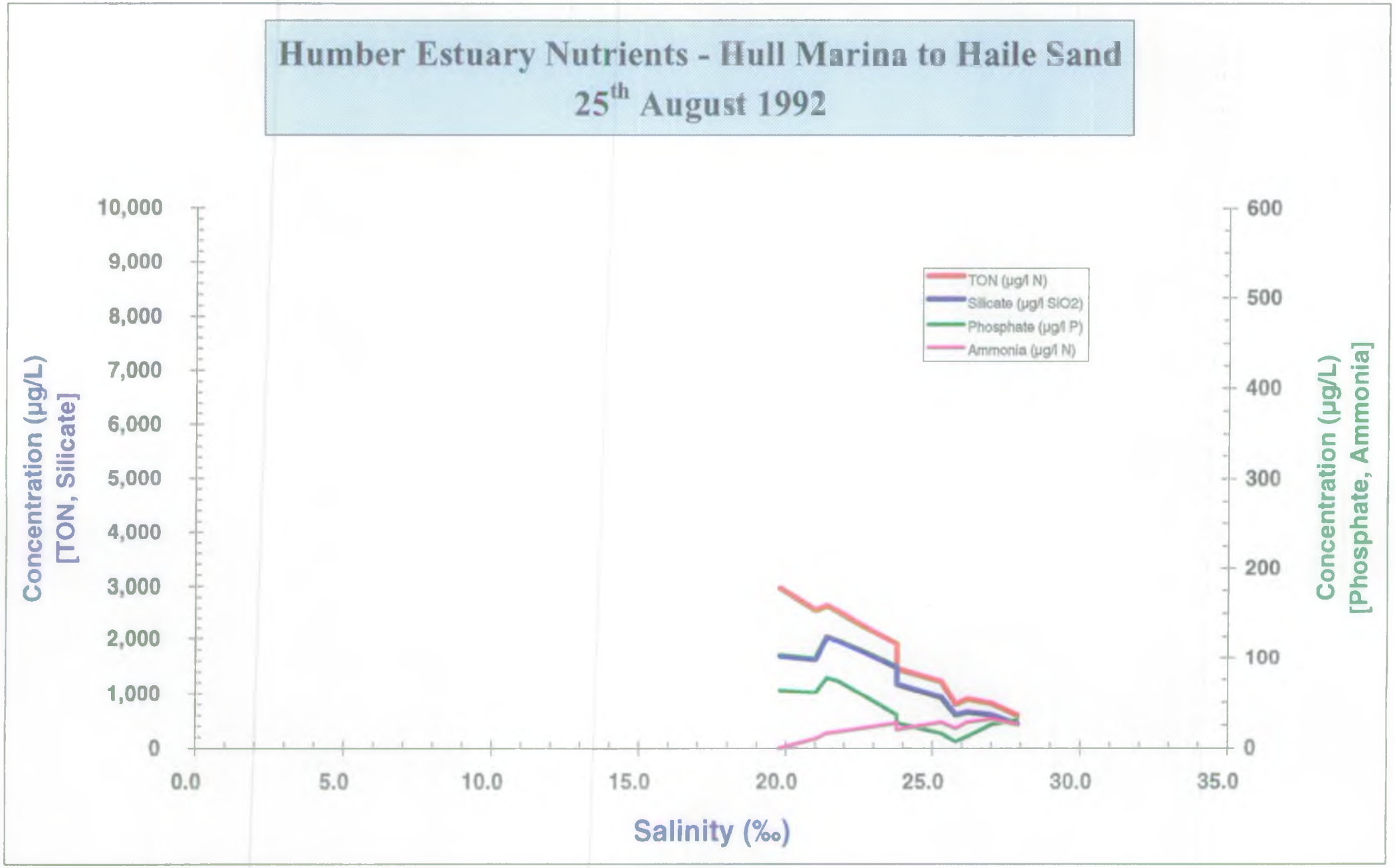


Figure 10a



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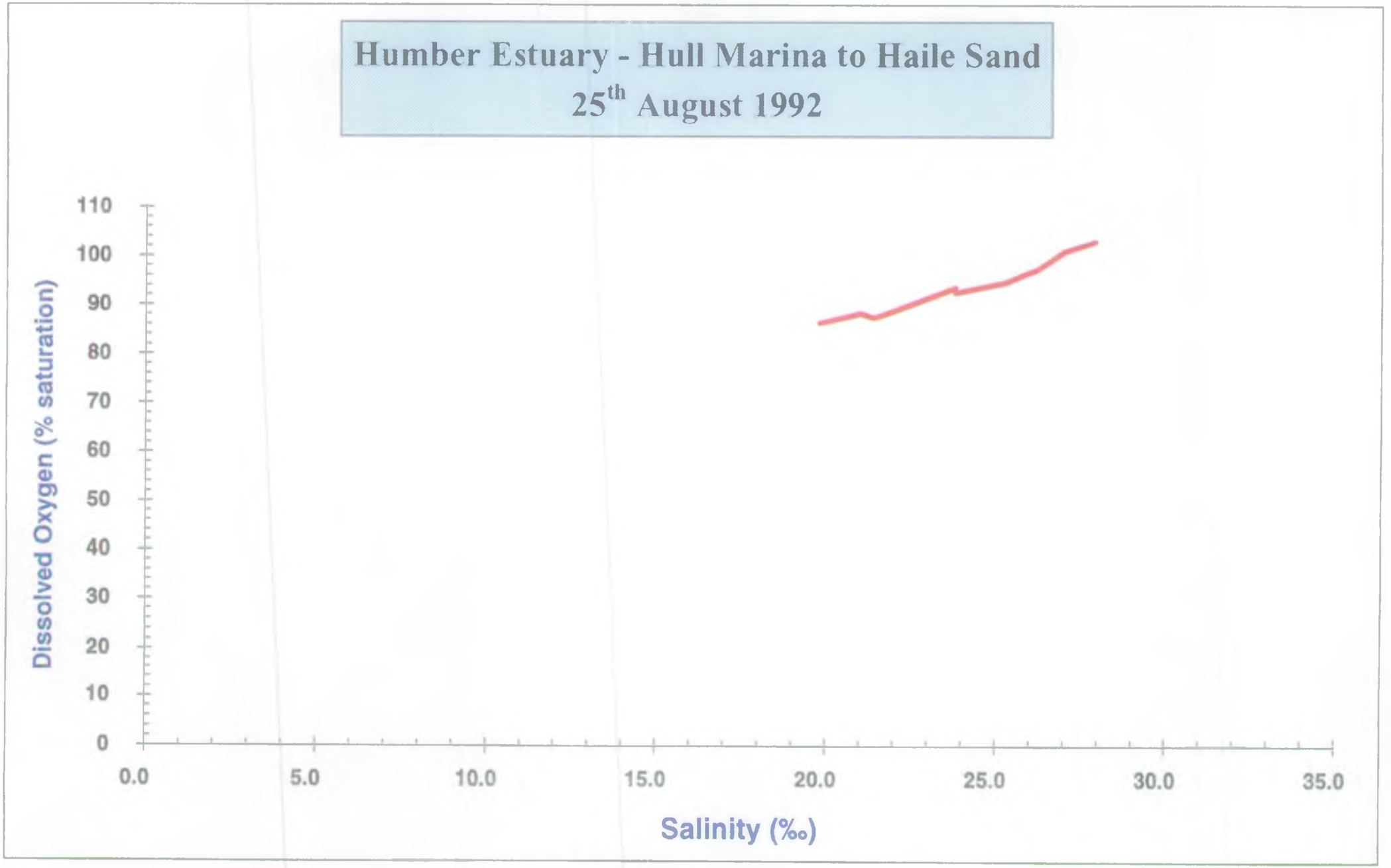
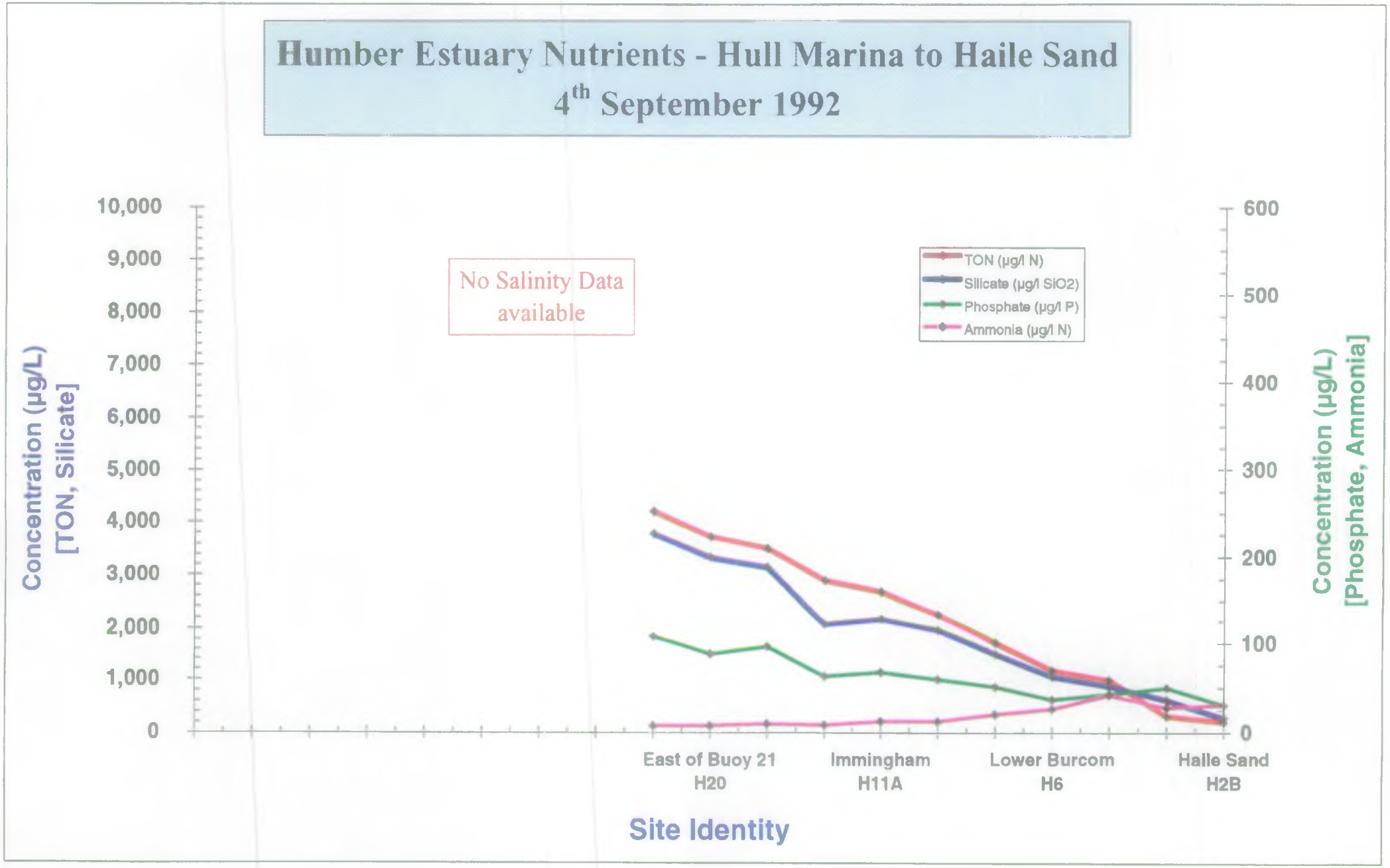


Figure 11a



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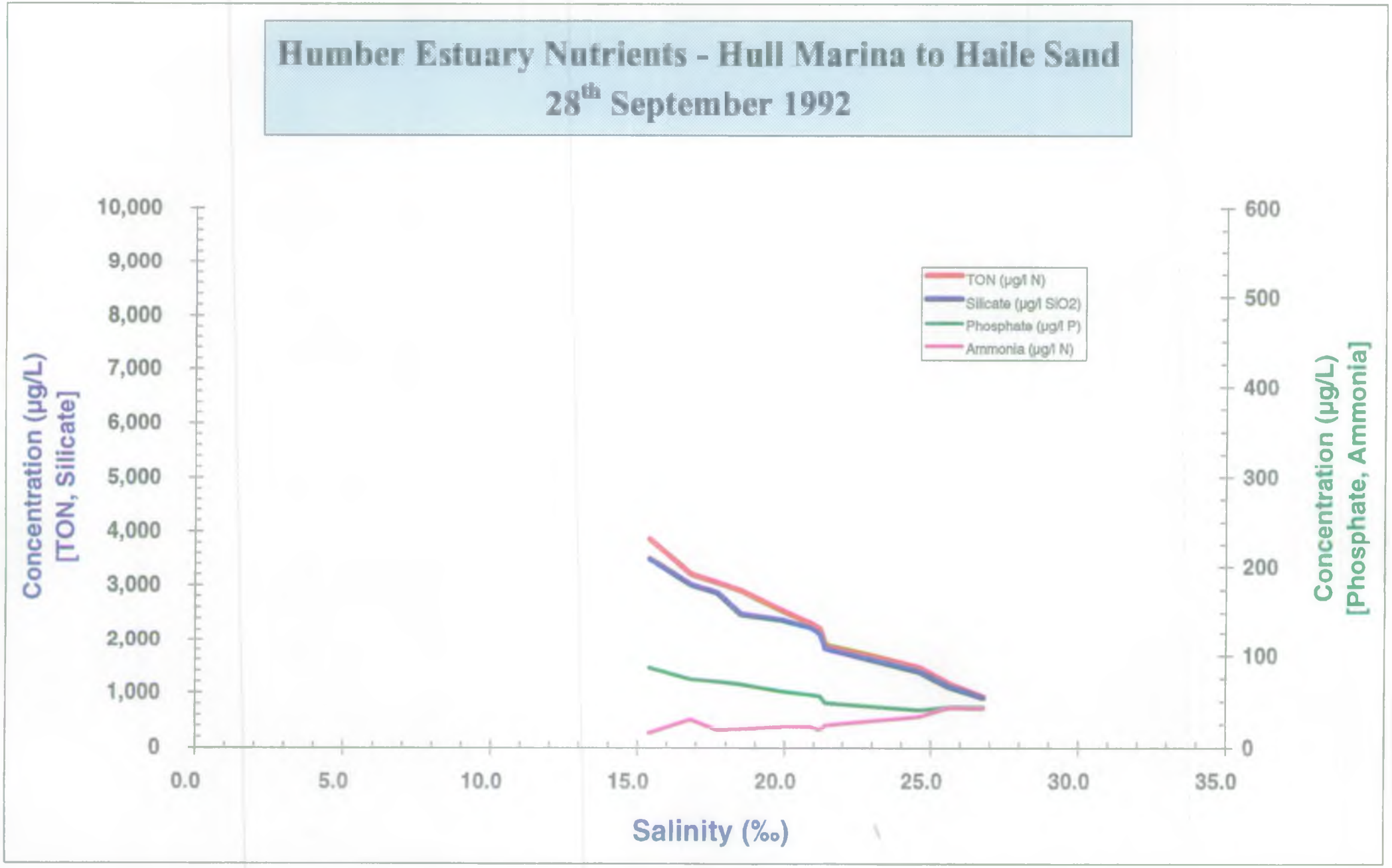

Figure 13

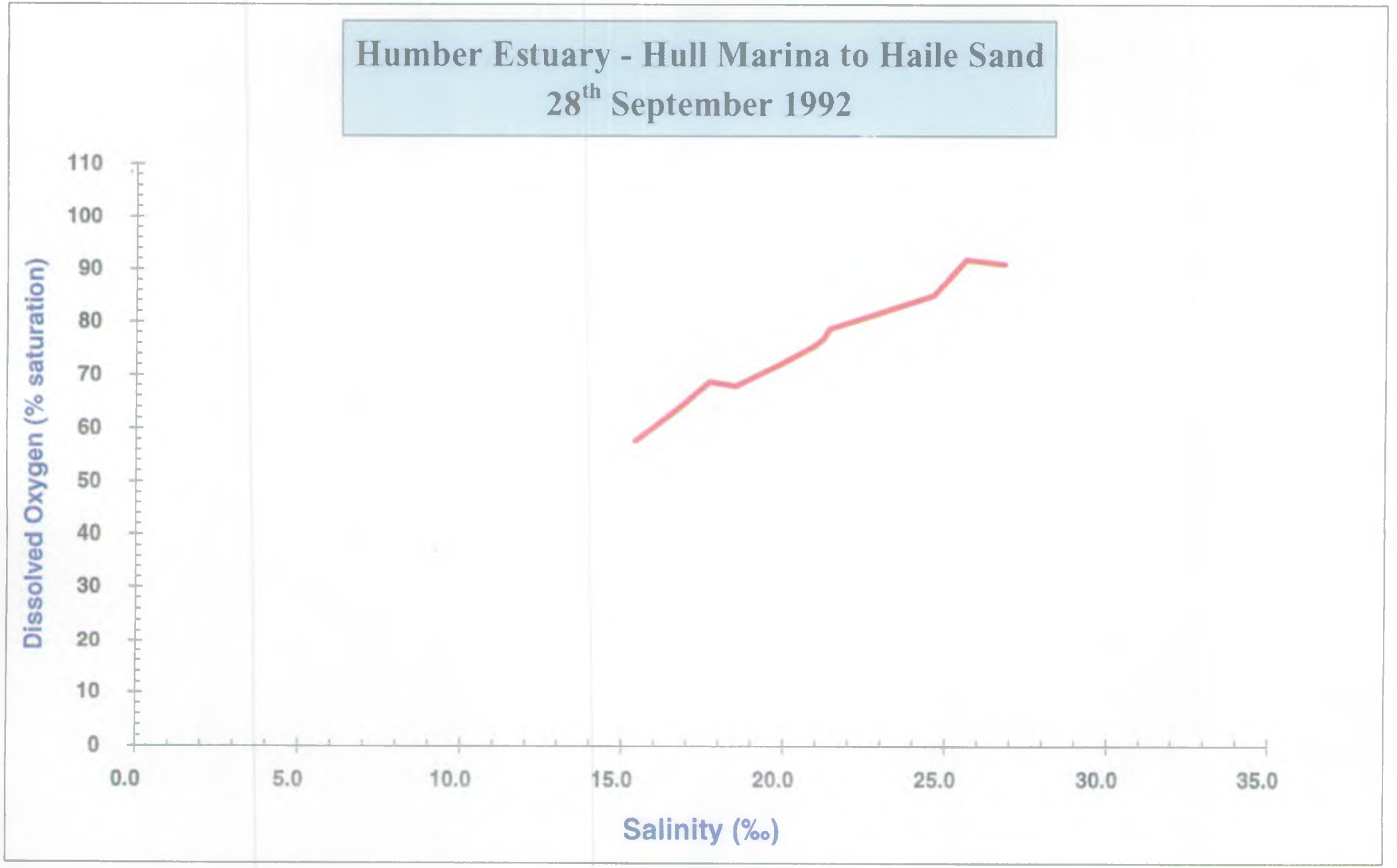

Figure 13a

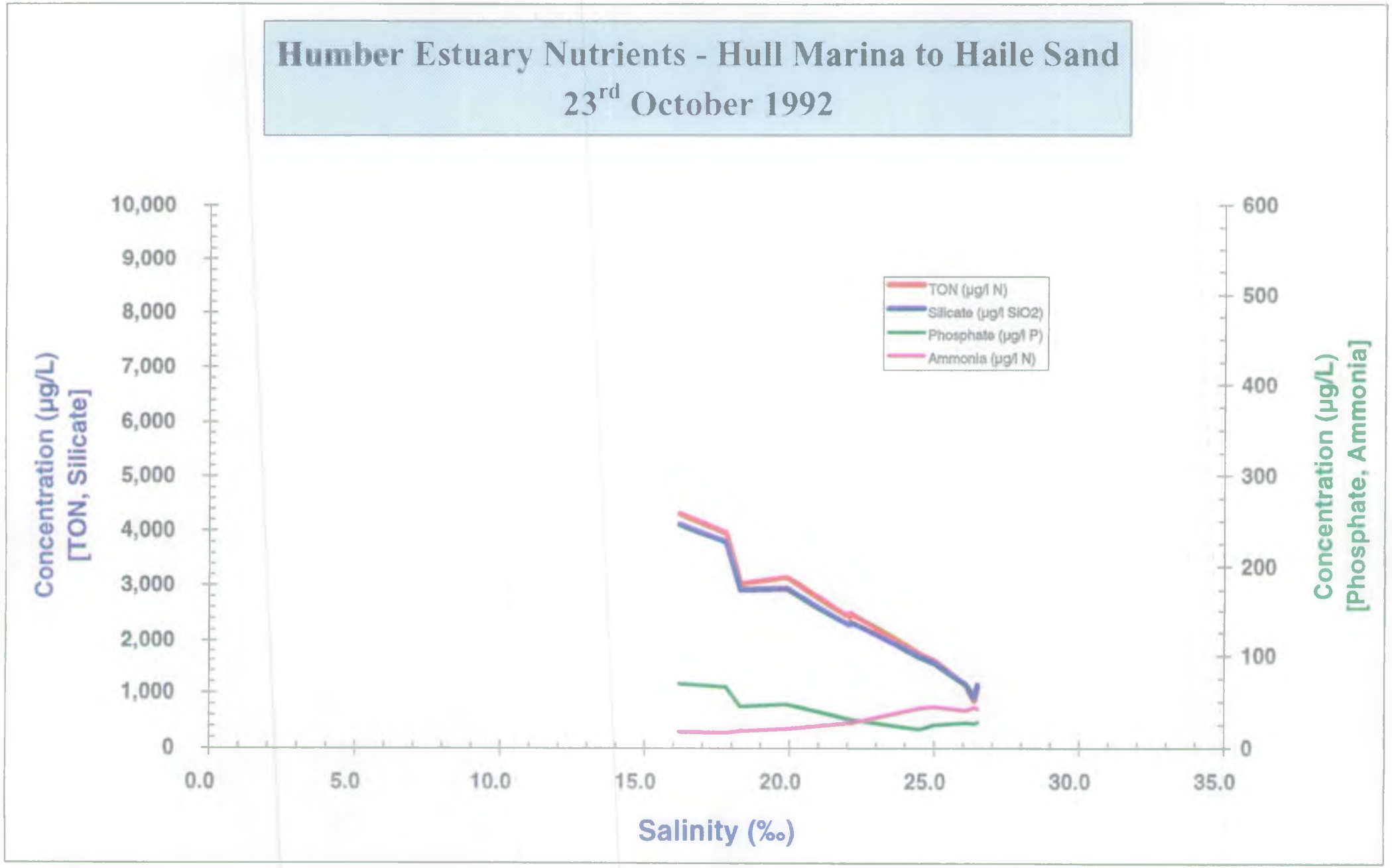

Figure 14

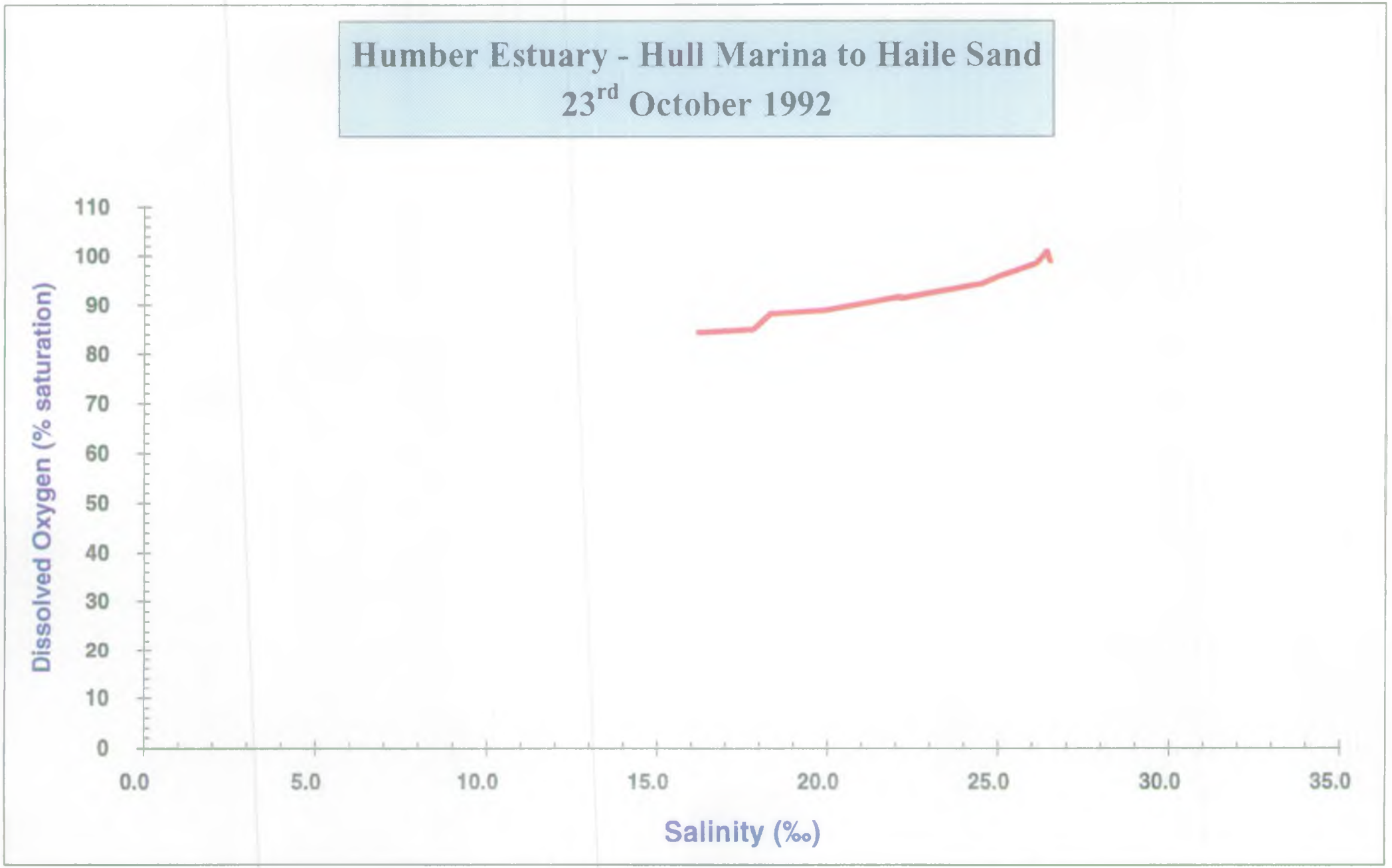

Figure 14a

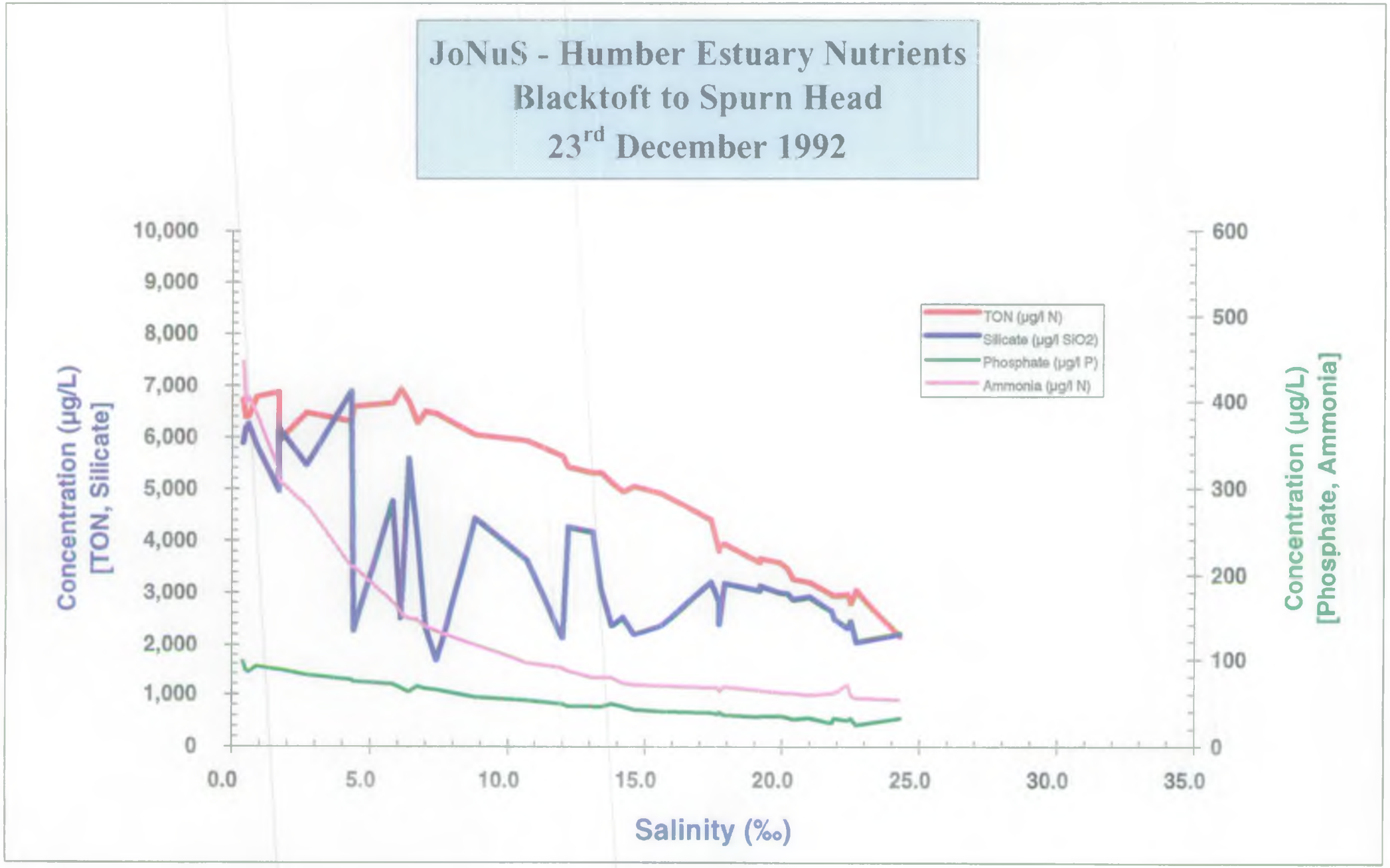

Figure 15

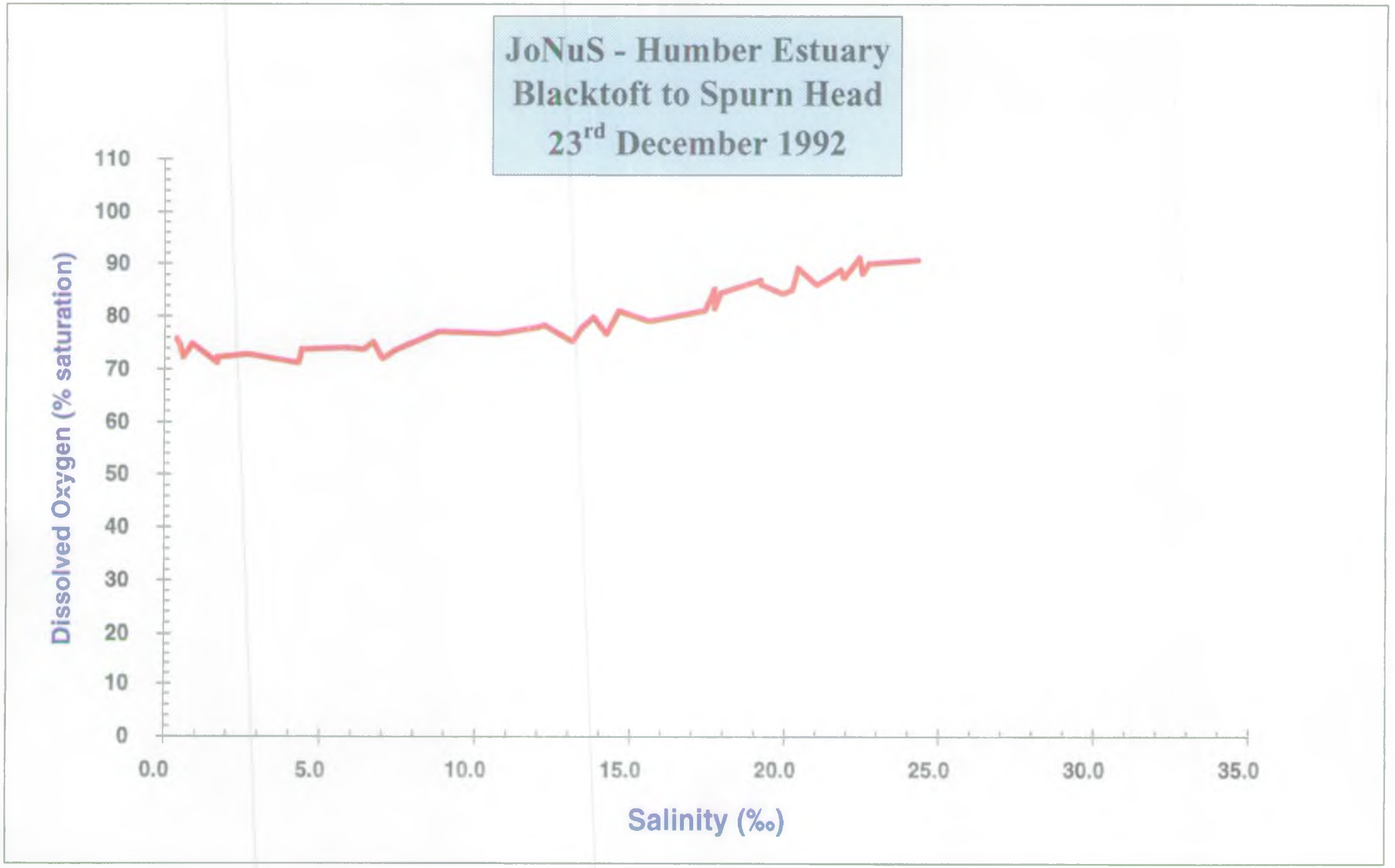

Figure 15a

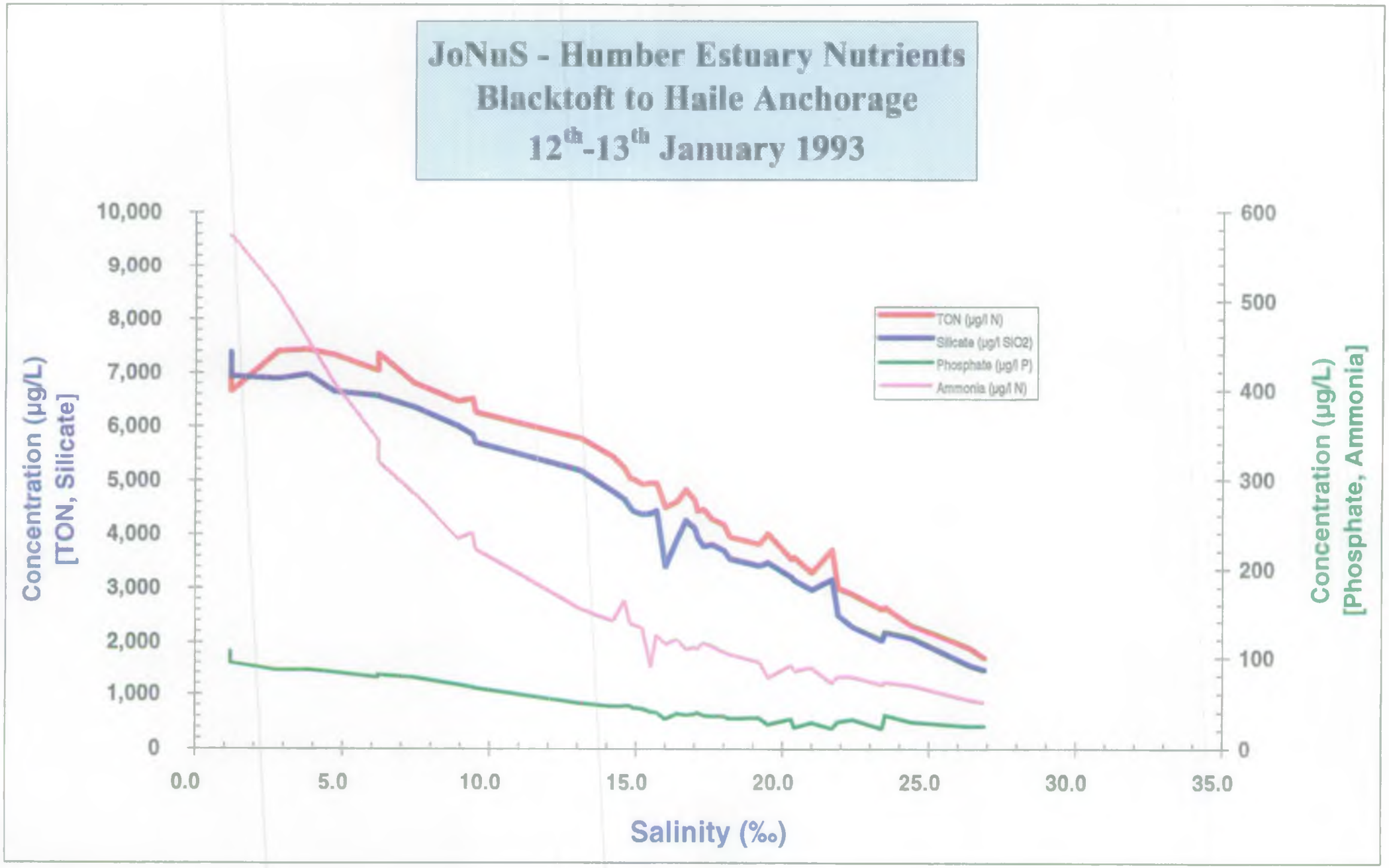

Figure 16

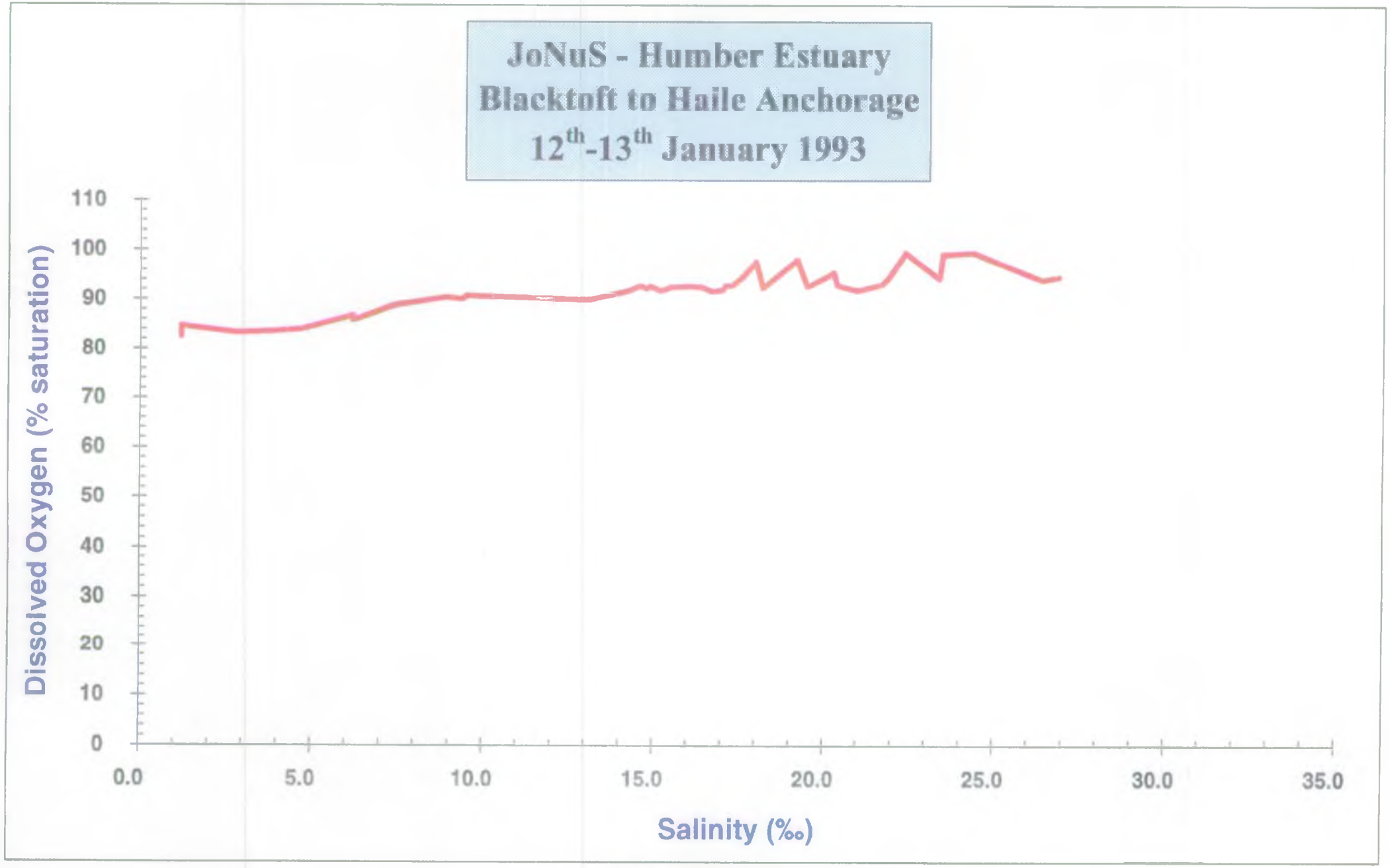

Figure 16a

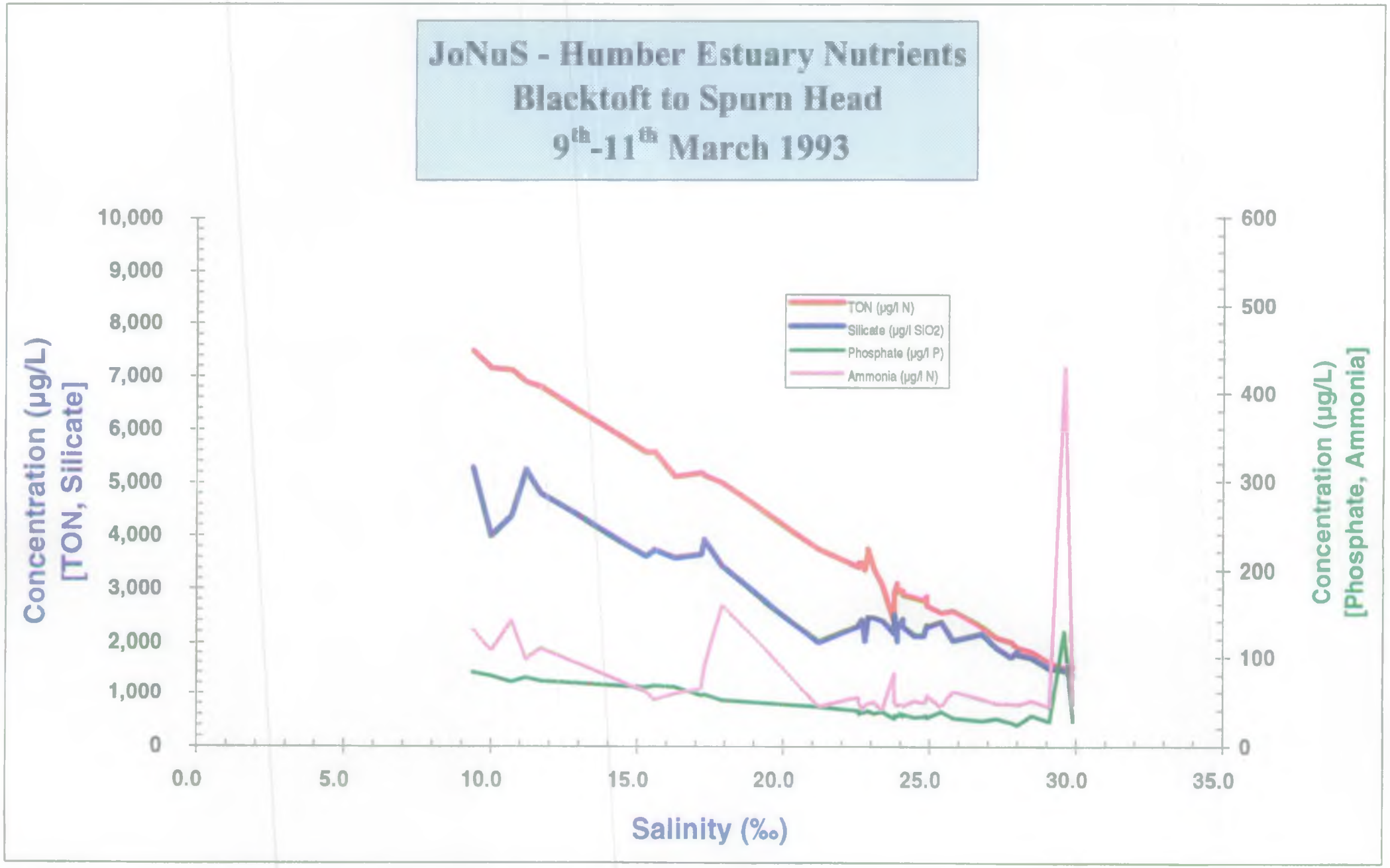

Figure 17

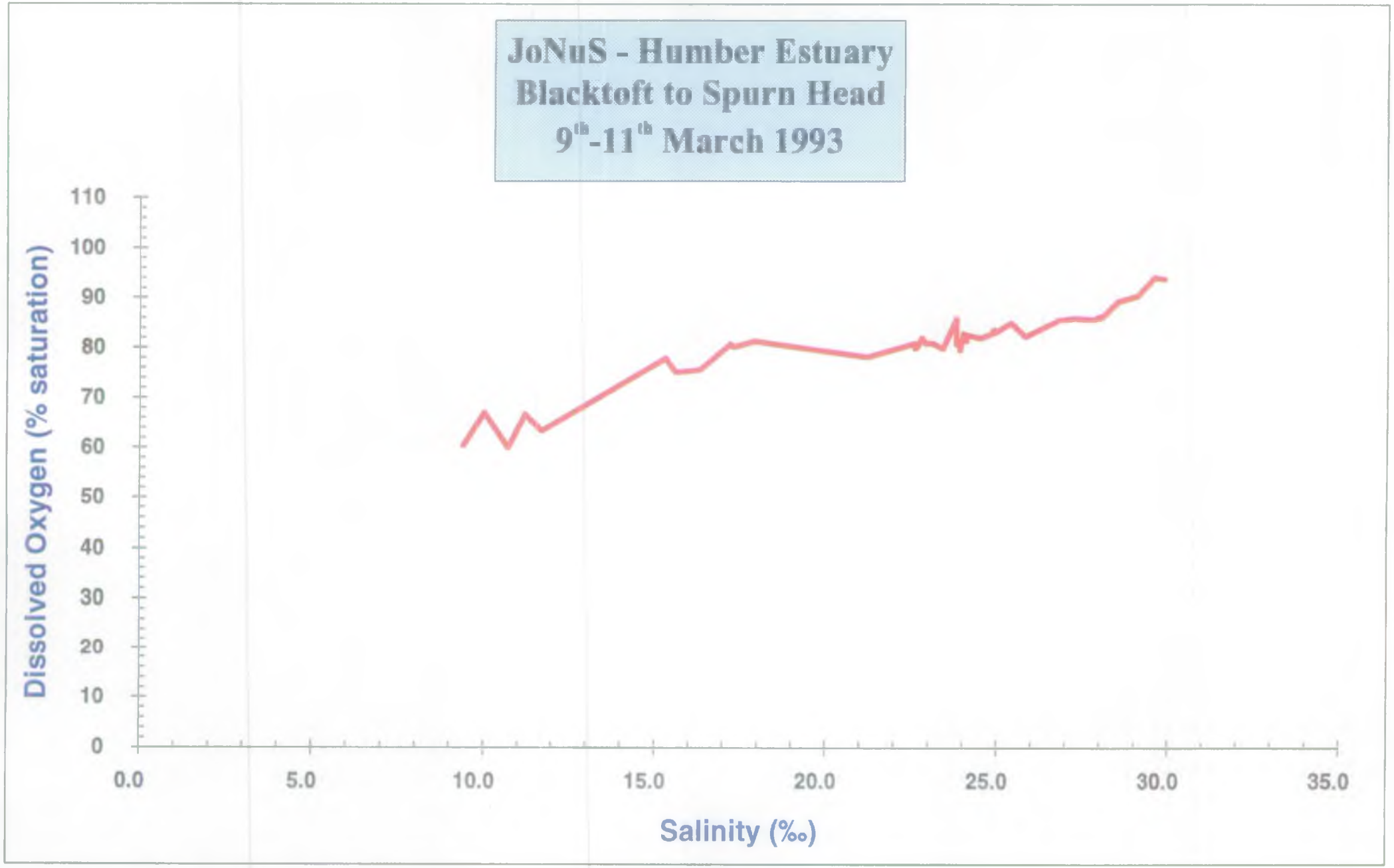

Figure 17a

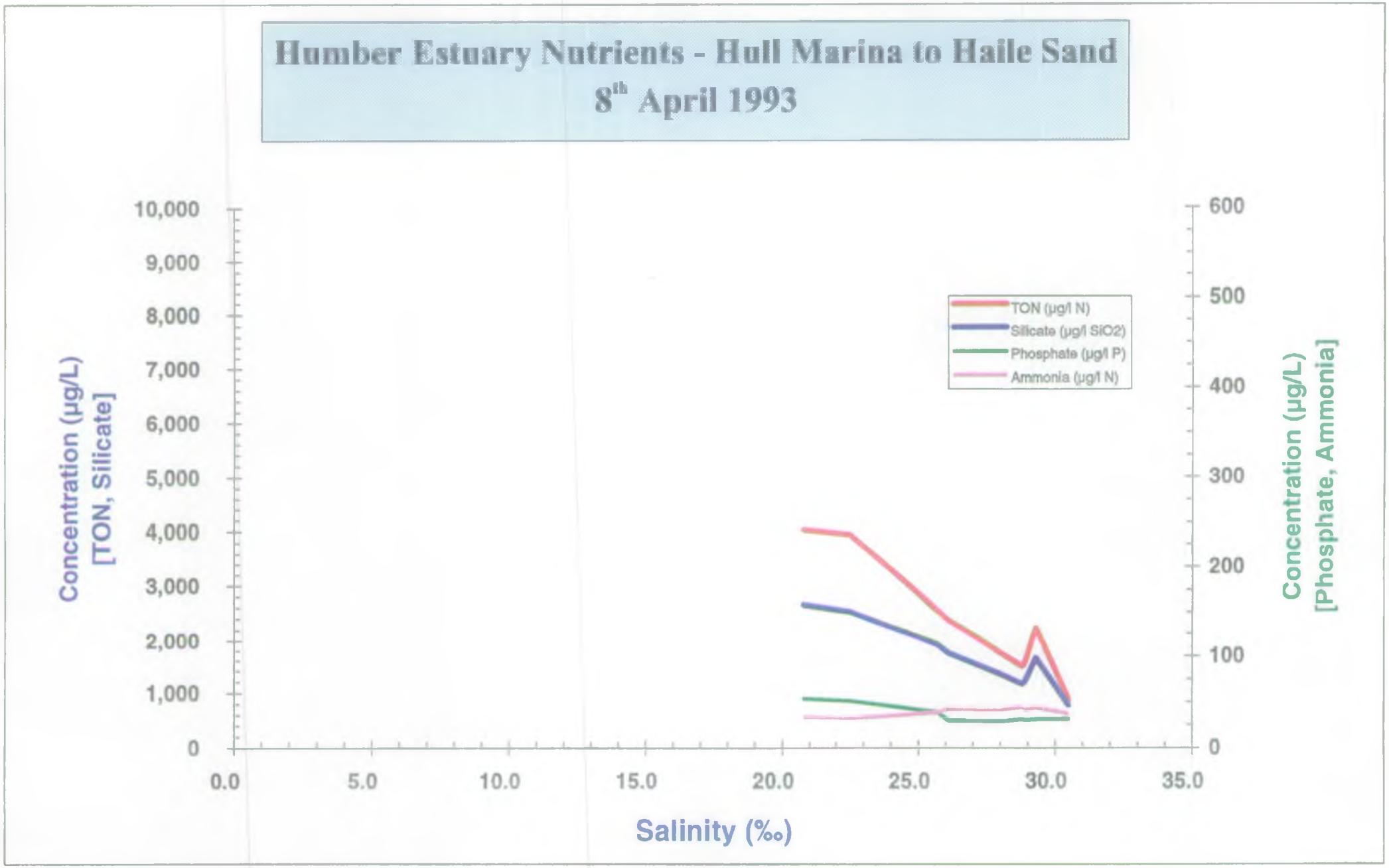

Figure 18

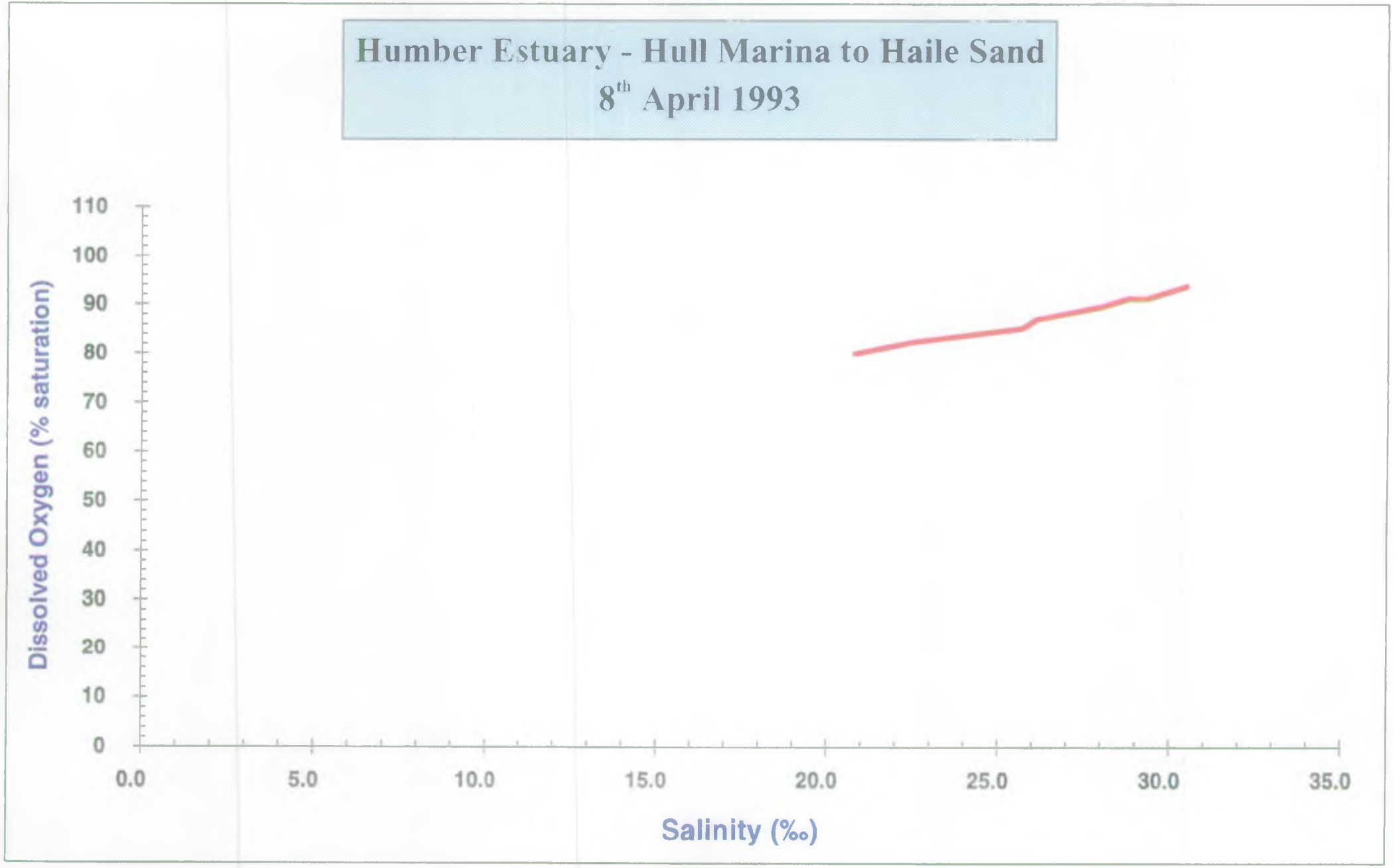

Figure 18a

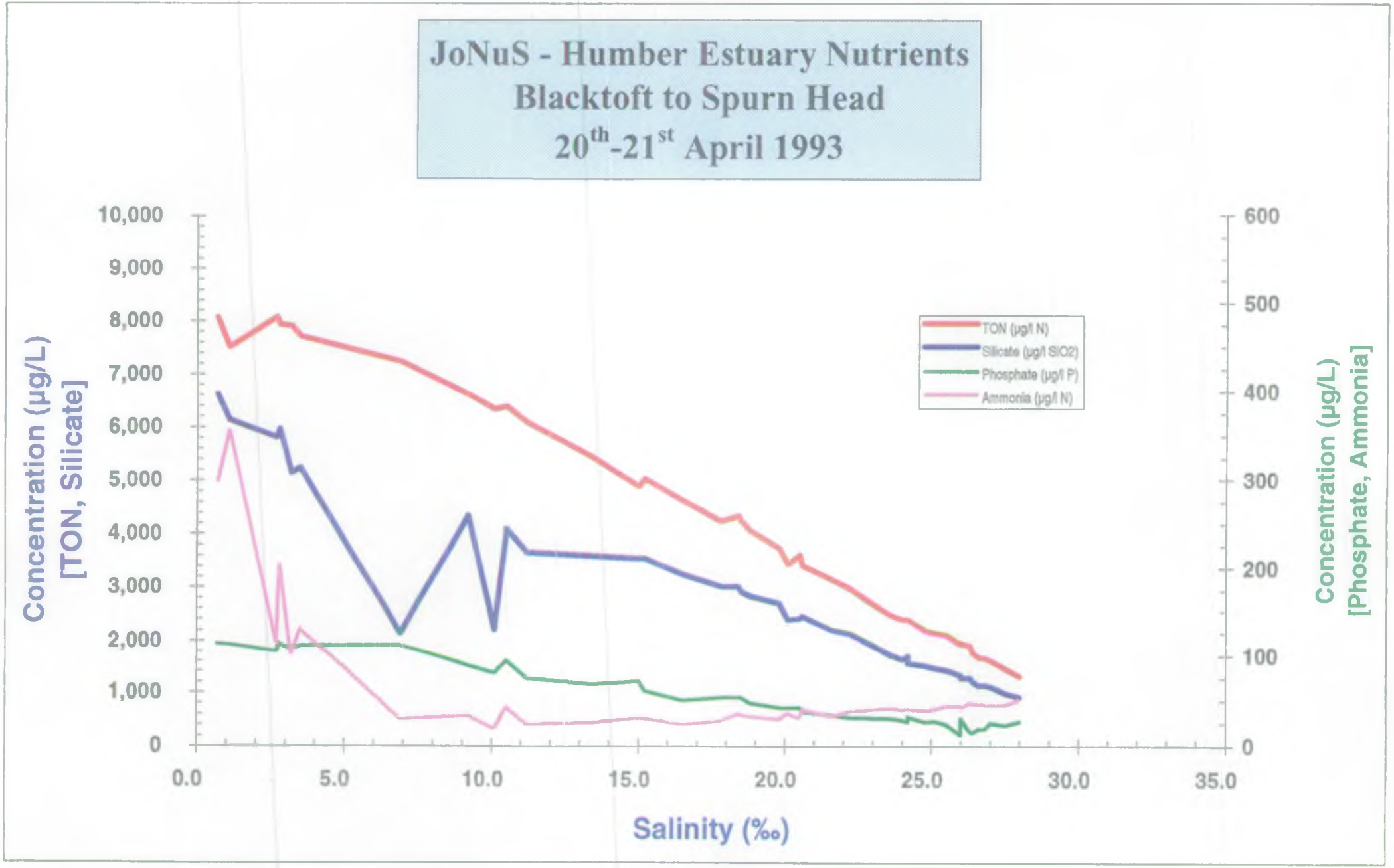

Figure 19

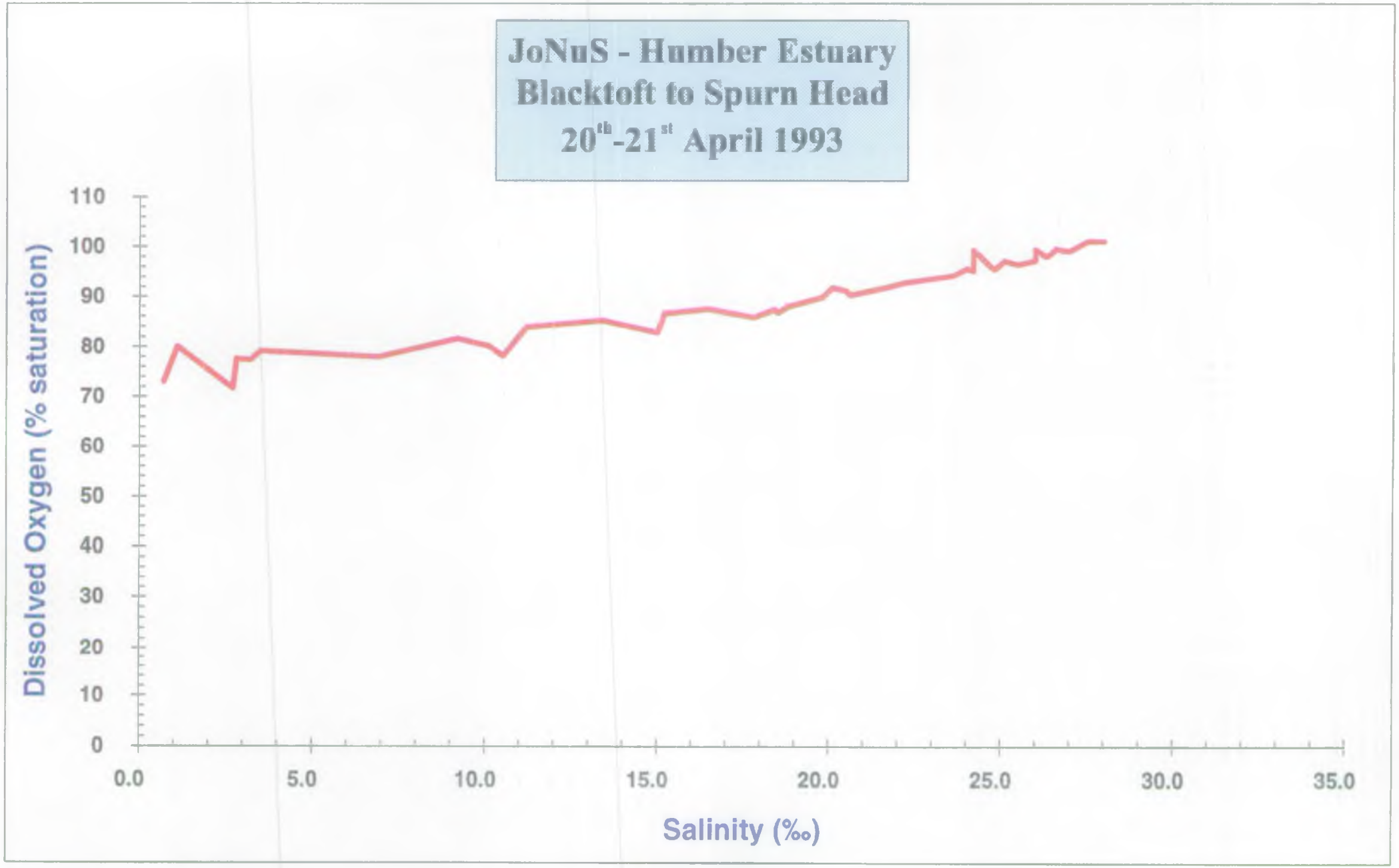

Figure 19a

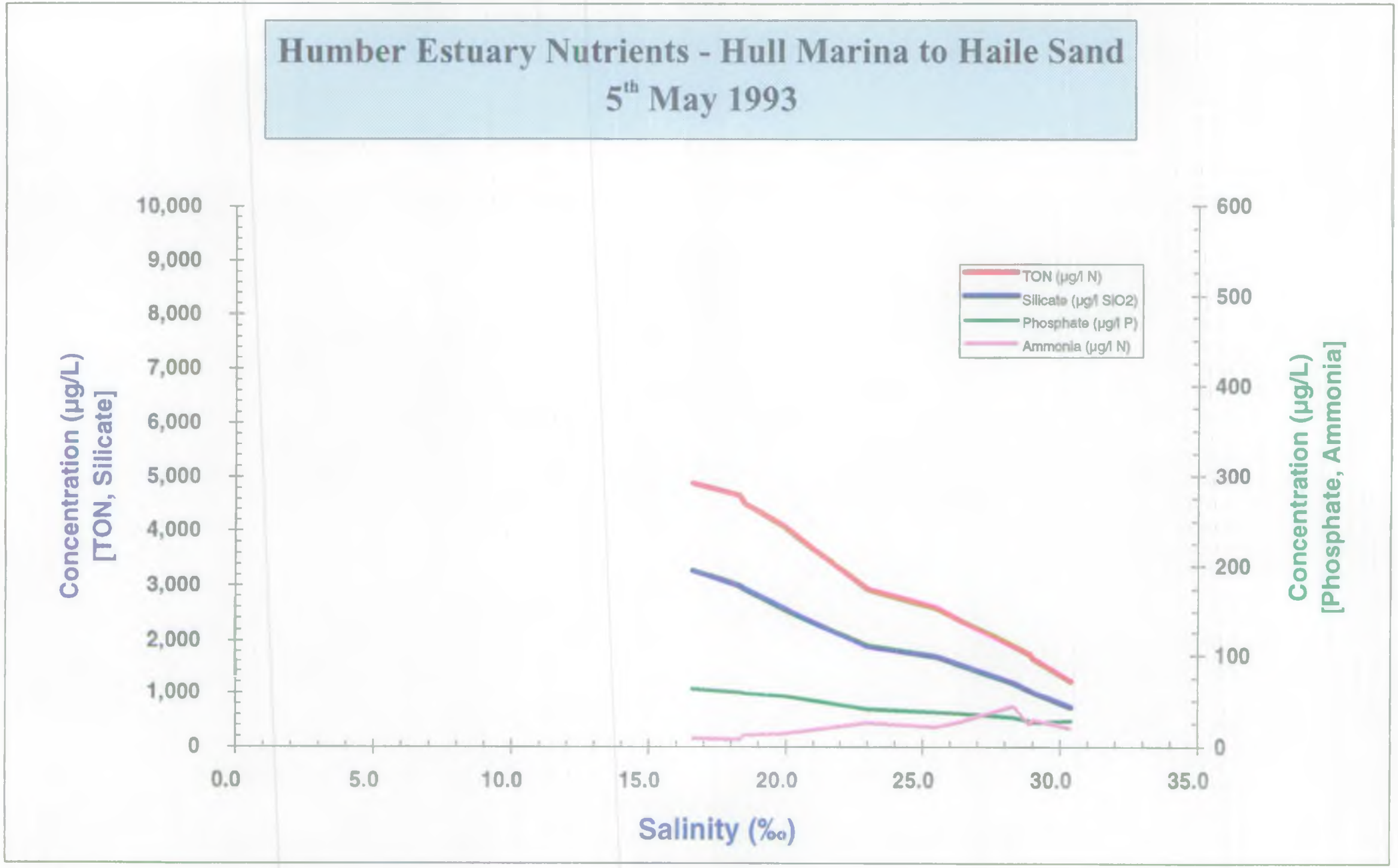

Figure 20

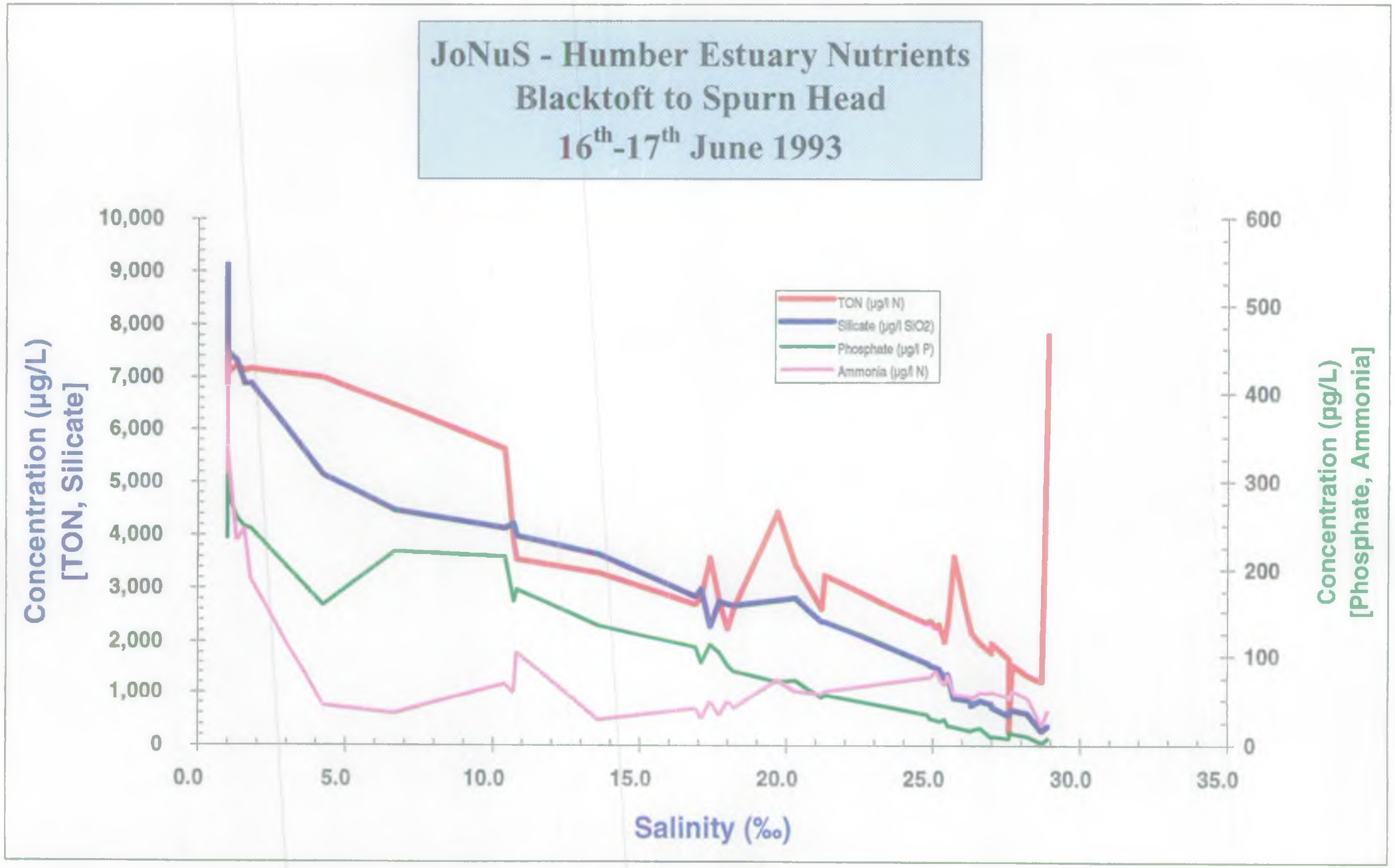

Figure 21

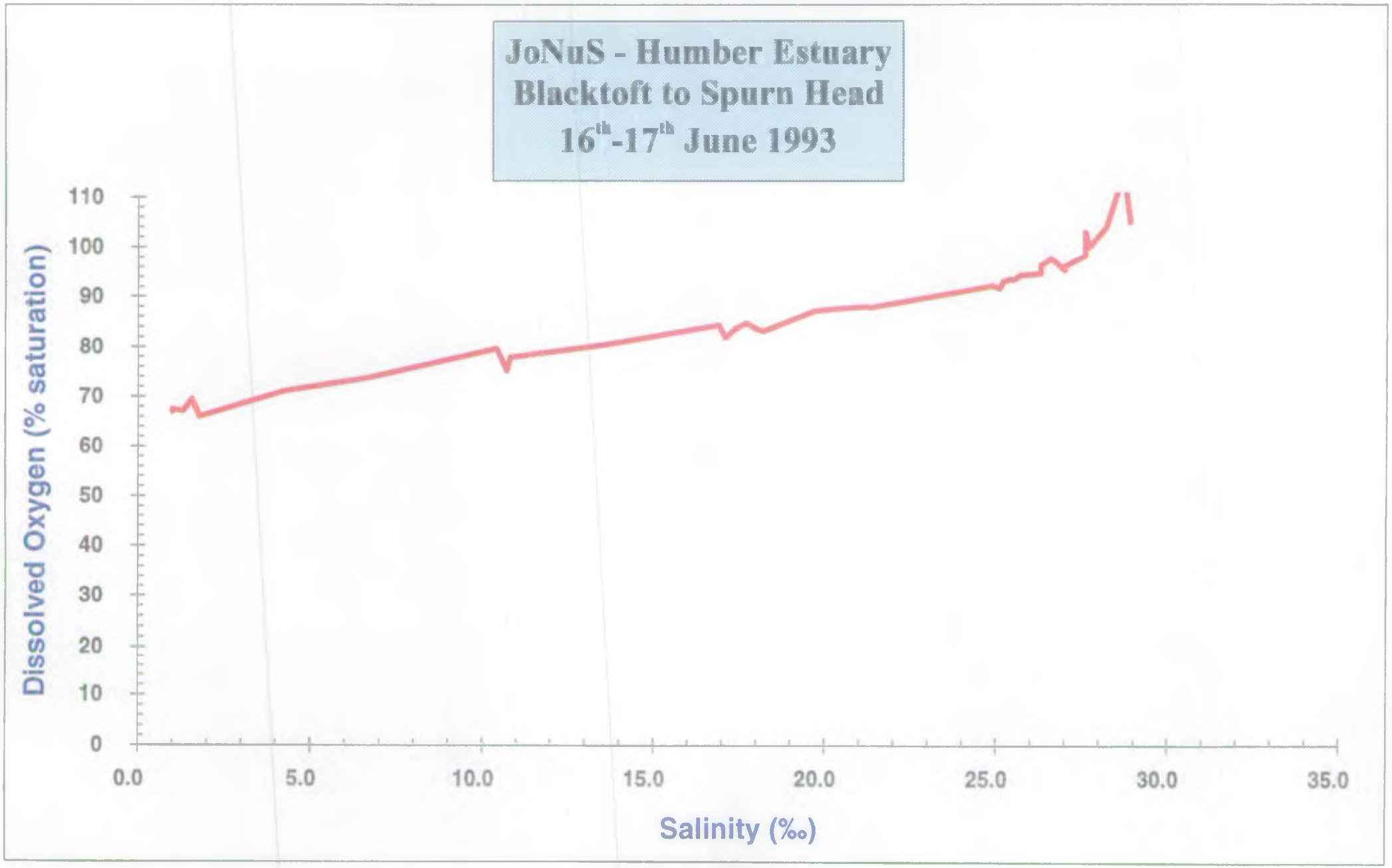

Figure 21a

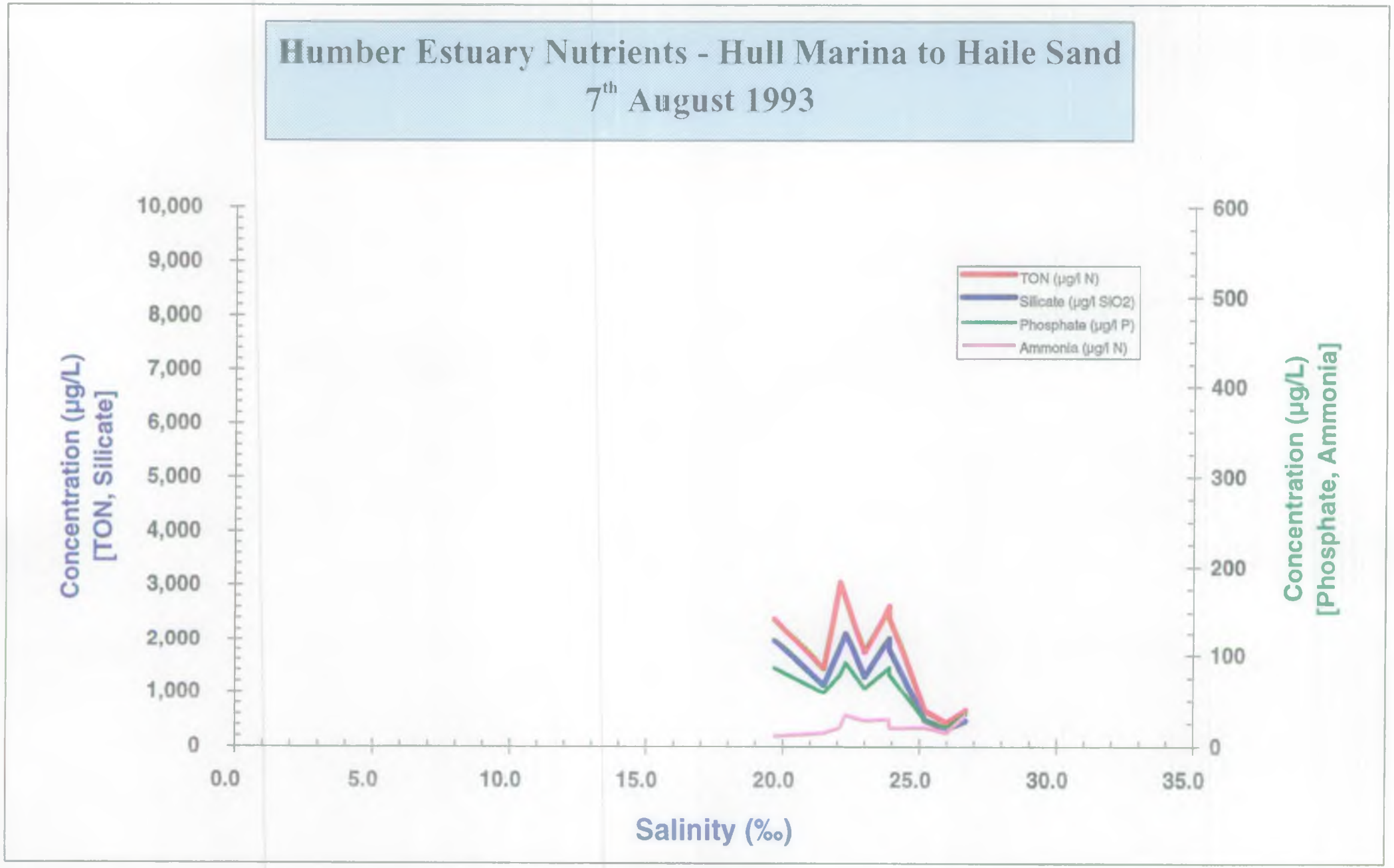

Figure 22

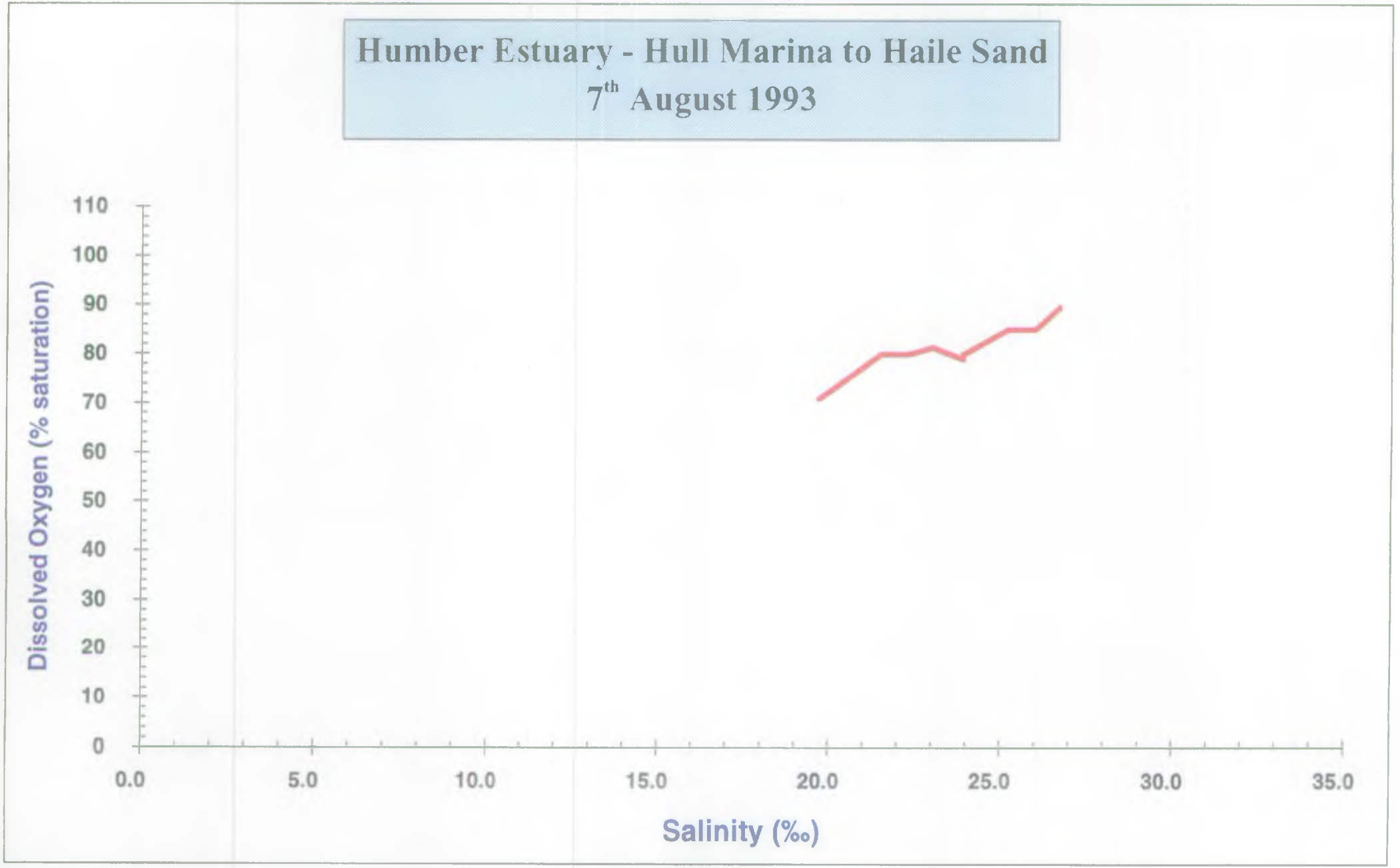

Figure 22a

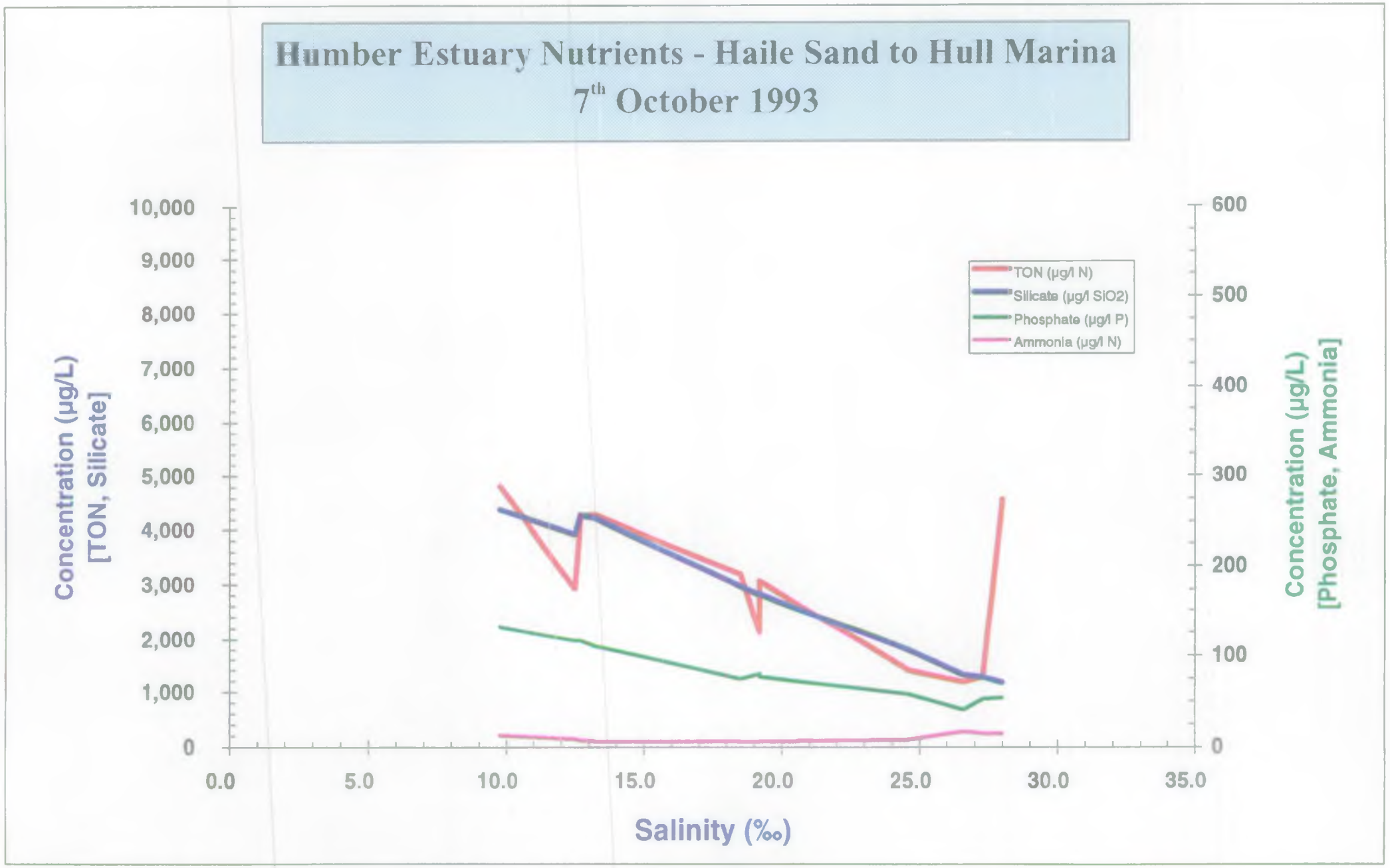

Figure 23

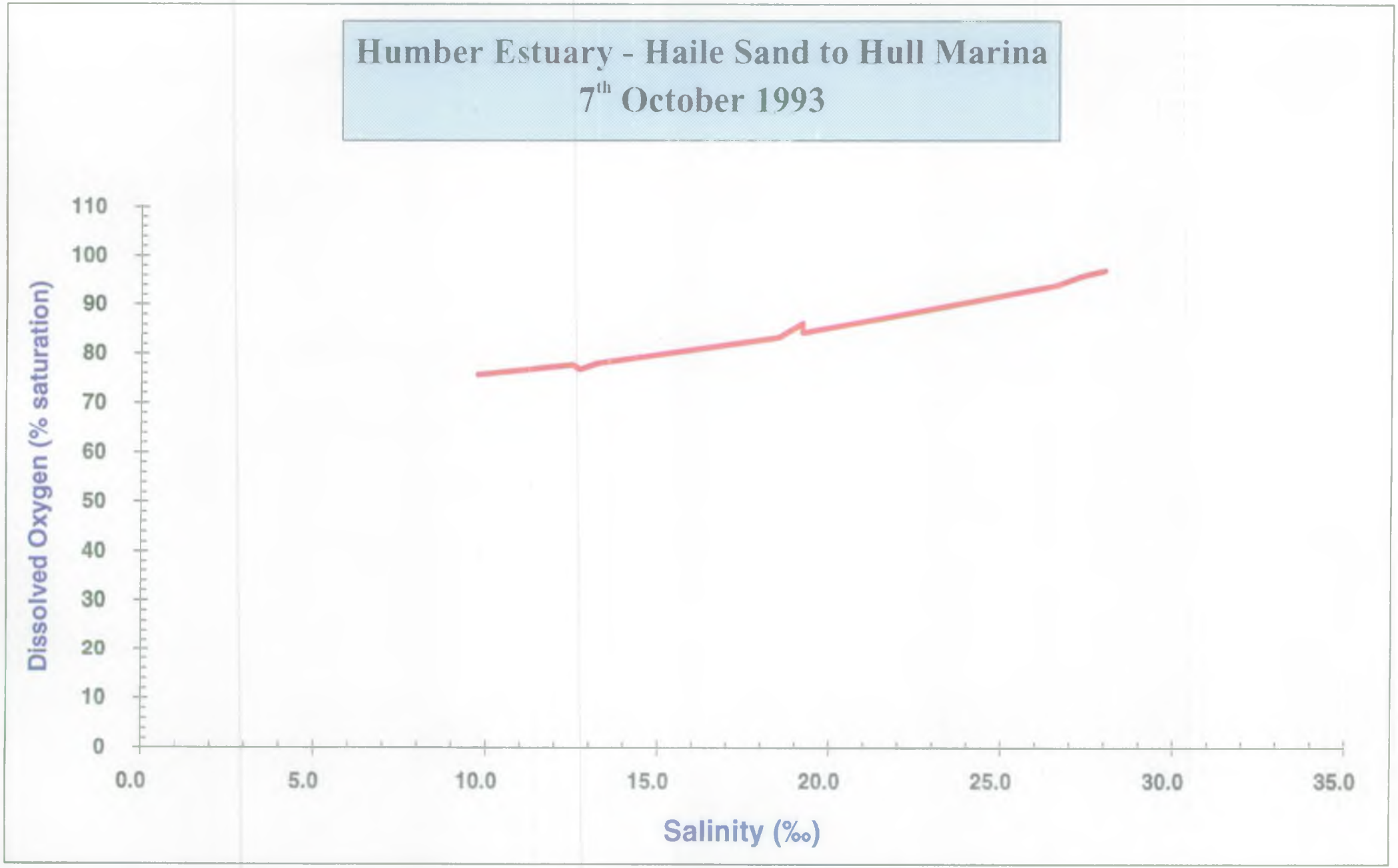

Figure 23a

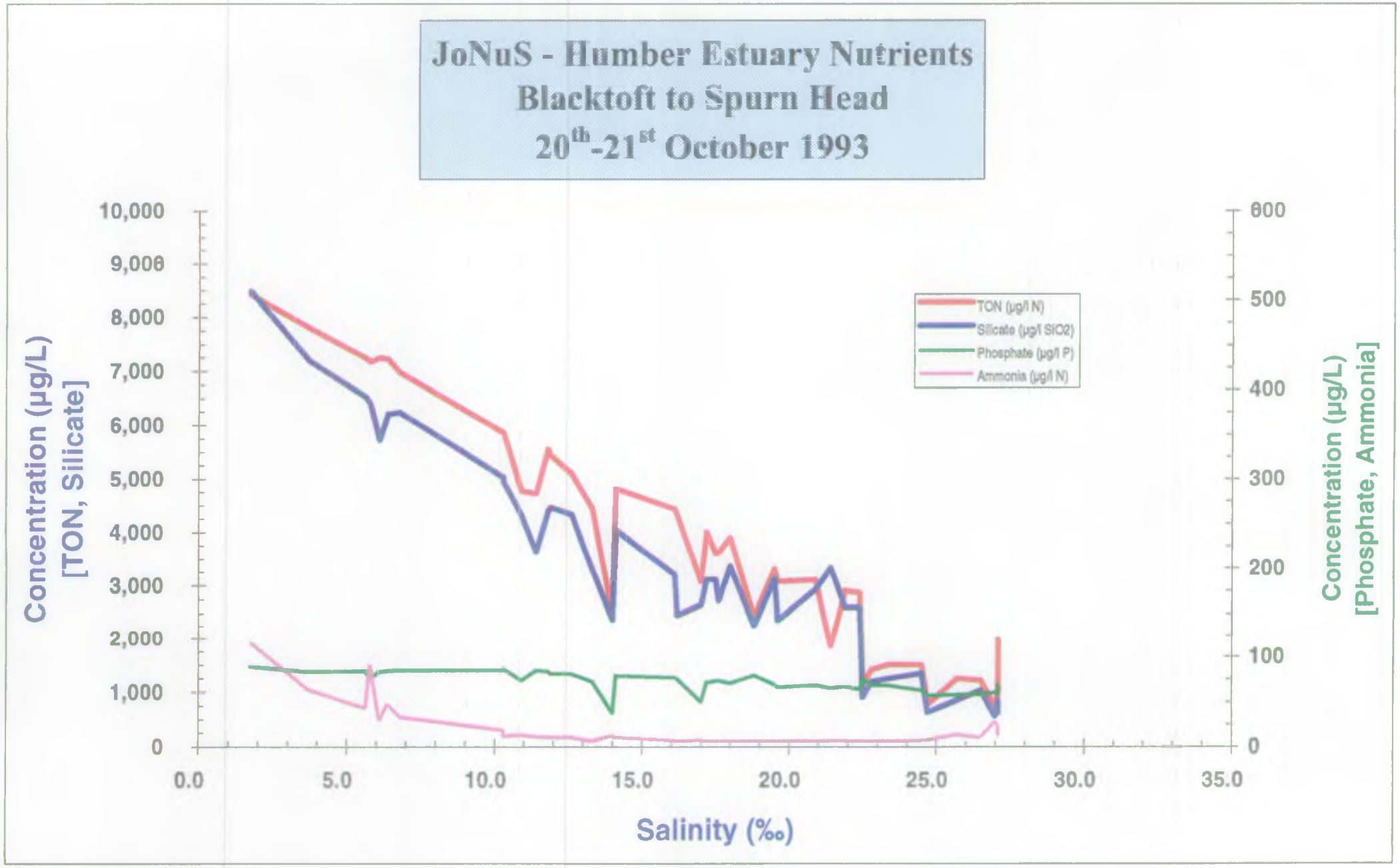

Figure 24

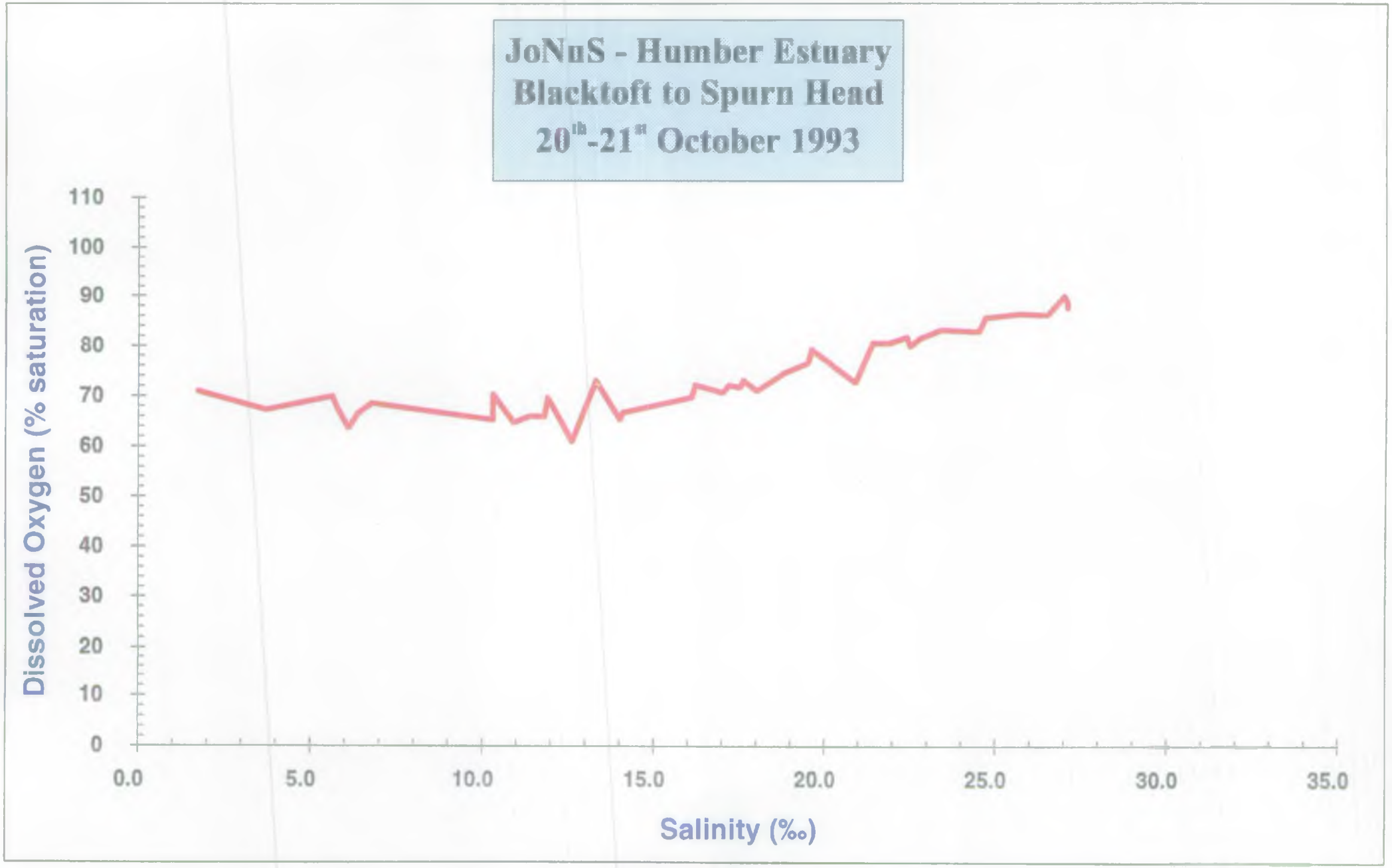

Figure 24a

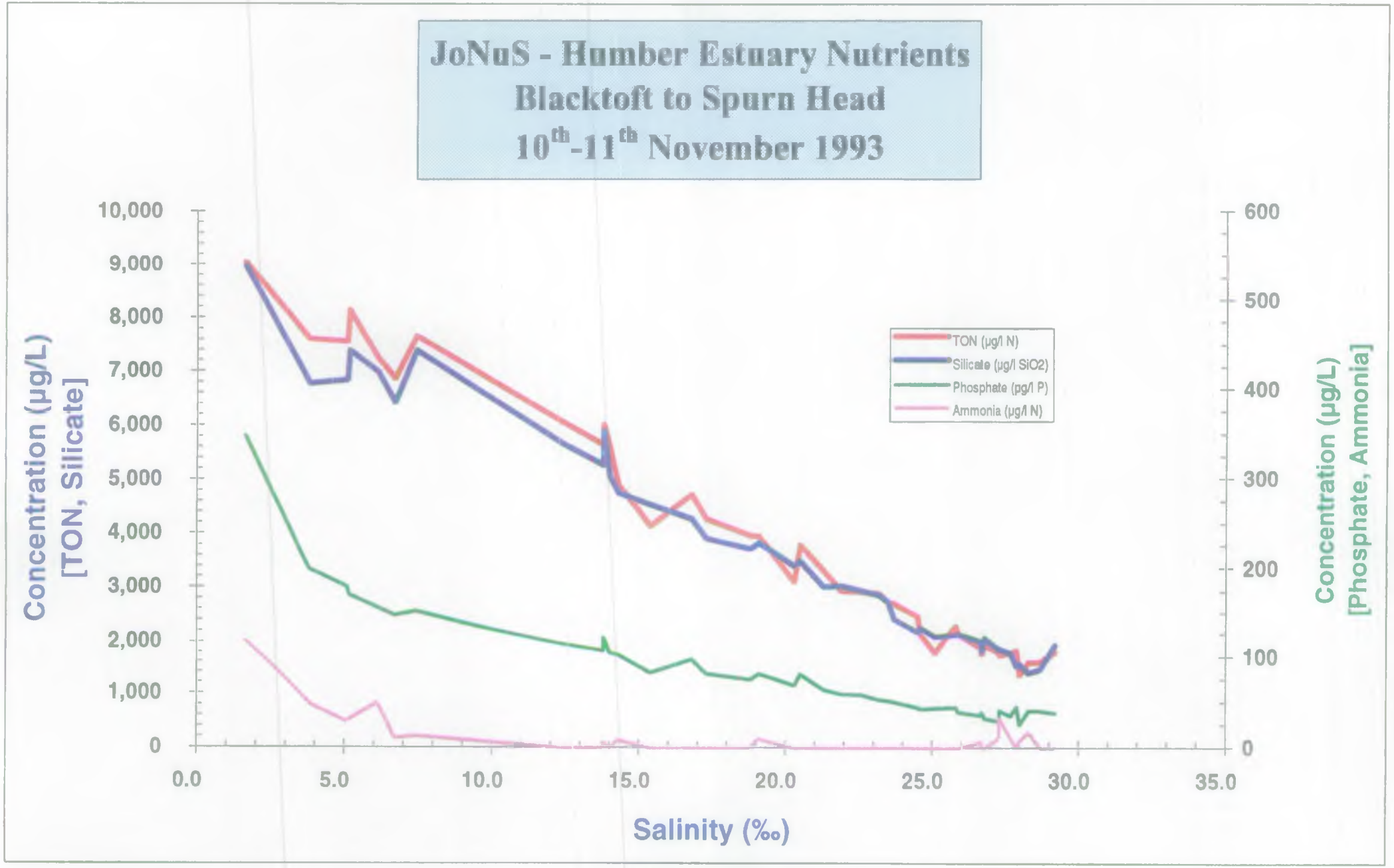

Figure 25

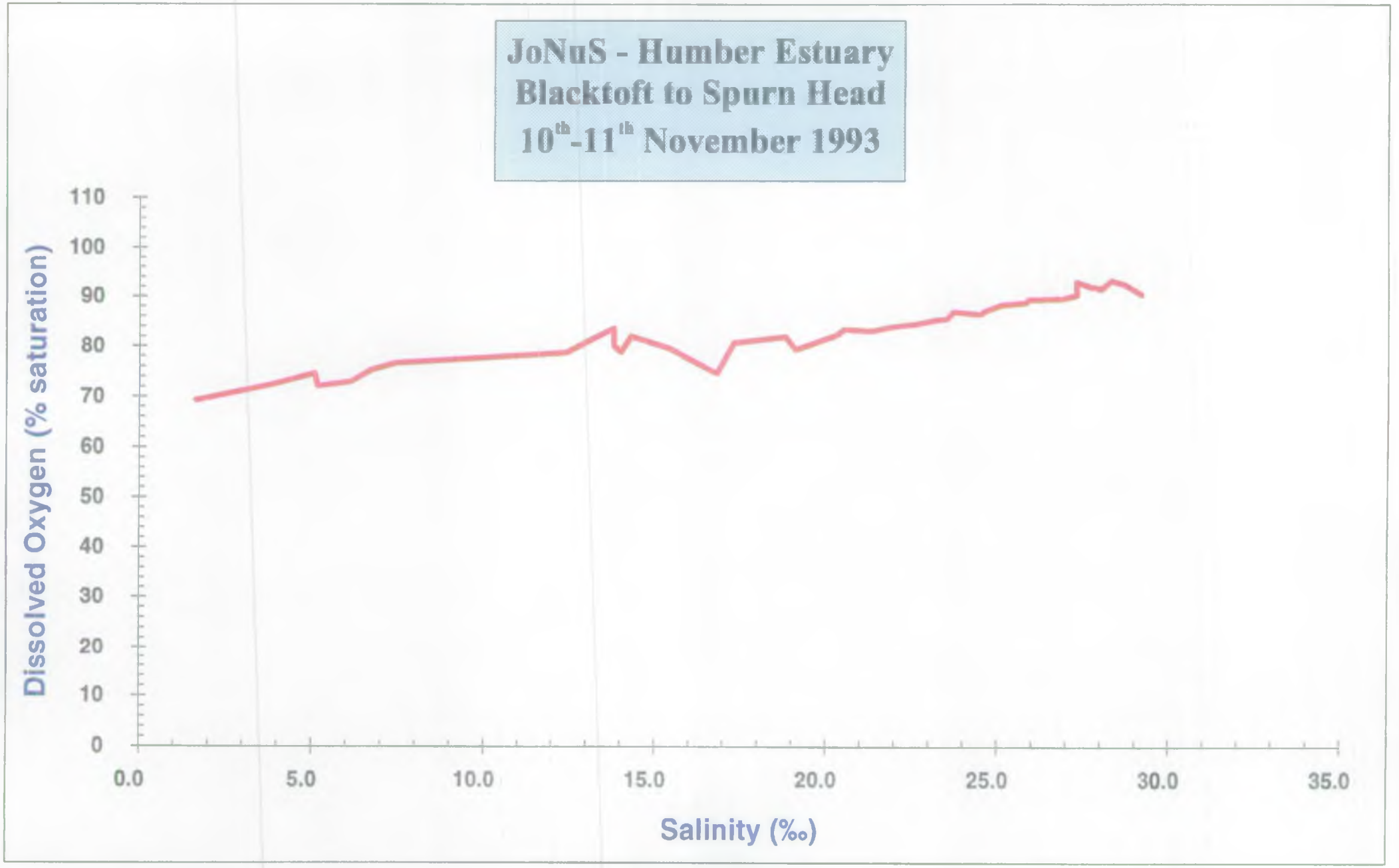

Figure 25a

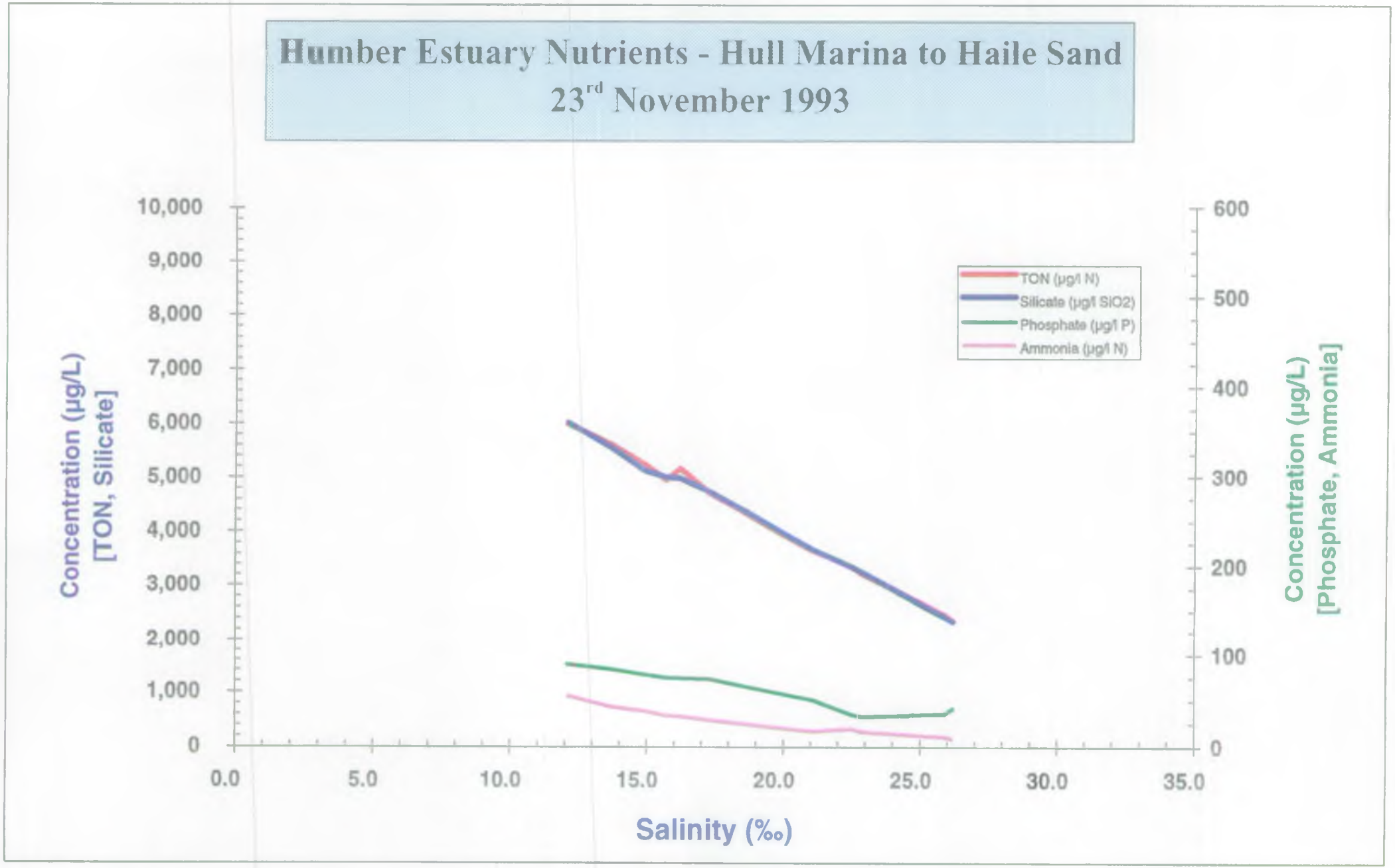

Figure 26

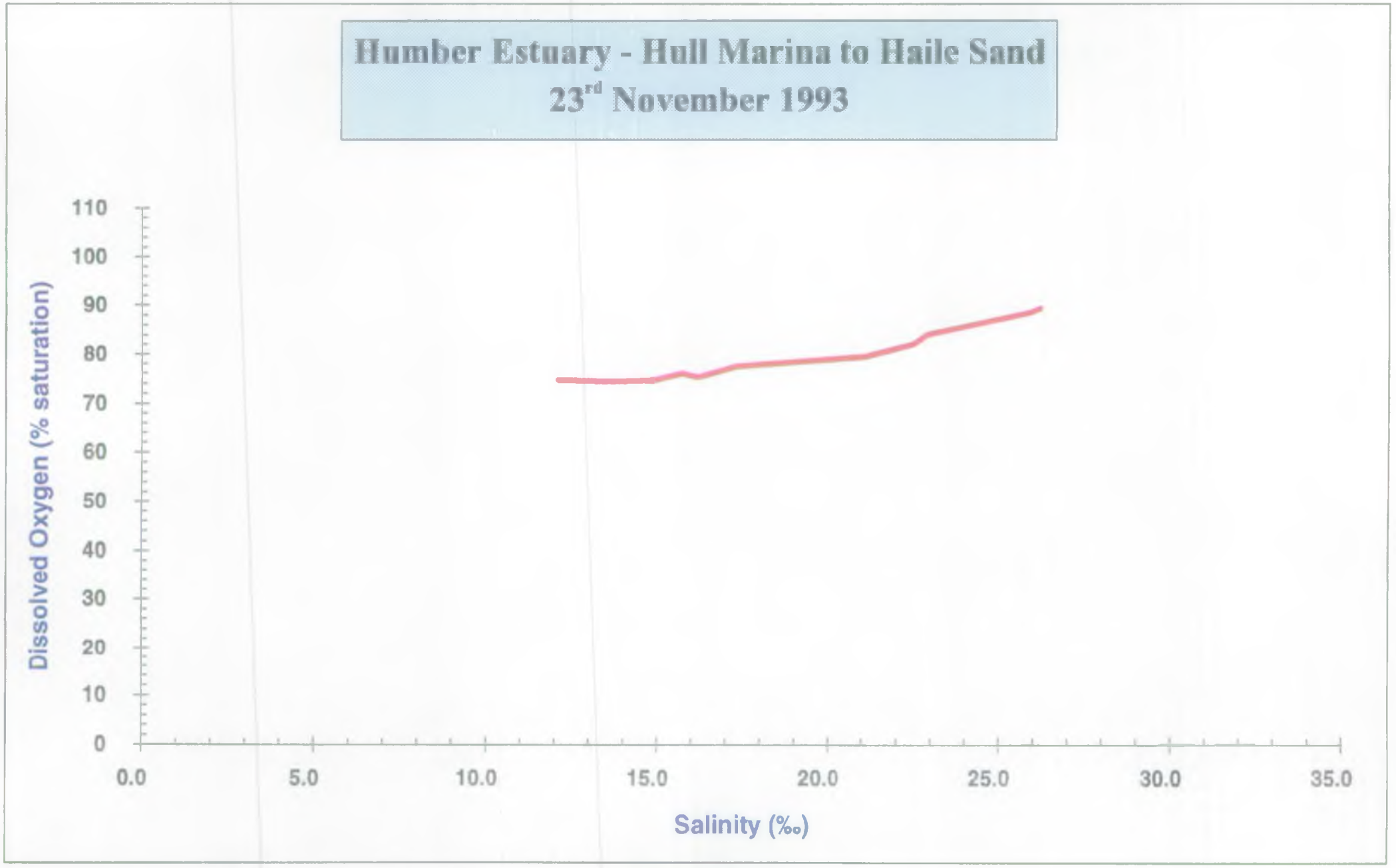

Figure 26a

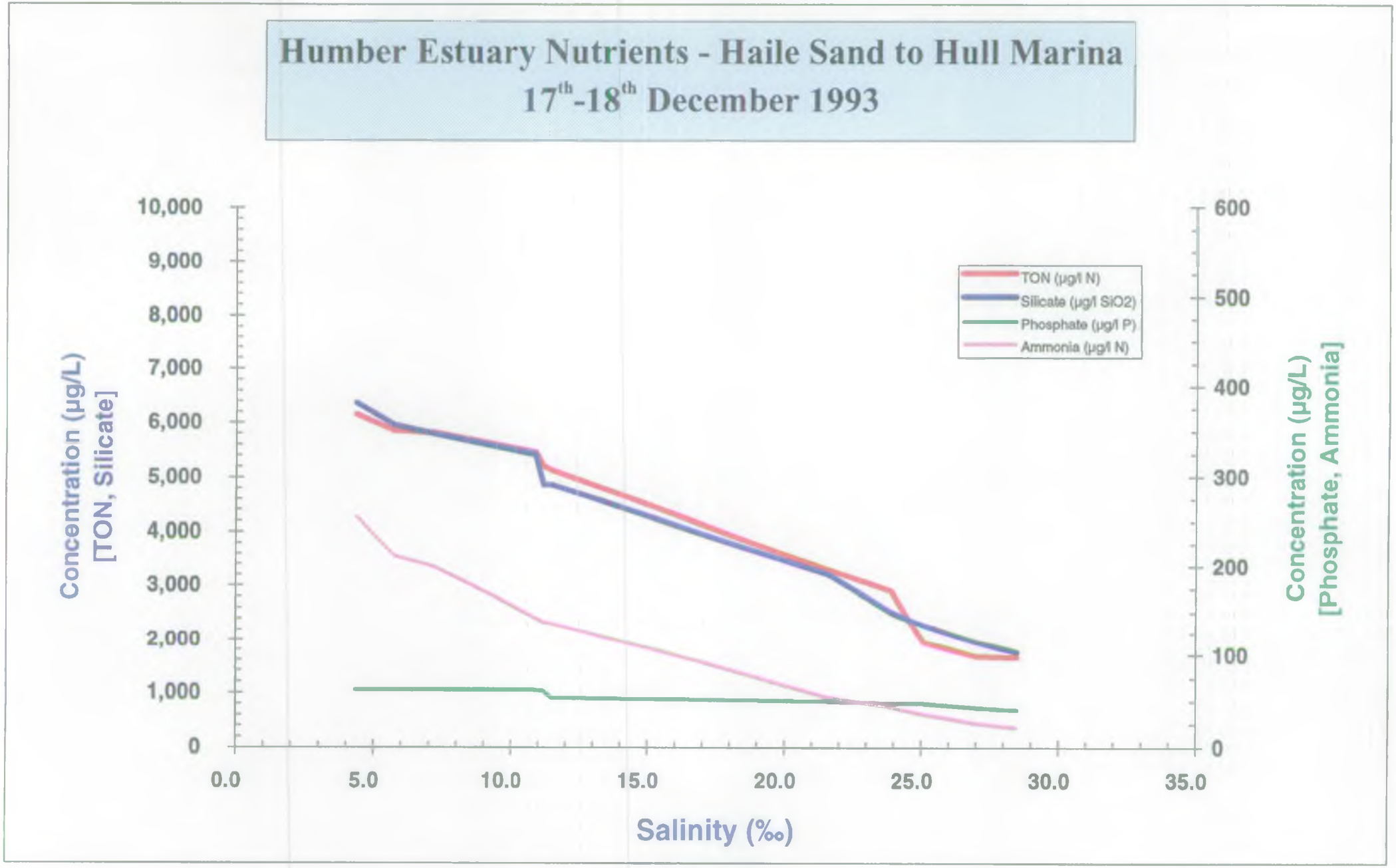

Figure 27

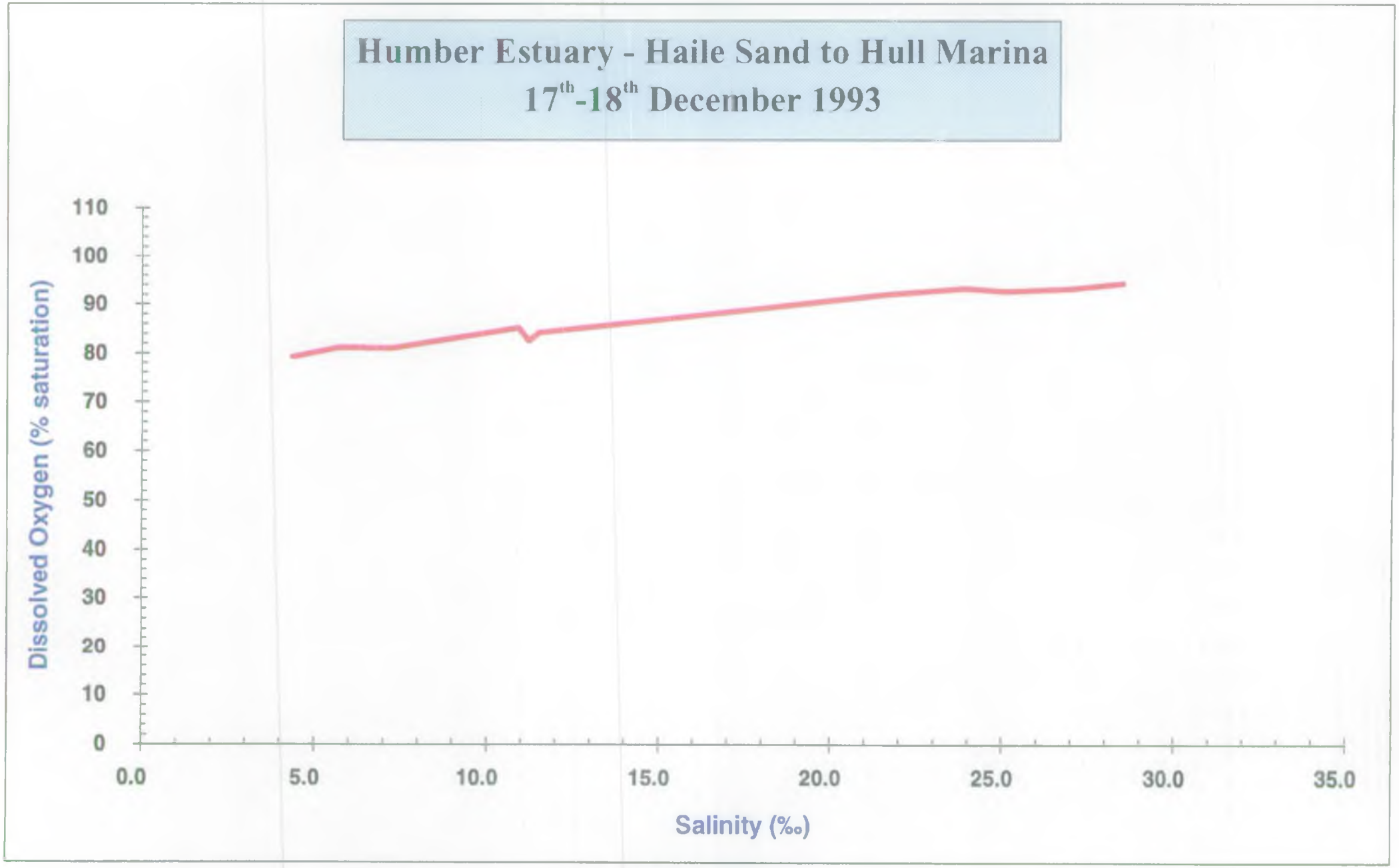

Figure 27a

Anglian Site Name	Easting	Northing	Sample Point Name	Sample Point Code
H 2	484500	423500	HUMBER 0.1 KM O/S BLACKTOFT	R03BIHU484423
H 1	486500	422500	HUMBER TRENT 1.3 KM U/S TRENT FALLS	R03BIHU486422
H 3	486500	423500	HUMBER 0.2 KM O/S APEX BUOY	R03BIHU486423
H 103	490500	425500	HUMBER 0.6 KM O/S WHITTON	R03BIHU490425
H 4	491500	425500	HUMBER 0.5 KM O/S WHITTON NESS	R03BIHU491425
H 104	494500	424500	HUMBER 1.5 KM O/S WINTERINGHAM HAVEN	R03BIHU494424
H 105	496500	422500	HUMBER READS ISLAND NORTH SIDE	R03BIHU496422
H 106	499500	424500	HUMBER 1.1 KM O/S CHOWDER NESS	R03BIHU499424
H 5	504500	425500	HUMBER NEAR HESSLE SAND 0.5 KM O/S	R03BIHU504425
H 107	508500	426500	HUMBER BUOY 26A 0.5 KM O/S WEST HULL	R03BIHU508426
H 26 / H 108	510500	427500	HUMBER BUOY 26 0.5 KM O/S HULL MARINA	R03BIHU510427
H 6	512500	427500	HUMBER EAST MIDDLE BUOY 0.6 KM O/S HULL	R03BIHU512427
H 21 / H 110	513500	427500	HUMBER BUOY 21 HEBBLES 0.4 KM O/S HULL	R03BIHU513427
H 20	514500	427500	HUMBER BUOY 20 0.3 KM EAST OF BUOY 21	R03BIHU514427
H 7 / H 16	515500	425500	HUMBER BUOY 16 SAND END 2.1 KM O/S	R03BIHU515425
H 112	515500	426500	HUMBER BUOY 18 ELBOW 1.1 KM O/S	R03BIHU515426
H 113	516500	423500	HUMBER BUOY 14 SKITTER HAVEN 1.7 KM O/S	R03BIHU516423
H 17	517500	422500	HUMBER BUOY 17 NORTH HOLME 2.0 KM O/S	R03BIHU517422
H 115	518500	419500	HUMBER BUOY 15 HOLME NOOK 1.2 KM O/S	R03BIHU518419
H 114	518500	420500	HUMBER BUOY 15A 1.6 KM O/S N KILLINGHOLME	R03BIHU518420
H 8	519500	417500	HUMBER BUOY 13 CLAY HUTS 1.0 KM O/S	R03BIHU519417
H 11a	520500	417500	HUMBER BUOY 11A 1.3 KM O/S IMMINGHAM	R03BIHU520417
H 116	521500	417500	HUMBER BUOY 11 HOLME 1.2 KM O/S IMMING.	R03BIHU521417
H 10a	522500	415500	HUMBER BUOY 10A 1.1 KM O/S STALLINGBORO	R03BIHU522415
H 9	522500	415500	HUMBER BUOY 10A 1.1 KM O/S STALLINGBORO	R03BIHU522415

Table 1 : Humber Estuary - *Sea Vigil* Sample Sites

Anglian Site Name	Easting	Northing	Sample Point Name	Sample Point Code
H 117	522500	416500	HUMBER BUOY 9A 1.5 KM O/S IMMINGHAM	R03BIHU522416
H 119	524500	415500	HUMBER BUOY 10 UPPER BURCOM 1.7 KM O/S	R03BIHU524415
H 6b / H 120	526500	414500	HUMBER BUOY 6B 3.0 KM O/S PYEWIPE	R03BIHU526414
H 131	527500	415500	HUMBER BUOY 63 SUNK CHANNEL)	R03BIHU527415
H 136	528500	413500	HUMBER BUOY 6A 2.1 KM O/S GRIMSBY	R03BIHU528413
H 130	529500	415500	HUMBER BUOY 61 SUNK CHANNEL	R03BIHU529415
H 6 / H 121	530500	412500	HUMBER BUOY 6 LOWER BURCOM 2.2 KM O/S	R03BIHU530412
H 129	530500	415500	HUMBER BUOY 59 SUNK CHANNEL	R03BIHU530415
H 122	532500	411500	HUMBER BUOY 4B 3.1 KM O/S CLEETHORPES	R03BIHU532411
H 128	532500	414500	HUMBER BUOY 57 HAWKE CHANNEL	R03BIHU532414
H 4a / H 123	534500	411500	HUMBER BUOY 4A CLEE NESS 4.4 KM O/S	R03BIHU534411
H 127	534500	414500	HUMBER BUOY 55 HAWKE CHANNEL	R03BIHU534414
H 135	535500	406500	HUMBER HAILE SAND FORT 1.7 KM O/S	R03BIHU535406
H 134	536500	407500	HUMBER SW HAILE ANCHORAGE 3.3 KM O/S	R03BIHU536407
H 13	536500	410500	HUMBER BUOY 4 BULL CHANNEL 5.3 KM O/S	R03BIHU536410
H 126	536500	413500	HUMBER BUOY 53 HAWKE CHANNEL	R03BIHU536413
H 2c	537500	406500	HUMBER BUOY 2C HAILE ANCHOR. 3.5 KM O/S	R03BIHU537406
H 133	537500	407500	HUMBER HAILE ANCHORAGE 4.5 KM O/S	R03BIHU537407
H 124	538500	409500	HUMBER BUOY BULL 1.4 KM O/S SPURN	R03BIHU538409
H 125	538500	411500	HUMBER BUOY 51 HAWKE CHANNEL	R03BIHU538411
H 132	540500	409500	HUMBER OFF SPURN HEAD 1.2 KM O/S	R03BIHU540409
H 2b	542500	405500	HUMBER BUOY 2B 6.8 KM O/S HAILE SAND	R03BIHU542405

Table 1 : Humber Estuary - *Sea Vigil* Sample Sites

Date	Survey Area	Surface Samples	Subsurface Samples	Comments
14-January-92	Humber - JoNuS	30		Sampled by MAFF
15-January-92	Humber - JoNuS	11		Sampled by MAFF
20-February-92	Humber - JoNuS	31		Sampled by MAFF
21-February-92	Humber - JoNuS	10		Sampled by MAFF
17-June-92	Humber - JoNuS	22		Sampled by MAFF
18-June-92	Humber - JoNuS	28		Sampled by MAFF
29-July-92	Humber Estuary	11		
05-August-92	Humber Estuary	11		
06-August-92	Humber - JoNuS	31	10	
12-August-92	Humber Estuary	11		
14-August-92	Humber Estuary	11		
17-August-92	Humber Estuary	11		
25-August-92	Humber Estuary	11		
04-September-92	Humber Estuary	11		
25-September-92	Humber Profile	35		Data not Available
28-September-92	Humber Estuary	11		
23-October-92	Humber Estuary	11		
23-December-92	Humber - JoNuS	42	11	
12-January-93	Humber - JoNuS	25	6	
13-January-93	Humber - JoNuS	16	5	
20-January-93	Humber Profile	34		Data not Available
09-March-93	Humber - JoNuS	11	5	
11-March-93	Humber - JoNuS	30	6	
08-April-93	Humber Estuary	10		
20-April-93	Humber - JoNuS	11	5	
21-April-93	Humber - JoNuS	30	6	
27-April-93	Humber Profile	18		Data not Available
05-May-93	Humber Estuary	11		
16-June-93	Humber - JoNuS	11	5	
17-June-93	Humber - JoNuS	30	6	
28-June-93	Humber Profile	15		Data not Available
07-August-93	Humber Estuary	11		
07-October-93	Humber Estuary	11		
20-October-93	Humber - JoNuS	31	6	
21-October-93	Humber - JoNuS	10	5	
10-November-93	Humber - JoNuS	10	5	
11-November-93	Humber - JoNuS	31	6	
23-November-93	Humber Estuary	11		
17-December-93	Humber Estuary	2		
18-December-93	Humber Estuary	9		

Table 2 : Humber Nutrient Surveys from *Sea Vigil* Sample Sites

Date	Survey Area	Data Table	Nutrients Profile	Dissolved Oxygen Profile
14-Jan-92	Humber - JoNuS	Table 4	Figure 2	n/a
15-Jan-92	Humber - JoNuS	Table 4	Figure 2	n/a
20-Feb-92	Humber - JoNuS	Table 5	Figure 3	n/a
21-Feb-92	Humber - JoNuS	Table 5	Figure 3	n/a
17-Jun-92	Humber - JoNuS	Table 6	Figure 4	n/a
18-Jun-92	Humber - JoNuS	Table 6	Figure 4	n/a
29-Jul-92	Humber Estuary	Table 7	Figure 5	Figure 5a
05-Aug-92	Humber Estuary	Table 8	Figure 6	Figure 6a
06-Aug-92	Humber - JoNuS	Table 9	Figure 7	Figure 7a
12-Aug-92	Humber Estuary	Table 10	Figure 8	Figure 8a
14-Aug-92	Humber Estuary	Table 11	Figure 9	Figure 9a
17-Aug-92	Humber Estuary	Table 12	Figure 10	Figure 10a
25-Aug-92	Humber Estuary	Table 13	Figure 11	Figure 11a
04-Sep-92	Humber Estuary	Table 14	Figure 12	data - No Salinity
25-Sep-92	Humber Profile	Data not Available		
28-Sep-92	Humber Estuary	Table 15	Figure 13	Figure 13a
23-Oct-92	Humber Estuary	Table 16	Figure 14	Figure 14a
23-Dec-92	Humber - JoNuS	Table 17	Figure 15	Figure 15a

Table 3 : Humber Surveys - Summary of Data Tables and Figures

Date	Survey Area	Data Table	Nutrients Profile	Dissolved Oxygen Profile
12-Jan-93	Humber - JoNuS	Table 18	Figure 16	Figure 16a
13-Jan-93	Humber - JoNuS	Table 18	Figure 16	Figure 16a
20-Jan-93	Humber Profile	Data not Available		
09-Mar-93	Humber - JoNuS	Table 19	Figure 17	Figure 17a
11-Mar-93	Humber - JoNuS	Table 19	Figure 17	Figure 17a
08-Apr-93	Humber Estuary	Table 20	Figure 18	Figure 18a
20-Apr-93	Humber - JoNuS	Table 21	Figure 19	Figure 19a
21-Apr-93	Humber - JoNuS	Table 21	Figure 19	Figure 19a
27-Apr-93	Humber Profile	Data not Available		
05-May-93	Humber Estuary	Table 22	Figure 20	Figure 20a
16-Jun-93	Humber - JoNuS	Table 23	Figure 21	Figure 21a
17-Jun-93	Humber - JoNuS	Table 23	Figure 21	Figure 21a
28-Jun-93	Humber Profile	Data not Available		
07-Aug-93	Humber Estuary	Table 24	Figure 22	Figure 22a
07-Oct-93	Humber Estuary	Table 25	Figure 23	Figure 23a
20-Oct-93	Humber - JoNuS	Table 26	Figure 24	Figure 24a
21-Oct-93	Humber - JoNuS	Table 26	Figure 24	Figure 24a
10-Nov-93	Humber - JoNuS	Table 27	Figure 25	Figure 25a
11-Nov-93	Humber - JoNuS	Table 27	Figure 25	Figure 25a
23-Nov-93	Humber Estuary	Table 28	Figure 26	Figure 26a
17-Dec-93	Humber Estuary	Table 29	Figure 27	Figure 27a
18-Dec-93	Humber Estuary	Table 29	Figure 27	Figure 27a

Table 3 : Humber Surveys - Summary of Data Tables and Figures

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO_2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Surface Samples													
14-January-92 09:03	H 136	20.9	5.5				300	3,390	2,884	11.8	49.6		
14-January-92 09:20	H 121	25.4	5.6				316	1,961	1,922	5.9	52.7		
14-January-92 09:32	H 122	27.3	5.8				297	1,611	1,682	7.6	40.3		
14-January-92 09:47	H 123	27.3	5.8				300	1,779	1,982	8.4	195.1		
14-January-92 10:04	H 13	27.3	5.7				300	1,625	1,622	8.4	49.6		
14-January-92 10:21	H 133	28.5	5.8				294	1,471	1,622	8.4	37.2		
14-January-92 10:38	H 135	26.5	5.6				291	1,793	1,922	7.6	34.1		
14-January-92 10:48	H 134	27.2	5.7				294	1,695	1,742	6.7	74.3		
14-January-92 11:04	H 124	29.7	5.8				297	1,191	1,322	7.6	34.1		
14-January-92 11:21	H 132	31.5	6.0				288	434	841	5.9	210.6		
14-January-92 11:44	H 125	30.0	5.9				294	1,079	1,141	5.9	37.2		
14-January-92 11:56	H 126	29.0	5.9				294	1,303	1,382	6.7	31.0		
14-January-92 12:12	H 127	25.9	5.7				284	1,933	1,922	7.6	34.1		
14-January-92 12:25	H 128	25.0	5.7				284	2,157	2,223	6.7	21.7		
14-January-92 12:38	H 129	26.6	5.7				288	1,793	1,802	6.7	27.9		
14-January-92 12:48	H 130	24.6	5.7				294	2,059	2,043	5.9	24.8		
14-January-92 13:01	H 131	25.0	5.7				297	2,087	2,043	5.9	24.8		
14-January-92 13:10	H 120	21.5	5.6				288	2,941	2,703	6.7	34.1		
14-January-92 13:27	H 119	20.3	5.6				294	3,166	2,884	6.7	40.3		
14-January-92 13:42	H 9	18.2	5.5				278	3,656	3,304	8.4	18.6		
14-January-92 13:57	H 117	18.1	5.4				291	3,698	3,304	8.4	24.8		
14-January-92 14:11	H 116	19.5	5.6				284	3,348	3,004	8.4	40.3		
14-January-92 14:26	H 8	20.6	5.6				275	2,927	2,884	7.6	27.9		
14-January-92 14:50	H 115	13.6	5.4				284	4,006	3,785	9.2	52.7		
14-January-92 15:08	H 114	13.9	5.4				284	4,398	4,085	8.4	58.9		
14-January-92 15:34	H 113	12.9	5.5				275	4,636	4,325	10.1	58.9		
14-January-92 15:54	H 7	11.5	5.5				250	4,790	4,686	12.6	71.2		

Table 4 : MAFF Humber Estuary JoNuS Survey - January 1992.

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO_2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Surface Samples													
14-January-92 16:12	H 112	10.3	5.4				266	5,098	4,626	10.9	71.2		
14-January-92 16:28	H 110	10.1	5.4				263	5,491	4,866	13.4	86.7		
14-January-92 16:45	H 6	7.8	5.3				244	5,813	5,226	17.6	86.7		
15-January-92 10:37	H 108	6.8	5.1				266	6,989	5,647	31.1	102.2		
15-January-92 11:01	H 5	5.1	5.0				256	7,227	5,827	32.8	108.4		
15-January-92 11:21	H 106	2.7	4.9				259	8,082	6,488	52.9	120.8		
15-January-92 11:57	H 104	1.2	4.4				291	9,581	7,149	69.8	136.3		
15-January-92 12:21	H 103	0.6	4.2				331	11,864	8,230	76.5	219.9		
15-January-92 12:50	H 2	0.5	4.4				325	7,382	7,209	81.5	219.9		
15-January-92 13:09	H 3	0.5	4.4				328	8,796	7,329	79.8	213.7		
15-January-92 13:23	H 1	0.2	4.3				325	12,480	8,470	82	263		
15-January-92 13:59	H 4	0.8	4.4				294	10,603	7,509	73.1	161.1		
15-January-92 14:34	H 105	3.5	4.9				263	8,082	6,368	47.9	117.7		
15-January-92 15:24	H 107	10.4	5.2				278	5,813	4,926	16.8	86.7		
Subsurface Samples													
14-January-92 11:04	H 124	33.0	6.3					546	661	6.7	34.1		
14-January-92 13:42	H 9	24.5	5.9					2,143	2,043	6.7	24.8		
14-January-92 14:26	H 8	25.7	5.9					2,003	1,922	6.7	24.8		
14-January-92 15:54	H 7	15.3	5.7					4,090	3,725	8.4	52.7		
14-January-92 16:45	H 6	11.1	5.5					5,267	4,506	10.1	74.3		
15-January-92 11:01	H 5	6.3	5.1					6,681	5,827	26.1	105.3		
15-January-92 12:50	H 2	0.4	4.4					7,382	6,969	85.7	219.9		
15-January-92 13:09	H 3	0.5	4.3					7,690	6,848	77.3	188.9		
15-January-92 13:23	H 1	0.4	4.3					11,934	8,230	79.8	254.0		
15-January-92 13:59	H 4	1.0	4.5					10,127	7,269	72.3	148.7		

Table 4 : MAFF Humber Estuary JoNuS Survey - January 1992.

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Surface Samples													
20-February-92 08:58	H 110	21.7	4.4				331	2,675	3,124	4.6	42.7		
20-February-92 09:14	H 7	21.7	4.3				309	3,796	3,124	3.8	37.2		
20-February-92 09:34	H 114	23.6	4.4				316	3,067	2,643	3.4	32.8		
20-February-92 09:48	H 8	23.7	4.4				309	2,899	2,703	3.4	32.5		
20-February-92 10:00	H 117	27.9	4.5				325	2,003	1,742	2.8	28.5		
20-February-92 10:13	H 119	28.0	4.5				325	1,793	1,562	2.8	26.6		
20-February-92 10:26	H 120	28.1	4.5				331	1,933	1,682	2.8	27.6		
20-February-92 10:36	H 136	28.7	4.6				325	1,751	1,562	2.9	24.8		
20-February-92 10:47	H 121	30.3	4.7				328	1,373	1,262	2.4	27.3		
20-February-92 10:59	H 122	29.3	4.6				319	1,527	1,382	2.7	22.9		
20-February-92 11:08	H 123	29.7	4.6				322	1,485	1,322	2.5	22.9		
20-February-92 11:21	H 13	30.2	4.7				325	1,387	1,322	2.4	20.8		
20-February-92 11:52	H 135	30.0	4.4				334	1,457	1,262	3.2	28.5		
20-February-92 12:04	H 134	30.1	4.6				328	1,415	1,262	2.7	26.0		
20-February-92 12:13	H 133	30.1	4.6				328	1,457	1,322	2.8	26.0		
20-February-92 12:25	H 124	28.7	4.6				316	1,835	1,622	2.7	27.9		
20-February-92 12:38	H 132	29.4	4.5				334	1,653	1,442	2.9	28.2		
20-February-92 13:07	H 125	27.4	4.4				334	2,297	1,922	3.4	26.6		
20-February-92 13:23	H 126	28.2	4.6				325	2,003	1,682	2.8	27.6		
20-February-92 13:41	H 127	27.1	4.5				322	2,339	1,862	3.1	27.3		
20-February-92 13:56	H 128	25.2	4.5				319	2,885	2,343	3.5	28.5		
20-February-92 14:10	H 129	24.5	4.5				322	3,067	2,463	3.2	29.4		
20-February-92 14:21	H 130	23.8	4.5				319	3,320	2,643	3.6	31.9		
20-February-92 14:35	H 131	22.0	4.4				319	3,838	3,004	3.9	36.2		
20-February-92 14:57	H 9	21.3	4.4				297	4,314	3,424	4.2	41.8		
20-February-92 15:12	H 116	19.6	4.4				300	4,482	3,424	4.8	44.0		
20-February-92 15:29	H 115	18.5	4.4				303	4,832	3,905	5.2	51.7		

Table 5 : MAFF Humber Estuary JoNuS Survey - February 1992.

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Surface Samples													
20-February-92 16:08	H 113	18.7	4.4				303	4,790	3,905	6.7	55.1		
20-February-92 16:21	H 112	18.3	4.4				303	4,916	4,025	6.7	60.7		
20-February-92 16:38	H 6	18.2	4.4				291	4,510	4,025	7.4	58.5		
20-February-92 16:55	H 108	17.6	4.4				306	4,762	4,145	7.7	61.9		
21-February-92 06:07	H 5	16.7	4.3				291	5,000	4,325	9.4	68.1		
21-February-92 06:22	H 106	15.0	4.3				275	5,351	4,686	9.4	65.0		
21-February-92 06:52	H 104	16.2	4.2				231	5,126	4,325	8.5	65.0		
21-February-92 07:17	H 103	11.7	4.4				231	6,793	5,947	35.0	65.0		
21-February-92 07:42	H 2	8.2	4.4				209	6,863	6,128	35.0	77.4		
21-February-92 08:15	H 1	7.3	4.6				178	7,718	6,969	49	102		
21-February-92 08:32	H 3	13.0	4.3				247	6,121	5,106	17.5	61.9		
21-February-92 09:01	H 4	13.1	4.3				253	5,995	5,046	18.6	61.9		
21-February-92 09:32	H 105	16.5	4.3				316	5,351	4,445	11.2	61.9		
21-February-92 10:14	H 107	19.7	4.4				316	4,818	3,905	9.4	61.9		
Subsurface Samples													
20-February-92 09:14	H 7	26.3	4.5					3,292	2,703	3.1	35.9		
20-February-92 09:48	H 8	29.0	4.6					1,933	1,742	2.7	29.1		
20-February-92 12:25	H 124	29.1	4.6					1,737	1,562	2.7	28.5		
20-February-92 14:57	H 9	21.3	4.4					3,936	3,184	2.9	41.2		
20-February-92 16:38	H 6	18.2	4.4					4,636	4,025	7.4	60.1		
21-February-92 06:07	H 5	17.3	4.3					4,874	4,145	8.3	61.9		
21-February-92 07:42	H 2	10.6	4.4					6,583	5,887	25.2	55.1		
21-February-92 08:15	H 1	9.3	4.5					6,793	5,827	29.4	77.4		
21-February-92 08:32	H 3	13.2	4.3					5,869	4,926	16.8	61.9		
21-February-92 09:01	H 4	13.9	4.3					5,939	4,926	16.1	65.0		

Table 5 : MAFF Humber Estuary JoNuS Survey - February 1992.

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Surface Samples													
17-June-92 09:40	H 206	0.62	19.2					4,342	5,587	448.2	170.4	714.3	
17-June-92 10:05	H 207	0.69	19.2					5,743	6,728	518.2	182.7	252.1	
17-June-92 10:27	H 208	0.73	19.1					6,303	7,209	462.2	185.8	322.2	
17-June-92 10:35	H 209	0.77	19.2					6,303	7,209	448.2	188.9	294.1	
17-June-92 10:55	H 210	0.00	19.1					6,583	7,209	213	186	107.9	
17-June-92 11:04	H 201	1.08	19.1					6,583	7,449	189.1	179.6	99.4	
17-June-92 11:25	H 211	1.51	19.1					4,902	5,407	54.6	136.3	58.8	
17-June-92 11:37	H 212	1.70	19.1					6,723	7,269	42.0	179.6	58.8	
17-June-92 11:52	H 213	1.98	19.1					6,583	6,969	18.2	182.7	60.2	
17-June-92 12:02	H 203	2.24	19.1					6,163	6,548	16.8	176.6	60.2	
17-June-92 12:12	H 214	2.29	19.0					6,583	7,029	16.8	185.8	60.2	
17-June-92 12:28	H 215	3.02	18.9					6,303	6,969	7.0	182.7	32.2	
17-June-92 12:43	H 2	2.45	18.7					6,303	6,848	3.1	179.6	30.8	
17-June-92 12:57	H 3	4.80	18.8					6,303	6,668	2.8	176.6	25.2	
17-June-92 13:17	H 1	2.63	19.4					6,863	7,449	5.6	269.5	54.6	
17-June-92 17:48	H 103	6.35	19.2					6,163	6,188	8.4	170.4	61.6	
17-June-92 18:06	H 4	10.10	19.6					5,463	5,166	7.0	123.9	81.2	
17-June-92 18:40	H 104	15.41	18.5					4,062	3,544	2.8	120.8	22.4	
17-June-92 19:00	H 105	17.07	18.3					3,922	3,304	4.2	117.7	28.0	
17-June-92 19:24	H 106	17.90	18.1					3,642	2,823	2.5	102.2	39.2	
17-June-92 19:50	H 5	20.15	17.9					3,362	2,463	5.6	102.2	46.2	
17-June-92 20:12	H 107	21.70	17.8					3,011	2,283	6.3	86.7	25.2	
18-June-92 09:28	H 110	23.79	17.4					2,591	1,742	7.0	74.3	40.6	
18-June-92 09:48	H 7	22.70	16.7					2,451	1,622	7.0	71.2	40.6	
18-June-92 10:02	H 114	23.00	17.0					2,283	1,562	6.6	58.9	46.2	
18-June-92 10:18	H 8	24.20	16.5					1,961	1,322	7.0	52.7	40.6	
18-June-92 10:31	H 117	27.90	16.9					1,541	1,021	6.6	52.7	37.8	

Table 6 : MAFF Humber Estuary JoNuS Survey - June 1992.

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Surface Samples													
18-June-92 10:44	H 119	26.20	16.6					1,443	901	6.6	43.4	44.8	
18-June-92 10:57	H 120	26.20	16.5					1,471	901	6.9	43.4	29.4	
18-June-92 11:07	H 136	26.90	16.1	0.0				1,065	685	5.6	22.9	18.2	
18-June-92 11:17	H 121	26.90	16.5					980	565	5.6	18.6	23.8	
18-June-92 11:29	H 122	27.00	16.5					1,065	619	6.2	24.8	224.1	
18-June-92 11:36	H 123	27.10	16.5					1,008	571	5.3	19.8	16.8	
18-June-92 11:48	H 13	28.20	16.0	0.0				742	409	5.3	29.7	21.0	
18-June-92 12:02	H 133	28.20	16.1					644	336	5.3	18.6	25.2	
18-June-92 12:18	H 124	28.50	16.1					700	384	4.8	29.1	25.2	
18-June-92 12:45	H 125	30.74	16.1					812	427	5.3	29.7	25.2	
18-June-92 13:03	H 126	30.43	16.4					714	402	5.0	31.0	22.4	
18-June-92 13:24	H 127	27.20	16.5					994	571	5.6	40.3	30.8	
18-June-92 13:40	H 128	25.90	16.5					1,611	931	5.9	46.5	25.2	
18-June-92 14:00	H 129	25.00	16.8					1,779	1,063	6.7	52.7	42.0	
18-June-92 14:10	H 130	24.20	16.8					2,031	1,201	6.7	55.8	22.4	
18-June-92 14:25	H 131	23.00	17.1					2,269	1,448	6.7	61.9	30.8	
18-June-92 14:55	H 9	20.20	17.0	0.0				3,081	2,283	5.9	77.4	26.6	
18-June-92 15:08	H 116	20.00	17.3					3,152	2,283	5.6	83.6	25.2	
18-June-92 15:25	H 115	19.10	17.3					3,362	2,463	3.9	92.9	25.2	
18-June-92 15:50	H 113	18.10	17.4										
18-June-92 16:07	H 112	17.86	17.8					3,992	3,004	5.6	111.5	40.6	
18-June-92 16:26	H 6	16.20	16.7	0.0				4,132	3,304	5.6	114.6	42.0	
18-June-92 16:46	H 108	16.20	17.4					4,202	3,424	5.0	117.7	44.8	

Table 6 : MAFF Humber Estuary JoNuS Survey - June 1992.

Date & Time	Site No.	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (µM/l)	Nitrate (µg/l N)	Silicate (µg/l SiO2)	Nitrite (µg/l N)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
Subsurface Samples													
17-June-92 09:40	H 206	0.47	19.2	6.0				4,062	5,707	448.2	145.6	322.2	
17-June-92 11:04	H 201	0.96	19.1	4.0				6,163	6,969	155.5	167.3	71.4	
17-June-92 12:43	H 2	3.91	18.7	7.0				6,443	6,848	3.4	185.8	30.8	
17-June-92 12:57	H 3	4.81	18.7	5.0				6,443	6,488	3.2	179.6	74.2	
17-June-92 13:17	H 1	2.60	19.3	3.0				6,863	7,569	4.8	257.1	30.8	
17-June-92 18:06	H 4	10.32	19.2	4.0				5,182	4,866	8.4	139.4	56.0	
17-June-92 19:50	H 5	21.09	17.8	8.0				3,081	2,283	4.2	86.7	21.0	
18-June-92 09:48	H 7	24.38	17.2	11.0				2,381	1,622	7.0	65.0	28.0	
18-June-92 10:18	H 8	26.07	16.9	14.0				2,031	1,322	7.0	49.6	29.4	
18-June-92 11:07	H 136	28.78	16.7	11.0				1,022	655	5.6	26.0	23.8	
18-June-92 11:48	H 13	30.56	16.3	12.0				770	409	4.8	29.7	23.8	
18-June-92 14:55	H 9	21.81	17.5	10.0				3,011	2,163	6.2	77.4	30.8	
18-June-92 16:26	H 6	16.98	17.9	6.0				4,202	3,304	5.3	117.7	22.4	

Table 6 : MAFF Humber Estuary JoNuS Survey - June 1992.

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Phosphate (µg/l P)	Ammonia (µg/l N)	Chlorophyll a (µg/l)
29-July 09:00	H 26	Hull Marina	21.6	17.8	9.8		78		3,850	1,940	76	22	
29-July 09:14	H 21	Hebbles	23.1	17.6	6.6		79		3,040	1,410	52	29	
29-July 09:25	H 16	Sand End	23.0	17.7	9.2		78		3,010	1,490	54	27	
29-July 09:36	H 17	North Holme	23.2	17.7	9.8		85		2,620	1,580	58	33	
29-July 09:50	H 11A	Immingham	24.3	17.7	6.2		84		2,770	1,420	50	37	
29-July 10:02	H 10A	Stallingborough	24.8	17.6	15.0		86		1,450	1,040	35	31	
29-July 10:16	H 6B	Pyewipe	26.0	17.6	11.3		87		1,270	833	31	32	
29-July 10:30	H 6	Lower Burcom	27.2	17.5	8.1		92		927	471	5	29	
29-July 10:42	H 4A	Clee Ness	27.6	17.4	9.8		94		834	384	13	33	
29-July 11:05	H 2C	Halle Anchor	28.5	17.5	11.0		108		607	108	10	20	
29-July 11:26	H 2B	Halle Sand	29.0	17.4	12.1		110		577	93	17	30	

Table 7 : Humber Estuary Water Quality Survey, 29th July 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	Ammonia (µg/l N)	TON (µg/l N)	Silicate (µg/l SiO_2)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
05-August 18:39	H 2B	Haile Sand	30.1	17.4	12.9		92		42	528	434	48	
05-August 19:10	H 2C	Haile Anchor	29.8	17.7	12.4		92		46	709	510	31	
05-August 19:32	H 4A	Clee Ness	28.6	17.8	9.7		87		35	1,000	849	55	
05-August 19:47	H 6	Lower Burcom	28.9	17.7	9.1		88		43	1,070	863	42	
05-August 20:05	H 6B	Pyewipe	25.3	17.9	12.7		82		14	2,030	1,740	68	
05-August 20:22	H 10A	Stallingborough	25.1	17.9	7.7		80		13	2,190	1,880	46	
05-August 20:32	H 11A	Immingham		17.9	7.8		81		15	2,120	1,850	71	
05-August 20:50	H 17	North Holme		17.9	10.1		80		12	2,530	2,240	83	
05-August 21:02	H 16	Sand End	22.9	17.9	9.0		80		11	2,770	2,420	88	
05-August 21:11	H 21	Hebbles	22.8	17.9	10.3		79		12	2,810	2,500	93	
05-August 21:24	H 26	Hull Marina	21.4	18.0	8.1		79		10	3,170	2,840	99	

Table 8 : Humber Estuary Water Quality Survey, 5th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
06-August 10:10	H 107	West Hull	21.2	17.6	1.0	7.0		80		2,950	2,750	14	100
06-August 10:27	H 5	Hessle Sand	21.0	17.5	1.0	5.2		77		3,080	2,800	16	103
06-August 10:27	H 5	Hessle Sand	20.9	17.5	4.7	5.2		66		3,110	2,870	15	104
06-August 10:45	H 106	Chowder Ness	20.0	17.4	1.0	5.7		80		3,430	3,170	15	108
06-August 11:06	H 105	Reads Island	19.4	17.5	1.0	3.6		78		3,610	3,380	15	109
06-August 11:25	H 104	Winteringham	16.6	17.3	1.0	4.7		76		4,430	4,040	15	113
06-August 11:42	H 4	Whitton Ness	16.5	17.3	1.0	4.7		72		4,560	4,140	11	112
06-August 11:42	H 4	Whitton Ness	17.2	17.2	4.2	4.7		77		4,310	3,920	16	112
06-August 11:53	H 103	Whitton	16.1	17.4	1.0	5.5		73		4,640	4,110	16	111
06-August 12:18	H 1	Trent Falls	13.9	17.5	1.0	4.5		72		5,100	4,760	7	119
06-August 12:18	H 1	Trent Falls	14.3	17.4	4.0	4.5		68		4,860	4,590	16	122
06-August 12:40	H 2	Blacktoft	14.3	17.5	1.0	6.0		76		4,740	4,480	17	121
06-August 12:40	H 2	Blacktoft	14.9	17.5	5.5	6.0		72		4,650	4,330	25	128
06-August 12:58	H 3	Apex Buoy	15.3	17.5	1.0	7.0		76		4,600	4,240	13	118
06-August 12:58	H 3	Apex Buoy	16.1	17.4	6.5	7.0		75		4,290	4,000	17	115
06-August 14:33	H 26/108	Hull Marina	23.3	18.2	1.0	9.0		82		2,430	2,260	13	88
06-August 14:45	H 6	Middle Buoy	23.8	18.1	1.0	6.8		83		2,310	2,150	13	84
06-August 14:45	H 6	Middle Buoy	24.1	17.9	6.3	6.8		82		2,190	2,040	18	82
06-August 14:55	H 21	Hebbles	23.4	17.9	1.0	7.9		85		2,200	2,050	15	82
06-August 15:05	H 112	Elbow	24.2	17.9	1.0	11.0		83		2,250	1,990	17	79
06-August 15:12	H 16	Sand End	24.8	17.8	1.0	9.8		81		2,070	1,830	20	72
06-August 15:12	H 16	Sand End	24.8	17.8	9.3	9.8		82		2,090	1,840	19	73
06-August 15:23	H 113	Skitter Haven	24.8	17.9	1.0	10.0		83		2,090	1,870	17	74
06-August 15:35	H 114	Killingholme	25.1	18.1	1.0	9.4		87		2,060	1,780	16	72
06-August 15:48	H 115	Holme Nook	25.1	17.8	1.0	9.7		85		1,970	1,720	17	71
06-August 15:53	H 8	Clay Huts	25.5	17.8	1.0	12.6		87		1,870	1,620	19	66
06-August 15:53	H 8	Clay Huts	25.5	17.6	12.1	12.6		83		1,530	1,340	27	58
06-August 16:07	H 116	1.2km Immingham	26.2	17.7	1.0	18.4		84		1,580	1,390	22	62

Table 9 : Humber Estuary Water Quality Survey, 6th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
06-August 16:15	H 117	1.5km Immingham	26.0	17.8	1.0	8.0		85					
06-August 16:25	H 10A	Stallingborough	26.2	17.6	1.0	7.1		85		1,560	1,370	24	55
06-August 16:25	H 10A	Stallingborough	26.4	17.7	6.6	7.1		88		1,570	1,370	25	55
06-August 16:40	H 119	Upper Burcom	27.5	17.8	1.0	9.0		84		1,500	1,300	25	55
06-August 16:58	H 6B	Pyewipe	27.6	19.0	1.0	12.1		89		1,600	1,400	20	65
06-August 17:10	H 136	Grimsby	28.4	18.0	1.0	9.2		88		1,460	1,270	24	60
06-August 17:23	H 6	Lower Burcom	28.6	18.3	1.0	7.4		87		1,380	1,190	25	56
06-August 17:38	H 122	Cleethorpes	28.7	18.1	1.0	10.1		89		1,160	995	31	32
06-August 17:50	H 4A	Clee Ness	28.8	18.0	1.0	8.6		88		1,090	939	33	49
06-August 18:01	H 13	Bull Channel	28.9	17.9	1.0	10.6		89		931	786	36	31
06-August 18:22	H 134	Haile Anchorage 3.3	29.6	18.0	1.0	7.3		90		739	557	45	42
06-August 18:36	H 135	Haile Sand Fort	30.0	18.0	1.0	5.3		96		644	450	47	42
06-August 18:50	H 133	Haile Anchorage 4.5	29.2	17.6	1.0	11.5		91		887	733	39	29
06-August 18:58	H 124	Bull	29.8	17.7	1.0	15.6		93		758	674	40	58
06-August 18:58	H 124	Bull	30.1	17.5	15.1	15.6		92		596	518	49	52
06-August 19:10	H 132	Spurn Head	29.9	17.8	1.0	18.8		94		688	621	37	57
06-August 19:26	H 125	B51 Hawke Channel	29.7	18.6	1.0	3.9		96		906	791	37	60
06-August 19:36	H 126	B53 Hawke Channel	28.0	17.8	1.0	10.0		91		1,120	996	28	60
06-August 19:52	H 127	B55 Hawke Channel	28.0	17.7	1.0	13.0		90		1,200	1,070	28	60
06-August 20:03	H 128	B57 Hawke Channel	27.6	17.6	1.0	7.5		88		1,290	1,160	25	61
06-August 20:15	H 129	B59 Sunk Channel	27.2	17.6	1.0	9.8		87		1,370	1,300	23	61
06-August 20:15	H 129	B59 Sunk Channel	27.2	17.6	1.0	9.8		87		1,370	1,300	23	61
06-August 20:23	H 130	B61 Sunk Channel	26.9	17.6	1.0	9.0		87		1,520	1,430	21	64
06-August 20:30	H 131	B62 Sunk Channel	26.6	17.6	1.0	10.7		86		1,550	1,460	20	64

Table 9 : Humber Estuary Water Quality Survey, 6th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
12-August 09:22	H 26	Hull Marina	20.2	17.1	9.0		84		2,920	2,720	10	110	
12-August 09:37	H 21	Hebbles	23.0	17.1	9.5		82		2,390	2,220	14	92	
12-August 09:50	H 16	Sand End	23.6	17.1	8.9		84		2,250	2,060	58	88	
12-August 10:03	H 17	North Holme	24.0	17.1	9.0		86		2,160	1,970	24	78	
12-August 10:24	H 11A	Immingham	25.1	17.1	9.7		86		1,860	1,710	30	65	
12-August 10:33	H 10A	Stallingborough	25.8	17.1	6.9		88		1,680	1,530	32	49	
12-August 10:53	H 6B	Pyewipe	26.8	17.0	10.2		86		1,490	1,260	38	39	
12-August 11:12	H 6	Lower Burcom	28.1	17.0	6.2		88		1,060	850	50	28	
12-August 11:30	H 4A	Clee Ness	28.4	17.0	4.5		88		1,020	803	52	18	
12-August 11:56	H 2C	Haile Anchor	29.0	16.9	11.2		91		767	580	59	35	
12-August 12:20	H 2B	Haile Sand	29.8	16.9	10.0		93		582	413	44	38	

Table 10 : Humber Estuary Water Quality Survey, 12th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
14-August 14:00	H 2B	Haile Sand	27.5	16.7	18.0		96		599	420	48	45	
14-August 14:20	H 2C	Haile Anchor	26.8	16.5	11.7		95		861	609	55	35	
14-August 14:42	H 4A	Clee Ness	26.1	16.4	8.2		93		1,020	733	58	31	
14-August 14:57	H 6	Lower Burcom	24.0	16.6	6.5		90		1,700	1,310	33	54	
14-August 15:15	H 6B	Pyewipe	23.1	16.6	11.5		89		2,090	1,530	24	67	
14-August 15:34	H 10A	Stallingborough	22.1	16.6	7.3		88		2,420	1,520	17	71	
14-August 15:50	H 11A	Immingham	20.8	16.6	7.4		88		2,850	1,960	17	99	
14-August 16:08	H 17	North Holme	20.3	16.6	9.4		87		2,840	1,900	16	101	
14-August 16:22	H 16	Sand End	19.3	16.5	8.0		86		3,550	1,950	15	112	
14-August 16:36	H 21	Hebbles	18.5	16.5	5.0		86		3,450	2,420	16	134	
14-August 16:51	H 26	Hull Marina	17.1	16.5	7.4		84		3,840	2,970	15	147	

Table 11 : Humber Estuary Water Quality Survey, 14th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
17-August 10:30	H 26	Hull Marina	21.1	16.6	11.1		85		2,400	1,860	19	83	
17-August 10:45	H 21	Hebbles	21.2	16.6	7.9		86		2,370	1,760	18	81	
17-August 10:55	H 16	Sand End	21.5	16.6	11.3		88		2,310	1,700	14	79	
17-August 11:06	H 17	North Holme	23.6	16.6	11.7		88		2,170	1,570	19	66	
17-August 11:21	H 11A	Immingham	24.5	16.5	10.2		90		1,930	1,360	23	66	
17-August 11:30	H 10A	Stallingborough	26.6	16.5	8.8		90		1,350	927	29	49	
17-August 11:42	H 6B	Pyewipe	27.1	16.4	12.6		90		1,180	798	35	47	
17-August 12:56	H 6	Lower Burcom	27.8	16.6	7.0		94		992	646	51	37	
17-August 13:08	H 4A	Clee Ness	28.3	16.5	9.0		92		1,040	676	46	32	
17-August 13:27	H 2C	Halle Anchor	29.3	16.5	10.7		98		684	409	51	37	
17-August 13:48	H 2B	Haile Sand	29.9	16.3	11.5		97		576	388	49	46	

Table 12 : Humber Estuary Water Quality Survey, 17th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
25-August 11:34	H 2B	Haile Sand	27.9	16.3	9.2	8.0	103		595	441	26	32	
25-August 11:57	H 2C	Haile Anchor	27.0	16.4	12.1	7.9	101		816	611	32	26	
25-August 12:18	H 4A	Clee Ness	26.2	16.5	10.6	7.6	97		896	666	29	14	
25-August 12:30	H 6	Lower Burcom	25.8	16.6	7.9	7.5	96		801	613	22	8	
25-August 13:22	H 6B	Pyewipe	25.3	16.6	13.1	7.5	95		1,220	930	29	17	
25-August 13:36	H 10A	Stallingborough	23.8	16.7	16.2	7.6	93		1,450	1,170	20	28	
25-August 13:46	H 11A	Immingham	23.8	16.6	7.5	7.6	94		1,930	1,480	28	37	
25-August 14:03	H 17	North Holme	21.8	16.7	10.7	7.6	89		2,540	1,990	18	74	
25-August 14:15	H 16	Sand End	21.4	16.8	9.3	7.6	88		2,640	2,070	17	77	
25-August 14:24	H 20	East of Buoy 21	21.0	16.8	11.0	7.7	88		2,560	1,620	10	61	
25-August 14:36	H 26	Hull Marina	19.8	16.8	8.4	7.7	86		2,960	1,690	<6.57	63	

Table 13 : Humber Estuary Water Quality Survey, 25th August 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
04-September 14:00	H 2B	Haile Sand		14.0	19.9	8.1	96		203	273	31	31	
04-September 14:25	H 2C	Haile Anchor		14.3	13.6	8.0	95		305	604	28	50	
04-September 14:52	H 4A	Clee Ness		14.4	6.9	7.9	93		977	862	42	43	
04-September 15:10	H 6	Lower Burcom		14.4	6.1	7.8	91		1,160	1,050	26	37	
04-September 16:28	H 6B	Pyewipe		14.5	10.1	7.7	89		1,680	1,470	21	51	
04-September 16:50	H 10A	Stallingborough		14.5	14.0	7.7	86		2,240	1,930	13	60	
04-September 17:07	H 11A	Immingham		14.4	6.4	7.7	84		2,680	2,160	12	68	
04-September 17:34	H 17	North Holme		14.4	8.2	7.7	83		2,890	2,060	8	63	
04-September 17:52	H 16	Sand End		14.3	7.7	7.7	86		3,500	3,140	10	97	
04-September 18:10	H 20	East of Buoy 21		14.3	7.7	7.7	84		3,730	3,320	8	88	
04-September 18:30	H 26	Hull Marina		14.1	7.2	7.8	84		4,200	3,790	8	109	

Table 14 : Humber Estuary Water Quality Survey, 4th September 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
28-September 11:12	H 26	Hull Marina	15.4	14.2		7.6	58		3,870	3,500	17	87	
28-September 11:26	H 21	Hebbles	16.8	14.0		7.5	64		3,210	3,010	31	74	
28-September 11:36	H 16	Sand End	17.7	14.1		7.5	69		3,050	2,870	20	72	
28-September 11:47	H 17	North Holme	18.5	14.1		7.5	68		2,910	2,490	21	69	
28-September 12:02	H 11A	Immingham	19.9	14.1		7.5	72		2,550	2,380	23	62	
28-September 12:11	H 10A	Stallingborough	20.9	14.1		7.6	76		2,320	2,230	23	58	
28-September 12:26	H 6B	Pyewipe	21.2	14.2		7.6	77		2,210	2,110	20	56	
28-September 12:40	H 6	Lower Burcom	21.4	14.2		7.6	79		1,870	1,810	25	49	
28-September 12:53	H 4A	Clee Ness	24.6	14.0		7.6	85		1,460	1,380	34	41	
28-September 13:16	H 2C	Haile Anchor	25.6	14.5		7.7	92		1,170	1,110	43	44	
28-September 13:36	H 2B	Haile Sand	26.8	14.3		7.8	91		920	901	43	44	

Table 15 : Humber Estuary Water Quality Survey, 28th September 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
23-October 00:30	H 2B	Haile Sand	26.4	9.9	10.9	8.1	101	9.7	848	910	44	27	
23-October 00:46	H 2C	Haile Anchor	26.1	9.5	11.3	8.1	99	9.5	1,140	1,150	41	28	
23-October 01:03	H 4A	Clee Ness	26.5	9.5	9.2	8.1	99	9.5	1,120	1,140	42	28	
23-October 01:15	H 6	Lower Burcom	25.0	9.2	9.4	7.9	96	9.4	1,580	1,540	45	26	
23-October 01:29	H 6B	Pyewipe	24.5	9.3	13.9	7.8	94	9.2	1,700	1,650	43	21	
23-October 01:42	H 10A	Stallingborough	22.1	9.3	18.8	7.8	91	9.1	2,490	2,320	27	32	
23-October 01:50	H 11A	Immingham	22.1	9.2	11.6	7.8	92	9.2	2,410	2,250	27	32	
23-October 01:59	H 17	North Holme	18.3	9.1	11.6	7.8	88	9.1	3,020	2,920	19	45	
23-October 02:13	H 16	Sand End	19.9	9.1	9.9	7.7	89	9.1	3,140	2,940	21	48	
23-October 02:23	H 21	Hebbles	17.8	9.0	9.6	7.8	85	8.8	3,970	3,810	17	66	
23-October 02:35	H 26	Hull Marina	16.2	8.8	9.6	7.8	84	8.8	4,310	4,120	18	70	

Table 16 : Humber Estuary Water Quality Survey, 23rd October 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
23-December 04:25	H 26/108	Hull Marina	7.0	4.6	1.0	11.0		72	8.8	6,490	2,350	142	66
23-December 05:26	H 104	Winteringham	1.7	4.2	1.0	6.4		72	9.4	5,940	6,170	310	89
23-December 05:47	H 4	Whitton Ness	1.7	4.1	1.0	6.0		71	9.2	6,870	4,960	321	88
23-December 05:47	H 4	Whitton Ness			5.5	6.0				6,700	5,630	292	85
23-December 06:10	H 3	Apex Buoy	0.6	3.8	1.0	7.5		72	9.4	6,400	6,250	407	85
23-December 06:10	H 3	Apex Buoy			7.0	7.5				6,210	4,680	395	88
23-December 06:28	H 2	Blacktoft	0.5	3.6	1.0	9.3		75	9.7	6,380	6,180	398	88
23-December 06:28	H 2	Blacktoft			8.8	9.3				5,570	5,830	370	81
23-December 06:55	H 1	Trent Falls	0.4	3.8	1.0	5.0		76	9.9	6,720	5,890	449	99
23-December 06:55	H 1	Trent Falls			4.5	5.0				6,590	5,290	426	106
23-December 07:20	H 103	Whitton	0.9	3.8	1.0	5.5		75	9.8	6,780	5,830	386	93
23-December 07:55	H 105	Reads Island	2.7	4.2	1.0	5.7		73	9.4	6,460	5,460	281	82
23-December 08:10	H 106	Chowder Ness	4.3	4.4	1.0	6.3		71	9.0	6,300	6,890	210	77
23-December 08:28	H 5	Hessle Sand	5.8	4.7	1.0	5.6		74	9.1	6,650	4,770	169	71
23-December 08:28	H 5	Hessle Sand			5.1	5.6				6,050	1,730	157	70
23-December 08:40	H 107	West Hull	4.4	4.5	1.0	10.2		74	9.3	6,580	2,280	211	74
23-December 08:59	H 6	Middle Buoy	6.7	4.8	1.0	7.6		75	9.2	6,270	4,080	149	69
23-December 08:59	H 6	Middle Buoy			7.1	7.6				6,040	4,330	122	71
23-December 09:12	H 112	Elbow	7.4	5.2	1.0	10.5		74	9.0	6,450	1,650	136	65
23-December 09:24	H 113	Skitter Haven	10.7	4.9	1.0	9.5		77	9.2	5,920	3,640	96	53
23-December 09:33	H 114	Killingholme	12.2	5.5	1.0	9.0		78	9.1	5,410	4,260	87	47
23-December 09:43	H 8	Clay Huts	12.0	5.2	1.0	13.0		78	9.2	5,620	2,110	91	49
23-December 09:43	H 8	Clay Huts			12.5	13.0							
23-December 09:52	H 117	1.5km Immingham.	14.2	5.4	1.0	22.0		77	8.9	4,940	2,530	73	46
23-December 10:00	H 10A	Stallingborough	13.1	5.0	1.0	8.2		75	8.9	5,300	4,170	79	46
23-December 10:00	H 10A	Stallingborough			7.7	8.2				5,110	2,240	75	52
23-December 10:12	H 119	Upper Burcom	13.8	5.7	1.0	6.0		80	9.2	5,110	2,360	79	49
23-December 10:18	H 6B	Pyewipe	14.6	5.1	1.0	12.2		81	9.3	5,050	2,180	71	43
23-December 10:33	H 136	Grimsby	17.7	5.5	1.0	9.6		85	9.7	3,800	2,820	68	37

Table 17 : Humber Estuary Water Quality Survey, 23rd December 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
23-December 10:33	H 136	Grimsby			9.1	9.6				3,560	2,860	90	34
23-December 10:40	H 6	Lower Burcom	17.9	5.4	1.0	7.3		85	9.5	3,940	3,170	69	37
23-December 10:51	H 122	Cleethorpes	19.2	5.3	1.0	6.5		87	9.7	3,570	3,030	65	34
23-December 11:00	H 4A	Clee Ness	19.2	5.3	1.0	9.9		86	9.6	3,650	3,120	64	35
23-December 11:10	H 13	Bull Channel	20.4	5.4	1.0	11.6		89	9.9	3,250	2,870	61	32
23-December 11:10	H 13	Bull Channel			11.1	11.6				2,810	2,360	57	33
23-December 11:32	H 135	Haile Sand Fort	22.4	5.0	1.0	6.0		91	10.1	2,960	2,280	71	30
23-December 11:39	H 134	Haile Anchorage 3.3	22.7	5.3	1.0	8.6		90	9.8	3,040	2,000	56	25
23-December 11:48	H 133	Haile Anchorage 4.5	21.8	5.4	1.0	12.0		89	9.6	2,960	2,650	61	27
23-December 12:01	H 124	Bull	22.5	5.5	1.0	16.0		88	9.5	2,790	2,440	59	33
23-December 12:12	H 132	Spurn Head	24.3	5.3	1.0	19.4		91	9.8	2,110	2,160	54	33
23-December 12:33	H 125	B51 Hawke Channel	21.9	5.4	1.0	5.0		87	9.5	2,940	2,490	61	33
23-December 12:44	H 126	B53 Hawke Channel	21.0	5.5	1.0	10.8		86	9.4	3,190	2,920	59	33
23-December 13:00	H 127	B55 Hawke Channel	19.9	5.4	1.0	14.3		84	9.3	3,580	3,000	62	36
23-December 13:10	H 128	B57 Hawke Channel	20.2	5.4	1.0	8.4		85	9.4	3,460	2,980	61	34
23-December 13:20	H 129	B59 Sunk Channel	17.7	5.3	1.0	9.6		82	9.0	3,890	2,380	64	40
23-December 13:28	H 130	B61 Sunk Channel	17.4	5.3	1.0	10.7		81	9.2	4,400	3,200	68	39
23-December 13:37	H 131	B62 Sunk Channel	15.6	5.2	1.0	11.9		79	9.0	4,900	2,360	70	41
23-December 14:03	H 116	1.2km Immingham	13.4	5.1	1.0	7.0		78	9.1	5,310	3,060	79	46
23-December 14:15	H 115	Holme Nook	8.8	5.0	1.0	10.0		77	9.0	6,040	4,430	119	57
23-December 14:33	H 16	Sand End	6.4	4.7	1.0	12.0		74	9.1	6,670	5,580	150	62
23-December 14:33	H 16	Sand End			11.5	12.0				5,470	2,020	93	72
23-December 14:45	H 21	Hebbles	6.1	4.7	1.0	13.6		74	9.1	6,920	2,510	156	68

Table 17 : Humber Estuary Water Quality Survey, 23rd December 1992

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
12-January 10:52	H 6	Middle Buoy	14.6	3.5	1.0	12.5		93	11.1	5,220	4,650	166	47
12-January 10:52	H 6	Middle Buoy			12.0	12.5				4,660	4,190	121	41
12-January 11:12	H 21	Hebbles	14.8	3.6	1.0	13.0		92	11.1	5,030	4,490	141	47
12-January 11:22	H 112	Elbow	14.9	3.5	1.0	13.6		93	11.1	5,020	4,430	140	45
12-January 11:32	H 16	Sand End	15.2	3.6	1.0	12.0		92	11.0	4,920	4,370	136	44
12-January 11:32	H 16	Sand End			11.5	12.0				4,660	3,980	124	43
12-January 11:50	H 113	Skitter Haven	15.5	3.6	1.0	11.0		93	11.1	4,950	4,390	89	41
12-January 12:01	H 114	Killingholme	15.7	3.5	1.0	10.0		93	11.0	4,940	4,440	128	40
12-January 12:17	H 8	Clay Huts	16.0	3.6	1.0	12.5		93	10.9	4,490	3,400	116	33
12-January 12:17	H 8	Clay Huts			12.0	12.5				4,290	3,920	115	36
12-January 12:40	H 117	1.5km Immingham	17.3	3.6	1.0	8.0		93	10.9	4,450	3,780	117	37
12-January 12:57	H 10A	Stallingborough	16.7	3.7	1.0	8.3		92	10.7	4,820	4,260	110	37
12-January 12:57	H 10A	Stallingborough			7.8	8.3				4,540	4,000	112	37
12-January 13:20	H 119	Upper Burcom	17.0	3.7	1.0	13.5		92	10.8	4,630	4,120	112	39
12-January 13:37	H 6B	Pyewipe	17.1	3.7	1.0	12.1		93	11.0	4,430	3,940	111	40
12-January 13:52	H 136	Grimsby	18.2	3.8	1.0	9.8		92	10.8	3,950	3,550	104	34
12-January 13:52	H 136	Grimsby			9.3	9.8				2,900	2,280	88	30
12-January 14:08	H 6	Lower Burcom	19.5	3.8	1.0	9.3		93	10.7	4,010	3,470	78	27
12-January 14:26	H 122	Cleethorpes	20.4	3.8	1.0	8.1		93	10.6	3,560	3,140	86	24
12-January 14:36	H 4A	Clee Ness	21.7	3.9	1.0	8.0		93	10.5	3,700	3,160	73	23
12-January 14:53	H 13	Bull Channel	21.0	3.9	1.0	12.5		92	10.5	3,280	2,960	89	29
12-January 14:53	H 13	Bull Channel			12.0	12.5				2,800	2,490	74	24
12-January 15:21	H 135	Haile Sand Fort	26.4	3.9	1.0	6.0		94	10.6	1,850	1,530	54	26
12-January 15:32	H 134	Haile Anchorage 3.3	26.9	4.1	1.0	8.6		95	10.2	1,670	1,450	51	25
12-January 15:39	H 133	Haile Anchorage 4.5	23.4	3.9	1.0	13.0		94	10.8	2,610	1,990	71	23
12-January 16:00	H 126	B53 Hawke Channel	21.9	3.8	1.0	12.6		94	10.6	3,000	2,500	79	30
12-January 16:18	H 128	B57 Hawke Channel	20.3	3.8	1.0	9.0		96	10.9	3,530	3,210	92	33
12-January 16:33	H 130	B61 Sunk Channel	17.6	3.7	1.0	10.8		95	11.1	4,280	3,810	114	36

Table 18 : Humber Estuary Water Quality Survey, 12-13th January 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
12-January 16:43	H 131	B62 Sunk Channel	16.4	3.6	1.0	11.5		93	11.0	4,610	3,930	122	39
12-January 17:03	H 116	1.2km Immingham	14.2	3.5	1.0	9.0		92	11.1	5,430	4,790	144	47
12-January 17:15	H 115	Holme Nook	13.1	3.5	1.0	10.5		90	10.9	5,780	5,180	157	50
13-January 09:11	H 115	Holme Nook			4.5	5.0				7,270	6,640	570	119
13-January 09:18	H 1	Trent Falls	1.2	4.2	1.0	5.0		83	10.6	7,220	7,380	572	110
13-January 09:42	H 2	Blacktoft	1.2	4.1	1.0	8.2		85	11.0	6,650	6,940	575	96
13-January 09:42	H 2	Blacktoft			7.7	8.2				6,770	6,860	570	99
13-January 10:04	H 3	Apex Buoy	2.8	3.9	1.0	9.6		83	10.8	7,400	6,890	509	87
13-January 10:04	H 3	Apex Buoy			9.1	9.6				7,410	6,880	488	82
13-January 10:30	H 103	Whitton	3.8	3.8	1.0	7.0		84	10.7	7,430	6,970	456	87
13-January 10:45	H 4	Whitton Ness	4.7	3.9	1.0	6.4		84	10.7	7,340	6,650	407	84
13-January 10:45	H 4	Whitton Ness			5.9	6.4				7,370	6,580	354	82
13-January 11:17	H 104	Winteringham	6.2	3.6	1.0	9.4		87	11.0	7,040	6,570	344	78
13-January 11:39	H 105	Reads Island	6.2	3.6	1.0	6.6		86	10.8	7,360	6,560	321	81
13-January 12:01	H 106	Chowder Ness	7.4	3.6	1.0	8.0		89	11.1	6,800	6,360	286	78
13-January 12:16	H 5	Hessle Sand	9.4	3.6	1.0	5.7		90	11.2	6,510	5,850	242	67
13-January 12:16	H 5	Hessle Sand			5.2	5.7				6,550	5,700	231	68
13-January 12:34	H 107	West Hull	8.9	3.6	1.0	10.6		90	11.1	6,460	6,010	235	70
13-January 12:45	H 26/108	Hull Marina	9.5	3.6	1.0	10.3		91	11.1	6,260	5,700	224	66
13-January 15:25	H 124	Bull	23.5	4.2	1.0	16.7		99	11.0	2,650	2,150	73	38
13-January 15:40	H 132	Spurn Head	24.4	4.1	1.0	22.0		100	11.0	2,290	2,040	70	30
13-January 15:57	H 125	B51 Hawke Channel	22.4	4.0	1.0	4.8		100	11.3	2,880	2,270	79	33
13-January 16:20	H 127	B55 Hawke Channel	19.2	3.8	1.0	14.5		98	11.3	3,810	3,420	96	35
13-January 16:45	H 129	B59 Sunk Channel	18.0	3.7	1.0	10.1		98	11.2	4,180	3,700	107	36

Table 18 : Humber Estuary Water Quality Survey, 12-13th January 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
09-March 16:27	H 26/108	Hull Marina	17.9	4.4	0.5	10.3		81		4,980	3,420	162	52
09-March 16:35	H 107	West Hull	17.3	4.3	0.5	9.0		80		5,130	3,920	88	58
09-March 16:47	H 5	Hessle Sand	17.2	4.4	0.5	6.1		81		5,180	3,640	65	57
09-March 16:47	H 5	Hessle Sand			6.0	6.1				4,980	3,860	62	66
09-March 17:08	H 106	Chowder Ness	15.3	4.4	0.5	7.3		78		5,560	3,610	62	67
09-March 17:25	H 105	Reads Island	15.6	4.5	0.5	6.6		75		5,570	3,730	53	69
09-March 17:37	H 104	Winteringham	16.3	4.4	0.5	7.3		76		5,110	3,580	59	67
09-March 17:46	H 4	Whitton Ness	11.2	4.9	0.5	7.2		67		6,880	5,250	98	77
09-March 17:46	H 4	Whitton Ness			7.0	7.2				6,240	4,490	70	75
09-March 17:58	H 103	Whitton	10.0	4.8	0.5	6.1		67		7,150	4,000	108	79
09-March 18:10	H 3	Apex Buoy	10.7	4.7	0.5	8.7		60		7,110	4,350	145	73
09-March 18:10	H 3	Apex Buoy			8.0	8.7				6,990	4,870	118	75
09-March 18:22	H 2	Blacktoft	9.4	4.9	0.5	9.6		60		7,480	5,280	134	83
09-March 18:22	H 2	Blacktoft			9.0	9.6				7,470	5,290	128	79
09-March 18:55	H 1	Trent Falls	11.7	4.7	0.5	9.0		63		6,790	4,790	111	73
09-March 18:55	H 1	Trent Falls			9.0	9.0				6,570	4,780	100	71
11-March 10:05	H 113	Skitter Haven	22.7	4.5	0.5	10.7		81		3,460	2,400	42	38
11-March 10:08	H 6	Middle Buoy	22.9	4.4	0.5	8.5		81		3,730	2,450	48	40
11-March 10:08	H 6	Middle Buoy			8.0	8.5				3,020	2,070	52	36
11-March 10:19	H 21	Hebbles	21.2	4.5	0.5	16.3		78		3,730	1,960	45	45
11-March 10:29	H 112	Elbow	22.8	4.5	0.5	11.9		82		3,330	1,980	45	38
11-March 10:40	H 16	Sand End	22.6	4.5	0.5	10.4		81		3,380	2,270	55	40
11-March 10:40	H 16	Sand End			10.0	10.4				2,810	2,350	45	38
11-March 11:09	H 114	Killingholme	22.6	4.6	0.5	10.2		80		3,470	2,310	49	36
11-March 11:16	H 115	Holme Nook	23.1	4.7	0.5	12.1		81		3,350	2,440	49	37
11-March 11:25	H 8	Clay Huts	24.0	4.8	0.5	13.6		83		2,970	2,320	48	37
11-March 11:25	H 8	Clay Huts			13.0	13.6				2,680	2,050	55	34
11-March 11:34	H 116	1.2km Immingham	24.1	4.5	0.5	7.3		81		2,940	2,410	45	34
11-March 11:42	H 117	1.5km Immingham	24.8	4.6	0.5	9.0		83		2,780	2,070	49	34
11-March 11:56	H 10A	Stallingborough	23.9	4.5	0.5	8.6		81		3,080	1,970	44	34
11-March 11:56	H 10A	Stallingborough			8.0	8.6				2,980	2,410	47	35
11-March 12:07	H 119	Upper Burcom	24.1	4.7	0.5	6.8		83		2,890	2,250	45	36

Table 19: Humber Estuary Water Quality Survey, 9-11th March 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
11-March 12:23	H 6B	Pyewipe	24.9	4.8	0.5	11.8		84		2,850	2,270	50	35
11-March 12:36	H 136	Grimsby	25.4	4.8	0.5	9.2		85		2,530	2,340	44	39
11-March 12:36	H 136	Grimsby			9.0	9.2				1,970	1,850	47	26
11-March 12:50	H 6	Lower Burcom	23.8	4.8	0.5	8.1		86		2,360	2,120	83	31
11-March 13:02	H 122	Cleethorpes	28.0	4.6	0.5	7.0		86		1,840	1,780	47	24
11-March 13:12	H 4A	Clee Ness	28.0	4.6	0.5	8.5		86		1,840	1,720	46	24
11-March 13:22	H 13	Bull Channel	27.8	4.6	0.5	9.5		86		1,950	1,670	47	26
11-March 13:22	H 13	Bull Channel			9.0	9.5				1,810	1,710	49	26
11-March 14:10	H 135	Haile Sand Fort	29.9	4.9	0.5	4.7		94		1,480	1,320	45	27
11-March 14:11	H 133	Haile Anchorage 4.5	29.6	5.0	0.5	8.0		94		1,460	1,430	431	129
11-March 14:19	H 134	Haile Anchorage 3.3	29.1	4.8	0.5	10.7		91		1,560	1,460	44	27
11-March 14:28	H 124	Bull	27.3	4.6	0.5	15.3		86		2,030	1,840	48	31
11-March 14:37	H 132	Spurn Head	28.5	4.7	0.5	21.3		89		1,770	1,660	51	34
11-March 14:55	H 125	B51 Hawke Channel	26.8	5.0	0.5	6.1		86		2,240	2,110	53	29
11-March 15:05	H 126	B53 Hawke Channel	25.8	4.8	0.5	9.8		82		2,570	1,980	62	32
11-March 15:15	H 127	B55 Hawke Channel	24.9	5.1	0.5	12.8		83		2,680	2,240	57	32
11-March 15:25	H 128	B57 Hawke Channel	24.5	4.9	0.5	7.2		82		2,830	2,070	51	33
11-March 15:32	H 129	B59 Sunk Channel	23.8	4.6	0.5	9.7		81		2,930	2,510	49	35
11-March 15:39	H 130	B61 Sunk Channel	23.9	4.6	0.5	9.4		80		2,940	2,270	45	34
11-March 15:47	H 131	B62 Sunk Channel	23.4	4.6	0.5	10.3		80		3,040	2,380	41	39

Table 19: Humber Estuary Water Quality Survey, 9-11th March 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
08-April 06:30	H 4A	Clee Ness	30.5	7.0	14.3	8.0	94	9.3	880	771	38	32	
08-April 06:42	H 6	Lower Burcom	28.8	7.2	12.2	8.0	91	9.1	1,480	1,160	44	32	
08-April 06:56	H 6B	Pyewipe	28.9	7.3	13.1	8.0	91	9.1	1,550	1,210	42	31	
08-April 07:10	H 10A	Stallingborough	29.3	7.3	12.2	8.0	91	9.0	2,190	1,640	44	32	
08-April 07:19	H 11A	Immingham	28.0	7.3	12.2	7.9	90	8.9	1,730	1,350	42	29	
08-April 07:32	H 17	North Holme	26.1	7.3	14.1	7.8	87	8.8	2,360	1,730	43	30	
08-April 07:44	H 16	Sand End	25.7	7.4	13.0	7.8	85	8.6	2,550	1,890	39	39	
08-April 07:55	H 21	Hebbles	22.5	7.5	10.0	7.8	82	8.5	3,940	2,530	33	52	
08-April 08:10	H 26	Hull Marina	20.8	7.7	13.3	7.8	80	8.3	4,030	2,650	34	54	

Table 20 : Humber Estuary Water Quality Survey, 8th April 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
20-April 16:12	H 107	West Hull	10.1	10.5	1.0	8.4		80	8.4	6,340	2,210	20	82
20-April 16:38	H 106	Chowder Ness	9.2	10.8	1.0	6.8		82	8.5	6,610	4,350	34	90
20-April 17:02	H 105	Reads Island	6.9	10.9	1.0	5.3		78	8.2	7,240	2,140	31	114
20-April 17:14	H 104	Winteringham	3.5	11.7	1.0	7.0		79	8.4	7,710	5,240	134	114
20-April 17:26	H 4	Whitton Ness			5.3	5.3				7,880	5,630	80	115
20-April 17:26	H 4	Whitton Ness	3.2	11.6	1.0	5.8		77	8.2	7,910	5,150	103	110
20-April 17:33	H 103	Whitton	2.7	11.6	1.0	4.8		72	7.6	8,070	5,810	117	108
20-April 17:53	H 1	Trent Falls			5.1	5.1				7,880	6,530	255	100
20-April 17:53	H 1	Trent Falls	0.7	12.3	1.0	5.6		73	7.7	8,060	6,620	298	117
20-April 18:12	H 2	Blacktoft			6.8	6.8				7,190	6,010	233	89
20-April 18:12	H 2	Blacktoft	1.1	12.3	1.0	7.3		80	8.5	7,510	6,140	357	116
20-April 18:39	H 3	Apex Buoy			5.7	5.7				7,880	5,390	119	105
20-April 18:39	H 3	Apex Buoy	2.8	11.8	1.0	6.2		78	8.2	7,930	5,960	206	117
20-April 19:52	H 5	Hessle Sand			6.1	6.1				5,170	3,500	28	71
20-April 19:52	H 5	Hessle Sand	10.5	10.4	1.0	6.6		78	8.2	6,390	4,100	44	96
20-April 20:12	H 26/108	Hull Marina	15.0	9.9	1.0	12.0		83	8.5	4,890	3,540	32	72
21-April 08:19	H 6	Middle Buoy			8.9					3,830	2,680	38	47
21-April 08:19	H 6	Middle Buoy	17.8	9.6	1.0	9.4		86	8.7	4,240	3,010	29	54
21-April 08:27	H 21	Hebbles	18.5	9.5	1.0	13.7		87	8.8	4,250	2,910	35	54
21-April 08:33	H 112	Elbow	18.4	9.5	1.0	12.0		88	8.9	4,340	3,000	36	54
21-April 08:41	H 16	Sand End			11.0					3,290	2,270	36	34
21-April 08:41	H 16	Sand End	18.8	9.5	1.0	11.5		88	8.9	4,070	2,830	33	48
21-April 09:04	H 114	Killingholme	20.6	9.4	1.0	11.0		90	9.0	3,400	2,450	42	39
21-April 09:17	H 8	Clay Huts			14.2					2,280	1,690	37	26
21-April 09:17	H 8	Clay Huts	20.1	9.5	1.0	14.7		92	9.2	3,420	2,390	37	43
21-April 09:28	H 117	1.5km Immingham	23.6	9.1	1.0	17.0		94	9.3	2,470	1,700	43	31
21-April 09:40	H 119	Upper Burcom	24.2	9.1	1.0	17.3		95	9.3	2,380	1,670	42	28
21-April 09:50	H 6B	Pyewipe	24.8	9.0	1.0	13.6		95	9.4	2,150	1,490	40	28

Table 21 : Humber Estuary Water Quality Survey, 20-21st April 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
21-April 10:00	H 136	Grimsby			10.6					1,750	1,300	41	32
21-April 10:00	H 136	Grimsby	25.5	9.0	1.0	11.1		96	9.4	2,070	1,410	45	25
21-April 10:10	H 6	Lower Burcom	26.3	9.1	1.0	10.3		98	9.5	1,860	1,270	49	17
21-April 10:20	H 122	Cleethorpes	26.0	9.0	1.0	8.4		97	9.5	1,890	1,320	46	13
21-April 10:27	H 4A	Clee Ness	26.4	8.9	1.0	10.0		98	9.6	1,740	1,200	48	16
21-April 10:36	H 13	Bull Channel			12.7					1,670	1,160	43	25
21-April 10:36	H 13	Bull Channel	27.0	8.8	1.0	13.2		99	9.6	1,590	1,110	46	26
21-April 11:12	H 135	Haile Sand Fort	28.0	9.5	1.0	6.2		101	9.6	1,300	908	52	28
21-April 11:20	H 133	Haile Anchorage 4.5	27.5	9.4	1.0	8.4		101	9.7	1,440	986	46	24
21-April 11:27	H 134	Haile Anchorage 3.3	26.6	9.1	1.0	12.0		100	9.6	1,650	1,120	47	20
21-April 11:36	H 124	Bull	26.8	8.9	1.0	15.2		99	9.6	1,640	1,130	47	20
21-April 11:45	H 132	Spurn Head	26.0	9.2	1.0	22.1		99	9.6	1,910	1,260	43	31
21-April 12:17	H 125	B51 Hawke Channel	24.2	9.7	1.0	4.6		99	9.6	2,380	1,540	42	33
21-April 12:31	H 126	B53 Hawke Channel	25.1	9.1	1.0	10.1		97	9.5	2,110	1,450	41	29
21-April 12:48	H 127	B55 Hawke Channel	24.0	9.2	1.0	13.0		96	9.4	2,380	1,620	41	29
21-April 13:03	H 128	B57 Hawke Channel	22.2	9.4	1.0	7.7		93	9.2	2,970	2,100	39	33
21-April 13:17	H 129	B59 Sunk Channel	21.6	9.4	1.0	10.1		92	9.1	3,130	2,170	34	35
21-April 13:26	H 130	B61 Sunk Channel	20.5	9.5	1.0	9.3		91	9.1	3,600	2,410	32	43
21-April 13:37	H 131	B62 Sunk Channel	19.8	9.6	1.0	10.4		90	9.0	3,730	2,700	30	44
21-April 14:04	H 10A	Stallingborough			16.6					3,830	2,750	32	43
21-April 14:04	H 10A	Stallingborough	16.5	10.0	1.0	17.1		88	8.9	4,630	3,240	25	51
21-April 14:20	H 116	1.2km Immingham	15.2	10.1	1.0	8.8		87	8.8	5,040	3,540	31	61
21-April 14:35	H 115	Holme Nook	13.4	10.2	1.0	9.4		85	8.8	5,450	3,590	27	69
21-April 14:55	H 113	Skitter Haven	11.2	10.4	1.0	9.2		84	8.8	6,090	3,660	25	76

Table 21 : Humber Estuary Water Quality Survey, 20-21st April 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
05-May 08:01	H 26	Hull Marina	16.6	11.6	11.7	7.7	75	7.3	4,890	3,270	10	65	
05-May 08:15	H 20	East of Buoy 21	18.5	11.4	16.1	7.7	77	7.4	4,490	2,920	13	59	
05-May 08:33	H 17	North Holme	19.9	11.3	11.1	7.8	77	7.4	4,100	2,590	15	56	
05-May 08:48	H 11A	Immingham	23.0	10.8	10.2	8.0	79	7.6	2,920	1,850	27	42	
05-May 08:57	H 10A	Stallingborough	25.5	10.5	9.1	7.8	81	7.7	2,600	1,650	22	38	
05-May 09:09	H 6B	Pyewipe	26.4	10.5	13.5	7.9	83	7.8	2,350	1,500	28	37	
05-May 09:22	H 6	Lower Burcom	28.3	10.3	9.0	7.9	86	8.0	1,850	1,180	45	32	
05-May 09:25	H 16	Sand End	18.3	11.4	11.8	7.7	76	7.4	4,650	2,980	9	61	
05-May 09:32	H 4A	Clee Ness	29.0	10.1	10.5	8.0	87		1,620	1,000	30	27	
05-May 09:51	H 2C	Haile Anchor	28.9	10.5	12.2	8.0	90	8.4	1,690	1,030	24	29	
05-May 10:11	H 2B	Haile Sand	30.4	10.0	9.1	8.1	93	8.6	1,200	724	21	29	

Table 22 : Humber Estuary Water Quality Survey, 5th May 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
16-June 13:51	H 26/108	Hull Marina	10.8	16.1	1.0	10.9		78	7.2	3,560	3,990	106	178
16-June 14:01	H 107	West Hull	10.4	16.2	1.0	8.7		80	7.4	5,630	4,130	69	216
16-June 14:16	H 5	Hessle Sand	10.7	16.1	1.0	5.4		75	6.9	3,880	4,220	59	165
16-June 14:16	H 5	Hessle Sand			4.9	5.4				3,960	4,330	38	148
16-June 14:30	H 106	Chowder Ness	6.7	16.2	1.0	6.6		74	7.0	6,460	4,470	36	222
16-June 14:50	H 105	Reads Island	4.2	16.2	1.0	4.8		71	6.8	7,000	5,140	45	161
16-June 15:05	H 104	Winteringham	1.6	16.2	1.0	4.6		70	6.7	7,130	6,880	248	250
16-June 15:19	H 4	Whitton Ness	1.8	16.2	1.0	5.8		66	6.4	7,160	6,890	190	248
16-June 15:19	H 4	Whitton Ness			5.3	5.8				6,750	6,560	193	234
16-June 15:27	H 103	Whitton	1.3	16.2	1.0	4.4		67	6.5	7,220	7,310	234	260
16-June 15:47	H 1	Trent Falls	<1.0	16.5	1.0	4.0		67	6.5	7,860	9,130	309	320
16-June 15:47	H 1	Trent Falls			3.5	4.0				7,520	8,990	347	322
16-June 16:08	H 2	Blacktoft	<1.0	16.2	1.0	5.3		67	6.6	6,850	7,820	453	237
16-June 16:08	H 2	Blacktoft			4.8	5.3				6,950	8,050	409	291
16-June 16:23	H 3	Apex Buoy	<1.0	16.2	1.0	6.6		68	6.6	7,080	7,470	335	287
16-June 16:23	H 3	Apex Buoy			6.1	6.6				6,670	6,740	320	270
17-June 07:19	H 6	Middle Buoy	17.1	15.6	1.0	6.6		82	7.3	2,810	2,980	30	93
17-June 07:19	H 6	Middle Buoy			6.1	6.6				2,690	2,810	42	111
17-June 07:32	H 112	Elbow	18.2	15.6	1.0	11.7		83	7.4	2,610	2,670	42	84
17-June 07:38	H 16	Sand End	18.0	15.6	1.0	11.1		84	7.4	2,220	2,700	50	90
17-June 07:38	H 16	Sand End			10.6	11.1				1,010	2,340	71	63
17-June 07:57	H 114	Killingholme	17.7	15.6	1.0			85	7.5	2,770	2,750	33	105
17-June 08:08	H 8	Clay Huts	20.3	15.5	1.0	13.9		88	7.7	3,450	2,810	62	73
17-June 08:08	H 8	Clay Huts			13.4	13.9				2,150	1,930	87	27
17-June 08:32	H 119	Upper Burcom	25.1	15.1	1.0	9.0		92	7.9	2,230	1,460	85	29
17-June 08:42	H 6B	Pyewipe	24.8	15.2	1.0	13.1		92	8.0	2,320	1,540	77	35
17-June 08:52	H 136	Grimsby			10.0	10.5				1,730	966	72	19
17-June 08:52	H 136	Grimsby	25.3	15.1	1.0	10.5		93	8.0	1,560	1,390	69	37
17-June 09:52	H 6	Lower Burcom	25.4	15.2	1.0	9.3		94	8.0	1,950	1,270	67	29
17-June 10:08	H 122	Cleethorpes	26.3	15.1	9.5	9.5		95	8.1	2,130	834	55	16
17-June 10:16	H 4A	Clee Ness	27.0	15.0	1.0	9.6		95	8.1	1,730	766	59	9
17-June 10:31	H 13	Bull Channel	27.0	15.0	13.1	13.1		96	8.2	1,920	715	60	10

Table 23 : Humber Estuary Water Quality Survey, 16-17th June 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
17-June 10:31	H 13	Bull Channel			12.6	13.1				1,370	465	54	6
17-June 10:50	H 135	Haile Sand Fort	28.7	14.9	1.0	6.2		115	9.7	1,190	271	22	3
17-June 10:59	H 133	Haile Anchorage 4.5	28.2	14.9	1.0	8.4		104	8.8	1,310	599	53	10
17-June 11:06	H 134	Haile Anchorage 3.3	27.7	15.0	1.0	12.4		100	8.5	1,510	657	61	13
17-June 11:15	H 124	Bull	27.6	15.1	1.0	15.4		98	8.3	1,620	555	54	8
17-June 11:27	H 132	Spurn Head	28.9	14.7	1.0	23.8		105	8.9	7,800	364	39	8
17-June 11:46	H 125	B51 Hawke Channel	27.6	15.2	1.0	5.7		103	8.7	265	608	50	15
17-June 12:01	H 126	B53 Hawke Channel	26.6	15.4	1.0	10.6		98	8.3	1,920	832	59	20
17-June 12:16	H 127	B55 Hawke Channel	26.3	15.3	1.0	14.6		96	8.2	2,120	739	53	17
17-June 12:26	H 128	B57 Hawke Channel	25.7	15.3	1.0	8.8		94	8.1	3,600	882	58	21
17-June 12:39	H 129	B59 Sunk Channel	25.5	15.3	1.0	9.8		93	8.0	2,320	1,340	80	23
17-June 12:46	H 130	B61 Sunk Channel	25.2	15.3	1.0	11.1		93	8.0	2,290	1,440	76	27
17-June 12:57	H 131	B62 Sunk Channel	24.9	15.3	1.0	11.8		92	7.9	2,370	1,500	76	30
17-June 13:21	H 10A	Stallingborough	21.3	15.8	1.0	10.1		88	7.6	3,240	2,360	61	57
17-June 13:21	H 10A	Stallingborough			9.6	10.1				2,560	1,700	90	7
17-June 13:43	H 117	1.5km Immingham	21.2	15.9	1.0	10.2		88	7.6	2,610	2,360	57	54
17-June 13:50	H 116	1.2km Immingham	19.7	16.0	1.0	15.4		87	7.6	4,440	2,770	74	72
17-June 14:02	H 115	Holme Nook	17.4	16.1	1.0	12.3		84	7.4	3,580	2,280	50	114
17-June 14:26	H 113	Skitter Haven	16.9	16.2	1.0	10.1		84	7.5	2,690	2,840	42	111
17-June 14:42	H 21	Hebbles	13.6	16.2	1.0	13.1		80	7.3	3,290	3,650	29	138

Table 23 : Humber Estuary Water Quality Survey, 16-17th June 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
07-August 12:23	H 26	Hull Marina	19.7	16.4	10.3	7.6	71	6.9	2,390	1,970	12	87	1.2
07-August 12:40	H 20	East of Buoy 21	22.1	16.4	11.6	7.6	80	7.3	3,060	1,820	21	80	5.0
07-August 12:51	H 16	Sand End	22.3	16.4	10.9	7.7	80	7.8	2,760	2,110	35	93	2.0
07-August 13:03	H 17	North Holme	23.9	16.4	10.2	7.7	79	7.5	2,620	2,010	30	87	2.3
07-August 13:19	H 11A	Immingham	23.9	16.4	8.1	7.7	80	7.8	2,400	1,780	21	80	7.0
07-August 13:33	H 10A	Stallingborough	21.5	16.3	16.0	7.7	80	7.9	1,430	1,130	15	59	4.7
07-August 13:44	H 6B	Pyewipe	23.0	16.3	12.1	7.7	81	7.9	1,730	1,280	29	64	3.5
07-August 13:58	H 6	Lower Burcom	25.2	16.2	9.5	7.7	85	8.4	662	494	22	30	3.5
07-August 14:16	H 4A	Clee Ness	26.0	16.9	8.8	7.8	85	8.3	442	328	15	21	3.5
07-August 14:29	H 2C	Haile Anchor	26.7	16.2	12.1	7.9	90	8.8	666	474	35	36	3.3
07-August 14:47	H 2B	Haile Sand		15.8	13.9	8.0	91	9.0	313	243	26	26	1.4

Table 24 : Humber Estuary Water Quality Data, 7th August 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
07-October 17:41	H 2B	Haile Sand	28.0	12.8	10.7	8.3	97	8.4	4,560	1,170	15	54	
07-October 18:01	H 2C	Haile Anchor	27.3	12.8	11.3	8.2	96	8.4	1,280	1,280	15	53	
07-October 18:20	H 4A	Clee Ness	26.6	12.8	9.8	8.2	94	8.4	1,180	1,320	17	41	
07-October 18:33	H 6	Lower Burcom	24.6	12.7	9.3	8.1	91	8.3	1,400	1,770	9	58	
07-October 18:52	H 6B	Pyewipe	19.2	12.6	9.1	8.1	86	8.1	2,110	2,810	6	80	
07-October 19:04	H 10A	Stallingborough	19.2	12.6	11.0	8.1	84	7.9	3,060	2,830	7	77	
07-October 19:17	H 11A	Immingham	18.5	12.7	9.7	8.1	83	7.9	3,190	2,970	7	75	
07-October 19:32	H 17	North Holme	13.2	12.4	10.6	8.1	78	7.7	4,290	4,230	7	111	
07-October 19:44	H 16	Sand End	12.5	12.3	9.1	8.1	78	7.7	2,920	3,930	10	117	
07-October 19:56	H 21	Hebbles	12.7	12.5	7.5	8.1	77	7.5	4,250	4,280	6	117	
07-October 20:09	H 26	Hull Marina	9.8	12.5	9.6	8.1	76	7.6	4,820	4,380	14	134	

Table 25 : Humber Estuary Water Quality Survey, 7th October 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
20-October 13:40	H 6	Middle Buoy	12.6	9.0	1.0	7.1	8.2	61		5,100	4,330	11	80
20-October 13:40	H 6	Middle Buoy			6.1	7.1				4,840	4,120	21	80
20-October 13:53	H 112	Elbow	14.0	9.2	1.0	10.3	8.2	65		2,480	2,380	13	38
20-October 14:04	H 113	Skitter Haven	14.1	9.2	1.0	8.9	8.3	67		4,820	4,060	11	78
20-October 14:15	H 114	Killingholme	16.1	9.3	1.0	8.6	8.2	70		4,430	3,220	7	77
20-October 14:26	H 8	Clay Huts	17.0	9.4	1.0	10.5	8.2	71	7.3	3,080	2,660	8	50
20-October 14:26	H 8	Clay Huts			9.5	10.5				4,060	3,190	9	74
20-October 14:38	H 117	1.5km Immingham	18.0	9.5	1.0	7.6	8.2	71	7.2	3,900	3,370	<6.57	70
20-October 14:48	H 119	Upper Burcom	17.5	9.4	1.0	7.4	8.2	72	7.4	3,610	3,120	<6.57	73
20-October 14:58	H 6B	Pyewipe	18.8	9.5	1.0	12.5	8.3	75	7.7	2,440	2,270	<6.57	79
20-October 15:06	H 136	Grimsby	20.9	9.6	1.0	9.7	8.3	73		3,110	2,940	<6.57	68
20-October 15:06	H 136	Grimsby			8.7	9.7				2,510	2,350	55	67
20-October 15:20	H 6	Lower Burcom	21.9	9.7	1.0	7.4	8.3	81	7.7	2,910	2,610	7	67
20-October 15:29	H 122	Cleethorpes	22.4	9.7	1.0	9.8	8.3	82	7.8	2,880	2,610	<6.57	64
20-October 15:38	H 4A	Clee Ness	22.5	9.7	1.0	9.4	8.3	80	7.8	1,160	913	<6.57	75
20-October 15:49	H 13	Bull Channel	24.5	9.9	1.0	12.2	8.3	83	7.9	1,510	1,360	7	63
20-October 15:49	H 13	Bull Channel			11.2	12.2				2,110	1,960	21	59
20-October 16:11	H 135	Haile Sand Fort	27.0	9.6	1.0	6.0	8.4	90	8.7	724	566	29	60
20-October 16:18	H 133	Haile Anchorage 4.5	27.1	9.9	1.0	8.6	8.4	89	8.2	1,030	853	22	58
20-October 16:24	H 134	Haile Anchorage 3.3	25.7	9.9	1.0	12.0	8.3	87	8.0	1,260	862	14	58
20-October 16:31	H 124	Bull	26.5	10.0	1.0	13.6	8.3	86	8.1	1,230	1,040	10	58
20-October 16:39	H 132	Spurn Head	27.1	9.9	1.0	22.2	8.4	88	8.2	2,000	623	12	69
20-October 16:55	H 125	B51 Hawke Channel	24.7	9.8	1.0	4.7	8.3	86	8.2	779	643	8	57
20-October 17:03	H 126	B53 Hawke Channel	23.4	9.8	1.0	10.2	8.3	83	8.0	1,520	1,260	<6.57	68
20-October 17:13	H 127	B55 Hawke Channel	22.8	9.8	1.0	13.5	8.3	82	7.9	1,420	1,200	<6.57	68
20-October 17:24	H 128	B57 Hawke Channel	21.4	9.7	1.0	8.0	8.3	81	7.8	1,860	3,340	7	65

Table 26 : Humber Estuary Water Quality Survey, 20-21st October 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
20-October 17:30	H 129	B59 Sunk Channel	19.6	9.6	1.0	9.1	8.3	79	7.3	3,080	2,370	<6.57	66
20-October 17:35	H 130	B61 Sunk Channel	19.5	9.6	1.0	10.9	8.3	77	7.5	3,320	3,150	<6.57	69
20-October 17:42	H 131	B62 Sunk Channel	17.6	9.4	1.0	11.4	8.3	73	7.4	3,630	2,730	<6.57	73
20-October 18:00	H 10A	Stallingborough	17.2	9.4	1.0	8.8	8.2	72	7.3	4,010	3,120	<6.57	71
20-October 18:00	H 10A	Stallingborough			7.8	8.8				4,010	3,470	12	74
20-October 18:13	H 116	1.2km Immingham	16.2	9.3	1.0	8.3	8.2	72	7.0	4,320	2,470	<6.57	75
20-October 18:24	H 115	Holme Nook	13.3	9.0	1.0	11.5	8.2	73	7.1	4,450	3,320	<6.57	72
20-October 18:49	H 16	Sand End	10.9	8.8	1.0	7.9	8.2	65	6.9	4,770	4,310	13	73
20-October 18:49	H 16	Sand End			6.9	7.9				5,240	4,670	12	85
20-October 19:02	H 21	Hebbles	11.4	8.9	1.0	12.2	8.2	66	6.9	4,720	3,650	11	85
20-October 19:18	H 26/108	Hull Marina	10.3	8.7	1.0	9.7	8.2	65	7.0	5,860	5,030	19	85
21-October 08:38	H 107	West Hull	11.9	8.5	1.0	11.6	8.0	70	7.4	5,440	4,460	10	81
21-October 08:53	H 5	Hessle Sand	11.8	8.5	1.0	6.1	8.1	66	7.1	5,550	4,400	11	83
21-October 08:53	H 5	Hessle Sand			5.1	6.1				5,450	23,000	22	92
21-October 09:08	H 106	Chowder Ness	10.3	8.2	1.0	7.8	8.1	70	7.5	5,860	4,950	12	86
21-October 09:27	H 105	Reads Island	6.1	7.6	1.0	8.8	8.2	64	7.1	7,250	5,720	29	83
21-October 09:42	H 104	Winteringham	6.8	7.4	1.0	5.3	8.2	69	7.8	6,980	6,240	33	85
21-October 09:59	H 4	Whitton Ness	5.8	7.5	1.0	6.6	8.2	67	7.7	7,180	6,410	91	75
21-October 09:59	H 4	Whitton Ness			5.6	6.6				7,000	6,400	57	84
21-October 10:07	H 103	Whitton	6.4	7.6	1.0	6.0	8.2	67	7.5	7,230	6,210	48	84
21-October 10:28	H 2	Blacktoft	3.7	7.2	1.0	8.5	8.2	67	7.9	7,810	7,200	63	83
21-October 10:28	H 2	Blacktoft			7.5	8.5				7,780	6,900	62	85
21-October 10:56	H 1	Trent Falls	1.7	7.0	1.0	5.6	8.3	71	8.4	8,420	8,490	116	89
21-October 10:56	H 1	Trent Falls			4.6	5.6				7,390	6,420	80	85
21-October 11:24	H 3	Apex Buoy	5.6	7.4	1.0	8.3	8.2	70	7.9	7,240	6,530	43	84
21-October 11:24	H 3	Apex Buoy			7.3	8.3				7,150	6,610	38	80

Table 26 : Humber Estuary Water Quality Survey, 20-21st October 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
10-November 12:20	H 107	West Hull	14.3	8.5	1.0	8.1	7.4	82		4,890	4,740	8	102
10-November 12:33	H 5	Hessle Sand	13.8	8.5	1.0	5.1	7.7	84		5,630	5,260	<6.57	107
10-November 12:33	H 5	Hessle Sand			4.6	5.1				5,560	5,200	14	117
10-November 12:48	H 106	Chowder Ness	13.8	8.7	1.0	6.8	7.9	80		6,000	5,890	7	123
10-November 13:09	H 105	Reads Island	6.7	8.8	1.0	8.8	8.0	75	8.4	6,860	6,420	11	149
10-November 13:31	H 104	Winteringham	7.4	8.5	1.0	4.1	7.9	77	8.6	7,650	7,380	13	153
10-November 13:43	H 4	Whitton Ness	6.1	8.5	1.0	6.1	7.9	73	8.2	7,240	6,980	49	157
10-November 13:43	H 4	Whitton Ness			5.6	6.1				6,900	6,750	16	152
10-November 13:55	H 103	Whitton	5.2	8.5	1.0	5.2	7.9	72	8.2	8,130	7,380	31	171
10-November 14:17	H 1	Trent Falls	1.6	8.9	1.0	4.1	8.0	69	7.8	9,030	8,970	122	348
10-November 14:17	H 1	Trent Falls			3.6	4.1				7,670	7,440	48	214
10-November 14:35	H 2	Blacktoft	3.8	8.6	1.0	7.1	8.0	72	8.2	7,600	6,770	49	200
10-November 14:35	H 2	Blacktoft			6.6	7.1				7,870	7,830	55	222
10-November 14:50	H 3	Apex Buoy	5.1	8.6	1.0	8.1	7.9	75	8.5	7,550	6,840	29	180
10-November 14:50	H 3	Apex Buoy			7.6	8.1				7,410	7,560	25	187
11-November 05:39	H 26/108	Hull Marina	16.8	8.3	1.0	9.8	8.1	75	8.5	4,710	4,270	<6.57	97
11-November 05:53	H 6	Middle Buoy	19.1	8.5	1.0	5.1	8.2	79	8.4	3,950	3,820	10	82
11-November 05:53	H 6	Middle Buoy			4.6	5.1				4,010	3,910	<6.57	82
11-November 06:05	H 112	Elbow	20.5	8.5	1.0	11.4	8.2	83	8.5	3,780	3,470	<6.57	81
11-November 06:17	H 113	Skitter Haven	20.3	8.5	1.0	9.4	8.2	82	8.4	3,090	3,380	<6.57	69
11-November 06:27	H 114	Killingholme	21.9	8.6	1.0	9.6	8.2	84	8.5	2,930	3,020	<6.57	59
11-November 06:37	H 8	Clay Huts	23.2	8.6	1.0	12.0	8.2	85	8.6	2,880	2,850	<6.57	53
11-November 06:37	H 8	Clay Huts			11.5	12.0				2,700	2,500	7	51
11-November 06:49	H 117	1.5km Immingham	23.7	8.7	1.0	9.8	8.2	87	8.7	2,700	2,410	<6.57	50
11-November 07:05	H 119	Upper Burcom	24.6	8.7	1.0	8.8	8.2	87	8.6	2,090	2,220	<6.57	43
11-November 07:16	H 6B	Pyewipe	25.1	8.7	1.0	12.6	8.2	88	8.7	1,740	2,040	<6.57	43
11-November 07:29	H 136	Grimsby	25.9	8.7	1.0	9.9	8.2	89	9	2090.0	2,090	<6.57	39
11-November 07:29	H 136	Grimsby			9.4	9.9				1750.0	1,870	<6.57	31

Table 27 : Humber Estuary Water Quality Survey, 10-11th November 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Sample Depth (m)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)
11-November 07:39	H 6	Lower Burcom	26.8	8.8	1.0	9.1	8.2	90	8.7	1,880	2,010	<6.57	32
11-November 07:47	H 122	Cleethorpes	27.3	8.7	1.0	10.9	8.2	90	8.7	1,750	1,790	11	29
11-November 07:55	H 4A	Clee Ness	26.7	8.8	1.0	10.3	8.3	90	8.7	1,820	1,940	7	35
11-November 08:03	H 13	Bull Channel	29.2	8.8	1.0	12.5	8.3	90	8.8	1,760	1,880	<6.57	38
11-November 08:03	H 13	Bull Channel			12.0	12.5				1,740	1,740	7	37
11-November 08:24	H 135	Halle Sand Fort	27.3	8.3	1.0	5.6	8.3	93	9.1	1,700	1,810	33	41
11-November 08:31	H 133	Haile Anchorage 4.5	27.7	8.7	1.0	8.3	8.3	92	8.9	1,740	1,730	11	35
11-November 08:39	H 134	Haile Anchorage 3.3	28.0	8.8	1.0	12.0	8.3	91	8.8	1,330	1,540	8	26
11-November 08:47	H 124	Bull	27.9	8.8	1.0	13.0	8.3	92	8.8	1,780	1,500	<6.57	45
11-November 08:55	H 132	Spurn Head	28.7	8.9	1.0	21.9	8.4	92	8.9	1,570	1,440	<6.57	40
11-November 09:17	H 125	B51 Hawke Channel	28.3	8.1	1.0	4.9	8.4	93	9.1	1,560	1,370	18	41
11-November 09:29	H 126	B53 Hawke Channel	26.7	8.7	1.0	11.7	8.3	90	8.7	1,720	1,770	<6.57	39
11-November 09:43	H 127	B55 Hawke Channel	25.8	8.7	1.0	12.8	8.3	89	8.7	2,260	2,080	<6.57	45
11-November 09:53	H 128	B57 Hawke Channel	24.5	8.7	1.0	7.1	8.2	87	8.5	2,460	2,140	<6.57	44
11-November 10:05	H 129	B59 Sunk Channel	23.5	8.6	1.0	8.7	8.2	86	8.5	2,720	2,730	<6.57	52
11-November 10:14	H 130	B61 Sunk Channel	22.6	8.6	1.0	9.6	8.2	85		2,910	2,930	<6.57	58
11-November 10:24	H 131	B62 Sunk Channel	21.3	8.6	1.0	10.9	8.2	83	8.5	3,300	3,000	<6.57	64
11-November 10:46	H 10A	Stallingboro	18.8	8.4	1.0	9.5	8.2	82	8.5	3,970	3,710	<6.57	75
11-November 10:46	H 10A	Stallingboro			9.0	9.5				3,720	3,670	<6.57	71
11-November 11:01	H 116	1.2km Immingham	17.3	8.4	1.0	8.8	8.2	81	8.5	4,270	3,910	<6.57	82
11-November 11:14	H 115	Holme Nook	15.4	8.3	1.0	10.5	8.3	80	8.5	4,140	4,520	<6.57	82
11-November 11:47	H 16	Sand End	14.0	8.3	1.0	8.6	8.3	79	8.5	5,590	5,060	<6.57	105
11-November 11:47	H 16	Sand End			8.1	8.6				4,660	4,330	7	96
11-November 11:58	H 21	Hebbles	12.4	8.2	1.0	8.6	8.3	79	8.6	6,050	5,650	<6.57	115

Table 27 : Humber Estuary Water Quality Survey, 10-11th November 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
23-November 03:17	H 26	Hull Marina	12.1	4.8	10.0		75		5,990	6,020	56	91	
23-November 03:33	H 21	Hebbles	13.7	5.0	7.0		75		5,600	5,550	44	85	
23-November 03:48	H 16	Sand End	14.9	5.2	9.8		75	0.0	5,240	5,130	40	79	
23-November 04:06	H 17	North Holme	16.2	5.3	10.0		76	8.6	5,170	4,990	34	75	
23-November 04:27	H 11A	Immingham	15.7	5.0	8.2		76	8.7	4,960	5,010	35	76	
23-November 04:41	H 10A	Stallingborough	17.3	5.2	14.3		78	8.8	4,710	4,730	30	75	
23-November 05:00	H 6B	Pyewipe	21.1	5.7	12.0		80	8.7	3,650	3,670	18	51	
23-November 05:22	H 6	Lower Burcom	22.5	5.6	7.1		82	8.9	3,340	3,340	21	36	
23-November 05:39	H 4A	Clee Ness	22.9	5.7	10.5		84	9.0	3,210	3,230	17	33	
23-November 06:04	H 2C	Haile Anchor	25.9	5.9	10.3		89	9.3	2,460	2,420	12	37	
23-November 06:22	H 2B	Haile Sand	26.2	5.9	11.0		90	9.4	2,330	2,320	10	42	

Table 28 : Humber Estuary Water Quality Survey, 23rd November 1993

Date & Time	Site No.	Site Name	Field Salinity (‰)	Temp. (°C)	Water Depth (m)	pH	Field DO (% Satn)	Field DO (mg/l)	TON (µg/l N)	Silicate (µg/l SiO_2)	Ammonia (µg/l N)	Phosphate (µg/l P)	Chlorophyll a (µg/l)
17-December 23:08	H 2C	Haile Anchor	27.0	5.2	11.3		93	9.8	1,660	1,930	27	44	
17-December 23:08	H 2B	Haile Sand	28.5	5.3	12.8		94	9.8	1,640	1,730	22	41	
18-December 06:13	H 4A	Clee Ness	25.1	5.1	10.6		93	10.0	1,930	2,270	37	48	
18-December 06:27	H 6	Lower Burcom	23.9	5.0	8.5		93	10.1	2,900	2,520	44	49	
18-December 08:00	H 6B	Pyewipe	21.6	4.9	14.0		92	10.1	3,300	3,210	55	51	
18-December 06:56	H 10A	Stallingborough	10.9	4.4	13.7		85	9.5	5,460	5,420	145	63	
18-December 07:07	H 11A	Immingham	11.5	4.4	13.6		84	9.3	5,140	4,860	139	55	
18-December 07:23	H 17	North Holme	11.2	4.4	12.1		83	9.7	5,220	4,860	141	62	
18-December 07:34	H 16	Sand End	7.2	4.2	11.6		81	9.6	5,810	5,790	202	64	
18-December 07:45	H 21	Hebbles	5.7	4.2	10.1		81	10.2	5,850	5,960	215	64	
18-December 08:00	H 26	Hull Marina	4.4	4.1	11.3		79	9.9	6,150	6,370	257	63	

Table 29 : Humber Estuary Water Quality Data, 17-18th December 1993